CX-Protocol
WS02-PSTC1-E

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# CS1 Unit Descriptions

## WS02-PSTC1-E
# CX-Protocol

## Create serial communications protocols to communicate with standard serial devices

Allows program debugging in a single PLC before the actual system has been assembled. Reduces the total lead time required for machine/equipment development and startup.

**Key Features**

The CX-Protocol software creates data communications procedures (protocol macros) to exchange data between standard serialdevices and the PLC (Serial Communications Unit or Board).

### What is a Protocol Macro?
A protocol macro defines the communications protocol for communications between the PLC and any serial device that has an RS-232C port or RS-422A/RS-485 port and uses half-duplex or full-duplex communications with start-stop synchronization. Serial communications can be processed without a ladder program routineonce the protocol macro has been written to the Serial Communications Unit or Board (CS/CJ Series Unit/Board, C200HX/C200HG/C200HE Board, or CQM1H Board) and the PMCR instruction hasbeen executed from the CPU Unit's ladder program.
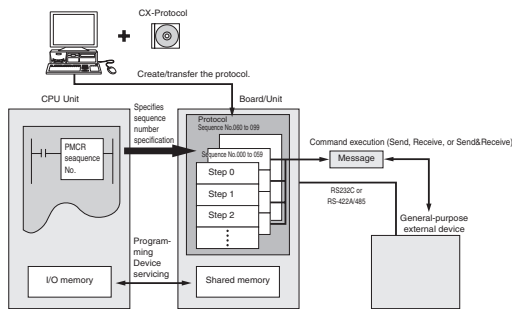


### Overview of Protocol Macros
The protocol macro function can be broadly divided into the following two functions.
1. Creation of communications frames (messages)
2. Creation of procedures to send/receive those communications frames (messages)
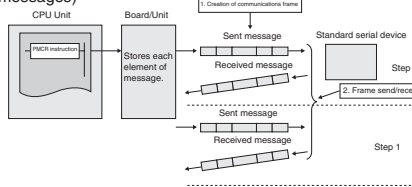


### 1. Creating communications frames (messages)

1) Communications frames (referred to as "messages" here), which can be understood by general-purpose external devices, can be created according to the communications specifications.
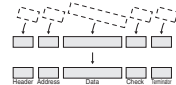
Note: In general, the data area of a send message contains acommand code and data. The data area of a receive message contains a response code.
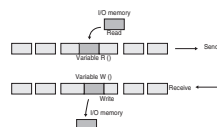
2) Variables for reading data from (or writing data to, if receiving) the I/O memory data areas in the CPU Unit, can be integrated into the messages.



This function has the following advantages:

● Ladder program processing will not be necessary at the CPU Unit when, for example, sending messages after arranging them all in data memory.

● The components of the previously created messages are stored in memory at the Unitor Board, not the CPU Unit. When sendingor receiving data, the CPU Unit only has to execute the PMCR instruction.

● When handling one part of the I/O memory data, if the variable required for reading that data has been integrated into a send message, the Unit or Board will automatically read the required data from the I/O memory of the CPU Unit when the PMSU sends the message. Similarly, when writing data from one part of a received message into I/O memory, if the variable required to read the data has been integrated into the reception settings message, the Unit or Board will automatically write the data at the designated position in the message into I/O memory when the Unit or Board receives the message.
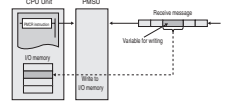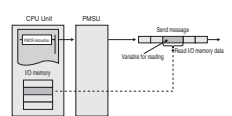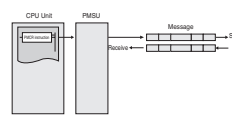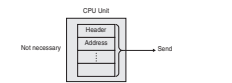
2. Creating procedures to send/receive the communications frames (messages)
1) This function enables all the processing needed to send or receive a message to be handled as one step, and possesses all the commands (step commands), such as Send, Receive, Send&Receive and Wait, that are needed for each step.
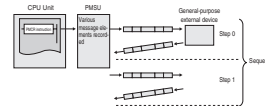
2) This step can be set so that the next process (step/end) depends on the processing result of the previous step. In particular, it is possible to set the sequence so that the next process depends on the contents of one or several set receive messages.
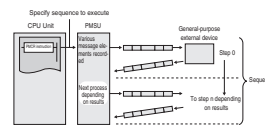
Note 1: A send message created with aprotocol macro will perform settings for messages that are actually sent.
Note 2: A receive message created with protocol macro will set an expected message for comparison with messages that are actually received.

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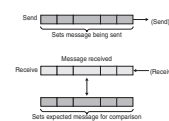


## Developing Communication Protocols

Supports a Wide Range of Communication Protocols

● Send frames and receive frames can be created according to the communications frame (message) specifications of external devices. In addition, variables for exchanging data with the PLC can be incorporated in send and receive frames.

● Supports error check code calculation, frame length calculation during transmission processes, and numeric data conversion between ASCII and hexadecimal.

● Repeat variables can be used, 1:N communications are supported, and write destinations can be switched.

● Supports send and receive time monitoring functions as well as retry processing, so the required communications error processing can be specified easily.

● The interrupt function can send an interrupt to the CPU Unit when receiving data, so high-speed data processing can be performed.

● Expected reception data can be registered and processing can be switched based on the received data.

## Complete Set of Debugging Functions

Sequences can be evaluated, saved, and printed with send/receive message tracing.

●Trace function

With a CS/CJ Series PLC, up to 1,700 characters of time-sequential transmission or reception data, which the Board orUnit exchanges with external devices, can be traced. Tracing allows the user to determine which messages were transmitted or received in each step number. The results of tracing can be saved as data in project files or printed.
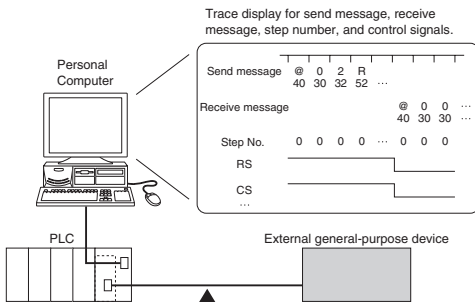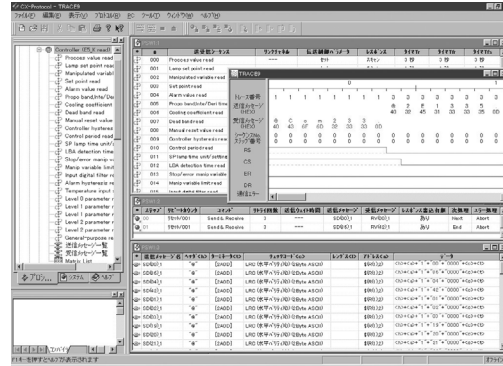


●I/O memory monitor function
Send/receive data stored in the PLC's data areas can be moni-tored.

## Standard System Protocols

Protocols to exchange Data with OMRON Control Devices area Standard Feature.

Data exchange protocols for 13 kinds of OMRON control devices, such as Temperature Controllers and Bar Code Readers, are provided. The standard system protocols can be copied easily and customized.

| Connected component | | Model | Send/receive sequences |
|---|---|---|---|
| CompoWay/F Master | | OMRON components equipped with CompoWay/F Slave functions | Sending CompoWay/F commands and receiving responses |
| Controllers/ Temperature Controllers | Small Digital Controller with Communications Functions (53 × 53 mm) | E5CK | Present value read, set point read, manipulated variable read, etc. Set point write, alarm write, PID parameter write, etc. |
| | Temperature Controllers with Digital Indications (96 × 96 mm or 48 × 96 mm) | E5□J-A2H0 | |
| | Digital Controllers with Communications Functions (96 × 96 mm) | ES100□ | |
| | High-density Temperature Controller with Communications Functions | E5ZE | |
| Digital Panel Meters with Communications Output (custom specification) | | K3T□ | Display value read, comparison value read, write, etc. |
| Bar Code Readers | Laser Scanner version | V500 | Read start, data read, read stop, etc. |
| | CCD version | V520 | |
| Laser Micrometer | | 3Z4L | Measurement condition set, continuous measurement start, etc. |
| Machine Vision Systems | High speed, high precision, low cost version | F200 | Measurement, continuous measurement, etc. |
| | High-precision Inspection/Positioning | F300 | |
| | Character Inspection Software/ Positioning Software | F350 | Measurement, positioning, inspection, character inspection, etc. |
| ID Controllers | Electromagnetic coupling | V600 | Carrier data read, autoread, write to carrier, etc. |
| | Microwave | V620 | |
| Hayes modem AT command | | MD24FB10V MD144FB5V ME1414B2 | Initialize modem, dial, transfer data, etc. |

### Specifications

| | |
|---|---|
| Basic Functions | Create protocols, transfer protocols between the CX-Protocol and the Serial Communications Unit/Board, and save files. |
| Other Functions | Transmission line trace, standard system protocols, PLC I/O memory monitor, PLC error display, protocol print |
| Created files | CX-Protocol project file (*.psw) Contents: Protocol list, PLC communications settings, trace list |

### Operating Environment

| | |
|---|---|
| CPU: | Pentium 90 MHz or faster CPU Note: Windows Me requires a 150 MHz or faster CPU. Recommended CPU: Pentium 166 MHz or faster |
| OS: | Windows 95, 98, Me, 2000, NT 4.0, or XP |

Compatible PLCs:

CS Series, CJ Series, CQM1H Series, and C200HX/HG/HE Series

Compatible Serial Communications Units/Boards:

| CS Series | Serial Communications Units/Boards CS1W-SCB21-V1, CS1W-SCB41-V1, CS1W-SCU21-V1 |
|---|---|
| CJ Series | Serial Communications Units CJ1W-SCU21 and CJ1W-SCU41 |
| C200HX/HG/HE | Communications Boards C200HW-COM04, C200HW-COM04-V1, C200HW-COM05, C200HW-COM05-V1, C200HW-COM06, and C200HW-COM06-V1 |
| CQM1H | Serial Communications Board CQM1H-SCB41 |

Trace display for send message, receive message, step number, and control signals.

Personal Computer

Send message @ 0 2 R
40 30 32 52

Receive message @ 0 0 ···
40 30 30 ···

Step No. 0 0 0 0 ··· 0 0 0

RS

CS

PLC

External general-purpose device

Tracing the send/receive message or control signals that runs through the transmission line.