Universal Resistance Temperature Detector (URTD) Module II

Table of Contents

E·T·N

Powering Business Worldwide

1.0 Introduction

The Universal RTD Module II (URTDII) is an electronic resistance-temperature detector accessory for the devices shown in Table 1:

Table 1, Applicable Devices

Legacy	Expanded
MP3000	EMR3000
MP4000	EMR4000
FP6000	EMR5000
IQ1000II	ETR4000
	ETR5000
	EGR4000
	EGR5000

The URTDII can be used to monitor as many as 12 RTD inputs, These inputs fall into four groups that consist of: six motor windings, two motor bearings, two load bearings, and two auxiliary RTDs.

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

• 100 ohm platinum

• 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 motor winding RTD inputs can be programmed for 10 ohm copper and the motor bearing RTD inputs can be programmed for 120 ohm nickel.

The URTDII 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 URTDII 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.

2.0 Assembly Drawing
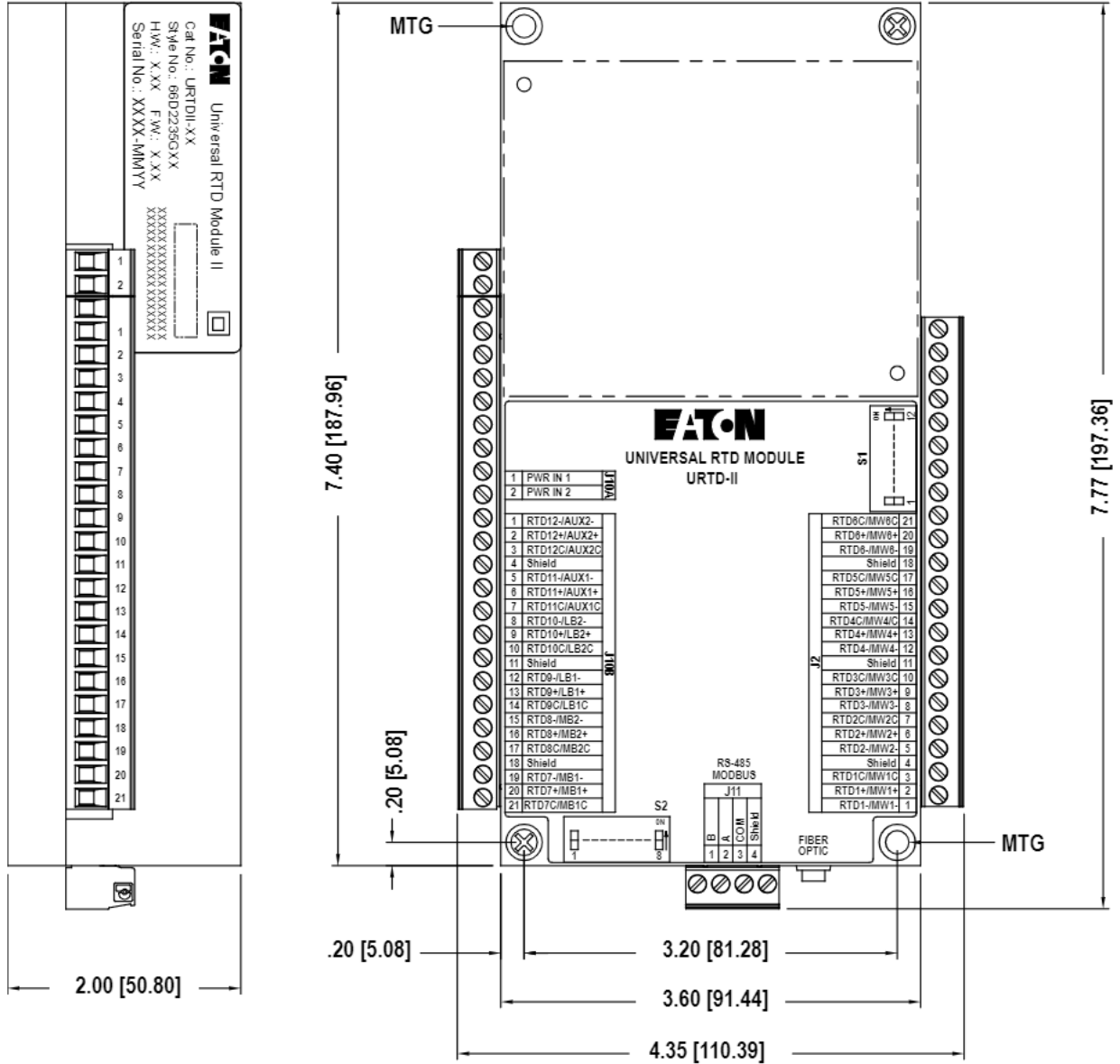
The URTDII dimensions are shown in Figure1.

Figure 1, Dimension Drawing
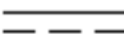
3.0 Installation

⚠ WARNING

HAZARDOUS CONDITIONS MAY RESULT IF THIS PRODUCT IS NOT USED FOR INTENDED PURPOSES. THE DEVICE WILL NOT OPERATE PROPERLY IF USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER.

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

Table 2, Specifications

Specifications	URTDII-01	URTDII-02
Input Power Requirements	48-240 VAC / 48-250 VDC	24-48 VDC
Frequency	50/60 Hz or DC	DC
Power Consumption	3.5W	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	I	I

Table 3, IEC Symbol Description

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

3.1 Mounting

The URTDII can be mounted to the back of a MP3000 or MP4000 using the supplied bracket and hardware. The 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.

3.2 Control Power

Connect the power supply terminals (labeled J10A) on the URTDII 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 shall be included in the building installation.

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

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

Product shall be installed in accordance with local codes.

Table 4, URTDII Power Connections

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

3.3 URTDII Wiring

Each RTD must be wired to the URTDII, as shown in Figures 2 and 3. 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: motor winding, motor bearing, load bearing and auxiliary. For example, you cannot monitor one 10 ohm copper motor bearing RTD and one 120 ohm nickel motor bearing RTD. However, you can monitor 10 ohm copper winding RTDs and 100 ohm nickel motor bearing RTDs.

1. Use #18 three-conductor, stranded, twisted, copper wire to connect the RTD to the URTDII.

2. Connect three conductors from the RTD to the URTDII. (Two return wires must be connected together). Where the motor 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 3). If only two conductors are connected between the RTD and the URTDII, the device will not operate correctly.

3. Connect the cable shield and drain wires to the appropriate terminal on the URTDII. At the opposite end, cut the shield and drain wire short and tape them, to prevent short circuits.

Note: 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.
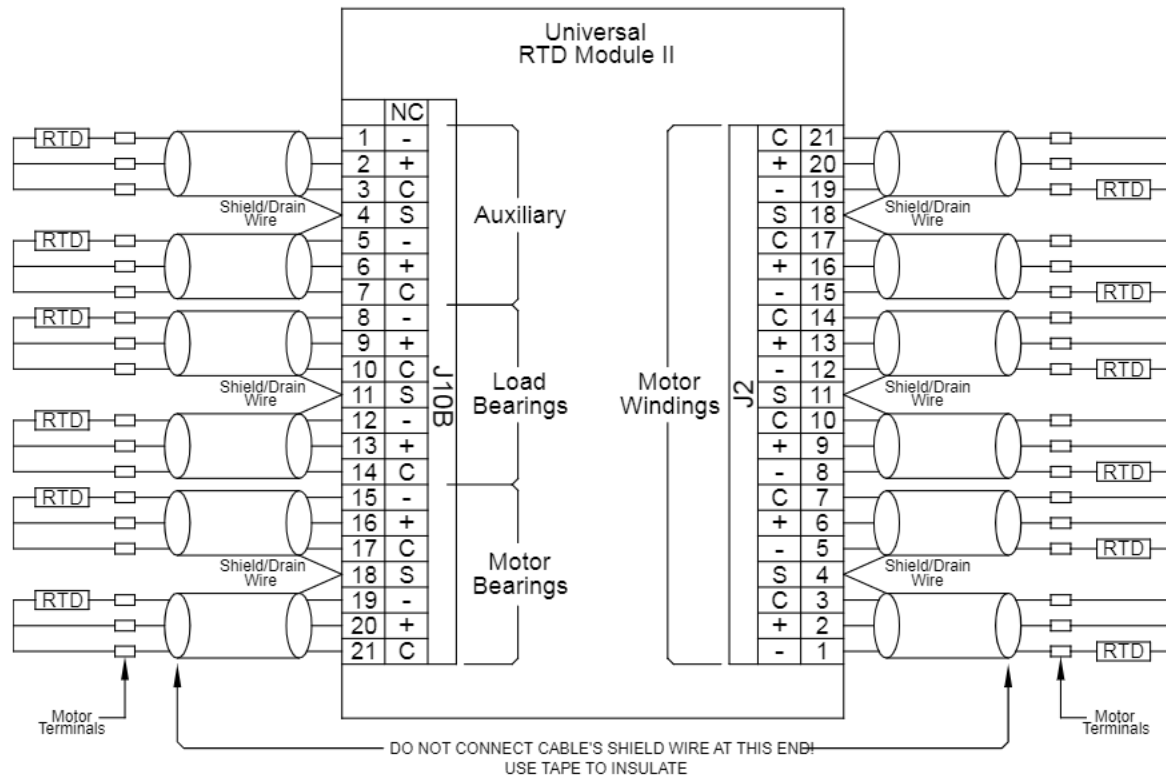
Note:

1. Each shielded cable conductor must be connected on the URTDII as shown.

2. Use of three-lead RTDs is recommended.

3. RTDs must not be grounded at the motor, and no common connections between RTDs should be made at the motor.

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 2, RTD Wiring (Three-Lead Type)

RTD WIRING (TWO-LEAD TYPE)

S	4
C	3
+	2
-	1

Shield/Drain Wire

RTD

Motor Terminals

DO NOT CONNECT
CABLE'S SHIELD WIRE AT THIS END!
USE TAPE TO INSULATE

RTD WIRING (THREE-LEAD TYPE)

S	4
C	3
+	2
-	1

Shield/Drain Wire

RTD

Motor Terminals
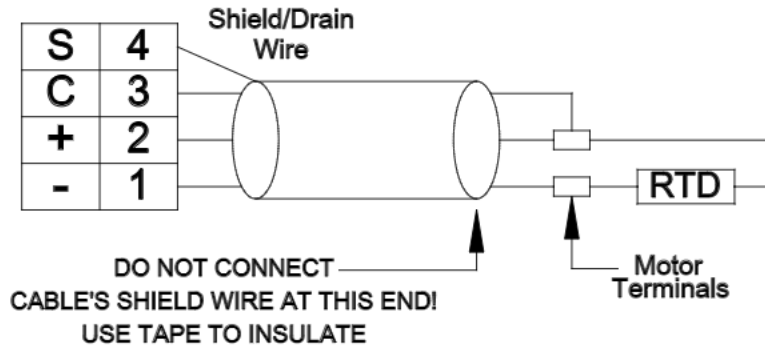
DO NOT CONNECT
CABLE'S SHIELD WIRE AT THIS END!
USE TAPE TO INSULATE
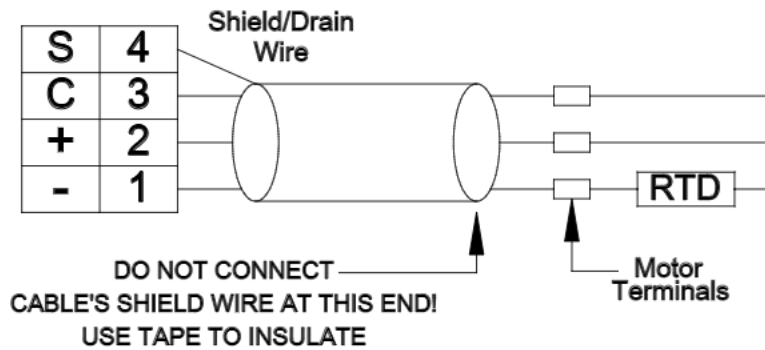
Notes:

1. Connect cable shield at URTDII terminals only. Cut shield short at motor end and use shrink tubing or electrical tape to insulate.

2. RTDs must not be grounded at the motor and no common connections between individual RTDs should be made at the motor.

Figure 3, Wiring to URTDII

3.4 Programming the Universal RTD Module II

The URTDII must be programmed for the type of RTDs that are being monitored. A DIP switch assembly on the module enables programming for the specific application. Figure 4 shows the arrangement of the DIP switches in the assembly. They provide four selection groupings that you must set during installation.

As Figure 4 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.

Observe the ON and OFF designations on the DIP switches shown in Figures 4 and 5.

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

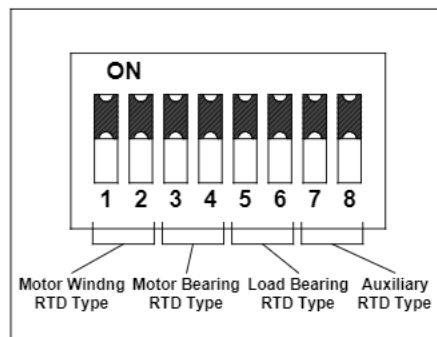DIP switch ON and OFF settings are shown in Table 5. .
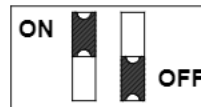

Figure 4, DIP Switches S2

Figure 5, DIP Switch Positions

Table 5, DIP Switch Settings

A. Motor Winding RTD			C. Load Bearing RTD		
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
B. Motor Bearing RTD			D. Auxiliary RTD		
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

3.5 Protective Device Connections

The URTDII 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 Eaton using style numbers MPFO-xxx, or from Hewlett-Packard using style number HFBR-ELS-xxx, where xxx is the length of the cable in meters. This is plastic fiber optic cable that has connectors already attached at each end. Equivalent cable and connectors may be used. Cabling reference numbers are shown in Table 6.
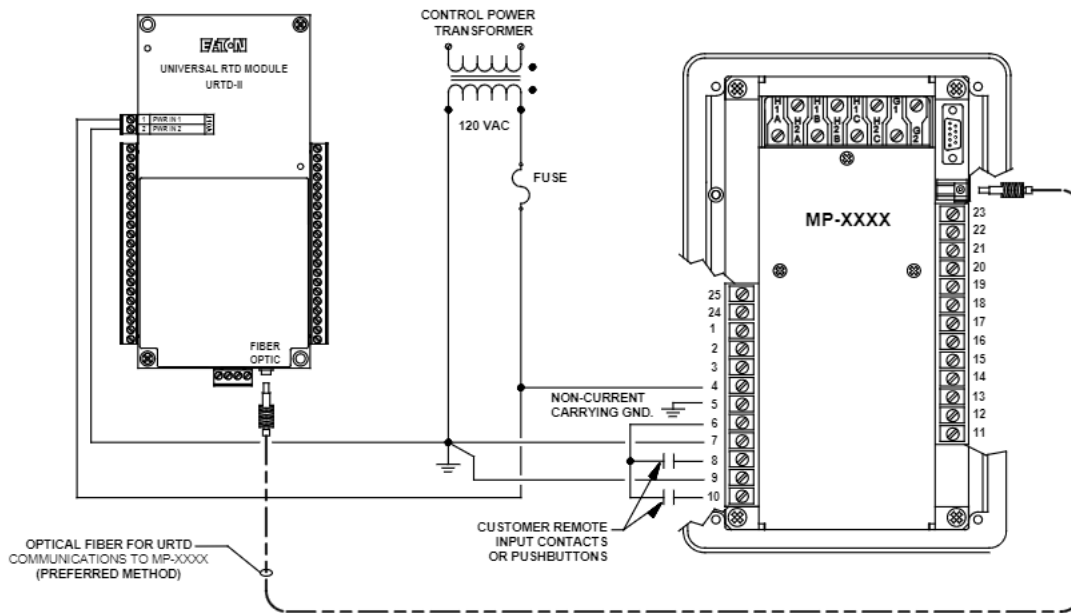

Figure 6, Fiber Optic Connection between MP-4000 and Universal RTD Module II

Table 6, Fiber Optic Cabling

Length (Meters)	Eaton Catalog Number	H-P Style Number
1	MPFO-1	HBFR-ELS-001 or HBFR-RLS-001
5	MPFO-5	HBFR-ELS-005 or HBFR-RLS-005-
10	MPFO-10	HBFR-ELS-010- or HBFR-RLS-010
25	MPFO-25	HBFR-ELS-025
50	MPFO-50	HBFR-ELS-050
75	MPFO-75	HBFR-ELS-075
76	MPFO-76	HBFR-ELS-076
100	MPFO-100	HBFR-ELS-100
120	MPFO-120	HBFR-ELS-102R
Uncut Fiber	Not Applicable	HBFR-EUS (length)

3.6 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.

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

4.0 COMMUNICATIONS

4.1 Fiber Optic Settings

A set of dip switches (S1) is located on the 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:

Table 7, Dip Switch Settings

Dipsw10	Mode
OFF	11 RTDs (Legacy Mode)
ON	12 RTDs, Case, Hottest (Expanded)

4.2 Modbus

4.2.1 General Modbus Description

The URTDII 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

4.2.2 Addressing

A set of dip switches (S1) is located on the side of the module. See Figure 7. These switches set the Modbus address/configuration. Dipswitches 1 to 8 represent the binary address of the URTDII. Dipswitch 1 is the most significant address bit and dipswitch 8 is the least significant bit. Table 8 shows an abbreviated example of the addressing. Valid addresses range from 1 to 254.

Observe the ON and OFF designations on the DIP switches shown in Figures 7 and 8.

See notes below about reserved addresses.

Note: **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 URTDII module in a mode provided exclusively for IMR systems. Please refer to IMR Documentation for further information.

Note: **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 URTDII should not be connected to a network because the network protocol is not being handled. The URTDII will respond to any message it received with a minimum of a prompt character potentially disrupting any other communications on the network.

Table 8, Modbus Address Selection Settings

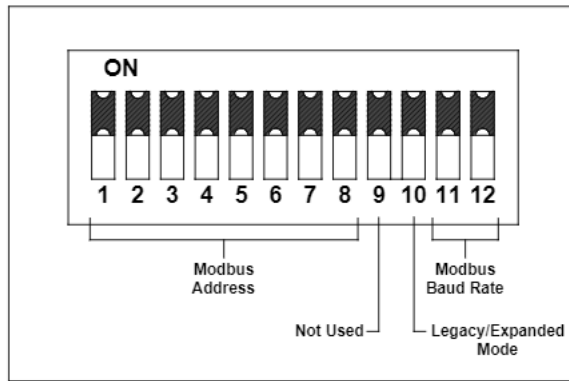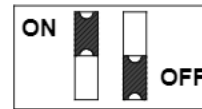| Address	Dipsw1	Dipsw2	Dipsw3	Dipsw4	Dipsw5	Dipsw6	Dipsw7	Dipsw8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
...								
254	ON	ON	ON	ON	ON	ON	ON	OFF
255	ON	ON	ON	ON	ON	ON	ON	ON

Figure 7, DIP Switches (S1)

Figure 8, DIP Switch Positions

4.2.3 Baud Rates

Dipswitches 11 and 12 of dipswitch S1 (accessed on the side of the URTDII) set the Modbus baud rate. Table 9 shows the setting definitions:

Table 9, Baud Rate Selection Settings

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

4.2.4 Register Map

Table 10 shows the addresses and data values contained in each application category with a base address of 0x00.

Table 10, Modbus Register Map

Actual Value Objects				Register Number (Decimal)		Register Number (Hexadecimal)			
Category	Name	Units	No. of Reg.	IEEE Float	Fixed Point	IEEE Float	Fixed Point	Fixed Point Scale Factor	Fixed Point Sign Factor
Product ID	Product ID		2	404718	406254	126E	186E	1	Signed
	Motor winding 1	°C	2	404740	406276	1284	1884	1	Signed
	Motor winding 2	°C	2	404742	406278	1286	1886	1	Signed
	Motor winding 3	°C	2	404744	406280	1288	1888	1	Signed
	Motor winding 4	°C	2	404746	406282	128A	188A	1	Signed
	Motor winding 5	°C	2	404748	406284	128C	188C	1	Signed
Temperature	Motor winding 6	°C	2	404750	406286	128E	188E	1	Signed
	Motor bearing 1	°C	2	404752	406288	1290	1890	1	Signed
	Motor bearing 2	°C	2	404754	406290	1292	1892	1	Signed
	Load bearing 1	°C	2	404756	406292	1294	1894	1	Signed
	Load bearing 2	°C	2	404758	406294	1296	1896	1	Signed
	Auxiliary 1	°C	2	404760	406296	1298	1898	1	Signed
	Auxiliary 2	°C	2	404762	406298	129A	189A	1	Signed
	Case	°C	2	404764	406300	129C	189C	1	Signed