

°C	Series <b>SD16A &amp; KR16A</b>
%RH	
<b>SHIMADEN</b>	

# SHIMADEN DIGITAL INDICATORS



CE and C<sup>RU</sup> US approved

## BASIC FEATURES

- DIN Size 48 x 96 mm**
- ±0.3% High Accuracy Indication**
- Large 20 mm bright display**  
*Make reading from long distance and low light location easier*
- Multi-inputs & Multi-ranges**  
*User selectable Thermocouple, RTD, V, mV and Current inputs*  
*A 250Ω resistor is required across the input terminal for 4-20mA DC*
- Inverse scaling possible**  
*With voltage and current input signals, normal and inverse scaling is possible.*  
*Additionally, normal and inverse scaling is possible for the analog output signals.*
- Dust and splash proof front panel**  
*Equivalent to IP66*
- Wide range of optional features**  
*Alarms, analog output signals and communication interface*  
*(RS-232C or RS-485: MODBUS / Shimaden) available*  
*Sensor power supply 24V DC available*  
*A six-point selector switch, (the KR16A series), is available for combined use.*

**Display**

- ◆ Digital display : Process value (PV) 7 segment Red LED 4 digits (H: 20mm)
- ◆ Action display : 1 point of parameter display (SET) by green LED  
: 1 point of communication display (COM) by green LED  
: 2 points of alarm (AL1, AL2) by red LED
- ◆ Display accuracy :  $\pm(0.3\% \text{ FS} + 1 \text{ digit})$  within measuring range  
: Excluding cold junction temperature compensation accuracy in the case of thermocouple input  
:  $\pm 5\% \text{ FS}$  for temperature below 400 °C of thermocouple B  
: When the thermocouple [T, U] indication value is 0 - 100 °C, 0.5%FS and when it is below -100 °C, 1%FS
- ◆ Display accuracy range : 23 °C  $\pm 5$  °C (18 - 28 °C)
- ◆ Display resolution : Depends on measuring range (0.001, 0.01, 0.1, 1)
- ◆ Measured value display range : -10 - 110% of measuring range (Accuracy guaranteed for value is within measuring range only)  
: For R.T.D. input of -200 - 600 °C: 210 - 680 °C  
: For thermocouple [K] input of -199.9 - 800 °C: -273.1 - 900.0 °C
- ◆ Display update cycle : 0.25 - 5.00 seconds configurable (0.25 seconds step)  
When 0.5 second or more is set, there may occur a difference among the displayed value, the analog output and the communication data.

**Setting**

- ◆ Setting : By four (4) front key switches
- ◆ Setting range : Same as measuring range
- ◆ Setting protection : Keylock ON/OFF

**Input**

- ◆ Type of input : Three-type multiple input of Thermocouple, R.T.D., Voltage (mV, V)
- ◆ Thermocouple : B, R, S, K, E, J, T, N, {U, L (DIN 43710)}, WR5-26  
Refer to measuring range code table
- ◆ External resistance : 100  $\Omega$  max.
- ◆ Input impedance : 500 K $\Omega$  max.
- ◆ Burnout : Standard (Up-scale)
- ◆ Cold junction temperature compensation accuracy :  $\pm 1$  °C (18 - 28 °C range)  
:  $\pm 2$  °C (5 - 18 °C, 28 - 45 °C range)  
( $\pm 5$  °C to the negative side of measuring range in case of T and U input)
- ◆ R.T.D. : JIS Pt100  $\Omega$  3-wire type
- ◆ Amperage : Approx. 0.25mA
- ◆ Lead wire tolerable resistance : 5  $\Omega$  max. / wire (3 lead wire should have same resistance)  
When the resistance value of each wire is same  
0 - 5  $\Omega$ : 0.05 °C, 5 - 10  $\Omega$ : 0.2 °C, 10 - 20  $\Omega$ : 0.6 °C, 20 - 30  $\Omega$ : 1.4 °C max.
- ◆ Voltage (mV) : 0 - 10mV DC
- ◆ Voltage (V) : 0 - 5V, 1 - 5V, 0 - 10V DC
- ◆ Input impedance : 500 K $\Omega$  min.
- ◆ Current : 4 - 20mA DC
- ◆ Input impedance : 250  $\Omega$  [A shunt resistor needs to be connected to the terminal]
- ◆ Input scaling function : Scaling possible for voltage (mV, V) or current (mA) input and inverse scaling possible.
- ◆ Scaling range : -1999 - 9999 unit
- ◆ Span : 10 - 10000 unit
- ◆ Position of decimal point : 1, 0.1, 0.01, 0.001
- ◆ Sampling cycle : 0.25 seconds
- ◆ PV bias : -1999 - 2000 unit
- ◆ PV filter : 0 - 100 seconds (0 = without filter)
- ◆ Isolation : Isolated between input and analog output (sensor power supply), or between input and communication.  
Not isolated between input and system.

**Alarm output (option)**

- ◆ Number of alarm points : 2a (AL1 and AL2) for both normal open and common
- ◆ Alarm type : Selectable from combinations of the following 4 types  
: Higher limit absolute value (latching function)  
: Lower limit absolute value (latching function)
- ◆ Alarm setting range : Within measuring range or within full scaling range
- ◆ Alarm action : ON-OFF action
- ◆ Alarm sensitivity : 1 - 999 unit Within measuring range
- ◆ Alarm output / rating : Contact 1a (common) / 240V, AC1.5A (resistive load)
- ◆ Alarm output update cycle : 0.25 seconds

**Analog output (option) /**

**Not selectable with the sensor power supply**

- ◆ Analog output type : 0 - 10mV DC (output resistance: 10 Ω)  
: 0 - 10V DC (load current: 1mA max.)  
: 4 - 20mA DC (load resistance: 300 Ω max.)
- ◆ Output resolution : Approx. 1/14000
- ◆ Output accuracy : ±(0.3%FS + 1 digit) of display value
- ◆ Output scaling : Within measuring range or input scaling range (inverse scaling possible)
- ◆ Output update cycle : 0.25 seconds

**Communication (option)**

- ◆ Communication type : RS-232C, RS-485
- ◆ Communication system : Half duplex start-stop synchronized system
- ◆ Communication speed : 1200, 2400, 4800, 9600, 19200 bps
- ◆ Data bit length : 7 bit even parity 1 stop bit  
8 bit non parity 1 stop bit
- ◆ Data format : 7E1, 7E2, 7N1, 7N2, 8E1, 8E2, 8N1, 8N2
- ◆ Communication address : 1 - 100
- ◆ Multi-drop connection : 31 max. (with RS-485)
- ◆ Communication delay : 1 - 100 milli-seconds
- ◆ Communication protocol : Shimaden standard protocol, MODBUS ASCII, MODBUS RTU
- ◆ Communication code : Shimaden standard protocol: ASCII  
MODBUS ASCII: ASCII  
MODBUS RTU: binary
- ◆ Others : Start character and BCC operation method can be selected for Shimaden standard protocol.

**Sensor power supply (option)**

- ◆ Output rating : 24V±3V DC 25mA max.
- ◆ ON/OFF : Depending upon instrument's power ON-OFF status.
- ◆ Restrictions : Sensor power supply can't be selected when the analog output is selected. Sensor power supply can't be selected when the power supply 24V is selected.

**Others**

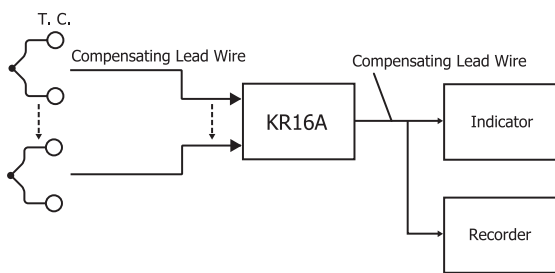
- ◆ Data storage : By non volatile memory (EEPROM)
- ◆ Ambient conditions for use : -10 - 50 °C/90%RH max. (on condition that there is no dew condition)
- ◆ Height : 2000m above sea level or lower
- ◆ Installation category : Category II
- ◆ Degree of pollution : Degree 2
- ◆ Power supply voltage : 100 - 240V AC±10%, 50/60Hz  
24V AC (50/60Hz) /DC±10% (option)
- ◆ Power consumption : 11VA (100~240V AC), 7VA (24V AC), 5W (24V DC)
- ◆ Applicable standard : IEC61010-1, EN61010-1
- ◆ Safety : EN61326:1997+A1:1998, A2:2001, A3:2003
- ◆ EMC : EMC testing display accuracy ±3%FS
- ◆ Dust proof/Drip proof : IP66 (Complies with the IEC 529-IP66)
- ◆ Insulation resistance : Between input/output terminal and power supply terminal:  
500V DC 20 MΩ minimum  
: Between input/output terminal and protective conductor terminal  
500V DC 20 MΩ minimum
- ◆ Dielectric strength : Between all input/output terminals and power terminal:  
2300V AC for one minute (faradic current 1mA)  
: Between power terminal and ground terminal:  
1500V AC for one minute (faradic current 1mA)
- ◆ Case material : PPO resin molding (equivalent to UL94V-1)
- ◆ External dimensions : H48 x W96 x D110 mm
- ◆ Mounting : Push-in panel (one-touch mount)
- ◆ Panel thickness : 1.0~4.0 mm
- ◆ Panel cutout : H45 x W92 mm
- ◆ Weight : Approx. 250g

**Selector KR16A series**

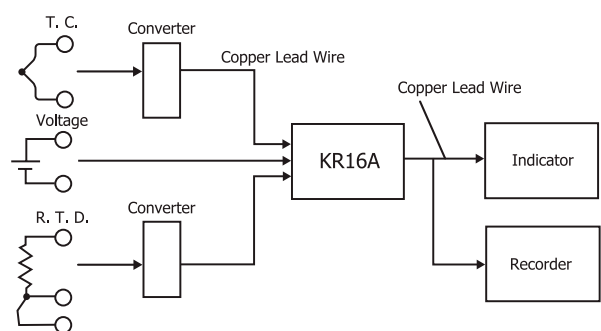
- ◆ No of switching points : 6
- ◆ No of switching circuits : 2
- ◆ Switching operation : Rotary switching
- ◆ Applicable signal : Thermocouples, voltage (R.T.D. not applicable)
- ◆ Contact rating
- Contact method : Slide type
- Voltage : 30V DC Maximum
- Current : 100mA DC maximum
- Contact resistance : 300m Ω maximum
- ◆ Ambient temperature/humidity range conditions for operation : -10 - +50 °C / 90% RH maximum (no dew condensation)
- ◆ Material : Resin molding
- ◆ Color
- Front and case : Mansel value N1 equivalent
- ◆ External dimensions : H48 x W96 x D118mm (in panel 100mm)
- ◆ Panel cutout : H45 x W92 mm
- ◆ Mounting : Flush in panel (snap-in)
- ◆ Panel thickness : 1 - 4mm
- ◆ Weight : Approx. 250g

**APPLICATION EXAMPLE**

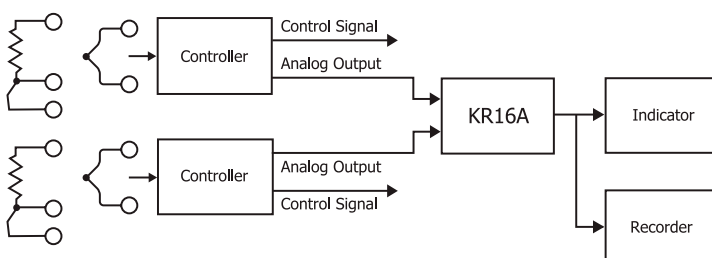
**1. Selection of T. C. Switching**



**2. Selection of Voltage Switching**



**3. Selection of Analog Output (Voltage)**



**4. Installation Example With SD16A**



# ORDERING INFORMATION

Series **SD16A**

ITEM	CODE		SPECIFICATIONS	
1. SERIES	SD16A -		Digital Indicator DIN Size 48 × 96 mm	
2. INPUT (Note 1)	8		Universal-input <ul style="list-style-type: none"> <li>• Thermocouple</li> <li>• R.T.D. (Pt100, JPt100)</li> <li>• Voltage (Input impedance 500 kΩ min.)</li> <li>• 0 - 10mV DC</li> <li>• 0 - 5, 1 - 5, 0 - 10V DC</li> </ul>	Refer to "4. Measuring range code table" for details. In case voltage input, scaling/reverse scaling is available. (Note 2)
		4	Current 4 - 20mA DC An external receiving resistor is provided.	
3. POWER SUPPLY	90 -		100 - 240 V AC±10% (50/60 Hz)	
	08 -		24V AC ±10% (50/60Hz) / 24V DC±10% (Note: 2)	
4. ALARM OUTPUT (OPTION)	0		None	
	1		Separate setting/separate output 2-point (a-contact, "COM" used commonly) Contact rating 240V AC 1.5A/resistive load	
5. ANALOG OUTPUT (OPTION)OR SENSOR POWER SUPPLY (Note:3)	0		None	
	3		0 - 10mV DC Output resistance: 10 Ω	Scaling/reverse scaling available (Within measuring range)
	4		4 - 20mA DC Load resistance: 300 Ω max.	
	6		0 - 10V DC Load resistance: 1mA max.	
8		Sensor power supply 24V DC 25mA max. (Note:3)		
6. COMMUNICATION FUNCTION (OPTION)	0		None	
	5		RS-485 Shimaden standard protocol/MODBUS (RTU/ASCII) communication protocol	
	7		RS-232C Shimaden standard protocol/MODBUS (RTU/ASCII) communication protocol	
7. REMARKS	0		Without	
	9		With (Please consult before ordering)	

Note 1 The instrument supports full universal input; however please select one of two codes, as an external receiving resistor (250Ω) is supplied for current input. If no external receiving resistor is required, a code 8 specification product can be used for current input.

Note 2 Scaling range: -1999 ~ 9999 Unit  
Span: 10 ~ 10000 Unit

Note 3 When the 08 power supply code (24V AC/DC) is selected, the sensor power supply cannot be selected.

# MEASURING RANGE CODES

INPUT	TYPE	CODE	RANGE (°C)	RANGE (°F)
THERMOCOUPLE	B	01	0 - 1800	0 - 3300
	R	02	0 - 1700	0 - 3100
	S	03	0 - 1700	0 - 3100
	K	04	-199.9 - 800.0	-300 - 1500
	K	05	0 - 1200	0 - 2200
	E	06	0 - 700	0 - 1300
	J	07	0 - 600	0 - 1100
	T	08	-199.9 - 300.0	-300 - 600
	N	09	0 - 1300	0 - 2300
	*1 U	10	-199.9 - 300.0	-300 - 600
	*1 L	11	0 - 600	0 - 1100
	*2 WRe5-26	12	0 - 2300	0 - 4200
R.T.D.	Pt	31	-199.9 - 600.0	-300 - 1100
		32	-100.0 - 100.0	-150.0 - 200.0
	JPt	* 33	-199.9 - 500.0	-300 - 1000
		* 34	-100.0 - 100.0	-150.0 - 200.0
VOLTAGE	0-10mV	71	Initial value: 0.0 - 100.0 Scaling possible (Inverse scaling possible)	Thermocouple B, R, S, K, E, J, T, N: JIS/ANSI/IEC *1 Thermocouple U, L: DIN 43710 *2 Thermocouple WRe5-26: Made of Hoskins
	0- 5V	81		
	1- 5V	82		
CURRENT	0-10V	83	Scaling setting range: -1999 - 9999 Span: 10 - 10000 unit	
	4-20mA	95		

Factory Setting:

Universal-Input K: 0 - 1200 °C  
Current Input 4 - 20mA 0.0 - 100.0 (Without unit)

\* Scaleover occurs at -240.0 °C at Pt (Code 31) or JPt (Code 33).

Thermocouple T, U: Accuracy = ±0.5%FS for -100 - 0 °C  
±1%FS for -100 °C or less

Any decimal position shown in the measuring ranges of thermocouple and R.T.D. inputs may be concealed.

Thermocouple B: Accuracy = ±5%FS for 400 °C or less

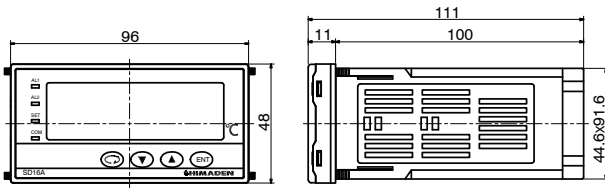
# ORDERING INFORMATION

Series **KR16A**

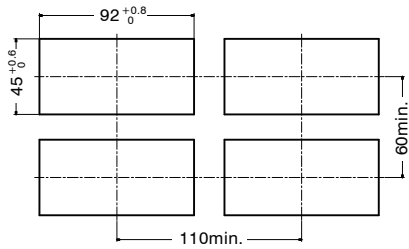
ITEMS	CODE		SPECIFICATIONS
SERIES	KR16A -		Rotary type 6points selector switch
REMARKS	0		Without
	9		With (Please consult before ordering.)

## ● SD16A

### External Dimensions

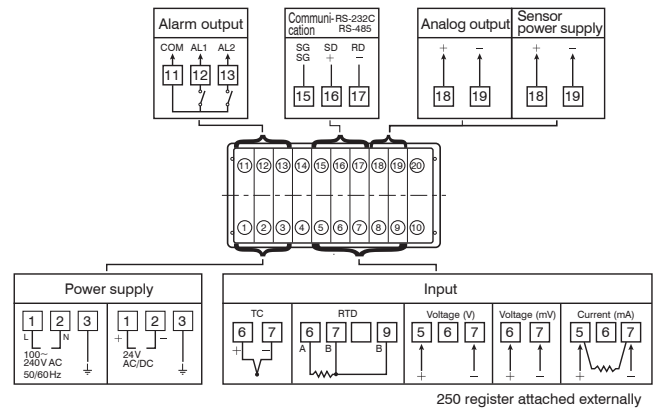


### Panel Cutout



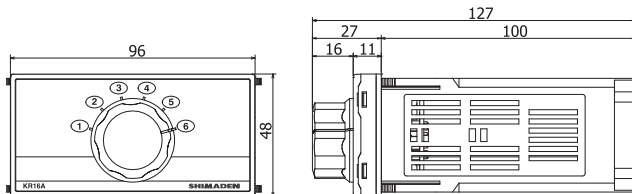
(Unit : mm)

### Terminal Arrangement

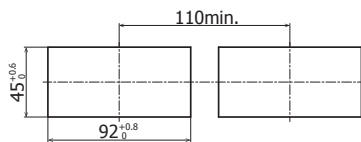


## ● KR16A

### External Dimensions

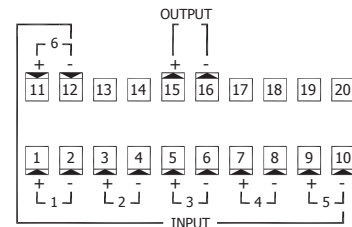


### Panel Cutout



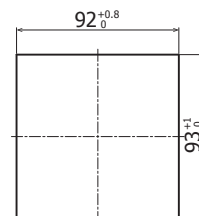
(Unit : mm)

### Terminal Arrangement



### Panel Cutout

In case installed with SD16A



(Unit : mm)

### ⚠ Warning

\* The SD16A & KR16A series is designed for the control of temperature, humidity and other physical values of general industrial equipment. (It is not to be used for any purpose which regulates the prevention of serious effects on human life or safety.)

### ⚠

\* If the possibility of loss or damage to your system or property as a result of failure of any part 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.



The contents of this manual are subject to change without notice.

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