

The Series 662 programmable dual input HART® field temperature transmitter is a 2-wire unit with analog output. It includes input for RTDs; resistance inputs in 2-wire, 3-wire, and 4-wire connections; thermocouples and voltage signals. The transmitter can be supplied with or without a digital display, in either a general-purpose aluminum housing, or explosion-proof aluminum housing. The Series 662 can be programmed with a PC or a HART® protocol handheld terminal. When supplied with a digital display, the LC screen shows the current measured value and a bar graph with limit value violation indicator.

## PROGRAMMABLE DUAL INPUT FIELD TEMPERATURE TRANSMITTER

Programmable temperature transmitter for resistance thermometers (RTDs), thermocouples, resistance inputs and voltage inputs:  
adjustable via HART® protocol.



**HART** COMMUNICATION PROTOCOL

### Application Areas

- Dual Input Temperature field transmitter with HART® protocol for converting various input signals to an analog, scaleable (4 to 20) mA output signal
- Input:
  - Resistance thermometer (RTD)
  - Thermocouples (TC)
  - Resistance input (Ohm)
  - Voltage input (mV)
- HART® protocol for operating the device on site using a handheld communicator or remotely via the PC

### Features and Benefits

- Universally programmable with HART® protocol for various input signals
- Illuminated display, rotatable
- Operation, visualization and maintenance with PC; e.g. using TransComm Light operating software
- 2-wire technology, analog output (4 to 20) mA
- Highly accurate in entire operating temperature range
- Approvals:
  - FM and CSA (IS, NI, XP and DIP)
- Galvanic isolation, 2kV (Sensor input to the output)
- Output simulation
- Min./max. process values recorded
- Customized measuring range setup or expanded SETUP; see questionnaire

HART® is a registered trademark of HART Communication Foundation



CE marked

## ORDER CODES

**Example Order Number:**

1-0    1-1    1-2    1-3    1-4    1-5    1-6    1-7    1-8  
**662A - D - 33 - 85 - 85 - E - U - S(0-200) C**

### 1-0 Transmitter Type

CODE	DESCRIPTION
662A	(4 to 20) mA HART® Field Transmitter with general-purpose aluminum housing
662C	(4 to 20) mA HART® Field Transmitter with explosion-proof aluminum housing FM/CSA/XP Class I / Div 1 / Groups A,B,C,D / DIP Class II / Div 1 / Groups E,F,G / Class III / NI Class I / Div 2 / Groups A,B,C,D
662F	(4 to 20) mA HART® Field Transmitter with general-purpose aluminum housing FM/CSA IS Class I / Div 1 / Groups A,B,C,D / NI Class I / Div 2 / Groups A,B,C,D

### 1-1 Options

CODE	DESCRIPTION
T	Solid cover
D	Glass cover with digital display

### 1-2 Configuration Input

CODE	DESCRIPTION
2I	Ch1: RTD 2-wire, Ch2: inactive
22	Ch1: RTD 2-wire, Ch2: RTD 2-wire
23	Ch1: RTD 2-wire, Ch2: RTD 3-wire
2T	Ch1: RTD 2-wire, Ch2: Thermocouple
3I	Ch1: RTD 3-wire, Ch2: inactive
32	Ch1: RTD 3-wire, Ch2: RTD 2-wire
33	Ch1: RTD 3-wire, Ch2: RTD 3-wire
3T	Ch1: RTD 3-wire, Ch2: Thermocouple
4I	Ch1: RTD 4-wire, Ch2: inactive
4T	Ch1: RTD 4-wire, Ch2: Thermocouple
TI	Ch1: Thermocouple, Ch2: inactive
TT	Ch1: Thermocouple, Ch2: Thermocouple

### 1-3 Sensor Input Channel 1

CODE	DESCRIPTION
J	Type J thermocouple
K	Type K thermocouple
T	Type T thermocouple
N	Type N thermocouple
E	Type E thermocouple
R	Type R thermocouple
S	Type S thermocouple
B	Type B thermocouple
85	100 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
55	500 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
95	1000 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )

### 1-8 Unit of Measure

CODE	DESCRIPTION
C	Celsius
F	Fahrenheit

### 1-7 Range

CODE	DESCRIPTION
S	(lower limit – upper limit)

### 1-6 Failure Mode

CODE	DESCRIPTION
U	Upscale Burnout $\geq 23 \text{ mA}$
D	Downscale Burnout $\leq 3 \text{ mA}$

### 1-5 Input Set-ups

CODE	DESCRIPTION
0	One Input
A	Process variable = Ch1; Ch2 = inactive
C	Process variable = the difference between Ch1 and Ch2
D	Process variable = average of Ch1 and Ch2
E	Sensor backup; Process variable = Ch1 and Ch2

### 1-4 Sensor Input Channel 2

CODE	DESCRIPTION
00	No second channel
J	Type J thermocouple
K	Type K thermocouple
T	Type T thermocouple
N	Type N thermocouple
E	Type E thermocouple
R	Type R thermocouple
S	Type S thermocouple
B	Type B thermocouple
85	100 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
55	500 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
95	1000 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )

HART® is a registered trademark of HART Communication Foundation



### INPUT

#### Resistance Thermometer (RTD)

TYPE	STANDARDS	MEASUREMENT RANGE	MINIMUM RANGE
Pt100 ( $\alpha = 0.00385\text{ }^{\circ}\text{C}^{-1}$ ) Pt200 Pt500 Pt1000	ASTM E1137 IEC 60 751	(-200 to 850) °C [-328 to 1562] °F (-200 to 850) °C [-328 to 1562] °F (-200 to 250) °C [-328 to 482] °F (-200 to 250) °C [-328 to 482] °F	10 °C [18 °F] 10 °C [18 °F] 10 °C [18 °F] 10 °C [18 °F]
Pt100 ( $\alpha = 0.003916$ )	JIS C1604	(-200 to 649) °C [-328 to 1200] °F	10 °C [18 °F]
Pt100 ( $\alpha = 0.003923$ )	SAMA	(-100 to 700) °C [-148 to 1292] °F	10 °C [18 °F]
Ni100 ( $\alpha = 0.006180$ ) Ni1000 ( $\alpha = 0.006180$ )	DIN 43 760	(-60 to 250) °C [-76 to 482] °F (-60 to 150) °C [-76 to 302] °F	10 °C [18 °F] 10 °C [18 °F]
Ni120 ( $\alpha = 0.006720$ ) Cu10 ( $\alpha = 0.004274$ )	Edison Curve	(-70 to 270) °C [-94 to 518] °F (-100 to 260) °C [-148 to 500] °F	10 °C [18 °F] 10 °C [18 °F]
Pt50 ( $\alpha = 0.003911$ ) Pt100 ( $\alpha = 0.003911$ ) Cu50 ( $\alpha = 0.004278$ ) Cu100 ( $\alpha = 0.004278$ )	GOST	(-200 to 1100) °C [-328 to 2012] °F (-200 to 850) °C [-328 to 1562] °F (-200 to 200) °C [-328 to 392] °F (-200 to 200) °C [-328 to 392] °F	10 °C [18 °F] 10 °C [18 °F] 10 °C [18 °F] 10 °C [18 °F]
Polynomial RTD Pt100 (Callendar - van Dusen)		(-200 to 850) °C [-328 to 1562] °F (-200 to 850) °C [-328 to 1562] °F	10 °C [18 °F] 10 °C [18 °F]
Connection type		2-, 3- or 4-wire connection cable resistance compensation possible in the 2 wire system (0 to 30) $\Omega$	
Sensor cable resistance		3-wire and 4-wire connection, sensor wire resistance to maximum 50 $\Omega$ per wire	
Sensor current		$\leq 0.3$ mA	

#### Resistance ( $\Omega$ )

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
Resistance ( $\Omega$ )	(10 to 400) $\Omega$ (10 to 2000) $\Omega$	10 $\Omega$ 100 $\Omega$

#### Thermocouples (TC) (ASTM E230)

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
B (PtRh30-PtRh6)	(0 to 1820) °C [32 to 3308] °F	500 °C [900 °F]
C (W5Re-W26Re)	(0 to 2320) °C [32 to 4208] °F	500 °C [900 °F]
D (W3Re-W25Re) <sup>[1]</sup>	(0 to 2495) °C [32 to 4523] °F	500 °C [900 °F]
E (NiCr-CuNi)	(-270 to 1000) °C [-454 to 1832] °F	50 °C [90 °F]
J (Fe-CuNi)	(-210 to 1200) °C [-346 to 2192] °F	50 °C [90 °F]
K (NiCr-Ni)	(-270 to 1372) °C [-454 to 2501] °F	50 °C [90 °F]
L (Fe-CuNi) <sup>[2]</sup>	(-200 to 900) °C [-328 to 1652] °F	50 °C [90 °F]
N (NiCrSi-NiSi)	(-270 to 1300) °C [-454 to 2372] °F	50 °C [90 °F]
R (PtRh13-Pt)	(-50 to 1768) °C [-58 to 3214] °F	500 °C [900 °F]
S (PtRh10-Pt)	(-50 to 1768) °C [-58 to 3214] °F	500 °C [900 °F]
T (Cu-CuNi)	(-270 to 400) °C [-454 to 752] °F	50 °C [90 °F]
U (Cu-CuNi) <sup>[2]</sup>	(-200 to 600) °C [-328 to 1112] °F	50 °C [90 °F]
Cold junction	internal (Pt100) or external (0 to 80) °C [32 to 176] °F	
Cold junction accuracy	$\pm 1$ °C	
Max. sensor resistance	10 k $\Omega$	
[1] ASTM E1751		
[2] according to DIN 43710		

#### Voltage (mV)

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
Millivolt (mV)	(-20 to 100) mV	5 mV

1) Significant measuring inaccuracy for temperatures lower than 300 °C [572 °F]

2) When operating conditions are based on a large temperature range, the Series 662 offers the ability to split the range. For example, a Type S or R thermocouple can be used for the low range and a Type B can be used for the upper range. The Series 662 is then programmed to switch at a predetermined temperature.

This allows for utilization of the best performance from each individual thermocouple and provides 1 output that represents the process temperature. Note: the dual sensor option must be included in the order code for the HART® protocol.

3) Basic requirements NE89: detection of increased sensor resistance (e.g. corrosion of contacts or wires) of TC or RTD/4-wire.

HART® is a registered trademark of HART Communication Foundation



### OUTPUT

#### Output (Analog)

Output signal	Analog (4 to 20) mA or (20 to 4) mA
Transmission as	Temperature linear, resistance linear, voltage linear
Maximum load	$(V_{\text{power supply}} - 11\text{V}) / 0.023\text{ A}$ (current output)
Digital filter 1st degree	(0 to 60) s
Induced current required	$\leq 3.5\text{ mA}$
Current limit	$\leq 23\text{ mA}$
Switch on delay	4 s (during switch-on operation $I_a = 4\text{ mA}$ )
Response time	1 s

#### Failure Mode

Undershooting measurement range	Decrease to 3.8 mA
Exceeding measurement range	Increase to 20.5 mA
Sensor breakage/short circuit	$\leq 3.6\text{ mA}$ or $\geq 21.0\text{ mA}$ (configurable 21.6 mA to 23 mA)

#### Electrical Connection

Power supply	$U_b = 11$ to 40 V (8 to 40 without display), reverse polarity protected
Cable entry	Three 1/2" NPT openings
Allowable ripple	$U_{ss} \leq 3\text{ V}$ at $U_b \geq 13.5\text{ V}$ , $f_{\text{max}} = 1\text{ kHz}$

### ACCURACY

Reference conditions	Calibration temperature $(23 \pm 5)^\circ\text{C}$ [ $73.4 \pm 9$ ] $^\circ\text{F}$
----------------------	--

#### Resistance Thermometer (RTD)

TYPE	MEASUREMENT ACCURACY - DIGITAL	MEASUREMENT ACCURACY - D/A <sup>[1]</sup>
Cu100, Pt100, Ni100, Ni120	$\pm 0.1^\circ\text{C}$ [0.18 $^\circ\text{F}$ ]	$\pm 0.02\%$
Pt500	$\pm 0.3^\circ\text{C}$ [0.54 $^\circ\text{F}$ ]	$\pm 0.02\%$
Cu50, Pt50, Pt1000, Ni1000	$\pm 0.2^\circ\text{C}$ [0.36 $^\circ\text{F}$ ]	$\pm 0.02\%$
Cu10, Pt200	$\pm 1^\circ\text{C}$ [1.8 $^\circ\text{F}$ ]	$\pm 0.02\%$

#### Thermocouple (TC)

TYPE	MEASUREMENT ACCURACY - DIGITAL	MEASUREMENT ACCURACY - D/A <sup>[1]</sup>
K, J, T, E, L, U	Typical $\pm 0.25^\circ\text{C}$ [0.45 $^\circ\text{F}$ ]	$\pm 0.02\%$
N, C, D	Typical $\pm 0.5^\circ\text{C}$ [0.9 $^\circ\text{F}$ ]	$\pm 0.02\%$
S, B, R	Typical $\pm 1^\circ\text{C}$ [1.8 $^\circ\text{F}$ ]	$\pm 0.02\%$

#### Resistance ( $\Omega$ )

TYPE	MEASUREMENT ACCURACY - DIGITAL	MEASUREMENT ACCURACY - D/A <sup>[1]</sup>	MEASUREMENT RANGE
Resistance	$\pm 0.04\ \Omega$	$\pm 0.02\%$	(10 to 400) $\Omega$
	$\pm 0.08\ \Omega$	$\pm 0.02\%$	(10 to 2000) $\Omega$

#### Voltage (mV)

TYPE	MEASUREMENT ACCURACY - DIGITAL	MEASUREMENT ACCURACY - D/A <sup>[1]</sup>	MEASUREMENT RANGE
Voltage	$\pm 10\ \mu\text{V}$	$\pm 0.02\%$	(20 to 100) mV

[1] % relates to the set span. Accuracy = digital + D/A accuracy

HART® is a registered trademark of HART Communication Foundation



### ACCURACY (continued)

#### Physical input range of the sensors

TYPE	MEASUREMENT ACCURACY <sup>[1]</sup>
(10 to 400) Ω	Cu10, Cu50, Cu100, polynomial RTD, Pt50, Pt100, Ni100, Ni120
(10 to 2000) Ω	Pt200, Pt500, Pt1000, Ni1000
(-20 to 100) mV	Thermocouple type: C, D, E, J, K, L, N
(-5 to 30) mV	Thermocouple type: B, R, S, T, U

[1] % is related to the adjusted measurement range (the value to be applied is the greater)

#### General

Repeatability	0.0015% of the physical input range (15 Bit) Resolution A/D conversion: 18 Bit
Load influence	≤ ± 0.005%/V deviation from 24 V, related to the full-scale value
Long term stability	≤ 0.1 °C [0.18 °F] / year or ≤ 0.05%/year Date under reference conditions. % relates to the set span. The larger value applies.

#### Temperature Drift

Total temperature drift = input temperature drift + output temperature drift	Effect on the accuracy when ambient temperature changes by 1 °C [1.8 °F]	
	Input (10 to 400) Ω	0.001% of measured value, minimum 1 m Ω
	Input (10 to 2000) Ω	0.001% of measured value, minimum 10 m Ω
	Input (-20 to 100) mV	typ. 0.002% of measured value, minimum 0.2 μV
	Input (5 to 30) mV	typ. 0.001% of measured value, minimum 0.2 μV
	Output (4 to 20) mA	typ. 0.001% of span

### INSTALLATION CONDITIONS

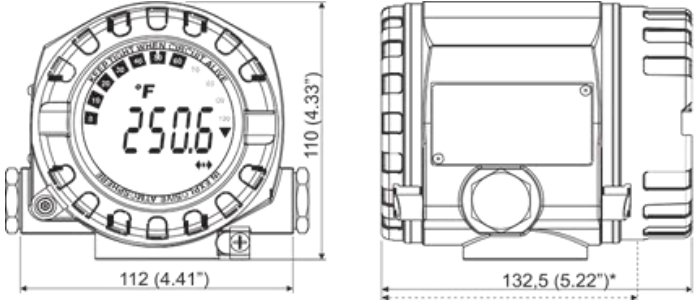
#### Ambient Conditions

Ambient temperature	Without display: (-40 to 85) °C [-40 to 185] °F With display: (-40 to 80) °C [-40 to 176] °F NOTE: The display can react slowly for temperature < -20 °C [< -4 °F]
Storage temperature	Without display: (-40 to 100) °C [-40 to 212] °F With display: (-40 to 80) °C [-40 to 176] °F
Allowable Altitude	6560 ft. above sea level
Climatic class	As per EN 60 654-1, Class C
Moisture condensation	Allowable
Shock and vibration protection	3 g / (2 to 150) Hz according to IEC 60 068-2-6
EMC immunity	Interference immunity and interference emission as per EN 61 326-1 (IEC 1326) (0.08 to 2) GHz 10 V/m; (1.4 to 2) GHz 30 V/m to EN 61 000-4-3
Protection	IP67, NEMA 4X, Class 1, Division 1, Group A, B, C; Class II Division I, Groups E, F, G and Class III, Division I (when specified)

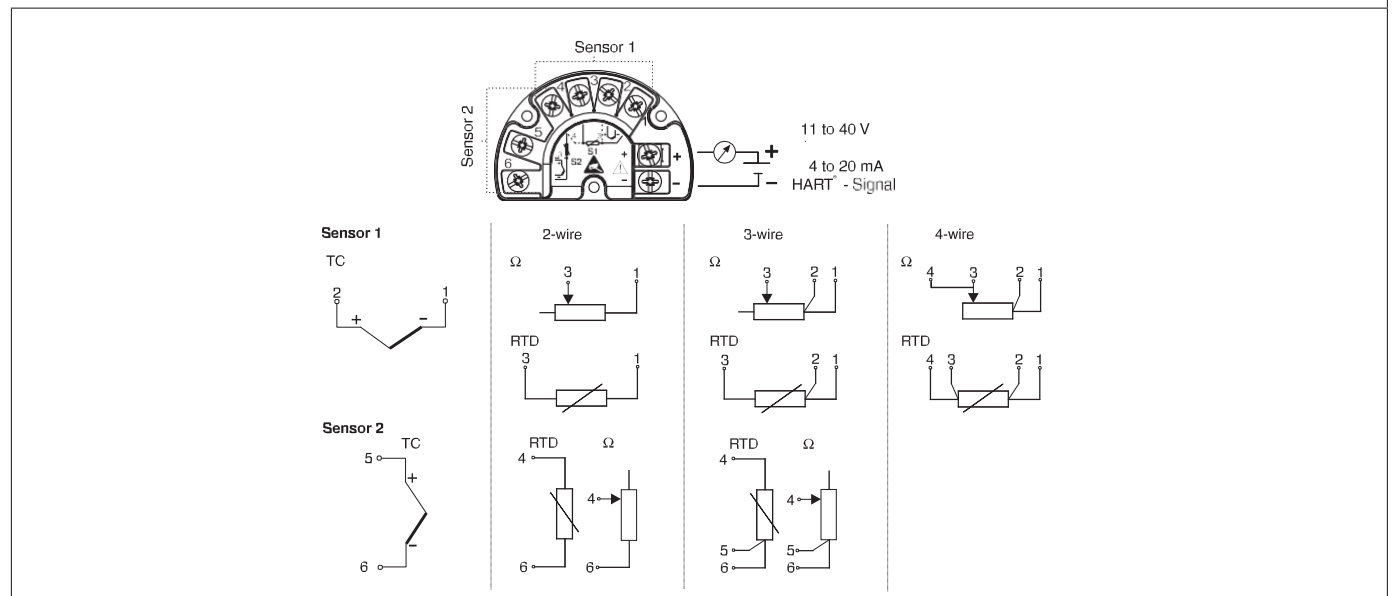
HART® is a registered trademark of HART Communication Foundation



### MECHANICAL CONSTRUCTION

Dimensions	 <p>Display rotatable in 90° increments</p>
Weight	approximately 1.6 kg [3.53 lb]
Materials	Housing: die-cast aluminum with powder coating
Terminals	Cables / wires up to max. 2.5 mm <sup>2</sup> (AWG 12)

### Terminal Connections

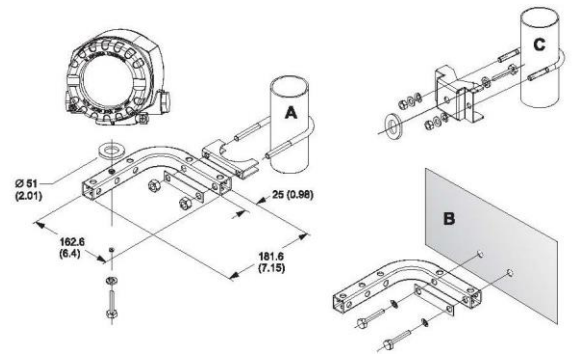


### Optional Mounting Bracket

**Part Number: 17614**  
Stainless Steel Wall/Tube Kit - Figure A or B.

**Part Number: 17615**  
Stainless Steel Pipe Mounting Kit - Figure C.

Designed for use on pipes with a diameter of 2".



HART® is a registered trademark of HART Communication Foundation