

Head-mounted Two-wire Signal Conditioners 27-UNIT

2-WIRE UNIVERSAL TEMPERATURE TRANSMITTER
(HART communication, intrinsically safe)

MODEL **27HU**

MODEL & SUFFIX CODE SELECTION

MODEL _____ 27HU-□□
 SAFETY APPROVAL _____
 0 : None
 1 : FM intrinsically safe
 2 : CENELEC intrinsically safe (ATEX)
 OPTIONS _____
 /L : Ultra-low temperature drift

ORDERING INFORMATION

Specify code number and suffix codes. Use Ordering Information Sheet (No. ESU-7651). Default setting will be used if not otherwise specified.

- Code number (e.g. 27HU-2)

RELATED PRODUCTS

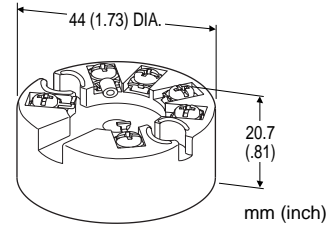
- RS-232C interface Bell202 modem (model: COP-H)*
 - USB interface Bell202 modem (model: COP-HU)*
 - Hand-held communicator
 - PC configurator software (model: 27HUCFG)
 Downloadable at M-System's web site:
<http://www.m-system.co.jp>
- *Usable in 'non-hazardous' area only.

GENERAL SPECIFICATIONS

Electrical connection: M3 screw terminals
 (nickel-plated brass; torque 0.5 N·m)
Housing material: Flame-resistant resin (black)
Isolation: Input to output
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
- Cold junction compensation (T/C; internal or external sensor selectable)
- Linearization
- Sensor calibration
- Output calibration
- HART communication mode

Damping time: 0 to 30 sec. (ex-factory set to: 0)



Functions & Features

- Universal input: mV, T/C, RTD and resistance
- High accuracy
- HART communication
- Intrinsically safe approval
- CE marking (conforms to ATEX and EMC)
- 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.)

HART COMMUNICATION

Protocol: HART communication protocols
HART address range: 0 – 15 (ex-factory set to: 0)
Transmission speed: 1200 bps
Digital current: Approx. 1mA p-p when communicating
Character format: 1 Start Bit, 8 Data Bits, 1 Odd Parity Bit, 1 Stop Bit
Distance: 1.5 kilometers (0.9 mile)
HART communication mode:
 Master-Slave Mode and Burst Mode
 (ex-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.

INPUT

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: 1MΩ minimum

■ **THERMOCOUPLE** (dual input available)

Input resistance: 1MΩ minimum

Burnout sensing: 33μA

External CJC sensor type: Pt 100

■ **RTD & RESISTANCE** (2-wire, 3-wire or 4-wire)

Input resistance: 1MΩ minimum

Excitation: 0.2mA

Allowable leadwire resistance: Max. 10Ω per wire

OUTPUT

Output range: 4 – 20mA DC

Operational range: 3.75 – 23mA

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

Upper output limit proportional to the input:

20 – 21.5mA (factory set to: 21.5mA)

Lower output limit proportional to the input:

3.8 – 4mA (factory set to: 3.8mA)

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

Output characteristics for dual input: Average or
Differential selectable

Load resistance vs. supply voltage:

$$\text{Load Resistance } (\Omega) = \frac{\text{Supply Voltage (V)} - 8 \text{ (V)}}{0.023 \text{ (A)}}$$

(including leadwire resistance)

INSTALLATION

Supply voltage: 8 – 35V DC (non-approved)
8 – 28V DC (approved)

Operating temperature: -40 to +85°C (-40 to +185°F)
(See Safety Parameters for use in a hazardous location.)

Operating humidity: 0 to 95% RH (non-condensing)

Mounting: Head-mounting (DIN type B head)

Dimensions: 44 dia. × 20.7 mm (1.732 dia. × 0.81")

Weight: 50 g (1.76 oz)

PERFORMANCE

Accuracy: See Table 1.

Cold junction compensation accuracy: ≤ ±0.5°C
with internal CJC sensor

Temp. coefficient:

Optional /L 0.002%/°C typ.

0.005%/°C max.

w/o Option/L 0.015%/°C

Response time: ≤2 seconds (0 – 90%) with damping
time set to 0 and when not communicating via HART.

Supply voltage effect: ≤ ±0.005% of span/V

Insulation resistance: ≥100MΩ with 500V DC
(input to output)

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

STANDARDS & APPROVAL

CE conformity: ATEX Directive (94/9/EC)

EEx ia EN50020

EMC Directive (89/336/EEC)

EMI EN61000-6-4

EMS EN61000-6-2

Safety approval

FM: Intrinsically safe

Class I, Div. 1, Groups A, B, C and D

Class I, Zone 0, AEx ia IIC

T4, T5 and T6

(Class 3610)

CENELEC: Intrinsically safe (ATEX)

⊕ II 1G, EEx ia IIC; T4, T5 and T6

(EN50020 - 2002)

SAFETY PARAMETERS

Operating temperature for CENELEC (ATEX)/FM:

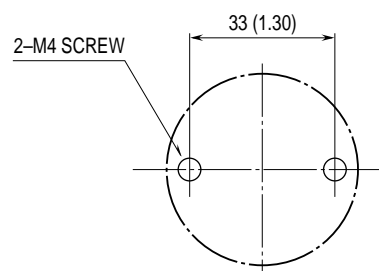
T4 -40 to +80°C

T5 -40 to +60°C

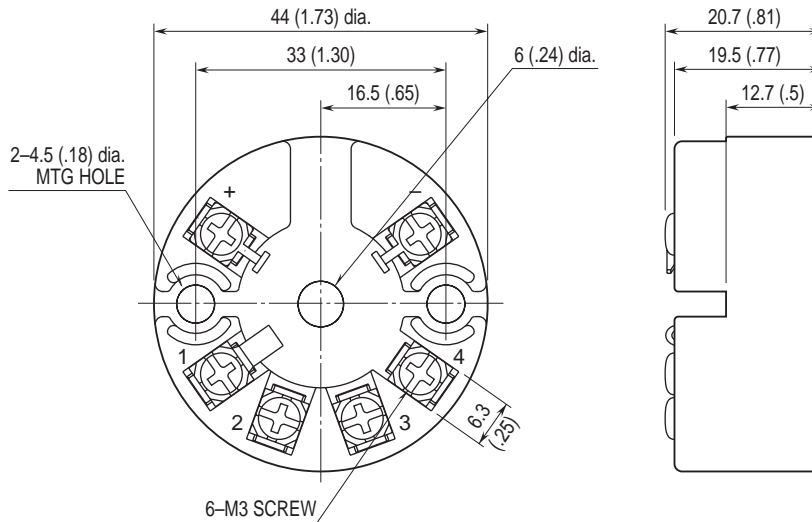
T6 -40 to +45°C

Ex-data:

U _i (V _{max})	30V DC	U _o (V _{oc})	30V DC
I _i (I _{max})	96mA DC	I _o (I _{sc})	24mA DC
P _i (P _{max})	720mW	P _o	180mW
C _i	1 nF	C _o (C _a)	50 nF
L _i	0 mH	L _o (L _a)	40 mH

MOUNTING REQUIREMENTS mm (inch)

EXTERNAL DIMENSIONS mm (inch)



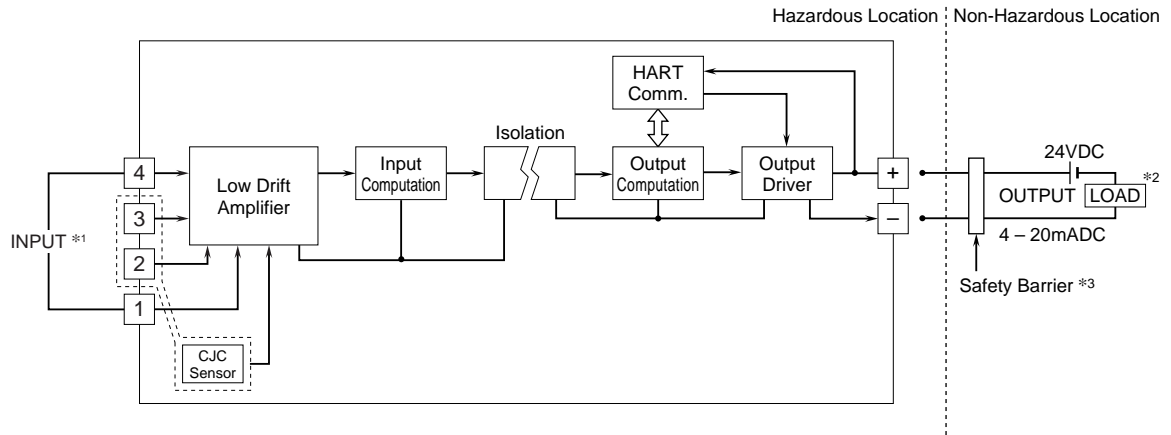
INPUT TYPE, RANGE & ACCURACY

TABLE 1

INPUT TYPE	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	TEMPERATURE DRIFT				
				STANDARD DRIFT*2	ULTRA-LOW DRIFT*3			
DC mV	4mV	-100 to +800mV	±10μV	±1.5μV/°C	±0.5μV/°C			
Resistance	25Ω	0 to 4kΩ	±0.1Ω	±15mΩ/°C	±5mΩ/°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	-180 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 DRIFT	
	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	MINIMUM SPAN	MAXIMUM RANGE	ACCURACY *1	STANDARD DRIFT*2	ULTRA-LOW DRIFT*3
Pt 100 (JIS'97, DIN, 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 (DIN43760 '87)	10	-60 to +250	±0.2	18	-76 to +482	±0.36	±0.015°C/°C	±0.005°C/°C

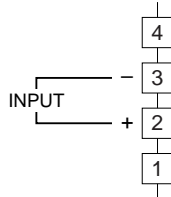
*1. DC mV: Or ±0.05% of absolute range (greater of 0% and 100% range values), whichever is greater.
Or ±0.2% of absolute negative range for two inputs including negative ranges, whichever is greater.
Resistance: Or ±0.05% of absolute range (greater of 0% and 100% range values), whichever is greater.
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

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



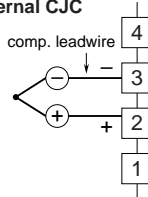
***1. Input Connection Examples**

■ **DC MILLIVOLT**



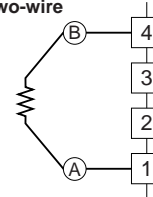
■ **THERMOCOUPLE**

• **Internal CJC**

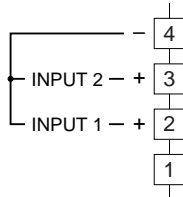


■ **RTD & RESISTANCE**

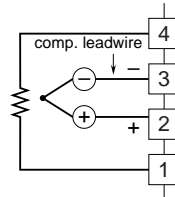
• **Two-wire**



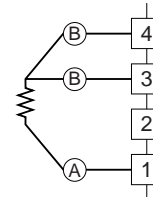
• **Two Inputs**



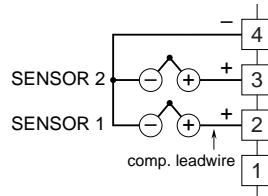
• **External CJC**



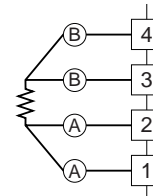
• **Three-wire**



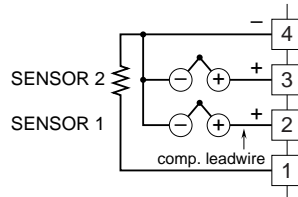
• **Two Inputs, Internal CJC**



• **Four-wire**



• **Two Inputs, External CJC**



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

*3. A safety barrier must be installed for the intrinsic safety.

The safety barrier must meet the Ex-data of this unit and must be approved for the hazardous location.