

# DIGITAL MONITOR SWITCH

## Model J-DMS03

### Introduction

The J-DMS03 Digital Monitor Switch (DMS) is a microprocessor-based device, which compares an input signal with the pre-determined values of alarm set points and generates an alarm in case the input goes over or under the set point.

The J-DMS03 is available in two types: high-level (4 to 20 mA or 1 to 5 V) input type and low-level (thermocouple or resistance thermometer detector(RTD)) input type. Key pads and LED indicators at the front of the DMS enable settings and monitoring digital values such as a process value, alarm set points and configuration data.

The J-DMS03 provides three alarming types: PV input alarm, PV rate of change alarm, and PV deviation alarm. In each type, the user can specify an high limit, low limit, and both high/low limits. It is also possible to retransmit inputs as 4 to 20 mA or 1 to 5 V signals (optional).

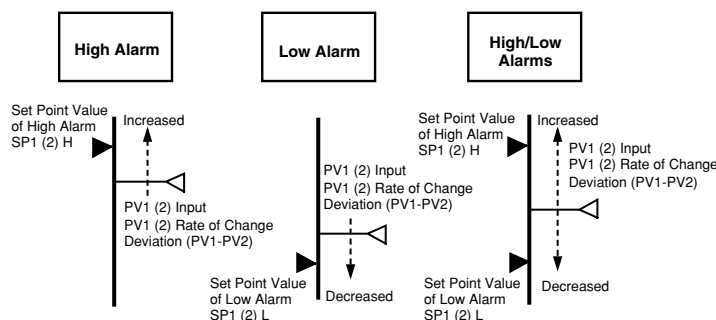
### Features

- 1) Compact design, a large data display which can display up to five digits.
- 2) AC 100 V or DC 24 V are available for power source.
- 3) Highly accurate settings with digital set values.
- 4) A transmitter power supply function is available in the high-level input type.
- 5) The low-level input types allow direct input of a thermocouple or RTD, which is linearized in the DMS.
- 6) Square root and dropout functions are available as standard functions.
- 7) Data are set and displayed in engineering units.
- 8) An input retransmission function is available (optional).
- 9) Highly reliable relay contacts for alarm which can directly drive a DC 125 V load.
- 10) The power supply part, the I/O part, and the retransmission part are electrically isolated.



### Functions

The figure at right shows the alarming functions of the DMS. In the figure, the (▶) mark indicates an alarm set point value, while the (◁) mark indicates an alarm generating factor such as a PV input, rate of change, or deviation. "Increase" and "decrease" represent the directions of change in which such factors will generate alarm. The table below lists DMS alarming functions and shows alarm generating conditions in terms of relationships between factors and set point values. The user can specify up to two (as No. 1 and No. 2 alarm) of these functions.



Alarming Functions	Alarm Conditions	
	No. 1 Alarm	No. 2 Alarm
PV1 high alarm (H)	$PV1 > SP1H$	$PV1 > SP2H$
PV1 low alarm (L)	$PV1 < SP1L$	$PV1 < SP2L$
PV1 high/low alarms (HL)	$PV1 > SP1H$ or $PV1 < SP1L$	$PV1 > SP2H$ or $PV1 < SP2L$
PV1 rate-of-change high alarm (DEVH)	$PV1 \text{ rate of change} > SP1H$	$PV1 \text{ rate of change} > SP2H$
PV1 rate-of-change low alarm (DEVL)	$PV1 \text{ rate of change} < SP1L$	$PV1 \text{ rate of change} < SP2L$
PV1 two-way rate of change (DEVHL)	$PV1 \text{ rate of change} > SP1H$ or $SP1L < PV1 \text{ rate of change}$	$PV1 \text{ rate of change} > SP2H$ or $PV2 \text{ rate of change} < SP2L$
PV2 high alarm (H)	$PV2 > SP1H$	$PV2 > SP2H$
PV2 low alarm (L)	$PV2 < SP1L$	$PV2 < SP2L$
PV2 high/low alarms (HL)	$PV2 > SP1H$ or $PV1 < SP1L$	$PV2 > SP2H$ or $PV2 < SP2L$
PV2 rate-of-change high alarm (DEVH)	$PV2 \text{ rate of change} > SP1H$	$PV2 \text{ rate of change} > SP2H$
PV2 rate-of-change low alarm (DEVL)	$PV2 \text{ rate of change} < SP1L$	$PV2 \text{ rate of change} < SP2L$
PV2 rate of change high/low alarm (DEVHL)	$PV2 \text{ rate of change} > SP1H$ or $SP1L < PV2 \text{ rate of change}$	$PV2 \text{ rate of change} > SP2H$ or $PV2 \text{ rate of change} < SP2L$
Deviation high alarm (H)	$SP1H < PV1 - PV2$	$SP2H < PV1 - PV2$
Deviation low alarm (L)	$SP1L > PV1 - PV2$	$SP2L > PV1 - PV2$
Deviation high/low alarm (HL)	$SP1H < PV1 - PV2$ or $PV1 - PV2 < SP1L$	$SP2H < PV1 - PV2$ or $PV1 - PV2 < SP2L$

# Specifications

Item		High Level Input	Thermocouple Input	RTD Input
Input Function	Number of inputs	2	2	1 (Note 1)
	Types of signals	1 - 5V DC 4 - 20mA DC	T (CC) : - 200 ~ 350 °C J (IC) : - 100 ~ 1100 °C E (CRC) : - 200 ~ 900 °C K (CA) : - 200 ~ 1300 °C R (PR) : 0 ~ 1600 °C	Pt : - 150 ~ 500 °C JPt : - 150 ~ 600 °C Ni : - 50 ~ 150 °C
	Input bias current	- 1 μA (for 1 to 5 V DC) maximum	50 nA maximum (in case of downscale burnout specified)  - 100 nA maximum (in case of upscale burnout specified)	_____
	CMRR/NMRR	90 dB (50 Hz) / 30 dB (50 Hz) minimum		
	Others	Transmitter power supply: DC 24 V, current limit 30 ± 3 mA	Upscale or downscale burnout (selective)	Wiring resistance 10 Ω maximum
Output Function	Alarm	2 points (relay contacts; single polar, double-throw (SPDT)); Energized to alarm or de-energized to alarm (selective)		
	Device failure	1 point (relay contact; single polar, single-throw(SPST)); De-energized and contact closed to device failure. Selective to use or not to use this function.		
	Contact capacity	DC: 125 V/0.5 A, 60 W (resistive load); AC: 125 V/1.0 A (resistive load, 75 VA or less recommended)		
	Cycle time	50msec	100msec	100msec
	Retransmission (Optional)	1 to 5 V DC, output impedance: 250Ω 4 to 20 mA DC, output impedance: 250 kΩ minimum, Allowable resistive load: 600Ω maximum		
Display Function	Alarm	2 point (display color: red)		
	Operation (Run)	1 point (display color: green)		
	Input fault	1 point (display color: red)		
	Data type indication lamp	PV1/SP1, PV2/SP2, DEV/H, Δ / L, FUNC/DIFF (display color: orange)		
	Data	5 digits (- 9999 to 10000) (display color: green)		
	Write-protection	LED in left upper corner of data display (fllickering: write enable; off: write disable), (display color: green)		
Operation Function	Display (mode)	For data display selection, or mode selection with Shift key pressed		
	▲	To increase displayed value		
	▼	To decrease displayed value		
	Set (write-protection)	For data entry, or write enable/disable with Shift key pressed		
	Shift key	For switching the functions of Display (mode) key and Set (write-protection) key		
Accuracy	Basic accuracy (25 °C, 50% RH, AC 100 V or DC 24 V)	Alarm output accuracy: High level input : ± 0.1% fullscale (± 0.2% fullscale in case of square root function selected) Thermocouple input: See table on next page. RTD input : See table on next page. Indication accuracy: (alarm output accuracy) ± 1 digit Retransmission output (optional) accuracy: alarm output accuracy ± 0.2% Effect of ambient temperature changes: basic accuracy ± (basic accuracy) /15 °C		
Power Supply	Voltage	DC24V ±15%, AC100V <sup>+35%</sup> / <sub>-20%</sub> (50 / 60Hz <sup>+6Hz</sup> / <sub>-3Hz</sub> )		
	Power consumption	DC: 5.5 W (8.4 W), AC: 10 VA (14 VA). Figures in parenthesis are in case of supplying power for transmitter. The same figures are applicable in case of retransmission output function used.		
	Voltage breakdown limit	Between AC power supply and GND : 1500 VAC, 1 minute Between DC power supply and GND : 500 VAC, 1 minute Between I/O and GND : 1000 VAC, 1 minute (AC power supply), 500 VAC, 1 minute (DC power supply)		
	Insulation resistance	Between AC power supply and GND : 100 MΩ (500 VDC) minimum Between DC power supply and GND : 100 MΩ (500 VDC) minimum Between I/O and GND : 100 MΩ (500 VDC) minimum		
Others	Ambient temperature/humidity	0 to 50 °C / 10 to 90% RH		
	Mounting	Indoor panel flush mounting		
	Mounting angle	Up to 10 degrees in any direction from the horizontal position		
	Color	Front part and terminal cover: black (Munsell N1.2; leather-tone finish); Case: black		
	Weight	10 N		
	Isolation	Between power supply, I/O, and retransmission output (not isolated between two inputs)		

(Note 1) The one-input model is available for the RTD input type.

**Alarm output accuracy for thermocouple input type (including cold junction compensation accuracy)**

Thermocouple Type	Temperature Range	Accuracy	Accuracy (FS (full-scale) basis)
T (CC)	- 200 ~ 0 °C	$\pm (0.8 - 0.005 \times \text{temp. input value})^\circ\text{C}$	0.15 ~ 0.33%FS (FS : - 200 ~ 350 °C)
	0 ~ 350 °C	$\pm 0.8^\circ\text{C}$	0.15%FS (FS : - 200 ~ 350 °C)
J (IC)	- 100 ~ 0 °C	$\pm (0.8 - 0.005 \times \text{temp. input value})^\circ\text{C}$	0.07 ~ 0.11%FS (FS : - 100 ~ 1100 °C)
	0 ~ 1100 °C	$\pm 0.8^\circ\text{C}$	0.07%FS (FS : - 100 ~ 1100 °C)
E (CRC)	- 200 ~ 0 °C	$\pm (0.8 - 0.005 \times \text{temp. input value})^\circ\text{C}$	0.08 ~ 0.17%FS (FS : - 200 ~ 900 °C)
	0 ~ 900 °C	$\pm 0.8^\circ\text{C}$	0.08%FS (FS : - 200 ~ 900 °C)
K (CA)	- 200 ~ 0 °C	$\pm (1.0 - 0.005 \times \text{temp. input value})^\circ\text{C}$	0.07 ~ 0.14%FS (FS: - 200 ~ 1300 °C)
	0 ~ 1300 °C	$\pm 1.0^\circ\text{C}$	0.07%FS (FS : - 200 ~ 1300 °C)
R (PR)	0 ~ 400 °C	$\pm 3.0^\circ\text{C}$	0.19%FS (FS : 0 ~ 1600 °C)
	400 ~ 1600 °C	$\pm 2.0^\circ\text{C}$	0.13%FS (FS : 0 ~ 1600 °C)

**Alarm output accuracy for RTD input type**

RTD Type	Temperature Range	Accuracy	Accuracy (FS (full-scale) basis)
JPt	- 150 ~ 500 °C	$\pm 0.8^\circ\text{C}$	0.13%FS (FS : - 150 ~ 500 °C)
Pt	- 150 ~ 600 °C	$\pm 0.8^\circ\text{C}$	0.11%FS (FS : - 150 ~ 600 °C)
Ni	- 50 ~ 150 °C	$\pm 0.3^\circ\text{C}$	0.15%FS (FS : - 50 ~ 150 °C)

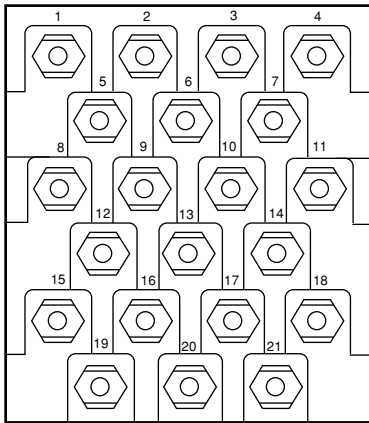
**Model number table**

Basic Model No.	Selective Items		Options	Description
	Power Supply	Input Type	Retransmission Output	
J-DMS03				Panel-mounting type, Digital monitor switch
	- A			AC100V $\begin{matrix} +35\% \\ -20\% \end{matrix}$ , 50/60Hz
	- M			DC24V $\pm 15\%$
		21		Thermocouple type T (CC)
		22		Thermocouple type J (IC)
		23		Thermocouple type E (CRC)
		24		Thermocouple type K (CA)
		25		Thermocouple type R (PR)
		31		JPt (JIS Pt 100 $\Omega$ ) (Note 1)
		32		Pt 100 $\Omega$ (Note 1)
		33		Ni 508.40 $\Omega$ (Note 1)
		41		4 to 20 mA input
		42		1 to 5 V input
			- X	No retransmission
		- 1	Retransmission (4 to 20 mA)	
		- 2	Retransmission (1 to 5 V)	

(Note 1) The one-input model is available for RTD input.

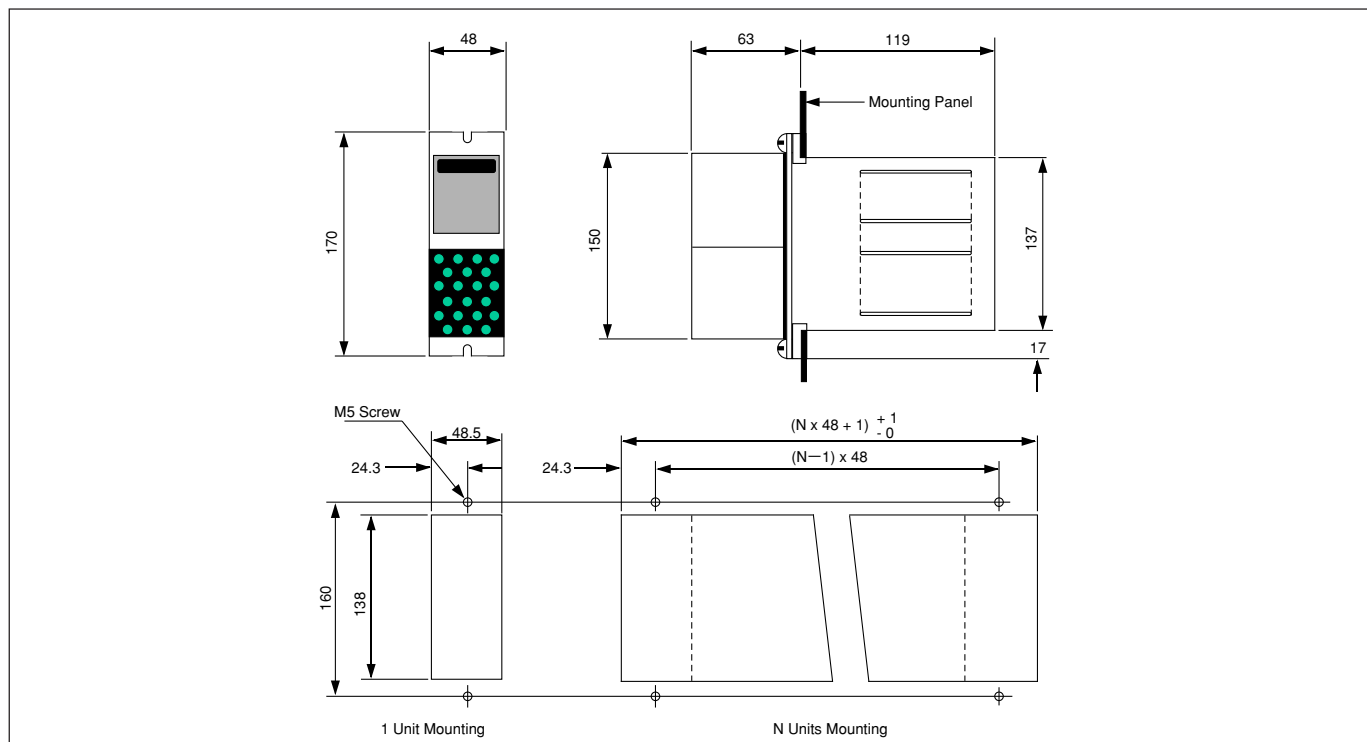
(Note 2) Please specify a tag name within 15 characters if necessary.

## Terminal Connections



Terminal No.	High Level Input	Low Level Input		Description
	1 - 5V/4 - 20mA	Thermocouple Input	RTD Input	
1	PV1+	IN1+	A1	No. 1 input
2	PV1-	IN1-	B1 (B)	
3	PV2+	IN2+	_____	No. 2 input
4	PV2-	IN2-	_____	
5	_____	CAL	_____	
6	XP1	(TcJ)	B1 (C)	TcJ : Cold junction compensation resistor XP : Transmitter power supply
7	XP2	(TcJ)	_____	
8	_____	OUT+	_____	Retransmission output
9	_____	OUT-	_____	
10	_____	CPU · F	_____	Device failure output
11	_____	CPU · F	_____	
12	_____	a 1	_____	No. 1 alarm output
13	_____	c 1	_____	
14	_____	b 1	_____	
15	_____	a 2	_____	No. 2 alarm output
16	_____	c 2	_____	
17	_____	b 2	_____	
18	_____	_____	_____	
19	_____	DC 24 V or AC H		DC 24 V or AC 100 V
20	_____	0 V or AC N		
21	_____	GND	_____	Grounding

## Dimensions



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