START HERE

iDRN-TC

THERMOCOUPLE 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:

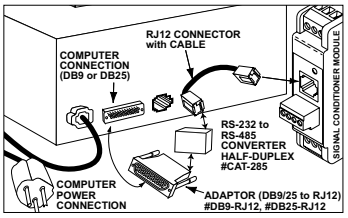
The signal conditioner configuration program is a MS DOS/Windows program (this manual is for the Windows version). It is designed especially for the iDRN Series Signal Conditioner. This program will run on any PC with Windows application and will start automatically.

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.newportUS.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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INPUT TYPE:
Type J,K,T,E,R,S,B,N, J DIN

Input Type	Range °F	Range °C
J	-346 to 1400°F	-210 to 760 °C
K	-454 to 2500°F	-270 to 1372 °C
T	-454 to 752 °F	-270 to 400 °C
E	-454 to 1832 °F	-270 to 1000 °C
R, S	-58 to 3214 °F	-50 to 1768 °C
B	+212 to 3308 °F	+100 to 1820 °C
N	-454 to 2372°F	-270 to 1300 °C
J DIN	-328 to 1652 °F	-200 to 900 °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:
±1°C for temperature above -150 °C
±2°C for temperature below -150 °C

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)

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ANALOG OUTPUT LINEARITY:
0.1% of FS

ANALOG OUTPUT STEP RESPONSE TIME:
2 seconds to 99% of final value

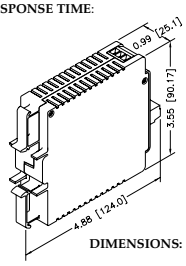
INPUT POWER:
10 to 32 Volt DC

POWER CONSUMPTION:
2.4 Watts (100 mA at 24 V DC)

OPERATING AMBIENT:
-5 to +55 °C

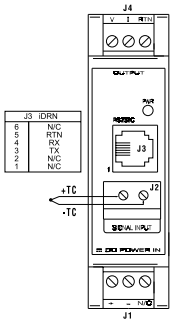
STORAGE TEMPERATURE:
-40 to +85 °C

RELATIVE HUMIDITY:
90% at 40 °C non-condensing



DIMENSIONS:

Introduction:
The thermocouple input signal conditioners are high performance instruments used to measure temperature for a variety of different T/C probe. The following thermocouple types may be used with the T/C input signal conditioners: J, K, T, E, R, S, B, N, and J DIN. Key features of the signal conditioners are built in cold junction compensation, patented algorithm for linearization of thermocouple to confirm to NIST 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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Operation:

Note: When connecting a thermocouple input signal, ensure that the input signal wires are connected correctly. All thermocouples have a positive and negative lead which if not connected properly will cause a wrong temperature reading. Signal conditioners provide certain degree of protection against high voltage spikes (250 V AC for 1 minute) which may be induced on the thermocouple 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 a 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 10 Volt, since the peak current may reach 1 to 5 Amp for a few milliseconds.

2. Determine the thermocouple types used to measure the temperature.

3. Determine the positive and negative leads of the thermocouple and observe the polarity marked on the signal input cover. Then connect wires accordingly.

4. Ensure that if the selected thermocouple type 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 thermocouple wires 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 thermocouple simulator then simulate a millivolt signal 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 millivolt input may be displayed.

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Note: When calibrating thermocouples using standard millivolt input signal source, pay attention to the cold junction compensation which is at work. Suppose you want to simulate a millivolt signal corresponding to 500 °C for type J thermocouple, while the signal conditioner is operating in a room at a temperature of 25 °C. If you look up the millivolt output for type J thermocouple in the NIST handbook, you will find that type J thermocouple outputs 27.388 mV at 500 °C. If you applied this signal 27.388 millivolt to the signal conditioner, you will notice that it would show a temperature approximately 25 °C higher or about 525 °C. The reason is that a real thermocouple is a differential device meaning that it generates a signal that is proportional to the difference in temperature between it's cold and hot junction. So the real thermocouple's signal would have been about 1.277 millivolt less corresponding to the 25°C room temperature. Therefore you must apply a signal equal to: Signal input = 27.388-1.277=26.111 mV. Applying this signal 26.111 will display the correct temperature.

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

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2. Model and serial number of the product under warranty, and
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M2538/N/0204

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