

# Transformer Protection Relay

## Oil & Winding Temperature Indicators For Oil cooled Transformers





# About EMBELINK

- EMBELINK TECHNOLOGIES – a name stands for excellence in embedded manufacturing and service industry. EMBELINK was established in 2014.
- EMBELINK is recognized for standing in market place with great customer satisfaction and as one of the trusted name offering quality products and solution in Embedded and IoT field with strong services.
- EMBELINK is a small close-knit company with well-qualified and trained manpower.





# Nature of Business

- Manufacturers and sales of industrial electronics and process control instruments and micro-controller based control system for Transformer, Power-Energy, Electrical utility center, Medical, Banking, Security, Text-tile, Boom-barrier and toll gate automation etc.
- Also, providing customized application development services in field of embedded, IoT and IT or combinations of any for the above said industries.





# Technical Expertise

- EMBELINK is having expertise in developing customized application or product using following advanced technologies :
- Advanced interfaces like : UART, I2C, SPI, RS-232, RS-485, Ethernet, USB, CANBUS etc.
- Advanced interfacing of module like : GSM / GPRS, GPS, Wi-Fi, RFID, Blue-tooth, Zigbee, InfraRed, RF etc.
- Advanced universal protocols like : TCP/IP, MODBUS, Profibus, DLMS etc.
- Development of product to comply IEC 61000 series EMI/EMC standards
- Advanced Linux OS based boards like : Raspberry Pi, Beagle bone etc.
- Advanced PCB Designing : Single-side, Double-side and Four layer board.

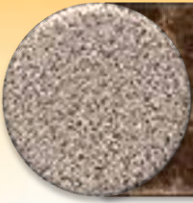




# Products

- Transformer Protection Relay for Dry and Oil cooled transformer.
- Energy Meter Gateway for single and three phase energy meter.
- Blood warming system, Rectal and skin temperature monitoring device for Medical Application.
- Ethernet TCP/IP based banking security product.
- Industrial SMPS.
- Energy efficient system for Solar based street light.
- USB, Wi-Fi and RF based Gate controlled device for automatic toll collection booth.
- Xbee based data logging system for temperature and humidity.
- Customized embedded and IoT application development.





## Basic Requirements for Winding Temperature Indicators

For the safety, reliability and long operational life of the transformer, a good temperature surveillance system is necessary.

A good temperature surveillance system should provide the following features:

- Accurate temperature measurement and display for Oil and Winding Temperature.
- Alarm and Trip signals for Oil and Winding temperatures
- Cooling fan controls.
- EMI / EMC conformity and should be suitable for switchyard environmental conditions.
- Sensor Fault monitoring and indication.
- Maximum temperature registering.
- Signal for remote indication and SCADA / DAS





## EMBELINK OTI & WTI Features

**EMBELINK** oil & winding temperature scanners (Transformer protection relays) are designed to meet these basic requirements. Most of them will have many more added features incorporated.

### Salient Features :

- **WTI is designed to give better noise immunity for Transient Spike, Surge, Electrostatic Discharge and Radiated Magnetic field.**
- **Wide operating power supply range from 85 – 440 VAC / DC.** This makes our unit to work without any problem considering neutral open or other phase imbalance conditions.
- **WTI Enclosure is designed for Ingress Protection IP-55.** This makes our unit to work for long life without any dust, moisture or water related problems and it allows to mount the WTI in open sky condition. However, we recommend to mount it in marshalling box with Fuse / MCB protection.
- **Isolated 4-20mA output with maximum burden resistance of 500 ohms.**
- **Isolated SCADA / DAS compatibility (RS-485 based MOBUS RTU Slave protocol)**
  - In very near future, IEC 61850 gateway connectivity.





## EMBELINK OTI & WTI Features

### Salient Features :

- OTI & WTI comes in a single combined unit.
- Individual displays for Oil and Winding temperature.
- Site configurable CT and dT(Gradient)
- Anticipated Fan Control increases life of transformers.
- Fan Exerciser keeps Fan in healthy condition.
- Isolated 4-20mA outputs for Oil and Windings.
- Isolated RS-485 output for computer communication using MODBUS RTU Slave protocol.



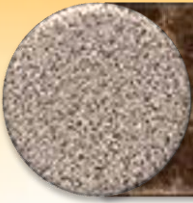




## Advantages over conventional Dial Type OTI & WTI

- Compact single unit for OTI & WTI.
- Super bright displays offer unambiguous readings even in ambient light conditions.
- Installation convenience
  - The layout is to customer choice and convenience. With non-separable dangling capillaries in dial type unit, it is quite inconvenient to handle.
- Low rating CT required.
- Interchangeability of main unit and sensor due to standardization leads to ease in installation, maintenance and service.
- Ease of calibrating at end customer's place. This is not possible with conventional ones.

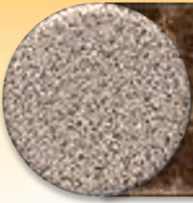




## Advantages over conventional Dial Type OTI & WTI (Advanced Fan Control)

- **Anticipated fan control**
  - Anticipatory fan control is a unique feature of EMBELINK OTI&WTI. TPR-105 is capable of anticipating whether the temperature is going to cross the fan set point much before it actually happens. It uses this information to turn on the Fan.
  - This feature along with high accuracy, minimizes the overshoot of temperature above the fan set point, reducing the thermal shocks and enhancing transformer's life.
  - Also, it allows the user to use the transformer for higher loads.
- **Fan exerciser**
  - During cold seasons or under low load conditions, it may happen that the Fan is not operated for long durations of time. This results in jamming of Fans and so it is recommended to switch on Fans regularly for small time to keep it in healthy and working conditions.

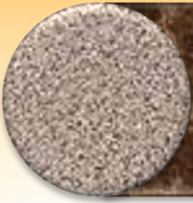




## Advantages over conventional Dial Type OTI & WTI (RS-485 Port)

- EMBELINK “OTI&WTI” has an Isolated RS-485 port
- Benefits of using RS-485 are
  - Just 2 wires can be used to connect 32 units to a SCADA / DAS.
  - The data does not get corrupt because of ambient noise.
  - Data can be taken to long distances (upto 1 km). Further it can taken using repeaters.
  - External RS-485 connected devices can be used to transmit data over internet, on wireless networks, on GPRS systems etc very easily.
  - Can be used with our remote indicators to pass on all the information to a remote location, if SCADA / DAS is not available.

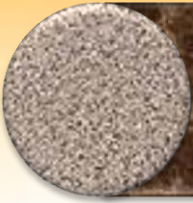




## Advantages over conventional Dial Type OTI & WTI (RS-485 & 4-20mA outputs)

- Using RS-485 capabilities, using just 2 wires, this remote indicator can show
  - Both oil and winding temperatures
  - Maximum temperatures recorded
  - Alarm & Trip status
  - Fan relay status
  - Fault indication
  - Set points.
- Isolated 4-20 mA signals corresponding to oil and winding temperature are available as in-built feature. Isolated signals eliminated ground looping problem at data acquisition unit's end. These signals can be used to connect to SCADA / DAS or easily available remote indicators.
- **Not available in conventional WTIs. Resistance based remote indicators suffer from accuracy, reliability and interchangeability issues.**





## Advantages over conventional Dial Type OTI & WTI (Sensors)

- Only one sensor is required to be installed that too in a simple oil pocket installed on the top plate of the transformer.
- The sensor is easily available RTD Pt-100 sensor and is easily interchangeable if required.
- No special heater pockets are required to be installed for our OTI&WTI





# Cost Effectiveness

- Procurement costs reduces
  - Our Digital OTI&WTI cost < Conventional OTI + WTI.
  - As OTI&WTI can be stocked as Max. CT load and dT (Gradient) can be set easily at customer or at end customer's place.
  - As standard CTs can be procured and stocked.
- Material costs reduces
  - Marshaling box size can be reduced to more than half
    - As our Digital OTI/WTI requires half the space
    - In-built 4-20 mA eliminates the need of an external device which reduces the marshaling box size and interconnection costs involved
  - Only one simple standard sensor pocket and small rating CT saves material cost
  - Replacement costs due to accidental damage to capillary during installations
- Labor cost
  - Simple electrical connections costs less labor.
  - No interconnections (for 4-20mA units etc.) costs less labor.



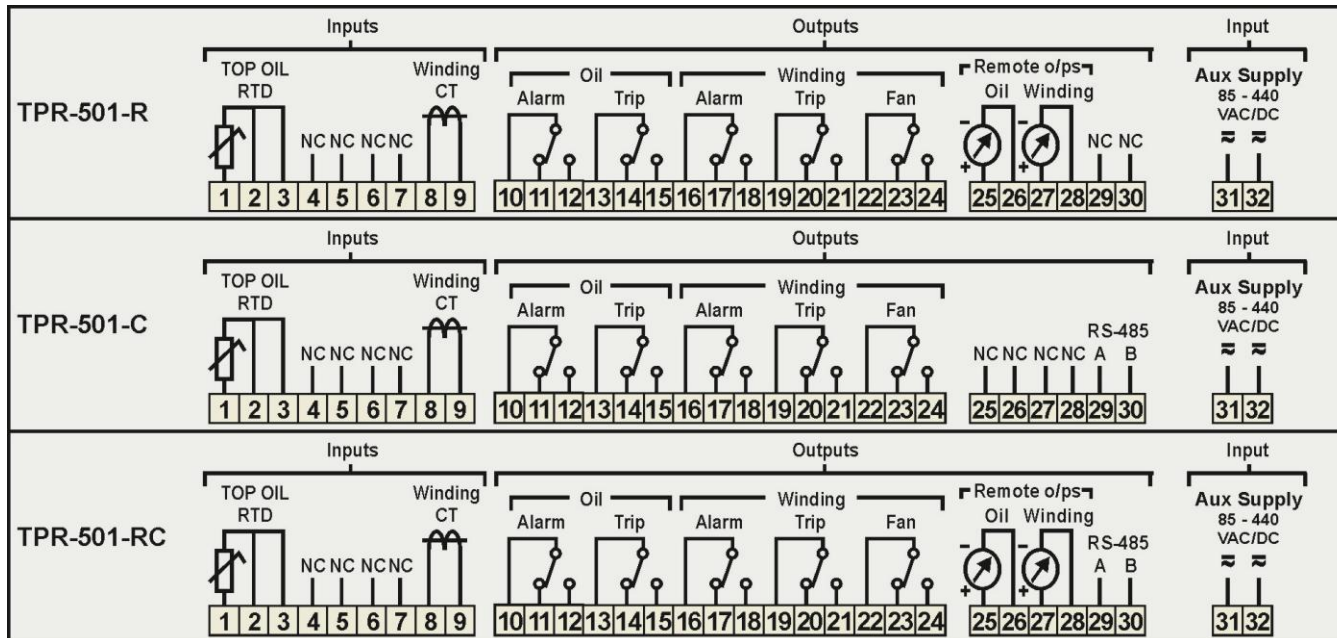


## EMBELINK OTI & WTI Variants for Oil cooled Type Power Transformers

Models →	TPR-501-R	TPR-501-C	TPR-501-RC
4-20 mA Analog Outputs	1 - Oil 1 - Winding	No	1 - Oil 1 - Winding
RS-485 MODBUS Protocol	No	Yes	Yes
No. of Relay Outputs	5 (1 C/O)	5 (1 C/O)	5 (1 C/O)



# EMBELINK OTI & WTI Wiring Details







**Thank You**

## **EMBELINK TECHNOLOGIES**

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