

Application Note OVR AN001 for OVR 06D, OVR SL06, OVR 06Q, OVR RTD, OVR SL RTD, OVR RTDQ

# Protection for Resistance Temperature Detectors (RTDs)

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The Resistance Temperature Detector is a widely used device for measuring temperature. In basic terms, the electrical resistance of a sensing resistor,  $R_t$ , varies with temperature.

Temperature is simply measured indirectly by reading the voltage drop across the sensing resistor in the presence of a constant current flowing through it using Ohm's Law.

## 2 Wire systems

2 Wire systems offer poor accuracy due to lead resistance but are adequate for some industrial applications.

This type of system can be protected using a single 2-channel OVR 06D or space saving Slim Line OVR SL06 surge protective device (SPD) (OVR 06D illustrated opposite).

## 3 Wire systems - earthed bridge

3 Wire systems allow for a good deal of lead resistance compensation and therefore offer better accuracy than a 2 wire system.

In a typical 3 wire system, the bridge circuit is earthed as shown in the diagram opposite. It is therefore necessary to protect all three wires.

This could be accomplished using two OVR 06D or OVR SL06 SPDs where only 1 channel of the second SPD is utilised. However, this would be bulky and not cost effective due to the unused channel.

The OVR SL RTD and OVR RTD are 3-channel SPDs specifically designed to protect this type of system. All 3 channels are housed in an enclosure identical in size to their respective 2-channel SPD.

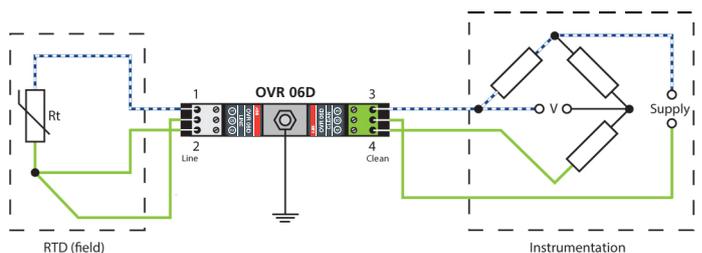
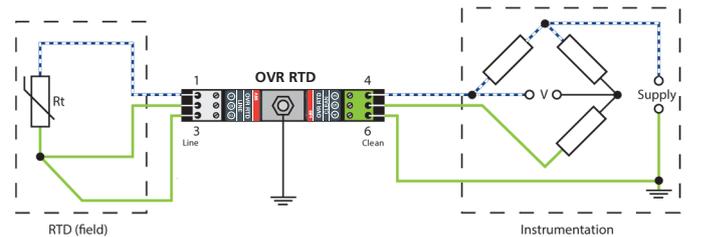
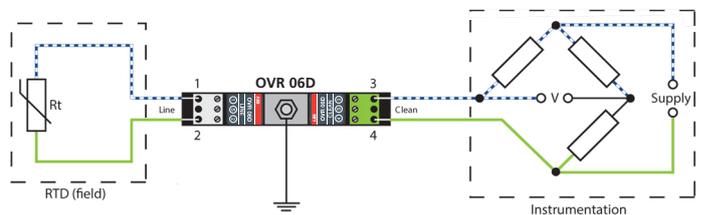
## 3 Wire systems - floating bridge

There are also 3 wire systems where the bridge circuit is not earthed and is said to be "floating".

In this system, a single OVR SL06 or OVR 06D SPD can be used to protect the 2 leads from the bridge arms whilst the third (supply) lead is connected to the SPD's earth via the screen connection (OVR 06D illustrated opposite).

Fundamentally, every sensing resistor is a 2 wire device. It is essential that the resistance values of any external lead wires are taken into account.

Depending on the accuracy required and application, the sensing resistor is terminated with either 2, 3 or 4 wires. Each type of lead wire arrangement is connected to a suitable bridge circuit in the measuring instrumentation.



## 4 Wire systems

4 Wire systems provide the highest accuracy as the lead resistances and connection contact resistances have a negligible effect if the measuring circuit has high input impedance.

The leads are often connected to a constant current circuit.

All 4 channels can be protected using two OVR 06D or OVR SL06 SPDs (OVR SL06 illustrated opposite).

## Summary

### For 2 wire systems

use 1 x OVR 06D or OVR SL06 SPD

### For 3 wire systems (earthed bridge)

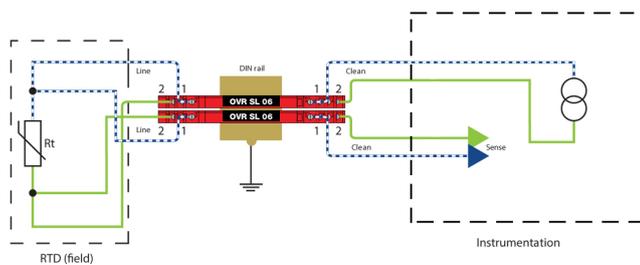
use 1 x OVR RTD or OVR SL RTD SPD

### For 3 wire systems (floating bridge)

use 1 x OVR 06D or OVR SL06 SPD

### For 4 wire systems

use 2 x OVR 06D or OVR SL06 SPDs



### Please note:

Information about safe and correct installation of ABB OVR SPDs can be found in the OVR SPD installation Instructions, supplied with all products.



## Protecting multiple RTDs

Where there are multiple RTD systems requiring protection, the OVR Q series variants, OVR 06Q and OVR RTDQ, can be utilised.

The OVR 06Q provides protection for 4 pairs (8 channels) of wires whilst the OVR RTDQ will protect three sets of 3 wires (9 channels). Diagrams for each type are shown opposite.

Thus space saving potential and cost effectiveness can be realised over the equivalent number of SPDs.



An OVR 06Q unit is capable of protecting:

- Four 2 wire systems
- Four 3 wire systems (floating bridge)
- Two 4 wire systems



An OVR RTDQ unit is designed to protect up to three 3 wire systems with an earthed bridge.

Part No.	ABB order code
OVR 06D	7TCA085400R0288
OVR SL06	7TCA085400R0360
OVR 06Q	7TCA085400R0333
OVR RTD	7TCA085400R0313
OVR SLRTD	7TCA085400R0315
OVR RTDQ	7TCA085400R0314

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