x-Messenger User's Manual

Applied to EXM series CPU& Extensions.

Version：V 1.3

Easy Electronic Co., Ltd

Contents

- Introduction
- Getting started
- Applications
- x-Messenger functions
- Installation and wiring
- Configuring &software
- Technical data

Introduction

Congratulations with your x-Messenger SMS/GSM/GPRS Micro-PLC provided by Easy Electronic Co., Ltd.

The x-Messenger is a compact and expandable telemetry module combining industrial grade GSM/GPRS modem, PLC controller, data logger, Ethernet module, camera interface, audio output interface and multiple communication capability (1USB,1RS232&1RS485 ,MODUS ASCII/RTU/TCP, Mater/Slave).

Each module incorporates not only a real-time clock and calendar, but also provides support for SMS, Call-In,Email, Ring &voice and optional expansion digital /analog -I/O modules and to enhance control and monitoring applications. Data adjustments can easily be performed via the keypad, the LCD display, or through the easy-to-use eSmsConfig.exe. DIN-rail and panel-mounted options are both available, offering full flexibility to the various installation needs of your application.

The x-Messenger is available in 120V/240V AC or 12V and 24V DC versions, making it the ideal solution for relay replacement, or simple control applications such as building and parking lot lighting, managing automatic lighting, access control, watering systems, pump control, ventilation systems, home automation and a wide field of other applications demanding low cost to be a primary design issue.

We strongly recommended taking the time to read this manual, before putting the x-Messenger to work. Installation, programming and use of the unit are detailed in this manual. The feature-rich x-Messenger provides an for off-line operation mode, allowing full configuration and testing prior to in-field service commissioning. In reviewing this manual you will discover many additional advantageous product properties, which will greatly simplify and optimize the use of your x-Messenger.

Valid range of this manual

The manual applies to devices of EXM series modules. For more information about expansion module or accessories, please refer to the correlative model instruction files.

Safety Guideline

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol; notices referring to property damage only have no safety alert symbol. The notices shown below are graded according to the degree of danger.

Caution

Indicates that death or severe personal injury may result if proper precautions are not taken

Caution

With a safety alert symbol indicates that minor personal injury can result if proper precautions are not taken.

Caution

Without a safety alert symbol indicates that property damage can result if proper precautions are not taken.

Attention

Indicate that an unintended result or situation can occur if the corresponding notice is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by qualified personnel. Within the context of the safety notices in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards. Please read the complete operating instructions before installation and commissioning.

GSM network failure or power interruptions cannot guarantee a secure monitoring. The use of a prepaid SIM card is possible. It is recommended to use a SIM card with subscription.

This avoids possible credit balance problems. The individual responsibility for protecting the SIM card against abuse lies solely with the card owner. EASY does not accept any liability for possible damage to persons, buildings or machines, which occur due to incorrect use or from not following the details.

Prescribed Usage

Note the following:

Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by EASY. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee

full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Additional support

We take pride in answering your question as soon as we can:
Please consult our website at www.xLogic-plc.com for your closest point of contact or email us at sales@xlogic-relay.com

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Chapter 1 General Introduction to x-Messenger

1.1 Overview

Easy x-Messenger SMS/GSM/GPRS Micro-PLC with built-in GSM modem is a device dedicated for remote monitoring, diagnostics and control of objects via short text messages (SMS) , E-mail or CLIP calls. Configurable messages sent from the device with static (text) or dynamic (text and measured values) content are a convenient way of passing important information to the monitoring center, or directly to the defined phone numbers. SMS messages sending or Call-out can be triggered by change of binary input state, reaching alarm thresholds, marker state change, counters and clocks. Industrial design, practical set of I/O resources, easy to use configuration software tools and direct connection of sensors lowers the cost of building system. There are 4 optional (0...10V DC) signal inputs or 2 (0/4…20mA) inputs built-in the CPU. So, it can work with humidity sensors, water level sensor, pressure transducers, flow sensors, smoke, gas, motion, shock and noise detectors, etc.

The device's own phone book saves up to 50 mobile phone numbers of the receivers.

The programming of the x-Messenger is carried out with the eSmsConfig. Two programming modes are available-standard and customized mode. All the settings can be configured very easy and without special knowledge of any programming language in standard mode. In this way the settings can be configured conveniently, flexibly and easily. Additional, Customized mode is supplied to users who are familiar with the logic boxes of Boolean algebra, and moreover complex control, logic, timer, counter, analog math etc would be needed for their systems.

(Refer to the software chapter for standard and customized mode instructions)

***GSM network**: **850MHz, 900MHz, 1800MHz, 1900MHz (Quad-band GSM module inside)**

1.2 Highlight feature

- Support Quad-band 850/900/1800/1900 MHz frequency

- Change register value via SMS
- Max. 64 different short messages and voice alarms
- Max. 70 Unicode Characters in one short message
- Time-based and event-based SMS, Call-IN, Call-Out, Ring, voice &MMS.
- Email alarm
- IO status ,alarming message includes counters, analog values can be directly sent to Users
- GPRS optional (Wireless downloading/uploading configuration or monitoring)
- 4 lines, 16-character per line, backlight display& keypad optional.

- Standard Modbus RTU/ASCII/TCP communication protocol supported
- It's optional for x-Messenger to act as slave or master in certain Modbus communication network.
- Access to internal resources with standard MODBBUS ACSII/RTU/TCP
- Expandable up to 8 linked IO expansion modules reaching 40DI/36DO,36AI/36DO in maximum

- 1 RS232, 1USB&1RS485 ports built-in
- Optional Ethernet Interface
- Optional speaker built-in
- 1 Socket of telephone crystal plug & 1 Audio output interface optional
- Camera Interface optional.
- Multiple channels analog inputs available with DC 0-10V signal, PT100 signal& 0/4….20mA.
- Default Real Time Clock (RTC)

- Backup at Real Time Clock (RTC) at 25 °C:100 hours
- Two channels high-speed counting(60KHz)
- Diagnostic LEDs (module status, GSM status, IO status) optional
- 2 PWM channels(333Hz)

- Retentive memory capability
- Power supply 12/24V DC, 110/240V AC
- RS232 communication download cable with photo-electricity isolation
- USB communication download cable with photo-electricity isolation
- Mounting via modular 35mm DIN rail or screw fixed mounting plate

- On-line monitor& Off-simulation by PC

- Pre-configured standard functions, e.g. on/ off-delays, pulse relay , counters ,wathdog function PI controller etc..

- Logic functions-AND, OR, NOT, XOR……
- Standard config soft& Customized soft(Function block diagram)
- Local and remote (Via GPRS/Ethernet) configuration ,programming and firmware update
- Data logging (SD card built-in/ optional accessory)
- Audio In/Output optional (voice output via speak or Telephone)

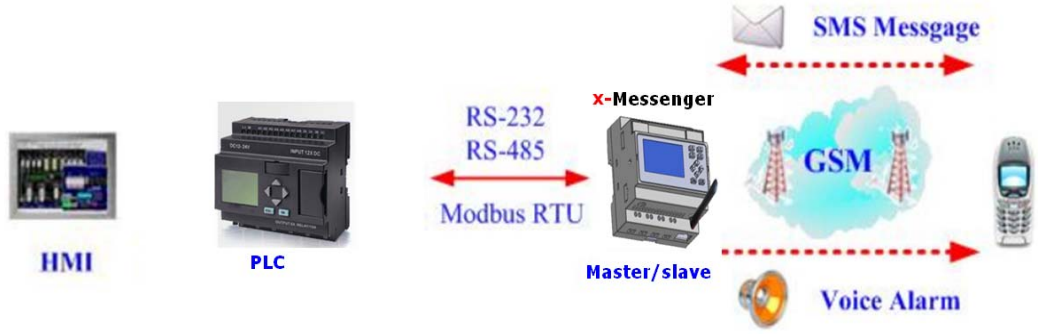
Chapter 2 Applications

2.1 Application overview

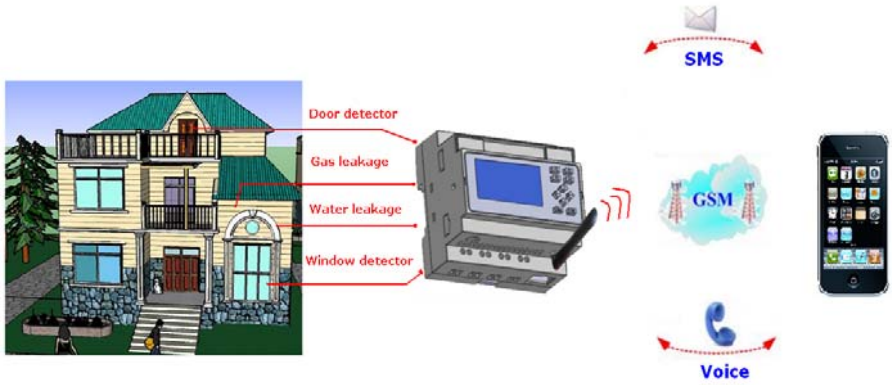
Heating control
Pump control
Irrigation installations
Alarm transmission
Level monitoring
Temperature monitoring
Pressure monitoring
Valve control
Voltage monitoring
Building Automation
Factory Automation
Machine Automation
Remote Maintenance
Remote diagnosis
Testing Equipment
HVAC & Refrigeration
Gaming Machine

2.2 Application architecture

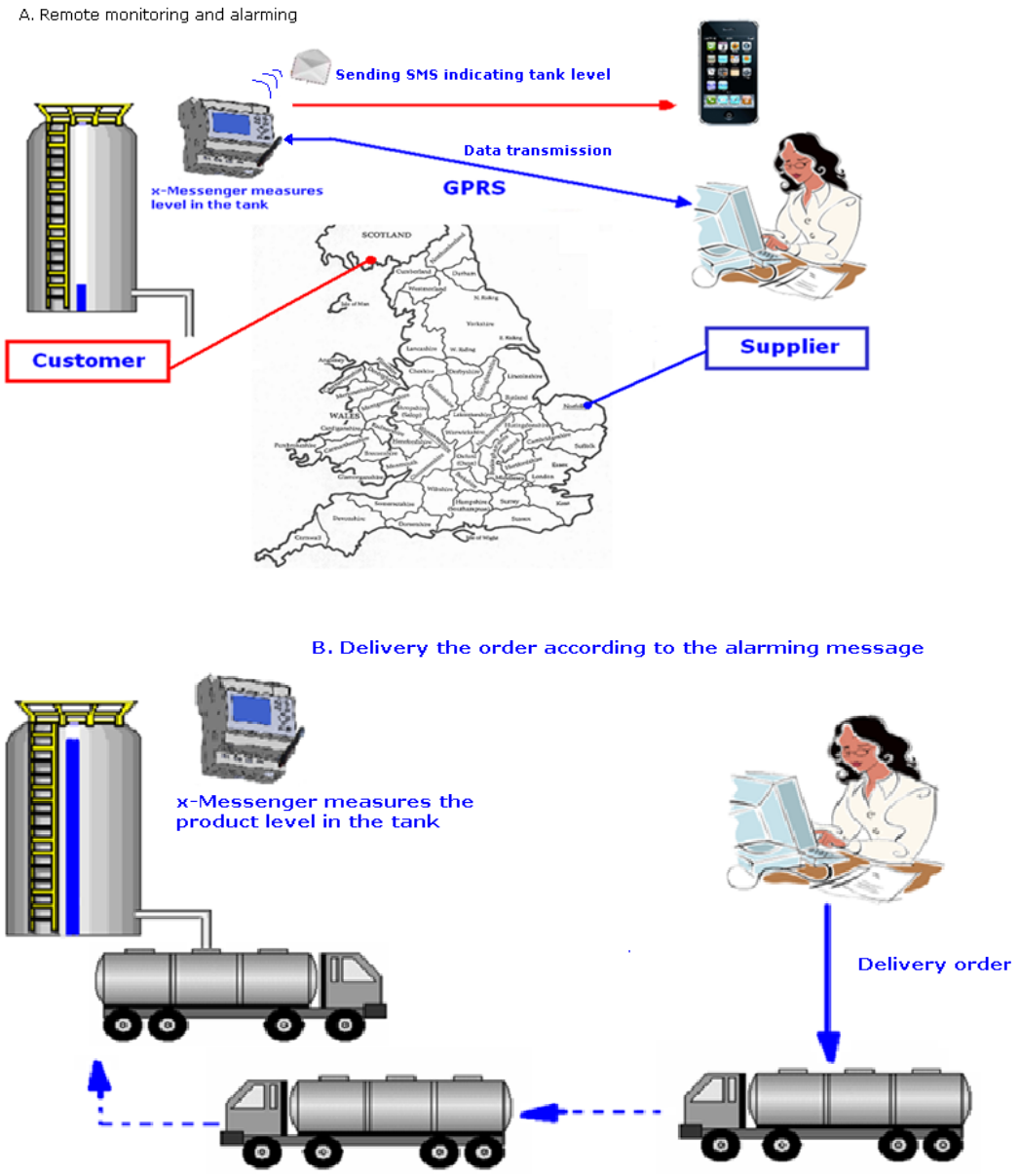
Application 1: Signal Alarm and SMS Communication



Application 2: Home Security



Application 3: Remote monitoring of product level in a tank



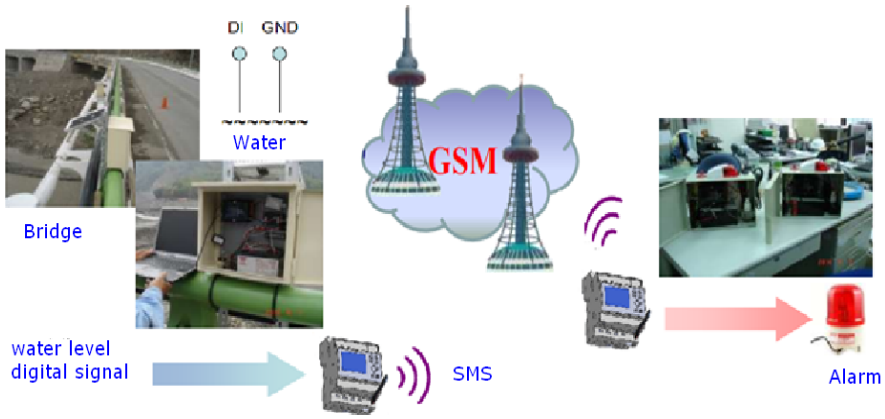
Application 4: Water Pressure Gauge, Fluid Gauge

Application 5: Data Centre, Power substation, Machinery plant unattended, Sites with expensive equipment

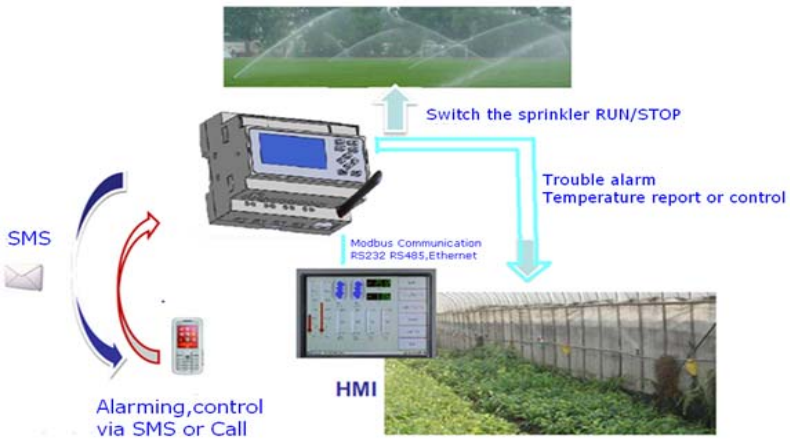
Application 6: Freezer Warehouse, Walk-in Cold Room, Medical Storage, Data Centre, Power substation, Laboratory

Application 7 Vending/Gaming Machine Monitoring & Reporting System

Application 8 Bridge Alarm System

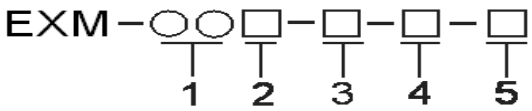


Application 9 Farmland Sprinkler System



Chapter 3 Hardware models and resources

3.1 Naming Rules of EXM Series



EXM：series name(EASY x-Messenger)

1. Points of total IOs
2. Power Supply (DC 12~24V, AC 110~240V)
3. Digital/Analog（ D :digital，DA : digital &analog configurable, DAI: digital,(0…10V)&(0/4…20mA)）
4. Output type（R :Relay， TN : transistor(PNP type)）
5. Special function （ V :voice via GSM network/speaker, TV :Voice alarming via wired telephone， ，C:Webcam connection， N :Ethernet access）

3.2 Hardware model selection

x-Messenger (SMS Micro PLC) Model Selection chart (excluding accessories)

Model	EXM-8AC-R	EXM-12DC-D-R	EXM-12DC-DA-R	EXM-12DC-DAI-R	EXM-12DC-D-TN	EXM-12DC-DA-TN	EXM-12DC-DAI-TN
Supply Voltage	110~240VAC	12 ~ 24 VDC					
Inputs	6 digital	8 digital	4 digital/analog+4 digital	2digital/analog+2analog +4 digital	8 digital	4 digital/analog+4 digital	
Analog Input signal	No	No	4 DC (0..10V)	2 (DC 0...10V) + 2 (0...20mA)	No	4 DC (0..10V)	2 (DC 0...10V) + 2 (0...20mA)
Outputs	2 relay(10A)	4 relay(10A)			4 transistor(0.3A)		
PWM	No				2 channel (Max.333Hz)		
High Speed Count(I7,I8)	No	(I7,I8)60kHz					
SMS	Yes (64 different short message configuration)						
Voice alarming	No						

GPRS	Yes
Webcam Interface	No
Ethernet	No
Data logging	Optional(Optional accessory: ELC-MEMORY required)
Interface	1B-type USB ,1 RS232 & 1 RS485
Communication protocol	Modbus RTU&ASCII
RTC	yes
LCD display with keypad	Optional(*)
Alarming mode	SMS, Ring ,voice/ Speaker
output control mode	SMS , Call-In, Logic program control
Programming	Standard config soft& Customized soft(Function block diagram)

Model	EXM-8AC-R-V	EXM-12DC-D-R-V	EXM-12DC-DA-R-V	EXM-12DC-DAI-R-V	EXM-12DC-D-TN-V	EXM-12DC-DA-TN-V	EXM-12DC-DAI-TN-V
Supply Voltage	110~240VAC	12 ~ 24 VDC					
Inputs	6 digital	8 digital	4 digital/analog+4 digital	2digital/analog+2analog +4 digital	8 digital	4 digital/analog+4 digital	2digital/analog+2analog +4 digital
Analog Input signal	No	No	4 DC (0..10V)	2 (DC 0...10V) + 2 (0...20mA)	No	4 DC (0..10V)	2 (DC 0...10V) + 2 (0...20mA)
Outputs	2 relay(10A)	4 relay(10A)			4 transistor(0.3A)		
PWM	No				2 channel (Max.333Hz)		
High Speed Count(I7,I8)	No	(I7,I8)60kHz					
SMS	Yes (64 different short message configuration)						
Voice alarming	1W speaker built-in & Call-out						
GPRS	Yes						
Webcam Interface	No						
Ethernet	No						
Data logging	Optional(Optional accessory: ELC-MEMORY required)						

Interface	1B-type USB ,1 RS232 ， 1 RS485&1 Audio input/output
Communication protocol	Modbus RTU&ASCII
RTC	yes
LCD display with keypad	Optional(*)
Alarming mode	SMS, Ring ,voice/ Speaker
output control mode	SMS , Call-In, Logic program control
Programming	Standard config soft& Customized soft(Function block diagram)

Model	EXM-8AC-R-N	EXM-12DC-D-R-N	EXM-12DC-DA-R-N	EXM-12DC-D-TN-N	EXM-12DC-DA-TN-N	EXM-12DC-DA-R-CVN	EXM-3DC-D-R	EXM-6DC-D-R	EXM-2DC-PT100-R
Supply Voltage	110~240VAC	12 ~ 24 VDC							
Inputs	6 digital	8 digital	4 digital/analog+4 digital	8 digital	4 digital/analog+4 digital		2 digital	4 digital	1 analog
Analog Input signal	No	No	4 DC (0..10V)	No	4 DC (0..10V)		No	No	1 pt100
Outputs	2 relay(10A)	4 relay(10A)		4 transistor(0.3A)		4 relay(10A)	1 relay (10A)	2 relay (10A)	1 relay (10A)
PWM	No			2 channel (Max.333Hz)			No	No	No
High Speed Count(I7,I8)	No	(I7,I8)60kHz					No	No	No
SMS	Yes (64 different short message configuration)						Yes	Yes	Yes

Voice alarming	no		No	No	No
GPRS	Yes		No	No	No
Webcam Interface	No	**Yes**	No	No	No
Ethernet	Yes		No	No	No
Data logging	Optional(Optional accessory: ELC-MEMORY required)	**SD card socket built-in**	No	No	No
Interface	1B-type USB ,1 RS232 & 1 RS485	1B-type USB ,1 RS232， 1 RS485& 1Audio input/output	1B-type USB ,1 RS232		
Communication protocol	Modbus RTU&ASCII,TCP		Modbus RTU&ASCII	Modbus RTU&ASCII	Modbus RTU&ASCII
RTC	yes				
LCD display with keypad	Optional(*)		no		
Alarming mode	SMS, Ring ,voice/ Speaker		SMS, Ring		
output control mode	SMS , Call-In, Logic program control		SMS , Call-In		
Programming	Standard config soft& Customized soft(Function block diagram)		Standard config	Standard config	Standard config

Notes: A. If LCD display with keypad is selected, then the speaker built-in shall not be available anymore, however, the voice alarming via phone is still available.

B. If LCD panel is selected, and then B-type usb interface shall not be available anymore.

C. Both B-type usb and the RS232 port can be used as either programming or communication port between x-Messenger and PC/third party devices.

D. RS485 port can be used as either expansion or communication port, while serving as communication port, EXM-RS485 communication expansion module would be required as such port is not photo electricity-isolated.

3.3 Resources

3.3.1 GSM /GPRS module built- in

Each x-Messenger CPU integrates an industry Quad-band GSM module inside. The x-Messenger can work under the following GSM networks: 850MHz, 900MHz, 1800MHz, 1900MHz and will search these frequency bands automatically.

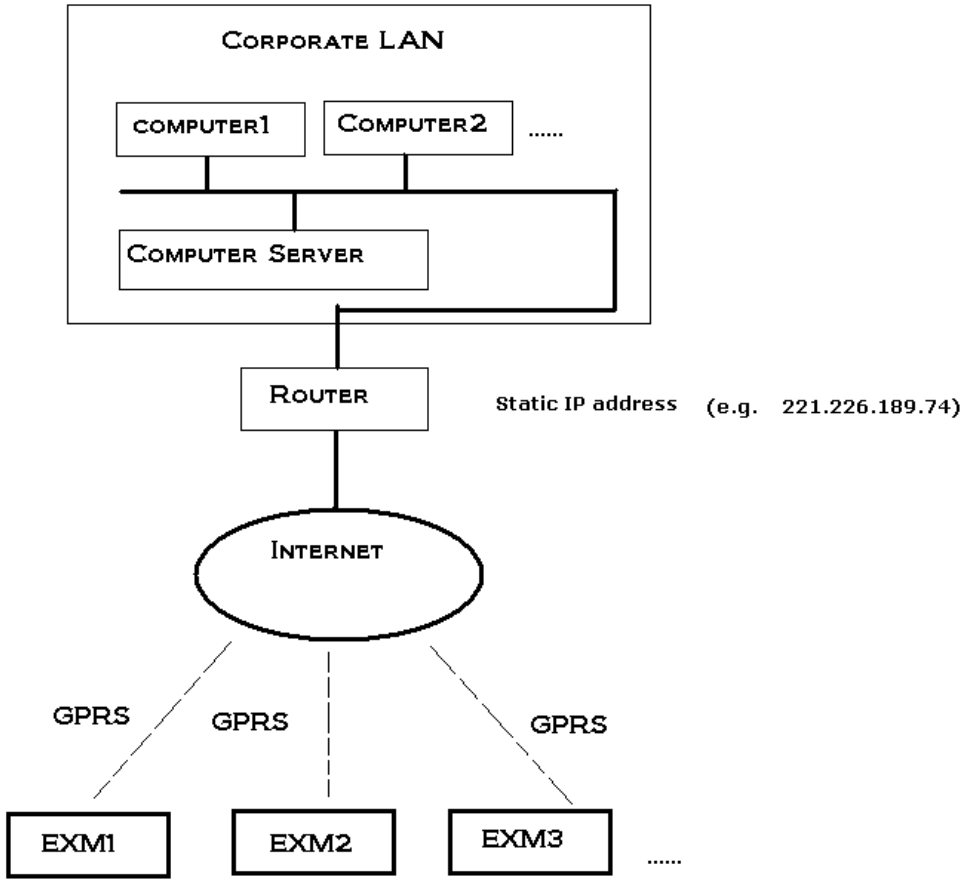
Note: A. all the x-Messenger CPUs support the GSM function.

B. The GPRS function is not available for the following type CPUs :EXM-3DC-D-R,EXM-6DC-D-R,EXM-2DC-PT100-R.

3.3.1.1 How to establish the connection between x-Messenger and PC via GPRS?

A. Hereunder is GPRS network connection's sketch map：

x-Messenger CPU(EXM) shall work as client at Internet and PC shall act as SERVER . Meanwhile, Internet service provider would automatically assign one dynamic IP address to SIM card inserted into the x-Messenger CPU(EXM).



B. Prior to establishing GPRS connection, these two tasks listed at below shall be performed.

1. Internet Address Disposal

User must apply for one static IP address from their local internet service provider(Such static IP address shall be unique on earth), in this case, after successful connection setup from Router to

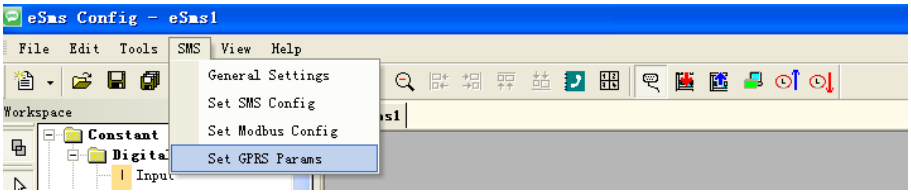
Internet, such static IP address shall be automatically designated to user's Router. User might consult their local internet service provider for more detailed information. However, if one unique static IP address is already available, please go to the next step.

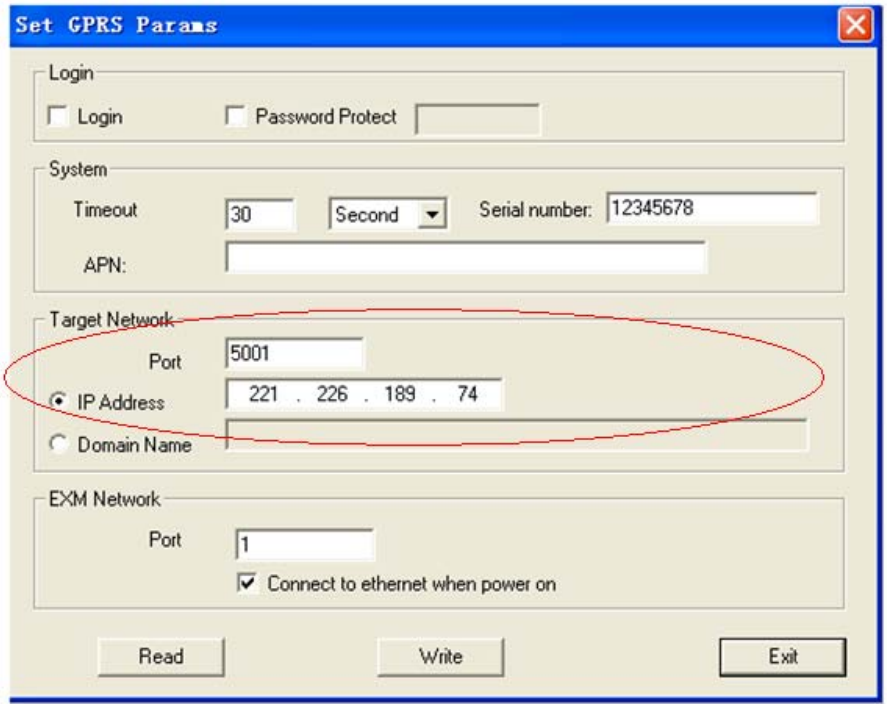
2. LAN Address Disposal

User shall assign x-Messenger CPU's communication port for GPRS to IP address of server PC. e.g. "5001" is just x-Messenger CPU's communication port for GPRS, and "5001" had been assigned to computer 1 as well,

further let's suppose 192.168.0.119 is just IP address for server PC（computer1, in above sketch map）, then Port "5001" shall be assigned to 192.168.0.119 in Router's configuration. In addition, the said communication port refers to the one to be configured via eSmsConfig, furthermore, such configuration would be downloaded to x-Messenger CPU.

Click the menu "SMS->Set GPRS params" to set the server port number.





Please note that PORT's assigning method is subject to various routers, hence, user shall consult your local router suppliers for specific assigning method.

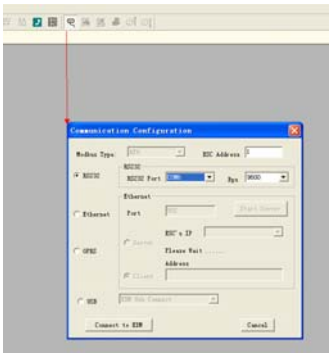
For instance, if the static IP address user had applied is 221.226.189.74, then such IP address shall be treated as server address to be connected by all x-Messenger CPUs(EXM) involved in the network. Please take a look at below demonstration configure as example for your better understanding.

C. Hereunder is a demonstration example illustrating GPRS connection establishment between remote x-Messenger and eSmsConfig installed in the server PC(or other server software).

Step1: A static IP address shall be required, for example, it is 221.226.189.74, and you can refer to the

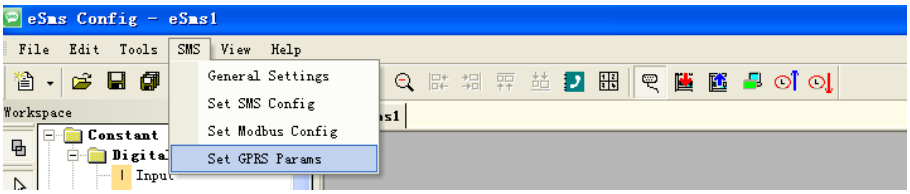
forementioned A&B for the detailed explanation on static IP address. Meanwhile, the eSmsConfig installed in the server PC works as the server.

Step2: Open the software eSmsConfig and set up a connection between x-Messenger and eSmsConfig via USB/RS232 mode.



Step3:To confirm the connection is established successfully, you can read the RTC from the x-Messenger.

Step4: Click the menu “SMS->Set GPRS params”.



Step5: Configure the APN based on your SIM card and then click "Write" to download the configuration into x-Messenger.

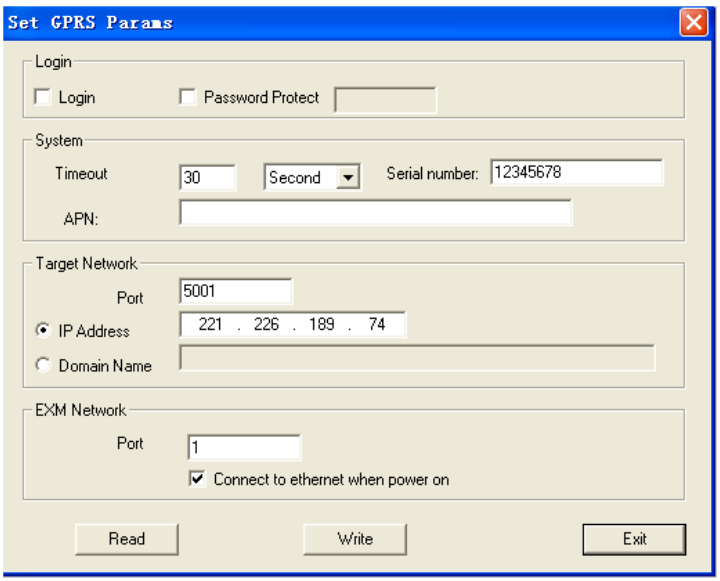
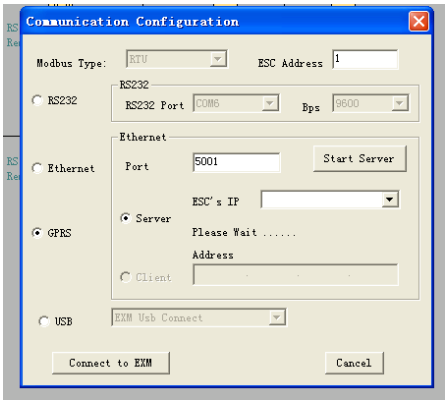


Fig 3

You can set the IP address and the port number in the above dialog box. (It is based on your server(fixed IP address).

Step6: Click the " Write " button. After set successfully, you can establish the connection via GPRS between x-Messenger and eSmsConfig (your server).

Step7: Open the COM port again and select the GPRS option



Set the port number "5001" (it is the same as the you set in the Fig 3), and click "Start server" and then the IP address of x-Messenger will be displayed in the "ESC's IP"

Step8: After the connection is established successfully, Program download/upload and data remote monitoring can be realized in a wireless way all over the world.

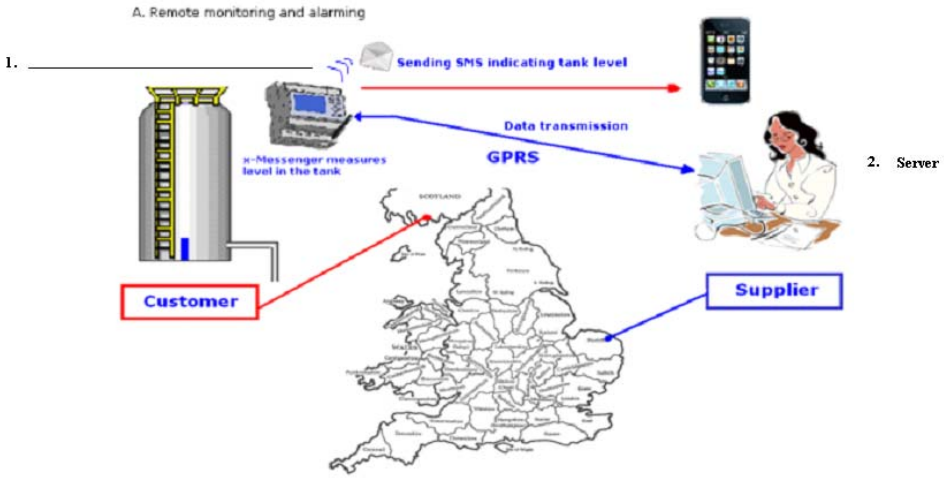
Application:

1.x-Messenger is client with a dynamic IP address,(SIM card)

2.Server software (With a static IP address)

Option A:

The server software can ask for some information such as temperature(analog inputs), level (digital inputs) from the remote station, also it can remotely control items such as a valve with a standard command (MODBUS TCP command). We are not supplying server software, which is available from other sources. This is only to use the GPRS function.



The data transmission after the GPRS connection has been established, the communication protocol is achieved using standard Modbus TCP. For the detailed information about the modbus protocol and memory map/ register addresses of x-Messenger, please read the "Modbus TCP communication protocol" from our side/website.

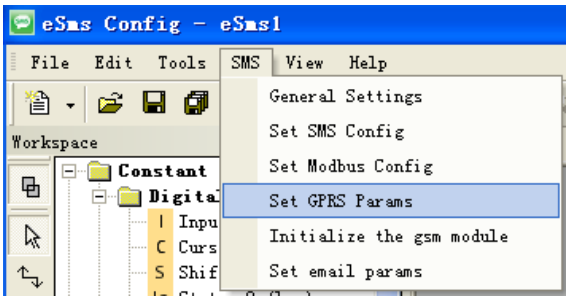
Option B:

x-Messenger can upload the digital inputs/outputs, analog inputs to the server. There are 2 GPRS function blocks available. Please see the chapter 7.2.14 &7.2.15 for a detailed description.

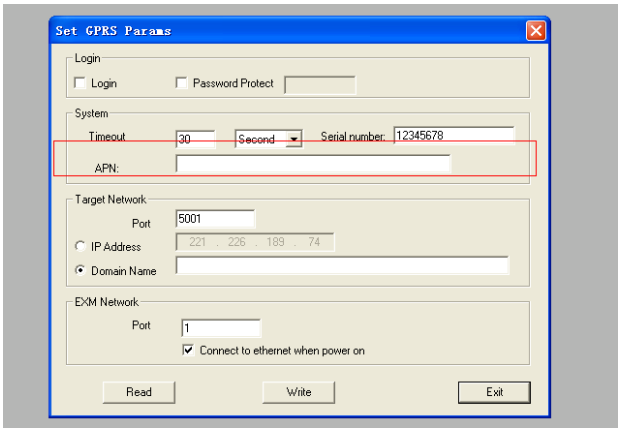
3.3.1.2 E-mail and how to set?

This chapter is only available under the customized programming mode!

Step A: Enable the GPRS function via the menu SMS->Set GPRS param.(The communication port must be opened, and then this step would be available.)

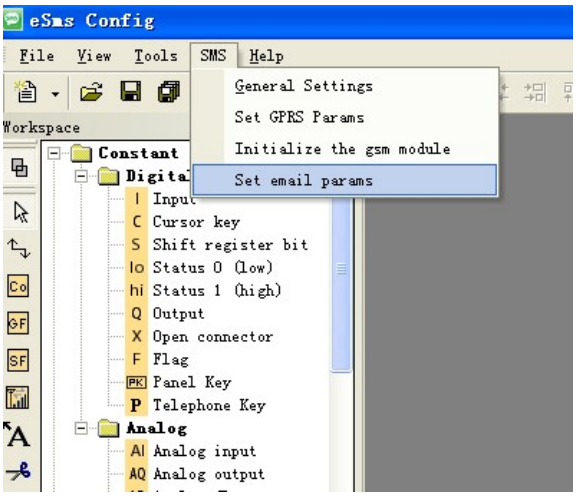


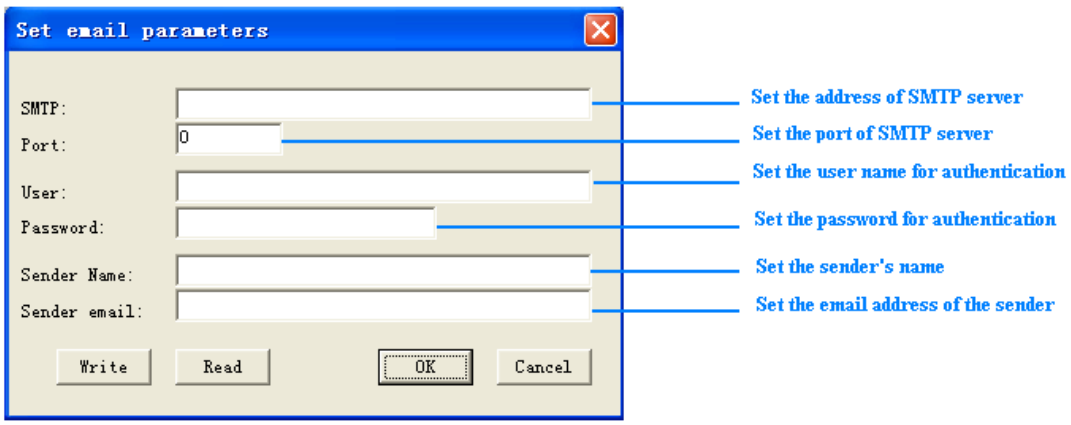
Configure the APN(Access Point Name) based on your SIM card and then click "Write" to download the configuration into x-Messenger.



Step B: Set up your email parameters

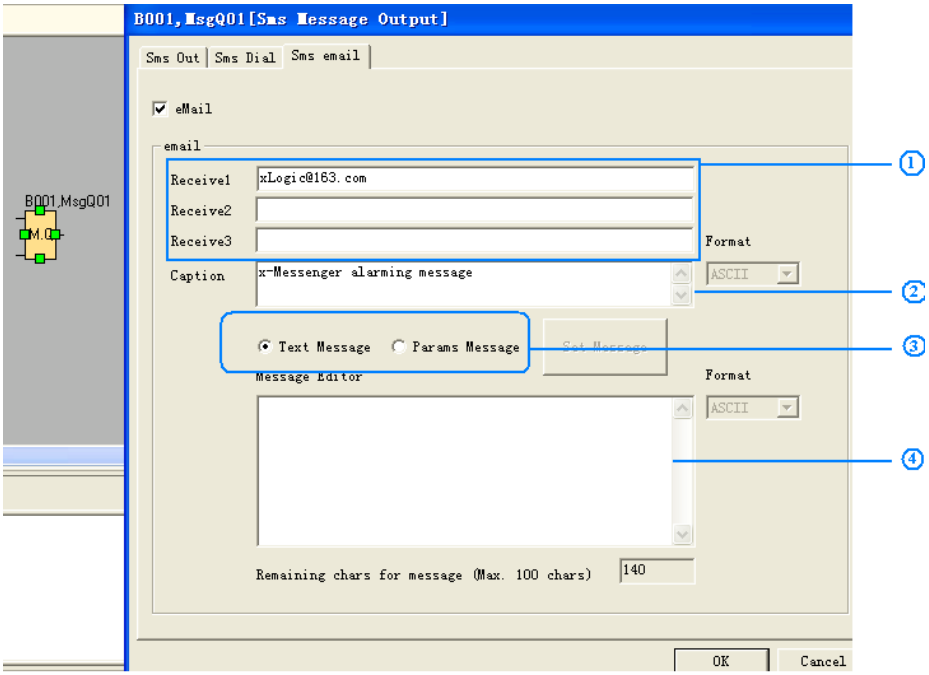
Click menu SMS->Set email params





Click "Write" button to download the parameters into x-Messenger

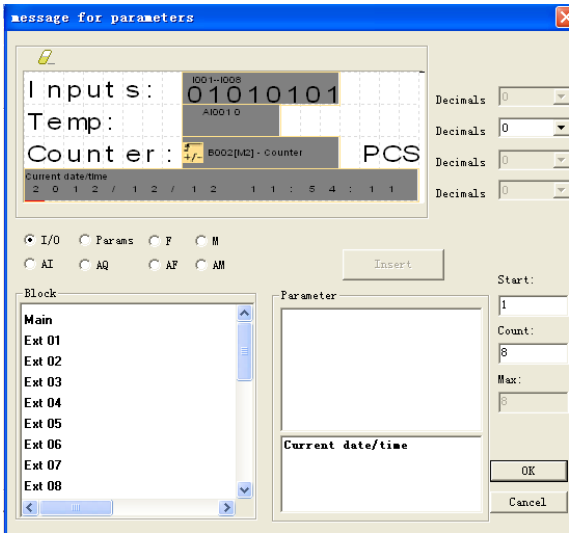
The receiver email address and the alarm text can be edited in the "sms message output" function block.



1. Set the email address of the receivers, there are 3 receiver E-mail addresses can be set.
2. E-mail caption configuration box.
3. Email contents can be text message and parameters message

Text message can be edit in the message editor(4 in the above figure)

Parameters message including such as IO status, analog IO values, kinds of parameters(counters, timers, RTC etc).



3.3.1.3 How to change the register value(F,Q,AQ,AF,REG) or phonebook via SMS

Send an SMS message formatted like the example below

##**

AF1=2;

AQ02=100;

Q01=1;Q12=0;

F1=1;F2=0;

AM1=10;

REG1=100;

REG100=300;

TEL,B002,1,B002,2,B003,1,B003,5:13851448223;

RTC=89-01-09,01:32:09,0;

Message Parameters:

Start characters: **###*** (These 4 characters must be included at the start of your message)

End character: **;** (This symbol must be used to terminate each line of your message)

Parameters:

AF1= 2; This is to change the AF value, you can input the different numbers, for example AF=200;

AQ02=100; This is to change the AQ value, you can input the different analog outputs, for example AQ21=200;

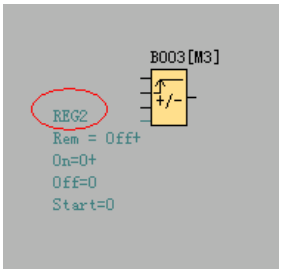
Q01=1;Q12=0; This is to change the the I/O output status, for example Q22=1;

F1=1;F2=0; This is to change the FLAG output status,for example F22=1;

AM1=10; This is to change the AM value, you can input the different numbers, for example AM30=200;

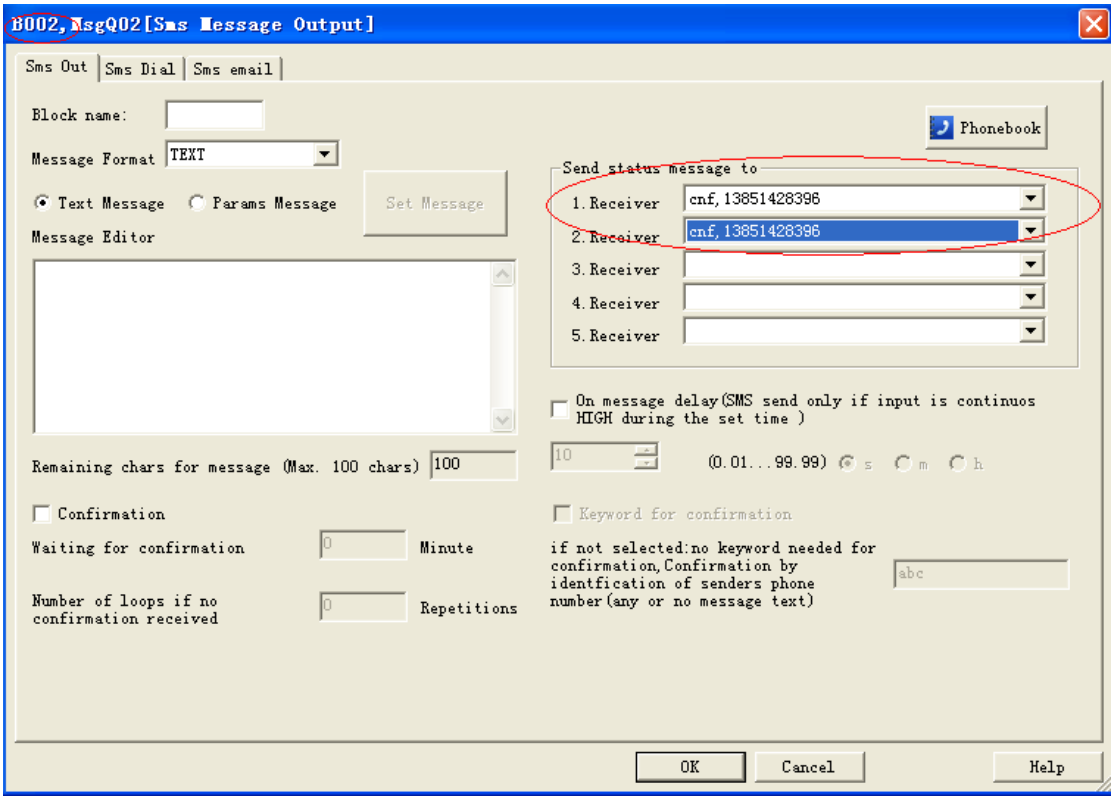
REG1=100;

REG100=300; This is to change the REG value, you can input the different numbers, for example REG2=200; This can be used to change the current value of function blocks, such as counters.



TEL,B002,1:13851448223;

This is to change receiver for the sms message output block.

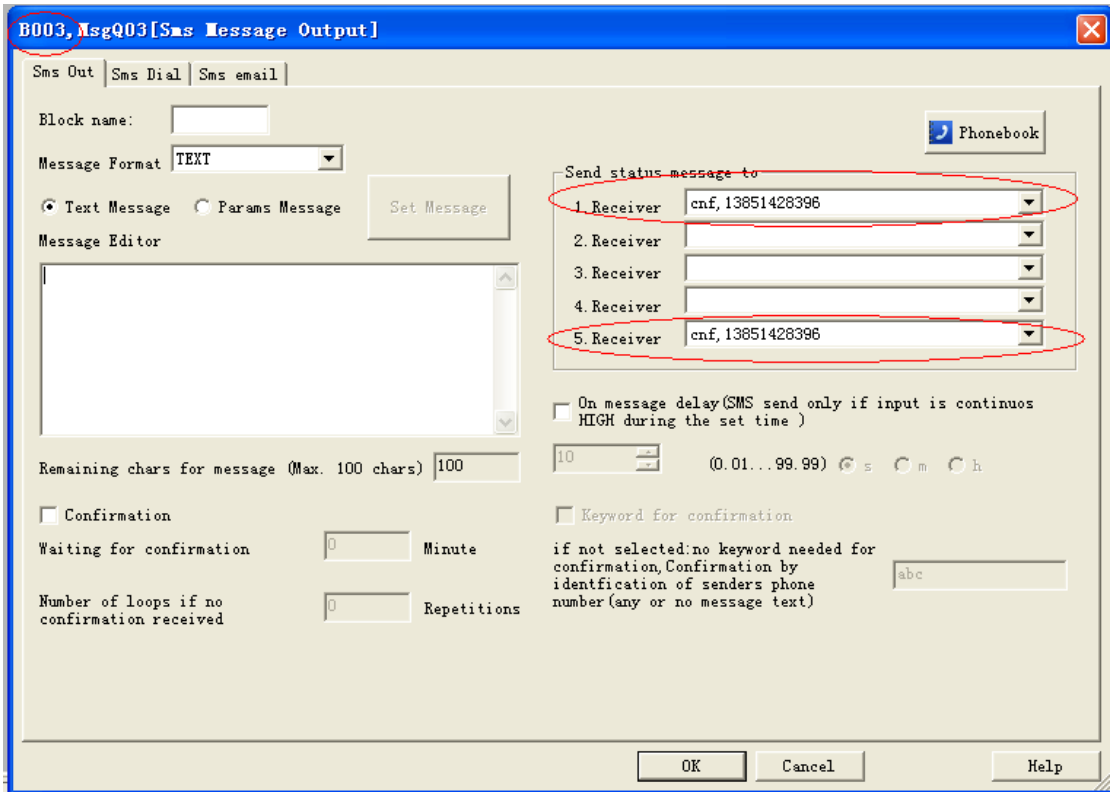


If you send the short message contents as the

##**

TEL,B002,1,B002,2,B003,1,B003,5:13851428396;

,consequently, the receiver1 & receiver2 of the B002 function block and receiver1 & receiver5 of B003 shall turn to 13851428396.



How to modify the all the receiver number of sms message output blocks in the program ?

If you want to modify the receiver number in all the sms message output block, you can edit the short message format like this:

####

ALL:TELQ,1:13851448223;

This is to change receiver 1 for all the sms message output block in the program.

TELQ, means the "SMS message output block"

1 means the receiver 1 in the block, this number can be 1 to 5.

13851448223; It is the phone number which will be set into the receiver.

Modify the telephone number in the sms message input like this:

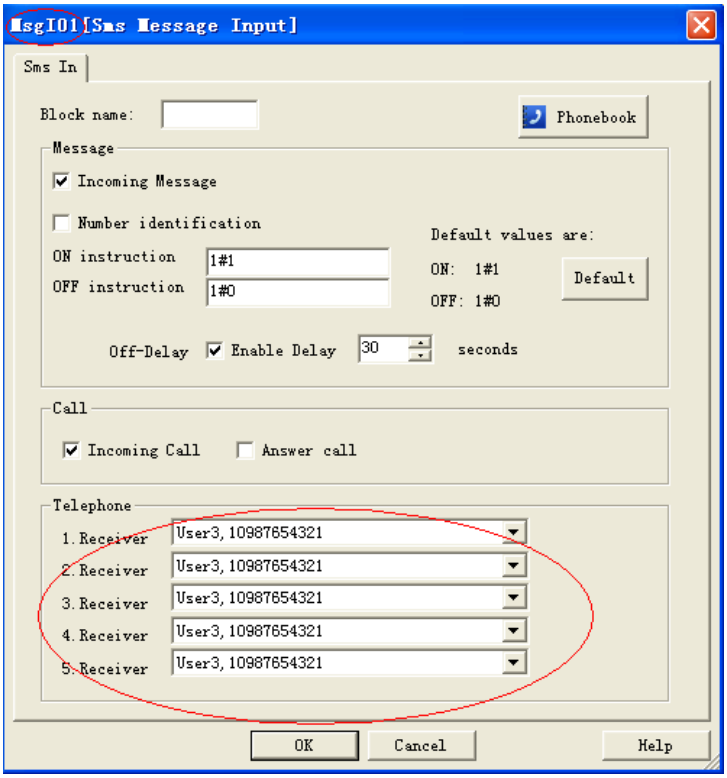
Edit short message :

####

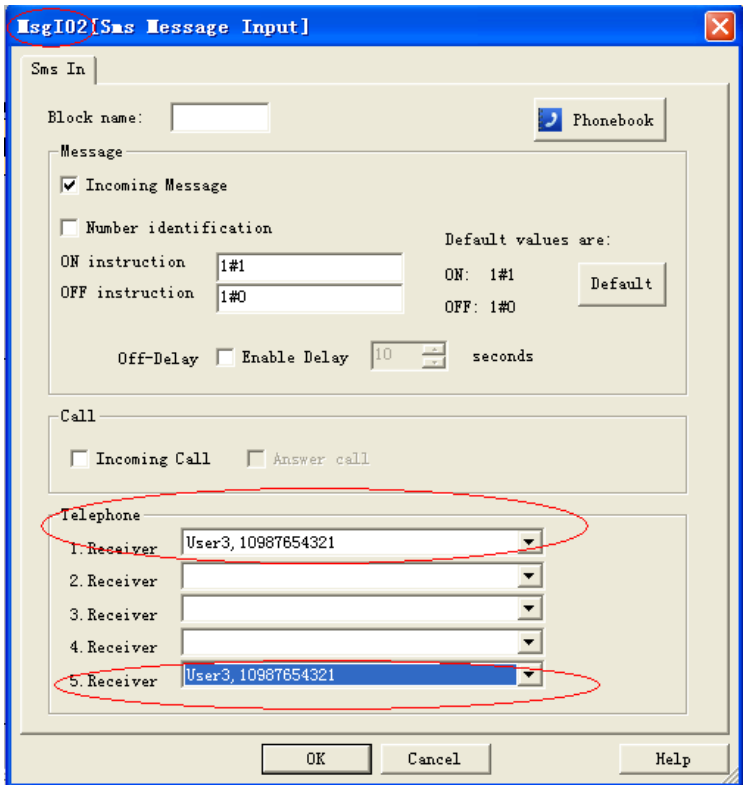
Msg,I01,1,I01,2,I01,3,I01,4,I01,5,I02,1,I02,5,I03,2,I03,4,I03,5:10987654321;

And then the phone number in the sms message input shall be changed with **10987654321.**

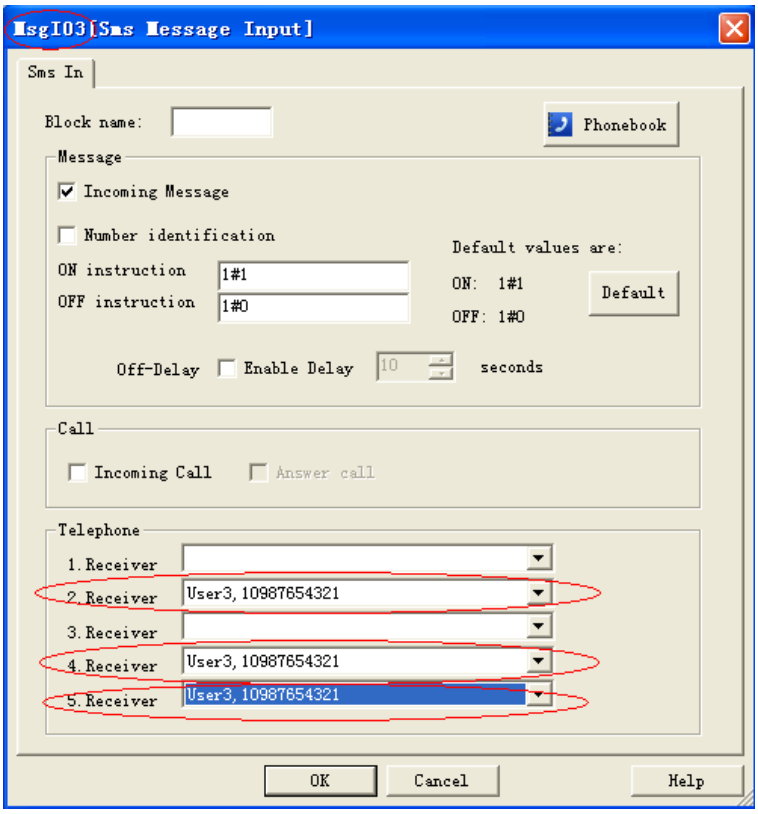
MsgI01:



MsgI02:



MsgI03:



How to modify the all the receiver number of sms message input blocks in the program ?

If you want to modify the receiver number in all the sms message input block, you can edit the short message format like this:

####

ALL:TELI,1:13851448223;

This is to change receiver 1 for all the sms message input block in the program.

TELI, means the "SMS message input block"

1 means the receiver 1 in the block, this number can be 1 to 5.

13851448223; It is the phone number which will be set into the receiver.

RTC=89-01-09,01:32:09,0;

This is used to change the Real time clock of x-Messenger, Year-month-day,hour:minute:second,week;

0: Sunday

1: Monday…..

Note: The parameters can include one or more items as above shows, for example, you want to modify the phone number, you only need to edit message as follows:

####

Msg,I01,1,I01,2,I01,3,I01,4,I01,5,I02,1,I02,5,I03,2,I03,4,I03,5:10987654321;

This function also can be used between two individual x-Messengers CPU.

For example:

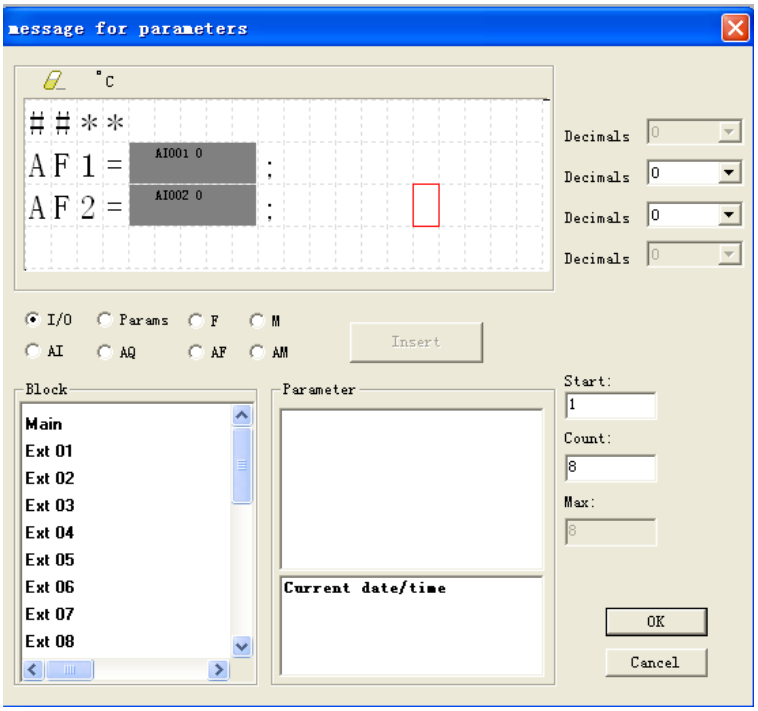
Locally Remote

GMS

The Analog input1 & Analog input2 of remote station can be sent to the local one by means of SMS.

The SMS message can be configured like this:

This parameter can be configured in the sms message output block.

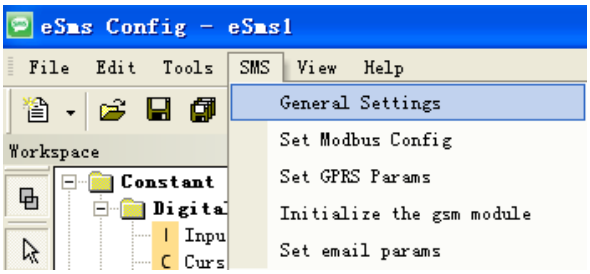


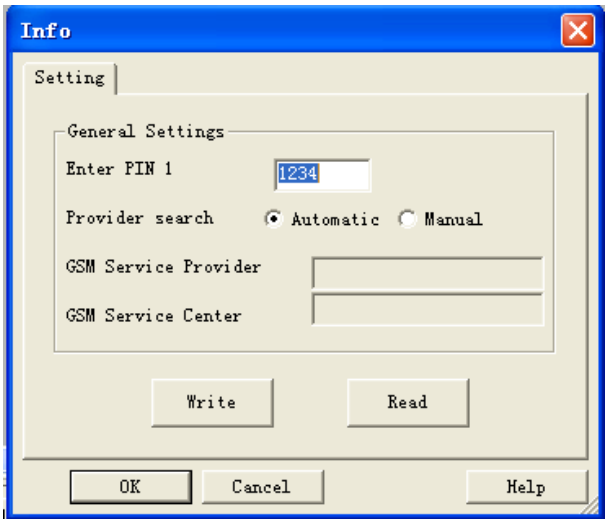
3.3.1.4 How to modify the PIN via SMS

Note: 1.The PIN code of SIM card must be set on cell-phone, here PIN is only for the x-Messenger.

2.Only when the PIN you set into x-Messenger is the same as the one of SIM CARD, and then the SIM CARD would be in service in normal.

The PIN of x-Messenger can be set in the eSmsConfig from the menu "SMS->General Settings"





Send an SMS message formatted like the example below

###*

PIN:1234;

Message Parameters:

Start characters: **###*** (These 4 characters must be included at the start of your message)

End character: **;** (This symbol must be used to terminate each line of your message)

Parameters:

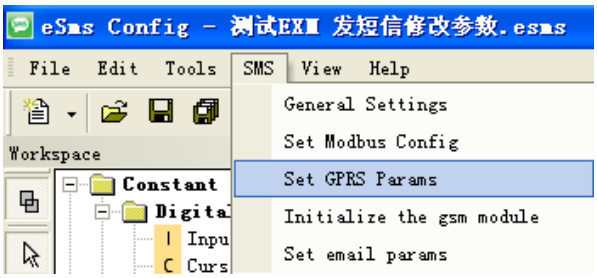
PIN:1234;

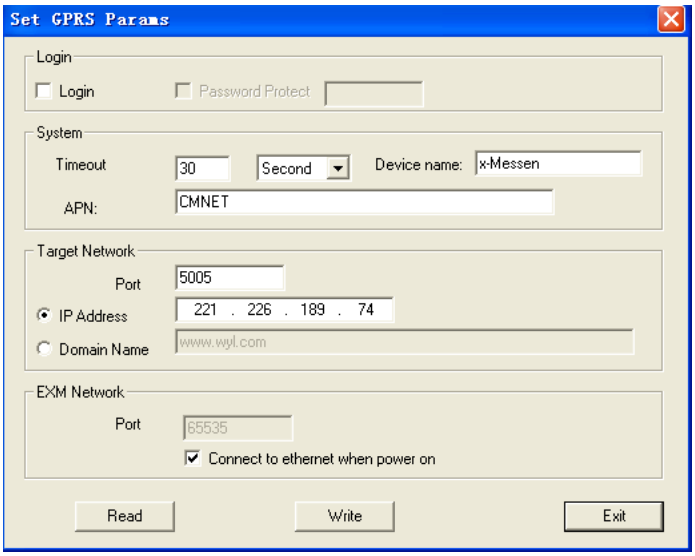
PIN code must be 4 digit Arabic numerals(0--9).

3.3.1.5 How to modify the GPRS Parameters and Email parameters via SMS

1. GPRS parameters and modification via SMS.

GPRS parameters can be viewed from menu "SMS-> Set SMS parameters"





Send an SMS message formatted like the example below

####
PGPRS:
TIMEOUT"60",
IPORDOMAIN"0",
POWCONNECT"0",
APN"CMNET",
TADR"221.226.189.74",
TPORT"5005",
SNUMB"12345678",
DOMAIN"www.wyl.com";

Message Parameters:

Start characters: **####** (These 4 characters must be included at the start of your message)

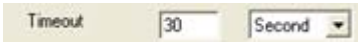
Parameters interval characters: **,** (This symbol must be used to differentiate each parameter of your message)

End character: **;** (This symbol must be used to terminate each line of your message)

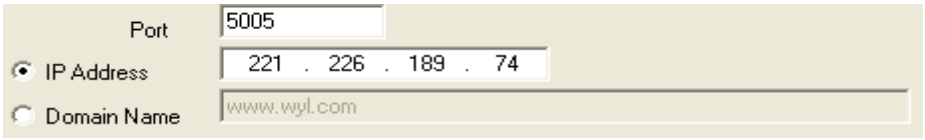
Parameters:

PGPRS : (This head means the below contents is used to modify the GPRS parameters)

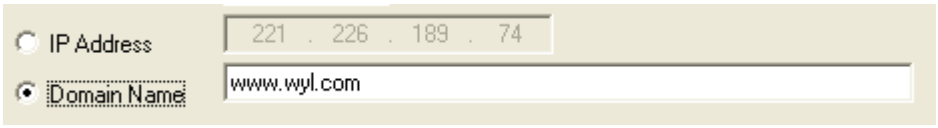
TIMEOUT"60", (This is to change the time out period, the unit is "second" and the minimum value is 30, if you set the value less than 30, x-Messenger would set 30 automatic value)



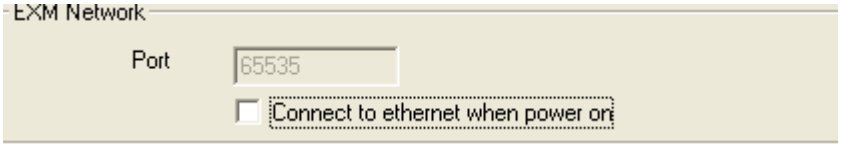
IPORDOMAIN"0", This is to change network mode. **IPORDOMAIN"0",** means IP address option shall be ticked:



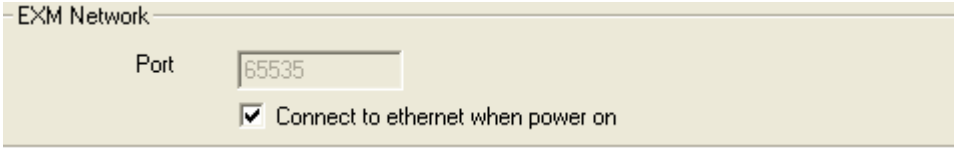
And if **IPORDOMAIN"1",** means Domain Name option shall be ticked.



POWCONNECT"0", This command is used to change the option "Connect to ethernet when power on", if the contents is **POWCONNECT"0",** this option shall be un-ticked:

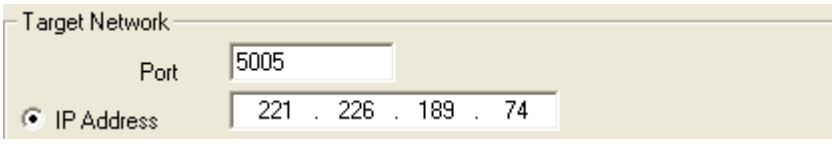


And if the contents is **POWCONNECT"1",** this option shall be ticked:



APN"CMNET", This command is used to modify the APN(Access Point Name).

TADR"221.226.189.74", This command is used to modify the Target IP address



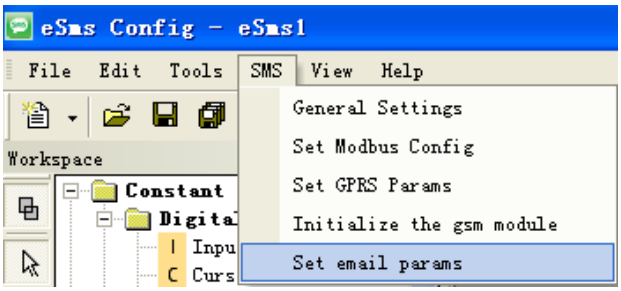
TPORT"5005", This command is used to modify the Port number for target network.

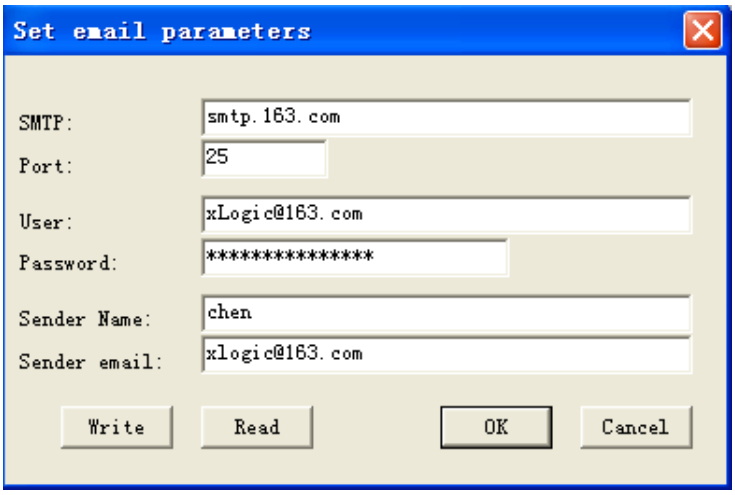
SNUMB"12345678", This command is used to modify the Device Name(serial number) 8 characters in maximum.

DOMAIN"www.wyl.com"; This command is used to modify the Domain name.

2.Email parameters and modifications via SMS.

Email parameters can be viewed from menu "SMS-> Set email params"





Send an SMS message formatted like the example below

##**
PEMAIL:
SMTPADR"smtp.163.com",
SMTPPORT"25",
SMTPUSER"xLogic@163.com",
SMTPPWD"12345678",
SENDNAME"chen",
SENDEMAIL"xLogic@163.com";

Message Parameters:

Start characters: **##**** (These 4 characters must be included at the start of your message)

Parameters interval characters: **,** (This symbol must be used to differentiate each parameter of your message)

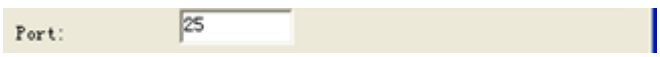
End character: **;** (This symbol must be used to terminate each line of your message)

Parameters:

PEMAIL : (This head means the below contents is used to modify the email parameters)

SMTPADR"smtp.163.com", This command is used to modify the SMTP for your Email box

SMTPPORT"25", This command is used to modify the SMTP for your Email box.



SMTPUSER"xLogic@163.com",This command is used to modify the user name for your Email box.

SMTPPWD"12345678",This command is used to modify the password for your Email box.

SENDNAME"chen",This command is used to modify the sender name for the Email.

SENDEMAIL"xLogic@163.com";This command is used to modify the email address for the sender..

You are allowed to send a SMS to check the settings as follows:

##**

RPGPRS;

RPEMAIL;

Parameters

RPGPRS; This command is used to check the settings of GPRS. GPRS information would be sent to the user who want to check.

RPEMAIL; This command is used to check the settings of GPRS. GPRS information would be sent to the user who want to check.

3.3.1.6 How to modify the email address of the receiver via SMS?

Send an SMS message formatted like the example below

##**

EML,B002,1,B002,2,B003,1,B003,3:xLogic@163.com;

Message Parameters:

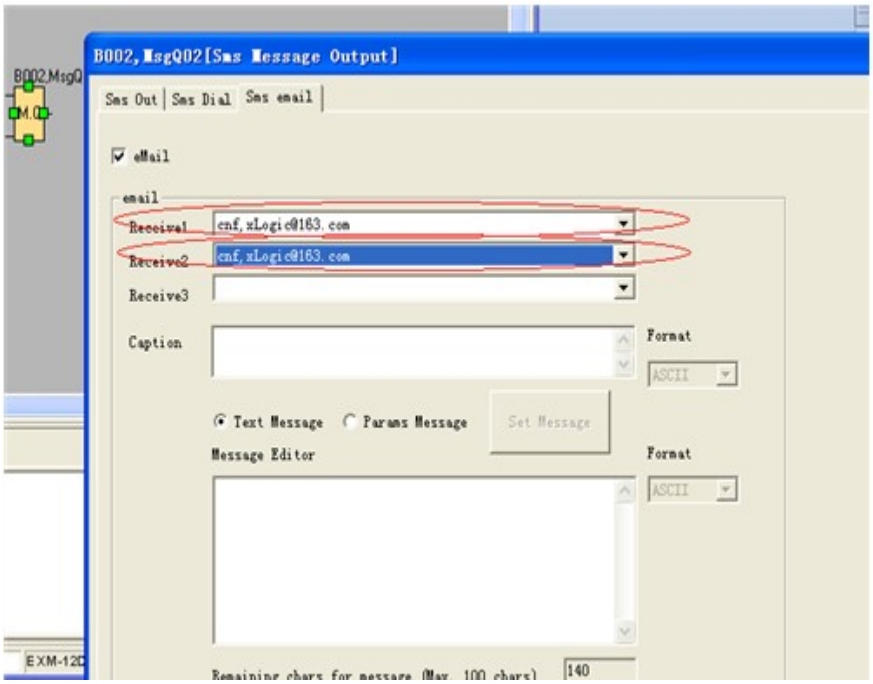
Start characters: **##**** (These 4 characters must be included at the start of your message)

End character: **;** (This symbol must be used to terminate each line of your message)

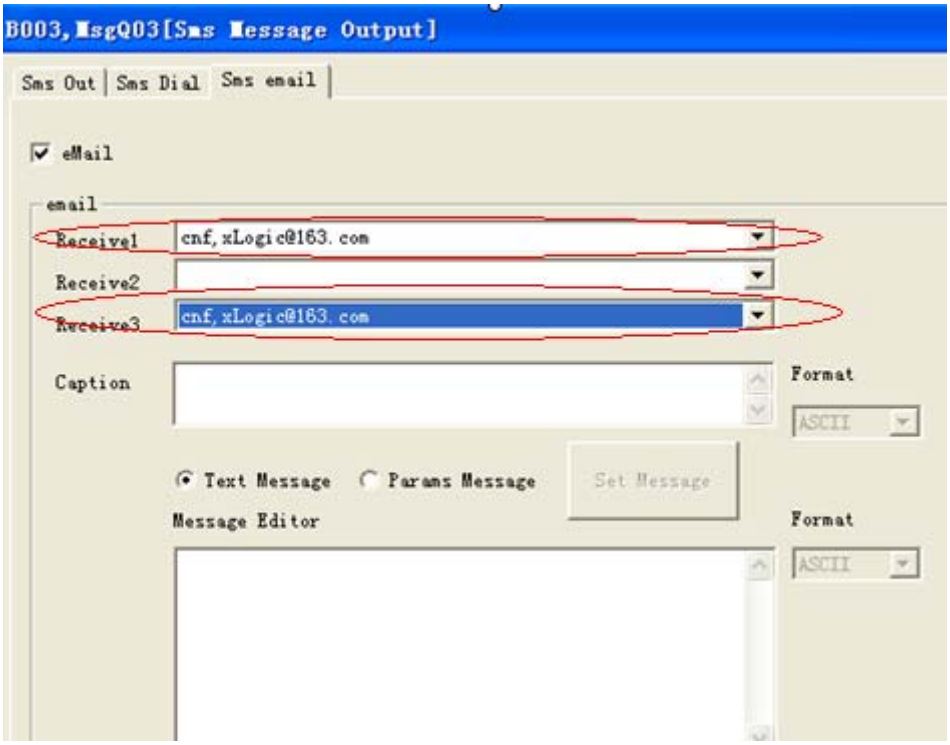
Parameters:

EML,B002,1,B002,2,B003,1,B003,3:xLogic@163.com; The receiver 1, receiver2 of B002 block and receiver1, receiver3 of B003 block would be modified to "xLogic@163.com".

B002(Sms Message Output):



B003(Sms Message Output):



How to modify the all the receiver E-mail address of sms message output blocks in the program ?

If you want to modify the receiver E-mail address in all the sms message input block, you can edit the short message format like this:

####

ALL:EMALQ,1:xLogic@163.com;

This is to change receiver 1 for all the sms message output block in the program.

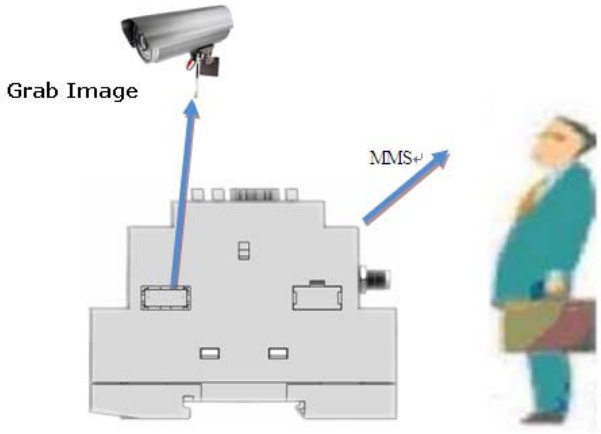
EMALQ, means the the receiver email address in the sms message output block.

1 means the receiver 1 in the block, this number can be 1 to 3.

xLogic@163.com; It is the phone number which will be set into the receiver.

3.3.2 Camera interface

x-Messenger offers an optional camera interface, used to connect camera to grab the photo in real time on site, and further the photo can be sent to specified user via MMS.

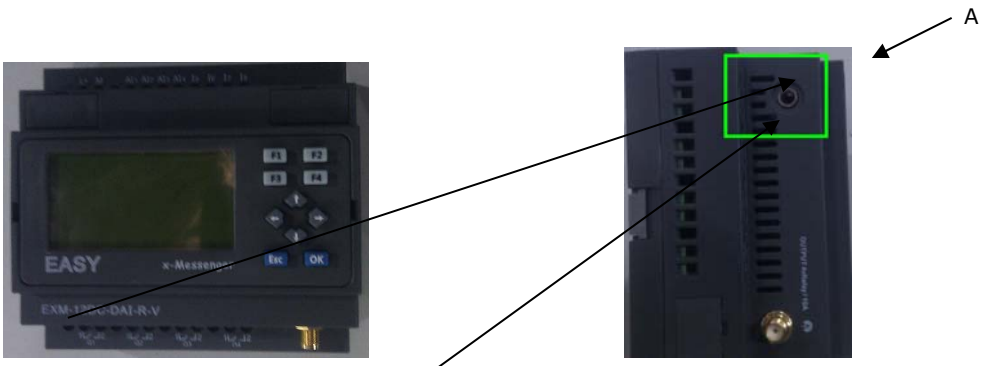


Note: Only one kind of CPU supports this function is EXM-12DC-DA-R-CVN

3.3.3 Voice alarm

With '-v" series x-Messenger CPU means the voice function is available. Voice function includes voice alarm, telephone control function and automatic dialing function. Voice alarm can be realized via the audio jack (see A below) or the built in speaker in certain models (see B below), alarm message also can be got after you hold the call from x-Messenger and press the button on your phone according the prompt voice. Telephone control function means you can control the x-Messenger with your phone remotely.

Structure of the voice interface



With HMI model(-v)

Without HMI model(-v)

A.Voice module on-line recording audio input port &Audio output port (to be connected with the microphone (Input) or speaker (Output)) Applied to both with HMI model and without HMI model.

B.SPK (Built in speaker in some non-display models) Only applied to x-Messenger without HMI model.

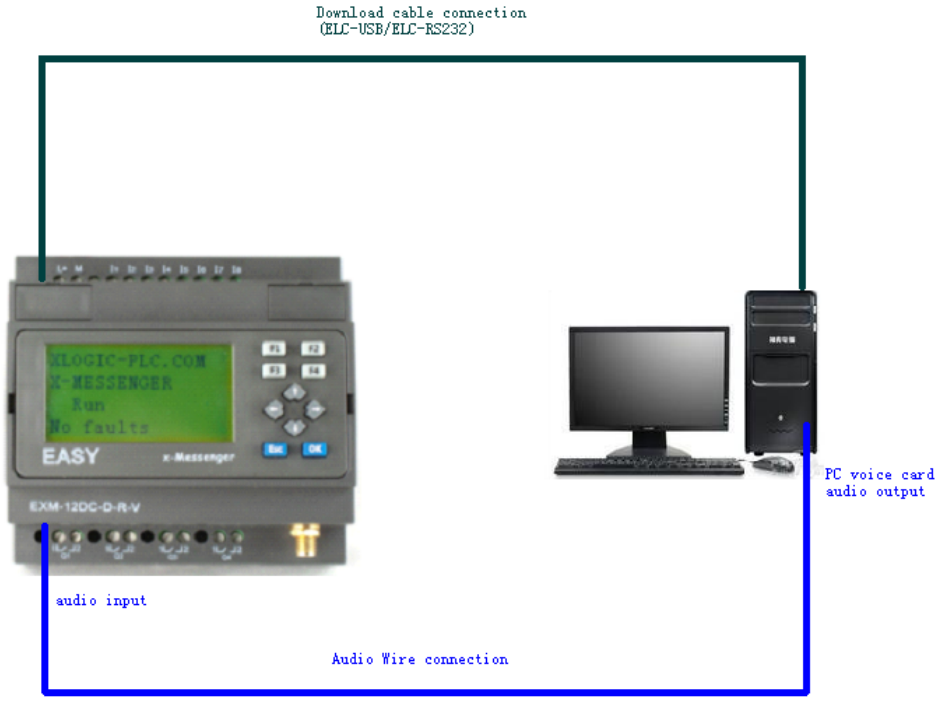
How to record the voice section into x-Messenger?

Before recording, equip your PC with voice card , otherwise the recording can't be carried out.

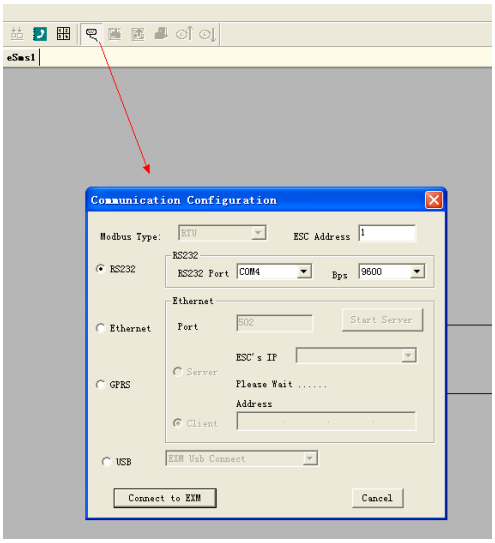
Step A.

Establish the connection between x-Messenger programming port and the COM port of your PC(RS232/USB) with the download cable(ELC-USB,ELC-RS232, EXM-USB-B) and the connection between the audio input interface of x-Messenger and the audio output interface of your PC with audio wire(see below figure).

Free audio wire accessory, to connect the voice audio input and PC audio output.

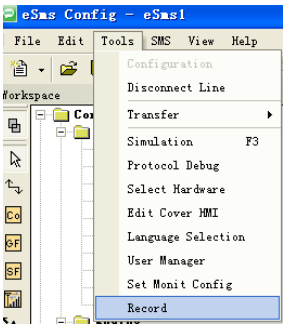


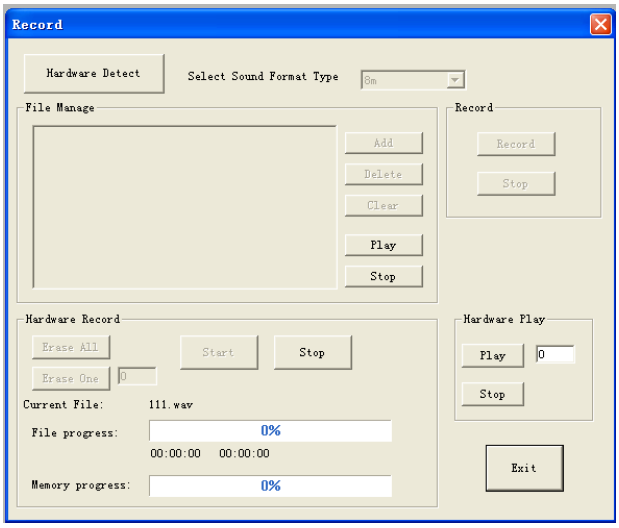
Step B. Open the "eSmsConfig" software and establish the communication (Select the correct com port you are using, and connect to EXM).



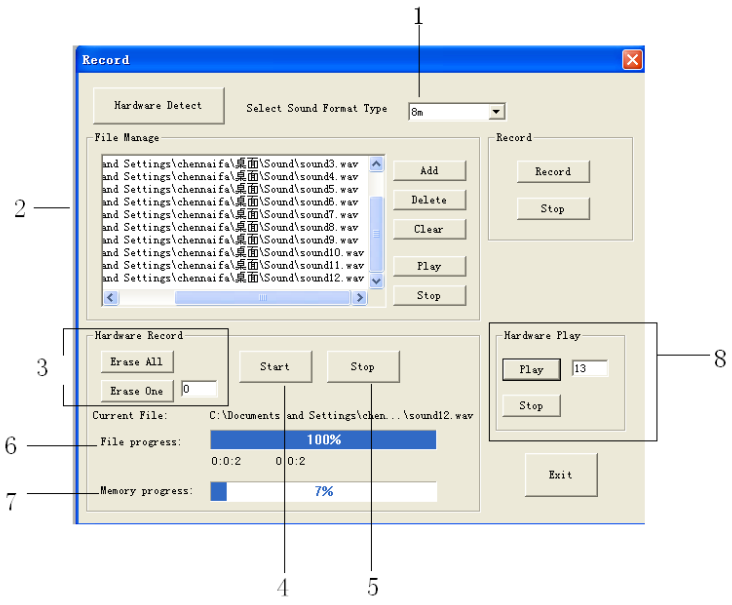
Step C. Download voice section.

Click menu Tool-> Record





Click "Hardware Detect" button.



1. Sound format selection:

There are 3 options : 4m ,6m and 8m.

In total length range of the recording, the recording of the voice module can be divided into 0-99 sections . (Note: Option1: 4 minutes, the voice sampling frequency is 3.4 K Hz, Option2: 6 minutes, sampling frequency is 2.3 KH z, 8 minutes sampling frequency is 1.7KHz, if you want better sound quality, use a higher sampling frequency.)

sound0.wav

2. Voice section displayed, you can add ,delete,and clear all the file with the relevant button. The voice file format is ".wav" Any other format file is unavailable.

3. Erase the voice section in x-Messenger.

Erase all the voice sections by clicking the "Erase all" button.

Erase one of the voice section by clicking the "Erase one" button. You can input the voice section number in the dialog box which you want to delete.

4. Record all the voice section by click "Start".(While the "Start button" is pressed down, the voice would be played and at the same time x-Messenger shall record one by one.)

Note: The audio wire must be connected between x-Messenger and PC, otherwise , although the voice has been displayed, x-Messenger cannot record any voice section. In other words, the voice section is downloaded from PC to x-Messenger by the audio wire, not via the download cable.

6. File progress: It is showing you the voice section "playing progress".

7. Memory progress: It is showing you the voice memory space status. Total memory space can be used to store up to 4, 6 or 8 minutes voice section.

Note: 4 minutes format with the best voice quality, and 8 minutes format with the worst voice quality.

8.Hardware play: You can play any one of the voice sections in the x-Messenger(0-99 section)

Relative voice function block description

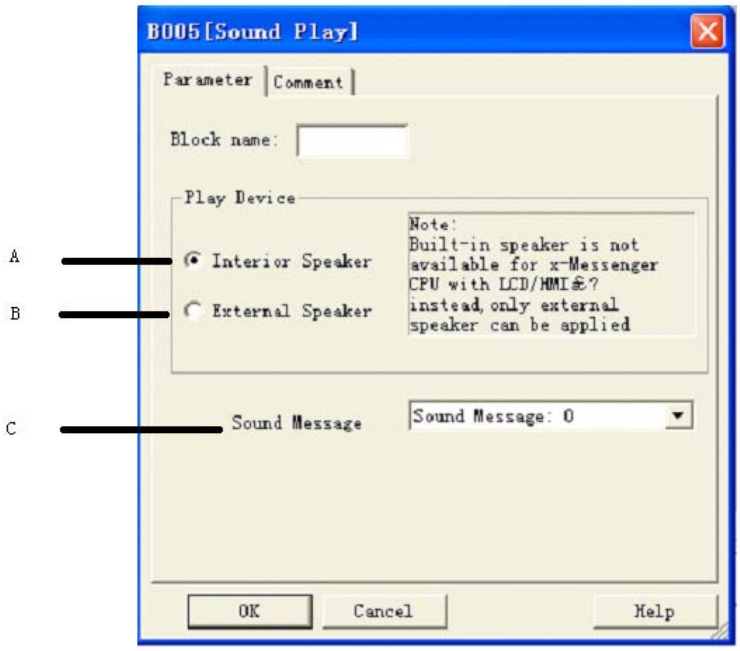
Sound play

Description of function

The relative voice message would be played if this block were enabled. There are 3 optional ways for sound playing:A. built-in speaker B. External speaker C. Phone alarm voice

Connection	**Description**
Input **En**	You enable/disable the sound play with the signal at input En.
Output **Q**	Q switches on if sound play were enabled and the sound section had been played more than 1 time successfully.

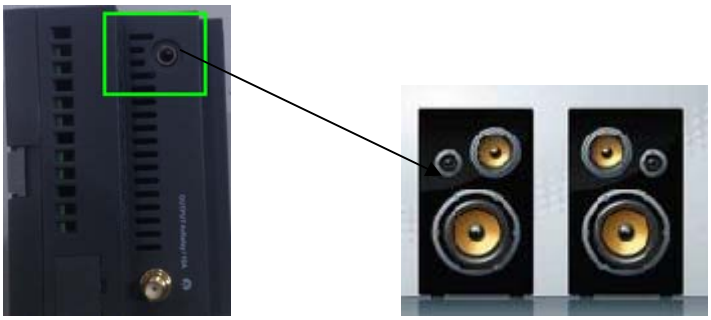
Property dialog box description



A. Interior speaker

This option is for the built-in speaker model.(Only applied to "....-v-cap" model)

B.External Speaker

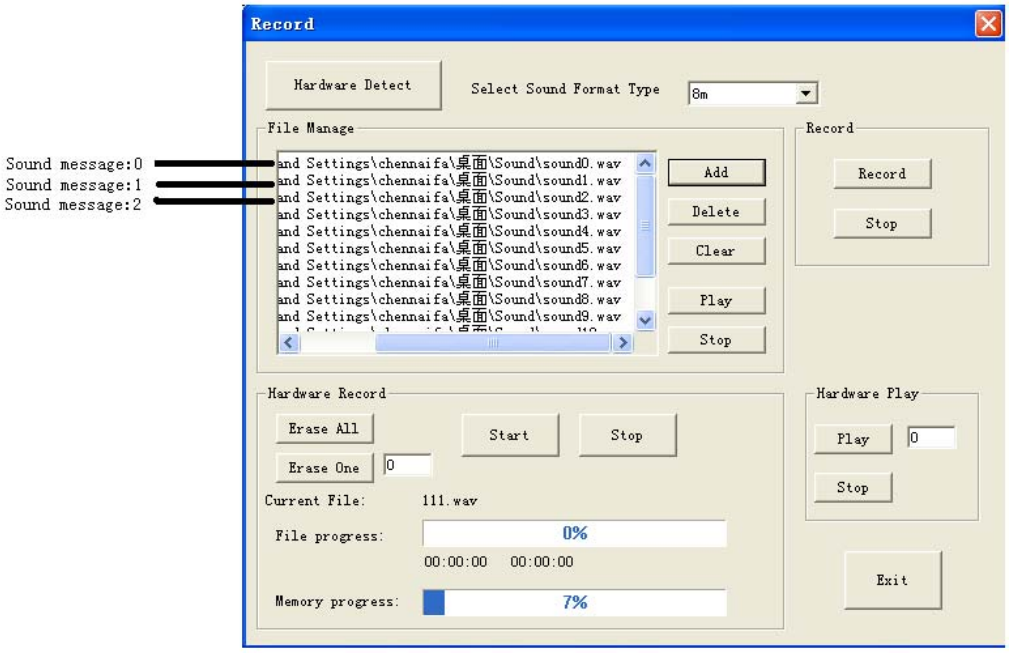


External acoustics

Sound message :

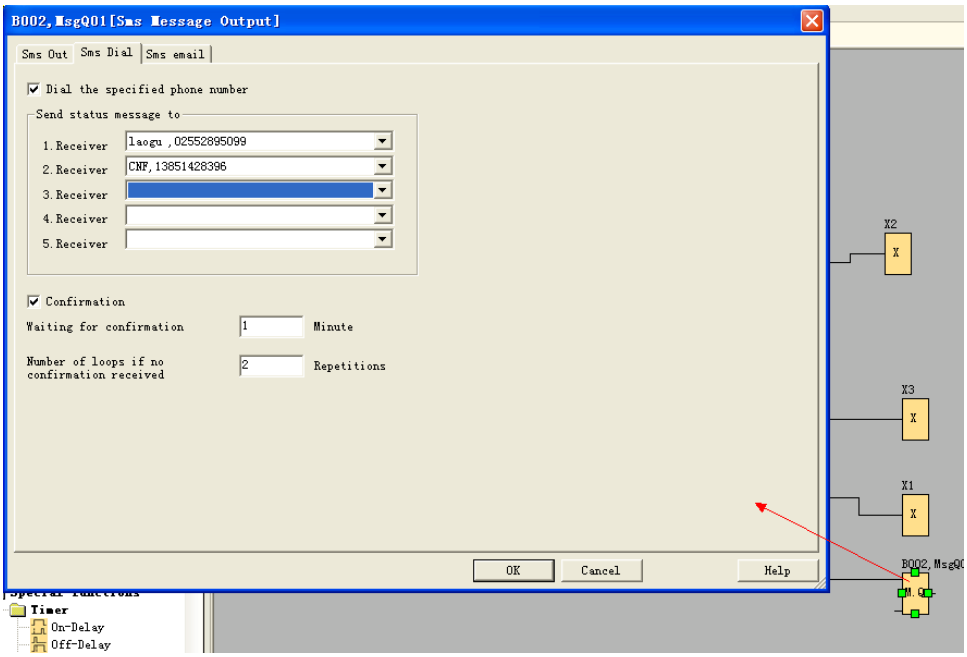
Voice section selection.

Sound message: 0 means the voice section 0 from the record manage dialog box.



Voice alarming via phone

In your program, you must use the "sms message output'' function block(Refer to the relative chapter in the user manual).



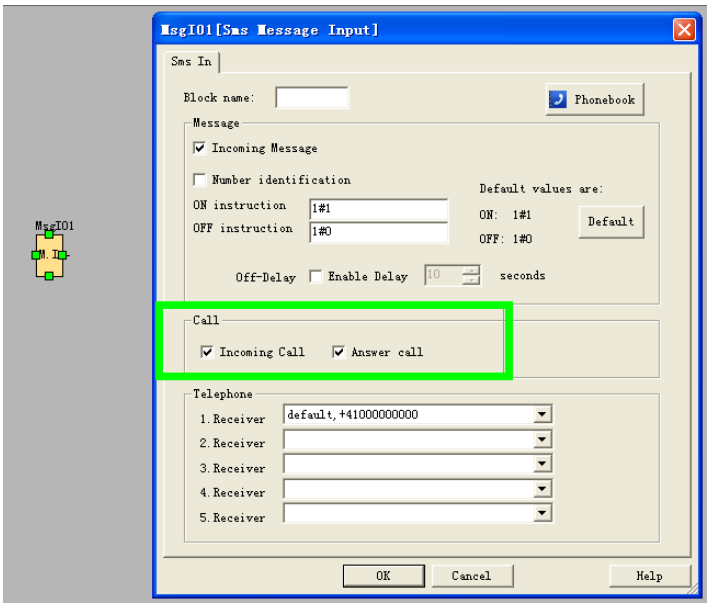
Select the "Sms Dial" option, you can choose the receiver phone number from the Phone book. If this block were enabled, x-Messenger would dial to the corresponding user's cell phone. And users can check the alarm voice according to the broadcast contents.If there is no "sound play" function block enabled, x-Messenger would not broadcast alarm voice section.

How to realize the 'telephone control function' ?

When a user dials x-Messenger, x-Messenger will answer the telephone automatically and broadcast-Please enter the password for confirmation, then the user enters the x-Messenger password.

A. If the entered password is correct, x-Messenger will then broadcast**-Correct password. Please enter the control code to control.** Then the user can control the equipment by the use of the telephone key.

Note: This function is available only if you put the sms message input function block in your programme and select the "Incoming Call and Answer call" box.



Telephone key

P Telephone Key

Description of function

There are 9 bit flags based on the 1--9 key of the telephone. After you enter into the telephone control mode, and enter # 0, the P0 block would give off one trigger. If you enter # 8, the P8 would give one trigger

Operation Instructions of the Voice function for x-Messenger

1.The first five sections (section 0, section 1, section 2, section 3, section 4) are for the voice system. Users cannot record the five sections randomly.

2.Section 5 to section 99 of the voice module are the voice sections for users programming and can be used randomly. However, users must start recording from section 0 while the functions of section 0 to section 4 are fixed by the system.

Functions from section 0 to section 4 are as follows:

Section 0: When dialing out through the "sms message input/output" block, it will broadcast this section "**Please enter No. 0 key and receive the information**". (When recording, users must record this voice contents "**Please enter No. 0 key and receive the information**")

Section 1: the voice prompt for confirming the user status. It will be broadcasted when x-Messenger system number has been dialed or x-Messenger dialed out to configured user. Normal broadcasting can be carried out with this section.

Section 2: the voice prompt for the correct password. It will be broadcasted when the correct password is used. Normal broadcasting can be carried out with this section.

Section 3: the voice prompt for the wrong password. It will be broadcasted when the wrong password is used. Normal broadcasting can be carried out with this section.

Section 4: the voice prompt for dialing to an external telephone. It will be broadcasted when x-Messenger dials an external telephone. Normal broadcasting can be carried out with this section.

3.Usage of the five special sections

For example: users can use the five message sections as follows:

Step I:

Record section 0 as Please enter No. 0 key and receive the information.

Record section 1 as Please enter the password for confirmation.

Record section 2 as Correct password. Please enter the control code to control.

Record section 3 as Wrong password. Please re-enter.

Record section 4 as Emergency. Please enter the password to control.

Record section 5 as Emergency. Gas leakage.

Step II:

When a user dials x-Messenger, x-Messenger will answer the telephone automatically and broadcast-Please enter the password for confirmation, then the user enters the x-Messenger password.

A. If the entered password is correct, x-Messenger will then broadcast**-Correct password. Please enter the control code to control.** Then the user can control the equipment by the use of the telephone.

B.If the entered password is not correct, the x-Messenger will broadcast**-Wrong password. Please re-enter.** Then the system will repeatedly broadcast**-Please enter the password for confirmation.**

Step III:

When x-Messenger dials an external telephone number(pre-set in sms message output block of your program), it will broadcast the pre-set message such as section **5-Emergency, Gas leakage.** Together with section 4**-Emergency, Please enter the password to control.**

A. When the user enters the correct password, the voice system will broadcast section 2**-Correct password. Please enter the control code to control** and then repeatedly broadcast section 5**-Emergency, Gas leakage.** At this time the user can take control of connected equipment in real time by the use of the telephone.

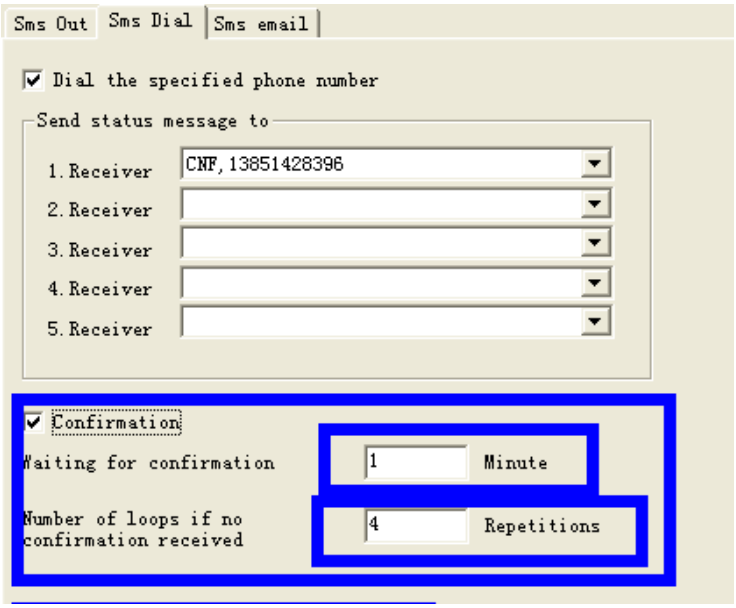
B.When the user enters a wrong password, the voice system will broadcast section 3-Wrong password. Please re-enter. And then it will broadcast section 4 and section 5 repeatedly.

Password protection is according to the x-Messenger settings, if there is no password for x-Messenger, it will broadcast the alarm voice without section 2.

Notes:

1. x-Messenger dialing an external telephone, if there is no answer or a password is not entered within the

connection set point time, the x-Messenger voice system will stop dialing and cease to broadcast the voice message. The x-Messenger will then redial automatically according to the settings in the "Sms message output block.



2. User must enter a # before entering the password. The broadcasting will then stop and the user should enter a four-digit password within 10 seconds. If the user fails to enter the password, the x-Messenger will re-broadcast the voice prompt. The user must then enter # first and then enter the password. If the user needs to enter the password again, the procedure needs to be repeated. That is to say that every time the user needs to enter the password, he must enter a # first and enter a four-digit password within 10 seconds after the voice has stopped.

3. When the user has entered the correct password, the voice system will broadcast section 2**-Correct password. Please enter the control code to control** and then the user can do the following operation. If the password is wrong, the voice system will broadcast section 3-Wrong password. Please re-enter. The user can only enter the wrong password three times. If the user enters the wrong password for a fourth time , x-Messenger will hang up the telephone and stop broadcasting. If the alarm status still exists, the voice system will dial automatically, for alarm purposes, every 40 seconds.

4. When the alarm status exists, x-Messenger will broadcast the alarm voice repeatedly. It can be stopped by the use of the control function within the program.

5.

For the first time set-up, before recording, the user must delete existing messages before. Otherwise the recorded voice may be lost. As to the recorded voice messages, user may delete or modify randomly the voice message in them. And it has no effect on the other voice messages. As for the details, it is explained in the voice recording

explanation.

Examples of Voice Module

Preparations:

1.Connect the x-Messenger to your PC as detailed above.

2.Record message. (The first five messages must be recorded and the other four messages recorded according to the user's needs.)

Message 0: Press key #0 and listen to the message.

Message 1: Please enter the password.

Message 2: Correct password.

Message 3: Wrong password. Please re-enter.

Message 4: Run normal. No alarming.

Message 5: The door is not closed. Please handle urgently.

Message 6: Thief. Please catch. Address: No. 28, ningshuang Road.

3.Set the telephone.

First you need edit the phone book and select the phone number in the sms message input/output.

Second:

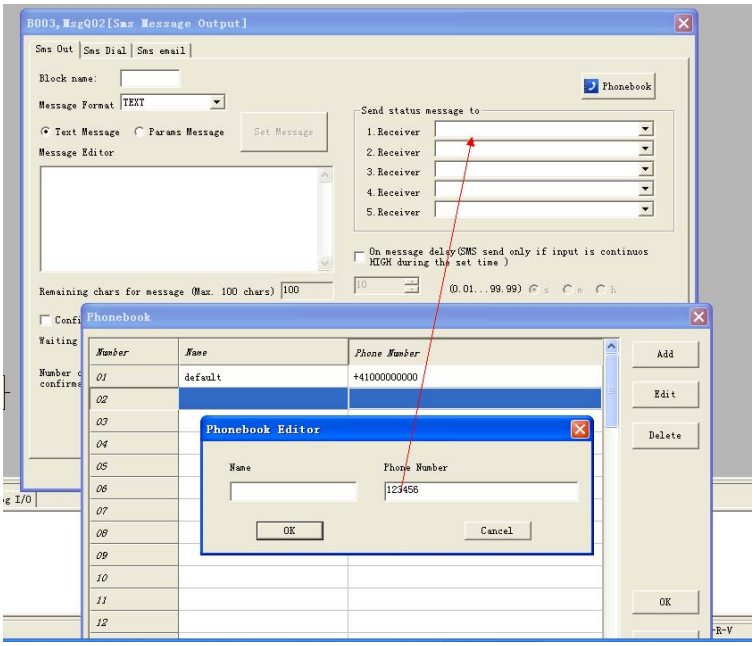
SIM card in x-Messenger is No.1234567

Set the user1 phone No. 11111111

Set the user2 phone No. 22222222

Set the user3 phone No. 33333333

Set the user4 phone No. 44444444



Example 1

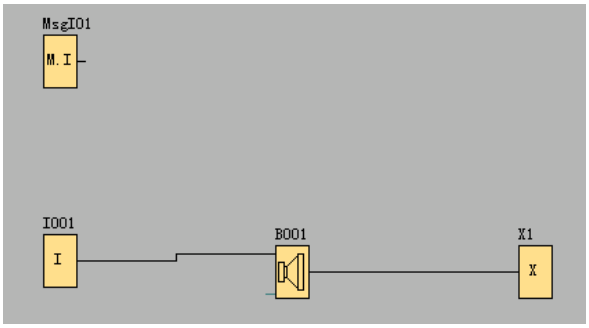
Check if x-Messenger system running normally and retrieve unit information. The user himself check the system, the password is set. Only the password is correct, the system information can be learned. So set the password via the panel key or software.

When programming, requirements are as follows:

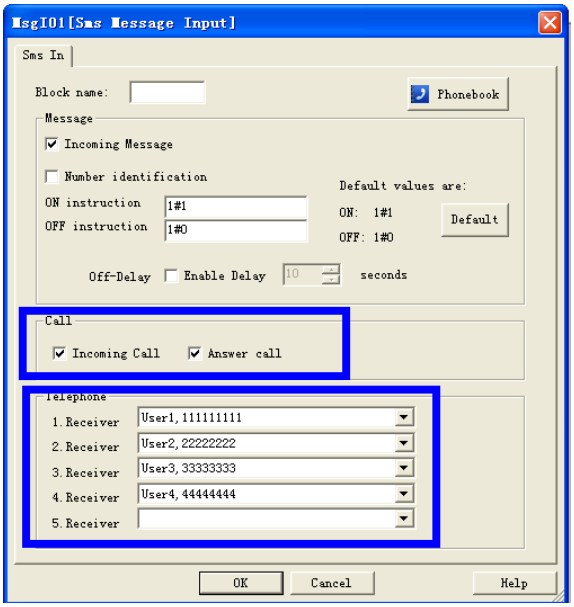
① Correct password.

② Set related function block.

Program is as follows:

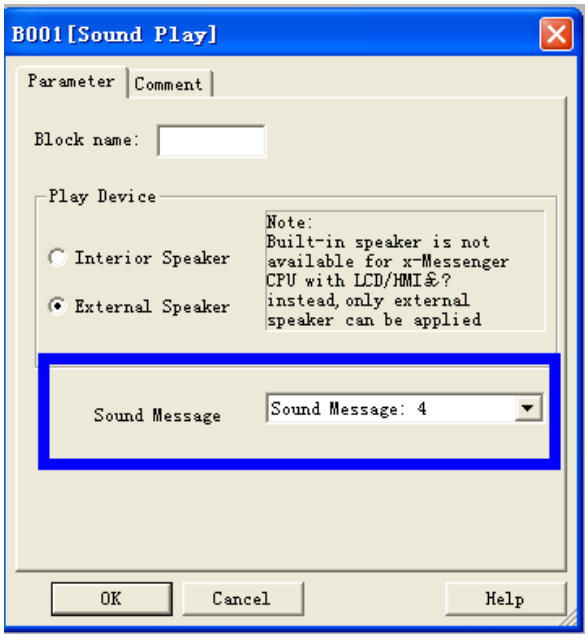


MsgIO1 "sms message input' function block property box settings:



x-Messenger can only answer a call from user1,user2,user3,user4 phone number, other users calls cannot be answered.

B001 "Sound play" function block property settings



Actual Demonstration:

① Dial the telephone No. 1234567 of the voice module from user1--4..

② It will play Message 1 "Please enter the password."

③ Enter the preset password via the telephone keys.

A. Correct password.

It will play Message 2 "Correct password." If I1 is not triggered, it will play Message 4 "Run normally. No alarm." After playing, if user doesn't hang up the telephone, it will play Message 4 repeatedly.

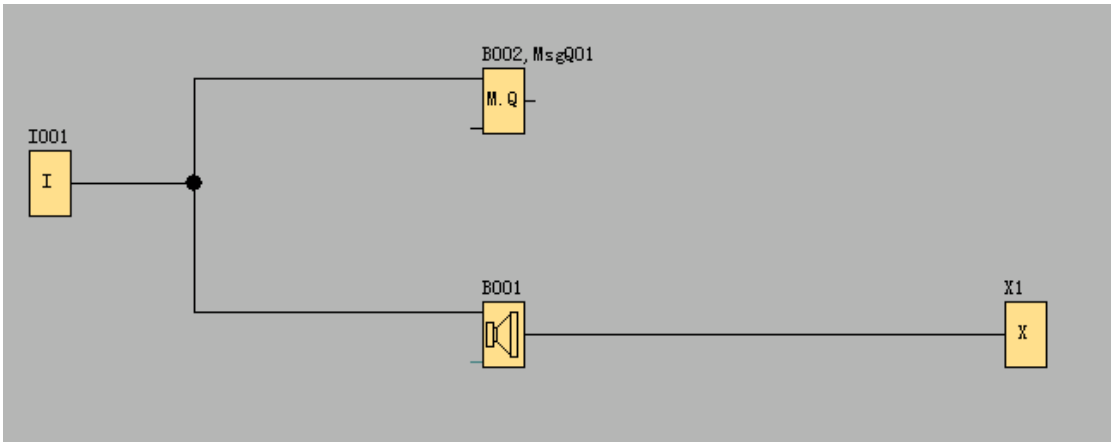
B. Wrong password.

It will play Message 3 "Wrong password. Please re-enter." and then Message 1 "Please enter the password."

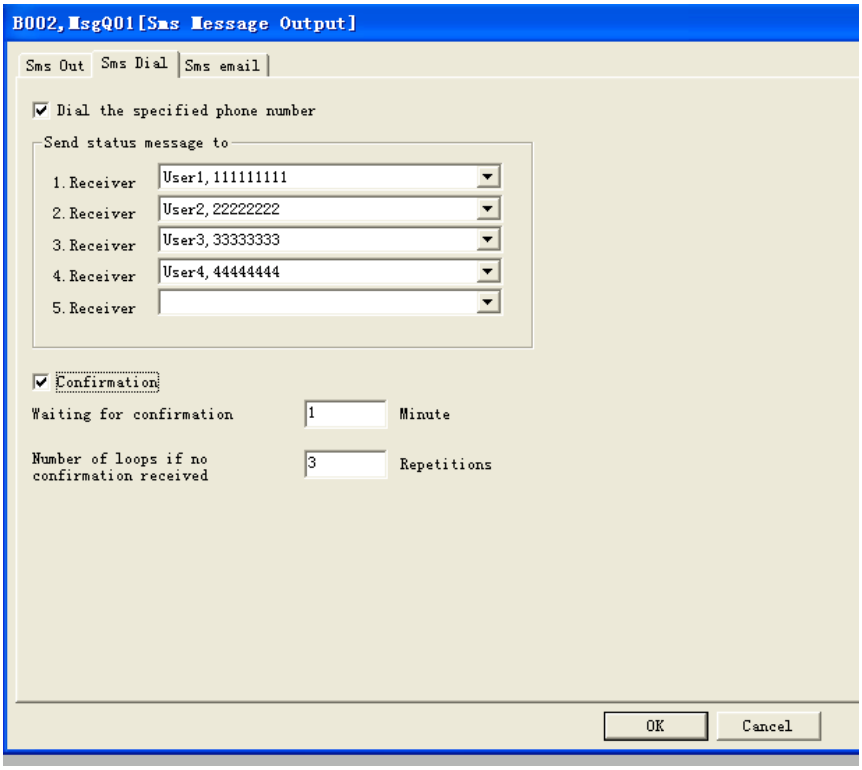
Example 2

x-Messenger system detects there is something abnormal and prompt the user. Under this situation, the x-Messenger is needed to set password to avoid the stranger knowing the prompting contents. Password can be set via the panel key or via the menu in eSmsConfig software.

Program is as follows:



B002 "sms message output' function block settings:



Actual Demonstration:

① x-Messenger system detects that the door is not closed. (I1 connected to the switch testing the door status.) I1 is triggered and B002 is activated by I1. Then the x-Messenger will dial user1 11111111 the preset telephone of B002.

② When the user picks up the telephone, he will hear that "Please press Key #0 and listen to the message."

When the user presses Key #0, it will play Message 1 "Please enter the password."

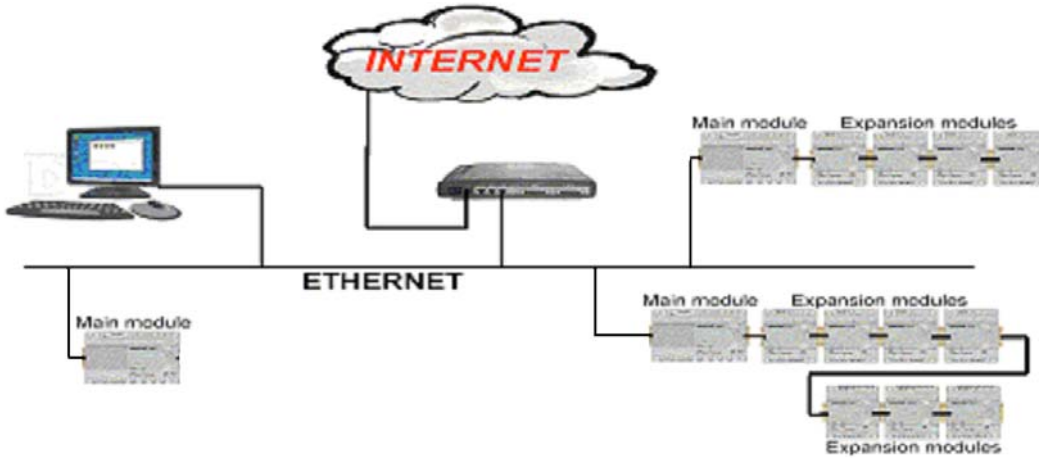
In this example, when the voice module dials the preset telephone, if the user1 doesn't pick up the telephone, x-Messenger would dial user2 and user3 according to the confirmation settings(waiting time and loops)

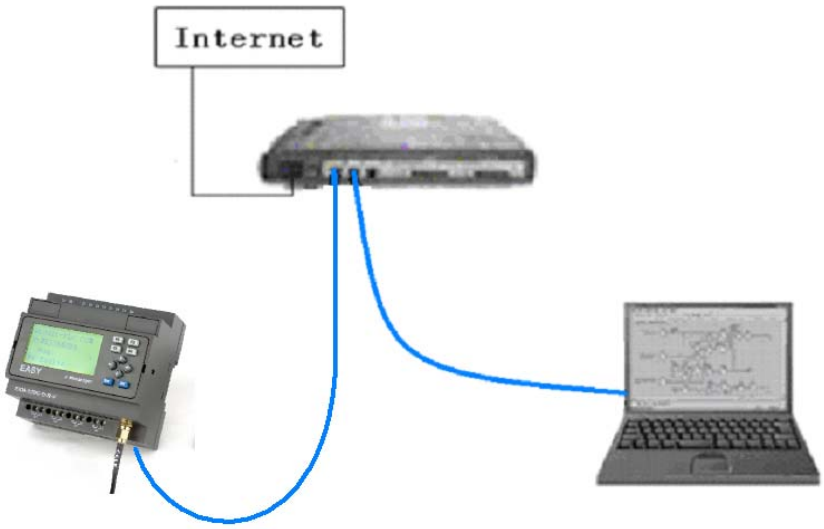
3.3.4 Ethernet Interface

This chapter is applied to the CPU built-in the Ethernet module, the model with "-N".

Built-in LAN port

If the application requires a system where more than one CPU is needed and these CPUs have to communicate, each CPU will be connected over an Ethernet Module box to the Ethernet. The project down- and upload to and from the CPUs and the communication between the CPUs happens over the Ethernet network. Furthermore the visualization of the whole system is possible and easy to realize by a personal computer.





Software part:

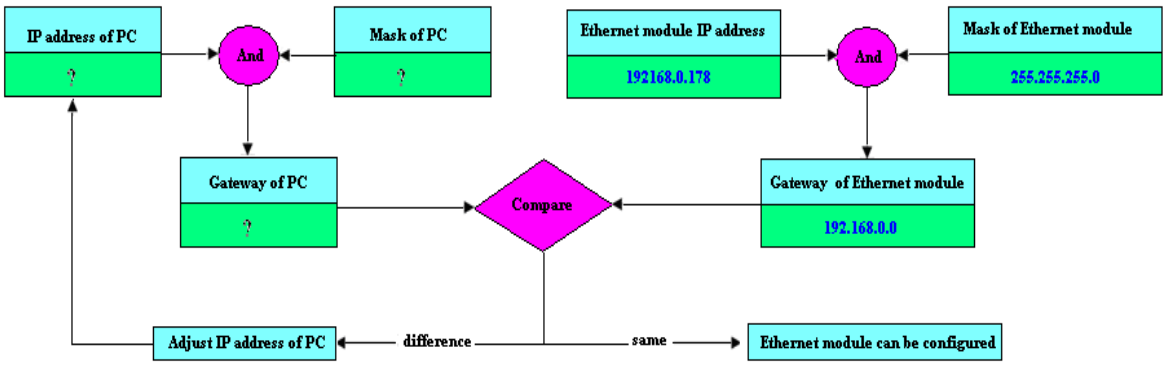
Device **IP** factory setting

The default IP address of Ethernet module is：192.168.0.250

Network segment check of PC and Ethernet module's

Users need ensure that PC has Ethernet cards,and that the network settings of PC and Ethernet module's must keep in the same network segment before establishing communication between PC and Ethernet module.

The Ethernet module has a factory setting IP（192.168.0.250） and network mask（255.255.255.0）. Users can process as shown in Figure 4.3 to check whether the Ethernet module and PC in the same network segment. If in the same network segment, then congratulations to you, and you do not have to read the following network setting contents. If it is different, then the following settings is very important to you.



Above contents is used to tell you how to make the user's PC with the ethernet module in the same network segment.

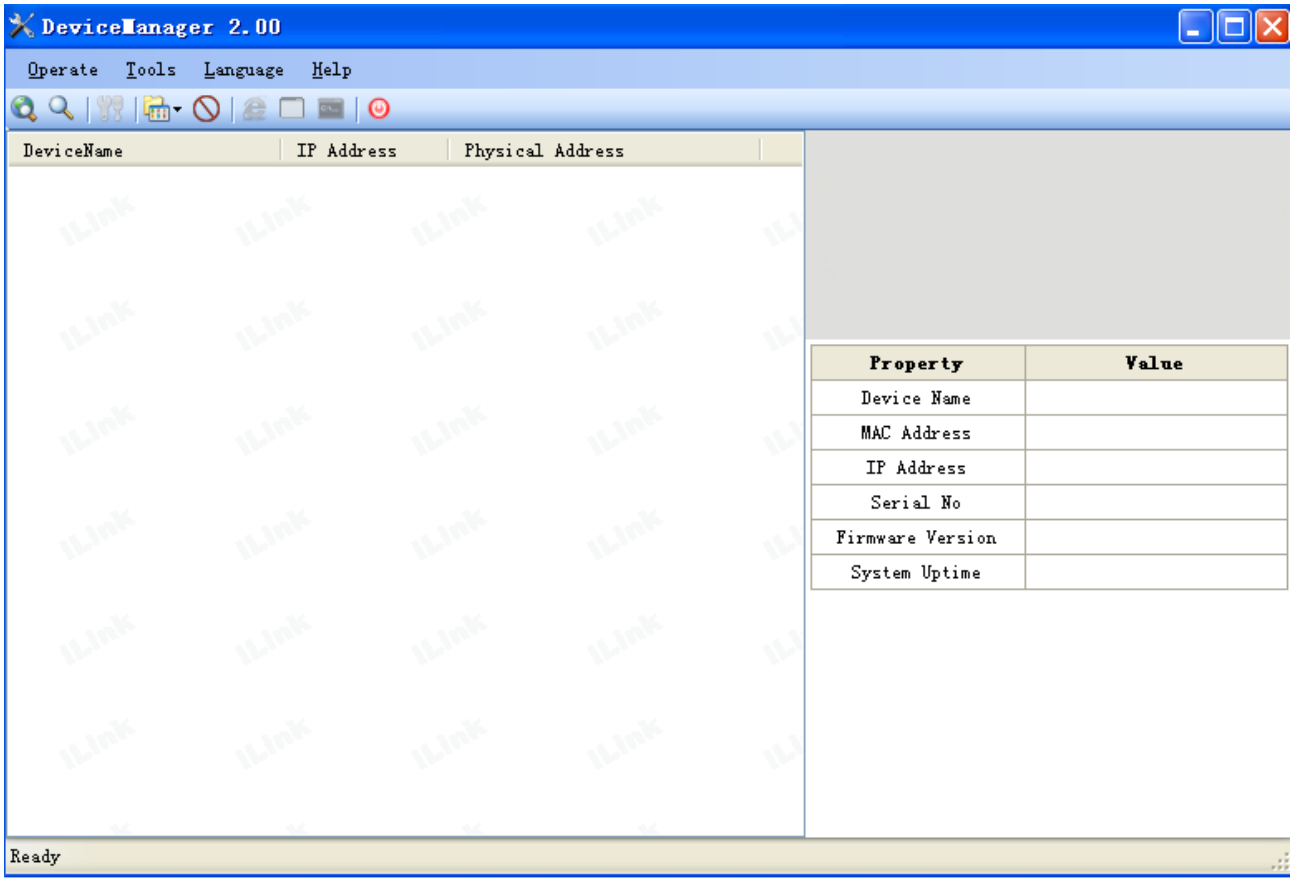
First part: set or modify IP address, port number with "DeviceManager2.00" software.

How to configure Ethernet module built-in EXM address?

Start Ethernet module IP address configuration software.

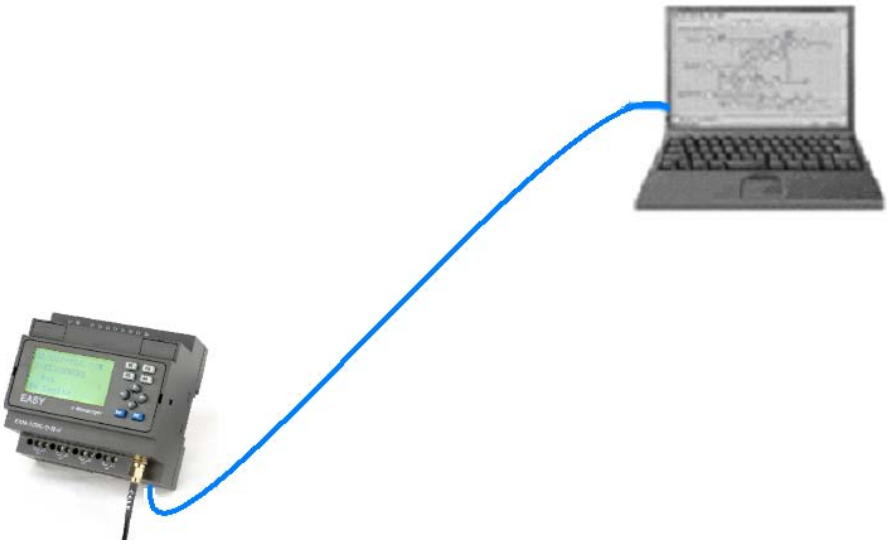
Step one: Double click the file "DeviceManager" in CD and then the following contents will pop out:

Step two: Select "DeviceManagement.exe" file, and start it with double-click the left key of your mouse.



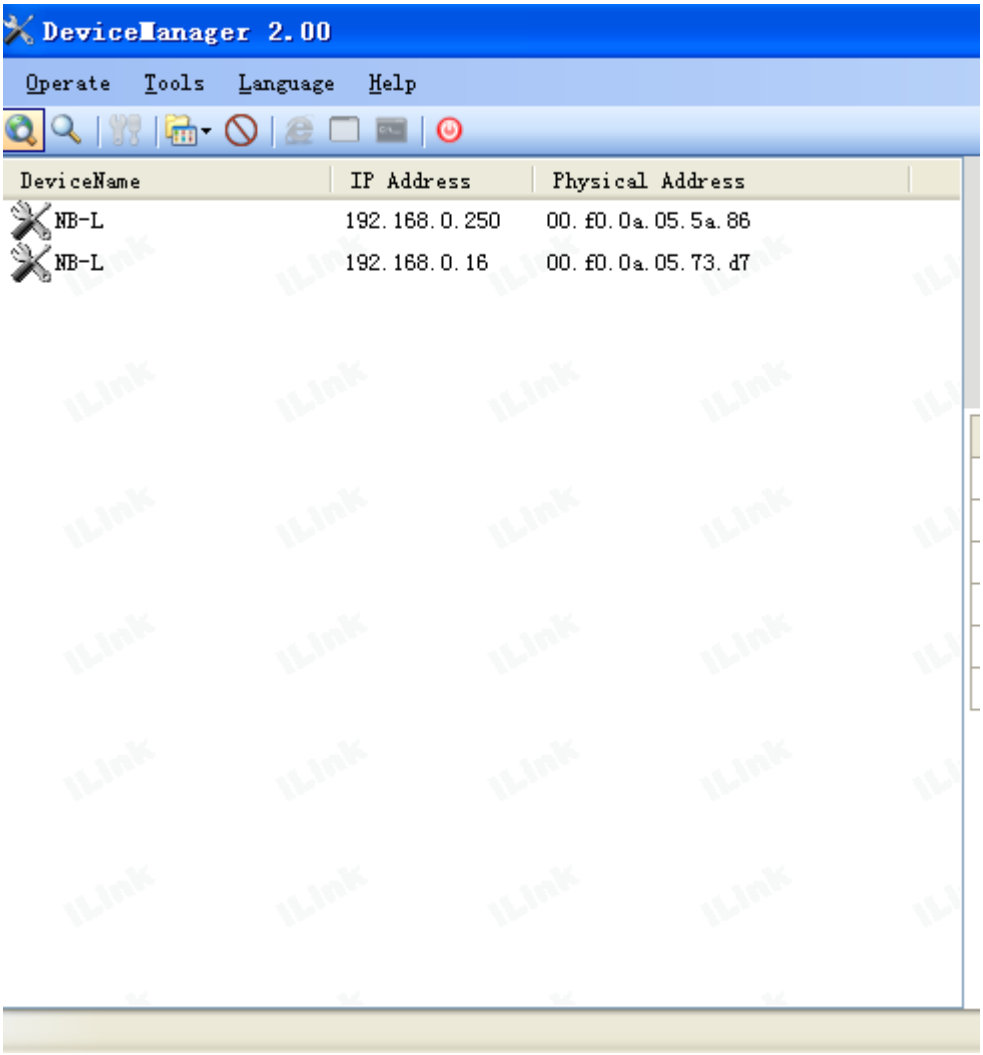
In order to enable your Ethernet module to link to Ethernet, you are required to connect the LAN port of the CPU to your computer by net router. You are allowed to connect the LAN port of the CPU to Ethernet directly by common net cable. Hereunder let's take computer as an example:

Connect diagram:

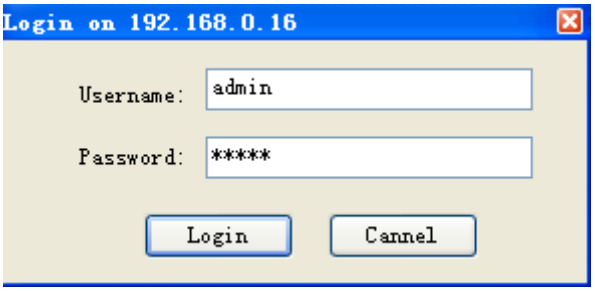


You are required to set as following way, otherwise the Ethernet module may fail to work , please take some time to study the below instruction carefully :

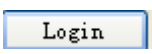
Power on CPU and click to search Ethernet module. At the same time the searching Process will be showing. In the search window, we can see the search module, and the corresponding MAC address and IP Address.



Double-click the device in the list of equipment; or select equipment items, click the toolbar button

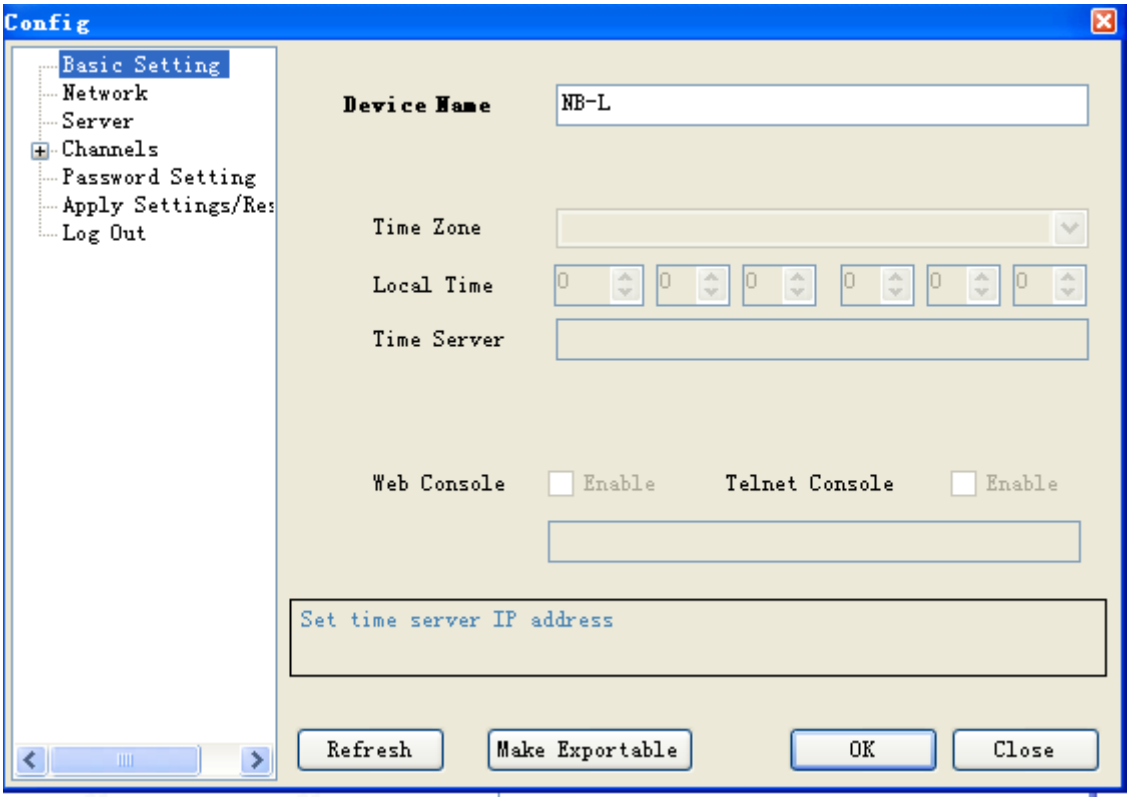


Input the username and password to login. The default is Username: admin; Password is admin.

If the username and the password are both correct, you can click the 

button. And the

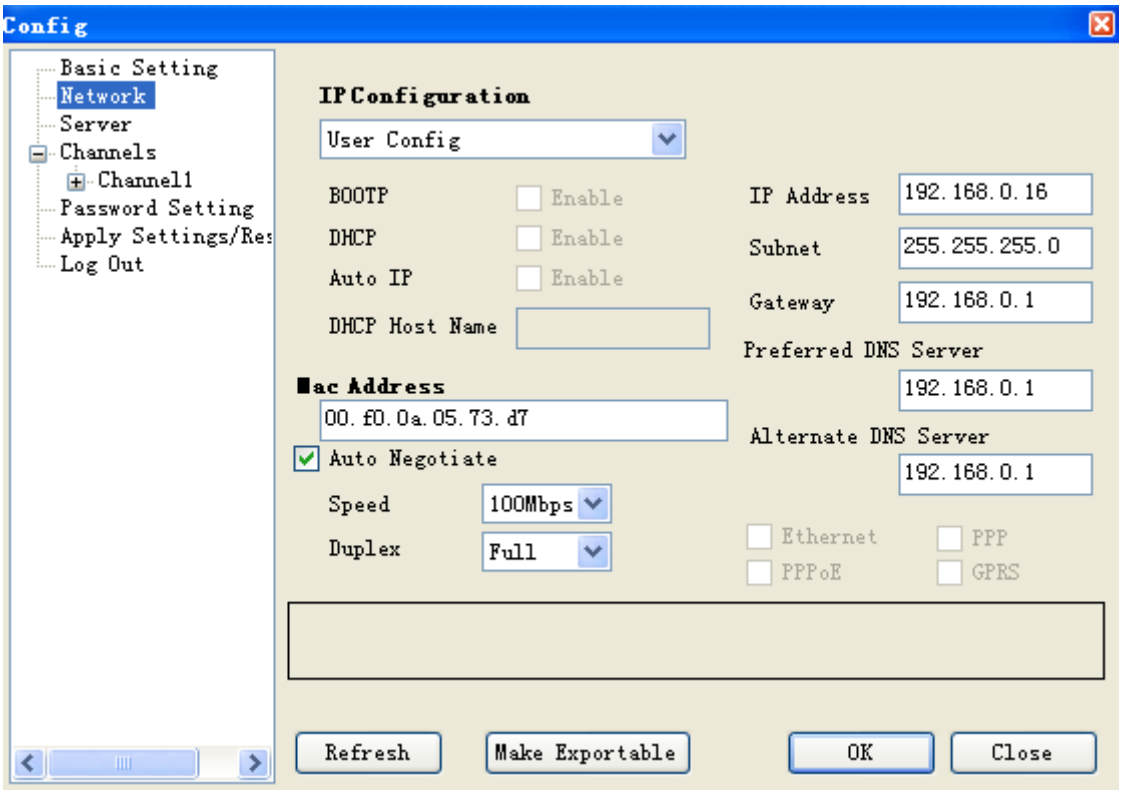
configuration dialog box would pop out.



Basic Settings:

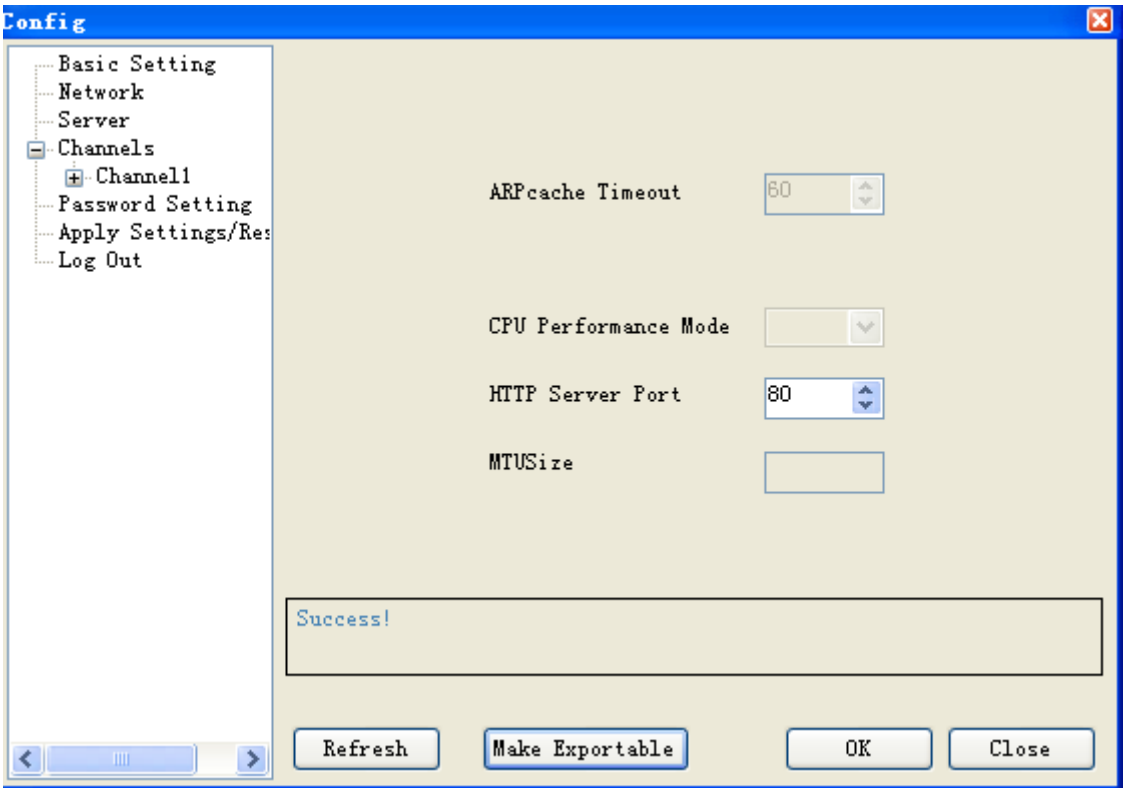
You can rename the Device name, default is NB-L

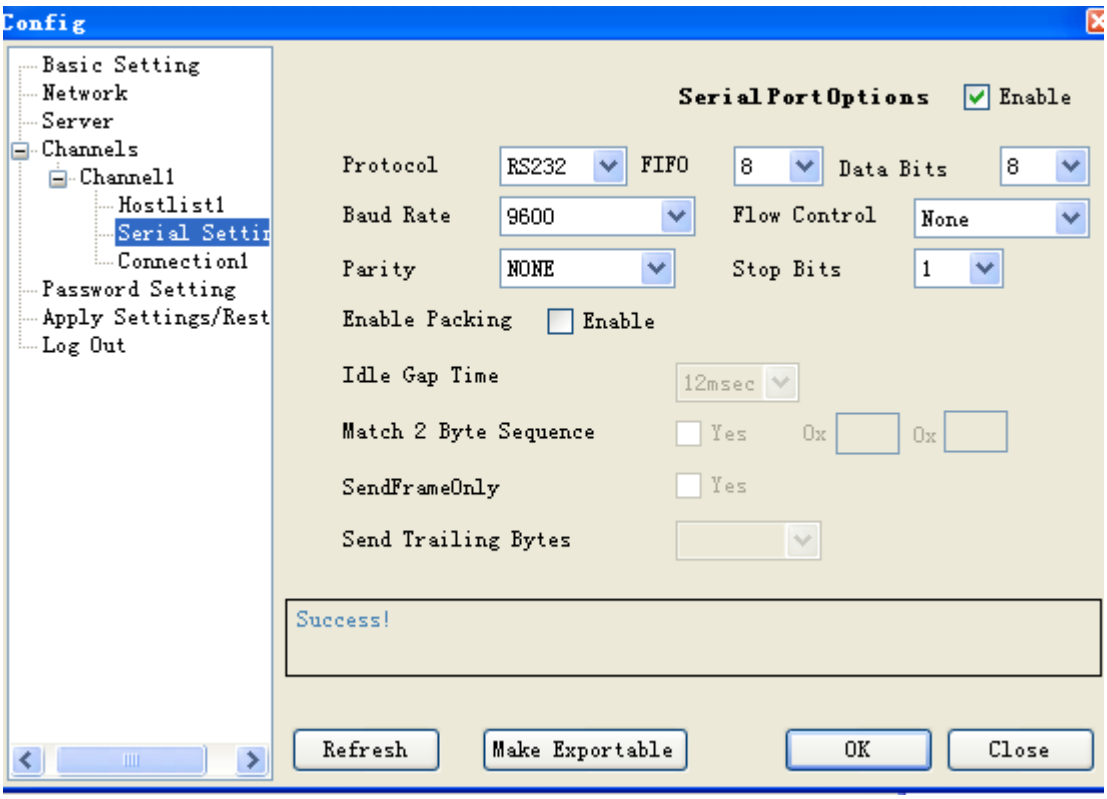
After you click the "OK" button, the settings in the current dialog box would be set into the CPU.



Network settings:

You can view the network parameters in such table.

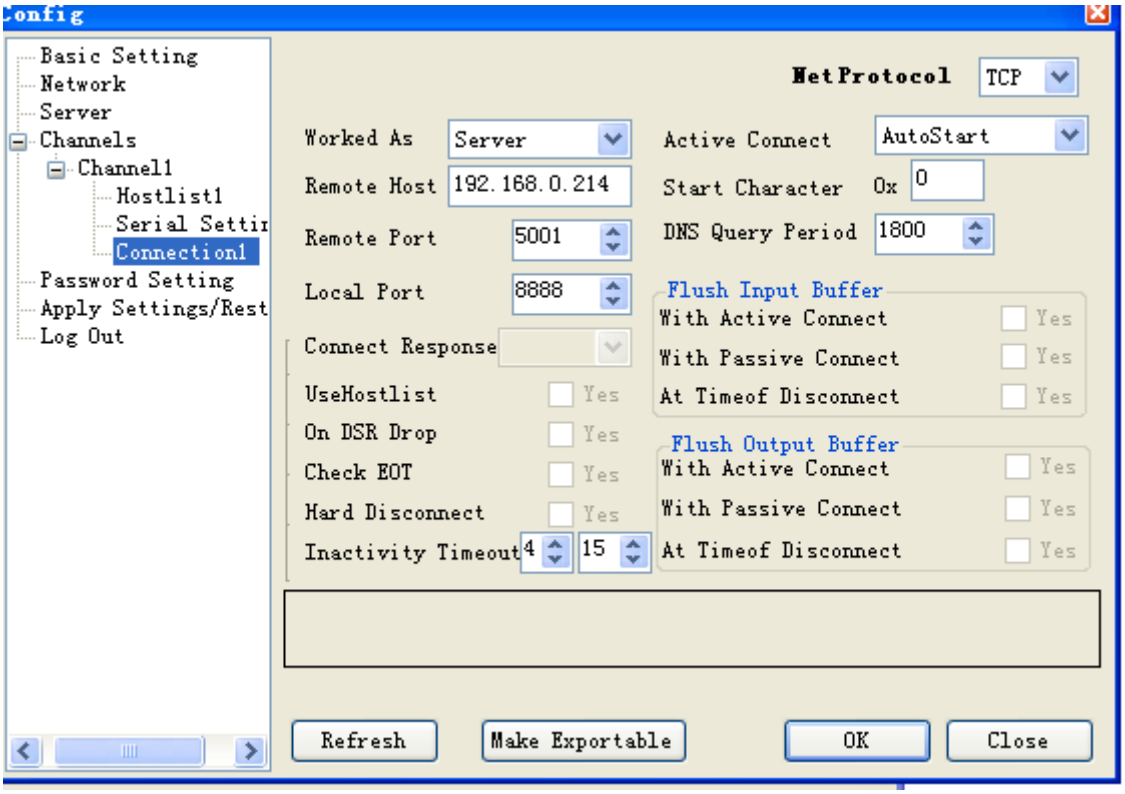




Serial Settings:

This item is very important, you must set as the above figure shows

Note: Baudrate can be set "4800" ,"9600","19200" and the corresponding communication port must be set the same as baudrate , namely , the COM3 of CPU. The default baudrate is 9600 in CPU.



Connection settings:

ELC-22DC-DA-R-N can work as either server or client.

Net Protocol: TCP

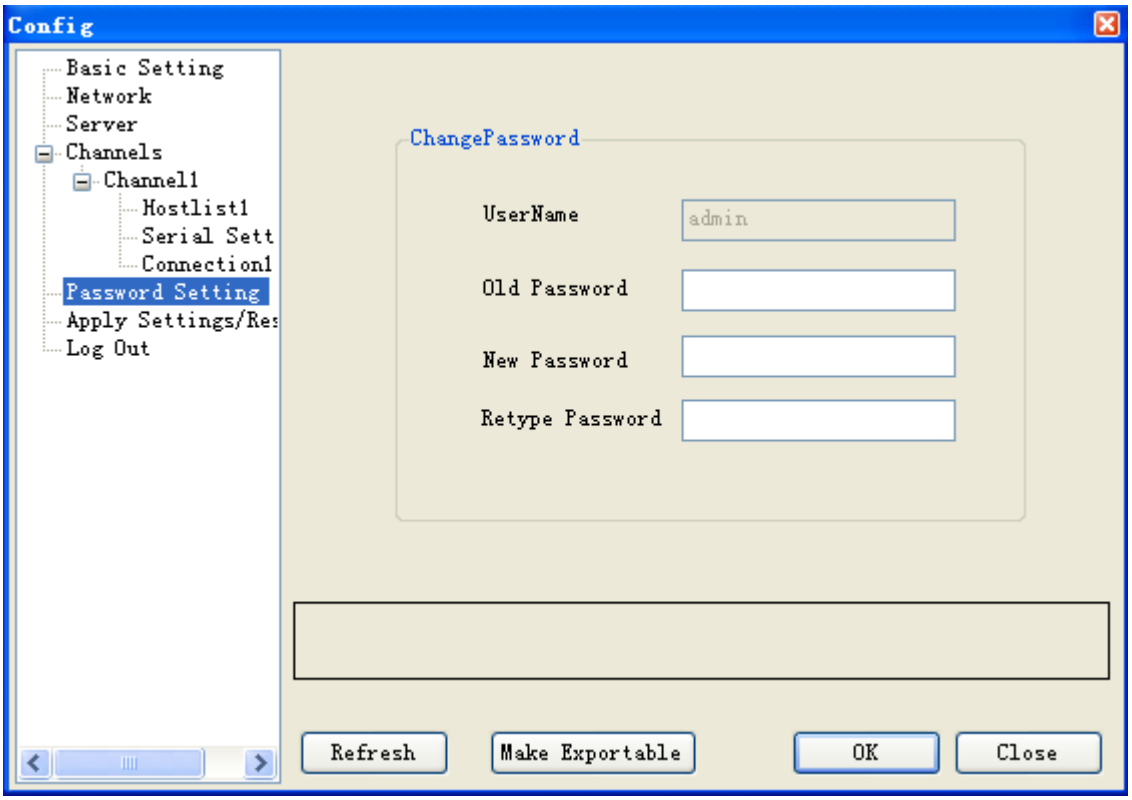
Worked As: Server/Client

Remote Host: The remote PC IP address (while working as client, CPU will automatically get connected to such remote host.)

Active connect : AutoStart

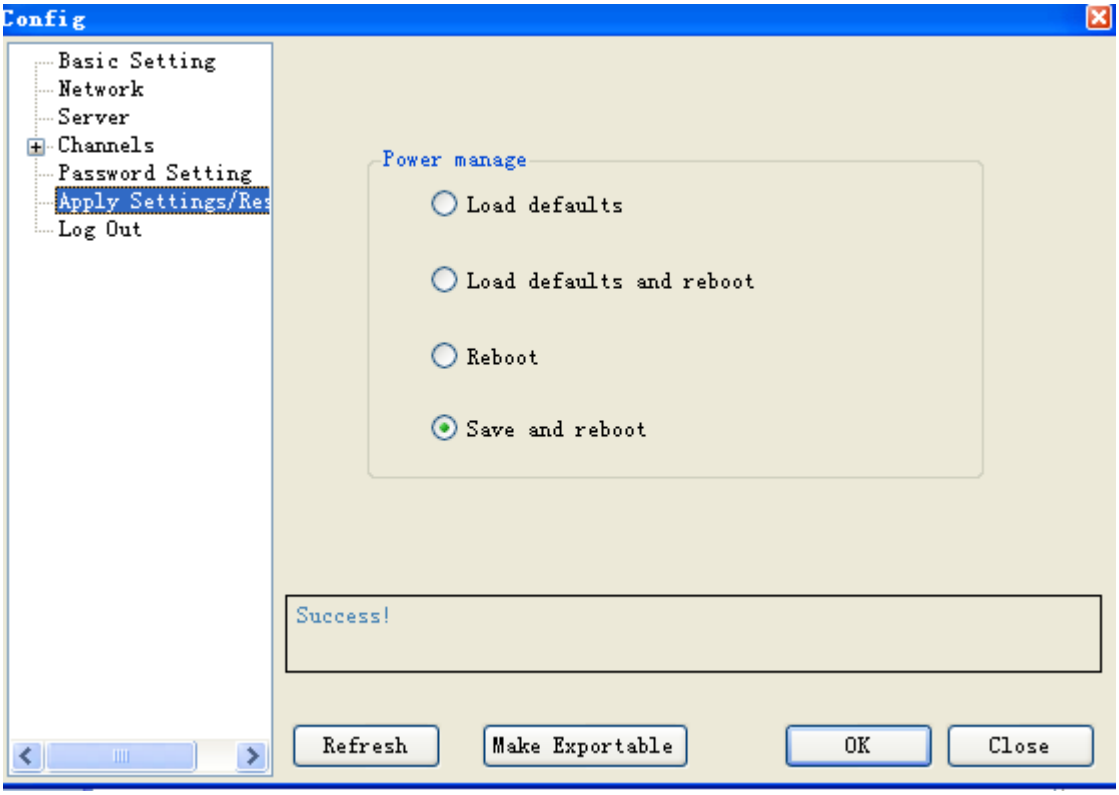
Remote Port: the remote port (while working as client, CPU will get connected to remote host with such port.)

Local Port: the local port (while working as server, the client shall be connected with the CPU



Password setting

Password can be changed in such dialog box. Password is required for accessing the Ethernet port. You must enter at least one character or number.

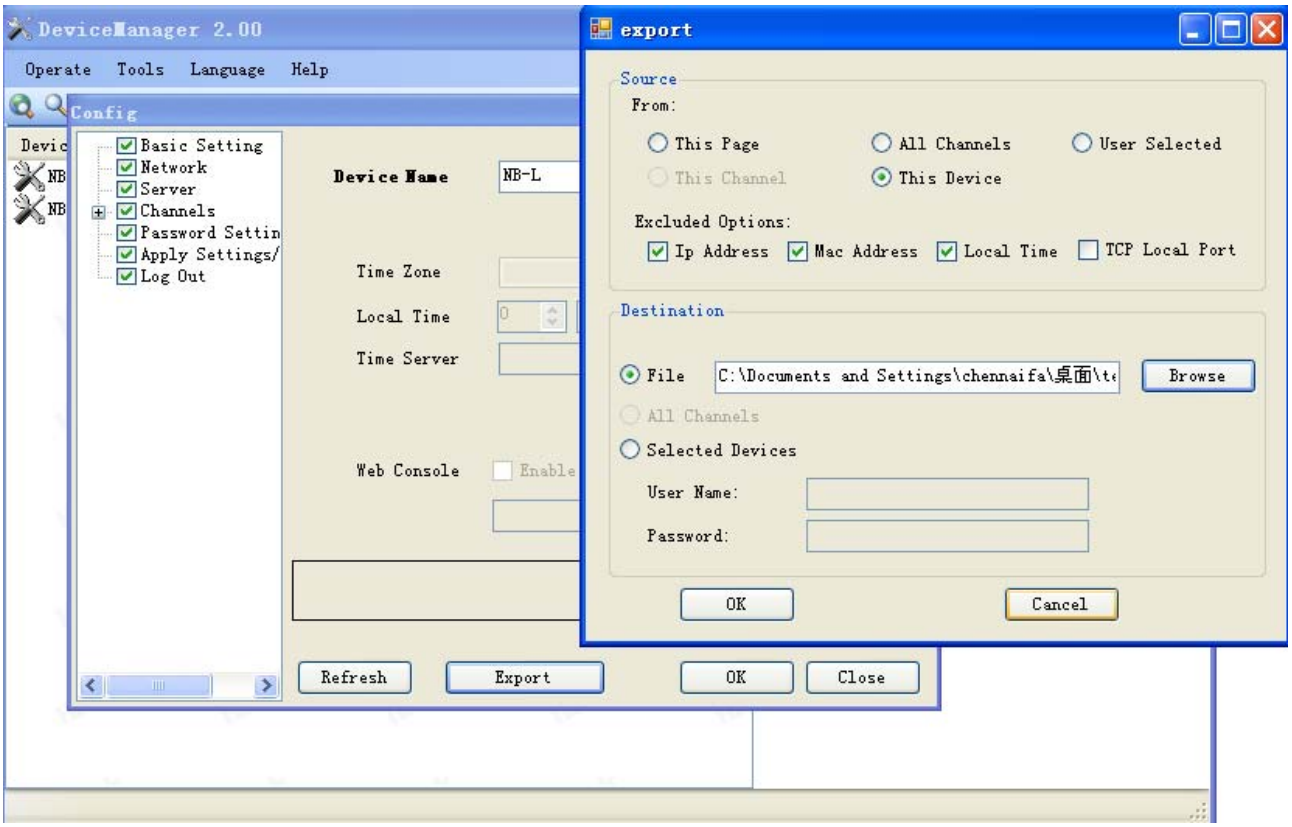


Apply Settings/Reset

Merely "Save and reboot " option can be selected among those options shown in above page.

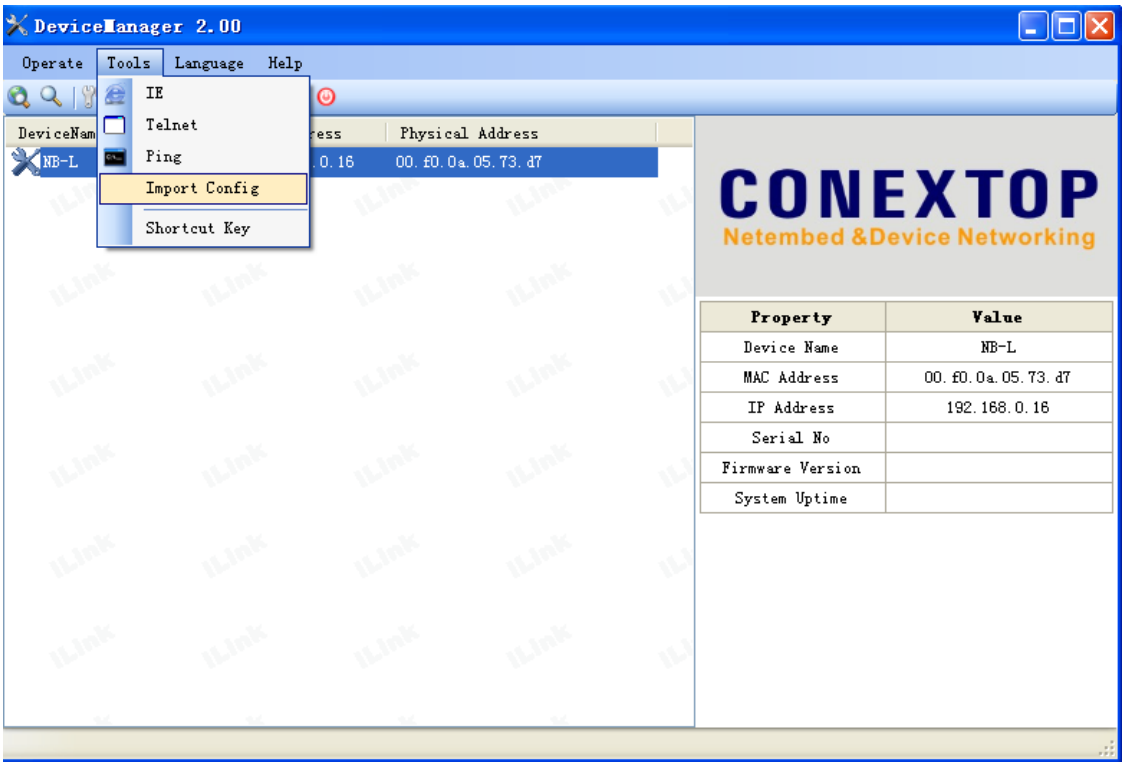
Export you settings:

Click to export the settings



The configuration would be saved as a .xml file.

You also can import the existed configuration by the menu Tools->Import Config



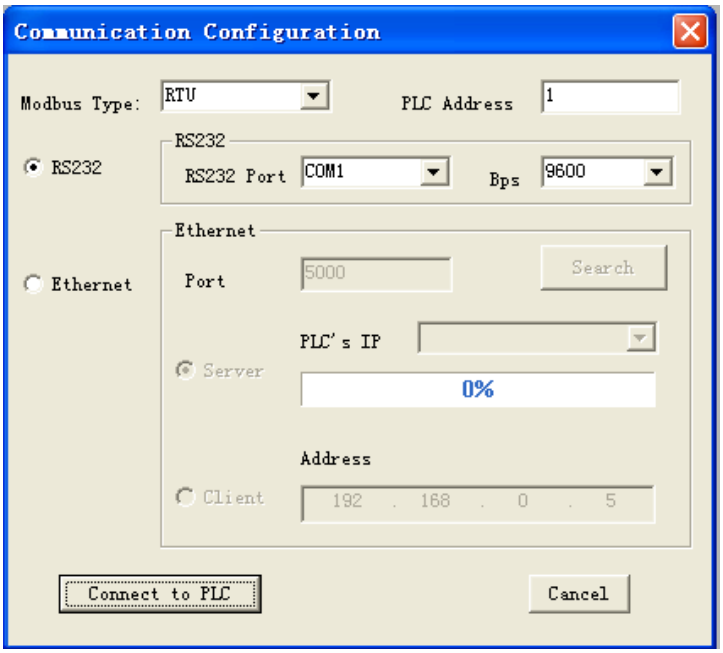
Second part: Communication and monitor with xLogicSoft.

1.Connect the ELC-22DC-DA-R-N as the first part, and configure as the first part.

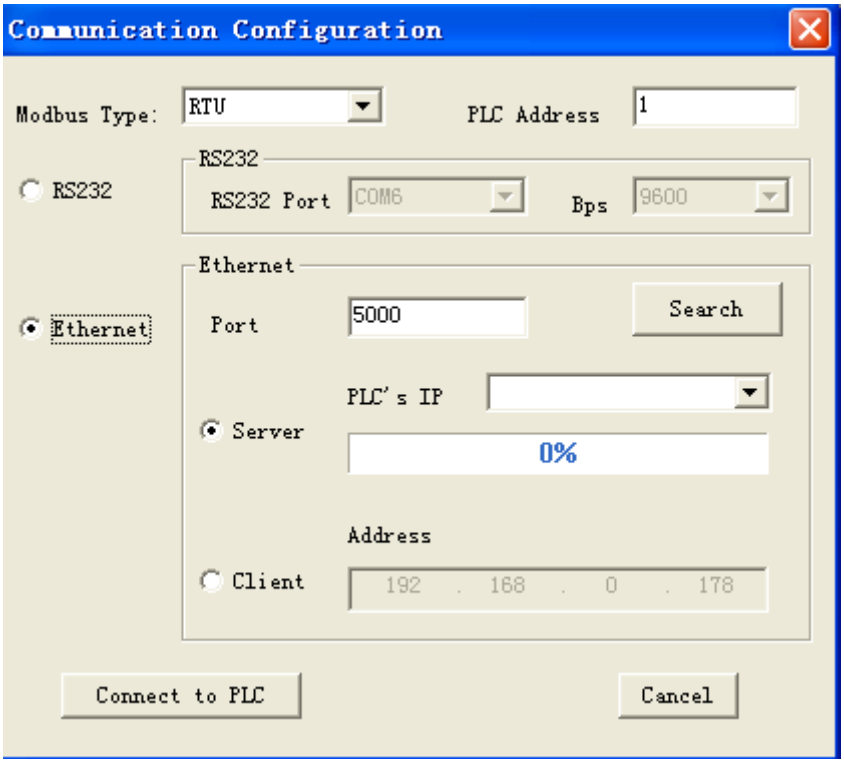
2. Here are two options to open "COM PORT":

A. click symbol B. select menu Tools->Configuration

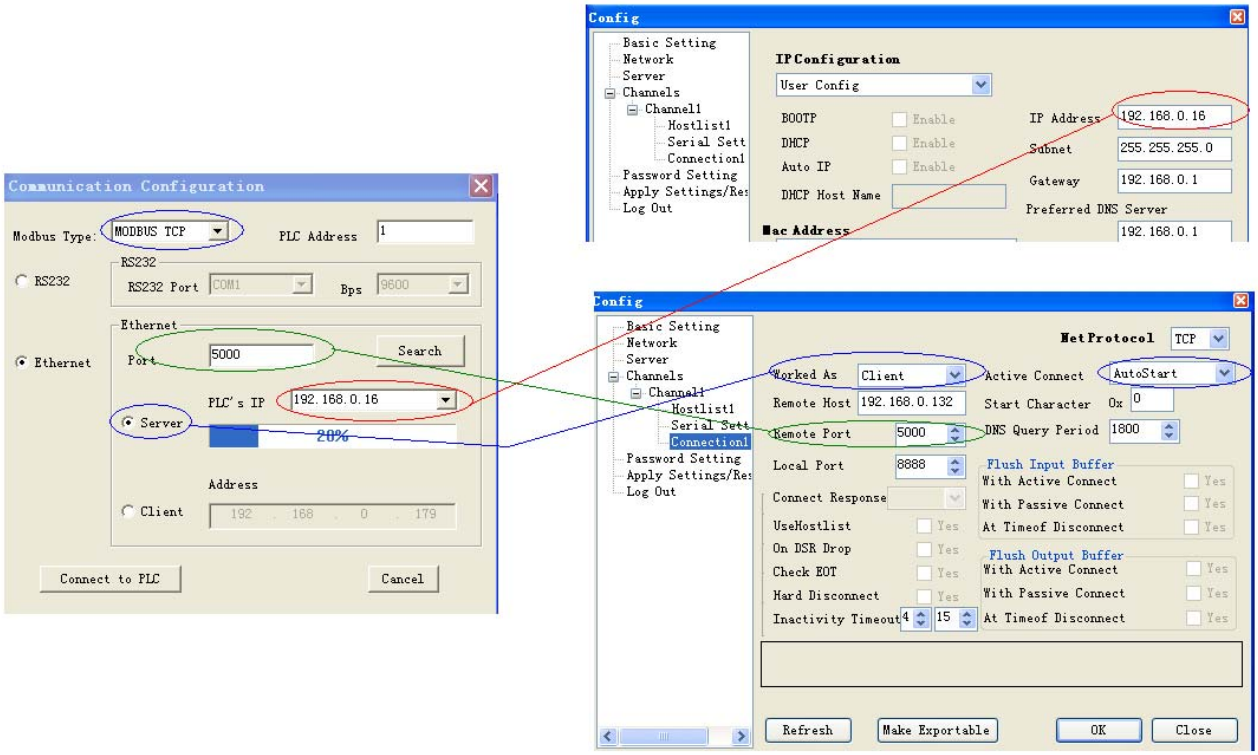
Option 1: Ethernet module in CPU works under TCP client mode, xLogicsoft software acting as server .



3.Select "Ethernet" option



4. To search "PLC's IP" by clicking "Search" button



eSmsConfig Com port setting dialog box LAN port setting in Device manager

Port number and PLC's IP pre-configure in Device manager shall be configured as above figure shows

Notes:

1.The remote host IP address is the same as that of the PC in which the eSmsConfig being installed .

2.Modbus Type in x-Messenger shall be MODBUS TCP

3. Active Connect must be "AutoStart" in device manager.

5. Click "Connect to PLC" button, and then the Ethernet module and PC will be linked.

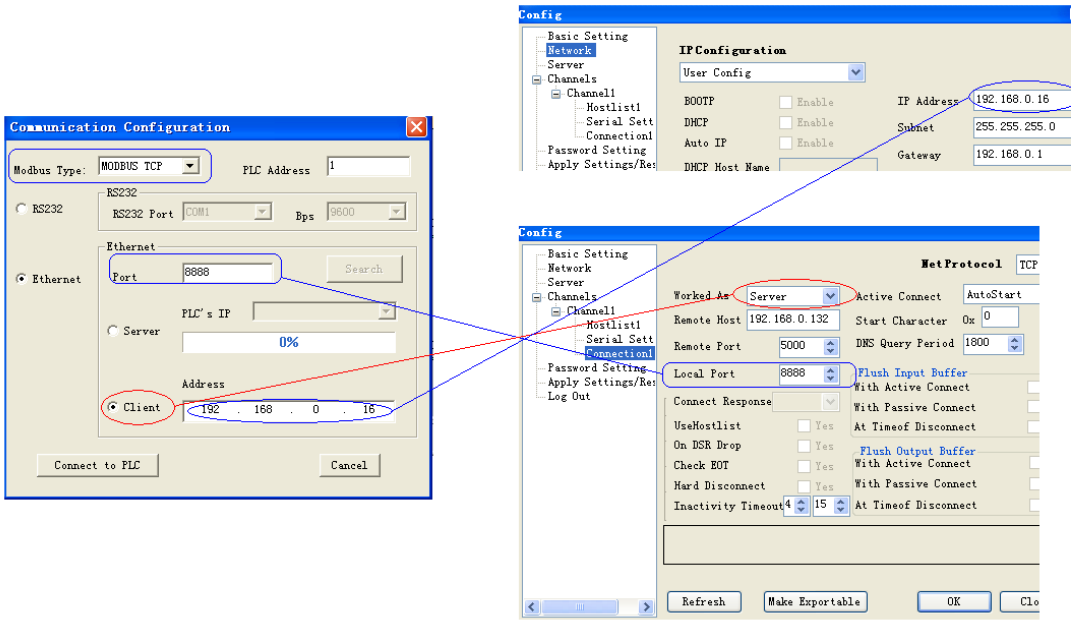
After the EXM CPU and PC being linked, many features can come true, e.g. downloading user program into x-Messenger CPU module , uploading program into PC and online monitor (monitor real time status of x-Messenger IO)can be done, herewith Ethernet module just plays a role of ELC-RS232/USB cable.

A . Upload program: click

B. Download program: click

C. Monitor program run status: click

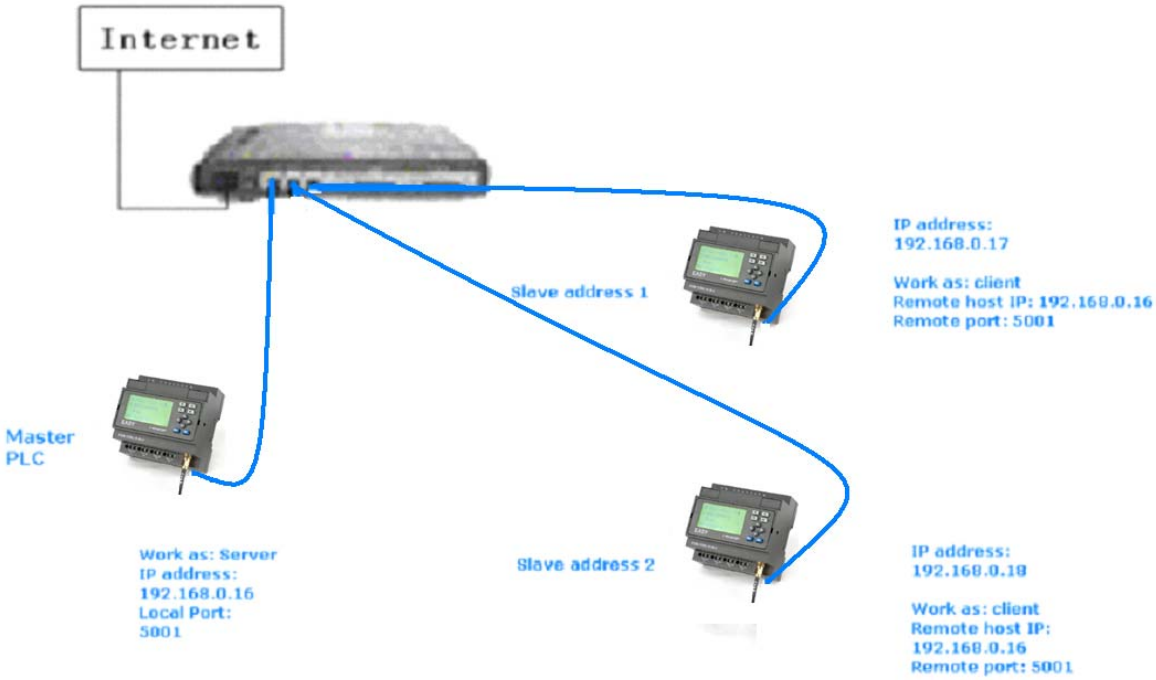
Option 2: EXM CPU work under TCP serve mode, xLogicsoft software acting as Client.



6. Click "Connect to PLC" button, and then the Ethernet module and PC will be linked.

How to establish the communication between EXM CPUs via Ethernet ?

Hardware connection.



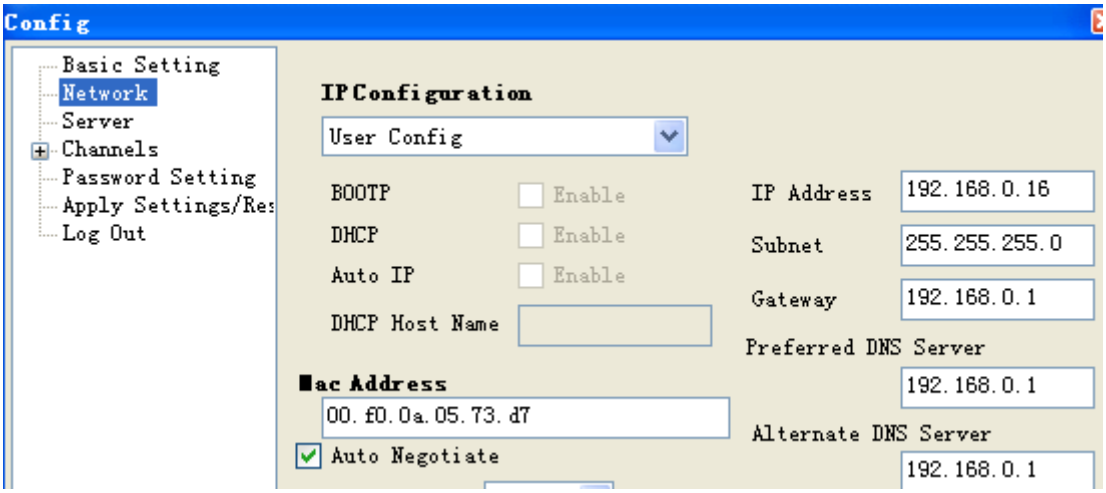
Step A.

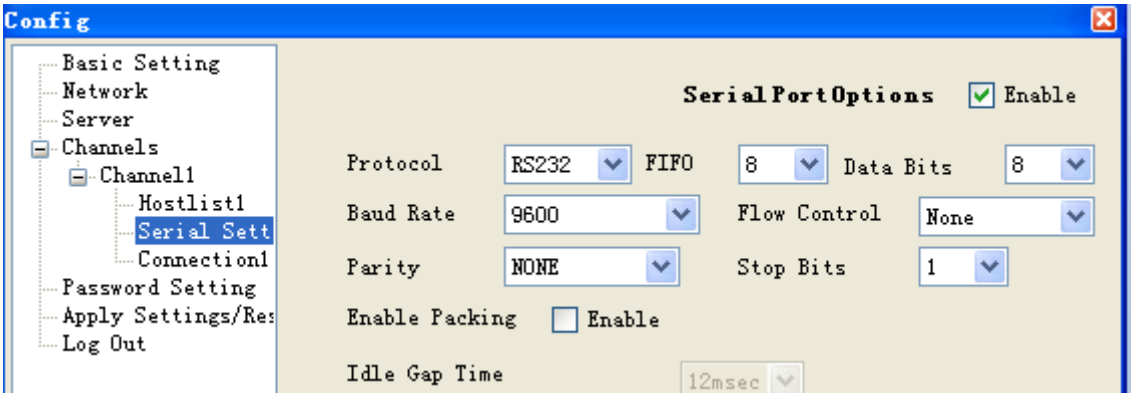
First you need use the device manger to configure the LAN connection.

Example:

Master PLC works as server. Its IP address is 192.168.0.16 and the local port shall be set as 5001.

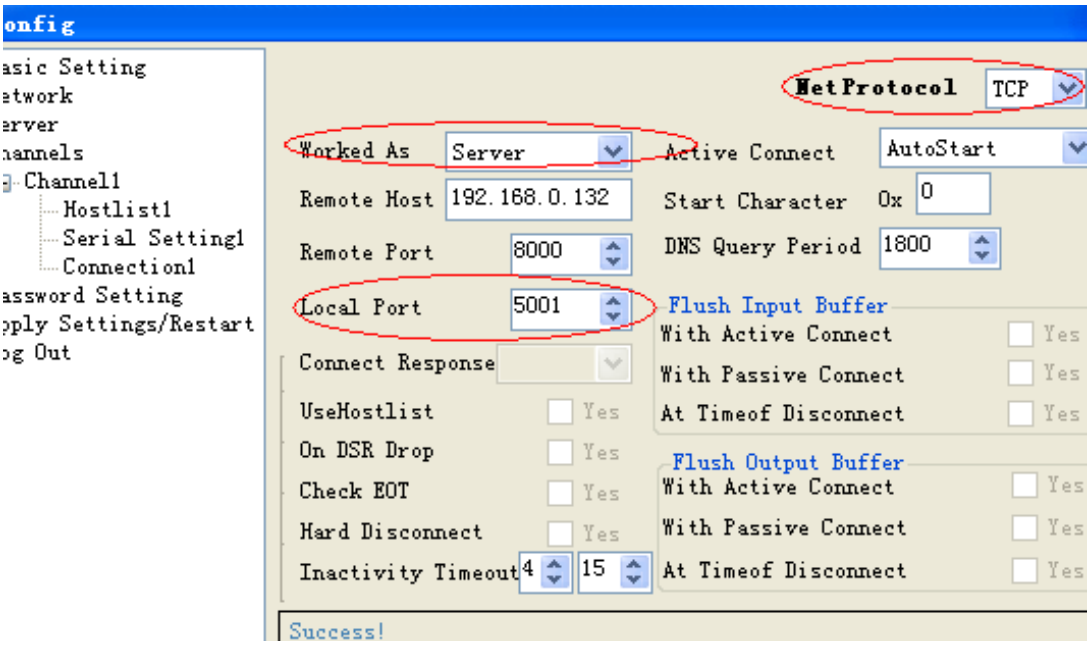
As below configure shows :





Work as: server

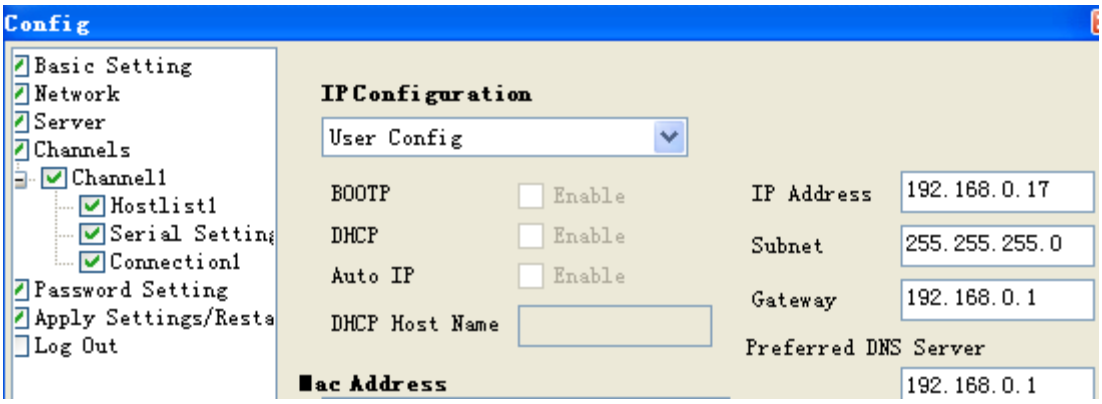
Local port: 5001



The items with red circle marked must be the same as the above figure.

Slave 1 settings:

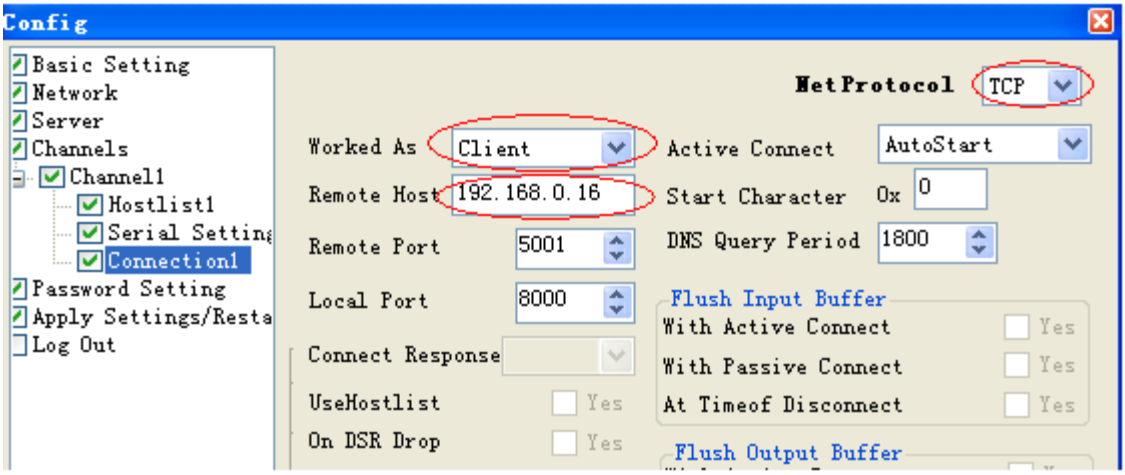
IP address is 192.168.0.17



Work as：Client

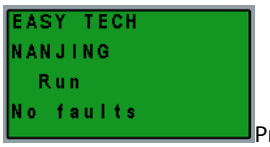
Remote Host: 192.168.0.16

Remote port: 5001

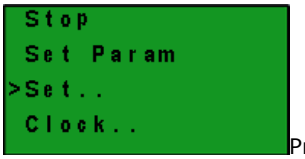


The items with red circle marked must be the same as the above figure.

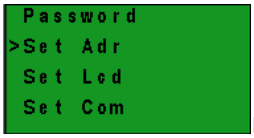
PLC address need be changed to 1 (default is 1). Change the CPU address with the panel key



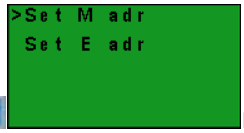
Press Esc ,and then press



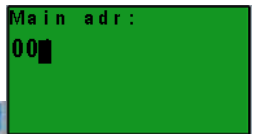
Press Ok



Press Ok



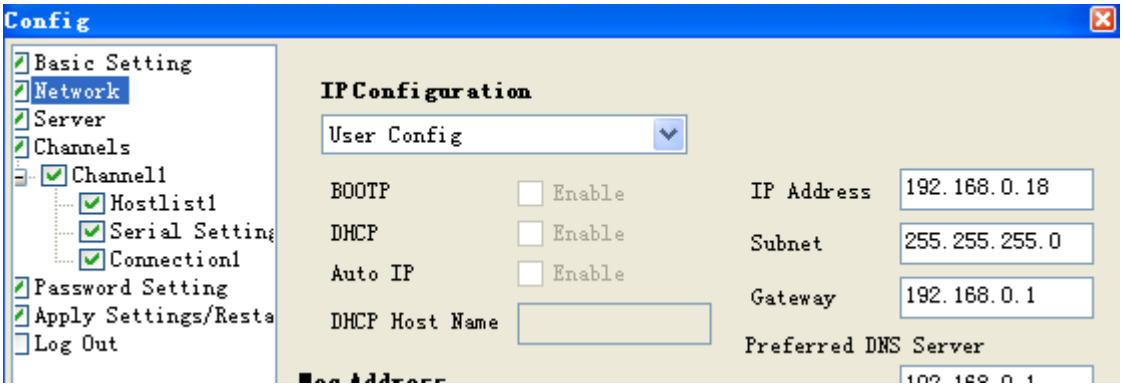
Press Ok



Change address with UP or DOWN button and confirm with OK.

Slave 2 settings:

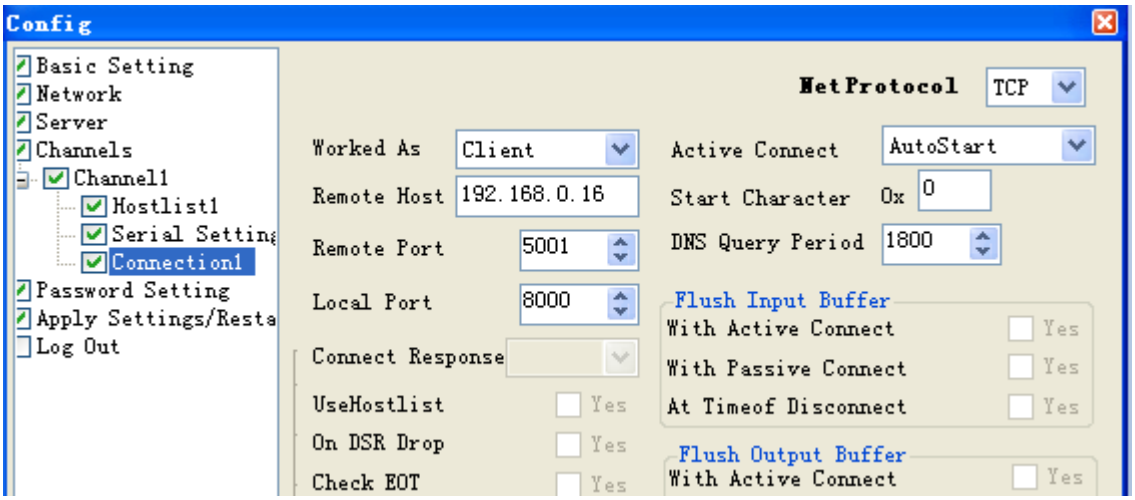
IP address is 192.168.0.18



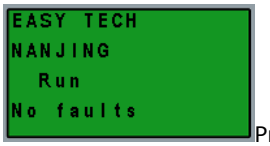
Work as : Client

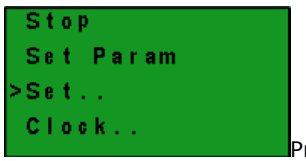
Remote Host: 192.168.0.16

Remote port: 5001

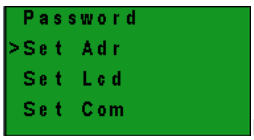


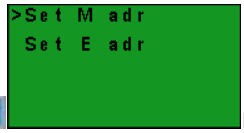
PLC address need be changed to 2 (default is 1). Change the CPU address with the panel key

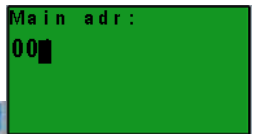


Press Esc ,and then press 

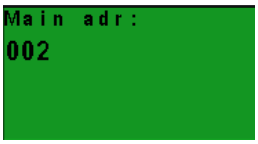
Press Ok



Press Ok


Press Ok


Change address with UP or DOWN button and confirm with OK.



Regarding the program. We need realize the below logic.

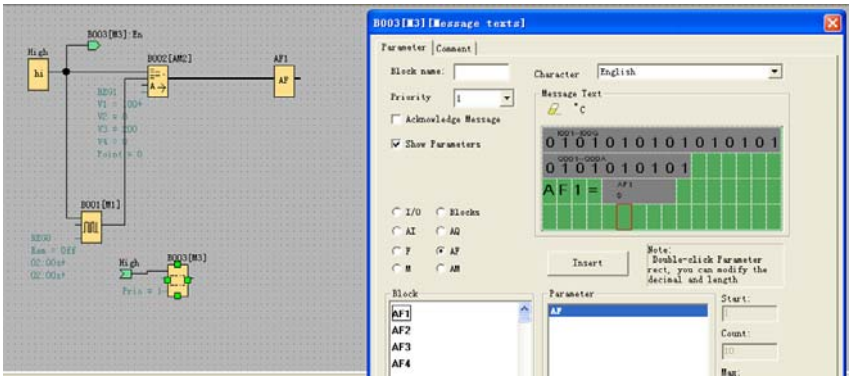
1.I1--I4 in master to control the Q1--Q4 in slave1&salve2, if I1 is ON in master, the corresponding Q1 in salves is ON; I2 is ON in master, the corresponding Q2 in salves is ON;....I4 is On in master, the corresponding Q4 in salves is ON. If I1 is OFF in master, the corresponding Q1 in salves is OFF.....I4 is OFF in master, the corresponding Q4 in salves is OFF.

2. Read the Inputs I1--I4 status of slave 1 to control the F11--F14 in master; Read the Inputs I1--I4 status of slave 2 to control the F21--F24.

3. Read the AF1 value of slave1 to be saved in the AF1 of master; Read AF1 value of slave2 to be saved in AF2 of master.

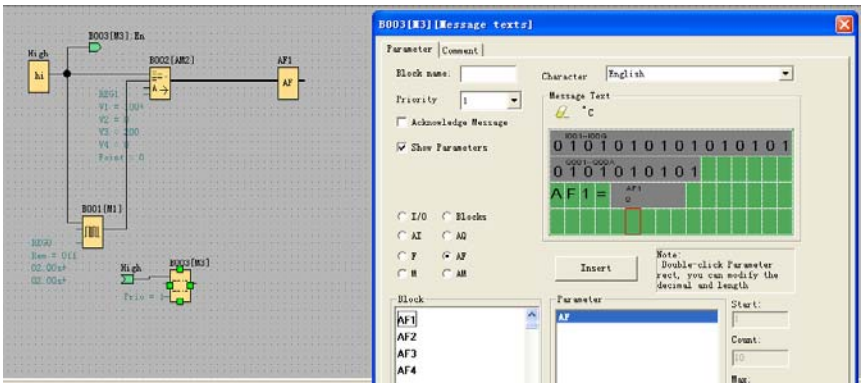
Program in slave 1

(Note: In the program, you can put the input/output block in, but you cannot link the input pin of the output)



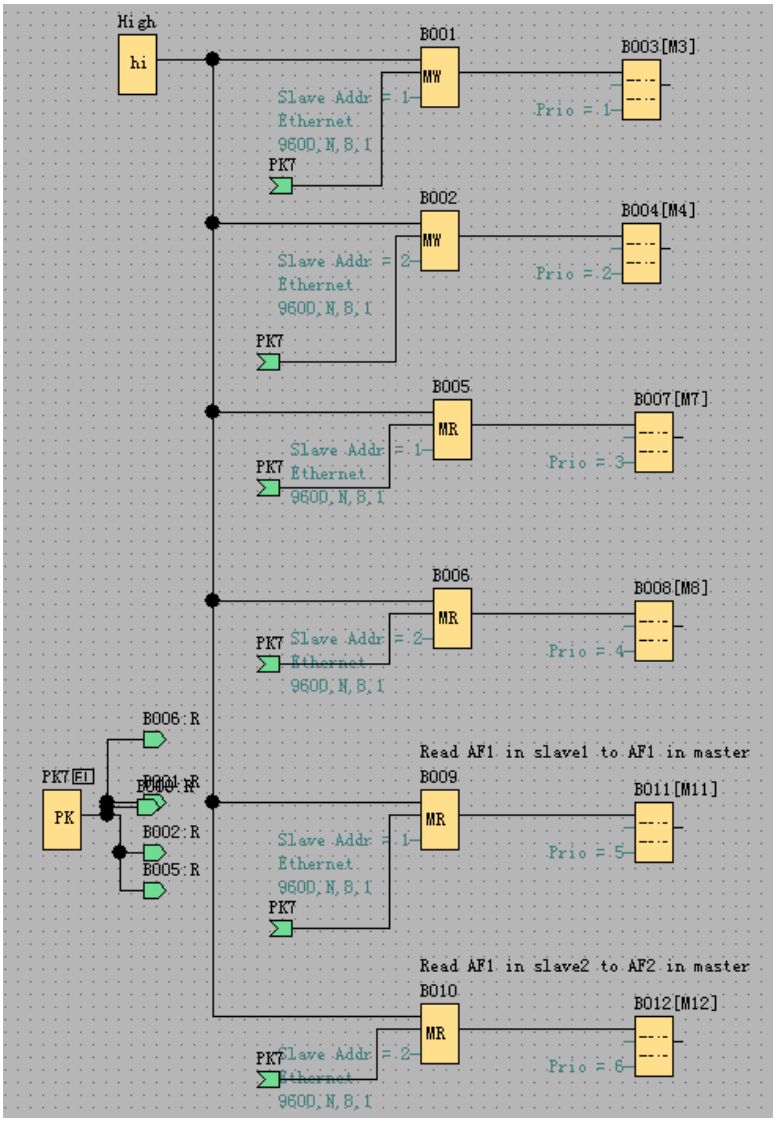
Program in slave 2

(Note: In the program, you can put the input/output block in, but you cannot link the input pin of the output)

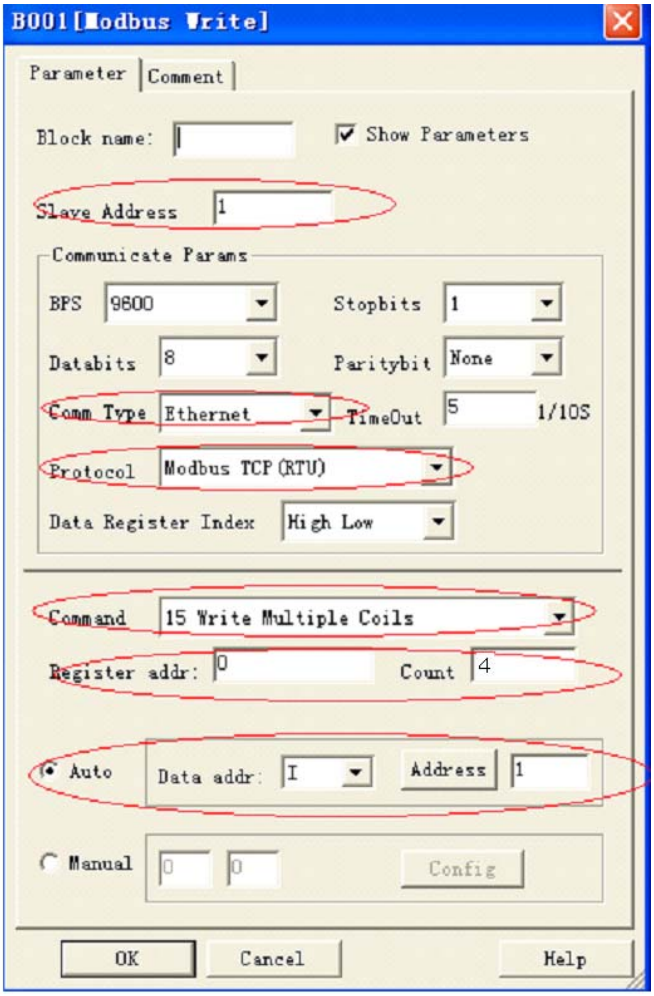


Program in master

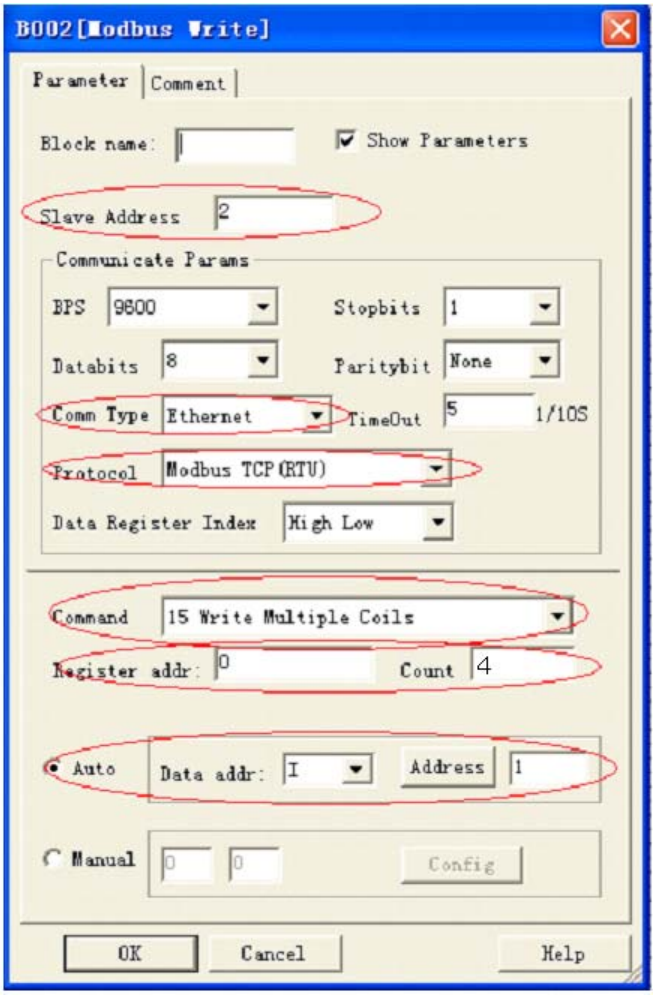
You need use the MODBUS BLOCK to realize the data transmission between master and slaves.



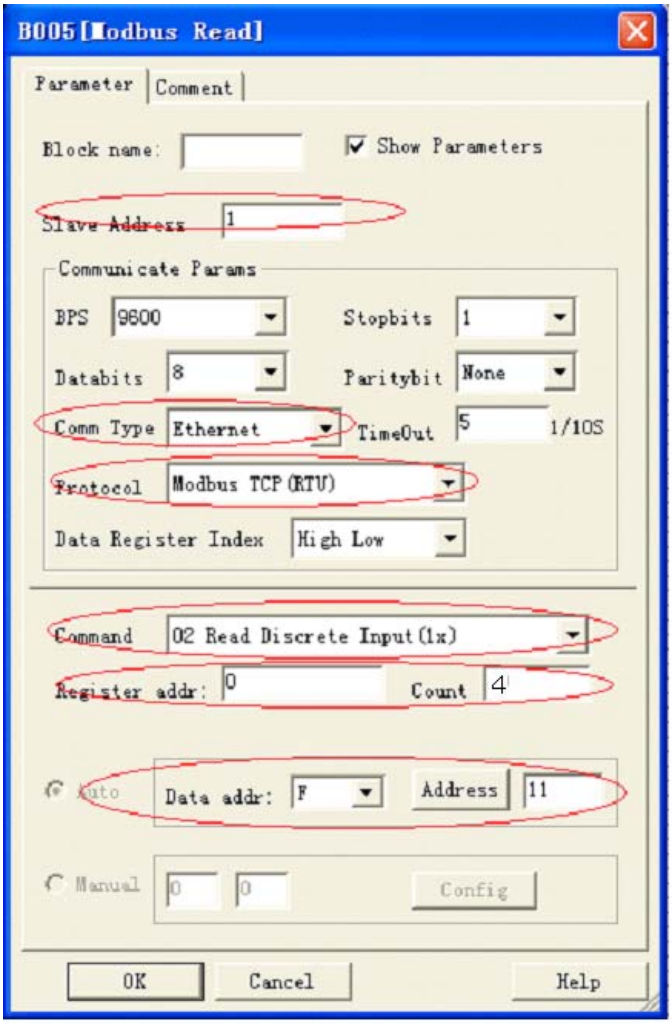
B001: Transfer the I1--I4 status from the master to the Q1-Q4 of the slave1. Setting as follows:



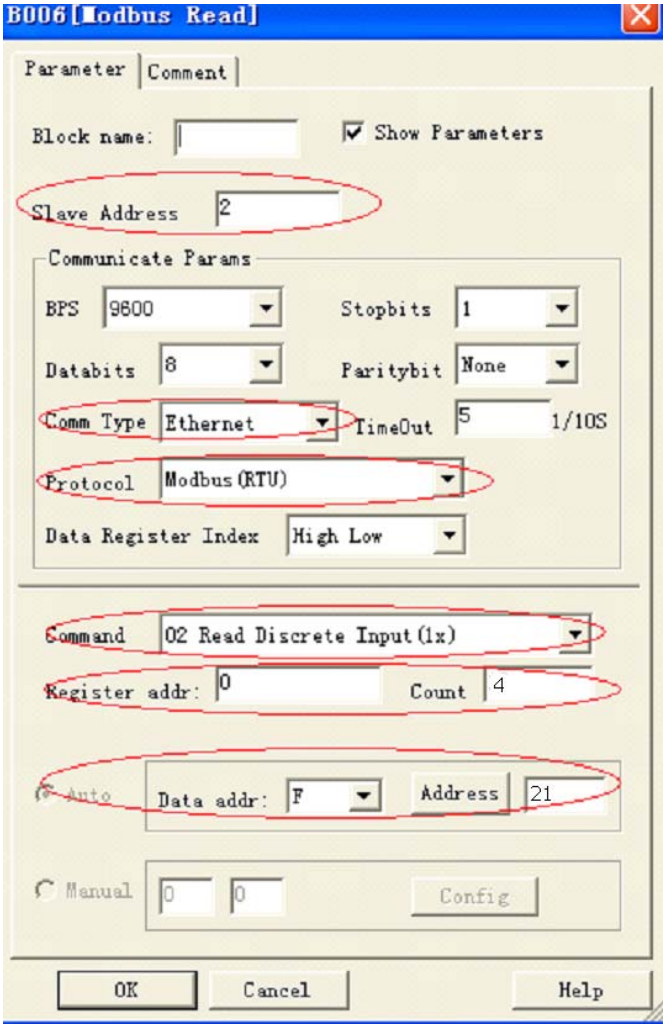
B002: Transfer the I1--IA status from the master to the Q1-QA of the slave2. Setting as follows:



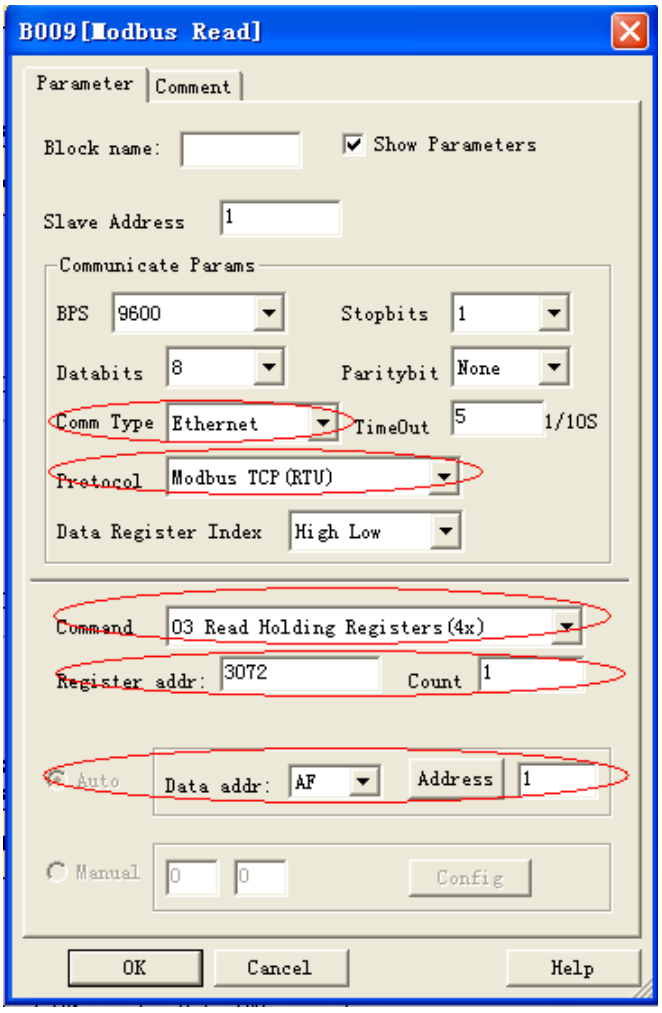
B005: Read the I1--I4 status from the slave1 to the F11-F14 of the master. Setting as follows:



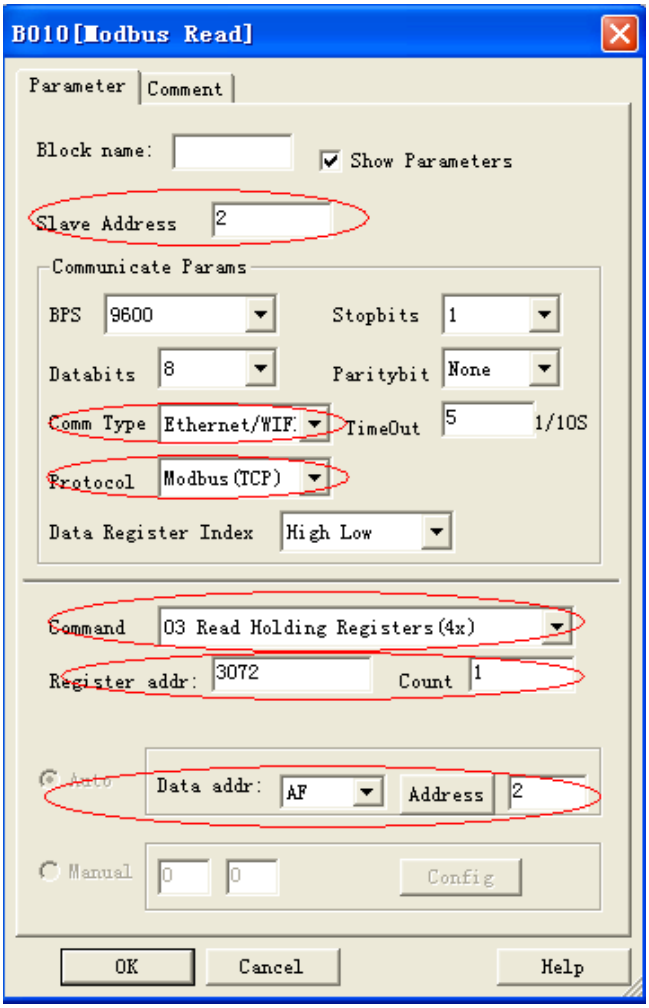
B006: Read the I1--IA status from the slave2 to the F21-F24 of the master. Setting as follows:



B009: Read the AF1 value from the slave1 to the AF1 of the master. Setting as follows:



B010: Read the AF1 value from the slave2 to the AF2 of the master. Setting as follows:



Notes:

1. When you do not use the MODBUS blocks in your program, then EXM CPU shall work as slave, in this case, you can use the SCADA or touch screen to communicate with EXM via the LAN port. However, if MODBUS BLOCKS had been used in your program, moreover, the communication type (comm Type) is Ethernet, then EXM can not work as slave through Ethernet port

2. In your program, if the Modbus read/write blocks would be used, then you can use the EXM as the master CPU to communicate with the slave (i.e. x-Messenger or the devices from other supplier which supports the standard MODBUS TCP communication protocol.) in Modbus network

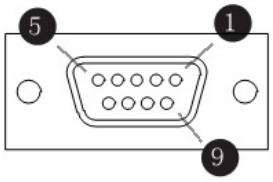
3.3.5 SD card Data logging

Reserved(Currently not available) If data storage is needed use, our ELC-MEMORY is an optional accessory.

3.3.6 Communication Interface

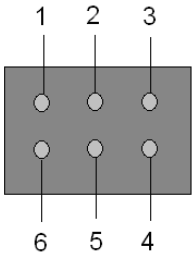
1. Programming port/RS232 port(ELC-RS232 ,ELC-USB,ELC-Copier,ELC-MEMORY should be inserted in this port)

When the programming port is to be used as the standard RS232 port (D-shape 9 pin header) ,the ELC-RS232 cable is needed. Below are the pin-outs for the RS232 connection:



PIN	function
2	RXD
3	TXD
5	GND
others	NULL

2. Expansion port/RS485 (pin definition(2X3 pin socket)



1------RS485 A1

6------RS485 B1

2------

3------

4------GND

5------Battery

Communication between CPU and expansion module will use pin 1, 6. This is COM1.

EXM-E-RS485 module is required when EXM-12 CPU needs to communicate with third party devices via RS485 bus and then these pins (1 and 6) will be used by EXM-E-RS485 module .This is COM1.

So if you had use any extension module with EXM-12 CPU, EXM-E-RS485 shall be unavailable.

Note: 1.The baud rates and communication mode(Modbus RTU/ASCII/TCP) of COM0, COM1 can be modified via the panel key.

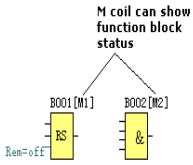
2. The COM1 port also can work as the common RS485 port, when there is no expansion module in the application.

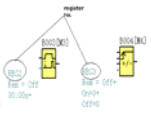
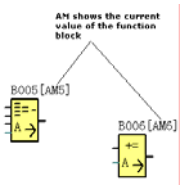
3.USB-B programming port. The CPU without LCD , provides one USB-B programming port.

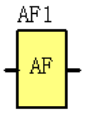
3.3.7 Multiple Modbus communication protocol.

There are three optional communication protocols available. Refer to the communication protocol file for details. Following are the register addresses for the x-Messenger.

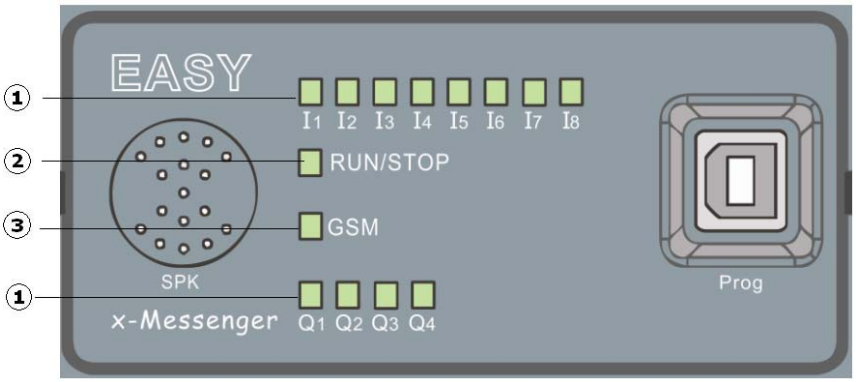
Name	Code	Set address method (DECIMAL)	Data format	Attribute

Digital quantity input switch Block in xlogicsoft: Type: (1x)	EXM-12	0～7	BIT	R	
4 cursors （Cursor key） (1x)	C	256~259	BIT	R	
Coils outputs (0x)	EXM-12/ELC-12(CPU): ELC12-E-8(EXT1) ELC12-E-8(EXT2) ELC12-E-8(EXT3)	0～7 8～15 16～23 24～31	BIT	R/W	
Middle coil  (0x)	M EXM-12	 256~767		R	

F outputs (0x)	F EXM-12	1536~1599	BIT	R/W
Holding register(timer、counter value)  (4x)	REG EXM-12	0~511	LONG	R/W
Analog quantity input register (4x)	AI EXM-12	(1024~1279) CPU:1024~1031 EXT1:1032~1039 EXT2:1040~1047 ……	Signed short	R
Analog quantity output buffer (4x)	AQ EXM-12	(1280~1535) CPU:1280~1281 EXT1:1282~1283 EXT2:1284~1285	Signed short	R/W
Analog quantity buffer  (4x)	AM EXM-12	1536~2074	Signed short	R

Analog quantity buffer  (4x)	AF EXM-12	 3072~3135	Signed short	R/W
The frequency value buffer of threshold trigger (4x)	REG EXM-12	 2560~3071	Word	R

3.3.8 Indicators of module



x-Messenger has 14 LEDs, the GSM LED ， the status LED and the IO status LED.

1.Inputs / Outputs

In addition the states of the inputs and outputs are displayed by means of an LED. These LED are designated as follows:

Inputs I1, I2, I3, I4, I5, I6, I7, I8 (LED lit = input is switched on)
Outputs Q1, Q2, Q3, Q4 (LED lit = output is switched on)

2. Status-LED (RUN/STOP)

This LED is used to indicate the CPU RUN/STOP

- STOP: red. It means there is no program in the current CPU or the program is in STOP mode

-RUN: green. It means the program is running correctly.

3. GSM-LED

- Flashing regularly (every second)

  x-Messenger is not registered in the GSM network.

- Short flashing (approx. every three seconds)

  x-Messenger is registered but there is no communication.

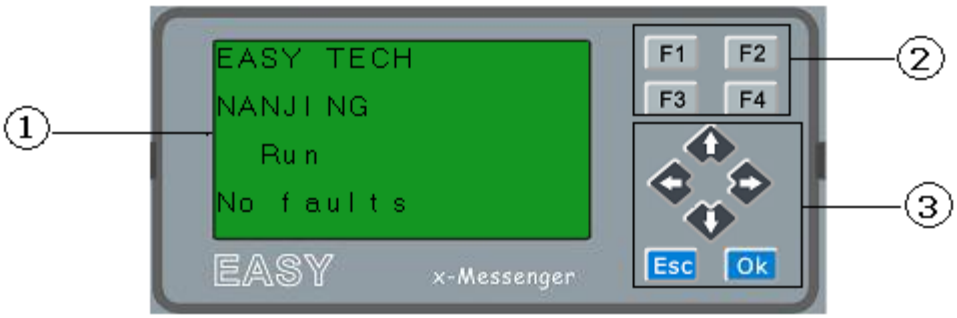
- Continuously lit

  Communication connection is made

- Irregular flashing

  Data transmitted (SMS)

3.3.9 LCD panel instruction



1. **Display area:** 4x16 characters can be displayed
2. **4 X Function key:** operate the program by pressing down these key
3. **6x Panel key:** you can modify the parameters, programming, view alarming message.

What this operate panel can do for you?

1. Display the RUN/STOP status of the CPU
2. Display the GSM signal strength
3. Display or modify the Clock.
4. Display the IO status of CPU& extensions
5. Display all kinds registers value(AI/AO, Parameters of blocks etc)

6. Display multiple alarming messages

7. Modify the parameters of blocks

8. Manual programming

9. Backlight can be controlled via programming(Light on Alarm)

10. System cover message can be customized

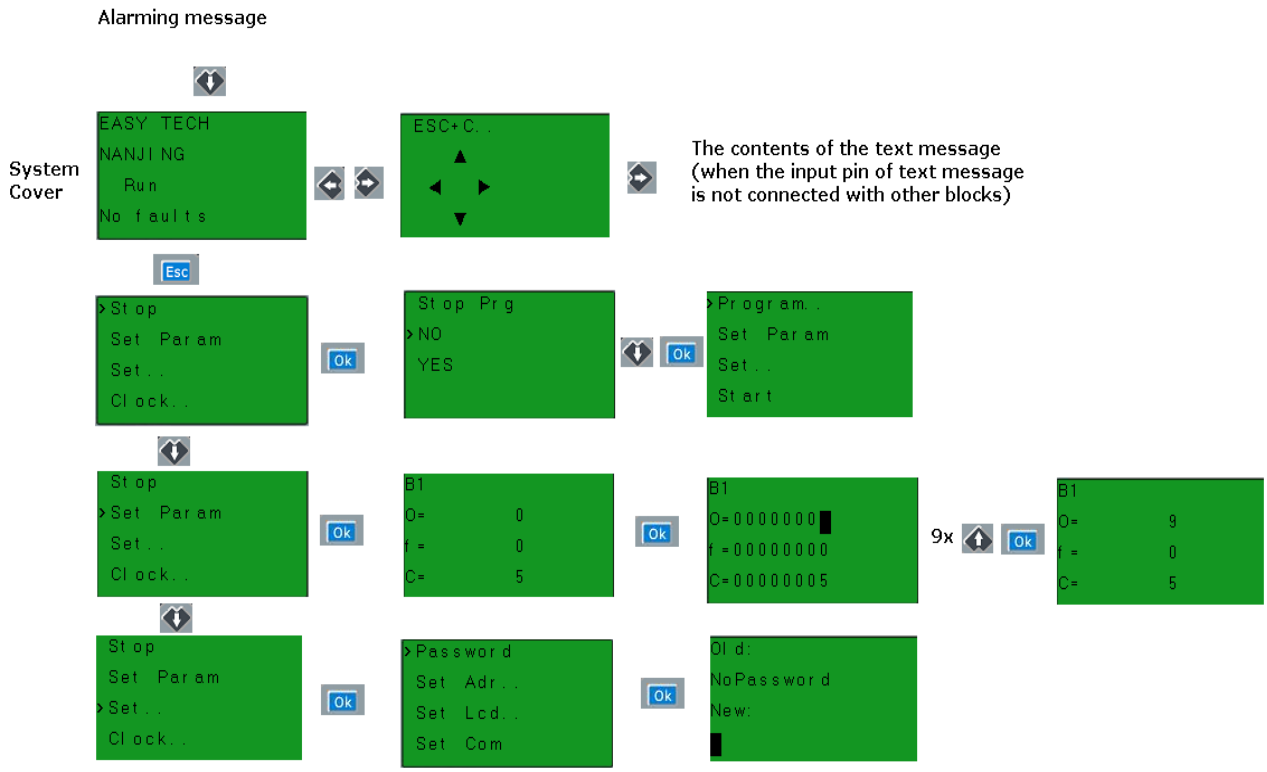
11. Up to 64 different alarming messages is allowed.

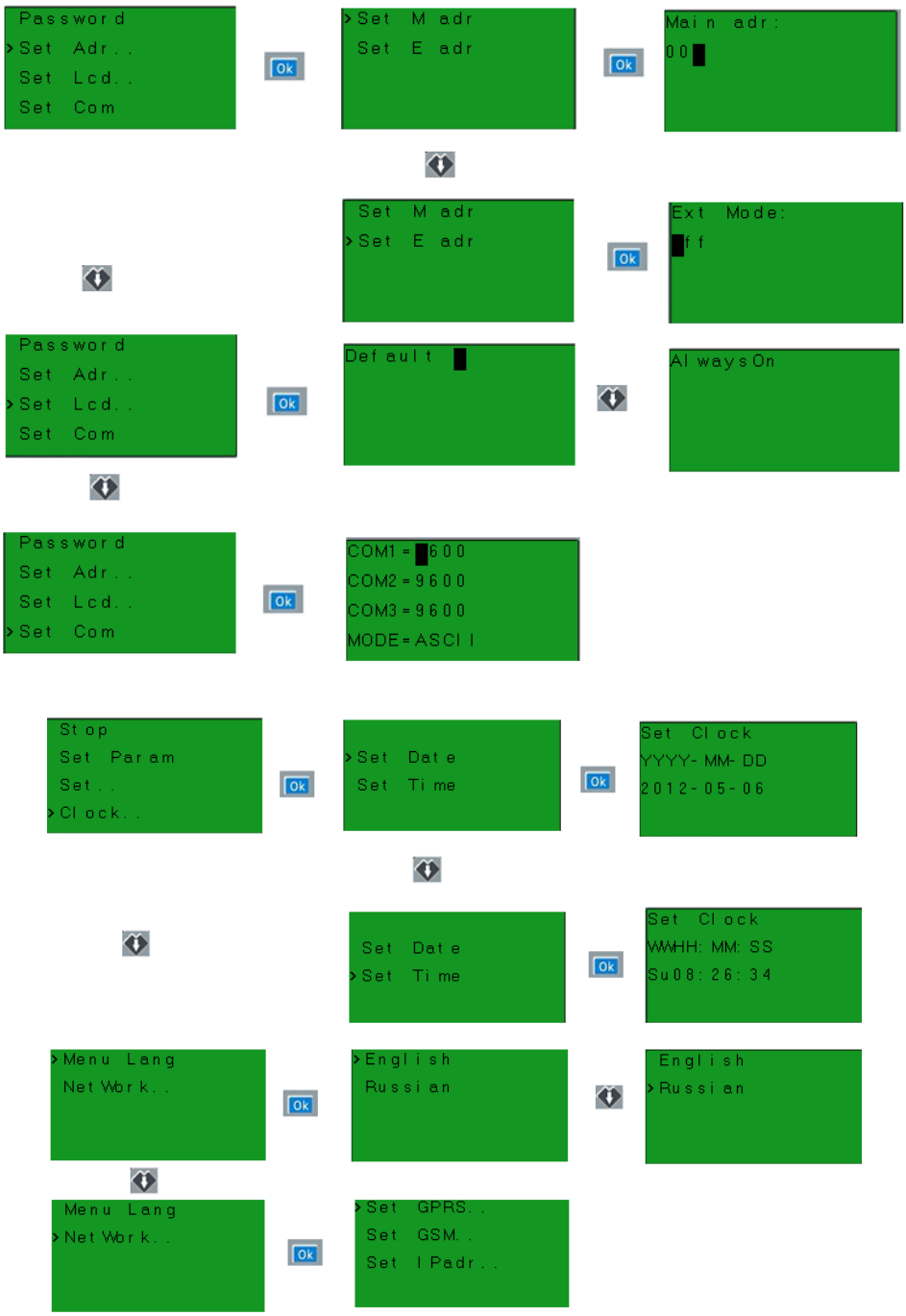
12. The CPU address can be modified

13. Set password protection

.....

Menu shows:





Manual programming menu:

How to program via keypad? Please refer to the chapter 5 for more detail.

3.3.10 Antenna

The x-Messenger comes together with the EXM-ANT 3 meters adhesive antenna. The location of installation must be taken into account and the right antenna has to be selected to ensure reliable connection with the network.

Following antennas is are also available for use:

A **B** **C** **D**

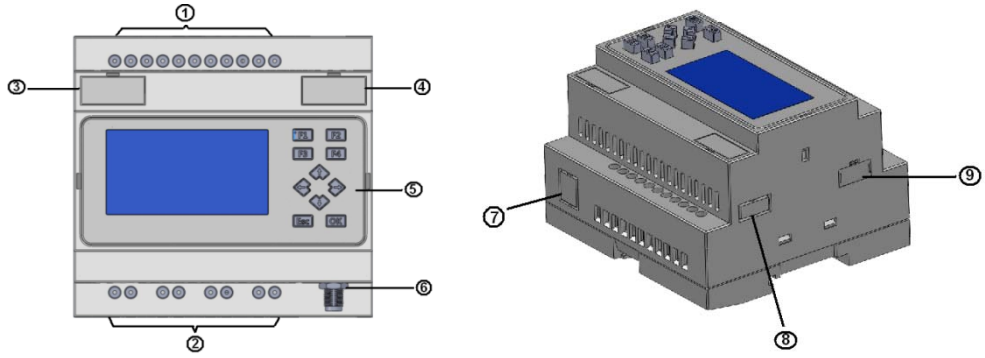
A. Penta-band GSM Antenna
B. EXM-ANT(standard accessory with x-Messenger CPU)
C. The antenna with magnetic base
D. T shape antenna

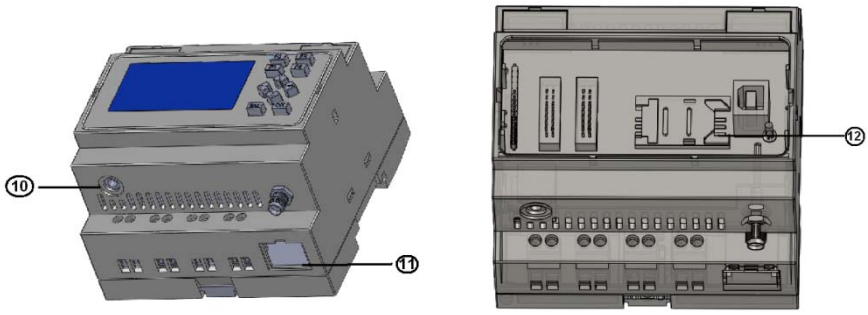
Note：The Penta-band GSM Antenna *is not suitable for installation inside a control panel (shielding).*

3.4 Structure & dimension

1. Standard EXM-12 series CPU

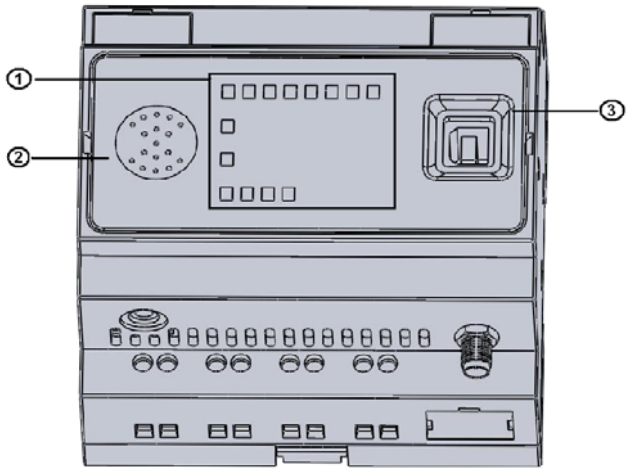
A. With LCD panel model





1. Power supply & Inputs terminals
2. Output terminals (Relay/Transistors)
3. RS232 / Programming interface (TTL signal)
4. Expansion/RS485 port
5. LCD panel (4X16 chars display & 10 panel keys)
6. GSM antenna socket
7. Socket of telephone crystal plug
8. Optional A-type USB interface
9. Mini-SD card socket
10. Audio input/output interface
11. Ethernet interface
12. SIM card holder (Under the LCD panel/ LED indicator cover)

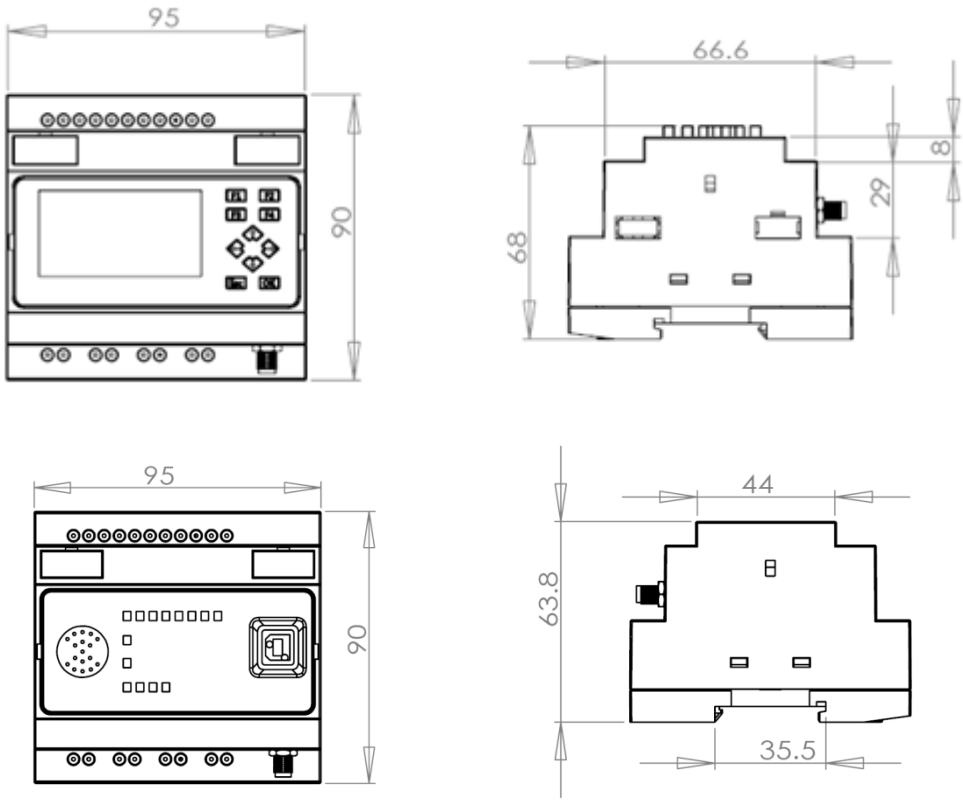
B. Without LCD panel model



1. Indicator area (IO status, RUN/STOP status, GSM status)
2. 1 W speaker
3. B-type USB interface

2. Dimensions

Standard EXM CPU:



Chapter 4 Installing/removing EXM

4.1 DIN rail mounting

Mounting

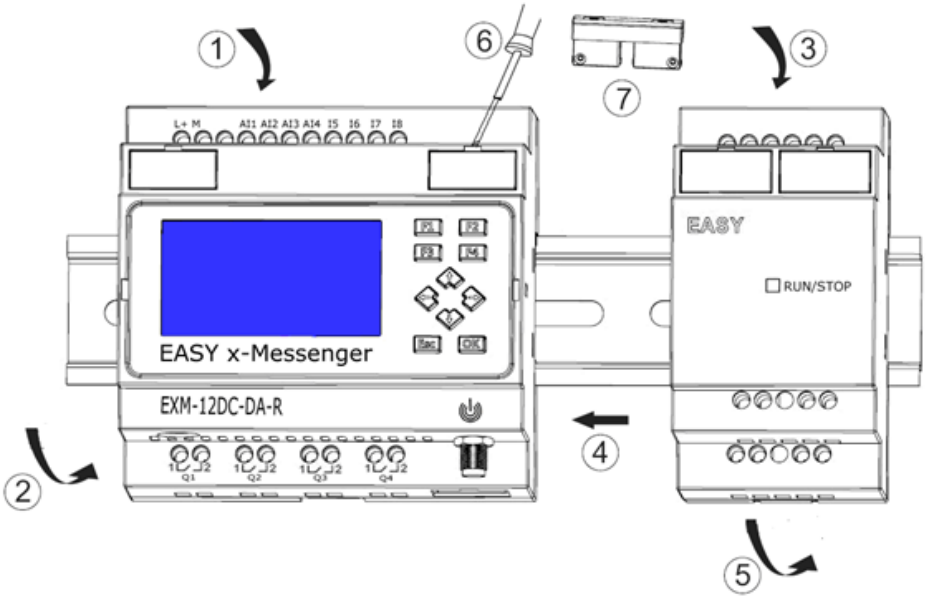
How to mount a x-Messenger module and a expansion module onto a DIN rail:

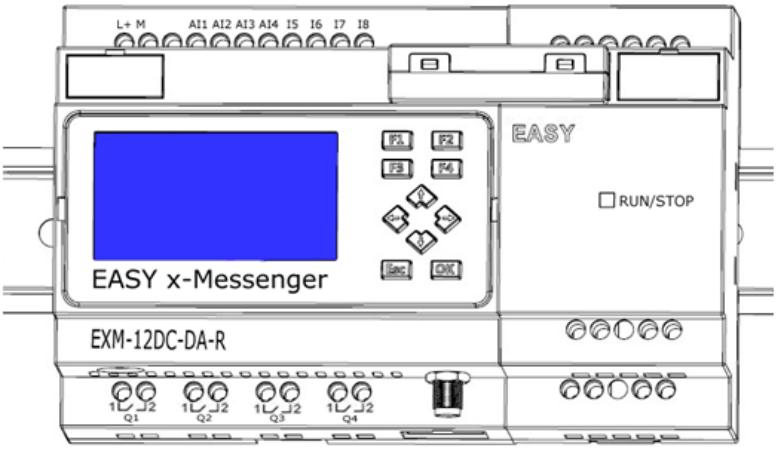
1. Hook the x-Messenger Basic module onto the rail.
2. Push down the lower end to snap it on. The mounting interlock at the rear must engage.
3. Hook the x-Messenger expansion module onto the rail
4. Slide the module towards the left until it touches the x-Messenger CPU.
5. Push down the lower end to snap it on. The mounting interlock at the rear must

engage.

6. Remove the plastic cover in the expansion port of CPU and expansion module.

7. Plus the connection bridge





Repeat the expansion module steps to mount further expansion modules.

Notes: 1. EXM-E extensions connect with EXM-12 CPU by EXM-CB-A connector or EXM-CB-B connection cable (3 meters)

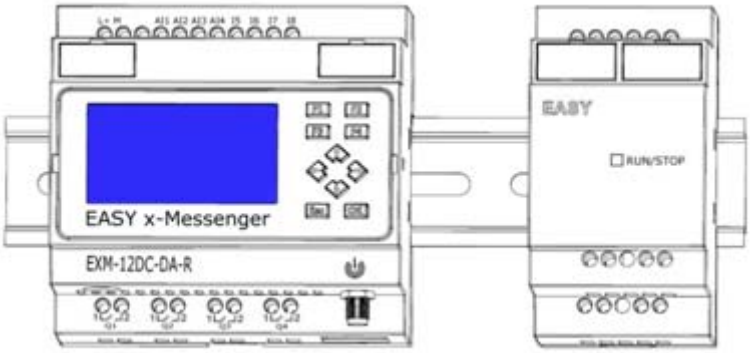
Removal

To remove x-Messenger:

..... if you have installed only one x-Messenger Basic:

1. Insert a screwdriver into the eyelet at the bottom of the slide interlock and move the latch downward.

2. Swing the x-Messenger Basic off the DIN rail.



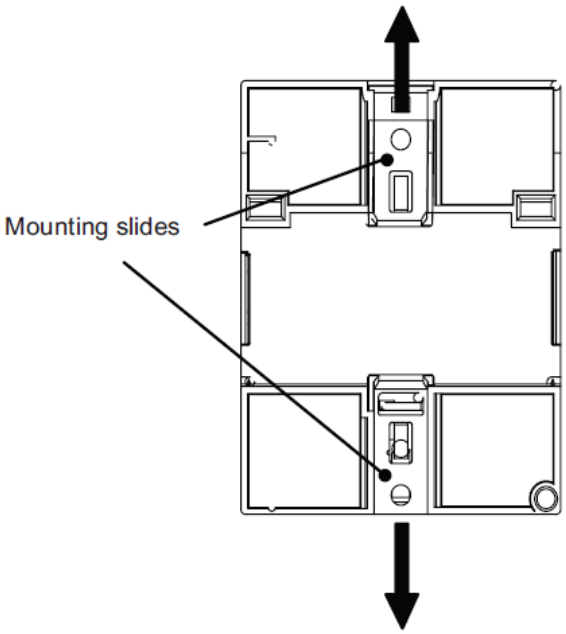
..... if you have connected at least one expansion module to x-Messenger Basic:

1. Remove the connector
2. Slide the expansion module off towards the right.
3. Insert a screwdriver into the eyelet at the bottom of the slide interlock and lever it downward.
4. Swing the expansion module off the profile rail.

Repeat steps 1 to 4 for all other expansion modules.

4.2 Wall-mounting

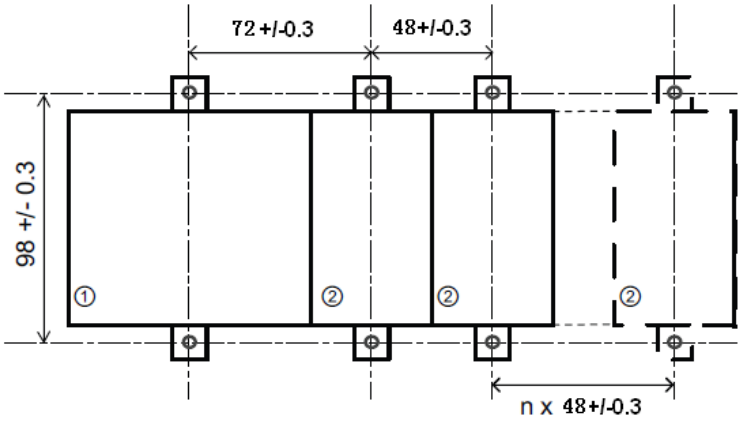
For wall-mounting, first slide the mounting slides on the rear side of the devices towards the outside. You can now wall-mount x-Messenger by means of two mounting slides and two ØM4 screws (tightening torque 0.8 to 1.2 Nm).



Drilling template for wall-mounting

Before you can wall-mount x-Messenger, you need to drill holes using the template shown below.

EXM series(applied to CPU and extensions):



All dimensions in mm

Bore hole for Ø M4 screw, tightening torque 0.8 to 1.2 Nm

1. x-Messenger CPU

2. EXM-E series extensions

4.3 wiring EXM

Wire the x-Messenger using a screwdriver with a 3-mm blade.

You do not need wire ferrules for the terminals. You can use conductors with cross-sections of up to the following thicknesses:

- 1 x 2.5 mm^2
- 2 x 1.5 mm^2 for each second terminal chamber
- Tightening torque: 0.4.. .0.5 N/m or 3. ..4 lbs/in

Note

Always cover the terminals after you have completed the installation. To protect x-Messenger adequately from impermissible contact to live parts, local standards must be complied with.

4.3.1 Connecting the power supply

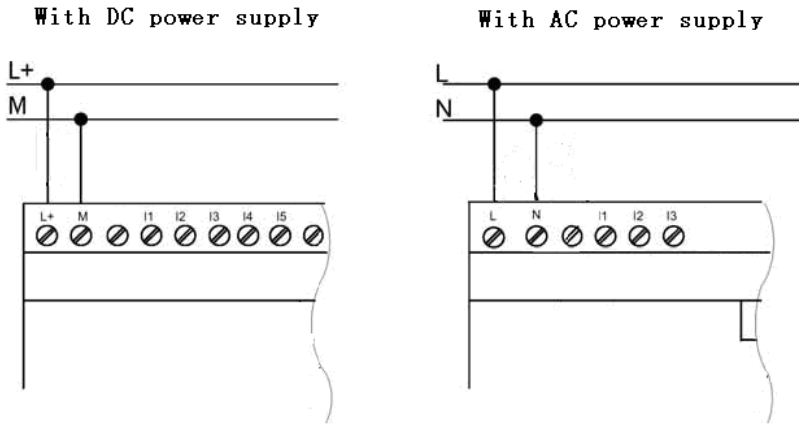
The EXM-8AC versions of x-Messenger are suitable for operation with rated voltages of 110 V AC and 240 V AC. The standard EXM-DC versions can be operated with a 12 or 24 VDC power supply.

Note

A power failure may cause an additional edge triggering signal.

Data of the last uninterrupted cycle are stored in x-Messenger.

To connect x-Messenger to the power supply:



4.3.2 Connecting x-Messenger inputs

1. Requirements

At the inputs you connect sensor elements such as: momentary switches, switches, light barriers, daylight control switches etc.

	EXM-8AC	EXM-12DC EXM-6DC EXM-3DC
Signal status 0	<40VAC <0.24mA	<3VDC <1.5mA
Signal status 1	>85VAC Typical	>8VDC Typical 3mA
Analogue input	NO	AI1-AI4(0-10V DC)

Note:

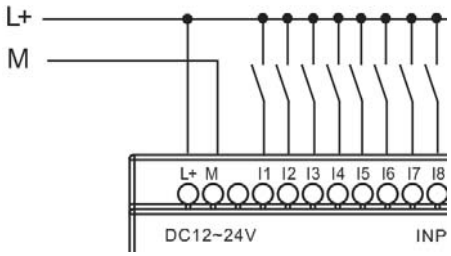
1. For EXM-12DC-DA Series versions. That can receive analog input. They can be set to analog input or digital input as either may be used in the program. They will be recognized as analog inputs when the input terminal is connected with an analog function block, and they will be recognized as switching inputs when the input terminal is not connected with an analog function block.

2. The analog inputs require DC 0V ~ +10V voltage signals. These are divided equally in 0.02V increments. In programming, all the block parameters related to the analog inputs are based on the minimum increment of 0.02V.

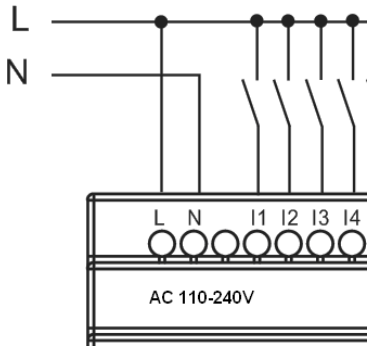
3. They can be recognized as switching input when the input voltage is more

2. Connecting x-Messenger is shown as in the following figures:

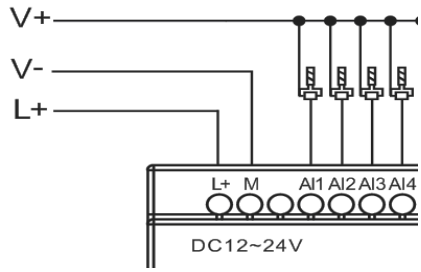
*** EXM-3DC, EXM-6DC and EXM-12DC Series inputs**



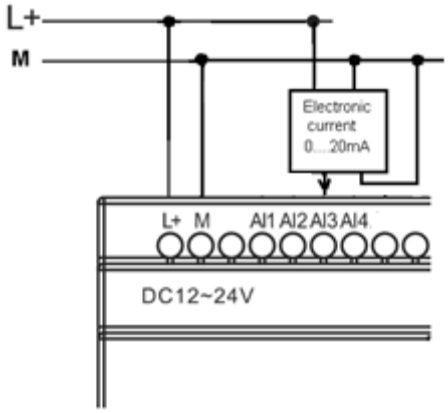
*** EXM-8AC Series inputs**



*** EXM-Analog Inputs (DC 0…10V)**



***EXM current Inputs (0…20mA)**



The above figure shows how to make a four-wire current measurement.

Connect two-wire sensor to EXM which has the current(0/4…20mA) input.

Two-wire sensor wiring is as follows:

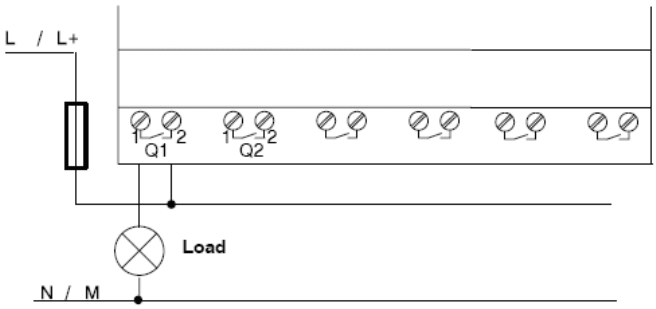
1. Connect the output of the sensor to the "AI3" terminal (0…20mA current measurement) of x-Messenger module.
2. Connect the attached connector of the sensor to the +24V (L+) of power supply.
3. Connect the current output terminal M to the corresponding M terminals of Power supply.

Note: this figure can be applied to EXM-12DC-DAI CPUs and the extension which has current inputs.

4.3.3 Connecting EXM Outputs

1. Requirement for the relay output

Various loads such as lamp, fluorescent tube, motor, contact, etc., can be connected to the outputs of x-Messenger. The maximum ON output current that can be supplied by x-Messenger is 10A for the resistance load and 2A for the inductive load. The connection is in accordance with the following figure:



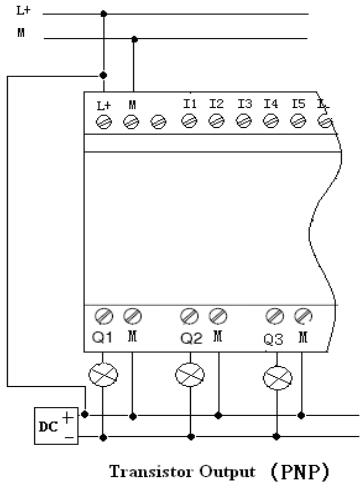
Relay Output

2. Requirement for the electronic transistor output:

The load connected to x-Messenger must have the following characteristics:

***** The maximum switch current cannot exceed 0.3A.

***** When the switch is ON (Q=1), the maximum current is 0.3A.



Transistor Output (PNP)

Notes (PNP):

* The load connecting voltage must be ≤60VDC and it must be DC.
* The "+" terminal of the output wiring must be connected with the DC positive voltage, and it must be connected with the "L+" terminal of the x-Messenger power ， a load must be connected with the "-" terminal of the DC negative voltage.

Chapter 5 Programming via panel key

Getting started with x-Messenger

Programming refers to creating a circuit program from the x-Messenger Basic module.

In this chapter you will learn how to use x-Messenger to create the x-Messenger circuit programs for your application.

eSmsConfig is the x-Messenger programming software that you can use on your PC to quickly and easily create, test, modify, save and print the circuit programs. The topics in this manual, however, relate only to the creation of circuit programs on the actual x-Messenger Basic module. The programming software eSmsConfig contains extensive online help.

A small example in the first part of this chapter introduces the operating principles of x-Messenger:

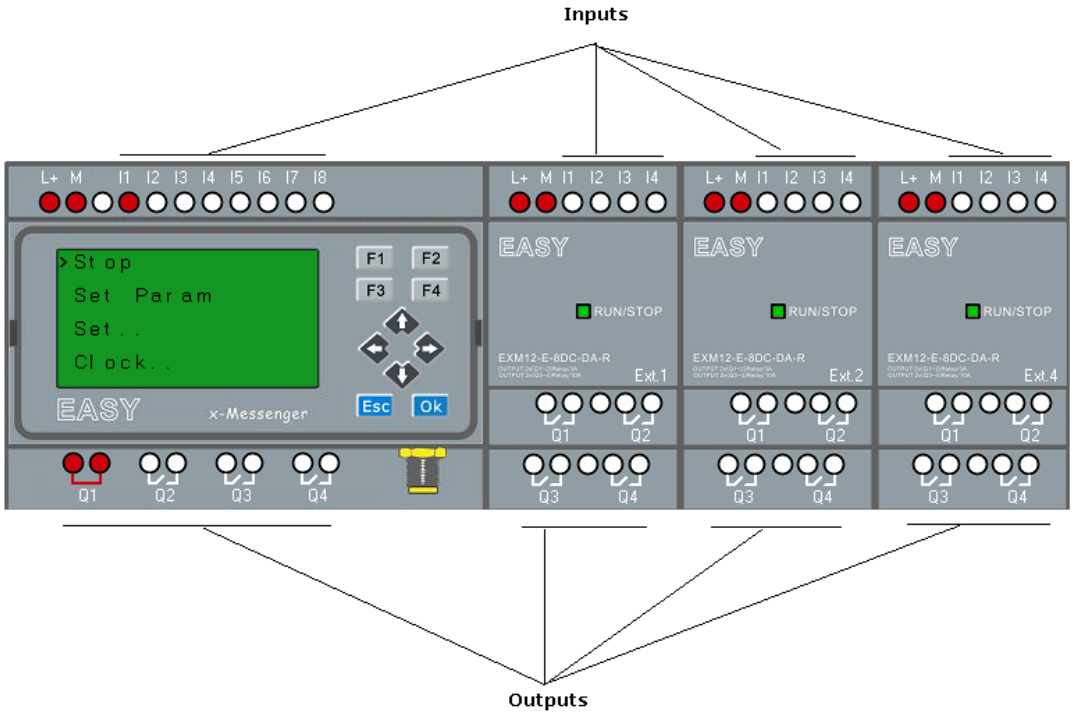
- You will learn the meaning of two basic terms, namely the connector and the block.
- As the next step, you will create a circuit program based on a simple conventional circuit.
- Lastly, you will enter this program directly in x-Messenger.

It will take you only a few pages of this manual to store your first executable circuit program in the x-Messenger unit. With suitable hardware (switches etc.), you will then be able to carry out initial tests.

5.1 Connectors

x-Messenger is equipped with inputs and outputs

Example of a configuration with several modules:



Each input is identified by the letter I plus a number. When you look at x-Messenger from the front, you can see the input terminals at the top. Only analog modules (PT100 and 0…20mA inputs) have the inputs at the bottom.

Each output is identified by the letter Q plus a number (EXM-E- AQ: AQ plus number). In the figure, you can see the output terminals at the bottom.

Note

x-Messenger can recognize, read and switch the I/O of all expansion modules regardless of their type. The I/Os are not presented in the module installation order, it rests with the address of the expansion modules. For example the first input of the expansion module with the

address 2 , the symbol will be I21 . The second output of the expansion module with the address 4 ,the symbol will be Q42. Refer to chapter 5.2.4，for how to set the expansion module address.

The following I/Os and flag blocks are available for creating your circuit program: I1 to I8(CPU),I11 to I14(EXT1), I21 to I24(EXT2),I31 to I34(EXT3)…….I81 to I84 (EXT8).

AI1 to AI4(CPU), AI11 to AI14(EXT1), AI21 to AI24(EXT2),AI31 to AI34(EXT3)…….AI81 to AI84 (EXT8). Q1 to Q4(CPU),Q11 to Q14(EXT1), Q21 to Q24(EXT2),Q31 to Q34(EXT3)…….Q81 to Q84 (EXT8). AQ1 to AQ2(CPU), AQ11 to AQ12(EXT1), AQ21 to AQ22(EXT2),AQ31 to AQ32(EXT3)…….AQ81 to AQ82 (EXT8). F1 to F64, and AF1 to AF64. Also available are the shift register bits S1 to S8, 4 cursor keys: C▲ , C▶ , C▼ and C◀ . See the "Constants and connectors" topic for more details.

The following applies to inputs AI1,AI2,AI3 and AI4 of ELC-12DC-DA-R(TN/TP) and versions: If you use I1, I2, I3 or I4 in the circuit program, this input signal is digital. If you use AI1, AI2, AI3, AI4 the input signal is analog. The expansion modules also follow these rules.

The illustration above with numbered AI inputs shows the conceptual usage of the inputs, not the actual physical markings on the module.

x-Messenger 's connectors

The term connector refers to all connections and states in x-Messenger.
The digital I/O status can be '0' or '1'. Status '0' means that the input does not carry a specific voltage. Status '1' means that the input does carry a specific voltage.
The 'hi', 'lo' connectors have been introduced to make it easier for you to create the
circuit program:
'hi' (high) is assigned the status '1',
'lo' (low) is assigned the status '0'.
You do not have to use all of the connectors of a block. The circuit program automatically assigns the unused connectors a status that ensures proper functioning of the relevant block. For information on the meaning of the term "block", refer to the topic on "Blocks and block numbers ".

5.2 Blocks and block numbers

This chapter shows you how to use x-Messenger elements to create complex circuits and how blocks and I/O are interconnected.
In the topic "From circuit diagram to x-Messenger Program" you will learn how to transform a conventional circuit into a x-Messenger circuit program.

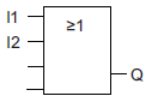
Blocks

A block in x-Messenger represents a function that is used to convert input information into output information. Previously you had to wire the individual elements in a control cabinet or terminal box.
When you create the circuit program, you interconnect the blocks. To do so, simply select the connection you require from the **Co** menu. The menu name **Co** is an abbreviation of the term "Connector".

Logic operations

The most elementary blocks are the logic operations:

- AND
- OR
- …



Inputs I1 and I2 are here connected to the OR block. The last two inputs of the block remain unused.

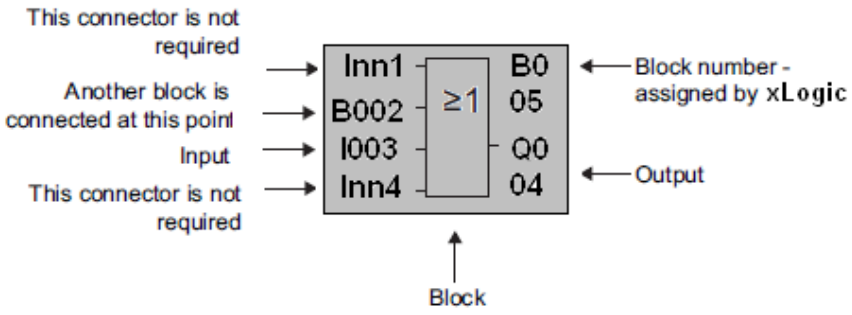
These special functions offer you significantly greater performance:

- Pulse relay
- Up/down counter
- On-delay
- Softkey
- ....

The chapter entitled " x-Messenger functions " gives a full list of the x-Messenger functions.

Block representation on the x-Messenger Display

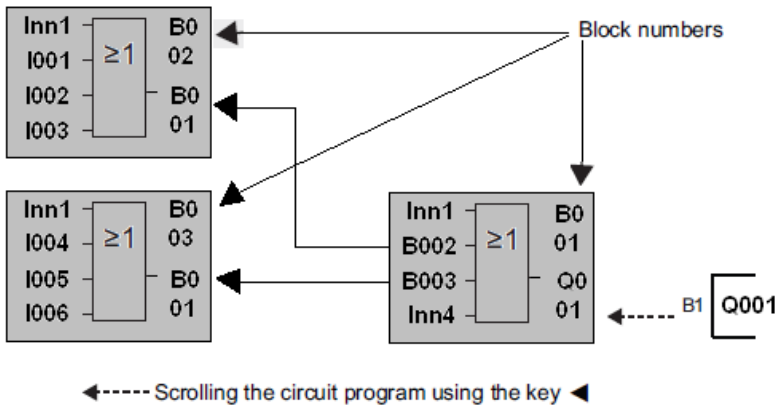
The figure below shows a typical view of the x-Messenger Display. As you can see, it can show only one block at a time. We have therefore introduced block numbers to help you check the circuit structure.



Assigning a block number

x-Messenger assigns each new block in a circuit program a block number.

x-Messenger uses these block numbers to indicate the block interconnections. This means that these numbers are mainly an aid to your orientation in the circuit program.



The figure above shows you three views of the x-Messenger Display, which represent the circuit program. As you can see, x-Messenger interconnects the blocks using their numbers.

Advantages of block numbers

You can connect almost any block to an input of the current block by means of its block number. In this way, you can reuse the interim results of logical or other operations, reduce programming effort, save memory space and clean up your circuit layout. To do so, however, you need to know how x-Messenger has named the blocks.

Note

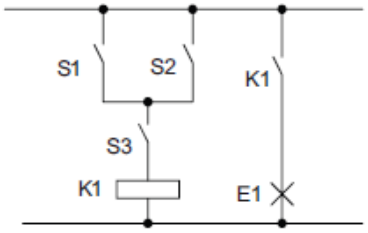
We advise you to create an organizational program chart. You will find this a valuable aid when you create the circuit program because you can enter in this chart all the block numbers that x-Messenger assigns.

By using the eSmsConfig software to program x-Messenger , you can directly create a function chart of your circuit program. eSmsConfig also allows you to assign eight character names to up to 512 blocks, and to view these on the x-Messenger Display in parameter assignment mode.

5.3 From circuit diagram to x-Messenger program

View of a circuit diagram

You know, of course, how a circuit logic is represented in a circuit diagram. Nevertheless, here is an example:



Load E1 is switched on and off by means of the switches (S1 OR S2) AND S3.

Relay K1 picks up when condition (S1 OR S2) AND S3 is met.

Creating this circuit with x-Messenger

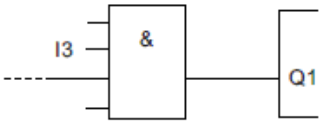
In x-Messenger you create a circuit logic by interconnecting blocks and connectors:

To create a circuit logic in x-Messenger, start at the circuit output.

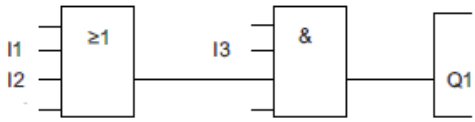
The output is the load or relay that is to be switched.

Convert the circuit logic into blocks by working through the circuit, starting at the output and ending at the input:

Step 1: The make contact S3 is interconnected in series to output Q1 and to a further circuit element. A series connection corresponds with the AND block:



Step 2: S1 and S2 are connected in parallel. A parallel circuit corresponds with the OR block:



Unused inputs

Keep NULL connection for the unused connectors.

In our example we shall use only two inputs of the OR block and two inputs of the AND block; the relevant unused first and fourth inputs have no connection.

Wiring

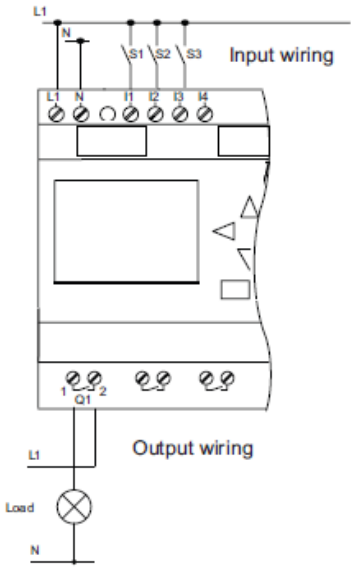
Connect the switches S1 to S3 to the screw terminals of your x-Messenger:

- S1 to connector I1 of x-Messenger
- S2 to connector I2 of x-Messenger
- S3 to connector I3 of x-Messenger

The output of the AND block controls the relay at output Q1. The load E1 is connected to output Q1.

Wiring example

The following figure shows you the wiring, based on a 220 V AC version of x-Messenger.



5.4 The four golden rules for operating x-Messenger

Rule 1: Changing the operating mode

● You create the circuit program in programming mode. After power is on, and when the display shows "No Program ", press the ESC key to select programming
mode.

● Timer and parameter values of an existing circuit program can be edited both in
parameter assignment mode and in programming mode. During parameter assignment x-Messenger is in RUN mode; that is, it continues executing the circuit program (see the topic "Configuring x-Messenger "). To work in programming mode, you need to terminate the circuit program by calling the "Stop" command.

● Select the 'Start' command on the main menu to set RUN mode.

● When the system is in RUN, you can return to parameter assignment mode by pressing the ESC key.

● When parameter assignment mode is open and you want to return to programming mode, select the "Stop" command from the parameter assignment menu, and confirm "Stop Prg" prompt with "Yes". To do so, move the cursor to "Yes" and confirm with OK.

Rule 2: Outputs and inputs

● Always create your circuit program by working from the output to the input.

● You can connect an output to several inputs, but not the same input to several outputs.

● Within the same program path you may not connect an output to an upstream input. For such internal recursions you should interconnect flags or outputs.

Rule 3: Cursor and cursor movement

The following applies when you edit a circuit program:

● You can move the cursor when it appears in the form of an underscore:

– Press , , or to move the cursor in the circuit program.

– Press OK to change to "Select connector/block".

– Press ESC to exit programming mode.

● You select a connector/block - when the cursor appears as a solid square:

– Press or to select a connector or a block.

– Confirm with OK.

– Press ESC to return to the previous step.

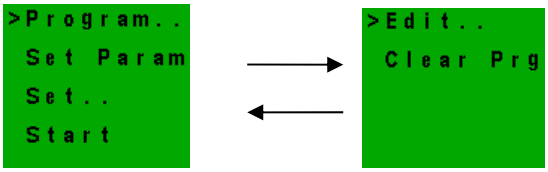
Rule 4: Planning

● Before you start to create a circuit program, you should either first create a design on paper or program x-Messenger directly using eSmsConfig.

●x-Messenger can only save complete and faultless circuit programs.

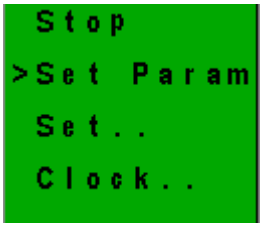
5.5 Overview of x-Messenger menu

Programming mode



Parameter assignment mode

Parameter assignment menu:



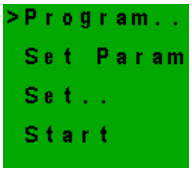
5.6 Writing and starting the circuit program

After you have designed a circuit, you want to write it to your x-Messenger. The small example below shows how to do this.

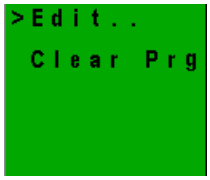
5.6.1 Selecting programming mode

You have connected x-Messenger to the power supply and switched it on. The display now shows you the message:

Switch x-Messenger to programming mode by pressing ESC. This will take you to the main menu of x-Messenger:

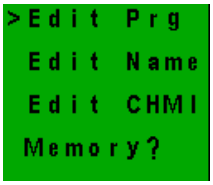


The first character in the first line is the ">" cursor. Press ▲ and ▼ to move the ">" cursor up and down. Move it to "**Program..**" and confirm with OK. x-Messenger opens the programming menu.



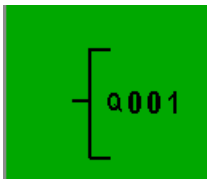
x-Messenger's programming menu

Here you can also move the ">" cursor by pressing ▲ and ▼. Move the ">" cursor to "**Edit..**" and confirm with OK.



The Edit menu of x-Messenger

Move the ">" cursor to "Edit Prg" (for editing the circuit program) and confirm with OK. x-Messenger now shows you the first output:



The first output of x-Messenger

You are now in programming mode. Press ▲ and ▼ to select the other outputs. Now start to edit your circuit program.

Note

Because we have not yet saved a password for the circuit program in x-Messenger, you can directly enter editing mode. When you select "Edit" after you have saved a password protected circuit program, you are prompted to enter a password and to confirm it with OK.

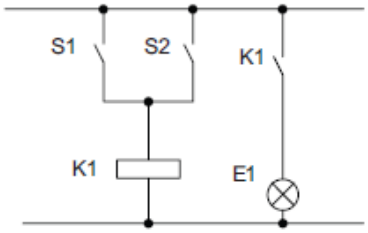
You can only edit the program after you have entered the correct password.

5.6.2 The first circuit program

Let us now take a look at the following parallel circuit consisting of two switches.

Circuit diagram

The corresponding circuit diagram



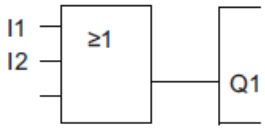
The load is switched on with S1 OR S2. **xLogic** interprets this parallel circuit as an 'OR' logic, because S1 OR S2 switches on the output.

Translated into a x-Messenger circuit program this means: Relay K1 is (at output Q1) is controlled by means of an OR block.

Circuit program

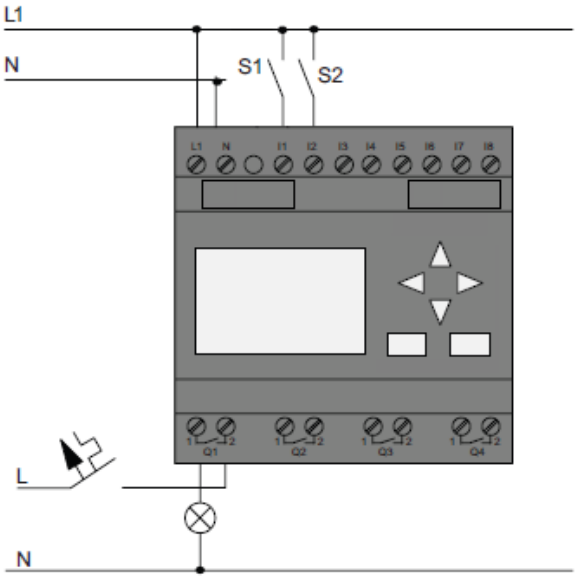
S1 is connected to the I1 and S2 to the I2 input connector of the OR block.

The corresponding layout of the circuit program in x-Messenger:



Wiring

The corresponding wiring:

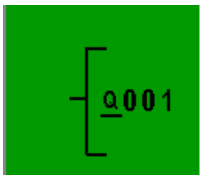


S1 switches input I1, while S2 switches input I2. The load is connected to the relay Q1.

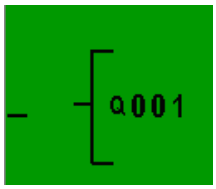
5.6.3 Circuit program input

Let us now write the circuit program, starting at the output and working towards the input.

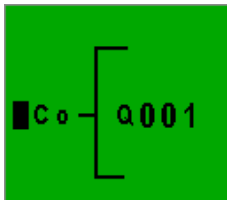
x-Messenger initially shows the output:



You will see an underscore below the Q in Q001, which is the cursor. The cursor indicates your current position in the circuit program. You can move the cursor by pressing the ▲ ,▼ , ◀and ▶ keys. Now press the ◀ key. The cursor moves to the left.

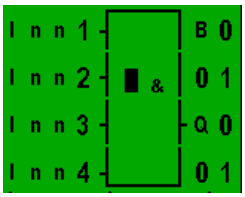


At this point you enter only the first (OR) block. Press OK to select editing mode.



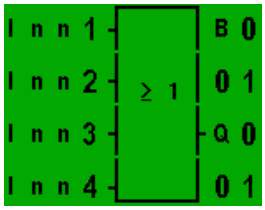
The cursor no longer appears in the form of an underscore; but instead as a flashing solid square. x-Messenger offers you various options here.

Select GF (basic functions) by pressing the key until GF appears, and confirm with OK.
x-Messenger now shows the first block from the list of basic functions:



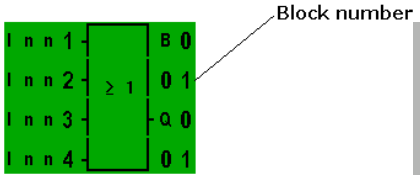
The AND is the first block of the basic function list.
The solid square cursor prompts you to select a block.

Now press ▼ or ▲ until the OR block appears on the display:

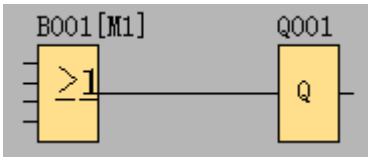


Press OK to confirm your entries and exit the dialog.

The display now shows:

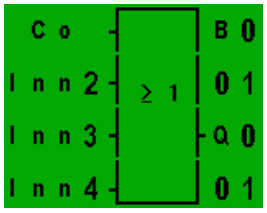


Your complete circuit program layout:



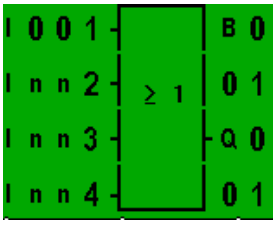
You have now entered the first block. Each new block is automatically assigned a block number. The only thing left to do is interconnect the block inputs. This is how it is done:
Press OK.

The display now shows:



Select the Co list: Press OK

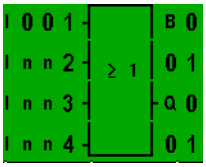
The display now shows:



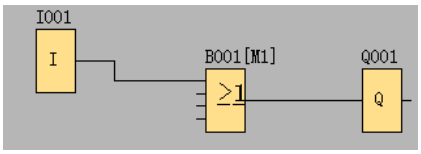
The first element of the Co list is the "Input 1" character, namely "I001".

Press OK. I1 is now connected to the input of the OR block. The cursor jumps to the next input of the OR block.

The display now shows:



Your complete circuit program in x-Messenger up to now:

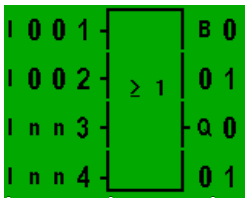


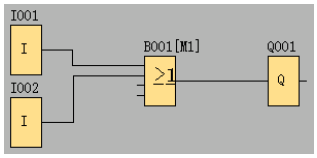
Now you connect input I2 to the input of the OR block:

1. Switch to editing mode: Press OK
2. Select the Co list: Press or
3. Confirm the Co list with: Press OK
4. Select I2: Press or
5. Apply I2: Press OK

I2 is now connected to the input of the OR block

The display now shows: Your complete circuit program in x-Messenger up to now:





We do not need the last two inputs of the OR block for this circuit program.

We shall now exit circuit programming mode. To return to the programming menu: Press ESC

Note

x-Messenger has now saved your circuit program to nonvolatile memory. The circuit program remains in the x-Messenger memory until you explicitly delete it.
You can save the actual values of special functions in the case of a power outage assuming that these functions support the "Retentive" parameter and that the necessary program memory is available. The Retentive parameter is deactivated when you insert a function; to use it, you must enable this option.

5.6.4 Assigning a circuit program name

You can assign your circuit program a name that consists of up to 16 uppercase/lowercase letters, numbers and special characters.
In the programming menu:

1. Move the ">" cursor to '**Edit..**': Press ▼ or ▲
2. Accept '**Edit**': Press OK
3. Move the ">" cursor to '**Edit Name**': Press ▼ or ▲ .
4. Accept '**Edit Name**': Press OK

Press ▲ and ▼ to list the alphabet, numbers and special characters, either in ascending or descending order. You can select any letter, number or character.
To enter a space character, simply move the cursor with ▶ to the next position. This character is the first one in the list.
Examples:

Press once to select an " A "

four times to select " } ", etc.

The following character set is available:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e
f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
v	w	x	y	z	0	1	2	3	4	5	6	7	8	9	!
"	#	$	%	&	'	(	)	*	+	,	-	.	/	:	;
<	=	>	?	@	[	\	]	^	_	'	{	|	}	~	

Let us assume you want to name your circuit program "ABC":

1. Select " A": Press ▼
2. Move to the next letter: Press ▶
3. Select " B": Press ▼
4. Move to the next letter: Press ▶
5. Select " C": Press ▼
6. Confirm the complete name: Press OK

Your circuit program is now named "ABC", and you are returned to the programming menu.

To change the name of your circuit program, proceed in the same way.

5.6.5 Assigning system cover

Default display:

The message in first and the second line can be modified/edit in the progamming mode(also can be modified in eSmsConfig) , each line contains 10 characters.

In the programming menu:

1. Move the ">" cursor to **'Edit..**': Press ▼ or ▲

2. Accept '**Edit**': Press OK

3. Move the ">" cursor to '**Edit CHMI**': Press ▼ or ▲ .

4. Accept '**Edit CHMI**': Press OK

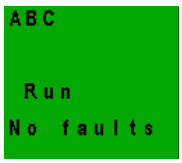
Press ▲ and ▼ to list the alphabet, numbers and special characters, either in ascending or descending order. You can select any letter, number or character.
To enter a space character, simply move the cursor with ▶ to the next position. This character is the first one in the list.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e
f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
v	w	x	y	z	0	1	2	3	4	5	6	7	8	9	!
"	#	$	%	&	'	(	)	*	+	,	-	.	/	:	;
<	=	>	?	@	[	\	]	^	_	'	{	|	}	~	

Let us assume you want to edit the system cover "ABC":

1. Select " A": Press ▼
2. Move to the next letter: Press ▶
3. Select " B": Press ▼
4. Move to the next letter: Press ▶
5. Select " C": Press ▼
6. Confirm: Press OK

Press “ESC”…



5.6.6 Second circuit program

Up to this point, you have successfully created your first circuit and assigned it a name and, if desired, a password. In this section we will show you how to modify existing circuit programs and how to use the special functions.

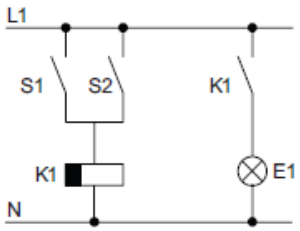
Using this second circuit program, we will show you how to:

- Add a block to an existing circuit program.
- Select a block for a special function.
- Assign parameters.

Modifying circuits

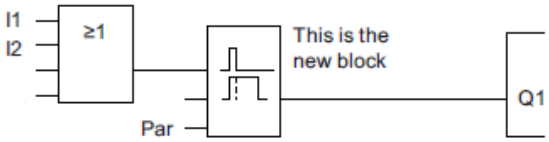
We shall use the first circuit program as a basis for the second, with some slight modifications.

First of all take a look at the circuit diagram for the second circuit program:



You already know the first part of the circuit. S1 and S2 switch a relay, which is to be used to switch on the load E1, and to switch off the load with a delay of 12 minutes.

This is the circuit program layout in x-Messenger:



You can see the OR block and the output relay Q1 we have already used in the first circuit program. The only difference is the new off-delay block.

Editing the circuit program

Switch x-Messenger to programming mode.

As a reminder:

1. Switch x-Messenger to programming mode

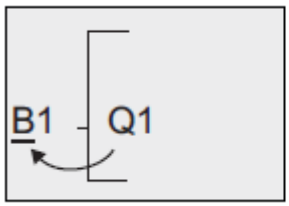
(in RUN: Press ESC to enter the parameter assignment mode. Select the 'Stop' command, confirm with OK, then move the '>' cursor to 'Yes', and once again confirm with OK). For additional details, see the topic "The four golden rules for operating x-Messenger ".

2. On the main menu, select "Program"

3. On the Programming menu, select "Edit", confirm with OK. Next, select "Edit Prg" and confirm with OK. If required, enter your password at the prompt and confirm with OK. You can now modify the current circuit program.

Adding a block to a circuit program

Move the cursor to the B in B1 (B1 is the number of the OR block):

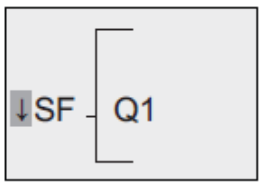


To move the cursor:
Press ◀

We now insert the new block at this position.

Confirm with OK.

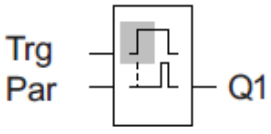
Press ▼ to select the SF list:



The SF list contains the special function blocks.

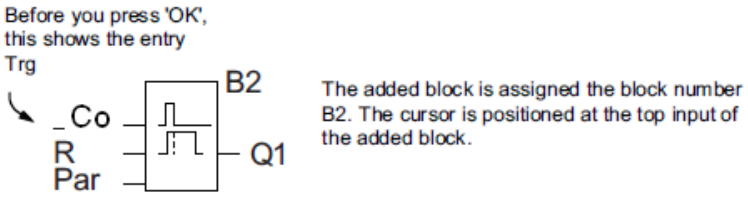
Press OK.

The block of the first special function is shown:

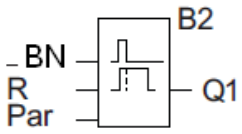


When you select a special or basic function block, **xLogic** shows you the relevant function block. The solid square cursor is positioned on the block. Press ▼ or ▲ to select the required block.

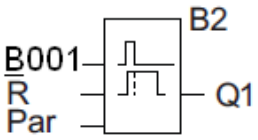
Select your block (off-delay, see the next figure), and then press OK:



Press ▼ or ▲ to select BN option.



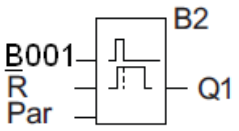
Press “OK”.



The B1 block previously connected to Q1 is automatically connected to the uppermost input of the new block. Note that you can only interconnect digital inputs with digital outputs or analog inputs with analog outputs. The 'old' block will otherwise be lost.

The off-delay block has three inputs. At the top is the trigger input (Trg) you use to start the off-delay time. In our example, the OR block B1 triggers the off-delay. You reset the time and the output with a signal at the reset input. Set the off-delay time at parameter T of the input Par.

In our example we do not use the reset input of the off-delay function.



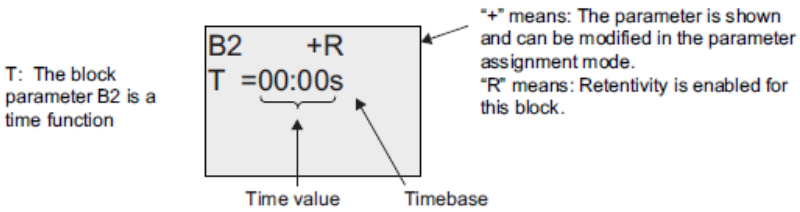
This is what the display should now show.

Assigning block parameters

Now you set the off-delay time T:

1. Move the cursor to Par, if it not already at this position: Press ▼ or ▲
2. Switch to editing mode: Press OK

x-Messenger shows the parameters in the parameter assignment window:



To change the time value:

- Press ◀ and ▶ to position the cursor.
- Press ▲ and ▼ to modify the value at the relevant position.
- Confirm your entries with OK.

Setting the time

Set the time T = 12:00 minutes:

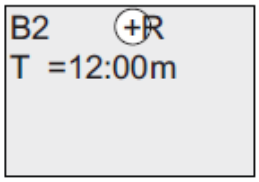
1. Move the cursor to the first digit: Press ◀ or ▶
2. Select the digit '1': Press ▲ or ▼
3. Shift the cursor to the second digit: Press ◀ or ▶
4. Select digit '2': Press ▲ or ▼
5. Move the cursor to the unit: Press ◀ or ▶
6. Select the timebase 'm' (for minutes): Press ▲ or ▼

Showing/hiding parameters - the parameter protection mode

If you want to show/hide the parameter and allow/prevent its modification in parameter assignment mode:

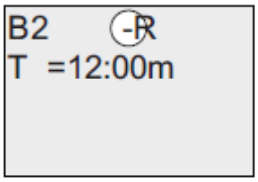
1. Move the cursor to the protection mode: Press ◀ or ▶
2. Select the protection mode: Press ▲ or ▼
   The display should now show:

The display should now show:



Protection mode +: The value of the time T can be modified in parameter assignment mode

or



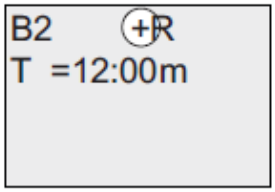
Protection mode - : The value of the time T is hidden in parameter assignment mode

3. Confirm your entries with: OK

Enabling/disabling retentivity

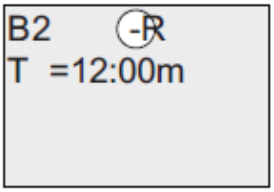
To decide whether you want to retain your current data after a power failure or not:

1. Move the cursor to the retentivity setting: Press ◀ or ▶
2. Select the retentivity setting: Press ▲ or ▼
   The display now shows:



Protection mode +: The value of the time T can be modified in parameter assignment mode

or



Protection mode - : The value of the time T is hidden in parameter assignment mode

3. Confirm your entries with OK

Note

For further information on the protection mode, refer to the topic "Parameter protection ".
For further information on retentivity, refer to the topic "Retentivity ".
You can modify the protection mode and retentivity setting only in programming mode.
This is not possible in parameter assignment mode.
In this manual, the protection mode ("+" or "-") and retentivity ("R" or "/") settings are only shown in the displays where these can actually be changed.

Verification of the circuit program

This program branch for Q1 is now completed. x-Messenger shows you the output Q1. You can once again view the circuit program on the display. Use the keys to browse the circuit program; that is, press or to move from block to block, and to move between the inputs at a block.

Closing the programming mode

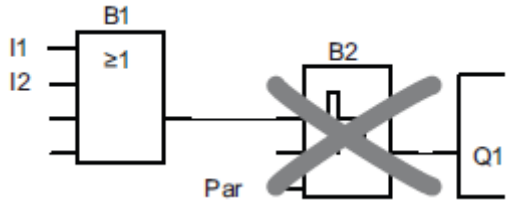
Although you were shown how to exit the programming mode when you created your first circuit program, here is a reminder:

1. Return to the programming menu: Press ESC
2. Return to the main menu: Press ESC
3. Move the '>' cursor to 'Start': Press ▲ or ▼
4. Confirm 'Start': Press OK

   x-Messenger is back in RUN mode:

5.6.7 Deleting a block

Let us assume you want to delete the connection of block B2 from your circuit program and connect B1 directly to Q1.



Proceed as follows:

1. Switch x-Messenger to programming mode

(as a reminder, refer to the topic "The four golden rules for operating x-Messenger").

2. Select 'Edit': Press ▲ or ▼

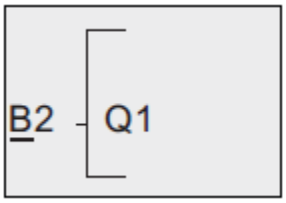
3. Confirm 'Edit': Press OK

(If required, enter your password and confirm with OK.)

4. Select 'Edit Prg': Press ▲ or ▼

5. Confirm 'Edit Prg': Press OK

6. Move the cursor to B2, the input of Q1: Press ◀



7. Confirm with OK.

8. Now replace block B2 with block B1 at output Q1. The procedure:

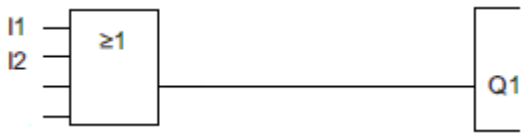
– Select the BNlist: Press ▲ or ▼

– Accept the BN list: Press OK

– Select 'B1': Press ▲ or ▼

– Apply 'B1': Press OK

Result: Block B2 is deleted, because it is no longer used in the circuit. Block B1 has replaced



5.7 Memory space and circuit program size

The size of a circuit program in x-Messenger is limited by the memory space (memory used by the blocks). Up to 512 blocks can be used in x-Messenger.

Indication of available memory space

x-Messenger shows you the amount of free memory space.

Proceed as follows:

1. Switch x-Messenger to programming mode

(as a reminder, refer to the topic "The four golden rules for operating x-Messenger ".

2. Select 'Edit': Press ▲ or ▼

3. Accept 'Edit': Press OK

4. Select 'Memory?': Press ▲ or ▼

5. Accept 'Memory?': Press OK

The display now shows:

Chapter 6 Configuring & Software-standard mode

6.1 System requirements

The "*eSMSConfig.exe*" configuration software runs on the current Microsoft operating systems. The following minimum system requirements must be met in order that the software functions properly:

Operating system:

Windows2000

Windows XP

Windows Vista

Windows7

CPU computer capacity:

Pentium II / 166MHz

Recommended: Pentium III / 800MHz

RAM:

256MB (Windows XP)

Hard disc storage capacity available

40MB

Programming interface:

RS232

USB

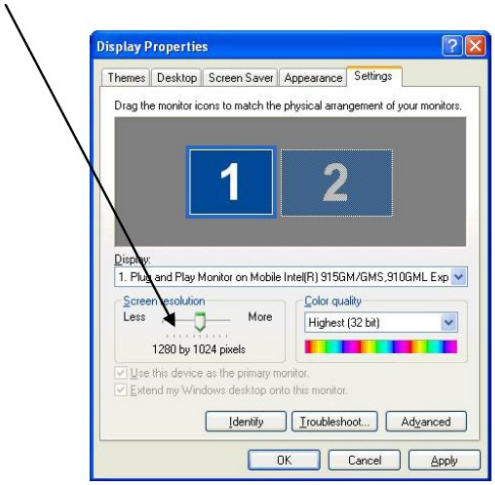
Ethernet

***Screen resolution**

Minimal: 1024 x 768 pixels

**PLEASE NOTE*:

If the screen resolution is too low, the window of the programming software will not be displayed in the normal size. That means some tabs or buttons would be outside the screen window and therefore invisible. To avoid this, change the screen resolution of your computer system. Select "Start" – "System controls" – "Display" and then the register "Settings". Please set the screen resolution to 1024 x 768 pixels in minimum.



6.2 General

The x-Messenger is configured and prepared for use with the *"eSmsConfig.exe"* configuration software. The x-Messenger configuration (telephone book creation, message definitions, default settings, etc.) can be done on a PC and saved in a respective file without connection to the device. In order to do this, the software is started, a new or existing file opened and edited. The saved file needs to be downloaded to the x-Messenger with the programming cable. In offline mode, the diagnostic functions are not active and can only be accessed once the x-Messenger is connected to the PC via RS232, USB or Ethernet interface.

Two modes available in eSmsConfig.exe: A. Standard mode B. Customized mode

Who will use the standard mode?

Users who are not familiar with PLC programming, and furthermore merely simple control or no multiple logic would be required for their applications.

Who will use the customized mode?

Users who are familiar with the logic boxes of Boolean algebra, and moreover complex control, logic, timer, counter, analog math etc would be needed for their systems.

Chapter 6 shall introduces the standard mode and for customized mode in detail, please refer to the chapter7.

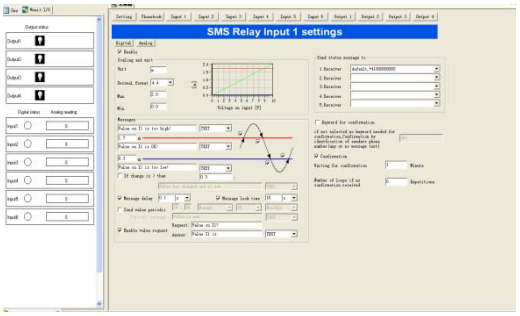


Fig 6.1 standard mode

6.3 Create connection

1.Cut off the power supply of the x-Messenger SMS Relay

2.Insert the SIM card

3.Connect the x-Messenger module and PC via the following optional methods:

Option A . EXM-RS232 /EXM-USB

Option B . EXM-USB-B

Option C . Ethernet (Only available for the model which has Ethernet interface)

4. Connect power supply to the x-Messenger SMS Relay

5. As soon as the Status-LED of the x-Messenger SMS Relay flushes in a cycle off 1 second, the software can be started.

6. Choose a saved file or create a new one.

7.For transmission, choose the required COM port of your PC or required IP address and port Number by click” ”..

Everything is now set up to download the prepared configuration file to the device.

6.4 Edit telephone book

Add – register of a new phone number

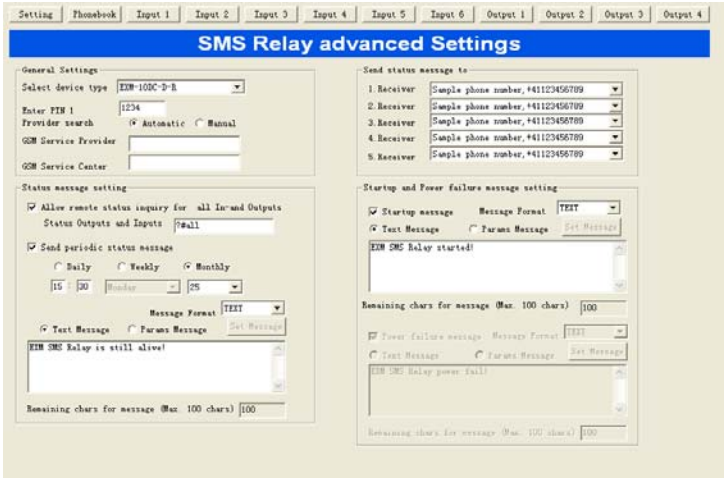
Edit – editing of an already existing entry

Delete – deleting of an existing entry

Please enter the phone number in international format (i.e. with country code and prefix), e.g. +41793333333. (+41 Switzerland; +49 Germany, +31 Netherland, etc)

6.5 Standard mode settings

The default settings for SMS transmission contain important general data which help to identify the device. The SIM card can be protected with a PIN code just like for normal cell phone use. The PIN request is activated and the PIN code is input in the required field. This concerns PIN1. Further information can be obtained from the SIM card manual. Likewise the process of unblocking the SIM card after three incorrect inputs of PIN1 is described in the SIM manual. In order to do this, the SIM card must be removed from the SMS Relay and inserted into a mobile phone. Now the card can be unblocked according to the details of the network providers.



6.5.1 Device types

Depending on the device type, the correct type has to be selected. The selection has an influence on the configuration of the inputs and outputs. It is however possible to correct the selected type at any time. The following types are available:

EXM-2DC-PT100-R	**EXM-12DC-D-TN**
EXM-3DC-D-R	**EXM-12DC-DA-TN**
EXM-6DC-D-R	**EXM-12DC-DAI-TN**
EXM-8AC-R	**EXM-12DC-DA-R**

EXM-12DC-D-R	EXM-12DC-DAI-R

6.5.2 Automatic provider search

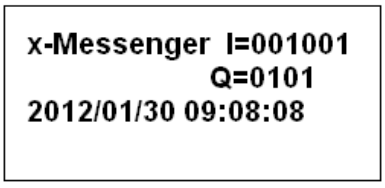
The automatic provider selection depends on the SIM card inserted into the SMS Relay. The provider details and access of the SIM card are adapted. Basically, the provider is preassigned when the SIM card is purchased. With the "Automatic" setting, the network provider is automatically searched and logged. That is useful if the card is used in the home network. Other GSM networks can be accessed abroad with the same SIM card according to the roaming contracts.

6.5.3 Manual provider search

For manual provider searches, the available GSM networks are scanned several times. The results of this search are displayed with a list of networks. A mouse click on "Search", and then the available networks would be shown. The desired network can now be chosen. The SMS service centre number can be taken from the SIM card documentation. Normally this number is already saved on the SIM card. The number depends on the GSM provider.

6.6 Status messages

The receiver of the status messages can be chosen from the telephone book. In order to do this click with the mouse pointer onto the expand arrow and select the required entry.
The SMS relay can send the following status messages:
Remote enquiry of all inputs and outputs
The device offers the possibility to interrogate all input and output states by SMS. A code word is therefore sent by SMS to the device. The code word can be individually created. The default code word is: **?#all**
The answer is sent to the same phone number from which the correct code word was received (phone number identification). The states of the inputs and outputs are displayed as follows in the SMS message:



I:001001 → Inputs 1 to 6 → 0 = OFF / 1 = ON
O:0101 → Outputs 1 to 4 → 0 = OFF / 1 = ON

- *Message at the start*

A message for each start up (switching on / return of power) of the SMS relay is sent (According to the phone number assigned to the event). The message contents can be edited.

- *Periodical message*

The periodic message provides information of the device's current status and is sent periodically. The message can be sent daily (time), weekly (time, weekday) or monthly (time, date). The message text can be edited. It is for checking functionality or operation confirmation.

Note: All messages have two optional message formats: A. TEXT B. PDU(UCS2) (Protocol Data Units)

A.TEXT is supposed to support ASCⅡ.(Up to 100 chars can be edited)

B.PDU is supposed to support multi languages.(Up to 70 chars can be edited)

6.7 Input configuration

6.7.1 General

Depending of the device type, all this inputs can be used as **digital inputs** or as **digital / analogue inputs** .

6.7.2 Digital inputs

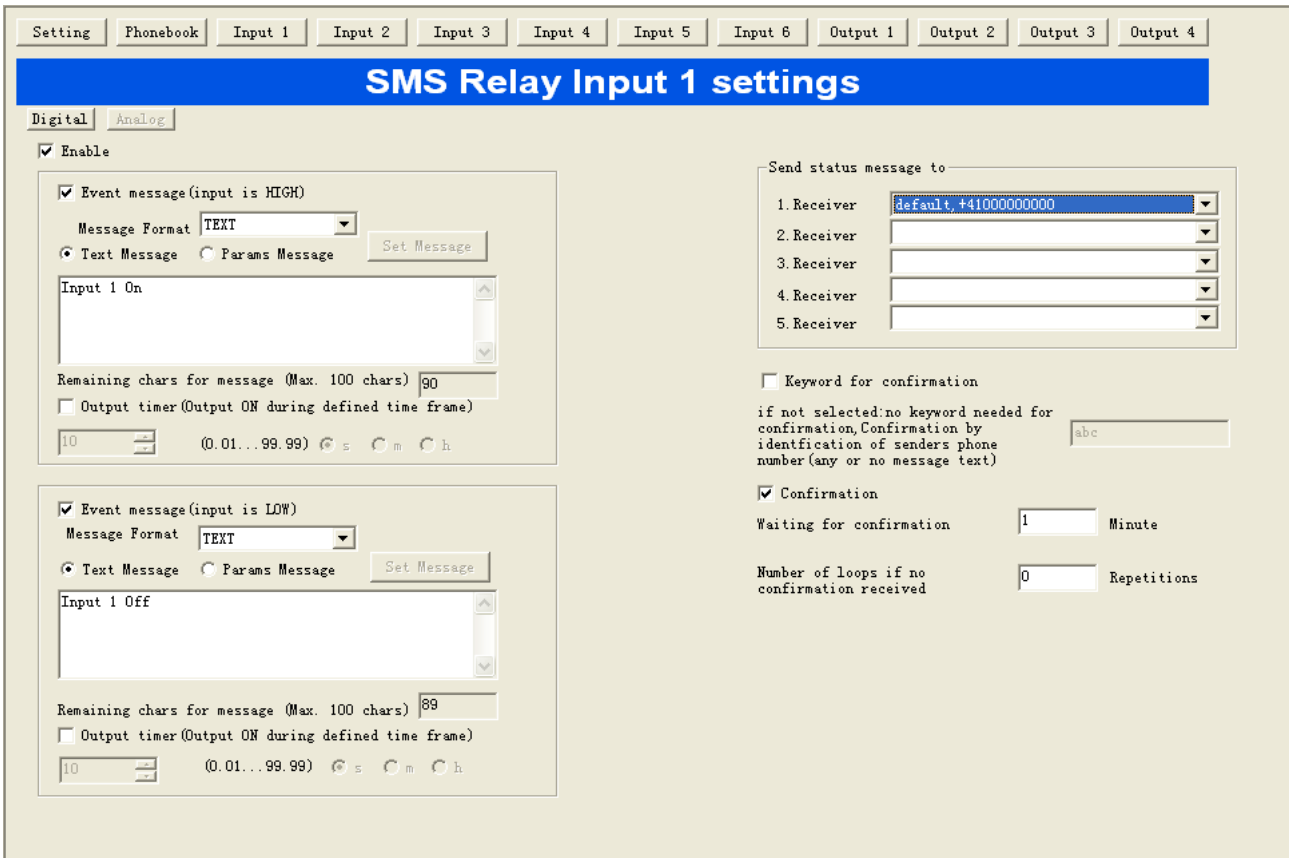
Each one of these inputs can activate an SMS message to a predefined telephone number either in case of HIGH or LOW input signal (up to 5 various numbers).
Basically two events can trigger an SMS message: the change from LOW-to-HIGH and the inverse, the change from HIGH-to-LOW. One or both events can be configured to activate a message. A separate text message can be entered for each event. For details refer to 6.8.2.2 and 6.8.2.3

With **confirmation function** activated:
If the SMS Relay does not receive an acknowledgement SMS within a certain preset time from the receiver, the event message will be sent to the next receiver. This means that the device runs through the 5 allocated receiver numbers and restarts afterwards with the first number again (The number of running loops can be pre-defined). As soon as the device
receives a confirmation from the receivers the process is stopped. If this is not the case, the message will be sent to the next receiver (after expiry of the preset time).
If the **confirmation** is inactive, all receivers who are allocated to that event will receive a message without repetition.
If the **confirmation code word** is not activated, the phone number identification is carried out as a security

check and it is sufficient to send an empty SMS message to the x-Messenger SMS Relay.

6.7.2.1 Parallel message handling

It may occur that the status of several inputs change at the same time or within the actual running message cycle. Every input activates its individually message.
Every change of the input status, which triggers an event message, is processed in order of the appearance. That means that all the messages for every input will be handled individual. Several events at the same time can trigger different messages at the same time. Example: The events "pump breakdown" and "over temperature" (two different inputs) appear at the same time both events are processed individually and both messages will be sent one after the other.



6.7.2.2 Time delayed message for input ON

If there is an input signal, the respective message transmission can be time delayed, i.e. the SMS relay only sends the pre-defined message after the preset time has elapsed and if the signal has remained ON constantly during that time. In other words, the input signal is ignored during the set delay time. Time delays

of 0.1 seconds to 99.9 hours are possible. This time function default must be activated and is to prevent unstable triggers producing numerous SMS messages.

REMARK

It is recommended to use the delay function to avoid several messages being *sent for the same event*.

6.7.2.3 Time delayed message for output OFF

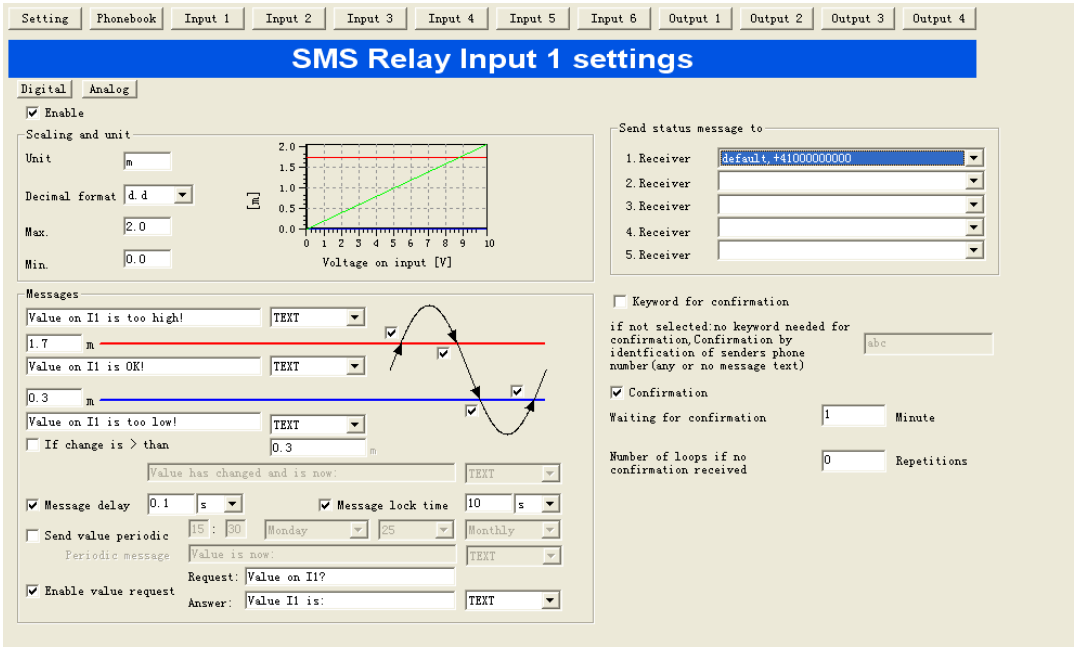
If an input changes from HIGH to LOW, i.e. there is no longer an input signal, a delayed message can also be activated here. The SMS relay sends the predefined message after the preset time has elapsed and if the signal is no longer present respectively the input signal was constantly OFF during the selected time delay. Time delays of 0.1 seconds to 99.9 hours are possible. This time function must be activated and is to prevent that unstable short signals as for example of a floating level switch will activate numerous messages.

REMARK

It is recommended to use the delay function to avoid that several messages being *sent for the same event.*

6.7.3 Analogue inputs

The 4 inputs(AI1—AI4) can be individually configured as digital or analogue inputs. For that purpose each input has to be predefined as analogue or digital input. The analogue inputs(AI1-AI4) are designed for a standard 0 … 10V DC ,AI5 and AI6 are designed for a standard 0 … 20 mA analogue signal.



6.7.3.1 Scaling and units

In a first step, the measuring unit and the scale have to be defined. For both end-values 0V (0 mA) and 10V (20 mA), a minimal and a maximum value of the selected unit is assigned. With this two values, a linear function is interpolated (straight line between 2 points) and displayed in the configuration window. The linear function is adapted automatically in

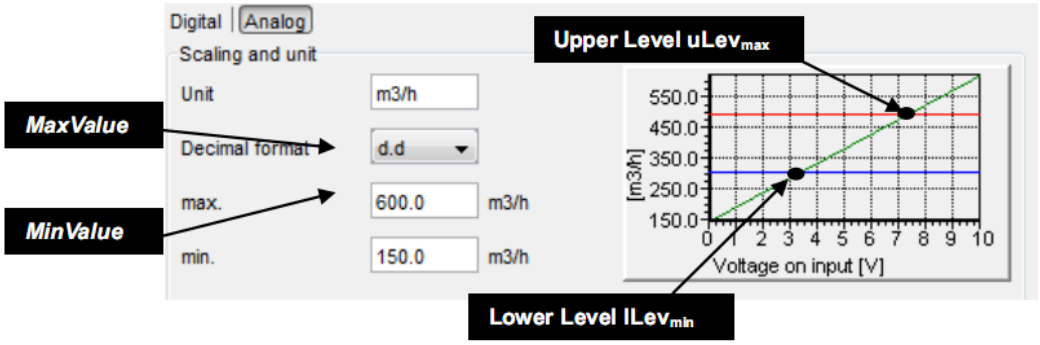
accordance to the set values. The values displayed on the PC screen or transmitted by SMS can be display in different

resolutions:

- **d** integer value, i.e. 5200
- **d.d** one digit after decimal point, i.e. 520.0
- **d.dd** two digits after decimal point, i.e. 52.00
- **d.ddd** tree digits after decimal point, i.e. 5.200

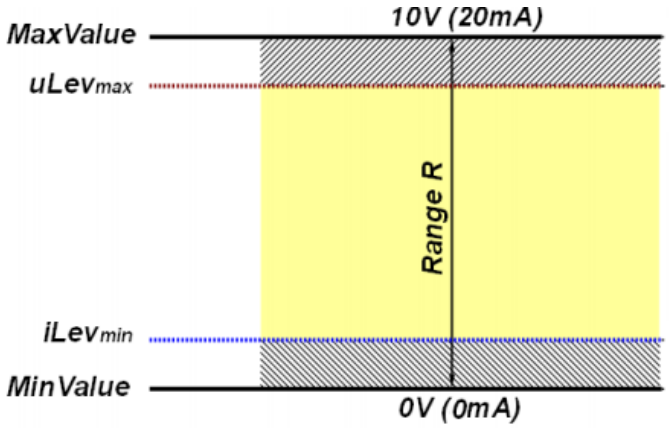
9 characters are available for the description of the units. This unit will be sent with every value message following the actual value:

Example of a message: The temperature is 15.5 C



Detail: Scaling and unit

The top and the bottom thresholds have to be defined to allow sending of messages.



Description of the range

The value between the max and the min value is the range R. This range has an important function in the designation of the thresholds.

The maximum Upper Level uLevmax ≤ MaxValue

➔ Inserted values higher than MaxValue are corrected automatically by the software.

The minimum Lower Level lLevmin ≥ MinValue

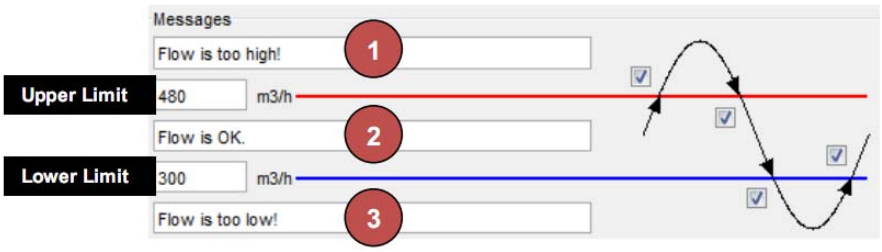
➔ Inserted values lower than MaxValue are corrected automatically by the software

Example:

Max. value 600m3/h 10V of the analog signal

Min. value 150m3/h 0V of the analog signal

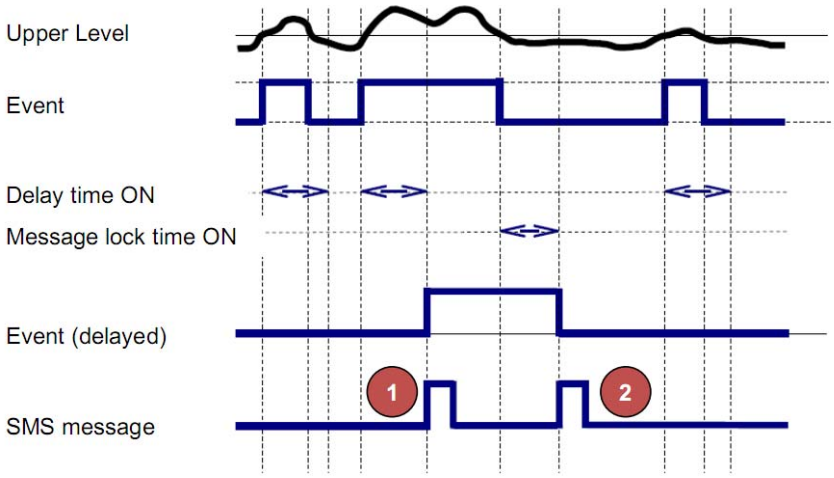
The above example allows monitoring the scenario as seen below:



Threshold messages

The actual measured value is higher than the defined upper limit.

The system is not in its normal status. The upper limit is exceeded. A message is sent (if thisis activated by ☑). The message text can be freely configured.



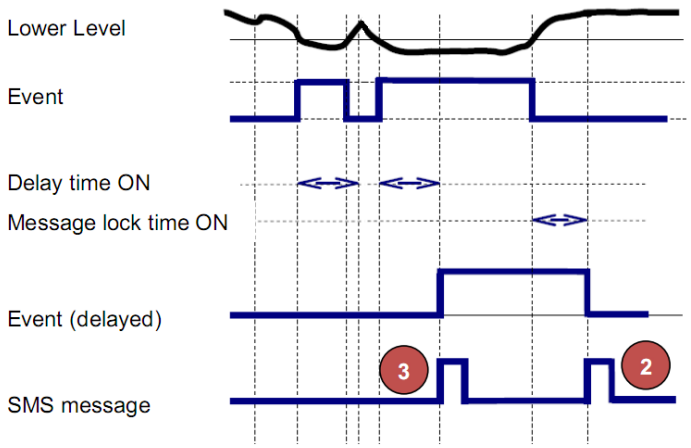
Analogue value processing: The measured value is above the upper level.

The actual measured value is between the Upper and the Lower Level.

The installation is in normal status. A message shall be sent (if default set) .

On this example the actual measured value is below the set Lower Level

The system is not in its normal status. The value is below the lower limit. A message is sent (if this is activated by ☑). The message text can be freely configured.



Analogue value processing: "Value is smaller than the lower level"

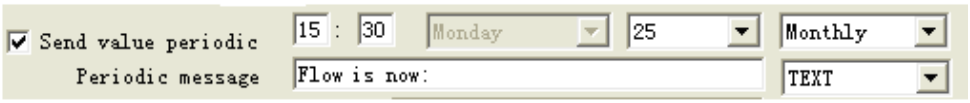
A certain difference between the actual value and the last sent value is exceeded

The SMS Relay monitors the analogue value. A message is sent if the difference exceeds a certain value (if this is activated by ☑). The message text can be freely configured. The value also can be freely configured .

Periodical messages

The actual values can be sent by SMS periodically in intervals of days, weeks or months. The periodical message is sent to the first receiver. If this message is not confirmed, it will be forwarded automatically to the next receiver.

All message texts can be freely edited. The measured value and the unit are always transmitted together with the message text. A space is inserted automatically between the message text and the value. No space is inserted between the value and the unit.

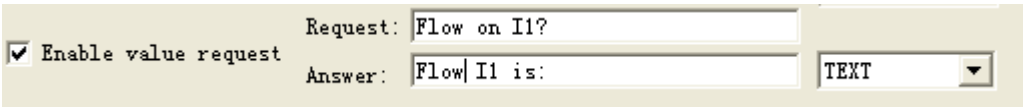


Periodic message

Request value

The actual present value can be enquired by SMS. The message text can be freely edited. To enquire the actual value, a SMS message has to be sent to the device first. This message text can be edited freely. However, the incoming SMS text must comply fully with the programmed enquiry text. A space is inserted automatically between the message text and

the value. No space is inserted between the value and the unit.



Request value

Confirmation

If the SMS Relay does not receive a confirmation SMS within a certain preset time from the receiver, the event message will be sent to the next receiver. This means that the device runs through the 5 allocated receiver

numbers and restarts afterwards with the first number again (The number of running loops can be pre-defined). As soon as the device receives a confirmation from the receivers the process is stopped. If this is not the case the message will be sent to the next receiver (after expiry of the preset time). if the acknowledgement is inactive, all receivers who are allocated to that event will receive a message without repetition. If the confirmation code word is not activated, the phone number identification is carried out as a security check and it is sufficient to send an empty SMS message to the x-Messenger SMS Relay.

6.7.3.3 Message delay

If the message criteria are reached, the respective message transmission can be time delayed, i.e. the SMS relay only sends the pre-defined message after the preset time has elapsed and if the value has remained constantly during that time. In other words, the measured value is ignored during the set delay time. Time delays of 0.1 seconds to 99.9
hours are possible. This time function default must be activated and is to prevent that unstable short signals can activate numberless identical SMS messages.

REMARK

It is recommended to use the delay function to avoid several messages being *sent for the same event*.

6.7.3.4 Message block

If message criteria are reached, which requires sending of a message, a timer is triggered. There will be no further message (same messages) sent during that pre-set time. With that setting it can be avoided that the same status message is sent repeatedly during a set time (Block time).

REMARK

It is recommended to use the delay function to avoid several messages being *sent for the same event*.

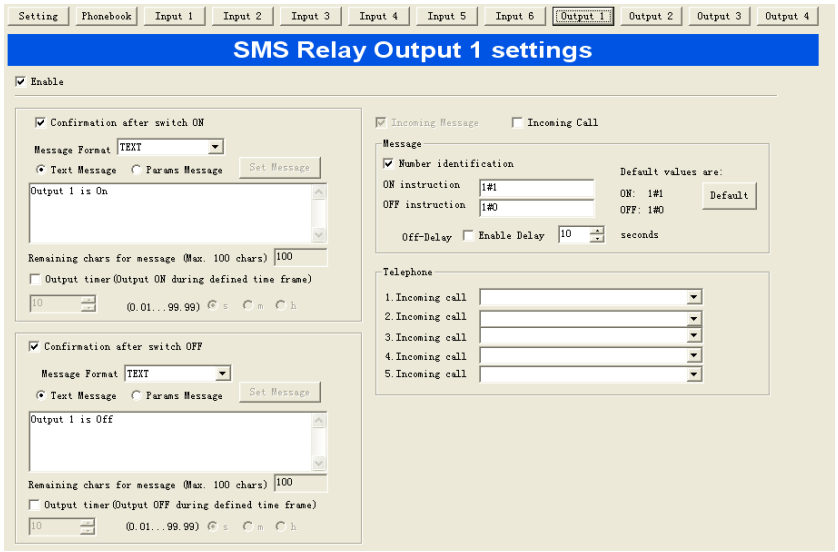
6.8 Output configuration

6.8.1 General

The x-Messenger SMS Relay has max.4 relay outputs (NO 10A, 250V). The outputs can be controlled by a message i.e. they can be switched ON and OFF. Each output can be activated individually. The message text can be edited individually. However, the device only accepts the exact expression i.e. the message must correspond exactly with the registered expressions. Upper and lower cases are ignored, spaces between the words and other characters must be typed correctly. Switching commands are only accepted from numbers which are registered in the telephone book. That means, an output can be switched ON or OFF by receiving a SMS message. The SMS Relay confirms this with an acknowledging message to the sender after carrying out the action. An additional message can be defined, to inform the sender if the output is already switched to the required state and consequently no action will be carried out.

- **Default**

  A click on this button will reset the ON/OFF instructions to factory setting.



6.8.2 Timer function

An output can be switched ON for a certain time with the time function option. With that function the output can be switched ON with an SMS message for a preset time. The output will switch OFF again automatically without the need of receiving an OFF message again after that time has elapsed. Time delays of 0.1 seconds to 99.9 hours are possible. The

output OFF is reconfirmed to the sender after set time has expired. If a switch-OFF message is received before the set time has elapsed, the output will ignore the remaining ON time and switches to OFF status

immediately. The default of that timing function is normally inactive and therefore must be activated.

WARNING

This device is not suitable for monitoring sensitive installations or time critical processes. GSM network failure or power interruptions cannot guarantee a secure monitoring.

6.8.3 CALL-IN function

The CALL-IN function allows the user to activate the outputs by phone call for a certain time as described in chapter 6.9.2. The device detects the incoming call and switches the outputs without answering. The outputs are automatically switched-off after the preset time. This allows activating a process without costs.

REMARK

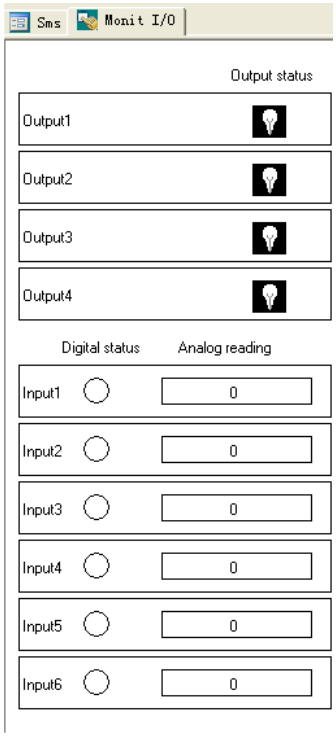
Activate the output timer to activate the field "Activate Call-In"!

6.8.4 I/O status remote request

With a successful established data connection (via GSM-network connection or via a serial cable connection, Ethernet connection), the user can ask for the status of all inputs and outputs of the x-Messenger SMS Relay including analogue input values.

REMARK

Modification of values and settings over remote access will not be immediately shown in the I/O states display window. This takes some time and depends on the scanning cycle.



Digital IO status and analog input value can be displayed.

6.8.5 Digital inputs

Digital input **ON** →

Digital input **OFF** →

6.8.6 Analogue inputs

The measuring bar always displays the input value 0 to 1000 ,which represents the analog input signal 0 to 10V DC(0…20 mA).

Example:the input signal is 5V DC(10mA) , so the value shall display 500.

6.8.7 Outputs

The states of the outputs are displayed with→ **ON** and→ **OFF**.

Chapter 7 Configuring & Software-customized mode

Users who are familiar with the logic boxes of Boolean algebra can use the customized mode. In fact customized mode adapts the function block programming way. eSmsConfig is available as a programming package for the PC. This mode provides many features, for example:

- A graphic interface for offline creation of your circuit program by means of Function Block Diagram (function chart)
- Simulation of your circuit program on the PC
- Generating and printing of an overview chart for the circuit program
- Saving a backup of the circuit program on the hard drive or other media
- Easy configuration of blocks
- Transferring the circuit program

– from the x-Messenger to the PC and

– from the PC to x-Messenger

- Setting the TOD

1. Online test: Display of status changes and process variables of x-Messenger in RUN mode:

– Status of a digital I/O, shift register bits and cursor keys

– The values of all analog I/Os

– The results of all blocks

– The current values (including the times) of selected blocks

– Change the output(the input pin of the output cannot be connected) status via eSmsConfig with customized mode

- Starting and stopping circuit program execution via the PC (RUN, STOP).

The x-Messenger alternative

As you can see, eSmsConfig represents an alternative to conventional engineering methods:

1. You start by developing the circuit program on your desktop.
2. You simulate the circuit program on your computer and verify its functions, before you actually implement it in your system.
3. You can add comments to the circuit program and create hardcopies.
4. You save a copy of your circuit program to the file system on your PC, to make it directly available for any modifications.
5. It takes only a few key actions to download the circuit program to x-Messenger.
6. Under Simulate mode in eSmsConfig, you can study how to program via the panel key.

7.1 x-Messenger Functions

EXM series customized mode adopts the programming methods by the use of function blocks. A total of 8 general function blocks, 30 special function blocks, and 6 input & output function blocks are configured. And each block can achieve a specific control function independently, e.g. TOND, TOFD, SBPL, TBPL, SCHD, etc. As several blocks are linked up in a specific way, relatively complicated control functions can be performed. Programming with function blocks is simpler and better appreciated than the conventional PLC instruction programming.

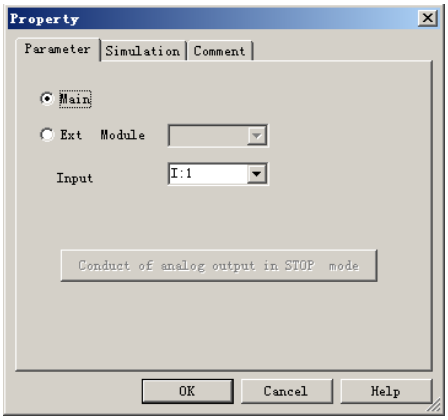
The following types of operator for x-Messenger function blocks are available for options：

7.2 General Input & Output functions

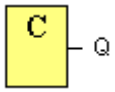
7.2.1 Inputs

Input blocks represent the input terminals of x-Messenger. Up to 8 digital inputs are available to you.

In your block configuration, you can assign an input block a new input terminal, if this terminal is not already used in the circuit program.



7.2.2 Cursor keys



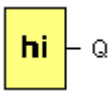
Up to four cursor keys are available to you. Cursor keys are programmed for the circuit program in the same ways as other inputs. Cursor keys can save switches and inputs, and allow operator control of the circuit program.

7.2.3 Outputs

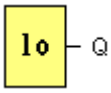
Output blocks represent the output terminals of x-Messenger. You can use up to 4 outputs. In your block configuration, you can assign an output block a new terminal, provided this terminal is not already used in your circuit program.

The output always carries the signal of the previous program cycle. This value does not change within the current program cycle.

7.2.4 Permanent logical levels HI and LO



Set the block input to logical **hi** (hi = high) to set it permanently to logical '1' or 'H' state.

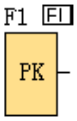


Set the block input to logical **lo** (lo = low) to set it permanently to logical '0' or 'L' state.

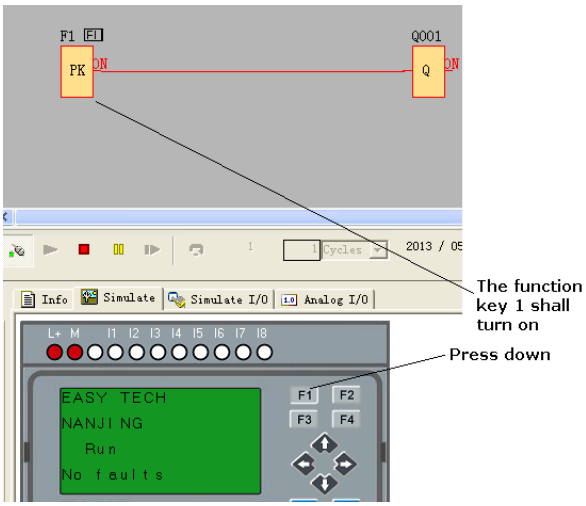
7.2.5 Open Connector

Interconnect the output of an unused block with the "open connector" block. Up to 512 can be used in one program.

7.2.6 Panel Key



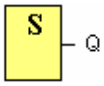
It is the symbol of the Function key on the panel (F1—F4). If one of the function keys is pressed down, the status of the corresponding symbol in the program shall turn from 0 to 1. And it shall give off one high trigger.



Notes: 1.Only one function key is allowed to be pressed down at any one time, if you press down two or more at the same time, x-Messenger does not process.

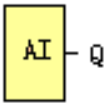
2. If the arrow keys(UP, DOWN, LEFT and RIGHT), Esc and OK had been applied to the program, then they would be invalid for menu operation (e.g. manual programming,parameters modification and view alarming message etc).

7.2.7 Shift register bits

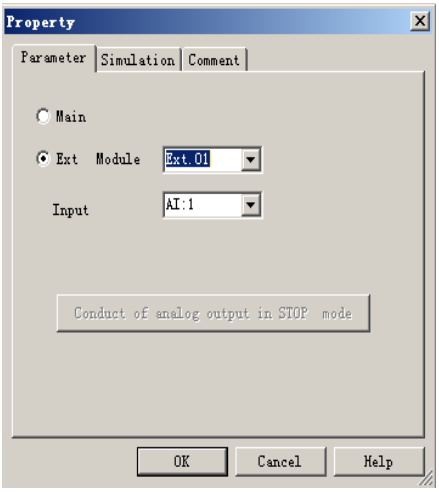


x-Messenger provides the shift register bits S1 to S8, which are assigned the read-only attribute in the circuit program. The content of shift register bits can only be modified by means of the Shift register special function

7.2.8 Analog inputs

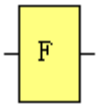


You can use up to 36 analog inputs. In your block configuration, you can assign a new input terminal to an input block, provided this terminal is not already used in the circuit program.



For help on analog block parameter, refer to Information on analog value processing.

7.2.9 F (digital flag)



Flags are used when x-Messenger works in a communication system. F is digital flag which is used to save /transfer signal 1 or 0(data format is Bit) and AF is analog flag which is used to save /transfer analog values (data format is Signed short) between the master and slave devices. Both of the flags (digital/analog) are up to 64 can be used when programming. In your block configuration, you can assign a new number to the flag, provided this flag number does not already exist in your circuit program.

The output always carries the signal of the previous program cycle. This value does not change if the communication has failed.

Startup flag: F8

The F8 flag is set in the first cycle of the user program and can thus be used in your circuit program as a **startup flag**. It is reset after the first program execution cycle.

In the subsequent cycles, the F8 flag reacts in the same way as the F1 to F64 flags.

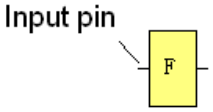
Backlight flags: F64

The F64 flag controls the backlight of the x-Messenger onboard display.

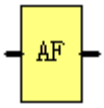
You can use the outputs of timers, message texts, or other function blocks to activate the backlight flags. To enable multiple conditions to control the backlight of the devices, you can use multiple function blocks in parallel or in sequence.

Notes: 1.The address of " F" can be found in the modbus communication protocol file . the F block figure must have the input pin in the eSmsConfig showing.

2. Keep the input pin of F NULL(do not connect with other blocks) ,if you want to use the write property.



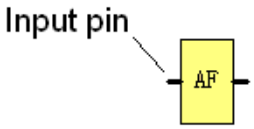
7.2.10 AF (Analog flag)



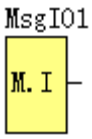
Flags are used when x-Messenger works in a communication system. F is digital flag which is used to save /transfer signal 1 or 0(data format is Bit) and AF is analog flag which is used to save /transfer analog values (data format is Signed short) between the master and slave devices. Both of flags (digital/analog) are up to

64 for x-Messenger CPU can be used when programming. In your block configuration, you can assign a new number to the analog flag, provided this flag number does not already exist in your circuit program.
The output always carries the signal of the previous program cycle. This value does not change if the communication were failed.

Notes: 1.The address of "AF" can be found in the modbus communication protocol file .
2.Keep the input pin of AF NULL(do not connect with other blocks) ,if you want to use the write property.



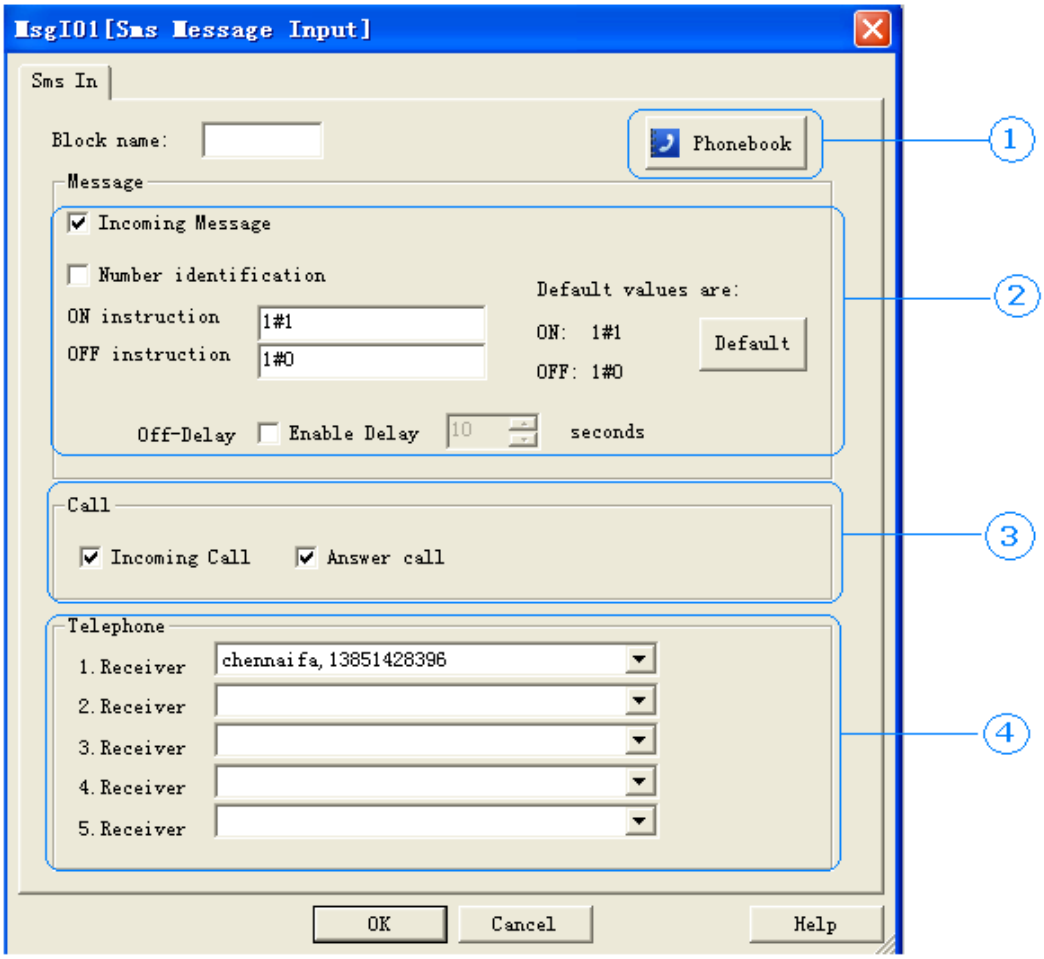
7.2.11 SMS message input



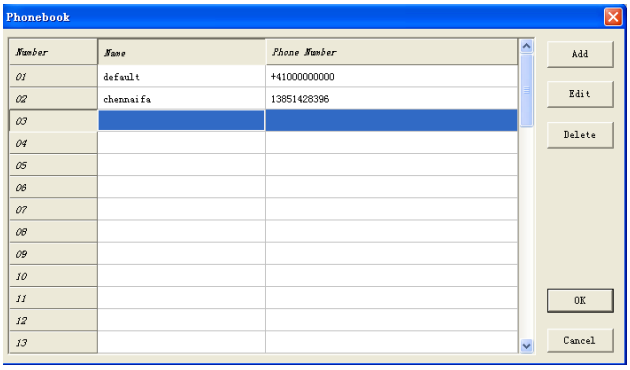
Short description

Up to 32 SMS message inputs are available for you. SMS message inputs are programmed for the circuit program in the same ways as other digital inputs. SMS message inputs allow operator control of the circuit program by means of short message or "Incoming Call" by users' handsets. Users send pre-set short message content to change the status of SMS message inputs from "0"/OFF to "1"/ON or "1"/ON to "0"OFF. And then the program (circuit diagram) shall take the logic state of the SMS message input into the logic to realize a certain control function.

General description of parameter dialog box:



1. Phonebook: click this button, you can edit the phonebook



You are allowed to edit Phone book by clicking the button in the toolbar as shown below :

2. Incoming Message configuration

3. Incoming Call configuration

4. Receiver selection

There are **two** option control modes for the SMS message input:

A.Incoming message B.Incoming Call

Incoming Message mode means that you can send a pre-set short message to control the state of " SMS message input"

Number identification: If the box were ticked, only the short messages from the telephone settings(Up to 5 user's phone number can be selected from the phone book) can be recognized by the x-Messenger, only when the contents is the same as the pre-set one,then the SMS message input state would be changed correctly.

On instruction: Here you can pre-edit the short message contents to control the "SMS message input" ON/HIGH". The default setting is1#1.

OFF instruction: Here you can pre-edit the short message contents to control the "SMS message input " OFF/LOW".The default setting is "1#0"

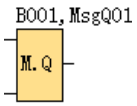
OFF-Delay:If the "Enable Delay" box were ticked, after the message input status changes from Low to High via a preset short message, then the status of SMS message input block would switch off(reset to Low) on expiration of the preset delay time(1...99 seconds). If this item was not enabled, the SMS message does not reset automatically.

Incoming Call mode means you can dial the phone number of the x-Messenger to control SMS message input state. While the x-Messenger gets one incoming call but it does not answer, the SMS message state would change from 0 to1. After the call being timed-out or cut off, the SMS message state would change 1 to 0.

Answer Call: If the box were ticked, the x-Messenger shall pick up your call but without any voice. This item can help you ensure the x-Messenger has got your phone correctly and you can control the SMS message input which keeps high for **10 seconds** unless you cut off the call.

Note: If answer call is not selected. You call the x-Messenger would not have call cost. Contrarily, the call cost would exist.

7.2.12 SMS message output



Up to 64 SMS message outputs are available. Each one of these message outputs can send an SMS message or Call out without voice. Only the change from LOW-to-HIGH can trigger an SMS.

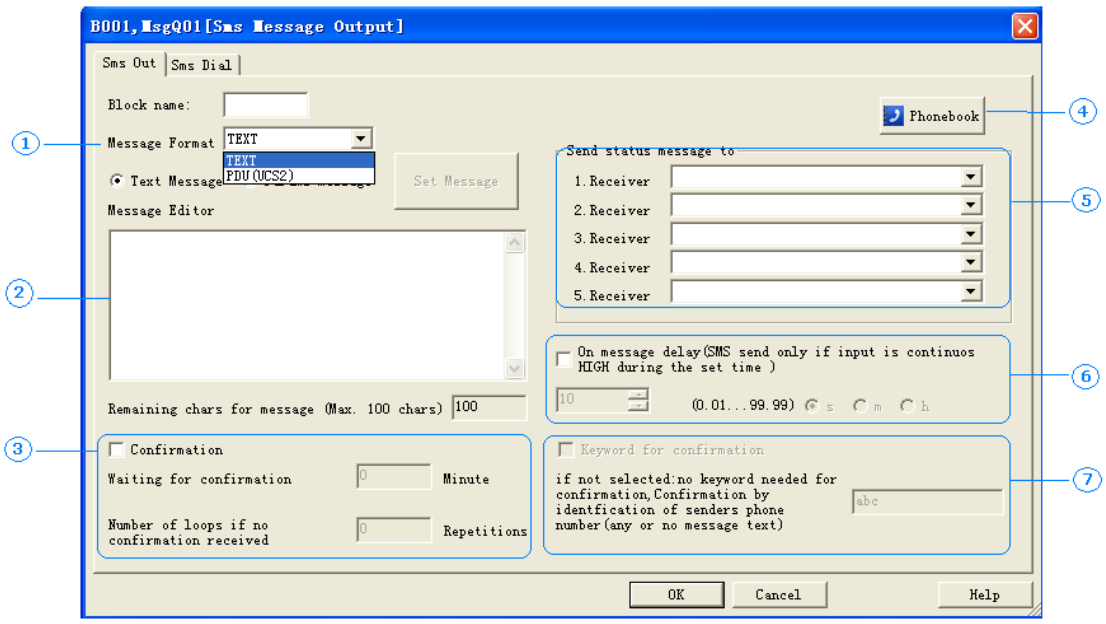
Caution ： Please remember every SMS message output needs at least one phone number in its list. The display of special characters in the GSM network can cause problems. Please use only text characters and figures. The programming software identifies special characters and an error messages will occur.

Short description

The output would not be high until all the pre-defined short messages were successfully sent out.

Connection	**Description**
Input **Trg**	Start sending short message out (Trigger)
Input **R**	Only reset the output signal to 0.
Output **Q**	Q is switched on after all the short message sent out successfully.

General description of parameter dialog box:



1.Message Format ： TEXT or PDU (UCS2).

TEXT is supposed to support ASCⅡ.

PDU is supposed to support multi languages.

2. Short message content edit area: Up to 100 characters are available under TEXT mode and up to 70 characters under PDU (UCS2) This area is only for the "Text Message"

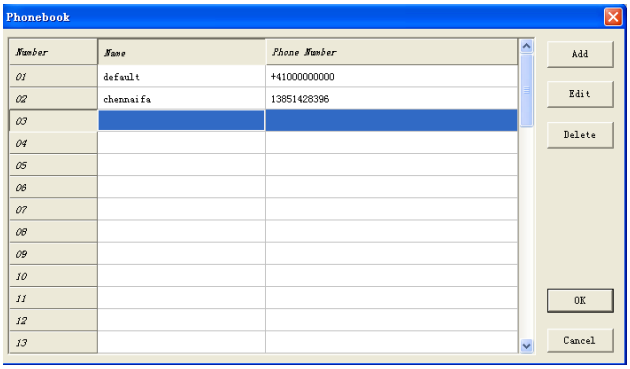
3. With **confirmation** function activated:

If the x-Messenger does not receive an acknowledgement SMS within a certain preset time from the receiver, the event message will be sent to the next receiver. This means that the device runs through the 5 allocated receiver numbers and restarts afterwards with the first number again (The number of running loops can be pre-defined). As soon as the device receives a confirmation from the receivers the process is stopped. If this is not the case, the message will be sent to the next receiver (after expiry of the preset time).

If the confirmation is inactive, all receivers who are allocated to that event will receive a message without

repetition.

4. Phonebook: click this button, you can edit the phonebook



You are allowed to edit Phone book by clicking the button in the toolbar as shown below:

5. Receiver selection

6. On message delay --Time delayed message for input ON

If there is an input signal, the respective message transmission can be time delayed, i.e. the x-Messenger only sends the pre-defined message after the preset time has elapsed and if the signal has remained ON constantly during that time. In other words, the input signal is ignored during the set delay time. Time delays of 0.1 seconds to 99.9 hours are possible. This time function default must be activated and is to prevent sending of numerous identical SMS messages.

REMARK

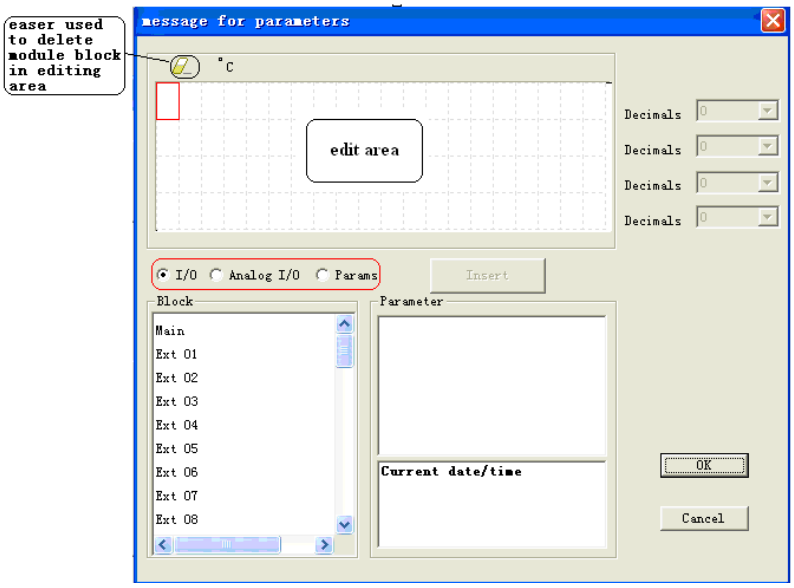
It is recommended to use the delay function to avoid that several messages are sent for the same event.

7. Keyword for confirmation

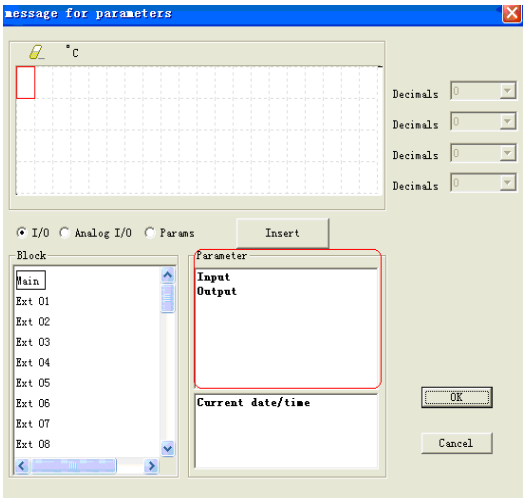
If the **confirmation code word** is not activated, the phone number identification is carried out as a security check and it is sufficient to send an empty SMS message to the SMS Relay.

Usage instruction for "Parameters Message" sector:

First of all, select "**Parameter Message**", and then click "Set Message" button, the below configuration appears:



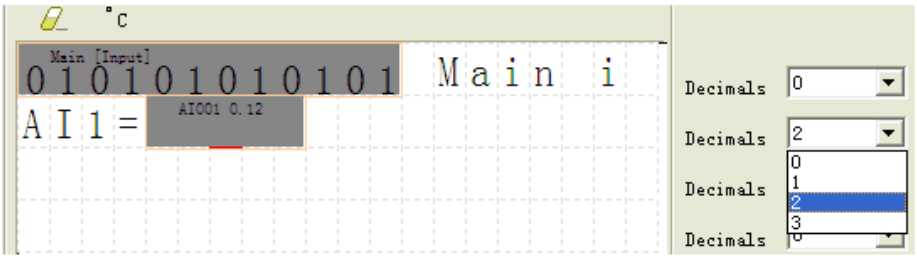
A. Select "I/O", hereunder "Block" section consists of "Main CPU", 8 pieces extensions, hence any of "Main", "Ext 01", "Ext 02", … can be selected, as below configuration shows:



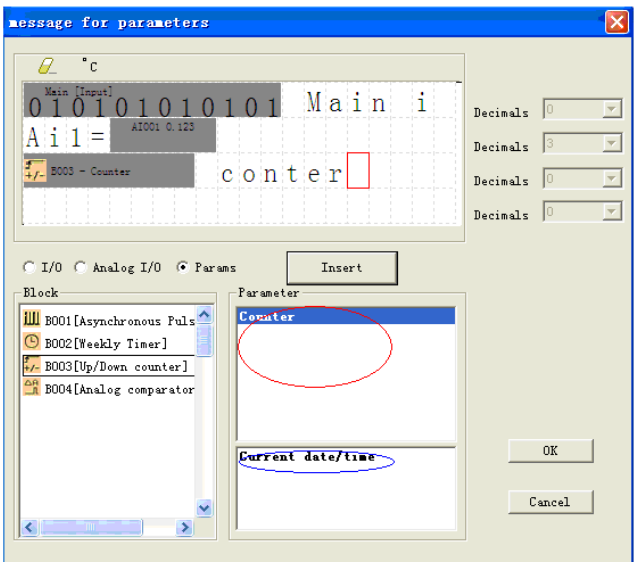
After that, Main CPU's I/O will appear in "Parameter" section, so you can select "Input" or "output", further click "Insert" button, the editing area will display the "input" or "output" as below configuration shows, finally click "ok" button to finish and confirm your insertion :

Certainly, you are also allowed to add text description in the blank area, as above configuration shows

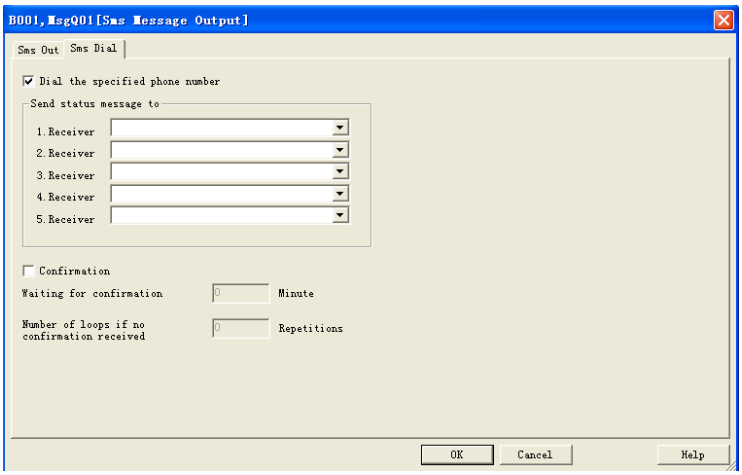
B. Select "Analog I/O", hereunder "Block" section consists of "8-route analog inputs of Main CPU", " 2-route analog inputs for 31 pieces expansion modules respectively，… can be selected，"Analog I/O" insertion method is same as you do with "I/O" above, as below configuration shows:



C. Select "Params", hereunder "Block" section will automatically list out all function blocks in your program which are able to be inserted into "Editing area". Then select a certain block, after that, parameters of that selected block will be displayed under "Parameter" section, hence just select specific parameter you would like, further click " Insert " button, finally click "ok " button to finish and confirm your inserting. As below configuration shows:



This block also can be configured as RING alarm.

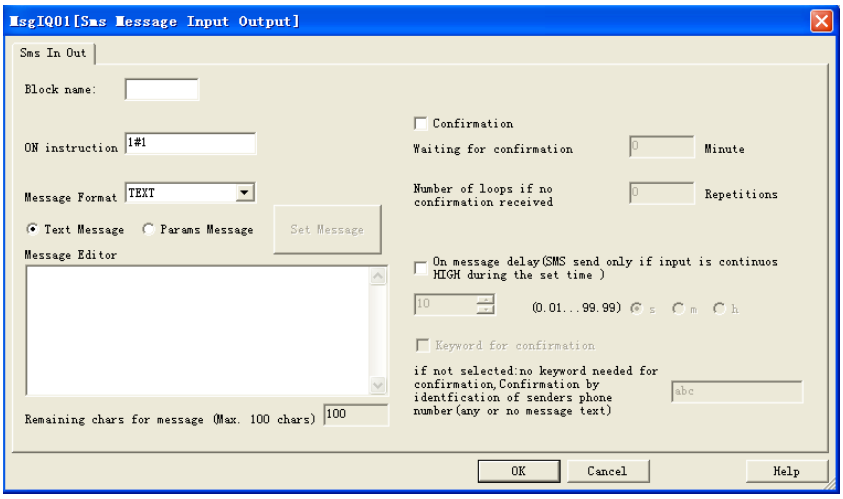


When the **En** pin had been activated, x-Messenger would dial the phone number in the 5 pre-set receivers. With **confirmation** function activated:

If the receiver does not answer the call from x-Messenger within a certain preset time from the receiver, the x-Messenger would dial next receiver. This means that the device runs through the 5 allocated receiver numbers and restarts afterwards with the first number again (The number of running loops can be pre-defined). As soon as the device receives a confirmation from the receivers the process is stopped. If this is not the case, the x-Messenger would dial the next receiver (after expiry of the preset time).

7.2.13 Sms message Input Output

Up to 12 "SMS message input output" blocks can be used in program.



Users can send the message as per the contents in the ON instruction option, the x-Messenger can send

the message including the parameters to the phone which sent the message in.

General description of parameter dialog box:

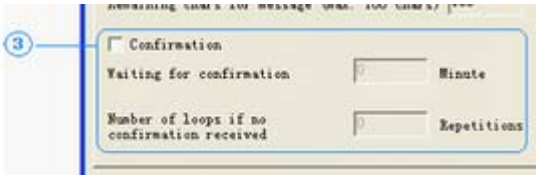
1.Message Format :TEXT or PDU (UCS2).

TEXT is supposed to support ASCⅡ.

PDU is supposed to support multi languages.

2. Short message content edit area: Up to 100 characters are available under TEXT mode and up to 70 characters under PDU (UCS2) This area is only for the "Text Message"

3. With **confirmation** function activated:



If the x-Messenger does not receive an acknowledgement SMS within a certain preset time from the receiver, the event message will be sent to the next receiver. This means that the device runs through the 5 allocated receiver numbers and restarts afterwards with the first number again (The number of running loops can be pre-defined). As soon as the device receives a confirmation from the receivers the process is stopped. If this is not the case, the message will be sent to the next receiver (after expiry of the preset time).

If the confirmation is inactive, all receivers who are allocated to that event will receive a message without repetition.

4. On message delay --Time delayed message for input ON

If there is an input signal, the respective message transmission can be time delayed, i.e. the x-Messenger only sends the pre-defined message after the preset time has elapsed and if the signal has remained ON constantly during that time. In other words, the input signal is ignored during the set delay time. Time delays of 0.1 seconds to 99.9 hours are possible. This time function default must be activated and is to prevent the sending of numerous identical SMS messages.

REMARK

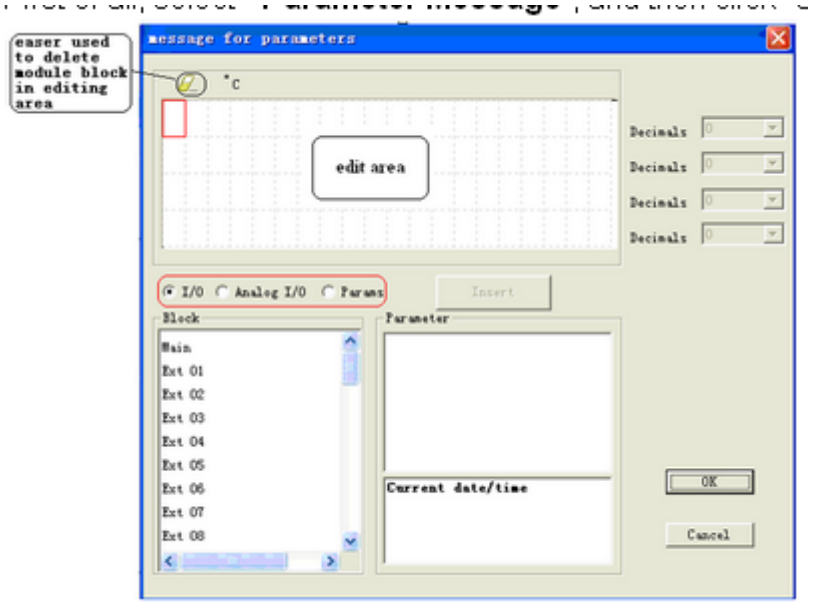
It is recommended to use the delay function to avoid several messages being sent for the same event.

7. Keyword for confirmation

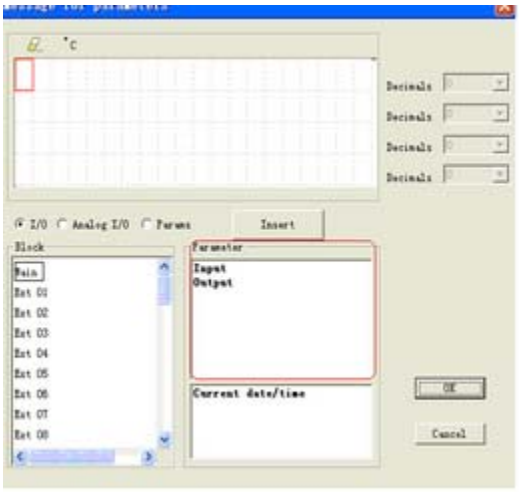
If the **confirmation code word** is not activated, the phone number identification is carried out as a security check and it is sufficient to send an empty SMS message to the SMS Relay.

Usage instruction for "Parameters Message" sector:

First of all, select "**Parameter Message**", and then click "Set Message" button the below configuration is shown:

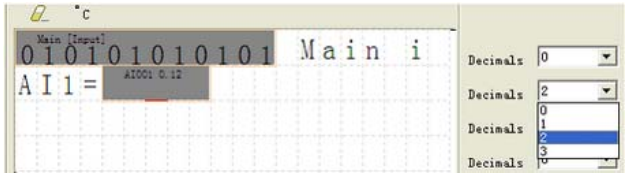


A. Select "I/O", hereunder "Block" section consists of "Main CPU", 8 pieces extensions, hence any of "Main","Ext 01","Ext 02",… can be selected,as below configuration shows:



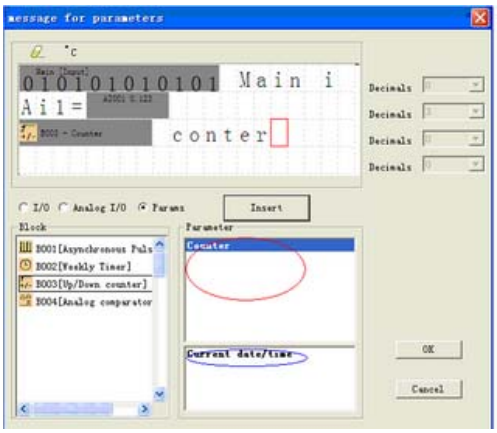
After that, Main CPU's I/O will appear in "Parameter" section, so you can select "Input" or "output", further click "Insert" button, herewith the editing area will display the "input" or "output" as below configuration shows, finally click "ok" button to finish and confirm your inserting :

Certainly, you are also allowed to add text description in the blank area, as above configuration shows



B. Select "Analog I/O", hereunder "Block" section consists of "8-route analog inputs of Main CPU", " 2-route analog inputs for 31 pieces expansion modules respectively,… can be selected,"Analog I/O" inserting method is same as you do with "I/O" above, as below configuration shows:

C. Select "Params", hereunder "Block" section will automatically list out all function blocks in your program which are able to be inserted into "Editing area". Then select a certain block, after that, parameters of that selected block will be dislayed under "Parameter" section, hence just select specific parameter you would like, further click " Insert " button, finally click "ok " button to finish and confirm your inserting. As below configuration shows:



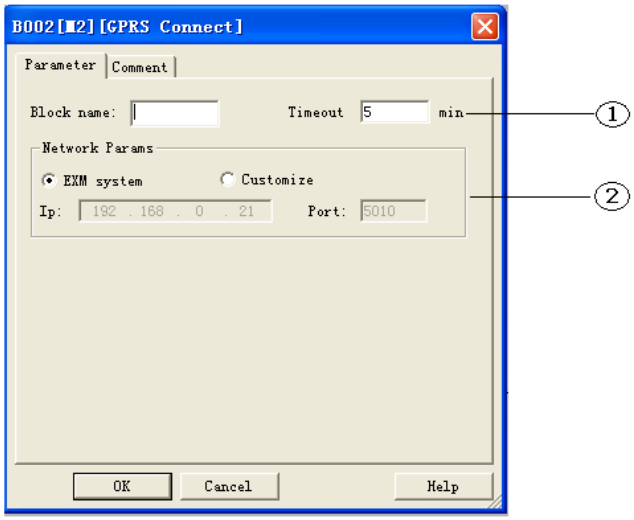
7.2.14 GPRS Connect

Short description

This block can be used to enable the GPRS connection or disable the connection.

Connection	**Description**
Input **Trg**	Enable the GPRS connection according to the settings in the property dialog box via trigger the input.
Output **Q**	Q is switched on after the GPRS connection is established. If the connection disconnected, the output also shall be switched off.

Property box instructions:

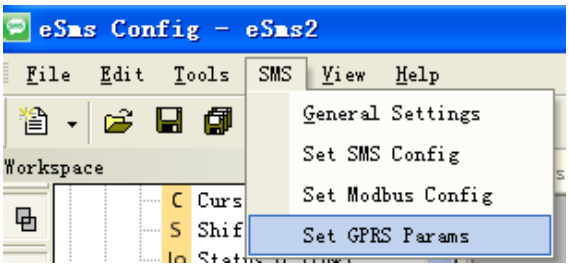


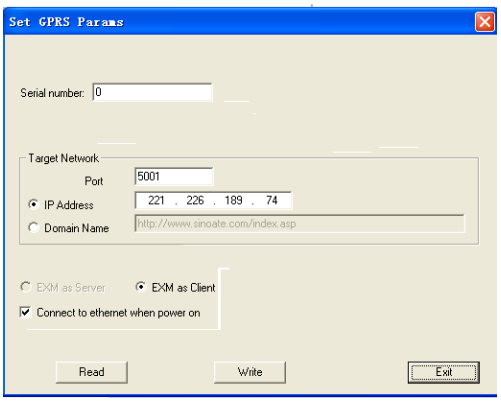
1. **Timeout time settings:** the timeout time of the GPRS connection. If there is no data transmission in the period more than the time of the settings value, the GPRS shall disconnect automatically.

2. **Network parameters settings.**

   Here there are 2 options for you.

   a. EXM system: If this setting is selected, the IP and the port number of the server shall be the same as the settings in the menu "SMS->GPRS Param"





   b. Customized: This option allows you to select another server.

Note: 1.The connection of this block configuration has a higher priority than the menu setting, that means if this block is activated, the GPRS connection of the menu settings shall disconnect automatically.

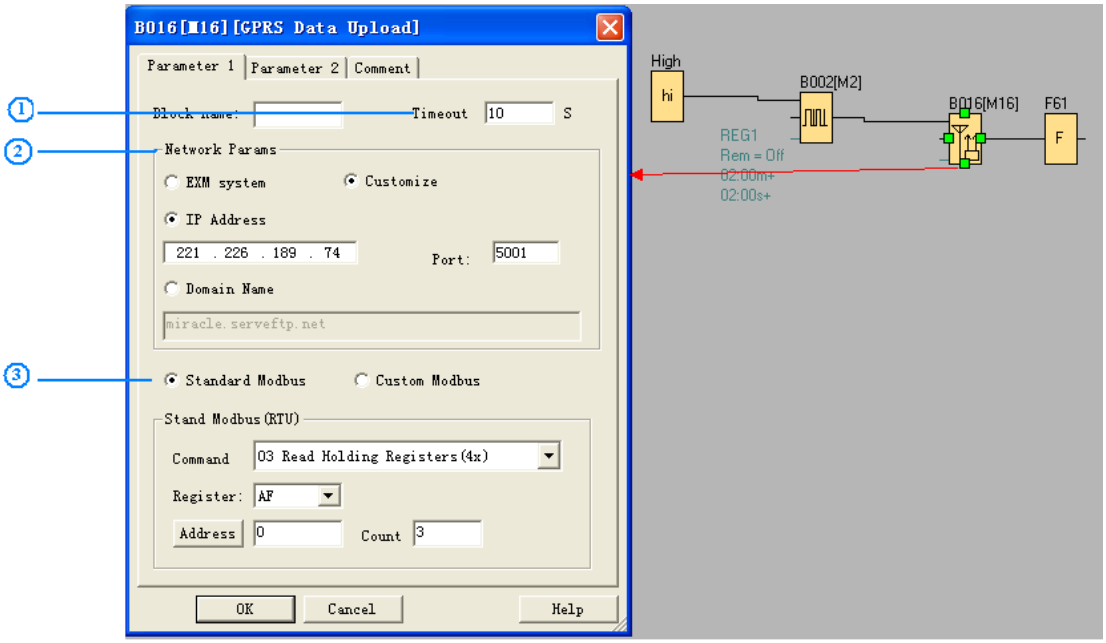
2. The data transmission between x-Messenger and the server is based on standard Modbus TCP protocol.

7.2.15 GPRS Data Upload

Short description

This block can be used to enable the GPRS connection and then transfer some information of the registers to the network server.

Connection	**Description**
Input **Trg**	Enable the GPRS connection according to the settings in the property dialog box via trigger the input.
Input **R**	Reset the output and disable the GPRS connection even if the **Trg** input keeps high.
Output **Q**	Q is switched on after the GPRS connection is established and the server software has made right response according to MODBUS TCP . If the connection disconnected, the output also shall be switched off.



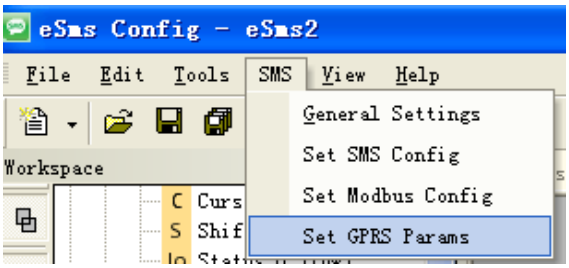
1.Timeout

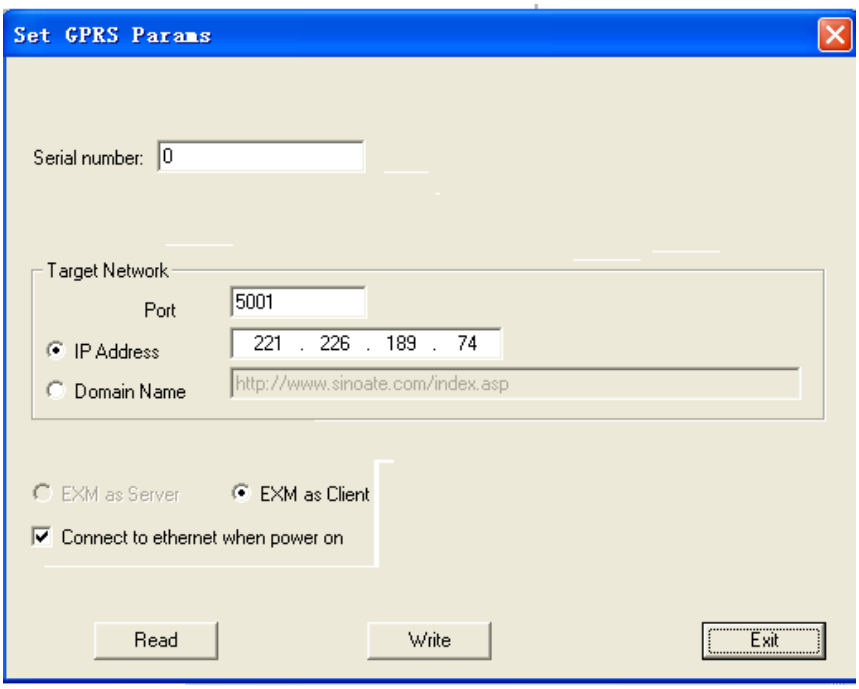
Such time setting is for the GPRS connection. If the server software does not respond within 10 seconds, after x-Messenger transfer the data(pre-set, here is AF1 --AF3 values), then x-Messenger would repeat the data transmission for 3 times, and finally the GPRS connection shall disconnect automatically.

2.Network parameters settings.

There herewith are 2 options for you.

A. EXM system: If this setting is selected, the IP and the port number of the server shall be the same as the settings in the menu "SMS->GPRS Param"





B. Customized: This option allows you to select another server.

Note: 1.The connection of this block configuration has a higher priority than the menu setting, that means if this block is activated, the GPRS connection of the menu settings shall disconnect automatically.

A. Standard Modbus

Server software get the data like this:

00 05 00 00 00 09 01 03 06 01 30 ff 6a 00 00

The request and response are prefixed by six bytes as follows

byte 0: transaction identifier - copied by server - usually 0

byte 1: transaction identifier - copied by server - usually 0

byte 2: protocol identifier = 0

byte 3: protocol identifier = 0

byte 4: length field (upper byte) = 0 (since all messages are smaller than 256)

byte 5: length field (lower byte) = number of bytes following

byte 6: unit identifier (previously 'slave address')

byte 7: MODBUS function code

byte 8: data length field (lower byte) = number of bytes following

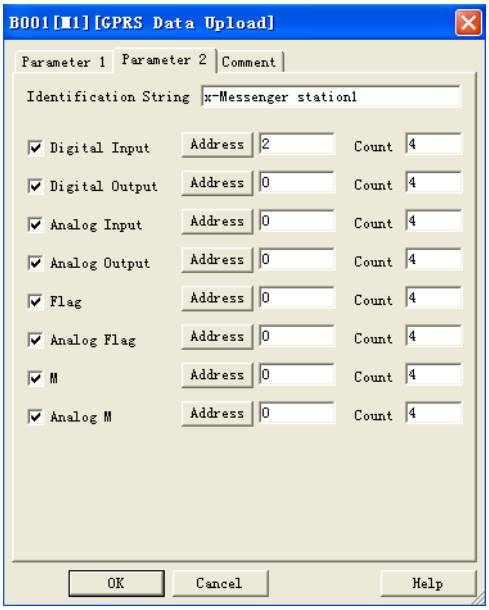
So, AF1 = 01 30 (DECIMAL 304)

AF2 = ff 6a (DECIMAL 65386)

AF3 = 00 00 (DECIMAL 0)

B. Standard Modbus

For example,configuration in program like this:



Server software gets the data like this:

00 09 00 00 00 4c 01 8b 49 14 78 2d 4d 65 73 73 65 6e 67 65 72 20 73 74 61 74 69 6f 6e 31 01 01 01 02 01 0d 0b 08 00 80 00 88 00 00 00 00 0c 08 00 00 00 00 00 80 00 88 16 01 02 17 08 01 c2 00 00 02 26 00 00 07 01 04 0d 08 00 00 00 00 00 00 01 c2

Description:

00 09 00 00 00 4c : MODBUS TCP data prefixed by six bytes

01 ： x-Messenger address(the default is 01)

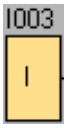
8b : Upload code(fixed, if GPRS Data upload used)

49 :length field =number of bytes following

14 :length field = number of bytes of Identification string

78 2d 4d 65 73 73 65 6e 67 65 72 20 73 74 61 74 69 6f 6e 31 : x-Messenger station1(Identification String)

01 01 01

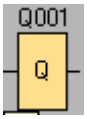


01 : type code (01 means the digital inputs)

01 : length field = number of bytes of the digital inputs

01 : status of the digital inputs(I3=1,I4=0,I5=0,I6=0)

02 01 0d

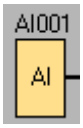


02 : type code (02 means the digital outputs)

01 : length field = number of bytes of the digital outputs

0d : status of the digital outputs (Q1=1,Q2=0,Q3=1,Q4=1)

0b 08 00 80 00 88 00 00 00 00



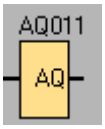
0b : type code (0b means the Analog Input)

08 :length field = number of bytes

of the analog inputs

00 80 00 88 00 00 00 00 : analog inputs value (AI1= 00 80 , AI2 = 00 88, AI3= 00 00,AI4= 00 00)

0c 08 00 00 00 00 80 00 88

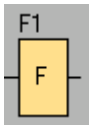


0c : type code (0c means the Analog output)

08 : length field = number of bytes of the analog outputs

00 00 00 00 00 80 00 88 : analog outputs value (AQ1= 00 00 , AQ2 = 00 00, AQ11= 00 80,AQ12= 00 88)

16 01 02

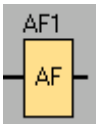


16 : type code (16 means the digital flag)

01 : length field = number of bytes of the digital flag

02 : status of the digital flag (F1=0,F2=1,F3=0,F4=0)

17 08 01 c2 00 00 02 26 00 00

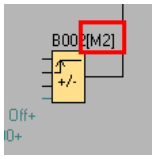


17 : type code (17 means the Analog flag)

08 : length field = number of bytes of the analog flag

01 c2 00 00 02 26 00 00 : analog flag value (AF1= 01 c2 , AF2 = 00 00, AF3= 02 26,AF4= 00 00)

07 01 04

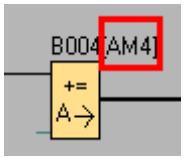


07 : type code (07 means the M status)

01 : length field = number of bytes of M(Function block status(1/0))

04: status of the M (M1=0,M2=10,M3=1,M4=0)

0d 08 00 00 00 00 00 00 01 c2



0d : type code (0d means the AM value)

08 : length field = number of bytes of AM

00 00 00 00 00 00 01 c2: AM value (AM1=00 00,AM2=00 00,AM3=00 00,AM4=01 c2)

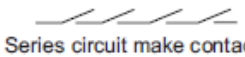
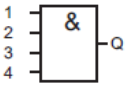
The command format is based on the standard Modbus TCP. Please refer to the technical file "Modbus TCP communication protocol" for details if needed.

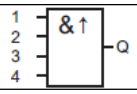
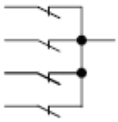
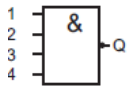
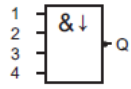
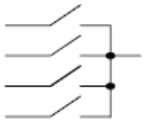
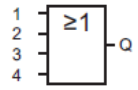
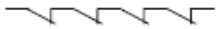
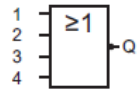
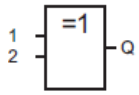
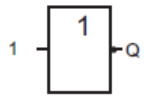
7.3 Basic functions list – GF

Basic functions represent simple logical elements of Boolean algebra.

You can invert the inputs of individual basic functions , i.e. the circuit program inverts a logical "1" at a relevant input to a logical "0"; if "0" is set at the input, the program sets a logical "1".

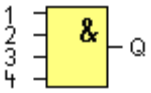
The GF list contains the basic function blocks you can use for your circuit program. The following basic functions are available:

View in the circuit diagram	View in x-Messenger	Name of the basic function
 Series circuit make contact		AND

		AND with edge evaluation
 Parallel circuit with break contacts		NAND （Not AND）
		NAND with edge evaluation
 Parallel circuit with make contacts		OR
 Series circuit with break contacts		NOR (Not OR)
 Double changeover contact		XOR (exclusive OR)
 Break contact		NOT (negation, inverter)
BOOLEAN FUNCTION		BOOLEAN FUNCTION

7.3.1 AND

Circuit diagram of a series circuit with several make contacts:



(Symbol in x-Messenger)

The output of an AND function is only 1 if **all** inputs are 1, i.e. when they are closed.

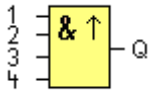
A block input that is not used (x) is assigned: x = 1.

Logic table of the AND block:

Input1	Input2	Input 3	Input 4	Output

0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

7.3.2 AND with edge evaluation



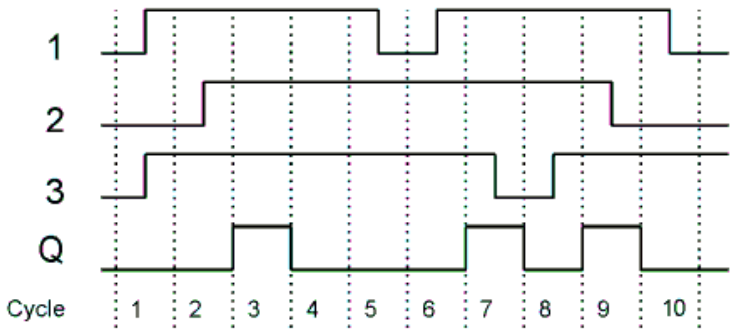
(Symbol in x-Messenger)

The output of an AND with edge evaluation is only 1 if **all** inputs are 1 and **at least one** input was 0 during the last cycle.

The output is set to 1 for the duration of one cycle and must be reset to 0 for the duration of the next cycle before it can be set to 1 again.

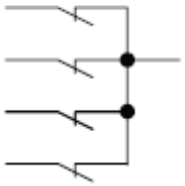
A block input that is not used (x) is assigned: x = 1.

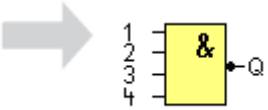
Timing diagram of an AND with edge evaluation



7.3.3 NAND

Parallel circuit with multiple break contacts in the circuit diagram:





(Symbol in x-Messenger)

The output of an NAND function is only 0 if **all** inputs are 1, i.e. when they are closed.

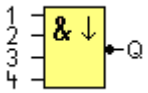
A block input that is not used (x) is assigned: x = 1.

Logic table of the NAND block:

Input 1	Input 2	Input 3	Input 4	Output
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1

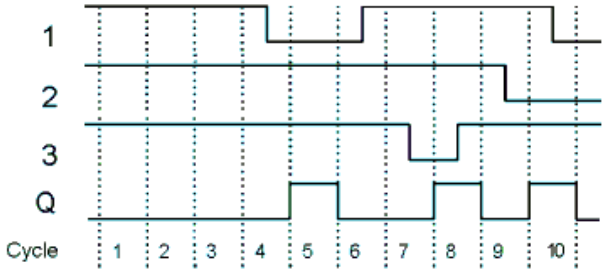
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

7.3.4 NAND with edge evaluation



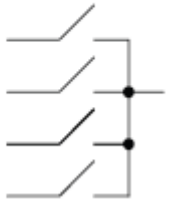
The output of a NAND with edge evaluation is only 1 **at least one** input is 0 and **all** inputs were 1 during the last cycle.
The output is set to 1 for the duration of one cycle and must be reset to 0 at least for the duration of the next cycle before it can be set to 1 again.
A block input that is not used (x) is assigned: x = 1.

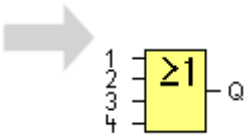
Timing diagram of a NAND with edge evaluation



7.3.5 OR

Circuit diagram of a parallel circuit with several make contacts:





(Symbol in x-Messenger)

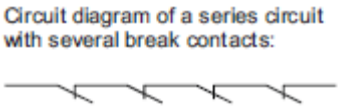
The output of an OR is 1 if **at least one** input is 1 (closed).

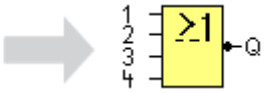
A block input that is not used (x) is assigned: x = 0.

Logic table of the OR function:

Input 1	Input 2	Input 3	Input 4	Output
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

7.3.6 NOR





(Symbol in x-Messenger)

The output of a NOR (NOT OR) is only 1 if **all** inputs are 0 , i.e. when they are open. When one of the inputs is switched on (logical 1 state), the output is switched off.

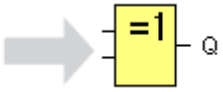
A block input that is not used (x) is assigned: x = 0.

Logic table of the NOR function:

Input 1	Input 2	Input 3	Input 4	Output
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

7.3.7 XOR

The XOR in a circuit diagram, shown as series circuit with 2 changeover contacts:



(Symbol in x-Messenger)

The XOR (exclusive OR) output is 1 if the signal status of the inputs is **different**.

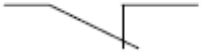
A block input that is not used (x) is assigned: x = 0.

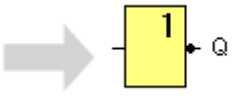
Logic table of the XOR function:

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

7.3.8 NOT

A break contact in the circuit diagram:





(Symbol in x-Messenger)

The output is 1 if the input is 0. The NOT block inverts the input status.

Advantage of the NOT, for example: x-Messenger no longer requires break contacts. You simply use a make contact and convert it into a break contact with the help of the NOT function.

Logic table of the NOT function:

Input 1	Output
0	1
1	0

7.4 Basics on special functions

Because of their different input designation, you can see right away that there is a difference between the special functions and basic functions. SFs contain timer functions, retentive functions and various parameter assignment options, which allow you to adapt the circuit program to suit your own requirements.
This section provides you with a brief overview of input designations and with some particular background information on SFs. The SFs in particular are described in Chapter7.5

7.4.1 Designation of the inputs

Logical inputs
Here, you will find the description of the connectors you can use to create a logical link to other blocks or to the inputs of the x-Messenger unit.
S (Set):
A signal at input S sets the output to logical "1".
R (Reset):
The reset input R takes priority over all other inputs and resets the outputs.
Trg (Trigger):
This input is used to trigger the start of a function.
Cnt (Count):
This input is used for counting pulses.
Fre (Frequency):
Frequency signals to be evaluated are applied to this input.
Dir (Direction):
This input determines the direction of count.
En (Enable):
This input enables a block function. When this input is "0", other signals to the block will be ignored.

Inv (Invert):

A signal at this input inverts the output signal of the block.

Ral (Reset all):

All internal values are reset.

Parameter inputs

At some of the inputs you do not apply any signals. You configure the relevant block values instead. Examples:

Par (Parameter):

This input will not be connected. Here, you set the relevant block parameters (times, on/off thresholds etc.).

No (Cam):

This input will not be connected. Here, you configure the time patterns.

P (Priority):

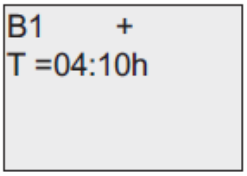
This is an open input. Here, you define priorities and specify whether a message is to be acknowledged in RUN.

7.4.2 Time response

Parameter T

In some of the SFs it is possible to configure a time value T. When you preset this time, note that your input values are based on the time base set:

Time base	_ _ :	_ _
s (seconds)	seconds	: 1/100 seconds
m (minutes)	minutes	: seconds
h (hours)	hours	: minutes



Setting a time T of 250 minutes:
Unit in hours h:

04:00 hours	240 minutes
00:10 hours	+10 minutes
=	250

Accuracy of T

Because of slight tolerances in the characteristics of electronic components, the set time T may deviate. The x-Messenger has a maximum tolerance of ± 0.02 %.

When 0.02 % of the time T is smaller than 0.02 seconds, the maximum deviation is 0.02 seconds.

Example: The maximum tolerance per hour (3600 seconds) is ±0.02%, which is proportional to ± 0.72 seconds. The maximum tolerance per minute (60 seconds) is ± 0.02 seconds.

Accuracy of the timer (weekly/yearly timer)

The maximum timing in accuracy is ± 5 s/day.

7.4.3 Backup of the real-time clock

Because the internal real-time clock of an x-Messenger is backed up, it continues operation after a power failure. The ambient temperature influences the backup time. At an ambient temperature of 25°C, the typical backup time of x-Messenger is 100 hours.

7.4.4 Retentivity

The switching states and counter values of SFs can be set retentive. This means that current data is retained after a power failure, and that the block resumes operation at the break point. The timer is not reset, but resumes operation until the time-to-go has expired, for example, to enable this response, however, the relevant functions must be set retentive.

R: The data is retained.

/: Current data is not retained (default). See the section in topic "Second circuit program " on enabling and disabling retentivity.

SFs hours counter, weekly timer, yearly timer and PI controller are always retentive.

7.4.5 Parameter protection

In the parameter protection settings, you can determine whether or not the parameters can be displayed and edited in x-Messenger parameter assignment mode. Two options are available:

+: The parameter attribute permits read/write access in parameter assignment mode(default).

-: The parameter settings are read–/write–protected in parameter assignment mode, and can be edited only in programming mode. See the parameter protection mode example in the "Second circuit program".

7.4.6 Calculating the gain and offset of analog values

A sensor is connected to the analog input and converts a process variable into an electrical signal. This value of signal lies within the typical range of this sensor. x-Messenger always converts the electrical signals at the analog input into digital values from 0 to 1000. A voltage of 0 to 10 V (or current signal 0/4…20mA) at input AI is transformed internally into range of values from 0 to 1000. An input voltage exceeding 10 V is shown as internal value 1000.

Because you cannot always process the range of values from 0 to 1000 as predetermined by x-Messenger, you can multiply the digital values by a gain factor and then shift the zero of the range of values (offset). This allows you to output an analog value to the x-Messenger display, which is proportional to the actual process variable.

Parameter	Minimum	Maximum
Input voltage (in V)	0	≥ 10
Input current(in mA)	0/4	≥20
Internal value	0	1000
Gain	–10.00	+10.00
Offset	–10000	+10000

Mathematical rule

Actual value Ax =

(internal value at input Ax·gain) + offset

Gain and offset calculation

The gain and offset is calculated based on the relevant high and low values of the function.

Example 1:

The available thermocouples have the following technical data: –30 to +70℃, 0 to 10 V DC (i.e. 0 to 1000 in x-Messenger).

Actual value = (internal value ·gain) + offset, thus

–30 = (0 ·A) + B, i.e. offset B = –30

+70 = (1000 ·A) –30, i.e. gain A = 0.1

Example 2:

A pressure sensor converts a pressure of 1000 mbar into a voltage of 0 V, and a pressure of 5000 mbar into a voltage of 10 V.

Actual value = (internal value. gain) + offset, thus

= (0·A) + B, i.e. offset B = 1000

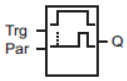
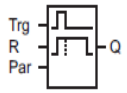
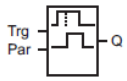
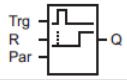
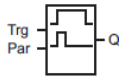
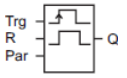
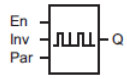
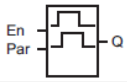
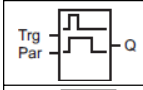
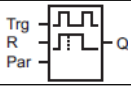
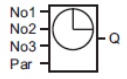
= (1000 ·A) +1000, i.e. gain A = 4

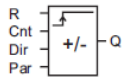
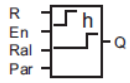
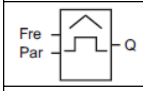
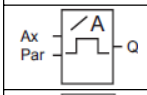
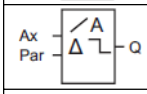
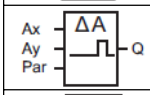
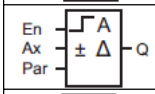
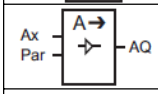
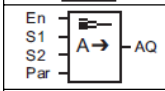
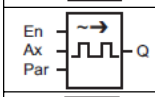
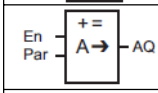
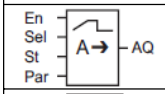
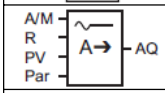
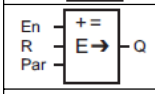
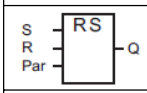
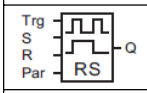
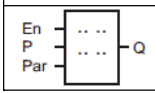
Example of analog values

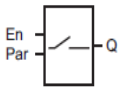
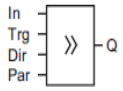
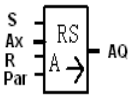
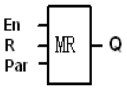
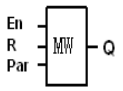
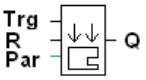
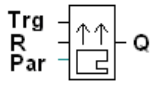
Process variable	Voltage (V)	Internal value	Gain	Offset	Value shown (A)
-30^0 C	0	0	0.1	−30	−30
0^0 C	3	300	0.1	−30	0
$+70^0$ C	10	1000	0.1	−30	70
1000 mbar	0	0	4	1000	1000
3700 mbar	6.75	675	4	1000	3700
5000 mbar	10	1000	4	1000	5000
	0	0	0.01	0	0
	5	500	0.01	0	5
	10	1000	0.01	0	10
	0	0	1	0	0
	5	500	1	0	500
	10	1000	1	0	1000
	0	0	10	0	0
	5	500	10	0	5000
	10	1000	10	0	10000
	0	0	0.01	5	5
	5	500	0.01	5	10
	10	1000	0.01	5	15
	0	0	1	500	500
	5	500	1	500	1000
	10	1000	1	500	1500
	0	0	1	−200	−200
	5	500	1	−200	300
	10	1000	1	−200	800
	0	0	10	−10000	−10000
	10	1000	10	−10000	0
	0.02	2	0.01	0	0
	0.02	2	0.1	0	0
	0.02	2	1	0	2
	0.02	2	10	0	20

7.5 Special functions list – SF

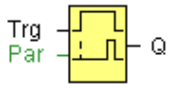
When you create your circuit program in eSmsConfig, you find the special function blocks in the SF list. You can invert the inputs of SFs individually, i.e. the circuit program converts a logical "1" at the input into a logical "0"; a logical "0" it converts into a logical "1". The table also specifies whether the relevant function can be set retentive (Rem). The following SFs are available:

View in x-Messenger	Name of the special function	Rem
Timer		
	On-delay	REM
	Off-delay	REM
	On-/Off-delay	REM
	Retentive on-delay	REM
	Wiping relay(pulse out)	REM
	Edge triggered wiping relay	REM
	Asynchronous pulse generator	REM
	Random generator	
	Stairway lighting switch	REM
	Multiple function switch	REM
	Weekly timer	
	Yearly timer	

Counter		
	Up/down counter	REM
	Hours counter	REM
	Threshold trigger	
Analog		
	Analog threshold trigger	
	Analog differential trigger	
	Analog comparator	
	Analog value monitoring	
	Analog amplifier	
	Analog multiplexer	
	Pulse Width Modulator(PWM)	
	Analog math	
	Analog ramp	
	PI controller	
	Analog math error detection	
Miscellaneous		
	Latching relay	
	Pulse relay	
	Message texts	

	Softkey	
	Shift register	
	Data latching relay	
	Modbus Read	
	Modbus Write	
	Memory Write	
	Memory Read	

7.5.1 On-delay



Short description

The output is not switched on until a configured delay time has expired.

Connection	**Description**
Trg input	The on delay time is triggered via the Trg (Trigger) input
Parameter	**T** represents the on delay time after which the output is switched on (output signal transition 0 to 1). **Retentivity** on = the status is retentive in memory.
Output **Q**	Q switches on after a specified time T has expired, provided Trg is still set.

Parameter T

The time for parameter T can also be preset based on the actual value of another, already-configured function. You can use the actual values of the following functions:

Analog comparator: Ax - Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

PI controller:AQ

Data latching relay: AQ

Up/Down counter: Cnt

You select the required function via the block number. Time-base can be adjusted.

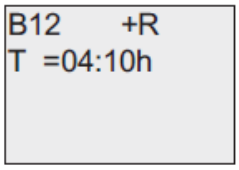
The value of "T" can be set/modified in parameter mode. For information about how to modify，refer to chapter 5.2.2 please.

For information on the validity and accuracy of the time base, refer to the x-Messenger time-base list as follows:

Valid ranges of the time-base, if T = parameter

Time-base	**Max. value**	**Min. resolution**	**Accuracy**
s (seconds)	99:99	10 ms	**±** 10 ms
m (minutes)	99:59	1s	± 1 s
h (hours)	99:59	1 min	± 1 min

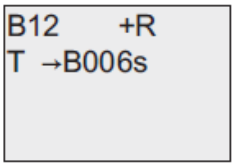
The display in programming mode (example):



Valid ranges of the time base, if T = Actual value of an already-programmed function

Timebase	max. value	Meaning	Accuracy
ms	99990	Number of ms	+ 10 ms
s	5999	Number of s	+ 1 s
m	5999	Number of min	+ 1 min

The display in programming mode (example):



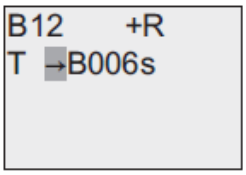
If the referenced block (B6, in the example) returns a value that lies out of the valid range, the value is rounded up or down to the next valid value.

Parameter preset = Actual value of an already-programmed function

How to include the actual value of an already-programmed function:

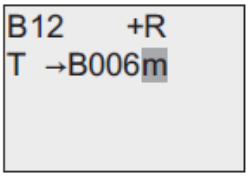
1. Press ▶ to move the cursor to the equal sign of parameter T.

2. Press ▼ to change the equal sign into an arrow. If it exists, the last referenced block and its timebase is shown.

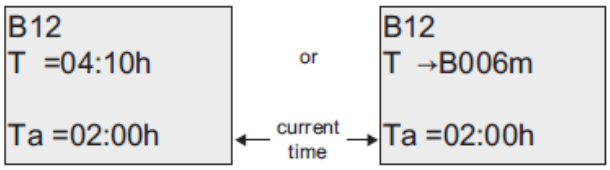


3. Press ▶ to move the cursor to the "B" of the shown block, and then press to select the required block number.

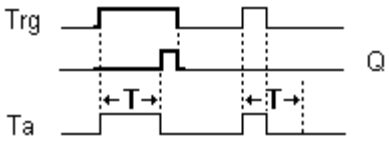
4. Press ▶ to move the cursor to the block's time base and press to select the required time base.



The view in parameter assignment mode (example):



Timing diagram



Description of the function

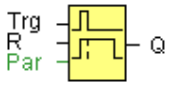
The time Ta (the current time in x-Messenger) is triggered with the 0 to 1 transition at input Trg.

If the status at input Trg stays 1 at least for the duration of the configured time T, the output is set to 1 when this time has expired (the on signal of the output follows the on signal of the input with delay).

The time is reset if the status at input Trg changes to 0 again before the time T has expired.

The output is reset to 0 when input Trg is 0.

7.5.2 Off-delay



Short description

The output with off delay is not reset until a defined time has expired.

Connection	**Description**
Input **Trg**	Start the off delay time with a negative edge (1 to 0 transition) at input Trg (Trigger)
Input **R**	Reset the off delay time and set the output to 0 via the R (Reset) input. Reset has priority over Trg
Parameter	**T:** The output is switched off on expiration of the delay time T (output signal transition 1 to 0). **Retentivity** on = the status is retentive in memory.
Output **Q**	Q is switched on for the duration of the time T after a trigger at input Trg.

Parameter

The time set in parameter T can be supplied by the value of another already-programmed function:

Analog comparator: Ax - Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

PI controller:AQ

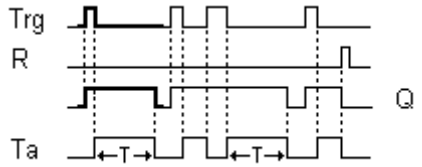
Data latching relay: AQ

Up/Down counter: Cnt

The value of " T " can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Select the required function by the block number. The time base is configurable. For information on valid time base ranges and parameter preset, refer to chapter 4.4.1 the On-delay topic.

Timing diagram



Description of the function

Output Q is set to 1 momentarily with a 0 to 1 transition at input Trg.

At the 1 to 0 transition at input Trg, x-Messenger retriggers the current time T, and the output remains set.

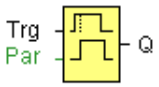
The output Q is reset to 0 when T_a reaches the value specified in T (T_a=T) (off delay).

A one-shot at input Trg retriggers the time Ta.

You can reset the time Ta and the output via the input R (Reset) before the time Ta has expired.

If retentivity is not set, output Q and the expired time are reset after a power failure.

7.5.3 On-/Off-delay



Short description

The on/off delay function is used to set an output after a configured on delay time and then reset it again upon expiration of a second configured time.

Connection	Description
Input **Trg**	You trigger the on delay with a positive edge (0 to 1 transition) at input Trg (Trigger). You trigger the off delay with a negative edge (1 to 0 transition).

Parameter	**T_H** is the on delay time for the output (output signal transition 0 to 1). **T_L** is the off delay time for the output (output signal transition 1 to 0). **Retentivity** on = the status is retentive in memory.
Output **Q**	Q is switched on upon expiration of a configured time T_H if Trg is still set. It is switched off again upon expiration of the time T_L and if Trg has not been set again.

Parameter

The on-delay time and off-delay time set in parameter TH and TL can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

PI controller: AQ

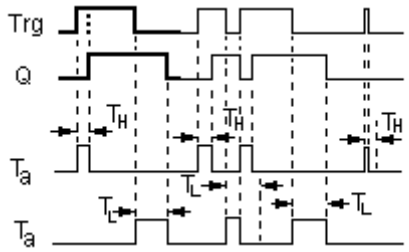
Data latching relay: AQ

Up/Down counter: Cnt

The value of "TH", "TL" can be set/modified in parameter mode. For information about how to modify, refer to chapter 7.2.2 please.

For information on the validity and accuracy of the time base, refer to 7.4.2

Timing diagram



Description of the function

The time T_H is triggered with a 0 to 1 transition at input Trg.

If the status at input Trg is 1 at least for the duration of the configured time T_H, the output is set to logical 1 upon expiration of this time (output is on delayed to the input signal).

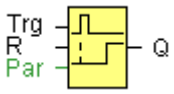
The time T_H is reset if the status at input Trg is reset to 0 before this time has expired.

The time T_L is triggered with the 1 to 0 transition at the output.

If the status at input Trg remains 0 at least for the duration of a configured time T_L, the output is reset to 0 upon expiration of this time (output is off delayed to the input signal).

The time T_L is reset if the status at input Trg is returns to 1 before this time has expired.

7.5.4 Retentive on-delay



Short description

A one-shot at the input triggers a configurable time. The output is set upon expiration of this time.

Connection	Description
Input **Trg**	Trigger the on delay time via the Trg (Trigger) input.
Input **R**	Reset the time on delay time and reset the output to 0 via input **R** (Reset). Reset takes priority over **Trg**.
Parameter	T is the on delay time for the output (output signal transition 0 to 1). **Retentivity** on = the status is retentive in memory.
Output **Q**	Q is switched on upon expiration of the time T.

Parameter

The time in parameter T can be provided by the value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

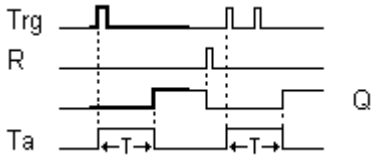
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of " T " can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



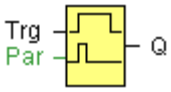
Description of the function

The current time Ta is triggered with a 0 to 1 signal transition at input Trg. Output Q is set to 1 when Ta reaches the time T. A further pulse at input Trg does not affect Ta.

The output and the time Ta are only reset to 0 with a1 signal at input R.

If retentivity is not set, output Q and the expired time are reset after a power failure.

7.5.5 Wiping relay (pulse output)



Short description

An input signal generates an output signal of a configurable length.

Connection	**Description**
Input **Trg**	You trigger the time for the wiping relay with a signal at input Trg (Trigger)
Parameter	**T**L represents the time after which the output is reset (output signal transition 1 to 0). **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	A pulse at Trg sets Q. The output stays set until the time T has expired and if Trg = 1 for the duration of this time. A 1 to 0 transition at Trg prior to the expiration of T also resets the output to 0.

Parameter

The off time T can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

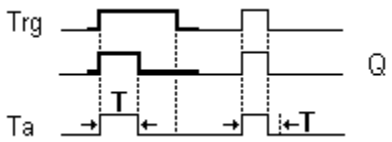
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of " T L " can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



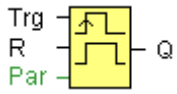
Description of the function

With the input signal Trg = 1, output Q is set to 1. The signal also triggers the time Ta, while the output remains set.

When Ta reaches the value defined at T (Ta=T), the output Q is reset to 0 state (pulse output).

If the signal at input Trg changes from 1 to 0 before this time has expired, the output is immediately reset from 1 to 0.

7.5.6 Edge triggered wiping relay



Short description

An input pulse generates a preset number of output pulses with a defined pulse/pause ratio (retriggerable), after a configured delay time has expired.

Connection	Description
Input **Trg**	You trigger the times for the Edge-triggered wiping relay with a signal at input Trg (Trigger).
Input **R**	The output and the current time Ta are reset to 0 with a signal at input R.
Parameter	**TL, TH:** The interpulse period T_L and the pulse period T_H are adjustable. **N** determines the number of pulse/pause cycles T_L / T_H: Value range: 1...9. **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Output Q is set when the time T_L has expired and is reset when T_H has expired.

Parameter

The pulse width TH and the interpulse width TL can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

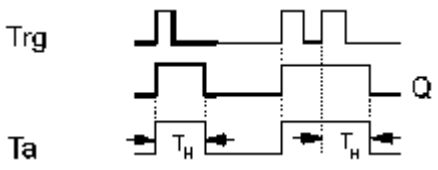
PI controller:AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of "TH", "TL" can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



T_L = 0; N = 1

Description of the function

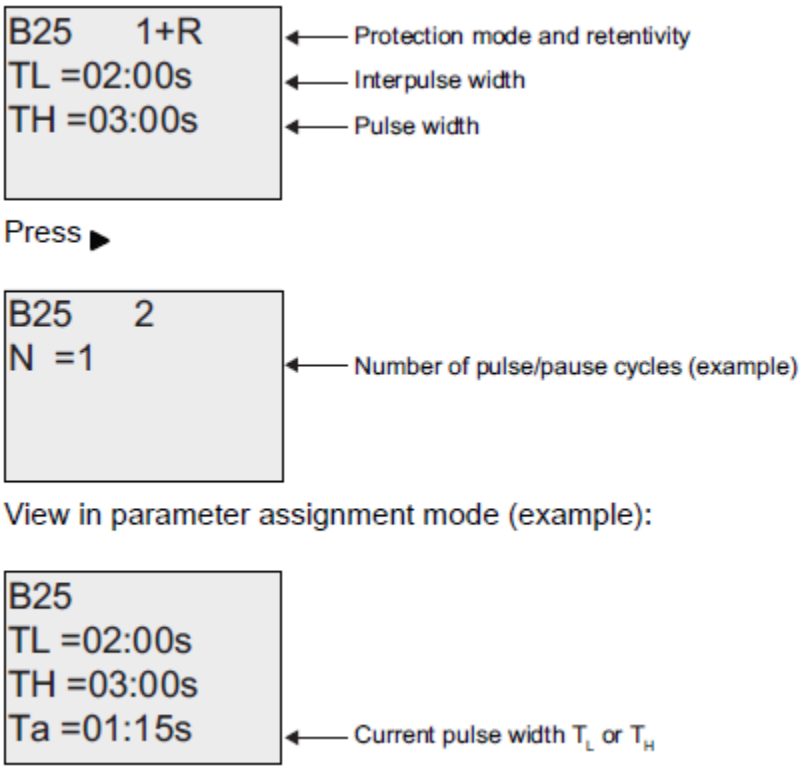
With the change at input Trg to 1, the time T_L (time low) is triggered. After the time T_L has expired, output Q is set to 1 for the duration of the time T_H (time high).

If input Trg is retriggered prior to the expiration of the preset time (T_L + T_H), the time Ta is reset and the pulse/pause period is restarted.

If retentivity is not set, output Q and the time are reset after a power failure.

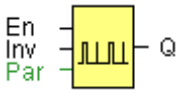
Setting the Par parameter

View in programming mode (example):



View in parameter assignment mode (example):

7.5.7 Asynchronous pulse generator



Description of function

The pulse shape at the output can be modified via a configurable pulse/pause ratio.

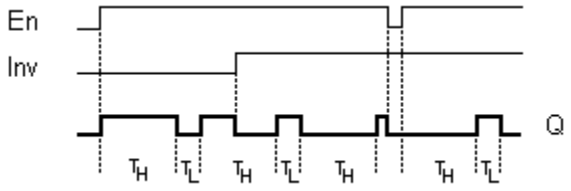
Connection	Description
Input **En**	You enable/disable the asynchronous pulse generator with the signal at input En.
Input **Inv**	The Inv input can be used to invert the output signal of the active asynchronous pulse generator..
Parameter	**TL,TH:** You can customize the pulse (TL)/ pause (TH) ratio. **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Q is toggled on and off cyclically with the pulse times T_H and T_L.

Parameter

The pulse width TH and the inter-pulse width TL can be provided by the actual value of another already-programmed function:
Analog comparator: Ax – Ay
Analog trigger: Ax
Analog amplifier: Ax
Analog multiplexer: AQ
Analog ramp: AQ
Analog math: AQ
PI controller: AQ
Data latching relay: AQ
Up/Down counter: Cnt

The value of "TH", "TL" can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



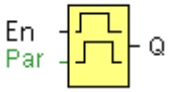
Description of the function

You can set the pulse/pause ratio at the TH (Time High) and TL (Time Low) parameters.

The INV input can be used to invert the output signal. The input block INV only inverts the output signal if the block is enabled via EN.

If retentivity is not set, output Q and the expired time are reset after a power failure.

7.5.8 Random generator



Short description

The output of a random generator is toggled within a configurable time.

Connection	**Description**
Input **En**	The positive edge (0 to 1 transition) at the enable input En (Enable) triggers the on delay for the random generator. The negative edge (1 to 0 transition) triggers the off delay for the random generator.
Parameter	**TH:** The on delay is determined at random and lies between 0 s and T_H. **TL:** The off delay is determined at random and lies between 0 s and T_L.
Output **Q**	Q is set on expiration of the on delay if En is still set. It is reset when the off delay time has expired and if En has not been set again.

Parameter

The on-delay time TH and the off-delay time TL can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

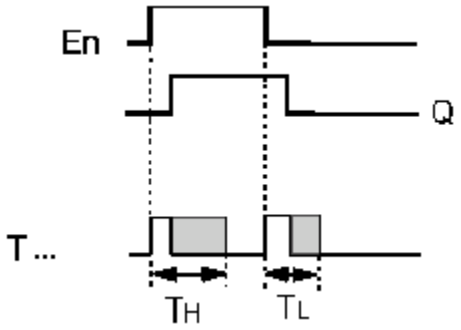
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of "TH", "TL" can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



Description of the function

With the 0 to 1 transition at input En, a random time (on delay time) between 0 s and T_H is set and triggered.

If the status at input En is 1 at least for the duration of the on delay, the output is set to 1 when this on delay time has expired.

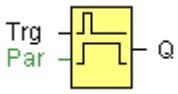
The time is reset if the status at input En is reset to 0 before the on delay time has expired.

When input En is reset 0, a random time (off delay time) between 0 s and T_L is set and triggered.

If the status at input En is 0 at least for the duration of the off delay time, the output Q is reset to 0 when the off delay time has expired.

The time is reset if the status at input En returns to 1 before the on delay time has expired.

7.5.9 Stairway lighting switch



Short description

The edge of an input pulse triggers a configurable time. The output is reset when this time has expired. An off warning can be output prior to the expiration of this time.

Connection	Description
Input **Trg**	You trigger the time (off delay) for the stairway switch with a signal at input Trg (Trigger).
Parameter	**T:** The output is reset (1 to 0 transition when the time T has expired. **T!** Determines the triggering time for the pre-warning. **T!L** determines the length of the pre-warning time. **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Q is reset after the time T has expired. A warning signal can be output before this time has expired.

Parameter

The off-delay time T, the pre-warning time T! and the pre-warning period T!L can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

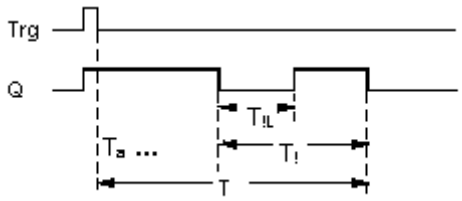
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of " T " can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



Changing the time base

You can change the pre-warning time base and the period.

Time base **T**	**Pre-warning time**	**Pre-warning** **period**
Seconds	750 ms	50 ms
Minutes	15 s	1 s
Hours	15 min	1 min
* makes sense only for programs with a cycle time of < 25 ms		

Description of the function

Output Q is set to 1 with a 0 to 1 signal transition at input Trg. The 1 to 0 transition at input Trg triggers the current time and output Q remains set.

Output Q is reset to 0 when Ta reaches the time T. Before the off delay time (T - $T_!$) has expired, you can output a pre-warning that resets Q for the duration of the off pre-warning time $T_{!L}$.

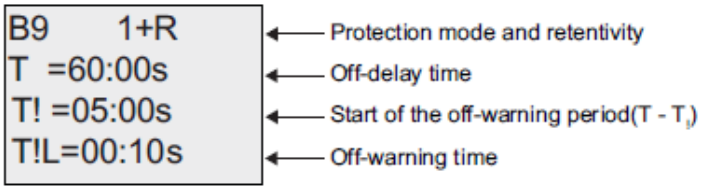
Ta is retriggered (optional) at the next high/low transition at input Trg and if Ta is expiring.

If retentivity is not set, output Q and the expired time are reset after a power failure.

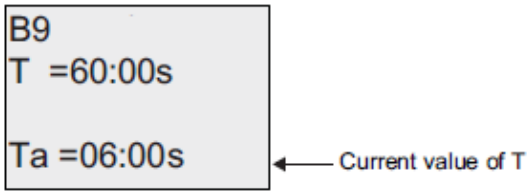
Setting the Par parameter

Note

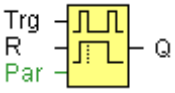
All times must have the same time base.



View in parameter assignment mode (example):



7.5.10 Multiple function switch



Short description

Switch with two different functions:

- Pulse switch with off delay
- Switch (continuous light)

Connection	Description
Input **Trg**	With a signal at input Trg (Trigger) you set output Q (continuous light), or reset Q with off delay. Output Q can be reset with a signal at the Trg input.
Input **R**	You set the current time Ta, and reset the output to 0, with a signal at input R.
Parameter	**T:** The output is reset (1 to 0 transition) when the time T has expired. **T_L** determines the period during which the input must be set in order to enable the permanent light function. **$T_!$** Determines the on delay for the pre-warning time. **$T_{!L}$** determines the length of the pre-warning time. **Retentivity** set (on) = the status is retentive in memory.

Output **Q**	Output Q is set with a signal at input Trg, and it is reset again after a configured time has expired and depending on the pulse width at input Trg, or it is reset with another signal at input Trg.

Parameter

The off-delay time T, the permanent light time TL, the on-delay pre-warning time T!, and the pre-warning time period T!L can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

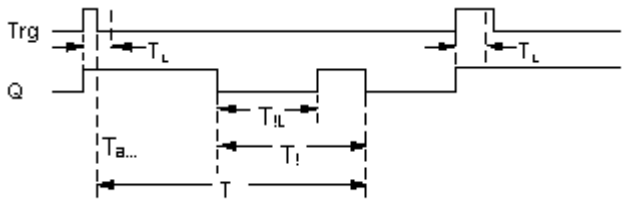
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of "T", "TL" can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



Description of the function

Output Q is set to 1 with a 0 to 1 signal transition at Trg.

If output Q = 0, and input Trg is set hi at least for the duration of TL, the permanent lighting function is enabled and output Q is set accordingly.

The off delay time T is triggered when the status at input Trg changes to 0 before the time T_L has expired.

Output Q is reset when the Ta = T.

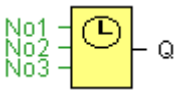
Before the off delay time (T - $T_!$) has expired, you can output an off pre-warning that resets Q for the duration of the off pre-warning time $T_{!L}$. A further signal at input Trg always resets T and output Q.

Caution

The time base for the T, $T_!$ and $T_{!L}$ must be identical.

If retentivity is not set, output Q and the expired time are reset after a power failure.

7.5.11 Weekly timer



Caution

Your x-Messenger must be equipped with an internal real-time clock if you are going to use this SFB.

Short description

The output is controlled by means of a configurable on/off date. The function supports any combination of weekdays.

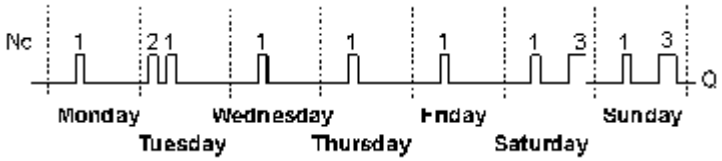
Connection	Description
Parameter	At the **No1, No2, No3** (cam) parameters you set the on and off triggers for each cam of the weekly timer. The parameter units are the days and the time-of-day.
Output Q	Q is set when the configured cam is actuated.

Parameter

You can configure a time hysteresis for each individual cam in parameter mode. For information about how

to modify, refer to chapter 4.2.2 please.

Timing diagram (three practical examples)



No1: Daily: 06:30 h to 08:00 h

No2: Tuesday: 03:10 h to 04:15 h

No3: Saturday and Sunday: 16:30 h to 23:10 h

Description of the function

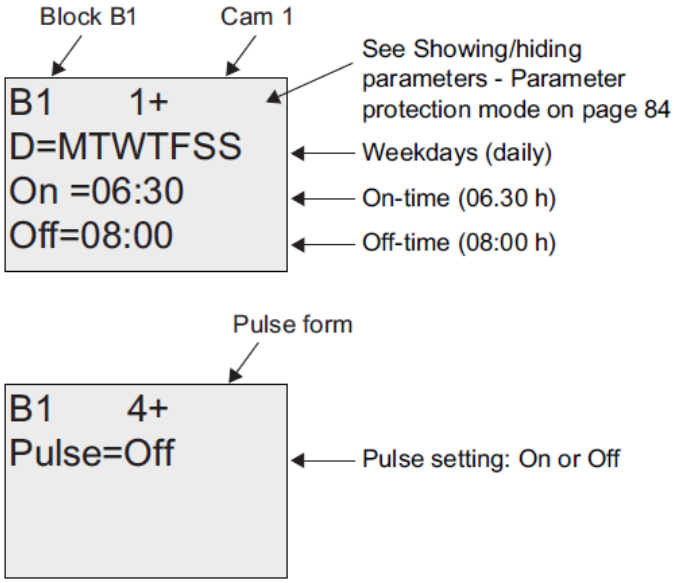
Each weekly timer is equipped with three cams. You can configure a time hysteresis for each individual cam. At the cams you set the on and off hysteresis. The weekly timer sets the output at a certain time, provided it is not already set.

The output is reset at a certain time, provided it is not already reset. A conflict is generated in the weekly timer when the set on time and the set off time at another cam are identical. In this case, cam 3 takes priority over cam 2, while cam 2 takes priority over cam 1.

The switching status of the weekly timer is determined by the status at the No1, No2 and No3 cams.

Parameter assignment screen form

View of the parameter assignment screen form, for example for Cam1 and the Pulse setting:



Days of the week

The prefix "D=" (Day) has the following meaning:

● M: Monday
● T: Tuesday
● W: Wednesday
● T: Thursday
● F: Friday
● S: Saturday
● S: Sunday

Uppercase letters indicate a specific day of the week. A "-" indicates no selection for the day of the week.

On-/Off-times

Any time between 00:00 h and 23:59 h is possible. You can also configure the on time to be a pulse signal. The timer block will be activated at the specified time for one cycle and then the output is reset.

- -:- - means: No on-/off-times set.

Setting the weekly timer

To set the on-/off-times:

1. Move the cursor to one of the Cam parameters of the timer (e.g. No1).
2. Press OK. x-Messenger opens the Cam parameter assignment screen form. The cursor is positioned on the day of the week.
3. Press ▲ and ▼ to select one or several days of the week.
4. Press ▶ to move the cursor to the first position of the on-time.
5. Set the on-time.

Modify the value at the respective position, using the keys ▲ and ▼ . Move to the cursor to the various positions, using the keys ◀ and ▶ . At the first position, you can only select the value - -:- -

(- -:- - means: No on-/off-times set).

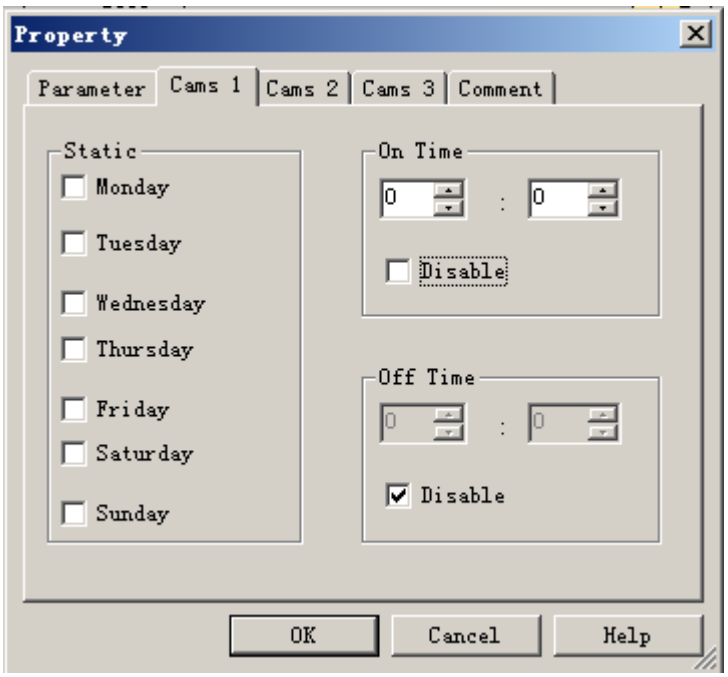
6. Press ▶ to move the cursor to the first position of the off-time.
7. Set the off-time (in same way as in step 5).
8. Confirm your entries with **OK**.

The cursor is now positioned on the No2 parameter (Cam2) and you can configure a further cam.

Special characteristics to note when configuring

The block properties window offers a tab for each one of the three cams. Here you can set the weekly on times for the cams. Each tab offers you in addition an option of defining the on and off times for each cam in hour and minute units. Hence, the shortest switching cycle is one minute.

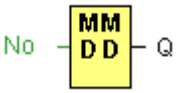
You can disable the on and off times individually, i.e. you can achieve switching cycles extending across more than one day, for example, by setting the on time for cam 1 to Monday 7:00 h and the off time of cam 2 to Wednesday 13:07 h, while disabling the on time for cam 2.



Backup of the real-time clock

The internal real-time clock of x-Messenger is buffered against power failure. The buffering time is influenced by the ambient temperature, and is typically 100 hours at an ambient temperature of 25°C.

7.5.12 Yearly timer



Caution

Your x-Messenger must be equipped with an internal real-time clock if you are going to use this SFB.

Short description

The output is controlled by means of a configurable on/off date

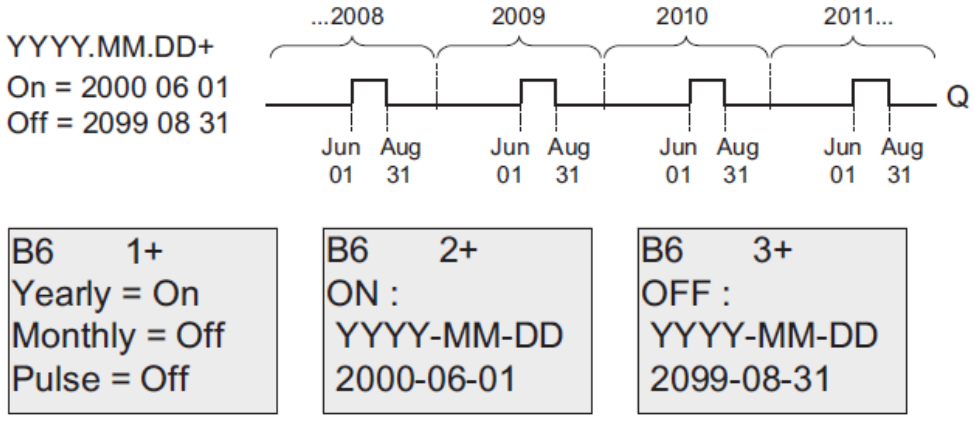
Connection	Description
Parameter	At the **No** (cam) parameter you set the on and off trigger for the cam of the yearly timer.
Output **Q**	Q is set on when the configured cam is switched on.

Parameter

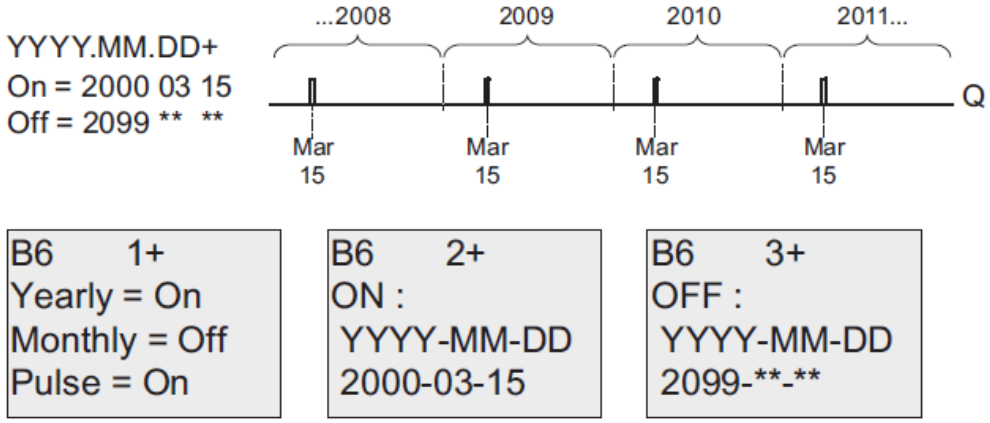
The on and off trigger for the cam of the yearly timer can be set/modified in parameter mode and you can configure what you need. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagrams

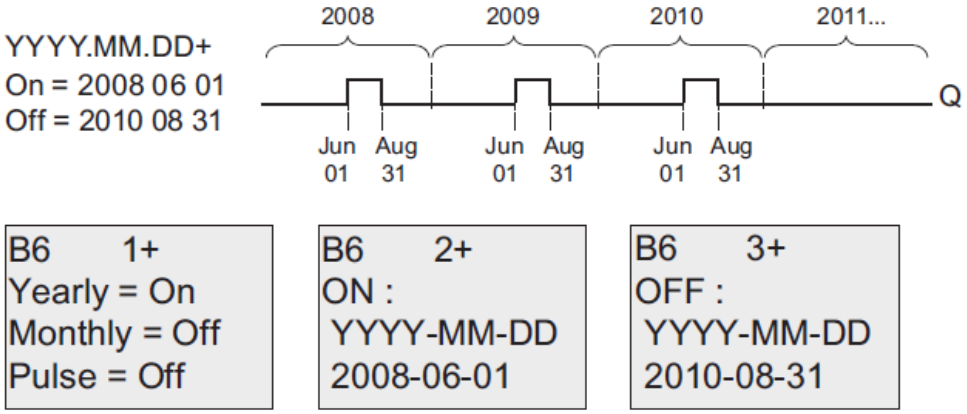
Example 1: Yearly mode on, Monthly mode off, Pulse Off, On Time = 2000-06-01, Off Time = 2099-08-31: Every year on June 1 the timer output switches on and remains on until August 31.



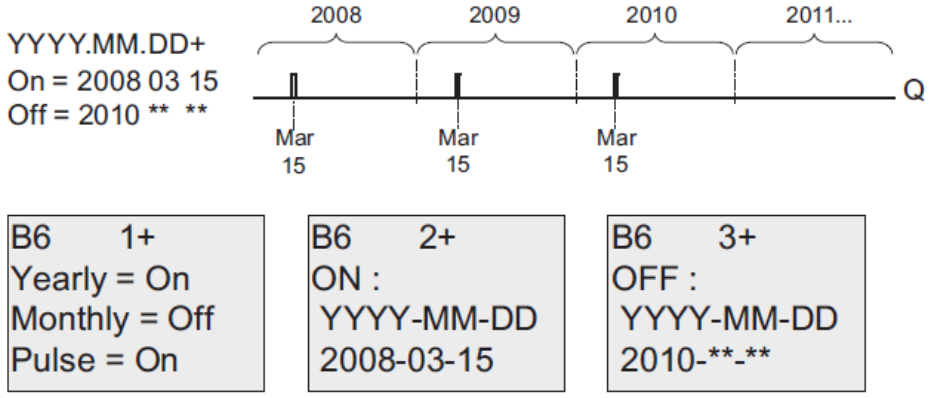
Example 2: Yearly mode on, Monthly mode off, Pulse on, On Time = 2000-03-15, Off Time = 2099-**-**: Every year on March 15, the timer switches on for one cycle.



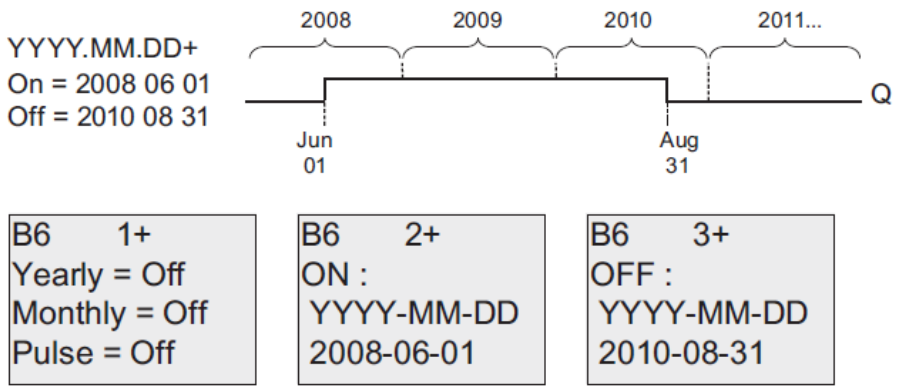
Example 3: Yearly mode on, Monthly mode off, Pulse off, On Time = 2008-06-01, Off Time = 2010-08-31: On June 1 of 2008, 2009, and 2010 the timer output switches on and remains on until August 31.



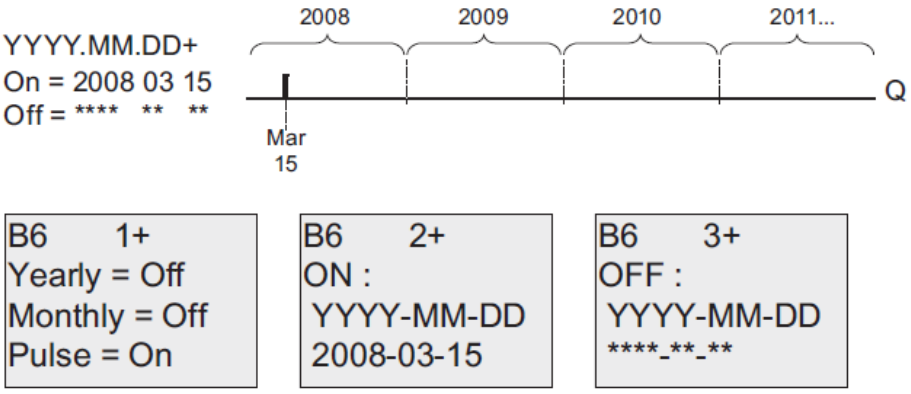
Example 4: Yearly mode on, Monthly mode off, Pulse on, On Time = 2008-03-15, Off Time = 2010-**-**: On March 15 of 2008, 2009, and 2010, the timer output switches on for one cycle.



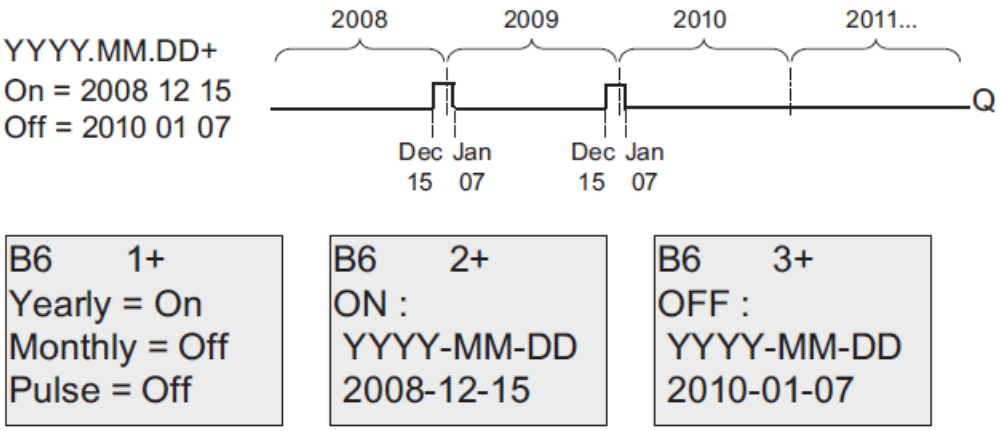
Example 5: Yearly mode off, Monthly mode off, Pulse off, On Time = 2008-06-01, Off Time = 2008-08-31: On June 1, 2008 the timer output switches on and remains on until August 31, 2010.



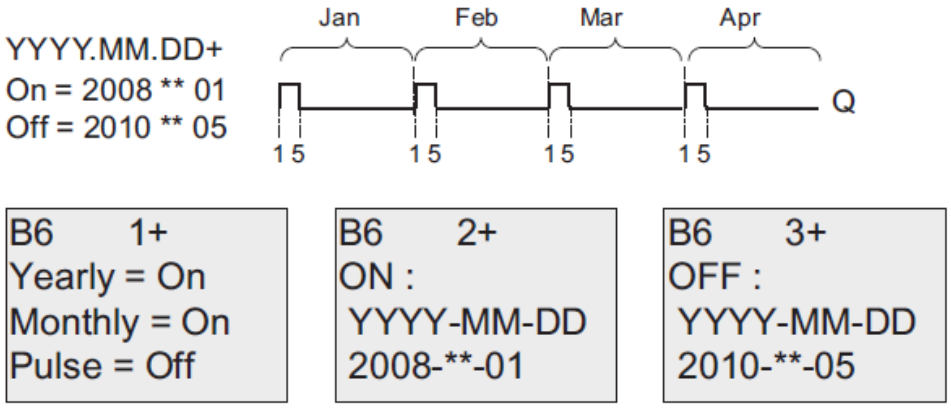
Example 6: Yearly mode off, Monthly mode off, Pulse selected, On Time = 2008-03-15, Off Time = ****-**-**: On March 15, 2008 the timer output switches on for one cycle. Because the timer does not have a monthly action or yearly action, the timer output pulses only one time
at the specified On Time.



Example 7: Yearly mode on, Monthly mode off, Pulse off, On Time = 2008-12-15, Off Time = 2010-01-07: On December 15 of 2008 and 2009, the timer output switches on and remains on until January 7 of the following year. When the timer output turns off on January 7, 2010 it does NOT turn on again the following December 15.



Example 8: Yearly mode on, Monthly mode on, On Time = 2008-**-01, Off Time = 2010-**-05: Starting in 2008, on the first day of each month the timer output switches on and switches off on the fifth day of the month. The timer continues in this pattern through the last month of 2010.



Description of the function

The yearly timer sets and resets the output at specific on and off times.

The off-date identifies the day on which the output is reset again. The first value defines the month, the second the day.

When you select the every month check box, the yearly clock switches on or off at a certain day of every month.

Backup of the real-time clock

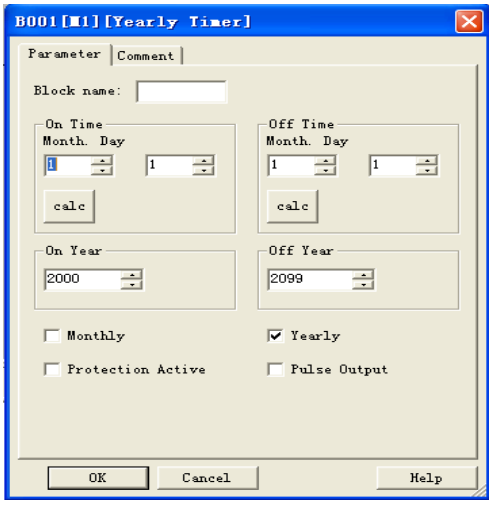
The internal real-time clock of x-Messenger is buffered against power failure. The buffering time is influenced by the ambient temperature, and is typically 100 hours at an ambient temperature of 25°C.

Special characteristics to note when configuring

A click on the dialog box enables direct keyboard input of the month and day values. The values entered may not exceed the logical maximum of the relevant input boxes; otherwise eSmsConfig returns an error message.

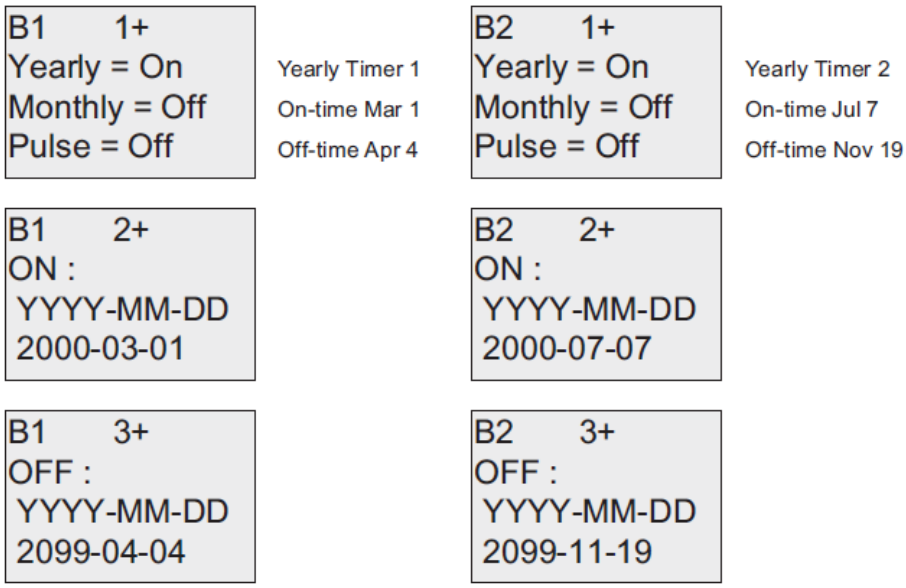
The **calendar** icon offers you an easy way of setting the date. It opens a window where you can set the days

and months by clicking the relevant buttons.

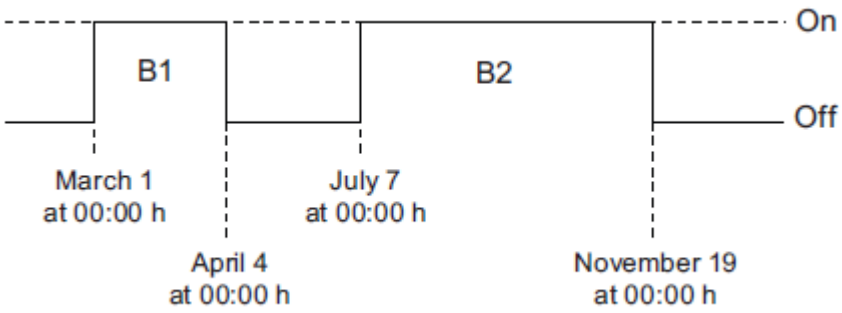


Sample configuration

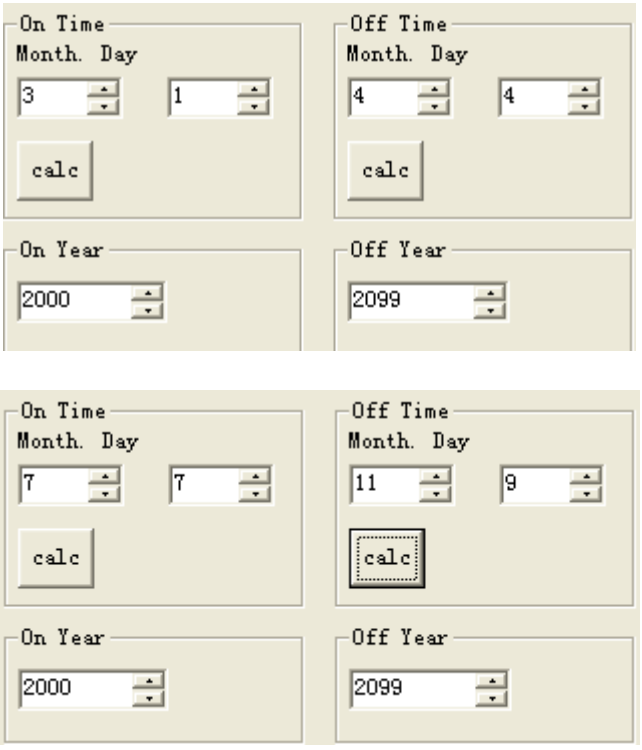
The output of an x-Messenger is to be set annually on March 1, reset on April 4, set again on July 7, and reset again on November 19. You need to configure two yearly timers with corresponding on-times. Then logically link the outputs by means of an OR block.



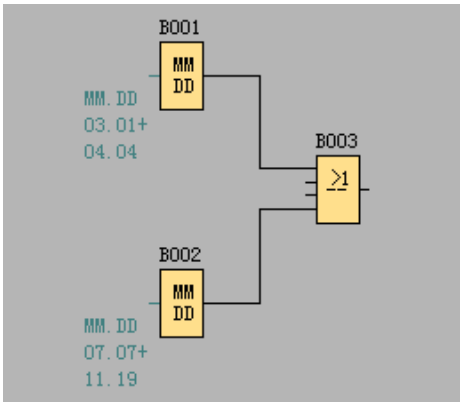
Result



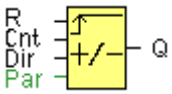
Place two yearly timer switch SFBs on your programming interface and configure the blocks as specified.



Create a logical link of the blocks via a standard OR block. The OR output is 1 if at least one of the yearly timer switches is set.



7.5.13 Up/Down counter



Short description

An input pulse increments or decrements an internal value, depending on the parameter setting. The output is set or reset when a configured threshold is reached. The direction of count can be changed with a signal at input Dir

Connection	Description
Input **R**	You reset the output and the internal counter value to zero with a signal at input R (Reset).
Input **Cnt**	This function counts the 0 to 1 transitions at input Cnt. It does not count 1 to 0 transitions.
Input **Dir**	Input Dir (Direction) determines the direction of count: Dir = 0: Up Dir = 1: Down
Parameter	**On:** On threshold Value range: 0...99999999 **Off:** Off threshold

	Value range: 0...99999999 **StartVal:** Initial value from which to begin counting either down or up. **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Q is set and reset according to the actual value at Cnt and the set thresholds.

Parameter

The on threshold On and the off threshold Off can be provided by the value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

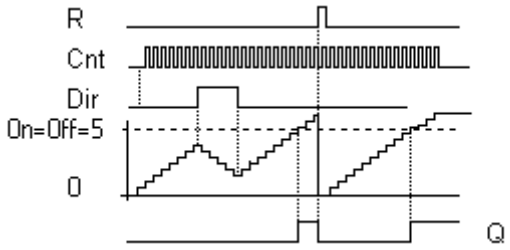
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

The value of " On " , " Off " and " Cnt " can be set/modified in parameter mode. For information about how to modify ,refer to chapter 5.2.2 please.

Timing diagram



Description of the function

The function increments (Dir = 0) or decrements (Dir = 1) the internal counter by one count with every positive edge at input Cnt.

You can reset the internal counter value to '000000', with a signal at the reset input R. As long as R=1, the output is 0 and the pulses at input Cnt are not counted.

Output Q is set and reset according to the actual value at Cnt and the set thresholds. See the following rules for calculation.

Calculation rule

If the on threshold >= off threshold, then:

Q = 1, if Cnt >= On

Q = 0, if Cnt < Off.

If the on threshold < off threshold, then:

Q = 1, if On <= Cnt < Off.

Caution

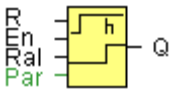
The function polls the limit value of the counter once in each cycle.

Thus, if the pulses at the fast inputs (ELC-12) or IB/IC(ELC-18) are faster than the scan cycle time, the SFB might not switch until the so specified limit has been exceeded.

Example: Up to 100 pulses per cycle can be counted; 900 pulses have been counted so far. On = 950; Off = 10000. The output is set in the next cycle, after the value has reached 1000.

The output would not be set at all if the value Off = 980

7.5.14 Hours counter



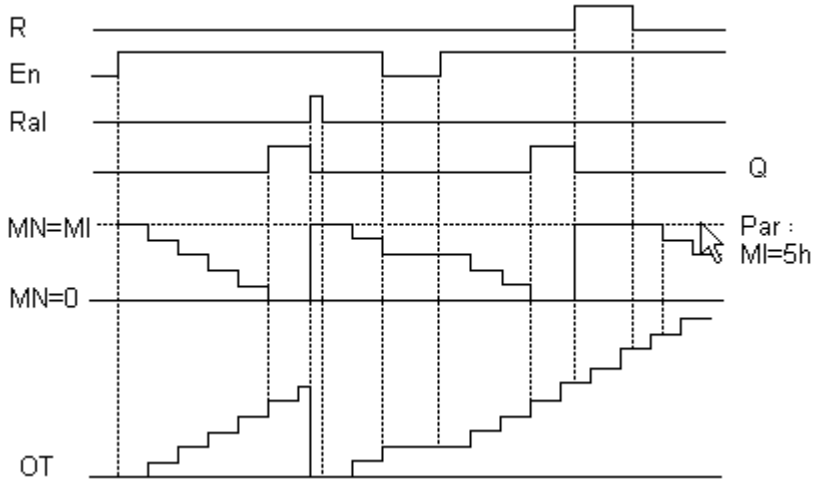
Short description

A configured time is triggered with a signal at the monitoring input. The output is set when this time has expired.

Connection	Description
Input **R**	A positive edge (0 to 1 transition) at input R resets output Q and sets a configured value MI at the counter for the duration of the time-to-go (MN).
Input **En**	En is the monitoring input. X-Messenger scans the on-time of this input.
Input **Ral**	A positive edge at input Ral (Reset all) resets both the hours counter (OT) and the output, and sets the configured value MI at the counter to for the duration of the time-to-go (MN). That is, • Output Q = 0, • The measured operating hours OT = 0, and • The time-to-go of the maintenance interval MN = MI.
Parameter	**MI**: Maintenance interval to be specified in hour units Range of values: 0000...9999 h

	OT: Expired total operation time. An offset can be specified. Range of values: 00000...99999 h **Q** 0: • When "R" is selected: Q = 1, if MN = 0; Q = 0, if R = 1 or Ral = 1 • When "R+En" is selected: Q = 1, if MN = 0; Q = 0, if R = 1 or Ral = 1 or En = 0.
Output **Q**	The output is set when the time-to-go MN = 0. The output is reset: • When "Q 0:R+En", if R = 1 or Ral = 1 or En = 0 • When "Q 0:R", if R = 1 or Ral = 1.

Timing diagram



MI = Configured time interval

MN = Time-to-go

OT = Total time expired since the last 1 signal at the Ral input

These values are principally held retentive!

Parameter

The maintenance interval MI can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay
Analog trigger: Ax
Analog amplifier: Ax
Analog multiplexer: AQ
Analog ramp: AQ
Analog math: AQ
PI controller: AQ
Data latching relay: AQ
Up/Down counter: Cnt

The value of "MI" can be set and modified in parameter mode. For information about how to modify, refer to chapter 4.2.2 please.

Description of the function

The hours counter monitors input En. As long as the status at this input is 1, x-Messenger calculates the time expired and the time-to-go MN. x-Messenger displays these times when set to configuration mode. The output is set to 1 when the time-to-go is equal to zero.
You reset output Q and the time-to-go counter to the specified value MI with a signal at input R. The operation hour counter OT remains unaffected.
You reset output Q and the time-to-go counter to the specified value MI with a signal at input Ral. The operation hour counter OT is reset to 0.
Depending on your configuration of the Q parameter, the output is either reset with a reset signal at input R or Ral, or when the reset signal is 1 or the En signal is 0.

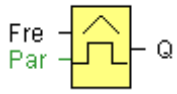
Limit value of OT
The values of the operating hours in OT are retained when you reset the hours counter with a signal at input R. The hours counter OT continues the count as long as En = 1, irrespective of the status at the reset input R. The counter limit of OT is 99999 h. The hours counter stops when it reaches this value.
In programming mode, you can set the initial value of OT. The counter starts operation at any value other than zero. MN is automatically calculated at the START, based on the MI and OT values.
Example: MI = 100, OT = 130, the result is MN = 70
Parameter preset
In eSmsConfig, you can define MI and an OT start value.
You determine that Q does not depend on En by selecting the corresponding check box.

Retentivity with the hours counter

The hours counter in the x-Messenger is generally retentive.
However, if the values of the hours counter are lost after a power failure, then select the respective block in

your circuit program. Right mouse click on the hours counter and select Block Properties > Parameters. The option Retentivity must be activated and not changeable (grayed out).
If the **Retentivity** option is not available, then delete the block and insert a new special function **hours counter** at the same position.

7.5.15 Threshold trigger



Short description

The output is switched on and off, depending on two configurable frequencies.

Connection	Description
Input Fre	The function count 0 to 1 transitions at input Fre. ! to 0 transitions are not counted. Use • Inputs I7,I8(EXM-12) 60kHz • Any other input or circuit element for low frequencies (typical 4 Hz).
Parameter	**On:** On threshold Range of values: 0000...9999 **Off:** Off threshold Range of values: 0000...9999 **G_T:** Time interval or gate time during which the input pulses are measured. Range of values: 00:05 s...99:99 s
Output **Q**	Q is set or reset according to the threshold values.

Parameter

The gate time G_T can be provided by the actual value of another already-programmed function:
Analog comparator: Ax – Ay
Analog trigger: Ax
Analog amplifier: Ax
Analog multiplexer: AQ
Analog ramp: AQ

PI controller: AQ

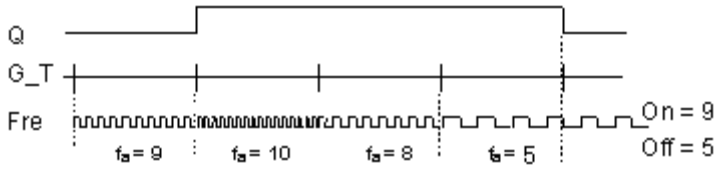
Up/Down counter: Cnt

Data latching relay: AQ

Analog Math AQ

The value of " On " , " Off " can be set/modified in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Timing diagram



fa = Input frequency

Description of the function

The trigger measures the signals at input Fre. The pulses are captured during a configurable period G_T. Q is set or reset according to the set thresholds. See the following calculation rule.

Calculation rule

If the threshold (On) > threshold (Off), then:

Q = 1, if fa >= On

Q = 0, if fa < Off.

If the threshold (On) < threshold (Off), then Q = 1, if

On <= fa < Off.

7.5.16 Latching relay

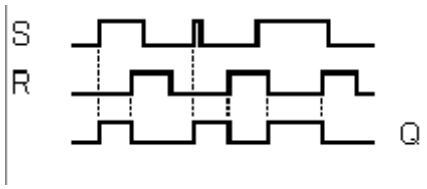
Short description

A signal at input S sets output Q. A signal at input R resets output Q.

Connection	Description
Input **S**	Set output Q with a signal at input S (Set).
Input **R**	Reset output Q with a signal at input R (Reset). Output Q is reset if S and R are both set (reset has priority over set).
Parameter	**Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Q is set with a signal at input S and remains set until it is reset with signal at input R.

No parameter of Latching relay can be set/modified in parameter mode .

Timing diagram



Description of the function

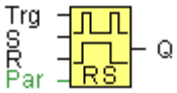
The latching relay represents a simple binary memory logic. The output value depends on the input states and the previous status at the output.

Logic table of the latching relay:

S	R	Q	Remark
0	0	x	Status unchanged
0	1	0	Reset
1	0	1	Set
1	1	0	Reset

When retentivity is enabled, the output signal corresponds with the signal status prior to the power failure.

7.5.17 Pulse relay



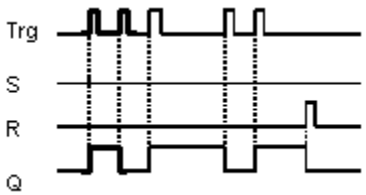
Short description

The output is set and reset with a short one-shot at the input.

Connection	Description
Input **Trg**	You switch output Q on or off with a signal at input Trg (Trigger) input.
Input **S**	A one-shot at input S (Set) sets the output to logical 1.
Input **R**	A one-shot at input R (Reset) resets the output to logical 0
Parameter	**Selection:** RS (input R priority), or SR (input S priority) **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Q is switched on with a signal at Trg and is reset again at the next Trg pulse, if both S and R = 0.

No parameter of Latching relay can be set/modified in parameter mode .

Timing diagram



Description of the function

The status of output Q changes with each 0 to 1 transition at input Trg and if both S and R = 0, i.e. the output is switched on or off.

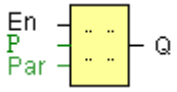
Input Trg does not influence the SFB when S = 1 or R = 1.

A one-shot at input S sets the pulse relay, i.e. the output is set to logical 1.

A one-shot at input R resets the pulse relay to its initial state, i.e. the output is set to logical 0.

Either the input R takes priority over input S (i.e. the signal at input S has no effect as long as R = 1), or the input S takes priority over input R (i.e. the signal at input R has no effect as long as S = 1), depending on your configuration.

7.5.18 Message text



Short description

Display parameterized message texts and parameters of other blocks in RUN mode.

Connection	Description
Input **En**	A 0 to 1 transition at En (Enable) triggers the output of the message text.
Input **P**	P is the priority of the message text. 1 is the lowest, 32 is the highest priority. Quit: Acknowledgement of the message text
Parameter	**Text:** Input of the message text **Par:** Parameter or actual value of another, already configured function (see "Visible parameters or actual values") **Time:** Shows the continuously updated time-of-day **Date:** Shows the continuously updated date **EnTime:** Shows the time of the 0 to 1 transition **EnDate:** Shows the 0 to 1 transition of the date
Output **Q**	Q remains set as long as the message text is queued.

Description of the function

With a 0 to 1 transition of the signal at input En, the display outputs your configured message text (actual value, text, TOD, date) in RUN mode.

Acknowledgement disabled (Ack = Off):

The message text is hidden with a 0 to 1 signal transition at input En.

Acknowledgement enabled (Ack = On):

After input En is reset to 0, the message text is displayed until acknowledged by pressing the OK button. The message text cannot be acknowledged as long as input En is high.

If several message text functions were triggered with En=1, the message with the highest priority (1 = lowest, 64=highest) is displayed. This also implies that a new message text is only displayed if its priority is

higher than that of previously enabled message texts.

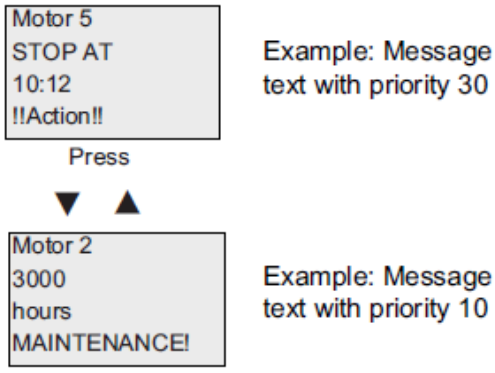
After a message text is disabled or acknowledged, the function automatically shows the previously active message text that takes the highest priority.

You can press the ▲ and ▼ keys to step through multiple active message texts.

Example

This is how two message texts could be shown:

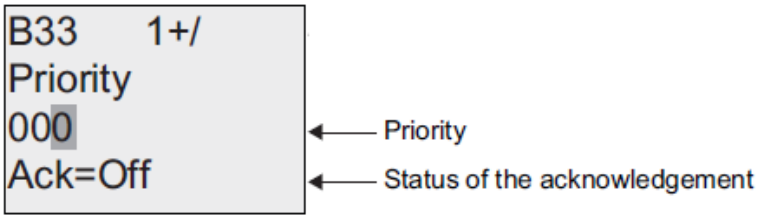
Display field of x-Messenger in RUN mode



Input P configuration

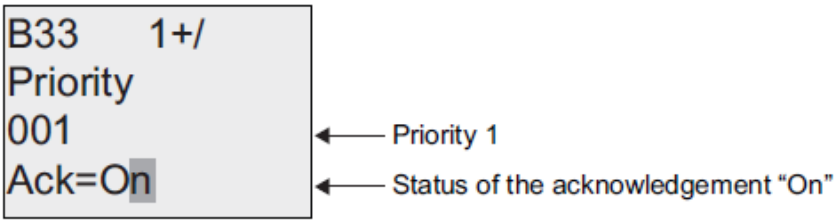
From the input P, you configure the following characteristics of the message text:

- Priority
- Acknowledgement
- Message destination



1. Increase the priority to 1: Cursor on '0' + ▲
2. Change to 'Ack': Press ▶
3. Enable 'Ack': Press ▲ or ▼

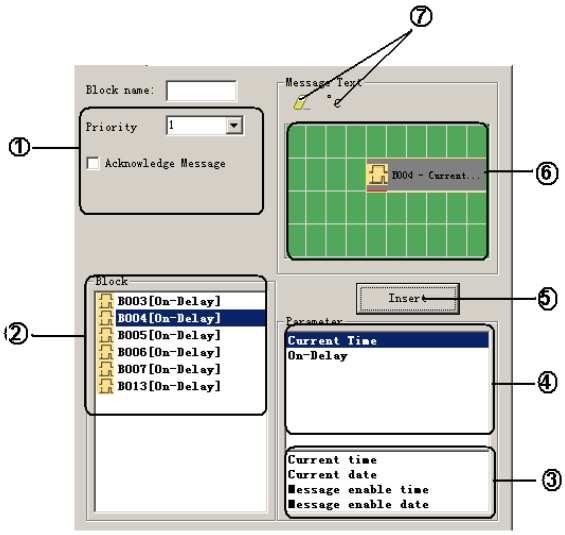
x-Messenger shows:



Restrictions

Up to 64 message text functions are available for EXM-12 CPUs.

Particular characteristics to be noted when configuring



1	**"General" area** Here you will find the following settings:· • Priority of the message text • Check box for message text acknowledgement
2	**"Blocks" area** Shows a list of all the circuit program blocks and their parameters.
3	**"General parameters" area** Shows general parameters such as the current date.
4	**"Block parameters" area** Shows the parameters of a block selected from the "Blocks" area which you can output in the message text.

5	**"Insert" button** Button for inserting a parameter selected from the "Block parameters" area. **"Block parameters"** or **"General parameters"** area into the message text.
6	**"Messages" area** You arrange the message text in this area. Information entered in this area corresponds with that on the x-Messenger display.
7	**"Delete" button** Button for deleting entries from the **"Messages"** area **"Special characters" button** Button for inserting special characters in the **"Messages"** area

To arrange the message text

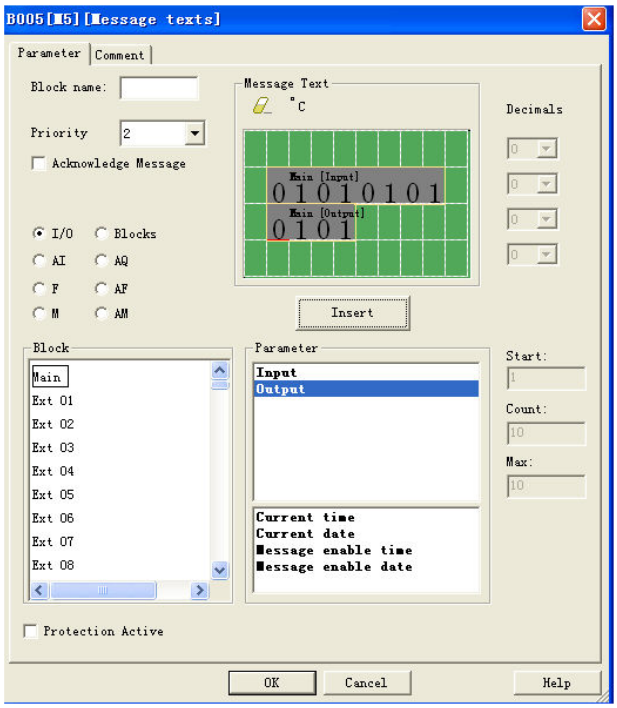
From the "Blocks" area, select the block whose parameters you want to output.
Drag and drop the parameters required from the "Block parameters" to the "Messages" area. You may also use the "Insert" button to do so.
In the "Mess
ages" area, you can add parameter data as required.

Particular characteristics to be noted when configuring

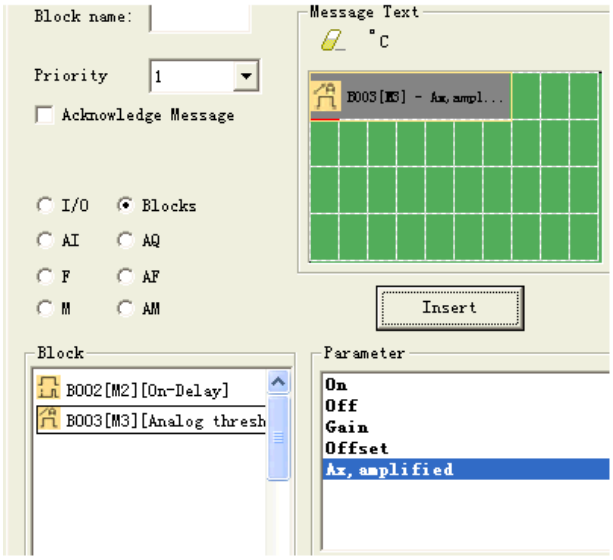
The message text can be configured in the block properties dialog. You can enter up to 4 lines for each message text (the text display of the x-Messenger has 4 x 16 characters) and set the priority. You can move to the next line using the cursor keys or the mouse. Hit the [ENTER] key to confirm all your entries in the block properties dialog and to close the dialog.
You may also enter the actual values of other blocks in the text lines. To do so, select the relevant block from the Block dialog. A Parameter dialog opens to display a list of all parameters available for the selected block. The block parameter you select in this dialog is written to the selected text line. The actual parameter value is now included when you call the message text.

Set the "Acknowledge message" attribute to specify whether a message is be acknowledged before it is closed.

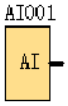
A. I/O status of CPU and extensions

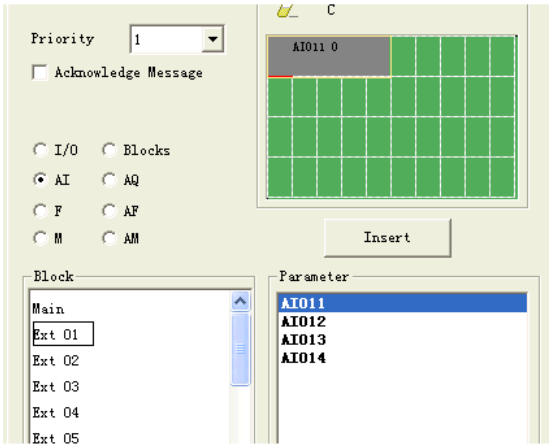


B .Blocks

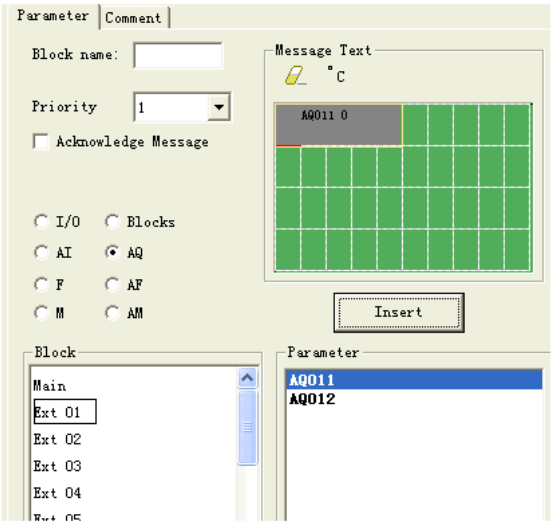


C. Analog input value of ELC-12 CPU and extensions

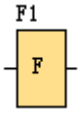


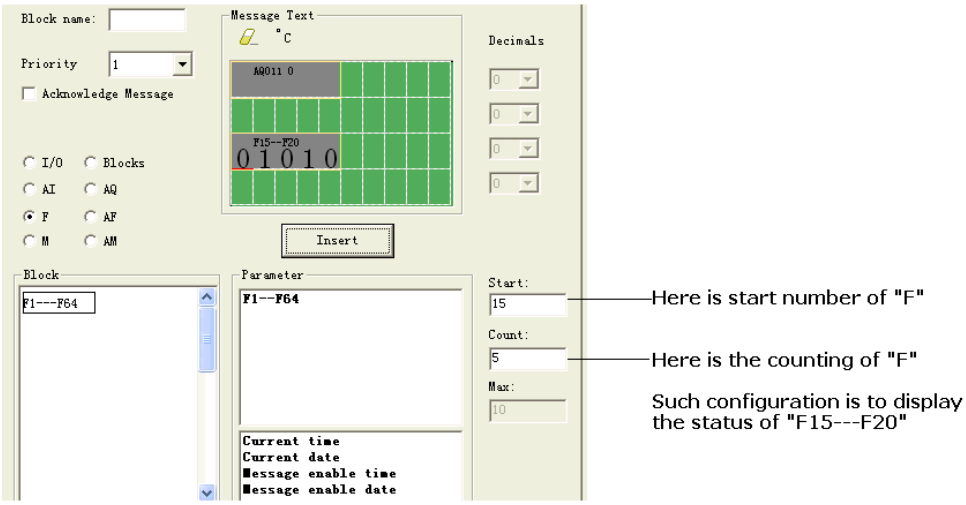


D. Analog output value of CPU and extensions

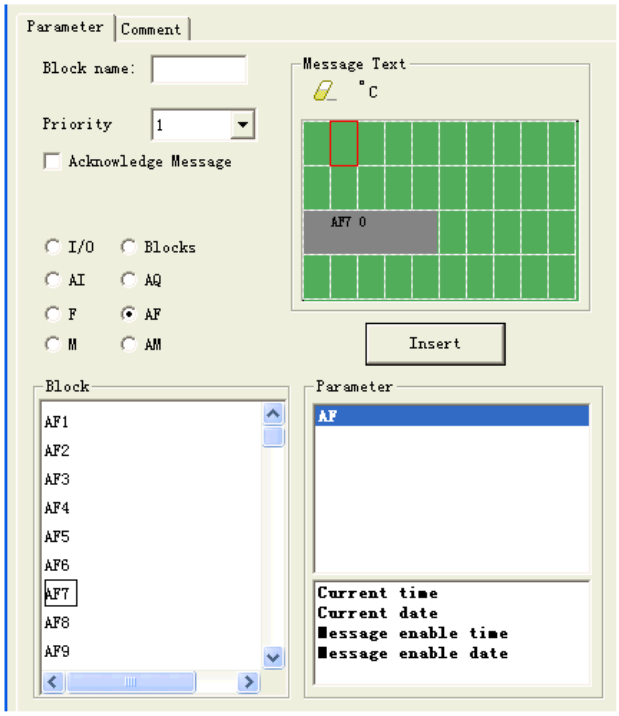


E. F (digital flag) status

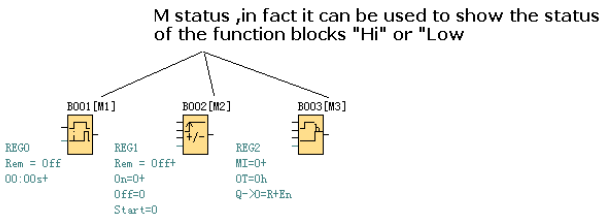




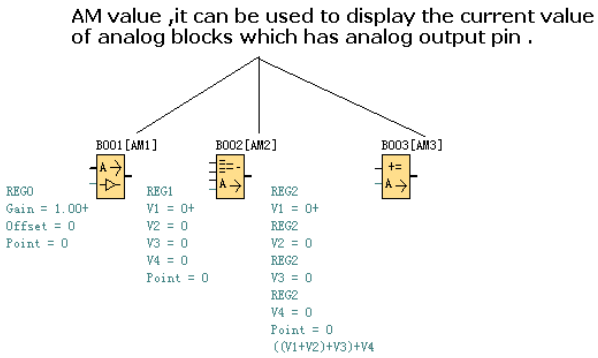
F. AF(analog flag) value

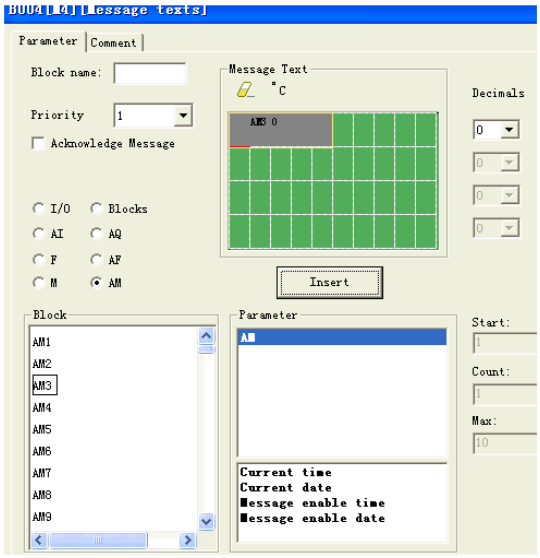


G. M status



H. AM value



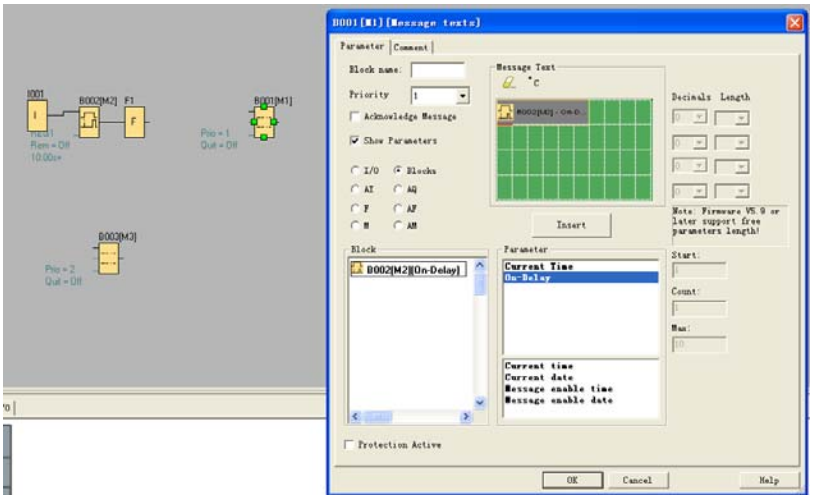


7.5.18.1 How to change parameters of blocks in displayed message ?

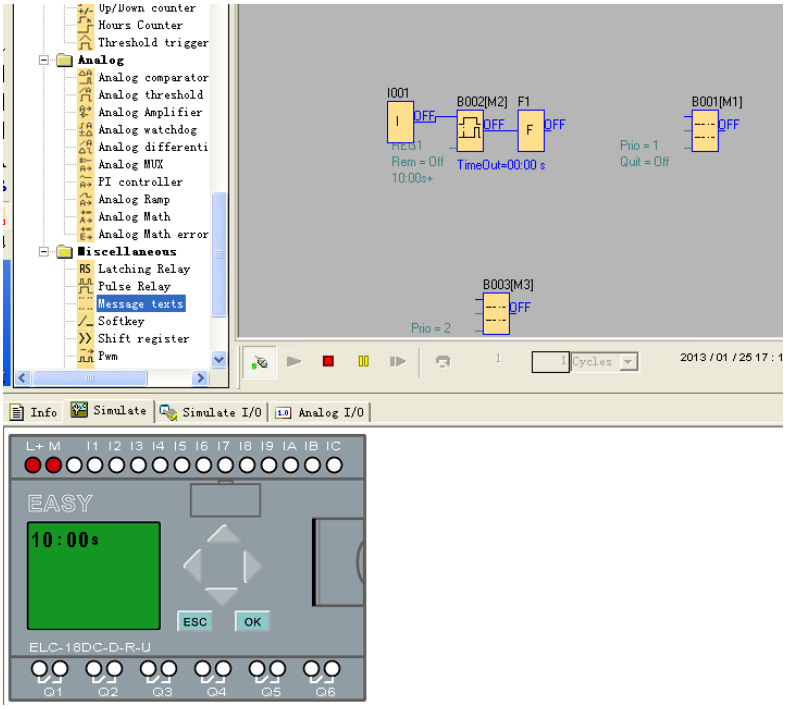
Parameters of blocks can be changed in displayed message if inserted into the "message text " block by press "OK" key for 3 seconds.

Step as follows:

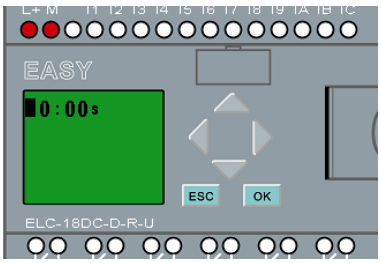
A. Insert the parameters of block into message text.(Here is On-delay).



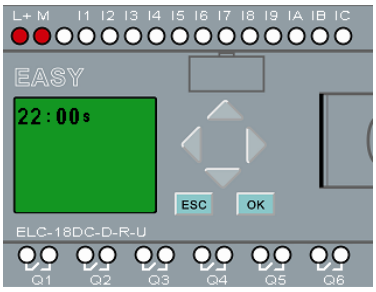
B. Change the page to display the message text contents by arrow keys.



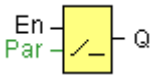
C. Press “ok” for 3 seconds and enter into edit mode.



D. Modify value by pressing arrow keys and confirm with OK key.



7.5.19 Softkey



Short description

This SFB provides the action of a mechanical pushbutton or switch.

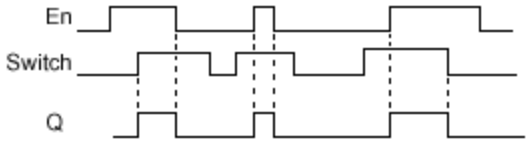
Connection	Description
Input **En**	Output Q is set with a 0 to 1 signal transition at input En (Enable) and if, in addition, 'Status=On' has been confirmed in configuration mode.
Parameter	**Type:** Sets either a pushbutton action for one cycle or a switching action of the function. **Status**: On or Off state that is applied in the initial cycle after program startup, is retentivity is not set. **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	Output Q remains set 1, as long as En=1 and the status at the parameter Type = Switch and Status = On. Output Q is set for the duration of one cycle if EN=1 and the status at the parameters Type = momentary (pushbutton) and Status = On.

The status of this switch can be changed momentarily in parameter mode. For information about how to modify, refer to chapter 5.2.2 please.

Factory state

Default of 'Type' is 'momentary action switch'.

Timing diagram



Description of the function

The output is set, when input En is set and the 'Status' parameter is set to 'On' and confirmed with OK. This action is performed irrespective of a configured switch or pushbutton function.

The output is reset to '0' in the following three cases:

- With a 1 to 0 signal transition at input En.
- When a pushbutton function is configured and one cycle has expired after its actuation.
- When the 'Status' parameter sets the 'Off' status in configuration mode, and this has been confirmed with OK.

Particular characteristics to be noted when configuring

The softkey can be used both with momentary pushbutton or switching action. At the status parameter you can define the on (actuated) or off state for the switch/pushbutton.

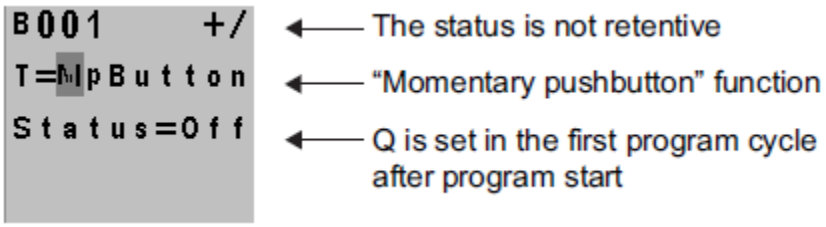
If the softkey is assigned a pushbutton action, the output is always set for the duration of one cycle with a 0 to 1 transition at input En when the pushbutton is in on state, or if the pushbutton state changes from Off to On when En=1.

Setting the Par parameter

View in programming mode (example):

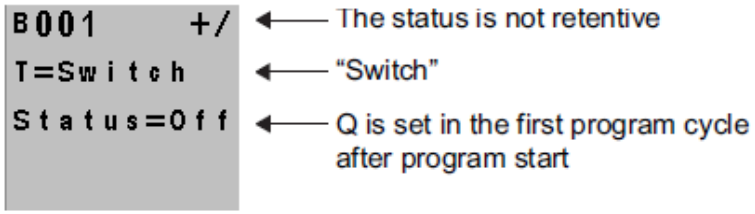
1. Select the 'Softkey' function.
2. Select input En and confirm with OK. The cursor is now positioned below 'Par'.
3. Change to the input mode of 'Par': Confirm with OK

(the cursor is now positioned to 'Off')



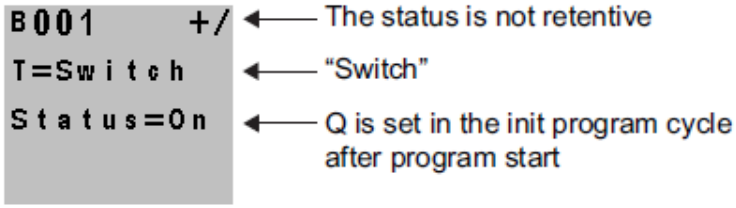
To change 'Par' to 'Switch' action and the initialization status after the program start:

4. To select 'Momentary pushbutton' or 'Switch' action: Press ▲ or ▼.



5. To change to the start state: Press ◀ or ▶

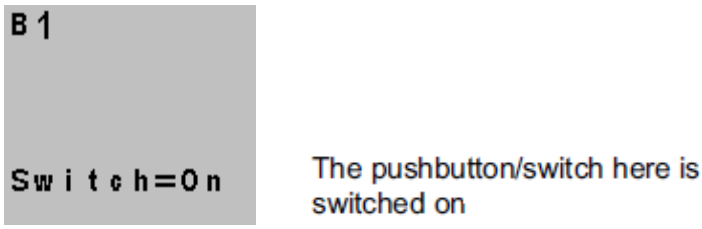
6. To change the start state: Press ▲ or ▼



7. Confirm your entries with OK

View in parameter assignment mode (example):

Here, you can set or reset the 'Switch' parameter (On/Off). When in RUN, x-Messenger shows the following display:

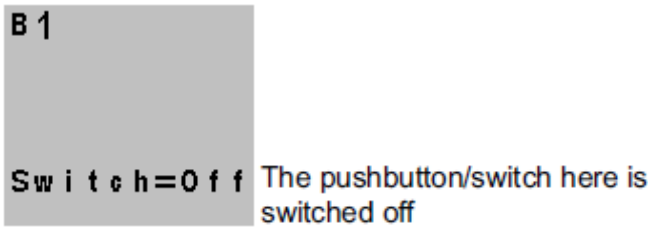


Let us assume you want to set 'Switch' (Off).

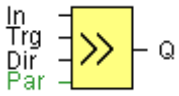
1. Change to the editing mode: Confirm with OK (the cursor is now positioned on 'On')

2. To change from 'On' to 'Off': Press ▲ or ▼

3. Confirm your entries with Press OK



7.5.20 Shift register

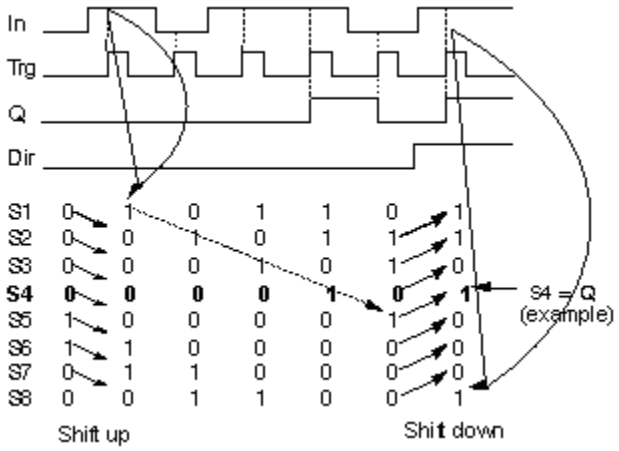


Short description

The shift register function can be used to read an input value and to shift the bits. The output value corresponds with the configured shift register bit. The shift direction can be changed at a special input.

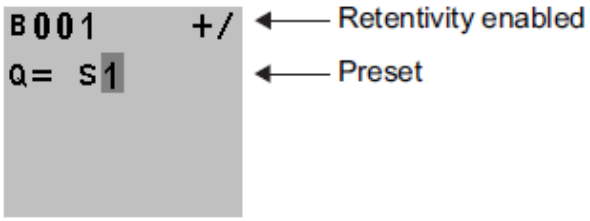
Connection	Description
Input **In**	The function when started reads this input value.
Input **Trg**	The SFB is started with a positive edge (0 t 1 transition) at input Trg (Trigger). A 1 to 0 transition is irrelevant.
Input **Dir**	You define the shift direction of the shift register bits S1...S8 at the Dir input: Dir = 0: shift up (S1 >> S8) Dir = 1: shift down (S8 >> S1)
Parameter	**Shift register bit** that determines the value of output Q. Possible settings: S1 ... S8 **Retentivity** set (on) = the status is retentive in memory.
Output **Q**	The output value corresponds with the configured shift register bit.

Timing diagram

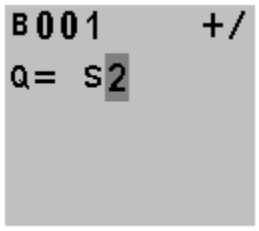


Setting the Par parameter

View in programming mode:



Press ▲



etc. You can select S1... S8

This special function is not available in parameter assignment mode.

Description of the function

The function reads the value of input In with a positive edge (0 to 1 transition) at input Trg (Trigger). This value is written to shift register bits S1 or S8, depending on the set shift direction:

- Shift up: S1 accepts the value of input In; the previous value of S1 is shifted to S2, S2 is shifted to S3, etc.
- Shift down: S8 accepts the value of input In; the previous value of S8 is shifted to S7, S7 is shifted to S6, etc.

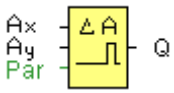
Q outputs the value of the configured shift register bits.

If retentivity is not enabled, the shift function restarts at S1 or S8 after a power failure.

Note

The special function shift register can be used only once in the circuit program.

7.5.21 Analog comparator



Short description

The output is set and reset depending on the difference Ax - Ay and on two configurable thresholds.

Connection	Description
Inputs **Ax, Ay**	Input the analog signals of which you want to determine the delta at the inputs Ax and Ay. Use the analog inputs AI1...AI8, the analog outputs AQ1 and AQ2. AI1..AI8: 0 - 10 V corresponds with 0 - 1000 (internal value).
Parameter	**A:** Gain Range of values: ± 10.00 **B:** Zero offset Range of values: ± 10,000 **On**: On threshold Range of values: ± 20,000 **Off:** Off threshold Range of values: ± 20,000 **p:** Number of decimals Range of values: 0, 1, 2, 3
Output **Q**	Q is set or reset depending on the set thresholds.

Parameter p (number of decimals)

The on threshold On and the off threshold Off can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

PI controller: AQ

Data latching relay: AQ

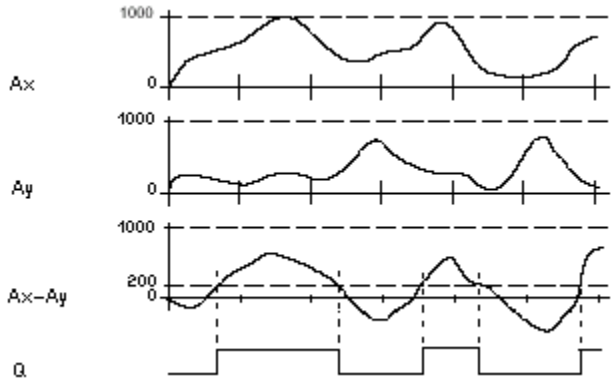
Up/Down counter: Cnt

Applies only to Ax, Ay, Delta, On and Off values displayed in a message text.

Does not apply to the comparison of on and off values! (The compare function ignores the decimal point.)

The value of " On " , " Off " and " Dec " can be set/modified in parameter mode. For information about how to set/modify, refer to chapter 5.2.2 please.(Dec means decimal point.)

Timing diagram



Q for Ax - Ay > 200, On = Off = 200

Description of the function

The function reads the value of the signal at the analog input Ax.

This value is multiplied by the value of parameter A (gain). Parameter B (offset) is added to the product, hence

(Ax · gain) + offset = Actual value Ax.

(Ay · gain) + offset = Actual value Ay.

Output Q is set or reset depending on the difference of the actual values Ax - Ay and the set thresholds. See the following calculation rule.

Calculation rule

- If threshold On ≥Threshold Off, then:

Q = 1, if (actual value Ax - actual value Ay) > On

Q = 0, if (actual value Ax - actual value Ay) ≤Off.

- If threshold On < Threshold Off, then Q = 1, falls:

On ≤ (actual value Ax - actual value Ay) < Off.

Reducing the input sensitivity of the analog comparator

You can delay the output of the analog comparator selectively by means of the "on delay" and "off delay" SFBs. By doing so, you determine that output Q is only set if the input trigger length Trg (= output of the analog comparator) exceeds the defined on delay time.

This way you can set a virtual hysteresis, which renders the input less sensitive to short changes.

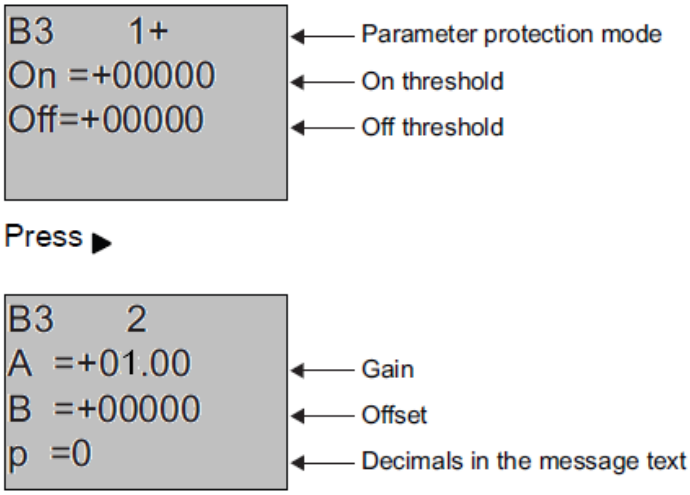
Particular characteristics to be noted when configuring

For help on analog block parameters, refer to the Analog value processing section in eSmsConfig.

Setting the Par parameter

The gain and offset parameters are used to adapt the sensors to the relevant application.

View in programming mode:



Example

In a heating control system, the supply Tv and return line temperatures Tr are to be compared, for example with a sensor at AI2.

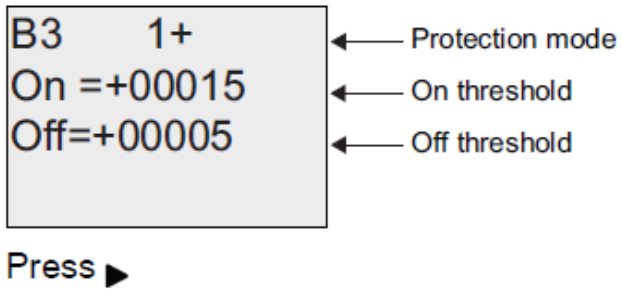
A control signal is to be triggered (for example "heater On") when the difference between the supply and return line temperatures is greater than 15 °C. The control signal is reset when the difference is less than 5 °C.

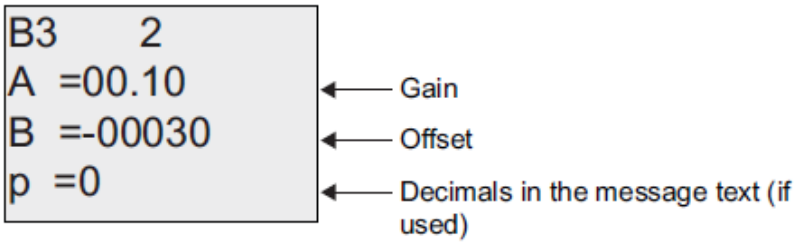
The process variable of the temperature is to be shown in parameter assignment mode.

The thermocouples available have the following technical data: -30 to +70 °C, 0 to 10 VDC.

Application	Internal mapping
-30 to +70 °C = 0 to 10 V DC	0 to 1000
0 °C	300 → Offset = -30
Range of values: -30 to +70 °C = 100	1000 → Gain = 100/1000 = 0.1
On threshold = 15 °C	Threshold = 15
Off threshold = 5 °C	Threshold = 5

Configuration (example):

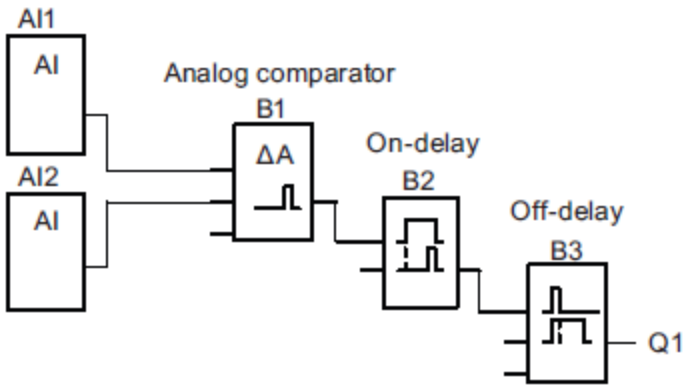




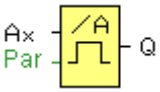
Reducing the input response of the analog comparator

You can selectively delay the output of an analog comparator by means of the "On-delay" and "Off-delay" special functions. With on-delay, output Q is only set if the pulse width of the triggering signal at input Trg (=analog comparator output) is longer than the on-delay time. Using this method, you will obtain a virtual hysteresis and reduce the input response to short signals.

Function block diagram



7.5.22 Analog threshold trigger



Short description

The output is set or reset depending on two configurable thresholds (hysteresis).

Connection	Description
Input **Ax**	Input the analog signal to be evaluated at input Ax. Use the analog inputs AI1...AI8, the analog outputs AQ1 and AQ2. 0 - 10 V is proportional to 0 - 1000 (internal value).
Parameter	**A:** Gain Range of values: ± 10.00 **B:** Zero offset Range of values: ± 10,000 **On:** On threshold Range of values: ±20,000 **Off:** Off threshold Range of values: ± 20,000 **p:** Number of decimals Range of values: 0, 1, 2, 3
Output **Q**	Q is set or reset depending on the set thresholds.

Parameter On and Off

The On and Off parameters can be provided by the actual value of another already-programmed function:
Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

PI controller: AQ

Data latching relay: AQ

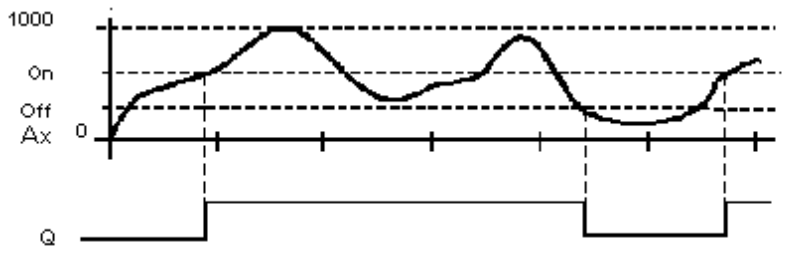
Up/Down counter: Cnt

Applies only to the display of On, Off and Ax values in a message text.

Does not apply to the comparison of On and Off values! (The compare function ignores the decimal point.)

The value of " On " , " Off " and " Dec " can be set/modified in parameter mode. For information about how to set/modify, refer to chapter 4.2.2 please.(Dec means decimal point.)

Timing diagram



Description of the function

The function reads the value of the signal at the analog input Ax.

This value is multiplied by the value of parameter A (gain). Parameter B (offset) is added to the product, hence

(Ax ·Gain) + Offset = Actual value Ax.

Output Q is set or reset depending on the set threshold values. See the following calculation rule.

Calculation rule

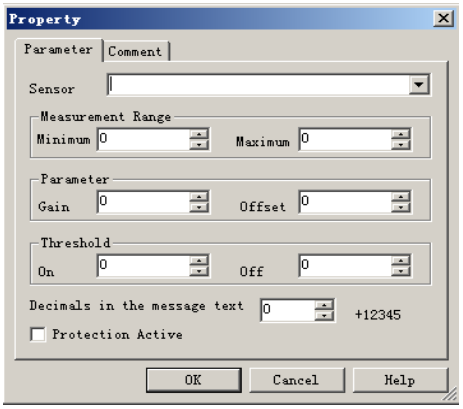
If threshold (On) ≥ threshold (Off), then:

Q = 1, if the actual value Ax > On

Q = 0, if the actual value Ax ≤Off.

If threshold (On) < threshold (Off), then Q = 1, if

On ≤ the actual value Ax < Off.



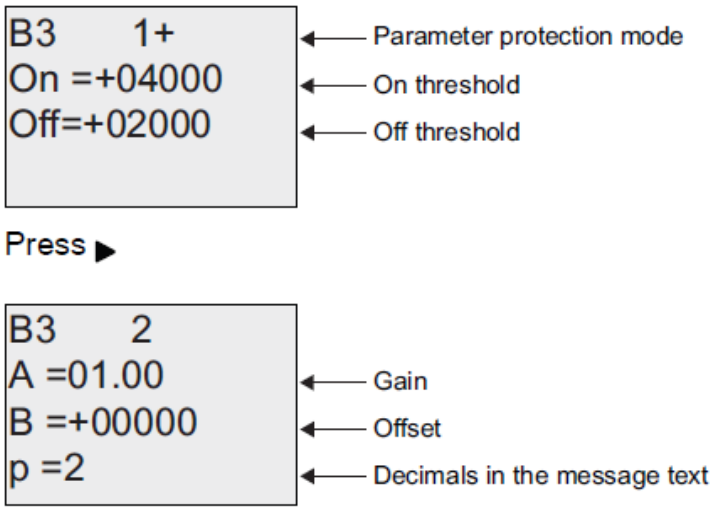
Note

The decimal point setting must be identical in the min. and max. range.

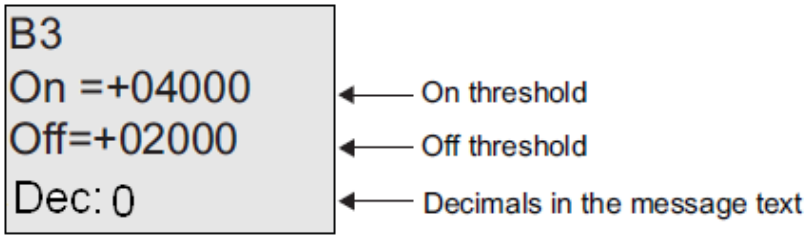
Setting the Par parameter

The gain and offset parameters are used to adapt the sensors to the relevant application.

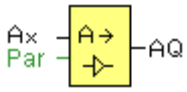
View in programming mode (example):



View in parameter assignment mode (example):



7.5.23 Analog amplifier



Short description

This SFB amplifies an analog input value and returns it at the analog output.

Connection	Description
Input **Ax**	Input the analog signal to be amplified at input Ax. Use the analog inputs AI1...AI8, the analog outputs AQ1 and AQ2. AI1..AI8: 0 - 10 V corresponds with 0 - 1000 (internal value).
Parameter	**A:** Gain Range of values: ± 10.00 **B:** Zero offset Range of values: ± 10000 **p:** Number of decimals Range of values: 0, 1, 2, 3
Output A**Q**	Analog output Value range for AQ: -32768...+32767

Parameter p (number of decimals)

Applies only to the display of Ax and Ay values in a message text.

Does not apply to the comparison of On and Off values! (The compare function ignores the decimal point.)

Description of the function

The function reads the value of an analog signal at the analog input Ax.

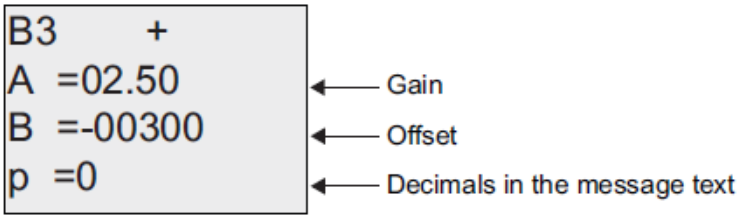
This value is multiplied by the gain parameter A. Parameter B (offset) is added to the product, i.e.

(Ax ·gain) + offset = Actual value Ax.

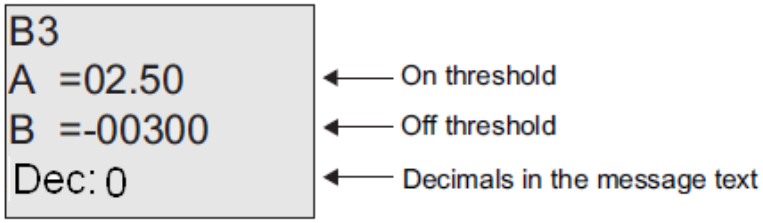
Setting the Par parameter

The gain and offset parameters are used to adapt the sensors to the relevant application.

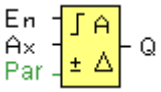
View in programming mode (example):



View in parameter assignment mode (example):



7.5.24 Analog value monitoring



Short description

This special function saves the process variable of an analog input to memory, and sets the output when the output variable exceeds or drops below this stored value plus a configurable offset.

Connection	Description
Input **En**	A positive edge (0 to 1 transition) at input En saves the analog value at input Ax ("Aen") to memory and starts monitoring of the analog range Aen ± Delta.
Input **Ax**	You apply the analog signal to be monitored at input Ax. Use the analog inputs AI1...AI8, the analog outputs AQ1 and AQ2. 0 - 10 V is proportional to 0 - 1000 (internal value).

Parameter	**A:** Gain Range of values: ± 10.00 **B:** Zero offset Range of values: ± 10,000 **Delta:** Difference value for the Aen on/off threshold Range of values: ± 20,000 **p:** Number of decimals Range of values: 0, 1, 2, 3
Output **Q**	Q is set/reset, depending on the stored analog value and the offset.

Parameter of p (number decimals)

The two threshold parameters Threshold 1 and Threshold 2 can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

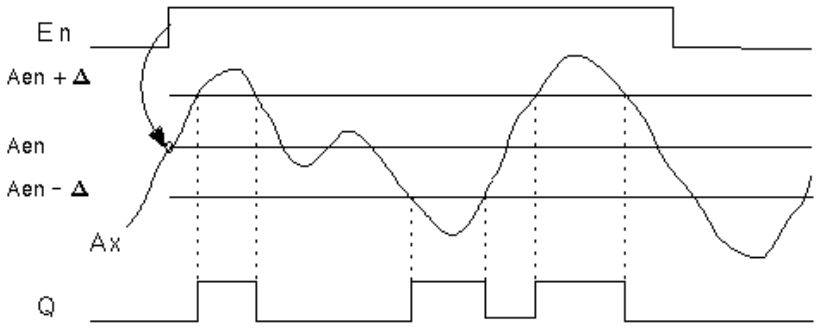
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

Applies only to the display of Aen, Ax and Delta values in a message text.

Timing diagram



Description of the function

A 0 to 1 transition at input En saves the value of the signal at the analog input Ax. This saved process variable is referred to as Aen".

Both the analog actual values Ax and Aen are multiplied by the value at parameter A (gain), and parameter B (offset) is then added to the product, i.e.

(Ax · gain) + offset = Actual value Aen, when input En changes from 0 to 1, or

(Ax · gain) + offset = Actual value Ax.

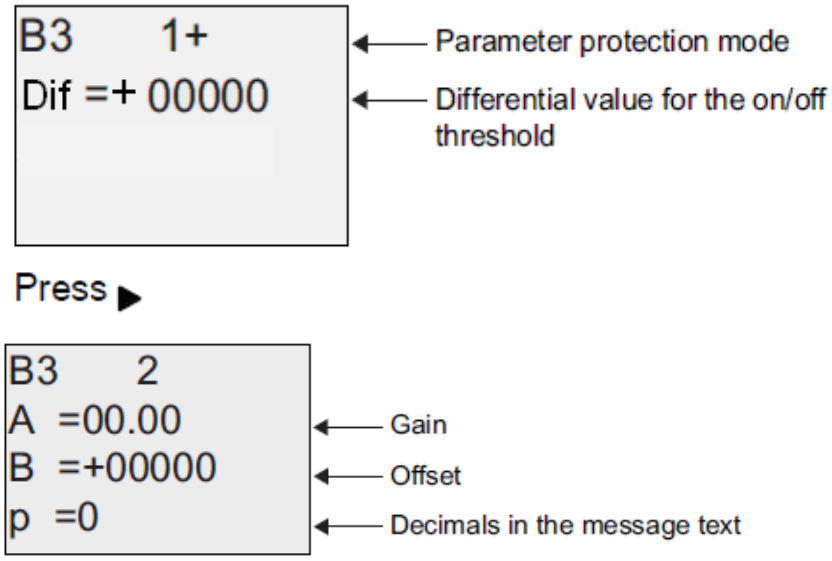
Output Q is set when the signal at input En = 1 and if the actual value at input Ax is out of range of Aen ± Delta.

Output Q is reset, when the actual value at input Ax lies within the range of Aen +- Delta, or when the signal at input En changes to lo.

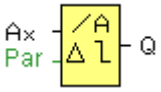
Setting the Par parameter

The gain and offset parameters are used to adapt the used sensors to the respective application.

View in programming mode:



7.5.25 Analog differential trigger



Short description

The output is set and reset depending on a configurable threshold and a differential value.

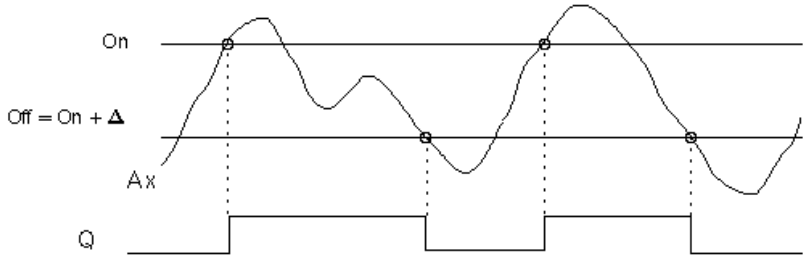
Connection	Description
Input **Ax**	You apply the analog signal to be analyzed at input Ax. Use the analog inputs AI1...AI8, the analog outputs AQ1 and AQ2. 0 - 10 V is proportional to 0 - 1000 (internal value).
Parameter	**A:** Gain Range of values: ± 10.00 **B:** Zero offset Range of values: ± 10,000 **On**: On threshold Range of values: ±20,000 **Delta:** Differential value for calculating the off parameter Range of values: ± 20,000 **p:** Number of decimals Range of values: 0, 1, 2, 3
Output **Q**	Q is set or reset, depending on the threshold and difference values.

Parameter p (number of decimals)

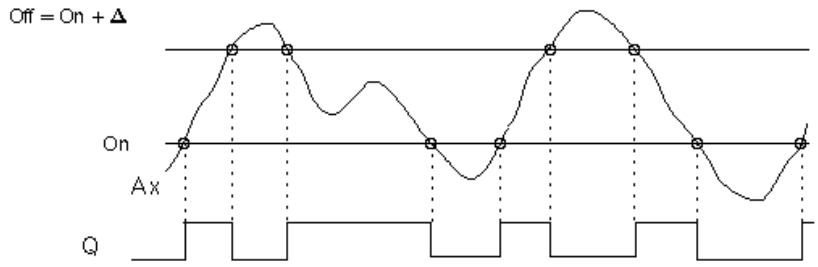
Applies only to the display of On, Off and Ax values in a message text.

Does not apply to the comparison of On and Off values! (The compare function ignores the decimal point.)

Timing diagram A: Function with negative difference Delta



Timing diagram B: Function with positive difference Delta



Description of the function

The function fetches the analog signal at input Ax.

Ax is multiplied by the value of the A (gain) parameter, and the value at parameter B (offset) is added to product, i.e.

(Ax · gain) + offset = actual value of Ax.

Output Q is set or reset, depending on the set (On) threshold and difference value (Delta). The function automatically calculates the Off parameter: Off = On + Delta, whereby Delta may be positive or negative. **See the calculation rule below.**

Calculation rule

When you set a negative differential value Delta, the On threshold >= Off threshold, and:

Q = 1, if the actual value Ax > On

Q = 0, if the actual value Ax ≤ Off.

See the timing diagram A.

When you set a positive differential value Delta, the On threshold < the Off threshold, and Q = 1, if:

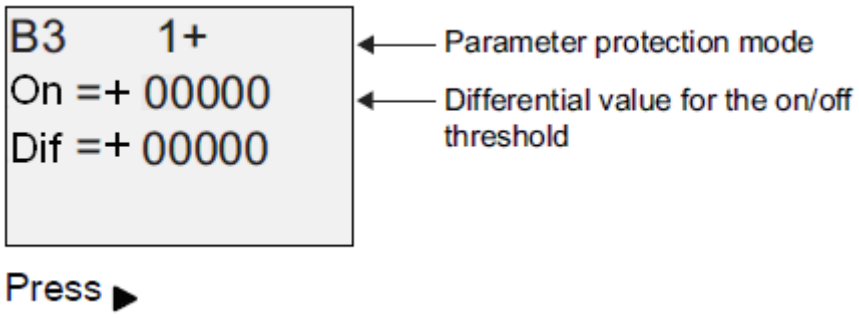
On ≤ the actual value Ax < Off.

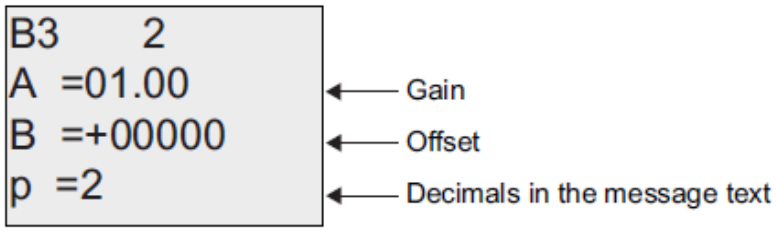
See the timing diagram B.

Setting the Par parameter

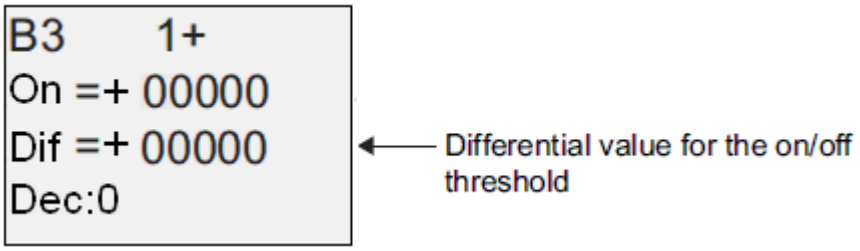
The gain and offset parameters are used to adapt the sensors to the relevant application.

View in programming mode (example):

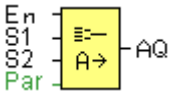




View in parameter assignment mode (example):



7.5.26 Analog multiplexer



Short Description

This special function displays 0 or one of 4 saved analog values on the analog output.

Connection	Description
Input **En**	1 on input En (Enable) switches, dependent on S1 and S2, a parameterized analog value to the output AQ. 0 on input EN switches 0 to the output AQ.
Inputs **S1** and **S2**	S1 and S2 (selectors) for selecting the analog value to be issued.

	S1 = 0 and S2 = 0: The value 1 is issued S1 = 0 and S2 = 1: The value 2 is issued S1 = 1 and S2 = 0: The value 3 is issued S1 = 1 and S2 = 1: The value 4 is issued
Parameter	**V1…V4**: Analog values (Value) that will be issued. Value range: -32768...+32767 **p**: Number of decimal places value range: 0, 1, 2, 3
Output **AQ**	Analog output Value range for AQ: -32768...+32767

Parameters V1…V4

The values for V1…V4 can be provided by the value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

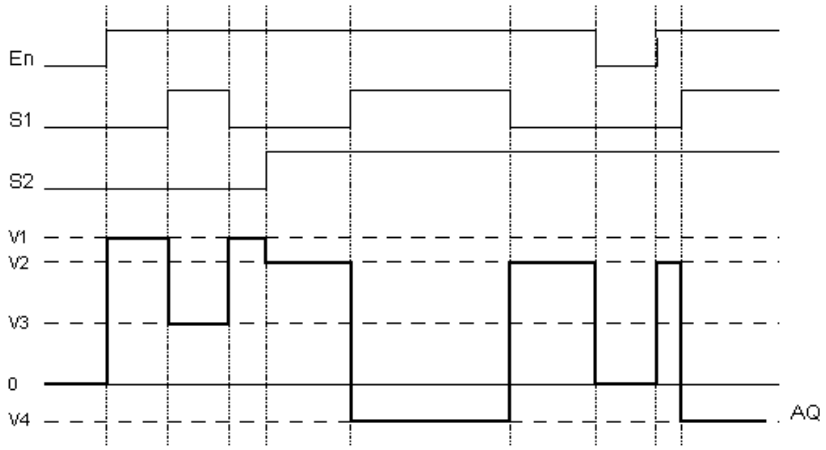
Analog math: AQ

PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

Timing Diagram



Description of Function

If input En is set, then the function issues one of 4 possible analog values V1 to V4 at the output AQ, depending on the parameters S1 and S2.

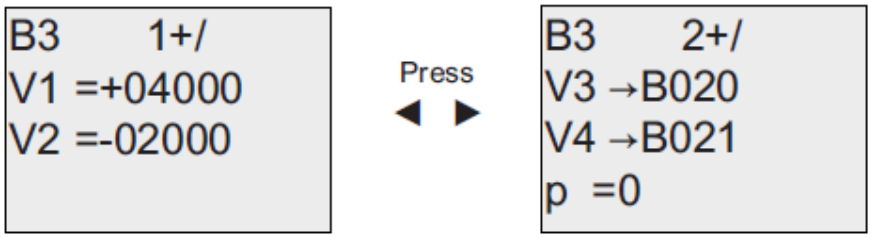
If the input En is not set, then the function issues the analog value 0 at output AQ.

Analog output

If you interconnect this special function with a real analog output, note that the analog output can only process values between 0 and 1000. To do this, you may need to connect an additional amplifier between the analog output of the special function and the real analog output. Using this amplifier, you standardize the output range of the special function to a value range of 0 to 1000.

Setting the Par parameter

View in programming mode (example):



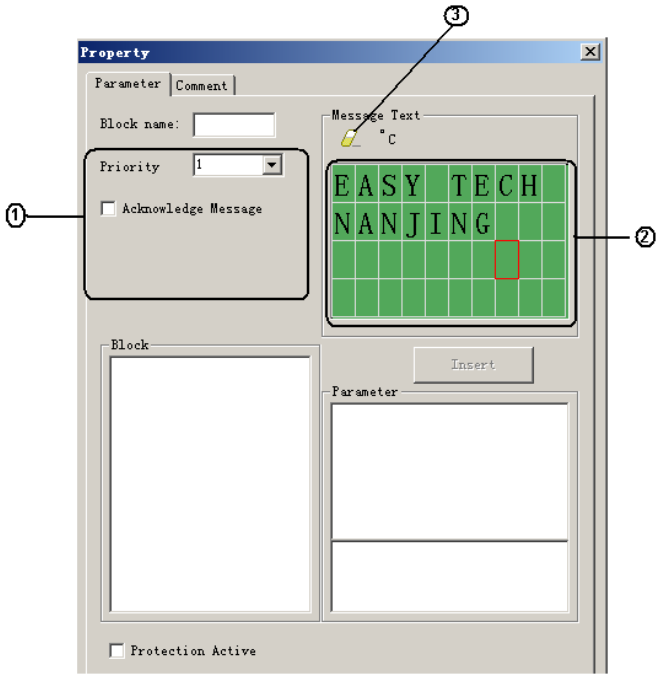
7.5.27 System cover

This block cannot directly be found in the block list ,however, it is set as default by system of x-Messenger, hence system cover can be available if you follow the below procedures : use your mouse to left-click “Tools” menu->select “Edit Cover HMI” by left-click in eSmsConfig .

Short description

Display the status (Run or Stop) of x-Messenger when power-on or simulation by soft.

Particular characteristics to be noted when configuring



1."General" area

Here you will find the following settings:

A. Priority of the system cover

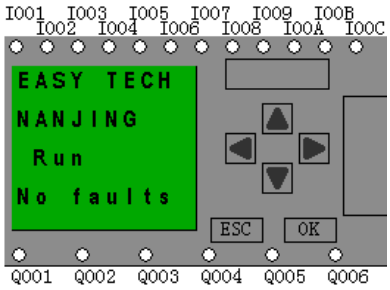
B. Check box for message text acknowledgment

2. "Messages" area

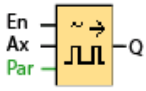
Users can edit the messages in the first and second line, the third line displays the state RUN or STOP, and the messages saying whether your program has mistakes or not will be shown in the fourth line.

3. "Delete" button

The button is used for deleting the “Messages” in the first and second line.



7.5.28 Pulse Width Modulator (PWM)



Short Description:

The Pulse Width Modulator (PWM) instruction modulates the analog input value Ax to a pulsed digital output signal. The pulse width is proportional to the analog value Ax.

connection	**Description**
EN	A positive edge (0 to 1 transition) at input En enables the PWM function block.
Input **Ax**	Analog signal to be modulated to a pulsed digital output signal.
parameter	**A:** Gain Range of values: +- 10.00 **B:** Zero offset Range of values: +- 10,000 **PT:** Periodic time over which the digital output is modulated **p:** Number of decimals Range of values: 0, 1, 2, 3
Output **Q**	Q is set or reset for the proportion of each time period according to the proportion of the standardized value Ax to the analog value range.

Parameter PT

The periodic time PT can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

PI controller: AQ

Analog math: AQ

Data latching relay: AQ

Up/Down counter: Cnt

Parameter p (number of decimals)

Parameter p applies only to the display of the Ax value in a message text.

Description of the function

The function reads the value of the signal at the analog input Ax.

This value is multiplied by the value of parameter A (gain). Parameter B (offset) is added to the product, as follows:

(Ax * Gain) + Offset = Actual value Ax

The function block calculates the proportion of the value Ax to the range. The block sets the digital output Q high for the same proportion of the PT (periodic time) parameter, and sets Q low for the remainder of the time period.

Examples with Timing Diagrams

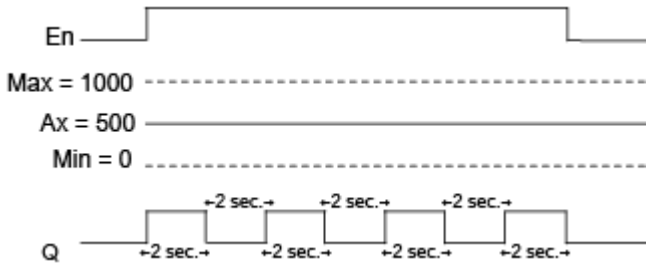
The following examples show how the PWM instruction modulates a digital output signal from the analog input value:

Example 1

Analog input value: 500 (range 0...1000)

Periodic time T: 4 seconds

The digital output of the PWM function is 2 seconds high, 2 seconds low, 2 seconds high, 2 seconds low and continues in that pattern as long as parameter "En" = high.

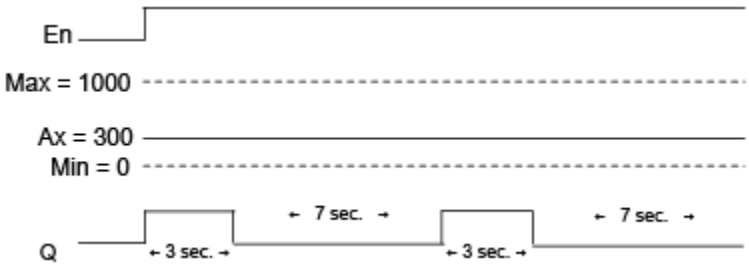


Example 2

Analog input value: 300 (range 0...1000)

Periodic time T: 10 seconds

The digital output of the PWM function is 3 seconds high, 7 seconds low, 3 seconds high, 7 seconds low and continues in that pattern as long as parameter "En" = high.



Calculation rule

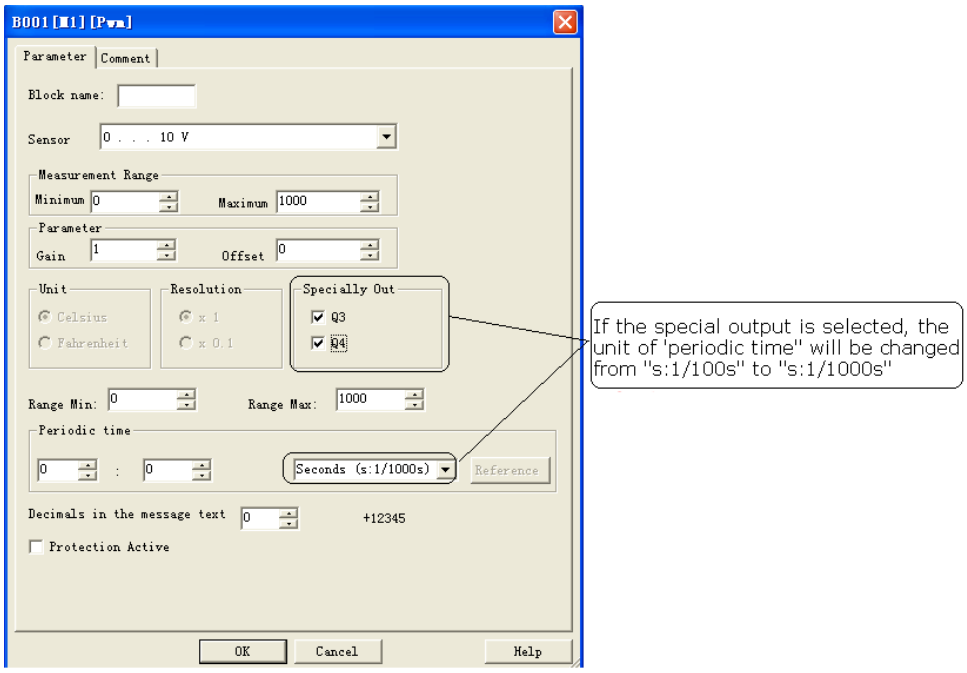
Q = 1, for (Ax – Min) / (Max – Min) of time period PT

Q = 0, for PT – [(Ax – Min) / (Max – Min)] of time period PT.

Note: Ax in this calculation refers to the actual value Ax as calculated using the Gain and Offset. Min and Max refer to the minimum and maximum values specified for the range

Special feature.

Generally, the output frequency could be up to 30Hz But the Q3,Q4 of EXM-12DC-D/DA-TN type (PNP transistor output) CPU could be up to 333 Hz and the property dialog box of PWM function block setting as follows:



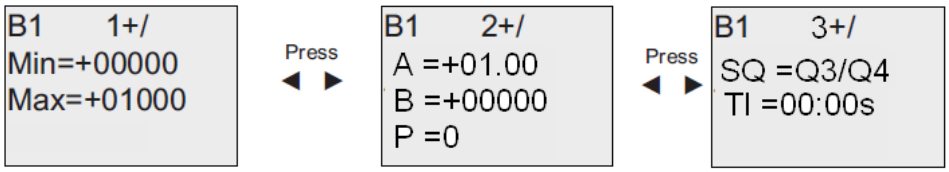
If the special output is selected in the property dialog box of PWM block, then the unit of "periodic time" will be changed from s:1/100s to s:1/1000s, so if you input 3 (1/1000s) , then its frequency is 1000/3 Hz.

Notes:

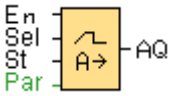
1. The periodic time must be no less than 3 ms.
2. If the specific output is selected in the property dialog box of PWM block, then the output pin of PWM function block cannot be linked as input to other blocks.
3. Q3, Q4 in the above dialog box are exactly corresponding to Q3, Q4 of EXM-12DC-D/DA-TN (PNP) CPUs

Setting the Par Parameter

The following illustration shows the view in programming mode that corresponds to the first example:



7.5.29 Analog Ramp



Short Description:

The Analog Ramp instruction allows the output to be changed from the current level to a selected level at a specified rate.

Connection	**Description**
Input **En**	A change in the status from 0 to 1 at input EN (Enable) applies the start/stop level (Offset "B" + StSp) to the output for 100 ms and starts the ramp operation to the selected level. A change in the status from 1 to 0 immediately sets the current level to Offset "B", which makes output AQ equal to 0.
Input **Sel**	SeI = 0: The step 1 (level 1) is selected. SeI = 1: The step 2 (level 2) is selected. A change in status of Sel causes the current level to start changing to the selected level at the specified rate.
Input **St**	A change in the status from 0 to 1 at input St (Decelerated Stop) causes the current level to decrease at a constant rate until the start/stop level (Offset "B" + StSp) is reached. The start/stop level is maintained for 100 ms and then the current level is set to Offset "B", which makes output AQ equal to 0.
parameter	Level1 and Level2: Levels to be reached; value range for each level: -10,000 to +20,000 MaxL: Maximum value that must not be exceeded. Value range: -10,000 to +20,000 StSp: Start/Stop offset: value that is added to Offset "B" to create the start/stop level. If the Start/Stop offset is 0, then the start/stop level is Offset "B"). Value range: 0 to +20,000 Rate: Speed with which level 1, level 2 or 0ffset is reached. Steps/seconds are issued. Value range: 1 to 10,000 A: Gain Value range: 0 to 10,00 B: Offset Value range: +- 10.000 p: Number of decimal places Value range: 0, 1, 2, 3
Output **AQ**	The output AQ is scaled using the formula:

	(Current Level - Offset "B") / Gain "A" Note: When AQ is displayed in parameter mode or message mode, it is displayed as an un-scaled value (engineering units: current level). Value range for AQ: 0...+32767

Parameter p (number of decimal places)

The level parameters Level1 and Level2 can be provided by the value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

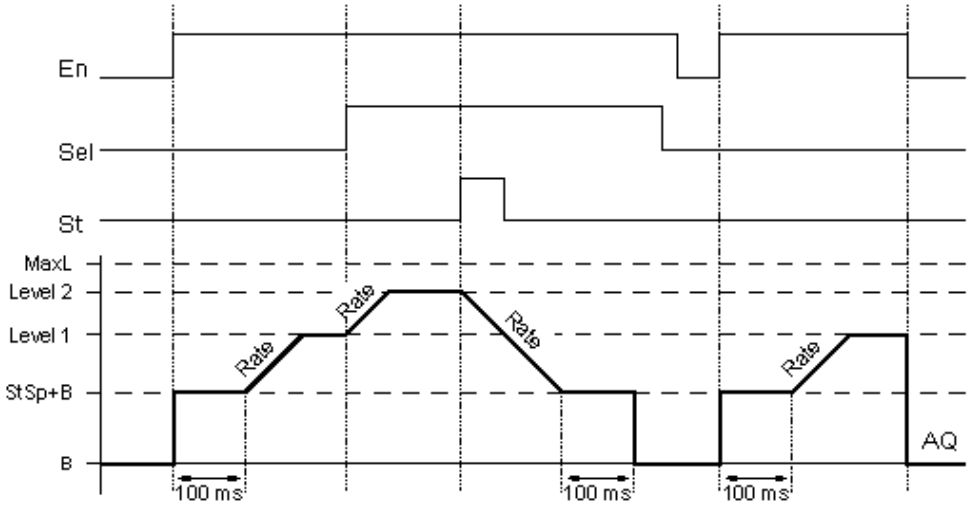
PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

Parameter p only applies for displaying the values of AQ, level 1, level 2, MaxL, StSp, and Rate in a message text.

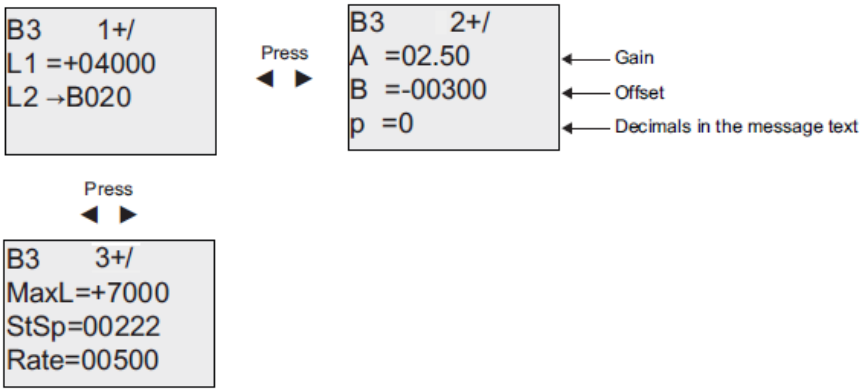
Timing diagram for AQ



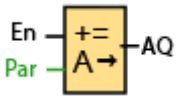
Description of function

If the input En is set, then the function sets the value StSp + Offset "B" for 100 ms.
Then, depending on the connection of Sel, the function runs from the level StSp + Offset "B" to either level 1 or level 2 at the acceleration set in Rate.
If the input St is set, the function runs to a level of StSp + B at the acceleration set in Rate. Then the function holds the level at StSp + Offset "B" for 100 ms. After 100 ms, the level is set to Offset "B". output AQ. The scaled value (output AQ) is 0.
If the input St is set, the function can only be restarted once the inputs St and En have been reset.
If input Sel has been changed, depending on the connection of Sel, the function runs from the current target level to the new target level at the rate that is specified.
If the input En is reset, the function immediately sets the current level to Offset "B".
The current level is updated every 100 ms. Note the relationship between output AQ and the current level:
Output AQ = (current level – Offset "B") / Gain "A"

Setting the Par parameter
View in programming mode (example):



7.5.30 Analog Math



Short Description
The analog math block calculates the value AQ of an equation formed from the user-defined operands and operators.

Connection	Description
Input **EN**	Enable the analog math function block.
Parameter	**V1:**Value 1: First operand **V2:** Value 2: Second operand **V3:** Value 3: Third operand **V4:** Value 4: Forth operand **Operator 1:** First operator **Operator2:** Second operator **Operator 3:** Third operator **Priority 1:** Priority of first operation **Priority 2:** Priority of second operation **Priority 3:** Priority of third operation **P:** number of decimals Range of values: 0,1,2,3
Output **AQ**	The output AQ is the result of the equation formed from the operand values and operators. AQ will be set to 32767 if a divide by 0 or overflow occurs, and -32768 if a negative overflow (underflow) occurs.

Parameter p (number of decimals)

The values V1, V2, V3, and V4 can be provided by the actual value of another already-programmed function:

Analog comparator: Ax – Ay

Analog trigger: Ax

Analog amplifier: Ax

Analog multiplexer: AQ

Analog ramp: AQ

Analog math: AQ

PI controller: AQ

Data latching relay: AQ

Up/Down counter: Cnt

Parameter p applies to the display of V1, V2, V3, V4 and AQ in a message text.

Description of the function

The analog math function combines the four operands and three operators to form an equation. The operator can be any one of the four standard operators: +, -, *, or /. For each operator, you must set a unique priority

of High ("H"), Medium ("M"), or Low ("L"). The high operation will be performed first, followed by the medium operation, and then by the low operation. You must have exactly one operation of each priority. The operand values can reference another previously-defined function to provide the value. The analog math function rounds the result to the nearest integer value.

The number of operand values is fixed at four and the number of operators is fixed at 3. If you need to use fewer operands, use constructions such as " + 0" or " * 1" to fill the remaining parameters.

You can also configure the behavior of the function when the Enable parameter "En"=0. The function block can either retain its last value or be set to 0.

Possible errors: Zero division and overflow

If the analog math function block execution results in zero division or overflow, it sets internal bits that indicate the type of error that occurred. You can program an analog math error detection function block in your circuit program to detect these errors, and to control the program behavior as needed. You program one analog math error detection function block to reference one specific analog math function block.

Examples

The following tables show some simple example analog math block parameters, and the resulting equations and output values:

V1	Operator1	V2	Operator2	V3	Operator3	V4
12	+(M)	6	/(H)	3	-(L)	1

Equation: (12 + (6 / 3)) - 1

Result: 13

V1	Operator1	V2	Operator2	V3	Operator3	V4
2	+(L)	3	*(M)	1	+(H)	4

Equation: 2+ (3*(1+4))

Result: 17

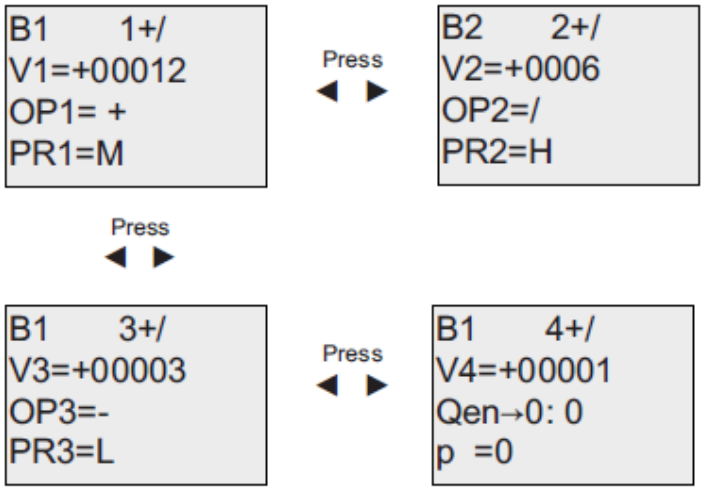
V1	Operator1	V2	Operator2	V3	Operator3	V4
100	-(H)	25	/(L)	2	+(M)	1

Equation: (100 – 25) / (2 + 1)

Result: 25

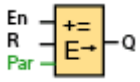
Setting the Par parameter

The following illustration shows the view in programming mode that corresponds to the first example (12 + (6 / 3)) - 1:



Use the ◀ and ▶ keys to navigate between the operand value, operator, and operation priority. To change a value, use the ▲ and ▼ keys to scroll through value choices for each value. Use the ◀ key to navigate from one screen to the previous screen when the cursor is on the V1..V4 line, and the ▶ key to navigate to the next screen from the PR1..PR3 line. Use the OK key to accept changes.

7.5.31 Analog math error detection



Short Description

The analog math error detection block sets an output if an error has occurred in the referenced analog math function block.

Connection	Description
Input **EN**	Enable the analog math error detection function block.
Input **R**	Reset the output
Parameter	**Referenced FB:** block number of an analog math instruction **Error to detect:** Zero division, Overflow, or Zero division OR Overflow. **Auto Reset:** Reset the output when the failure condition clears.
Output **AQ**	Q is set high if the error to detect occurred in the last execution of the referenced analog math function block.

Parameter Referenced FB

The value for the Referenced FB parameter references the block number of an already-programmed analog math function block.

Description of the function

The analog math error detection block sets the output when the referenced analog math function block has an error. You can program the function to set the output on a zero division error, an overflow error, or when either type of error occurs.

If you select the automatically reset checkbox, the output is reset prior to the next execution of the function block. If not, the output retains its state until the analog math error detection block is reset with the R parameter.

In any scan cycle, if the referenced analog math function block executes before the analog math error detection function block, the error is detected in the same scan cycle. if the referenced analog math function block executes after the analog math error detection function block, the error is detected in the next scan cycle.

Analog math error detection logic table

In the table below, Error to Detect represents the parameter of the analog math error detection instruction that selects which type of error to detect. Zero represents the zero division bit set by the analog math instruction at the end of its execution: 1 if the error occurred, 0 if not. OF represents the overflow bit set by the analog math instruction: 1 if the error occurred, 0 if not. Zero division OR Overflow represents the logical OR of the zero division bit and the overflow bit of the referenced analog math instruction. Output (Q) represents the output of the analog math error detection function. An "x" indicates that the bit can be either 0 or 1 with no influence on the output.

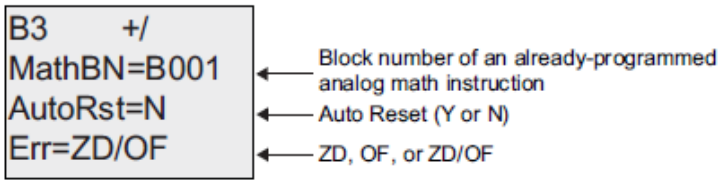
Error to Detect	zero	of	Output
Zero division	1	X	1
Zero division	0	X	0
Overflow	X	1	1

Overflow	X	0	0
Zero division OR Overflow	1	0	1
Zero division OR Overflow	0	1	1
Zero division OR Overflow	1	1	1
Zero division OR Overflow	0	0	0

If the Referenced Analog Math FB is null, then the output is always 0.

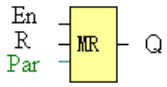
Setting the Par parameter

The parameters MathBN, AutoRst, and Err can be set in programming mode or parameter assignment mode. View in programming mode (example):



Use the ◀ and ▶ keys to navigate between the MathBN, AutoRst, and Err parameters. To change a value, use the ▲ and ▼ keys to scroll through value choices for each value. Use the OK key to accept changes.

7.5.32 Modbus Read



Short description:

When there is a high level at En, the Modbus Read block will be activated and the x-Messenger shall communicate with a peripheral device as a master via RS232 or RS485 interface. Furthermore, the output will be switched on when communication is established successfully. Otherwise the output (Q pin) remains "off"

which means communication has failed.

A signal at input R resets output Q and disables this block at the same time

Connection	Description
Input **En**	A high signal at En input will enable "Modbus Read" function block to be activated
Input **R**	Reset the value read from peripheral and set the output to 0 via the R (Reset) input. Reset has priority over En
Parameter	**Slave address**: 1 is default . **Communication protocol:** Modbus(RTU) **Communication parameter:** baud rate (BPS),Data bits, Stop bits, Parity， Overtime (response time out) **Comm Type:** RS232 or RS485(Communication interface of x-Messenger) **Data register Index:** High Low /Low High **Command:** 01 Read coils(0x) 02 Read Discrete Input(1x) 03 Read Holding Registers(4x) 04 Read Input Registers(3x) Register start address, count
Output **Q**	Q is set or reset depending on the communication status. Successful communication , Q=1; Failed communication ,Q=0;

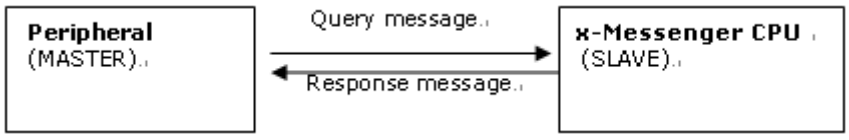
Note: 1. Data register Index: High Low /Low High

For example, when High Low index was set, one data 0x 00 12 was read and saved to AQ, AQ= 0X0012; however, when Low High index was set, AQ=0x 1200

Regarding Modbus RTU detail, please refer to our Modbus RTU communication protocol file for it.

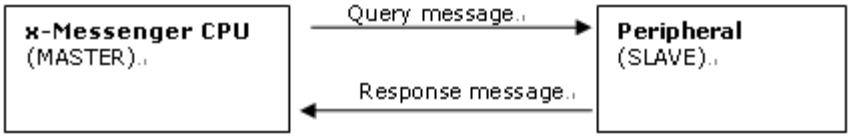
Description of the function:

In the configuration of our x-Messenger communication, the x-Messenger usually serves as a slave via Modbus RTU Protocol, and can communicate with a master directly. That's to say, any device communicating with x-Messenger sends command to it, and then its response will be sent out only when the x-Messenger has received the command, Just as the below figure shows:



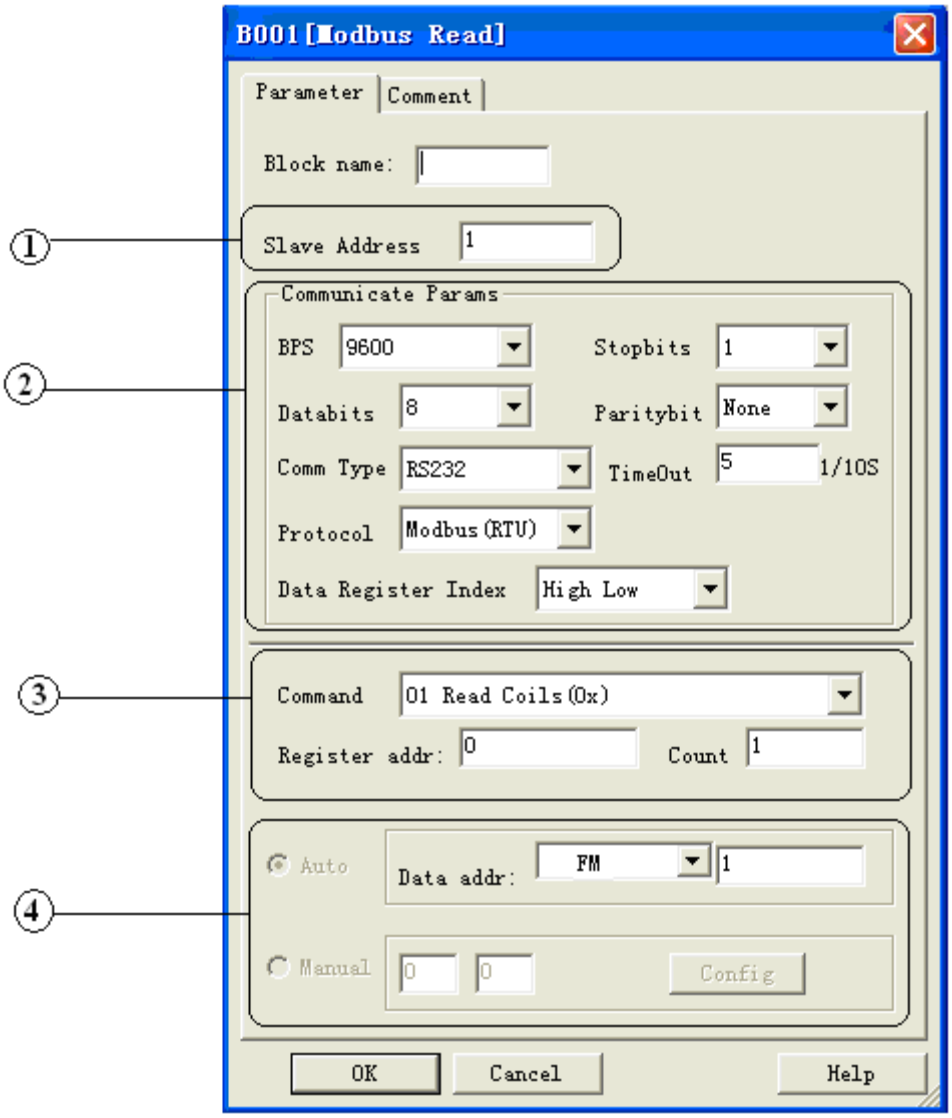
However, the "Modbus Read" or "Modbus Write"(next chapter will introduce it) function block would be

utilized if x-Messenger shall be required to play a role of master to communicate with other devices. As the following figure shows:



When you put the "Modbus read" or "Modbus Write" function block in your program and make some configurations, the function that x-Messenger serves as master will be realized.

The Property in dialog box of "Modbus Read" shows as below figure:



1. Slave Address: 1 is default

2. Communication parameters: BPS is baud rate、Stopbits、Databits、Communication type: RS232、RS485 . Actually RS232 or RS485 are just interface of x-Messenger.

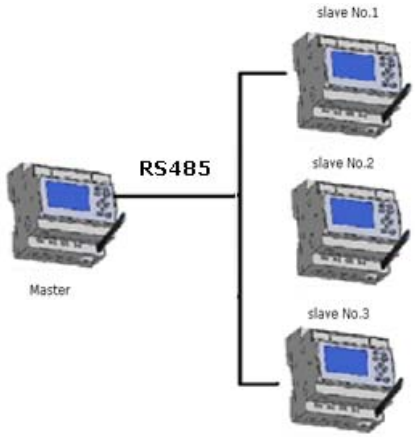
3. Command, register address and register count

Command	**Function description**	**remark**
01	Read one group coil status（00000～0XXXX）	Read Coil Status（output）
02	Fetch one group data of the status of switch input （10000～1XXXX）	Read input Status (input relay)
03	Read data of multi-holding register（40000～4XXXX）	Read Holding Registers (Output register)
04	Read data of input registers (3000～3XXXX)	Read Input Registers

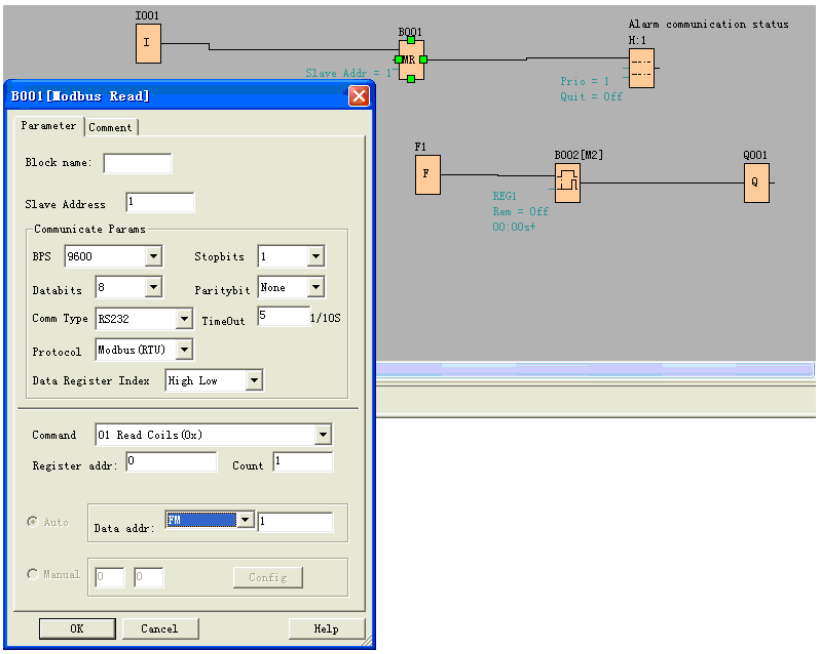
Note: Please use "03" command to read AI/AO of x-Messenger

4. Where to save the data read from Slave.

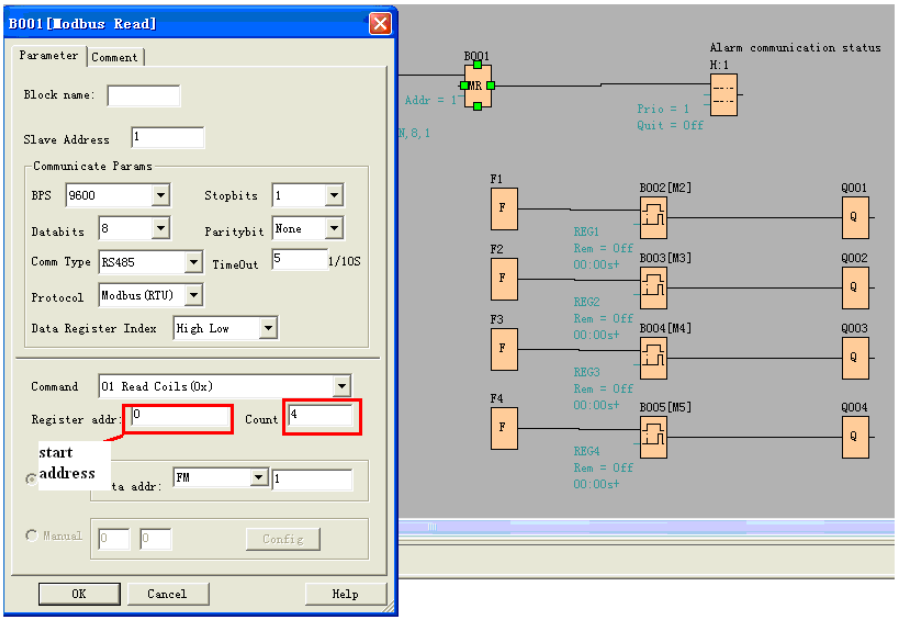
Example: The following we'll take a example that one x-Messenger (Master) communicate with other x-Messenger (Slave) via RS485.



Example 1: Get Q1 status of SLAVE1(x-Messenger) and then save the bit status to F1.

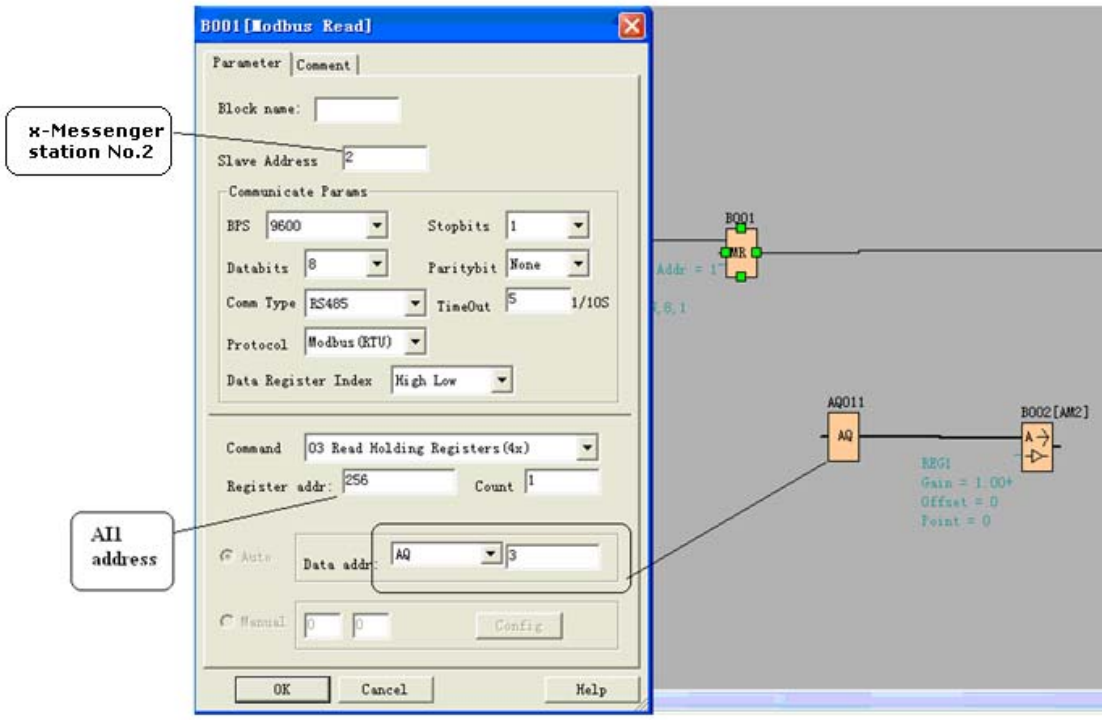


If count was set 4, the Q1,Q2,Q3,Q4 of x-Messenger (station No.1) will be read and save to F1 to F4

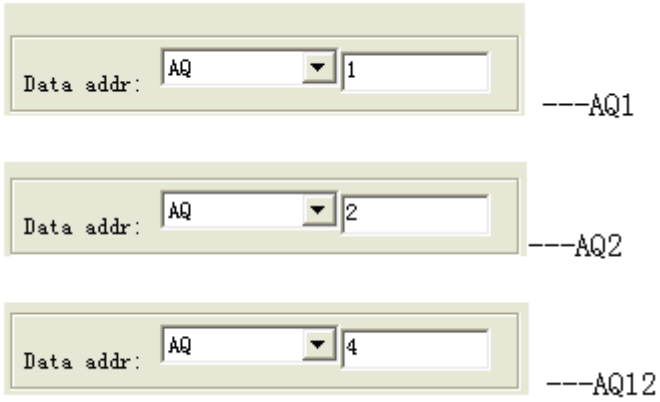


F is bit type flag. It can be used to receive bit data from slave device.

Example 2 : Get AI value from Slave 2(x-Messenger with station No.2) and save the data to AQ11



Note:



The number setting of Q,I,AQ are continuous .AQ12 cannot be set as AQ 12 and should be set AQ 4 as above figure shows.

The following table shows how to set.

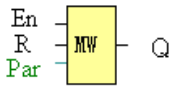
Note: this table also can be applied for the configuration of Modbus Write function block.

Model	I,Q,AI,AQ	Dialog box set
CPU	I1-I8	I1-I8
	Q1-Q4	Q1-Q4
	AI1—AI8	AI1—AI8
	AQ1—AQ2	AQ1—AQ2
Expansion1 (Address is 1)	I11-I14	I9-I12
	Q11-Q14	Q9-Q12
	AI11-AI14	AI9—AI12
	AQ11-AQ12	AQ3,AQ4
Expansion2 (Address is 2	I21-I24	I18—I21
	Q21-Q24	Q17—Q19
	AI21-AI24	AI17---AI24
	AQ21-AQ22	AQ5--AQ6
…….		

Data format instruction

Name	Data format
F, I,Q	BIT
AF,AI,AQ,	Signed Short

7.5.33 Modbus Write



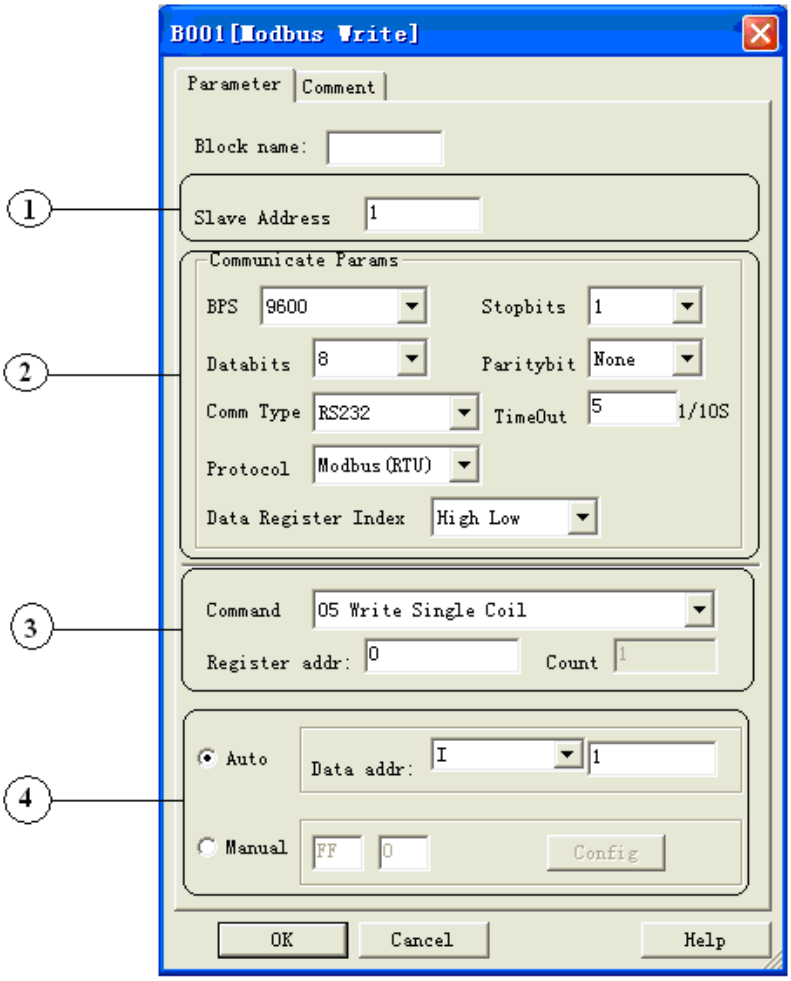
Short description:

When a high level in En, the Modbus Write block will be activated and the x-Messenger could communicate with peripheral as a master via RS232 or RS485 interface, further the output will be switched on when the communication is established successfully. Otherwise the output (Q pin) is kept"off" it means communication has failed.

A signal at input R resets output Q and disable, this block at the same time

Connection	**Description**
Input **En**	A high signal at En input will enable "Modbus Write" function block to be activated
Input **R**	Reset the value read from peripheral and set the output to 0 via the R (Reset) input. Reset has priority over En
Parameter	**Slave address**: 1 is default . **Communication protocol:** Modbus(RTU) **Communication parameter:** baud rate (BPS),Data bits, Stop bits, Parity, Overtime (response time out) **Comm Type:** RS232 or RS485(Communication interface of x-Messenger) **Data register Index:** High Low /Low High **Command:** 05 Write Single Coil 06 Write Single Register 15 Write Multiple Coils 16 Write Multiple Registers **Register start address, count**
Output **Q**	Q is set or reset depending on the communication status. Successful communication , Q=1; Failed communication ,Q=0;

The Property in dialog box of "Modbus Write" shows as below figure:



1. Slave Address: 1 is default

2.Communication parameters：BPS is baud rate、Stopbits、Databits、Communication type: RS232、RS485 .

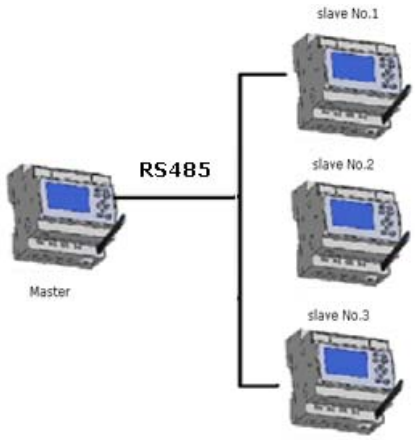
Actually RS232 or RS485 are just interface of x-Messenger.

3. Command, register address and register count

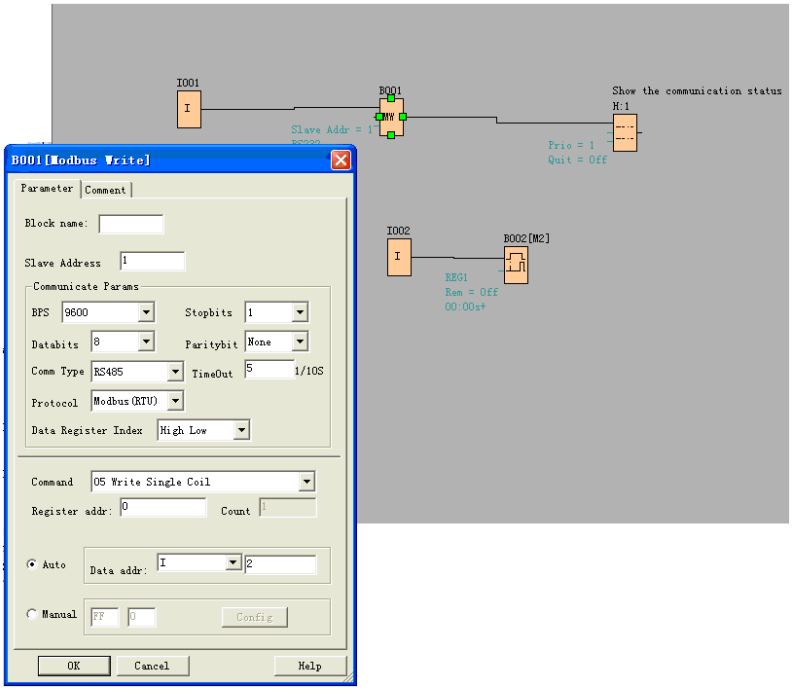
Command	**Function description**	**remark**
05	Force the switch status of single coil（00000～0XXXX）	Force Single Coil （output）
06	Pre-set the data of single register （40000～4XXXX）	Set single output register
15	Force multi-coils on/off bit（00000～0XXXX）	
16	Write multi-holding registers data（40000～4XXXX）	

4. Where is to save the pre-configuration data that would be written to Slave. It contains 2 kind ways to pre-configuration. One is auto mode, this data uses the flags in the program, such as FM, AFM, I, Q and AQ. The manual mode is input a fixed value or bit status.

Example 1



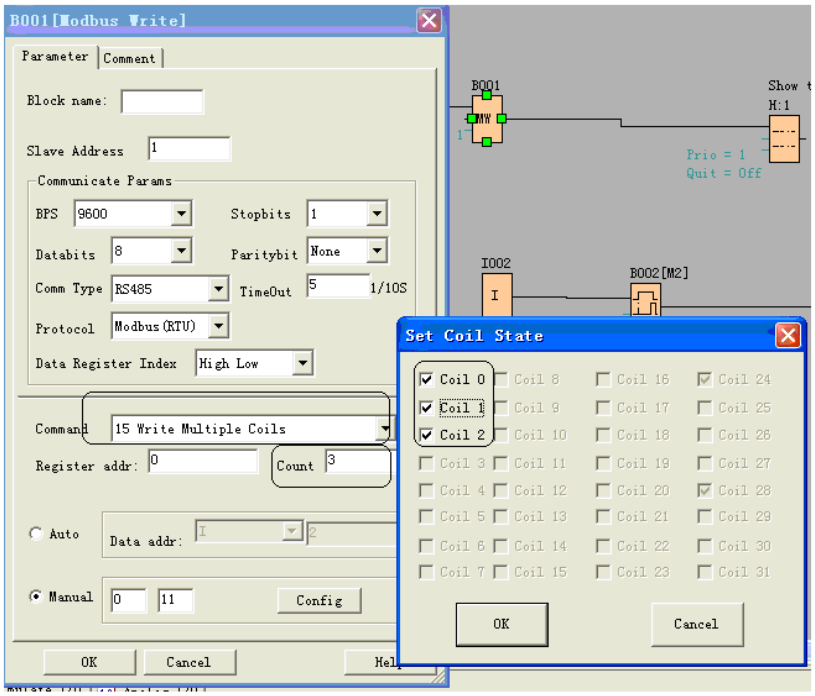
Write the I2 bit status of Master x-Messenger to Slave x-Messenger with No.1 and control Q1 of Slave via RS485 port. The program of master can be made as follows:

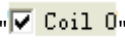


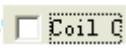
I1of master is used to control the communication .If I1 is high and the communication is established successfully, one alarm message (text message block) will be displayed on LCD. Then the Q1 of slave No.1 will be controlled by I2 of master. If I2 is high, Q1 of slave No.1 would be ON and if I2 is low, Q1 of slave would be OFF.

Note: The Q1 must be free, it means the in the program of Slave No.1, the input pin of Q1 must be not linked to other blocks.

Example 2, manual mode input value

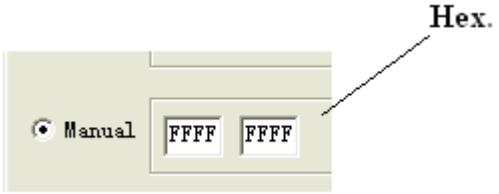


The above configuration is to force Q1, Q2, Q3 of Slave No.1 ON. " 

" means pre-set the BIT 1 and " 

" means pre-set the BIT 0 "Coil 0" is corresponding to the start address ,Here is Q1.

Note: The manual input value is Hex data .it contains 4 bytes. If you want to write a decimal value to the register of SLAVE, please convert it to Hex format.



4. The following table shows how to set.

Note: this table also can be applied for the configuration of Modbus Read function block

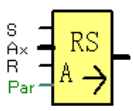
MODEL	I,Q,AI,AQ	DIALOG BOX SET
CPU	I1-IC	I1-I12
	Q1-Q6	Q1-Q6
	AI1-AI8	AI1-AI8
	AQ1-AQ2	AQ1-AQ2
Expansion 1	I11-I18	I13-I20
	Q11-Q18	Q7-Q14
(Address is 1)	AI11-AI18(AI15-AI18 are reserved)	AI9-AI12
	AQ11-AQ12	AQ3-AQ4
Expansion 2	I21-I28	I21-I28
	Q21-Q28	Q15-Q22
(Address is 2)	AI21-AI28	AI17-AI24
	AQ21-AQ22	AQ5-AQ6
.....		

Data format instruction

Name	Data format
F, I,Q	BIT
AF,AI,AQ,	Signed Short

For the detail information about I, AI, Q, AQ, registers address of x-Messenger ,refer to the RTU protocol file.

7.5.34 Data latching relay

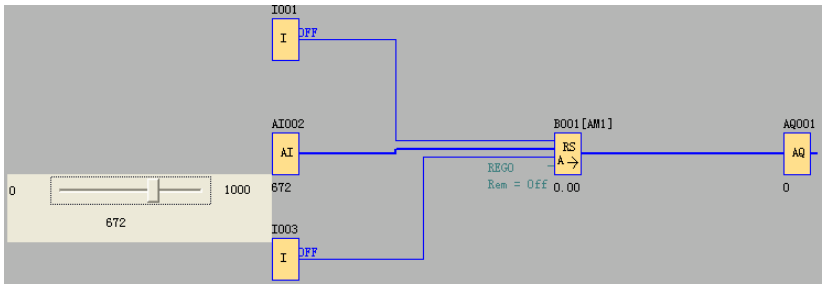


Short description

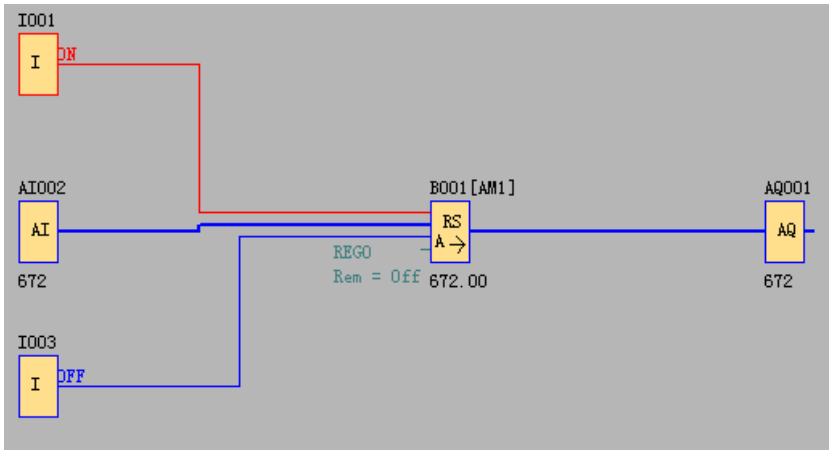
This special function saves the process variable of an analog input to memory, and returns it at the analog output.

Connection	Description
Input **S**	Save the Ax to memory and return it at the analog output with a signal at input S (Set).
Input **Ax**	Input the analog signal to be amplified at input Ax. Use the analog inputs, the block number of a function with analog output, or the analog outputs.
Input **R**	Reset analog output AQ to 0 with a signal at input R (Reset). analog Output AQ is reset if S and R are both set (reset has priority over set).
Output **AQ**	Analog output Value range for AQ: -32768...+32767

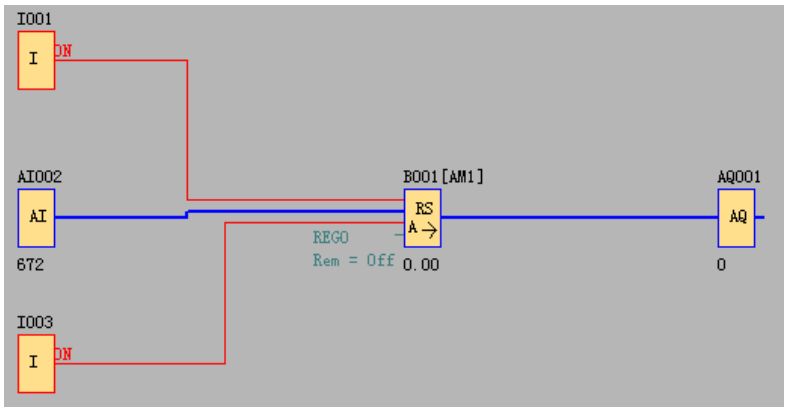
Example



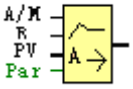
When I1 turn to HIGH, the value of AI2 will be saved to memory and return it to AQ1 as follows:



When the I3 turns to HIGH, the value of this function block will be reset to 0.



7.5.35 PI controller



Short Description

It is proportional-action and integral-action controllers. You can use both types of controller individually or combined.

Connection	Description
Input **A/M**	Set the mode of the controller: 1: automatic mode 0: manual mode
Input **R**	Use the input R to reset the output AQ. As long as this input is set, the input A/M is disabled. The output AQ is set to 0.
Input **PV**	Analog value: process value, Influences the Output
Parameter	Sensor: Type of sensor being used **Min.:** Minimum value for PV value range: -10,000 to +20,000 **Max.:** Maximum value for PV value range: -10,000 to +20,000 **A:** Gain Value range: +- 10.00 **B:** Offset Value range: +- 10,000 **SP:** Set-value assignment value range: -10,000 to +20,000

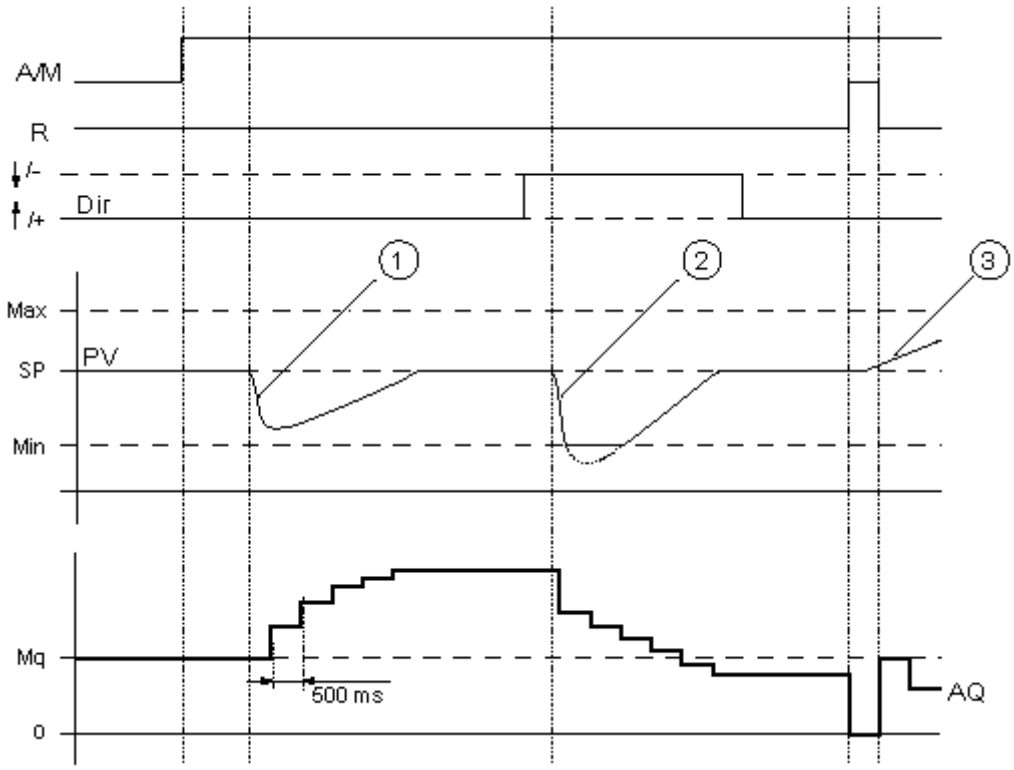
	Mq: Value from AQ with manual mode. Value range: 0 to 1,000 **Parameter sets:** application-related presets for KC, TI and Dir (see below) **KC:** Gain value range: 00.00 to 99.99 **TI:** Integral time value range 00:01 min to 99:59 min **Dir:** Action direction of the controller value range: + or - **p:** Number of decimal places value range: 0, 1, 2, 3
Output **AQ**	Analog output (manipulated variable) Value range for AQ: 0 to 1,000

Parameter P (number of decimal places)

Only applies for portraying the values from PV, SP, Min. and Max. in a message text.

Timing Diagram

The nature, manner and speed with which the AQ changes depends on the parameters KC and TI. Thus, the course of AQ in the diagram is merely an example. A control action is continuous; therefore the diagram portrays just an extract.



1. A disturbance causes the PV to drop, as Dir is positioned upwards, AQ increases until PV corresponds again to SP.

2. A disturbance causes the PV to drop, as Dir is positioned upwards, AQ decreases until PV corresponds again to SP.

   Dir is coordinated to the basic conduct of a control loop. The direction (dir) cannot be changed during the term of the function. The change in Dir here is shown for the purposes of clarification.

3. As AQ is set to 0 by means of the input R, PV changes. This is based on the fact that PV increases, which on account of Dir = upwards causes AQ to drop.

Description of Function

If the input A/M is set to 0, then the special function issues output AQ with the value that you set with parameter Mq.

If the input A/M is set to 1, then automatic mode commences. As an integral sum the value Mq is adopted, the controller function begins the calculations in accordance with the formulas given in Control and regulate basics. The updated value PV is used to calculate in the formulas.

Updated value PV = (PV * gain) + offset

If the updated value PV = SP, then the special function does not change the value of AQ.

Dir = upwards/+ (timing diagram numbers 1 and 3)

- If the updated value PV > SP, then the special function reduces the value of AQ.
- If the updated value PV < SP, then the special function increases the value of AQ.

Dir = downwards/- (timing diagram number 2)

- If the updated value PV > SP, then the special function increases the value of AQ.
- If the updated value PV < SP, then the special function reduces the value of AQ.

With a disturbance, AQ continues to increase / decrease until the updated value PV again corresponds to SP. The speed with which AQ changes depends on the parameters KC and TI. If the input PV exceeds the parameter Max., then the updated value PV is set to the value of Max.. If the PV falls short of the parameter Min., then the updated value PV is set to the value of Min.

If the input R is set to 1, then the AQ output is reset. As long as R is set, the input A/M is disabled.

Sampling Time

The sampling time is fixed at 500 ms.

Parameter sets

In order to simplify the use of the PI controller, the parameters for KC, TI and Dir are already given as sets for the following applications:

Parameter set	Application example	Parameter KC	Parameter TI (s)	Parameter Dir
Temperature fast	Temperature, cooling control of small spaces; small volumes	0,5	30	+
Temperature slow	Heating, ventilation, temperature, cooling control of large spaces; large volumes	1,0	120	+
Pressure 1	Quick pressure change, compressor control	3,0	5	+
Pressure 2	Slow pressure change, differential pressure control (flow controller)	1,2	12	+
Full level 1	Vat and/or reservoir filling without drain	1,0	1	+
Full level 2	Vat and/or reservoir filling with drain	0,7	20	+

Characteristics when configuring

Observe the Control and regulate basics.

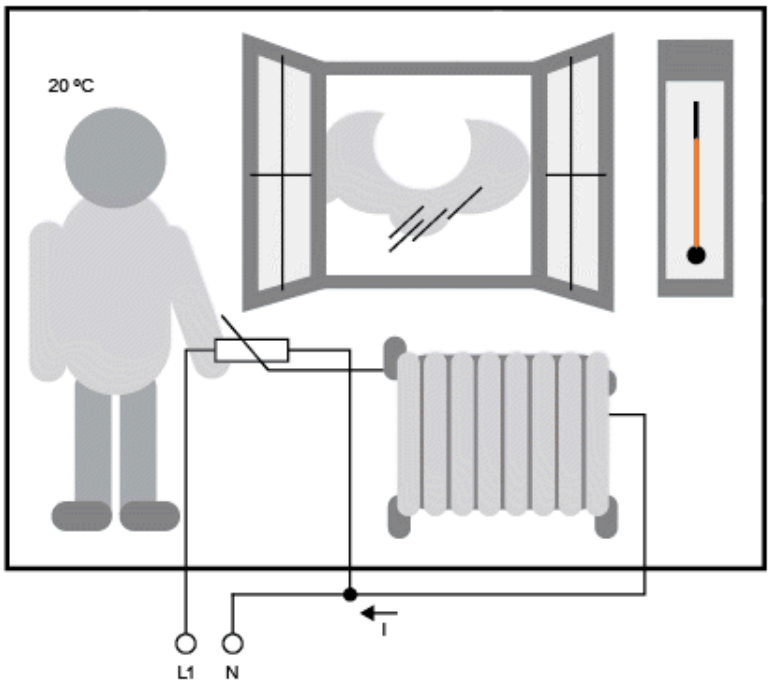
Control and regulate

In engineering, quantities can be both controlled and regulated.

When controlling, a quantity is manipulated without being able to compensate for outside influences. When regulating, a quantity is maintained at a specific value in order to compensate for outside influences.

In the following example, controlling means that the person can set the heat output at a fixed value. The heater cannot compensate for the drop in room temperature when a window is opened.

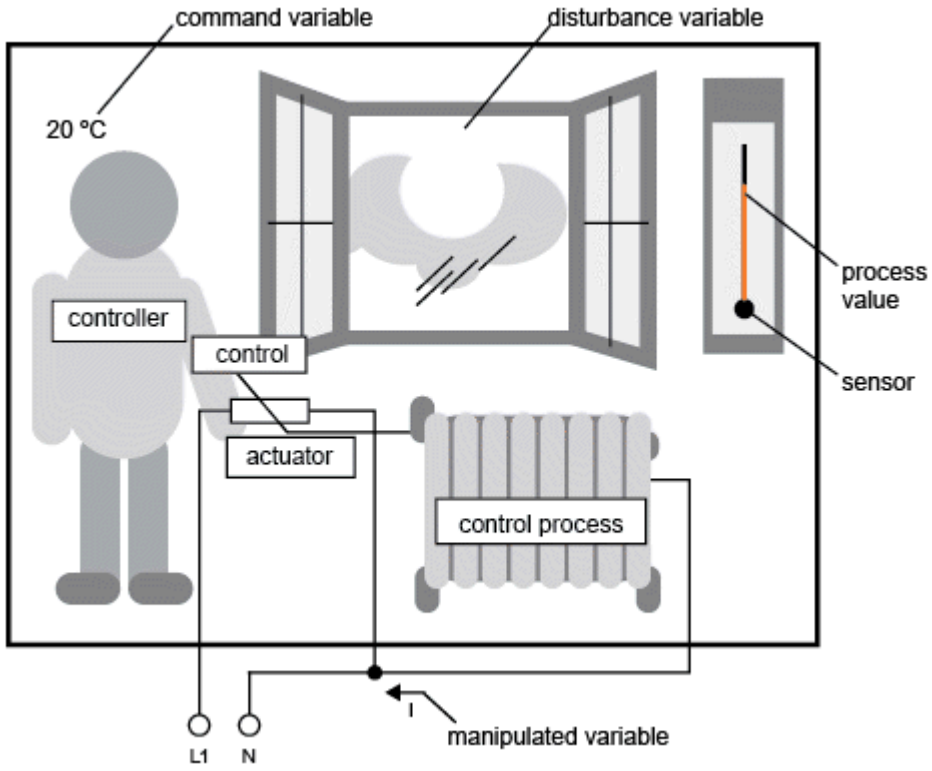
In the example below, regulating means that the person can increase the heat output if the room temperature drops to below 20 °C. If the room temperature rises above 20 °C, the heat output is reduced.



Basic concepts of regulating

In the example, the current for the electric heating is the manipulated variable. The changeable resistance is the actuator. The hand that operates the actuator is the control. The actual room temperature is the controlled variable or the process value. The desired room temperature is the command variable or the setpoint value. The electric heating is the control process. The thermometer is the sensor. The temperature loss from opening the window is the disturbance variable.

So this means that the person measures the process value (room temperature) with the sensor (thermometer), compares the process value (room temperature) with the command variable (desired room temperature) and uses the actuator (changeable resistance) to manually regulate the manipulated variable (heating current), in order to compensate for the disturbance variable (temperature drop from opening the window). The person is therefore the controller.

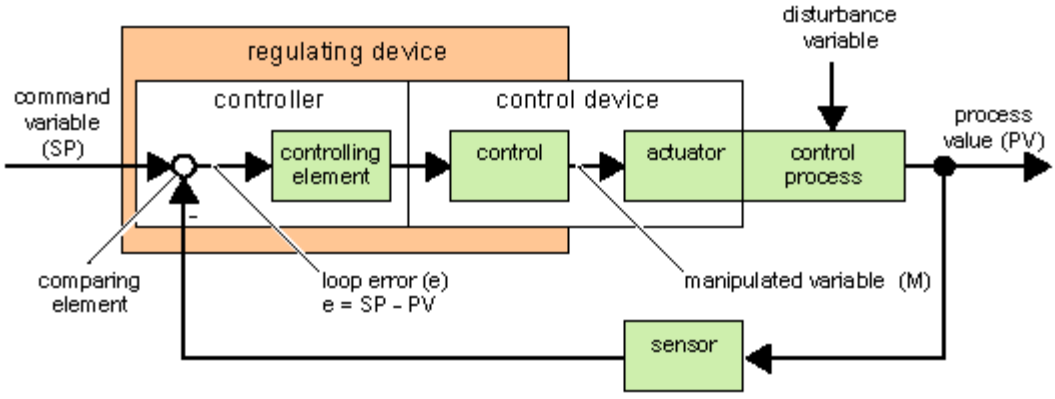


The control device is formed from the actuator and the control.

The control and controller together form the regulating device.

The following picture gives an abstract portrayal of the situation described above.

The comparing element uses the sensor to compare the command variable with the process value. If the command variables and process value deviate from one another, this results in a positive or negative loop error that in turn changes the process value.



Control loop

The process value x influences the manipulated variable M by means of the regulating device. This creates a

closed circuit that is also known as a control loop.

If, in the example above, the window is opened, the temperature in the room drops. The person must increase the heat output of the heater. If the heat output is increased too much, it will get too hot. The person must then reduce the heat output.

If the heat output is increased or reduced too quickly, then the control loop starts to sway. The room temperature fluctuates. It is either too hot or too cold. To prevent this, the person must carefully and slowly reduce or increase the heat output.

Loop error

The loop error is the difference between the command variable and the process value. In other words: the deviation of a process value from a set value.

e = SP – PV

The loop error e brings about a change to the manipulated variable M.

The example above illustrates this very well: if, with a desired temperature of 20 °C (= command value w), the room temperature is 22 °C (= process value PV), this results in the loop error:

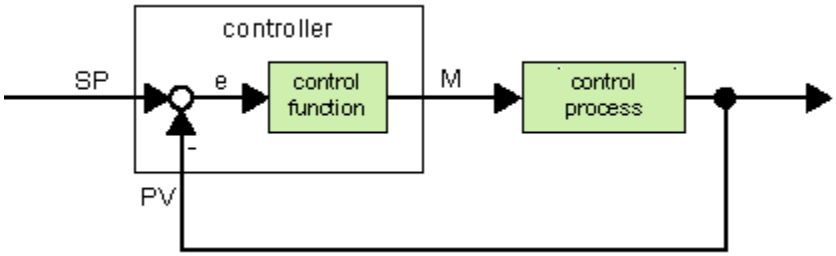
e = SP – PV = 20 °C - 22 °C = -2 °C

In this case, the negative sign indicates a reversing action: the heat output is reduced.

In a control loop's state of equilibrium, the loop error is zero or very small. If the command variable changes or there is a disturbance, a loop error arises. The loop error is corrected by means of the manipulated variable M.

Controller basics

A controller can be simply portrayed as follows:



The comparing element and the controller function describe the conduct of the controller.

The following describes the most important types of controller. A controller's step response tells us a lot about its conduct. The step response describes how a controller reacts to the erratic change in the process value.

There are 3 important basic types of controller:

Proportional-action controller (P controller)

Integral-action controller (I controller)

Differential-action controller (D controller – we're not touching on this here)

These are combined for a real controller. For instance, the PI controller:

P Controller

A proportional-action controller (P controller) changes the manipulated variable M proportional to the loop error. The P controller works immediately. By itself it cannot drive the loop error to zero.

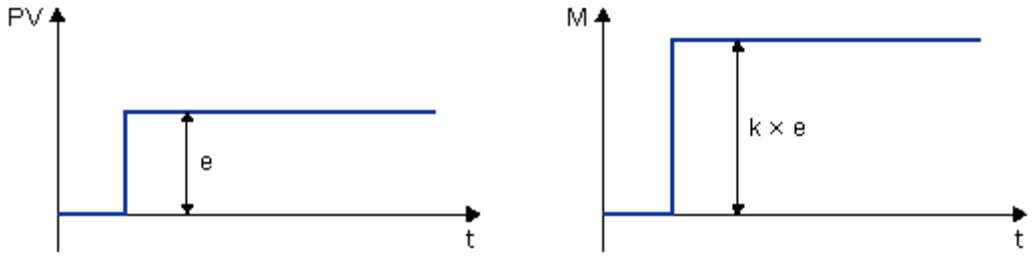
$$M_{Pn} = k_P \times e_n$$

M_{Pn} :Manipulated variable of the P controller at the time n

k_P :Gain of the P controller

e_n: Loop error at the time n

The following picture shows a jump in process value and step response of the controller:



Summary

The P controller has the following characteristics:

It cannot correct faults with the control process > lasting loop error.

It reacts immediately to a change in the process value.

It is stable.

I Controller

An integral-action controller (I controller) changes the manipulated variable M proportional to the loop error and to the time. The I controller works by delayed action. It completely remedies a loop error.

In order to calculate the value of the manipulated variable at a period of time n, the time up until this period of time must be divided into small time slices. The loop errors at the end of each time slice must be added up (integrated) and they are then entered in the calculation.

$$M_{In} = k_I \times (T_S / T_I) \times (e_n + e_{n-1} + e_{n-2} + e_{n-3} + \ldots + e_0) = k_I \times (T_S / T_I) \times e_n + M_{In-1}$$

M_{In}: Manipulated variable of the I controller at the time n

M_{In-1}: Manipulated variable of the I controller at the time n-1; also called integral sum

k_I : Gain of the I controller

T_S: Sampling time, duration of a time slice

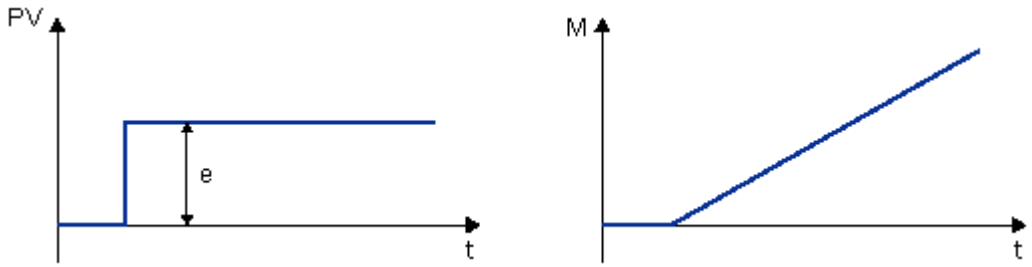
T_I: Integral time: by means of this time, the influence of the integral part is controlled on the manipulated variable, also known as integral-action time

e_n: Loop error at the time n

e_{n-1}: Loop error at the time n-1; etc.

e_0: Loop error at the beginning of the calculations

The following picture shows a jump in process value and step response of the controller:



Summary

The PI controller has the following characteristics:

It sets the process value exactly to the command variable.

By so doing, it tends to oscillate and is unstable.

It requires more time to carry out the control action than the P controller .

PI controller

A PI controller reduces the loop error immediately and will eventually drive the loop error to zero.

$$M_n = M_{Pn} + M_{In} = k_P \times e_n + k_I \times (T_S / T_I) \times e_n + M_{In-1}$$

M_n: Manipulated variable at the time n

M_{Pn}: Proportional part of the manipulated variable

M_{In}: Integral part of the manipulated variable

M_{In-1}: Manipulated variable of the I controller at the time n-1; also called integral sum

k_P : Gain of the P controller

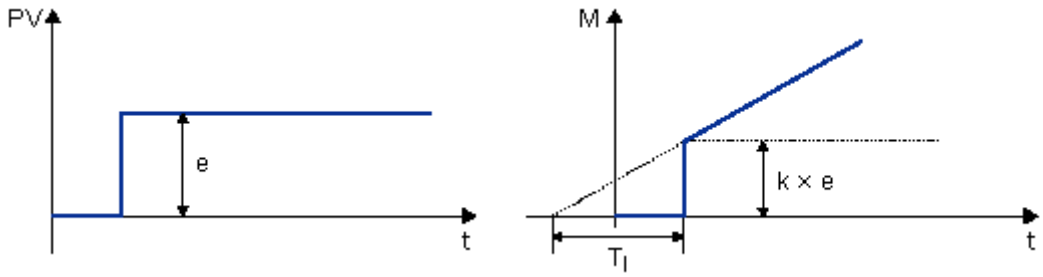
k_I : Gain of the I controller

T_S : Sampling time, duration of a time slice

T_I : Integral time; by means of this time the influence of the integral part is controlled on the manipulated variable, also known as the integral-action time

e_n : Loop error at the time n

The following picture shows a jump in process value and step response of the controller:



Summary

The PI controller has the following characteristics:

The P controller components quickly intercept an occurring loop error.

The I controller components can then remedy the remaining loop error.

The controller components supplement each other so that the PI controller works quickly and precisely.

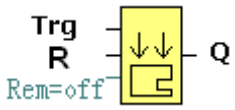
Description of the individual parameters

Controller parameters	Portrayed in x-Messenger	Possible value range in the x-Messenger
Mn Manipulated variable at the time n	Output of the PI controller block	0 to 1,000

kP Gain of the P part kI Gain of the I part	In the x-Messenger, the parameter KC applies as an increase for the I part and the P part of the controller equally. Should you enter KC=0, then the P part of the controller switches off. In this special case, k is automatically set to 1 for the I part. If KC = 0: kP = 0 and kI = 1 If KC <> 0: kP = kI = KC	0.00 to 99.99
Ts Sampling time, duration of a time slice	Fixed	500 ms
TI Integral time	Parameter TI, if you set this parameter to 99:59 min, then you switch off the I part of the controller.	00:01 min to 99.59 min
en Loop error at the time n; generally applies: e = SP – PV	Refer to SP and PV	"
SP	The parameter SP is the set-value assignment w. For this parameter you can use the analog output of a different special function.	-10,000 to +20,000
PV	PV is the process value x and is calculated as follows: PV = (analog value on input * gain) + offset. You can connect the input for example by means of an analog input with a PT100 sensor.	"
	The gain parameter has an effect on PV	0.0 to 10.0
	The offset parameter has an effect on PV	-10,000 to +20,000

	PV is restricted by the parameters Min. and Max.	In each case: -10,000 to +20,000
	The Dir parameter gives the action direction of the controller. Positive means: If set value > process value then the process value is increased; if set value < process value then the process value is reduced. Negative means: If set value > process value then the process value is reduced; if set value < process value then the process value is increased. e.g. heat regulation: if the set value is greater than the process value (room is too cold), the manipulated variable increases the process value.	- or +

7.5.36 Memory write



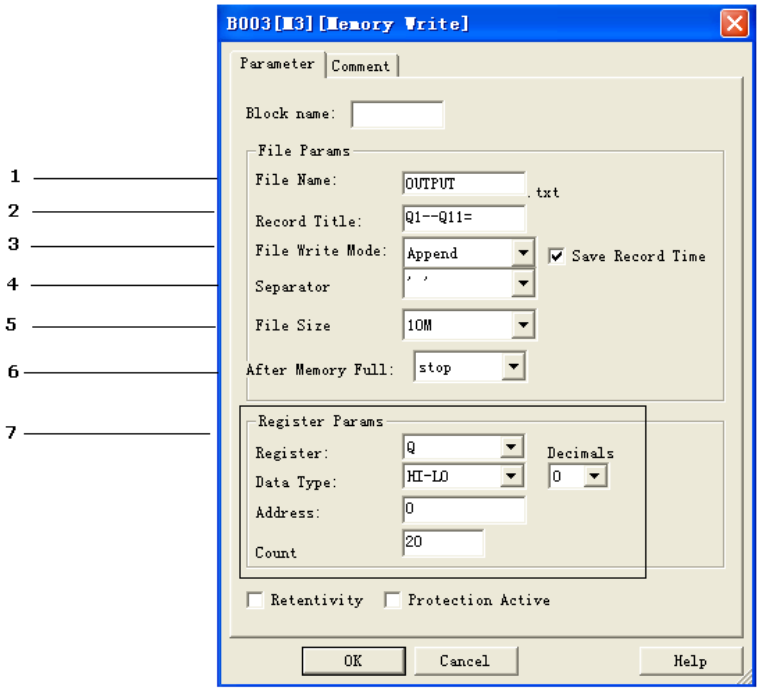
Short Description

Only when there is a low to high trigger at Trg pin, the Memory Write block will be activated and the pre-configured record action will be performed, at the same time the output will switch on if the record action had been done successfully.

Connection	Description
Trg input	Only when there is a low to high trigger at Trg pin, the Memory write Read block will be activated and the pre-configured record

	action will be performed. Each trigger, only write once.
Input **R**	Reset the Memory Write block and set the output to 0 via the R (Reset) input. Reset has priority over Trg
Output **Q**	Q switches on only after Write function had been executed correctly.

Description of Memory write block's property dialog box :



1. File name

Place where you can set the name of the file used to save the registers' data

file in SD card of ELC-MEMORY

2. Record title

Below is an example in the "OUTPUT.TXT"

```
2011-01-30 13:52:25 Q1--Q11=1111000010000000000
2011-01-30 13:52:31 Q1--Q11=1111000010000000000
2011-01-30 13:52:37 Q1--Q11=1111000010000000000
```

The above range circled in red is just pre-set contents in the "Record title" of the Memory write block's

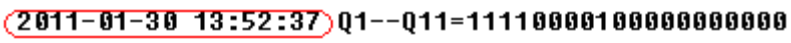
property dialog box.

3. File write mode

Two options available: Option A. Append (This option would be selected if a certain file is already existed in the Mini SD card inserted in ELC -MEMORY)

B . Create (This option shall be chosen, if no any file existed or existed file has different name from that pre-set in the "file name" in the Mini SD card inserted in EXM-MEMORY

If such box has been ticked ,the file content will show the time when the data starts to be recorded.



4. Separator

Such separator shall be required while more than one analog values would be stored and displayed for easier observation and convenient analysis.

5. File Size

It is an option for you to set the size of file to be stored.

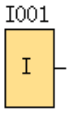
6. After memory Full

Two options can be selected after memory is full (it means the relative file has reached its pre-configured size), one is to over-write and the other is to stop recording.

7. Register params:

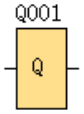
This section is for register's parameters setting. The register includes following sorts:

A. I digital inputs



Name	Address:
I1-I8	0….7
I11-I14	8---15
I21-I24	16…23
…..	……

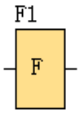
B. Q digital outputs



Name	Address:

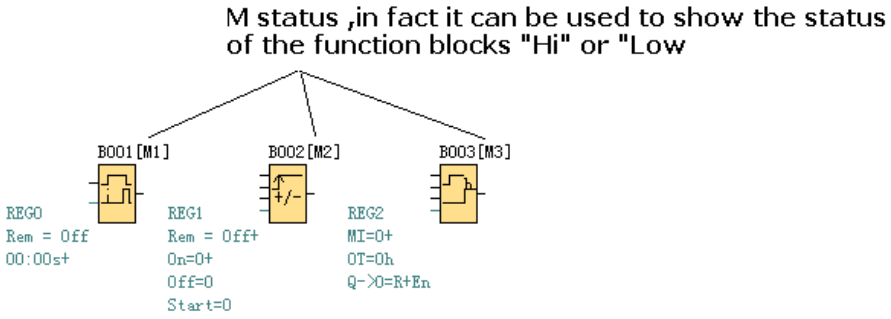
Q1-Q4	0….7
Q11-Q14	8---15
Q21-Q24	16…23
…..	……

C. F digital flag



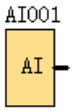
Name	Address:
F1-F64	0….63

D. M



Name	Address:
M1-M512	0….511

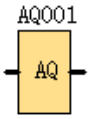
F. AI analog inputs



Name	Address:
AI1-AI8	0….7

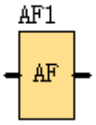
AI11-AI14	8---15
AI21-AI24	16…23
…..	……

G**. AQ analog outputs**



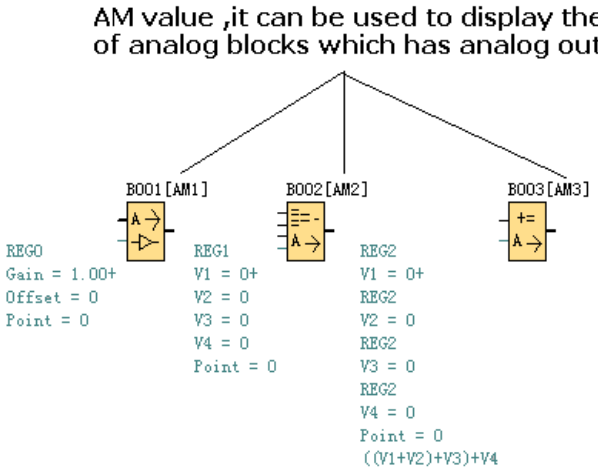
Name	Address:
AQ1-AQ2	0….1
AQ11-AQ12	2---3
AQ21-AQ22	4…5
…..	……

G. AF analog flag



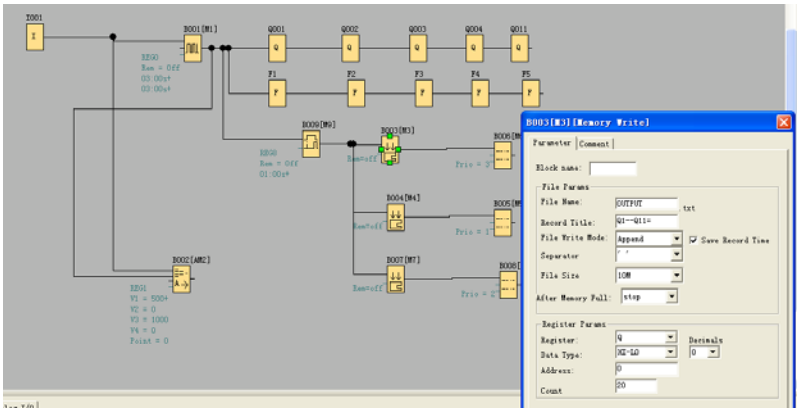
Name	Address:
AF1-AF64	0….63

I. AM



Name	Address:
AM1-AM512	0….511

EXAMPLE:



Please refer the property dialog box of B003, it can record the output status .The start address is from 0 and it must record the 20 outputs with continuous addresses.

And the record file shows below:

2011-01-30 13:52:25 Q1--Q11=11110000100000000000↵
2011-01-30 13:52:31 Q1--Q11=11110000100000000000↵
2011-01-30 13:52:37 Q1--Q11=11110000100000000000↵
2011-01-30 13:52:43 Q1--Q11=11110000100000000000↵
2011-01-30 13:52:49 Q1--Q11=11110000100000000000↵
2011-01-30 13:52:55 Q1--Q11=11110000100000000000↵
2011-01-30 13:53:01 Q1--Q11=11110000100000000000↵

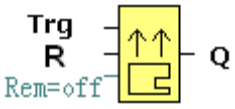
Per the program, every 6 seconds the record will do once, and the Q1, Q2, Q3, Q4, Q11 will be all “ON”. You can see the record file and you’ll see the recording time and the status of the output.

Q1--Q11=11110000100000000000
Q1-Q4 **Q11**

Note: 1.The ELC-MEMORY only can be inserted into the RS232 port (programming port) of EXM series CPU.

2.If this function block is working ,the RS232 port (programming port) will be occupied ,some data will be being transferred , if you want to use the programming port for some purposes (for example download or upload program) , you must make sure the Trg pin of this block keeps at Low status or stop the CPU by panel key.

7.5.37 Memory Read



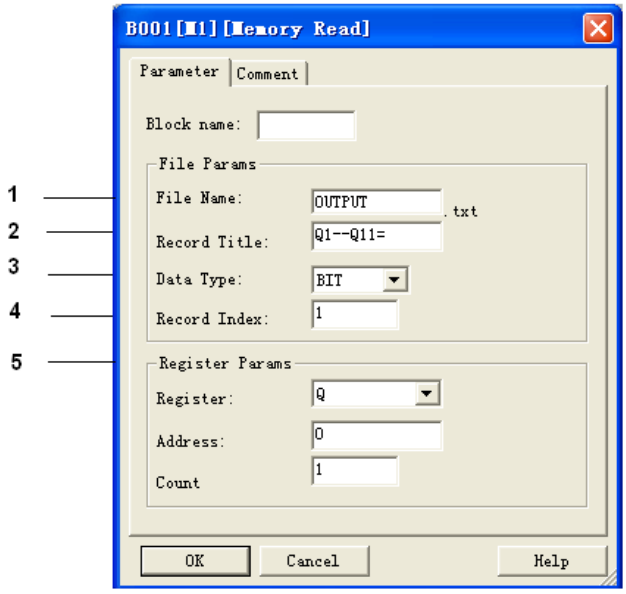
Short Description

Only when there is a low to high trigger at Trg pin, the Memory Read block will be activated once and x-Messenger CPU will read correlative data (bit or short) to set pre-configured register from the file in the SD card of ELC-MEMORY module, at the same time the output will switch on if the read action had been done successfully.

Connection	Description
Trg input	Only when there is a low to high trigger at Trg pin, the Memory Read block will be activated and x-Messenger CPU will read some data (bit or short) to set pre-configured register from the file in the SD card of ELC-MEMORY module. Each trigger, only write once.
Input **R**	Reset the Memory Read block and set the output to 0 via the R

	(Reset) input. Reset has priority over Trg
Output **Q**	Q switches on only after the Read function had been executed correctly, provided.

Description of Memory write block's property dialog box:



1. File name

The name of the file which you want to access is stored in the mini-SD card of the EXM-MEMORY module.

file in SD card of ELC-MEMORY

2. Record Title

Below is an example in the "OUTPUT.TXT"

```
2011-01-30 13:52:25 Q1--Q11=11110000100000000000
2011-01-30 13:52:31 Q1--Q11=11110000100000000000
2011-01-30 13:52:37 Q1--Q11=11110000100000000000
```

3. Data Type:

Two options available: Option A. BIT (0 or 1, this is used to be set the status of Q or F)

Option B . WORD (this is used to be set the value of AQ or AF)

4. Record Index:

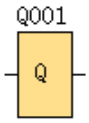
Here is used to set which line the CPU will access via this Memory Read block

4. Register Params

Here is to set the parameters of register, all these registers have "write" property.

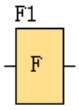
BIT data can be used to set the register “Q” and “F”.

Q: digital outputs



Name	Address:
Q1-Q4	0….7
Q11-Q14	8---15
Q21-Q24	16…23
…..	……

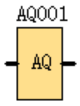
F: digital flag



Name	Address:
F1-F64	0….63

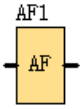
WORD data can be used to set the register “AQ” and “AF”

AQ analog outputs



Name	Address:
AQ1-AQ2	0….1
AQ11-AQ12	2---3
AQ21-AQ22	4…5
…..	……

AF analog flags

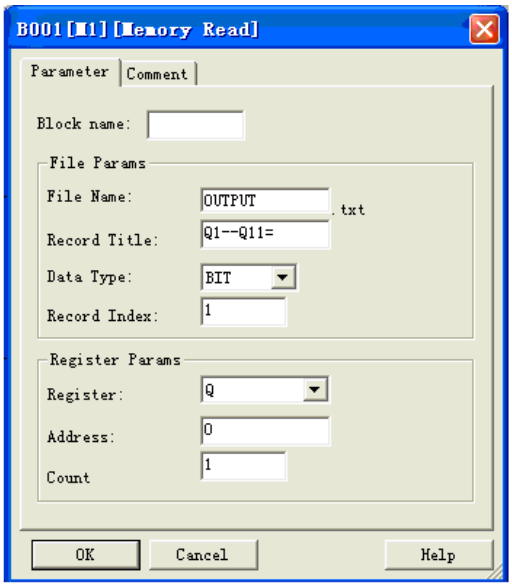


Name	Address:
AF1-AF64	0….63

Count

Here is to set how many register you want to set once.

For example

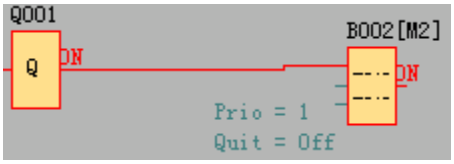


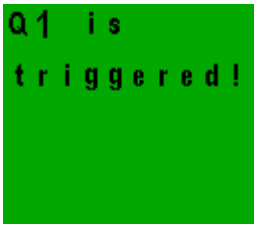
file in SD card of ELC-MEMORY

This bit would be used to set the Q1 status .

```
2011-01-30 13:52:25 Q1--Q11=11110000100000000000
2011-01-30 13:52:31 Q1--Q11=11110000100000000000
2011-01-30 13:52:37 Q1--Q11=11110000100000000000
```

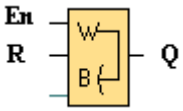
If the Memory Read block had been triggered, the Q1 of ELC-12 CPU will be set “1”.



,


.

7.5.38 Word to Bit

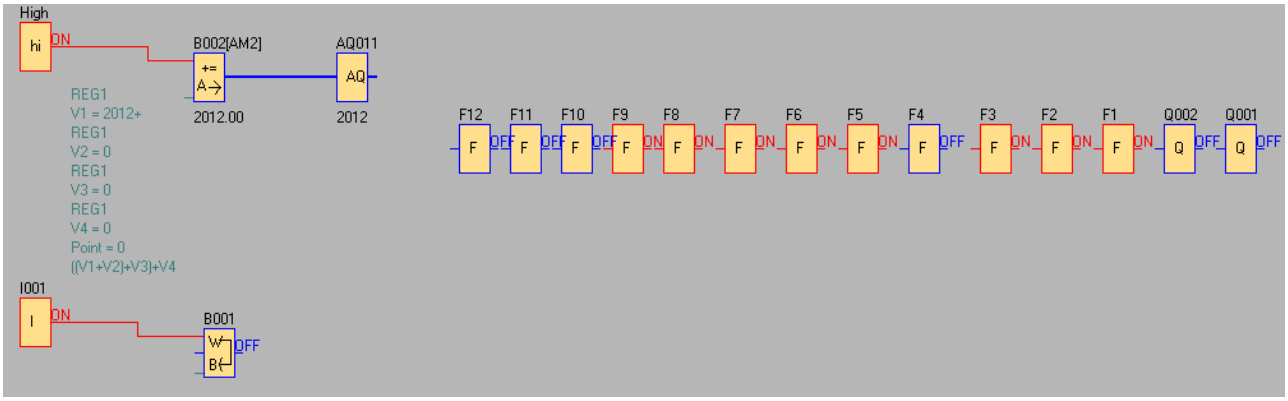


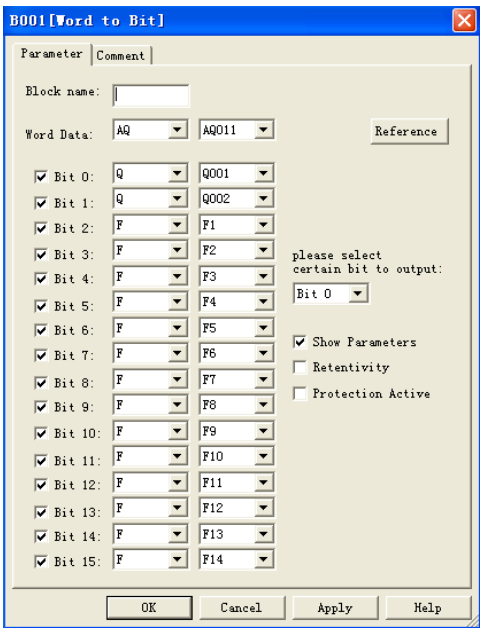
Short description

This special function is used to transfer the word type data (AI, AF or AQ) to 16 bit status (0 or 1)(F or Q)

Connection	Description
Input En	Enable this function.
Input R	Reset output Q with a signal at input R (Reset).
Parameter	Retentivity set (on) = the status is retentive in memory.
Output Q	Q is switched on with a signal at input En, and switched off with a low signal at input En.

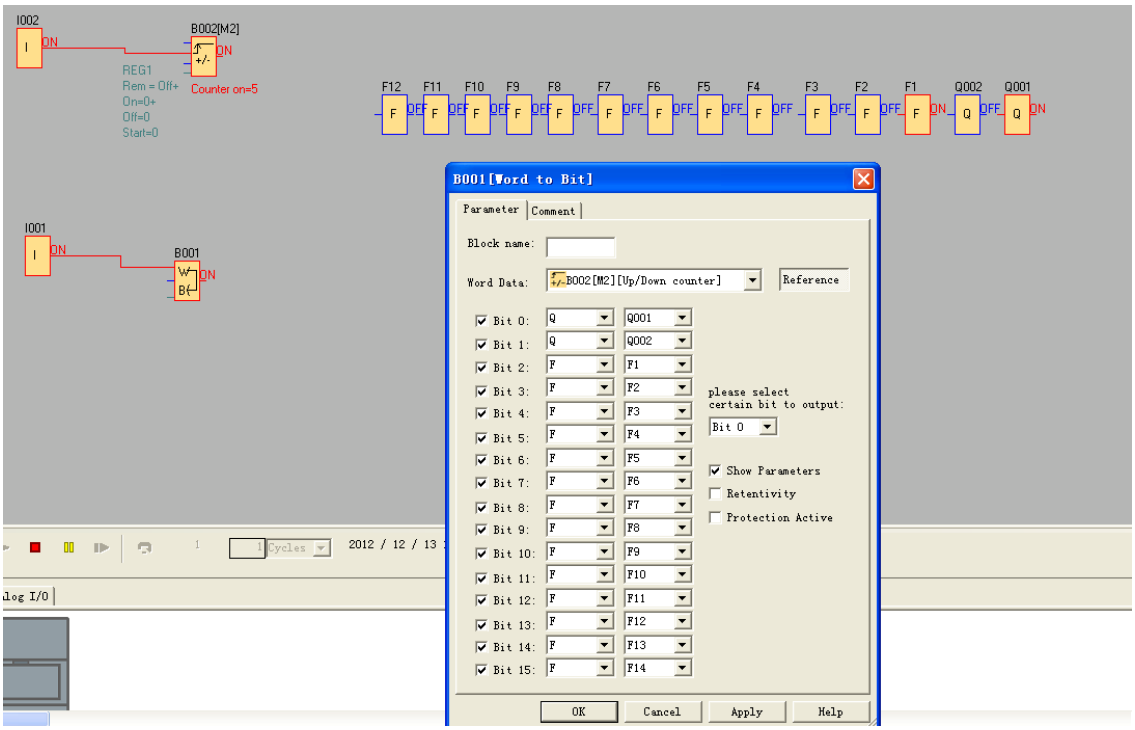
Example1:





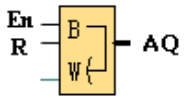
Convert the AQ11 (2012) to Q1,Q2 and F1--F14(0000011111011100)

Example2:



Convert the counter value (5) to Q1,Q2 and F1--F14(0000000000000101)

7.5.39 Bit to Word



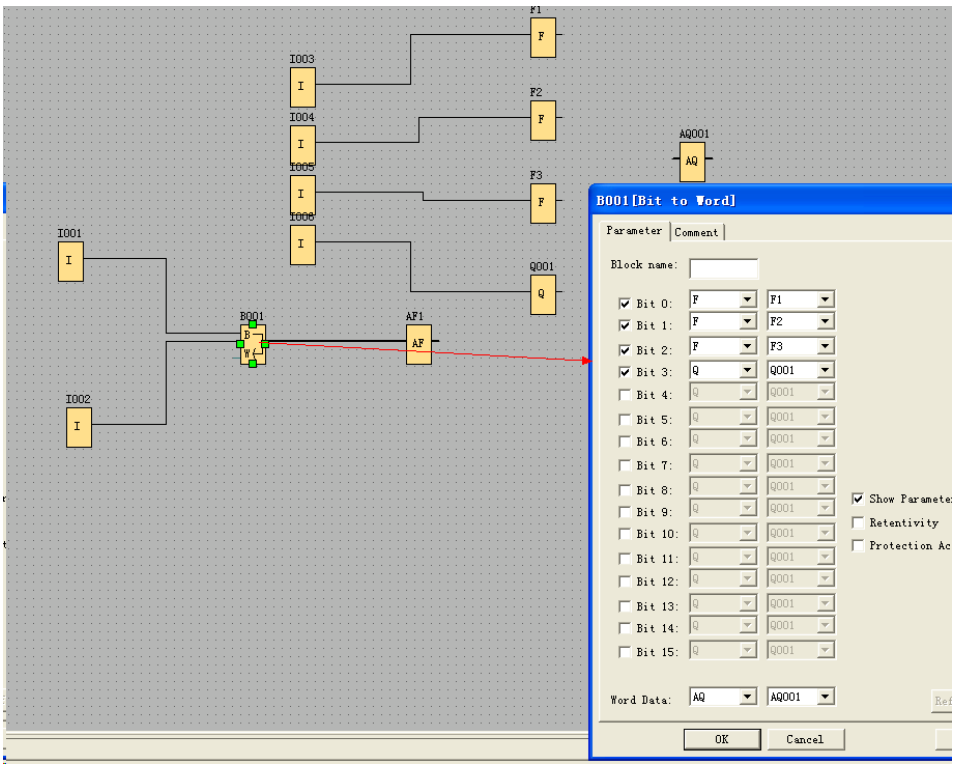
Short description

This special function is used to transfer the 16-Bit status(0 or 1)(F or Q) to word type data (AF or AQ).

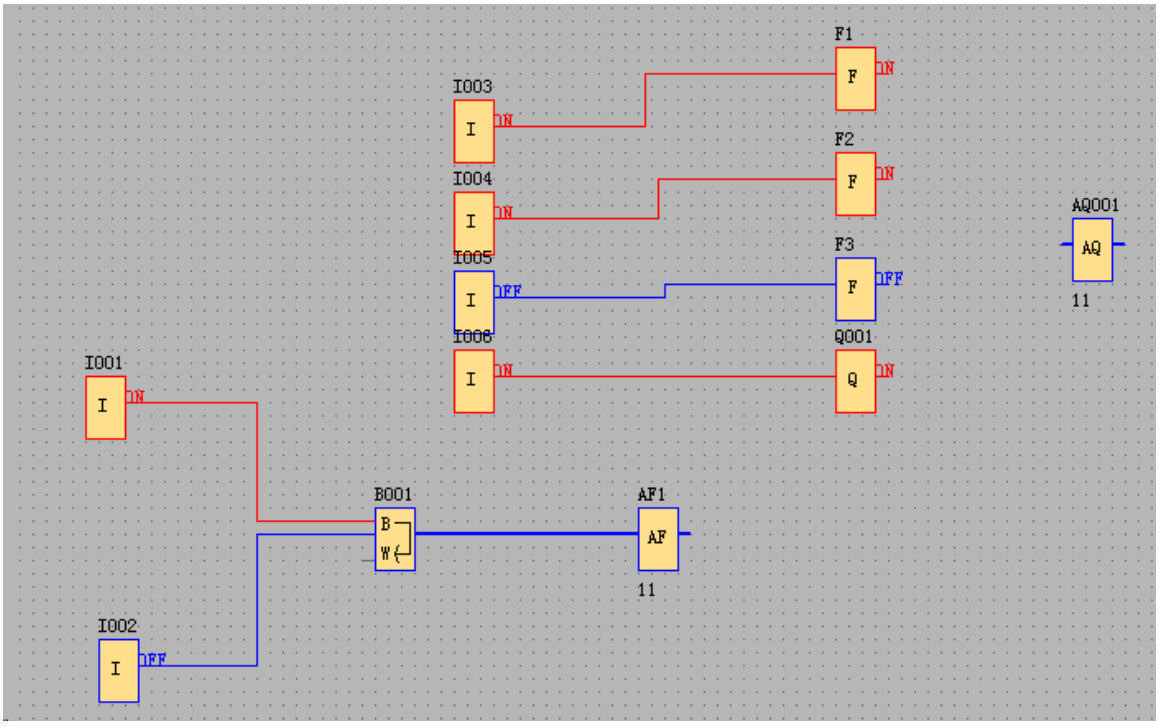
Connection	Description
Input **En**	Enable this function.
Input **R**	Reset output AQ with a signal at input R (Reset).
Parameter	Retentivity set (on) = the value is retentive in memory when power lost.
Output **AQ**	AQ will output the value of the block when En was activated.

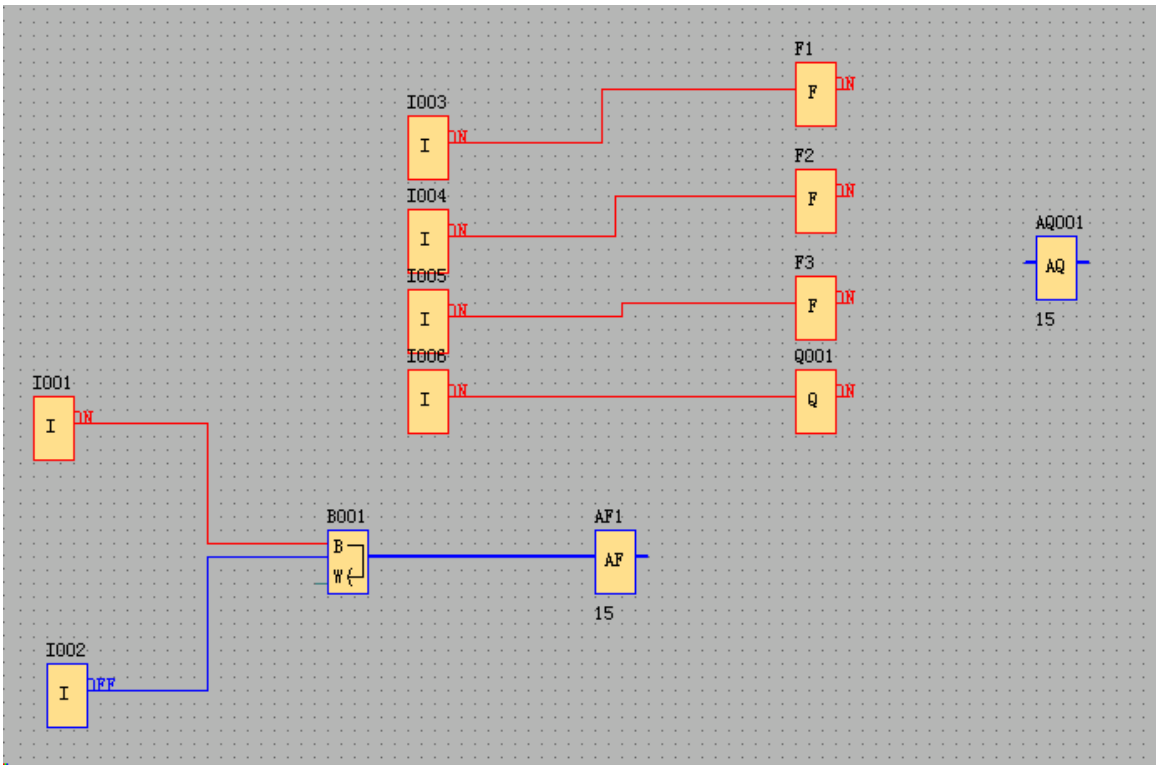
For example

Transfer the F1--F3 and Q1 status to the AQ001. F1 is saved in Bit0, F2 is saved in Bit1,F3 is saved in Bit2,Q1 is saved in Bit3.



F1	F2	F3	Q1	AQ1 value
0	0	0	0	0
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
0	0	1	0	4
1	0	1	0	5
0	1	1	0	6
1	1	1	0	7
0	0	0	1	8
1	0	0	1	9
0	1	0	1	10
1	1	0	1	11
0	0	1	1	12
1	0	1	1	13
0	1	1	1	14
1	1	1	1	15



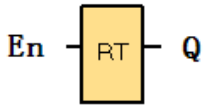


Notes:

1.The Bit4--Bit15 was not ticked, they are all recognized as 0.

2. With such block you can realize to modify one bit of the word register in the slave devices together with the code 06/16 in Modbus network.

7.5.40 Device Reset



Short description

This function block is used to reset the device (Ethernet modem or WIFI modem built-in) in the CPU, if the communication has been timeout already. so it merely can be applied to the CPU with Ethernet module or Wifi module built-in.

Available in below CPUs:

EXM series type:

EXM-12DC-DA-R-N

EXM-12DC-D-R-N

EXM-12DC-DAI-R-N

EXM-12DC-DA-RT-WIFI

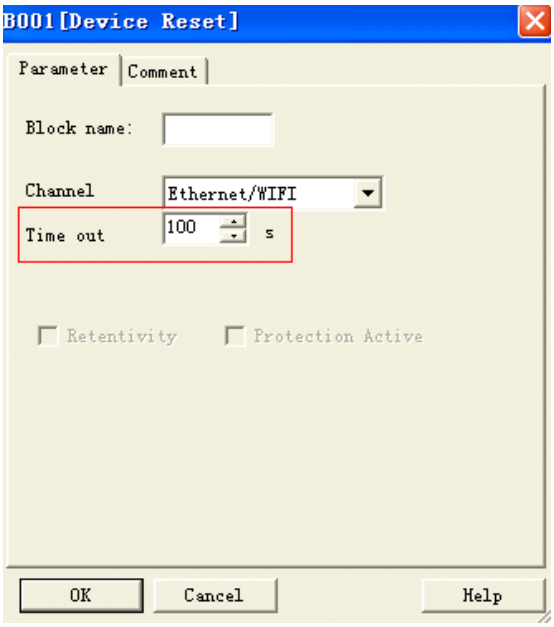
EXM-12DC-DA-RT-GWIFI

Connection	Description
En	Enable the function block if a HI level at En input pin. If En turns from HI to LOW, the function would be disabled.
Parameter	Channel: Ethernet/WIFI Timeout:1—100s
Output	When a HI level at the En pin and the timeout is reached, the output will be HI, and it will be reset when the En is switched.

Description of the function

In order to monitor the communication status of the Ethernet/WIFI to see if it is normal or continuous, sometimes we need reset the Ethernet module or WIFI module built-in in the CPU when the communication has failed or been timeout.

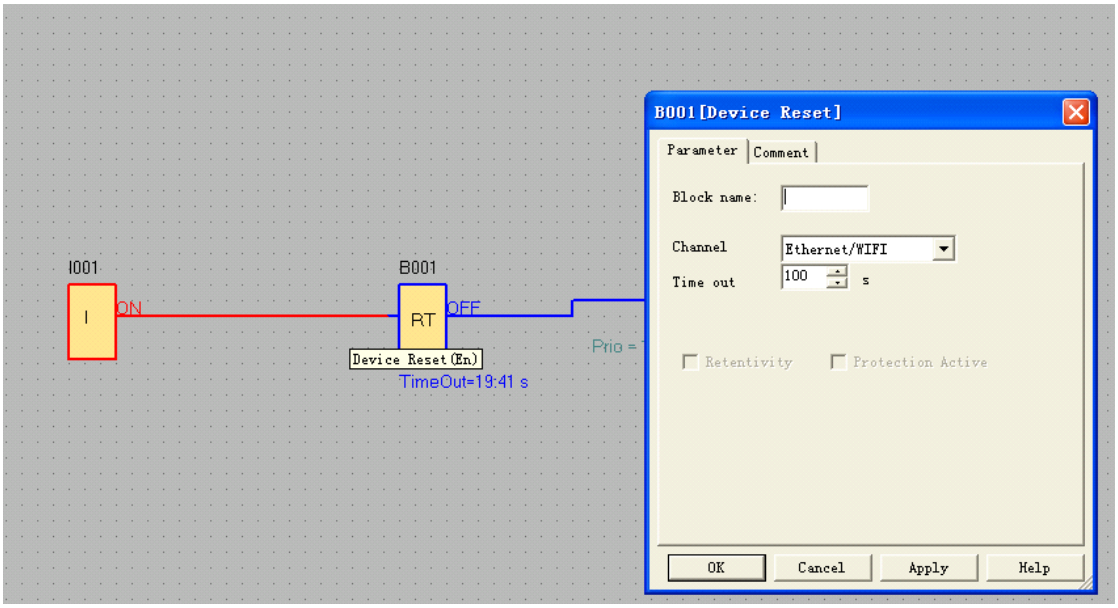
Just one parameter to be set is the timeout as follows:



Here are two examples with detailed description on how to use these blocks in the program.

Example 1

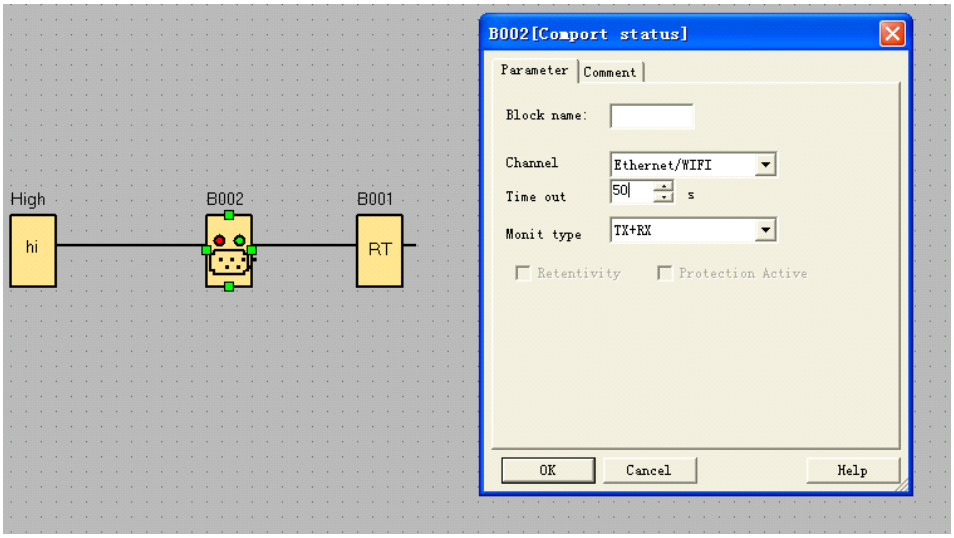
Just as below program shows, after the CPU running, we can push down the digital input1 to enable the function block, and the data transmission would be monitored through the Ethernet/WIFI port , if there is no data transmission through the Ethernet/WIFI port within the timeout 100s, the "Device Reset" function block will output a high signal, and at the same time the Ethernet/WIFI modem will be reset once.



Example2

We also can use such "device reset" block along with the "Com status" function block together in the program,

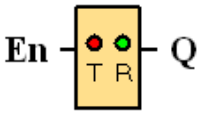
when there is no data transmission through the Ethernet/WIFI port while the timeout period(50s) is reached, the com port status will output HI signal ,and then the Device reset block would be enabled while the timeout period is reached in the device reset block property dialog box.



Note:

Please set the timeout time not less than the modem startup time, and the WIFI module need 5s-10s to start up and establish the connection. Hence, If the timeout period you set is less than 5—10s, and also the "Device Reset" block is enabled when the CPU starts up in 5-10s, CPU will be resetting the Ethernet/WIFI modem before the communication connection has been established successfully. In this case, it can not work normally.

7.5.41 Comport Status



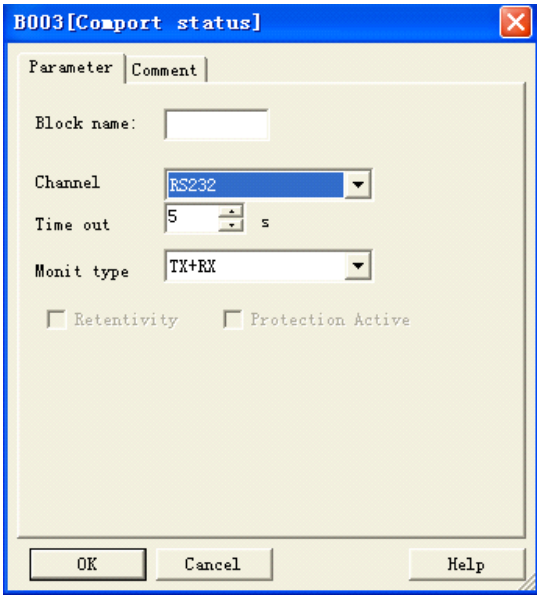
Short description

This function block is used to monitor the communication status of the RS232 (programming port), RS485 port, Ethernet/WIFI port.

With the text message block, we can insert the com port status from such function block for displaying on the LCD.

Connection	Description
En	Enable the function block if a HI level at En input pin and if a trigger from HI to

	LOW, the function would be disabled.
Parameter	Channel: RS232 RS485 Ethernet/WIFI Timeout:1—100s Monitor type: TX RX TX+RX
Output	When a HI level at the En pin and the timeout is reached the output will be HI, and it will be reset when the En is switched.



Parameters

Channel

RS232: This channel is the programming port, it can be used to monitor or display the communication status of the below accessories:

ELC-RS232 cable
ELC-USB cable
PRO-RS485 cable
ELC-MEMORY
ELC-Copier

RS485: This channel is the RS485 port, it can be used to monitor or display the communication status of the below accessories:

EXM-12 Series

EXM-E-RS485

Ethernet/WIFI: This channel is the Ethernet/WIFI port, it can be used to monitor or display the communication status of the LAN port built-in in the CPU:

EXM Series
EXM-12DC-DA-R-N
EXM-12DC-D-R-N
EXM-12DC-DAI-R-N
EXM-12DC-DA-RT-WIFI
EXM-12DC-DA-RT-GWIFI

Timeout 1—100s

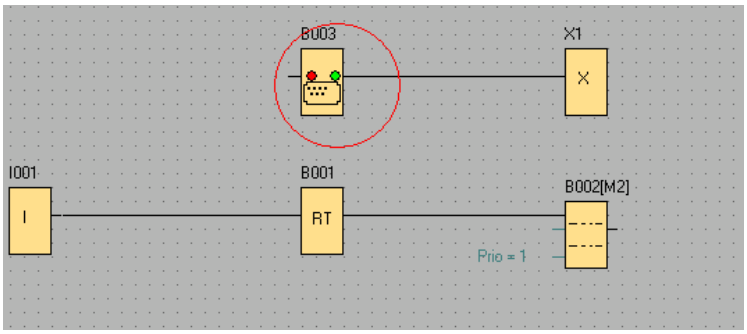
Monitor type
Tx : Data from CPU to external devices.
Rx: Data from external device to CPU
Tx+Rx: Data transmission between external device and CPU.

Description of the function

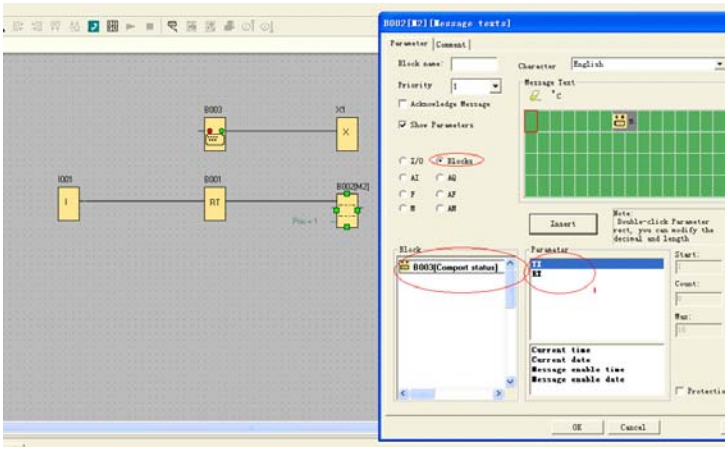
In order to monitor the communication status of the RS232, RS485 and Ethernet port, we can enable such function block, when the timeout period exceeds, such block shall output a high level trigger.

How to insert the com port status to the text message for displaying?

Put the "com port status" into program.

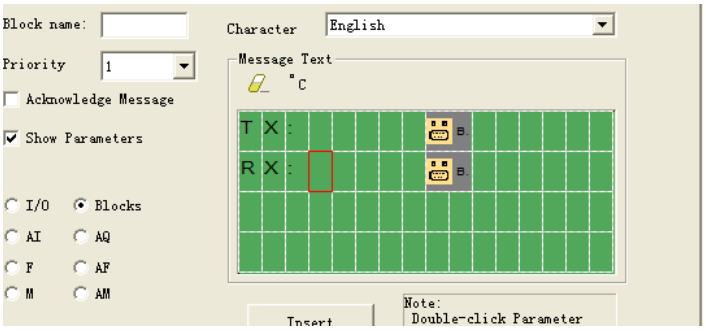


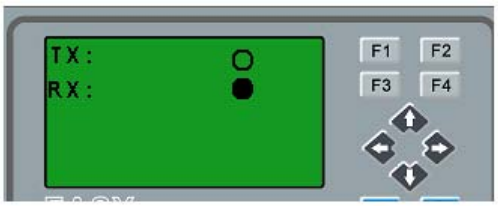
Select "BLOCKS" in the text message property block.



select TX or Rx and insert into the screen.

You can edit the text in the screen, such as TX:,RX:





So, you can view the communication status on the LCD, even if there are no indicators on the ELC-RS232/ELC-USB/PRO-RS485.

If there is data transmission, the status of the com port on the LCD will be flashing.

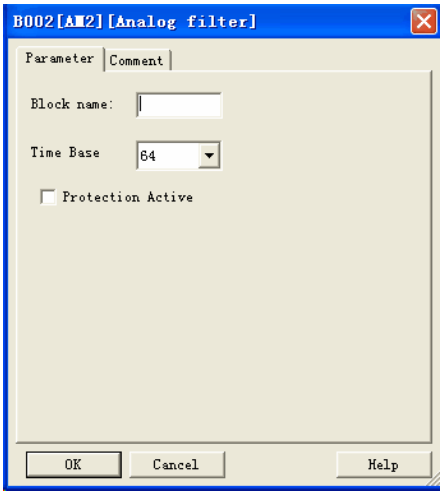
7.5.42 Analog filter

Short Description

Connection	Description
Input **Ax**	Analog Inputs Analog Outputs Analog Flags The block number of a function with analog output
Parameter	Sn (Number of samples): determines how many analog values are sampled within the program cycles that are determined by the set number of samples. x-Messenger samples an analog value within every program cycle. The number of program cycles is equal to the set number of samples. Possible settings: 8, 16, 32, 64, 128, 256
Output **AQ**	AQ outputs an average value of the analog input Ax over the current number of samples, and it is set or reset depending on the analog input and the number of samples. * Analog inputs: 0 to 10 V corresponds with 0 to 1000 (internal value).

Parameter

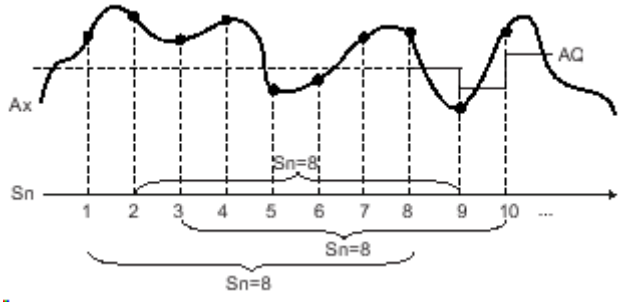
You can set the number of samples to the following values:



After you set the parameter, the analog filter calculates the average value of the samples and assigns this

value to AQ.

Timing diagram



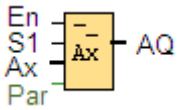
Description of function

The function outputs the average value after sampling the analog input signal according to the set number of samples. This SFB can reduce the error of analog input signal.

Note

There are a maximum of eight analog filter function blocks available for use in the circuit program in eSmsConfig

7.5.43 Max/Min



Short description

The Max/Min function block records the maximum or minimum value.

Connection	Description
Input **En**	The function of input En (Enable) depends on the settings of parameter Mode and the selection of check box "when En = 0, reset Max/Min".
Input **S1**	This input is enabled when you set Mode =2: A positive transition (0 to 1) at input S1 sets the output AQ to the maximum value.. A negative transition (1 to 0) at input S1 sets the output AQ to the minimum value.
Input **Ax**	Input Ax is one of the following analog signals: Analog Inputs

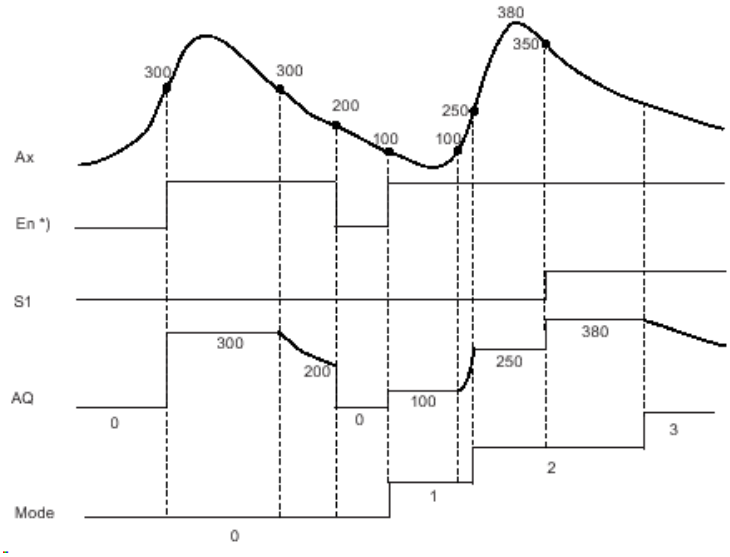
	Analog Outputs Analog flags Block number of a function with analog output
Parameter	Mode Possible settings: 0, 1, 2, 3 Mode = 0: AQ = Min Mode = 1: AQ = Max Mode = 2 and S1= 0 (low): AQ = Min Mode = 2 and S1= 1 (high): AQ = Max Mode = 3 or a block value is referenced: AQ = Ax
Output **AQ**	AQ outputs a minimum, maximum, or actual value depending on the inputs, or is reset to 0 if configured to do so when function is disabled Analog inputs: 0 to 10 V corresponds with 0 to 1000 (internal value).

Parameter Mode

You can set the values for parameter Mode based on the actual values of another already-programmed function:
Analog comparator: Ax - Ay
Analog threshold trigger: Ax
Analog amplifier: Ax
Analog multiplexer: AQ
Analog ramp: AQ
Mathematic instruction: AQ
Up/Down counter: Cnt
Threshold trigger: Fre
Max/Min: Ax
PI controller: AQ
Analog filter : AQ
Average value : AQ

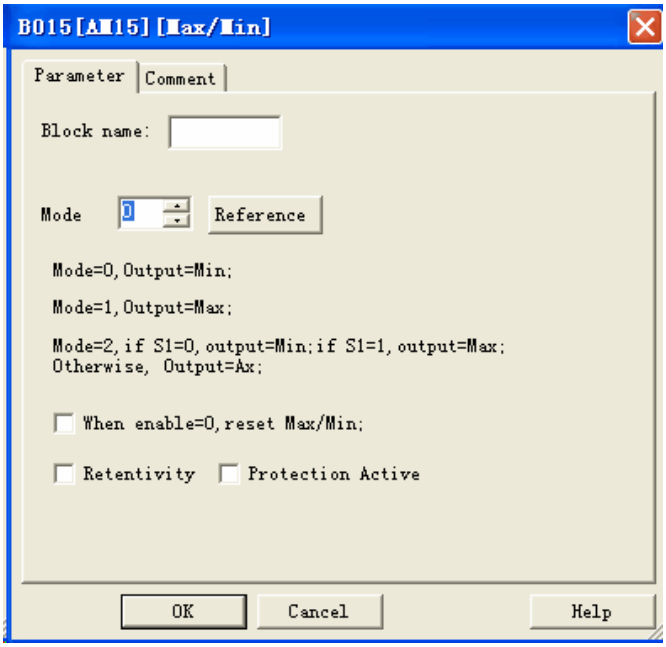
You can select the required function by the block number.

Timing diagram



*) If you select the check box "when En = 0, reset Max/Min"

Description of the function



If you select the check box "when En = 0, reset Max/Min":

En = 0: The function sets the AQ value to 0.

En = 1: The function outputs a value at AQ, depending on the settings of Mode and S1.

If you do not select the check box "when En = 0, reset Max/Min":

En = 0: The function holds the value of AQ at the current value.

En = 1: The function outputs a value at AQ, depending on the settings of Mode and S1.

Mode = 0: The function sets AQ to the minimum value

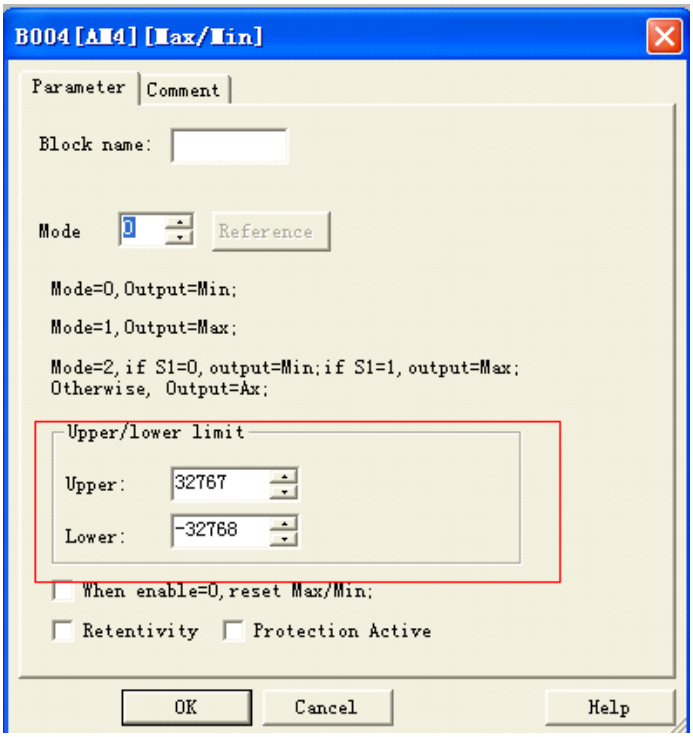
Mode = 1: The function sets AQ to the maximum value

Mode = 2 and S1 = 0: The function sets AQ to the minimum value

Mode = 2 and S1 = 1: The function sets AQ to the maximum value

Mode = 3 or a block value is referenced: The function outputs actual analog input value.

Max/Min block upper/lower function



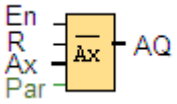
In the dialog box of Max/Min block, there is a upper/lower limit setting, when the block output the AQ value is less than the lower value, the AQ shall be equal to the Lower value; While the block output the AQ value is more than the upper value, the AQ shall be equal to the upper value.

If someone wants to use the upper/lower limitation for other function blocks. such upper/lower limit function can be used, then this block can be referenced as other blocks parameters when programming.

Here is an example:

Someone wants to use the panel key to change the on-delay parameters for 1s—10s in the text message block, if the value which user set exceeds such range, then it will crush the machine, hence we must add the upper/lower limitation in the program to avoid such trouble.

7.5.44 Average value



Short description

The average value function samples the analog input signal during configured time period and outputs the average value at AQ

Connection	Description
Input **En**	A positive edge (0 to 1 transition) at input En (Enable) sets the output AQ to the average value of input Ax after the configured time. A negative edge (1 to 0 transition) holds the output at its last calculated value.
Input **R**	A positive edge (0 to 1 transition) at input R (Reset) resets the output AQ to 0.
Input **Ax**	Input Ax is one of the following analog signals: Analog Inputs Analog Outputs Analog Flags The block number of a function with analog output
Parameter	St (Sampling time): You can set it to Seconds, Days, Hours or Minutes. Range of values: If St = Seconds: 1 to 59 If St = Days: 1 to 365 If St = Hours: 1 to 23 If St = Minutes: 1 to 59 Sn (Number of samples): Range of values: If St = Seconds: 1 to St*100 If St = Days: 1 to 32767 If St = Hours: 1 to 32767 If St = Minutes and St ≤ 5 minutes: 1 to St*6000 If St = Minutes and St ≥ 6 minutes: 1 to 32767

Output AQ

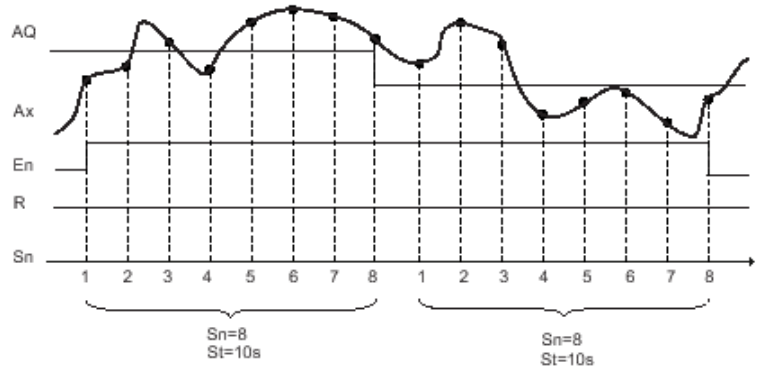
AQ outputs the average value over the specified time of sampling.

* Analog Inputs: 0 to 10 V corresponds with 0 to 1000 (internal value).

Parameter St and Sn

Parameter St represents the sampling time and parameter Sn represents the number of samples.

Timing diagram



Description of the function

When En = 1, the average value function calculates the average value of the samples during the configured time interval. At the end of the sampling time, this function sets output AQ to this calculated average value. When En = 0, the calculation stops, and AQ retains the last calculated value. When R = 0, AQ is reset to 0.

7.5.45 Astronomical clock

Short description

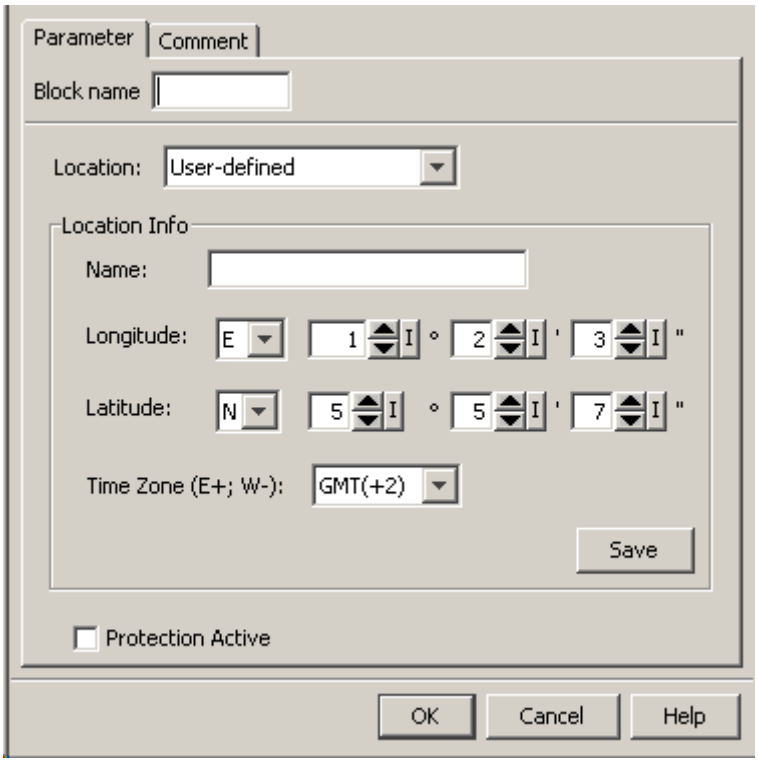
The astronomical clock SFB is used to set an output high between sunrise and sunset based on the local time at the geographical location of the x-Messenger devices. The output status of this function block also depends on the configuration of summer time/wintertime conversion.

Connection Description

Output Q

Q is set to hi when sunrise time is reached. It holds this state until sunset time is reached.

Parameter

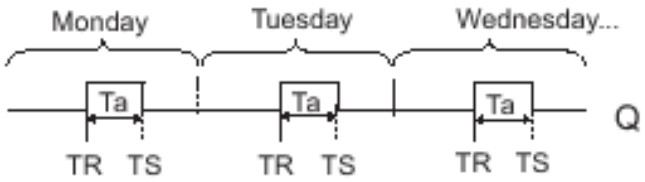


In the astronomical clock dialog, you can select the location of the x-Messenger device. You can select one of following pre-defined time zone locations:

Beijing
Berlin
London
Rome
Moscow
Tokyo
Washington
Ankara
Madrid
Amsterdam

If you select one of these locations, eSmsConfig uses the latitude, longitude, and time zone of your selection. Alternatively, you can configure a specific latitude, longitude, and time zone for your location, and provide a name for this custom location.
Based on the location and time zone, x-Messenger calculates the absolute sunrise and sunset time for the current day. The block also takes summer time/winter time into consideration, if it is configured on the computer where eSmsCofig is installed. To do such configuration, you should select check box of "Automatically adjust clock for daylight for saving changes" in the "Date and Time Properties" dialog.

Timing diagram



Description of function

The function calculates the value at the input and sets or resets Q depending on the sunrise time and sunset time at the configured location and time zone of the module.

7.5.46 Stopwatch

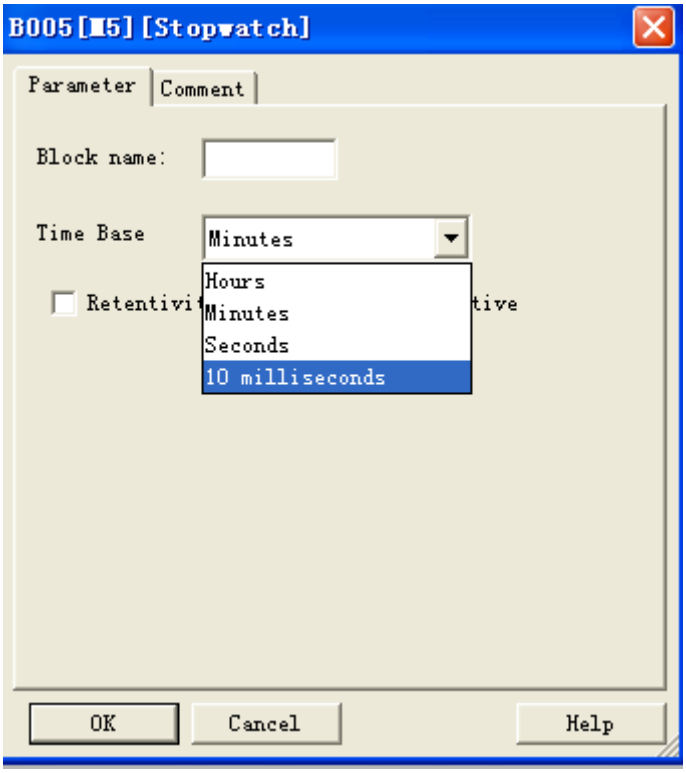
Short description

The stopwatch records the time elapsed since it was enabled.

Connection	Description
Input **En**	En (Enable) is the monitoring input. x-Messenger sets the current elapsed time to 0 and begins counting elapsed time when En transitions from 0 to 1. When En transitions from 1 to 0, the elapsed time is frozen.
Input **Lap**	A positive edge (0 to 1 transition) at input Lap pauses the stopwatch, and sets output to lap time. A negative edge (1 to 0 transition) at input Lap resumes the stopwatch, and set the output to current elapsed time..
Input **R**	A signal at input R (Reset) clears the current elapsed time and lap time.
Parameter	Time base for elapsed time, which you can set to hours, minutes, seconds, or 1/100ths of seconds.
Output **AQ**	The output AQ outputs value of the current elapsed time when it is a negative edge (1 to 0 transition) at the input Lap, and outputs value of the Lap time when it is a positive edge (0 to 1 transition) at the input Lap. A positive edge (0 to 1 transition) resets the value at output AQ to 0.

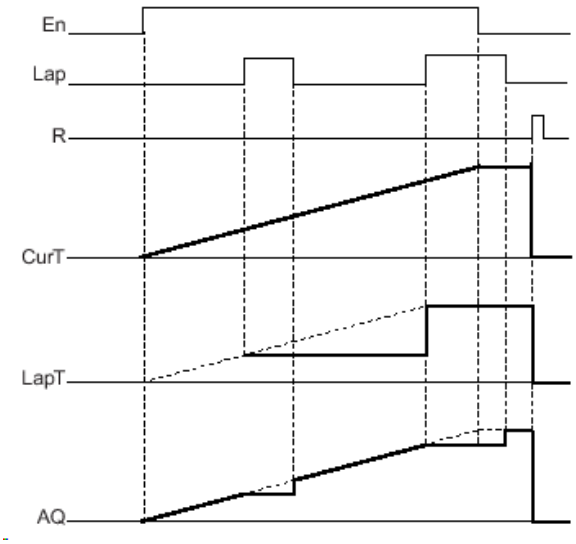
Parameters Time base

You can configure the time base for the analog output:



The time base for the elapsed time can be in hours, minutes, seconds, or 1/100ths of seconds (units of 10 milliseconds). The smallest time base, and therefore the resolution, is 10 milliseconds, or 1/100ths of seconds.

Timing diagram



Description of the function

When En = 1, the current time increases.

When En = 0, the current time counting pauses.

When En = 1 and Lap = 0, the output AQ outputs the value of the current elapsed time.

When En = 1 and Lap = 1, the current time continue increasing, but the output AQ outputs the value of the Lap time.

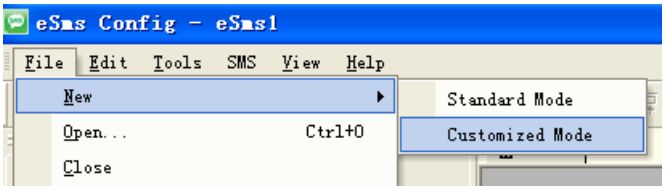
When En = 0 and Lap =1, the output AQ outputs the value of the Lap time.

When En = 0 and Lap = 0, the output AQ outputs the value of the latest current time.

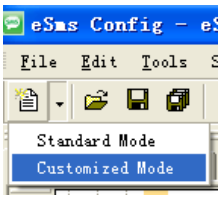
When R = 1, both the current time and the Lap time are reset.

7.6 Enter into "Customized mode"

Click File->New->Customized Mode

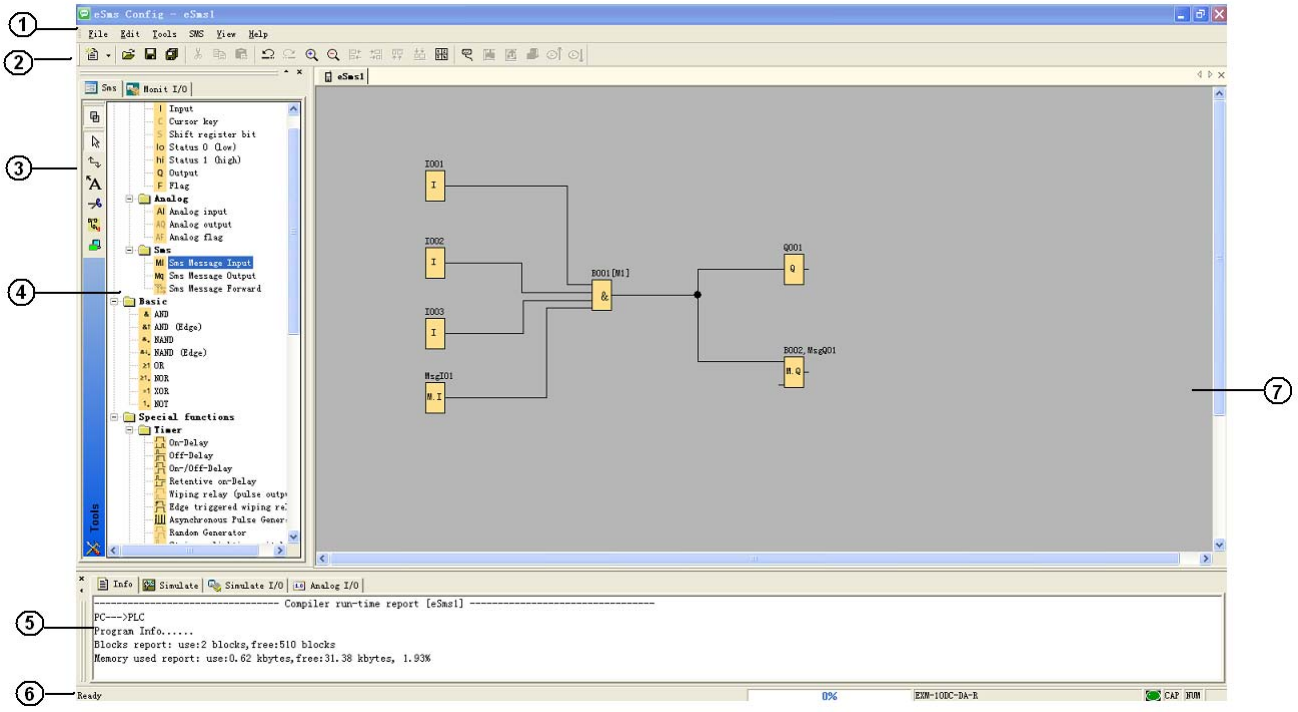


or



You now see the complete user interface of eSmsConfig.exe under customized mode. The programming interface for creating your circuit programs occupies the greater part of the screen. The icons and logical links of the circuit program are arranged on this programming interface.

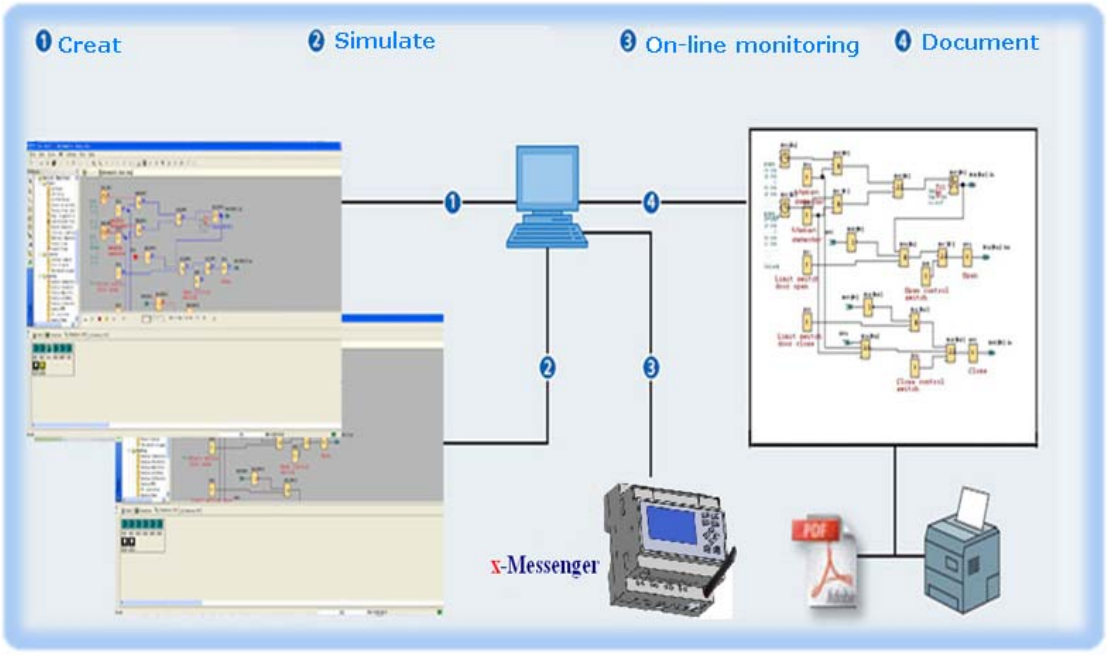
To help you to maintain an overview of large circuit programs, the right side and the bottom of the programming interface contains scroll bars, which you can use for vertical and horizontal scrolling of the circuit program.



1. Menu bar
2. Standard Toolbar
3. Programming Toolbar
4. Reference material (Function block list)
5. Info box (Display memory Info, IO status and analog IO values under simulation/monitoring mode)
6. Status bar (Including current operation, current CPU model and the communication status)
7. Programming Interface

Notes: For the detailed operation, please refer to Chapter 10 and Chapter 11 of this part.

7.7 Main Functions



1. Edition function

The main function of eSmsConfig is programming for x-Messenger. By using the Logical Function Edition window of eSmsConfig, you can create and edit your desired x-Messenger programs using various function blocks of x-Messenger and can also perform file operations such as save, print, program management etc.

2. Simulation operation function

After the program is edited, you can view the program operation result on the computer and conveniently check if the said program meets your control requirements. Here eSmsConfig provides you with a completely new off-line test function, through which you can debug the program without installing the x-Messenger on site. With this function, many inconvenience of the site test can be avoided.

3. Real-time monitoring

eSmsConfig has a Real-Time Monitoring window. You can view the process of the control system and the running conditions of all x-Messenger and control remote x-Messenger, by connecting the x-Messenger communication port (RS232,USB, Ethernet optional) to the computer you can view the process of the control system.

4. Document

The program circuit can be saved and printed. The analog values also can be saved in one excel file .

7.8 Operation Instructions of Customized Mode

7.8.1 Menu Bar

When eSmsConfig is used to edit x-Messenger programs under customized mode, some basic operations including files management, opening and closing of the Tool Bar and Status Bar access to Help information are completed by using pull-down menu under File, Edit, Tools, SMS, View and Help. The Instruction Function list of eSmsConfig is characterized by its flexibility and variation according to the main selection.
It can be changed according to the current operation for convenience of your specific operations.

7.8.1.1 File

The instruction is mainly used for file management, including creation, opening, saving and printing of files.

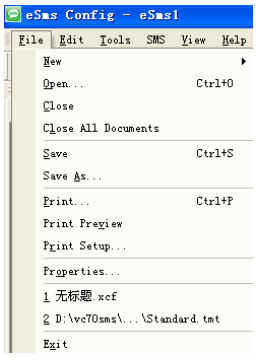


Fig. 10.1 File Menu

Instruction Name	Function
New	Open a new file
Open	Open an old file
Close	Close the current active Window
Close All Documents	Close all the current active Windows
Save	Save a file
Save As	Save current file to a new path and a new file
Print	Print a file
Print Preview	Preview the file printing result
Print Setup	Setup printing format
Property	File property(page size &model select)

Exit	Exit the eSmsConfig

7.8.1.2 Edit

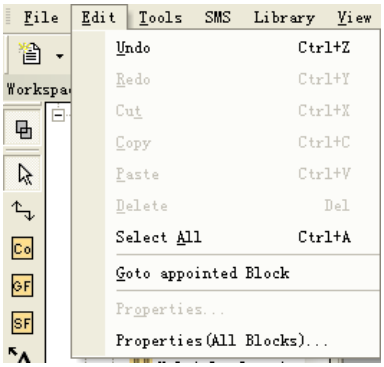


Fig. 10.2 Edit Menu

※ Undo: Undo the previous step operation and support consecutive operations.

※ Redo: Recover the contents undone by the previous step of operation and support consecutive operations.

※ Cut: Cut the contents in the area highlighted with the cursor.

※ Copy: Copy the contents highlighted with the cursor.

※ Paste: Paste the contents cut or copied.

※ Delete: Delete various graphic components.

※ Select All: Select all the contents in the current window editing box and setup the label.

※ Goto Apponited block: Goto the apponited block in the program interface.

※ Property: open the property box of the apponited block

※ Properties (all blocks): Open all the property boxes of the selected blocks.

※ Phonebook: Add/Delete phone number into phonebook Refer to the chapter 6.5.2 .

7.8.1.3 Tools

This instruction is mainly used for reading program from x-Messenger, writing program to x-Messenger, diagnosis the communication situation of x-Messenger, program management and simulation and so on. The pull down menu of Tools is shown as the following:

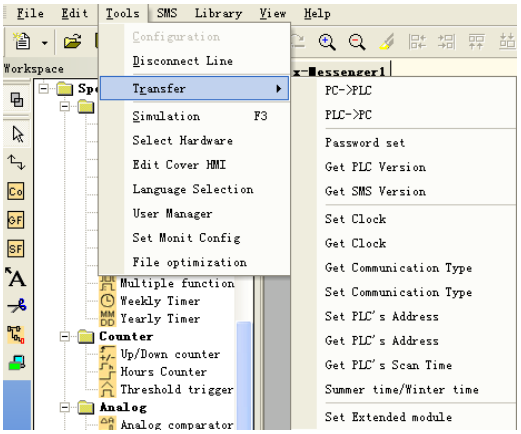


Fig. 10.3 Tools Menu

※ Configuration: Select and open the Com port.

※ Disconnect Line: Cancel the connection of PC and x-Messenger.

※ Transfer: Transfer the following data between PC and x-Messenger.

PC-> PLC: Download the program to x-Messenger

PLC->PC: Upload the program from x-Messenger.

Password set: Set Password protection to x-Messenger

Get PLC Version: Get the current x-Messenger hardware version

Set Clock: Set RTC for x-Messenger

Get Clock: Get RTC from x-Messenger

Get Communication Type: Get current communication type

Set Communication Type: Set communication type for current x-Messenger

Set PLC's address: Set the current x-Messenger address

Get PLC's address: Get the address of current x-Messenger

Get PLC's scan time: Get the scan period of the x-Messenger for current program

Summer time/Winter time: Activate/disable the conversion of the summer/ winter time

Set Extended module: Activate/disable the expansion port of x-Messenger

※Simulation: simulate the x-Messenger program.

※ Select Hardware: Select the model of x-Messenger for programming.

※ Edit Cover HMI: Customers are allowed to edit the first page of the HMI by this menu.

※ User manger: File management, program can be protected with different priorities.

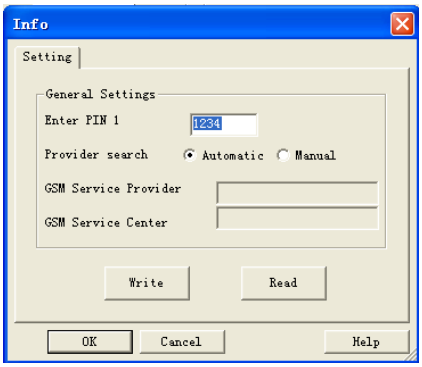
※ Set monit config: select elements for monitoring or saving with Excel file.

7.8.1.4 SMS

The instruction is mainly used for SMS items. The pull down menu is as the following:

Fig. 10.4 SMS Menu

※ General Settings: set PIN code and gsm provider selected

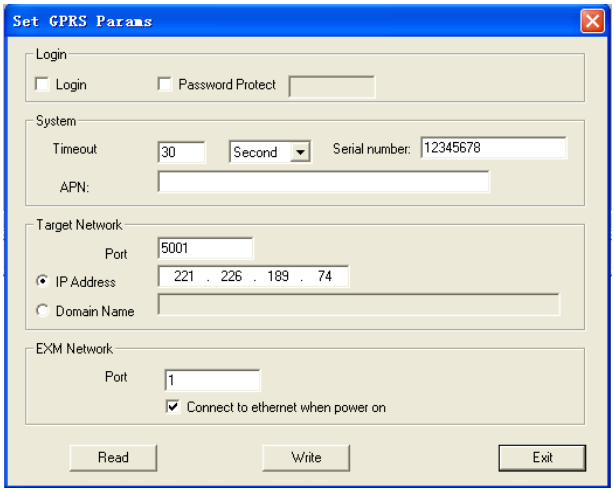


Generally, you are not required to fill out the GSM provider, because the x-Messenger unit can automatically search it. But the GSM servers centre number need manually input and the x-Messenger also can save it. The SIM card can be protected with a PIN code just like for normal cell phone use. The PIN request is activated and the PIN code is inputted in the required field. This concerns PIN1. Further information can be obtained from the SIM card manual. Likewise the process of unblocking the SIM card after three incorrect inputs of PIN1 is described in the SIM manual. In order to do this, the SIM card must be removed from the x-Messenger and inserted into a mobile phone. Now the card can be unblocked according to the details of the network providers.

Note: 1.The x-Messenger unit do not check the PIN code you set if the SIM card without PIN code protection.

2. The x-Messenger unit shall not log-in the GSM network unless the correct PIN code inputted if the PIN request of SIM card is activated

※ Set GPRS Params: set the communication parameters if you want to establish the connection between x-Messenger and the PC via GPRS.



7.8.1.5 View

This instruction is to display the status bar, workspace and the Information window and so on. The pull down menu is shown as the following:

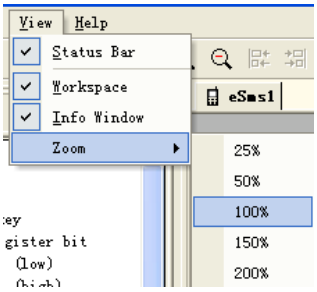


Fig. 10.5 View Menu

※ Status bar: state bar displaying instruction

※ Workspace: workspace displaying instruction

※ Info Window: Info window displaying instruction

※ Zoom: window proportion displaying instruction. There are four different sizes of the windows for the user to select.

7.8.1.6 Help

※ Content Index: Help index and detailed contents

※ About eSmsConfig

7.8.2 Toolbar

The icons of the standard toolbar provide quick access to commands that are also available on the menu.

Standard Toolbar			
	New		Zoom In
	Open		Zoom Out
	Save		Align Left
	Save All		Align Right
	Cut		Align Top
	Copy		Align Bottom
	Paste		Page Layout Tab
	Undo		Open COM port
	Redo		Download(PC-> x-Messenger)
	On-line monitor		Upload(x-Messenger-> PC)
	Get RTC from x-Messenger		Set RTC to x-Messenger

7.8.3 Programming Toolbar

The programming toolbar contains integral icons for creating, editing and testing programs. Each one of these tools represents a programming mode, in which mouse operations have different effects.

The editing tools are not available as menu commands.

	Catalog of the elements of a circuit program open / close
	Selection Tool

	Text Tool
	Cut/Join
	Connector Tool
	Constants and Terminals
	Basic functions
	Special functions
	Simulation
	On-line test

Selection Tool

You can use the selection tool to select and move blocks, text and connecting lines. You can select objects individually with a left-click; you can select multiple objects with [Ctrl]+Click, or you can use the mouse as a "lasso" to surround objects with a rectangle and capture them as a selection.
You can call the selection tool in any other tool by pressing the [ESC] key or by clicking on the icon in the programming toolbar.

Text Tool

This tool is used to insert or edit user-defined text objects in the programming interface. You can specify the font type, font size and font color for each individual label.
Text figures can be set in Wrap Text format. You can adjust the size of a text figure typically by dragging the rectangle handles.

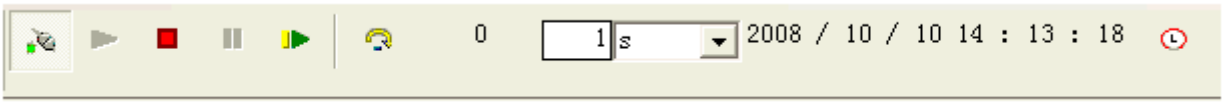
Cut/Join

This tool is used to cut and join connections between blocks. To cut a connection, left-click to select the relevant line while the Cut/Join tool is active. The connection is replaced at the blocks by a reference to the partner block. The reference is labeled with the page number, block number and the I/O of the partner block.

7.8.4 Simulation Tool and status window

A toolbox pops up when you open the simulation mode. It contains:

- Icons (e.g. switches) for operator control of the inputs .
- An icon for the simulation of a power failure, for testing the switching response with reference to retentivity characteristics after power failure.
- Icons (e.g. bulbs) for monitoring outputs .
- Simulation control icons and
- Time control icons.

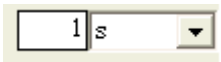
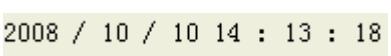


Simulation control icons

	Start simulation
	Stop simulation
	Hold simulation (pause)

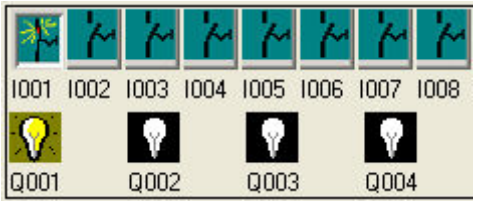
Time control

If you have programmed a time-sensitive circuit, you should use the time control to monitor the reaction of your circuit program.

	Start simulation for a specific time or number of cycles. Set the period and the number of cycles using the following icons.
	Setting the period and the time base for a time limited simulation or setting a specific number of cycles
	Display of the current time in eSmsConfig

	Modification of the current time in eSmsConfig

Status display



Layout of inputs

The inputs are displayed in the form of key or switch icons. The name of the input is displayed below the icon. An open input represents an inactive switch. When you click on the icon, it is indicated active and the switch is shown in closed state.

→ Icon for pushbutton I1, not actuated → open input

→ Icon for pushbutton I1, actuated → closed input

→ Icon for pushbutton I2, not actuated → open input

→ Icon for pushbutton I2, actuated → closed input

Layout of the outputs

The status of an output is indicated by a light or dark bulb icon. The name of the output in your circuit program is displayed below this icon.

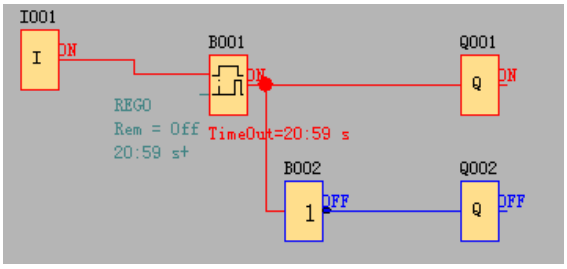
→ Status display of output Q1 → Output switched off

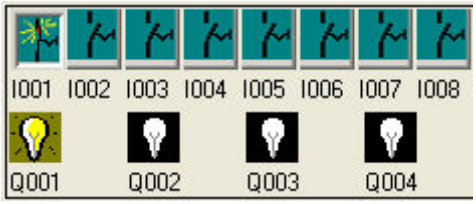
→ Status display of output Q1 → Output switched on

The output status only indicates the status as such. Here, you cannot switch an output by clicking on an icon. When your circuit program switches an output, the indicator lamp is active; when the output is switched off, the indicator lamp is also switched off.

Prerequisite: The display of signal states and process variables is enabled under **Tools** → **Simulation**.

The colored indication lets you identify the "1" or "0" status of a connecting line. Default color of connecting lines carrying a "1" signal is red. Default color of connecting lines carrying a "0" signal is blue.





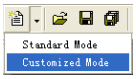
7.9 Basic Operation

This chapter will tell you how to write logic function graph Program with eSmsConfig, how to simulate the Program you write with eSmsConfig, how to communicate between PC and x-Messenger with eSmsConfig, how to copy system document of x-Messenger with eSmsConfig, and how to complete the update of application and system Program code. If you want to write a function graph Program, first of all, it's necessary to start an empty document, and then put the function block into editing box. First set the property of every function block, then link every function block according to logic controlling relation, thereby complete the protracting of a logic function graph. In addition, in order to help the users confirm if the function graph accord with the prospective controlling result, eSmsConfig also provides most intuitionist function of simulation. You can get the moving result of the program through simulation of the function graph.

7.9.1 Open File

7.9.1.1 Open New File

Operation method:

To open a new file, click 'New-> Customized mode' option of menu 'File', click once with left button of mouse, or click 

once in toolbar. As shown in the following fig.

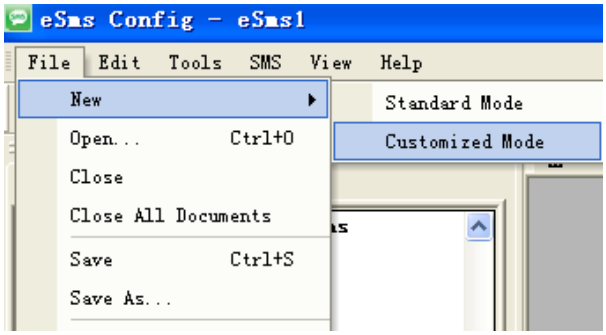


Fig.7. 9.1 Open New Document

Notes: An option Window of outside-meet extended module will appear before a new document opened.

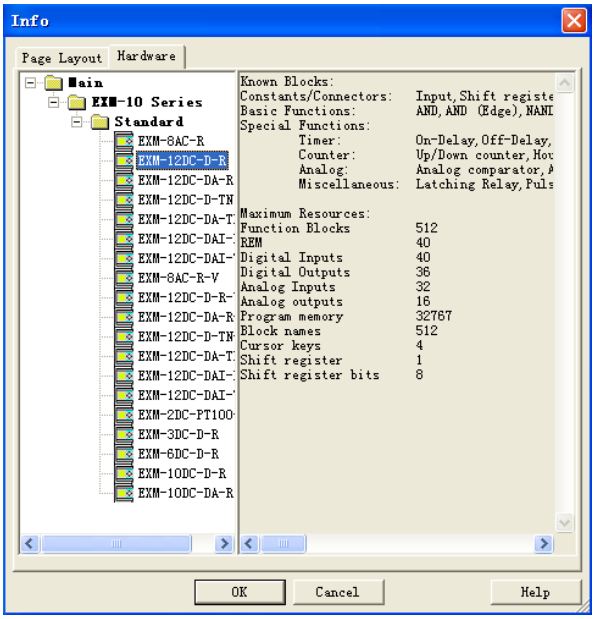


Fig.7. 9.2 Hardware type selection

Page layout set and hardware selection before programming

In the **Page Layout** tab, you can specify how and on how many pages to print your circuit program. You can preview the pagination in this tab. If you choose more than one program page, the page breaks are indicated by white lines on the programming interface.

The **hardware type** selection is also needed be done before programming. The available elements are showing in the right area in the above figure.

7.9.1.2 Open Existed Document

Operation Method:

1. To open a document, click 'Open' option of menu 'File' once with left button of mouse ,or click once in toolbar, shortcut key 'Ctrl+O' also can be used. As shown in Fig 11.3:

Fig7. 9.3 Open Existed Document

2. Click 'Open', find the path of saving file, dialogue box as follows:

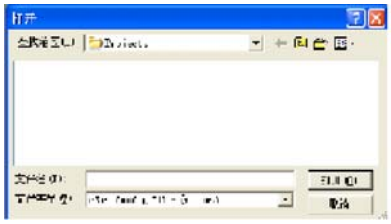


Fig7.9.4 Dialogue Box of Existed Document

3. Click the file you want to open with left button of mouse, then click button "Open". After opening the document, you can modify or print the document.

7.9.2 Edit Function Diagram Program

7.9.2.1 Place Function Block

While you set up a new document, you can write your control Program in the new program interface.

The method and process of placement is as follows:

The method of placing function block is as follows: choose function block needed from the workspace left of the program interface.

Operation Procedure:

1. Choose corresponding function group. “Constant”, “Basic”, ”Special” list and various blocks can be selected .Refer to the function block instruction chapter 6 for detail instruction of function blocks

2. Click the block you needed with left button of the mouse

3. Move the mouse to the proper place in the program interface, click with left button of the mouse, then complete the placement of a block.

4. According to above operation, put all modules in program interface.

E.g.: To complete all the function block of one certain system control, as Fig 7.10.1 shown, put all function modules into the edit program interface.

Fig 7.10.1 Place block

7.9.2.2 Edit Property of Function Block

After put all function block in edit box, it’s necessary to setup property of every function block. This is the most important step to write function block Program.

Operation Method:

1. In the function block Program interface, click some block twice with left button of the mouse, or pitch on a block and press right button of the mouse, then an edit menu appears, and then click “Properties…” of this menu. As shown in Fig 11.6:

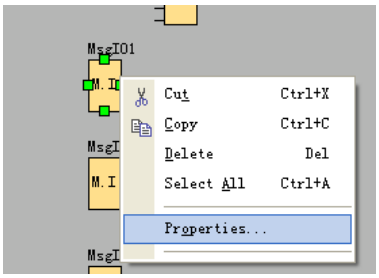


Fig 7.10.2 Block edit menu

2. Property dialogue box, as shown in Fig 7.10.3, to setup each item of content according to what you need, you also could click "Help" to observe the detail instruction.

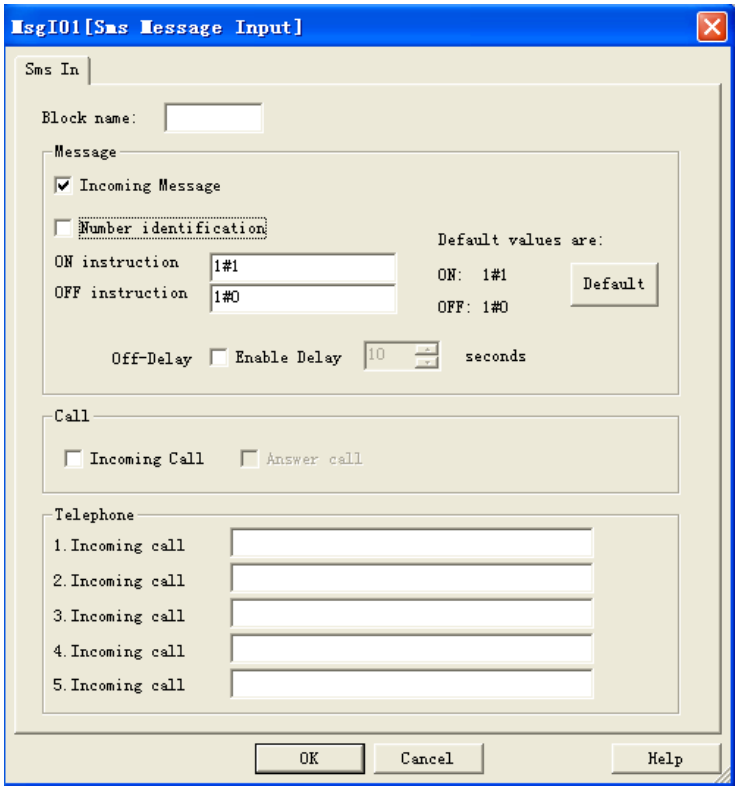


Fig 7.10.3 property box

Note: Different block has different property setup, especially the property of special function module. Please read chapter 6, the explanation to refer the detailed setup.

7.9.2.3 Setup link

After put all the blocks needed in protracting function graph, and set up properties as needed, it's necessary to set up link according to logic control relation and make it an integrated function diagram.

Operation Method:

1. Pitch on shortcut key , when the mouse becomes the shape of a pen, it can be used to link.

2. To do so, move the mouse pointer to a block input or output and press the left mouse button. Keep the mouse button being pressed down and then drag the mouse pointer from your selected source terminal to the target terminal. Now release the mouse button to anchor the connecting line to both terminals. While the connecting line is being drawn, it is shown as a straight line between the first terminal and the mouse pointer. Once it is anchored, it appears as a combination of horizontal and vertical lines, which can be manipulated using the selection tool.

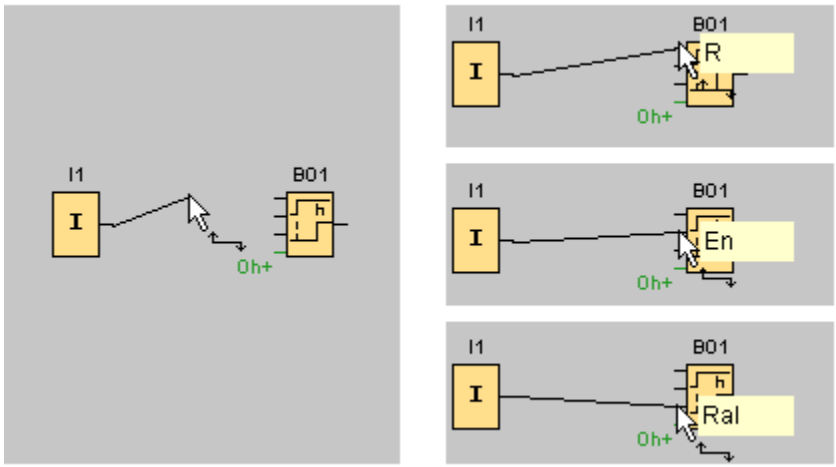


Fig. 7.10.4

eSmsConfig offers you a further option of connecting blocks when you right-click on the input or output of a block. In the shortcut menu, click the **Connect with block** menu command. This calls a selection list that contains all blocks available for your connection. Click on the relevant target block. eSmsConfig Comfort then draws the connecting line. This method is especially useful for connecting a source to a target block over a greater distance on the programming interface.

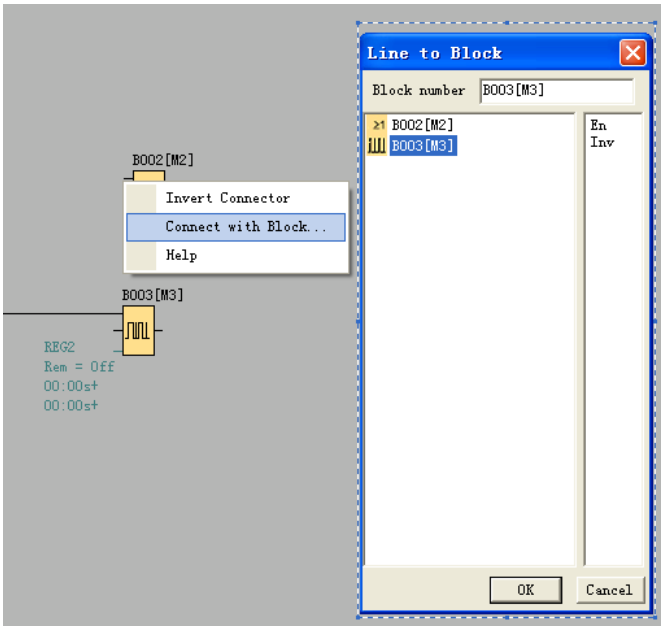


Fig. 7.10.5

Tips on connecting blocks

1. Move the mouse pointer over a block and briefly hold it in this position. The name of the block is shown. The name of the block input appears when you move the mouse pointer onto the input.

2. To make it easier for you to interconnect blocks, a blue frame around the mouse pointer pops when it is "captured" by a pin.

Rules for connecting blocks

The following rules apply to the connection of blocks:

1. You can connect a single input to multiple outputs.

2. You cannot connect multiple inputs to a single output.

You cannot interconnect I/O in the same path of a circuit program. Recursion is not permitted. Interconnect a flag or output if necessary.

Special function blocks also have green "connectors". These do not represent connecting pins, but are used instead for assigning the parameter settings.

Analog I/O cannot be connected to digital I/O.

7.9.2.4 Delete Function Block or Delete Link

When you put some needless block in program interface or link some default ones, you need to delete them as follows:

1. Pitch on module or link to delete with mouse.

2. Press “Delete” in the keyboard, or click right button of the mouse, select option “Delete” in the menu, then you can delete the module or link.

7.10 Simulation Running

eSmsConfig.exe could edit function diagram, and perform function of simulation operation.
After you finish the edit, you can start the function of simulation operation, to
examine program to see if it performs your control logic or not.
Operation Method:
1.Click "Simulation" under the menu "Tools" with left button of the mouse . It's time to start

program of simulation, or click " " in the simulation toolbar with mouse, and it also can open

simulation operation interface. It shows as Fig. 11.9.

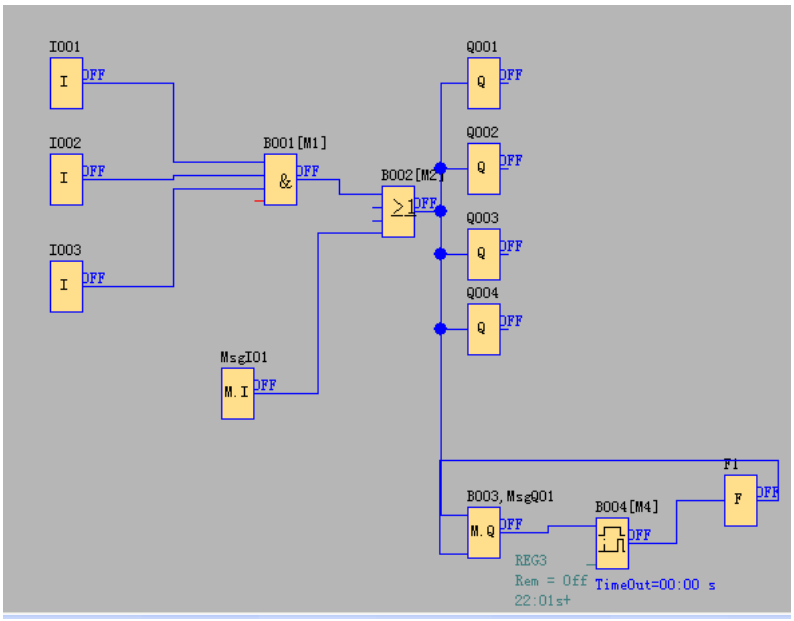


Fig. 7.10.6 Start simulation

2. Click input block with mouse. It can change the state of input, state displays "ON" and "OFF" in the output point of the module, so you can observe the state of input or output.

3. Click button again, to terminate the operation function of the module.

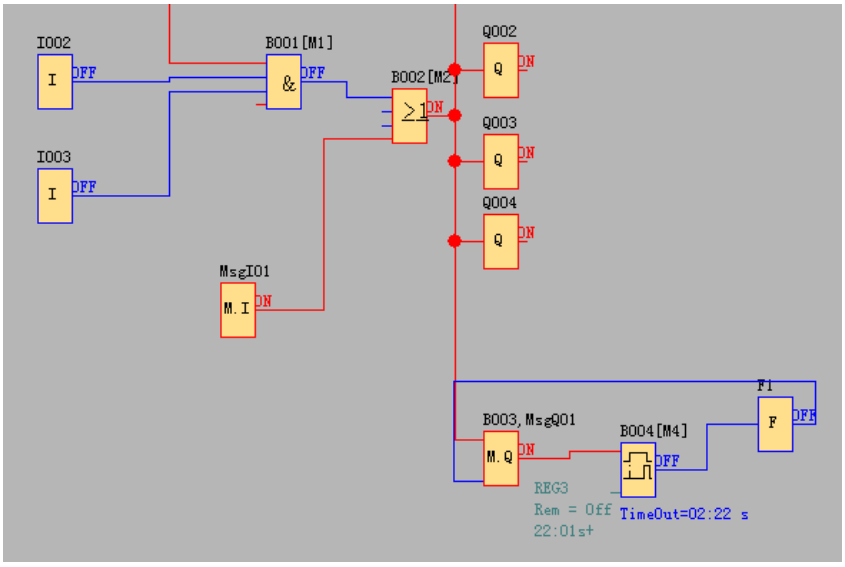


Fig. 7.10.7 Simulation Operation

Attn: In above graph, you can see "ON" or "OFF" state of input and output, and the output state and the current state of timing and counting of all blocks. Through this simulation operation graph, you can exam the program to see if it performs control requirement or not.

7.11 Save and Print

Operation method of file saving

1.To save a Program, click option "save" or "Save As" under menu "File" with left button of the mouse, as shown in Fig.7.10.8, or click button " "under toolbar.

2. You can set up saving path and file name in this box.

3. After the setup of the file saving path and file name, click "save" to save file in the appointed path, then complete to save file.

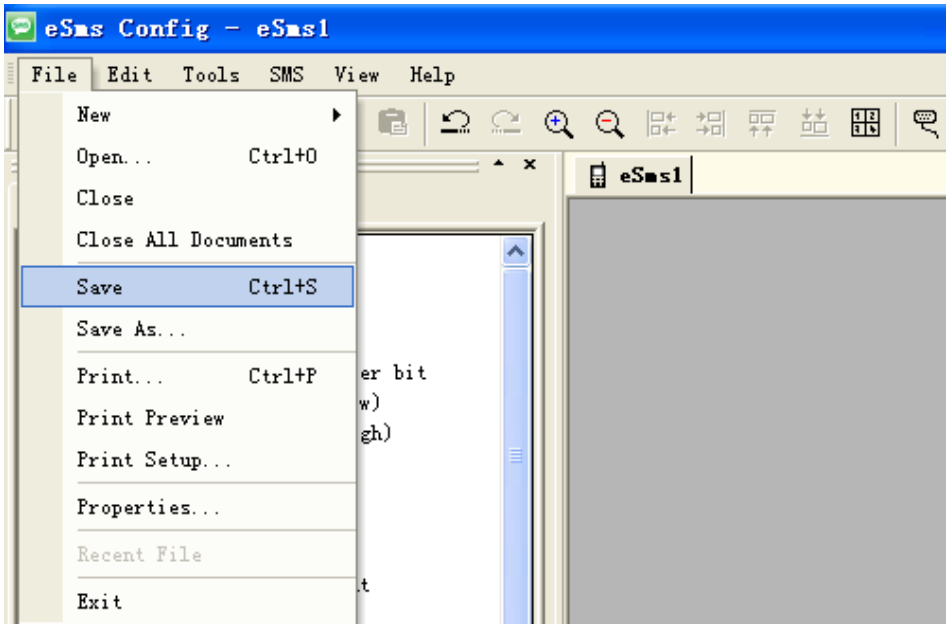


Fig. 7.10.8 Save File Menu

Operation Method of Printing File

1. Click option "Print" under menu "File" with left button of mouse.

2. Dialog box as shown in Fig. 7.10.9 appears, set up your printing requirement according to the cue of dialog box.

3. Click "confirm" with left button of mouse, then your file will be printed in your printer.

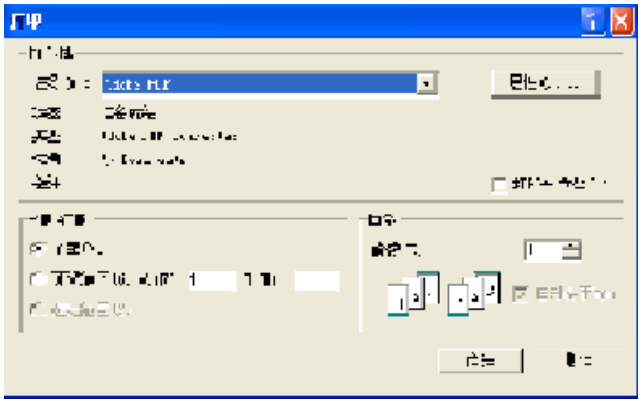


Fig. 7.10.9 File Print

7.12 Modify Password and transfer the Program

Operation Method:

a. First of all, link x-Messenger with your PC through the optional way: RS232 cable, USB cable (need install driver first), Ethernet connection.

b. Open application software eSmsConfig, set up a new document, then open computer com. Click option

"Configuration" under menu "Tools" with left button of the mouse, or click" "in toolbar, dialog box shown as 7.10.10 appears, then select your communication port and speed.

Option A. RS232. This option is used when you use the ELC-RS232 or ELC-USB(relative driver needed) cable.

Option B. Ethernet. This option is used when you use the EXM-E-Ethernet module.

Option C. GPRS. This option is used when you has established the GPRS connection between x-Messenger and PC.

Option D. USB. This option is used when you use the EXM-USB-B cable.(relative driver needed)

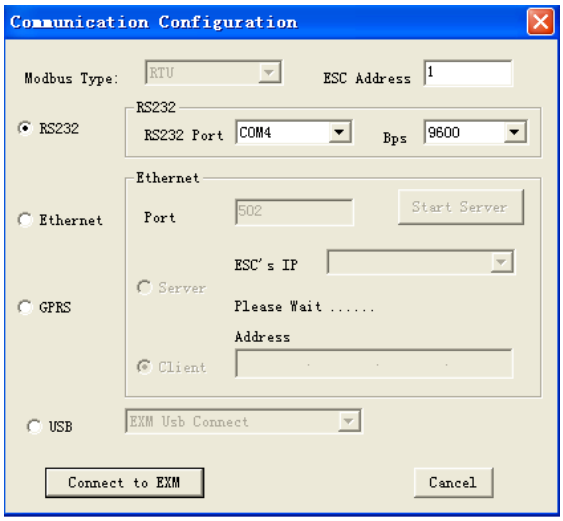


Fig. 7.10.10 Set Up Port and Baud Rate

1. Setup Password and Time

I. x-Messenger permits you to set up password for your Program. Only after input of right password, you can write, read and modify your Program.

Operation method of setup password

a. Click "Tools->transfer-> Password set" with left button of mouse, dialog box shown as Fig.7.10.11 appears:

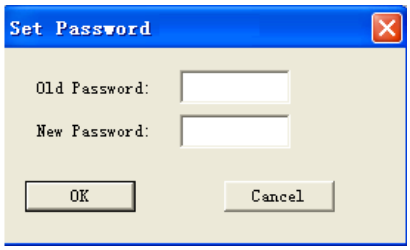


Fig. 7.10.11 Modify password

You can modify communication password of your x-Messenger mainframe in this dialog box.

b. Input new password in edit box after "New Password", "write to x-Messenger.

II. You can set up time for x-Messenger

Operation Method:

c. Clink option "Tools->transfer->Set EXM time" with left button of the mouse, or clink " " under toolbar,

dialog box appears shown as Fig. 7.10.12.

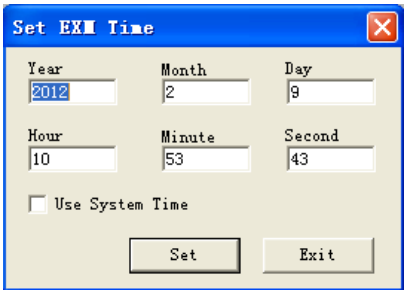


Fig. 7.10.12 Modify Time Interface

d. Display system time in this dialog box, click "Set", cue shown as Fig. 7.10.13 appears, to renew time of x-Messenger succeed.

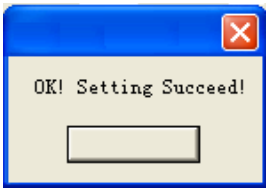


Fig. 7.10.13 Setup Time Succeed

2. Download/Upload Function Block Program

After you debug the function graph successfully, you need to download it into x-Messenger, and operate as following process.

Operation Method of read-in Program

a. First of all, link x-Messenger with your PC through the optional way: RS232 cable, USB cable(need install driver first), Ethernet connection.

b. Open application software eSmsConfig, set up a new document, then open computer com. Click option "Configuration" under menu "Tools" with left button of the mouse, or click" "in toolbar.

c. Click option "transfer->PC->x-Messenger" under menu "Tools"; or click button " "in toolbar

d. Click button " " with left button of mouse, start update Program, downloading status shown as Fig. 7.10.14 display update Program course.

Fig. 7.10.14 downloading status

Attn: After the Program update, x-Messenger will run the Program automatically, need not restart.

Operation Method of Upload Program:

a. Click option "Transfer->x-Messenger->PC" under menu "Tools" with left button of mouse, or click " "under toolbar.

b. Click button " " with left button of mouse, start upload Program, uploading status shown as Fig. 7.10.14 display upload Program course.

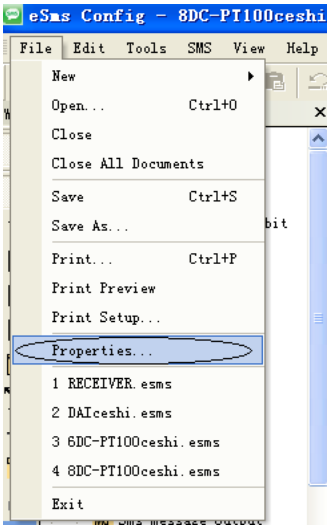
7.13 How to prevent your program from being copied/stolen?

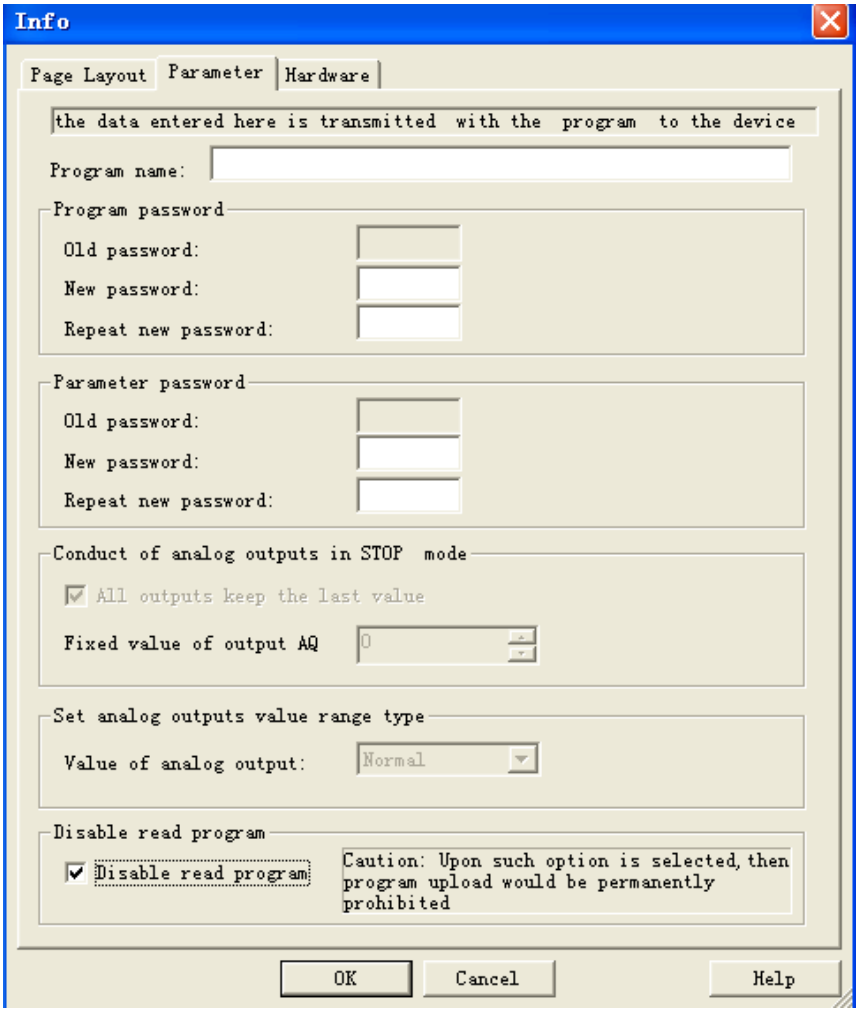
For OEM users, they have extremely high requirement on program protection, so our "program password" might not be able to 100% cater for their high demand in this aspect.

In order to absolutely prevent user's intellectual works(program in the CPU) from being copied/stolen by unexpected personnel, user might make good use of "Disable read program" feature, and upon such feature being activated, no one including user himself/herself can read program from CPU ,in other words, "program upload" would be permanently prohibited, surely, under such situation, copy machine(ELC-COPIER) can not work either. However, new program can still be allowed to be downloaded into such CPU. Therefore, please take good care of your program, and save it in a safe place as backup to avoid unnecessary trouble resulted from your program losing.

The listed below is just detailed procedures on how to make such configuration:

1. While a new program being made or a ready program being opened，open the property dialog box of program via the menu File->Properties, or click the icon ，and switch over to Parameter tab.



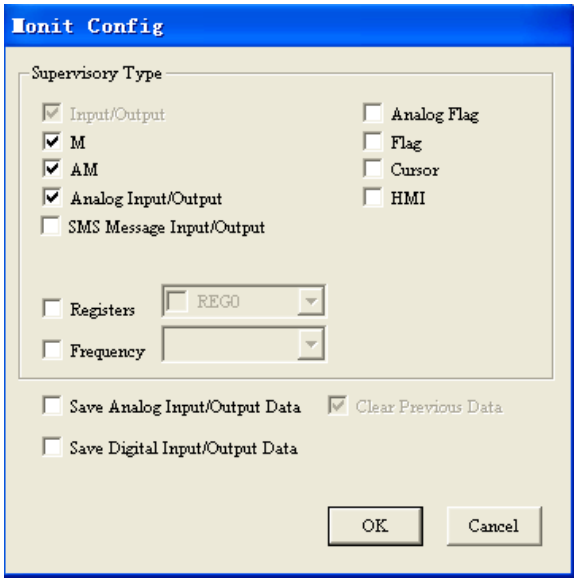


2. Click download icon to download program to CPU，in this case, the program in the CPU shall be protected completely, in other words, such protected program can not be uploaded by anyone in any way anymore.

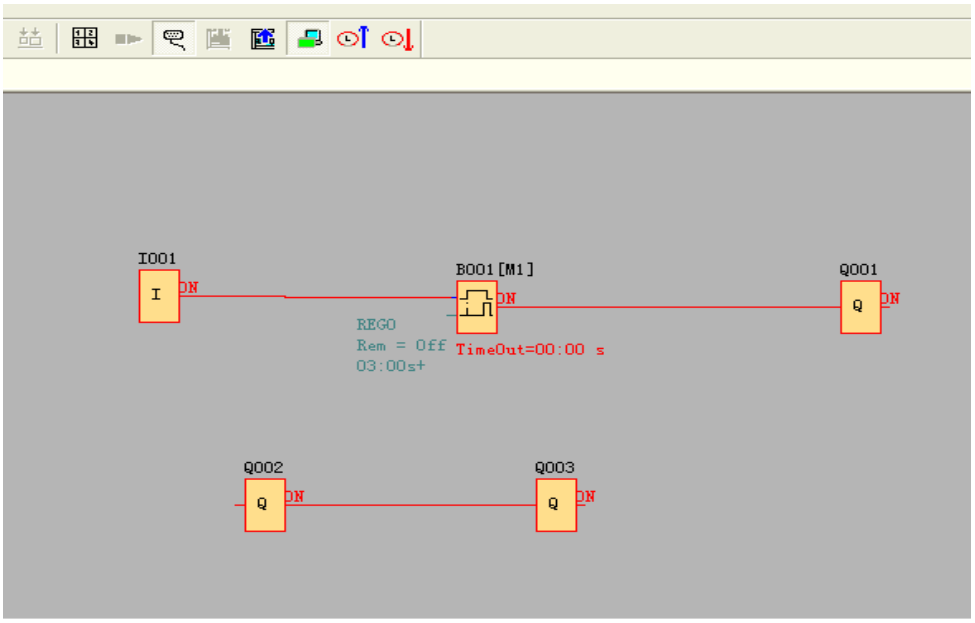
Note：Merely CPU with firmware version no less than V35 can support such function. Moreover, such "disable read program" feature would NOT work, while the CPU's firmware version is less than v35, or the old version(before v2.3.0.0) eSmsConfig is being used.

7.14 On-line monitoring/test circuit program

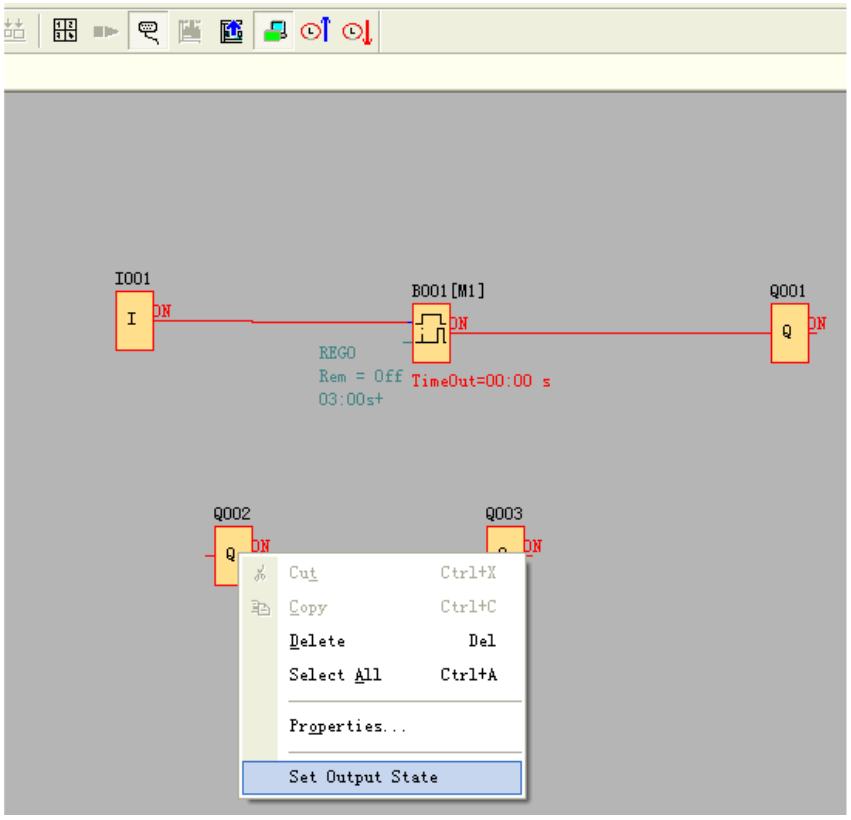
After you are satisfied with your program simulation and have downloaded it to x-Messenger CPU, you can also perform an online test of the circuit program. An online test is similar to simulation in that you can view inputs and outputs and block parameters. It differs, however, in that you are testing the program running in the x-Messenger with "live" inputs rather than testing the program on the PC with simulated inputs.
Multiple registers can be accessed individually by clicking “Tools->Set Monitor Config”.



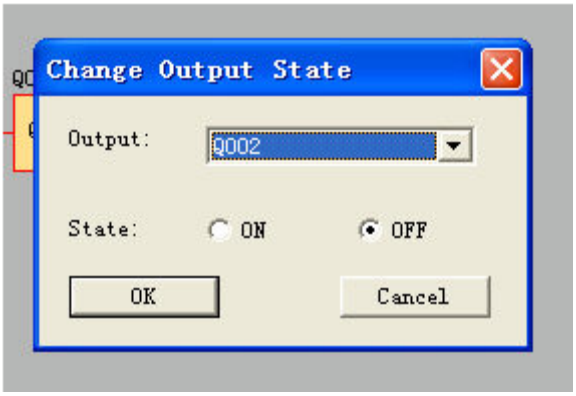
Monitor mode:



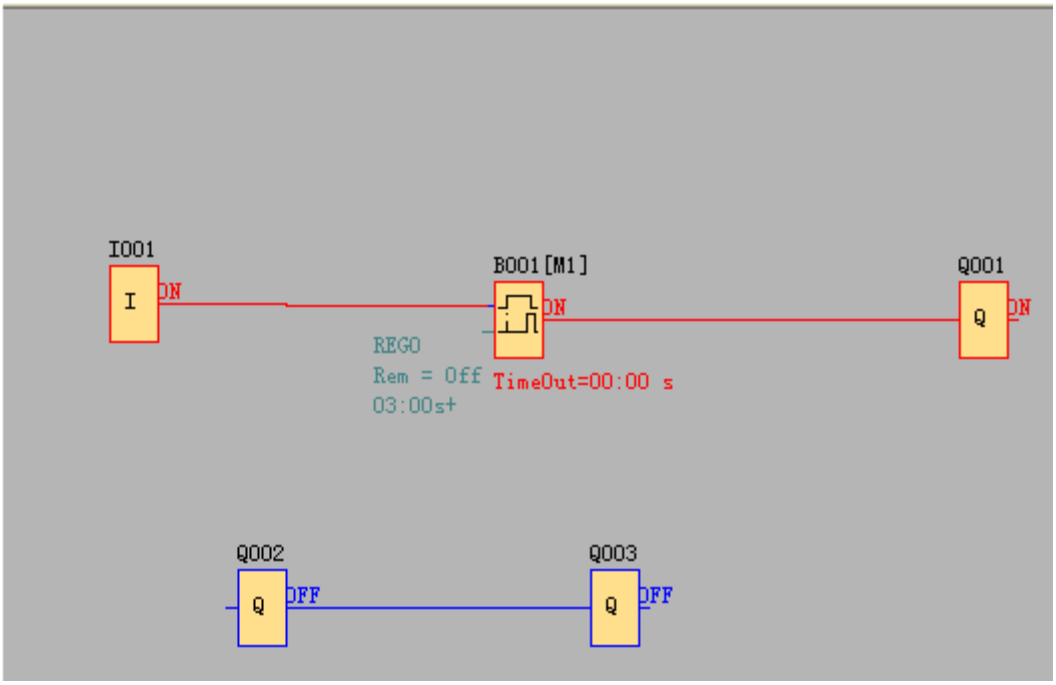
Under monitor mode, user can change the spare output (the input pin of Q is not connected to other blocks) state via eSmsConfig.



Right click "Q2" and then click "Set Output State".



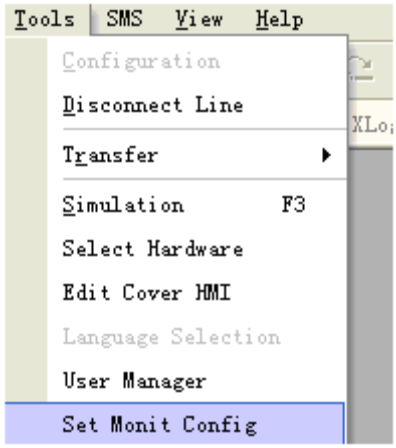
Click "OK" button and the Q2 of x-Messenger will be turned off.



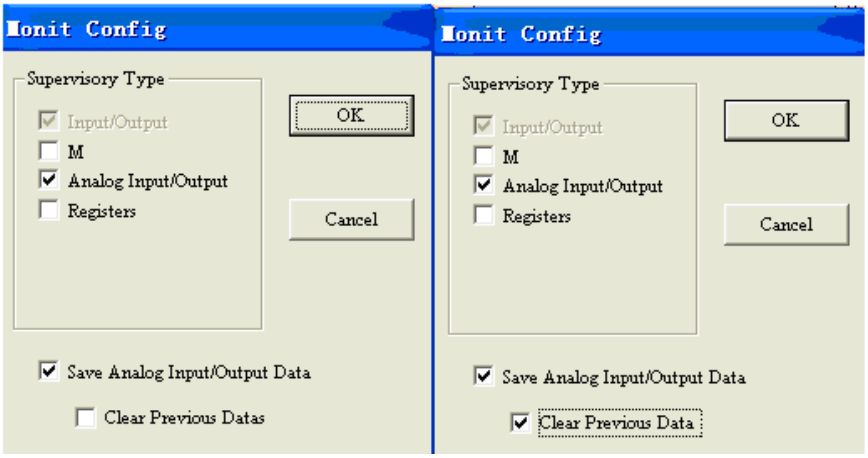
How to transfer monitoring data (AI/AQ) to an Excel file ?

Example program:

1. Select Tools-> Set Monit Config and further click it.



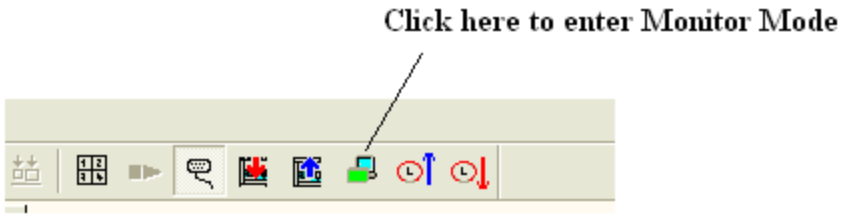
As below configuration shows, all history data of AI/AQ under monitor mode can be automatically saved to one EXCEL file for user's reference.



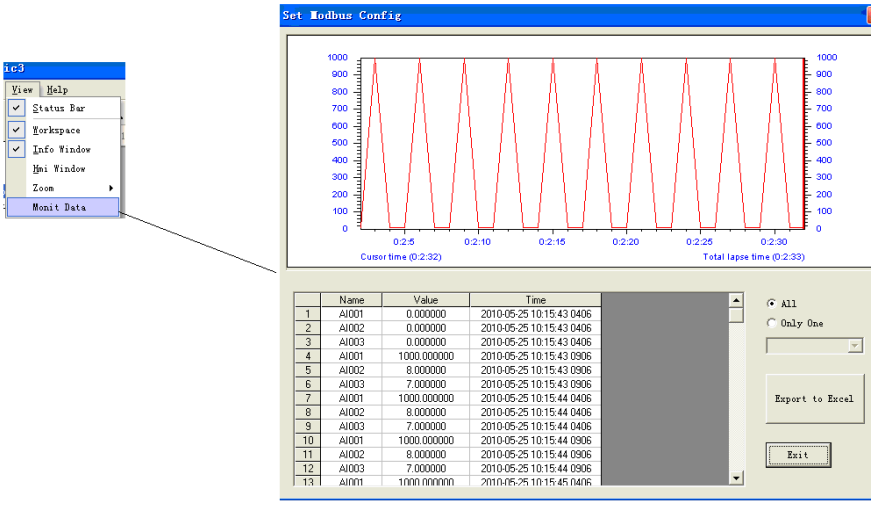
Caution: If the "clear previous data" is selected as well, then the history data cannot be saved, and then only the current monitor data can be saved, furthermore, the history data (previous monitor data) would be

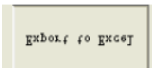
simultaneously cleared.

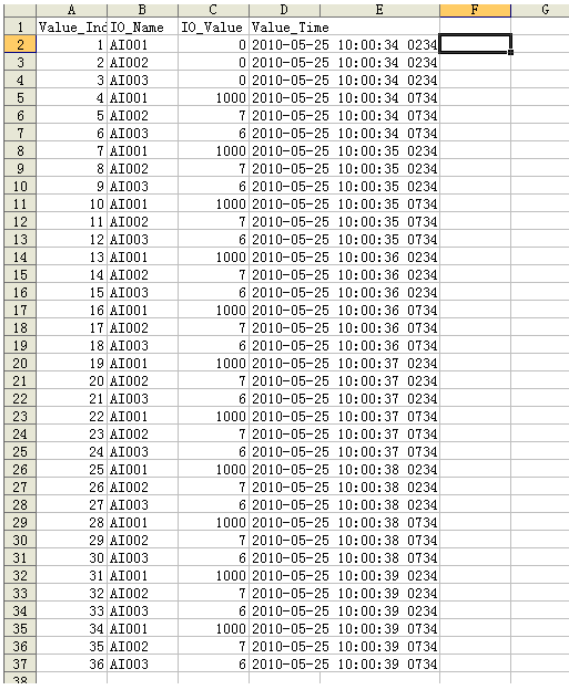
2. Click here to enter Monitor Mode



3. View the data by clicking View-> Monit data.



4. Click  to transfer data into one excel file (it contains AI1/AQ number, value and the corresponding time.).



	A	B	C	D	E	F	G
1	Value_Inc	IO_Name	IO_Value	Value_Time			
2	1	AI001	0	2010-05-25 10:00:34 0234			
3	2	AI002	0	2010-05-25 10:00:34 0234			
4	3	AI003	0	2010-05-25 10:00:34 0234			
5	4	AI001	1000	2010-05-25 10:00:34 0734			
6	5	AI002	7	2010-05-25 10:00:34 0734			
7	6	AI003	6	2010-05-25 10:00:34 0734			
8	7	AI001	1000	2010-05-25 10:00:35 0234			
9	8	AI002	7	2010-05-25 10:00:35 0234			
10	9	AI003	6	2010-05-25 10:00:35 0234			
11	10	AI001	1000	2010-05-25 10:00:35 0734			
12	11	AI002	7	2010-05-25 10:00:35 0734			
13	12	AI003	6	2010-05-25 10:00:35 0734			
14	13	AI001	1000	2010-05-25 10:00:36 0234			
15	14	AI002	7	2010-05-25 10:00:36 0234			
16	15	AI003	6	2010-05-25 10:00:36 0234			
17	16	AI001	1000	2010-05-25 10:00:36 0734			
18	17	AI002	7	2010-05-25 10:00:36 0734			
19	18	AI003	6	2010-05-25 10:00:36 0734			
20	19	AI001	1000	2010-05-25 10:00:37 0234			
21	20	AI002	7	2010-05-25 10:00:37 0234			
22	21	AI003	6	2010-05-25 10:00:37 0234			
23	22	AI001	1000	2010-05-25 10:00:37 0734			
24	23	AI002	7	2010-05-25 10:00:37 0734			
25	24	AI003	6	2010-05-25 10:00:37 0734			
26	25	AI001	1000	2010-05-25 10:00:38 0234			
27	26	AI002	7	2010-05-25 10:00:38 0234			
28	27	AI003	6	2010-05-25 10:00:38 0234			
29	28	AI001	1000	2010-05-25 10:00:38 0734			
30	29	AI002	7	2010-05-25 10:00:38 0734			
31	30	AI003	6	2010-05-25 10:00:38 0734			
32	31	AI001	1000	2010-05-25 10:00:39 0234			
33	32	AI002	7	2010-05-25 10:00:39 0234			
34	33	AI003	6	2010-05-25 10:00:39 0234			
35	34	AI001	1000	2010-05-25 10:00:39 0734			
36	35	AI002	7	2010-05-25 10:00:39 0734			
37	36	AI003	6	2010-05-25 10:00:39 0734			

Chapter 8 Description of the WIFI module built-in the EXM WIFI CPU

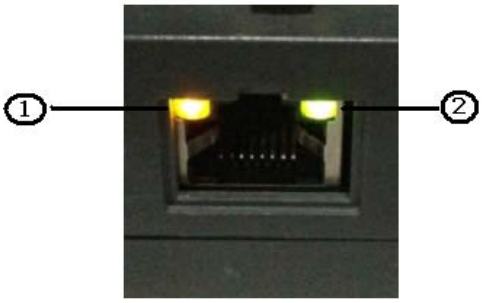
There is a WIFI module named "HF-A11" built-in the EXM WIFI CPU, before establishing the communication between EXM WIFI CPU and other devices(including PC EXM WIFI CPU or the device can be connected to the Ethernet network), you need do some configurations via the web sever built-in the HF-A11 module.

Bulit-in Wireless Parameters

Support 802.11b/g/n wireless standards
Support TCP/IP/UDP network protocols
Support work as STA/AP mode
Support Router/Bridge mode networking
Support Transparent/Agreement Transmission Mode(Transparent used by EXM WIFI CPU)
Support Friendly Web Configuration Page
Support Palmodic Signal, WIFI connection instruction
Outdoor 100m with 3dBi antenna and indoor 40m;
FCC /CE Certificated

is built-in

Indicator instruction.



These two indicators is for the wifi module, not for the LAN port.

1.Indicator the WIFI module status of power on process:

"1"-Finish WIFI module boot up process;

"0"-WIFI module boot up not finish.

2.WIFI status indicator: "1"- WIFI connection available.

"0"-No WIFI connection

8.1 Functional description

Wireless Networking

HF-A11 module can be configured as both wireless STA and AP base on network type. Logically there are two interfaces in HF-A11. One is for STA, and another is for AP. When HF-A11 works as AP, other STA equipments are able to connect to wireless LAN via HF-A11 module. Wireless Networking with HF-A11 is very flexible.

Following figure shows the functional architecture of HF-A11 module:

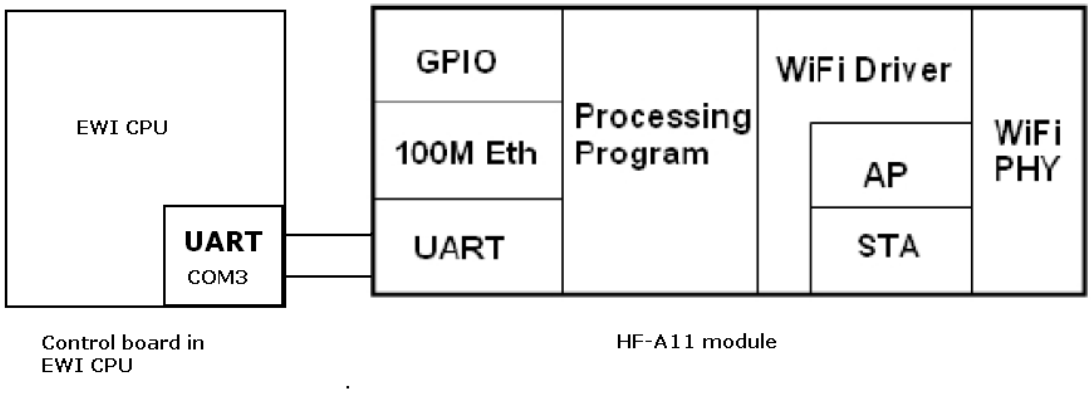


Figure 15. Connection inside of EXM WIFI CPU between HF-A11 module and CPU board

Notes:

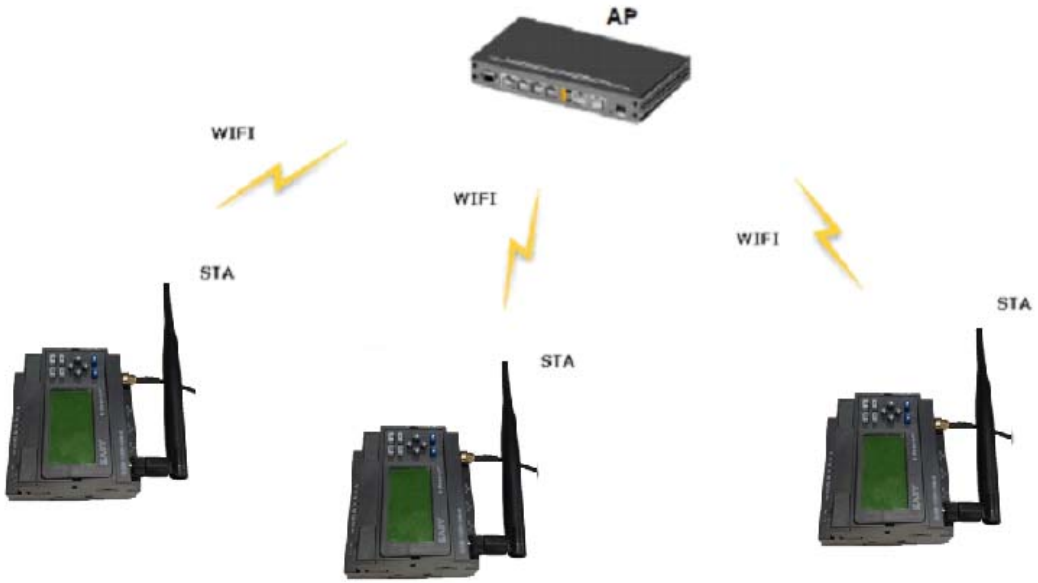
AP: that is the wireless Access Point, the founder of a wireless network and the center of the network nodes. The wireless router we use at home or in office may be an AP.

STA: short for Station, each terminal connects to a wireless network (such as laptops, PDA and other networking devices) can be called with a STA device.

Basic Wireless Network Based On AP (Infrastructure)

Infrastructure: it's also called basic network.It built by AP and many STAs which join in.

The characters of network of this type are that AP is the center, and all communication between STAs is transmitted through the AP. The figure following shows such type of networking.



External Antenna

If user select external antenna, HF-A11 modules must be connected to the 2.4G antenna according to IEEE 802.11b/g/n standards.

The antenna parameters required as follows:

Item	Parameters
Frequency range	2.4~2.5GHz
Impedance	50 Ohm
VSWR	2 (Max)
Rerurn Loss	-10dB (Max)
Connector Type	I-PEX or populate directly

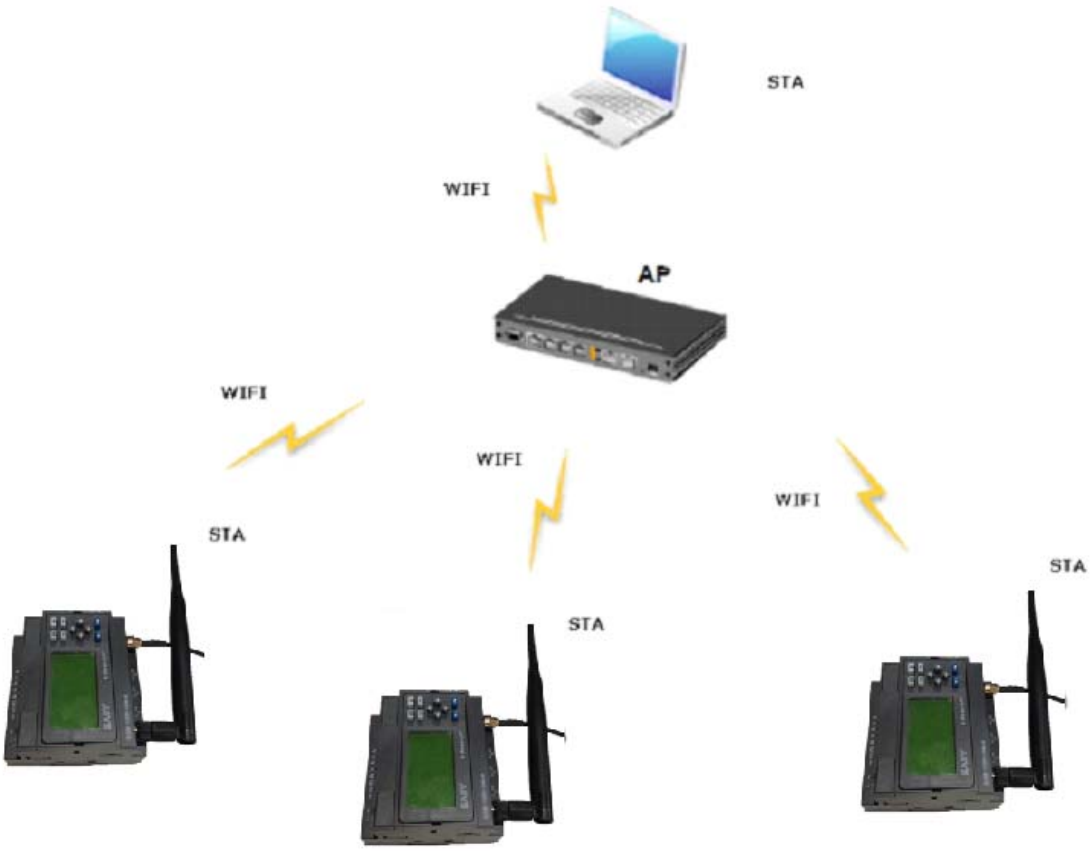
Transparent Transmission Mode

HF-A11 modules support serial interface transparent transmission mode. The benefit of this mode is achieves a plug and play serial data port, and reduces user complexity furthest. In this mode, user should only configure the necessary parameters. After power on, module can automatically connect to the default wireless network and server.
As in this mode, the module's serial port always work in the transparent transmission mode, so users only need to think of it as a virtual serial cable, and send and receive data as using a simple serial.
The transparent transmission mode can fully compatible with user's original software platform and reduce the software development effort for integrate wireless data transmission.

Notes:
1.The WIFI module HF-A11 module is using the COM3 port of the EXM WIFI unit
2.The communication parameters is fixed. Baud rates:9600; Data bits:8 Parity:None Stop:1;
3.The data transmission protocol for COM3 is the MODBUS TCP

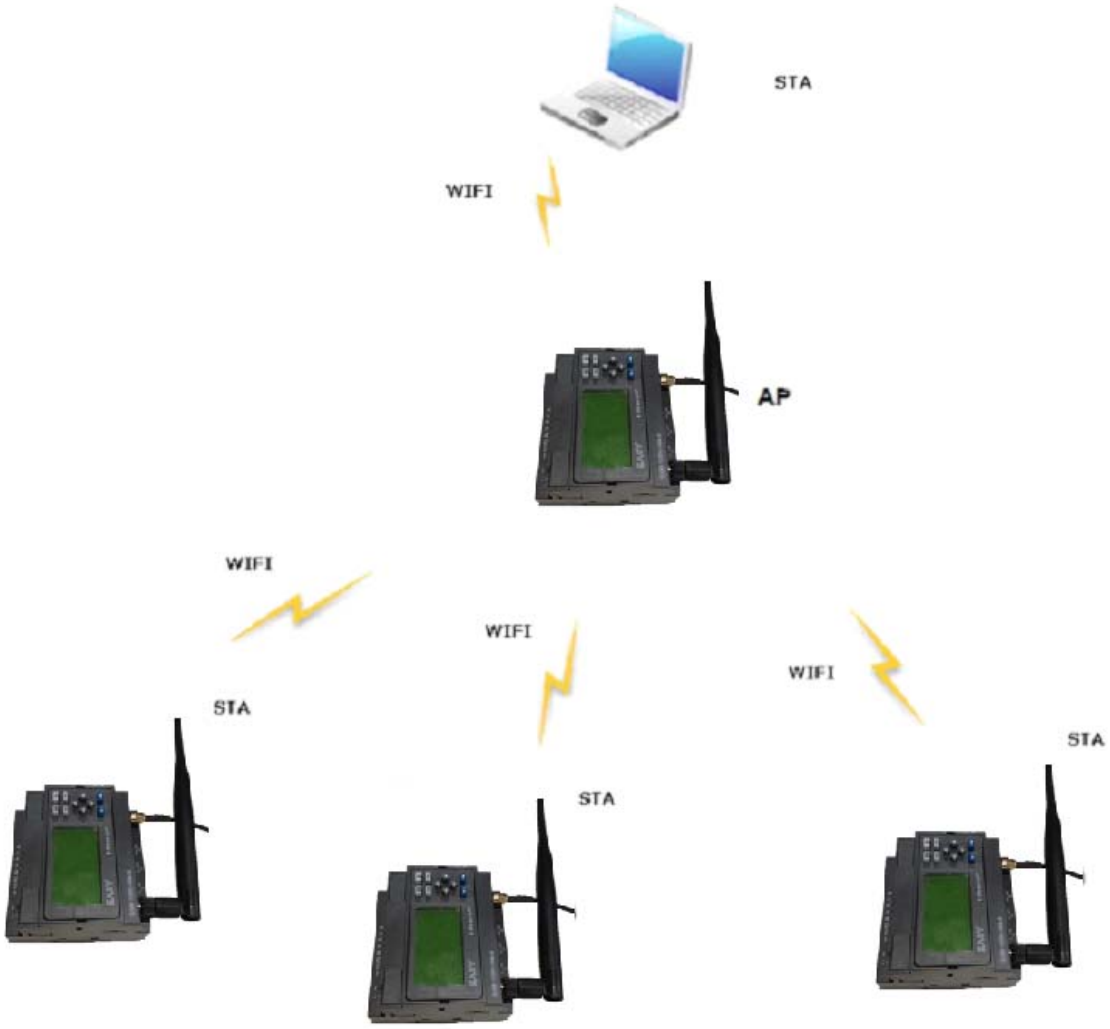
Basic Wireless Network Based On AP (Infrastructure)

Infrastructure: it's also called basic network.It built by AP and many STAs which join in.
The characters of network of this type are that AP is the center, and all communication between STAs is transmitted through the AP. The figure following shows such type of networking.



Wireless Network Based On Adhoc Network (Adhoc)

Adhoc: It's also called independent basic service set, and it's built by two or more STAs without AP, this type of network is a loose structure, all the STAs in the network can communicate directly. As showing in the figure below, HF-A11 (1) can be treat as an AP, and HF-A11 (2), HF-A11 (3) and the laptop are STAs connected to HF-A11 (1). Meanwhile, all HF-A11 modules can connected to EXM WIFI CPU via UART interface. All HF-A11 modules can be operated and managed through the laptop. So it is convenient to O&M all EXM WIFI CPUs. Moreover, in such Adhoc network structure, the whole coverage of a wireless network can be extended easily.



Security

HF-A11 module supports multiple wireless encryption mechanisms, and enables to protect the security of user's data transmission, the mechanisms include:

- WEP
- WAP-PSK/TKIP
- WAP-PSK/AES
- WAP2-PSK/TKIP
- WPA2-PSK/AES

Address Binding

HF-A11 module supports the feature of binding the BSSID address of target network.
According to the provisions of 802.11 protocol, different wireless networks can have a same network name (ie SSID / ESSID), but must correspond to a unique BSSID address (ie MAC address). Illegal intruders can create a wireless network with the same SSID / ESSID, it will make STAs in the network to join to the illegal AP, thereby and then network leakage happen.
Users can prevent STA from joining to illegal network by binding the BSSID address,to improve wireless network security.

8.2 OPERATION GUIDELINE

Configuration via Web Accessing

When first use HF-A11 modules(EXM WIFI CPUs), user may need some configuration. User can connect to HF-A11x module's wireless interface with following default setting information and configure the module through laptop or smart phone.

Table 5
HF-A11 Web Access Default Setting

Parameters	Default Setting
SSID	HF-A11x_AP
IP Address	10.10.100.254
Subnet Mask	255.255.255.0
User Name	admin
Password	admin

Open Web Management Interface

Step 1: Connect laptop to SSID "HF-A11_AP" of HF-A11 module via wireless LAN card;
Step 2: After wireless connection OK. Open Wen browser and access "http://10.10.100.254";
Step 3: Then input user name and password in the page as following and click "OK" button.

Figure 22. Open Web Management page

The HF-A11 web management page support English and Chinese language. User can select language environment at the top right corner and click “Apply” button.

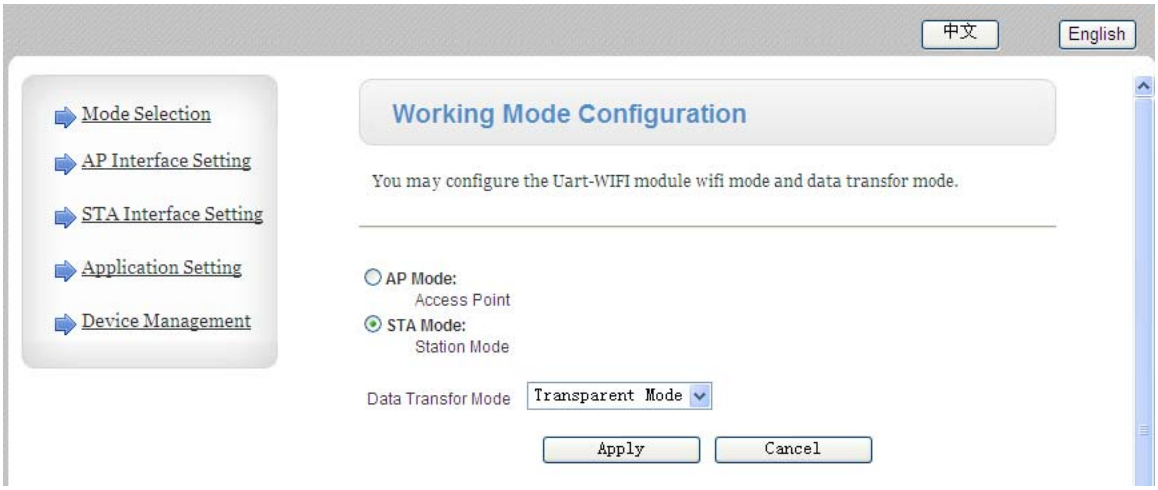
The main menu include five pages: “Mode Selection”,” AP Interface Setting”,”STA Interface Setting”,”Application Setting”, and “Device Management”

Notes:

Default, High-Flying suggests all Web management related operation shall execute at AP mode. (Even you need configure STA parameters and want module works as STA mode). If user selects STA mode and still want to configurate the module through Web browser, you have to access the module through another AP (and get the module IP address through this AP.)

Mode Selection Page

This page use to setting the module working mode (Transparent Transmission or Agreement Transmission) and wireless networking mode (AP and STA mode).



AP Interface Setting Page

This page use to setting the parameters when HF-A11 module works as AP.

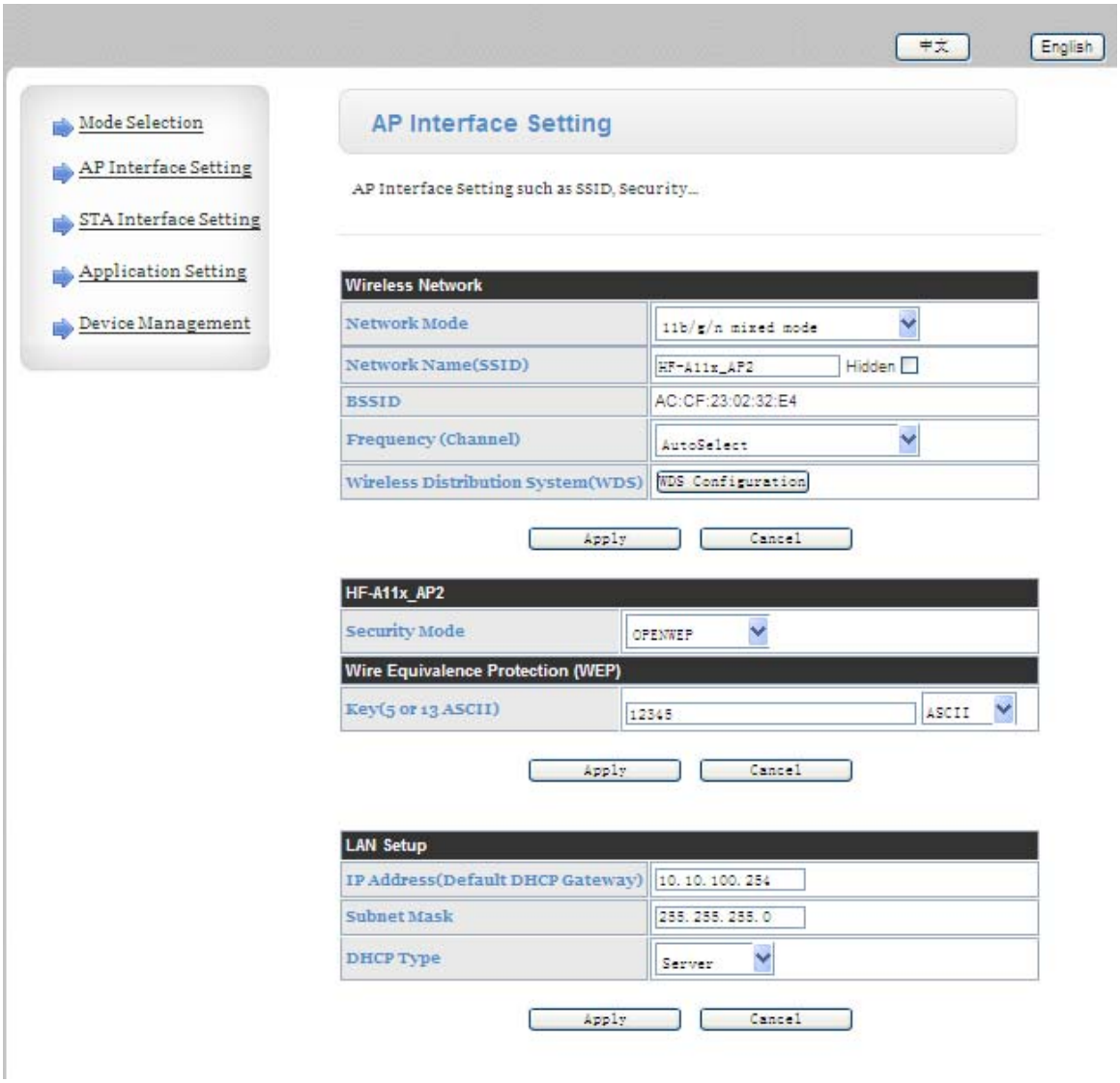
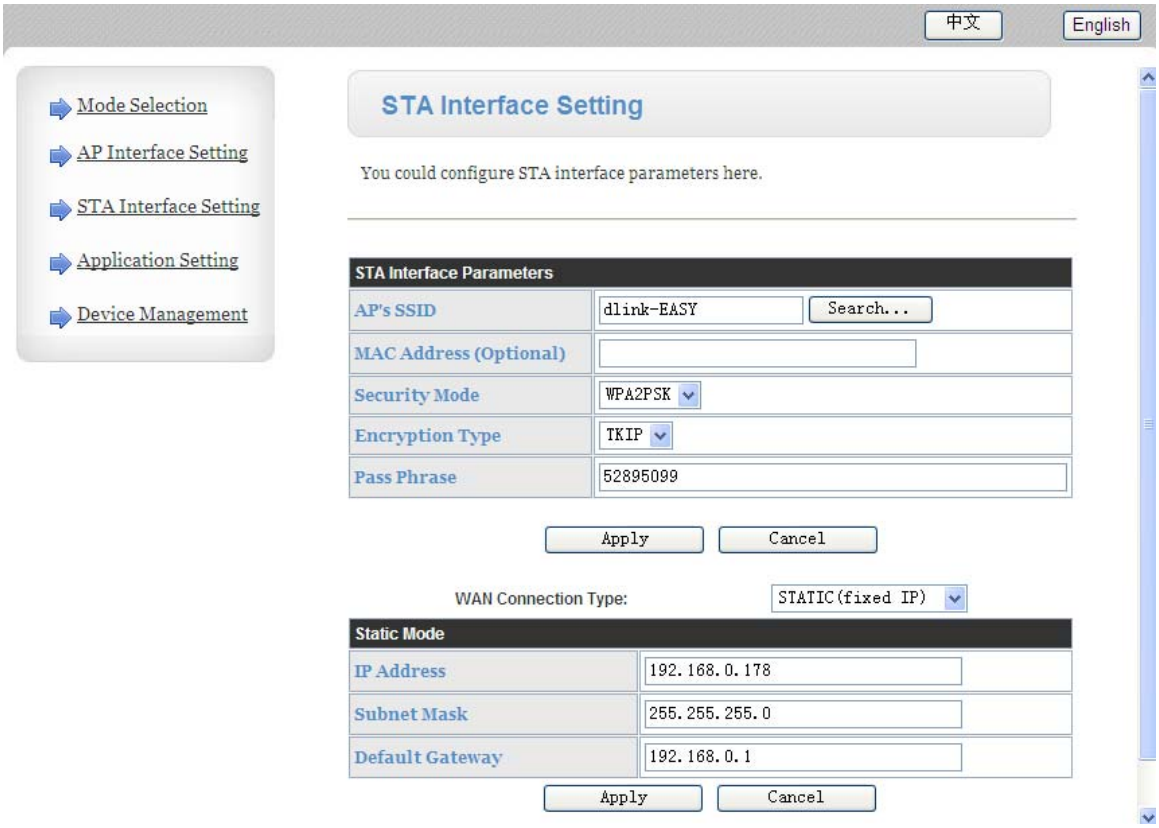


Figure 24. AP Interface Setting Page

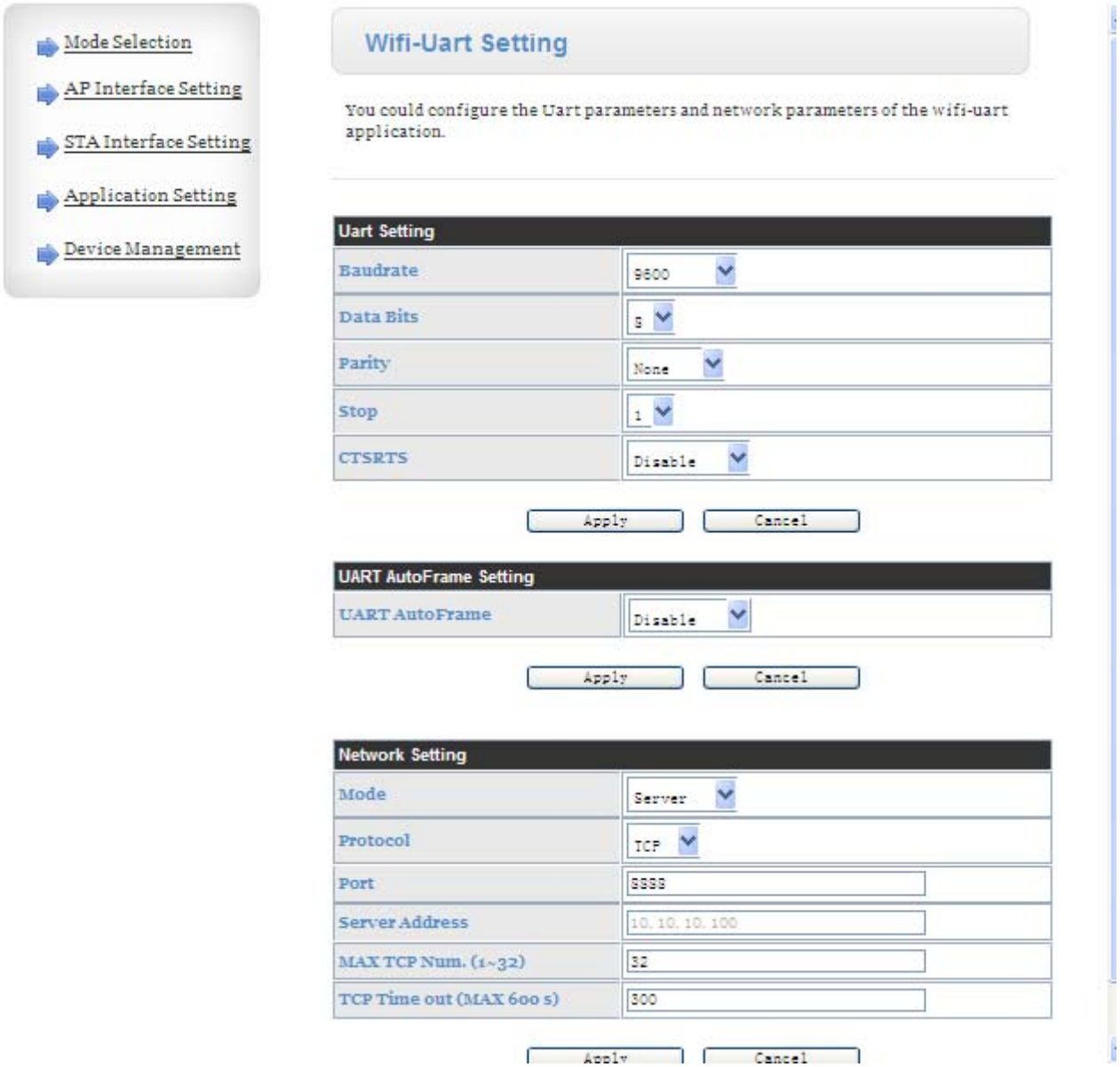
STA Interface Setting Page

This page use to setting the parameters when HF-A11 module works as STA.
Such as SSID of AP which module need to connected, and also select the networking type: DHCP or static IP address.



Application Setting Page

This page use to setting the parameters of serial port communication, such as UART setting and high layer network protocol setting which used support serial communication.



Notes:

1.Generally, Network protocols support three modes: TCP Server, TCP Client, and UDP. UDP has no server and client requirement according to standard.

Besides module working as TCP Server (IP address not required in this mode). User must set the IP address of the device which need communicate with HF-A11 module.

Also the Port ID between two sides of the communication devices must keep the same.

2.If you have load factory default, the Baud rates shall be "57600"(This is the module factory default settings), but the EXM WIFI Unit only support the "9600" , so you must keep the UART settings as follows, other settings will be not available for EXM WIFI unit to communicate.

Uart Setting	
Baudrate	9600
Data Bits	8
Parity	None
Stop	1
CTSRTS	Disable

Apply Cancel

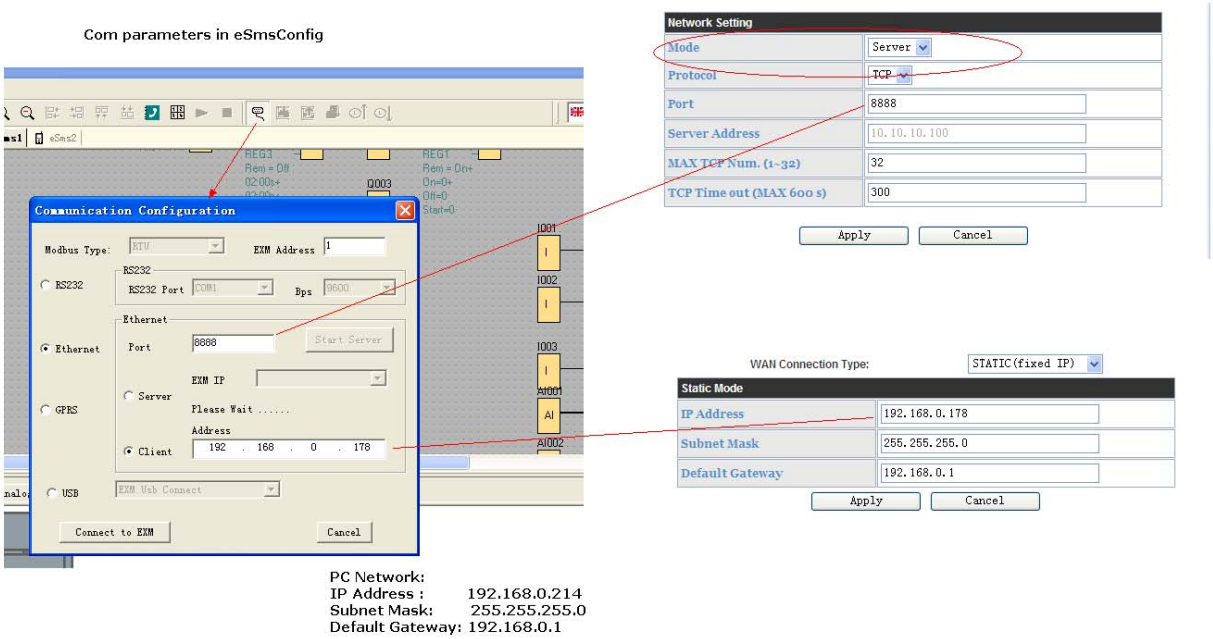
UART AutoFrame Setting	
UART AutoFrame	Disable

Apply Cancel

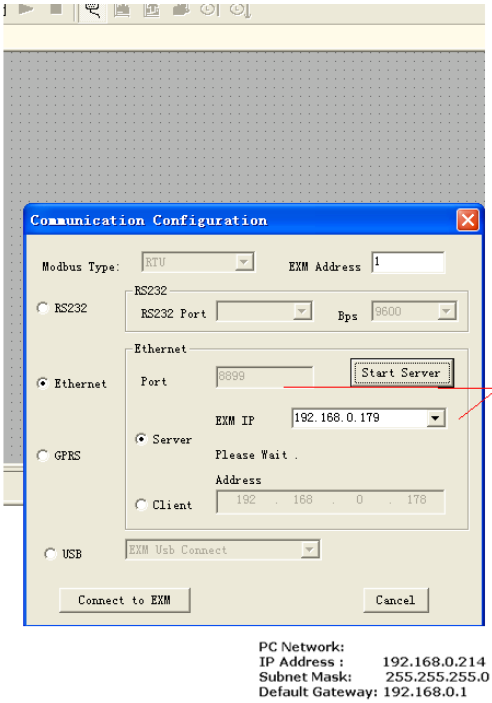
Establish the communication between eSmsConfig and EXM WIFI Unit.

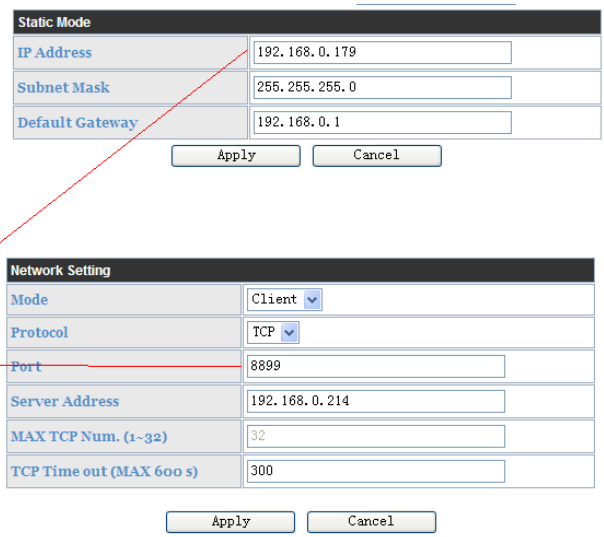
Two communication modes available:

A. EXM WIFI unit works as server, eSmsConfig works as client.



B. EXM WIFI unit works as client, eSmsConfig works as server.



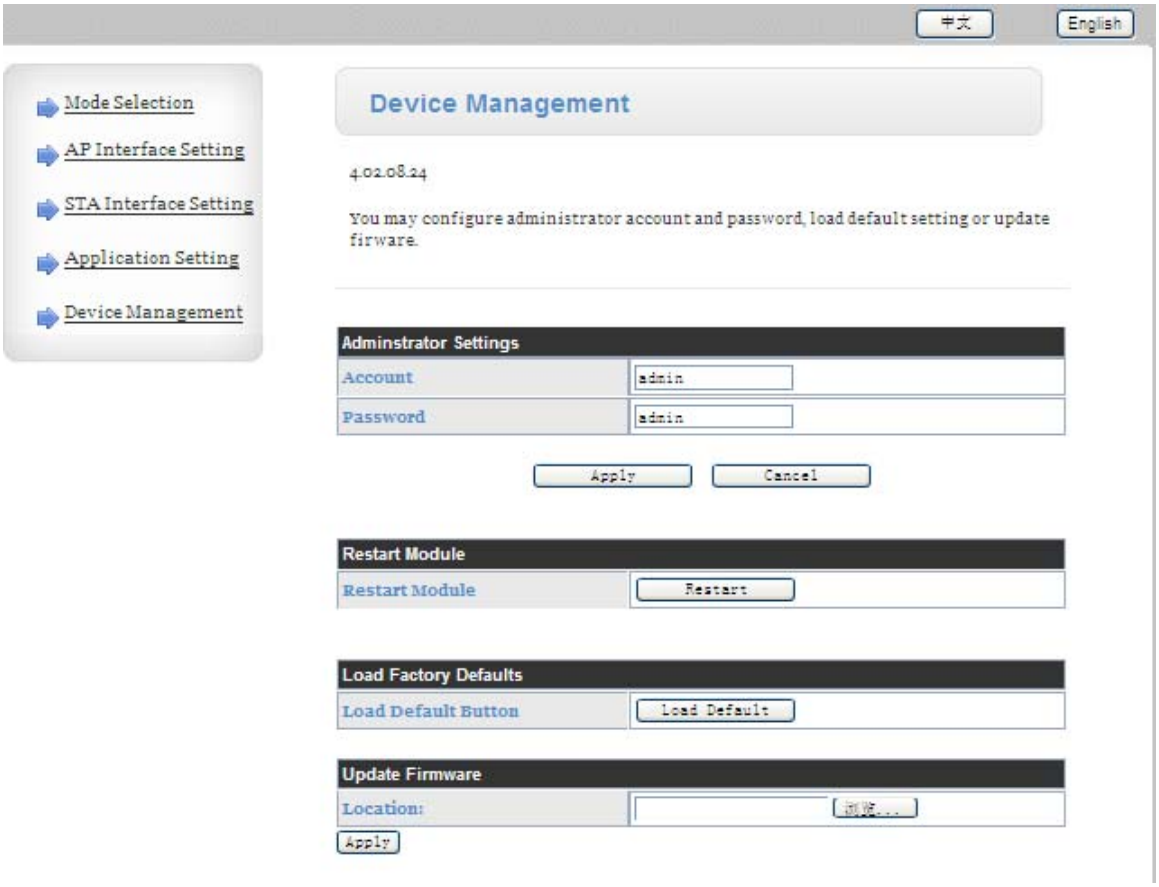


eSmsConfig com settings

Web page settings of wifi module

Device Management Page

This page use to manage HF-A11 module general setting, such as administrator setting, restart module button, restore factory default setting button, and update firmware through webpage.



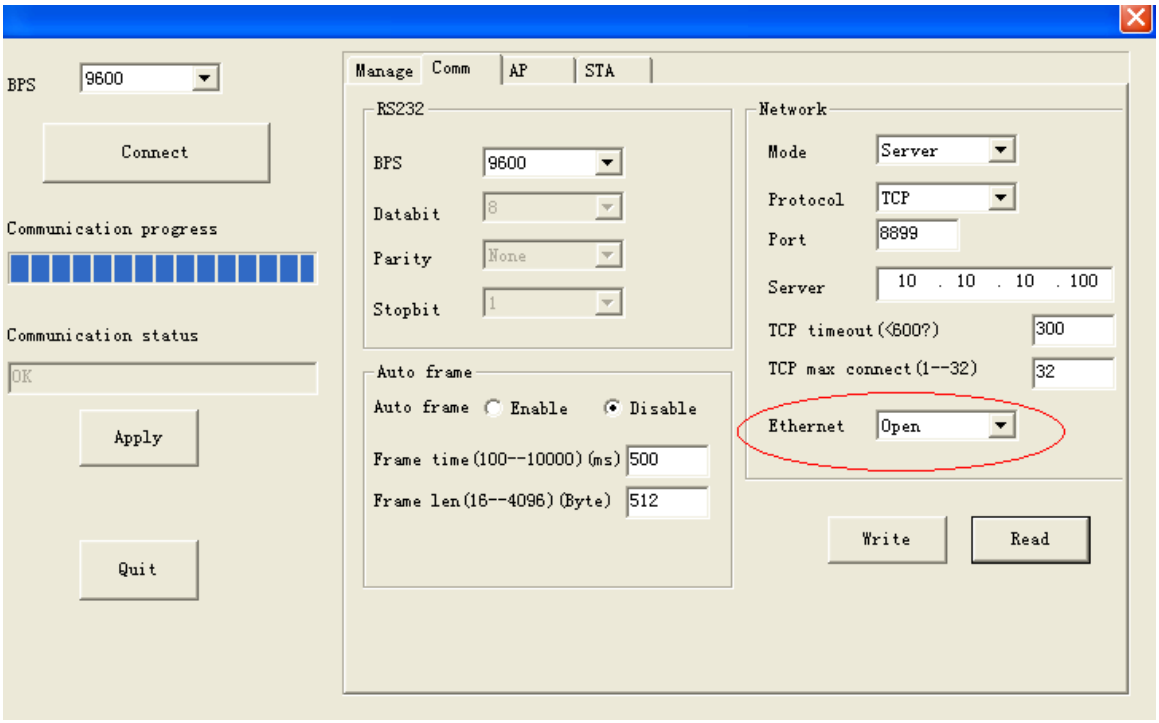
Notes:

If you click the "Load Default" button, you must change the baud rates to 9600, otherwise the the HF-A11 module cannot establish communication with EXM WIFI CPU.

8.3 10/100M Ethernet Interface

HF-A11 modules provide one 10/100M Ethernet PHY layer interface for data transmission or user configuration.

Close module's Ethernet port function can reduce the power consumption. The default setting for HF-A11 is close Ethernet port function, but you can open the Ethernet port in the configuration of eSmsConfig.exe



If you recovery the settings of the HF-A11 module, the Ethernet port would be closed, if you still want to use the LAN port, you must open it in the eSmsConfig.exe from the menu:Tools->wifi parameters

8.4 HF-A11 Ethernet Interface Networking (As AP)

HF-A11 Ethernet Interface Networking (As AP)

For above networking, HF-A11 module works as AP and also the center of this network. All devices's IP address in this network shall use the same network segment with HF-A11 and they

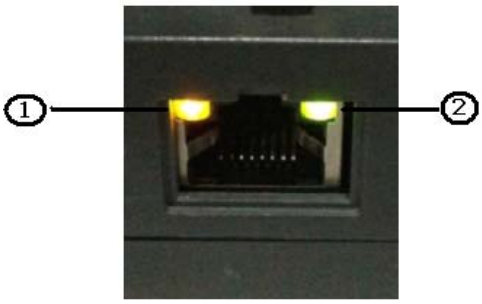
can intercommunication with this method.

Notes:

1.After the Ethernet port opened, you can directly connect the PC to the LAN port of CPU by net wire, and set the internet card with the dynamic IP address, and then you can configure the wifi module with the built-in web page, you only need input the gateway of your PC into the browser, and then the web page will be showing:

2. Indicators on the LAN port is not for the LAN connection, it is for the wifi modu

Indicator instruction.



These two indicators is for the wifi module, not for the LAN port.

2.Indicator the WIFI module status of power on process:

"1"-Finish WIFI module boot up process;

"0"-WIFI module boot up not finish.

2.WIFI status indicator: "1"- WIFI connection available.

"0"-No WIFI connection

8.5 How to Configure the wifi module by the eSmsConfig.exe

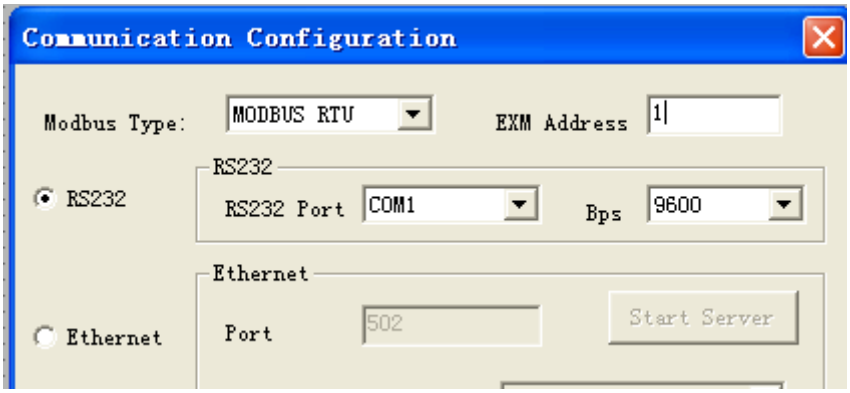
If the WIFI module is worked on the STA mode, but it is disconnected with any router and the LAN port is also closed, so, the web configuration would be disabled, now you need configure the WIFI module via the program port by eSmsConfig.exe.

Hardware requirement:

Program cable :ELC-RS232 cable, ELC-USB cable.

Steps:

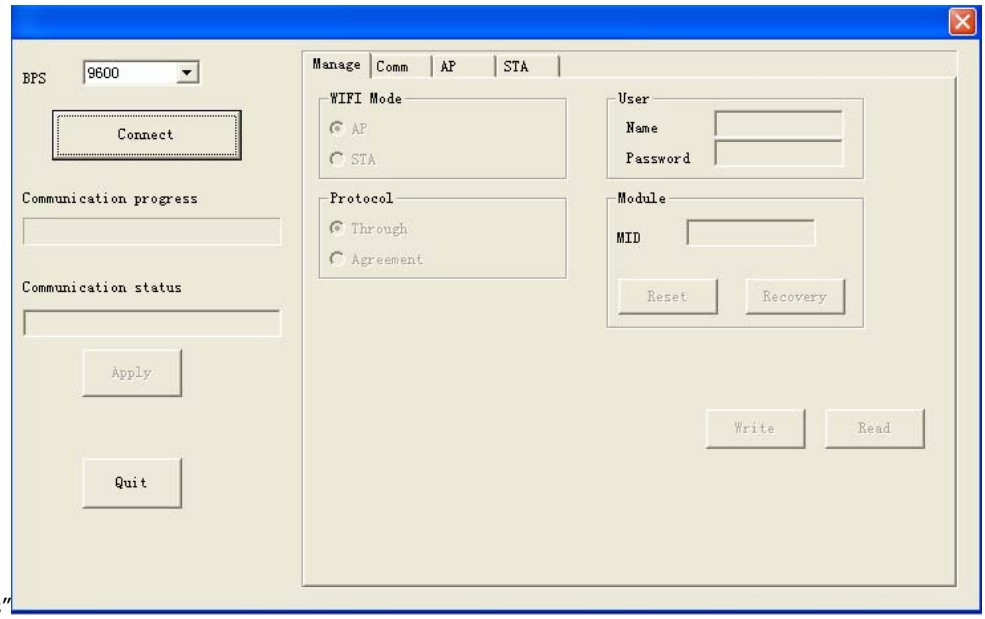
1. Connect the programming cables to the program port
2. Open the eSmsconfig.exe and establish the communication with WIFI CPU.



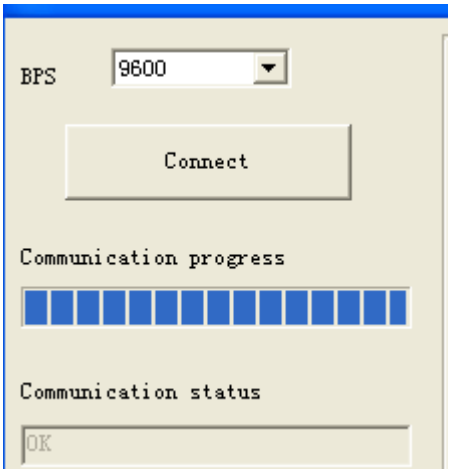
Note:

1. Only the RS232 option available for the wifi parameters setting.

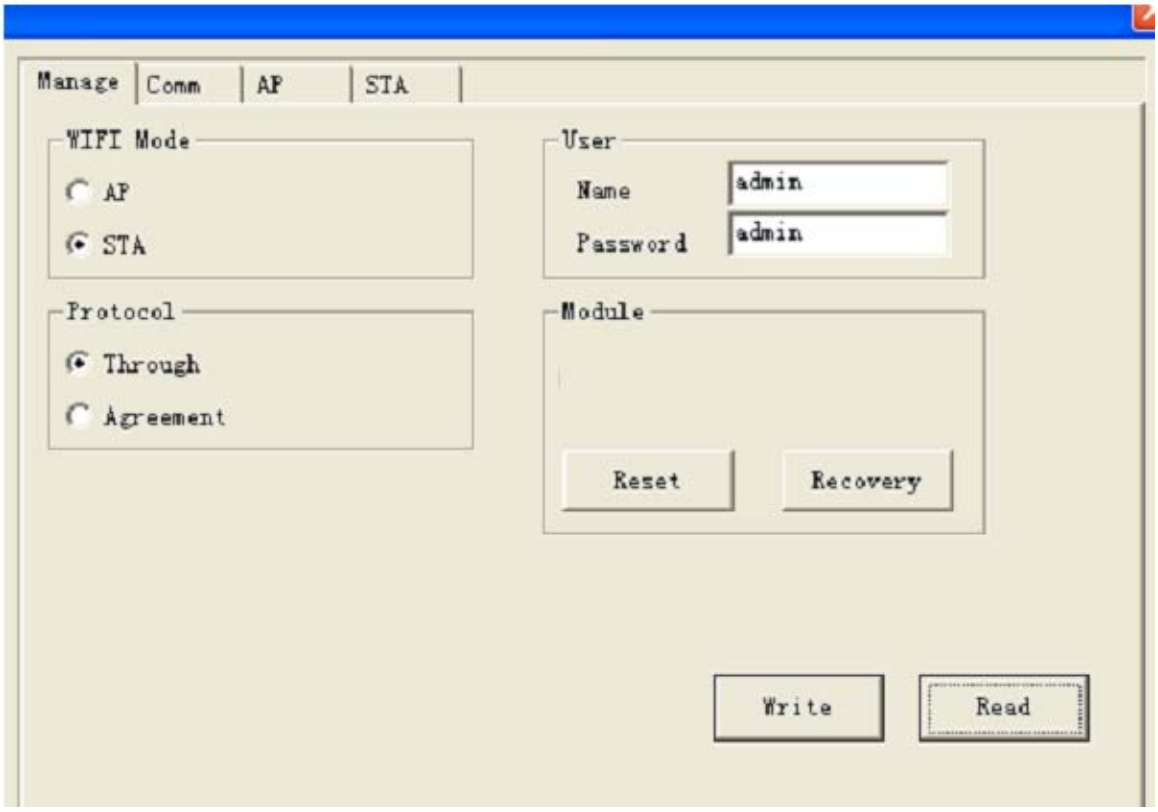
3. Click the menu "Tools-> wifi

params” 

4.Click the “Connect” button, and wait about 30 seconds.



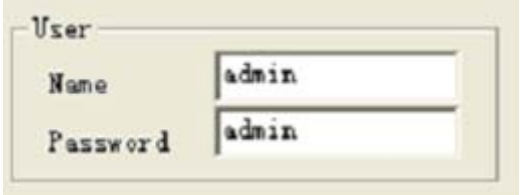
5.Read kinds of parameters as follows and click write button to set into the wifi module.



Manage item:

This page use to setting the module working mode (Transparent Transmission or Agreement Transmission) and wireless networking mode (AP and STA mode).

Please select “Through”, “Agreement” is not available for WIFI CPU.



This is the name and password for the web configuration.

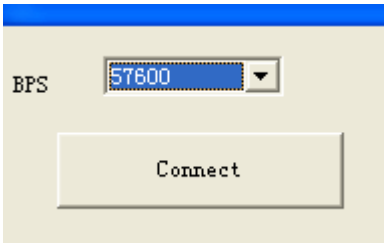
Reset button, click it, the wifi module in the CPU will be reset once.

Recover button, click it the wifi module will be recovery, and the baud rates will be set from 57600 to 9600 by eSmsConfig.exe automatically.

Note:

1. We need set baurates in the wifi module 9600, and then the communication between the wifi module and the EXM CPU will be established, but by the default setting with the HF-A11 factory is57600.

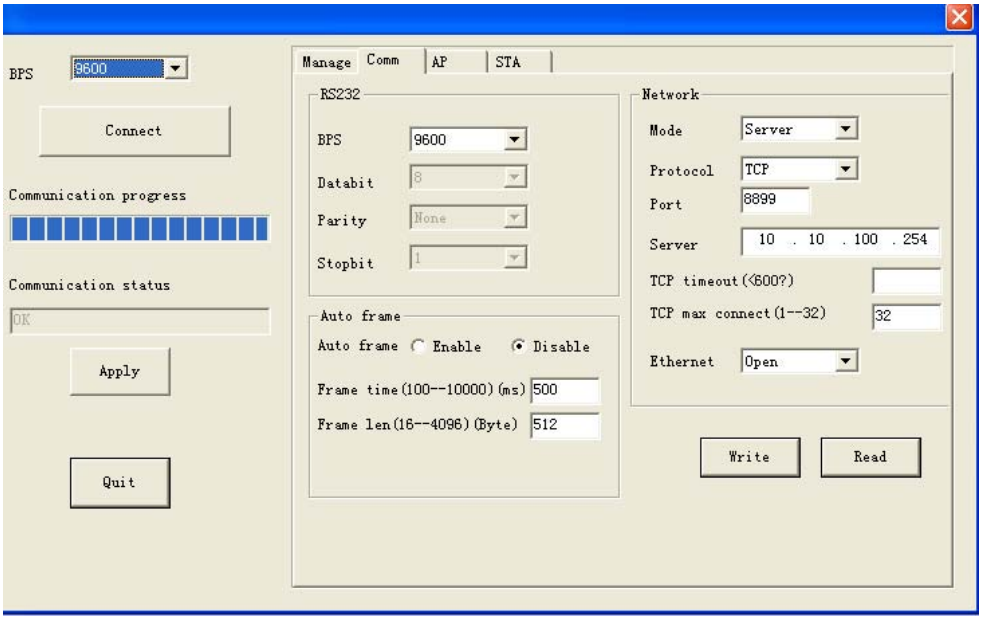
2.After you click the "Recovery" button, please wait about 20s, and then connect the wifi module by clicking the "Connect" button again or exit the settings dialog box, otherwise the baud rates of the wifi module will stay with "57600", so when you want to connect to the wifi module, you must select "57600".



Read the configuration from the wifi module by clicking "Read" button. Such operation only can get the information on the current page.

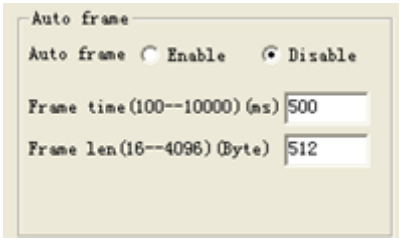
Write the configuration into the wifi module. Such operation only can set the configuration in to wifi module on the current page.

Comm item:



Set the serial parameters for the communication between wifi module and the EXM CPU.

Please select “9600”, other settings would be unavailable.



Please keep the default settings, do not change.

Disable “Auto frame”.

Network settings:

Mode：Server/client

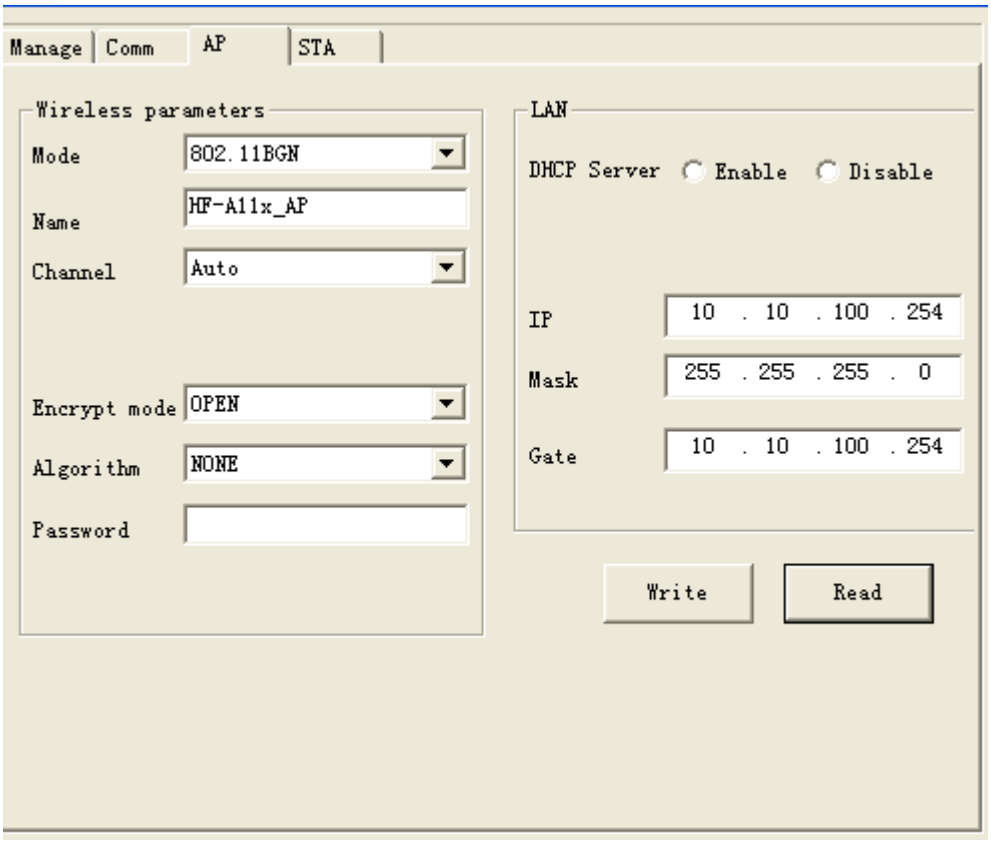
Protocol: TCP

Port number：when mode is server, such port is for local host, when mode is client, such port is for remote host.

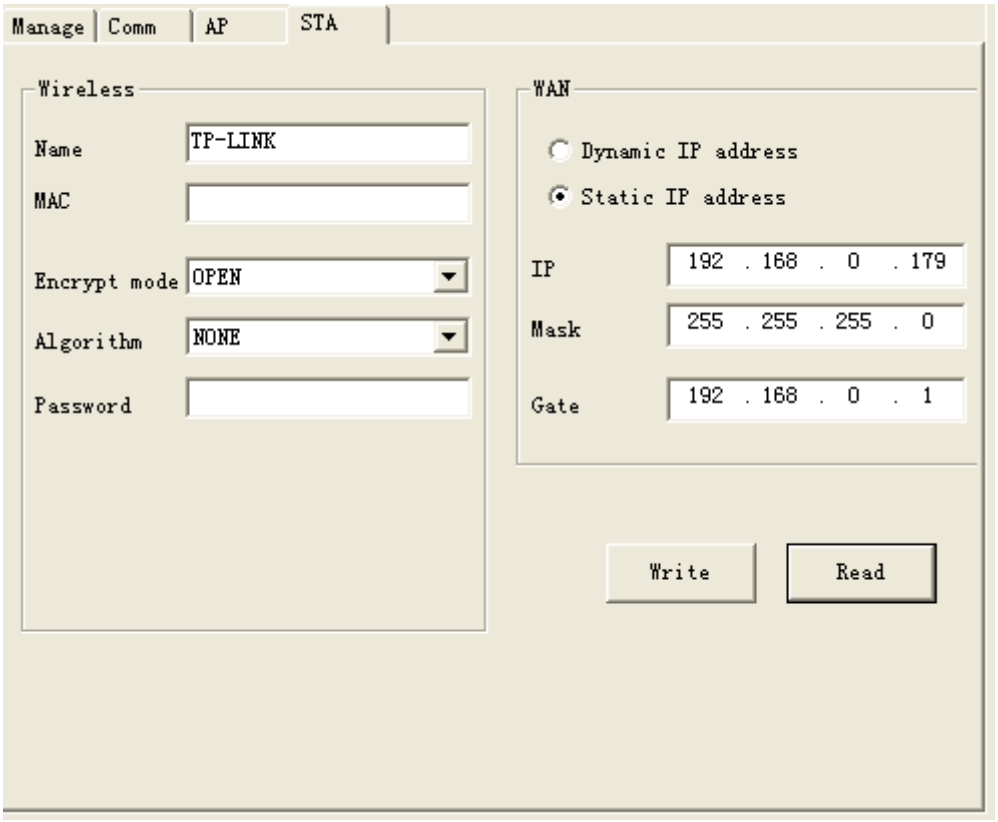
Server Ip address: When mode is client, the remote host IP address need set in here.

The default settings of HF-A11 is closed, if you want to use the LAN port, please select open.

AP setting item



STA item



Wireless

Name: the name of the destination router

MAC: MAC address of the the destination router

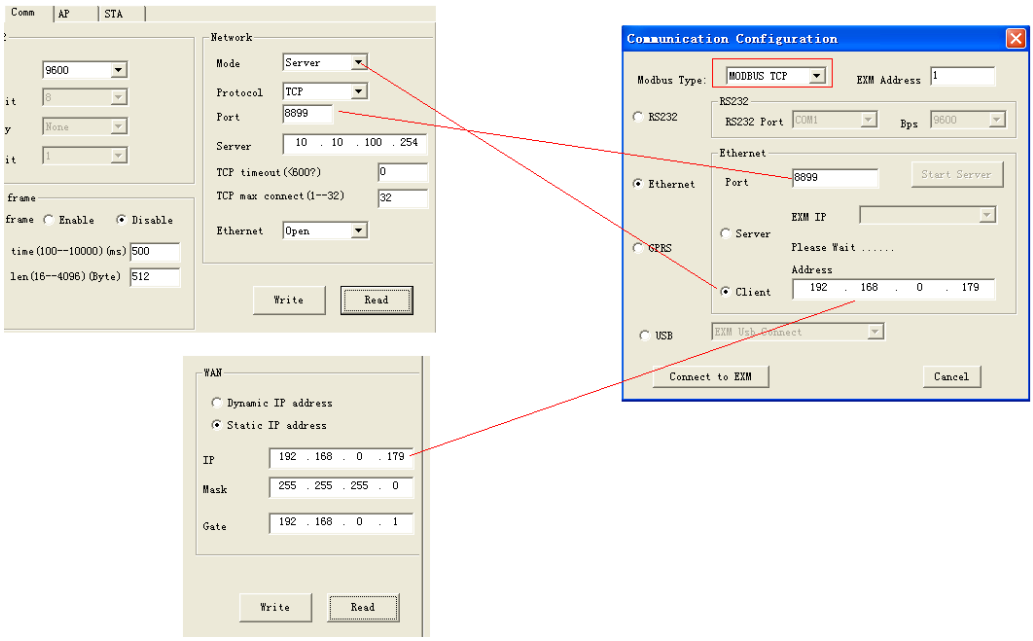
Password settings

WAN

IP address settings.

Two communication modes available:

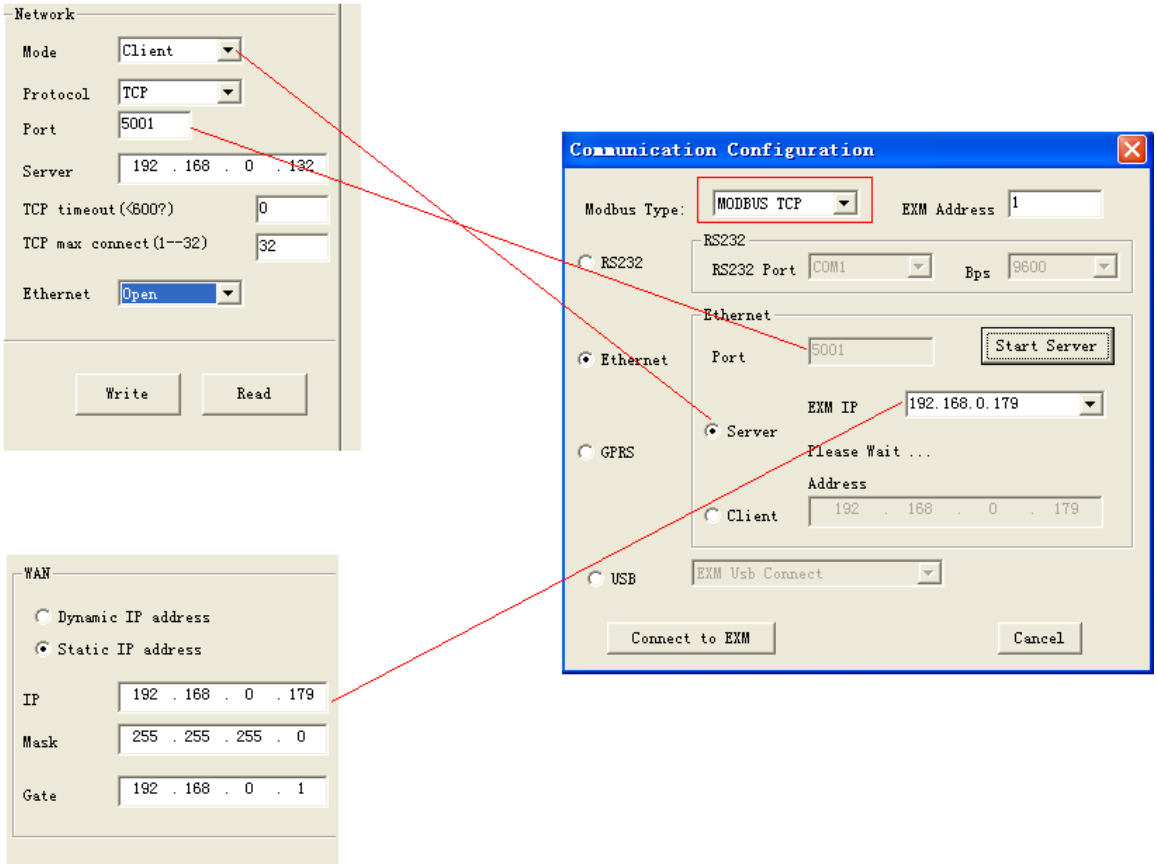
B. EXM WIFI unit works as server, eSmsConfig works as client.



WIFI parameter settings communication parameters in eSmsConfig

Note: The modbus type must be MODBUS TCP.

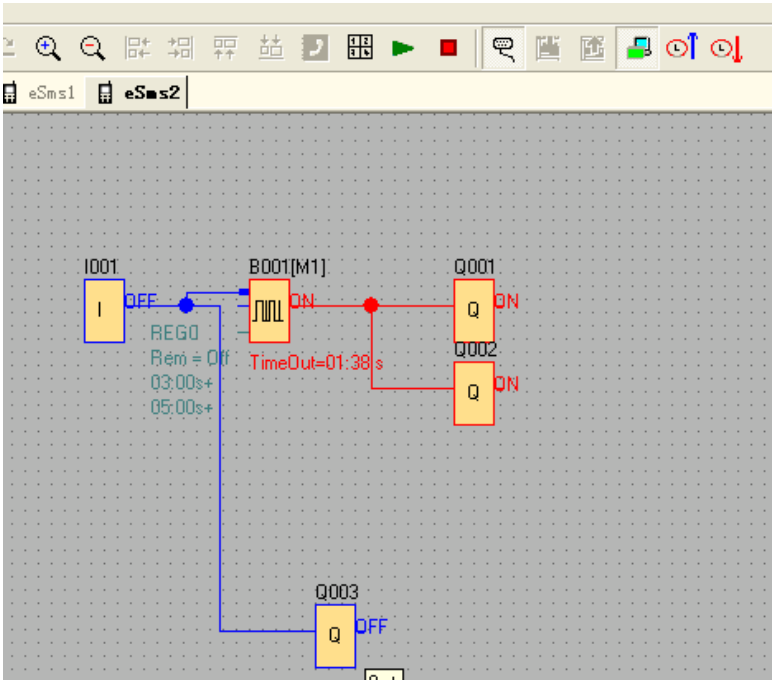
B. EXM WIFI unit works as client, eSmsConfig works as server.



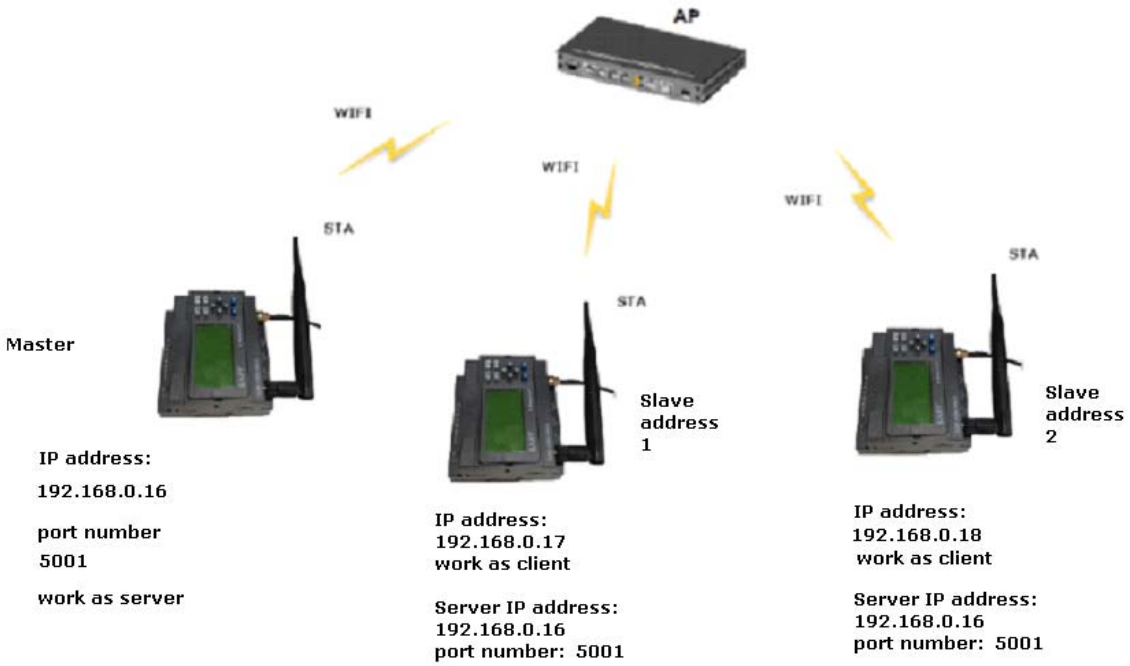
WIFI parameter settings

communication parameters in eSmsConfig

After the connection is established between EXM WIFI CPU, and then you can download/upload program, monitoring the registers by eSmsConfg.exe,



8.6 How to configure WIFI connection (TCP protocol) among EXM WIFI CPUs?



Step1: we must establish the TCP connection among the EXM WIFI CPUs, take an example as above figure shows, The wifi module are all working on STA mode.

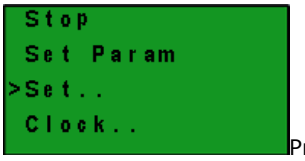
The master EXM cpu works as a server, and slave1 and slave2 are working as client.

Regarding the settings of the WIFI parameters, you can the pre-chapter for detail.

Because of the default address of EXM CPU is 1, you need also to change the Slave 2 address to 2 by panel key or the menu via Tools-> transfer-> Set EXM address.

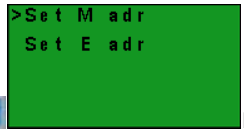
Change the address by panel key.

Press Esc ,and then press

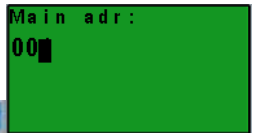


Press Ok

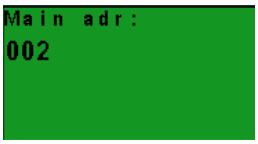
Press Ok



Press Ok



Change address with UP or DOWN button and confirm with OK.



Step2: Program in the eSmsConfig.exe.

Example

Regarding the program. We need realize the below logic.

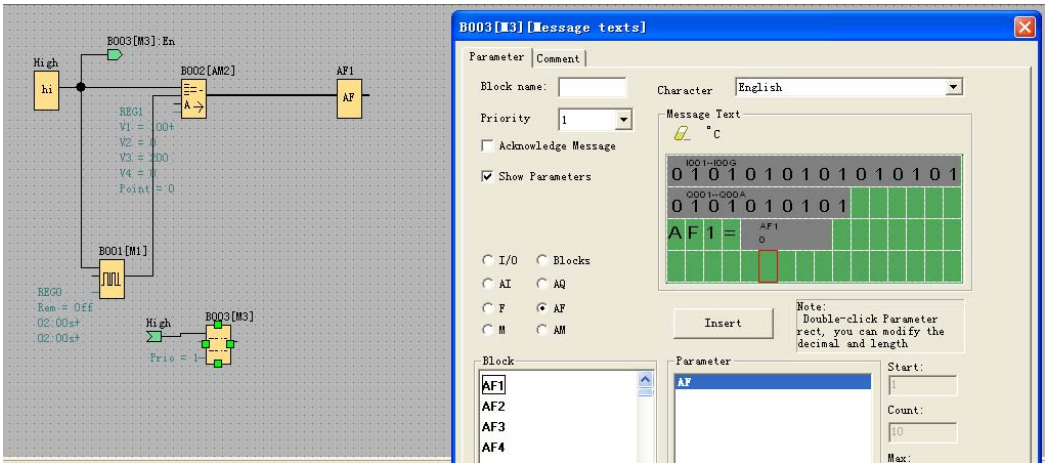
1.I1--I4 in master to control the Q1--Q4 in slave1&salve2, if I1 is ON in master, the corresponding Q1 in salves is ON; I2 is ON in master, the corresponding Q2 in salves is ON;....I4 is On in master, the corresponding Q4 in salves is ON. If I1 is OFF in master, the corresponding Q1 in salves is OFF.....I4 is OFF in master, the corresponding Q4 in salves is OFF.

2. Read the Inputs I1--I4 status of slave 1 to control the F11--F13 in master; Read the Inputs I1--I4 status of slave 2 to control the F21--F23.

3. Read the AF1 value of slave1 to be saved in the AF1 of master; Read AF1 value of slave2 to be saved in AF2 of master.

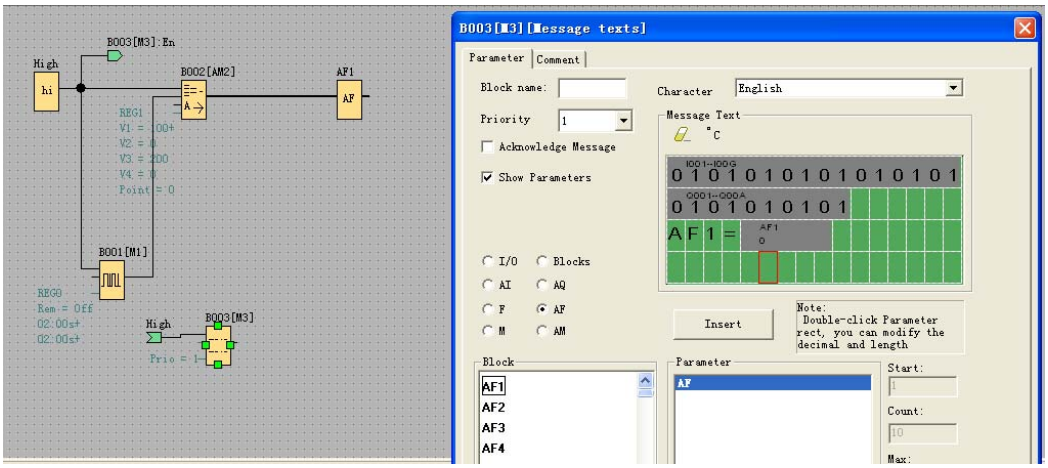
Program in slave 1

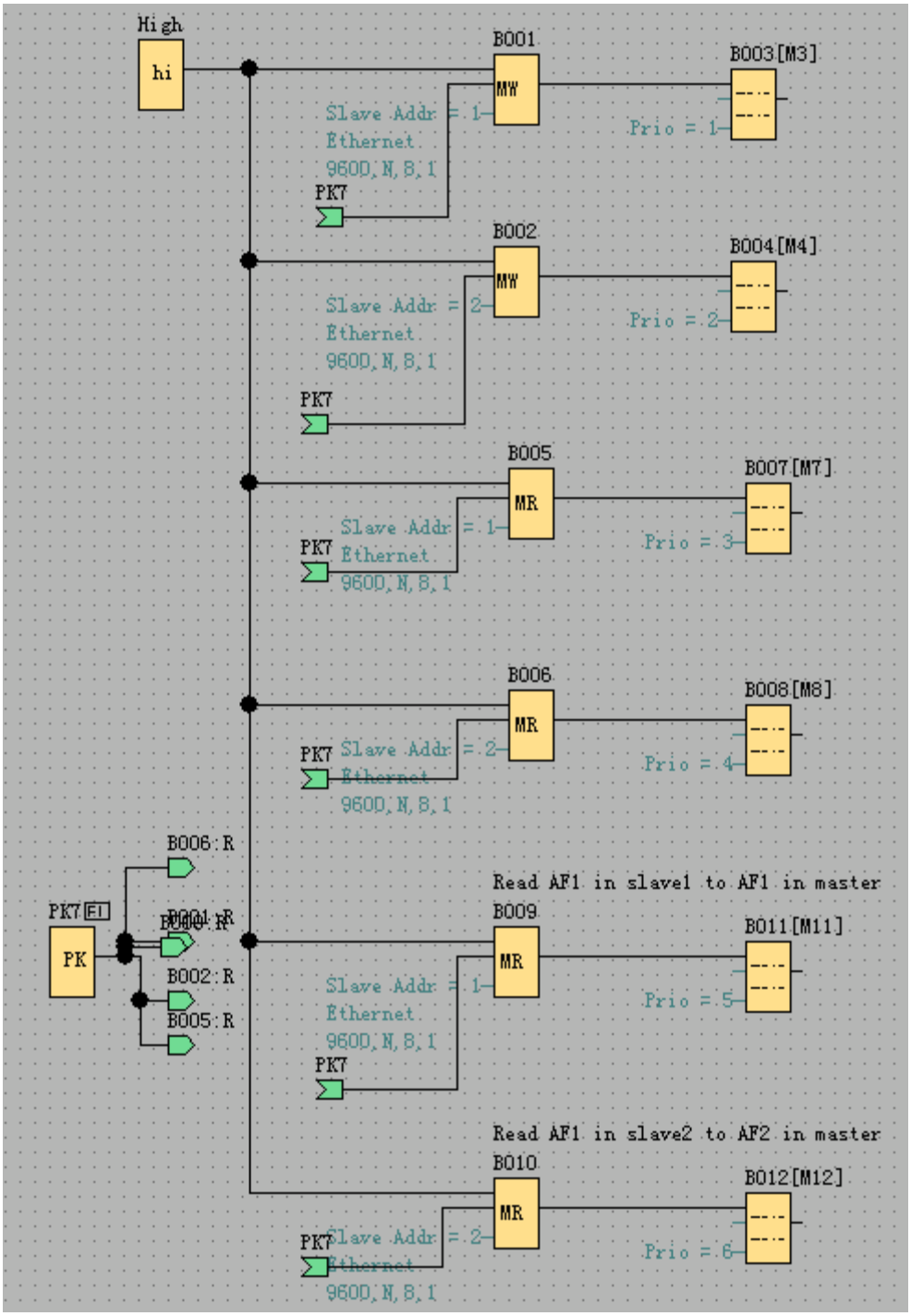
(Note: In the program, you can put the input/output block in, but you cannot link the input pin of the output)



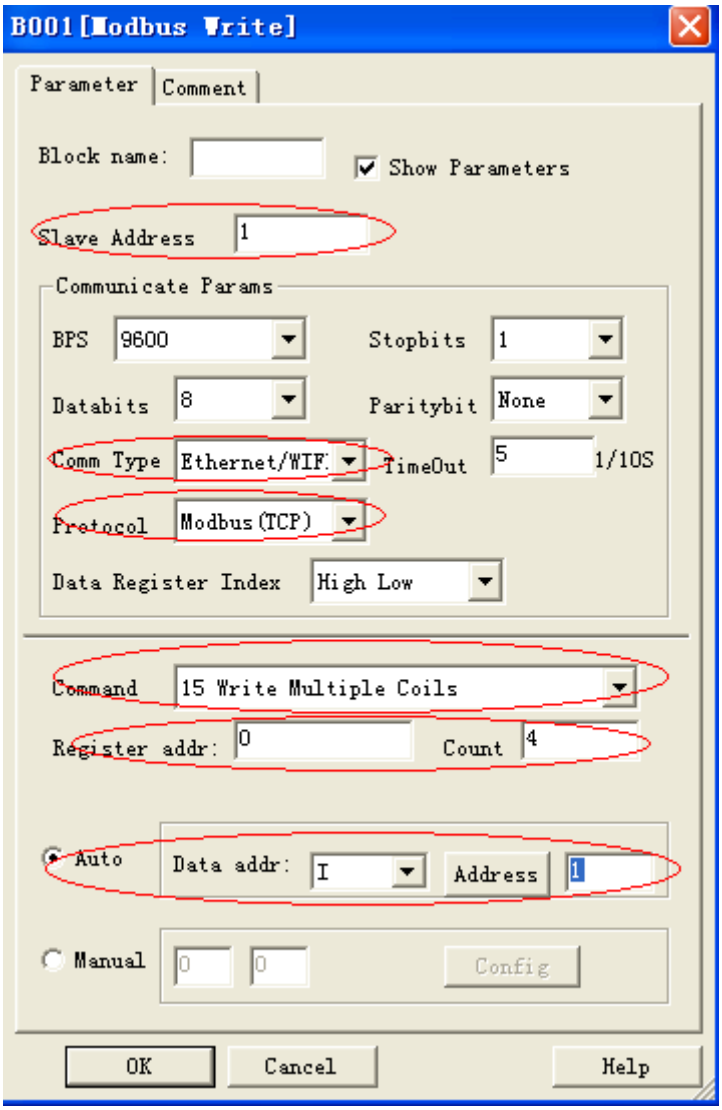
Program in slave 2

(Note: In the program, you can put the input/output block in, but you cannot link the input pin of the output)

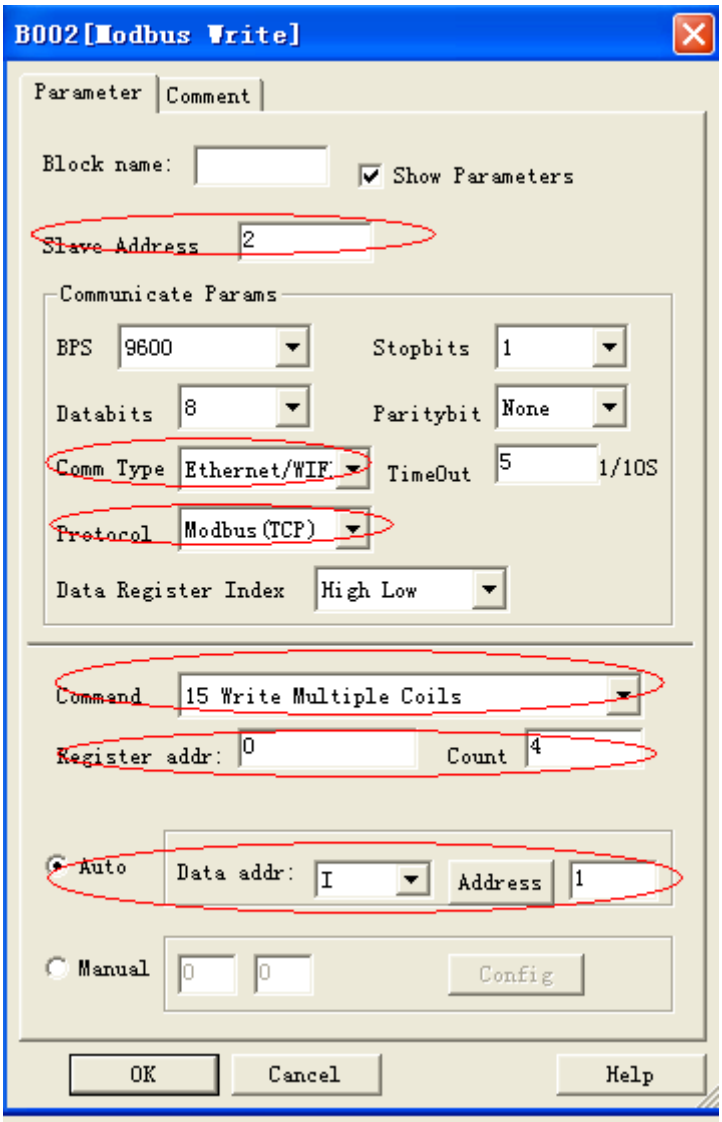




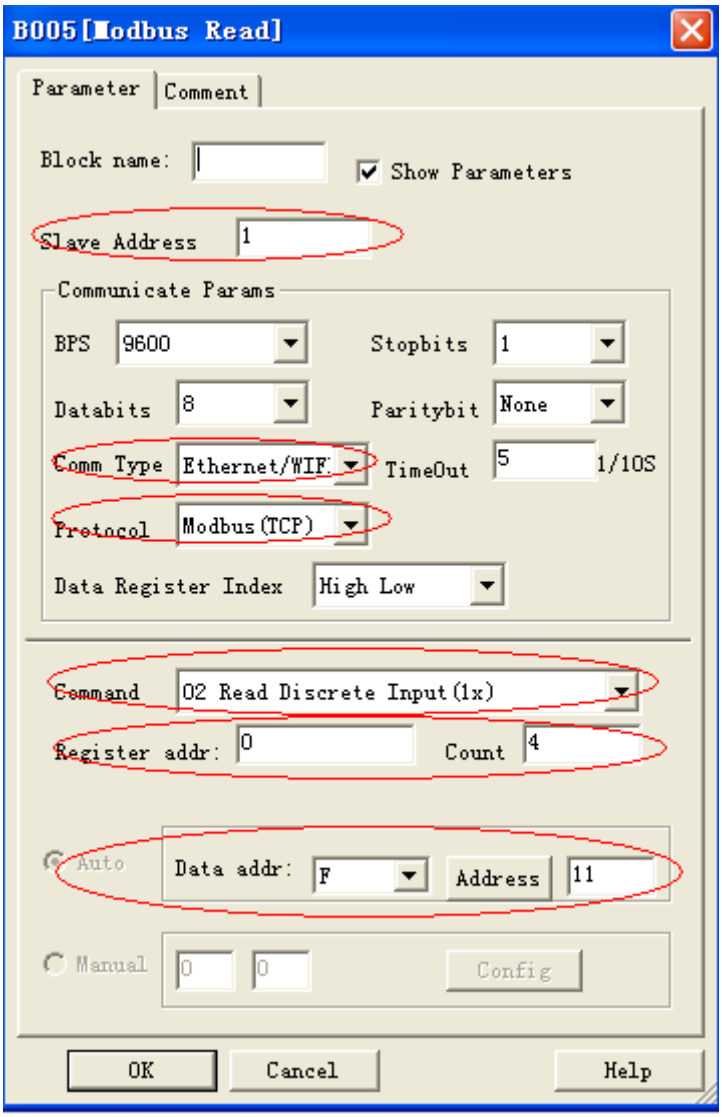
B001: Transfer the I1--I4 status from the master to the Q1-Q4 of the slave1. Setting as follows:



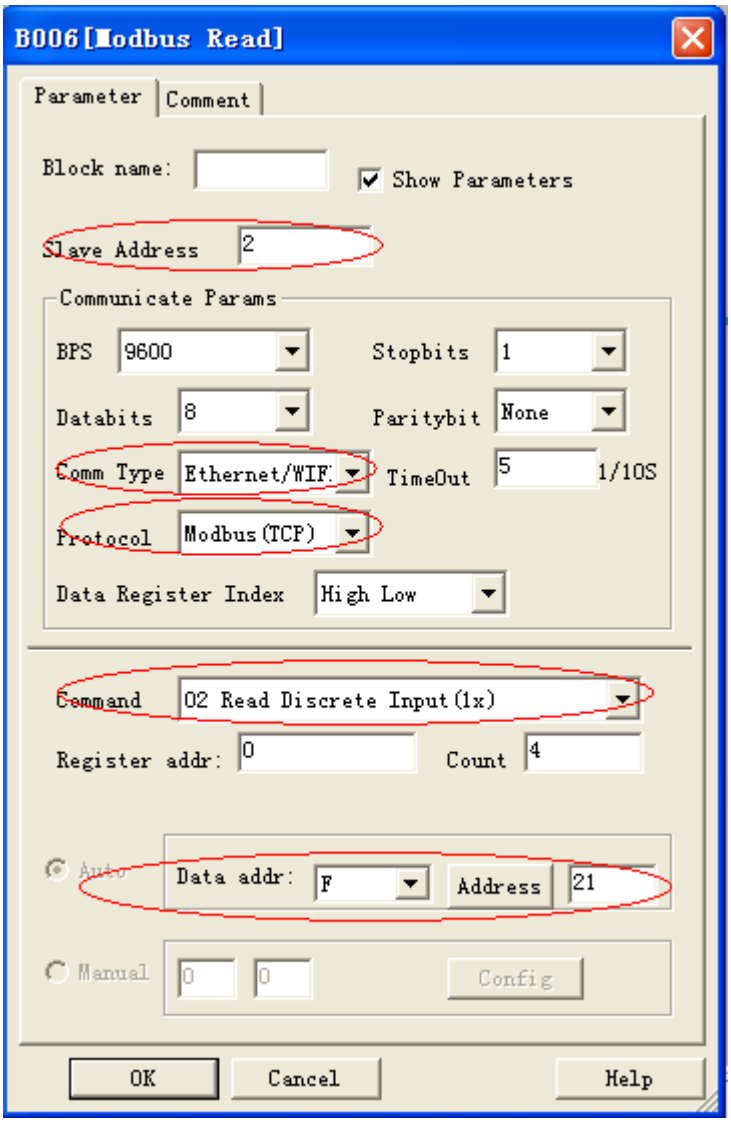
B002: Transfer the I1--IA status from the master to the Q1-QA of the slave2. Setting as follows:



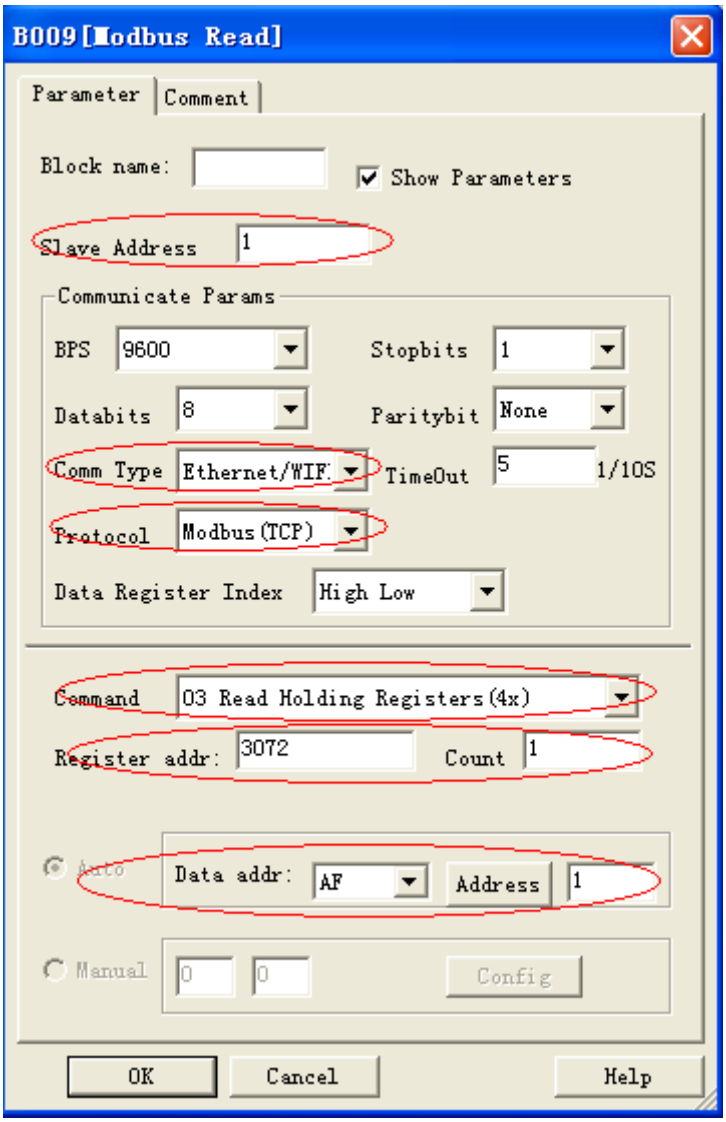
B005: Read the I1--I4 status from the slave1 to the F11-F13 of the master. Setting as follows:



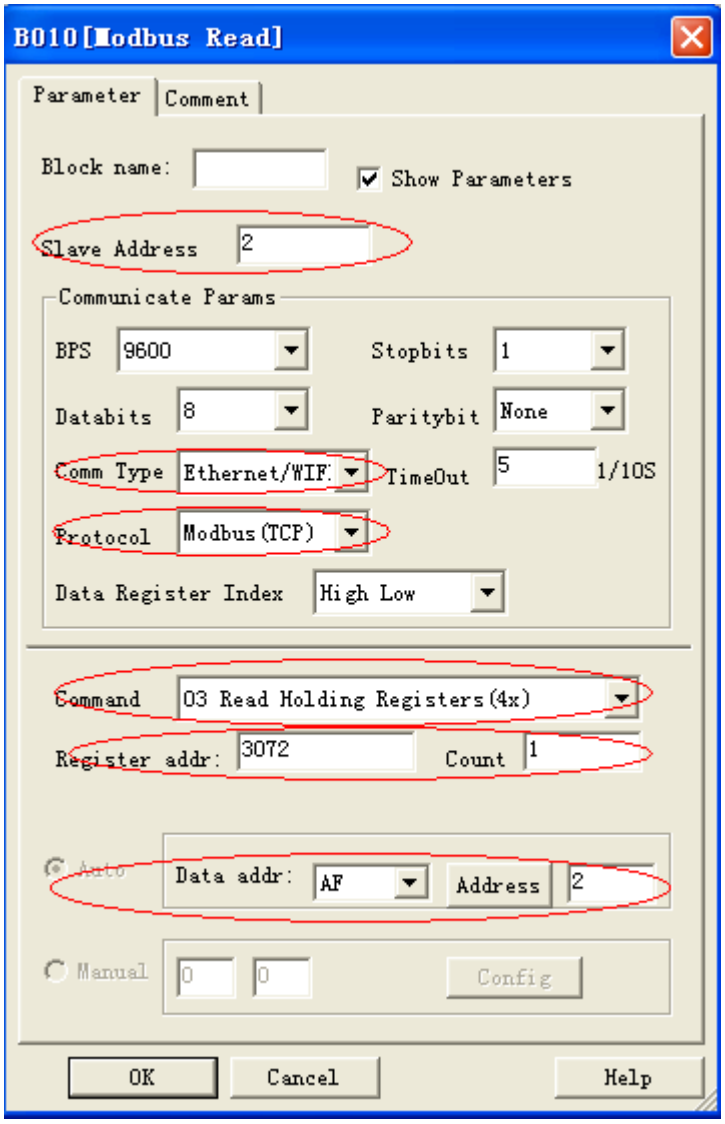
B006: Read the I1--I4 status from the slave2 to the F21-F23 of the master. Setting as follows:



B009: Read the AF1 value from the slave1 to the AF1 of the master. Setting as follows:



B010: Read the AF1 value from the slave2 to the AF2 of the master. Setting as follows:


B010[Modbus Read]
Parameter
Comment
Block name:
Show Parameters
Slave Address
2
Communicate Params
BPS
9600
Stopbits
1
Databits
8
Paritybit
None
Comm Type
Ethernet/WIF
TimeOut
5
1/10S
Protocol
Modbus(TCP)
Data Register Index
High Low
Command
03 Read Holding Registers(4x)
Register addr:
3072
Count
1
Auto
Data addr:
AF
Address
2
Manual
0
0
Config
OK
Cancel
Help

Appendix

A Technical data

CPU Model	EXM-8AC-R	EXM-8AC-R-V	EXM-8AC-R-N
Power	AC 110-240V		
Input	6 digital		
Analog input	No		
Permissible range with signal "0" with signal "1" Input current	85 ... 265 V AC Max.40 V AC 0.03 mA Max. 79 V AC, 0.08 mA		
Output	2 relays		
Continuous current	10 A with resistive load;2 A with inductive load		
Short-circuit protection	External fuse required		
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	No		
High speed input	No		
SMS	Yes		
Voice alarming	No	*Speaker built-in or telephone voice alarming*	*No*
GPRS	Yes		
Camera interface	No	No	No
Ethernet interface	No	*No*	*Yes*
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII	*Modbus RTU/ASCII*	*Modbus RTU/ASCII/TCP*
Expansion	Yes	Yes	Yes
Alarming mode	SMS, Ring	*SMS, Ring, Speaker/Telephone voice*	
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
Telephone crystal plug	No	No	No
E-mail	Yes	Yes	Yes

CPU model	EXM-12DC-D-R	EXM-12DC-D-R-V	EXM-12DC-D-R-N
Power	DC 12--24V		
Input	8 digital		
Analog input	No		
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max. 8 V DC,1.5 mA		
Output	4 relays		
Continuous current	10 A with resistive load;2 A with inductive load		
Short-circuit protection	External fuse required		
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	No		
High speed input	I7,I8 (60KHZ)		
SMS	Yes		
Voice alarming	no	Speaker built-in or telephone voice alarming	No
GPRS	Yes		
Camera interface	No		
Ethernet interface	No	No	Yes
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII	Modbus RTU/ASCII	Modbus RTU/ASCII/TCP
Expansion	Yes	Yes	Yes
Alarming mode	SMS, Ring	SMS, Ring, Speaker/Telephone voice	
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
E-mail	Yes	Yes	Yes

CPU model	EXM-12DC-DA-R	EXM-12DC-DA-R-V	EXM-12DC-DA-R-N
Power	DC 12--24V		
Input	4 digital/ 4 analog +4 digital		
Analog input	4 analog(0…10V)		
Permissible range with signal “0” with signal “1” Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA		
Output	4 relays		
Continuous current	10 A with resistive load;2 A with inductive load		
Short-circuit protection	External fuse required		
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	No		
High speed input	I7,I8 (60KHZ)		
SMS	Yes		
Voice alarming	no	Speaker built-in or telephone voice alarming	No
GPRS	Yes		
Camera interface	No		
Ethernet interface	No	No	Yes
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII	Modbus RTU/ASCII	Modbus RTU/ASCII/TCP
Expansion	Yes	Yes	Yes
Alarming mode	SMS, Ring	SMS, Ring, Speaker/Telephone voice	
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
Telephone crystal plug	no	no	no
E-mail	Yes	Yes	Yes

CPU model	EXM-12DC-D-TN	EXM-12DC-D-TN-V	EXM-12DC-D-TN-N
Power	DC 12--24V		
Input	8 digital		
Analog input	No		
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA		
Output	4 transistors(PNP)		
Continuous current	0.3A		
Short-circuit protection	External fuse required		
Switching frequency	10Hz		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	333HZ(Q3,Q4)		
High speed input	I7,I8 (60KHZ)		
SMS	Yes		
Voice alarming	no	Speaker built-in or telephone voice alarming	No
GPRS	Yes		
Camera interface	No		
Ethernet interface	No	No	Yes
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII	Modbus RTU/ASCII	Modbus RTU/ASCII/TCP
Expansion	Yes		
Alarming mode	SMS, Ring	SMS, Ring, Speaker/Telephone voice	
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
Telephone crystal plug	no	no	no
E-mail	Yes	Yes	Yes

CPU model	EXM-12DC-DA-TN	EXM-12DC-DA-TN-V	EXM-12DC-DA-TN-N
Power	DC 12--24V		
Input	4 digital/4 analog+4 digital		
Analog input	4 analog (0…10V)		
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA		
Output	4 transistors(PNP)		
Continuous current	0.3A		
Short-circuit protection	External fuse required		
Switching frequency	10Hz		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	333HZ(Q3,Q4)		
High speed input	I7,I8 (60KHZ)		
SMS	Yes		
Voice alarming	no	Speaker built-in or telephone voice alarming	No
GPRS	Yes		
Camera interface	No	No	No
Ethernet interface	No	No	Yes
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII	Modbus RTU/ASCII	Modbus RTU/ASCII/TCP
Expansion	Yes	Yes	Yes
Alarming mode	SMS, Ring	SMS, Ring, Speaker/Telephone voice	
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
Telephone crystal plug	no	no	no
E-mail	Yes	Yes	Yes

CPU model	EXM-12DC-DAI-R	EXM-12DC-DAI-R-V	EXM-12DC-DAI-TN
Power	DC 12--24V		
Input	2 digital/2 analog+2 analog+4 digital		
Analog input	2 analog (0…10V)+ 2 analog (0/4…20 mA)		
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA		
Output	4 Relay		4 transistors(PNP)
Continuous current	10 A with resistive load; 2 A with inductive load		0.3 A
Short-circuit protection	External fuse required		
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load		10 HZ
RTC（real time clock）	Yes		Yes
LCD panel	optional		
PWM output	No		333HZ(Q3,Q4)
High speed input	I7,I8 (60KHZ)		
SMS	Yes		
Voice alarming	no	Speaker built-in or telephone voice alarming	no
GPRS	Yes		
Ethernet interface	No	No	No
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII	Modbus RTU/ASCII	Modbus RTU/ASCII
Expansion	Yes	Yes	Yes
Alarming mode	SMS, Ring	SMS, Ring, Speaker/Telephone voice	SMS, Ring
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
E-mail	Yes	Yes	Yes

CPU model	EXM-12DC-DA-R-VN	EXM-12DC-DAI-TN-V
Power	DC 12--24V	
Input	4 digital/4 analog+4 digital	2 digital/2 analog+2 analog +4 digital
Analog input	4 analog (0…10V)	2 analog (0…10V)+ 2 analog (0/4…20 mA)
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA	
Output	4 Relay	4 transistors(PNP)
Continuous current	10 A with resistive load; 2 A with inductive load	0.3 A
Short-circuit protection	External fuse required	
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load	10 HZ
RTC（real time clock）	Yes	Yes
LCD panel	optional	
PWM output	No	333HZ(Q3,Q4)
High speed input	I7,I8 (60KHZ)	
SMS	Yes	
Voice alarming	Speaker built-in or telephone voice alarming	
GPRS	Yes	
Camera interface	NO	No
Ethernet interface	Yes	No
Data logger	SD card socket built-in	ELC-MEMORY optional ;No SD card socket
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)	
Communication protocol	Modbus RTU/ASCII/TCP	Modbus RTU/ASCII
Expansion	Yes	
Alarming mode	SMS, Ring, Speaker/Telephone voice	
Output control	SMS , Call-In, program logic control	
25℃ RTC backup time	100 hours	
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)	
Storage temperature	– 40 ºC to+ 70 ºC	
Degree of protection	IP20	
Certification	CE	
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting	
Dimensions	W x H x D (95*90*68 mm)	
E-mail	Yes	

CPU model	EXM-6DC-PT100-R	EXM-8DC-PT100-R	
Power	DC 12--24V		
Input	3 PT100	2 PT100 + 2 digital	
Analog input	3 PT100 (Range:-50 ºC --200 ºC)	2 PT100 (Range:-50 ºC --200 ºC)	
Permissible range with signal "0" with signal "1" Input current		10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA	
Output	3 Relay	4 Relay	
Continuous current	10 A with resistive load;2 A with inductive load		
Short-circuit protection	External fuse required		
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	No		
High speed input	No		
SMS	Yes		
Voice alarming	No		
GPRS	Yes		
Camera interface	No		
Ethernet interface	No		
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232, 1 RS485(expansion port)		
Communication protocol	Modbus RTU/ASCII		
Expansion	No	No	
Alarming mode	SMS, Ring		
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
Telephone crystal plug	no	no	
E-mail	Yes	Yes	

CPU model	EXM-3DC-D-R	EXM-6DC-D-R	EXM-2DC-PT100-R
Power	DC 12--24V		
Input	2 Digital	4 Digital	1 Analog
Analog input	No	No	1 PT100 (Range:-50 ºC --200 ºC)
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA		
Output	1 Relay	2 Relay	1 Relay
Continuous current	10 A with resistive load;2 A with inductive load		
Short-circuit protection	External fuse required		
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load		
RTC（real time clock）	Yes		
LCD panel	optional		
PWM output	No		
High speed input	No		
SMS	Yes		
Voice alarming	No		
GPRS	No		
Camera interface	No		
Ethernet interface	No		
Data logger	ELC-MEMORY optional ;No SD card socket		
Communication port	1 B type USB(optional), 1 RS232		
Communication protocol	Modbus RTU/ASCII		
Expansion	No	No	No
Alarming mode	SMS, Ring		
Output control	SMS , Call-In, program logic control		
25℃ RTC backup time	100 hours		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to+ 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	W x H x D (95*90*68 mm)		
Telephone crystal plug	no	no	no
E-mail	No	No	No

Extension model	ELC12-E-8AC-R	ELC12-E-8DC-DA-R	ELC12-E-8DC-DA-TN	ELC12-E-8DC-DA-TP
Inputs	4 digital	4 digital	4 digital	4 digital
of which can be used in analog mode	none	4 (0 to 10V)	4 (0 to 10V)	4 (0 to 10V)
Input/supply voltage	110-240V AC	12-24V DC	12-24V DC	12-24V DC
Permissible range with signal "0" with signal "1" Input current	85 ... 265 V AC 100 ... 253 V DC max. 40 V AC 0.03 mA min. 79 V AC, 0.08 mA	10.8 V ... 28.8 V DC max. 3 V DC,1mA min. 8 V DC,1.5 mA	10.8 V ... 28.8 V DC max. 3 V DC, 1mA min. 8 V DC,1.5 mA	10.8 V ... 28.8 V DC max. 3 V DC, 1mA min. 8 V DC,1.5 mA
Outputs	4 relays	4 relays	4 transistors(PNP)	4 transistors(NPN)
Continuous current	10 A with resistive load; 2 A with inductive load	10 A with resistive load; 2 A with inductive load	0.3 A	0.3 A
Short-circuit protection	External fuse required			
Switching frequency	2 Hz with resistive load; 0.5 Hz with inductive load	2 Hz with resistive load; 0.5 Hz with inductive load	2 Hz	2 Hz
Connection cables	2 x 1.5 mm^2 or 1 x 2.5 mm^2			
Ambient temperature	-20 ºC to + 55 ºC			
Storage temperature	– 40 ºC to + 70 ºC			
Degree of protection	IP20			
Certification	CE			
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting			
Dimensions	(W X H X D) 48 x 90 x 64 mm			

Extension model	ELC12-E-PT100	ELC12-E-AI-I	ELC12-E-AQ-V	ELC12-E-AQ-I
Inputs	2 PT100	4 Analog	None	None
of which can be used in analog mode	2 PT100 (Range: -50 ºC --200 ºC)	4 (0 /4...20mA)	None	None
Input/supply voltage	12-24V DC	12-24V DC	15-24V DC	12-24V DC
Outputs	None	None	2 (DC 0...10V)	2(0/4...20mA)
Short-circuit protection	External fuse required			
Connection cables	2 x 1.5 mm² or 1 x 2.5 mm²			
Ambient temperature	-20 ºC to + 55 ºC			
Storage temperature	– 40 ºC to + 70 ºC			
Degree of protection	IP20			
Certification	CE			
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting			
Dimensions	(W X H X D) 48 x 90 x 64 mm			

Extension model	ELC12-E-8AC-DI	ELC12-E-8DC-DI	EXM-E-RS485
Inputs	8 digital	8 digital	
of which can be used in analog mode	none	none	none
Input/supply voltage	110-240V AC	12-24V DC	12-24V DC
Permissible range with signal "0" with signal "1" Input current	85 ... 265 V AC 100 ... 253 V DC max. 40 V AC 0.03 mA min. 79 V AC, 0.08 mA	10.8 V ... 28.8 V DC max. 3 V DC, 1mA min. 8 V DC,1.5 mA	Isolated 485 converter, used to bring out the terminals of RS485 port built-in EXM-12 series CPU for connection with third party devices.
Outputs	none	none	
Continuous current			
Short-circuit protection	External fuse required	External fuse required	External fuse required
Switching frequency	none	none	
Connection cables	2 x 1.5 mm² or 1 x 2.5 mm²		
Ambient temperature	-20 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)		
Storage temperature	– 40 ºC to + 70 ºC		
Degree of protection	IP20		
Certification	CE		
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting		
Dimensions	(W X H X D) 48 x 90 x 64 mm		

Accessories	
ELC-CB-B	Extended connection cable between x-Messenger CPU &Extension modules, 3-meter standard length
Program Copier (ELC-Copier)	Program Copier can be used for mass program production from CPU to CPU.
Data-logger (ELC-MEMORY)	Data-logger is a data logging devices with a mini-SD card for x-Messenger's 12-points CPUs, specific production or process data(such as I/O status, analog values, register values etc)can be saved in SD card of Data-logger to either read it with a PC or evaluate it from the SD card at the work station. It's good for data analysis. SD card capacity up to 2GB.
ELC-RS232	RS232 communication cable between PC and x-Messenger CPUs
ELC-USB	USB communication cable between PC and x-Messenger CPUs
EXM-USB-B	USB communication cable between PC and x-Messenger CPUs with B-type USB port

CPU model	EXM-12DC-DA-RT-WIFI	EXM-12DC-DA-RT-GWIFI
Power	DC 12--24V	
Input	4 digital/4 analog+4 digital	
Analog input	4 analog (0…10V) AI1-AI4	
Permissible range with signal "0" with signal "1" Input current	10.8 V ... 28.8 V DC Max. 3 V DC,1mA Max.8 V DC,1.5 mA	
Output	2 Relay(10A)+ 2transistors(PNP)/0.3A	
Short-circuit protection	External fuse required	
Switching frequency	Relay: 2 Hz with resistive load; Transistor : 1KHZ 0.5 Hz with inductive load	
WIFI modem	Yes	
RTC（real time clock）	Yes	
LCD panel	Yes	
PWM output	1K HZ(Q3,Q4)	1K HZ(Q3,Q4)
High speed input	I7,I8 (60KHZ)	
SMS	NO(no GSM modem built-in)	YES
GPRS	NO(no GSM modem built-in)	YES
Ethernet interface	YES	YES
Data logger	With ELC-Memory	With ELC-Memory
Communication port	1 RS232, 1 RS485(expansion port), 1 Ethernet/WIFI	
Communication protocol	Modbus RTU/ASCII/TCP	Modbus RTU/ASCII/TCP
Expansion	Yes (ELC12-E series expansion and EXM-E-RS485 communication modules are available)	
Alarming mode	No	SMS, Ring
Output control	program logic control	SMS , Call-In, program logic control
25℃ RTC backup time	100 hours	
Ambient temperature	0 ºC to + 55 ºC (LCD display /refresh reaction speed shall be slow at -20 ºC , response time :3s)	
Storage temperature	– 40 ºC to+ 70 ºC	
Degree of protection	IP20	
Certification	CE	
Mounting	On 35 mm standard mounting rail, 4 MW, or wall-mounting	
Dimensions	W x H x D (95*90*68 mm)	
E-mail	NO	Yes

REVISION RECORD

Revision	Description
2012.9.25	EXM-12DC-DAI-R/TN CPU Inputs: 2digital/analog+2 analog+4 digital AI3 &AI4 can only be used as analog inputs with 0/4..20mA analog signal
2012.12.15	Chapter 7.2.15 More detailed description about the "GPRS data upload" had been added! Chapter 3.3.1.3: " how to change phone number in SMS message input and output block" had been modified. Chapter 7.5.38 Detailed description on "Word to bit" had been added .
2013.1.25	Chapter 3.3.1.4 How to modify the PIN via SMS had been added (Firmware version V35) Chapter 3.3.1.5 How to modify the GPRS Parameters and Email parameters via SMS had been added.(Firmware version V35) Chapter 3.3.1.6 How to modify the email address of the receiver via SMS had been added.(Firmware version V35) Chapter 7.5.18.1 How to change parameters of blocks in displayed message ?
2013.2.4	Modify Chapter 3.3.1.6 How to modify the email address of the receiver via SMS? SMS format "TEL" to "EML". "How to modify the all the receiver number of sms message input/output blocks in the program ? " added in chapter 3.3.1.3 How to modify the all the receiver E-mail address of sms message output blocks in the program ? Added in chapter 3.3.1.6
2013.2.7	Chapter 7.13 How to prevent your program from being copied/stolen? Had been added.
2013.5.21	Chapter 3.3.3 user should enter a four-digit password (or less) within 10 seconds, Modification: deleted the "or less", because the password must be a four-digit password.
2013.8.20	Chapter 3.3.4 Ethernet Interface. Regarding how to use the EXM CPU with ethernet module had been added Following new function blocks had been added. 7.5.39 Bit to Word 7.5.40 Device Reset 7.5.41 Comport Status 7.5.42 Analog filter 7.5.43 Max/Min 7.5.44 Average value 7.5.45 Astronomical clock 7.5.46 Stopwatch Regarding how to use WIFI CPUI had been added in chapter 8 Chapter 8 Description of the WIFI module built-in the EXM WIFI CPU 8.1 Functional description 8.2 OPERATION GUIDELINE 8.5 How to Configure the wifi module by the eSmsConfig.exe 8.6 How to configure WIFI connection (TCP protocol) among EXM WIFI CPUs?