

**START HERE**

**iDRN-RTD  
RTD INPUT**

**General Description:**

The iDRN Series of DIN rail-mountable signal conditioners are available for Thermocouple, RTD, Strain, Process, AC Voltage, AC Current and Pulse/Totalizer input types. The factory calibrated signal conditioners are ideal for all process and power monitoring applications, they feature 3-way isolation, high accuracy input, programmable outputs, and are excellent front end interfaces for programmable logic controllers or data acquisition systems. For maximum user configurability the signal conditioners allow complete input-output scaling via a RS-232 connection to any PC or PLC.

**Software Description:**

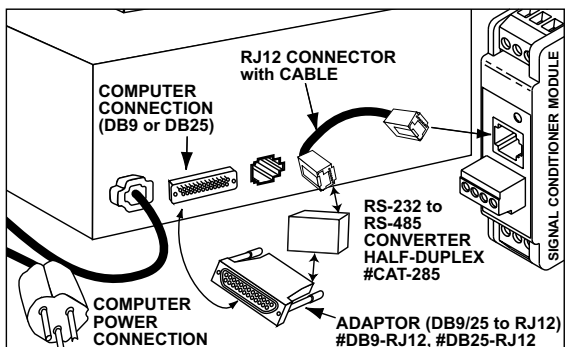
The signal conditioner configuration program is a MS DOS/Windows program (this manual is for the Windows version). It is designed especially for the iDRN Series Signal Conditioner. This program will run on any PC with Windows application and will start automatically.

**Free Serial Communication software and ActiveX Controls are on the CD-ROM enclosed with this shipment. To download the latest software release (or request a free CD-ROM) please go to: [www.omega.com/software](http://www.omega.com/software)**

**What You need:**

- Your choice of the signal conditioner
- IBM PC or compatible
- Windows software 3.1 or higher, or Windows 95/98
- RJ12 connector with telephone cable
- Adapter (DB9 or DB25 to RJ12)

**Setting up your System**



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**SPECIFICATIONS:**

100, 500, 1000 Ohm platinum RTD with both European (alpha=0.00385) and American (alpha=0.00392) curves.

**INPUT TYPE:**

100 Ohm	-328 to 1562 °F	-200 to 850 °C
500 Ohm	-328 to 1562 °F	-200 to 850 °C
1000 Ohm	-328 to 1562 °F	-200 to 850 °C

**ISOLATION:**

Dielectric strength per 1 minute test based on EN 61010 for 50 Vdc or Vrms working voltage.

Three way Isolation:

- Power to Signal Input: 1800V Peak
- Power to Analog Output/Communication: 1800V Peak
- Signal Input to Analog Output/Communication: 1400V Peak

**COMMON MODE REJECTION:**

100 dB

**INPUT OVER-VOLTAGE PROTECTION:**

250 V AC for 1 Minute

**ANALOG TO DIGITAL TECHNIQUE:**

Dual slope

**READ RATE:**

3 readings/second, automatic polarity

**ACCURACY AT 25 °C:**

±0.5 °C for platinum RTD's

**TEMPERATURE STABILITY:**

0.05 °C/°C

**STEP RESPONSE FOR RS232 OUTPUT:**

2 seconds to 99% of the final value (Filter time constant = 64)

**RESPONSE TIME:**

To verify the response time, check the carriage return <CR>, it will be sent at the end of the response. You can send another command after you receive the <CR>.

i.e. send: \*X01  
response: X01<DATA><CR>

**WARM UP TO RATED ACCURACY:**

30 minutes

**ANALOG OUTPUT SIGNAL TYPE:**

Voltage: 0-10 Volt, maximum current 10mA

Current: 0-20 mA or 4-20 mA, maximum compliance voltage 10 Volts (maximum loop resistance 500Ω)

**ANALOG OUTPUT LINEARITY:**

0.1% of FS

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**ANALOG OUTPUT STEP RESPONSE TIME:**

2 seconds to 99% of final value

**INPUT POWER:**

10 to 32 Volt DC

**POWER CONSUMPTION:**

2.4 Watts (100 mA at 24 V DC)

**OPERATING AMBIENT:**

-5 to +55 °C

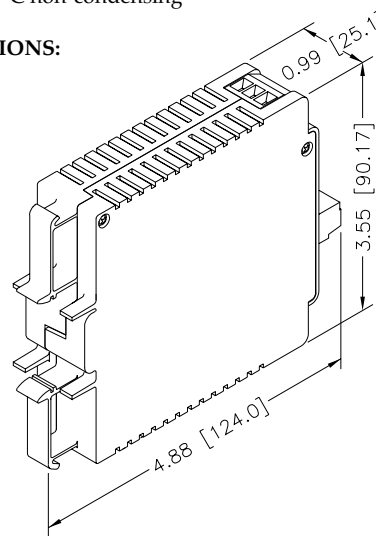
**STORAGE TEMPERATURE:**

-40 to +85 °C

**RELATIVE HUMIDITY:**

90% at 40 °C non-condensing

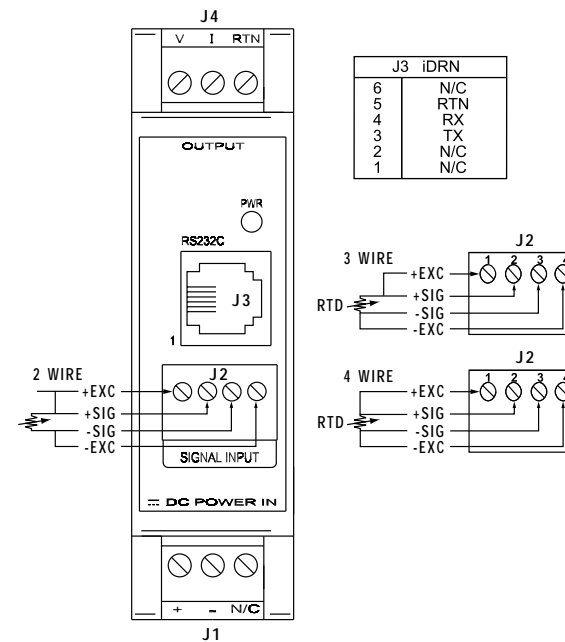
**DIMENSIONS:**



**INTRODUCTION:**

The RTD input signal conditioners are high performance instruments used to measure temperature supporting a variety of different RTD probes. The following RTD types may be used with the RTD input signal conditioners: 100, 500, and 1000 Ohms RTD with either 0.00385 or 0.00392 curves. Key features to the signal conditioners are 3 or 4 wire RTD connections to minimize errors due to lead resistance, low 200 μA excitation current to prevent self heating, patented algorithm for linearization of RTD's to conform to NIST and DIN tables, and a built-in RS232 interface for easy custom scaling. The RS232 interface may also be used for digital transmission of input signal to a computer or a PLC. Additional features include three way isolation between DC power, signal input and analog output/RS232.

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**OPERATIONS:**

**Note:** When connecting RTD probe using three wires ensure that the three lead lengths are equal for higher accuracy. Signal conditioners provide certain degree of protection against high voltage spikes (250 V ac for 1 minute) which may be induced accidentally on the RTD wires. To ensure signal integrity and safe operation never run the signal inputs wires in the same conduit with ac power lines.

**POWER INPUT AND ANALOG OUTPUT SETUP:**

To connect the signal input proceed as follows:

1. Connect a DC power supply with an output voltage between 10 to 32 Volt DC to the signal conditioner (J1).
- Note:** If power supply used has current limiting, it may not be able to power the signal conditioners if the available output voltage is around 10Volt, since the peak current may reach 1 to 5 Amp for a few milliseconds.
2. Determine the RTD type used to measure the temperature.

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3. Determine whether you will use 2, 3, or 4 wire RTD connection. If the probe lead is less than or equal to 3 feet you may use 2 wire connection. However, if the probe lead is longer than 3 feet and you want to obtain high accuracy then make it 3 or 4 wire connection. Usually 3 wire RTD is acceptable in most applications.

4. Ensure that if the selected RTD type and the connection method 2, 3, or 4 wire is different from the default then change the internal settings in the EEPROM. This can only be done via the RS232 communication and using the configuration software explained later in this manual.

5. Connect the RTD probe to the screw terminal, and ensure that the screws are tight.

6. To verify that the set up is correct, you may connect a DVM to the analog output. Once connected, power the signal conditioner. If you have a RTD simulator then select a resistance corresponding to the desired temperature. Measure and compare the analog output with expected values. If you are running the configuration software then the temperature corresponding to the RTD input resistance may be displayed.

7. To view/change the scaling that relates the analog output to signal input: Connect the RS232 output of the signal conditioner to an available serial port of a computer. The cable and the DB9 or DB25 connectors are available as an option.

8. Turn on the computer, start Windows 3.0 or higher and run the Signal Conditioner Configuration Setup Program.

9. To start the configuration program, you need to indicate which serial port is to be used for serial communication by checking the appropriate check box on the opening menu.

**Note:** It is not necessary to know the serial communication protocol, i.e. baud rate, parity, 7/8 data bit and stop bit; the program will determine this information automatically. However, it is a good practice to mark the protocols used on the signal conditioner label if different from default.

10. Once the program starts it will automatically detect the signal conditioner configuration and will display a window of available options. To view the signal input click on the display on/off.

11. To change analog output scaling choose Analog Output Scaling and enter the desired values.

12. Once the custom scaling is finished, **ensure that Send Configuration is clicked**, otherwise the changes will not take effect.

13. The input/output scaling may be fine tuned, while both communication and analog output are active. You may make a change to the analog output in the configuration program, and watch the DVM connected to analog output of the signal conditioner follow the new settings.

14. You may save or print a particular configuration by selecting the file menu. It's always a good practice to both print and save the scaling of each signal conditioner.

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15. If the program is not able to establish communication then an error message is displayed. This happens either when the wrong serial port is specified or when the cable is accidentally disconnected.

16. The procedure to disable Continuous Mode and change the iDRN to Command Mode is as follows:

Using HyperTerminal, or any serial communication program, type: **Ctrl + S**

To change the device to Command Mode, type: **^AE**

To change the Bus Format Register, type: **\*W0814**

To reset the device, type: **\*Z01**

Cycle power to the unit.

#### Modbus Register Definition

Reg. #	Read Function	Write Function	# of byte
1	Input Range	Input Range	1
2	Input/Output Config.	Input/Output Conf.	1
3	Decimal Point	Decimal Point	1
4	Filter Time Constant	Filter Time Constant	1
5	Reading/Output Scale	Not supported	3
6	Reading/Output Offset	Not supported	3
7	Comm. Parameters	Comm. Parameters	1
8	Comm. Bus Format	Comm. Bus Format	1
9	Comm. Data Format	Comm. Data Format	1
A	Comm. Device Addr.	Comm. Device Addr.	1
B	Comm. Recog. Char.	Comm. Recog. Addr.	1
C	Unit of measure	Not supported	3
D	Gate Time	Gate Time	1
E	Debounce Time	Debounce Time	1
F	Transmit Time	Transmit Time	2
10	Main Value	Hard Reset	3
11	Peak Value	Reset Peak	1
12	Valley Value	Reset Valley	1
13	Not Supported	L.S. bytes Output Scale	2
14	Not Supported	M.S. byte Output Scale	1
15	Not Supported	M.S. bytes Output Offset	2
16	Not Supported	L.S. byte Output Offset	1

Note:

- 1) Main, Peak, Valley value: 4 bytes will send from the unit a. Highest byte always 00h.  
b. 2nd Highest byte: (MSB is sign (1=negative, 0=positive), next 3 bits are number of decimal points).
- c. Low nibble of second byte, and lowest 2 bytes are the value.
- d. The decimal point register has to set to: 1, 2, 3, or 4.
- 2) Bus Format: Bit 5 1/0 = Modbus/Newport
- 3) Output Scale/Offset Write:  
Due to write single only, two write operation is needed to write scale/offset, and to make it effective it needs to follow with Hard Reset command.
- 4) To configure to Newport protocol, set bit 5 of Bus Format to low and follow with Hard Reset command.

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



This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device, as the guide contains important information relating to safety and EMC.

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

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.

**PATENT NOTICE:** This product is covered by one or more of the following patents: U.S. Pat. No. Des. 336,895, 5,274,577/ Canada 2052599, 2052600/ Italy 1249456, 1250938/ France Brevet No. 91 12756/ Spain 2039150, 2048066/ UK Patent No. GB2 249 837, GB2 248 954/ Germany DE 41 34398 C2.

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## iDRN-RTD RTD Input Signal Conditioner

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#### Servicing North America:

<b>USA:</b> ISO 9001 Certified	One Omega Drive, P.O. Box 4047 Stamford CT 06907-0047 TEL: (203) 359-1660 e-mail: <a href="mailto:info@omega.com">info@omega.com</a>	FAX: (203) 359-7700
<b>Canada:</b>	976 Berger Laval (Quebec) H7L 5A1 TEL: (514) 856-6928 e-mail: <a href="mailto:info@omega.ca">info@omega.ca</a>	FAX: (514) 856-6886

#### For immediate technical or application assistance:

<b>USA and Canada:</b>	Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA® Customer Service: 1-800-622-2378 / 1-800-622-BEST® Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
<b>Mexico and Latin American:</b>	TEL: (001)800-TC-OMEGA® FAX: (001) 203-359-7803 En Español: (001) 203-359-7803 e-mail: <a href="mailto:espanol@omega.com">espanol@omega.com</a>

#### Servicing Europe:

<b>Benelux:</b>	Postbus 8034, 1180 LA Amstelveen, The Netherlands TEL: +31 20 3472121 FAX: +31 20 6434643 Toll Free in Benelux: 0800 0993344 e-mail: <a href="mailto:sales@omegashop.nl">sales@omegashop.nl</a>
<b>Czech Republic:</b>	Frystatska 184, 733 01 Karviná TEL: +420 59 6311899 FAX: +420 59 6311114 e-mail: <a href="mailto:info@omegashop.cz">info@omegashop.cz</a>
<b>France:</b>	11, rue Jacques Cartier, 78280 Guyancourt TEL: +33 1 61 37 29 00 FAX: +33 1 30 57 54 27 Toll Free in France: 0800 466 342 e-mail: <a href="mailto:sales@omega.fr">sales@omega.fr</a>
<b>Germany/Austria:</b>	Daimlerstrasse 26, D-75392 Deckenpfronn, Germany TEL: +49 7056 9398-0 FAX: +49 7056 9398-29 Toll Free in Germany: 0800 639 7678 e-mail: <a href="mailto:info@omega.de">info@omega.de</a>
<b>United Kingdom:</b> ISO 9002 Certified	One Omega Drive River Bend Technology Centre Northbank, Irlam Manchester M44 5BD United Kingdom TEL: +44 161 777 6611 FAX: +44 161 777 6622 Toll Free in England: 0800 488 488 e-mail: <a href="mailto:sales@omega.co.uk">sales@omega.co.uk</a>