Cat.No.V108-E1-03

NB-series

NB3Q-TW□□B
NB5Q-TW□□B
NB7W-TW□□B
NB10W-TW01B

Programmable Terminals

HOST CONNECTION MANUAL

OMRON

NB-series
NB3Q-TW□□B
NB5Q-TW□□B
NB7W-TW□□B
NB10W-TW01B
Programmable Terminals

Host Connection Manual

Revised August 2012

Introduction

Thank you for purchasing an NB-series Programmable Terminal.

NB-Series Programmable Terminals (PTs) are designed to handle information generated in FA production sites. Be sure to understand the functions and performances etc thoroughly before using PT correctly.

Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA systems into production facilities.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and connecting FA facilities.
- Personnel in charge of managing FA systems and facilities

General Precautions

- The user must operate the product according to the performance specifications described in the operation manuals.
- Do not use the PT touch switch input functions for applications where danger to human life or serious property damage is possible, or for emergency switch applications.
- Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.
- Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.
- This manual provides information for connecting and setting up an NB-Series PT. Be sure to read this manual before attempting to use the PT and keep this manual close at hand for reference during installation and operation.

NB-series Manuals

NB-series manuals are organized in the sections listed in the following tables. Refer to the appropriate section in the manuals as required.

Programmable Terminals Host Connection Manual (Cat. No. V108) (This Manual)

Section	Contents
Section 1 List for All PLCs Supported by NB series	This section lists all PLCs supported by NB Units.
Section 2 Connecting to SIEMENS PLCs	This section describes the connection to SIEMENS PLCs.
Section 3 Connecting to Mitsubishi PLCs	This section describes the connection to Mitsubishi PLCs.
Section 4 Connecting to Schneider PLCs	This section describes the connection to Schneider PLCs.
Section 5 Modbus Connection	This section describes the connection on Modbus protocol.
Section 6 Connecting to Delta PLCs	This section describes the connection to Delta PLCs.
Section 7 Connecting to LG PLCs	This section describes the connection to LG PLCs.
Section 8 Connecting to Panasonic PLCs	This section describes the connection to Panasonic PLCs.
Section 9 Connecting to Allen-Bradley (Rockwell) PLC	This section describes the connection to Allen-Bradley PLC.
Section 10 Connecting to PLC of GE Fanuc Automation Inc.	This section describes the connection to PLC of GE Fanuc Automation Inc.

Programmable Terminals NB-Designer Operation Manual (Cat. No. V106)

Section	Contents
Section 1 Introduction	This section provides an outline of the NB-series PTs, including their functions, features, connection types and communication methods.
Section 2 Installation and Startup of NB-Designer	This section describes how to install and start the NB-Designer.
Section 3 Functions of NB-Designer	This section describes the functions of NB-Designer.
Section 4 Functions of NBManager	This section describes the functions of NBManager.
Section 5 Maintenance and Abnormality Handling	This section describes the maintenance and check to prevent the abnormality occurrence and the handling of the abnormalities occurred in NB Unit.
Section 6 Descriptions of New Functions Added into NB□□-TW01B	This section describes the new functions added into NB□□-TW01B, the system attributes and the component attributes.
Appendices	The appendices provide lists of the NB Units, the Communication Units, the applicable PLCs, and the list of NB-Designer functions.

Programmable Terminals Setup Manual (Cat. No. V107)

Section	Contents
Section 1 Part Names and Functions	This section describes the names and functions of the various parts of an NB Unit.
Section 2 Installing the NB Unit and Connecting Peripheral Devices	This section describes the methods used to install the NB Unit and connect peripheral devices.
Section 3 System Setting Mode	This section describes the System Setting Mode.
Section 4 Calibrate Mode	This section describes the Calibrate Mode.
Appendices	The appendices provide information on specifications, dimensions, wirings, and lists of the NB Units, the applicable PLCs and options.

Programmable Terminals Startup Guide Manual (Cat. No. V109)

Section	Contents
Section 1 NB Overview	This section provide specifications of the NB Unit, describes its names and functions of the various parts.
Section 2 System Design	This section describes the manual structure, takes NB7W as an example to introduce the operation procedures of the NB system.
Section 3 Installation and Wiring	This section describes how to install and wire the NB Unit.
Section 4 Screen Creation	This section describes how to create a demonstration project through NB-Designer.
Section 5 Run	This section describes how to start running at the Host side and prepare to send screen data to NB7W.
Section 6 Maintenance and Troubleshooting	This section describes the maintenance and inspection methods for preventing errors occurring, and troubleshooting measures when errors occur.

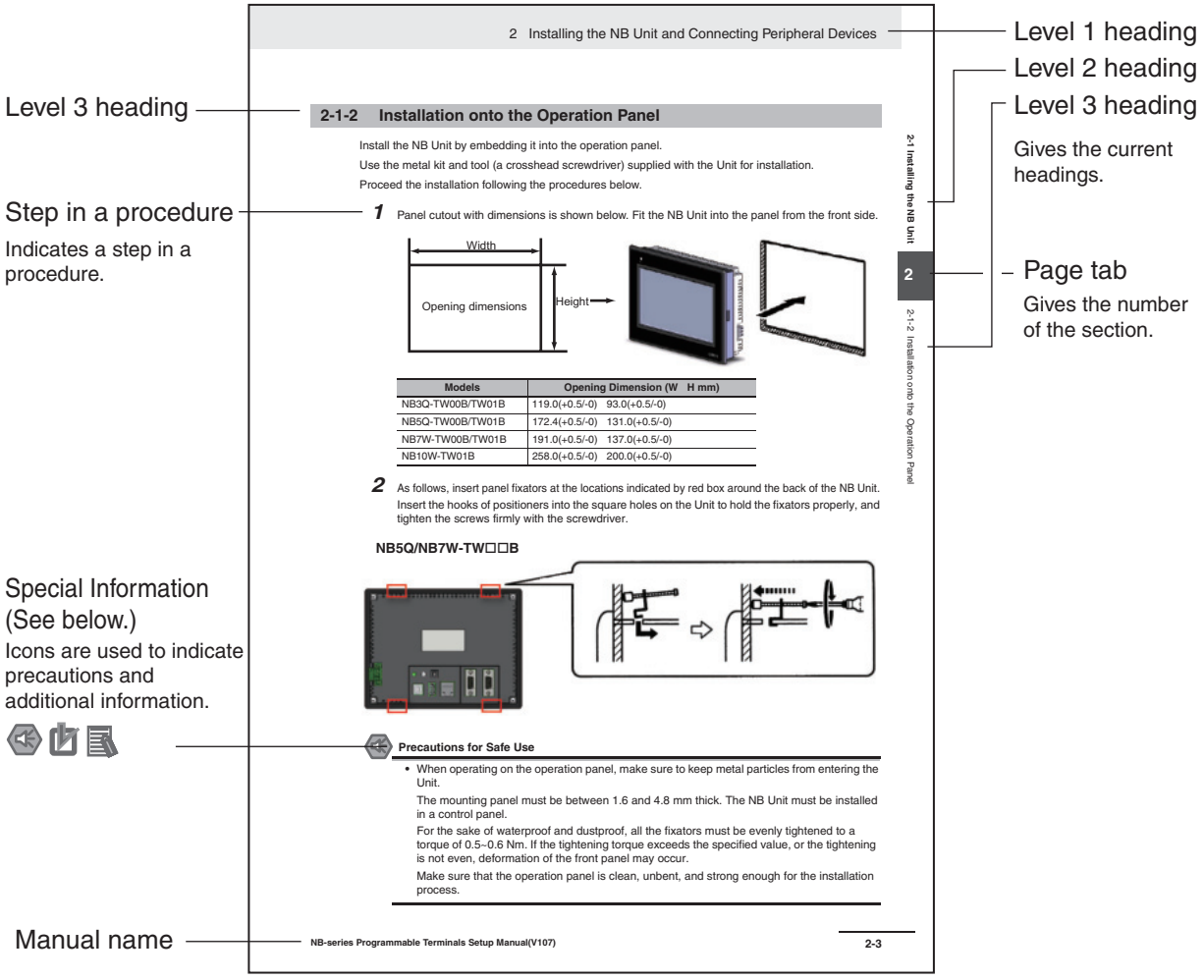
WARNING

Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Manual Structure

Page Structure and Icons

The following page structure and icons are used in this manual.



This illustration is provided only as a sample and may not literally appear in this manual.

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use
Precautions on what to do and what not to do to ensure using the product safely.

Precautions for Correct Use
Precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information
Additional information to increase understanding or make operation easier.

Terminology

The following terminology is used in this manual.

Terms	Descriptions
NB Unit	Indicates the main Unit of the products in the OMRON NB Series of Programmable Terminal.
NB Series	Indicates products in the OMRON NB□□ Series of Programmable Terminal. In this manual, unless otherwise specified, NB□□ Series is taken as the subject concerned.
PLC	Indicates a Programmable Controller.
CP Series	Indicates the following products in the OMRON CP Series of Programmable Controllers: CP1H, CP1L, CP1E
CS/CJ Series	Indicates the following products in the OMRON CS/CJ Series of Programmable Controllers: CS1G, CS1H, CS1G-H, CS1H-H, CJ1G, CJ1M, CJ2M, CJ2H
C Series	Indicates the following products in the OMRON C Series of Programmable Controllers: C200HX(-Z), C200HG(-Z), C200HE(-Z), CQM1, CQM1H, CPM1A, CPM2A, CPM2C
Serial Communication Unit	Indicates a Serial Communication Unit for an OMRON SYSMAC CS/CJ-Series PLC.
Serial Communication Board	Indicates a Serial Communication Board for an OMRON SYSMAC CS/CJ-Series PLC.
Communication Board	Indicates a Communication Board for an OMRON C200HX/HG/HE(-Z) PLC.
CPU Unit	Indicates a CPU Unit in the OMRON CP, CS/CJ or SYSMAC C Series of Programmable Controllers.
NB-Designer	Indicates the OMRON NB-Designer.
Host	Indicates the PLC and other units functioning as the control devices for NB-Series Units.
PT	Indicates an OMRON Programmable Terminal.
HMI	Indicates an OMRON Programmable Terminal.

CONTENTS

Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Safety Precautions

Notation Used for Safety Information

The following notation is used in this manual to provide precautions required to ensure safe usage of the product. The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

WARNING	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

Precautions for Safe Use
Indicates precautions on what to do and what not to do to ensure using the product safely.

Precautions for Correct Use
Indicates precautions on what to do and what not to do to ensure proper operation and performance.

Note Indicates suggestive information and precautions on operation of the product.

Symbols

- Prohibition
  Indicates a general prohibition.

- Caution
  Indicates general cautionary, warning, or danger level information.

⚠WARNING

Do not attempt to take the product apart and do not touch the product inside while the power is being supplied. Otherwise it may result in electric shock.

Always ensure that the personnel in charge confirm that installation, inspection, and maintenance were properly performed for the NB Unit.

"Personnel in charge" refers to individuals qualified and responsible for ensuring safety during machine design, installation, operation, maintenance, and disposal.

Ensure that installation and post-installation checks are performed by personnel in charge who possess a thorough understanding of the machinery to be installed.

Do not use the input functions of the touch switch, etc. of the NB Unit, in applications that involve human life, in applications that may result in serious injury, or for emergency stop switches.

Do not attempt to disassemble, repair, or modify the NB Unit. Otherwise it may impair the safety functions.

Never press more than two points on the touch panel of the NB Unit at a time. Otherwise, it may activate a switch somewhere between the two points.

Precautions for Safe Use

- When unpacking the NB Units and the peripheral devices, check carefully for any external scratches or other damages. Also, shake the Units gently and check for any abnormal sound.
- The NB Unit must be installed in a control panel.
- The mounting panel must be between 1.6 and 4.8 mm thick. Tighten the Mounting Brackets evenly to a torque of between 0.5 and 0.6 N·m to maintain water and dust resistance. If the tightening torque exceeds the specified value, or the tightening is not even, deformation of the front panel may occur. What is more, make sure the panel is not dirty or warped and that it is strong enough to hold the Units.
- Do not let metal particles enter the Units when preparing the panel.
- Do not connect an AC power supply to the DC power terminals.
- Use a DC power with a slight voltage fluctuation and that will provide a stable output even if the input is momentarily interrupted for 10 ms.
  Rated Power Supply Voltage: DC 24 V (Allowable range DC 20.4 ~ 27.6 V)
- Do not perform a dielectric voltage test.
- Making the connection by using terminal screws crimping on a twisted-pair cable with a crimping range of 12~26 AWG, and only 6.5 mm of insulation peel of the cable needs to be peeled off. Tighten the terminal screws at a torque of between 0.3 and 0.5 N·m. Make sure the screws are properly tightened.
- To prevent malfunctions caused by noise, ground the Unit correctly.
- Do not touch the packaging part of the circuit board with your bare hands. Discharge any static electricity from your body before handling the board.
- When using the No. 6 pin of the serial communication port COM1 connector for a voltage of DC+5V, make sure the supply equipment's current capacity is below 250mA before using it. The DC+5V voltage output of the NB unit is +5V±5%, and the maximum current is 250mA. (The serial communication port COM1 of NB3Q-TW00B and NB3Q-TW01B is unable to output the current.)
- Turn OFF the power supply before connecting or disconnecting cables.
- Always keep the connector screws firmly tightened after the communication cable is connected.
- The maximum tensile load for cables is 30 N. Do not apply loads greater than this.
- Confirm the safety of the system before turning ON or OFF the power supply, or pressing the reset button.
- The whole system may stop depending on how the power supply is turned ON or OFF. Turn ON/OFF the power supply according to the specified procedure.
- Reset by pressing the reset button, or restart the power supply, once the DIP switch settings are changed.
- To ensure the system's safety, make sure to incorporate a program that can confirm the normal functionality of the NB Unit before running the system.
- Start actual system application only after sufficiently checking screen data, macros and the operation of the program at the host side.
- Do not press the touch panel with a force greater than 30 N.
- Do not use hard or pointed objects to operate or scrub the screen, otherwise, the surface of the screen may be damaged.
- Confirm the safety of the system before pressing the touch panel.
- Signals from the touch switches may not be input if the touch switches are pressed consecutively at high speed. Confirm each input before proceeding to the next one.
- Do not accidentally press the touch panel when the backlight is not lit or when the display does not appear. Make sure of the safety of the system before pressing the touch panel.
- To use numeric input functions safely, always make maximum and minimum limit settings.
- Before initializing screen data, confirm that existing data is backed up at the NB-Designer.

- When changing the password with the screen, do not reset or turn OFF the power supply until writing is finished. Failure to save the password may cause the screen to fail to function.
- When using an equipment monitor, confirm the safety of the system before carrying out the following operations:
  - Changing monitor data.
  - Changing operation mode.
  - Forced setup/reset.
  - Changing the current value or the set value.
- Do not connect a USB connector to any device that is not applicable.
- When connecting the equipment with the USB HOST connector, make sure the supply equipment's current capacity is below 150mA before using it. The DC+5V voltage output of the NB Unit is +5V±5%, and the maximum current is 150mA.
- Before connecting a USB connector to a device, make sure that the device is free of damage.
- Commercially available and the recommended USB HUBs are different from the general specifications of the NB Unit. The unit may not function well in an environment subject to noise, static electricity. Therefore, when using a USB HUB, employ sufficient noise and static electricity insulation measures, or install it at a site free of noise or static electricity.
- While uploading or downloading screen data or system programs, do not perform the following operations that may corrupt the screen data or the system program:
  - Turning OFF the power supply of the NB Unit.
  - Pressing the PT's reset switch.
- Dispose of the Units and batteries according to local ordinances as they apply.

- When exporting products with lithium primary batteries containing perchlorate at 6ppb or above to or delivering them through California, USA, the following precautionary measures have to be publicized. Perchlorate material - applicable through special processing. Refer to http://www.dtsc.ca.gov/hazardouswaste/perchlorate.
  NB-Series products contain lithium primary batteries. When exporting products containing this kind of batteries to or delivering them through California, USA, label all the product packages as well as the appropriate delivery packages.
- Do not use benzene, paint thinner, or other volatile solvents, and do not use chemically treated cloths.
- Do not dispose the Units together with general waste at waste yards. When disposing them, follow the related local ordinances or rules.
- Customers may not replace the backlight lamp inside the NB Unit. Please contact OMRON's customer service center.
- Deterioration over time can cause the touch points to move. Calibrate the touch panel periodically.
- Water and oil resistance will be lost if the front sheet is torn or is peeling off. Do not use the Unit, if the front sheet is torn or is peeling off.
- The rubber packing will deteriorate, shrink, or harden depending on the operating environment. Inspect and replace the rubber packing periodically.
- The communication cables of the COM1 and COM2 connectors are not interchangeable. Confirm the pins of the ports before carrying out communications. (NB3Q-TW00B and NB3Q-TW01B only have COM1.)
- Periodically check the installation conditions in applications where the PT is subject to contact with oil or water.
- Do not perform the following operations during the communication of the USB memory:
  - Turning off the power supply of the NB Unit.
  - Pressing the Reset button on the NB Unit.
  - Removing the USB memory.
- Do not use the USB memory in the environment subject to strong vibration.

Precautions for Correct Use

- Do not install the unit in any of the following locations:
  Locations subject to severe changes in temperature
  Locations subject to temperatures or humidity outside the range specified in the specifications
  Locations subject to condensation as the result of high humidity
  Locations subject to corrosive or flammable gases
  Locations subject to strong shock or vibration
  Locations outdoors subject to direct wind and rain
  Locations subject to strong ultraviolet light
  Locations subject to dust
  Locations subject to direct sunlight
  Locations subject to splashing oil or chemicals

- Take appropriate and sufficient countermeasures when installing systems in the following locations:
  Locations subject to static electricity or other forms of noise
  Locations subject to strong electric field or magnetic field
  Locations close to power supply lines
  Locations subject to possible exposure to radioactivity

- Precautions for software:
  The update, restoration, uninstall and reinstallation of software in running status is prohibited in order to guarantee the correct use of the product.

Conformance to EC Directives

NB-Series Programmable Terminals are EMC compliant.

Concepts

OMRON products are electronic devices that are incorporated in machines and manufacturing installations. OMRON PTs conform to the related EMC Directives (see note) so that the devices and machines into which they are built can more easily conform to EMC Directives. The actual products have been through inspections and are completely in accordance with EMC directives. However, when they are built into customers' systems, whether the systems also comply with these Directives is up to the customers for further inspection.

EMC-related performance of OMRON PTs will vary depending on the configuration, wiring, and other conditions of the OMRON equipment or control panel. The customer must, therefore, perform final checks to confirm that the overall machine or device conforms to EMC standards.

Note The applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic sensitivity): EN61131-2: 2007
EMI (Electromagnetic Interference): EN61131-2: 2007

Conformance to EC Directives

NB-Series Programmable Terminals are EC compliant. Heed the following precautions in order to ensure that the customer's overall machine and device conform to EC Directives.

1 The PT must be installed in a control panel.

2 You must use reinforced insulation or double insulation for the DC power supply and the DC power supply must have minimal voltage fluctuations and provide a stable output even if the power supply input is interrupted for 10 ms.

3 The PTs conform to the standard EN 61131-2, but radiated emission characteristics (10m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.

4 This is a Class A product (Product for industry purpose). It may cause radio interference in residential areas, in which case the user may be required to take adequate measures to reduce interference.

Related Manuals

The related manuals are as follows:

Devices and Software	Manual Name	Manual No.
NB series	NB Series NB-Designer Operation Manual	V106
	NB Series Setup Manual	V107
	NB Series Host Connection Manual (This manual)	V108
	NB Series Startup Guide	V109
PLC	SYSMAC CP Series CP1L CPU Unit Operation Manual	W462
	SYSMAC CP Series CP1H/L CPU Unit Programming Manual	W451
	SYSMAC CP Series CP1H CPU Unit Operation Manual	W450
	SYSMAC CP Series CP1E CPU Unit Hardware USER'S Manual	W479
	SYSMAC CP Series CP1E CPU Unit Software USER'S Manual	W480
	SYSMAC C200HX/HG/HE(-E/-ZE) Installation Guide	W302
	SYSMAC C200HX/HG/HE Operation Manual	W303
	SYSMAC C200HX/HG/HE(-ZE) Operation Manual	W322
	SYSMAC CPM1A Operation Manual	W317
	SYSMAC CPM2A Operation Manual	W352
	SYSMAC CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual	W353
	SYSMAC CPM2C Operation Manual	W356
	SYSMAC CS1 Series CS1G/H Operation Manual	W339
	SYSMAC CS/CJ Series Serial Communications Boards and Serial Communications Units Operation Manual	W336
	SYSMAC CJ Series CJ1G/H(-H) CJ1M CJ1G Operation Manual	W393
	SYSMAC CS/CJ Series Programming Manual	W394
	SYSMAC CS/CJ Series INSTRUCTIONS Reference Manual	W340
	SYSMAC CS/CJ Series Programming Consoles Operation Manual	W341
	SYSMAC CS/CJ Series Communications Commands Reference Manual	W342
	SYSMAC CJ Series CJ2 CPU Unit Hardware USER'S Manual	W472
	SYSMAC CJ Series CJ2 CPU Unit Software USER'S Manual	W473
	SYSMAC CS/CJ Series CS1W/CJ1W-ETN21 (100Base-TX) Ethernet Units Operation Manual Construction of Networks	W420
	SYSMAC CS/CJ Series CS1W/CJ1W-ETN21 (100Base-TX) Ethernet Units Operation Manual Construction of Applications	W421
	SYSMAC CS/CJ Series CS1W/CJ1W-EIP21 (100Base-TX) EtherNet/IP Units Operation Manual	W465
	SYSMAC CP Series CP1L-EL/EM CPU Unit Operation Manual	W516
External Tool	CX-Programmer Ver.9.□ Operation Manual	W446

1

List for All PLCs Supported by NB Series

This section lists all PLCs supported by NB Units.

1-1 Lists for Supported PLC

Names Displayed in NB-Designer	PLC Models	PLC Manufacturers
AB CompactLogix/ControlLogix Series(DF1)	CompactLogix 1769-L20	Allen-Bradley(AB)
	CompactLogix 1769-L30	
	CompactLogix 1769-L31	
	CompactLogix 1769-L32E	
	CompactLogix 1769-L35E	
	ControlLogix 1756-L61	
	ControlLogix 1756-L63	
AB SLC500/PLC5/MicroLogix Series(DF1)	MicroLogix 1000/1200/1400/1500	
	SLC 5/03	
	SLC 5/04	
	SLC 5/05	
	PLC-5 11	
	PLC-5 20	
	PLC-5 30	
	PLC-5 40/40L	
	PLC-5 60/60L	
Delta DVP	DVP-xxES/EX/SS	Delta
	DVP-xxSA/SX/SC	
	DVP-xxEH/EH2/SV	
GE Fanuc Series SNP	IC693CPU311/313	GE
	IC693CPU321/323	
	IC693CPU331/340/341	
	IC693CPU350/351/352	
	IC693CPU360/363/364/374	
	IC693CSE311	
	IC693CSE313	
	IC693CSE323	
	IC693CSE331	
	IC693CSE340	
GE SNP-X	IC693CPU311/313/321/323	
	IC693CPU331/340/341	
	IC693CPU350/351/352	
	IC693CPU360/363/364/374	
	CPU001/002/005	
	CPUE05	
	IC200UAL004/005/006	
	IC200UDD110/120/212	
	IC200UDR005/006/010	
	IC200UAA007	
	IC200UAR028	
	IC693CMM311	

Names Displayed in NB-Designer	PLC Models	PLC Manufacturers
LS Master-K Cnet	K120s	LG
	K200s	
LS Master-K CPU Direct	K120s	
	K200s	
LS Master-K Modbus RTU	K120s	
	K200s	
LS XGT CPU Direct	XGT	
	XGB	
LS XGT Cnet	XBC-DN64H	
	XBC-DR32H	
Mitsubishi FX0N/1N/2N/3G	FX0N	Mitsubishi
	FX1N	
	FX2N	
	FX3G	
	FX1NC	
	FX2NC	
Mitsubishi FX1S	FX1S	
Mitsubishi FX2N-10GM/20GM	FX2N_10GM	
	FX2N_20GM	
Mitsubishi FX3U	FX3U	
	FX3UC	
Mitsubishi FX-485ADP/485BD/232BD (Multi-station)	FX-485ADP/485BD/232BD	
Mitsubishi Q Series (CPU Port)	Q02 CPU	
	Q02H CPU	
	Q12H CPU	
	Q25H CPU	
Mitsubishi Q_QnA (Link Port)	Q00 CPU	
	Q01 CPU	
	QJ71C24 module	
	QJ71C24-R2 module	
	QJ71C24N module	
	QJ71C24N-R2 module	
	QJ71C24N-R4 module	
Mitsubishi Q00J (CPU Port)	Q00J	
Mitsubishi Q06H	Q06H CPU	
Modbus ASCII	Modbus Compatible External Device	Modbus
Modbus RTU	Modbus Compatible External Device	
Modbus RTU Extend	Modbus Compatible External Device	
Modbus RTU Slave	Modbus Compatible External Device	
Modbus TCP Slave	Modbus Compatible External Device	
Omron C Series	C200HX/HG/HE(-Z)	Omron
	CQM1H	
	CPM1□/2□	
Omron CJCS Series	CS1□/CJ1□/CJ2□	
Omron CP1H/L/E	CP1H/L/E	

Names Displayed in NB-Designer	PLC Models	PLC Manufacturers
Omron CJ/CS Series Ethernet (UDP Slave)	CS1W-ETN21/EIP21	Omron
	CJ1W-ETN21/EIP21	
	CJ2H-□□□-EIP	
	CJ2M-CPU3□	
Omron CP Series Ethernet (UDP Slave)	CP1L-EM	
	CP1L-EL	
	CP1W-CIF41	
	CP1H	
	CP1L	
Panasonic FP	FP0/FP1/FP2/FP3	Panasonic
	FP2SH	
	FP10SH/FP10S	
	FP-M	
	FP-e	
	FP-X	
Schneider Modicon Uni-TelWay	Micro Series	Schneider
	Premium Series	
	Nano Series	
Schneider Twido Modbus RTU	TWD LCAA 10DRF	
	TWD LCAA 16DRF	
	TWD LCAA 24DRF	
	TWD LMDA 20DTK	
	TWD LMDA 20DUK	
	TWD LMDA 20DRT	
	TWD LMDA 40DTK	
	TWD LMDA 40DUK	
Siemens S7-200	CPU212/214/215/216	Siemens
	CPU221/222/224/226	
	CPU224 XP CN	
	CPU226 XP CN	
SIEMENS S7-300/400 (PC Adapter Direct)	CPU312IFM/CPU313/CPU313C	
	CPU314IFM/CPU314	
	CPU315/CPU315-2 DP	
	CPU316/CPU316-2 DP	
	CPU318-2	
	CPU412-1/CPU412-2 DP	
	CPU413-1/CPU413-2 DP	
	CPU414-1/CPU414-2 DP/CPU414-3 DP	
	CPU416-1/CPU416-2 DP/CPU416-3 DP	
	CPU417-4	

1-2 Definition and Description of Serial Port COM

● NB5Q/NB7W/NB10W-TW□□B

Serial port COM1 of NB5Q/NB7W/NB10W-TW□□B is a 9-pin D-type socket port. This port supports RS-232C communication function, making it connectable to a controller which features RS-232C function, and it can also be used for downloading programs or debugging for the product. The pins are defined as follows:

NB5Q/NB7W/NB10W-TW□□B		
Pins	**COM1 Signals**	**COM2 Signals**
1	NC	SDB+
2	SD	SD
3	RD	RD
4	RS(RTS)*	Terminal R1
5	CS(CTS)*	Terminal R2
6	DC+5V	RDB+
7	NC	SDA-
8	NC	RDA-
9	SG	SG

* Pin 4 and 5 are not used, thus not compliant with RS or CS function.

● NB3Q-TW□□B

NB3Q-TW□□B has only 1 serial port COM1, and this port supports communication based on RS-232C, RS-422 and RS-485, of which only 1 connection mode can be applied at one time. By means of the RS-232C mode (PIN 2~5), it can be connected to a controller based on RS-232C, and can also be used for downloading programs, as well as debugging for the product (connected to a PC). While with the RS-422 or the RS-485 mode (PIN 1, PIN 6~8), only a PLC can be connected. The pins are defined as follows:

NB3Q-TW□□B	
Pins	**COM1 Signals**
1	SDB+
2	SD
3	RD
4	RS(RTS)*
5	CS(CTS)*
6	RDB+
7	SDA-
8	RDA-
9	SG

* Pin 4 and 5 are not used, thus not compliant with RS or CS function.

● Precaution for Cable Fabrication

The COM 2 ports included in this manual and marked by cable manufacturers are intended for the HMI of NB5Q/NB7W/NB10W-TW□□B models, therefore when communication connection is carried out with the COM 1 port of NB3Q-TW□□B, please refer to the pin definitions in this section prior to connection.

2

Connecting to SIEMENS PLCs

This section describes the connection to SIEMENS PLCs.

2-1 Serial Port Communication

Series	CPU	Link Module	Driver
S7-200	CPU212 CPU214 CPU215 CPU216 CPU221 CPU222 CPU224 CPU226 CPU224 XP CN CPU226 XP CN	RS485 on the CPU unit	SIEMENS S7-200
S7-300	CPU312IFM CPU313 CPU313C CPU314 CPU314IFM CPU315 CPU315-2 DP CPU316 CPU316-2 DP CPU318-2	MPI port on the CPU unit	SIEMENS S7-300/400 (PC Adapter Direct)
S7-400	CPU412-1 CPU412-2 DP CPU413-1 CPU413-2 DP CPU414-1 CPU414-2 DP CPU414-3 DP CPU416-1 CPU416-2 DP CPU416-3 DP CPU417-4	MPI port on the CPU unit	

2-2 Serial Port Communication Parameters and Cable Fabrication

Series	CPU	Link Module	COMM Type	Parameter	Cable
S7-200	CPU222 CPU224 CPU226 CPU224 XP CN CPU226 XP CN	RS485 on the CPU unit	RS232 RS485	Refer to Section 2-3	Self-made cable required
S7-300	CPU312IFM CPU313 CPU313C CPU314 CPU314IFM CPU315 CPU315-2 DP CPU316 CPU316-2 DP CPU318-2	MPI port on the CPU unit	RS232 S7-300/400 (PC Adapter Direct) protocol		
S7-400	CPU412-1 CPU412-2 DP CPU412-3H CPU413-1 CPU413-2 DP CPU414-1 CPU414-2 DP CPU414-3 DP CPU416-1 CPU416-2 DP CPU416-3 DP CPU417-4	MPI port on the CPU unit	RS232 S7-300/400 (PC Adapter Direct) protocol		

2-3 Serial Port Communication Parameter Setting

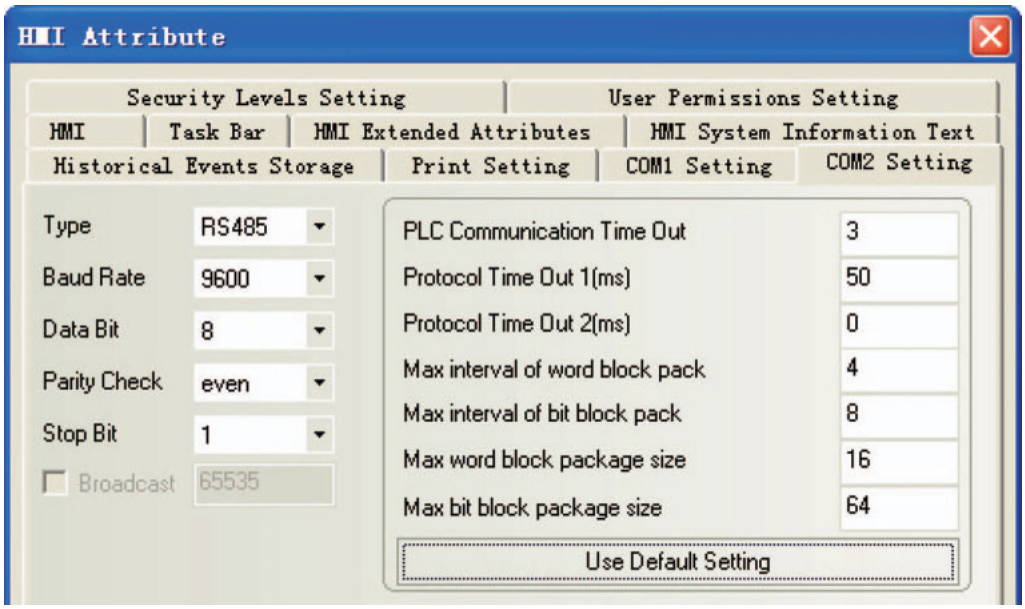
2-3-1 When Using SIEMENS S7-200 Communication Protocol

HMI Settings

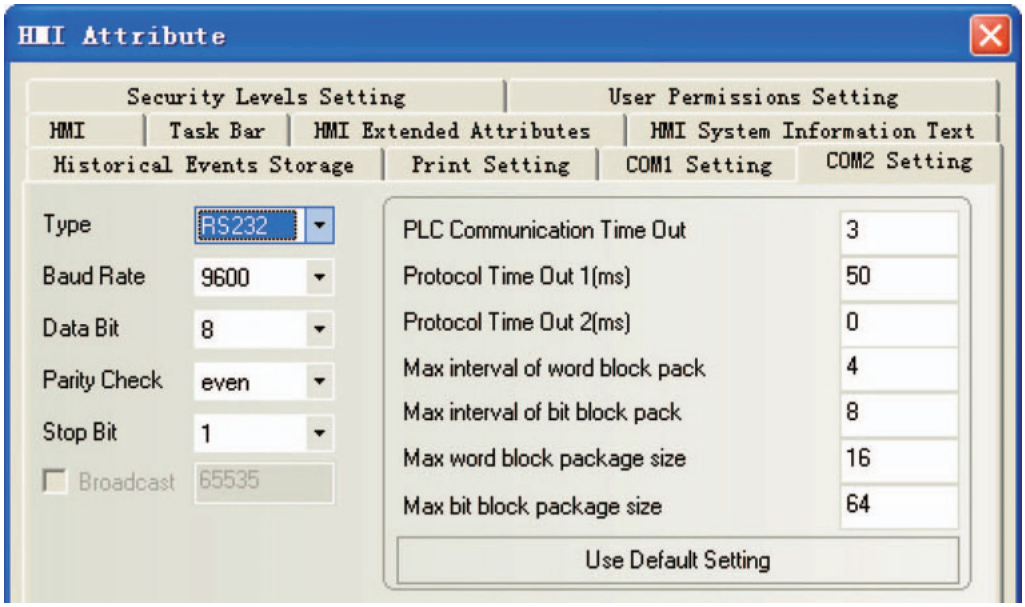
HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), 1 (Stop Bit), even(Parity Check) and 2 (PLC Station No.)

Note The maximum communication baud rate is 187.5K that is not supported by the direct online.
The PLC No. should match with the PLC No. in HMI. Because the PLC address of S7-200 ranges from 1 to 126, so the PLC No. in HMI should also range from 1 to 126.

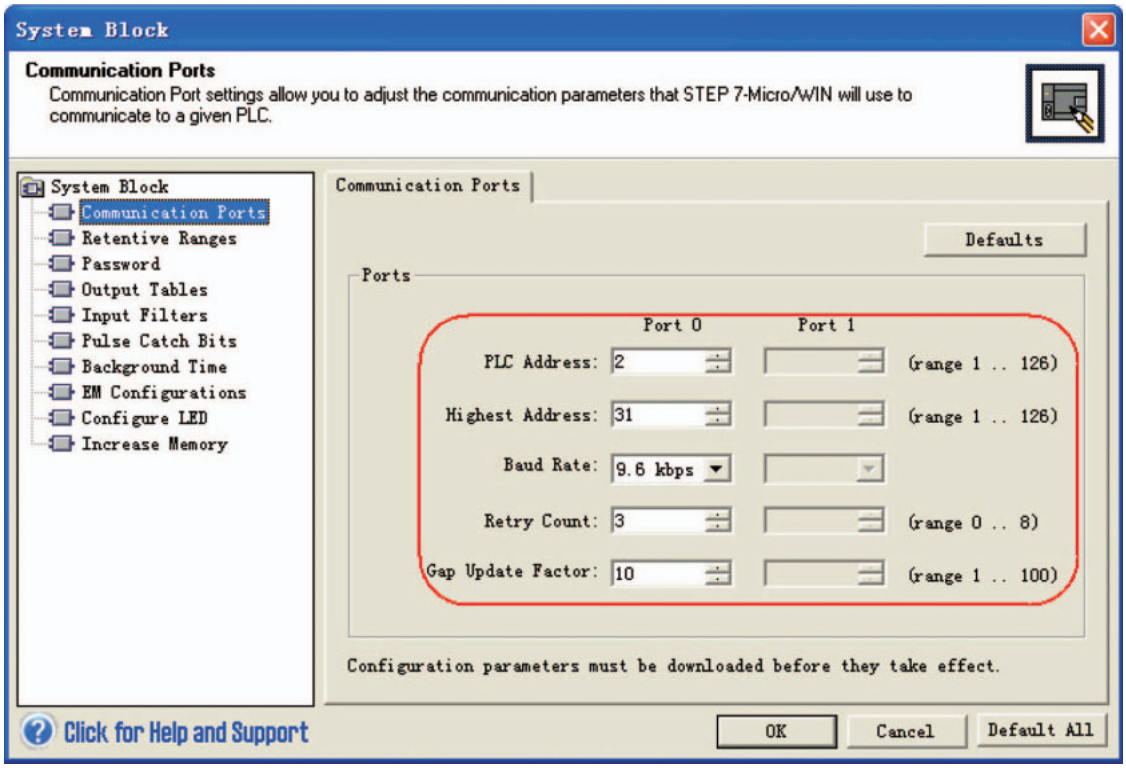
RS485 Communication



RS232 Communication



PLC Settings

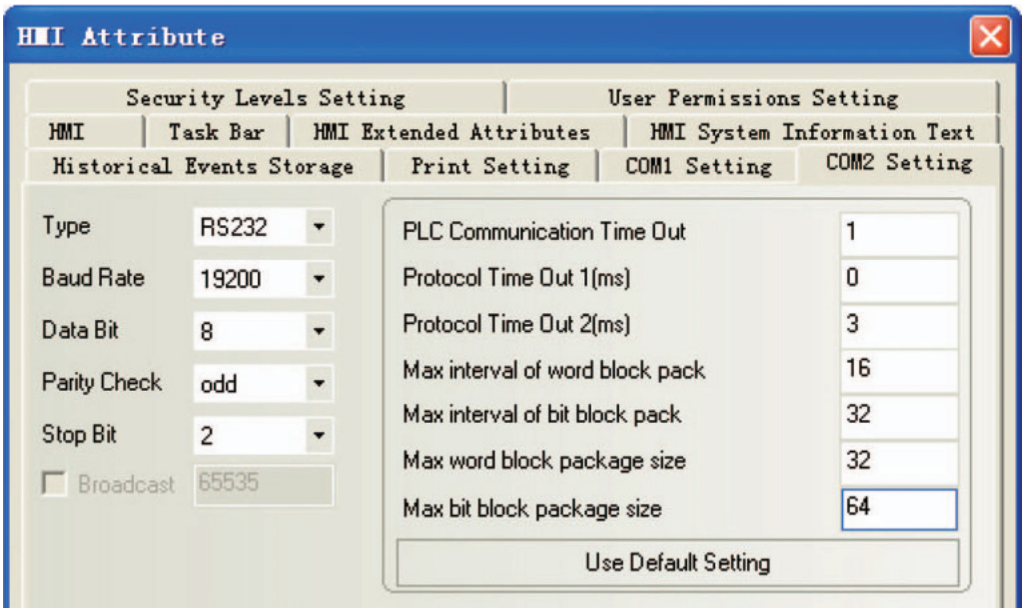


2-3-2 When Using SIEMENS S7-300/400 (PC Adapter Direct) Communication Protocol

HMI Settings

HMI default communication parameters: 19200bps(Baud Rate), 8(Data Bit), 2(Stop Bit), odd (Parity Check) and 2 (PLC Station No.) (Multiple Station No. is not supported.)

RS232 Communication



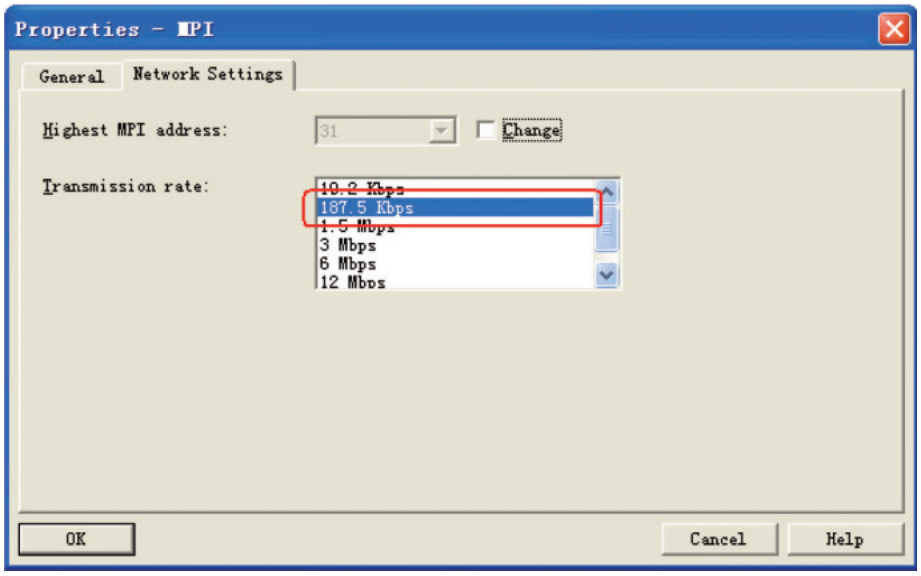
Note 1 The PLC Station No. is not needed if the PC adapter is used, which realize one for one communication.

2 The PLC baud rate and HMI baud rate are set to 187.5Kbps and 19200bps respectively when 6ES7972-0CA1□-0XA0 adapter is used to perform communications.

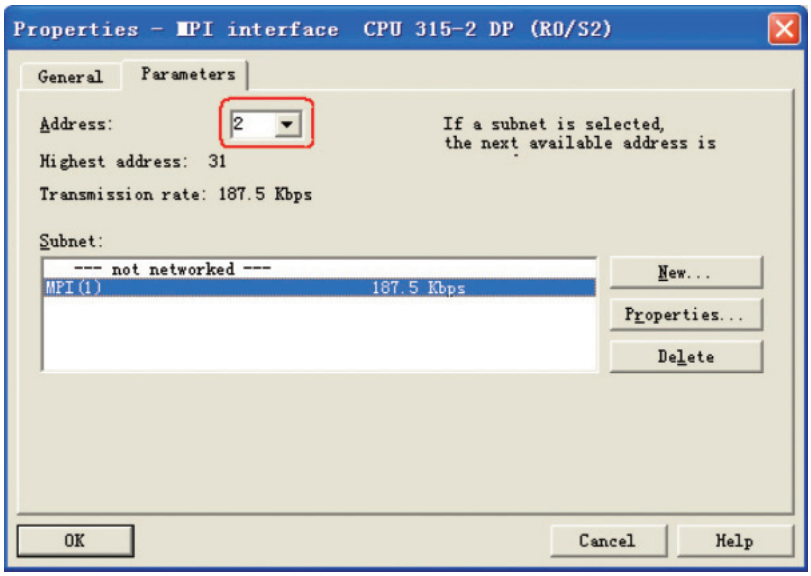
3 DB blocks should be established in PLC program configuration, otherwise the relevant registers (DB.DBX, DB.DBW, DB.DBD) can not be written. The even parity should be used on the initial addresses of DBm.DBW and DBm.DBD.

PLC Settings

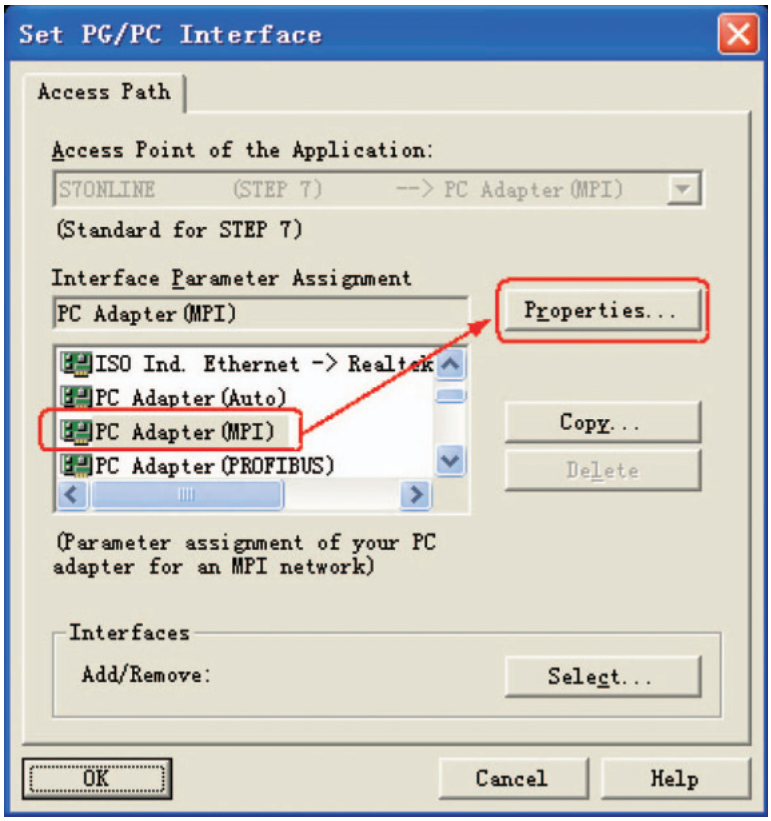
1 The PLC baud rate at MPI port is set to 187.5Kbps when 6ES7972-0CA1□-0XA0 adapter (HMI Adapter) is used to perform communications.

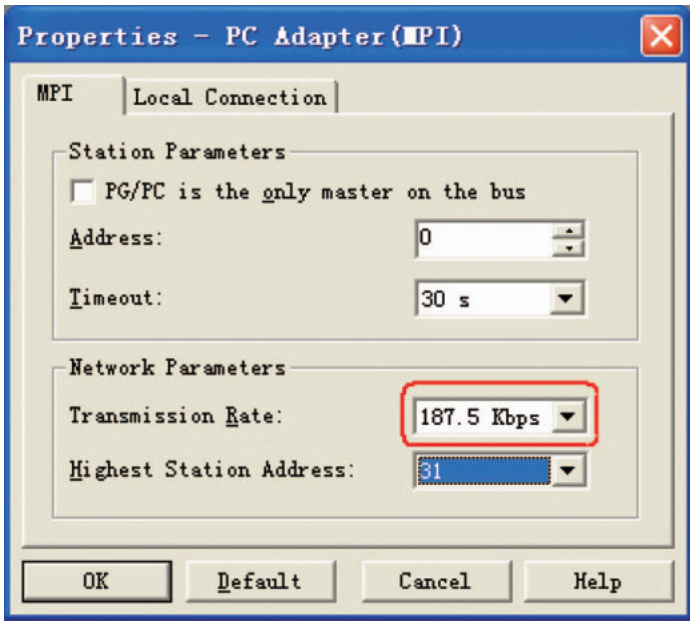


2 The MPI address must be 2.



3 Download the set parameters to PLC after the setting is completed. Then open [SIMATIC Manager] menu-[Option]-[PG/PC Interface Setting], select PC Adapter (MPI) and modify the transmission rate of MPI port to be 187.5K, as shown below:





2-4 Supported Registers

2-4-1 SIEMENS S7-200

Device	Bit Address	Word Address	Format	Notes
SCR Nodes	S.B 0.0-31.7	------	DD.O	
Special Memory Bit	SM.B 0.0-549.7	------	DDD.O	
Counter Bit	Cnt 0-255	------	DDD.O	
Counter Bit	Tim 0-255	------	DDD.O	
Variable Memory Nodes	V.B 0.0-10238.7	------	DDDDD.O	
Internal Memory Bit	M.B 0.0-31.7	------	DD.O	
Discrete Output and Map Register Nodes	Q.B 0.0-15.7	------	DD.O	
Discrete Input and Map Register Nodes	I.B 0.0-15.7	------	DD.O	
Analog Output	------	AQW 0-62	DD	
Analog Input:	------	AIW 0-62	DD	
SCR (32-bit)	------	SD 0-28	DD	
SCR	------	SW 0-30	DD	
Special Memory Registers (32-bit)	------	SMD 0-546	DDD	
Special Memory Registers	------	SMW 0-548	DDD	
Internal Memory Bit (32-bit)	------	MD 0-28	DD	
Internal Memory	------	MW 0-30	DD	
Discrete Output and Map Registers (32-bit)	------	QD 0-12	DD	
Discrete Output and Map Registers	------	QW 0-14	DD	
Discrete Input and Map Registers (32-bit)	------	ID 0-12	DD	
Discrete Input and Map Registers	------	IW 0-14	DD	
Counter PV	------	Cnt 0-255	DDD	
Timer PV	------	Tim 0-255	DDD	
Variable Memory (32-bit)	------	VD 0-10236	DDDDD	
Variable Memory	------	VW 0-10238	DDDDD	

Note The initial addresses of VW and VD must be even.
Address format description: D: decimal, O: octonary, H: hexadecimal.

2-4-2 SIEMENS S7-300/400 (PC Adapter Direct)

Device	Bit Address	Word Address	Format	Notes
External Input Nodes	I 0.0~511.7	------	DDDD.O	
External Output Nodes	Q 0.0~511.7	------	DDDD.O	
Internal Auxiliary Nodes	M 0.0~4095.7	------	DDDD.O	
Data Register Nodes	DBm.DBX 0~65535.7	------	DDDDD.O	m:10~60
Data Registers	------	DBm.DBW 0-65534	DDDDD	m:10~60
Data Registers (32-bit)	------	DBm.DBD 0-65532	DDDDD	m:10~60
Internal Registers	------	MW 0~2046	DDDD	
Internal Registers (32-bit)	------	MD 0~2044	DDDD	
External Output Registers	------	QW 0~126	DDD	
External Output Registers (32-bit)	------	QD 0~124	DDD	
External Input Registers	------	IW 0~126	DDD	
External Input Registers (32-bit)	------	ID 0~124	DDD	

Note The initial addresses of DBm.DBW and DBm.DBD must be even.
Address format description: D: decimal, O: octonary, H: hexadecimal.

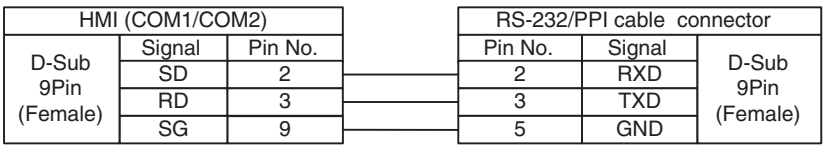
2-5 Cable Fabrication

When Using SIEMENS S7-200 Communication Protocol

● RS232 Communication Cable

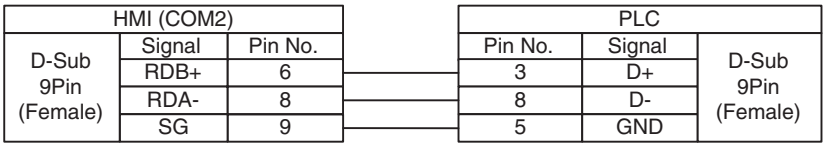
Use RS-232/PPI multi-host cable and self-made RS232 cable manufactured by SIEMENS to communicate with HMI.

- Self-made RS-232 Cable



HMI (COM1/COM2)				RS-232/PPI cable connector		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2		2	RXD	
	RD	3		3	TXD	
	SG	9		5	GND	

● RS485 Communication Cable

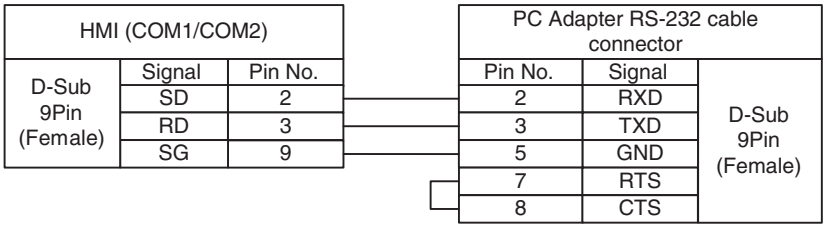


HMI (COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	RDB+	6		3	D+	
	RDA-	8		8	D-	
	SG	9		5	GND	

When Using SIEMENS S7-300/400 (PC Adapter Direct) Communication Protocol

● RS232 Communication Cable

Use 6ES7972-0CA1□-0XA0 communication cables for HMI Adapter to perform communications.



HMI (COM1/COM2)				PC Adapter RS-232 cable connector		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2		2	RXD	
	RD	3		3	TXD	
	SG	9		5	GND	
				7	RTS	
				8	CTS	

3

Connecting to Mitsubishi PLCs

This section describes the connection to Mitsubishi PLCs.

3-1 Serial Port Communication

Series	CPU	Link Module (The products in ( ) are also needed)	Driver
FXCPU	FX1S	RS422 on the CPU unit	Mitsubishi FX1S *2
		FX2NC-485-ADP (FX1N-CNV-BD) FX0N-485-ADP (FX1N-CNV-BD) FX1N-□□□-BD	Mitsubishi FX1S *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station) *1
	FX0N	RS422 on the CPU unit	Mitsubishi FX0N/1N/2N/3G *2
		FX2NC-485-ADP (FX1N-CNV-BD) FX0N-485-ADP (FX1N-CNV-BD)	Mitsubishi FX0N/1N/2N/3G *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station) *1
	FX1N	RS422 on the CPU unit	Mitsubishi FX0N/1N/2N/3G *2
		FX2NC-485-ADP (FX1N-CNV-BD) FX0N-485-ADP (FX1N-CNV-BD) FX1N-□□□-BD	Mitsubishi FX0N/1N/2N/3G *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station) *1
	FX2N	RS422 on the CPU unit	Mitsubishi FX0N/1N/2N/3G *2
		FX2NC-485-ADP (FX1N-CNV-BD) FX0N-485-ADP (FX1N-CNV-BD) FX2N-□□□-BD	Mitsubishi FX1S *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station) *1
	FX1NC	RS422 on the CPU unit	Mitsubishi FX0N/1N/2N/3G *2
		FX2NC-485-ADP (FX1N-CNV-BD) FX0N-485-ADP (FX1N-CNV-BD)	Mitsubishi FX0N/1N/2N/3G *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station)
	FX2NC	RS422 on the CPU unit	Mitsubishi FX0N/1N/2N/3G *2
		FX2NC-485-ADP (FX1N-CNV-BD) FX0N-485-ADP (FX1N-CNV-BD)	Mitsubishi FX0N/1N/2N/3G *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station)
	FX2N-10GM FX2N-20GM	RS422 on the CPU unit	Mitsubishi FX2N_10GM/20GM
	FX3UFX3UC	RS422 on the CPU unit	Mitsubishi FX3U *2
		FX3U-□□□-BD FX3U-485-ADP (FX3U-CNV_BD)	Mitsubishi FX3U *2 Mitsubishi FX-485ADP/485BD/232BD (Multi-station) *1
	FX3G	RS422 on the CPU unit	Mitsubishi FX0N/1N/2N/3G *2
		FX3G-□□□-BD FX3U-485-ADP (FX3G-CNV-ADP)	Mitsubishi FX-485ADP/485BD/232BD (Multi-station) *1

Series	CPU	Link Module (The products in ( ) are also needed)	Driver
QCPU	Q00JCPU	RS232 on the CPU unit	Mitsubishi Q00J (CPU Port)
		QJ71C24 QJ71C24-R2 QJ71C24N QJ71C24N-R2 QJ71C24N-R4	Mitsubishi Q_QnA (Link Port)
	Q00CPU Q01CPU	RS232 on the CPU unit	Mitsubishi Q_QnA (Link Port)
		QJ71C24 QJ71C24-R2 QJ71C24N QJ71C24N-R2 QJ71C24N-R4	
	Q02CPU Q02HCPU Q12HCPU Q25HCPU	RS232 on the CPU unit	Mitsubishi Q Series (CPU Port)
		QJ71C24 QJ71C24-R2 QJ71C24N QJ71C24N-R2 QJ71C24N-R4	Mitsubishi Q_QnA (Link Port)
	Q06HCPU	RS232 on the CPU unit	Mitsubishi Q06H
		QJ71C24 QJ71C24-R2 QJ71C24N QJ71C24N-R2 QJ71C24N-R4	Mitsubishi Q_QnA (Link Port)

*1 This protocol supports Multiple Station No..

*2 This protocol does not support Multiple Station No..

3-2 Serial Port Communication Parameters and Cable Fabrication

Series	CPU	Link Module	COMM Type	Parameter	Cable
FXCPU	FX1S FX1N FX2N	RS422 on the CPU unit	RS422	Refer to Section 3-3	Self-made cable required
		RS232 Module	RS232		
		RS485 Module	RS422		
	FX0N FX1NC FX2NC	RS422 on the CPU unit	RS232		
		RS485 Module	RS422		
	FX2N-10GM FX2N-20GM	RS422 on the CPU unit	RS422		
	FX3G	RS422 on the CPU unit	RS422		
		RS232 Module	RS232		
		RS485 Module	RS422		
	FX3UC FX3U	RR422 on the CPU unit	RS422		
		RS232 Module	RS422		
		RS485 Module	RS422		
Melsec Q	Q00JCPU Q00CPU Q01CPU Q02CPU Q02HCPU Q12HCPU Q25HCPU Q06HCPU	RS232 on the CPU unit	RS232		
	Q00JCPU Q00CPU Q01CPU Q02CPU Q02HCPU Q12HCPU Q25HCPU Q06HCPU	QJ71C24 QJ71C24-R2 QJ71C24N QJ71C24N-R2	RS232		
		QJ71C24 QJ71C24N QJ71C24N-R4	RS422		

3-3 Serial Port Communication Parameter Setting

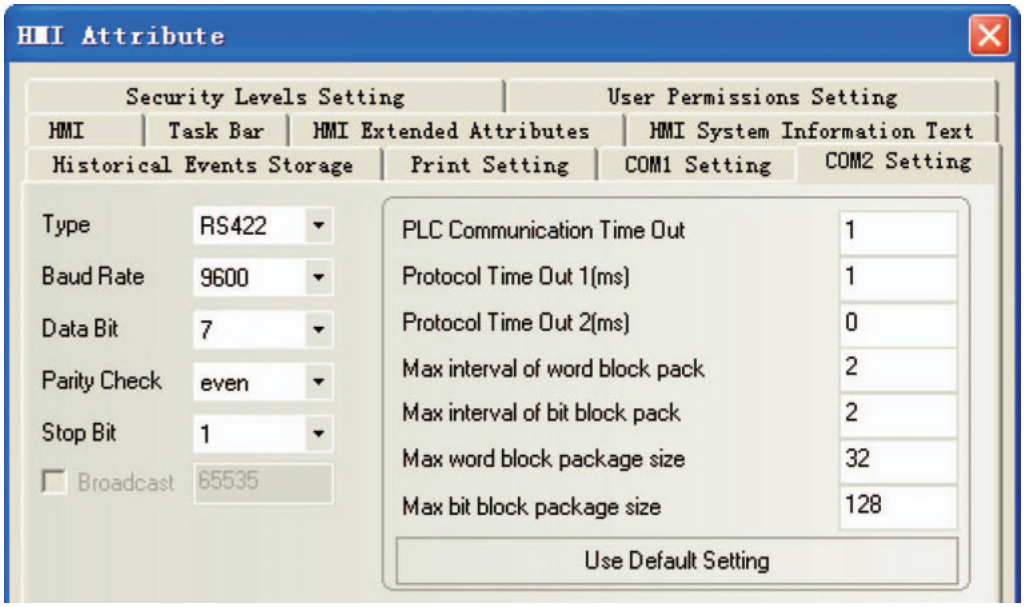
3-3-1 When Using Mitsubishi FX1S, Mitsubishi FX0N/1N/2N/3G and Mitsubishi FX3U Communication Protocols

HMI Settings

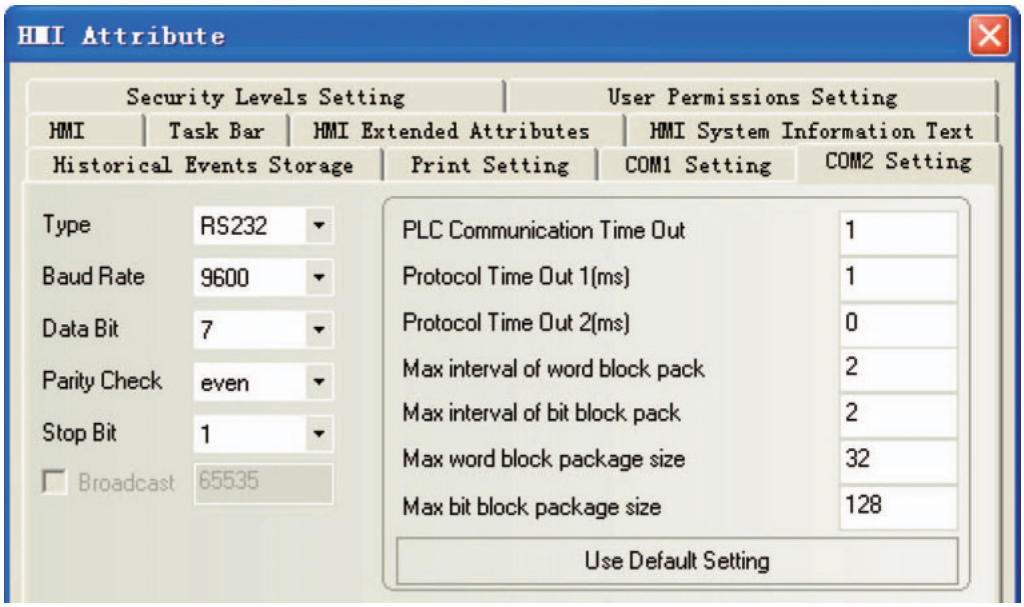
HMI default communication parameters: 9600bps (Baud Rate), 7 (Data Bit), even (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.)

The PLC Communication Time Out, Max interval of word (bit) block pack, Max word block package size on the right vary with PLC protocols. Generally the defaults are selected.

RS422 Communication



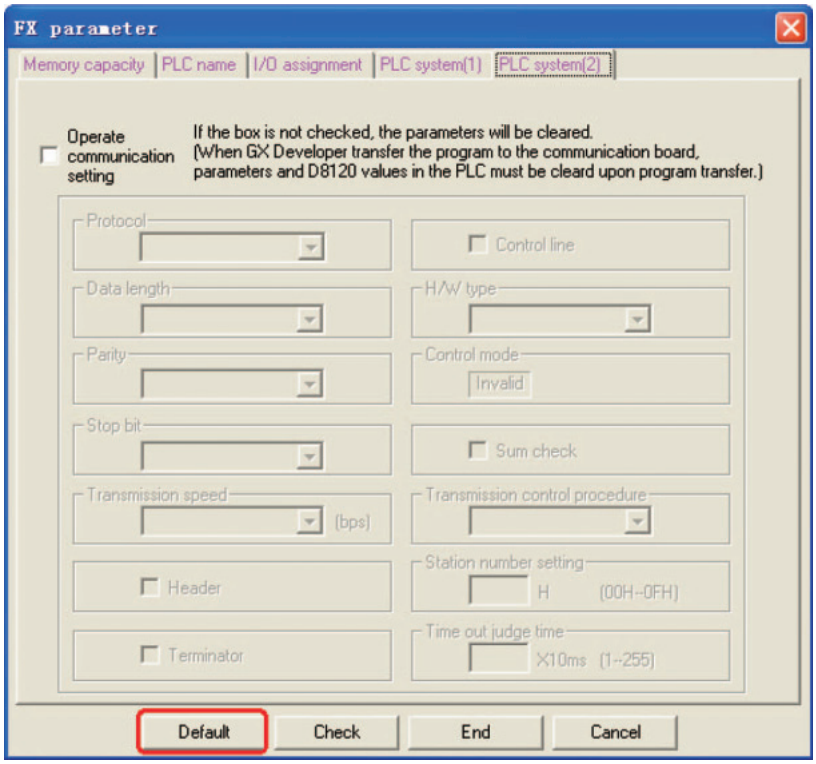
RS232 Communication



PLC Settings

The PLC setting is as shown below when **Mitsubishi FX1S, Mitsubishi FX0N/1N/2N/3G and Mitsubishi FX3U** communication protocols are used:

Click the [Default] button to make settings without checking the [Communication Setting]:



Note 1 The communication protocols such as Mitsubishi FX1S, Mitsubishi FX0N/1N/2N/3G and Mitsubishi FX3U etc. can be selected according to PLC model if the Station No. is not used when the communication is realized through the communication function expansion board.

2 Make sure the value of communication format D8120 is 0 when the communication is realized through the communication function expansion board.

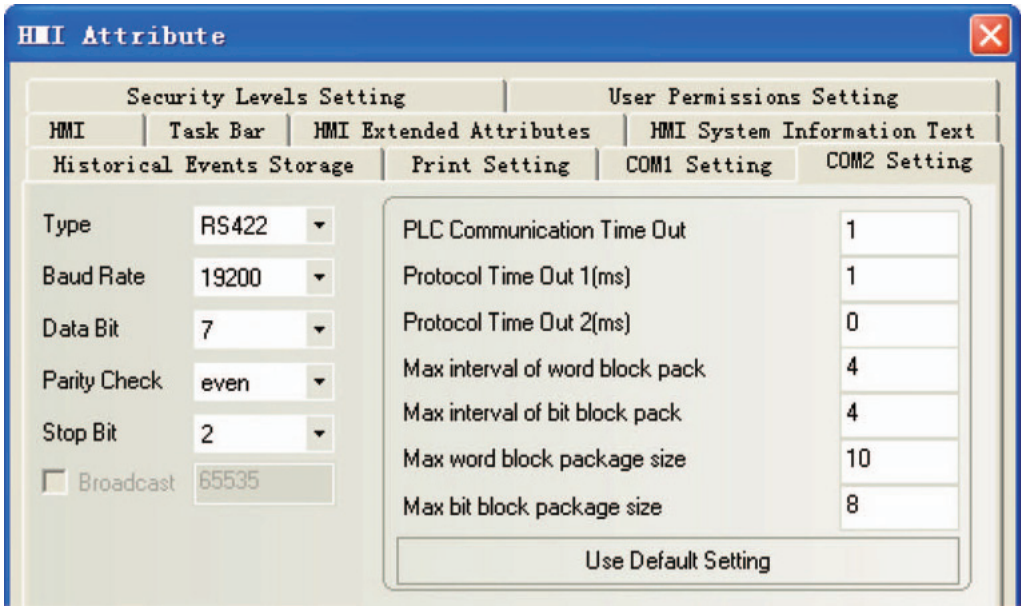
3-3-2 When Using Mitsubishi FX-485ADP/485BD/232BD (Multi-station) Communication Protocols

HMI Settings

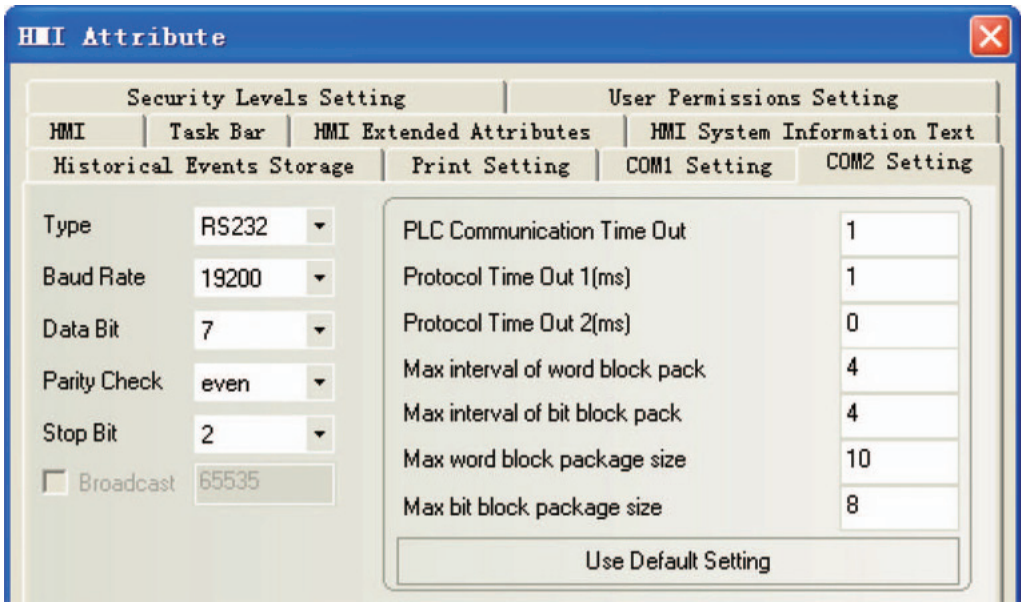
HMI default communication parameters: 19200bps (Baud Rate), 7(Data Bit), even (Parity Check), 2 (Stop Bit) and 0 (PLC Station No.)

Note: The protocols are only applicable to PLCs communicating through communication function expansion board and support Multiple Station No. and Baud Rate settings.

RS422 Communication



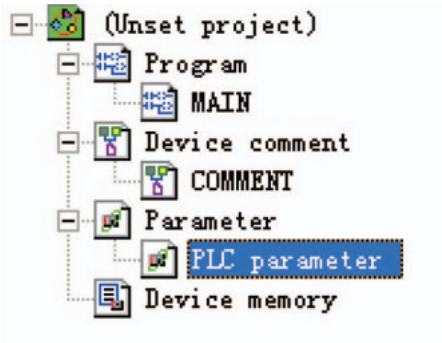
RS232 Communication



PLC Settings

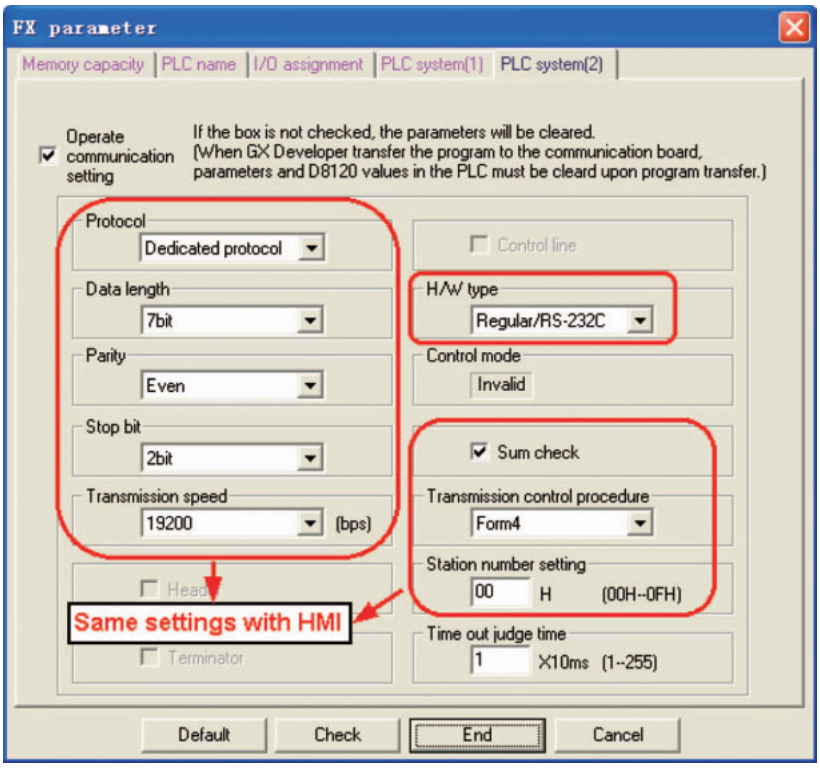
The PLC setting is as shown below when **FX-485ADP/485BD/232BD (Multi-station)** communication protocols are used:

1 Double-click the [PLC Parameter] under [Project Data List] in GX Developer software.



2 Open the [FX Parameter] dialog box.

(1) FX1S/FX1N/FX2N/3G Series PLC



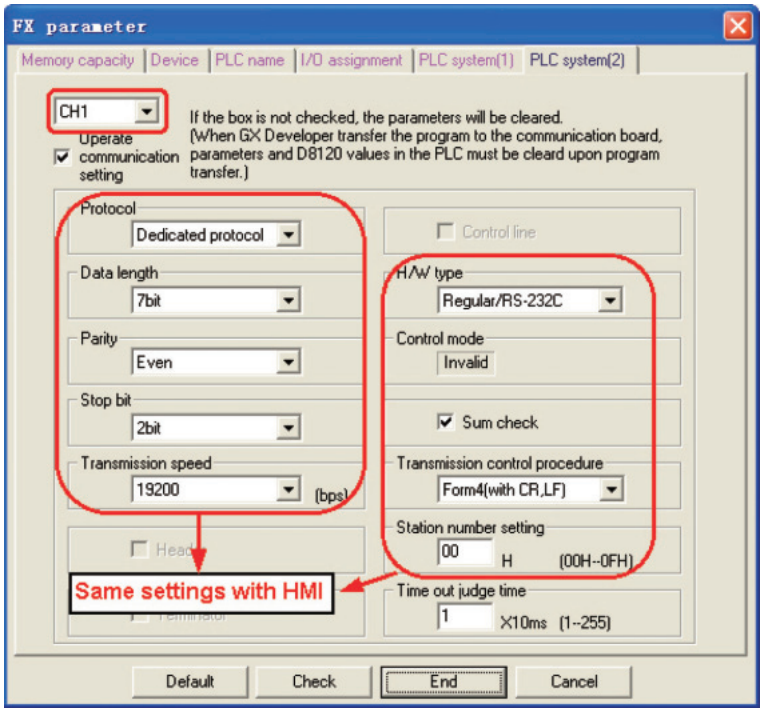
Check the [Operate communication setting] option.

Note 1 FX0N Series PLCs do not support the [FX Parameter] operation, but the communication parameters can be set through writing values to the special data registers D8120, D8121and D8129.

2 The [Dedicated Protocol] must be selected and the [Sum Check] must be checked with [Form4] selected for the Transmission Control Sequence.

3 The [H/W Type] is “Regular/RS-232C” and “RS-485” when FX□□-232-BD and FX□□-485-BD/FX□□-485-ADP communication are used respectively.

(2) FX3U/3UC Series PLC



Check the [Operate communication setting] option.

Note 1 The [CH1] should be selected for FX3U/3UC Series PLC.

2 The [Dedicated Protocol] must be selected and the [Sum Check] must be checked with [Form4] selected for the Transmission Control Sequence.

3 The [H/W Type] is “Regular/RS-232C” and “RS-485” when FX□□-232-BD and FX□□-485-BD/FX□□-485-ADP communication are used respectively.

Aside from using [FX Parameter], the user can use the special data register D8120 in PLC to set the communication parameters for PLC.

Special Data Registers	Descriptions
D8120	Communication format
D8121	Station No. setting
D8129	Data network out-time counting
Applicable to FX3U/3UC and other FX Series PLCs using CH1	

- For example:

  If the PLC communication parameters are: 9600bps (Baud Rate), 7 (Data Bit), even (Parity Check), 2 (Stop Bit), 1(PLC Station No.), RS485 (Communication Method) and 1 (PLC Communication Time Out), then D8120=0xE08E,

  D8121=1,

  and D8129=1.

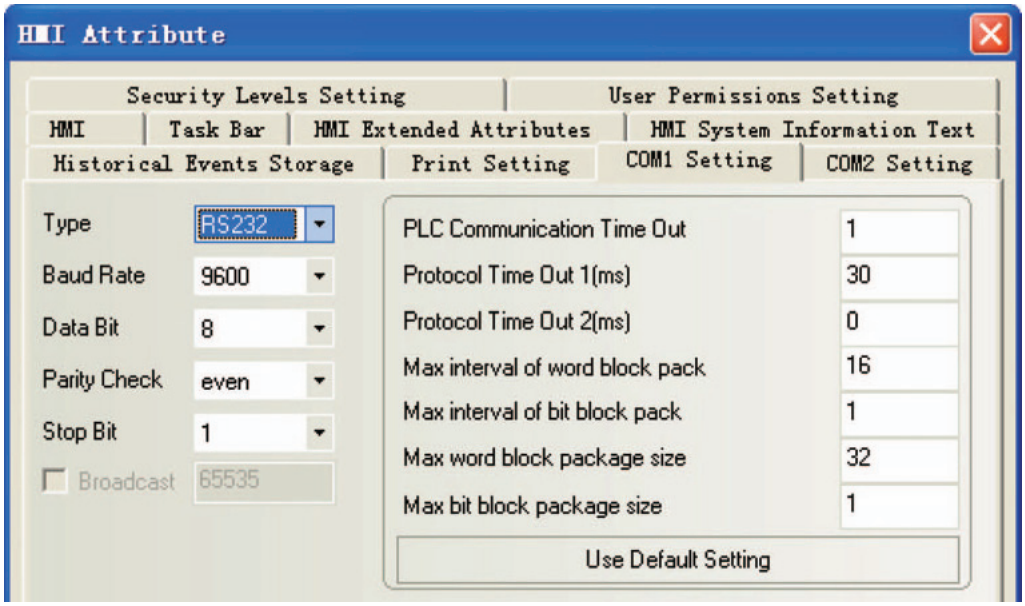
Note The settings will be valid when the PLC is turned OFF and then back ON again after the D8120 setting is modified.

3-3-3 When Using FX2N-10GM/20GM Communication Protocol

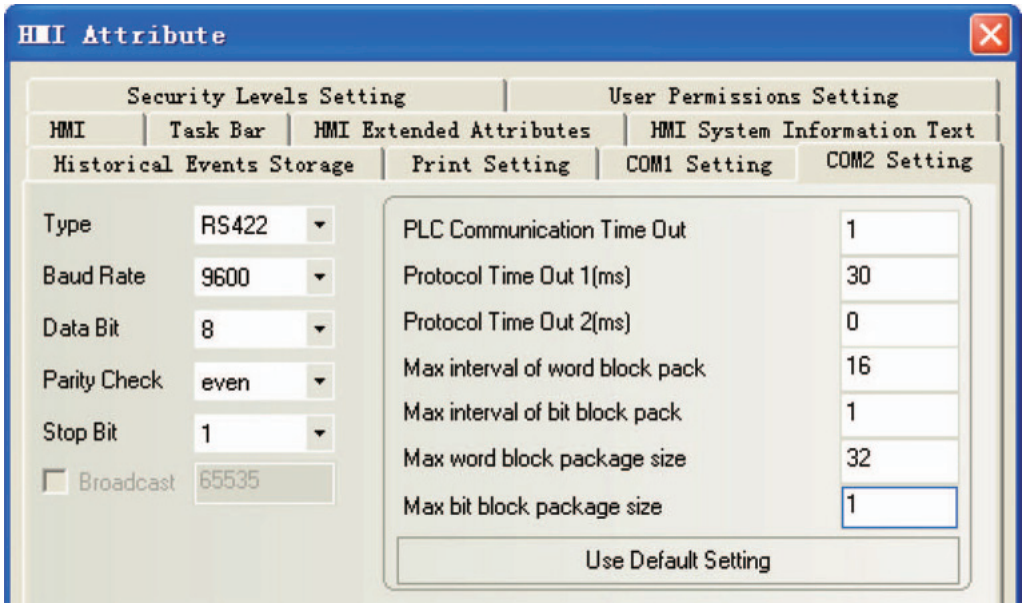
HMI Settings

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), even (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.)

RS232 Communication



RS422 Communication

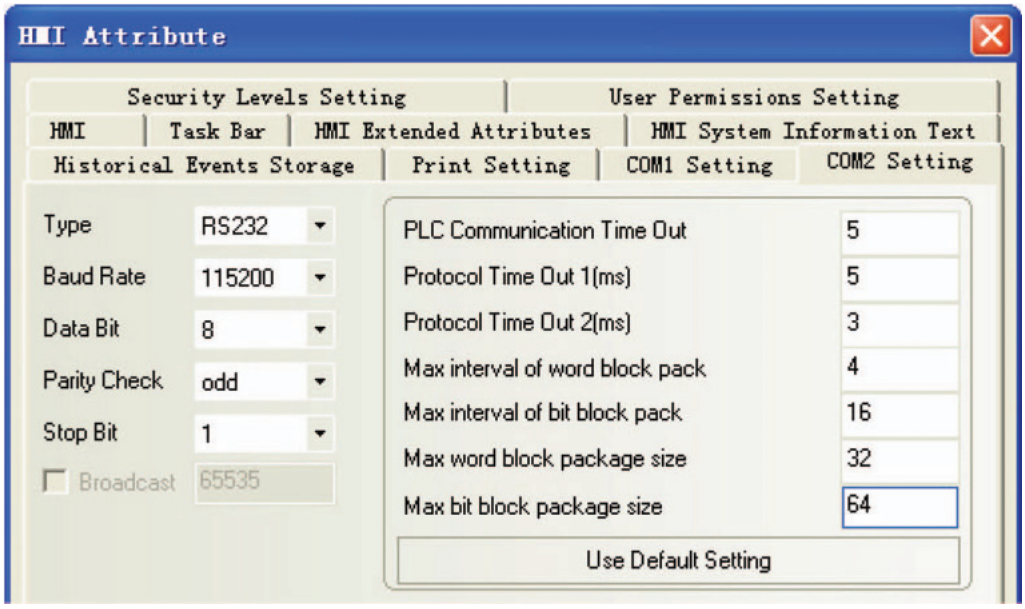


3-3-4 When Using Mitsubishi Q00J (CPU Port) Communication Protocol

HMI Settings

HMI default communication parameters: 115200bps (Baud Rate), 8 (Data Bit), odd (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.) (Multiple Station No. is not supported.)

RS232 Communication



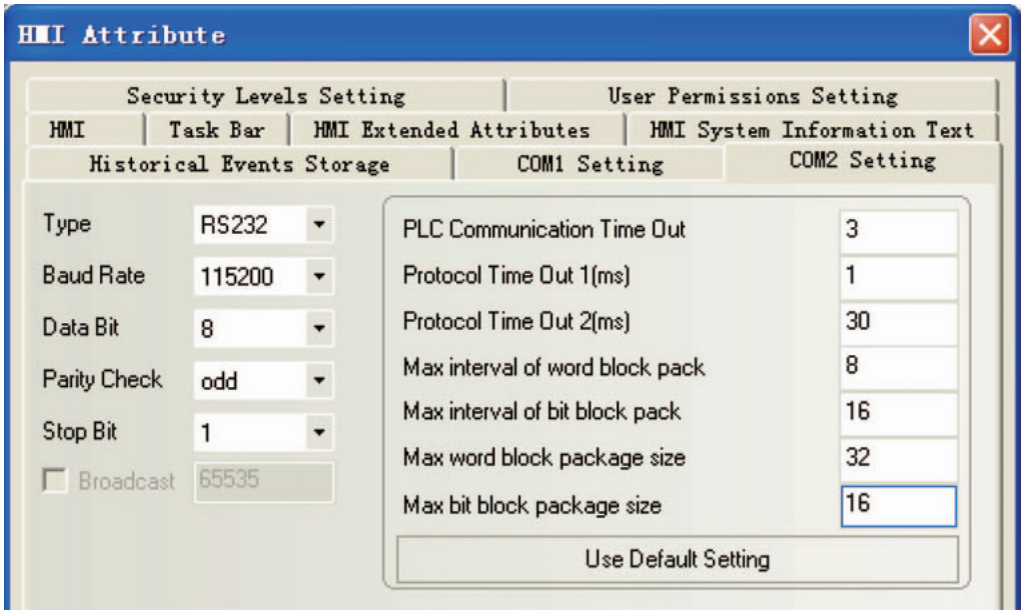
Note There is no need to set PLC baud rate that will automatically vary with the baud rate set by HMI.

3-3-5 When Using Mitsubishi Q series (CPU Port) Communication Protocol

HMI Settings

HMI default communication parameters: 115200bps (Baud Rate), 8 (Data Bit), odd (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.) (Multiple Station No. is not supported.)

RS232 Communication



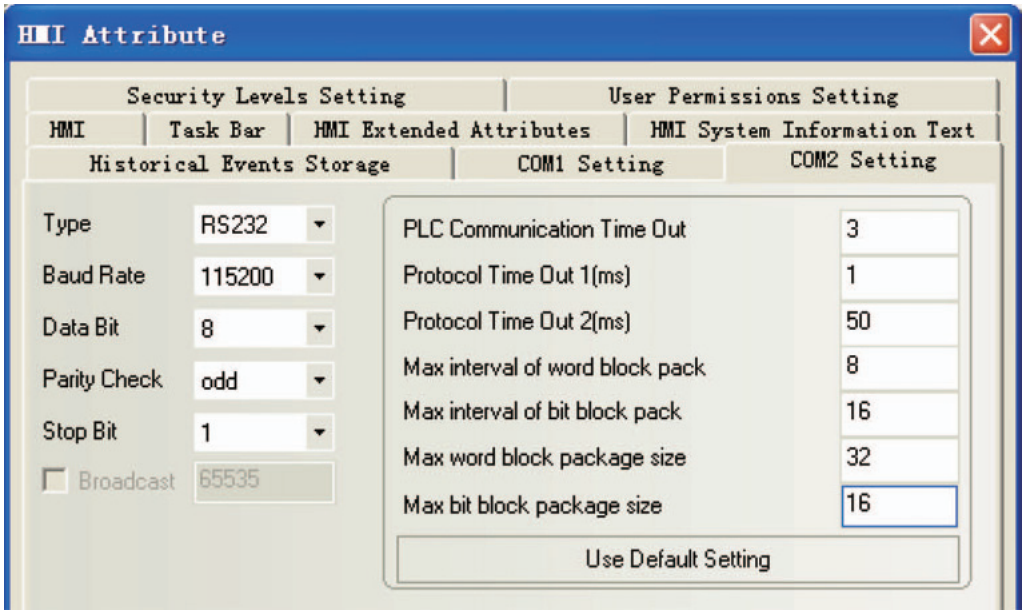
Note There is no need to set PLC baud rate that will automatically vary with the baud rate set by HMI.

3-3-6 When Using Mitsubishi Q06H Communication Protocol

HMI Settings

HMI default communication parameters: 115200bps (Baud Rate), 8 (Data Bit), odd (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.) (Multiple Station No. is not supported.)

RS232 Communication



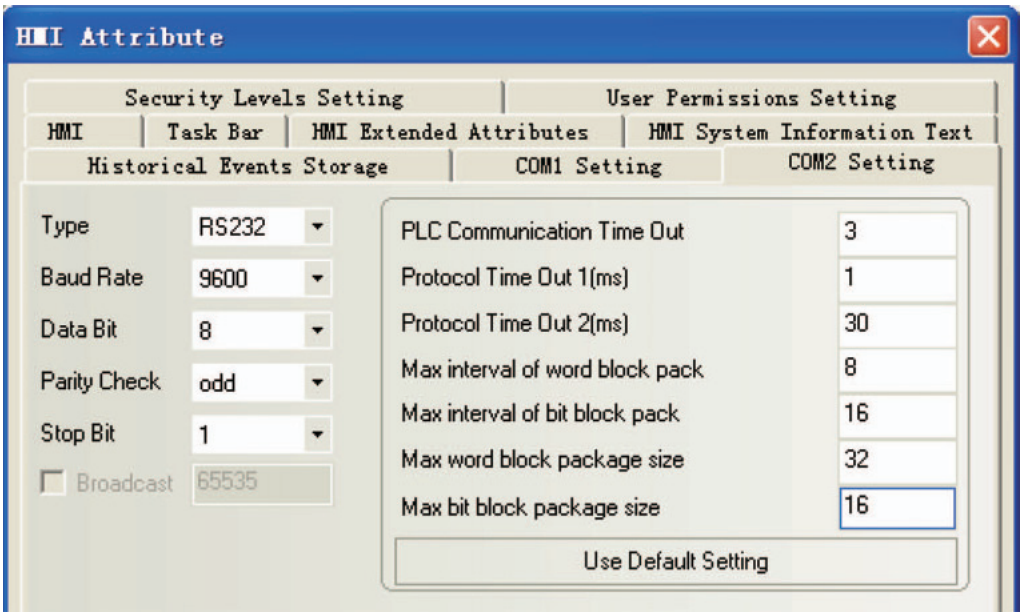
Note There is no need to set PLC baud rate that will automatically vary with the baud rate set by HMI.

3-3-7 When Using Mitsubishi Q_QnA (Link Port) Communication Protocol

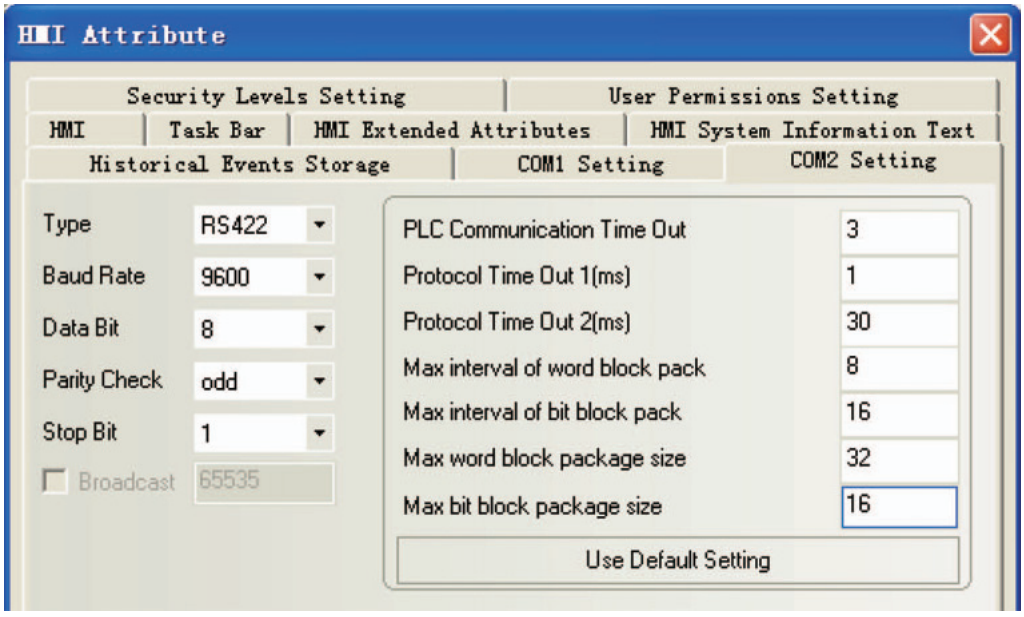
HMI Settings

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), odd (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.)

RS232 Communication



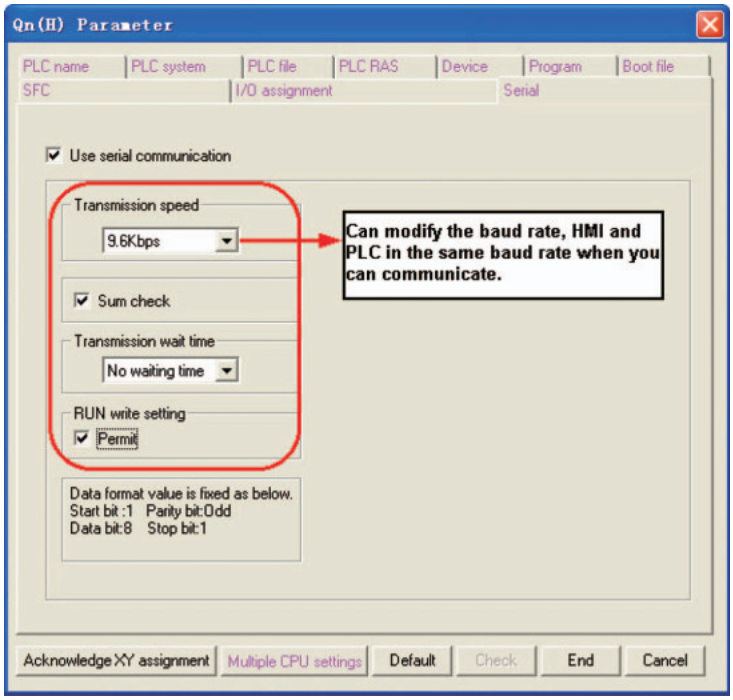
RS422 Communication



PLC Settings

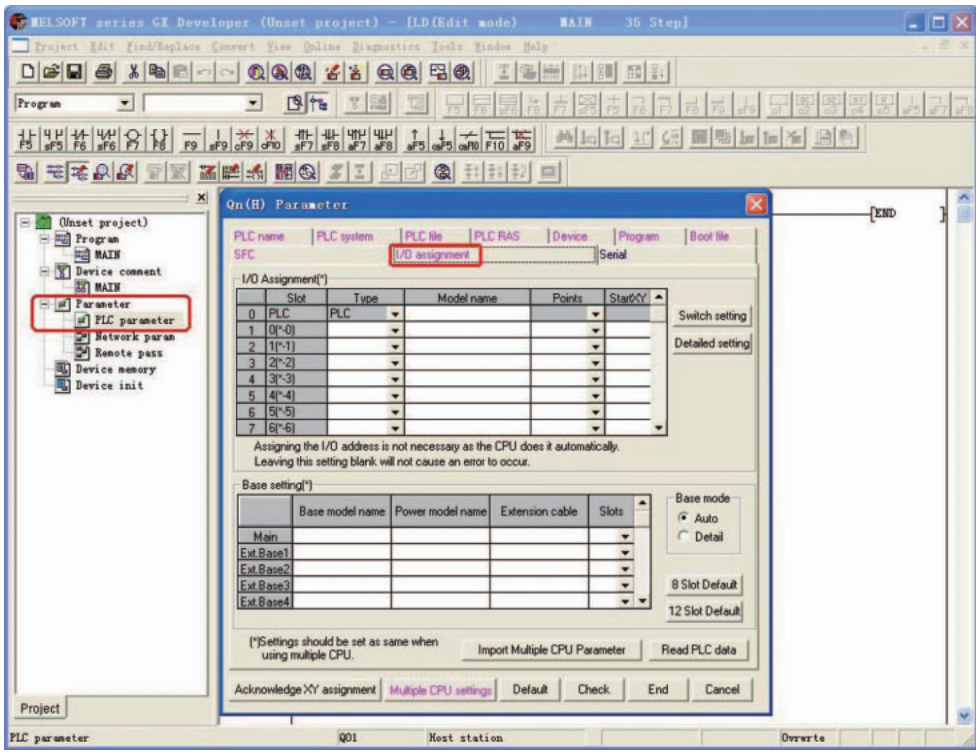
The PLC settings is as shown below when **Mitsubishi Q_QnA (Link Port) or Mitsubishi Melsec Q** communication protocols are used:

- **Communication through CPU Port**

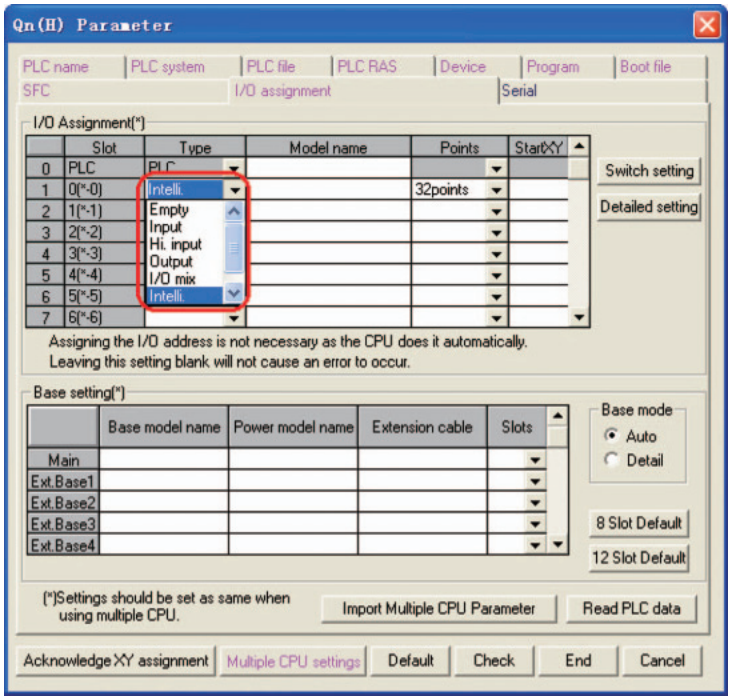


- **Communication through C24 Serial Port Communication Module**

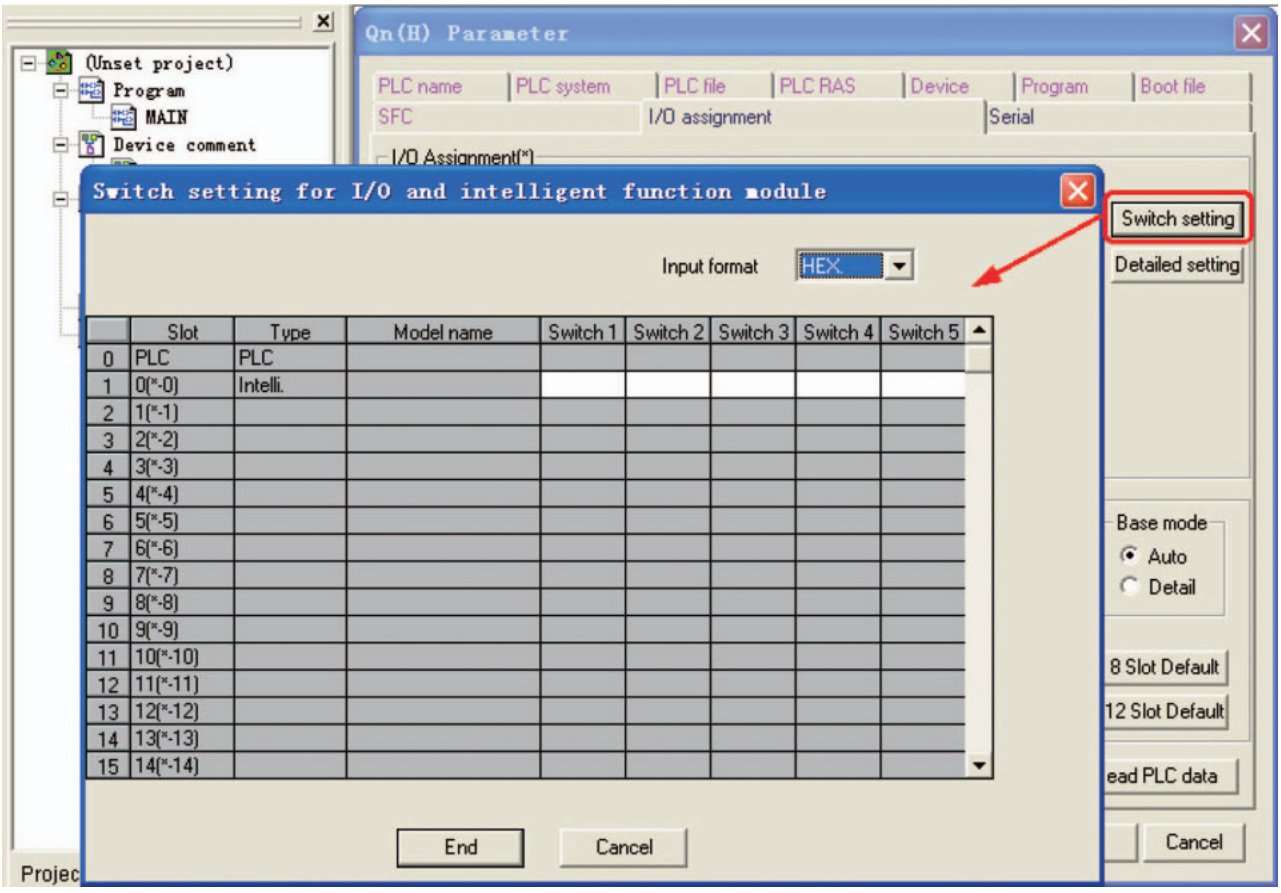
1 Open [Parameter] on Project Data List and double-click [PLC parameter], and select [I/O assignment] after the [Qn (H) Parameter] dialog box is opened.



2 Click the [Type] dropdown list to select the [Intelli.] option.



3 Click the [Switch setting] button and make settings as shown below:



The attribute descriptions of Switch1, Switch2, Switch3, Switch4 and Switch5 are as shown below:

<table>
<tr><th>Switch</th><th>Content</th><th>[Example]</th></tr>
<tr><td>Switch 1</td><td>CH1:Baud rate , transmission setting

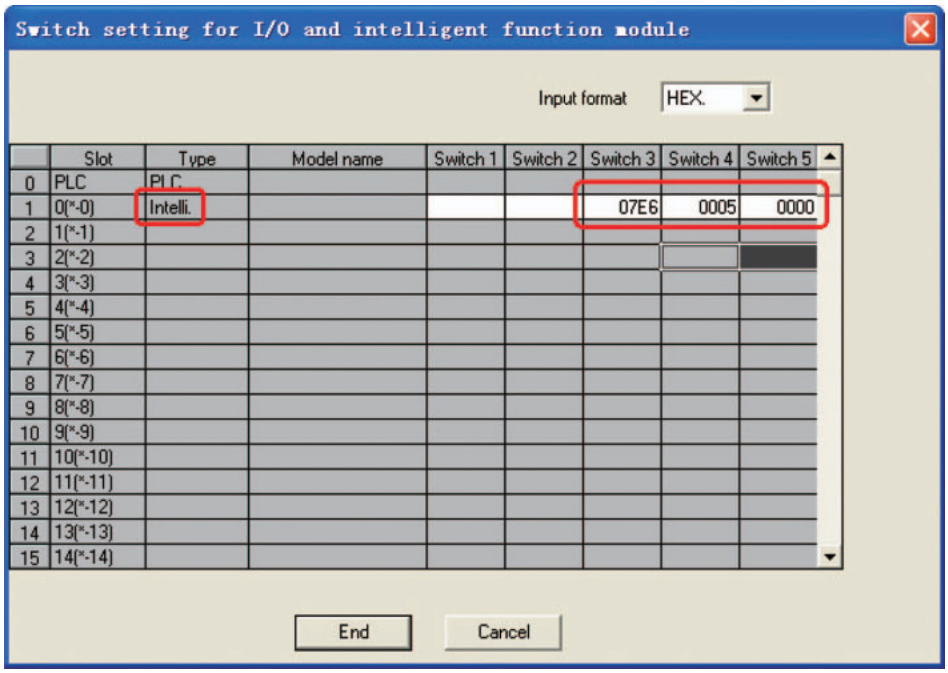
Bit 15 8 7 0
Baud rate | transmission setting

<table>
<tr><th>bps</th><th>Settings</th></tr>
<tr><td>4800</td><td>04H</td></tr>
<tr><td>9600</td><td>05H</td></tr>
<tr><td>19200</td><td>07H</td></tr>
<tr><td>38400</td><td>09H</td></tr>
<tr><td>57600</td><td>0AH</td></tr>
<tr><td>115200</td><td>0BH</td></tr>
</table>
<table>
<tr><th>Bit</th><th>Content</th><th>OFF</th><th>ON</th></tr>
<tr><td>0</td><td>Action set</td><td>Independent</td><td>Linked</td></tr>
<tr><td>1</td><td>Data bit</td><td>7</td><td>8</td></tr>
<tr><td>2</td><td>Parity check bit</td><td>Reserved</td><td>Served</td></tr>
<tr><td>3</td><td>Parity check</td><td>Odd</td><td>Even</td></tr>
<tr><td>4</td><td>Stop bit</td><td>1</td><td>2</td></tr>
<tr><td>5</td><td>Sum check</td><td>Reserved</td><td>Served</td></tr>
<tr><td>6</td><td>Run write</td><td>disable</td><td>enable</td></tr>
<tr><td>7</td><td>Set to change</td><td>disable</td><td>enable</td></tr>
</table></td><td>0BEEH
115Kbps
8bit
1bit
Even</td></tr>
<tr><td>Switch 2</td><td>CH1:Communication protocol</td><td>MC protocol Form 5 Binary code</td><td>0005H</td></tr>
<tr><td>Switch 3</td><td>CH2:Baud rate,transmission setting (The same with the switch 1)</td><td></td><td>0BEEH</td></tr>
<tr><td>Switch 4</td><td>CH2:Communication protocol</td><td>MC protocol Form 5 Binary code</td><td>0005H</td></tr>
<tr><td>Switch 5</td><td>Set the station number</td><td>0~31</td><td>000H</td></tr>
</table>

- Setting Example

  The Switch3, Switch4 and Switch5 can be set as shown below if the CH2 RS422 communication parameters and Station No. are set to 19200/8/Odd/1 and 0 respectively:

Setting Switch	Setting Value	Setup Description
Switch 3	07E6	19200/8/With/Odd/1
Switch 4	0005	Mode = Form 5
Switch 5	0000	Station No. = 0



The Switch1, Switch2 and Switch5 can be set as shown below if the CH1 RS232 communication parameters and Station No. are set to 19200/8/Odd/1 and 0 respectively:

Setting Switch	Setting Value	Setup Description
Switch 1	07E6	19200/8/With/Odd/1
Switch 2	0005	Mode = Form 5
Switch 5	0000	Station No. = 0

The difference between **Mitsubishi Q_QnA (Link Port)** protocol and **Mitsubishi Melsec Q** protocol:

- Mitsubishi Q_QnA (Link Port) protocol features fast communication speed while RS232 communication of module is not supported.
- Mitsubishi Melsec Q protocol features support for RS232 and RS485 communications of module while the communication speed is slower.

3-4 Supported Registers

FX1S

Device	Bit Address	Word Address	Format	Notes
Input Relay	X 00-17	------	OO	
Output Relay	Y 00-15	------	OO	
Internal Relay	M 000-511	------	DDD	
Timer Contact	T 00-63	------	DD	
Counter Contact	C 00-31	------	DD	
Data Contact	D 000.0-255.F	------	DDD.H	
State	S 000-127	------	DDD	
Timer Value	------	T 00-63	DD	
Counter Value	------	C 00-31	DD	
Data Register	------	D 000-255	DDD	
Special Data Register	------	SD 8000-8255	DDDD	
Counter Value	------	C_dword 235-255	DDD	32 bit device

FX1N/FX1NC

Device	Bit Address	Word Address	Format	Notes
Input Relay	X 000-177	------	OOO	
Output Relay	Y 000-177	------	OOO	
Internal Relay	M 0000-1535	------	DDDD	
Timer Contact	T 000-255	------	DDD	
Counter Contact	C 000-199	------	DDD	
Special Internal Relay	SM 8000-8255	------	DDDD	
State	S 000-999	------	DDD	
Timer Value	------	T 000-255	DDD	
Counter Value	------	C 000-199	DDD	
Data Register	------	D 0000-7999	DDDD	
Special Data Register	------	SD 8000-8255	DDDD	
Counter Value	------	C_dword 200-255	DDD	32 bit device

FX2N/FX2NC

Device	Bit Address	Word Address	Format	Notes
Input Relay	X 000-377	------	OOO	
Output Relay	Y 000-377	------	OOO	
Internal Relay	M 0000-3071	------	DDDD	
Timer Contact	T 000-255	------	DDD	
Counter Contact	C 000-199	------	DDD	
Special Internal Relay	SM 8000-8255	------	DDDD	
State	S 000-999	------	DDD	
Timer Value	------	T 000-255	DDD	
Counter Value	------	C 000-199	DDD	
Data Register	------	D 0000-7999	DDDD	
Special Data Register	------	SD 8000-8255	DDDD	
Counter Value	------	C_dword 200-255	DDD	32 bit device

FX2N-10GM/20GM

Device	Bit Address	Word Address	Format	Notes
Input Relay	X 00-67	------	OO	*1
Output Relay	Y 00-67	------	OO	*1
Internal Relay	M 000-511	------	DDD	*1
Special Internal Relay	SM9000-9175	------	DDDD	*1
Data Register	------	D 000-3999	DDDD	*2
Special Data Register	------	SD 9000-9599	DDDD	*2
Special Data Register	------	FD 4000-6999	DDDD	*2

*1 does not support batch transmission while

*2 supports batch transmission.

FX3UC

Device	Bit Address	Word Address	Format	Notes
Input Relay	X000-377	------	OOO	
Output Relay	Y000-377	------	OOO	
Timer Contact	T_bit 000-511	------	DDD	
Counter Contact	C_bit 000-199	------	DDD	
Data Contact	D_bit0.0-7999.F	------	DDDD.H	
State	S0000-4095	------	DDDD	
Internal Relay	M0000-7679	------	DDDD	
Special Internal Relay	SM8000-8511	------	DDDD	
Timer Value	------	T000-511	DDD	
Counter Value	------	C000-199	DDD	
Data Register	------	D0000-7999	DDDD	
Extension Register	------	R0000-32767	DDDDD	
Special Data Register	------	SD8000-8511	DDDD	
Counter Value	------	C_dword200-255	DDD	32 bit device

Q00JCPU

Device	Bit Address	Word Address	Format	Notes
Counter Coil	CC0-1023		DDDD	
Counter Contact	CS0-1023		DDDD	
Timer Coil	TC0-2047		DDDD	
Timer Contact	TS0-2047		DDDD	
Special Link Relay	SB000-7FF	------	HHH	
Link Relay	B0000-1FFF	------	HHHH	
Step Relay	S0000-1FFF	------	HHHH	
Edge Relay	V0000-2047	------	DDDD	
Annunciator	F0000-2047	------	DDDD	
Latch Relay	L0000-8191	------	DDDD	
Special Internal Relay	SM0000-2047	------	DDDD	
Internal Relay	M0000-8191	------	DDDD	
Output Relay	Y0000-1FFF	------	HHHH	
Input Relay	X0000-1FFF	------	HHHH	
File Register	------	R000-32767	DDDDD	
Special Link Register		SW0-3FF	HHH	

Device	Bit Address	Word Address	Format	Notes
Link Register	------	W000-7FF	HHH	
Special Data Register	------	SD0-2047	DDDD	
Data Register	------	D0-12287	DDDDD	
Counter Value	------	CN0-1023	DDDD	
Retentive Timer Value	------	SN0-2047	DDDD	
Timer Value	------	TN0-2047	DDDD	

Q00CPU/Q01CPU/Q02HCPU/Q06HCPU/Q12HCPU/Q25HCPU

Device	Bit Address	Word Address	Format	Notes
Special Link Relay	SB 00000- 7FFF	------	HHHH	
Link Relay	B 00000- 7FFF	------	HHHH	
Edge relay	V 00000-32767	------	DDDDD	
Annunciator	F 00000-32767	------	DDDDD	
Latch relay	L 00000-32767	------	DDDDD	
Special Internal Relay	SM 0000-2047	------	DDDD	
Internal Relay	M 00000-32767	------	DDDDD	
Output Relay	Y 0000-1FFF	------	HHHH	
Input Relay	X 0000-1FFF	------	HHHH	
Link Register	------	W 00000- 291F	HHHHH	
Timer Value	------	TN 00000-23087	DDDDD	
Counter Value	------	CN 00000-23087	DDDDD	
File Register	------	R 00000-32767	DDDDD	
Retentive Timer Value	------	SN 0-23087	DDDDD	
Special Link Register	------	SW 0000- 7FF	HHHH	
File Register (Block switching is not necessary)	------	ZR 00000-65535	DDDDD	
Data Register	------	D 00000-25983	DDDDD	
Special Data Register	------	SD 0000-2047	DDDD	

Q02CPU

Device	Bit Address	Word Address	Format	Notes
Special Link Relay	SB000-7FF	------	HHH	
Link Relay	B0000-1FFF	------	HHHH	
Edge Relay	V0000-2047	------	DDDD	
Annunciator	F0000-2047	------	DDDD	
Latch Relay	L0000-8191	------	DDDD	
Special Internal Relay	SM0000-2047	------	DDDD	
Internal Relay	M0000-8191	------	DDDD	
Output Relay	Y0000-1FFF	------	HHHH	
Input Relay	X0000-1FFF	------	HHHH	
Link Register	------	W0000-1FFF	HHHH	
Timer Value	------	TN0000-2047	DDDD	
Counter Value	------	CN0000-1023	DDDD	
File Register	------	R00000-32767	DDDDD	
Special Link Register	------	SW000-7FF	HHH	
Data Register	------	D00000-12287	DDDDD	
Special Data Register	------	SD0000-2047	DDDD	

Note Address format description: D: decimal, O: octonary, H: hexadecimal.

3-5 Cable Fabrication

FX Series RS232 Communication Cable

● FX□□-232-BD Communication Cable

HMI (COM1/COM2)			Communication expansion board or special communication adaptor		
	Signal	Pin No.	Pin No.	Signal	
D-Sub 9Pin (Female)	SD	2	2	RXD	D-Sub 9Pin (Female)
	RD	3	3	TXD	
	SG	9	5	GND	

FX Series RS485/422 Communication Cable

● Communication Cable for CPU Port/FX□□-422-BD Communication Cable

HMI (COM2)			Built-in standard port or communication expansion board		
	Signal	Pin No.	Pin No.	Signal	
D-Sub 9Pin (Female)	SDB+	1	2	RX+	8Pin Mini DIN (Female)
	RDB+	6	7	TX+	
	SDA-	7	1	RX-	
	RDA-	8	4	TX-	
	SG	9	3	GND	

● FX□□-485-BD/FX□□-485 ADP Communication Cable

HMI (COM2)			Communication expansion board or special communication adaptor	
	Signal	Pin No.	Signal	
D-Sub 9Pin (Female)	SDB+	1	RDB+	RS-422 connector
	RDB+	6	SDB+	
	SDA-	7	RDA-	
	RDA-	8	SDA-	
	SG	9	GND	

Q Series RS232 Communication Cable

● Communication Cable for CPU Port

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	6Pin Mini DIN (Female)
	SD	2	———	1	RXD	
	RD	3	———	2	TXD	
	SG	9	———	3	GND	

● RS232 communication cable for C24 communication module

HMI (COM1/COM2)				C24 serial communication module		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2	———	2	RXD	
	RD	3	———	3	TXD	
	SG	9	———	5	SG	
				1	CD	
				4	DTR	
				6	DSR	
				7	RTS	
				8	CTS	

Q-Series RS485/422 Communication Cable

● RS422 Communication Cable for C24 Communication Module

HMI (COM2)				C24 serial communication module	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-422 connector
	SDB+	1	———	RDB+	
	RDB+	6	———	SDB+	
	SDA-	7	———	RDA-	
	RDA-	8	———	SDA-	
	SG	9	———	SG	

4

Connecting to Schneider PLCs

This section describes the connection to Schneider PLCs.

4-1 Serial Port Communication

Series	CPU	Link Module	Driver
Micro	TSX3705001 TSX 37 05 028DR1 TSX 37 08 056DR1 TSX 37 10 128DT1 TSX 37 10 128DR1 TSX 37 10 128DTK1 TSX 37 10 164DTK1 TSX 37 10 028AR1 TSX 37 10 028DR1 TSX 37 21 101 TSX 37 22 101 TSX 37 21 001 TSX 37 22 001	TER port on the CPU	Schneider Modicon Uni-TelWayModbus RTU
Premium	TSX P57 103M TSX P57 153M TSX P57 203M TSX P57 253M TSX P57 303M TSX P57 353M TSX P57 453M	TER port on the CPU	
Nano	TSX 07 3L □□□□28 TSX 07 30 10□□□□ TSX 07 31 16□□□□ TSX 07 31 24□□□□ TSX 07 32 □□□□28 TSX 07 33 □□□□28	Programming port on CPU	
Twido	TWD LCAA 10DRF TWD LCAA 16DRF TWD LCAA 24DRF TWD LMDA 20DTK TWD LMDA 20DUK TWD LMDA 20DRT TWD LMDA 40DTK TWD LMDA 40DUK	RS485 on the CPU unit	Schneider Twido Modbus RTU

4-2 Communication Parameters and Cable Fabrication

Series	CPU	Link Module	Driver	COMM Type	Parameter	Cable
Modicon TSX	TSX3705001 TSX3705001 TSX 37 05 028DR1 TSX 37 08 056DR1 TSX 37 10 128DT1 TSX 37 10 128DR1 TSX 37 10 128DTK1 TSX 37 10 164DTK1 TSX 37 10 028AR1 TSX 37 10 028DR1 TSX 37 21 101 TSX 37 22 101 TSX 37 21 001 TSX 37 22 001	RS485 on the CPU unit	Schneider Modicon Uni-TelWay	RS232 RS485	Refer to Section 4-3	Self-made cable required
	TSX3705001 TSX3705001 TSX 37 05 028DR1 TSX 37 08 056DR1 TSX 37 10 128DT1 TSX 37 10 128DR1 TSX 37 10 128DTK1 TSX 37 10 164DTK1 TSX 37 10 028AR1 TSX 37 10 028DR1 TSX 37 21 101 TSX 37 22 101 TSX 37 21 001 TSX 37 22 001	RS485 on the CPU unit	Modbus RTU	RS232 RS485		
Twido	TWD LCAA 10DRF TWD LCAA 16DRF TWD LCAA 24DRF TWD LMDA 20DTK TWD LMDA 20DUK TWD LMDA 20DRT TWD LMDA 40DTK TWD LMDA 40DUK	RS485 on the CPU unit		RS232 RS485		

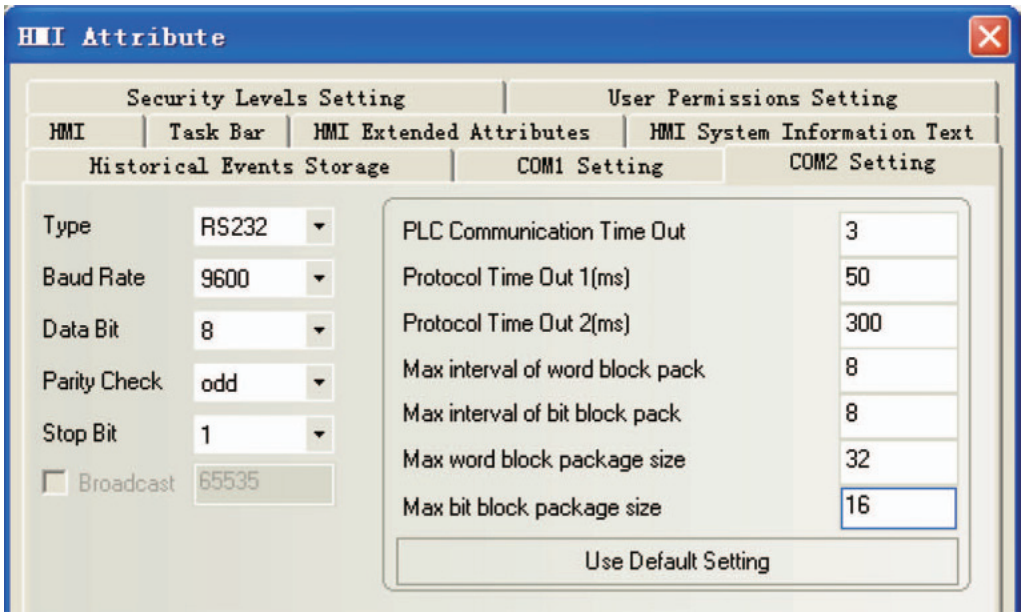
4-3 Communication Parameter Setting

HMI Settings

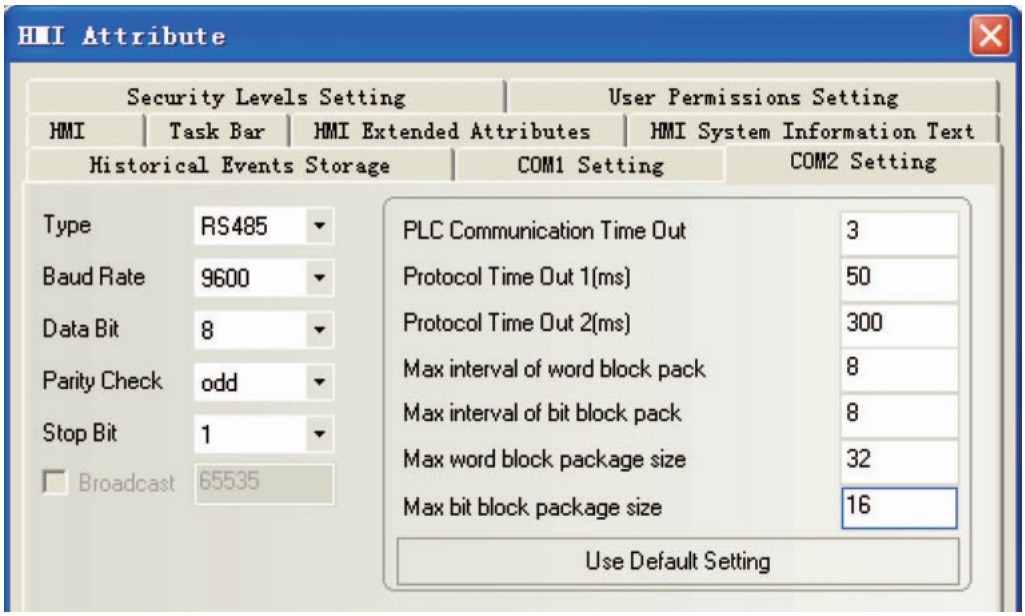
When Using Schneider Modicon Uni-TelWay Protocol

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), odd (Parity Check), 1 (Stop Bit) and 4 (PLC Station No.)

RS232 Communication



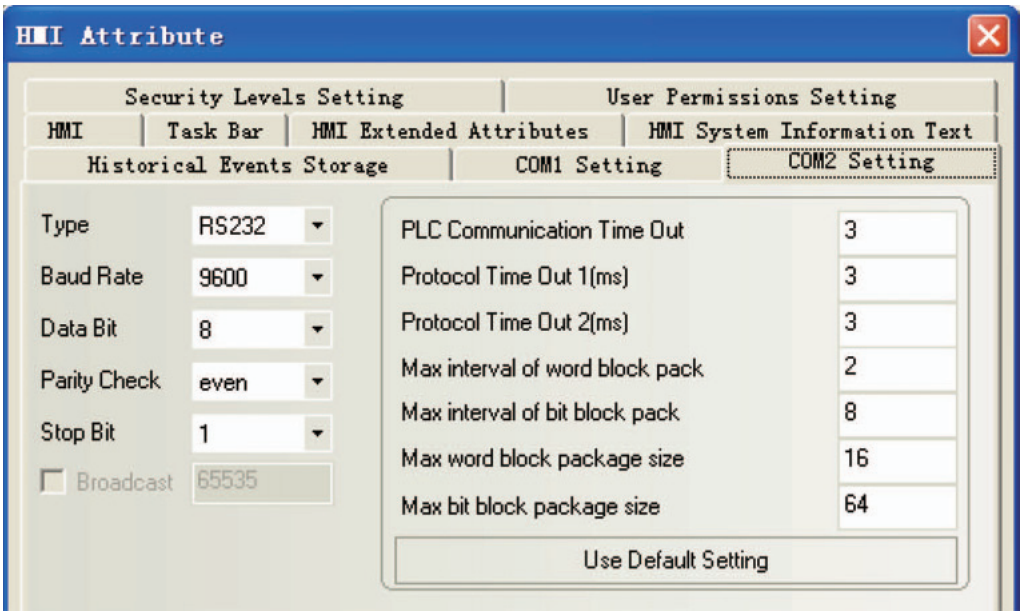
RS485 Communication



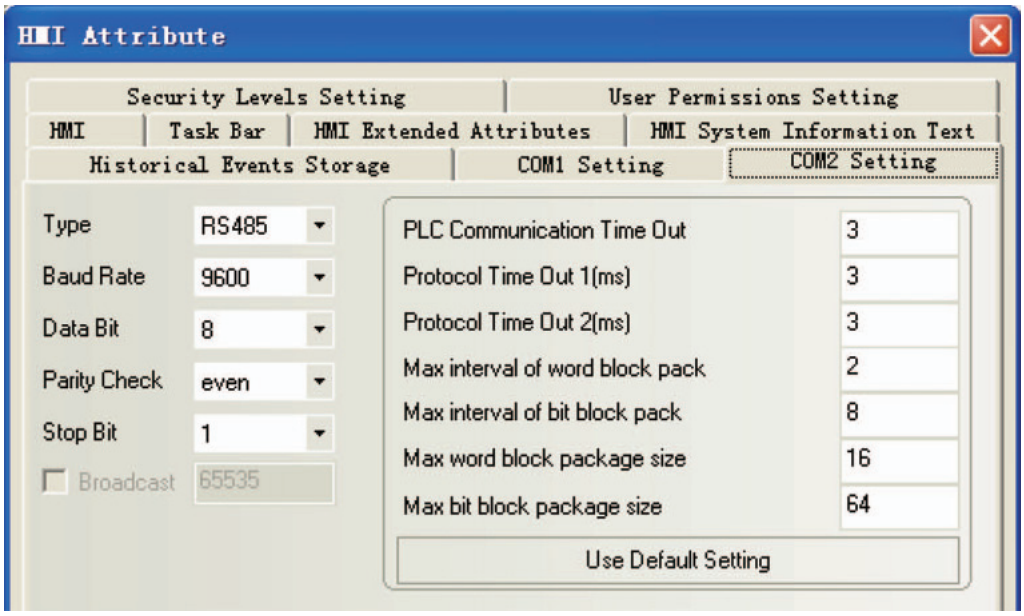
When Using Modbus RTU Protocol

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), even (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)

RS232 Communication



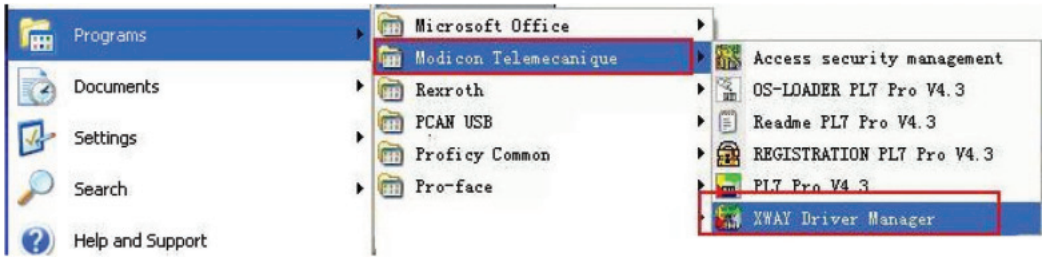
RS485 Communication



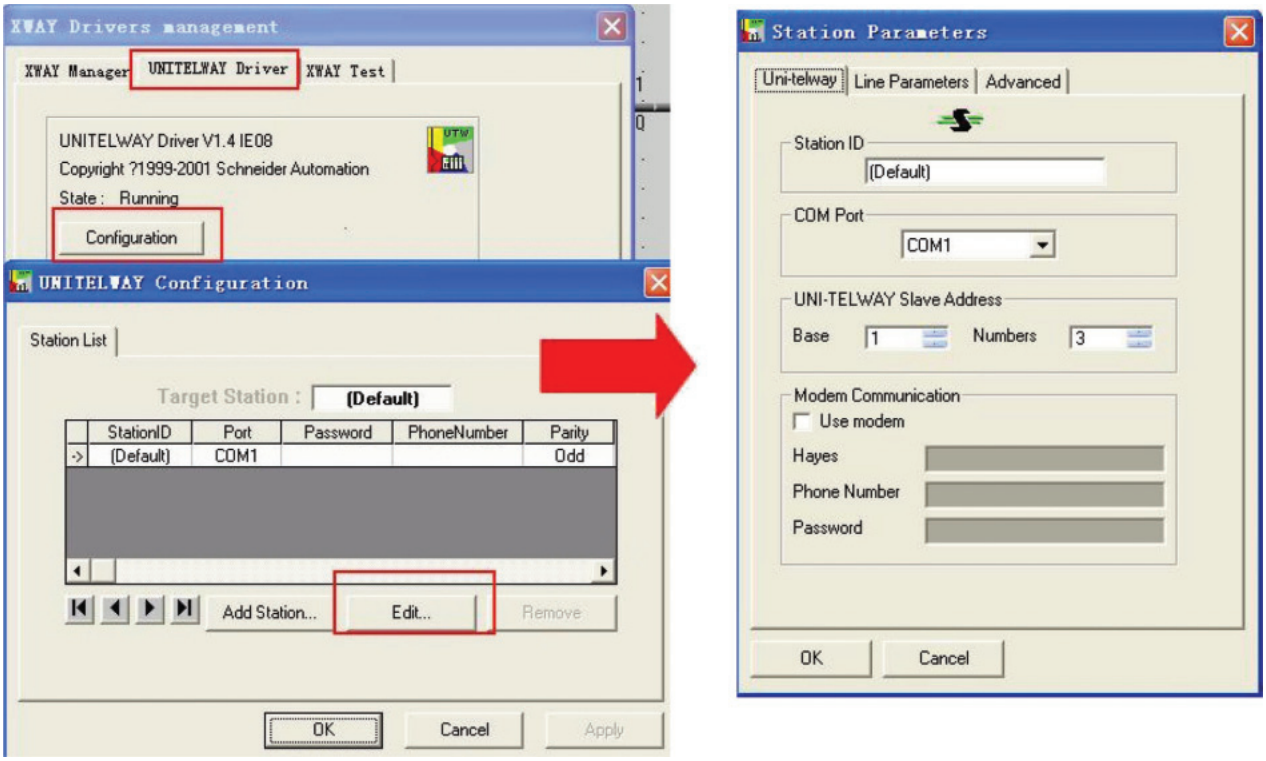
PLC Settings

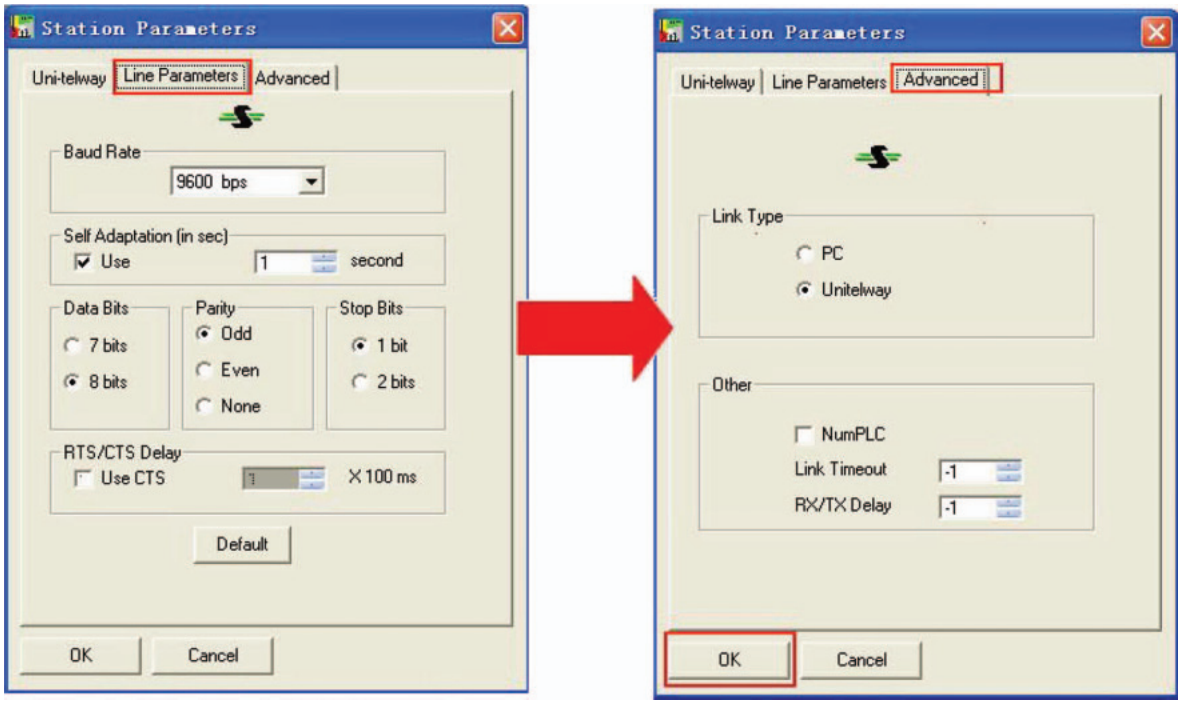
● PL7 Software Setting

1 Open “Programs” menu - Select [XWAY Driver Manager] from Modicon Telemecanique:

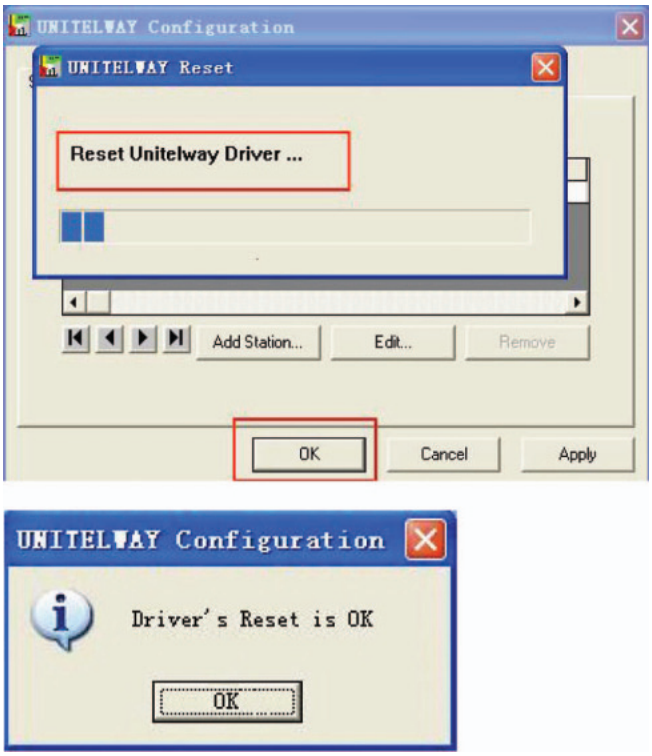


2 Select [UNITELWAY Driver]→[Configuration]→[Edit] in the popup window and modify relevant communication parameters:

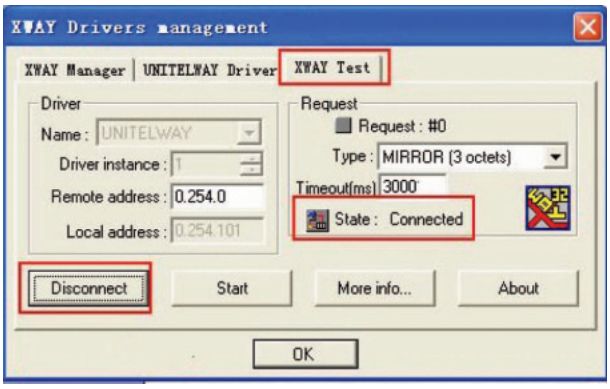




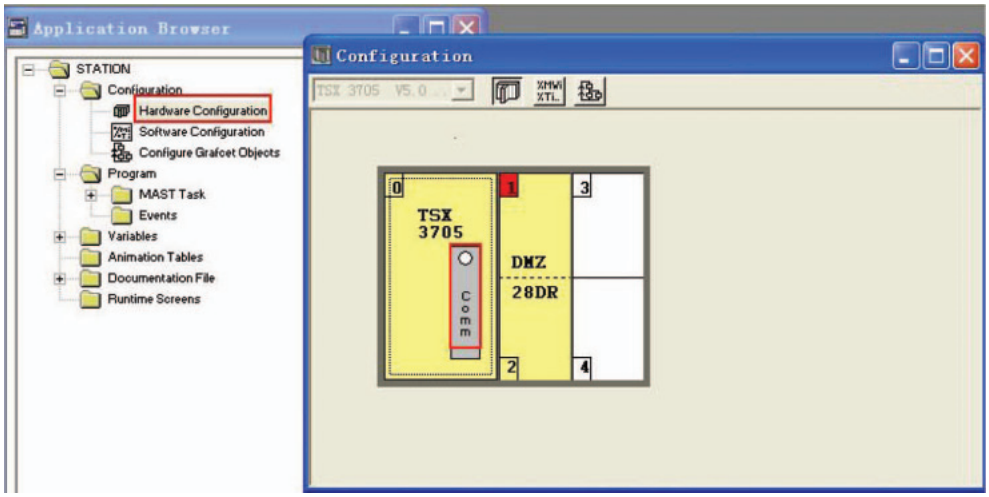
3 The following prompt information will appear after the [OK] button is clicked:



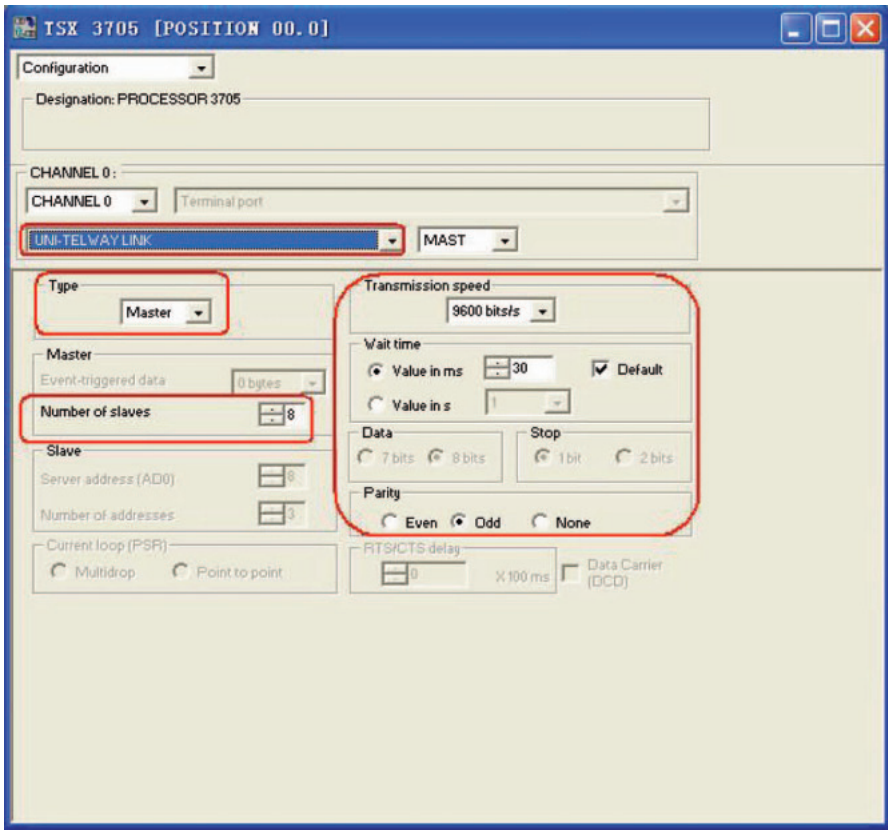
4 Click [XWAY Test]→[Connect] and the Connected prompt information will appear when the connection is successful.



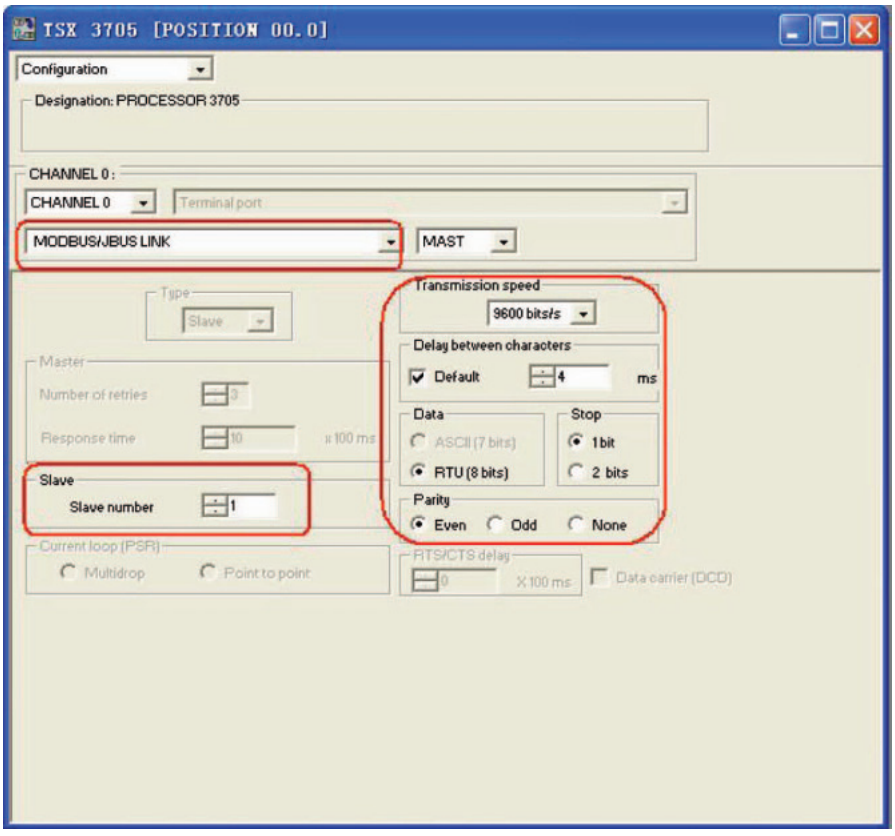
5 Open PL7 Software→New→Click [Hardware Configuration] in [STATION]→Double-click [comm] in popup window.



The settings are as shown below if Schneider Modicon Uni-TelWay Protocol is used:



The settings are shown as below if Modbus RTU Protocol is used:



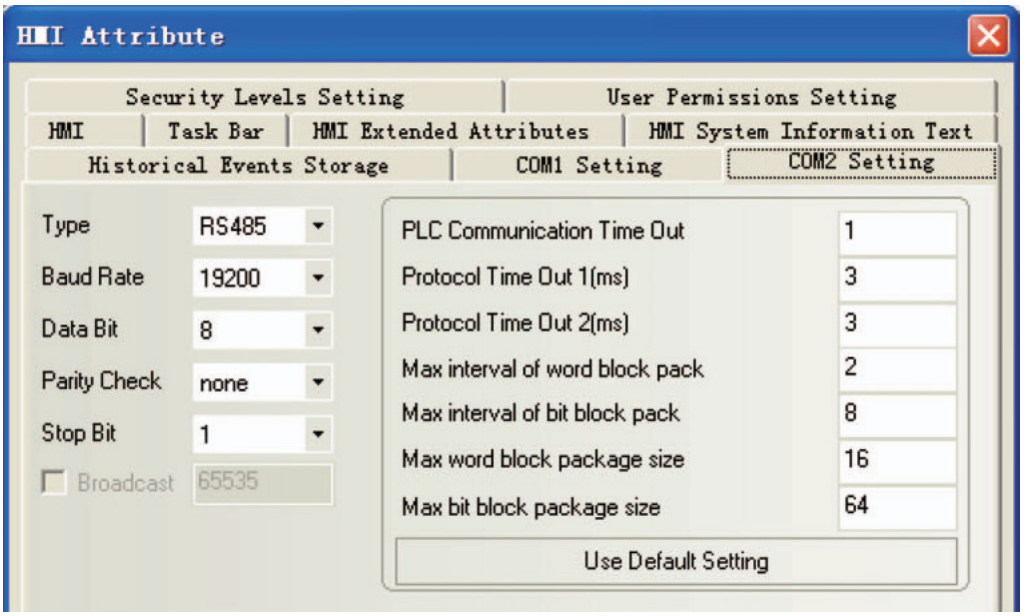
6 Download the project to PLC after the settings are completed.

HMI Settings

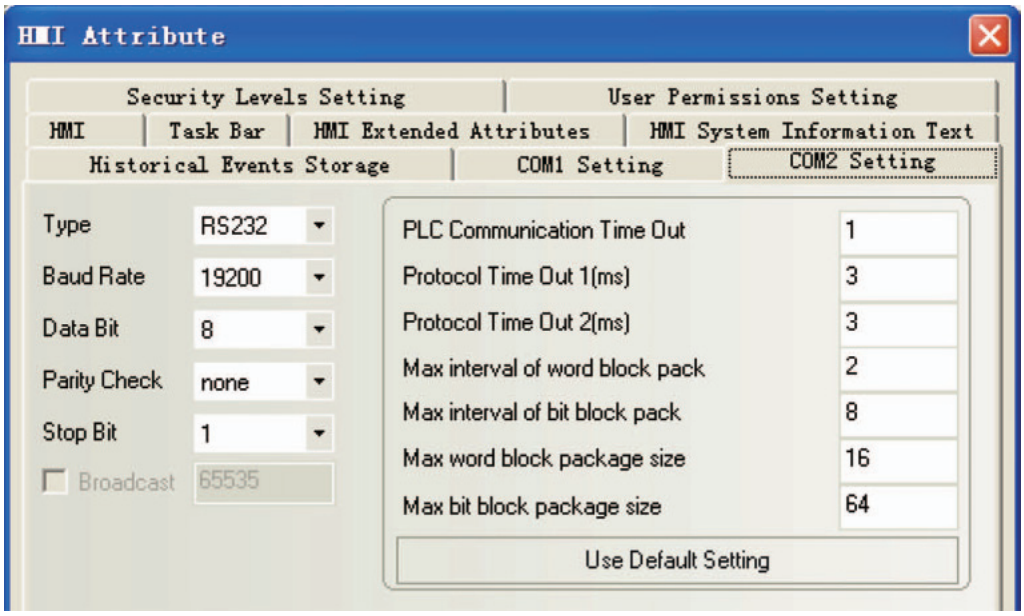
● When Using Schneider Twido Modbus RTU Protocol

HMI default communication parameters: 19200bps (Baud Rate), 8 (Data Bit), none (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)

RS485 Communication



RS232 Communication

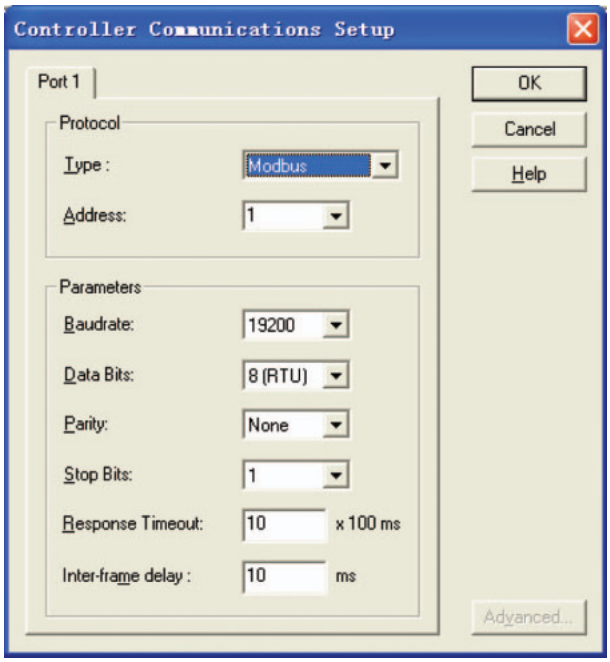


PLC Settings

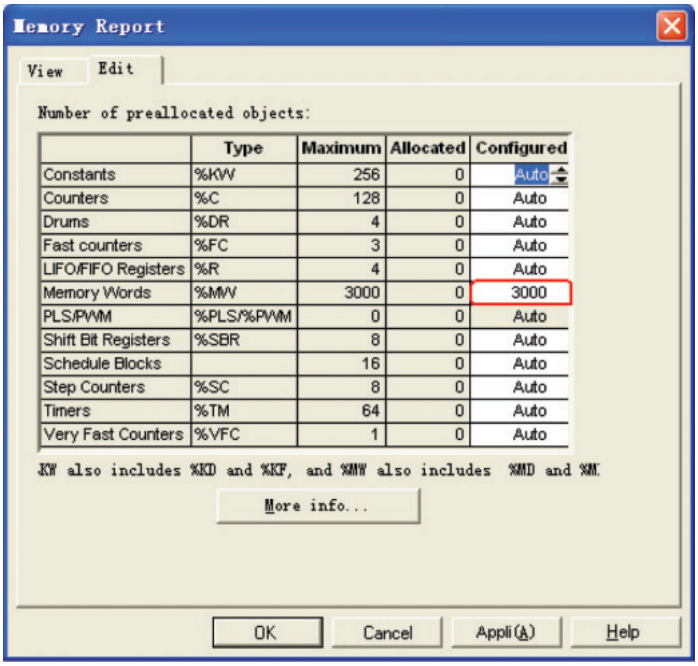
● When Using Schneider Twido Modbus RTU Protocol

Note The memory addresses of Twido are under dynamic management, which may lead to communication failure when address link is available. It is recommended the user to add one statement after PLC program. Only after the user has made the correct settings of the words or bits, referring to the following PLC Settings, PLC can communicate with the HMI device.

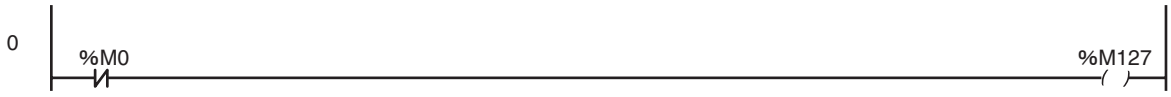
1 Controller Communications Setup



2 Extend the range of word memory address and change the [Auto] option in the [Assigned] column for the internal word to a larger value through the [Controller]→[Used Memory]→[Edit] and download it to the PLC.
It is assumed that the “Auto” is set to 3000 as shown below, all addresses before %MW3000 can perform the data swap.



3 Extend the range of open bit address and drive the coil with a maximum address through the programming.
It is assumed that a %M127 coil is driven as shown below, all addresses before %M127 can perform the data swap.



4-4 Supported Registers

Modicon TSX

Device	Bit Address	Word Address	Format	Notes
System Internal Nodes	S00000-32767	------	DDDDD	
Internal Auxiliary Nodes	M00000-32767	------	DDDDD	
Data Register Bit Nodes	MW.B0000-9999.F	------	DDDD.H	
Data Registers	------	MW0000-7999	DDDD	
Data Registers (32-bit)	------	MD0000-7999	DDDD	

Twido

Device	Bit Address	Word Address	Format	Notes
Internal Auxiliary Nodes	0X 1-9999	------	DDDD	
	1X 1-9999	------	DDDD	
	------	3X 1-9999	DDDD	
Data Registers	------	4X 1-9999	DDDD	

Note The registers M and MW in TWIDO software correspond to 0X and 4X of HMI respectively. The address offset of HMI and PLC is 1.
Do not use 1X and 3X of HMI for there are no registers in TWIDO software corresponding to them.
The HMI address must be “PLC address + 1”. For example: The M0 in PLC corresponds to 0X1 of HMI.
Address format description: D: decimal, O: octonary, H: hexadecimal.

4-5 Cable Fabrication

When Using Schneider Modicon Uni-TelWay Protocol

● RS232 Communication Cable

Use serial port programming cable manufactured by Schneider directly to communicate with HMI.

Note Direct the middle cable knob to position 2 and add a RS232 cable directly between the HMI and programming cable.

● RS485 Communication Cable

HMI (COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	8Pin Mini DIN (Female)
	RDB+	6		1	D+	
	RDA-	8		2	D-	
	SG	9		7	GND	

When Using Modicon modbus Protocol

● RS232 Communication Cable

Use serial port programming cable manufactured by Schneider directly to communicate with HMI.

Note Direct the middle cable knob to position 3

● RS485 Communication Cable

HMI (COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	8Pin Mini DIN (Female)
	RDB+	6		1	D+	
	RDA-	8		2	D-	
	SG	9		5	DPT	
				7	GND	

When Using Schneider Twido Modbus RTU Protocol

● RS232 Communication Cable

Use serial port communication cable manufactured by Schneider directly to communicate with HMI.

● RS485 Communication Cable

HMI (COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	8Pin Mini DIN (Female)
	RDB+	6		1	A+	
	RDA-	8		2	B-	
	SG	9		5	DPT	
				7	GND	

5

Modbus Connection

This section describes the connection on Modbus protocol.

5-1 Serial Port and Network Interface Communication

Series	CPU	Link Module	SIO Type	Driver
Modbus RTU	Modbus Compatible External Device	RS232 on the CPU unit	-	Modbus RTU
		RS485 on the CPU unit	-	
Modbus RTU Extend		RS232 on the CPU unit	-	Modbus RTU Extend
		RS485 on the CPU unit	-	
Modbus RTU Slave		RS232 on the CPU unit	-	Modbus RTU Slave
		RS485 on the CPU unit	-	
Modbus ASCII		RS232 on the CPU unit	-	Modbus ASCII
		RS485 on the CPU unit	-	
Modbus TCP		-	Ethernet	Modbus TCP
Modbus TCP Slave		-	Ethernet	Modbus TCP Slave

5-2 Communication Parameters and Cable Fabrication

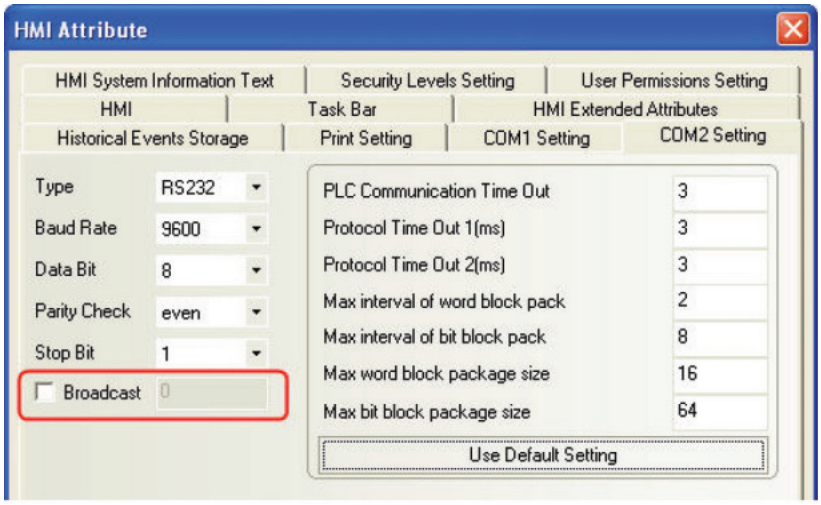
Series	CPU	Link Module	COMM Type	Parameter	Cable
Modbus RTU	Modbus Compatible External Device	RS232 on the CPU unit	RS232	Refer to Section 5-3	Self-made cable required
		RS485 on the CPU unit	RS422		
Modbus RTU Extend		RS232 on the CPU unit	RS232		
		RS485 on the CPU unit	RS422		
Modbus RTU Slave		RS232 on the CPU unit	RS232		
		RS485 on the CPU unit	RS422		
Modbus ASCII		RS232 on the CPU unit	RS232		
		RS485 on the CPU unit	RS422		
Modbus TCP		-	Ethernet		Network cable
Modbus TCP Slave		-	Ethernet		Network cable

5-3 Communication Parameter Setting

HMI Settings

● When Using Modbus RTU Protocol

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), even (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)



Note 1 Modbus RTU protocol supports broadcast station number, but the broadcast function only supports the write operation only i.e. the broadcast function cannot be used for the components with read attribute.

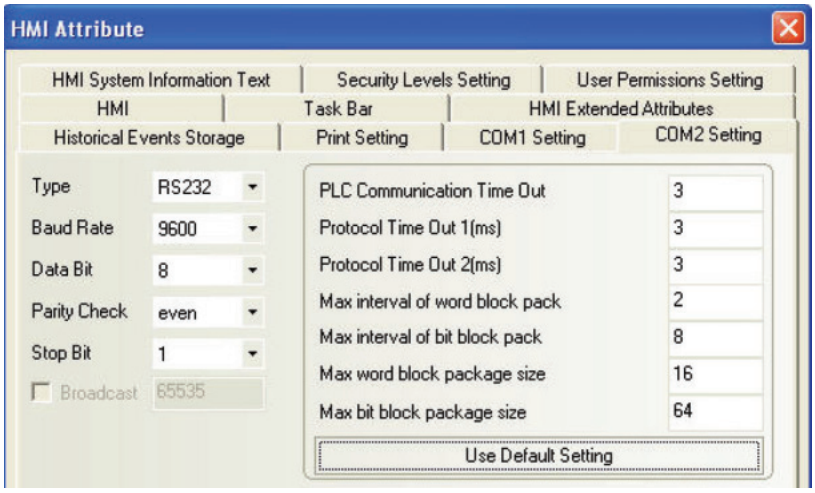
2 The broadcast function has two usage methods.

(a) For the components with write-only attribute (Bit State Setting component and “Toggle” excluded) and the Multiple State Setting components (“Add value”, “Sub value”, “JOG++” and “JOG--” excluded)

(b) Use Macro instruction in the Macro programming to perform the write operation for the address of the Broadcast Station No..

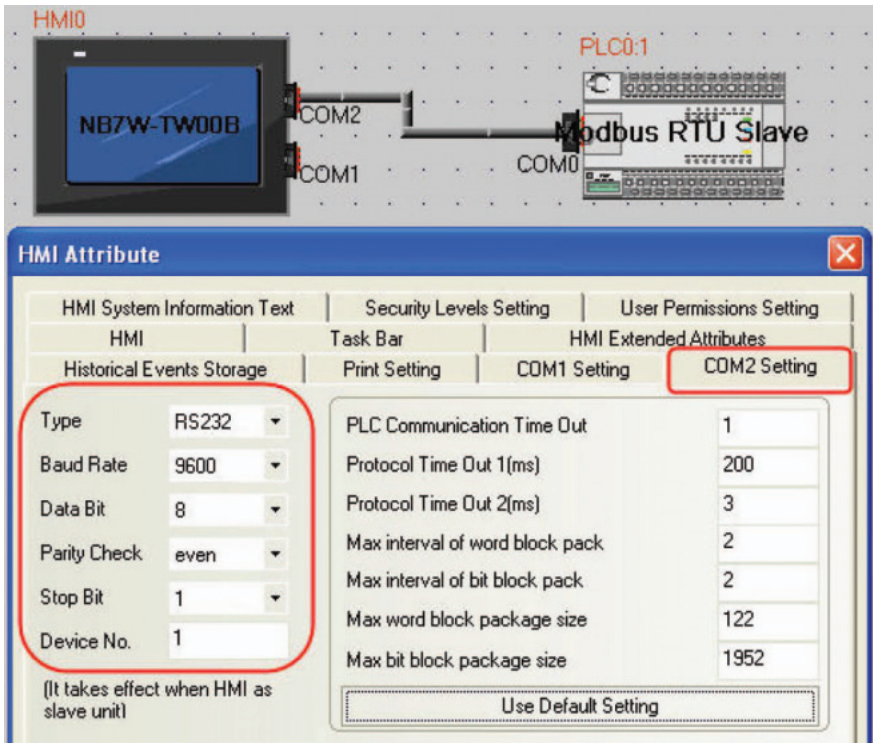
● When Using Modbus RTU Extend Protocol

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), even (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)



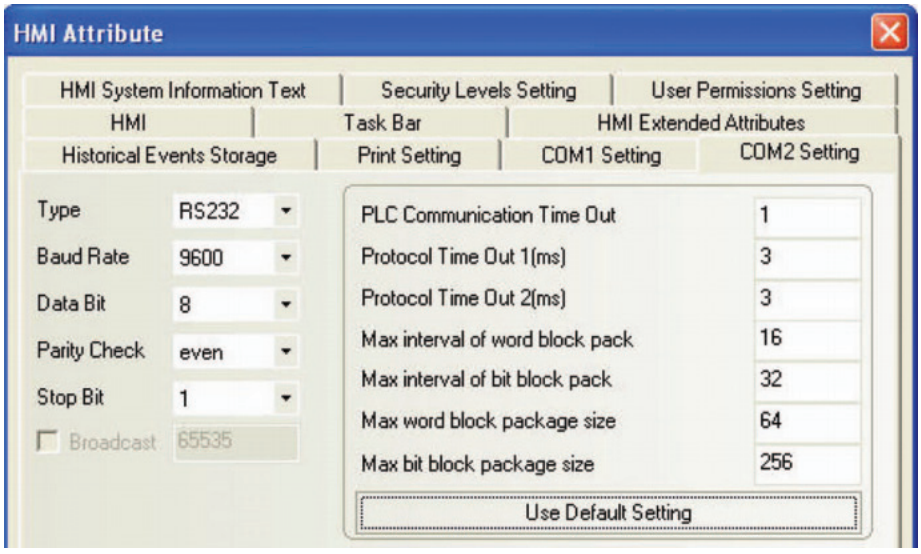
When Using Modbus RTU Slave Protocol

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), even (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)



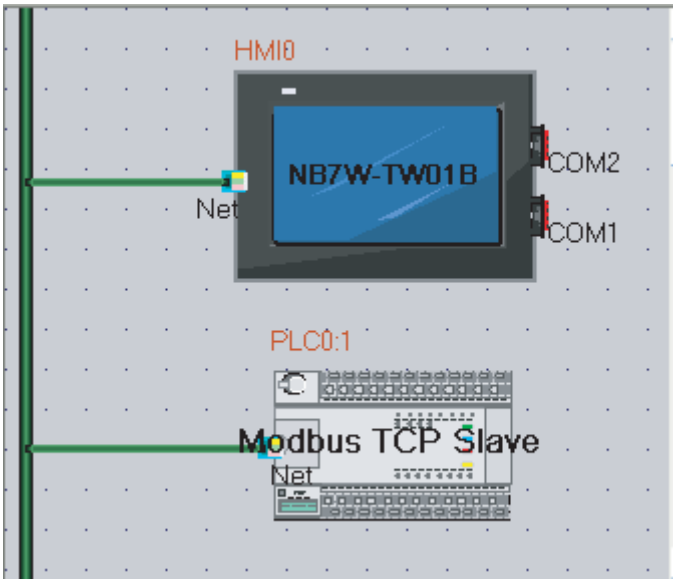
When Using Modbus ASCII Protocol

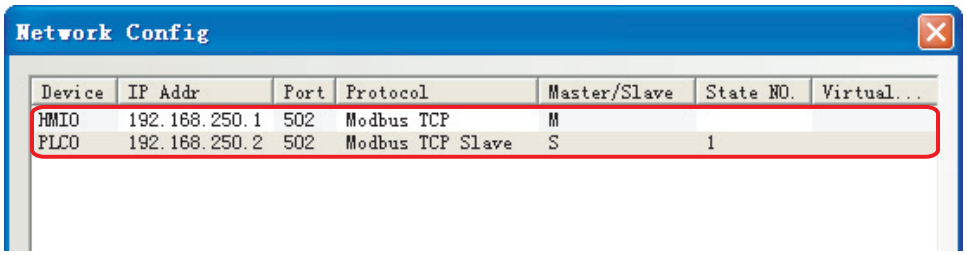
HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), even (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)



When Using Modbus TCP Slave Protocol

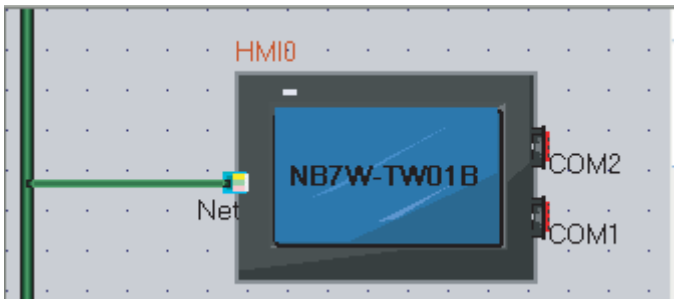
HMI serves as the master, the network configuration is as follows.

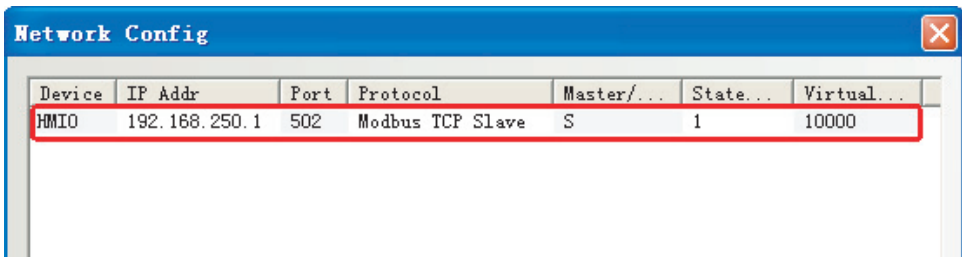




When Using Modbus TCP Protocol

HMI serves as the slave, the network configuration is as follows.





Refer to *5-7 Example of NB as Modbus Slave* for example.

5-4 Supported Registers

Modbus RTU

Device	Bit Address	Word Address	Format	Notes
System Internal/External Output Nodes	0X 1-65535	------	DDDDD	
System Internal/External Input Nodes	1X 1-65535	------	DDDDD	
Analog Input Data Registers	------	3X 1-65535	DDDDD	
Data Registers	------	4X 1-65535	DDDDD	

Modbus RTU Extend

Device	Bit Address	Word Address	Format	Notes
System Internal/External Output Nodes	0X 1-65535	------	DDDDD	
System Internal/External Input Nodes	1X 1-65535	------	DDDDD	
Analog Input Data Nodes	3X_bit 1.00-65535.15	------	DDDDD.DD	
Data Nodes	4X_bit 1.00-65535.15	------	DDDDD.DD	
4X Single Write Data Nodes	6X_bit 1.00-65535.15	------	DDDDD.DD	
Analog Input Data Registers	------	3X 1-65535	DDDDD	
Data Registers	------	4X 1-65535	DDDDD	
Data Registers	------	5X 1-65535	DDDDD	
4X Single Write	------	6X 1-65535	DDDDD	

Note The bytes in 5X are displayed in reverse order. For example, if 4X (1word) is H: 1234, the corresponding bytes in 5X (1word) will be displayed in reverse order as H: 3412.

Modbus RTU Slave

Device	Bit Address	Word Address	Format	Notes
System Internal/External Output Nodes	LB 0-9999	------	DDDDD	Mapping to 0x 1~9999
Data Registers	------	LW 0-65535	DDDDD	Mapping to 4x 1~9999

Modbus ASCII

Device	Bit Address	Word Address	Format	Notes
System Internal/External Output Nodes	0X 1-65535	------	DDDDD	
System Internal/External Input Nodes	1X 1-65535	------	DDDDD	
Analog Input Data Registers	------	3X 1-65535	DDDDD	
Data Registers	------	3X 1-65535	DDDDD	

Modbus TCP Slave

Device	Bit Address	Word Address	Format	Notes
System Internal/External Output Nodes	0X 1-65535	------	DDDDD	
System Internal/External Input Nodes	1X1-65535	------	DDDDD	
Analog Input Data Nodes	3X_bit 1.00-65535.15	------	DDDDD.DD	
Data Nodes	4X_bit 1.00-65535.15	------	DDDDD.DD	
Analog Input Data Registers	------	3X1-65535	DDDDD	
Data Registers	------	4X1-65535	DDDDD	
Data Registers	------	4X-DINV 1-65535	DDDDD	
Data Registers	------	3X-DINV 1-65535	DDDDD	

Note Address format description: D: decimal, O: octonary, H: hexadecimal.

5-5 Cable Fabrication

● RS232 Communication Cable

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin
	SD	2		2	RXD	
	RD	3		3	TXD	
	SG	9		5	GND	

● RS422 Communication Cable

HMI (COM2)				Communication expansion board or special communication adaptor	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-422 connector
	SDB+	1		RDB+	
	RDB+	6		SDB+	
	SDA-	7		RDA-	
	RDA-	8		SDA-	
	SG	9		SG	

● RS485 Communication Cable

HMI (COM2)				PLC	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-485 connector
	RDB+	6		SDB+/RDB+	
	RDA-	8		SDA-/RDA-	
	SG	9		SG	

● Ethernet Communication Cable

Connect with twisted-pair cable. Please refer to *A-1-3 Communication Specifications* in the *NB-series Setup Manual* for specifications.

5-6 Modbus Protocol

5-6-1 Introduction to Modbus Protocol

Modbus is a kind of request/response protocol, providing the service specified by the function codes.

Modbus protocol including ASCII, RTU and TCP modes etc. does not specify the physical layer, but defines the message structure identified and used by the controllers regardless of communication through what kind of network. ASCII, RTU modes included in Modbus protocol specify the structures of message and data, commands and the response methods. The data communication adopts Master-Slave mode: the master sends out the data request message(s) first, and then the slave sends the data to the master in response to the request after receiving the correct message(s); the master also can directly send the message(s) to modify the data in the slave, thus realizing the two-way reading/writing.

Modbus specifies that only the master has the initiative while the slave can only make response passively, including answering the error message(s).

When NB-series HMIs perform communications by Modbus protocol, it follows the standard Modbus communication process.

Universal data frame format is as follows:

Address code	Function code	Data area	Error checking code
8 bits	8 bits	N × 8 bits	16 bits

● Address code

The data field in the message frame contains two characters (ASCII) or 8 bits (RTU). The possible slave device addresses range from 0 to 247 (decimal), and the single device addresses range from 1 to 247. The master device selects the slave device through the data field in the message, where addresses of slave device(s) to communicate with the master are put. When sending back the response message(s), the slave device puts its own address into the data field of the response in order to make the master know which device has made the response. Address 0 is used as the broadcast address in order to make all the slave devices identify it.

● Function code

Modbus Function Code	Name	Function	Corresponding Address Type
01	Read coil status	Reads the bit data (N bits)	0x
02	Read input discrete value	Reads the bit data	1x
03	Read multiple registers	Reads the integer type/character type/status word /floating-point data (N words)	4x
04	Read input registers	Reads the integer type/status word/ floating-point type data	3x
05	Write single coil	Writes the bit data (one bit)	0x
06	Write single register	Writes the integer type/character type/status word /floating-point data (one word)	4x
15	Write multiple coils	Writes the bit data (N bits)	0x
16	Write multiple registers	Writes the integer type/character type/status word /floating-point data (N words)	4x

The read/write function codes corresponding to each mode are as follows:

Mode / Function	Modbus RTU, Modbus RTU Extend, Modbus RTU Slave, Modbus ASCII		Modbus TCP	
	Bit	Word	Bit	Word
Read	01, 02	03, 04	01, 02*	03, 04*
Write	05, 15	06, 16	05, 15	06, 16

* This function code is not supported when the HMI operates as the slave.

● Data area

The data area includes the data needed by the terminals to perform the specific functions or the data sampled during the terminal responding to the query. These data may be the number, reference addresses or set values. For example, when the function codes inform the terminal to read one register, the date area needs to specify which register the data is read from and how much data to be read. The imbedded address and the data type vary with the slave contents.

● Error checking code

Modbus protocol specifies that the data needs to be checked: besides the parity check for serial protocol, ASCII mode adopts LRC check, and RTU mode adopts 16-bit CRC check, while TCP mode has no requirements for extra check.

5-6-2 When NB adopts Modbus TCP protocol (Master/Slave mode)

When the PLC and the HMI are connected via the Modbus protocol, 2 situations exist depending on the master and slave statuses of the devices.

Method	Mater/Slave	Protocol used	Descriptions
1	HMI as the master	Modbus TCP	The HMI accesses the 0X, 1X, 3X and 4X registers mapped out by the PLC.
	PLC as the slave	Modbus TCP Slave	
2	HMI as the slave	Modbus TCP Slave	The HMI local address LW is mapped as the 4X register, and the LB as the 0X register.
	PLC as the master	Modbus TCP	As the master, the PLC can initiate communications.

(1) HMI as the master, and PLC as the slave (HMI adopts Modbus TCP protocol)

The PLC and the HMI communicate via the standard Modbus TCP protocol, with the HMI as the master control terminal and the PLC as the slave terminal. The PLC should support the Modus TCP Slave protocol, and also map out the 0X, 1X, 3X and 4X registers (hereof, the 0X and 1X are bit registers, while 3X and 4X are word registers.)

(2) PLC as the master, and HMI as the slave (HMI adopts Modbus TCP protocol)

The PLC and the HMI communicate via the standard Modbus TCP protocol, with the PLC as the master control terminal and the HMI as the slave terminal. The PLC should support the Modbus TCP protocol. The HMI local addresses LW and LB are mapped as the 4X and 0X registers, written and read by the PLC.

The corresponding relations of the registers are as below:

Modbus register address range	The corresponding HMI local address range
1X(1---9000)	LB(0---8999)
4X(1---9000)	LW(0---8999)

5-7 Example of NB as Modbus Slave

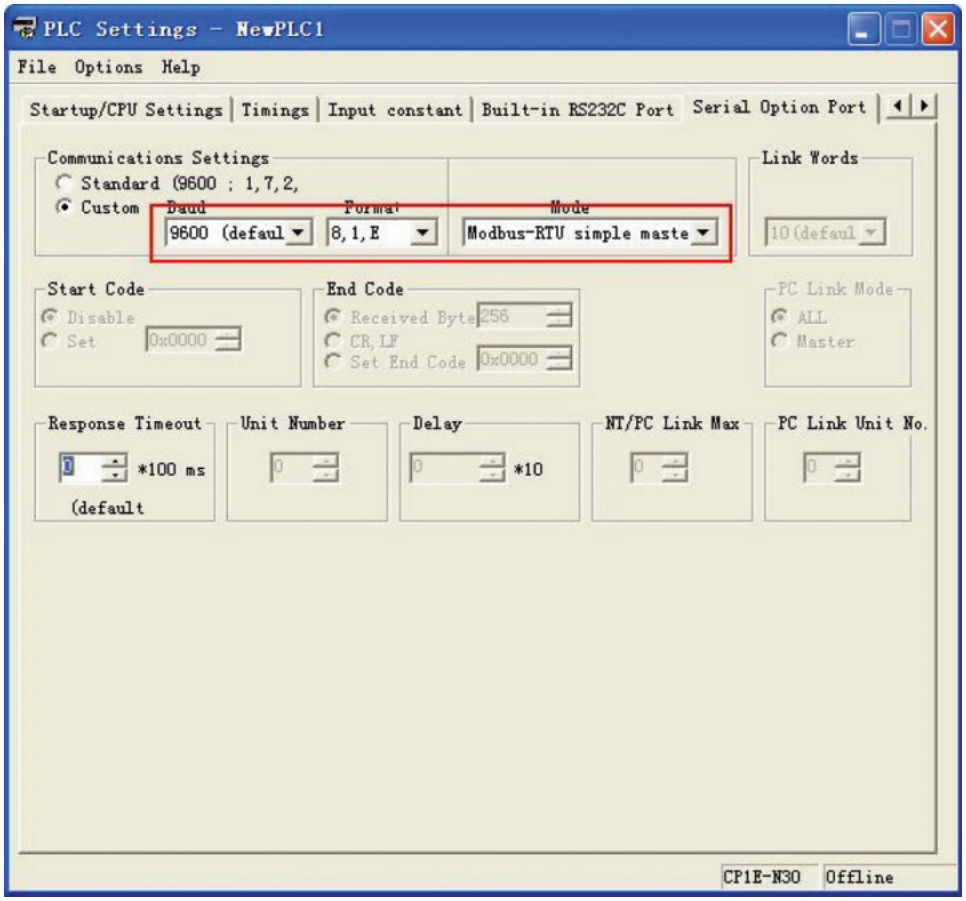
Communication by Modbus RTU protocol
System description: Use CP1E-N30D□-□ (30-point I/O type) as Modbus master and 2 NB Units as Modbus slave to perform the communication.

PLC Setting

CP1E-N30D□-□ should connect to CP1W-CIF11 module functioning as RS485 communication port.

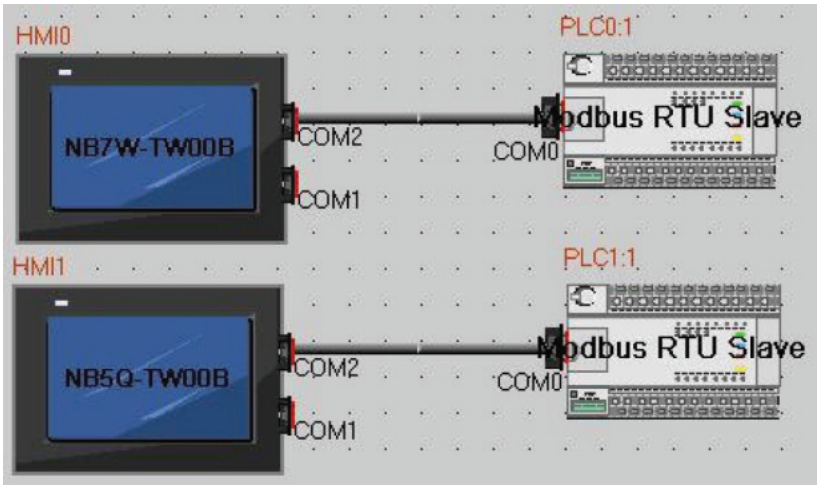
Use CX-Programmer to configure the peripheral port.

Make the communication settings as follows: 9600, 8, 1, Even and Modbus-RTU simple master.



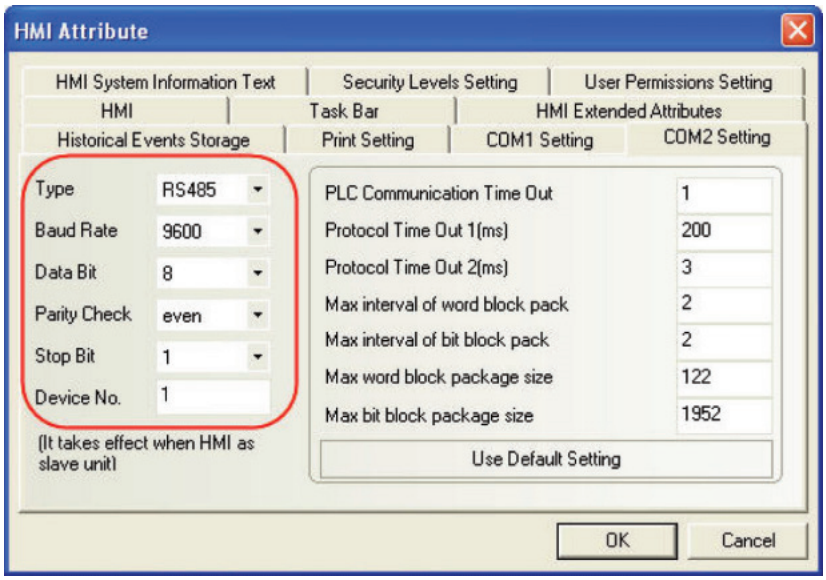
NB Unit Setting

We take one NB7W-TW00B and NB5Q-TW00B respectively as example with the system configuration as shown below:



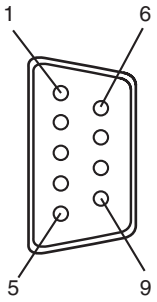
NB7W-TW00B communication settings: 9600 (Baud Rate), 8 (Data Bit), 1 (Stop Bit), Even (Parity Check) and 1 (Slave No.), as shown below:

NB5Q-TW00B communication settings: 9600 (Baud Rate), 8 (Data Bit), 1 (Stop Bit), Even (Parity Check) and 2 (Slave No.)



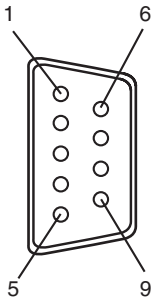
Cable Fabrication

NB7W-TW00B
COM2(female)



Signal	Pin No.
SDB+	1
SD(TXD)	2
RD(RXD)	3
Terminal 1	4
Terminal 2	5
RDB+	6
SDA-	7
RDA-	8
SG	9
FG	Connector shell

NB5Q-TW00B
COM2(female)



Signal	Pin No.
SDB+	1
SD(TXD)	2
RD(RXD)	3
Terminal 1	4
Terminal 2	5
RDB+	6
SDA-	7
RDA-	8
SG	9
FG	Connector shell

OMRON PLC side CP1W-CIF11

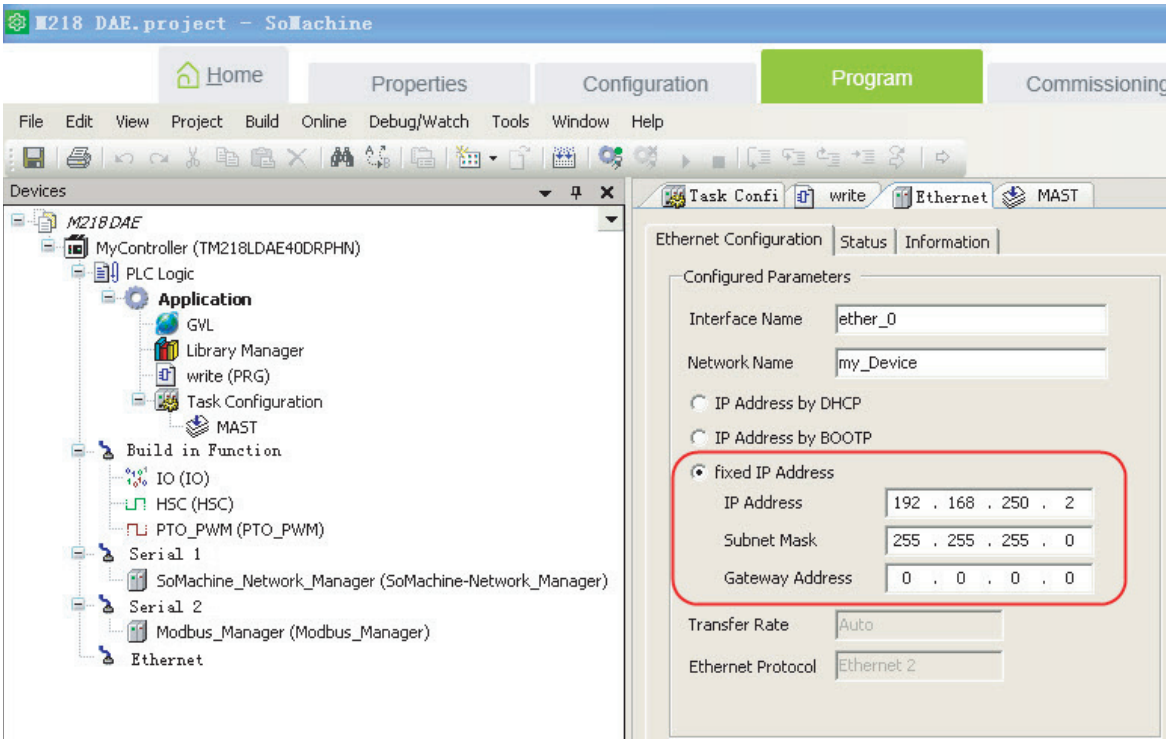
Pin No.	Signal
1	RDA-
2	RDB+
3	SDA-
4	SDB+
5	FG

Use Modbus TCP protocol to perform the communication, HMI serving as the slave.

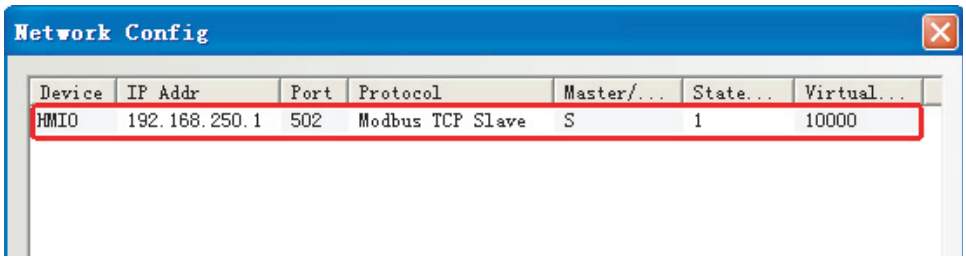
Use Modbus TCP protocol to perform the communication, HMI serving as the slave.

PLC Setting

Make the settings for Schneider PLC which supports Modbus TCP protocol as follows.



PLC Setting



For the details on network configuration, refer to “When Using Modbus TCP Protocol” in *5-3 Communication Parameter Setting*.

6

Connecting to Delta PLCs

This section describes the connection to Delta PLCs

6-1 Serial Port Communication

Series	CPU	Link Module	Driver
DVP	DVP-XXES/EX/SS DVP-XXSA/SX/SC DVP-XXEH/EH2/SV	RS232 on the CPU unit	Delta DVP
		RS485 on port	

6-2 Communication Parameters and Cable Fabrication

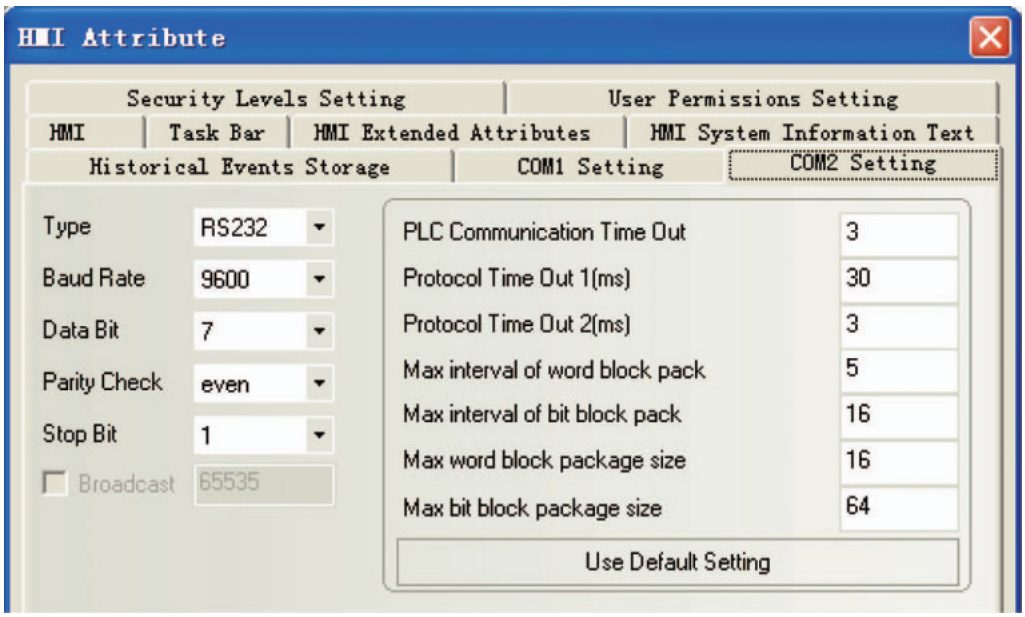
Series	CPU	Link Module	COMM Type	Parameter	Cable
DVP	DVP-XXES/EX/SS DVP-XXSA/SX/SC DVP-XXEH/EH2/SV	RS232 on the CPU unit	RS232	Refer to Section 6-3	Self-made cable required
		RS485 on port	RS485		

6-3 Communication Parameter Setting

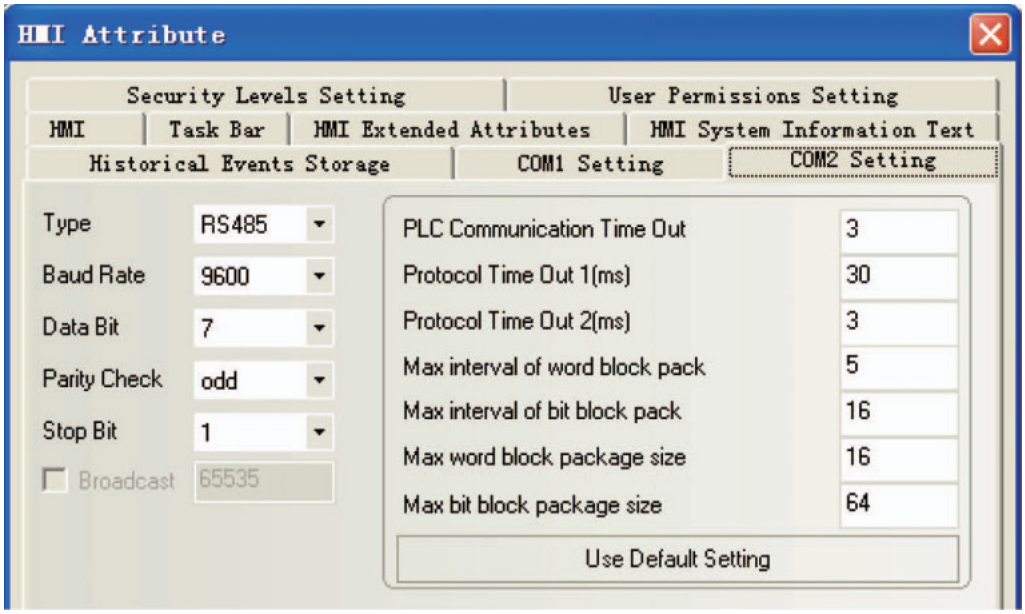
HMI Settings

HMI default communication parameters: 9600bps (Baud Rate), 7 (Data Bit), even (Parity Check), 1 (Stop Bit) and 1(PLC Station No.)

RS232 Communication



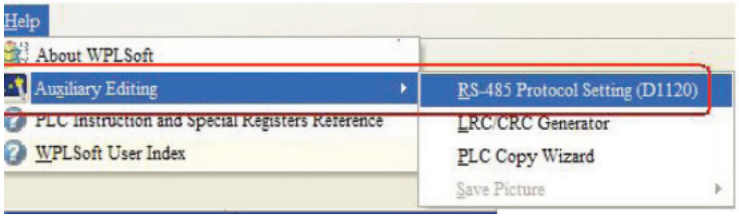
RS485 Communication

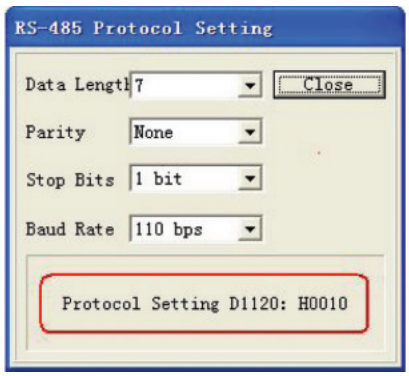


Note The communication parameters should be set through modification of D1120 value when RS485 communication is used.

PLC Settings

1 You can check the different values of D1120 corresponding to the different baud rates in the "RS-485 Protocol Setting (D1120)" dialog box through selecting the "RS-485 Protocol Setting (D1120)" from the "Auxiliary Editing" menu in the "Help" menu in the Wpl207 software.





2 Monitor and modify the value of D1120 after PLC is connected to Wpl207.

For example: If the communication parameters are 110bps (Baud Rate), 7 (Data Length), None (Parity) and 1 bit (Stop Bits), then D1120=H0010 (Protocol Setting).

6-4 Supported Registers

Device	Bit Address	Word Address	Format	Notes
External Input Nodes	X0-23417	------	OOOOO	
External Output Nodes	Y0-23417	------	OOOOO	
Internal Auxiliary Nodes	M0-9999	------	DDDD	
Sequence Control Nodes	S0-9999	------	DDDD	
Timer Nodes	T0-9999	------	DDDD	
Counter Nodes	C0-9999	------	DDDD	
Timer Buffers	------	TV0-9999	DDDD	
Counter Buffers	------	CV0-127	DDD	
Counter Buffers (double-word, 32-bit)	------	CV2 232-255	DDD	
Data Registers	------	D0-9999	DDDD	

Note Address format description: D: decimal, O: octonary, H: hexadecimal.

6-5 Cable Fabrication

● RS232 Communication Cable

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	8Pin Mini Din (Male)
	SD	2		4	RXD	
	RD	3		5	TXD	
	SG	9		8	GND	

● RS485 Communication Cable

HMI (COM2)				PLC	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-485 connector
	RDB+	6		SDB+/RDB+	
	RDA-	8		SDA-/RDA-	
	SG	9		SG	

7

Connecting to LG PLCs

This section describes the connection to LG PLCs

7-1 Serial Port Communication

Series	Type	CPU	Link Module	Driver
Master-K	K120S	K7M-DR10UE	Port1 on CPU unit Port2 on CPU unit	LS Master-K CPU Direct LS Master-K Cnet LS Master-K Modbus RTU
		K7M-DR20U		
		K7M-DT30U		
		K7M-DT40U		
		K7M-DT60U		
	K200S	K3P-07AS	RS232 on the CPU unit	
XGT	XGB	XBC-DN64H	RS232 on the CPU unit	LS XGT CPU Direct
		XBC-DR32H	Built-in RS-232C/RS-485	LS XGT Cnet

The differences between LS Master-K CPU Direct, LS Master-K Cnet and LS Master-K Modbus RTU protocols are as shown below:

Communication Protocol	PLC Settings	Supported Communication Methods	Multiple Station No.	Supported Baud Rate (bps)
LS Master-K Cnet	Tweak the pin 2 (up) of DIP switch to ON and pin 1 (low) of DIP switch to OFF	RS-232/RS-485	Supported	9600/19200/38400
LS Master-K MODBUS RTU	Tweak the pin 2 (up) of DIP switch to ON and pin 1 (low) of DIP switch to OFF	RS-232/RS-485	Supported	9600/19200/38400
LS Master-K CPU Direct	Pin 1 and pin 2 remain OFF	RS-232	Not supported	38400

7-2 Communication Parameters and Cable Fabrication

Series	CPU	Link Module	COMM Type	Parameter	Cable
K120S	K7M-DR10UE	Port1 on CPU unit	RS232	Refer to Section 7-3	Self-made cable required
		Port2 on CPU unit	RS485		
	K7M-DR20U	Port1 on CPU unit	RS232		
		Port2 on CPU unit	RS485		
K200S	K3P-07AS	RS232 on the CPU unit	RS232		
XGB	XBC-DN64H XBC-DR32H	RS232 on the CPU unit	RS232		
		Built-in RS-232C	RS232		
		Built-in RS-485	RS485		

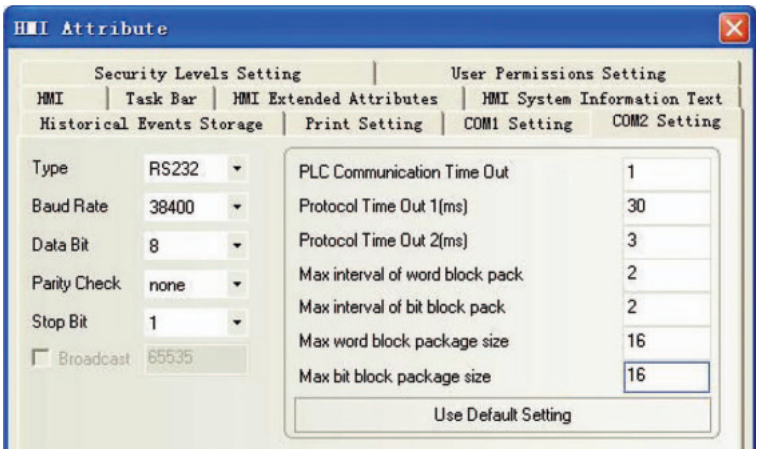
7-3 Communication Parameter Setting

HMI Settings

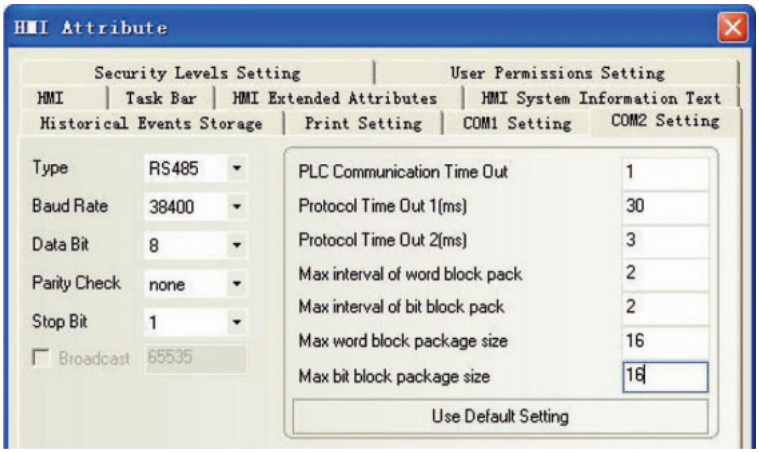
When Using LS Master-K Cnet Protocol

HMI default communication parameters: 38400bps (Baud Rate), 8 (Data Bit), none (Parity Check), 1 (Stop Bit) and 1(PLC Station No.)

RS232 Communication



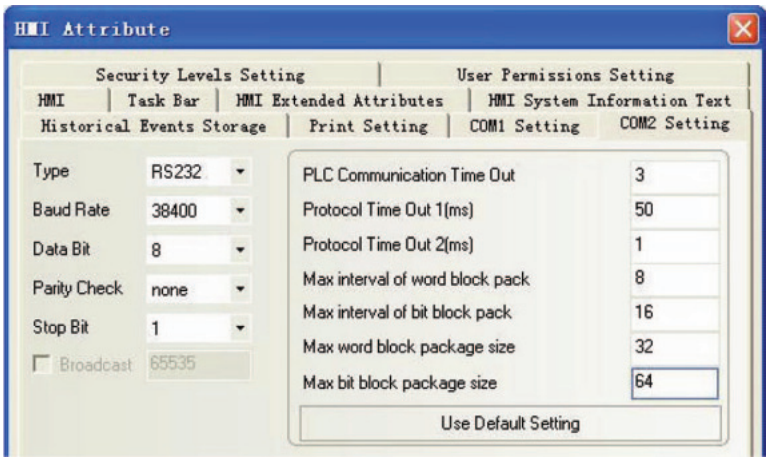
RS485 Communication



When Using LS Master-K CPU Direct Protocol

HMI default communication parameters: 38400bps (Baud Rate), 8 (Data Bit), none (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)

RS232 Communication

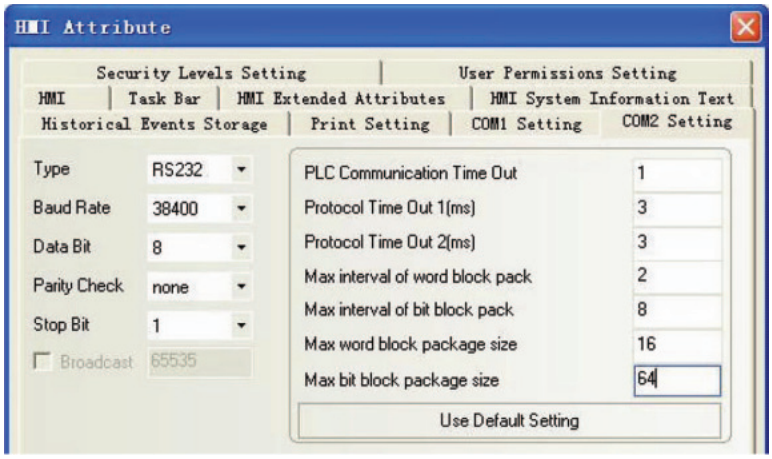


Note LS Master-K CPU Direct protocol only supports communication speed of 38400bps.

● When Using LS Master-K Modbus RTU Protocol

HMI default communication parameters: 38400bps (Baud Rate), 8 (Data Bit), none (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)

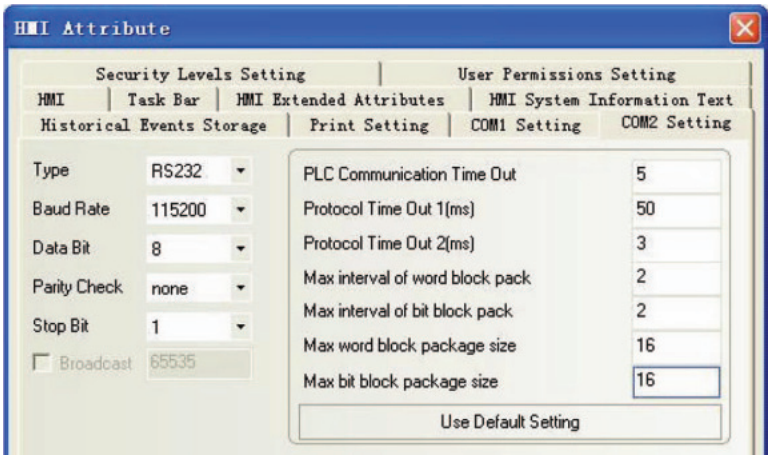
RS232 Communication



When Using LS XGT CPU Direct Protocol

HMI default communication parameters: 115200bps (Baud Rate), 8 (Data Bit), none (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.)

RS232 Communication

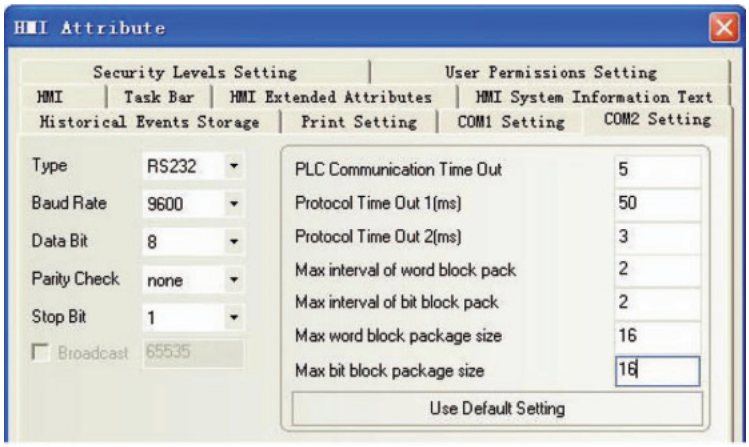


Note LS XGT CPU Direct protocol only supports communication speed of 115200bps and the Multiple Station No. is not supported.

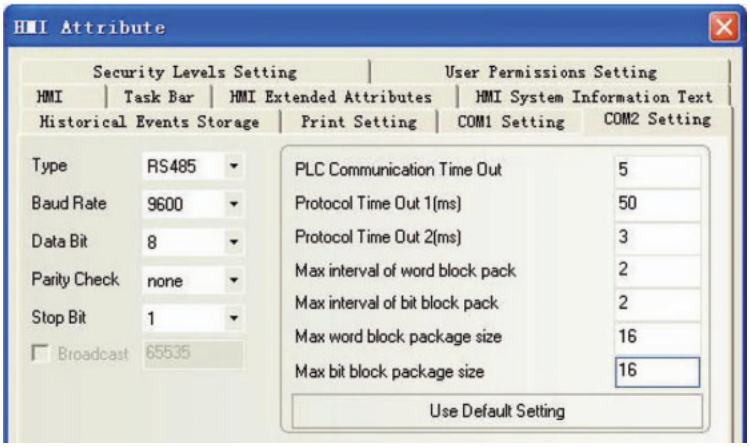
When Using LS XGT Cnet Protocol

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), none (Parity Check), 1 (Stop Bit) and 0 (PLC Station No.)

RS232 Communication



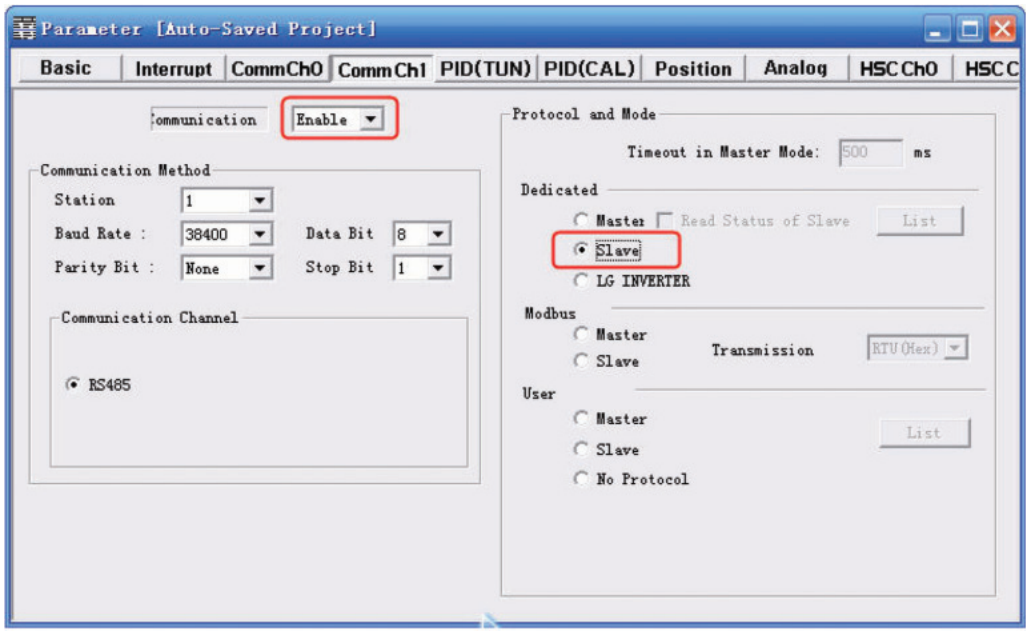
RS485 Communication



PLC Settings

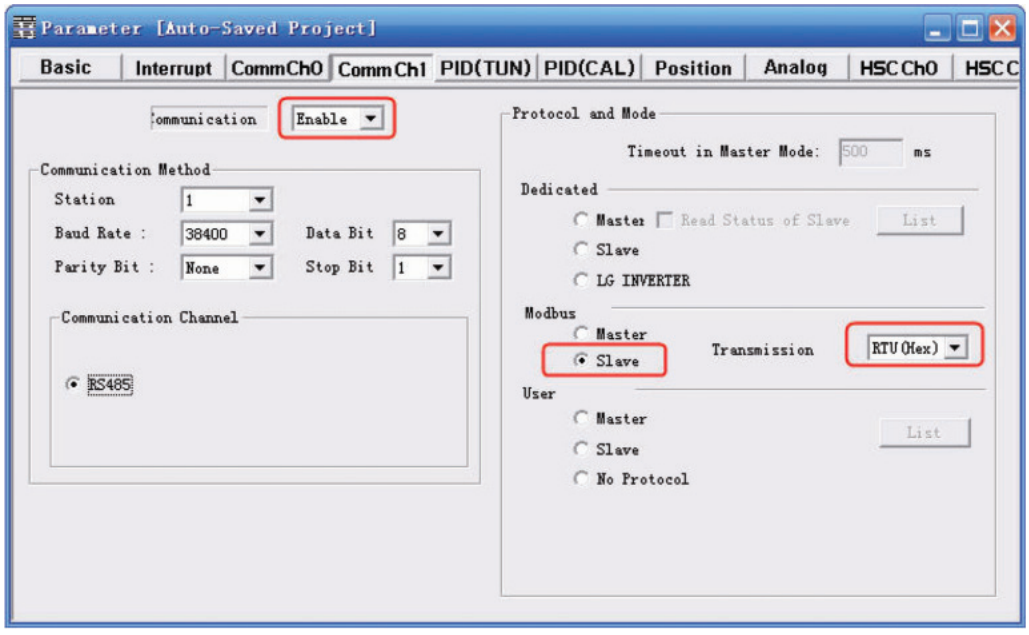
When Using LS Master-K Cnet Protocol

The software settings are as shown below (Please pay attention to the settings on the right selection area.):



When Using LS Master-K Modbus RTU Protocol

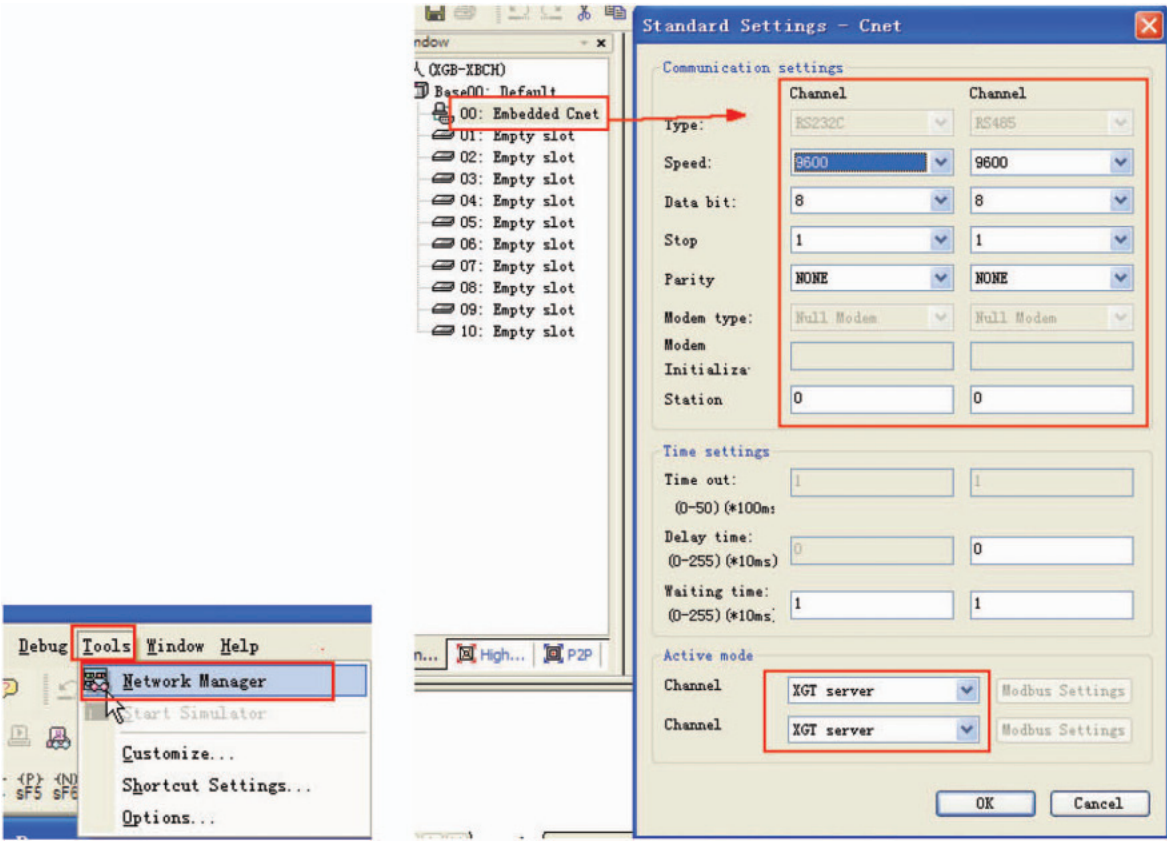
The software settings are as shown below (Please pay attention to the settings on the right selection area.):



The “Cannot Change PLC Mode” will appear when [Connect+Write+Run+Monitor Start] is clicked, then manual control is needed and download operation is available only when the RUN light is OFF. After the download operation is completed, the RUN light should maintain ON.

● When Using LS XGT Cnet Protocol

1 Set the communication parameters through the [Tools]-[Network Manager] menu option.



2 PLC must operate in [OPR] mode, which can be set on PLC

7-4 Supported Registers

K120S K7M-DR10UE

Device	Bit Address	Word Address	Format	Notes
I/O Relay	P 0.0-63.f	------	DD.H	
Auxiliary Relay	M 0.0-191.f	------	DDD.H	
Link Relay	L 0.0-63.f	------	DD.H	
Keep Relay	K 0.0-31.f	------	DD.H	
Special Relay	F 0.0-31.f		DD.H	
Timer	------	T 0-255	DDD	
Counter	------	C 0-255	DDD	
Data Register		D 0-4999	DDDD	

Note For bit registers, if the address in PLC is F01, then the address in HMI should be set to F0.1; and if the address in PLC is F2A, then the address in HMI should be set to F2.A, and the others can be deduced according to this rule.

LS XGT Cnet

Device	Bit Address	Word Address	Format
File Relay	R_bit 0.0-10239.F		DDDDD.H
Data Relay	D_bit 0.0-10239.F		DDDDD.H
Communication Relay	N_bit 0.0-5119.F		DDDD.H
Link Relay	L_bit 0.0-2047.F		DDDD.H
Index Relay	Z_bit 0.0-127.F	------	DDD.H
Counter Contact Relay	C_bit 0-1023	------	DDDD
Timer Contact Relay	T_bit 0-1023	------	DDDD
Special Relay	F_bit 0.0-1023.F	------	DDDD.H
Keep Relay	K_bit 0.0-4095.F	------	DDDD.H
Auxiliary Relay	M_bit 0.0-1023.F	------	DDDD.H
I/O Relay	P_bit 0.0-1023.F	------	DDDD.H
File Register	------	R_word 0-10239	DDDDD
Data Register	------	D_ word 0-10239	DDDDD
Communication Register	------	N_ word 0-5119	DDDD
Link Register	------	L_ word 0-2047	DDDD
Step Control Register		S_ word 0-127	DDD
Index Register		Z_ word 0-127	DDD
Counter	------	C_ word 0-1023	DDDD
Timer	------	T_ word 0-1023	DDDD
Special Register	------	F_ word 0-1023	DDDD
Keep Register	------	K_ word 0-4095	DDDD
Auxiliary Register	------	M_ word 0-1023	DDDD
I/O Register	------	P_ word 0-1023	DDDD

Note T_bit and C_bit registers do not support batch transmission.
Address format description: D: decimal, O: octonary, H: hexadecimal.

LS XGT CPU Direct

Device	Bit Address	Word Address	Format
File Relay	R_bit 0.0-10239.F	------	DDDDD.H
Data Relay	D_bit 0.0-10239.F	------	DDDDD.H
Communication Relay	N_bit 0.0-5119.F	------	DDDD.H
Link Relay	L_bit 0.0-2047.F	------	DDDD.H
Index Relay	Z_bit 0.0-127.F	------	DDD.H
	ZR_bit 0.0-10239.F	------	DDDDD.H
Counter Contact Relay	C_bit 0-1023	------	DDDD
Timer Contact Relay	T_bit 0-1023	------	DDDD
Special Relay	F_bit 0.0-1023.F	------	DDDD.H
Keep Relay	K_bit 0.0-4095.F	------	DDDD.H
Auxiliary Relay	M_bit 0.0-1023.F	------	DDDD.H
I/O Relay	P_bit 0.0-1023.F	------	DDDD.H
File Register	------	R 0-10239	DDDDD
Data Register	------	D 0-10239	DDDDD
Communication Register	------	N 0-5119	DDDD
Link Register	------	L 0-2047	DDDD
Step Control Register	------	S 0-127	DDD
Index Register	------	Z 0-127	DDD
	------	ZR 0-10239	DDDDD
Counter Set Value	------	C_ SV 0-1023	DDDD
Timer Set Value	------	T_ SV 0-1023	DDDD
Counter Current Value	------	C_ CV 0-1023	DDDD
Timer Current Value	------	T_ CV 0-1023	DDDD
Special Register	------	F 0-1023	DDDD
Keep Register	------	K 0-4095	DDDD
Auxiliary Register	------	M 0-1023	DDDD
I/O Register	------	P 0-1023	DDDD

Note Address format description: D: decimal, O: octonary, H: hexadecimal.

7-5 Cable Fabrication

When Using LS Master-K Cnet/LS Master-K Modbus RTU Protocol

- **RS232 Communication Cable**

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2		4	RX	
	RD	3		7	TX	
	SG	9		5	SG	

- **RS485 Communication Cable**

HMI (COM2)				PLC	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-485 connector
	RDB+	6		SDB+/RDB+	
	RDA-	8		SDA-/RDA-	
	SG	9		SG	

When Using LS Master-K CPU Direct Protocol

- **RS232 Communication Cable**

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2		2	RX	
	RD	3		3	TX	
	SG	9		5	GND	

When Using LS XGT CPU Direct Protocol

- **RS232 Communication Cable**

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	6Pin Mini Din (Female)
	SD	2		2	RX	
	RD	3		6	TX	
	SG	9		3	GND	

When Using LS XGT Cnet Protocol

● RS232 Programming Cable

PC				PLC		
D-Sub 9Pin (Male)	Signal	Pin No.		Pin No.	Signal	6Pin Mini Din (Female)
	SD	2	———	2	RX	
	RD	3	———	6	TX	
	SG	9	———	3	GND	

● RS232 Communication Cable

HMI (COM1/COM2)				PLC	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	Built-in RS-232C connector
	SD	2	———	RX	
	RD	3	———	TX	
	SG	9	———	GND	

● RS485 Communication Cable

HMI (COM2)				PLC	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	Built-in RS-485 connector
	RDB+	6	———	SDB+/RDB+	
	RDA-	8	———	SDA-/RDA-	
	SG	9	———	SG	

8

Connecting to Panasonic PLCs

This section describes the connection to Panasonic PLCs.

8-1 Serial Port Communication

Series	CPU	Link Module	Driver
FP	FP	Tool port on the Control unit	Panasonic FP
		AFPG801	
		AFPG802	
		AFPG803	
		AFPG806	
	FP0 FP1 FP-M	Tool port on the Control unit	
		RS232C port on the Control unit	
	FP2 FP2SH	Tool port on the Control unit	
		RS232C port on the Control unit	
		AFP2462	
		AFP2465+(AFP2803,AFP2804, FP2805)	
	FP3	Tool port on the Control unit	
		AFP3462	
	FP-e	Tool port on the Control unit	
		AFPE224300	
		AFPE224302	
		AFPE224305	
		AFPE214322	
		AFPE214325	
	FP10SH FP10S	Tool port on the Control unit	
		RS232C port on the Control unit	
		AFP3462	
	FP-X	RS232C port on the Control unit	

8-2 Communication Parameters and Cable Fabrication

Series	CPU	Link Module		COMM Type	Parameter	Cable
FP	FP	Tool port on the Control unit		RS232C	Refer to Section 8-3	Self-made cable required
		AFPG801				
		AFPG802				
		AFPG806				
		AFPG803		RS485		
		AFPG806				
	FP0	Tool port on the Control unit		RS232C		
		RS232C port on the Control unit				
	FP1 FP-M	Tool port on the Control unit		RS232C		
		RS232C port on the Control unit				
	FP2 FP2SH	Tool port on the Control unit		RS232C		
		RS232C port on the Control unit				
		AFP2462				
		AFP2465	AFP2803			
			AFP2804	RS422		
			AFP2805	RS485		
	FP3	Tool port on the Control unit		RS232C		
		AFP3462				
		AFP3463		RS422		
	FP-e	Tool port on the Control unit		RS232C		
		AFPE224300		RS232C		
		AFPE214325				
		AFPE224305				
		AFPE224302		RS485		
		AFPE214322				
	FP10SH FP10S	Tool port on the Control unit		RS232C		
		RS232C port on the Control unit				
		AFP3462				
	FP-X	RS232C port on the Control unit		RS232C		

Note 1 Only FP0 (C10CRM/C10CRS/C14CRM/C14CRS/C16T/C16CP/C32CT/C32CP) has RS232C communication port.

2 Only FP1 (C24/C40/C56/C72) has RS232C communication port.

3 Only FP1 (C20R/C20T/C32T) has RS232C communication port.

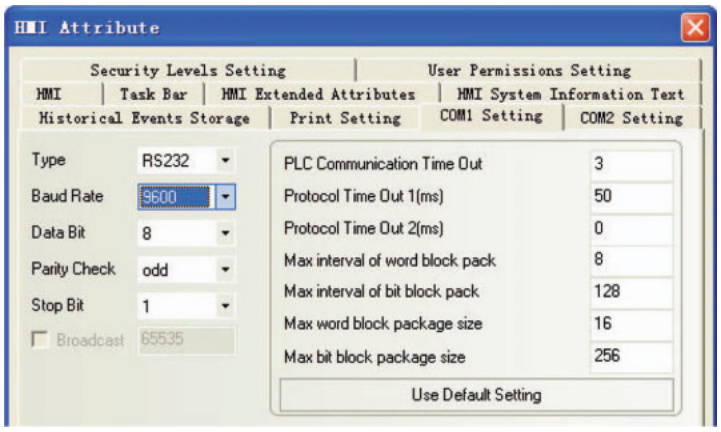
4 AFP245 is the combination of multi-communication of FP2/FP2SH. AFP2803, AFP2084 and AFP2085 are the communication modules connecting to AFP2465.

8-3 Communication Parameter Setting

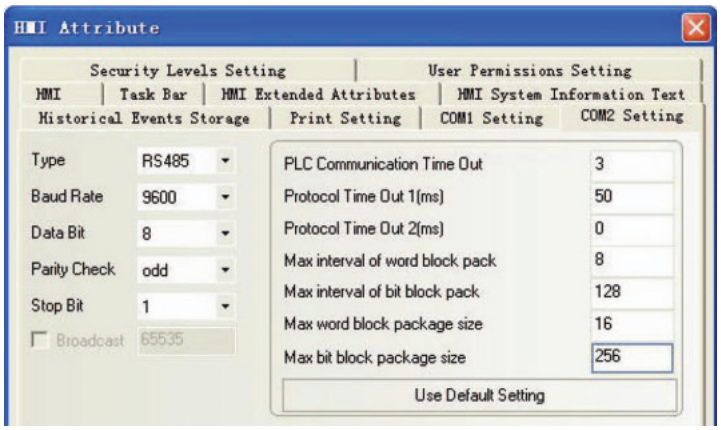
HMI Settings

HMI default communication parameters: 9600bps (Baud Rate), 8 (Data Bit), odd (Parity Check), 1 (Stop Bit) and 1 (PLC Station No.)

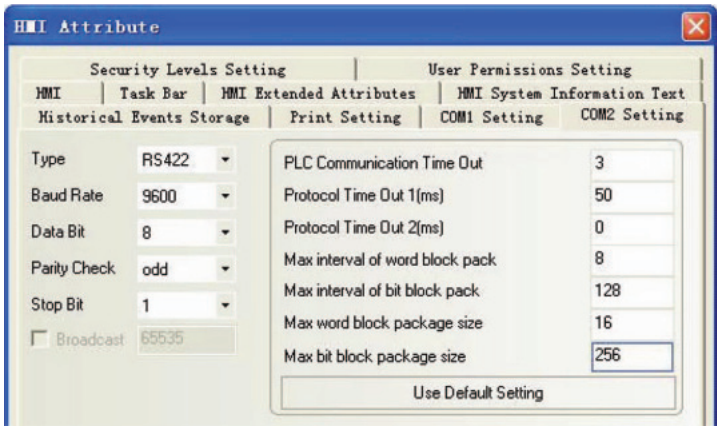
RS232 Communication



RS485 Communication



RS422 Communication



PLC Settings

Please refer to relevant instruction manual of communication device on parameter settings.

8-4 Supported Registers

FP0-C16

Device	Bit Address	Word Address	Format	Notes
External Output Nodes	Y0.0-12.F	---	DD.H	
External Input Nodes	X0.0-12.F	---	DD.H	
Timer Nodes	T0-99	---	DD	
Counter Nodes	C100-143	---	DDD	
Internal Auxiliary Nodes	R0.0-62.F R900.0-903.F	---	DD.H DDD.H	
Setting Value Registers for Timer/Counter	---	SV0-143	DDD	
Actual Value Registers for Timer/Counter	---	EV0-143	DDD	
Data Registers	---	DT0-1659	DDDD	

FPX

Device	Bit Address	Word Address	Format	Notes
External Input Nodes	X0.0~109.F	---	DDD.H	
External Output Nodes	Y0.0~109.F	---	DDD.H	
Timers	T0~1007	---	DDDD	
Counters	C1008~1023	---	DDDD	
Link Nodes	L0.0~127.F	---	DDD.H	
Internal Nodes	R0.0~255.F R900.0~911.F	---	DDD.H	
Actual Value Registers for Timer/Counter	---	EV0-1023	DDDD	
Setting Value Register for Timer/Counter	---	SV0-1023	DDDD	
Data Registers	---	DT0-32764	DDDDD	

Note 1 For X registers, if the address in PLC is X01,then the address in HMI should be set to X0.1; and if the address in PLC is X1F, then the address in HMI should be set to X1.F and Y, R registers can be deduced according to this rule.

2 The address range of EV register in HMI can be set to 32767 (max.), while the protocol only supports 9999 (max.).

3 Address format description: D: decimal, O: octonary, H: hexadecimal.

8-5 Cable Fabrication

● RS232 Communication Cable

• Tool port

HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	5Pin Mini Din (Female)
	SD	2	———	3	RXD	
	RD	3	———	2	TXD	
	SG	9	———	1	SG	

• CPU port

HMI (COM1/COM2)				PLC FP0 CPU	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-232 communication port
	SD	2	———	R	
	RD	3	———	S	
	SG	9	———	G	

• COM port

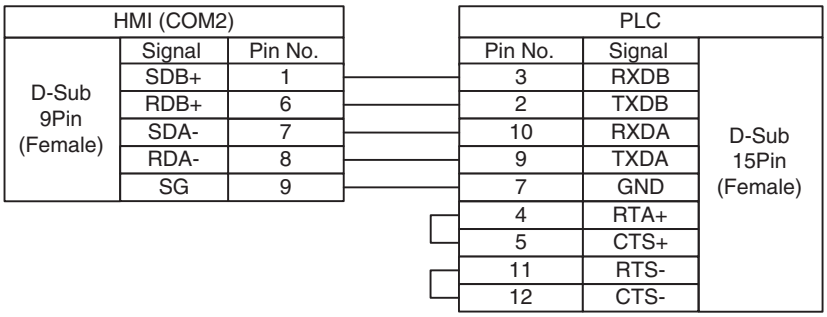
HMI (COM1/COM2)				PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2	———	3	RXD	
	RD	3	———	2	TXD	
	SG	9	———	7	GND	
				4	RTS	
				5	CTS	
				8	CD	
				9	ER	

● RS485 Communication Cable

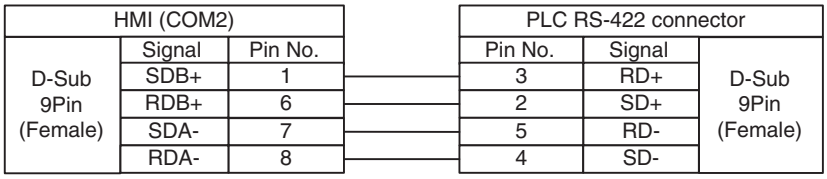
HMI (COM2)				PLC	
D-Sub 9Pin (Female)	Signal	Pin No.		Signal	RS-485 connector
	RDB+	6	———	SDB+/RDB+	
	RDA-	8	———	SDA-/RDA-	

● RS422 Communication Cable

- FP3 RS422 programming port



- RS422 communication port for other modules



9

Connecting to Allen-Bradley (Rockwell) PLC

This section describes the connection to Allen-Bradley PLC.

9-1 Serial Port Communication

Series	CPU	Link Module	Driver
MicroLogix	MicroLogix 1500 (1764-LRP)	Channel 1	AB DF1
	MicroLogix 1000 MicroLogix 1200 MicroLogix 1500 (1764-LSP, 1764-LRP)	Channel 0	
		AIC + Advanced Interface Converter1761-NET-AIC	
	MicroLogix 1400 (1766-L32BWAA)	Channel 0	
		Channel 2	
SLC500	SLC 5/03 SLC 5/04 SLC 5/05	Channel 0	
		1770-KF3 2760-RB 1775-KA 5130-RM	
		1771-KGM	
PLC-5	PLC-5/11 PLC-5/20 PLC-5/30 PLC-5/40 PLC-5/40L PLC-5/60 PLC-5/60L	Channel 0	
CompactLogix	1769-L20 1769-L30 1769-L31 1769-L32E 1769-L35E	Channel 0 Channel 1	AB CompactLogix/ControlLogix
ControlLogix	1756-L61 1756-L63	CPU Direct	

9-2 Serial Port Communication Parameters and Cable Fabrication

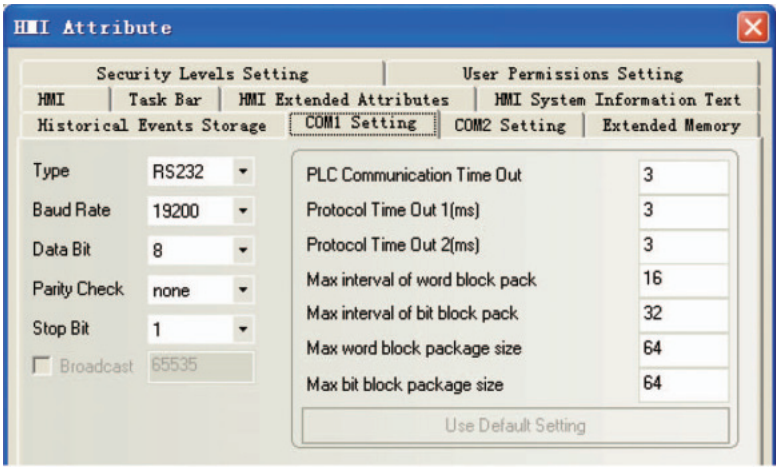
Series	CPU	Link Module	COMM Type	Parameter	Cable
MicroLogix	MicroLogix 1500 (1764-LRP)	Channel 1	RS232C	Refer to Section 9-3	Self-made cable required
	MicroLogix 1000 MicroLogix 1200 MicroLogix 1500	Channel 0			
		AIC +Advanced Interface Converter 1761-NET-AIC			
	MicroLogix 1400	Channel 0			
		Channel 2			
SLC500	SLC 5/03	Channel 0	RS232C		
	SLC 5/04 SLC 5/05	1770-KF3 2760-RB 1775-KA 5130-RM			
		1771-KGM			
PLC-5	PLC-5/11 PLC-5/20 PLC-5/30 PLC-5/40 PLC-5/40L PLC-5/60 PLC-5/60L	Channel 0	RS232C		
CompactLogix	1769-L20 1769-L30 1769-L31 1769-L32E 1769-L35E	Channel 0	RS232C		
		Channel 1			
ControlLogix	1756-L61	CPU Direct	RS232C		

9-3 Serial Port Communication Parameter Setting

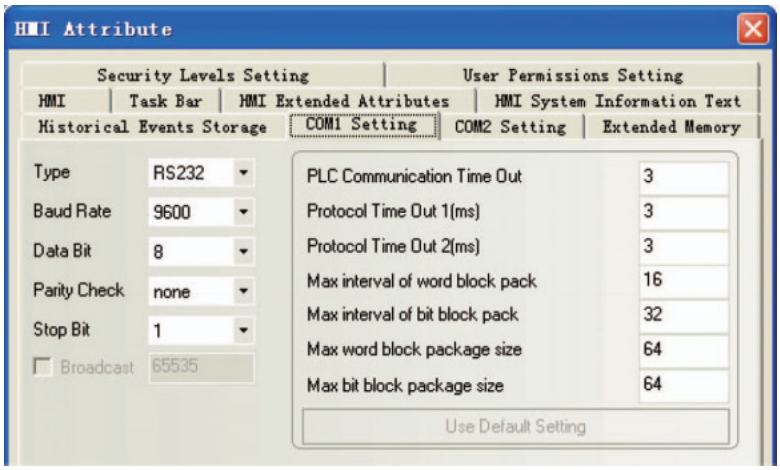
When Using AB SLC500/PLC5/MicroLogix Series Protocol

● HMI Settings

MicroLogix / PLC-5 default communication parameters: 19200 (Baud Rate), 8 (Data Bit), none (Parity), 1 (Stop Bit) and 0 (Station No.)



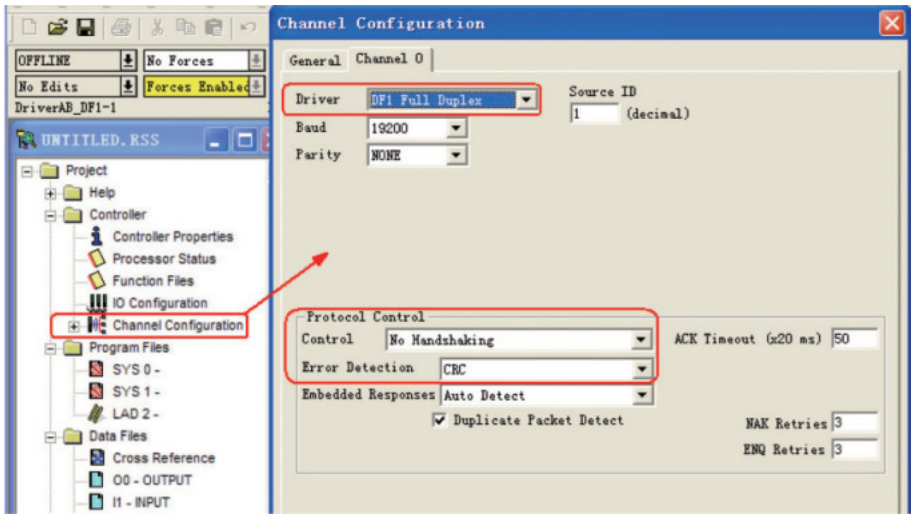
SLC500 default communication parameters: 9600 (Baud Rate), 8 (Data Bit), none (Parity), 1 (Stop Bit) and 0 (Station No.)



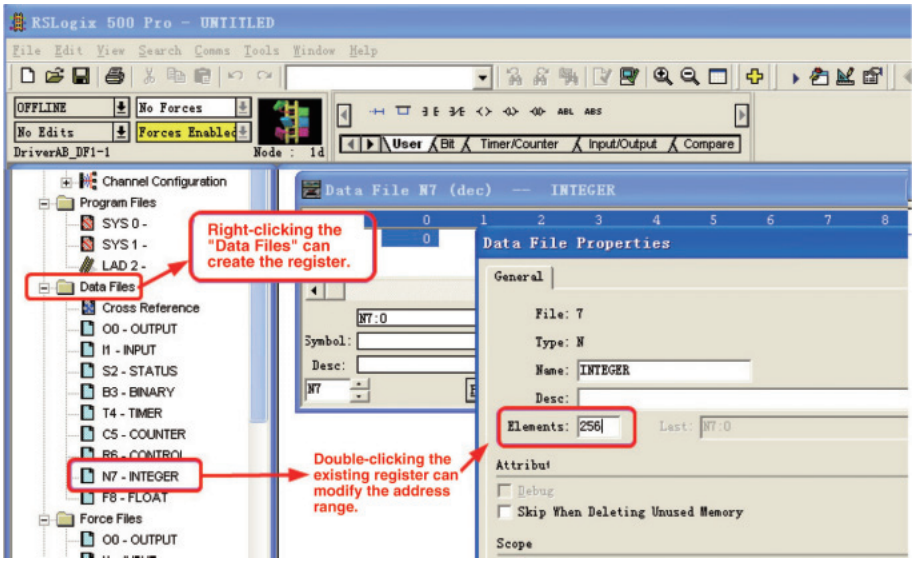
PLC Settings

- RSLogix500 software setting (Take MicroLogix 1500 as example)

Select the “DF1 Full Duplex” in the Driver option and “CRC” in the Error Detection option in the Channel Configuration dialog box of the software.



And the register setting is also available.



Rules of register setting:

(1) The file number should be unique. This number is set when the register is created, and after the creation, the file number will be fixed and therefore cannot be modified.

(2) The register address opening range of the PLC should be greater than the range set in the HMI configuration.

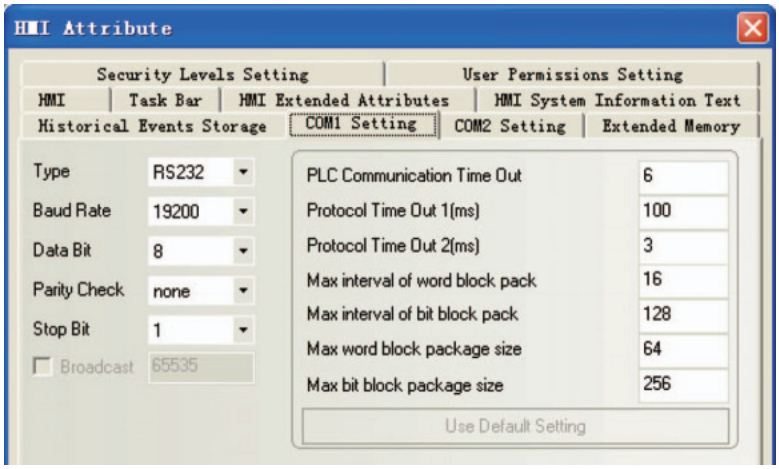
(3) The PLC has a limited memory capacity. During downloading, if a message “Program has errors, cannot download” pops up, it indicates the occurrence of an over-range caused by too much address opening.

(4) Neither C nor T register supports batch transmission.

When Using AB CompactLogix/ControlLogix Series Protocol

● HMI Settings

CompactLogix/ControlLogix default communication parameters: 19200 (Baud Rate), 8 (Data Bit), none (Parity), 1 (Stop Bit) and 0 (Station No.)

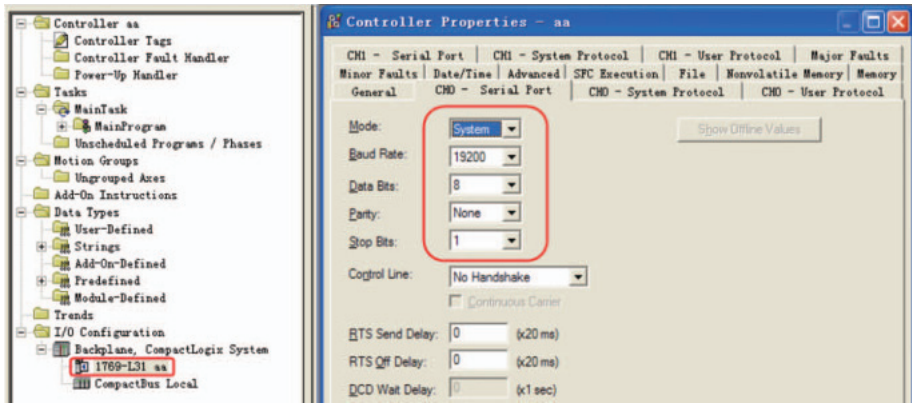


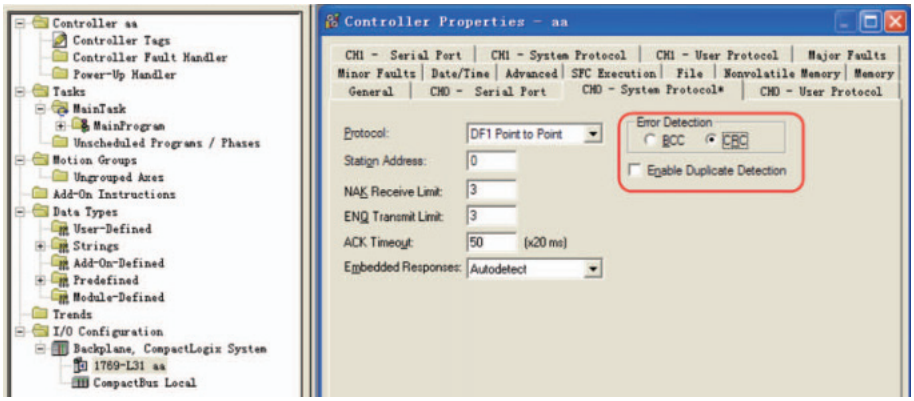
● PLC Settings

- RSLogix5000 Software Settings

Note "DF1 Point to Point" is selected as Protocol; "CRC" is selected as Error Detection and "Enable Duplicate Detection" is not checked.

1 Set communication parameters - Controller Properties

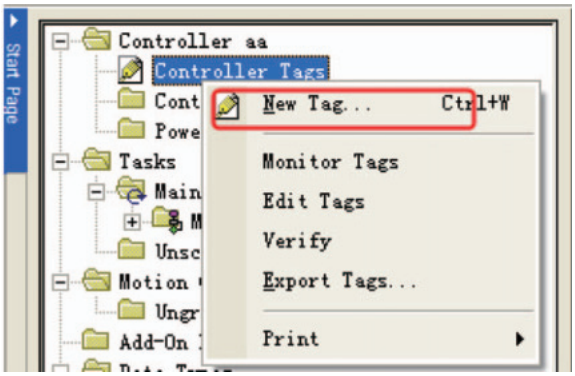




2 Define the tag and set the data types, then select “Controller Tags” and right-click the “New Tag” option in the dropdown list to create a new tag.

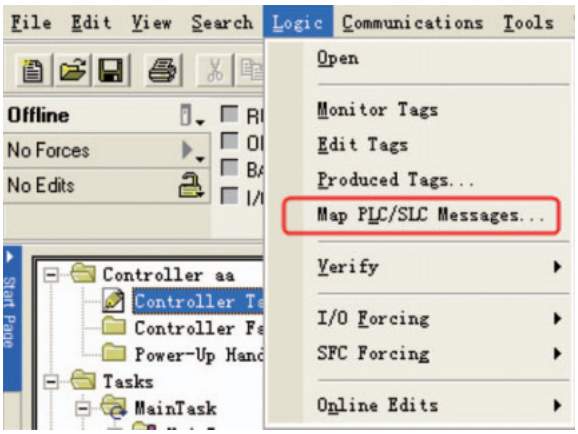
Note 1 The internal registers of the controller to be accessed by the HMI needs to be pre-defined in the RSLogix5000 software.

2 Controller Tags apply to all the routines in the controller. For the control, these tags are global, so they need to be created in “Controller Tags”.



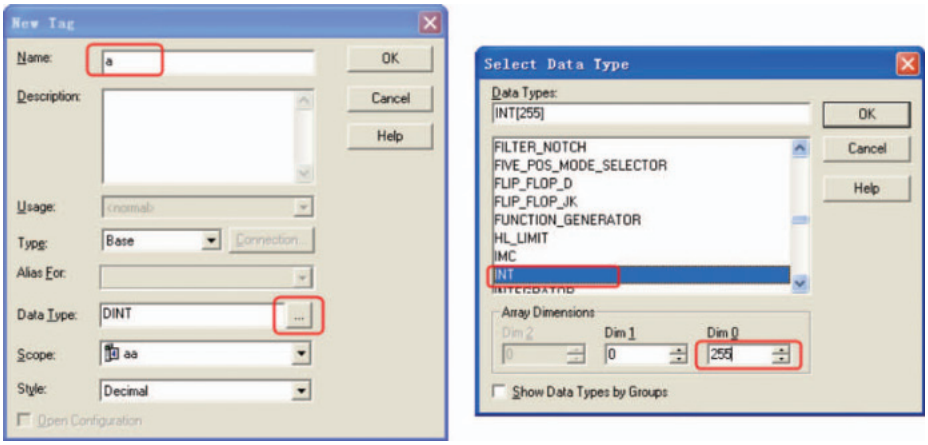
3 Make the Name correspond to the File Number, and then select “Map PLC/SLC Messages” in the dropdown list after “Logic” being selected.

Note The software must be changed to “Offline” status.



- Setting Example

Create a new tag with Name of a and Data Type of INT.

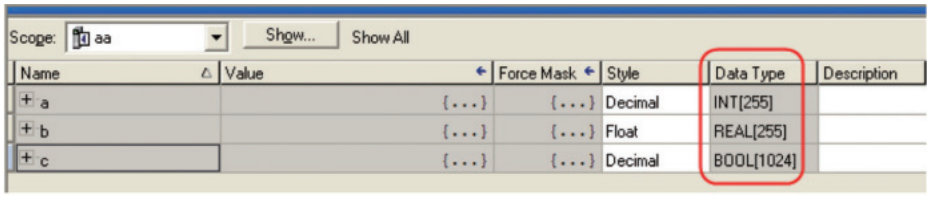


Note 1 When selecting the Data Type, please note that the CompactLogix/ControlLogix protocol only supports 3 data types, i.e. INT, BOOL and REAL.

2 The protocol does not support multidimensional array, therefore only the Dim0 range can be defined.

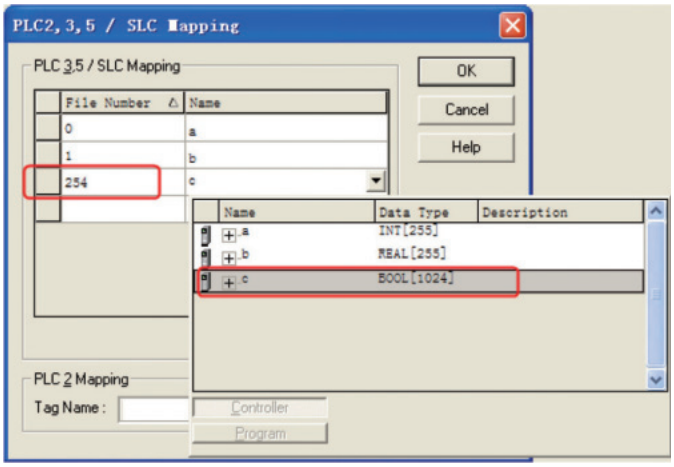
3 The ranges supported by the protocol are 0 to 254 for INT, 0 to 254 for REAL and 0 to 999 for BOOL respectively.

Continue to create 2 tags: one with Name of b and Data Type of REAL and the other with name of c and Data Type of BOOL, as shown below:



Note The address range of BOOL variable is defined to 1024 in the PLC, but the protocol only supports the range up to 999, so the HMI can only access the address up to 999.

After defining the tags, you also need to make the mapping between the Name and the File Number.



Note 1 The file number should be unique, i.e. the same File Number cannot be mapped to the different Names.

2 The File Number supported by the protocol ranges from 0 to 254.

The mapping of the above-mentioned items with NB-Designer addresses is shown as the following table.

Name	Data Type	Support Range	File Number	NB-Designer Address
a	INT[255]	0~254	0	INT 000000~000254
s	REAL[255]	0~254	1	REAL 001000~001254
b	BOOL[1024]	0~999	254	B_BOOL 254000~254999

9-4 Supported Registers

AB MicroLogix Series

Device	Bit Address	Word Address	Format
Internal Auxiliary Nodes	B10: 0.0~255.15	------	DDD.DD
Internal Auxiliary Nodes	B3: 0.0~255.15	------	DDD.DD
External Output Nodes	O0: 0.0~255.15	------	DD.DD
External Input Nodes	I1: 0.0~255.15	------	DD.DD
Data Registers	------	N15: 0~255	DDD
Data Registers	------	N14: 0~255	DDD
Data Registers	------	N11: 0~255	DDD
Data Registers	------	N7: 0~255	DDD
Floating-point Data Registers	------	F8: 0~255	DDD
Actual Value Registers for Counter	------	C5PV: 0~255	DDD
Setting Value Register for Counter	------	C5SV: 0~255	DDD
Actual Value Registers for Timer	------	T4PV: 0~255	DDD
Setting Value Registers for Timer	------	T4SV: 0~255	DDD

Note The format of I/O address for bit register is “I/O e.s/b”, where, “e” is the slot number, “s” is the pixel number, and “b” is the bit number. If the address in PLC is O0 0.0/11, then the address in HMI should be set to “O0 0.11”; and if the address in PLC is O0 0.1/8, then the address in HMI should be set to “O0 1.8”. When AB with the different CPU types uses the I/O modules, the addresses of I point and O point in HMI are arranged consecutively. Take Micrologix1400 with output module 1762-OW16 as example, the address corresponding to O0 1.0/3 in HMI is O0 6.3.

AB Compactlogix Series

Device	Bit Address	Word Address	Format
Integer data file bit level	N_BOOL000000.00~254254.15	------	FFFDDD.DD
Bit data file	B_BOOL000000~254991	------	FFFDDD
Floating point data file	------	REAL000000~254254	FFFDDD
Integer data file	------	INT000000~254254	FFFDDD

Note 1 FFF refers to the File Number and DDD refers to the Variable No. Address. Take N_ BOOL 112087.12 as example, the first three number 112 is the File Number, and 087.12 is the Variable No. Address. The blanks before the Variable No. Address less than three digits should be filled with 0.

2 The File Number can be customized by the user.

3 INT000000~254254 indicates that the range of the File Number is 0 to 254 (the first 3 digits), and the Address Range of the variable is 0 to 254 (the last 3 digits). If 001255 is input, a dialog box “over read address” will pop up, requesting the user to input again.

9-5 Cable Fabrication

● RS232 Communication Cable for MicroLogix

- Communication Cable 1761-CBL-PM02 manufactured by AB Corp. (The 8-pin mini din produced by AB Corp. is non-standard 8-pin)

HMI (COM1/COM2)			PLC		
D-Sub 9Pin (Female)	Signal	Pin No.	Pin No.	Signal	8Pin Mini Din (Female)
	SD	2	4	RXD	
	RD	3	7	TXD	
	SG	9	2	GND	

- Communication Module AIC with (P/No. 1761-NET-AIC) RS232 Communication Cable

HMI (COM1/COM2)			Micrologix series AIC-terminal		
D-Sub 9Pin (Female)	Signal	Pin No.	Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2	2	RXD	
	RD	3	3	TXD	
	SG	9	5	GND	

● RS232 Communication Cable for SLC 5 / 03

HMI (COM1/COM2)			PLC		
D-Sub 9Pin (Female)	Signal	Pin No.	Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2	2	RXD	
	RD	3	3	TXD	
	SG	9	5	GND	

● RS232 Communication Cable for PLC-5

HMI (COM1/COM2)			PLC		
D-Sub 9Pin (Female)	Signal	Pin No.	Pin No.	Signal	D-Sub 25Pin (Female)
	SD	2	3	RXD	
	RD	3	2	TXD	
	SG	9	7	SG	
			4	RTS	
			5	CTS	
			6	DSR	
			8	DCD	
			20	DTR	

● RS232 Communication Cable for CompactLogix/ControlLogix

HMI (COM1/COM2)			PLC CH0/CH1 terminal		
D-Sub 9Pin (Female)	Signal	Pin No.	Pin No.	Signal	D-Sub 9Pin (Male)
	SD	2	2	RXD	
	RD	3	3	TXD	
	SG	9	5	GND	

10

Connecting to PLC of GE Fanuc Automation Inc.

This section describes the connection to PLC of GE Fanuc Automation Inc.

10-1 Serial Port Communication

Series	CPU	Link Module	Driver
GE Fanuc Series 90-30	IC693CPU311 IC693CPU313 IC693CPU321 IC693CPU323 IC693CPU331 IC693CPU341 IC693CPU350 IC693CPU351 IC693CPU352 IC693CPU360 IC693CPU363 IC693CPU364 IC693CPU374 IC693CSE311 IC693CSE313 IC693CSE323 IC693CSE331 IC693CSE340	Serial Connector on Power Supply	GE Fanuc Series SNP (Break-free mode)*
	IC693CPU311 IC693CPU313 IC693CPU321 IC693CPU323 IC693CPU331 IC693CPU340 IC693CPU341 IC693CPU350 IC693CPU360 IC693CPU364	Connector on Power Supply	GE SNP-X
		IC693CMM311	
	IC693CPU351 IC693CPU352 IC693CPU363	Connector on Power Supply	
		Port1 on CPU unit	
		Port2 on CPU unit	
		IC693CMM311	
	IC693CPU374	Port on Power Supply	
		IC693CMM311	
VersaMax Series	CPU001/002/005 CPUE05	RS232 on port1	
		RS422 on port2	
VersaMax Micro & Nano Series	IC200UAL004/005/006 IC200UDD110/120/212 IC200UDR005/006/010 IC200UAA007 IC200UAR028	RS232 on port1	
		RS422 on port2	

* Series 90 Product Supporting Break-free SNP Feature is as follows:

Product	Break-free SNP
Series 90-30 CPU350-364	Support on all serial communication ports starting with firmware release 9.00
Series 90-30 CPU311, 313, 323, 331, 341	Supported starting with firmware release 8.20

Note When you use the above-mentioned CPU(s) for communication, be sure to update it (them) to the specified version(s) in order to make communications with GE Fanuc Series SNP protocol.

10-2 Serial Port Communication Parameters and Cable Fabrication

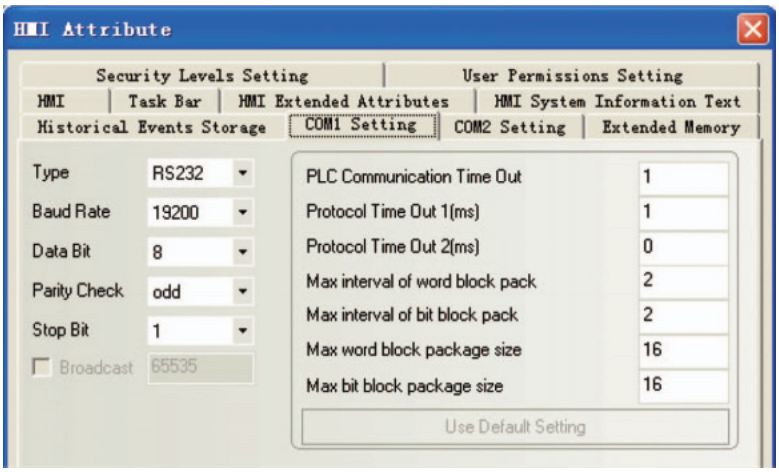
Series	CPU	Link Module	COMM Type	Parameter	Cable
GE Fanuc Series 90-30	IC693CPU374	RS422 on the CPU unit	RS232	Refer to Section 10-3	Self-made cable required
			RS422		
		IC693CMM311	RS232		
			RS422		
VersaMax Series	CPU001/002/005	RS232 on port1	RS232		
		RS422 on port2	RS422		
VersaMax Micro & Nano Series	IC200UAL004/005/006 IC200UDD110/120/212 IC200UDR005/006/010 IC200UAA007 IC200UAR028	RS232 on port1	RS232		
		RS422on port2	RS422		

10-3 Serial Port Communication Parameter Setting

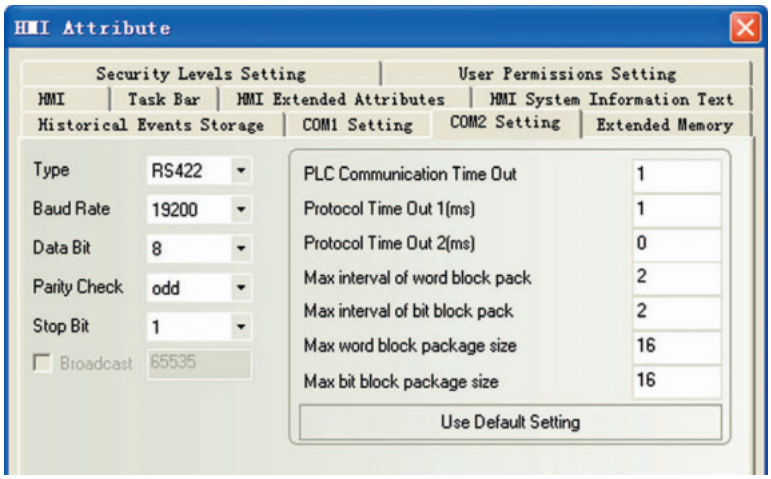
HMI Settings

Default communication parameters for GE Fanuc Series SNP Protocol: 19200 (Baud Rate), 8 (Data Bit), odd (Parity), 1 (Stop Bit), 1 (Station No.).

RS232 Communication

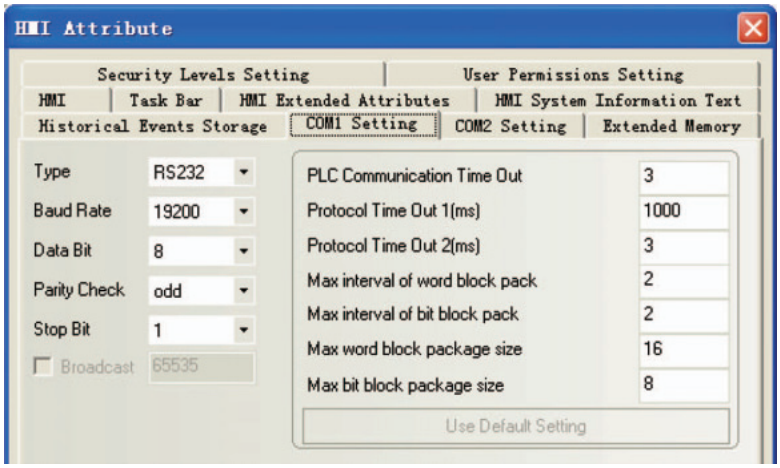


RS422 Communication

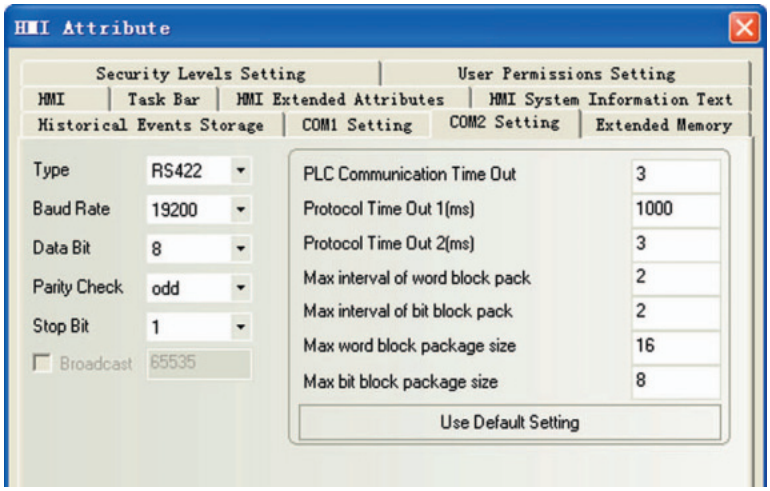


Default communication parameters for GE SNP-X Protocol: 19200 (Baud Rate), 8 (Data Bit), odd (Parity), 1 (Stop Bit), 1 (Station No.).

RS232 Communication



RS422 Communication

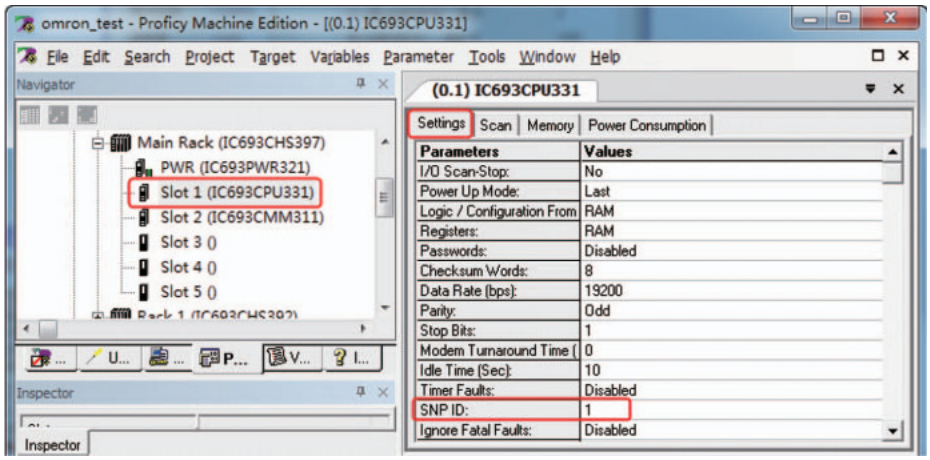


Note The maximum baud rate for the communication with serial port of GE Host is 19200 bps.

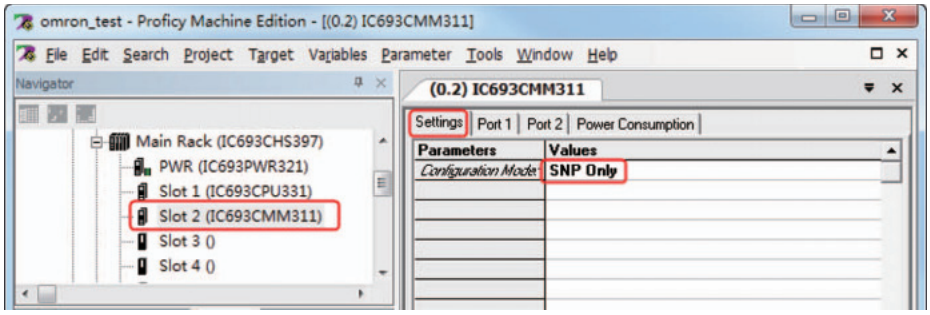
PLC Settings

Take the settings of IC693CPU331 and IC693CMM311 as example:

Select the PLC and devices with the correct models in the Proficy Machine Edition window and you can see the default settings here. There is no need to change the settings unless for some special conditions. But please note the SNP settings. And it only needs to set the related parameters in the HMI to be the same as that herein.



Note "SNP Only" should be selected during the configuration Mode setting.



10-4 Supported Registers

Device	Bit Address	Word Address	Format	Notes
System	SC 01~32	------	DD	
System	SB 01~32	------	DD	
System	SA 01~32	------	DD	
System	S 01~32	------	DD	
Temporary	T 001~256	------	DDD	
Internal	M 0001~4096	------	DDDD	
Genius Global	G 0001~1280	------	DDDD	
Output	Q 0001~2048	------	DDDD	
Input	I 001~256	------	DDD	
Analog Output	------	AQ 001~512	DDD	
Analog Input	------	AI 0001~2048	DDDD	
Register	------	R 0001~9999	DDDD	

Note Address format description: D: decimal, O: octonary, H: hexadecimal

10-5 Cable Fabrication

- **RS232 Communication for GE Fanuc Series SNP**

  Communicating with HMI by directly using the communication cable provided by GE

- **RS232 Communication for VersaMax Series**

HMI (COM1/COM2)				VersaMax series PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 9Pin (Female)
	SD	2	———	3	RD	
	RD	3	———	2	TD	
	SG	9	———	5	GND	

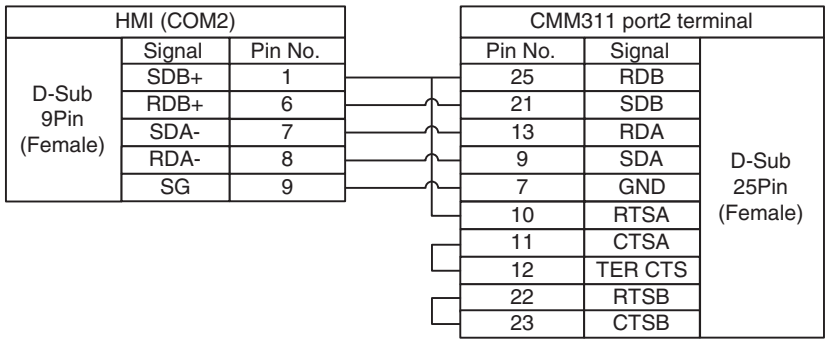
- **RS232 Communication for VersaMax Micro & Nano Series**

HMI (COM1/COM2)				VersaMax Micro&Nano series PLC		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	RJ45 terminal
	SD	2	———	6	RX	
	RD	3	———	5	TX	
	SG	9	———	1	GND	

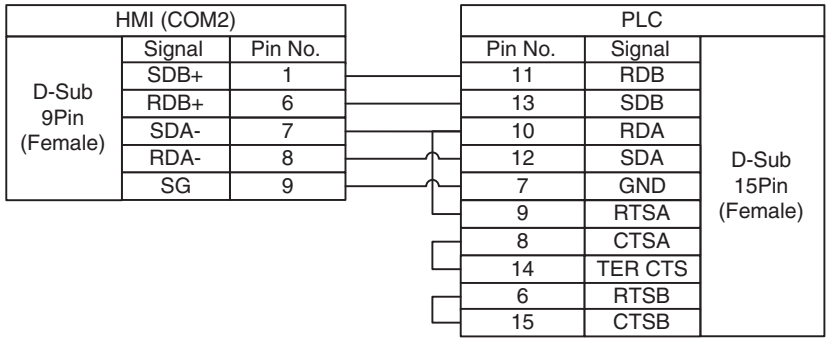
- **RS232 Communication Cable for Communication Module CMM311**

HMI (COM1/COM2)				CMM311 port1/port2 teminal		
D-Sub 9Pin (Female)	Signal	Pin No.		Pin No.	Signal	D-Sub 25Pin (Female)
	SD	2	———	3	RXD	
	RD	3	———	2	TXD	
	SG	9	———	7	GND	
				4	RTS	
				5	CTS	
				8	DCD	
				20	DTR	

● RS422 Communication Cable for Communication Module CMM311

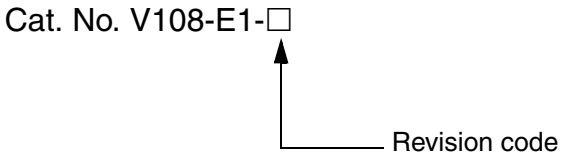


● RS422 Communication for 90-30/VersaMax



Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



Revision code	Date	Revised content
01	October 2011	Original production
02	April 2012	Adding descriptions of Modbus network interface communication and Modbus protocol.
03	August 2012	Adding descriptions of connecting to PLCs manufactured by Allen-Bradley and GE Fanuc Automation INC.

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