

Super-mini Signal Conditioners *Mini-M Series*

UNIVERSAL TRANSMITTER
(PC programmable; Modbus-RTU communication)

MODEL **M2XUM**

MODEL & SUFFIX CODE SELECTION

M2XUM-□□-□□

MODEL _____
INPUT _____
0 : User-calibrated (Factory default: 4 – 20mA)

If the unit is to be factory-calibrated to a specific input type, please select from the following:

DC mV, V, mA

- Z1** : Range 0 – 50mA DC
- S1** : Range -1 – +1V DC
- S2** : Range -10 – +10V DC

THERMOCOUPLE

- T1** : (PR) **T8** : S
- T2** : K (CA) **T9** : C (WRe 5-26)
- T3** : E (CRC) **TN** : N
- T4** : J (IC) **TU** : U
- T5** : T (CC) **TL** : L
- T6** : B (RH) **TP** : Platinel II
- T7** : R **T0** : Specify

RTD (2- or 3-wire)

- R1** : JPt 100 (JIS '89) **R6** : Ni 508.4Ω
- R3** : Pt 100 (JIS '89) **R7** : Pt 1000
- R4** : Pt 100
(JIS '97, DIN, IEC751) **R8** : Ni 100 (100Ω @0°C)
- R5** : Pt 50Ω (JIS '81) **R9** : Cu 10 (10Ω @25°C)
- R0** : Specify

POTENTIOMETER

- M** : Total resistance 100Ω – 10kΩ

OUTPUT

0 : User-calibrated (Factory default: 4 – 20mA)

If the unit is to be factory-calibrated to a specific output type, please select from the following:

Current

- Z1** : Range 0 – 20mA DC

Voltage

- V1** : Range -2.5 – +2.5V DC
- V2** : Range -10 – +10V DC

POWER INPUT

- M2** : 100 – 240V AC **R** : 24V DC
- P** : 110V DC

STANDARDS & APPROVALS

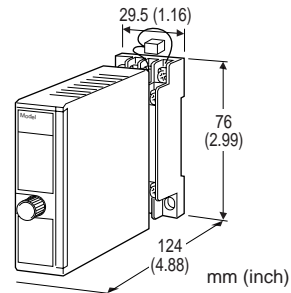
- /N : Without CE
- /CE: CE marking

ORDERING INFORMATION

Non-specified orders will be shipped at default factory settings (M2XUM-00: 4 – 20mA input/4 – 20mA output). However, a power suffix code **must** be specified. If you specify a full code number without specific calibration ranges, default settings (table to the right) will be used.

Ordering example:

- Code number (e.g. M2XUM-00-M2/CE)



Functions & Features

- Accepts direct inputs from various sensors and provides a standard process signal
- I/O types and calibration ranges are fully programmable via a PC
- Linearization up to 100 points can be programmed for DC and potentiometer inputs
- Wide environmental temperature range
- Isolation between input – output – RS-485 – power
- CE marking

Typical Applications

- Signal conversion between control room and field instrumentation with isolation
- Ideal for use as a fast solution, multifunctional spare part

INPUT CODE	DEFAULT
Z1	4 – 20mA DC
S1	0 – 100mV DC
S2	1 – 5V DC
T1	PR 0 – 1600°C
T2	K 0 – 1000°C
T3	E 0 – 500°C
T4	J 0 – 500°C
T5	T 0 – 300°C
T6	B 0 – 1800°C
T7	R 0 – 1600°C
T8	S 0 – 1600°C
T9	C (WRe 5-26) 0 – 2000°C
TN	N 0 – 1000°C
TU	U 0 – 300°C
TL	L 0 – 500°C
TP	Platinel II 0 – 1200°C
R1	JPt 100 0 – 100°C
R3	Pt 100 0 – 100°C
R4	Pt 100 0 – 100°C
R5	Pt 50Ω 0 – 200°C
R6	Ni 508.4Ω 0 – 100°C
R7	Pt 1000 0 – 100°C
R8	Ni 100 0 – 100°C
R9	Cu 10 0 – 100°C
M	100Ω – 10kΩ
OUTPUT CODE	DEFAULT
Z1	4 – 20mA DC
V1	0 – 1V DC
V2	1 – 5V DC

RELATED PRODUCTS

- JX configurator connection kit (model: JXCON)

GENERAL SPECIFICATIONS

Construction: Plug-in

Connection: M3 screw terminals (torque 0.8 N·m)

Housing material: Flame-resistant resin (black)

Isolation: input to output to power

Overrange output: approx. -15 – +115%
(Negative current output is not provided.)

Manual zero/span adjustments: See Front View.

Programming: PC programmable features include:

- T/C and RTD type and temp. range
- Linearization table
- Input and output ranges
- Zero and span adjustments
- Simulated output

Burnout protection (T/C, RTD and Pot.): Upscale standard; downscale or no burnout options are PC programmable

Linearization (DC, T/C and RTD)

DC: 100 points max. within the range of -15 – +115% input or output; specified in % of of full-scale (No table setting is done at shipping. [gain = 1])

T/C, RTD: Standard tables stored in memory

Cold Junction Compensation (T/C): CJC sensor (included) to be attached to the input terminals

Status indicator LED: Flashing patterns indicate operation status of the transmitter.

Configurator connection: 2.5 dia. miniature jack; RS-232C level

MODBUS COMMUNICATION

Standard: Conforms to RS-485, EIA

Transmission distance: 500 meters max.

Baud rate: 38.4 kbps max.

Communication: Half-duplex, asynchronous, no procedure

Protocol: Modbus RTU

Refer to Modbus Protocol Reference Guide (EM-5650) for detailed explanations about supported functions.

Transmission media: Shielded twisted-pair cable (CPEV-S 0.9 dia.)

INPUT**■DC mV, V & mA****•DC Current**

Input range: 0 – 50mA DC; shunt resistor (included) to be attached to the input terminals (100Ω, 0.5W)

Operational range: 0 – 70mA DC (100Ω, 0.5W)

Minimum span: 2mA

Offset: Lower range can be any specific value within the input range provided that the minimum span is maintained.

•DC Voltage

Input range: -10 – +10V DC

Operational range: -11.5 – +11.5V DC

Minimum span: 10mV for S1; 100mV for S2

Offset: Lower range can be any specific value within the input range provided that the minimum span is maintained.

■THERMOCOUPLE

Input resistance: 1MΩ minimum

Burnout sensing: 45nA ±10%

Offset: Lower range can be any specific value within the input range provided that the minimum span is maintained.

Temperature range

T/C	USABLE RANGE	
	°C	°F
(PR)	0 to 1760	32 to 3200
K (CA)*	-270 to +1370	-454 to +2498
E (CRC)*	-270 to +1000	-454 to +1832
J (IC)	-210 to +1200	-346 to +2192
T (CC)*	-270 to +400	-454 to +752
B (RH)*	0 to 1820	32 to 3308
R*	-50 to +1760	-58 to +3200
S*	-50 to +1760	-58 to +3200
C (WRe 5-26)	0 to 2315	32 to 4199
N*	-270 to +1300	-454 to +2372
U	-200 to +400	-328 to +752
L	-200 to +900	-328 to +1652
P (Platinel II)	0 to 1395	32 to 2543

*The transmitter may not satisfy specified accuracy for temperature ranges near the lower limits of the usable range. For more details, consult M-System.

RTD (2- or 3-wire)**Maximum leadwire resistance:** 200Ω per wire (3-wire)**Sensing current:** ≤1.0mA**Temperature range**

RTD	USABLE RANGE	
	°C	°F
JPt 100 (JIS '89)	-200 to +500	-328 to +932
Pt 100 (JIS '89)	-200 to +850	-328 to +1562
Pt 100 (JIS '97/DIN/IEC)	-200 to +850	-328 to +1562
Pt 50Ω (JIS '81)	-200 to +649	-328 to +1200
Ni 508.4Ω	-50 to +200	-58 to +392
Pt 1000	-200 to +200	-328 to +392
Ni 100	-50 to +200	-58 to +392
Cu 10	-50 to +200	-58 to +392

POTENTIOMETER: 100Ω – 10kΩ**Minimum span**

0 – 100Ω	: 2.5Ω
0 – 300Ω	: 3.0Ω
0 – 1000Ω	: 10Ω
0 – 10kΩ	: 10Ω

Excitation: ≤0.5V DC at 1kΩ**OUTPUT****DC CURRENT:** 0 – 20mA DC**Operational range:** 0 – 24mA DC**Minimum span:** 1mA**Offset:** Lower range can be any specific value within the input range provided that the minimum span is maintained.**Load resistance:** Output drive 15V maximum
(e.g. 4 – 20mA: 750Ω [15V/20mA])**DC VOLTAGE:** -2.5 – +2.5V DC for V1;
-10 – +10V DC for V2**Operational range:** -3 – +3V DC for V1;
-11.5 – +11.5V DC for V2**Minimum span:** 250mV for V1; 1V for V2**Offset:** Lower range can be any specific value within the input range provided that the minimum span is maintained.**Load resistance:** Output drive 1mA maximum
(e.g. 1 – 5V: 5000Ω [5V/1mA])**INSTALLATION****Power input****AC:** Operational voltage range 85 – 264V;
47 – 66 Hz, approx. 6VA**DC:** Operational voltage range for R: 24V
±10% or P: 85 – 150V;
approx. 3W (ripple 10% p-p max.)**Operating temperature:** -30 to +60°C (-22 to +140°F)**Operating humidity:** 30 to 90% RH (non-condensing)**Mounting:** surface or DIN rail**Dimensions:** W29.5×H81×D124 mm (1.16"×3.19"×4.88")**Weight:** 120 g (0.26 lbs)**PERFORMANCE****Accuracy:** input accuracy + output accuracy**Input accuracy**:** (% of input range)

(DC)	-1 – +1V	: ≤ ±0.02 (%)
	-10 – +10V	: ≤ ±0.02
	0 – 50mA	: ≤ ±0.02***
(T/C)	(PR)	: ≤ ±0.08
	K (CA)	: ≤ ±0.02
	E (CRC)	: ≤ ±0.02
	J (IC)	: ≤ ±0.04
	T (CC)	: ≤ ±0.06
	B (RH)	: ≤ ±0.12
	R	: ≤ ±0.08
	S	: ≤ ±0.08
	C (WRe 5-26)	: ≤ ±0.04
	N	: ≤ ±0.04
	U	: ≤ ±0.04
	L	: ≤ ±0.04
	P (Platinel II)	: ≤ ±0.04
(RTD)	JPt 100 (JIS '89)	: ≤ ±0.04
	Pt 100 (JIS '89)	: ≤ ±0.03
	Pt 100 (JIS '97/DIN/IEC751)	: ≤ ±0.03
	Pt 50Ω (JIS '81)	: ≤ ±0.04
	Ni 508.4Ω	: ≤ ±0.05
	Pt 1000	: ≤ ±0.08
	Ni 100	: ≤ ±0.14
	Cu 10	: ≤ ±0.6
(Pot.)	0 – 100Ω	: ≤ ±0.08
	0 – 300Ω	: ≤ ±0.04
	0 – 1000Ω	: ≤ ±0.04
	0 – 10kΩ	: ≤ ±0.04

Output accuracy:** ≤ ±0.02% of output range

**Inversely proportional to span.

[e.g.] Input accuracy at 1 – 5V:

$$\frac{\text{Code S2 Range (20V)}}{\text{Input Span (4V)}} \times \text{Input Accuracy } (\pm 0.02\%) = \pm 0.1\%$$

***Not including input resistor error.

Cold junction compensation error: ±0.4°C or ±0.7°F
maximum (at 20°C ±10°C or 68°F ±18°F)**Temp. coefficient**

(at -5 to +55°C [23 to 131°F] of I/O range)

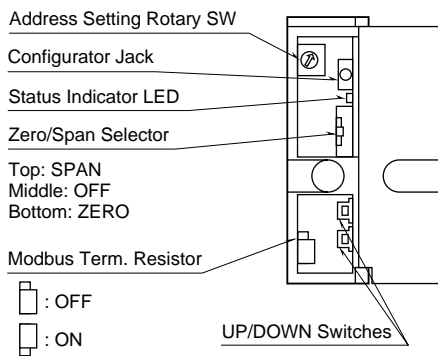
Input: ±0.016%/°C (±0.009%/°F) with current
±0.004%/°C (±0.002%/°F) with voltage
±0.004%/°C (±0.002%/°F) with T/C
±0.004%/°C (±0.002%/°F) with RTD
±0.004%/°C (±0.002%/°F) with Pot.**Output:** ±0.013%/°C (±0.007%/°F)**Response time:** ≤0.5 seconds (0 – 90%) with current
≤0.5 seconds (0 – 90%) with voltage
≤1.5 seconds (0 – 90%) with T/C
≤0.9 seconds (0 – 90%) with RTD
≤0.9 seconds (0 – 90%) with Pot.**Burnout response:** ≤10 seconds**Line voltage effect:** ±0.1% over voltage range**Insulation resistance:** ≥100MΩ with 500V DC**Dielectric strength:** 2000V AC @1 minute
(input to output to power to ground)

STANDARDS & APPROVALS

CE conformity: EMC Directive (89/336/EEC)
 EMI EN61000-6-4
 EMS EN61000-6-2
 Low Voltage Directive (73/23/EEC)
 Installation category II
 Pollution degree 2
 Max. operating voltage 300V
 Input or output to power – Reinforced insulation
 Input to output – Basic insulation

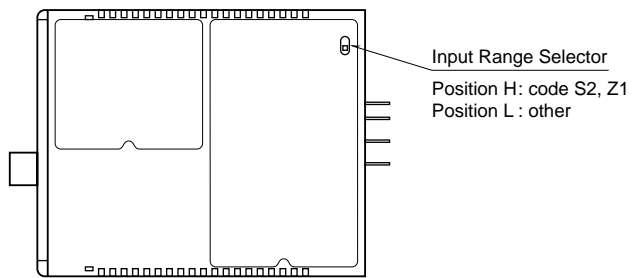
FRONT & SIDE VIEWS

■ **FRONT VIEW (with cover open)**



The front cover cannot be opened to 180 deg. when flush with neighboring units.

■ **RIGHT SIDE VIEW**



Manual zero/span adjustments: $\pm 5\%$ (set to 0% and 100% respectively at factory)

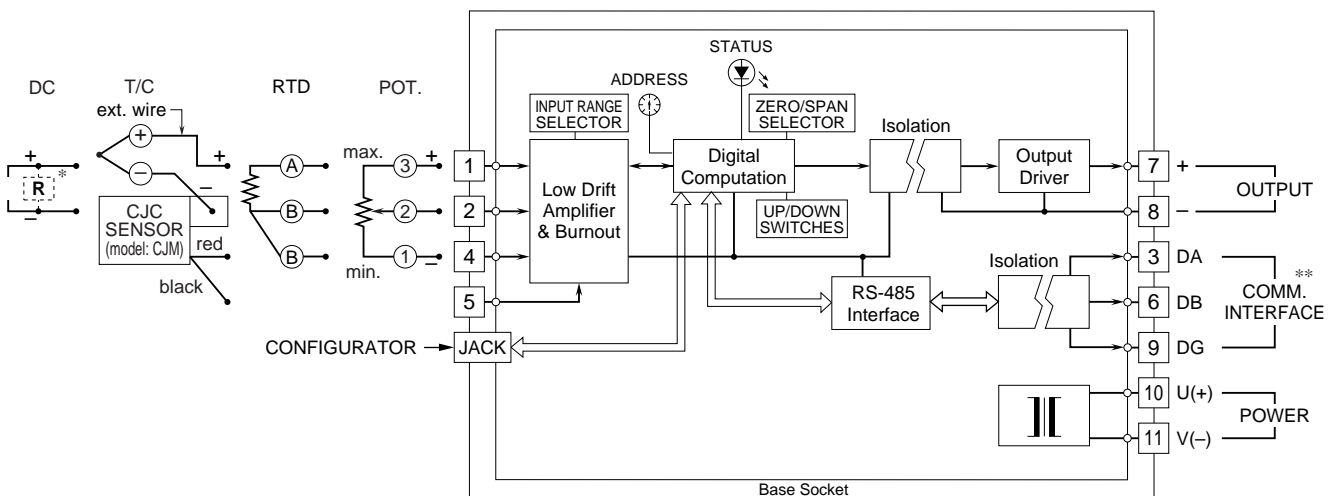
Zero/Span selector

- ZERO:** UP/DOWN switches enabled to access zero adjustment.
- OFF:** UP/DOWN switches disabled.
- SPAN:** UP/DOWN switches enabled to access span adjustment.

UP/DOWN switches

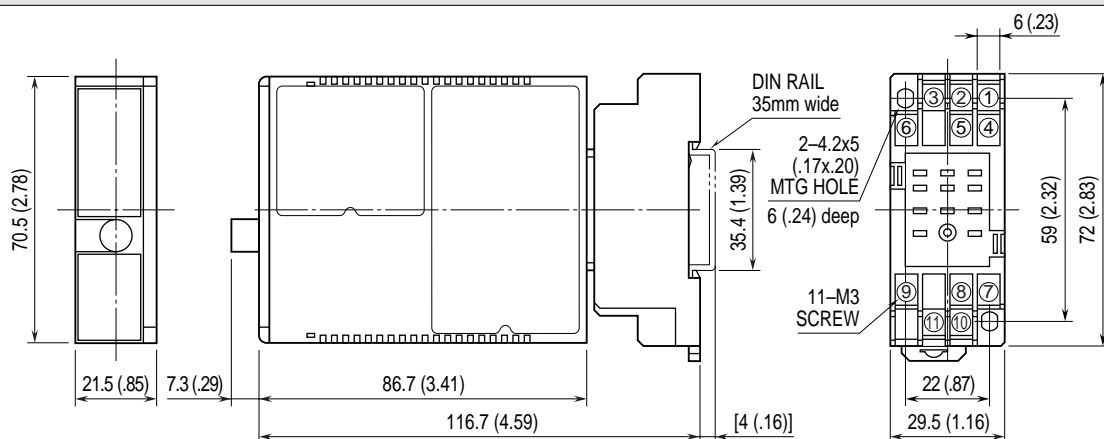
- UP:** Pressing UP increases adjusted values.
 - DOWN:** Pressing DOWN decreases adjusted values.
- (Press both switches at once to rest zero/span adjustments.)

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



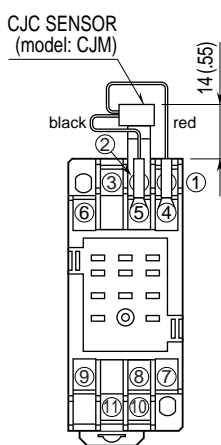
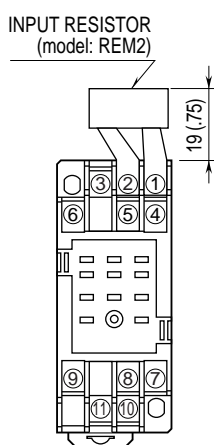
* Input shunt resistor attached for current input.
 **When the module is at the end of RS-485 transmission line, turn on the Modbus terminating resistor located behind the front cover, off when it is not.

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS mm (inch)



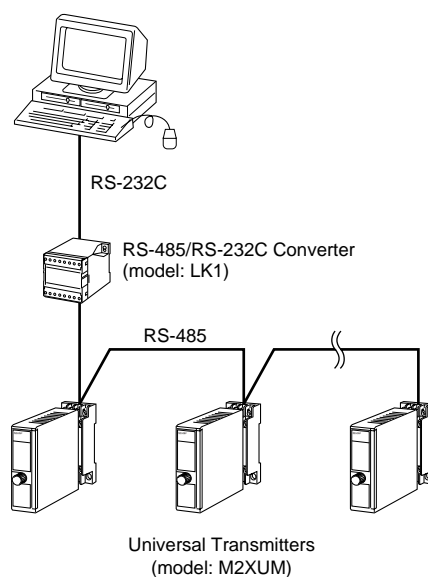
•When mounting, no extra space is needed between units.

TERMINAL ASSIGNMENTS mm (inch)



Use the input resistor (model: REM2) for a DC current input, and the CJC sensor (model: CJM) for a thermocouple input, both included in the package.

SYSTEM CONFIGURATION EXAMPLE



Modbus FUNCTION CODES & SUPPORTED CODES

■Communication Parameters

PARAMETERS	SPECIFICATIONS	DEFAULT	MODIFICATION
Transmission Mode	RTU	RTU	Not modifiable
Transmission Speed	9600 / 19200 / 38400 bps	38400 bps	JXCON Software
Parity	None / Odd / Even	Odd	JXCON Software
Bit Length	8	8	Not modifiable
Stop Bit	1	1	Not modifiable
Node Addresses	1 to 247	1	Hardware Rotary SW for 1 through 16, JXCON Software for 16 through 247 (Rotary SW set to 0).
Floating Point Data	Normal / Swapped	Normal	JXCON Software
Physical Layer	RS-485	RS-485	Not modifiable

■Function Codes

CODE	NAME *1	NOTES
01 (0X01)	Read Coil Status	Reading DO
02 (0X02)	Read Input Status	Reading DI
03 (0X03)	Read Holding Register	
04 (0X04)	Read Input Register	
05 (0X05)	Force Single Coil	Writing single DO
06 (0X06)	Preset Single Register	
15 (0X0F)	Force Multiple Coils	Writing multiple DO
16 (0X10)	Force Multiple Registers	

*1 : Based upon Modbus Protocol Reference Guide PI-MBUS-300

■Data Addresses

	ADDRESS	DATA FORMAT	NAME	
Coil (0X)	1 – 16		DO (internal switch)	
	17		Operation Mode SW (0 : Programming Mode, 1 : Run Mode)	
	18		Cold junction compensation SW (0 : Disable, 1 : Enable) *2	
	19		Linearization SW (0 : Disable, 1 : Enable) *3	
	23		Remote output mode SW (0 : Local, 1 : Remote)	
Input Status (1X)	1 – 16		DI (internal switch)	
	17		Input data error (0 : Normal, 1 : Error)	
Input Register (3X)	1 – 2	F	AI in %	
	3 – 4	F	AI in engineering unit	
	5 – 6	F	Cold junction temperature (°C, °F or K) *2	
	7	I	AI in % *4	
	8	I	Bit	Status Description
			0 – 3	Reserved for system's use
			4	1 : ADC Channel 1 Overrange
			5	1 : ADC Channel 2 Overrange
6			1 : Burnout Detected	
7	1 : ADC Hardware Error Detected			
8 – 15	Reserved for system's use			
129 – 144	B16	Model No. "M2XUM"		
Holding Register (4X)	1 – 2	F	AO in % *5	
	3	I	AO in % *4, *5	
	4	I	Input type No. *6	
	5	I	Temperature unit (3 : °C, 4 : °F, 5 : K) *7	
	6	I	Burnout type (0 : No Burnout, 1 : Downscale, 2: Upscale)	
	7	I	(Reserved)	
	8	I	#1 output type No. (0 : 0 – 20mA, 1 : ±2.5V, 2 : ±10V) *6	
	9 – 10	I	(Reserved, integer)	
	17 – 18	F	Input 100% scaled value	
	19 – 20	F	Input 0% scaled value	
	21 – 22	F	Output 100% scaled value (V or A)	
	23 – 24	F	Output 0% scaled value (V or A)	
	25 – 28	F	(Reserved, 32-bit floating)	
29 – 33	B10	Tag No.		

I = 16-bit integer, F = 32-bit floating, Bn = n-byte character

*2 : Thermocouple input

*3 : DC and Potentiometer input

*4 : 0 – 100% converted into 0 – 20000

*5 : Remote Output Mode SW automatically turned ON when reading

*6 : Be sure to scale 0% and 100% after the input type has been changed.

*7 : Thermocouple and RTD input

■Input Type & Type No.

I/O	I/O Type	Selection	Usable Range	Notes
DC input	0	0 – 50 mA	0 – 50 mA	
	1	-1 – 1 V	-1 – 1 V	
	2	-10 – 10 V	-10 – 10 V	
T/C input	16	(PR)	0 – 1760 °C	
	17	K (CA)	-270 – 1370 °C	
	18	E (CRC)	-270 – 1000 °C	
	19	J (IC)	-210 – 1200 °C	
	20	T (CC)	-270 – 400 °C	
	21	B (RH)	0 – 1820 °C	
	22	R	-50 – 1760 °C	
	23	S	-50 – 1760 °C	
	24	C (WRe 5-26)	0 – 2315 °C	
	25	N	-270 – 1300 °C	
	26	U	-200 – 400 °C	
	27	L	-200 – 900 °C	
	28	P (Platinel II)	0 – 1395 °C	
RTD input	29	User's T/C		
	32	JPt 100 (JIS '89)	-200 – 500 °C	
	33	Pt 100 (JIS '89)	-200 – 850 °C	
	34	Pt 100 (JIS '97/DIN/IEC)	-200 – 850 °C	
	35	Pt 50 (JIS '81)	-200 – 649 °C	
	36	Ni 508.4	-50 – 200 °C	
	37	Pt 1000	-200 – 200 °C	
	38	Ni 100	-50 – 200 °C	
	39	Cu 10 @25°C	-50 – 200 °C	
	40	User's RTD		
POT input	48	0 – 100 ohms	0 – 100 %	
	49	0 – 300 ohms	0 – 100 %	
	50	0 – 1k ohms	0 – 100 %	
	51	0 – 10k ohms	0 – 100 %	

Caution: Be sure to scale 0% and 100% input after the input type No. has been changed.