

°C	Series SD24 & KR17
%RH	
SHIMADEN	

DIGITAL INDICATOR



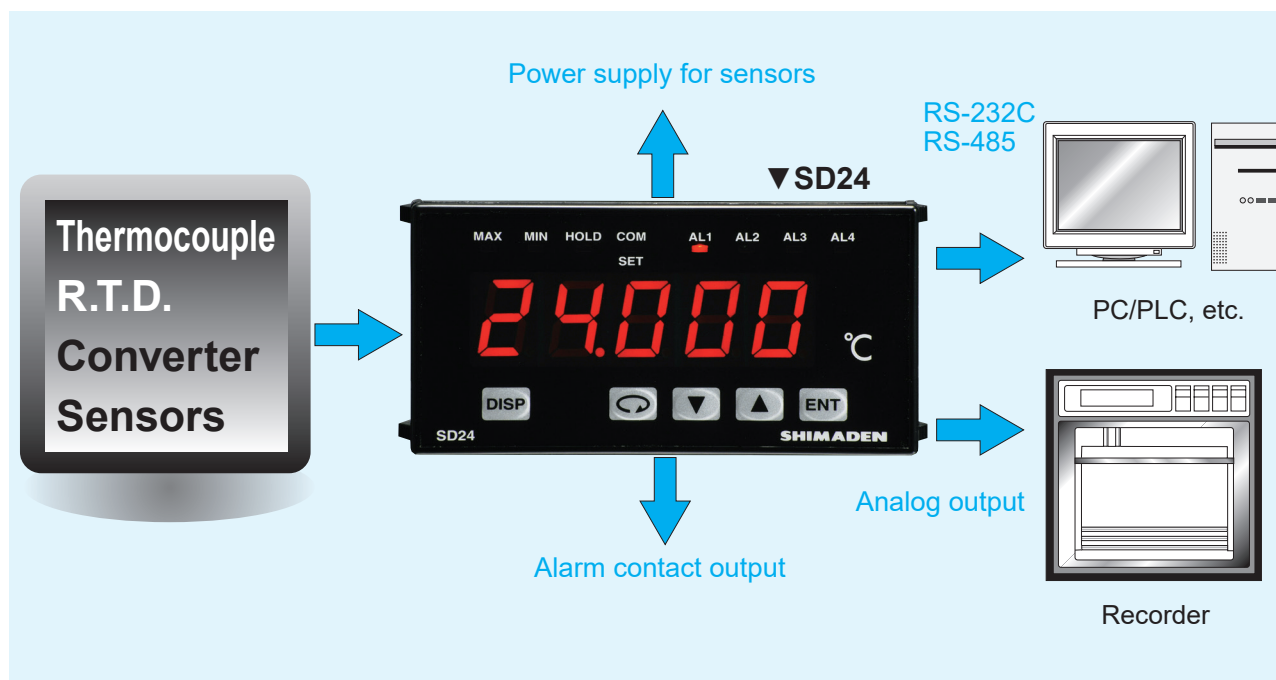
CE approved

PRODUCT FEATURE

- ☐ **High Accuracy $\pm 0.1\%$ FS+1 digit**
- ☐ **1/1000 °C Resolution Indication Possible (Pt input 0.000 to 30.000 °C)**
- ☐ **3 Display Modes (Peak Hold, Bottom Hold, Display Hold)**
- ☐ **External Control Input (2 points) as a Standard Feature**
- ☐ **C contact (2 points) or a contact (4 points) can be selected for alarm output.**
- ☐ **Analog Output Hold Function (Hold Display Value Output)**
- ☐ **Communication Function RS-485/RS-232C**
(Shimaden Standard Protocol/MODBUS)
- ☐ **Linear Approximation Operation Function (Voltage/Current Input only)**
- ☐ **Dust-proof and drip-proof structure: IP66 equivalent**

Comparison with SD20 (discontinued)

	SD20	SD24
Number of digit	4 digits	5 digits
Accuracy	0.25%	0.1%
Input	Specified by customer	Universal
Display cycle range	0.25 sec.	0.1 sec.
RoHS directive supported	Non-compliant	Compliant
Linear approximation function	Without	With
Analog output hold	Without	With

Example of use

SPECIFICATIONS

■ Display

- Display methods
 - Digital display : Measured value (PV) /7 segments red LED 5 digits Height of character: Approx. 14.3 mm
 - Status display : LED lamp display
 - Green: MAX, MIN, HOLD, COM/SET
 - Red: AL1, AL2, AL3, AL4
- Display accuracy : Refer to Measuring Range Codes.
 - TC: $\pm(0.1\% \text{ FS} + 1 \text{ digit})$, excluding reference junction temperature compensation error for thermocouple input.
 - See measuring range code table
 - Pt/JPt: $\pm(0.1\% \text{ FS} + 1 \text{ }^{\circ}\text{C} + 0.1 \text{ digit})$
 - mV, V: $\pm(0.1\% \text{ FS} + 1 \text{ digit})$
 - mA: $\pm(0.1\% \text{ FS} + 1 \text{ digit})$
- Display accuracy maintaining range : $23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$
- Display resolution : Depends on measuring range and scaling (0.001, 0.01, 0.1, 1)
- Measured value display range : -10 to 110% of measuring range (accuracy is not guaranteed outside measuring range)
 - RTD input: 0.000 to 30.000 $^{\circ}\text{C}$ with a max. of 32.000 $^{\circ}\text{C}$
 - 0.00 to 300.00 $^{\circ}\text{C}$ with a max. of 320.00 $^{\circ}\text{C}$
 - For details, see Specifications Measuring Range Codes.
- Display updating cycle : 0.1 seconds

■ Setting

- Set value display : Both the setting items and parameters are displayed on the PV display.
- Setting method : By operating 5 keys (, , , , ) on the front panel
- Key Lock : OFF, 1–2 (3 level)
 - OFF: No key lock
 - 1: Only key lock screen and mode 0 screen group can be changed.
 - 2: Only key lock screen can be changed.

■ Input

- Input type : Selectable from multi-input (TC, Pt, mV), voltage (V) or current (mA)
- Multi-input
 - Thermocouple** : B, R, S, K, E, J, T, N, PLII, PR40-20, C(WRe5-26), L(DIN43710), U(DIN43710), AuFe-Cr
 - Input resistance : 500 k Ω minimum
 - External resistance tolerance : 100 Ω maximum
 - Burnout function : Standard feature (up scale)
 - Cold junction temperature compensation accuracy : $\pm 1.0 \text{ }^{\circ}\text{C}$ (18–28 $^{\circ}\text{C}$ of ambient temperature)
 - R.T.D.** : Pt100/JPt100, 3-wire type
 - Amperage : Approx. 1 mA
 - Lead wire tolerance range : 10 Ω maximum/wire (3 lead wires should have the same resistance.)
 - Voltage (mV)** : -10–10, 0–10, 0–20, 0–50, 10–50, 0–100, -100–100 mV DC
 - Input resistance : 500 k Ω minimum
- Voltage (V) input : -1–1, 0–1, 0–2, 0–5, 1–5, 0–10, -10–10 V DC
 - Input resistance : 500 k Ω minimum
- Current (mA) input : 0–20, 4–20 mA DC
 - Receiving impedance : 250 Ω
- Isolation : Not insulated from input and DI but insulated from others
- Input scaling function : Voltage mV, V, current mA range Scalable (Inverse scaling possible)
 - Scaling range : -9999–30000 digit
 - Span : 10–39999 digit
 - Position of decimal point : None, 0.0, 0.00, 0.000
- Sampling cycle : 0.1 seconds
- PV bias : -9999–10000 digit
- PV slope : 0.500–1.500 multiple
- PV filter : 0–100 sec. (filter off by 0 sec. setting)
- Isolation : Isolated except for input and DI

■ Alarm output (option)

- Number of output points : Selectable from a contact output 4 points (AL1, AL2, AL3, AL4) or c contact output 2 points (AL1, AL2)
- Alarm types : Selectable from the following 12 types for AL1 – AL4
The following 12 types can be assigned for each alarm.
None
Higher limit absolute value alarm (without latching function)
Higher limit absolute value alarm (with latching function)
Lower limit absolute value alarm (without latching function)
Lower limit absolute value alarm (with latching function)
Scaleover
Deviation higher limit value alarm (without latching function)
Deviation higher limit value alarm (with latching function)
Deviation lower limit value alarm (without latching function)
Deviation lower limit value alarm (with latching function)
Deviation higher/lower limit value alarm (without latching function)
Deviation higher/lower limit value alarm (with latching function)
- Alarm conditions : When AL1 is assigned to 'None' or 'Scale Over,' AL2 cannot be assigned to deviation.
When AL3 is set to 'None' or 'Scale Over,' AL4 cannot be assigned to deviation.
- Action method : ON-OFF action
- Hysteresis : 1–9999 digit
- Standby action : Configurable to either None or Enabled (upon Power-On)
- Output type/rating : 4a or 2c
Form A Contact: 240V AC, 2A (Resistive Load)
Form C Contact: 240V AC, 2.5A (Resistive Load)
- Output updating cycle : 0.1 second
- Alarm range :

Code	Name	Setting range	Initial value
HA	Higher limit absolute value alarm	Within measuring range	Measuring higher limit value
LA	Lower limit absolute value alarm	Within measuring range	Measuring lower limit value
HA_L	Higher limit absolute value alarm (with latching function)	Within measuring range	Measuring higher limit value
LA_L	Lower limit absolute value alarm (with latching function)	Within measuring range	Measuring lower limit value
So	Scaleover	----	----
dHi	Deviation higher limit value alarm	-9999–19999	19999 digit
dLo	Deviation lower limit value alarm	-9999–19999	-9999 digit
dHL	Deviation higher/lower limit value alarm	1–19999	19999 digit
dHi_L	Deviation higher limit value alarm (with latching function)	-9999–19999	19999 digit
dLo_L	Deviation lower limit value alarm (with latching function)	-9999–19999	-9999 digit
dHL_L	Deviation higher/lower limit value alarm (with latching function)	1–19999	19999 digit

- Latching function : Can be set on absolute value and deviation alarm
- Latch release : Possible by key operation, DI or communication
- Isolation : When in a contact, between AL1 and AL2, and between AL3 and AL4 are not insulated but insulated from others.
When in c contact, between AL1 and AL2 is insulated and insulated from others.

■ External control input (DI)

- Number of input points : 2 points
- Type of DI allocation : Selectable from the following 4 types for each DI
NON
HLD (hold): Maintain the current input value
RESET (reset): Reset maximum or minimum value
L_RS (unlatching)
- Action input : Non voltage contact or open collector (level action) Approx. 5V DC
- Input minimum holding time : 0.1 seconds
- Isolation : Not insulated between DI and input but insulated from others

■ Communication function (option) Exclusive selection with analog output

- Type of communication : RS-232C, RS-485
- Communication method : 2-line half duplex start-stop synchronization system
- Communication distance
 - RS-485 : Max. 500 m (differs according to conditions)
 - RS-232C : Max. 15 m
- Communication speed : 2400, 4800, 9600, 19200 bps
- Data format : Selectable from among 7E1, 7E2, 7N1, 7N2, 8E1, 8E2, 8N1, 8N2
- Communication delay time : 1–100 msec
- Max. number of connections
 - RS-485 : 32 including host
 - RS-232C : 1
- Communication address : 1–255
- Communication code : ASCII, MODBUS RTU binary code only
- Communication protocol : Shimaden standard protocol / MODBUS ASCII, RTU
- Other : Start character and BCC operating method can be selected.
- Communication memory mode : Selectable among EEPROM, RAM and E_R
- Isolation : Isolation for all

■ Analog output (optional) Communication function (option) and exclusive choice

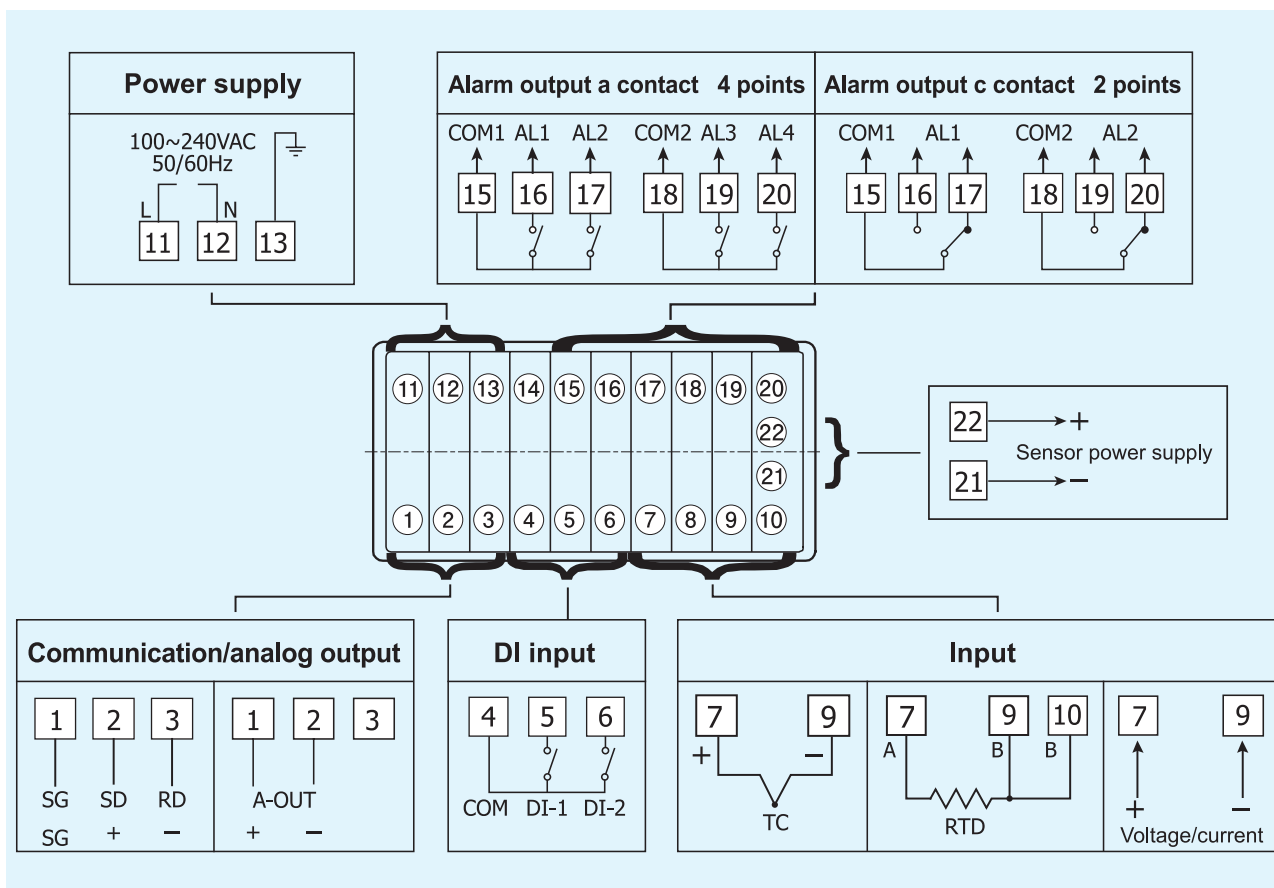
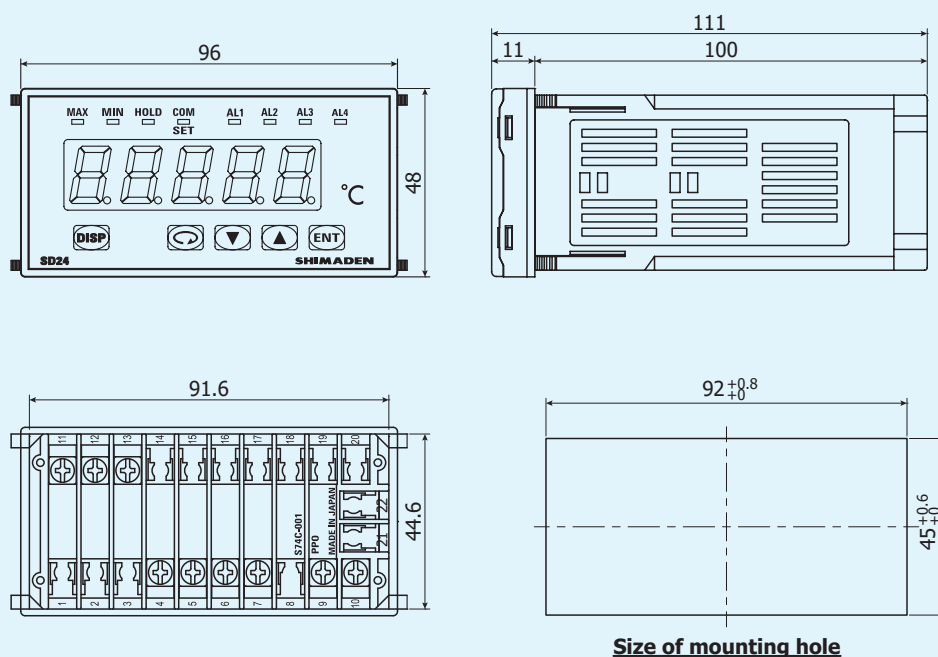
- Number of Outputs : 1 point
- Output type : Measured value
- Type : 0–10mV (output resistance 10Ω)
0–10V (max. load current 2mA)
4–20mA (max. load resistance 300Ω)
- Resolution : Approx. 0.008% (1/13000)
- Output accuracy : ±0.1%FS for display value
- Scaling : Within measuring range or output range (inverse scaling possible)
- Output updating cycle : 0.1 seconds
- Output selection on hold : Select whether to output the held input value or the current input value.
- Isolation : Isolation for all

■ Sensor power supply (option)

- Output rating : 24 V DC 50 mA (Two H71A/TH71A Series temperature/humidity sensors can be operated.)
- ON/OFF : Dependent on main body power supply
- Isolation : Isolation for all

■ General specifications

- Data storage : Non-volatile memory (EEPROM)
- Ambient conditions for operations
 - Temperature : -10–50 °C
 - Humidity : Max. 90% RH (no dew condensation)
 - Elevation : Max. 2000 m above sea level
 - Over voltage category : II
 - Pollution class : 2 (IEC60664)
- Storage temperature : -20–65 °C
- Supply voltage : 100–240 V AC±10%, 50/60 Hz
- Input/noise removal ratio : Normal mode minimum 50 dB (50/60 Hz)
Common mode minimum 120 dB (50/60 Hz)
- Insulation resistance : Between input/output terminals and power terminal Min. 500 V DC, 20MΩ
Between ground and power terminal Min. 500 V DC, 20 MΩ
- Dielectric strength : Between input/output terminals and power terminal 2300 V AC 1 minute
Between ground and power terminal 1500 V AC 1 minute
- Power consumption : Max. 13 VA for 100–240 V AC
- Applicable standards : Safety IEC61010-1 and EN61010-1
EN IEC 61010-2-030
EMC EN61326-1
RoHS directive supported
- Dust-proof and drip-proof structure : IP66 equivalent
- Material of case : PPE resin molding (flame resistant grade UL94V-1)
- External dimensions : H48×W96×D111 mm (in panel 100 mm)
- Panel thickness : 1.0–4.0 mm
- Panel cutout : H45×W92 mm
- Weight : 400 g maximum

TERMINAL ARRANGEMENT**EXTERNAL DIMENSIONS/PANEL CUTOUT**

Unit: mm

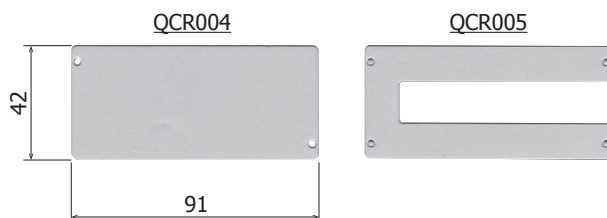
ORDERING INFORMATION

ITEM	CODE	SPECIFICATIONS	
SERIES	SD24-	DIN 48x96 Digital Indicator, DI 2 points	
INPUT	8	Universal-input Input resistance: 500 k Ω minimum • Thermocouple • R.T.D.: Pt100/JPt100 • Voltage (mV): -10-10, 0-10, 0-20, 0-50, 10-50, 0-100, -100-100 mV DC Input resistance: 500 k Ω minimum	Refer to "Measuring Range Codes" for details of input type and measuring range.
			Voltage mV, V, Current mA range Scaling Possible (inverse scaling possible) Range: -9999-30000 digit Span: 10-39999 digit
	6	Voltage (V) : -1-1, 0-1, 0-2, 0-5, 1-5, 0-10, -10-10 V DC Input resistance: 500 k Ω minimum	
	4	Current (mA) : 0-20, 4-20 mA DC Receiving impedance: 250 Ω	
POWER SUPPLY		90-	100-240V AC $\pm$ 10%, (50/60 Hz)
ALARM		0	None
		1	Individually set/output 4 points (a contact)
		2	Individually set/output 2 points (c contact)
ANALOG OUTPUT/ COMMUNICATION FUNCTION		00	None
		03	0-10 mV DC Output resistance: 10 Ω
		04	4-20 mA DC Resistive load: 300 Ω max.
		06	0-10 V DC Load current: 2 mA max.
		50	RS-485
		70	RS-232C
SENSOR DC POWER SUPPLY		0	Without
		1	With 24 V DC 50 mA
REMARKS		0	Without
		9	With

- Terminal cover (sold separately)

Model	Fixture
QCR004 (installed if the device is mounted alone)	Two screws of +B tight M2.3×6
QCR005 (installed if a plurality of SD24s and KR17s are mounted vertically)	Four screws of +B tight M2.3×6

Terminal cover dimensions



MEASURING RANGE CODES

		Input Type	Code	Measuring range	Measuring range (°F)
Universal-input	Thermocouple	B	01 *1	0.0 – 1800.0 °C	0 – 3300
		R	02	0.0 – 1700.0 °C	0 – 3100
		S	03	0.0 – 1700.0 °C	0 – 3100
		K1	04	–100.0 – 400.0 °C	–150.0 – 750.0
		K2	05	0.0 – 400.0 °C	0.0 – 750.0
		K3	06	0.0 – 800.0 °C	0.0 – 1500.0
		K4	07	0.0 – 1370.0 °C	0.0 – 2500.0
		K5	08 *2	–200.0 – 200.0 °C	–300.0 – 400.0
		E	09	0.0 – 700.0 °C	0.0 – 1300.0
		J	10	0.0 – 600.0 °C	0.0 – 1100.0
		T	11 *2	–200.0 – 200.0 °C	–300.0 – 400.0
		N	12	0.0 – 1300.0 °C	0.0 – 2300.0
		PLII	13	0.0 – 1300.0 °C	0.0 – 2300.0
		PR40-20	14 *3	0.0 – 1800.0 °C	0 – 3300
		C (WRe 5-26)	15	0.0 – 2300.0 °C	0 – 4200
		U	16	–200.0 – 200.0 °C	–300.0 – 400.0
		L	17	0.0 – 600.0 °C	0.0 – 1100.0
		K	18 *4	10.0–350.0 (K)	
		AuFe-Cr	19 *5	0.0–350.0 (K)	
	R.T.D.	Pt100	31 *6	–200.0 – 600.0 °C	–300.0 – 1100.0
			32	–100.00 – 100.00 °C	–150.0 – 200.0
			33	–100.0 – 300.0 °C	–150.0 – 600.0
			34	–60.00 – 40.00 °C	–80.00 – 100.00
			35	–50.00 – 50.00 °C	–60.00 – 120.00
			36	–40.00 – 60.00 °C	–40.00 – 140.00
			37	–20.00 – 80.00 °C	0.00 – 180.00
			38 *8	0.000 – 30.000 °C	0.00 – 80.00
			39	0.00 – 50.00 °C	0.00 – 120.00
			40	0.00 – 100.00 °C	0.00 – 200.00
			41	0.00 – 200.00 °C	0.0 – 400.0
			42 *9	0.00 – 300.00 °C	0.0 – 600.0
			43	0.0 – 300.0 °C	0.0 – 600.0
			44	0.0 – 500.0 °C	0.0 – 1000.0
		JPt100	45 *7	–200.0 – 500.0 °C	–300.0 – 900.0
			46	–100.00 – 100.00 °C	–150.0 – 200.0
			47	–100.0 – 300.0 °C	–150.0 – 600.0
			48	–60.00 – 40.00 °C	–80.00 – 100.0
			49	–50.00 – 50.00 °C	–60.00 – 120.00
			50	–40.00 – 60.00 °C	–40.00 – 140.00
			51	–20.00 – 80.00 °C	0.00 – 180.00
			52 *8	0.000 – 30.000 °C	0.00 – 80.00
			53	0.00 – 50.00 °C	0.00 – 120.00
			54	0.00 – 100.00 °C	0.00 – 200.00
			55	0.00 – 200.00 °C	0.0 – 400.0
			56 *9	0.00 – 300.00 °C	0.0 – 600.0
			57	0.0 – 300.0 °C	0.0 – 600.0
			58	0.0 – 500.0 °C	0.0 – 900.0
	Voltage (mV)	–10– 10 mV	71	Initial value: 0.00–100.00 Programmable Scaling Lower limit: -9999 Higher limit: 30000 (Span 10–39999 digit) (Inverse scaling possible) Scaleover is displayed for over 32000.	
		0– 10 mV	72		
		0– 20 mV	73		
		0– 50 mV	74		
		10– 50 mV	75		
		0–100 mV	76		
		–100–100 mV	77		
	Voltage (V)	–1– 1 V	81		
		0– 1 V	82		
		0– 2 V	83		
		0– 5 V	84		
		1– 5 V	85		
		0– 10 V	86		
		–10– 10 V	87		
	Current (mA)	0– 20 mA	94		
		4– 20 mA	95		

Thermocouple

- * 1. Thermocouple B: Accuracy guarantee not applicable to 400 °C or below
- * 2. Thermocouple K, T: -100 °C or below: Accuracy $\pm(0.5\% \text{ FS} + 1 \text{ digit})$
- * 3. Thermocouple PR 40-20 accuracy: Accuracy $\pm(0.3\% \text{ FS} + 1 \text{ digit})$
- * 4. Thermocouple K accuracy:

Below 30.0K	: $\pm(0.8\% \text{ FS} + 16\text{K} + 1 \text{ digit})$
30.0K or more-Below 70.0K	: $\pm(0.4\% \text{ FS} + 5.6\text{K} + 1 \text{ digit})$
70.0K or more-Below 170.0K	: $\pm(0.3\% \text{ FS} + 2.4\text{K} + 1 \text{ digit})$
170.0K or more-Below 270.0K	: $\pm(0.2\% \text{ FS} + 1.2\text{K} + 1 \text{ digit})$
270.0K or more	: $\pm(0.1\% \text{ FS} + 0.8\text{K} + 1 \text{ digit})$
- * 5. Thermocouple Metal-chromel (AuFe-Cr) (Kelvin) accuracy

Below 30.0K	: $\pm(0.3\% \text{ FS} + 2.4\text{K} + 1 \text{ digit})$
30.0K or more-Below 70.0K	: $\pm(0.2\% \text{ FS} + 1.2\text{K} + 1 \text{ digit})$
70.0K or more-Below 170.0K	: $\pm(0.1\% \text{ FS} + 1.0\text{K} + 1 \text{ digit})$
170.0K or more-Below 280.0K	: $\pm(0.1\% \text{ FS} + 0.8\text{K} + 1 \text{ digit})$
280.0K or more	: $\pm(0.2\% \text{ FS} + 0.8\text{K} + 1 \text{ digit})$

R.T.D.

- * 6. Measured value display range: -240.0–680.0 °C
- * 7. Measured value display range: -240.0–570.0 °C
- * 8. Scaleover is displayed for over 32.000.
- * 9. Scaleover is displayed for over 320.00.

voltage, Current

- *10. Exceeds 32000 digits, a scale over is displayed.

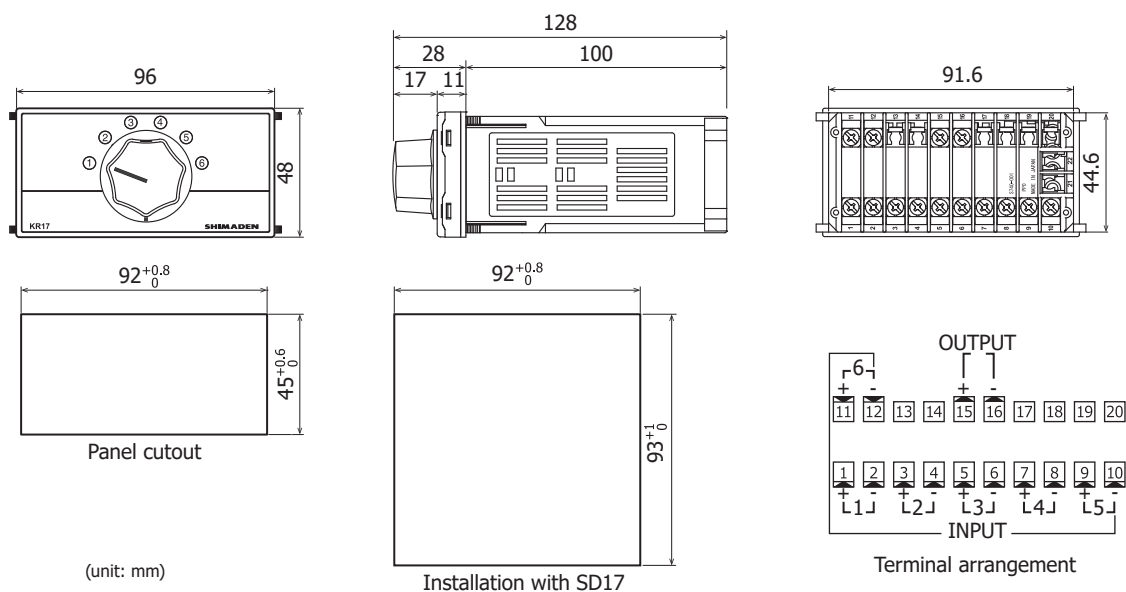
SPECIFICATIONS

■ No. of switching points	: 6
■ No. of switching circuits	: 2
■ Switching operation	: Rotary switching
■ Applicable signal	: Thermocouple, voltage (R.T.D. not supported)
■ Contact rating	: Contact method: Contact slide Current: Max. 100 mA DC Voltage: Max. 30 V DC Contact resistance: Max. 300mΩ
■ Operating ambient temperature range	: -10–50°C
■ Operating ambient humidity range	: 90%RH or less (no dew condensation)
■ Applicable standard	: EMC EN 61326-1 RoHS directive supported
■ Material	: PPE resin
■ Color	: Case: Munsell N1 equivalent Front side: Munsell N1 equivalent
■ External dimensions	: H48 × W96 × D128 mm (100 mm depth inside the mounting panel)
■ Panel cutout	: H45 × W92 mm
■ Installation	: One-touch mounting through panel cutout
■ Panel thickness	: 1.0–4.0 mm
■ Weight	: Approx. 250 g

ORDERING INFORMATION

ITEM	CODE	SPECIFICATIONS
SERIES	KR17-	Six-point rotary selector switch
REMARKS	0	Without
	9	With

TERMINALS, DIMENSIONS, AND PANEL CUTOUT



■ The contents of this material are subject to change without notice.



- * Be sure to follow the instruction manual when operating this device.
- * This device is designed for industrial use to control temperature, humidity and other physical values. Avoid using it for control of devices upon which human life is dependent.
- * If the possibility of loss or damage to your system or property as a result of failure of any parts of the process exists, proper safety measures must be made before the instrument is put into use so as to prevent the occurrence of trouble.

Head Office & Saitama Factory
ISO 9001/ISO14001 Certification Obtained

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