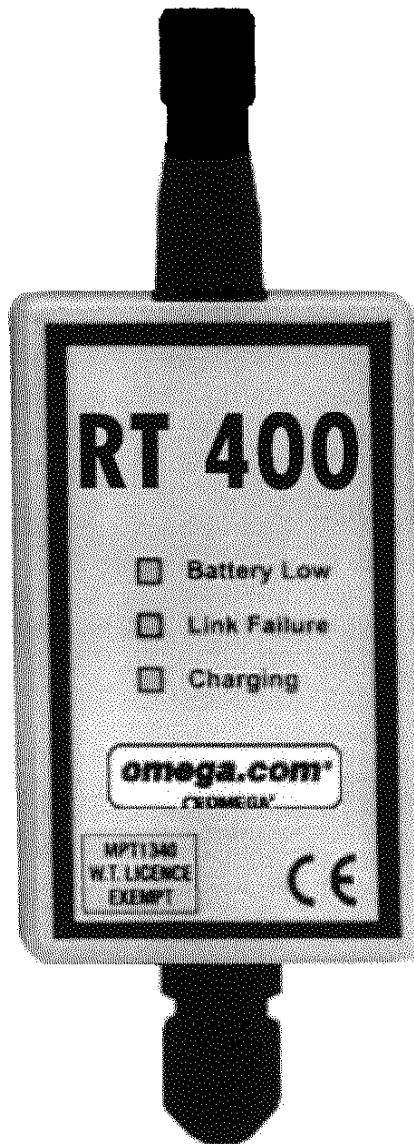


# *User's Guide*



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CE

**RT400**  
***Telemetry System***



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One Omega Drive, P.O. Box 4047  
Stamford CT 06907-0047  
TEL: (203) 359-1660  
e-mail: [info@omega.com](mailto:info@omega.com)

FAX: (203) 359-7700

**Canada:**

976 Bergar  
Laval (Quebec) H7L 5A1  
TEL: (514) 856-6928  
e-mail: [info@omega.ca](mailto:info@omega.ca)

FAX: (514) 856-6886

**For immediate technical or application assistance:**

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e-mail: [espanol@omega.com](mailto:espanol@omega.com)  
[Info@omega.com.mx](mailto:Info@omega.com.mx)

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TEL: +31 (0)20 6418405  
Toll Free in Benelux: 0800 0993344  
e-mail: [nl@omega.com](mailto:nl@omega.com)

FAX: +31 (0)20 6434643

**Czech Republic:**

Rudé armády 1868, 733 01 Karviná  
TEL: +420 (0)69 6311899  
Toll Free in Czech Rep.: 0800-1-66342

FAX: +420 (0)69 6311114  
e-mail: [czech@omega.com](mailto:czech@omega.com)

**France:**

9, rue Denis Papin, 78190 Trappes  
Tel: +33 (0)130 621 400  
Toll Free in France: 0800-4-06342  
e-mail: [france@omega.com](mailto:france@omega.com)

FAX: +33 (0)130 699 120

**Germany/Austria:**

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Tel: +49 (0)7056 3017  
Toll Free in Germany: 0800-TC-OMEGA  
e-mail: [germany@omega.com](mailto:germany@omega.com)

FAX: +49 (0)7056 8540

**United Kingdom:**  
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M44 5EX, United Kingdom  
Tel: +44 (0)161 777 6611  
Toll Free in the United Kingdom: 0800 488 488  
e-mail: [info@omega.co.uk](mailto:info@omega.co.uk)

FAX: +44 (0)161 777 6622

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The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, patient-connected applications.

## **DESCRIPTION**

TELEMETRY SYSTEM Wireless Telemetry from presents a neat alternative to costly cables or wires. TELEMETRY SYSTEM enables remote data acquisition from sensors without hard-wiring.

The TELEMETRY SYSTEM transmitter conveniently interfaces with any resistor or strain gauge based sensor and converts the sampled analogue measurements to digital code. This code is sent to the receiver unit by radio, where the original analogue signal is reconstructed and a scaled output signal is produced.

The in-built UHF radio transmitter and receiver circuits operate on 915MHz and are approved to FCC part 15, allowing LICENCE FREE use in the USA. A fixed compact 1/4 wave helical antenna is provided on both transmitter and receiver units as standard, enabling line of sight operating ranges of over 200 metres to be achieved.

The compact design incorporates a miniature microprocessor base circuit, which provides 16 bit analogue to digital conversion and digital encoding for the radio transmission. Using highly reliable radio designs, and by including data error detection techniques, data transmission is safe and free from errors caused by interference.

Both TELEMETRY SYSTEM units are powered by a re-chargeable battery. Battery life is extended to 500 hours by utilising duty-cycle power saving. Both the transmitter and receiver units are light, compact yet rugged, and are housed in a tough ABS enclosures, environmentally protected against water ingress or dust to IP65.

Typical applications include remote monitoring of strain gauge outputs for stress analysis, weighing systems, load cells and transducers.

## **INSTALLATION**

### **Surface mounting**

The RT400T and RT400R are intended for surface mount installation using the 4 brackets supplied. For best results do not mount these units directly onto a conductive/metal surface, use a spacer of wood or plastic to provide a minimum separation gap of 25mm. Ensure that NO metal objects are within 50mm of the free(hot) end of the antenna.

#### **To attach the unit to the intended surface(See figure 2):-**

- 1)Remove the the plastic blanking plugs in each corner of the rear housing to reveal the retaining screws.
- 2)Unscrew and remove the 4 retaining screws. Remove the rear housing for electrical installation access.
- 3)Insert each plastic mounting bracket into the square recesses in each corner of the rear housing and fix into place by fastening the original retaining screws through the bracket screw holes.
- 4)Tighten down the retaining screws to re-seal the housing.
- 5)Align the enclosure in the desired position on the mounting surface.
- 6)Fasten the unit to the surface using M4 screws through the 4mm slots in the mounting brackets.

## **ELECTRICAL INSTALLATION**

Access to the enclosure for electrical installation is achieved by removing the rear housing as described above.

### **Power connection**

As standard both the RT400T and RT400R units operate from an internal 3.6V rechargeable battery. When the TELEMETRY SYSTEM units are supplied new, this battery will be fully charged. To prevent draining the battery before installation, the Power ON/OFF switch will be factory set to the OFF position. To begin operation, slide the power switch into the ON position.

A 12Vdc/500mA power pack is required to recharge the internal battery when drained. The units can be left on float charge continuously without any harm. Otherwise, recharge the battery when indicated by the LED status light on the front panel of the units. The red 'Charging' LED is illuminated when the external power pack is connected and switched on.

### **Battery life**

**RT400T:** The battery life when fully charged will depend on two factors; the Duty Cycle time setting, and the input impedance of the interfaced sensor. Typically, when using a wheatstone bridge type sensor with input impedance of 1000ohms, and a Duty Cycle time of 10seconds, a continuous operation battery life of 500hours can be expected, before recharging is required.

A variant of the standard unit, includes a non-rechargeable Lithium battery pack, which will increase the battery life to typically 10000 hours continuous use before replacing.

**RT400R:** When fitted, the internal battery life will typically be 8 hours before recharging. This unit would therefore normally be powered by the 12V power pack, with the battery on float charge. The battery acts only as a power backup.

### **Signal connections**

A 4 way screw terminal block enables external signal connections to be made to the TELEMETRY SYSTEM units. The signal cable should be passed through the cable gland at the base of the units, which will accept cable diameters of 3 - 6.5mm. 4 way, screened instrument cable should be used for these connections. The screw terminal block will accept conductor sizes from 0.5 to 1.5mm<sup>2</sup>.

### **Address code**

An 8 way DIP switch is used to select the required transmitter and receiver address codes. The 8 bit address code must be set the same to allow the RT400T to communicate with RT400R. The address code prevent interference from adjacent sets, and 256 codes available.

## **RT400T TRANSMITTER**

### **Input signal**

The RT400T will interface directly with a wheatstone bridge sensor. A sensor excitation voltage of 3.3Vdc is provide to power the sensor, which is turned ON for 60mS before sampling the of sensor output takes pace, then switch OFF to preserve battery power. See figure 5 for connection details.

### **Input range**

The input sensitive range is selectable on 2 DIP switches (See figure 3). The sensitivity range should be selected to best match the interfaced sensor, as this will achieve the highest resolution of measurement. The selectable ranges are:-

<u>Range Switches</u>		<u>Input full-scale sensitivity</u>
<u>1</u>	<u>2</u>	
On	On	+/-5mV
On	Off	+/-25mV
Off	On	+/-500mV
Off	Off	+/-1000mV

### **Transmission duty-cycle**

Once powered, the transmitter unit will continue to sample the input signal and transmit the coded measurement. The time interval between each successive transmission is controllable and can be set to the required value between 500mS and 10seconds, by adjusting the duty-cycle trimming potentiometer (see figure 3). During each transmission, the 'Transmit' green LED will illuminate briefly.

## **RT400R RECEIVER**

### **Voltage signal**

The input signal from the transmitter units is reconstructed in the receiver, and a scaled output signal of 0 to +/-2.5Vdc is generated, representing zero to full-scale. For example:-

#### **Conditions**

Input range: 2mV/V selected.

Sensor type: Load cell, with measured full-scale sensitivity of 1.800mV/V.

Applied load: +50%FS.

$$\text{Then receiver output} = (50/100) \times (1.8 / 2) \times 2.5 \text{ V} = 1.125 \text{ V}$$

### **Communication link failure alarm**

The green LED switches ON (illuminated) to indicate that the communications link between the transmitter and receiver units has failed. This maybe due to a weak or nonexistent radio signal, or miss-matched address codes. When this LED is switched OFF a communications link is present.

This indication is also available as an open drain switch (see figure 4). The drain connection switches to 0V when the communication link is made, and switches to high impedance when communications are lost.

### **Time-out alarm delay**

The time period that the receiver unit waits to receive a valid data frame before activating the communication link failure alarm, can be adjusted to suit the duty-cycle of the transmitter unit. The time-out period can be adjusted from 1 second to 9hours by selecting the appropriate delay on the MODE switches (see selection table below).

<b><u>Mode switches</u></b>	<b><u>Time-out delay</u></b>
<b><u>4 3 2 1</u></b>	<b><u>(seconds)</u></b>
0 0 0 0	1
0 0 0 1	2
0 0 1 0	4
0 0 1 1	8
0 1 0 0	16
0 1 0 1	32
0 1 1 0	64
0 1 1 1	128
1 0 0 0	256
1 0 0 1	512
1 0 1 0	1024
1 0 1 1	2048
1 1 0 0	4096
1 1 0 1	8192
1 1 1 0	16384
1 1 1 1	32768

**Note: '0' represents OFF, '1' represents ON**

## RT400T SINGLE CHANNEL RADIO TRANSMITTER

### Technical Specification

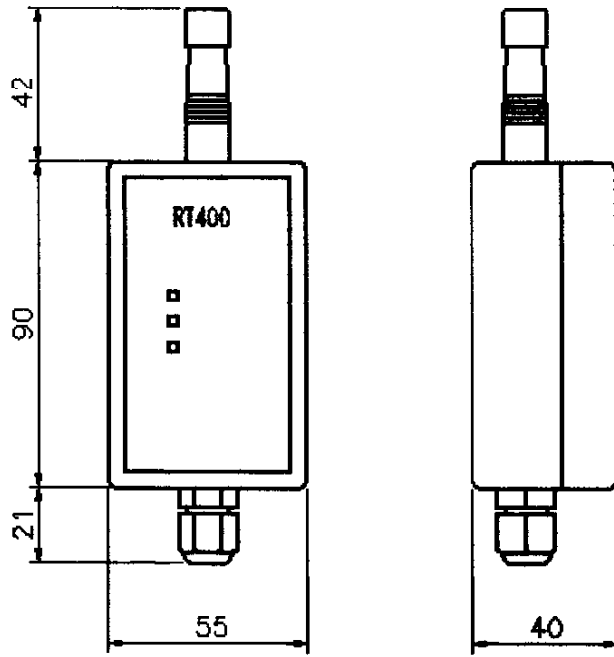
FREQUENCY RANGE:	915MHz
TRANSMITTER POWER:	0.25mW
TYPE APPROVAL:	FCC part 15
TRANSMISSION INTERVAL:	500 mS - 10 S (adjustable)
IDENTIFICATION ADDRESS:	0-255 (switch selectable)
USER SELECTABLE RANGES:	1)+/- 2mV/V                      5)+/-5mV 2)+/-10mV/V                     6)+/-25mV 3)+/-200mV/V                    7)+/-500mV 4)+/-400mV/V                    8)+/-1000mV
RESOLUTION:	Better than 0.02% (13 bit)
SENSOR EXCITATION:	3.3 Vdc ( 9Vdc available as option)
POWER REQUIREMENTS:	Internal 3.6V@120mAh rechargeable battery
STAND-BY CURRENT:	150uA
BATTERY LIFE:	500 hours typically when fully charged
BATTERY CHARGING :	12Vdc@10mA for 14 hours or continuous trickle charge
HOUSING:	High impact resistance ABS, rated to IP65
DIMENSIONS:	55 x 90 x 40 mm
WEIGHT:	120 g (approximately)
OPERATING TEMPERATURE:	-10 degC to +55 degC
STORAGE TEMPERATURE:	-40 degC to +85 degC
ANTENNA:	42mm, 1/4 wave helical in plastic moulding
SENSOR CONNECTION:	4 screw terminals for 0.5 to 1.5mm <sup>2</sup> wire
CABLE GLAND:	Accepts cable diameter 3.0 - 6.5mm diameter

## RT400R SINGLE CHANNEL RADIO RECEIVER

### Technical Specification

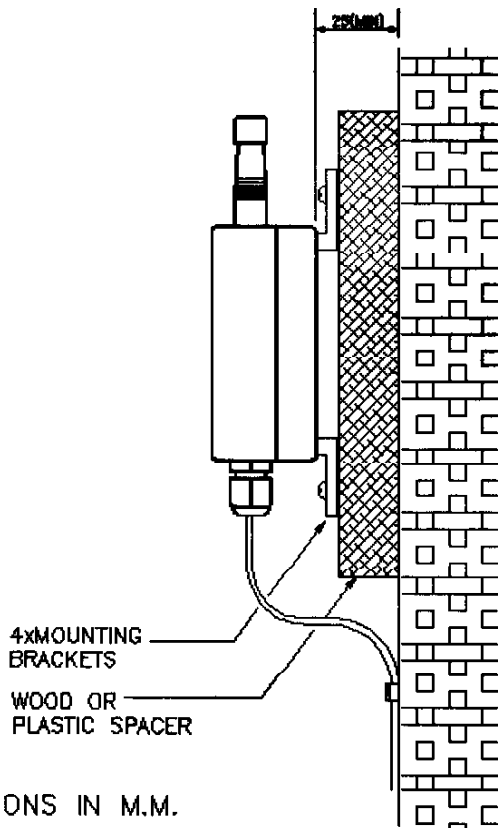
FREQUENCY RANGE:	915MHz
RECEIVER SENSITIVITY:	113 dBm
TYPE APPROVAL:	FCC part 15
COMMUNICATION FAILURE:	Adjustable time delay
ALARM:	Open drain output, maximum current 100mA. Switches to low impedance during communication failure.
ANALOGUE OUTPUTS:	+/-2.5Vdc full-scale (0-5 Vdc option available)
RESOLUTION:	Better than 0.02% (13 bit)
POWER REQUIREMENTS:	12Vdc from power pack.
INTERNAL BATTERY	3.6V@120mAh rechargeable (When fitted)
STAND-BY CURRENT:	14mA
BATTERY LIFE:	8 hours typically when fully charged
BATTERY CHARGING :	12Vdc@20mA for 7 hours or continuous float charge
HOUSING:	High impact resistance ABS, rated to IP65
DIMENSIONS:	55 x 90 x 40 mm
WEIGHT:	120 g (approximately)
OPERATING TEMPERATURE:	-10 degC to +55 degC
STORAGE TEMPERATURE:	-40 degC to +85 degC
ANTENNA:	42mm, 1/4 wave helical in plastic moulding
SENSOR CONNECTION:	4 screw terminals for 0.5 to 1.5mm <sup>2</sup> wire
CABLE GLAND:	Accepts cable diameter 3.0 - 6.5mm diameter





DIMESIONS IN M.M.

Figure 1. DIMENSIONAL DRAWING



DIMESIONS IN M.M.

Figure 2. RECOMMENDED WALL MOUNTING DETAIL

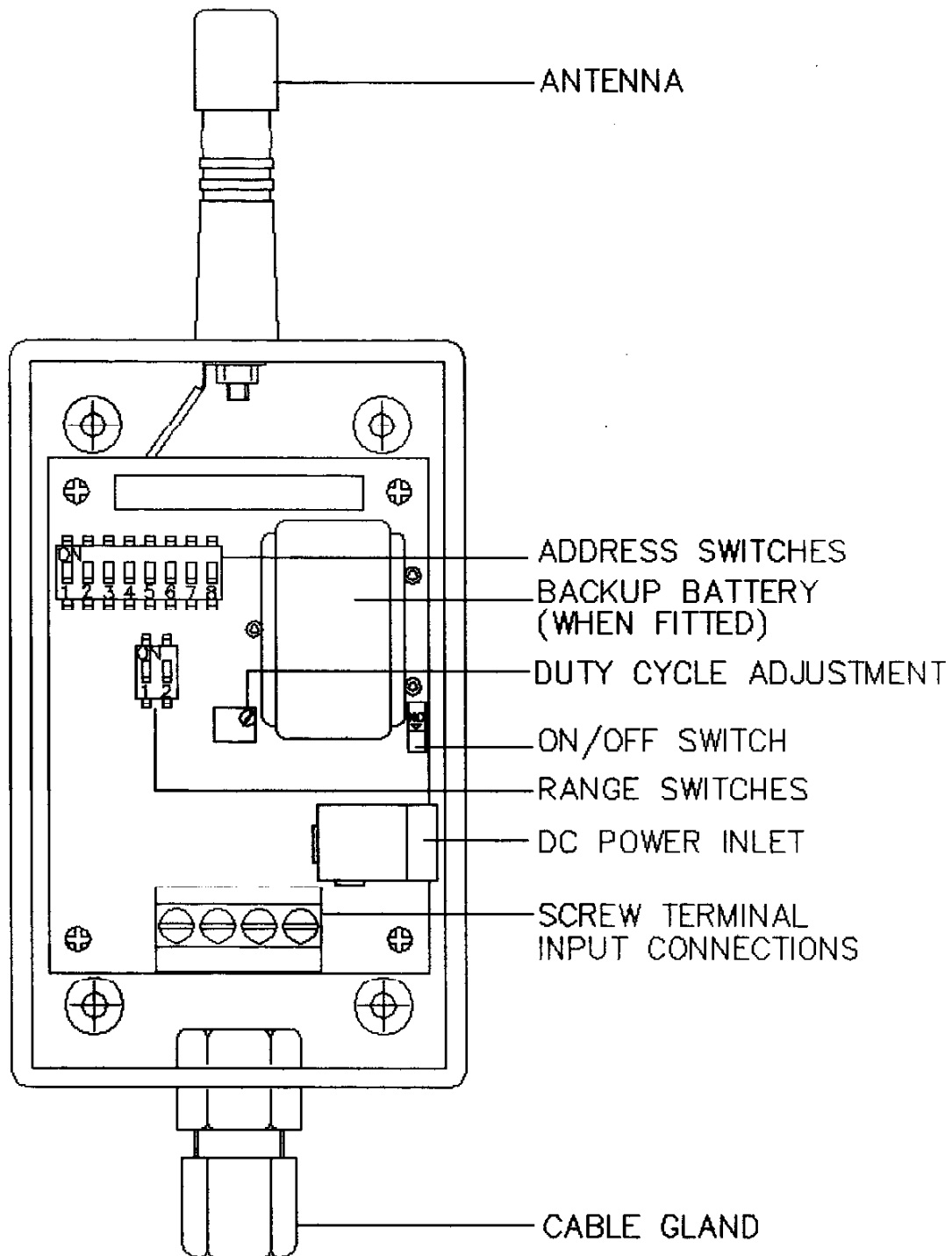


Figure 3. RT400T INTERNAL LAYOUT

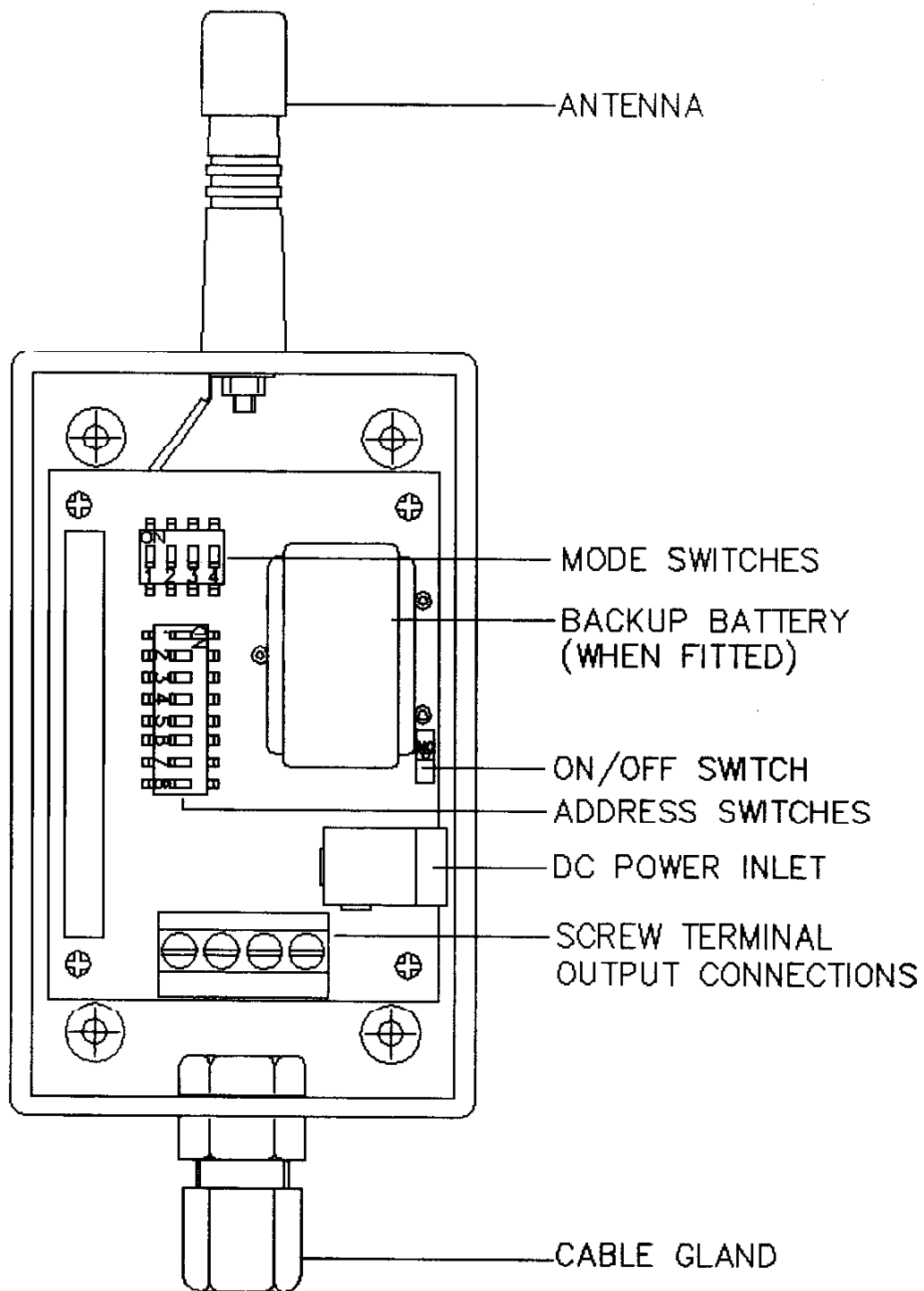


Figure 4. RT400R INTERNAL LAYOUT

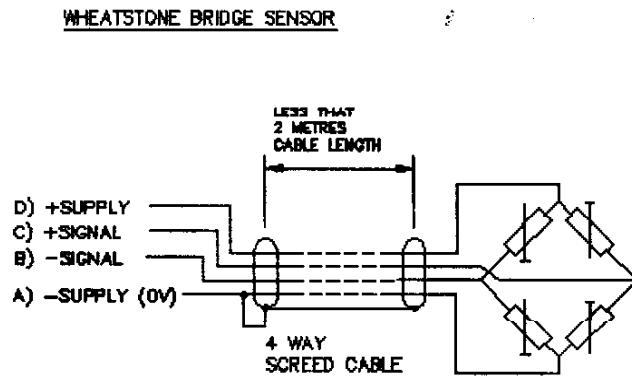
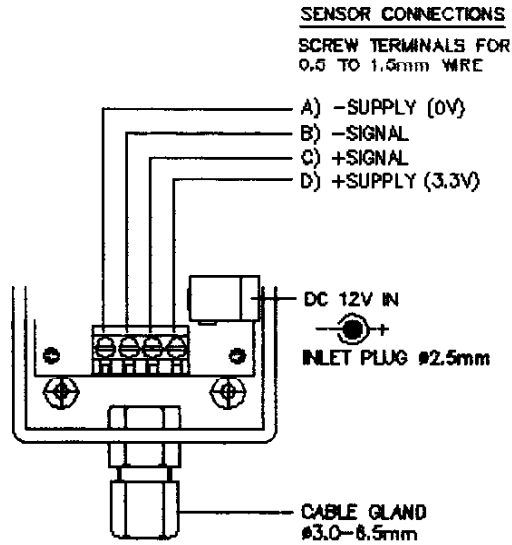


Figure 5. RT400T CONNECTION DETAILS

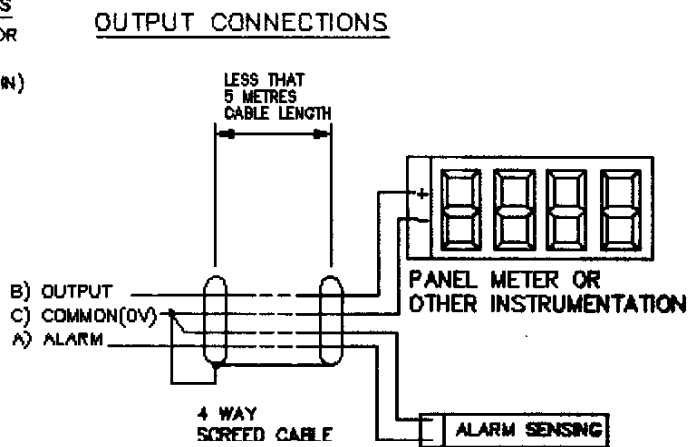
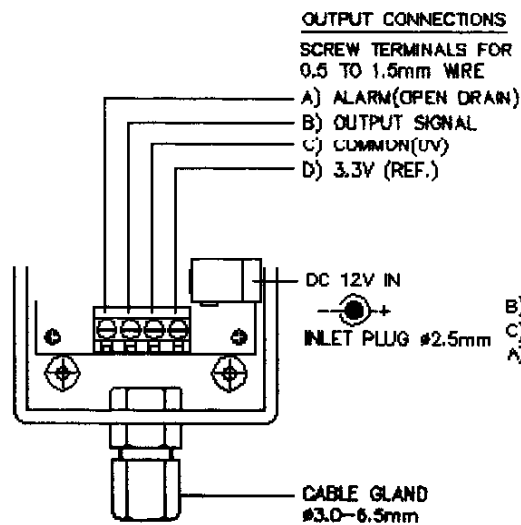


Figure 6. RT400R CONNECTION DETAILS

## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components, which wear, are not warranted, including but not limited to contact points, fuses, and triacs.

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

**FOR WARRANTY RETURNS,**  
please have the following information available  
BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

**FOR NON-WARRANTY REPAIRS,** consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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