

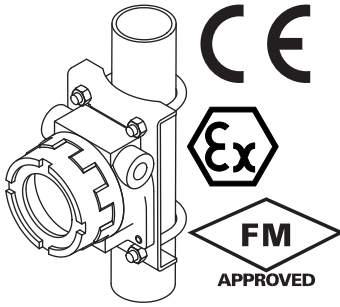
## Head-mounted Two-wire Signal Conditioners 27-UNIT

### 2-WIRE UNIVERSAL TEMPERATURE TRANSMITTER

(HART communication, outdoor enclosure, explosion-proof)

#### Functions & Features

- Universal input: mV, T/C, RTD and resistance
- High accuracy
- HART communication
- Explosion-proof approval
- Suitable for Functional Safety applications up to SIL2
- Programming via hand-held communicator or via PC
- A wide variety of T/C and RTD types
- User's temperature table can be used
- Self diagnostics
- Ultra-low temp. drift option (20 ppm/°C typ.)
- Stainless steel enclosure optional
- CE marking (conforms to ATEX and EMC)



## MODEL: 27HU-B-[1][2][3][4][5][6][7]

### ORDERING INFORMATION

- Code number: 27HU-B-[1][2][3][4][5][6][7]

Specify a code from below for each [1] through [7].  
(e.g. 27HU-B-0L1T01/S).

Use Ordering Information Sheet (No. ESU-7652). Factory standard setting will be used if not otherwise specified.

Specify the country in which the product is to be used with the Safety Approval code 4.

### [1] SAFETY APPROVAL

Confirm selectable combinations of approval and wiring conduit types in the table below.

- 0: None
- 3: FM explosion-proof
- 4: CENELEC flameproof (ATEX)
- 8: TIIS flameproof (CE not available)

### [2] TEMPERATURE DRIFT

- 0: Standard (temp. coefficient 0.015 %/°C)
- L: Ultra-low temperature drift  
(temp. coefficient 0.002 %/°C typ. 0.005 %/°C max.)

### [3] LED INDICATOR

- 0: Without
- 1: With (SIL not available)

### [4] TERMINAL BLOCK

- 0: None (Output connection: Terminals on module)  
(For TIIS, selectable only with 'No indicator' option.)
- T: Incorporated  
(Selectable only with the LED indicator option)

### [5] WIRING CONDUIT

Confirm selectable combinations of approval and wiring conduit types in the table below.

- 0: G 1/2
- 1: 1/2 NPT
- 2: M20 × 1.5
- 3: PG 13.5

### [6] MOUNTING BRACKET

- 0: Without
- 1: With

### [7] OPTIONS

#### Enclosure materials

Blank: Diecast aluminium enclosure

/S: Stainless steel enclosure

(TIIS approval not selectable)

■ **SELECTABLE WIRING CONDUITS SPECIFIC TO EACH APPROVAL**  
'N' marked combinations are not selectable.

WIRING CONDUIT \ APPROVAL	APPROVAL			
	0	3	4	8
0	Y	N	N	Y
1	Y	Y	Y	N
2	Y	N	Y	N
3	Y	N	N	N

### RELATED PRODUCTS

- RS-232C interface Bell202 modem (model: COP-H)  
Usable in 'non-hazardous' area only.
- USB interface Bell202 modem (model: COP-HU)  
Usable in 'non-hazardous' area only.
- Hand-held communicator
- PC configurator software (model: 27HUCFG)  
Downloadable at M-System's web site.
- Cable gland (model: BX-E-SXY)

## GENERAL SPECIFICATIONS

**Degree of protection:** NEMA 4X, IP66/IP67

**Wiring conduit:** See 'Ordering information.'

### Materials

**Transmitter Housing:** Flame-resistant resin (black)

**Electrical connection:** M3 screw terminals (nickel-plated brass; torque 0.5 N·m)

**Indicator Housing:** Flame-resistant resin (black)

**Electrical connection:** Euro terminal

**Applicable wire size:** AWG26 - 16 (0.14 - 1.5 mm<sup>2</sup>)

**Enclosure material:** Diecast aluminium standard; stainless steel casting optional (equivalent to type 316); silver color, epoxy resin coated

**Mounting bracket assembly:** Stainless steel 304

**Applicable pipe:** 1 1/2" min.; 2" max.

**Isolation:** Input to output to outdoor enclosure

### User-configurable items:

- Input sensor type and numbers
- Number of wires (RTD & resistance)
- Input range (inverted range selectable)
- Burnout
- Output limits (Upper / Lower)
- Damping time (factory set to 0)
- Cold junction compensation (T/C; internal or external sensor selectable)
- Linearization
- Sensor calibration
- Output calibration
- HART communication mode

Refer to the HART setup manual or the PC configurator users manual for the detail.

## HART COMMUNICATION

**Protocol:** HART communication protocol

**HART address range:** 0 - 15 (factory set to 0)

**Transmission speed:** 1200 bps

**Digital current:** Approx. 1 mA<sub>p-p</sub> when communicating

**Character format:** 1 Start Bit, 8 Data Bits, 1 Odd Parity Bit, 1 Stop Bit

**Distance:** 1.5 km (0.9 miles)

**HART communication mode:** Master-Slave Mode and Burst Mode (factory set to Master-Slave)

**HART network mode:** Point-to-Point Mode and Multi-drop Mode; automatically set to Multi-drop Mode when the address is set to other than 0.

## LED INDICATOR (option)

**LED:** 8 mm (.3") 7-segment, red

**Number of display digits:** 4

**Scaling range:** -1999 to 9999

**Offset range:** -1999 to 9999

**Decimal point position:** 10<sup>-1</sup>, 10<sup>-2</sup>, 10<sup>-3</sup>, or no decimal point

**Polarity sign:** Minus (-) sign added automatically according to the computation result

**Read rate:** 2.5/s

**Over-range warning:** All segments dark except the top ones that blink with the input exceeding the display/measurable range; or the bottom ones that blink with the input below the range.

**Engineering unit display:** Unit label included; LED backlight provided

## INPUT SPECIFICATIONS

The input is factory set for use with K thermocouple, single input, 0 to 100°C, internal CJC sensor.

See Table 1 for the available input type, the minimum span and the maximum range.

- DC mV (dual input available)

**Input resistance:** ≥ 1 MΩ

- THERMOCOUPLE (dual input available)

**Input resistance:** ≥ 1 MΩ

**Burnout sensing:** 33 μA

**External CJC sensor type:** Pt 100

- RTD (2-wire, 3-wire or 4-wire)

**Input resistance:** ≥ 1 MΩ

**Excitation:** 0.2 mA

**Allowable leadwire resistance:** Max. 10 Ω per wire

- RESISTANCE (2-wire, 3-wire or 4-wire)

**Input resistance:** ≥ 1 MΩ

**Excitation:** 0.2 mA

**Allowable leadwire resistance:** Max. 10 Ω per wire

## OUTPUT SPECIFICATIONS

**Output range:** 4 - 20 mA DC

**Operational range:** 3.75 - 23 mA

**Load resistance vs. supply voltage:**

Load Resistance (Ω) = (Supply Voltage (V) - 8 (V)\* ) / 0.023 (A) (including leadwire resistance)

\*12 (V) with LED indicator option.

**Burnout:** 3.75 - 3.8 mA or 21.5 - 23 mA (factory set to 23 mA)

**Upper output limit proportional to the input:** 20 - 21.5 mA (factory set to 21.5 mA)

**Lower output limit proportional to the input:** 3.8 - 4 mA (factory set to 3.8 mA)

**Update time:** 440 msec. (660 msec. with dual input)

**Output characteristics for dual input:**

Average or Differential selectable

## INSTALLATION

**Supply voltage:**

**Non-approved:** 8 - 35 V DC (without LED indicator)

12 - 39 V DC (with LED indicator)

**CENELEC (ATEX) & FM:** 8 - 32 V DC (without LED indicator)

12 - 32 V DC (with LED indicator)

**TIIS:** 8 - 28 V DC (without LED indicator)

12 - 32 V DC (with LED indicator)

## Operating temperature

**Non-approved:** -40 to +85°C (-40 to +185°F)

**CENELEC (ATEX) & FM:** T5, -40 to +80°C (-40 to +176°F)

T6, -40 to +70°C (-40 to +158°F)

**TIIS:** T6, -20 to +60°C (-4 to +140°F)

**Weight:** Approx. 1.3 kg (2.9 lbs), aluminium

Approx. 4.0 kg (8.8 lbs), stainless steel

Approx. 2.0 kg (4.4 lbs), TIIS flameproof

## PERFORMANCE

**Accuracy:** See Table 1.

**Display accuracy:**  $\pm 0.01$  mA

**Cold junction compensation accuracy:**  $\pm 0.5^\circ\text{C}$  with internal CJC sensor

**LED indicator temp. coefficient:**  $\pm 0.015$  %/ $^\circ\text{C}$

**Response time:**  $\leq 2$  sec. (0 - 90 %) with damping time set to 0 and when not communicating via HART.

**Supply voltage effect:**  $\pm 0.05$  % of span/V

**Insulation resistance:**  $\geq 100$  M $\Omega$  with 500 V DC

**Dielectric strength:** 1500 V AC @1 minute  
(input to output to outdoor enclosure)

**Safety integrity level according to IEC 61508:** Suitable for use in a safety instrumented system up to SIL2 (together with sensor) if appropriate safety instructions are observed. Consult M-System.

## STANDARDS & APPROVALS

### CE conformity:

ATEX Directive (94/9/EC)

EEx d EN 50018

EMC Directive (2004/108/EC)

EMI EN 61000-6-4

EMS EN 61000-6-2

### Safety approval:

FM: Explosion-proof and Dust-ignition proof

Class I, Division 1, Groups B, C and D

Class II, Division 1, Groups E, F and G

Class III, Division 1

T5 and T6

(Class 3615)

TIIS: Flameproof

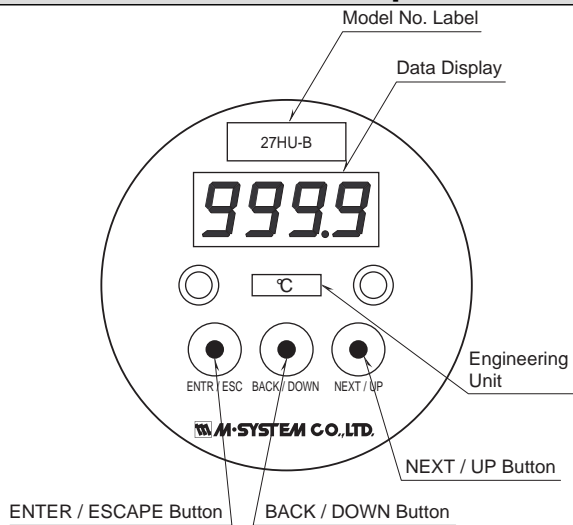
Ex d IIC T6

CENELEC: Flameproof (ATEX)

Ⓔ II 2G, EEx d IIC; T5 and T6

(EN50018: 2000)

## INDICATOR TOP VIEW (option)



## INPUT TYPE, RANGE & ACCURACY

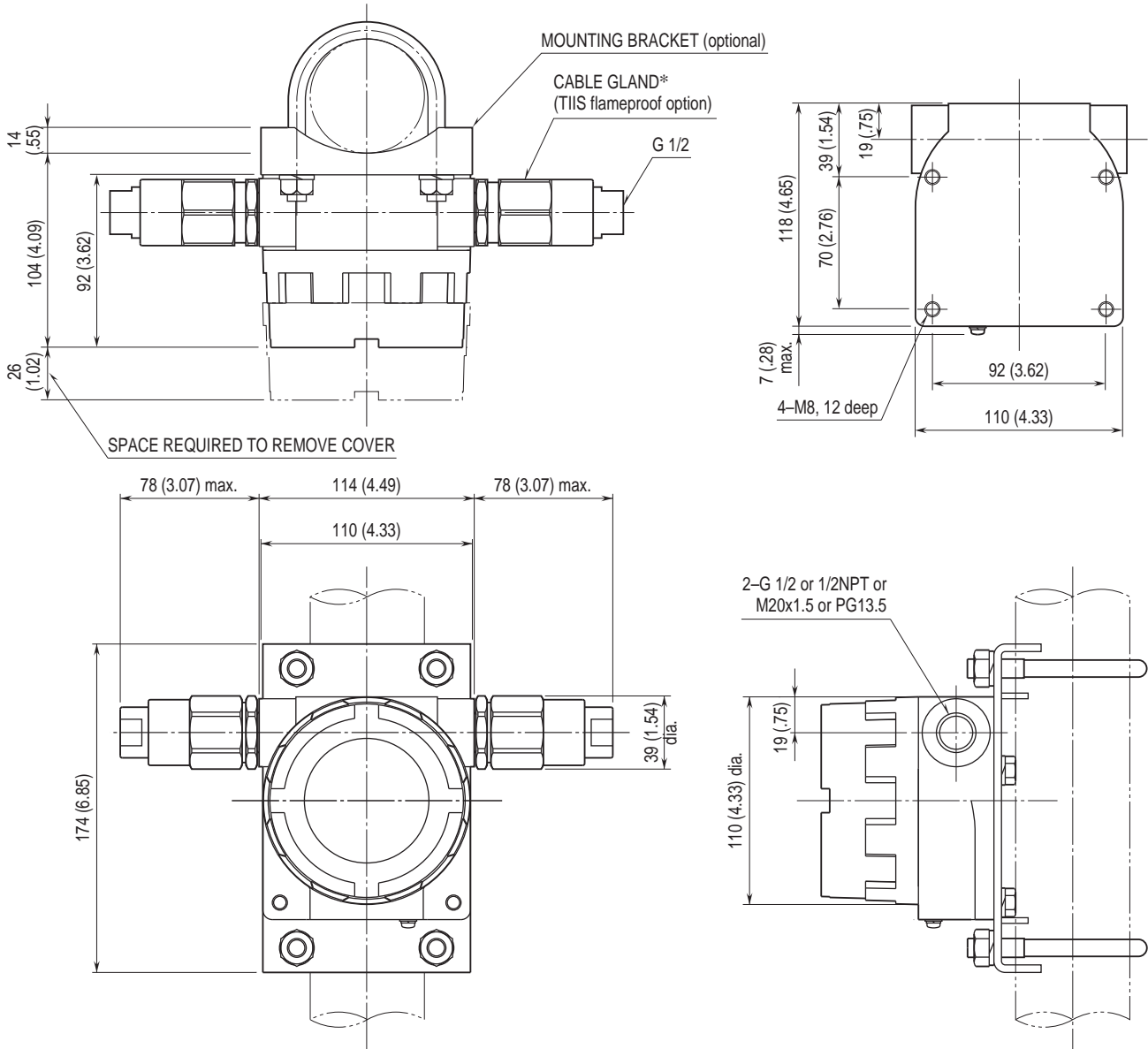
### INPUT TYPE, RANGE & ACCURACY

Table 1

INPUT TYPE	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	TEMPERATURE DRIFT				
				STANDARD DRIFT *2	ULTRA-LOW DRIFT *3			
DC mV	4 mV	-100 to +800 mV	±10 μV	±1.5 μV/°C	±0.5 μV/°C			
Resistance	25 Ω	0 to 4 kΩ	±0.1 Ω	±15 mΩ/°C	±5 mΩ/°C			
Thermocouple	°C			°F			TEMPERATURE DRIFT	
	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	STANDARD DRIFT *2	ULTRA-LOW DRIFT *3
K (CA)	50	-180 to +1372	±0.5	90	-292 to +2501	±0.9	±0.075°C/°C	±0.025°C/°C
E (CRC)	50	-100 to +1000	±0.5	90	-148 to +1832	±0.9	±0.075°C/°C	±0.025°C/°C
J (IC)	50	-100 to +1200	±0.5	90	-148 to +2192	±0.9	±0.075°C/°C	±0.025°C/°C
T (CC)	50	-200 to +400	±0.5	90	-328 to +752	±0.9	±0.075°C/°C	±0.025°C/°C
B (RH)	100	400 to 1820	±1	180	752 to 3308	±1.8	±0.3°C/°C	±0.1°C/°C
R	100	-50 to +1760*4	±1	180	-58 to +3200*4	±1.8	±0.3°C/°C	±0.1°C/°C
S	100	-50 to +1760*4	±1	180	-58 to +3200*4	±1.8	±0.3°C/°C	±0.1°C/°C
C (WRe 5-26)	100	0 to 2300	±1	180	32 to 4172	±1.8	±0.3°C/°C	±0.1°C/°C
D (WRe 3-25)	100	0 to 2300	±1	180	32 to 4172	±1.8	±0.3°C/°C	±0.1°C/°C
N	50	-180 to +1300	±0.5	90	-292 to +2372	±0.9	±0.075°C/°C	±0.025°C/°C
U	50	-200 to +600	±0.5	90	-328 to +1112	±0.9	±0.075°C/°C	±0.025°C/°C
L	50	-100 to +900	±0.5	90	-148 to +1652	±0.9	±0.075°C/°C	±0.025°C/°C
RTD	°C			°F			TEMPERATURE	
	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	STANDARD DRIFT *2	ULTRA-LOW DRIFT *3
Pt 100 (JIS '97, IEC)	10	-200 to +850	±0.1	18	-328 to +1562	±0.18	±0.015°C/°C	±0.005°C/°C
Pt 200	10	-200 to +850	±0.1	18	-328 to +1562	±0.18	±0.015°C/°C	±0.005°C/°C
Pt 500	10	-200 to +850	±0.1	18	-328 to +1562	±0.18	±0.015°C/°C	±0.005°C/°C
Pt 1000	10	-200 to +850	±0.1	18	-328 to +1562	±0.18	±0.015°C/°C	±0.005°C/°C
JPt 100 (JIS '89)	10	-200 to +510	±0.1	18	-328 to +950	±0.18	±0.015°C/°C	±0.005°C/°C
Ni 100 (DIN 43760 '87)	10	-60 to +250	±0.2	18	-76 to +482	±0.36	±0.015°C/°C	±0.005°C/°C

- \*1. DC mV: Or ±0.05 % of absolute range (greater of 0 % and 100 % range values), whichever is greater.  
 Or ±0.2 % of absolute negative range for two inputs including negative ranges, whichever is greater.  
 Resistance: Or ±0.05 % of absolute range (greater of 0 % and 100 % range values), whichever is greater.  
 Thermocouple: Or ±0.05 % of span, whichever is greater. Add cold junction compensation error.  
 RTD: Or ±0.05 % of max. range (greater of 0 % and 100 % range values converted into °C), whichever is greater.  
 (For 2- or 3-wire RTD, the value is valid by the sensor calibration after wiring is complete.)
- \*2. Or ±0.015 % of absolute range/°C (greater of 0 % and 100 % range values), whichever is greater.  
 \*3. Or ±0.005 % of absolute range/°C (greater of 0 % and 100 % range values), whichever is greater.  
 \*4. Conformance range: 50 to 1760°C or 122 to 3200°F

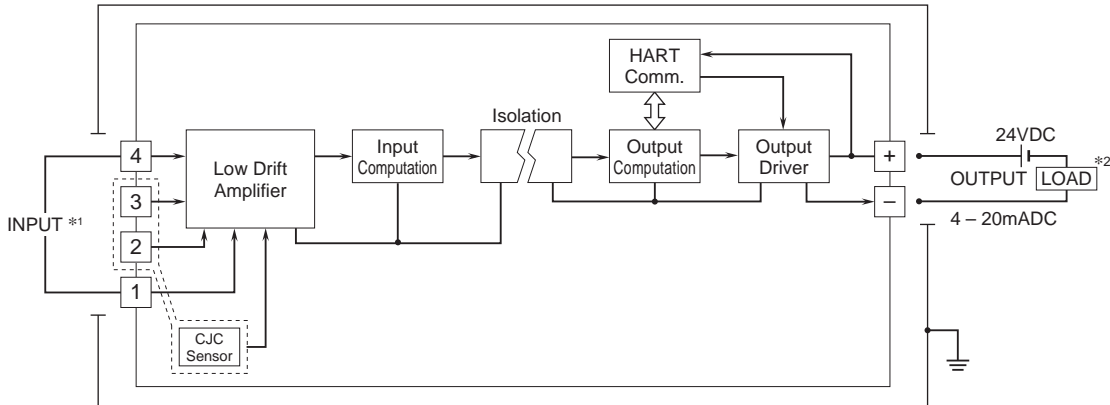
## DIMENSIONS unit: mm (inch)



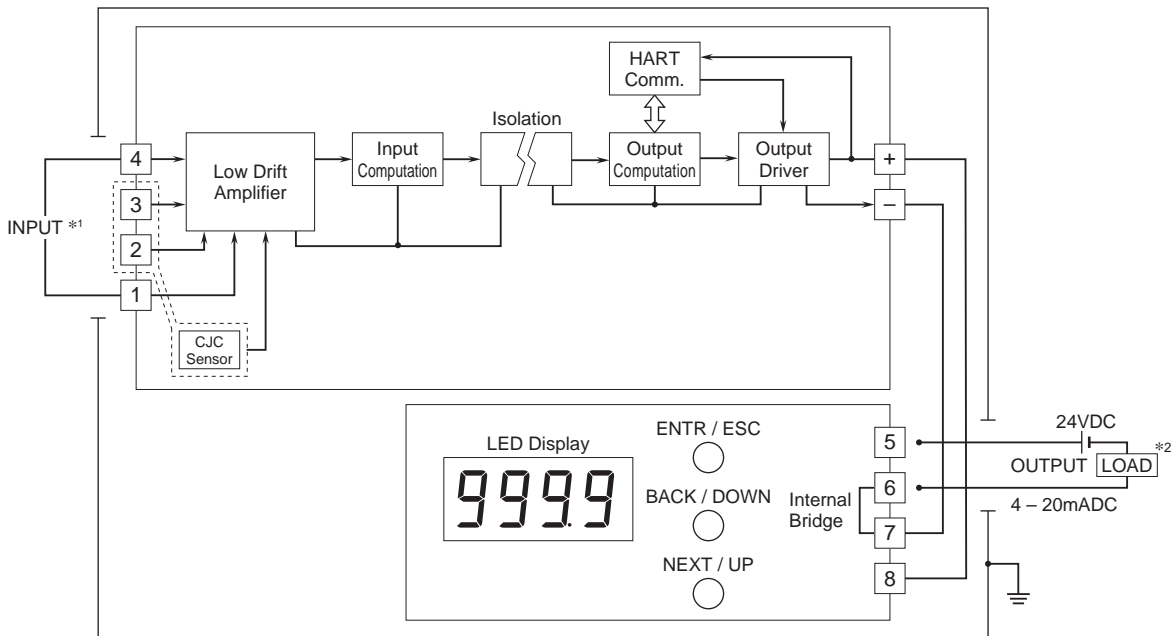
\*Two sets of cable gland are attached with TIIS flameproof option.

**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**

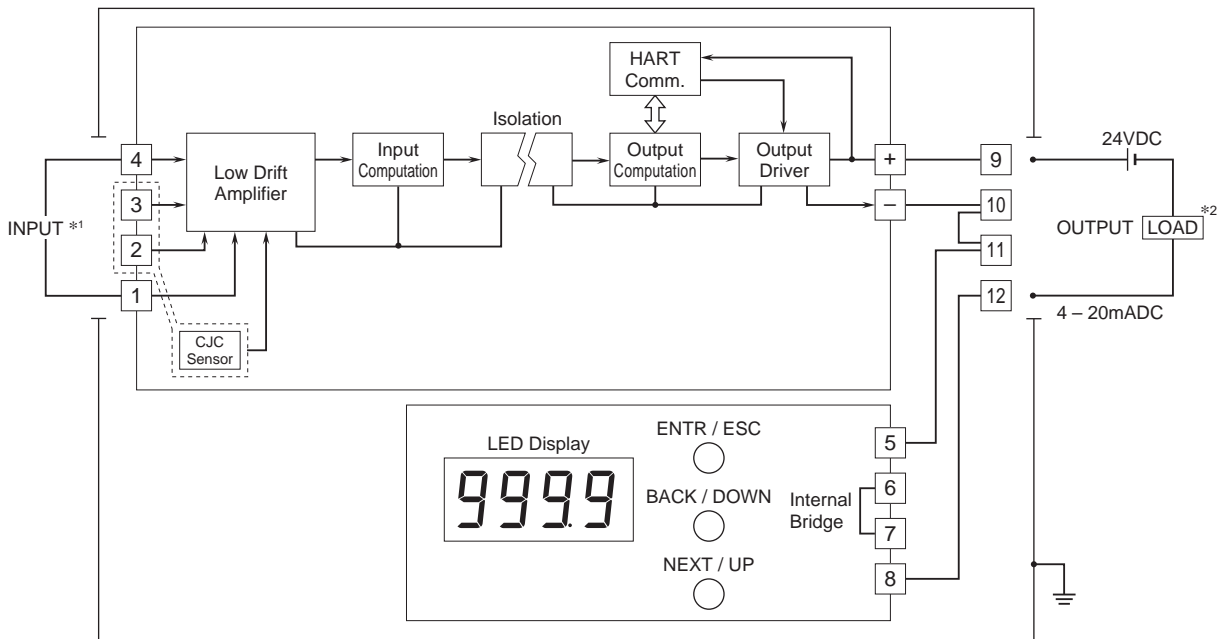
- WITHOUT TERMINAL BLOCK (Output connection: Terminals on module)
- Without LED Indicator



- With LED Indicator

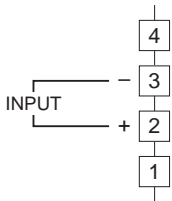


## WITH TERMINAL BLOCK



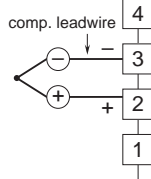
### \*1. Input Connection Examples

#### DC MILLIVOLT

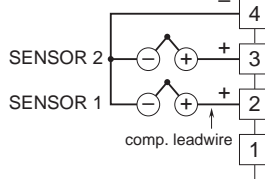


#### THEMOCOUPLE

##### Internal CJC

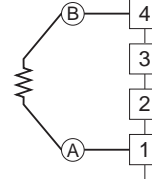


##### Two Inputs, Internal CJC

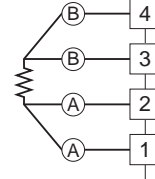


#### RTD & RESISTANCE

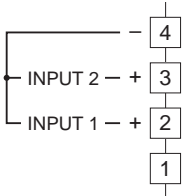
##### Two-wire



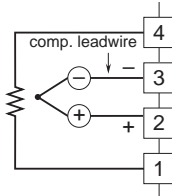
##### Four-wire



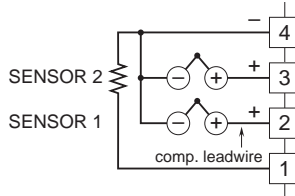
##### Two Inputs



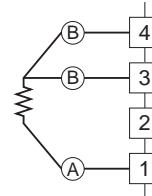
##### External CJC



##### Two Inputs, External CJC



##### Three-wire



\*2. Limited to 250 – 1100Ω for HART communication



Specifications are subject to change without notice.