

### Fast, Powerful, Flexible

The Customizable Counter Unit is a fully programmable counter module with discrete, analog, and pulse outputs for maximum control on the CS1 PLC platform. The unit's on-board PLC provides high speed independent control suitable for a wide array of applications ranging from high speed counting and interrupts to simple dual axis following, camming, and actuation. Programming is easy with CX-Programmer (Version 1.2 or later) or hand-held programming consoles. No additional software is needed.

- Parallel processing reduces system scan-times and improves performance
- All three models feature 20 I/O points for added control
- Counter, pulse, and analog I/O can be controlled independently - not through the main CS1 CPU - allowing greater flexibility
- Easy synchronous control provides electronic following, camming, and gearing capabilities
- Users may pre-program modules for quick, off-the-shelf replacement
- UL, CSA, CE certified

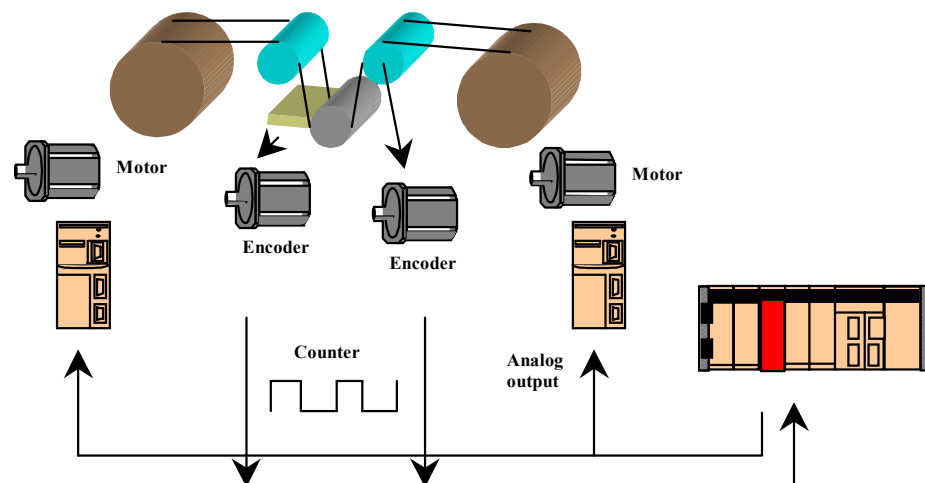




## ■ Tension control

- Paper feeding example

- Easy tension control with ladder program



## Specifications

| Item                                      |                                                                                                                                | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Model number                              |                                                                                                                                | CS1W-HIO01/CS1W-HCP22/CS1W-HCA22                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unit classification                       |                                                                                                                                | CS1 Special I/O Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Applicable PLCs                           |                                                                                                                                | CS1-series PLCs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Applicable unit numbers                   |                                                                                                                                | 00 to 95 (Must not be duplicated with other Special I/O Units)                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Applicable Rack/slot                      |                                                                                                                                | CS1-series CPU Rack or Expansion Rack<br><b>Note:</b> 1. There are no restrictions on the mounting slot.<br>2. Mounting to C200H Expansion Racks or SYSMAC BUS Slave Racks is not possible.                                                                                                                                                                                                                                                                                                      |
| Exchange of general-purpose data with CPU | Special I/O Unit Area<br>(CIO n to n+9;<br>$n = 2000 + (\text{unit number} \times 10)$ )                                       | 10 words per Unit (data exchanged constantly)<br>5 words: CPU → Customizable Counter Unit (RUN/STOP commands, general-purpose output data)<br>5 words: Customizable Counter Unit → CPU (Unit status, general-purpose input data)                                                                                                                                                                                                                                                                 |
|                                           | DM Area words allocated to Special I/O Units (m to m+99; $m = D20000 + (\text{unit number} \times 99)$ )                       | 100 words per Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                           | Initial settings from the CPU                                                                                                  | 10 words: System Setup Area (transferred from the CPU to the Customizable Counter Unit at startup or Unit restart).<br>The System Setup Area contains the following settings: Enable/disable of RUN/STOP command from the CPU; startup operating mode; specification of beginning word addresses for the output and input areas for data exchange with the CPU; number of exchange words; the area used as the data exchange area in the Customizable Counter Unit; address specifications, etc. |
|                                           | Area for exchanging general-purpose data with the CPU                                                                          | 90 words: For exchanging the general-purpose data listed below.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                           | Continuous data exchange between words in the SR Area in the Customizable Counter Unit and CIO Area allocated words in the CPU | 4 input words and 4 output words (Inputs are to Customizable Counter Unit)<br>I/O refresh is performed between words in the Customizable Counter Unit's SR Area (SR 231 to SR 234 and SR 236 to SR 239) and words allocated in the CPU's CIO Area.                                                                                                                                                                                                                                               |
|                                           | Continuous data exchange between user-set words in the Customizable Counter Unit and words allocated in the CPU's DM Area      | 90 words max.<br>I/O refresh is performed for up to 90 words between user-set words in the Customizable Counter Unit and words allocated in the CPU's DM Area.<br><b>Note</b> Both inputs and outputs can be set in Customizable Counter Unit's DM, AR, IR, LR, and EM Areas.                                                                                                                                                                                                                    |
|                                           | Continuous data exchange between LR Area words in the Customizable Counter Unit and user-set words in the CPU                  | 32 words max.<br>I/O refresh is performed for up to 32 words between the Customizable Counter Unit's LR Area (in the order inputs → outputs) and user-set words in the CPU.<br><b>Note</b> Both inputs and outputs can be set in CPU's CIO, WR, AR, HR, DM, and EM Areas.                                                                                                                                                                                                                        |

(This table continues on the next page)

Specifications table - continued from previous page

| Item                         | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on CPU's cycle time   | <ul style="list-style-type: none"> <li>When data exchange is performed using the words allocated in the CIO Area only: 0.2 ms</li> <li>When data exchange is performed using words allocated in the DM Area or the LR Area: 0.5 ms</li> </ul>                                                                                                                                                                                                          |
| Internal current consumption | CS1W-HIO01: 600 mA at 5 VDC<br>CS1W-HCP22: 800 mA at 5 VDC<br>CS1W-HCA22: 750 mA at 5 VDC, 150 mA at 26 VDC                                                                                                                                                                                                                                                                                                                                            |
| Dimensions                   | 34.5 x 130 x 100.5 mm (W x H x D)                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Weight                       | CS1W-HIO01: 250 g max.<br>CS1W-HCP22/HCA22: 350 g max.                                                                                                                                                                                                                                                                                                                                                                                                 |
| Standard accessories         | <b>CS1W-HIO01</b><br>One OMRON C500-CE241 Connector Set for connecting to I/O connector (soldered type; socket: FCN-361J024-AU made by Fujitsu; connector cover: FCN-360C024-J2 made by Fujitsu)<br><b>CS1W-HCP22/HCA22</b><br>In addition to the above, one C500-CE404 Connector Set (made by OMRON) for connecting to special I/O connector (soldered type; socket: FCN-361J040-AU made by Fujitsu; connector cover: FCN-360C040-J2 made by Fujitsu) |

## Program and Memory

| Item                                                                  | Specifications                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Control method                                                        | Stored program                                                                                                                                                                                                                                                                                                            |
| I/O control method                                                    | Cyclic scan and immediate processing are both possible.                                                                                                                                                                                                                                                                   |
| Customizable Counter Unit operating modes                             | RUN mode, MONITOR mode, PROGRAM mode                                                                                                                                                                                                                                                                                      |
| RUN/STOP specification method for Customizable Counter Unit's program | Select between the following:<br>1. RUN/STOP commands from the CPU's allocated memory<br>2. Operating mode command at startup, or command from the Programming Device after startup                                                                                                                                       |
| Status output to CPU                                                  | Unit's operating mode (RUN/STOP), fatal errors, CYCLE TIME OVER errors, Unit error codes, etc.                                                                                                                                                                                                                            |
| Compatible Programming Devices                                        | Programming Console (C200H-PRO27 or CQM1H-PRO01) or CX-Programmer Ver. 1.2 or later (Specify CQM1H as the PLC type. There are restrictions, such as the program capacity.)                                                                                                                                                |
| Programming language                                                  | Ladder diagram                                                                                                                                                                                                                                                                                                            |
| Execution modes                                                       | Possible to switch between Normal Execution Mode and High-speed Execution Mode.<br><ul style="list-style-type: none"> <li>Normal Execution Mode: 0.4 <math>\mu</math>s for LD instruction</li> <li>High-speed Execution Mode: 0.2 <math>\mu</math>s for LD instruction</li> </ul>                                         |
| Program capacity                                                      | 4 Kwords (Normal Execution Mode)<br><b>Note</b> In High-speed Execution Mode, the capacity for which execution (compiling) is possible is restricted. Also, whether or not programs can be executed depends on the contents of the program. The average program capacity in High-speed Execution Mode is approx. 1 Kword. |
| Instruction length                                                    | 1 to 4 words per instruction                                                                                                                                                                                                                                                                                              |
| Number of instructions                                                | 113 (14 basic instructions and 99 special instructions)                                                                                                                                                                                                                                                                   |
| Instruction execution time                                            | Basic instructions                                                                                                                                                                                                                                                                                                        |
|                                                                       | Special instructions                                                                                                                                                                                                                                                                                                      |
| Common processing (overhead)                                          |                                                                                                                                                                                                                                                                                                                           |

## ■ Functions

| Item                              |                                                 |                                                 |                                      | Specifications                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                          |
|-----------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Types of interrupts               | Input interrupts<br>(4 points max.)             | Input Interrupt Mode                            |                                      | Interrupt is executed in response to input to the Unit's built-in input points (input bits 00000 to 00003). Interrupts can be executed when the corresponding input turns ON, OFF, or both. The response time between the input conditions being satisfied and execution of the interrupt program is 0.08 ms (for execution at ON). | Note 1:<br>Specify the mode as either Input Interrupt Mode or Counter Mode using the INT instruction.<br><br>Note 2:<br>Specify ON, OFF, or both in the Unit Setup Area. |
|                                   |                                                 | Counter Mode                                    |                                      |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                          |
|                                   | Interval timer interrupt (1 point)              | Scheduled Interrupt Mode                        |                                      | Program is interrupted at regular intervals measured by one of the Unit's internal timers.                                                                                                                                                                                                                                          |                                                                                                                                                                          |
|                                   |                                                 | One-shot Interrupt Mode                         |                                      | Program is interrupted once after a certain time measured by one of the Unit's internal timers.                                                                                                                                                                                                                                     |                                                                                                                                                                          |
|                                   | CS1W-HCP22<br>(pulse I/O)                       | Pulse inputs<br>(high-speed counter)            | Target value interrupts              | Interrupt is executed when the high-speed counter PV is equal to a target value set with the CTBL instruction.                                                                                                                                                                                                                      |                                                                                                                                                                          |
|                                   |                                                 | Pulse outputs                                   | Target value interrupts              | Interrupt is executed when the pulse output PV is equal to a target value set with the CTBL instruction.                                                                                                                                                                                                                            |                                                                                                                                                                          |
|                                   |                                                 | CS1W-HCA22<br>(pulse inputs and analog outputs) | Pulse inputs<br>(high-speed counter) | Target value interrupts                                                                                                                                                                                                                                                                                                             | Interrupt is executed when the high-speed counter PV is equal to a target value set with the CTBL instruction.                                                           |
| Bit pattern output for comparison | CS1W-HCP22<br>(pulse I/O)                       | Pulse input<br>(high-speed counter)             | Range comparison bit pattern output  | A specified bit pattern is output when the high-speed counter PV lies within a range specified with the CTBL instruction.                                                                                                                                                                                                           |                                                                                                                                                                          |
|                                   |                                                 | Pulse output                                    | Range comparison bit pattern output  | A specified bit pattern is output when the pulse output PV or the pulse counter PV (measurement time) lies within a range specified with the CTBL instruction.                                                                                                                                                                      |                                                                                                                                                                          |
|                                   | CS1W-HCA22<br>(pulse inputs and analog outputs) | Pulse input<br>(high-speed counter)             | Range comparison bit pattern output  | A specified bit pattern is output when the high-speed counter PV lies within a range specified with the CTBL instruction.                                                                                                                                                                                                           |                                                                                                                                                                          |

## ■ I/O Specifications

| Part number                                             | I/O                                | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All Units: CS1W-HIO01,<br>CS1W-HCP22, and<br>CS1W-HCA22 | Contact inputs                     | 12 inputs (24-VDC; bits IR 00000 to IR 00011)<br><b>Details:</b><br><ul style="list-style-type: none"> <li>• 4 interrupt inputs in Input Interrupt Mode or Counter Mode. Can also be used as normal inputs (bits IR 00000 to IR 00003)</li> <li>• 8 normal inputs (bits IR 00004 to IR 00011)</li> </ul> <b>Note</b> It is possible to specify ON, OFF, or both for the timing of interrupts in Input Interrupt Mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                         | Contact outputs                    | 8 outputs (transistor NPN outputs; bits IR 00100 to IR 00107)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| CS1W-HCP22<br>(pulse I/O)                               | Pulse inputs (high-speed counters) | 2 inputs<br>Each input can be set to either single-phase or differential-phase (multiplication factor of 1, 2, or 4) at 50 or 200 kHz (switchable).<br><b>Note</b> Target value interrupts or range comparison bit pattern outputs for high-speed counter present values can be programmed. Measurement of the rate of change in high-speed counter present values and measurement of the frequency from the high-speed counter present values is also possible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                         | Pulse outputs                      | 2 outputs<br>Each output can be set to any one of the following:<br><ol style="list-style-type: none"> <li>1. Pulse output: 6 Hz to 200 kHz</li> <li>2. One-shot pulse output: Output can be set to turn ON for a time specified by the user. (Set in range 0.01 to 9,999 ms in 0.01-ms units.)</li> <li>3. Pulse output counter timer (time measurement): High-precision timer measurement in 0.01-ms units is possible using one-shot pulse output. (In this case, external pulse output is not possible.)</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| CS1W-HCA22 (pulse inputs<br>and analog outputs)         | Pulse inputs (high-speed counters) | 2 inputs<br>Each input can be set to either single-phase or differential-phase (multiplication factor of 1, 2, or 4) at 50 or 200 kHz (switchable).<br><b>Note</b> Target value interrupts or range comparison bit pattern outputs for high-speed counter present values can be programmed. Measurement of the rate of change in high-speed counter present values and measurement of the frequency from the high-speed counter present values is also possible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                         | Analog outputs                     | 2 outputs<br>Each output can be set to any one of the following: 1 to 5 V, 0 to 5 V, 0 to 10 V, or -10 to 10 V<br>Accuracy: $\pm 0.3\%$ ; Resolution: 4,000 (1 to 5 V, 0 to 5 V, 0 to 10 V) or 10,000 (-10 to 10 V), D/A conversion time: 0.5 ms max.<br>Outputs the output values set in the AR Area. Also, for each point, using the SPED instruction and ACC instruction (combined use possible), output at a fixed analog value, or output at values rising or falling at a fixed rate, is possible.<br><ul style="list-style-type: none"> <li>• It is possible to select either immediate refreshing when instructions are executed or refreshing of output values in the AR Area after execution of the END instruction as the refreshing method for analog output.</li> <li>• Analog output values can be held. (Analog values can be output at their peak, held, or cleared values when the Conversion Enable Flag is OFF, a fatal error occurs, or an analog output error occurs.)</li> </ul> <b>Note</b> It is also possible to produce trapezoidal output of analog values according to the time elapsed by combining the SPED instruction, the ACC instruction, timer instructions, and scheduled interrupts. |

## Ordering Information

| Description                                                            | Part Number       |
|------------------------------------------------------------------------|-------------------|
| Basic counter unit 20 digital I/O, 12 dc inputs 8 transistor outputs   | <b>CS1W-HIO01</b> |
| Counter with 20 digital I/O and 2 high speed inputs and analog outputs | <b>CS1W-HCA22</b> |
| Counter with 20 digital I/O and 2 high speed inputs and pulse outputs  | <b>CS1W-HCP22</b> |
| Screw Terminal block for 40 pin CN2 special I/O connector              | <b>XW2B-40G5</b>  |
| 0.5 m (1.64 ft) connecting cable to 40 pin screw terminal block        | <b>XW2Z-050B</b>  |
| 1.0 m (3.28 ft) connecting cable to 40 pin screw terminal block        | <b>XW2Z-100B</b>  |
| 2.0 m (6.56 ft) connecting cable to 40 pin screw terminal block        | <b>XW2Z-200B</b>  |
| 3.0 m (9.84 ft) connecting cable to 40 pin screw terminal block        | <b>XW2Z-300B</b>  |
| 5.0 m (16.40 ft) connecting cable to 40 pin screw terminal block       | <b>XW2Z-500B</b>  |
| Operation Manual for all Customizable Counter models                   | <b>W378-E1-1</b>  |
| Programming Manual all Customizable Counter models                     | <b>W384-E1-1</b>  |

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