Product Specification Sheet Model: MS5405DC

Alarm Setter with Dual/Quad Output (DC Signal)

DESCRIPTION

The MS5405DC is a plug-in alarm setter that compares the levels of DC current or voltage signals with two or four set-points and outputs two or four independent isolated relay contact closure signals. The unit's front panel is provided with a display to indicate input values and alarm status.

ORDERING CODE

MS5405DC-[1]-U[2]/[3]

[1] Power Supply

A: 100 to 240V AC (50 to 60Hz)
D: 24V DC
P: 110V DC

[2] Output

A: 4 form A contact outputs
B: 4 form B contact outputs
C: 2 form C contact outputs

[3] Option

No code: None
S: Screw terminal with spring washer
D: Relay contact with max. allowable voltage 125V DC
X: Special order

* For non-standard options, ask MTT for availability.

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.

Examples: MS5405DC-A-UA
MS5405DC-A-UA/SD

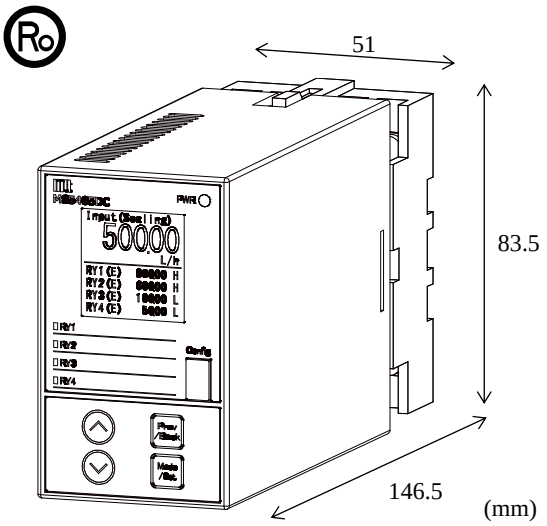
SPECIFICATIONS

●POWER SECTION

Power Requirements	100 to 240V AC: 85 to 264V AC (47 to 63Hz) 24V DC: 24V DC±10% 110V DC: 90 to 121V DC
Power Sensitivity	±0.02%/FS max. for each power supply range
Power Consumption	100V AC: 5.1VA / 240V AC: 7.2VA 24V DC: 2.2W 110V DC: 2.8W

●INPUT SECTION

Input	Current input: ±40mA DC Voltage input: ±10V DC / ±2V DC / ±200mV DC *Switching between current and voltage inputs is done with the rear panel switch.
Input Resistance	Current input: 50Ω typ. Voltage input: 1MΩ min. with/without power.
Allowable Input Range	Current input: ±50mA DC max., continuous. Voltage input: ±30V DC max., continuous.



Minimum Span	±40mA DC: 4mA ±10V DC: 1V ±2V DC: 200mV ±200mV DC: 20mV
Input Bias	Input bias can be set within the input range.
Measurement Range Available	-5 to 105% of span

●OUTPUT SECTION

Relay Contacts (Standard)

Rated Load	3A/250V AC (Resistive load) 3A/30V DC (Resistive load)
Maximum Allowable Voltage	250V AC, 30V DC
Maximum Allowable Current	3A (Resistive load)
Electrical Life	NO: 50,000 cycles / NC: 30,000 cycles (Resistive load; frequency 360 cycles/h)
Mechanical Life	5 million cycles (Frequency: 10,000 cycles /h)

Relay Contacts (Optional)

Rated Load	3A/250V AC (Resistive load) 3A/30V DC (Resistive load)
Maximum Allowable Voltage	250V AC, 125V DC* * 125V DC: Load current 0.4mA max. (Resistive load)
Maximum Allowable Current	3A (Resistive load)
Electrical Life	AC: 100,000 cycles / DC: 50,000 cycles (Resistive load, frequency 18,000 cycles/h)
Mechanical Life	10 million cycles (Frequency: 18,000 cycles /h)

●DISPLAY

Functions	Indicates input values, settings, alarm and error status, and other conditions.
Display Type	OEL display
Display Size	W 26.09 × H 26.09 mm, typ.
Pixel Count	128 × 128
Luminescent Color	White
Service Life	10,000 h, typ. (Standard period of time until the brightness is reduced by half)
Number of Digits	Negative: 4 digits / Positive: 5 digits (-9999 to 99999)
Decimal Point Position	Decimal point position can be set as desired.
Display Cycle	0.5s, typ.

●PERFORMANCE

Accuracy Rating*	±40mA / ±10V / ±2V DC range: ±0.02%/FS + 1 digit @ 25°C±5°C ±200mV DC range: ±0.1%/FS + 1 digit @ 25°C±5°C
Temperature Effect	±0.0025%/FS max. per °C (with reference to 25°C)
Response Time	500ms max. (Time required for the output to reach the 90% level in response to a step input)
Isolation	4-way isolation between input, output, power, and ground.
Insulation Resistance	100MΩ min. (at 500V DC) between [Input/internal circuit], [RY1/2], Power, and Ground.
Dielectric Strength	2000V AC for 1 minute between [Input/internal circuit], [RY1/2], Power, and Ground.
Operating Environment	Ambient temperature: -5°C to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

●PHYSICAL

Installation	Wall/DIN rail mounting
Mounting Orientation	Vertical
Screwing Torque (Recommended)	Standard: 0.78 to 1.18 Nm With spring washer: 0.78 to 0.98 Nm
Wiring	M3.5 screw terminal connection
External Dimensions	W51 × H83.5 × D146.5 mm (including the socket)
Weight	Main unit: 260g, typ. Socket: 75g, typ.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric epoxy resin (FR-4: UL 94V-0)
Conformal Coating	HumiSeal® 1A27NSLU (Polyurethane)

* HumiSeal® is a registered trademark of Chase Corporation.

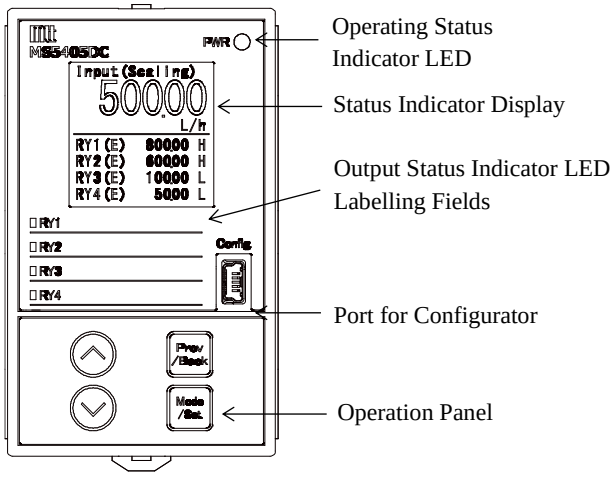
* Accuracy Rating

Since accuracy rating assumes that the input range is defined as a full span, accuracy of measurement with reference to an input set value (set span) is calculated as follows:

(Ex.) If the input range is ±40mA and input is 4-20mA:

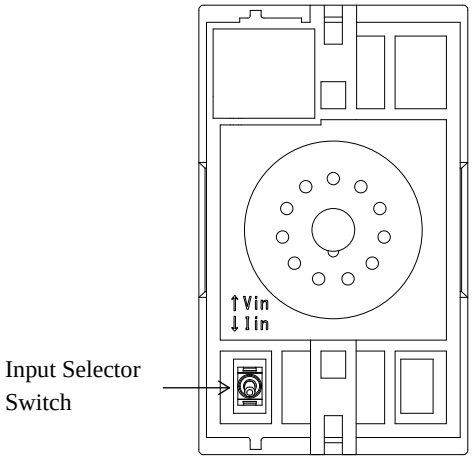
Input Accuracy = Accuracy rating × (Full span / Set span) + 1 digit
= 0.02%/FS × (80mA/16mA) + 1 digit
= 0.1% + 1 digit

FRONT VIEW



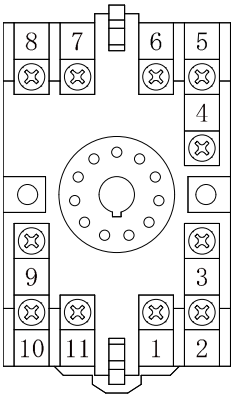
Name	Function
Operating Status Indicator LED	Indicates the operating status of the unit. A green LED lights in different patterns, depending on the status.
Status Indicator Display	Indicates input status, alarm status, and settings. Single and dual window modes are supported.
Output Status Indicator LED	Indicates the output status of the relays, RY1 - RY4. A red LED lights when the relay is activated.
Labelling Fields	These are fields to which labels (RY1 - RY4) are attached.
Port for Configurator	USB Type Mini-B, female connector. This port is connected to a PC when the unit is configured using the Configurator. USB bus power allows users to change parameters with the power off. (Screen display and output cannot be changed.)
Operation Panel	Four push buttons allow users to change display settings and parameters.

REAR VIEW



Name	Function
Input Selector Switch	Switches between current input and voltage input.

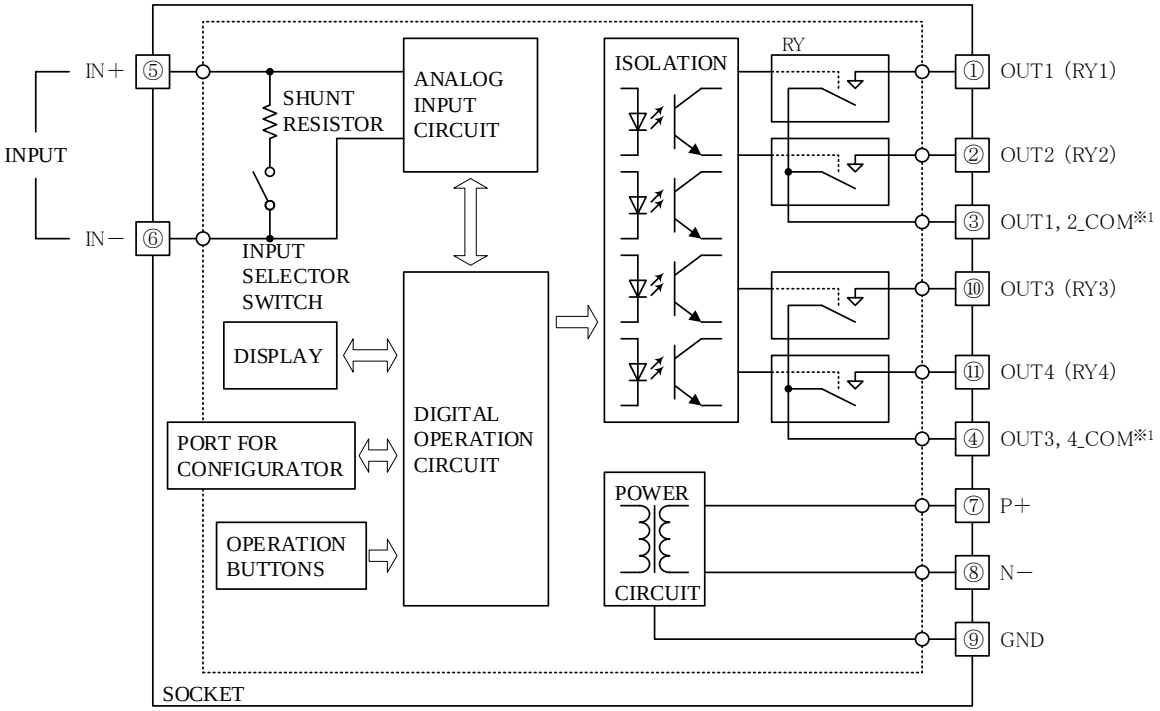
TERMINAL ASSIGNMENT



No.	Form A contact 4 outputs	Form B contact 4 outputs	Form C contact 2 outputs
1	OUT1 (NO)	OUT1 (NC)	OUT1 (NC)
2	OUT2 (NO)	OUT2 (NC)	OUT1 (NO)
3	OUT1, 2_COM		OUT1_COM
4	OUT3, 4_COM		OUT2_COM
5	IN+		
6	IN-		
7	P+ (POWER)		
8	N- (POWER)		
9	GND		
10	OUT3 (NO)	OUT3 (NC)	OUT2 (NC)
11	OUT4 (NO)	OUT4 (NC)	OUT2 (NO)

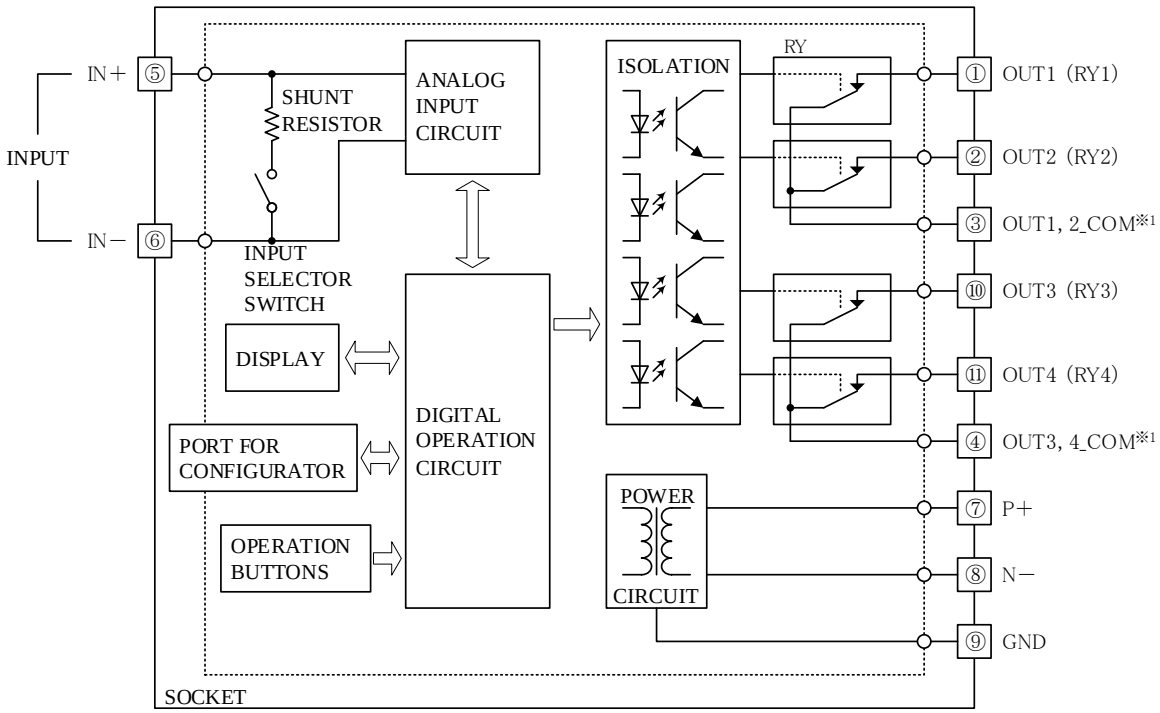
BLOCK DIAGRAM

● 4 form A contact outputs



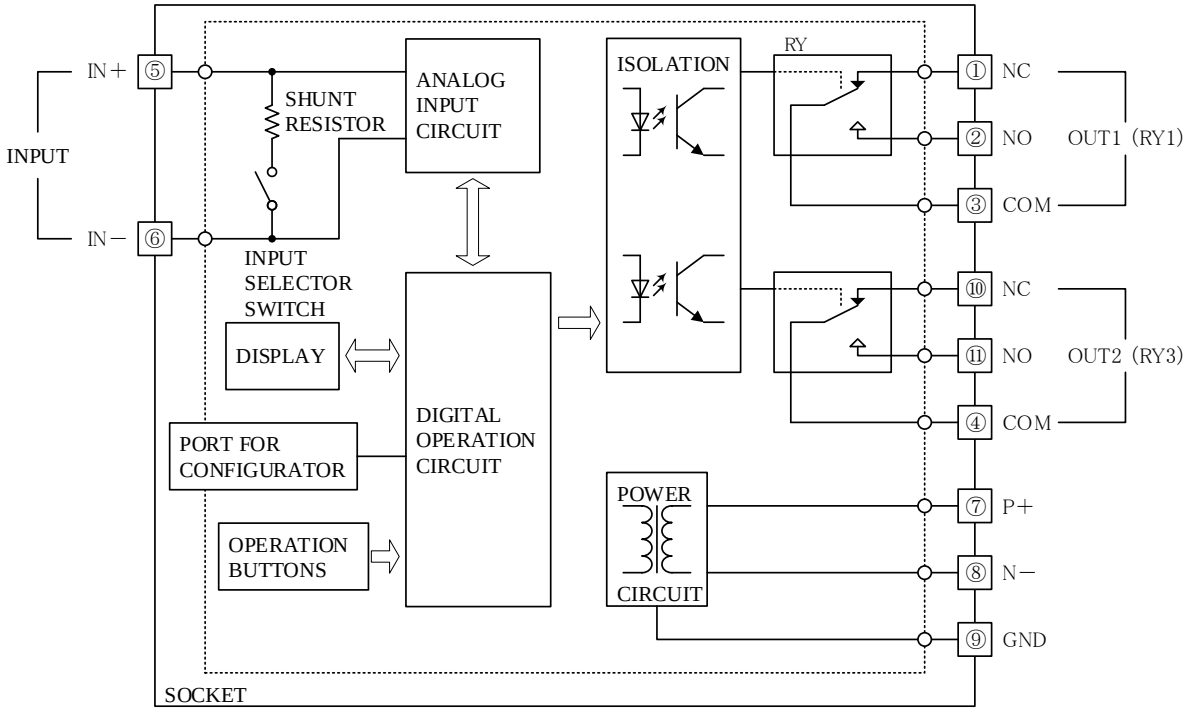
* The sum of the load currents on RY1 and RY2, and the sum of the load currents on RY3 and RY4 must not exceed 3A.

● 4 form B contact outputs

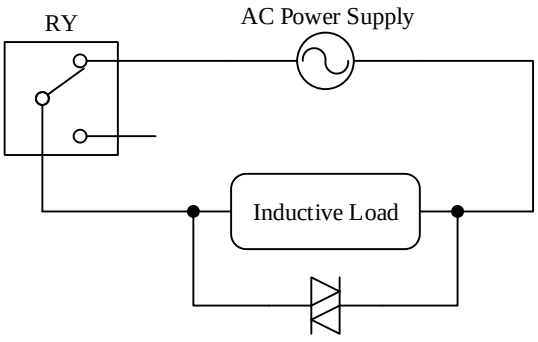


* The sum of the load currents on RY1 and RY2, and the sum of the load currents on RY3 and RY4 must not exceed 3A.

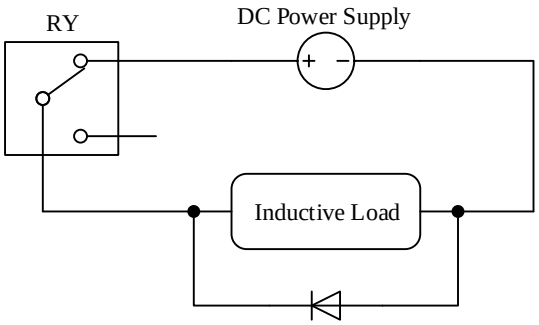
● 2 form C contact outputs



When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load as shown below.



Protection Circuit
(Varistor, CR circuit, etc.)



Protection Circuit
(Diode, varistor, CR circuit, etc.)

FUNCTIONS

Alarm Settings

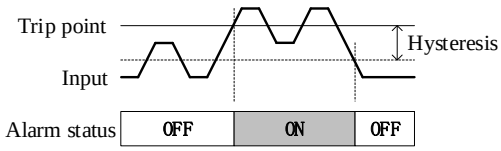
The following alarm settings are available for each output.

1. Alarm Mode: High / Low / Disable
2. Relay Activation with Alarm Status: Activated / Deactivated
3. Trip Point: Any value within the scaling setting range.
4. Hysteresis: Any positive value with reference to a trip point
5. Delay for Turning on the Alarm (seconds): Any value between 0 and 99.
6. Delay for Turning off the Alarm (seconds): Any value between 0 and 99.

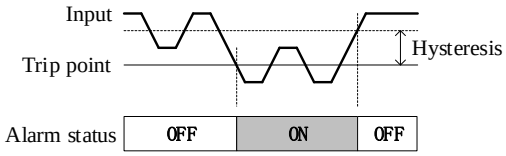
1. Alarm Mode:

The alarm mode can be set to “High Alarm” or “Low Alarm”. It can also be set to “Disable” if alarm is not used.

“High Alarm” mode:
Input > Trip point: Alarm turns on.
Input ≤ Trip point - Hysteresis: Alarm turns off.



“Low Alarm” mode:
Input < Trip point: Alarm turns on.
Input ≥ Trip point + Hysteresis: Alarm turns off.



“Disable Alarm” mode: Relay constantly deactivated

2. Relay Activation with Alarm Status:

Relay activation with alarm status can be set to either “Activated” or “Deactivated”.
The output (state between OUTx and COM terminals) depends on product specifications and relay behavior.

Specification	Relay Behavior	State between OUTx and COM
Form A Contact	Activated	Closed
	Deactivated	Open
Form B Contact	Activated	Open
	Deactivated	Closed

Note: Without power, all four form A contacts are open and all four form B contacts are closed.

Specification	Relay Behavior	State between OUTx and COM	
		NC	NO
Form C Contact	Activated	Open	Closed
	Deactivated	Closed	Open

Note: Without power, NC and COM are closed and NO and COM are open.

3. Trip Point

A threshold to trigger an alarm is adjustable within a scaling range of -9999 to 99999 in steps of 1.

4. Hysteresis

Hysteresis to turn off the alarm is adjustable within a positive scaling range of 0 to 99999 in steps of 1.

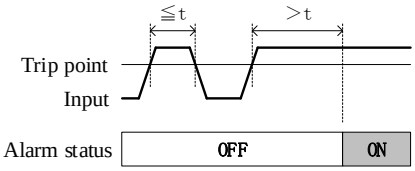
5. Delay for Turning on the Alarm:

A delay for turning on the alarm is adjustable from 0 to 99 seconds in steps of 1 second.

"High Alarm" mode with a delay for turning on the alarm set to "t" (s):

Duration of input above trip point > t: Alarm turns on.

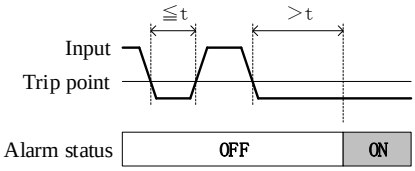
Duration of input above trip point ≤ t: Alarm does not turn on.



"Low Alarm" mode with a delay for turning on the alarm set to "t" (s):

Duration of input below trip point > t: Alarm turns on.

Duration of input below trip point ≤ t: Alarm does not turn on.



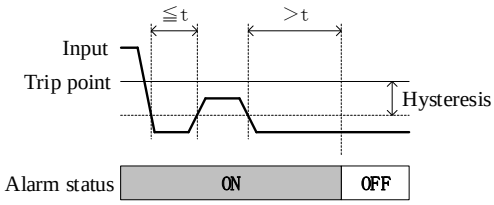
6. Delay for Turning off the Alarm:

A delay for turning off the alarm is adjustable from 0 to 99 seconds in steps of 1 second.

"High Alarm" mode with a delay for turning off the alarm set to "t" (s):

Duration of input below (trip point – hysteresis) > t:
Alarm turns off.

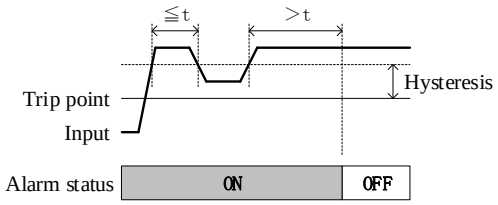
Duration of input below (trip point – hysteresis) ≤ t:
Alarm does not turn off.



"Low Alarm" mode with a delay for turning off the alarm set to "t" (s):

Duration of input above (trip point + hysteresis) > t:
Alarm turns off.

Duration of input above (trip point + hysteresis) ≤ t:
Alarm does not turn off.

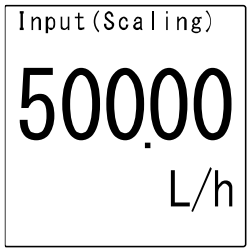


Display Screen

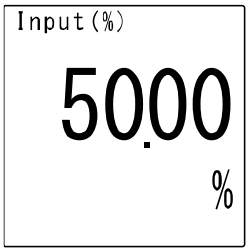
The Status Indicator Display on the front panel shows various settings and status of the unit.
(Note that the actual screen displays white text on a black background.)

[Standard Screen / Single Window]

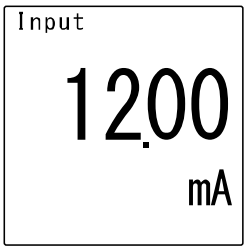
Scaled input value



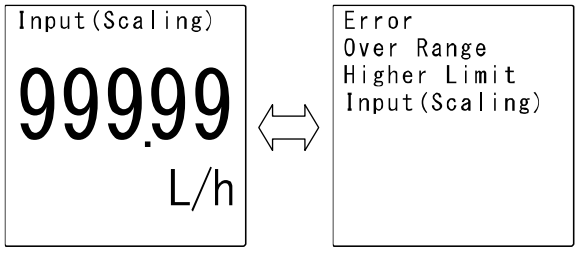
Input in percentage



Input in engineering unit



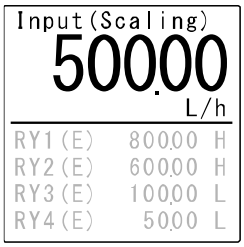
When an input error occurs
(display alternates between two screens)



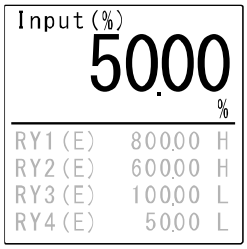
[Standard Screen / Dual Window]

Upper Window

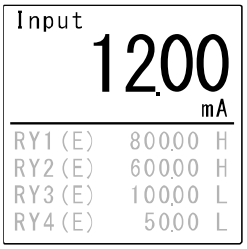
Scaled input value



Input in percentage

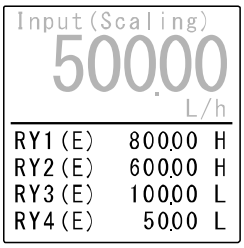


Input in engineering unit

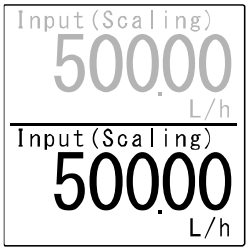


Lower Window

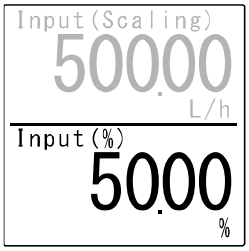
Alarm display



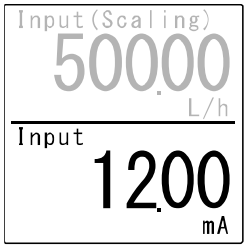
Scaled input value



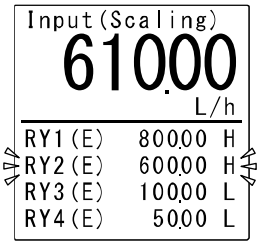
Input in percentage



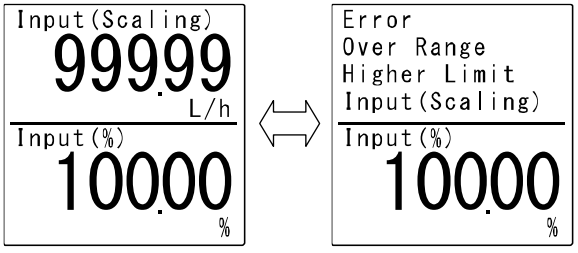
Input in engineering unit



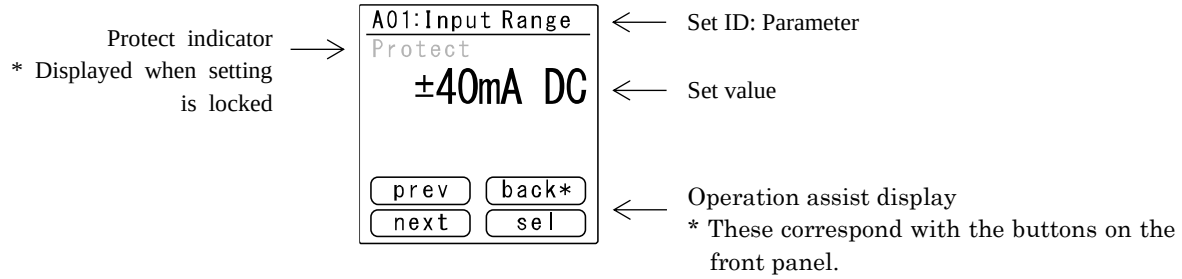
When there is an alarm
(Set point blinks)



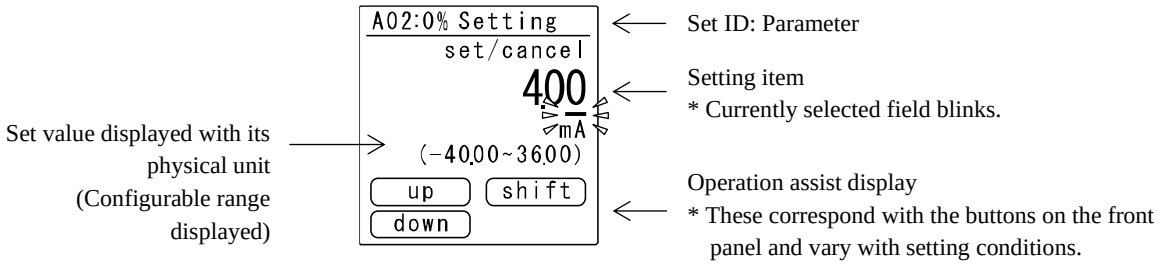
When an input error occurs
(only upper window display alternates between two screens)



[Parameter Selection Screen]

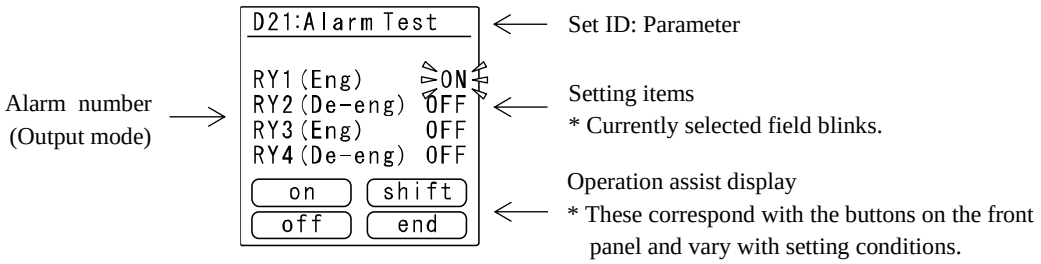


[Setting Screen]



[Other Screens]

(Ex.) Alarm test screen



● Status Indications

The status of the unit is indicated by the Status Indicator Display and Operating Status Indicator LED on the front panel.
If there are two or more errors, the Status Indicator Display indicates the errors in order, from top to bottom of the list below.
The Output Status Indicator LED of each relay comes on when the relevant relay is activated.

	Operating Status Indicator LED	Status Indicator Display		Remarks Troubleshooting
		Upper Screen	Lower Screen	
Initializing	OFF ○○○○ ○○○○	No display		–
CPU error				Push-button operation is disabled. Depending on error modes, the information displayed may vary. The unit requires repair if it does not recover from the error even after power cycling.
Initializing error	Blink *1 ●●●● ○○○○	No display		Push-button operation is disabled. The unit requires repair if it does not recover from the error even after power cycling.
Alarm testing	Blink *1 ●○●○ ●○●○	Screen for alarm testing		–
Memory error	Blink *1 ●●●● ○○○○	Settings		Execute “P_ID: D98 Initializing”, then reconfigure each item. The unit requires repair if it does not recover from the error even after the initialization.
Real input value over-range error		Error Over Range Higher Limit Input (%) *2	Settings	Set input to 105% or smaller.
Real input value under-range error		Error Over Range Lower Limit Input (%) *2	Settings	Set input to -5% or greater.
Scaled input value over-range error		Error Over Range Higher Limit Input (Scaling) *2	Settings	Set input to 99999 or smaller.
Scaled input value under-range error		Error Over Range Lower Limit Input (Scaling) *2	Settings	Set input to -9999 or greater.
Status Indicator Display error	Blink *1 ●●○○ ●●○○	No display		All processing except display continues. The unit requires repair if it does not recover from the error even after power cycling.
Limit Alarming	ON ●●●● ●●●●	Settings		–
Normal operation		Settings		–

*1: The circle symbols, ○ and ● show OFF and ON, respectively. Each symbol indicates a duration of 0.25s.
*2: Error information and settings (in normal operation) appear alternately on the display.

SETTING PARAMETERS

● A List of Setting Parameters

For details on each parameter, refer to the User's Manual, KRA0002483-H12-2.

Set ID (P_ID)	Parameter (Name Displayed)	Set Value/Range	Unit	Factory Default	Remarks
A01	Input range (Input Range)	±40mA DC ±10V DC ±2V DC ±200mV DC	-	±40mA DC	
A02	0% setting (0% Setting)	-40.00 to 36.00 -10.00 to 9.00 -2.000 to 1.800 -200.0 to 180.0	mA V V mV	4.00 1.00 0.000 0.0	
A03	100% setting (100% Setting)	-36.00 to 40.00 -9.00 to 10.00 -1.800 to 2.000 -180.0 to 200.0	mA V V mV	20.00 5.00 1.000 200.0	
A04	0% scaling (0% Scaling)	-9999 to 99999	-	0.00	A set value for A06 is reflected.
A05	100% scaling (100% Scaling)	-9999 to 99999	-	100.00	
A06	Scaling decimal point position (Dec Point)	0 to 4 decimal places	-	2 decimal places	
A07	Scaling unit (Scaling Unit)	Select from 120 kinds of unit. *User configurable	-	%	
B01 *1	Set memory number (Memory No.)	1 to 4	-	1	
B11 *1	RY1 mode of operation (RY1 Mode)	High/Low/ Disable	-	High	
B12 *1, 3	RY2 mode of operation (RY2 Mode)	High/Low/ Disable	-	High	
B13 *1	RY3 mode of operation (RY3 Mode)	High/Low/ Disable	-	Low	
B14 *1, 3	RY4 mode of operation (RY4 Mode)	High/Low/ Disable	-	Low	
B21 *1, 2	RY1 output mode (RY1 Out Mode)	Energized/ De-energized	-	Energized	
B22 *1, 2, 3	RY2 output mode (RY2 Out Mode)	Energized/ De-energized	-	Energized	
B23 *1, 2	RY3 output mode (RY3 Out Mode)	Energized/ De-energized	-	Energized	
B24 *1, 2, 3	RY4 output mode (RY4 Out Mode)	Energized/ De-energized	-	Energized	
B31 *1, 2	RY1 set-point (RY1 Setpoint)	-9999 to 99999	-	90.00	Set within the scaling setting range. A set value for A06 is reflected.
B32 *1, 2, 3	RY2 set-point (RY2 Setpoint)	-9999 to 99999	-	80.00	
B33 *1, 2	RY3 set-point (RY3 Setpoint)	-9999 to 99999	-	20.00	
B34 *1, 2, 3	RY4 set-point (RY4 Setpoint)	-9999 to 99999	-	10.00	

(Continued)

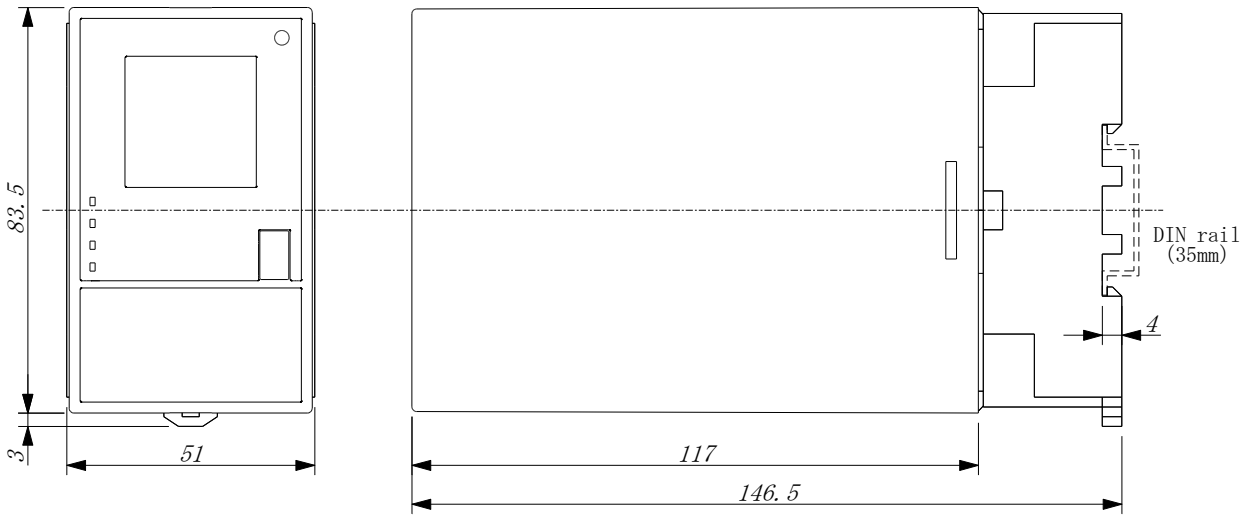
Set ID (P_ID)	Parameter (Name Displayed)	Set Value/Range	Unit	Factory Default	Remarks
C01 *2	RY1 hysteresis (RY1 Hys)	0 to 99999	-	1.00	A set value for A06 is reflected.
C02 *2, 3	RY2 hysteresis (RY2 Hys)	0 to 99999	-	1.00	
C03 *2	RY3 hysteresis (RY3 Hys)	0 to 99999	-	1.00	
C04 *2, 3	RY4 hysteresis (RY4 Hys)	0 to 99999	-	1.00	
C11 *2	RY1 ON delay time (RY1 ON Dly T)	0 to 99	Sec.	0	
C12 *2, 3	RY2 ON delay time (RY2 ON Dly T)	0 to 99	Sec.	0	
C13 *2	RY3 ON delay time (RY3 ON Dly T)	0 to 99	Sec.	0	
C14 *2, 3	RY4 ON delay time (RY4 ON Dly T)	0 to 99	Sec.	0	
C21 *2	RY1 OFF delay time (RY1 OFF Dly T)	0 to 99	Sec.	0	
C22 *2, 3	RY2 OFF delay time (RY2 OFF Dly T)	0 to 99	Sec.	0	
C23 *2	RY3 OFF delay time (RY3 OFF Dly T)	0 to 99	Sec.	0	
C24 *2, 3	RY4 OFF delay time (RY4 OFF Dly T)	0 to 99	Sec.	0	
C30	Power-on delay time (PWR ON Dly T)	0 to 99	Sec.	5	
D01	Display settings (Upper window) (Disp Set(T))	- Input (Scaling) - Input (%) - Input	-	Input (Scaling)	
D02	Display settings (Lower window) (Disp Set(B))	- Alarm - Input (Scaling) - Input (%) - Input - None	-	Alarm	Single window mode applies when “None” is selected.
D10	Display brightness (Disp Bright)	1 (dark) to 4 (bright)	-	2	
D11	Display turn-off time (Disp OFF T)	0 (stays ON) / 1 to 60	Min.	10	
D20	Alarm holding (Alarm Hold)	Enable/Disable	-	Disable	
D21	Alarm test (Alarm Test)	Nop/Test Run	-	Nop	
D98	Initializing (Reset Param)	Nop/Reset	-	Nop	
D99	Setting Protection (Protect)	Lock/Unlock	-	Lock	

*1: Each of the “Set memory numbers (set ID: B01)” 1 to 4 has set values, “B1x” to “B3x”. (Up to four combinations of set values “B1x” to “B3x” can be saved in the configuration memory.)

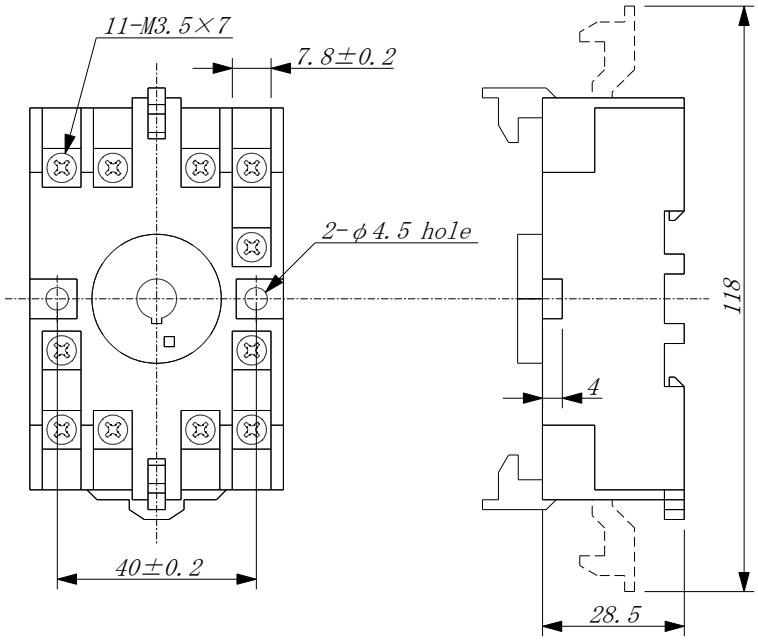
*2: If RYx mode of operation (set ID: B1x) is set to “Disable”, the items defined by the corresponding alarm number, “B2x” to “C2x” will not be displayed.

*3: For the form C contact output, both RY2 and RY4 setting parameters are not displayed.

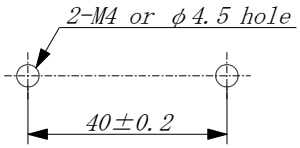
DIMENSIONAL OUTLINE DRAWINGS



* Mountable side by side without clearance



[Drilling Dimension for Wall Mounting]



(Unit: mm)

DEFAULT SETTINGS

If you specify a set value for each of the setting parameters when ordering, your product will be preconfigured to your specification and shipped. To specify, use Specification Order Form (KRA0002483-H20).
Otherwise, the product will be configured to our factory default settings.