



**Toshniwal  
Industries Pvt. Ltd.**  
Experience • Expertise  
MG Toshniwal Group

# SMART TEMPERATURE TRANSMITTER

## TTFU Series



## Features

- High accuracy (< 0.1% FS)
- Low cost
- Wide supply voltage range
- High accuracy in total ambient temperature range
- 2 wire technology, 4 to 20mA analog output
- Multiparametric, backlight, 360°rotatable LCD Display with bargraph 2
- Universal Input (RTD, T/C. VDC,Pot) & Range
- An internal temperature sensor for active temperature compensation (for T/C)
- HART/ Profibus PA Protocol/ Foundation Fieldbus



Multi-parametric backlight, 360° rotatable LCD display which has programmable, selectable input and multi ranging capabilities in a small instrumentation package. As only one instrument is used for all types and ranges of Thermocouples, RTDs, Potentiometer And DC inputs, spares inventory is reduced. Input-Output Solutions Provided Void Ground loop errors. Such errors can occur if Thermocouple is grounded or used above 600°C with any point in the output loop grounded (e.g. negative terminal of 24 VDC power supply/output measuring instrument). Isolated design is also recommended for process current loops where common mode voltage exists leading to common mode noise and for protection in an environment with high industrial noise/voltage transients. 2-Wire Transmitter, Catalog no. TTFU is available in a Wall or Pipe mounting IP66 Enclosure for use in the field and also available in Flameproof, cast aluminum enclosure.

## Technical Specifications

| INPUT                        | TYPE          | MEASUREMENT RANGES                    | MIN. MEAS. SPAN | MEASUREMENT ACCURACY |
|------------------------------|---------------|---------------------------------------|-----------------|----------------------|
| Resistance Thermometer (RTD) | Pt100         | -200°C to 850°C<br>(-328°F to 1562°F) | 10°K            | 0.1°C                |
|                              | Pt500         | -200°C to 250°C<br>(-328°F to 482°F)  | 10°K            |                      |
|                              | Pt1000        | -200°C to 250°C<br>(-328°F to 482°F)  | 10°K            |                      |
|                              | Cu50          | -50°C to 150°C<br>(-58°F to 302°F)    | 10°K            |                      |
|                              | Cu100         | -50°C to 150°C<br>(-58°F to 302°F)    | 10°K            |                      |
|                              | *Ni100        | -60°C to 180°C<br>(-76°F to 356°F)    | 10°K            |                      |
|                              | *Ni500        | -60°C to 180°C<br>(-76°F to 356°F)    | 10°K            |                      |
|                              | *Ni1000       | -60°C to 150°C<br>(-76°F to 302°F)    | 10°K            |                      |
| Resistance transmitter       | Resistance(K) | 0 K to 400 K                          | 10 K            | ±0.1 K or 0.08%      |
|                              |               | 0 K to 2000 K                         | 100 K           | ±1.5 K or 0.12%      |

Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)





|                                  |                           |   |       |          |
|----------------------------------|---------------------------|---|-------|----------|
| <b>Thermocouples (TC)</b>        | B (PtRh30-PtRh 6)         | 0 to 1820°C<br>( 32°F to 3308°F )         | 500°K | Typ. 1°C |
|                                  | E (NiCr-CuNi)             | -270°C to 1000°C<br>( -454°F to 1832°F )  | 50°K  | 0.5°C    |
|                                  | J (F e-CuNi)              | -210°C to 1200°C<br>( -346°F to 2192°F )  | 50°K  |          |
|                                  | K (NiCr-Ni)               | -270°C to 1372°C<br>( -454°F to 2501°F )  | 50°K  |          |
|                                  | N (NiCrSi-NiSi)           | -270°C to 1300°C<br>( -454°F to 2372°F )  | 50°K  | 1°C      |
|                                  | R ( PtRh13-Pt)            | -50°C to 1768°C<br>( -58°F to 3214.4°F )  | 500°K |          |
|                                  | S (PtRh10-Pt)             | -50°C to 1768°C<br>( - 58°F to 3214.4°F ) | 500°K |          |
|                                  | T (Cu-CuNi)               | -270°C to 400°C<br>( - 454°F to 752°F )   | 50°K  | 0.5°C    |
| <b>Voltage Transmitters (mV)</b> | Millivolt Transmitter(mV) | -10 to 75mV                               | 5mV   | 0.1%     |
|                                  |                           | -100 to 100mV                             | 5mV   |          |
|                                  |                           | -100 to 500mV                             | 6mV   |          |
|                                  |                           | -100 to 2000mV                            | 20mV  |          |

- ❖  $\alpha=5000$  ppm/K or 6180 ppm/K, Connection type: 2,3,4 wire connection, Sensor current: 0.5 mA

| <b>OUTPUT SPECIFICATIONS</b> |   |   |
|------------------------------|---|---|
| <b>Output</b>                | 4 to 20 mA  |   |
| <b>Signal on alarm</b>       | Underranging  | Linear drop to 3.8 mA                         |
|                              | OVERRANGING   | Linear drop to 20.5 mA                        |
|                              | Sensor break; sensor open-circuit                               | 3.6 (Downscale) or 22mA (Upscale) ,selectable |
| <b>Load</b>                  | Max. (V power supply -10.5 V) /0.022 A                          |   |
| <b>Linearisation</b>         | Temperature linear (TC/ RTD)/ Resistance linear, voltage linear |   |
| <b>Isolation</b>             | 2 KV AC ( input/output) , Galvanic                              |   |

**Toshniwal Industries Pvt. Ltd.**

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)





|                                |   |
|--------------------------------|---|
| <b>Communication Interface</b> | HART Protocol (TTFUH) or PROFIBUS(TTFUP) or TTFUF |
|--------------------------------|---|

| <b>PERFORMANCE CHARACTERISTICS</b>             |                                   |
|--|-----------------------------------|
| <b>Response time</b>                           | 500 ms                            |
| <b>Reference operating conditions</b>          | Calibration temperature: 23oC ±5K |
| <b>Stability</b>                               | 0.05% of Span/year                |
| <b>Switch on delay</b>                         | ≤5s                               |
| <b>Influence of ambient/ Load/Power supply</b> | Negligible                        |
| <b>Filter configuration</b>                    | 0 to 1 60μ A                      |
| <b>Resolution</b>                              | 0.3μA                             |

| <b>OTHERS</b>           |  |
|-------------------------|--|
| <b>Display Type</b>     | Visiblerange32.5X22.5mm;5digit,7 segment main display,digit height 8mm; 20 bars meter with 5% resolution |
| <b>Display Range</b>    | -19999 - 99999   |
| <b>Weight/ Material</b> | Approx. 800g /Die-cast Aluminium   |
| <b>Power Supply</b>     | 9 to 32 VDC, Polarity protected  |

| <b>ENVIRONMENT CONDITIONS</b>         |  |
|---------------------------------------|--|
| <b>Ambient temp. limits</b>           | (-) 40 to 85°C                         |
| <b>Storage temperature</b>            | (-) 40 to 100°C                        |
| <b>Degree of protection</b>           | IP 66 as per IEC 60529-1               |
| <b>Condensation</b>                   | Allowable                              |
| <b>Shock and vibration resistance</b> | 4g/2 to 1 50 Hz as per IEC 60068-26    |
| <b>Electromagnetic compatibility</b>  | Interference Immunity And Interference |

**Toshniwal Industries Pvt. Ltd.**

Industrial Estate, Makhapura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)





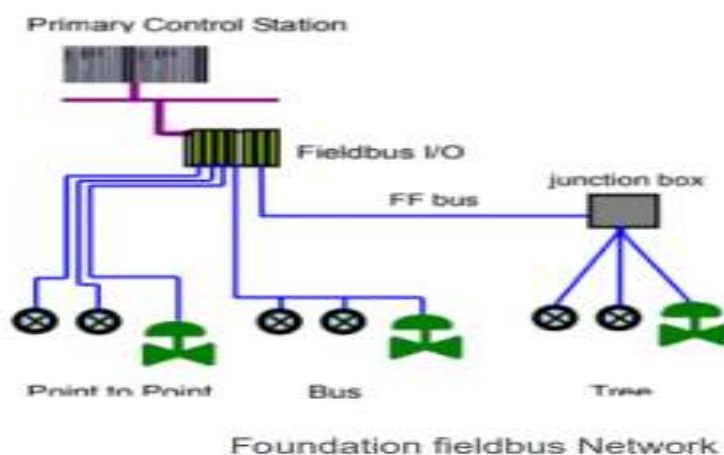
|       |                                     |
|-------|-------------------------------------|
| (EMC) | emission according to IEC 61000-4-3 |
|-------|-------------------------------------|

## Selection Table

| Model | Specification             | Code | Details  |
|-------|---------------------------|------|--|
| TTF   | Input & Range & Isolation | U    | Universal: Thermocouple/ mV/ mA(shunt on terminal) / RTD, 2/3/4 wire(with isolation) |
|       |                           | R    | RTD 2/3/4 (without isolation)  |
|       | Communication             | N    | None   |
|       |                           | H    | With HART  |
|       |                           | P    | PROFIBUS-PA  |
|       |                           | I    | With Isolation   |
|       | Dual Input                | D    | Dual Input   |

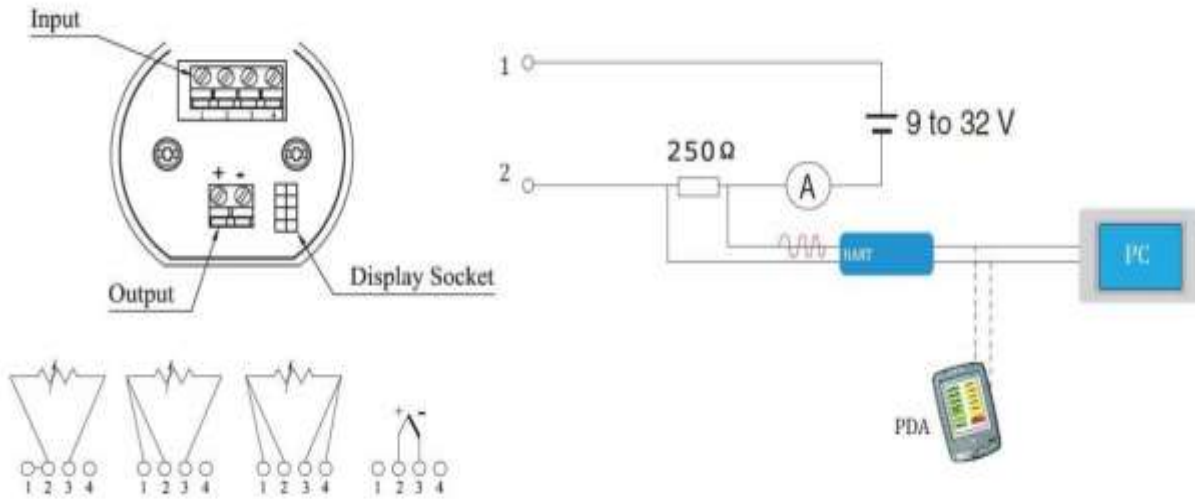
## Electrical Connection

### 1. Foundation FieldBus Diagram



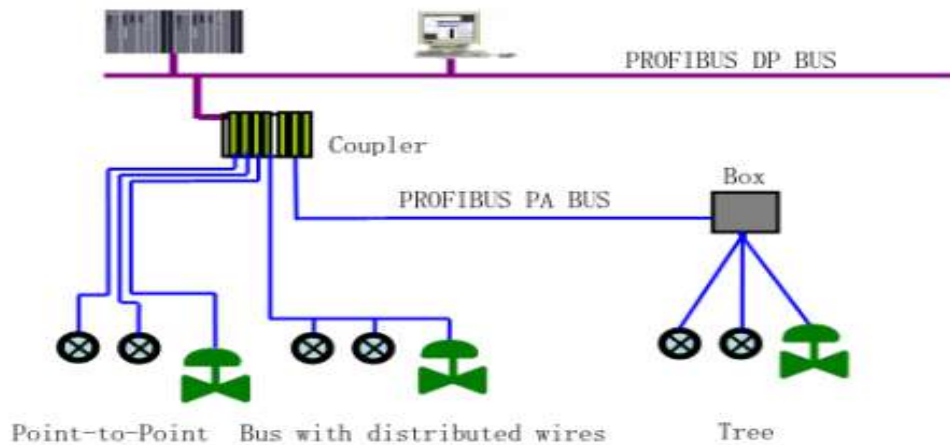


## 2. HART Communication



HART Communication

## 3. PROFIBUS Network



PROFIBUS Network

Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)





# TEMPERATURE TRANSMITTER

## TT Series



## Features

- Universal input (RTD, T/C, VDC, Pot), Dual input also available with DIN Rail Mounting
- High Accuracy and Repeatability (+/- 0.1%)
- HART Protocol
- 2 wire technology, 4 to 20mA analog output
- High accuracy in total ambient temperature range
- An internal temperature sensor for active temperature compensation (For T/C)
- Wide supply voltage range # Galvanic Isolation
- Sensor head/ DIN Rail/ Field mounting

TIPL offers Universal 2-Wire SMART Transmitter which has PC/ HART programmable enabling selectable input and multi-ranging capabilities in a small instrumentation package. Sensor type and range is selectable via USB/ HART Interface with our USBI HART Communicator accessory or other HART Communicator and offers the choice of most common sensors used in the industrial environment. As only one instrument is used for all types and ranges of Thermocouples, RTDs, Potentiometers and DC inputs, spares inventory is reduced.



Input-Output isolation is optionally available to avoid ground loop errors. Such errors can occur if Thermocouple is grounded or used above 600°C with any point in the output loop grounded (e.g. negative terminal of 24 VDC power supply/ output measuring instrument). Isolated design is also recommended for process current loops where common mode voltage exists leading to common mode noise and for protection in an environment with high industrial noise/voltage transients.

2-Wire Transmitter, is basically available in a Miniature circular sensor head mounting package. It is also offered in Wall or Pipe mounting IP65 Enclosure for use in field, DIN rail mounted package or in flameproof (CMRS certified for Group I, II A and II B), weather proof, cast aluminum enclosure.

Other model of 2-wire transmitter is available with built-in loop powered display (Ask for separate brochure)

## Technical Specifications

| INPUT  | TYPE                   | MEASUREMENT RANGES          | MIN. MEAS. SPAN | MEASUREMENT ACCURACY        |
|--|------------------------|-----------------------------|-----------------|-----------------------------|
| <b>Resistance Thermometer (RTD) 2/3/4 wire</b> | Pt100                  | -200°C to 850°C             | 10°K            | 0.2K or 0.08%               |
|  | Pt500                  | -70°C to 500°C              | 10°K            | 0.5K or 0.20%               |
|  | Pt1000                 | -70°C to 500°C              | 10°K            | 0.3K or 0.12%               |
|  | Pt50                   | -200°C to 850°C             | 10°K            | 0.2K or 0.08%               |
| <b>Resistance transmitter, 2/3/4 wire</b>      | Resistance( $\Omega$ ) | 0 $\Omega$ to 500 $\Omega$  | 10 $\Omega$     | $\pm$ 0.1 $\Omega$ or 0.08% |
|  |                        | 0 $\Omega$ to 4500 $\Omega$ | 100 $\Omega$    | $\pm$ 1.5 $\Omega$ or 0.12% |
| <b>Thermocouples (TC)</b>                      | B (PtRh30-PtRh 6)      | 0 to 1820°C                 | 100°K           | Typ. 2.0 K or 0.08%         |
|  | E (NiCr-CuNi)          | -270°C to 1000°C            | 25°K            | Typ. 0.5 K or 0.08%         |
|  | J (Fe-CuNi)            | -210°C to 1200°C            | 25°K            | Typ. 0.5 K or 0.08%         |
|  | K (NiCr-Ni)            | -270°C to 1372°C            | 25°K            | Typ. 0.5 K or 0.08%         |
|  | N (NiCrSi-NiSi)        | -270°C to 1300°C            | 25°K            | Typ. 1.0 K or 0.08%         |
|  | R ( PtRh13-Pt)         | -50°C to 1768°C             | 100°K           | Typ. 2.0 K or 0.08%         |
|  | S (PtRh10-Pt)          | -50°C to 1768°C             | 100°K           | Typ. 2.0 K or 0.08%         |
|  | T (Cu-CuNi)            | -270°C to 400°C             | 25°K            | Typ. 0.5 K or 0.08%         |

Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)







|                                  |                            |                 |      |                   |
|----------------------------------|----------------------------|-----------------|------|-------------------|
| <b>Voltage Transmitters (mV)</b> | Millivolt Transmitter (mV) | -10 to 75mV     | 5mV  | +/- 20µV or 0.08% |
|                                  |                            | -1000 to 1000mV | 20mV | +/- 50µV or 0.08% |

## OUTPUT SPECIFICATIONS

|                                |  |                       |  |
|--------------------------------|--|-----------------------|--|
| <b>Output</b>                  | 4 to 20 mA   |                       |  |
| <b>Signal on alarm</b>         | Underranging   | Linear drop to 3.9 mA |  |
|                                | Overranging  | Linear drop to 21 mA  |  |
|                                | Sensor break; open-circuit   | 3.9 mA                |  |
| <b>Load</b>                    | Max. (V power supply - 7.5 V) /0.022 A                                 |                       |  |
| <b>Linearisation</b>           | Temperature linear (TC inputs/ RTD)/ Resistance linear, voltage linear |                       |  |
| <b>Galvanic Isolation</b>      | 2 KV AC ( input/output) (Except TTHRn)                                 |                       |  |
| <b>Communication Interface</b> | Through USB/ HART Communication accessory                              |                       |  |

## PERFORMANCE CHARACTERISTICS

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| <b>Response time</b>                  | < 1 sec                           |
| <b>Reference operating conditions</b> | Calibration temperature: 27°C ±5K |
| <b>Long Term Stability</b>            | ≤0.05%/year                       |
| <b>Switch on delay</b>                | ≤5s                               |
| <b>Influence of ambient</b>           | Negligible                        |
| <b>Load Influence</b>                 | Negligible                        |
| <b>Filter settings</b>                | 0 to 30s                          |
| <b>Power supply Influence</b>         | Negligible                        |
| <b>Resolution</b>                     | 0.3µA                             |

Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)

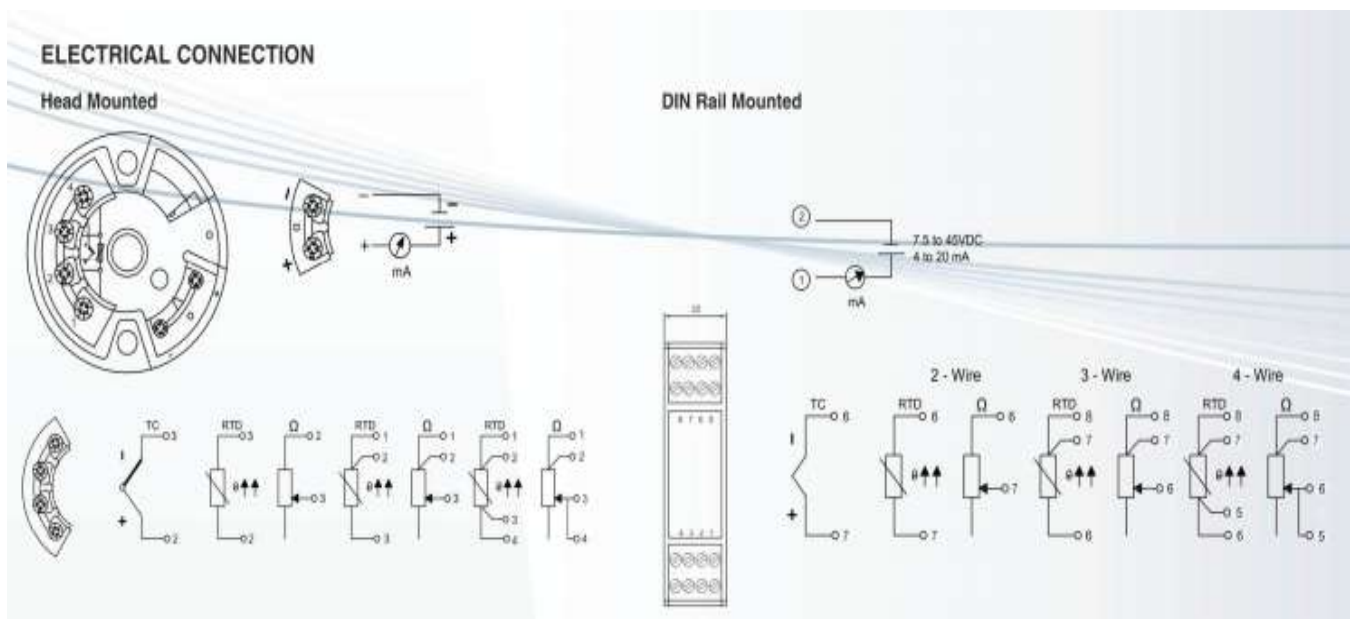




| ENVIRONMENT CONDITIONS              |   |
|-------------------------------------|---|
| Ambient temp. limits                | (-) 40 to 85°C  |
| Storage temperature                 | (-) 40 to 100°C   |
| Degree of protection                | IP 00 (without enclosure)/ IP65(with enclosure)   |
| Condensation                        | Allowable   |
| Shock and vibration resistance      | 4g/2 to 1 50 Hz as per IEC 60068-26   |
| Electromagnetic compatibility (EMC) | Interference Immunity And Interference emission according to GB/T17626.2-1998), Compliance with IEC 61000-4-3: 1995 |

| OTHERS  |  |
|---|--|
| Dimension<br>Sensor Head mounting<br>DIN Rail mounting<br>IP 65 enclosure | Dia 44mm X 24.7mm<br>115 X 100 X 22 mm<br>115 X 155 X 120        |
| Material Sensor head/ DIN Rail mounting                                   | Housing: Polycarbonate; Potting: epoxy<br>Housing: Cast Aluminum |
| Power Supply  | 9 to 32 VDC  |

## Electrical Connection



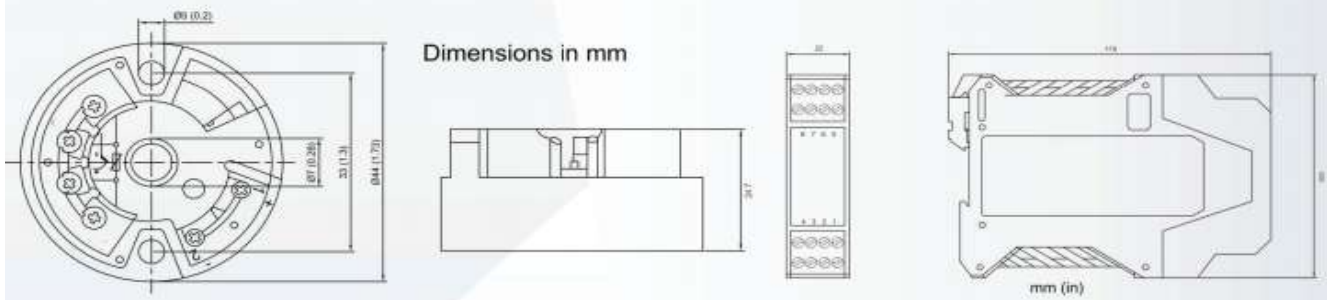
Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)



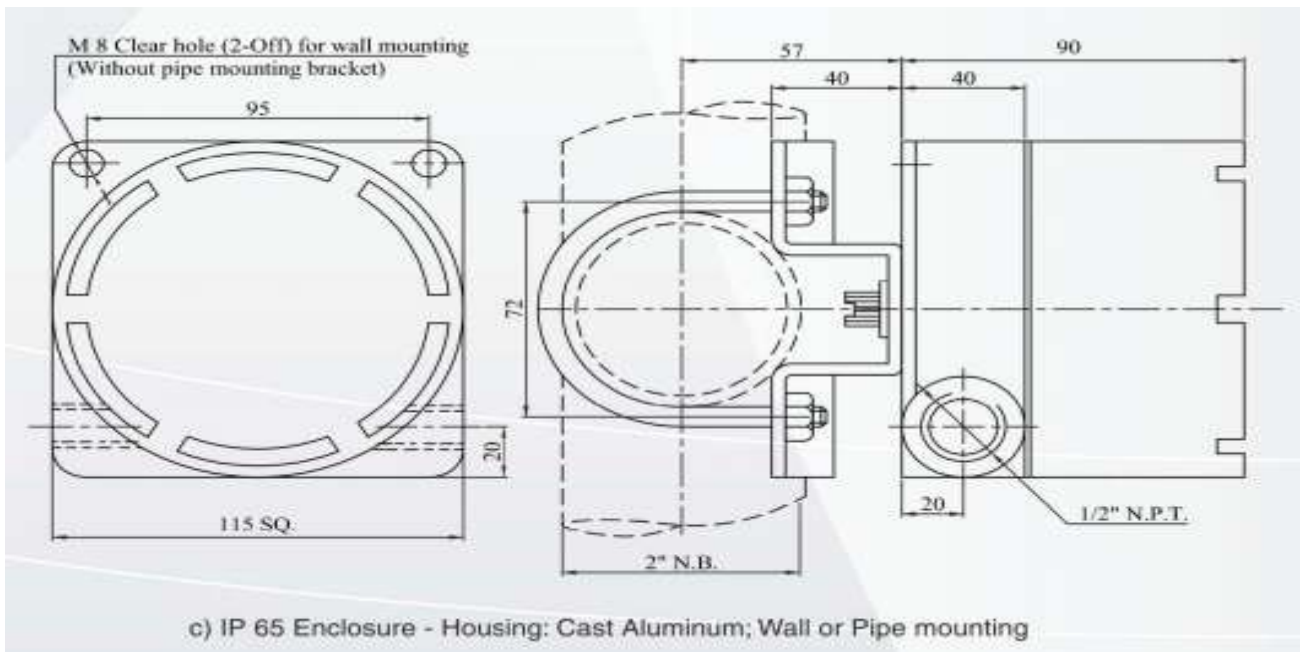


### DIMENSIONS



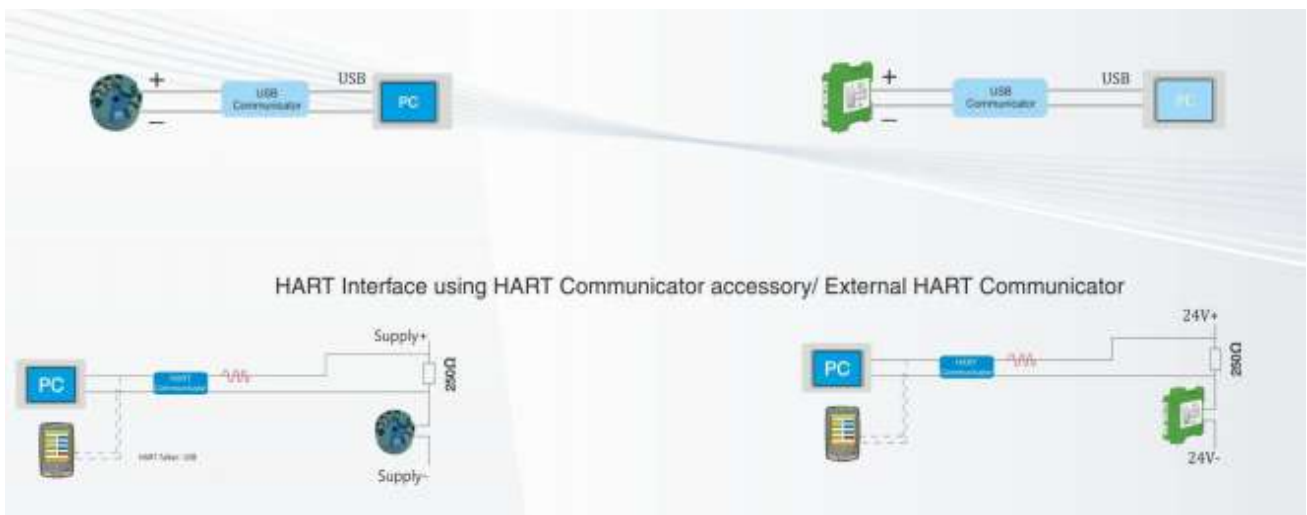
a) Housing: Polycarbonate; Sensor head mounting

b) Housing: Polycarbonate; 35 mm DIN Rail mounting



c) IP 65 Enclosure - Housing: Cast Aluminum; Wall or Pipe mounting

## How to Programme



Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)





## Selection Table

| Model | Item | Specification                | Code | Details  |
|-------|------|------------------------------|------|--|
| TT    | A    | Enclosure/<br>Mounting       | H    | Housing . Polycarbonate, potting :<br>Epoxy/sensor head mounting |
|       |      |                              | D    | Housing: Polycarbonate, 45mm width/DIN rail<br>(35mm) mounting   |
|       |      |                              | W    | IP65 enclosure/Wall or pipe mounting                             |
|       |      |                              | F    | Flameproof cast aluminum. Wall mounting.<br>1P66 enclosure       |
|       | B    | Input & Output               | R    | RTD input  |
|       |      |                              | U    | Universal input (T/C, VmA, Potentiometer,<br>2/3/4 wire          |
|       |      |                              | DU   | Dual input available in DIN rail mounting                        |
|       | C    | Isolation &<br>Communication | N    | Without Isolation-uses USB communication                         |
|       |      |                              | I    | With isolation-uses USB communication                            |
|       |      |                              | H    | With isolation-uses HART communication                           |
|       |      |                              | P    | With isolation-uses Profibus communication                       |

### Note:

- TT\_UI has Universal Input & Range as standard using the optional USB Communicator, however factory preset Input & Range can be provided if specified in order.
- TT\_UH has Universal Input & Range as standard using the optional HART Communicator or external HART Communicator, however factory preset Input & Range can be provided if specified in order.
- Universal Input and HART Communication is available only with isolation.
- If Input/ Range change is desired, order USB! HART Communicator accessory.

Toshniwal Industries Pvt. Ltd.

Industrial Estate, Makhupura, Ajmer- 305002, Rajasthan, India  
+91 844 844 1044 | [info@tipl.com](mailto:info@tipl.com) | [www.tipl.com](http://www.tipl.com)

