

### 1. PRECAUTION

For the correct use of this product, read through this manual before use. Please keep this manual carefully after use. This instrument has been thoroughly tested at the factory before shipment. When you receive it, visually inspect it for damage and check the accessories.

### 2. CHECKING PRODUCT SPECIFICATIONS AND THE CONTENTS OF PACKING

#### (1) Model Number and Specification Check

Check that the model number and specifications shown on the nameplate attached on the side of the product are as ordered.

#### (2) Contents of the Packing

Check that packing contains the following items:

- CCX7 main unit × 1
- Instruction Manual × 1

### 3. GENERAL

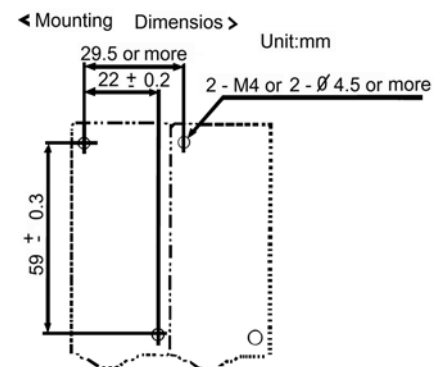
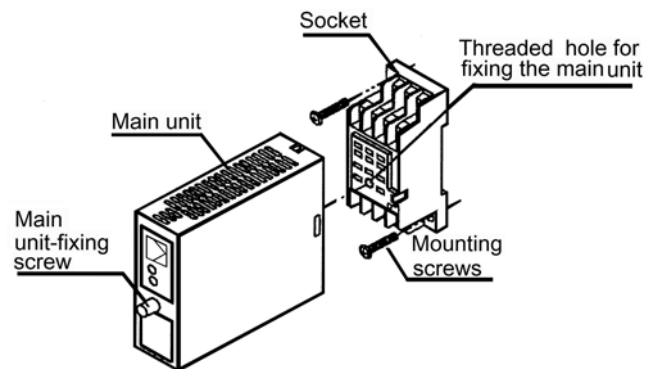
This Universal Computing Unit, which belongs to the SMPSC series of signal conditioners, receives DC current or voltage signals and converts them to pairs of isolated DC voltage or current signals.

• Output-2 signal is selectable from a DC voltage signal, DC current signal, communication function (RS-485), and alarm output (two relay contacts).

### 4. MOUNTING METHODS

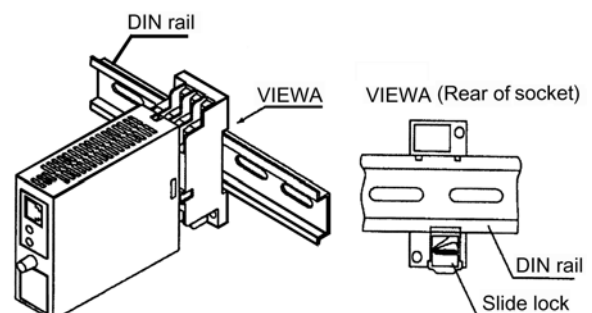
#### 4.1 Wall Mounting

Loosen the main unit-fixing screw of the computing unit to disconnect the main unit from the socket. Next, anchor the socket onto the wall with screws. Then, plug the main unit into the socket and secure the main unit with the main unit-fixing screw.



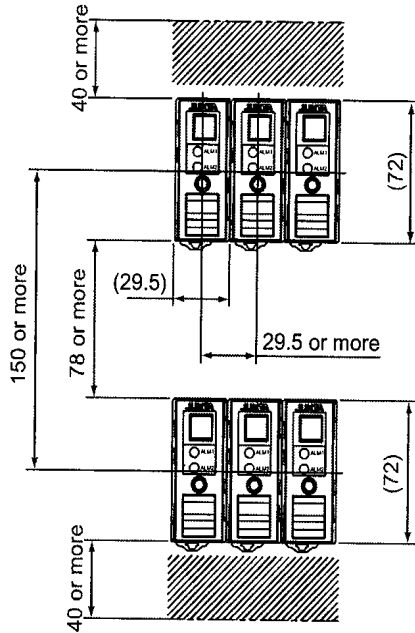
#### 4.2 DIN Rail Mounting

Locate the computing unit so that DIN rail fits into the upper part of the DIN-rail groove at the rear of the socket, and fasten the socket using the slide lock at lower part of the socket.



### 4.3 In Case of Top-Bottom Close Mounting

Transmitter should be mounted horizontally with its top and bottom slits being vertical. The top and bottom slits should not be covered. The area for wiring is required above and below the transmitter (the area with slant lines).



### 5. INSTALLATION LOCATION

- For installation, avoid any location where the product may be subject to vibrations, corrosive gases, or large amounts of dust, or where the product is exposed to water, oil, solvents, direct sunlight, radioactive rays, or strong electric or magnetic fields.
- If there is a possibility that lightning could induce a high surge voltage on the power and signal lines, provide lightning arresters on the line between the field instrument and indoor instrument in order to protect the product. Install a dedicated arrester on the field side and another on the indoor side.

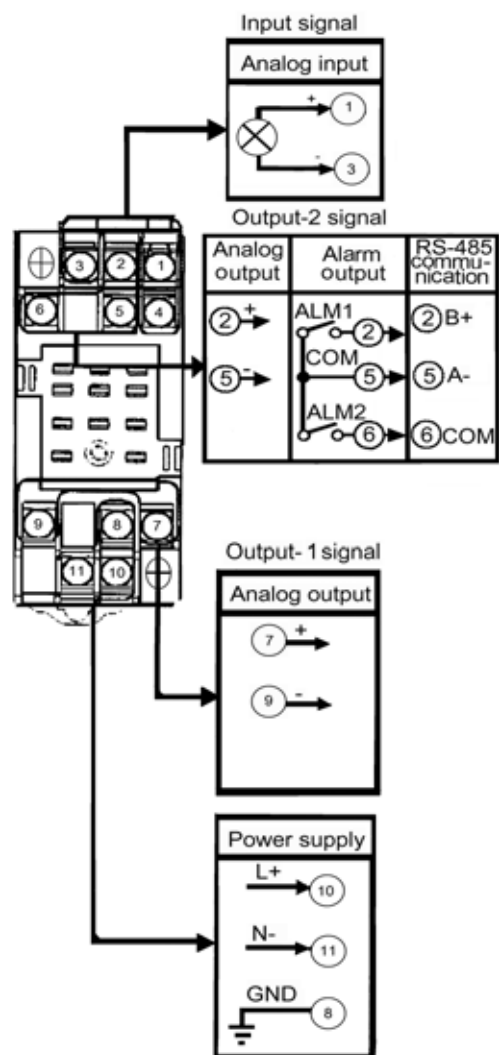
### 6. EXTERNAL WIRING

#### WARNING

Turn OFF the power supply and make sure that none of the cables are not in the hot-line state before carrying out the wiring to avoid the possibility of electric shock.

Wires are connected to the terminals of the isolator's socket. M3 screw terminals are provided for the connection of external signals. Attach a crimp-on lug to each wire for connection to the terminals.

- Recommended cables: A nominal cross-sectional area of  $0.5 \text{ mm}^2$  or thicker for signal cables, and that of  $1.25 \text{ mm}^2$  or thicker for power cables.
- For mounting, use M3 screws and crimp-on terminals with insulating sleeves appropriate for the wires used. Tool of the crimp-on terminals to be used should be appropriate for the crimp-on terminals.
- Mount a switch or 5A circuit breaker on the place near by the instrument, within operator's reach. And attach the indication that it is for disconnecting the instrument.



## NOTE

- Keep all sources of noise away from the power and signal cables. Otherwise, accuracy cannot be assured.
- Provide grounding to a grounding resistance of 100Ω. The length of the grounding cable should be 20 m or less. Directly connect the lead from the ground terminal (terminal no. 8) of the isolator to the ground. Do not carry out daisy-chained inter-ground terminal wiring.

## IMPORTANT

- If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- If the product is operated by a power supply exceeding the specifications, the product may become extremely hot and, as a result, damaged. To prevent this, ensure the following before turning on the power.
  - (a) The voltage of the supplied power and the input signal level meet the specifications of the product.
  - (b) External wires are connected to the correct terminals.
- Do not operate the product in the presence of flammable or explosive gases or vapors. To do is highly dangerous.
- The product is sensitive to static electricity; exercise care in operating it. Before you operate the product, touch a nearby metal part to discharge static electricity.

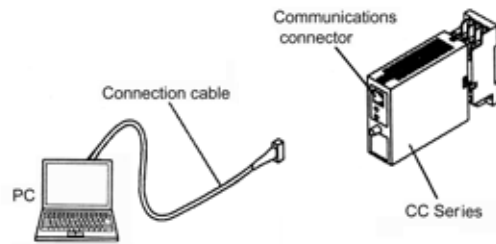
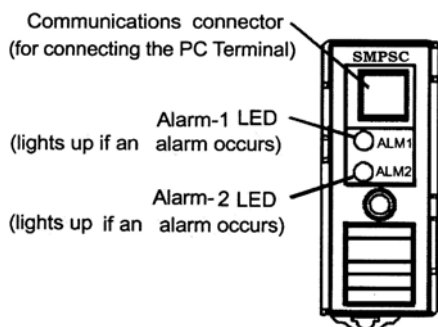
## 7. DESCRIPTION OF FRONT PANEL AND CONNECTION OF PC TERMINAL

### 7.1 Front Panel

The communications connector in the front panel is used for setting up parameters through the PC Terminal. The alarm-1 and alarm-2 LEDs light up if an alarm occurs.

### 7.2 Connecting the PC Terminal

Connect the signal conditioner module to the PC Terminal with connection cable.



Connecting the PC Terminal

## 8. SETTING PARAMETERS

Set the parameters using the PC Setup Utility. Refer to the list of parameters in this manual and the Setup Utility.

### 8.1 Settings Related to Inputs and Outputs

#### 8.1.1 Input Type

Set by selecting input type from among VOLTS (DC voltage) and CURRENT (DC current) in “Input type” item.

#### 8.1.2 Input Hard Range

Set by selecting the input hard range from among AUTO, HIGH, MIDDLE, and LOW in “Selection of input hard range” item. Generally, select AUTO.

- AUTO: Sets the input hard range automatically with respect to the input range to be set.
- HIGH: For a span of 5 V or more in an input range of -10 to +10 V.
- MIDDLE: For a span of 2.5 V or more in an input range of -5 to +5 V.
- LOW: For a span of 0.5 V or more in an input range of -1 to +1 V.

## NOTE

The conditions for the input hard range (HIGH, MIDDLE, and LOW) are specified for operations within the range of accuracy rating. The input range may be set to a range not meeting these conditions, but take note of accuracy limitations. Similar accuracy limitations exist even when AUTO is selected. For more information on accuracy limitations, see the general specification of CCX7.

#### 8.1.3 Input Range

Set the 0% value of input range to “Input low range” and the 100% value of input range to “Input high range” within the numerically specified range.

#### 8.1.4 Selection of Program Function

Select the following communication functions in “Selection of program” item.

(A)direct mapping, (B)moving average, (C)dead time, (D)first-order lag, (E)first-order lead, (F)velocity limiter, (G)limiter, (H) velocity computation, (J)linearizer, and (K)ratio setter.



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### 8.1.5 Computation Cycle Time

Set the computation cycle time by selecting either 100 ms or 200 ms in “Computing period” item.

### 8.1.6 Direction of Output Action

Analog output signals can be reversed. To reverse the signal from output-1, set “Direction of output-1 action” to REVERSE. To return the output-1 signal to normal, set “Direction of output-1 action” to DIRECT. For output-2, use the “Direction of output-2 action” item to set the active directions.

## 8.2 Settings Related to Communication Function

Set the following parameters when output-2 is specified for communication function. For more information on the communication function, see the Instruction Manual for CC Series Communication Function.

### 8.2.1 Communication Protocol

The communication protocol is MODBUS RTU Protocol.

### 8.2.2 Communication Address

Set the address number of the isolator numerically in a range of 1 to 255 in “Address” item.

### 8.2.3 Baud Rate

Set the baud rate by selecting from among 1200, 2400, 4800, 9600 and 19200 bps in “Baud rate” item.

### 8.2.4 Parity

Select and set NONE, EVEN, or ODD in “Parity” item.

### 8.2.5 Data Length

The data length is 8 bits.

### 8.2.6 Stop Bit

Select and set 1 bit or 2 bits in “Stop bit” item.

## 8.3 Settings Related to Alarm Output

Set the following parameters when output-2 is specified for alarm output.

### 8.3.1 Alarm Setpoints

Set the alarm setpoints of alarm-1 and alarm-2 in “Alarm-1 setpoint” item and “Alarm-2 setpoint” item numerically.

- Setting range: A range of 0% to 100% of input range
- Setting resolution: 0.1%

### 8.3.2 Direction of Alarm Action

Select the direction of alarm-1 action and that of alarm-2 action from among HIGH ALARM (high-limit alarm) and LOW ALARM (low-limit alarm) and set each in “Direction of alarm-1 action” item or “Direction of alarm-2 action” item.

- To activate alarm status when input signal  $\geq$  alarm setpoint, select HIGH ALARM.
- To activate alarm status when input signal  $\leq$  alarm setpoint, select LOW ALARM.

### 8.3.3 Hysteresis

Set alarm-1 and alarm-2 hysteresis, in “Alarm-1 hysteresis” item and “Alarm-2 hysteresis” item. Hysteresis is a value added to the alarm setpoint in order for an alarm status to be released (to normal) after the alarm status has been activated. The alarm status will be released in the following conditions, depending on the direction of alarm action.

- When HIGH ALARM (high-limit alarm) is set: Alarm is released when input signal  $<$  (alarm setpoint  $-$  hysteresis).
- When LOW ALARM (low-limit alarm) is set: Alarm is released when input signal  $>$  (alarm setpoint  $+$  hysteresis).
- Setting range: A range of 0% to 100% of input range
- Setting resolution: 0.1%

### 8.3.4 Alarm ON Delay and Alarm OFF Delay

Set alarm-1 and alarm-2 ON delays in “Alarm-1 ON delay setting” item and “Alarm-2 ON delay setting” item and then alarm-1 and alarm-2 OFF delays in “Alarm-1 OFF delay setting” item and “Alarm-2 OFF delay setting” item.

An alarm ON delay is a delay time from the establishment of alarm condition to alarm output; an alarm OFF delay is a delay time from the establishment of return-to-normal condition to output.

- Setting range: 0 to 999 seconds
- Setting resolution: 1 second

For example, when an alarm ON delay is set to 1 second, alarm output is generated if alarm status continues for more than 1 second after the input value exceeds the alarm setpoint. Further, when an alarm OFF delay is set to 2 seconds, alarm output is released if normal condition continues for more than 2 seconds after the input value has returned to normal from the alarm status.

### 8.3.5 Direction of Relay Action

Set the direction of relay energizing in alarm-1 normal condition and alarm-2 normal condition by selecting from among DEENERGIZED (de-energized under normal condition) and ENERGIZED (energized under normal condition) in “Normal direction of alarm-1 relay action” item and “Normal direction of alarm-2 relay action” item and set them.



## 9. Computing Function

### 9.1 CCX7-A (Direct Mapping)

The output value is direct map into the input percentage value.

### 9.2 CCX7-B (Moving Average Computation)

This computing unit stores the input values sampled at intervals of one-fortieth of the moving-average time (L) into 40 buffers in order, and outputs the moving average of 40 input values (Output-1=Y1, Output-2=Y2). The output between samplings is smoothed out by interpolation. Minimum sampling time is the set computing period. Therefore, when the moving-average time is set shorter, the number of samplings is less than 40. When using a first-order lag filter for input (X), set the first-order lag time constant (T). Set the moving-average time (L) value in "Function constant H02".

- Setting range of moving-average time:

0 to 320,000 seconds (about 3.7 days); minimum unit is 1 second (however, 0.1 second is possible for 4 seconds or shorter).

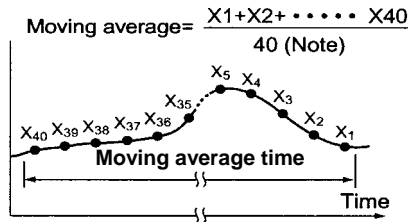
First-order lag time constant (T) is set the value in "Function constant H01".

- Setting range of time constant:

0 to 799.0 seconds, minimum unit is 0.1 second.

- Accuracy of moving average and time constant setting: ±1 second.

e.g.



Note: For the moving average times at 1, 2 and 3 second, the number of samplings is 10, 20 and 30, respectively (when the computing period is 100 ms).

### 9.3 CCX7-C (Dead Time Computation)

This computing unit stores the input values (X) sampled at intervals of one-fortieth of the dead time (L) into 40 buffers in order and outputs data (output-1=Y1, Output-2=Y2) after the dead time has elapsed. Minimum sampling time is the set computing period. Therefore, when the dead time is set shorter, the number of samplings is less than 40. However, for the dead times of 3, 2 and 1 second, the number of samplings is 30, 20, and 10, respectively (when the computing period is 100ms). The output between samplings is smoothed out by interpolation. When using a first-order lag filter for input (X), set the first-order lag time constant (T). Set the dead time (L) value in "Function constant H02".

- Setting range of dead time:

0 to 320,000 seconds (about 3.7 days); minimum unit is 1 second (however, 0.1 second is possible for 4 seconds or shorter).

First-order lag time constant (T) is set the value in "Function constant H01".

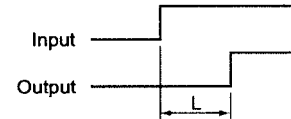
- Setting range of time constant:

0 to 799.0 seconds; minimum unit is 0.1 second.

- Accuracy of moving average and time constant setting: ±1 second.

$$Y1(s) = Y2(s) = \frac{e^{-Ls}}{1 + Ts} X(s)$$

e.g. 0% → 100% step input



### 9.4 CCX7-D (First-order Lag Computation)

This computing unit provides a first-order lag computation on input (X) with a time constant (T) and outputs the result (output-1=Y1, output-2=Y2). Set the time constant (T) value in "Function constant H01".

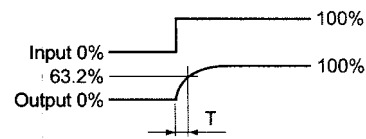
- Setting range of time constant:

0 to 799.0 seconds; minimum unit is 0.1 second.

- Accuracy of time constant setting: ±1 second.

$$Y1(s) = Y2(s) = \frac{1}{1 + Ts} X(s)$$

e.g. 0% → 100% step input



### 9.5 CCX7-E (First-order Lead Computation)

This computing unit provides a first-order lead computation on input (X) with a time constant (T) and outputs the result (output-1=Y1, output-2=Y2). Set the time constant (T) value in "Function constant H01".

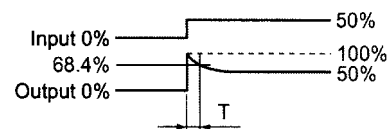
- Setting range of time constant:

0 to 799.0 seconds; minimum unit is 0.1 second.

- Accuracy of time constant setting: ±1 second.

$$Y1(s) = Y2(s) = \left(1 + \frac{Ts}{1 + Ts}\right) X(s)$$

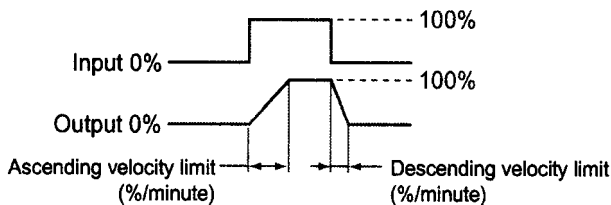
e.g. 0% → 50% step input



## 9.6 CCX7-F (Velocity Limiter)

This computing unit limit the input (X) velocity at the ascending velocity limit for a positive change and the descending velocity limit for a negative change, and outputs the limited value (output-1=Y1, output-2=Y2). When the input velocity (slope) is no more than the limit value, the unit outputs the input as is.

Set the ascending velocity limit at % value in “Function constant H01”, and the descending velocity limit at % value in “Function constant H02”. The value of 0 to 100.0 corresponds to that of 0 to 100.0%/minute.



- Setting range of velocity limit value:  
0.1% to 699.9%/minute; minimum unit is 0.1%/minute.  
Setting the limit at 700%/minute or above does not limit the input, so the unit simply outputs the input as is (i.e., works as an open limit function).
- Accuracy of velocity limit setting:  
±1%/ minute

## 9.7 CCX7-G (Limiter)

This computing unit serves as an ordinary converter as long as the input (X) is within the upper and lower limits. When the input exceeds the limit, the unit outputs the signal that corresponds to the limit value (output-1=Y1, output-2=Y2).

Set the upper limit at % value in “Function constant H01”, and the lower limit at % value in “Function constant H02”.

- Setting range of upper and lower limit value:  
-6.0% to 106.0%; minimum unit is 0.01%.  
However, if the setting is made so that the upper limit < lower limit, the unit outputs the upper limit value.

## 9.8 CCX7-H (Velocity Computation)

This computing unit calculates the input velocity by subtracting the input of the last velocity computation ( $X_L$ ) from the present input (X). The unit then adds a 50% bias to one-half of the obtained velocity and outputs the result (output-1=Y1, output-2=Y2). The output result is 50% when the input is not changed, 50% or more when the input increases (100% for  $X - X_L = 100\%$ ), and 50% or less when the input decreases (0% for  $X - X_L = -100\%$ ).

When using a first-order lag filter for input (X), set the first-order lag time constant (T).

$$Y1=Y2=\frac{X-X_L}{2}+50\%$$

Set the velocity computation time (L) value in “Function constant H02”.

- Setting range of velocity computation time:  
0 to 320,000 seconds (about 3.7 days); minimum unit is 1second (however, 0.1 second is possible for 4 seconds or shorter).

First-order lag time constant (T) is set the value in “Function constant H01”.

- Setting range of time constant:  
0 to 799.0 seconds, minimum unit is 0.1 second.
- Accuracy of moving average and time constant setting:  
±1 second.

## 9.9 CCX7- J (Linearizer)

This computing unit gives an optional relationship between the input (X) and output (output-1=Y1, output-2=Y2) signals using an optional line-segment function. The line-segment function has 21 breakpoints, which each gives an input-output relationship as a percentage (%). Set the input (X) at % value in “Function constant H01 to H21”, and the output (Y) at % value in “Function constant H22 to H42”.

- Breakpoint (21 points) setting conditions:  
For input:  $-6.0 \leq X0(H01) \text{ to } X20(H21) \leq 106.0\%$ ; minimum unit is 0.01%.  
 $X0 < X1 < X2 < \dots < X20$   
For output:  $-6.0 \leq Y0(H22) \text{ to } Y20(H42) \leq 106.0\%$ ; minimum unit is 0.01%  
When input  $\leq X0(H01)$ ,  $Y0(H22)$  is output  
When input  $\geq X20(H21)$ ,  $Y20(H42)$  is output.
- Computation accuracy:  
±1% (when line-segment gain is 1 or less)

## 9.10 CCX7-K (Ratio Setter)

This computing unit sets the ratio by the following expression.

$$Y1=Y2=K1 \times (X+A1)+A2$$

Where Y1: Output-1 signal (%)  
Y2: Output-2 signal (%)  
X: Input signal (%)  
K1: Ratio (no unit)  
A1, A2: Bias (%)

Set the ratio (K1) in “Function constant H01”, and the bias (A1) at % value in “Function constant H02”, and the bias (A2) at % value in “Function constant H03”.

- Setting range of ratio:  
-320 to 320; minimum unit is 0.00001.
- Setting range of bias:  
-32,000% to 32,000%; minimum unit is 0.001%.
- Computation accuracy:  
±1% (when  $K1=1, A1=A2=0\%$ )



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## 10. EXPRESSION OF FUNCTIONS

### General Definition:

(1) Computation Cycle Time:  $T_c = 0.1$  sec (or 0.2 sec)

(2) Sampling Time:  $T_s = \begin{cases} T_c, & \text{for } L \leq 40T_c \\ L/40, & \text{for } L > 40T_c \end{cases}$

(3) Number of Sampling:  $N = \begin{cases} \text{int}(L/T_c + 0.5), & \text{for } L \leq 40T_c \\ 40, & \text{for } L > 40T_c \end{cases}$

(4) Int(\*) : Integer Extracting Function

### 10.1 Direct Mapping

output value:  $Y[n] = X[n]$

### 10.2 Moving Average Computation

first-order lag time constant[H01]:  $T$  (0.0 ~ 799.0 sec) {initial setting  $T = 0$  sec}

first-order lag filter:  $X_f[n] = \begin{cases} X[n], & \text{for } T = 0 \text{ (without first - order lag)} \\ X_f[n-1] + (1 - e^{-\frac{T_s}{T}})(X[n] - X_f[n-1]), & \text{for } T \neq 0 \text{ (with first - order lag)} \end{cases}$

moving-average time[H02]:  $L$  (0.0 ~ 320,000.0 sec) {initial setting  $L = 10$  sec}

moving average output:  $Y[n] = \begin{cases} X_f[n], & \text{for } N = 0 \\ \frac{1}{N} \sum_{k=0}^{N-1} X_f[n-k], & \text{for } N \neq 0 \end{cases}$

### 10.3 Dead Time Computation

first-order lag time constant[H01]:  $T$  (0.0 ~ 799.0 sec) {initial setting  $T = 0$  sec}

first-order lag filter:  $X_f[n] = \begin{cases} X[n], & \text{for } T = 0 \text{ (without first - order lag)} \\ X_f[n-1] + (1 - e^{-\frac{T_s}{T}})(X[n] - X_f[n-1]), & \text{for } T \neq 0 \text{ (with first - order lag)} \end{cases}$

dead time[H02]:  $L$  (0.0 ~ 320,000.0 sec) {initial setting  $L = 10$  sec}

time delay output:  $Y[n] = X_f[n-N]$

### 10.4 First-Order Lag Computation

time constant[H01]:  $T$  (0.0 ~ 799.0 sec) {initial setting  $T = 10$  sec}

first-order lag output:  $Y[n] = \begin{cases} X[n], & \text{for } T = 0 \\ Y[n-1] + (1 - e^{-\frac{T_c}{T}})(X[n] - Y[n-1]), & \text{for } T \neq 0 \end{cases}$

### 10.5 First-Order Lead Computation

time constant[H01]:  $T$  (0.0 ~ 799.0 sec) {initial setting  $T = 10$  sec}

first-order lead output:  $Y[n] = \begin{cases} X[n], & \text{for } T = 0 \\ 2X[n] - Y[n-1], & \text{for } T \neq 0 \ \& \ X[n] \neq X[n-1] \\ Y[n-1] + (1 - e^{-\frac{T_c}{T}})(X[n] - Y[n-1]), & \text{for } T \neq 0 \ \& \ X[n] = X[n-1] \end{cases}$



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## 10.6 Uniform-Speed Response (Velocity Limiter)

ascending velocity limit[H01]:  $V_a$  (0.1 ~ 700.0 %/min) {initial setting  $V_a = 100$  %/min}

descending velocity limit[H02]:  $V_d$  (0.1 ~ 700.0 %/min) {initial setting  $V_d = 100$  %/min}

let  $V[n] = 60 \times (X[n] - Y[n-1])/T_c$

if  $V[n] \geq 0$

$$\text{output value: } Y[n] = \begin{cases} X[n], & \text{for } V[n] \leq V_a \\ Y[n-1] + (V_a/60) \times T_c, & \text{for } V[n] > V_a \end{cases}$$

if  $V[n] < 0$

$$\text{output value: } Y[n] = \begin{cases} X[n], & \text{for } |V[n]| \leq V_d \\ Y[n-1] - (V_d/60) \times T_c, & \text{for } |V[n]| > V_d \end{cases}$$

## 10.7 Limiter

upper limit value[H01]:  $X_U$  (-6.00 ~ 106.00 %) {initial setting  $X_U = 100$  %}

lower limit value[H02]:  $X_L$  (-6.00 ~ 106.00 %) {initial setting  $X_L = 0$  %}

$$\text{output value: } Y[n] = \begin{cases} X_L, & \text{for } X[n] < X_L \\ X[n], & \text{for } X_L \leq X[n] \leq X_U \\ X_U, & \text{for } X[n] > X_U \end{cases}$$

## 10.8 Velocity Computation

first-order lag time constant[H01]:  $T$  (0.0 ~ 799.0 sec) {initial setting  $T = 0$  sec}

$$\text{first-order lag filter: } X_f[n] = \begin{cases} X[n], & \text{for } T = 0 \text{ (without first - order lag)} \\ X_f[n-1] + (1 - e^{-\frac{T_s}{T}})(X[n] - X_f[n-1]), & \text{for } T \neq 0 \text{ (with first - order lag)} \end{cases}$$

velocity computation time[H02]:  $L$  (0.1 ~ 320,000.0 sec) {initial setting  $L = 20$  sec}

velocity computation output:  $Y[n] = (X_f[n] - X_f[n-N])/2 + 50\%$

## 10.9 Linearizer

input breakpoint[H01 ~ H21]:  $X_k$  ( $k=0 \sim 20$ ) (-6.00 ~ 106.00 %)

output breakpoint[H22 ~ H42]:  $Y_k$  ( $k=0 \sim 20$ ) (-6.00 ~ 106.00 %)

if  $X_k \leq X[n] \leq X_{k+1}$

$$\text{output value: } Y[n] = Y_k + \frac{Y_{k+1} - Y_k}{X_{k+1} - X_k} \times (X[n] - X_k)$$

## 10.10 Ratio Setting

ratio constant[H01]:  $K$  (-320.00000 ~ 320.00000) {initial setting  $K = 1$ }

input bias[H02]:  $X_b$  (-32,000.000 ~ 32,000.000 %) {initial setting  $X_b = 0$  %}

output bias[H03]:  $Y_b$  (-32,000.000 ~ 32,000.000 %) {initial setting  $Y_b = 0$  %}

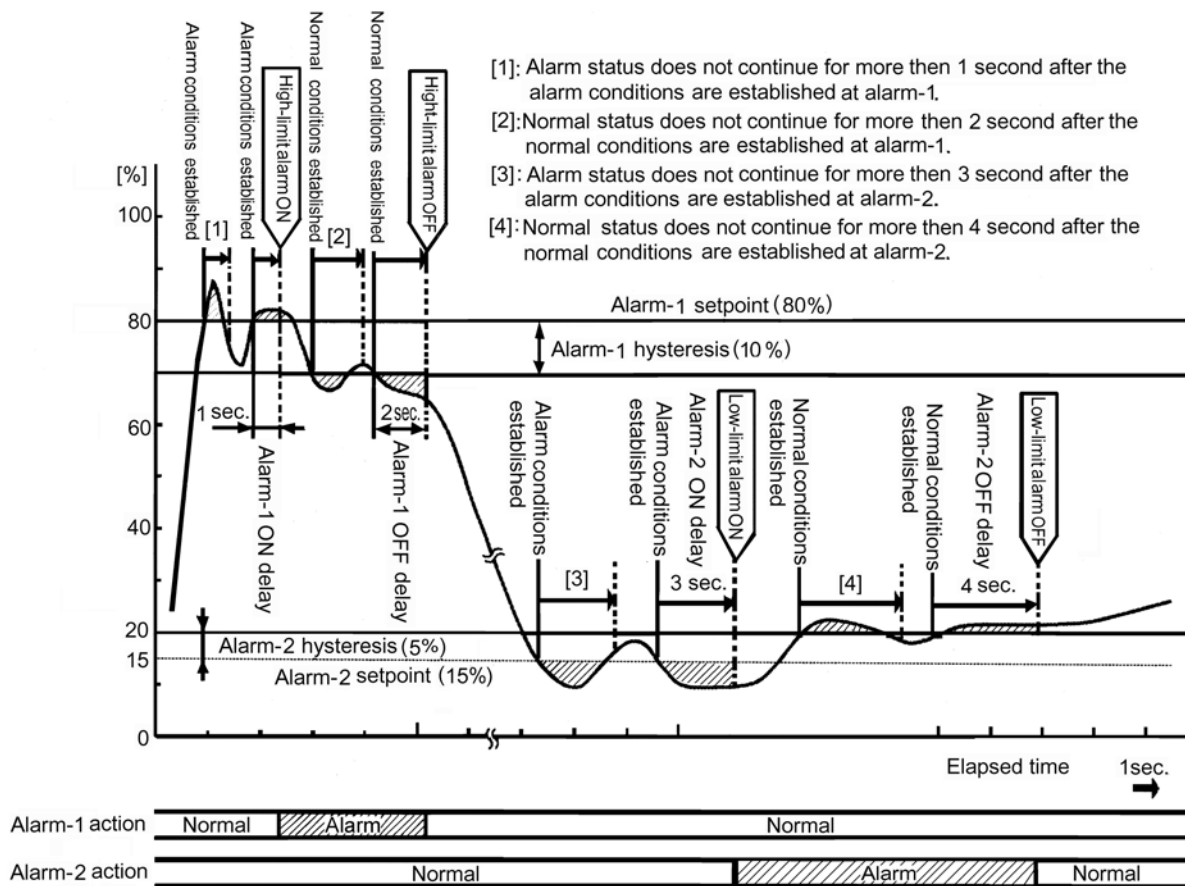
output value:  $Y[n] = K \times (X[n] + X_b) + Y_b$



## 11. DESCRIPTION OF ALARM ACTIONS

This section describes examples of alarm actions under the following conditions.

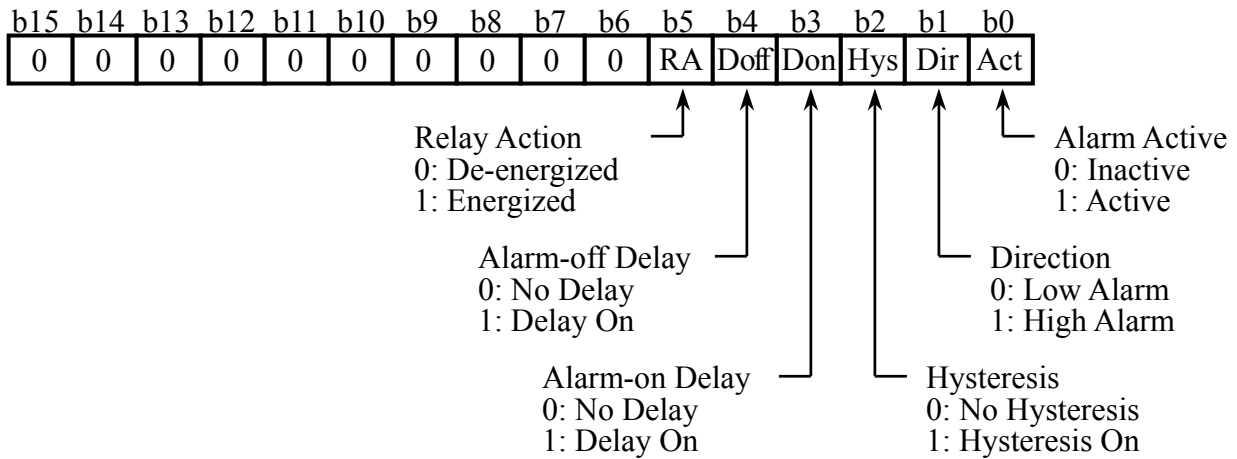
Item	Alarm-1 Setpoint	Alarm-2 Setpoint
Direction of alarm action	High-limit alarm	Low-limit alarm
Alarm setting	80%	15%
Hysteresis	10%	5%
Alarm ON delay	1sec.	3sec.
Alarm OFF delay	2sec.	4sec.
Description of alarm action	The alarm sounds if the condition where the input value is 80% or more of high-limit alarm continues for more than 1 second. After the alarm sounds, when the condition where input value is less than 70% of the high-limit alarm continues for more than 2 seconds, the status returns to normal.	The alarm sounds if the condition where the input value is 15% or less of low-limit alarm continues for more than 3 seconds. After the alarm sounds, when the condition where input value is less than 20% of the low-limit alarm continues for more than 4 seconds, the status returns to normal.



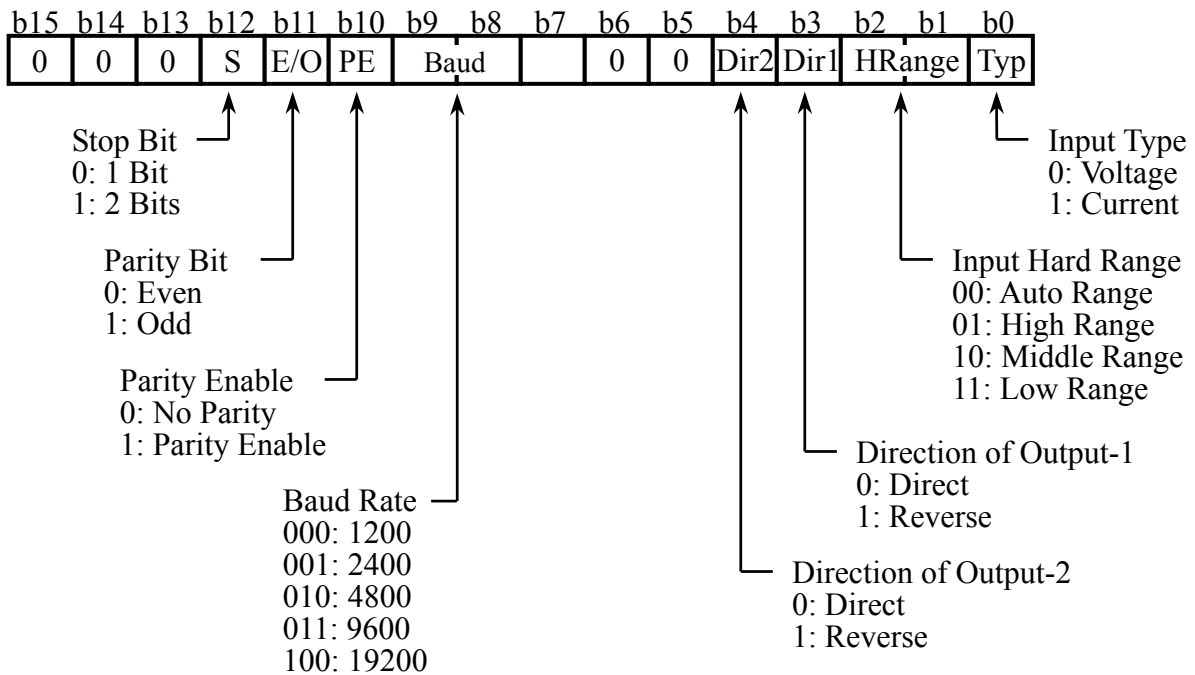
## 12. LIST OF PARAMETERS

Module Item				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0150	Model	8	String	“CCX7 “
0x0154	Tag no.	8	String	“ABC12345“
0x0158	Revise no.	2	Integer	Ver.×100
Display Item				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0160	Input value	4	Floating	Read the value of input
0x0162	Output value 1	4	Floating	Read the value of output-1
0x0164	Output value 2	4	Floating	Read the value of output-2
0x0166	Alarm-1 status	2	Integer	Read the status of alarm-1 (see Note 1)
0x0167	Alarm-2 status	2	Integer	Read the status of alarm-2 (see Note 1)
0x0168	Status	2	Integer	Read the status of module (see Note 2)

### Note 1: Alarm Status



### Note 2: Status



Setting Item				
I/O Setting				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0020	Tag no. 1	8	String	"ASCII543"
0x0024	Tag no. 2	8	String	"ASCII543"
0x0028	Comment 1	8	String	"ASCII543"
0x002C	Comment 2	8	String	"ASCII543"
0x0030	Input type	2	Integer	0:Voltage, 1:Current
0x0031	Selection of input hard range	2	Integer	0:Auto, 1:High, 2:Middle, 3:Low
0x0032	Input low range	4	Floating	Set the 0% value of input range
0x0034	Input high range	4	Floating	Set the 100% value of input range
0x0036	Direction of output-1 action	2	Integer	0:Direct, 1:Reverse
0x0037	Direction of output-2 action	2	Integer	0:Direct, 1:Reverse
0x0038	Selection of program	2	Integer	0, 1, 2, 3, 4, 5, 6, 7, 8, 9 ※Note
0x0039	Computing period	2	Integer	0:100ms, 1:200ms
Alarm Output Setting				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0040	Alarm-1 setpoint	2	Integer	[0.0-100.0%]×10
0x0041	Alarm-2 setpoint	2	Integer	[0.0-100.0%]×10
0x0042	Direction of alarm-1 action	2	Integer	0:Low alarm, 1:High alarm
0x0043	Direction of alarm-2 action	2	Integer	0:Low alarm, 1:High alarm
0x0044	Alarm-1 hysteresis	2	Integer	[0.0-100.0%]×10
0x0045	Alarm-2 hysteresis	2	Integer	[0.0-100.0%]×10
0x0046	Alarm-1 ON delay setting	2	Integer	0 to 999 seconds
0x0047	Alarm-2 ON delay setting	2	Integer	0 to 999 seconds
0x0048	Alarm-1 OFF delay setting	2	Integer	0 to 999 seconds
0x0049	Alarm-2 OFF delay setting	2	Integer	0 to 999 seconds
0x004A	Normal direction of alarm-1 relay action	2	Integer	0:De-energized, 1:Energized
0x004B	Normal direction of alarm-2 relay action	2	Integer	0:De-energized, 1:Energized
Communication Setting				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0050	Communication protocol	2	Integer	Modbus RTU protocol
0x0051	Address	2	Integer	1 to 255
0x0052	Baud rate	2	Integer	1200/2400/4800/9600/19200 bps
0x0053	Parity	2	Integer	0:None, 1:Odd, 2:Even
0x0054	Data length	2	Integer	8 bits
0x0055	Stop bit	2	Integer	1 bit or 2 bits
Adjusting Item				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0060	0% scale adjustment of input	2	Integer	Set the 0% input value
0x0061	100% scale adjustment of input	2	Integer	Set the 100% input value
0x0062	0% scale adjustment of output-1	2	Integer	Set the 0% output value
0x0063	100% scale adjustment of output-1	2	Integer	Set the 100% output value
0x0064	0% scale adjustment of output-2	2	Integer	Set the 0% output value
0x0065	100% scale adjustment of output-2	2	Integer	Set the 100% output value
Test Item				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0071	Forced output 1	2	Integer	0:OFF, 1:ON
0x0072	Forced output 2	2	Integer	0:OFF, 1:ON
0x0073	Forced alarm-1 output	2	Integer	0:OFF, 1:ON
0x0074	Forced alarm-2 output	2	Integer	0:OFF, 1:ON
Fixed constant setting item				
Register Address	Name	Data Size (Byte)	Data Format	Description
0x0080	Function constant H01	4	Floating	
0x0082	Function constant H02	4	Floating	
0x00D2	Function constant H42	4	Floating	



※Note

- |                                 |                         |
|---------------------------------|-------------------------|
| 0: Direct mapping               | 5: Velocity limiter     |
| 1: Moving average computation   | 6: Limiter              |
| 2: Dead time computation        | 7: Velocity computation |
| 3: First-order lag computation  | 8: Linearizer           |
| 4: First-order lead computation | 9: Ratio setter         |

### 13. MAINTENANCE

The product starts running immediately when the power is turned on; however, it needs 10 to 15 minutes of warm-up before it meets the specified performance. For cleaning the instrument, use a soft and dry cloth.

#### 13.1 Calibration apparatus

- A voltage and current generator
- A voltmeter
- A precision resistor of  $250\Omega \pm 0.01\%$ , 1W (for current output)

#### 13.2 Calibration Procedure

Connect the instruments as shown in figure below. First adjust the output-1 signal and then the output-2 signal. Produce input signal equivalent to 0, 25, 50, 75, and 100% of the input span from the voltage and current generator to the isolator. Then, check that the isolator's output signal shows voltage corresponding to 0, 25, 50, 75, and 100% of the input span within the rated accuracy range.

