FUJI ELECTRIC

TEMPERATURE TRANSMITTER

DATA SHEET FRC

FRC is a programmable two wire temperature transmitter suitable for head or field mounting.

FEATURES

1. Universal input:mV,V,thermocouple,RTD
2. High accuracy
3. HART communication
4. Intrinsically safe and explosion-proof approvals
5. Sensor burnout
6. A wide variety of thermocouple types
7. Programming via hand-held communicator or via PC
8. Self diagnostics
9. Input-output isolated

SPECIFICATIONS

General specifcations

Environmental protection:
NEMA 4X,IP65
Wiring conduit: See code symbols.
Electrical connection:
M3.5 screw terminals
Materials
Housing: Die-cast aluminum (epoxy resin and urethan resin coated in layers)
Body color: silver
Cover color: blue
(Munsell 6PB3.5/10.5)
Mounting bracket assembly: SUS 304
Isolation: Input to output
User-configurable item:
- Input sensor type
- Number of wires (RTD)
- Input ranges
- Zero and span adjustments
- Simulated output
- HART communication mode (burst mode selectable)
- HART network mode (point-to-point or multidrop)

Linearization: Standard feature
Inverted output: User-selectable (default:no inversion)
Cold junction compensation (thermocouple):
available
Burnout: Upscale,downscale or no burnout selectable (default:upscale)
Damping time: 0 to 30 sec.(default:0sec)

LCD display (option)

Features: Indicates input signal, engineering unit and transmitter status.
Display size: approx. 36 x 20 mm
Characters
Color: Black
Format: 2 rows of 5 alphanumeric characters;
Top: 7.4 mm high
Bottom: 6.5 mm high
6 status characters,1.9 mm high
Display range: –99999 to 99999
Decimal point: Top row only; positioned between two characters

Hart communication

Protocol: HART communication protocols
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 km
HART communication mode:
Master-slave mode and burst mode

Input

Input types, min. span and max. range: See Table 1.
DC mV & V: Input resistance 1MΩ minimum
Thermocouple: Burnout sensing 130nA ±10%
RTD: Wiring resistance.
Max.20Ω per wire
The input is factory set for use with RTD (3-wire) 0 to +150°C.

Output

Default output range: 4 to 20mA DC
Zero adjustment: 3.8 to 7.2mA
Span adjustment: 12.8 to 17.6mA
Operational range: 3.8 to 21.6mA
Load resistance vs. supply voltage:

$$\text{Max. load resistance } (\Omega) = \frac{\text{Supply voltage (V)} - 12\text{ (V)}}{0.024\text{ (A)}}$$

(including leadwire resistance)

Note: For communication with HART, min. of 250Ω required.

Installation

Supply voltage: 12 to 42V DC
Operating temperature :
–40 to +85°C Electronics
–30 to +80°C Display (full visibility)
Operating humidity: 0 to 95%RH (non-condensing)
Mounting: Pipe mounting or head-mounting
Dimensions: See outline diagram.
Weight: Approx.1.3 kg

Performance

Accuracy: See Table 1.
Cold junction compensation: ≤±0.5°C (at –5 to +55°C)
Temperature. coefficient (of max.span at –5 to +55°C):
±0.015%/°C
Start-up time: approx.8 sec.
Response time: ≤1 seconds (0 to 63%)with damping time set to 0 and when not communicating via HART.
Supply voltage effect:
±0.003% of span/V
Insulation resistance:
≥100MΩ with 500V DC (input to output)
Dielectric strength:
1500V AC x 1 minute
(input to output)

Standards & Approvals

CE conformity:
ATEX Directive (94/9/EC)
EEx ia EN50020
EEx d EN50018
EMC Directive (89/336/EEC)
EMI EN61000-6-4
EMS EN61000-6-2

Safety approvals:
FM : Intrinsically safe
Class I, Div.1, Groups A, B, C and D;
T4, T5 and T6;
Class II, Div.1, Groups E, F and G;
T4, T5 and T6;
Class III, Div.1; T4, T5 and T6
(Class 3610)
Class I, Zone 0, AEx ia IIC
T4, T5 and T6;
FM : Flameproof
Class I, Div.1, Groups B, C and D;
T4, T5 and T6;
Class II, Div.1, Groups E, F and G;
T4, T5 and T6;
Class III, Div.1; T4, T5 and T6
(Class 3615)
ATEX : Intrincically safe
II 1G, EEx ia IIC ; T4, T5 and T6
(EN50020 -1994) (KEMA)
ATEX : Flameproof
II 2G, EEx d IIC ; T4, T5 and T6
(EN50018 -2000) (KEMA)

Related products

- PC configurator software
- HART modem*
  VIATOR interface
  web site: www.mactekcorp.com
- Hand--held communicator*

*Consult HART Communication Foundation (HCF)
web site: www.hartcomm.org.

CODE SYMBOLS

Digit	Description	Note	1 2 3 4 5 6 7 8
			F R C
4	**Case**		
	None (modul only)		0
	Yes		1
5	**Aprovals for hazardous locations**		
	None		A
	FM flameproof (*1)	Note 1	B
	ATEX flameproof (*2)	Note 2	C
	FM intrinsic safty (*3)	Note 3	D
	ATEX intrinsic safty		E
6	**Display**		
	None		0
	LCD		1
7	**Wiring conduit**		
	None		0
	1/2NPT		1
	M20 x 1.5		2
	PG13.5		3

Note: (*1) Available for 7th digit code "1"
Note: (*2) Available for 7th digit code "1","2"
Note: (*3) Available for 7th digit code "0","1","2"

SCOPE OF DELIVERY

Templerature transmitter, mounting bracket, instruction manual.

Table 1

Input type	Min. span	Max. range	Accuracy of the DC voltage
DC mV & V	4mV	–50 to +1000mV	±0.1% or ±10μV, whichever is greater (F.S. input ≤50mV) ±0.1% or ±40μV, whichever is greater (F.S. input ≤200mV) ±0.1% or ±60μV, whichever is greater (F.S. input ≤500mV) ±0.1% or ±80μV, whichever is greater (F.S. input >500mV)

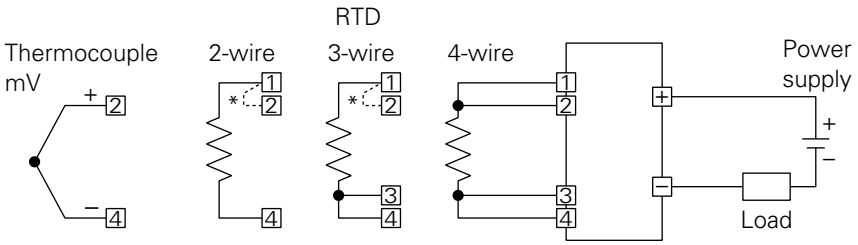
Thermocouple	°C				°F			
	Min. span	Max. range	Conformance range	Accuracy *1	Min. span	Max. range	Conformance range	Accuracy *1
(PR)	20	0 to 1760	0 to 1760	±1.00	36	32 to 3200	32 to 3200	±1.80
K (CA)	20	–270 to +1370	–150 to +1370	±0.25	36	–454 to +2498	–238 to +2498	±0.45
E (CRC)	20	–270 to +1000	–170 to +1000	±0.20	36	–454 to +1832	–274 to +1832	±0.36
J (IC)	20	–210 to +1200	–180 to +1200	±0.25	36	–346 to 2192	–292 to +2192	±0.45
T (CC)	20	–270 to +400	–170 to +400	±0.25	36	–454 to +752	–274 to +752	±0.45
B (RH)	20	100 to +1820	400 to +1760	±0.75	36	212 to +3308	752 to +3200	±1.35
R	20	–50 to +1760	200 to 1760	±0.50	36	–58 to 3200	392 to 3200	±0.90
S	20	–50 to +1760	0 to 1760	±0.50	36	–58 to +3200	32 to 3200	±0.90
C (WRe 5-26)	20	0 to 2315	0 to 2315	±0.25	36	32 to 4199	32 to 4199	±0.45
N	20	–270 to +1300	–130 to +1300	±0.30	36	–454 to +2372	–202 to +2372	±0.54
U	20	–200 to +600	–200 to +600	±0.20	36	–328 to +1112	–328 to +1112	±0.36
L	20	–200 to +900	–200 to +900	±0.25	36	–328 to +1652	–328 to +1652	±0.45
P (Platinel II)	20	0 to +1395	0 to +1395	±0.25	36	32 to 2543	32 to 2543	±0.45

RTD	EXCITATION	°C			°F		
		Min. span	Max. range	Accuracy *1	Min. span	Max. range	Accuracy *1
Pt 100 (JIS '97/DIN/IEC)	0.2mA	20	–200 to 850	±0.15	36	–328 to 1562	±0.27

*1 : Or ±0.1%, whichever is greater.

*2 : In case of using RTD, accuracy is determined by achieving zero and span calibration after wiring.

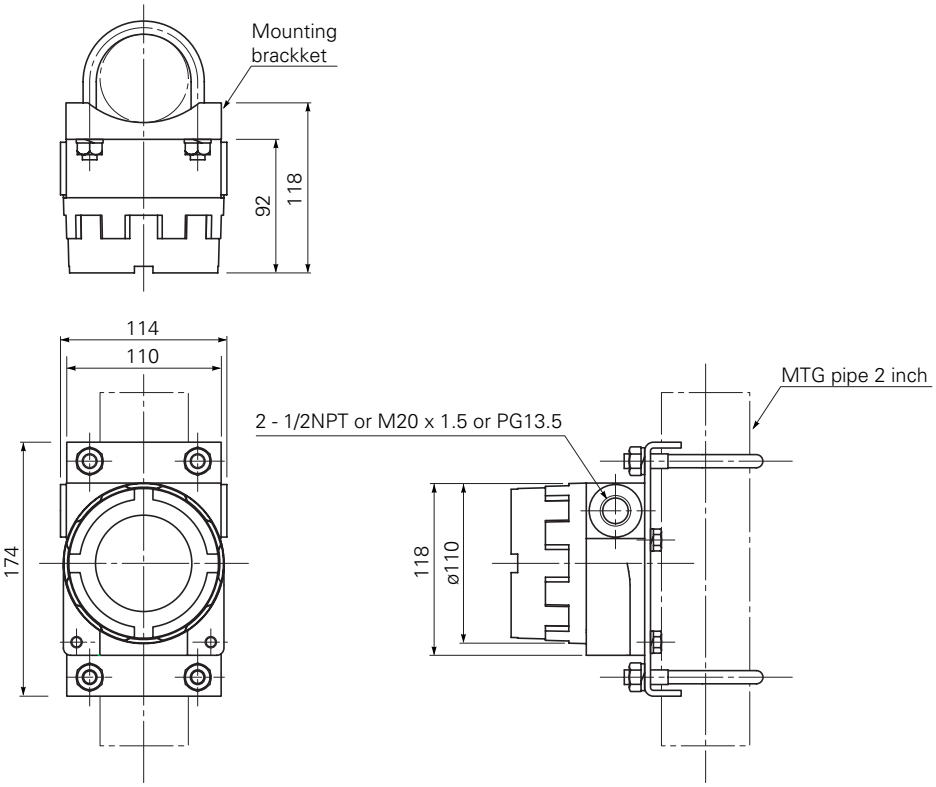
WIRING CONNECTIONS



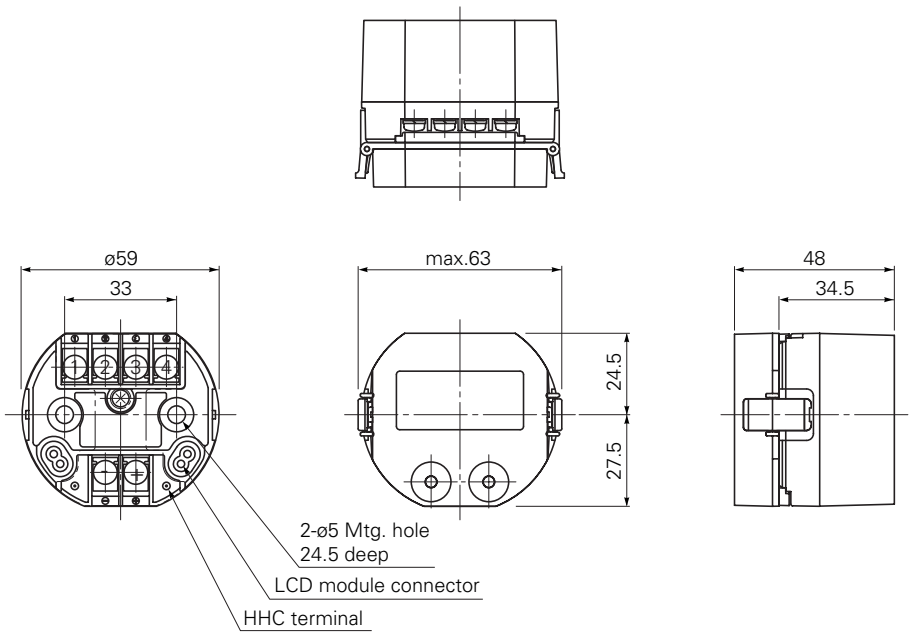
* Close across the terminals 1 & 2.

OUTLINE DIAGRAM (Unit:mm)

Model FRC1



Model FRC0



without LCD module (Terminal location)

with LCD module

⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual in advance.

Fuji Electric Co.,Ltd.

Head office
11-2, Osaki 1-chome, Shinagawa-ku, Tokyo, 141-0032 Japan
http://www.fujielectric.co.jp

Fuji Electric Instruments Co.,Ltd.

Sales Div.
International Sales Dept.
No.1, Fuji-machi, Hino-city, Tokyo, 191-8502 Japan
Phone: 81-42-585-6201, 6202
Fax: 81-42-585-6187
http://www.fic-net.co.jp

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