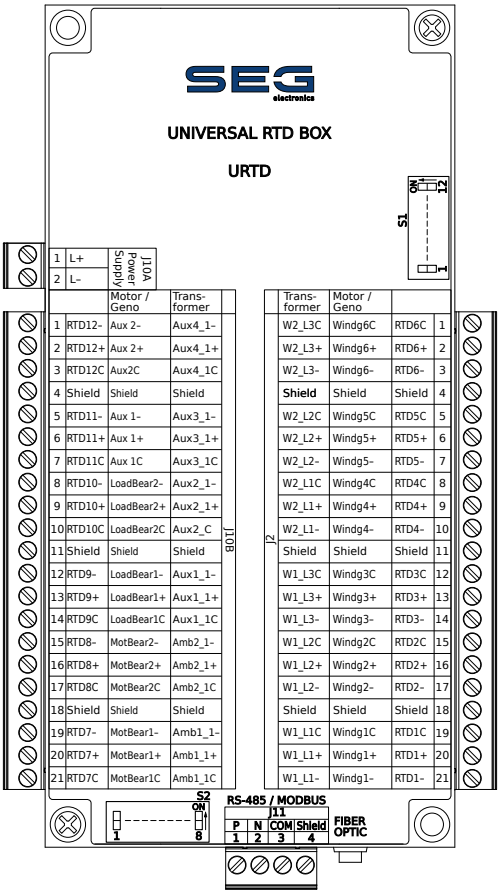
MANUAL

HighPROTEC | PROTECTION TECHNOLOGY MADE SIMPLE

URTD | UNIVERSAL RESISTANCE TEMPERATURE DETECTOR BOX



UNIVERSAL RESISTANCE TEMPERATURE DETECTOR BOX

Version: II

Original document

English

Revision: E

Table of Contents

Comments on the Manual

This manual explains in general the tasks of device planning, parameter setting, installation, commissioning, operation, and maintenance of the URTD devices.

The manual serves as working basis for:

- Engineers in the protection field;
- commissioning engineers;
- people dealing with setting, testing and maintenance of protection and control devices, and
- well trained personnel for electrical installations and power stations.

All functions concerning the type code will be defined. Should there be a description of any functions, parameters or inputs/outputs which do not apply to the device in use, please ignore that information.

All details and references are explained to the best of our knowledge and are based on our experience and observations.

This manual describes the (optionally) full featured versions of the devices.

All technical information and data included in this manual reflect their state at the time this document was issued. We reserve the right to carry out technical modifications in line with further development without changing this manual and without previous notice. Hence no claim can be brought based on the information and descriptions this manual includes.

Text, graphic and formulae do not always apply to the actual delivery scope. The drawings and graphics are not true to scale. We do not accept any liability for damage and operational failures caused by operating errors or disregarding the directions of this manual.

No part of this manual is allowed to be reproduced or passed on to others in any form, unless SEG Electronics GmbH have approved in writing.

This User manual is part of the delivery scope when purchasing the device. In case the device is passed on (sold) to a third party, the manual has to be handed over as well.

Any repair work carried out on the device requires skilled and competent personnel who need to be well aware especially of the local safety regulations and have the necessary experience for working on electronic protection devices and power installations (provided by evidence).

Information Concerning Liability and Warranty

SEG Electronics does not accept any liability for damage resulting from conversions or changes carried out on the device or planning (projecting) work, parameter setting or adjustment changes done by the customer.

The warranty expires after a device has been opened by others than SEG Electronics specialists.

Warranty and liability conditions stated in SEG General Terms and Conditions are not supplemented by the above mentioned explanations.

IMPORTANT DEFINITIONS

The signal definitions shown below serve the safety of life and limb as well as for the appropriate operating life of the device.

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to personal injury.

CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.

FOLLOW INSTRUCTIONS

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

PROPER USE

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (1) constitute “misuse” and/or “negligence” within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (2) invalidate product certifications or listings.

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docs.SEGelectronics.de/urtd

If your publication is not there, please contact your customer service representative to get the latest copy.

CAUTION

Electrostatic Discharge Awareness

All electronic equipment is electro-static sensitive, some components more than others. To protect these components from electro-static damage, you must take special precautions to minimize or eliminate electrostatic discharges

Follow these precautions when working with or near the control.

Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).

Follow these precautions when working with or near the control.

1. **Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).**
2. **Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.**
3. **Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.**
4. **Do not remove any printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:**
   - **Verify the safe isolation from supply. All connectors have to be unplugged.**
   - **Do not touch any part of the PCB except the edges.**
   - **Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.**
   - **When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.**

Introduction

The Universal RTD Module (URTD) is an electronic resistance-temperature detector accessory for use with protective devices:

The URTD can be used to monitor as many as 12 RTD inputs.

The URTD can be programmed to accept any of the following types of RTD inputs:

- 100 Ohm Platin
- 100 Ohm Nickel
- 120 Ohm Nickel
- 10 Ohm Copper

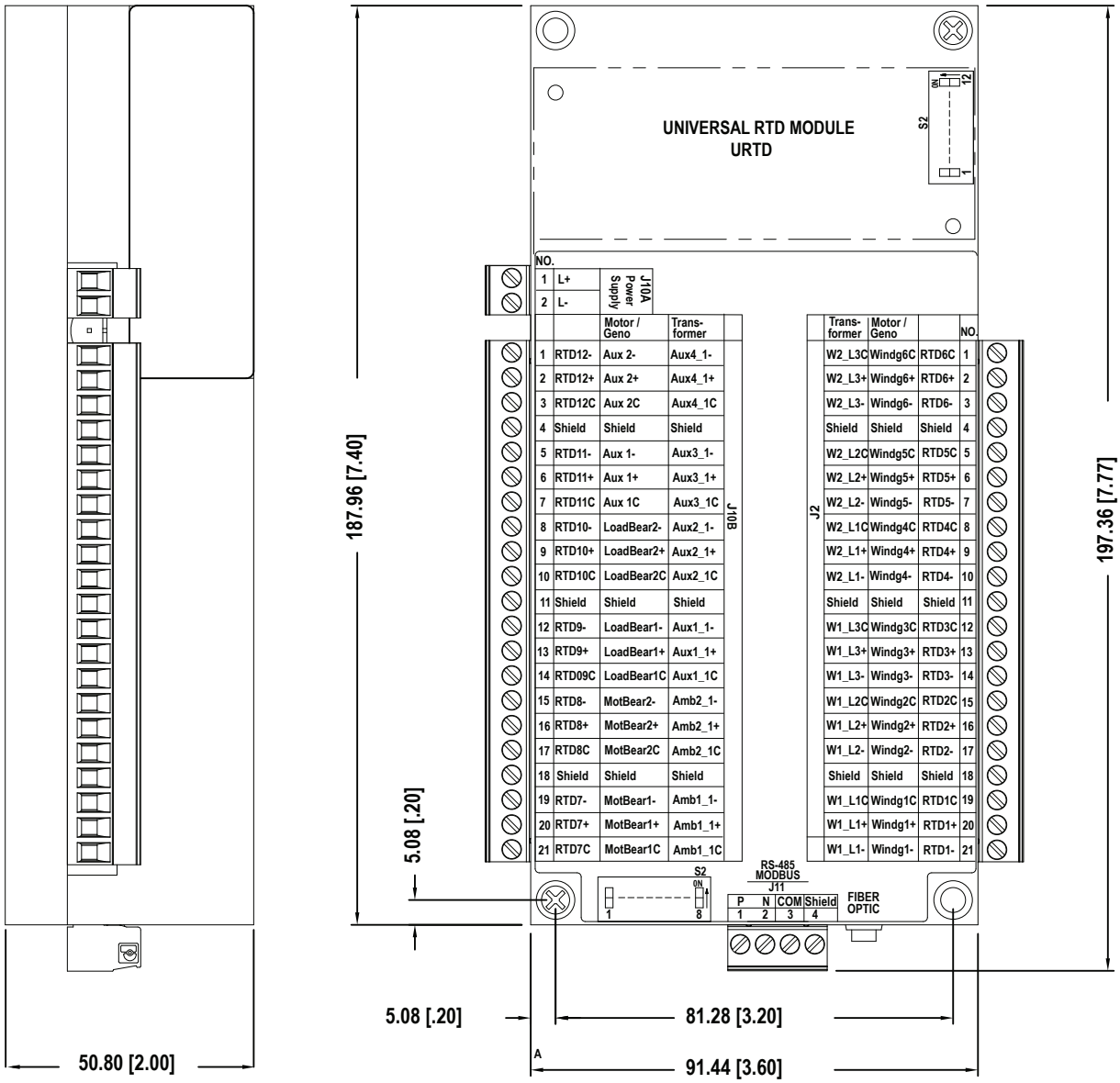
The RTD type can be selected for each of the four RTD groups. For example, The winding RTD inputs can be programmed for 10 ohm copper and the bearing RTD inputs can be programmed for 120 ohm nickel.

The URTD can transmit its information to a protective device using a fiber optic link. It can be mounted remotely up to 122 meters (400 feet) from the protective device when using the fiber optic link.

The URTD can also be used as a stand-alone device that communicates on a Modbus network. A bidirectional RS485 port is provided on the bottom of the unit.

Assembly Drawing

The URTD dimensions are shown in Figure1.



All dimensions in mm [inch]

Figure 1. Dimension Drawing

Installation

This industrial type control should be installed, operated, and maintained by adequately trained personnel. The instructions in this document do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check-out, safe operation, or maintenance.

⚠CAUTION Care must be exercised to comply with local, state, and national regulations, as well as safety practices, for this class of equipment.

Table 1. Specifications

Specification (Part Numbers)	*URTD-01*	*URTD-02*
Input Power Requirements	48-240 VAC (±20%) / 48-250 VDC (±20%)	24-48 VDC (±20%)
Frequency	50/60 Hz or DC	DC
Power Consumption	3,5 W	1 W
Operating Temperature	-20° to 55°C (-4° to 131°F)	-20° to 55°C (-4° to 131°F)
Storage Temperature	-40° to 85°C (-40° to 185°F)	-40° to 85°C (-40° to 185°F)
Humidity	0 to 95% R.H. Non-condensing	0 to 95% R.H. Non-condensing
Altitude	2000 Meters	2000 Meters
Pollution Degree	2	2
Installation Category	1	1

Table 2. Accuracy, RTD types and ranges

RTD Type	*Temp Range*	*Accuracy*	*Resistance Range*	*Shorted RTD*	*Open RTD*
100 Ohm Platinum (385)	-20 -250 deg C	± 2°C	92- 194 Ohm	<= 10 Ohm	>=400 Ohm
100 Ohm Nickel (618)	-20 -250 deg C	± 2°C	89 - 245 Ohm	<= 60 Ohm	>=325 Ohm
120 Ohm Nickel (672)	-20 -204 deg C	± 2°C	106 -245 Ohm	<= 60 Ohm	>=400 Ohm
10 Ohm Copper (427)	-20 -250 deg C	± 2°C	8.25 - 18.75 Ohm	<= 2 Ohm	>= 20 Ohm

Table 3. IEC Symbol Description

IEC Symbol	Description
	Both Direct and Alternating Current
	Direct Current
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION

Programming the Universal RTD Module

The URTD must be programmed for the type of RTDs that are being monitored. A DIP switch assembly (S2) on the module enables programming for the specific application. Figure 2 shows the arrangement of the DIP switches in the assembly. They provide four selection groupings that you must set during installation.

As Figure 2 shows, the DIP switch assembly contains eight two-position slide switches that are set in combination. Each switch is set to ON or OFF by sliding it back and forth.

When facing the DIP switches, slide them:

- Toward the FRONT of the unit for the ON position, and
- Toward the REAR of the unit for the OFF position.

Figure 3 shows a side view of a single slide switch, and how it is set to ON and OFF.

Observe the ON and OFF designations on the DIP switches shown in Figures 2 and 3.

NOTICE **Always look for the ON and OFF designations on the hardware or printed circuit board to be sure you are setting the switches correctly.**

DIP switch ON and OFF settings are shown in Table 2.

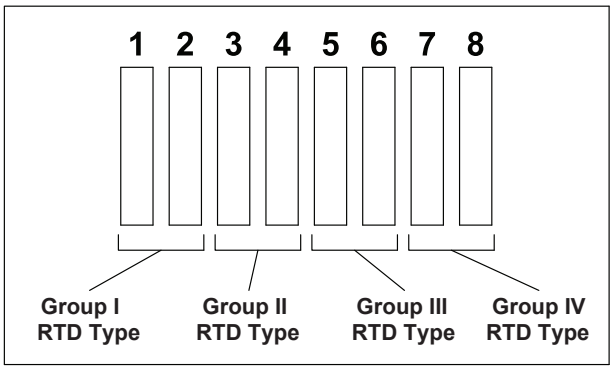


Figure 2. DIP Switches S2

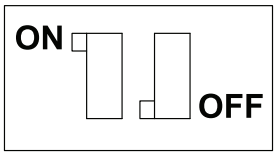


Figure 3. Dip Switch (Side View)

Table 4. DIP Switch Settings

Group I RTD1 - RTD6			*Group III RTD9 - RTD10*		
RTD Type	Switch Settings		RTD Type	Switch Settings	
	1	2		5	6
100 Ohm Platinum	ON	ON	100 Ohm Platinum	ON	ON
100 Ohm Nickel	OFF	ON	100 Ohm Nickel	OFF	ON
120 Ohm Nickel	ON	OFF	120 Ohm Nickel	ON	OFF
10 Ohm Copper	OFF	OFF	10 Ohm Copper	OFF	OFF
Group II RTD7 - RTD8			*Group IV RTD11 - RTD 12*		
RTD Type	Switch Settings		RTD Type	Switch Settings	
	3	4		7	8
100 Ohm Platinum	ON	ON	100 Ohm Platinum	ON	ON
100 Ohm Nickel	OFF	ON	100 Ohm Nickel	OFF	ON
120 Ohm Nickel	ON	OFF	120 Ohm Nickel	ON	OFF
10 Ohm Copper	OFF	OFF	10 Ohm Copper	OFF	OFF

RTD Wiring

Each RTD must be wired to the URTD, as shown in Figure 4. The following guidelines must be observed:

Use only one type of RTD (10 ohm copper, 100 ohm nickel, 100 ohm platinum, or 120 ohm nickel) for each RTD group: winding, bearing, load bearing, and auxiliary. For example, you cannot monitor one 10 ohm copper bearing RTD and one 120 ohm nickel bearing RTD. However, you can monitor 10 ohm copper winding RTDs and 100 ohm nickel bearing RTDs.

1. Use #18 three-conductor, stranded, twisted, copper wire to connect the RTD to the URTD
2. Connect three conductors from the RTD to the URTD. (Two return wires must be connected together). Where the device has only two leads from the RTD, connect two of the three conductors together at one of the leads. Make this connection as close to the RTD as possible (see Figure 5). If only two conductors are connected between the RTD and the URTD, the device will not operate correctly.
3. Connect the cable shield and drain wires to the appropriate terminal on the URTD. At the opposite end, cut the shield and drain wire short and tape them, to prevent short circuits.

NOTICE **Do not connect this wiring at the RTD end.**

4. If one or more of the 12 possible RTD inputs on the module are not used, they can be left open or jumpered out without affecting the operation of the protective devices.

Wire Routing

Wire routing is divided into two types: High voltage (440 Vac and higher) and low voltage (120 Vac and DC signals). The control and the RTD wiring are low voltage lines. Maintain at least 45 to 60 cm (1.5 to 2 feet) between high voltage and low voltage conductors. Never route high voltage and low voltage lines in the same raceway.

If a fiber optic link is used, run the optic cable in the same cable tray as high voltage conductors.

NOTICE **If a fiber optic link is used, run the optic cable in the same cable tray as high voltage conductors.**

Protective Device Connections

The URTD can be connected to a protective device using fiber optic cable. The fiber optic cable may be no longer than 122 meters (400 feet) in length. This cable is available from SEG Electronics. This is plastic fiber optic cable that has connectors already attached at each end.

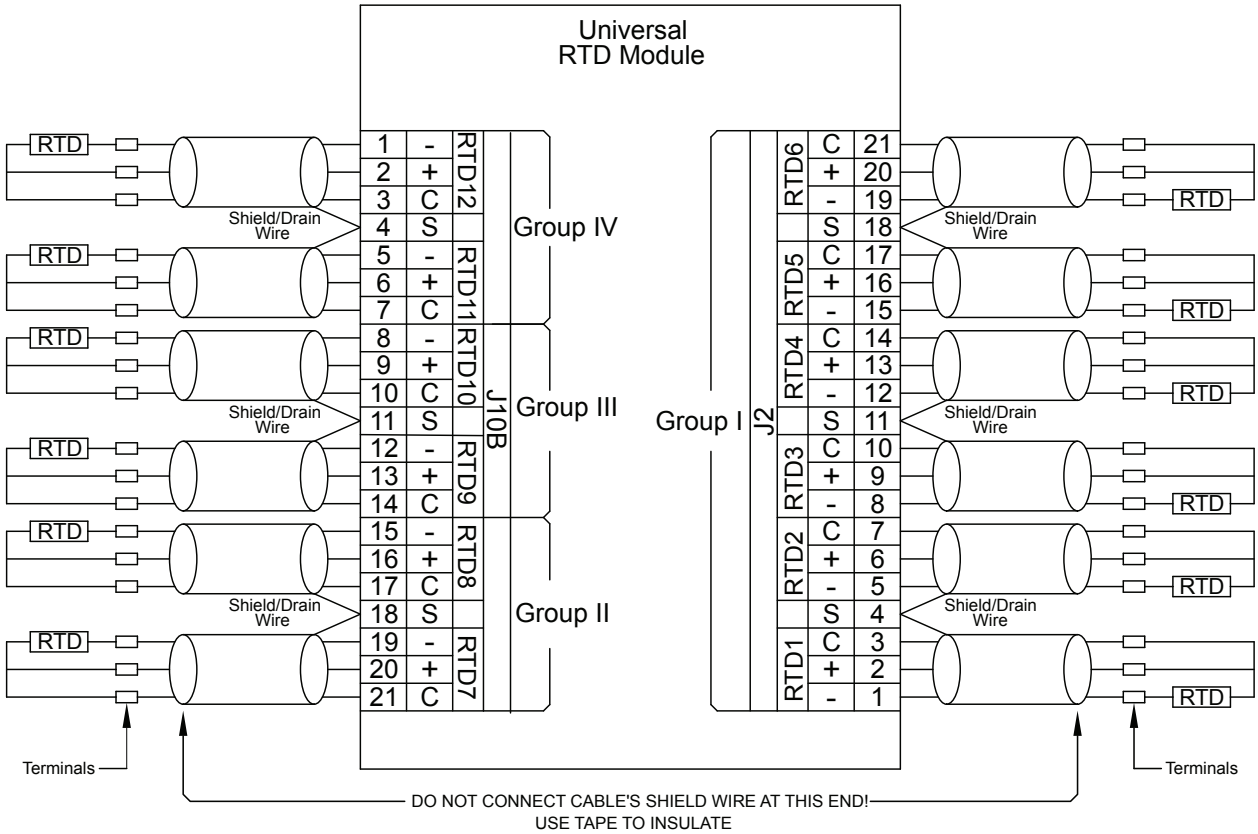


Figure 4. RTD Wiring (Three-Lead Type)

NOTICE

1. **Each shielded cable conductor must be connected on the URTD as shown.**
2. **Use of three-lead RTDs is recommended.**
3. **RTDs must not be grounded, and no common connections between RTDs should be made.**
4. **A suitable earth ground should be connected to J10B-4, J10B-11, J-10B-18, J2-4, J2-11, or J2-18. It is recommended that a ground connection is made to both sides of the unit.**

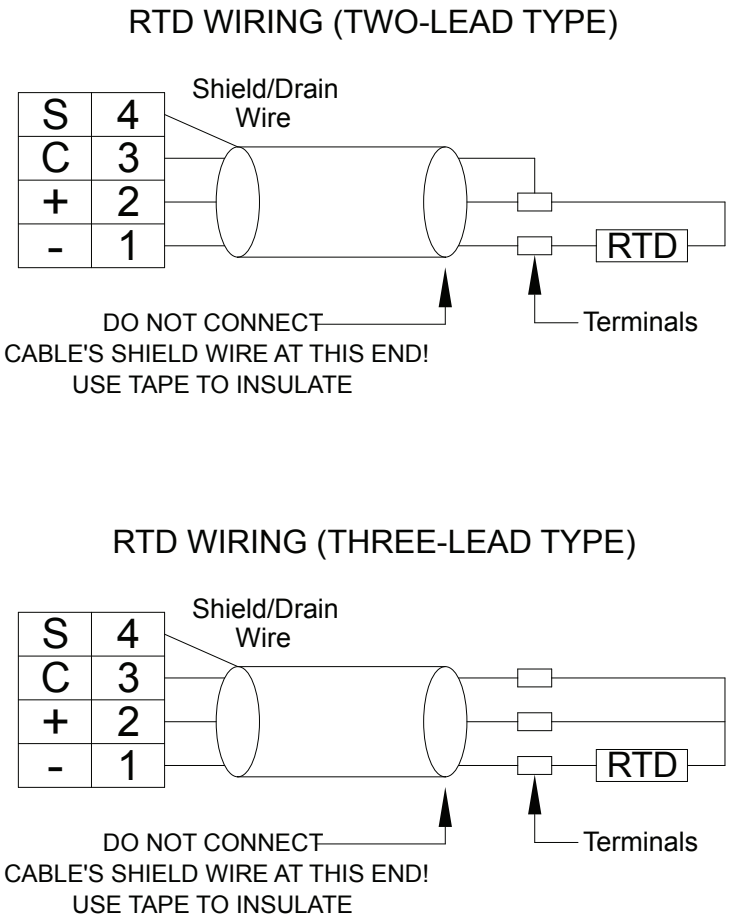


Figure 5. Wiring to URTD

NOTICE

1. **Connect cable shield at URTD terminals only. Cut shield short at end and use shrink tubing or electrical tape to insulate.**
2. **RTDs must not be grounded at the terminals and no common connections between individual RTDs should be made.**

a Grounding required for security if supply voltage is fed via a transformer

b Fuse

c Option depending on ordered device

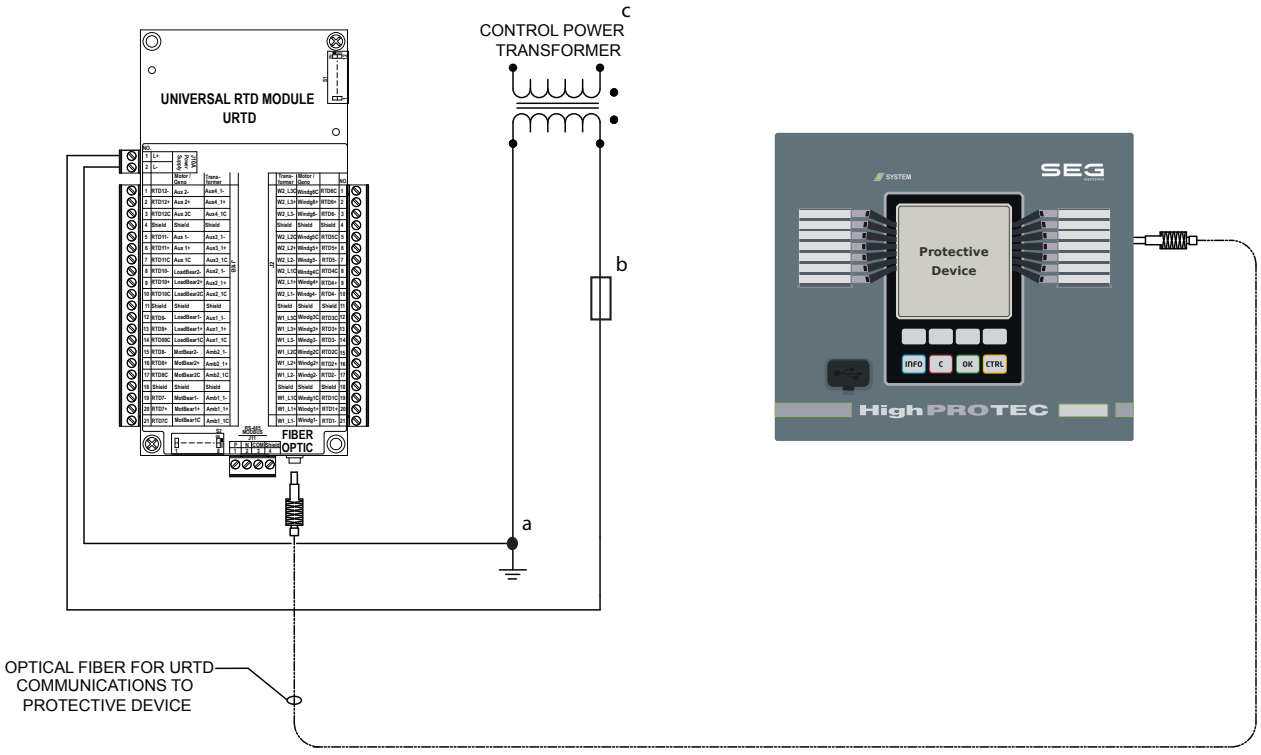


Figure 6. Fiber Optic Connection between URTD and Protective Device.

Table 5. URTD Power Connection

To Power Supply		
Terminal Block Power (J10A)	*AC Power Supply*	*DC Power Supply*
1 (L+)	Line	Positive
2 (L-)	Neutral	Negative

Mounting

URTDII can also be mounted as a stand-alone device at a convenient location using the mounting dimensions provided in Figure 1.

Device must be located where hazardous terminals are not accessible.

Control Power

Connect the power supply terminals (labeled J10A) on the URTD to a suitable power source. Refer to Table 4 for connection guidelines. The terminal blocks used in this device are suitable for field wiring, No. 22-14 AWG, solid or stranded copper wire conductor, tightening torque 7 in. lb.

The power supply wiring should be fused or put on a breaker sized to protect the wire.

A circuit breaker/fuse shall be included in the building installation.

The circuit breaker/fuse shall be in close proximity to the equipment and within easy reach of the operator.

The circuit breaker/fuse shall be marked as the disconnecting device for the equipment.

Product shall be installed in accordance with local codes.

Be aware that the range of the power supply depends on the different part numbers referred to in Table 1.

Communications

Dip-Switches S1

The dip switch S1 is located on the right side of the module.

Dipswitch 10 is used to select the data output format of the fiber optic port. Many products in the field today are connected to the existing URTD module. This module supports 11 RTDs providing only one Auxiliary RTD to the user. To minimize the effort of replacing an existing module with a URTDII module, dipswitch 10 selects a legacy mode that provides data in the same format as the existing URTD module. Expanded mode adds the 2nd Aux RTD, case temperature and hottest RTDs from each group of RTDs. Table 7 shows the selection of this switch:

Figure 7. DIP Switches (S1) and Positions

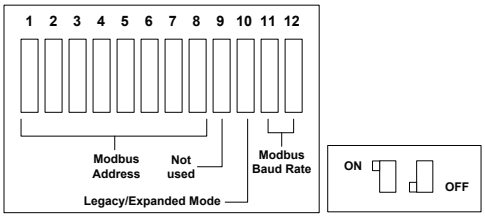


Table 6. Dips Switch Settings

Dipsw10	*Mode*
OFF	Do not use
ON	12 RTDs, Case, Hottest (Expanded)

Modbus

General Modus Description

The URTD can also be used as a stand-alone device that communicates on a Modbus network.
A bidirectional RS485 port is provided on the bottom of the unit. The following describes the configuration of the Modbus parameters.

Physical settings:

Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None

Addressing

A set of dip switches (S1) is located on the side of the module. These switches set the Modbus address/configuration. Dipswitches 1 to 8 represent the binary address of the URTD. Dipswitch 1 is the most significant address bit and dipswitch 8 in the least significant bit. Table 5 shows an abbreviated example of the addressing. Valid addresses range from 1 to 254. See notices below about reserved addresses.

NOTICE

Address 00 is a broadcast address and should not be used in a typical Modbus system. If this address is selected it will put the URTD module in a mode provided exclusively for IMR systems. Please refer to IMR Documentation for further information.

NOTICE

Address 255 is a reserved address. Normal Modbus commands will not be interpreted correctly while the unit is set to this address. In this mode the URTD should not be connected to a network because the network protocol is not being handled. The URTD will respond to any message it received with a minimum of a prompt character potentially disrupting any other communications on the network.

Table 7. Modbus Address Selection Settings

Address	*Dipsw0*	*Dipsw1*	*Dipsw2*	*Dipsw3*	*Dipsw4*	*Dipsw5*	*Dipsw6*	*Dipsw7*	*Dipsw8*
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
...									
254	ON	ON	ON	ON	ON	ON	ON	ON	OFF
255	ON	ON	ON	ON	ON	ON	ON	ON	ON

Baud Rates

Dipswitches 11 and 12 of dipswitch S1 (accessed on the side of the URTD) set the Modbus baud rate.
Table 8 shows the setting definitions:

Table 8. Baud Rate Selection Settings

Baud Rate	*Dipsw11*	*Dipsw12*
9600 Baud	OFF	OFF
19200 Baud	OFF	ON
38400 Baud	ON	OFF
115200 Baud	ON	ON

Register Map

The following tables show the addresses and data values contained in each application category with a base address of 0x00.

Table 9. Last Reset Status Definitions

Cause of Last Reset	*Holding Register Value*
Power Up Reset	0x00
Software Reset	0x01
Wake Up Reset	0x02
RTC Reset	0x03
Low Voltage Detect Reset	0x04
Watchdog Reset	0x05

Table 10. Modbus Register Map

Actual Value Objects		*Units*	*No. of Reg.*	*Register Number (Decimal)*		*Register Number (Hexadecimal)*			
Category	*Name*			*IEEE Float*	*Fixed Point*	*IEEE Float*	*Fixed Point*	*Fixed Point Scale Factor*	*Fixed Point Sign Factor*
Product ID	Product ID		2	4718	6254	126E	186E	1	Signed
	RTD winding 1	°C	2	4740	6276	1284	1884	1	Signed
	RTD winding 2	°C	2	4742	6278	1286	1886	1	Signed
	RTD winding 3	°C	2	4744	6280	1288	1888	1	Signed
	RTD winding 4	°C	2	4746	6282	128A	188A	1	Signed
	RTD winding 5	°C	2	4748	6284	128C	188C	1	Signed
Temperature	RTD winding 6	°C	2	4750	6286	128E	188E	1	Signed
	RTD bearing 7	°C	2	4752	6288	1290	1890	1	Signed
	RTD bearing 8	°C	2	4754	6290	1292	1892	1	Signed
	RTD bearing 9	°C	2	4756	6292	1294	1894	1	Signed
	RTD bearing 10	°C	2	4758	6294	1296	1896	1	Signed
	Auxiliary 11	°C	2	4760	6296	1298	1898	1	Signed
	Auxiliary 12	°C	2	4762	6298	129A	189A	1	Signed
	Case	°C	2	4764	6300	129C	189C	1	Signed

Connection cable between HighPROTEC device and URTD-Box

Product code and Part Number for fiber-URTD

Part Number	*Length of the Fiber cable / m*	*Description*
HPTURTDCON1M	1	Fiber between HighPROTEC devices and URTD-Box 1 m
HPTURTDCON2M	2	Fiber between HighPROTEC devices and URTD-Box 2 m
HPTURTDCON5M	5	Fiber between HighPROTEC devices and URTD-Box 5 m
HPTURTDCON10M	10	Fiber between HighPROTEC devices and URTD-Box 10 m
HPTURTDCON25M	25	Fiber between HighPROTEC devices and URTD-Box 25 m

CERTIFICATIONS AND ELECTROMAGNETIC COMPATABILITY

CERTIFICATIONS

ISO: Manufactured under an ISO9001 Registered Program

UL: UL508, Seventeenth edition, April 15, 2010

CNR- CAN/CSA C22.2 No. 14-10, Eleventh edition, February 2010

UL-File No.: E356783

CSA: Certificate: 2573219, Alternate File: 257195
CSA C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II.
CAN/CSA C22.2 No. 14-10 - Industrial Control Equipment

CE: IEC61010-1

Generic Standard	EN61000-6-4 EN61000-6-2 EN61000-6-3
Product Standard	UL508 (Industrial Control Equipment) ANSI C37.90 CSA22.2 No.14-10

ELECTROMAGNETIC COMPATIBILITY TESTING

(EMISSIONS + IMMUNITY)

EMISSIONS

CONDUCTED EMISSION TEST

EN 61000-6-4	150 kHz – 30MHz	Class A

RADIATED EMISSION TEST

EN 61000-6-4	30MHz – 1GHz	Class A

IMMUNITY

FAST TRANSIENT DISTURBANCE IMMUNITY TEST (BURST)

DIN EN 61000-4-4 IEEE C37.90.1	AC-Power Ports	1kV/5kHz
Class 2	DC Power Ports , Signal and Communication	0,5kV/2,5kHz

SURGE IMMUNITY TEST

IEC/EN 61000-4-5	AC/DC-Power Ports	0,5kV
Class 1	Signal Ports	1kV

ELECTRICAL DISCHARGE IMMUNITY TEST

IEC/EN 61000-4-2

Class 3	Air discharge	8kV
Class 2	Contact discharge	4kV

RADIATED RADIO - FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

IEC 61000-4-3	80MHz – 2GHz	3V/m
IEEE C37.90.2	2GHz – 2,7GHz	1V/m

IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RADIO FREQUENCY FIELDS

IEC/ EN 61000-4-6	0.15 to 47 MHz	10 V
	47 to 68 MHz	3 V
Class 2	68 to 80 MHz	10 V

POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

IEC/ EN 61000-4-8	continues	3 A/m
Class 2		

VOLTAGE DIPS AND INTERRUPTIONS

IEC/EN 61000-4-11	40%-60%	Class: C
	70%-30%	Class: B

Notes:

HighPROTEC

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