Specifications

Inputs:
Sensor Types: see Table 9
Ranges: Any span within Range in Table 9
Impedance: ≥ 1.0M ohms typical for t/c and mV inputs
RTD Excitation: ≤ 0.3mA
Burnout Detection: up or down scale
CJC Error: ≤ ±0.1°C max. (Instant Accuracy™ ensures the output is within ±0.5°C of rated accuracy 30 seconds after powering

Output:
Voltage
Ranges: 0-5V or 2-10V (default)
Drive: 10mA (1000 ohm load min.)
Current
Ranges: 0-20mA or 4-20mA (default)
Drive: 15V (750 ohms max.)

Isolation:
1800VDC or peak AC between input output & power

Configuration:
SW1: Pushbutton, input and output ranging
SW2: Linearization, Burnout, Output (voltage or current), and initialization mode
SW3: Input Type

Accuracy:
Input (A/D): see Table 9
Linearization: ≤ ±0.05% of accuracy range, max.
Output:≤ ±10μA for current output
≤ ±5mV for voltage output

Thermal Stability:
CJC: ± 0.01°C / °C change in ambient, max.
Zero: ± 0.0075% of full scale /°C change in ambient, max.
Span: ± 0.0075% of full scale /°C change in ambient, max.
Long Term: ± 0.1% max. over a 9 month period

Response Time:
400mSec, typical

Turn On Time:
≤ 5 seconds to establish output within 99% or 0.5°C of final value

LED Indicator:
Power (green):
On when power is on
Flashes for t/c burnout flash
Input (yellow):
Flashes for out of range
(red):
Flashes for switch setting error
Calibration: 1 green, 1 yellow and 1 red LEDs indicate steps in ranging process

Common Mode Rejection:
120dB at DC
> 90dB at 60Hz

ESD Susceptibility:
Capable of meeting IEC 801-2 level 3 (8kV)

Humidity (non-condensiing):
Operating: 15 to 95% @ 45°C
Soak: 90% RH for 24 Hours @ 60°C

Temperature:
Operating: -25°C to +65°C (-13 to 149°F)
Storage: -25°C to +70°C (-13 to 158°F)

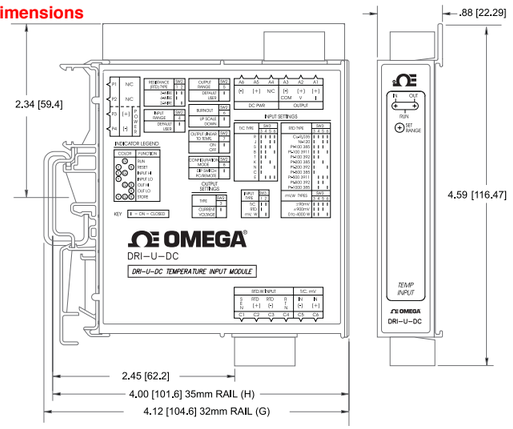
Power:
2.5W max., 9 to 30VDC ± 10%

Shipping Weight:
0.5 lbs.

Wire Terminal:
Socketed screw terminals for 12-22AWG

Agency Approvals
UL recognized per standard UL508 (File No. E99755).
CE Compliance per EMC directive 89/336/EEC and Low Voltage 73/23/EEC.

Dimensions



omega.com info@omega.com

Servicing North America:

U.S.A.:
Omega Engineering, Inc., One Omega Drive,
P.O. Box 4047, Stamford, CT 06907-0047 USA
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378
(USA & Canada only)
Engineering Service: 1-800-872-9436
(USA & Canada only)
Tel: (203) 359-1660
Fax: (203) 359-7700
e-mail: info @omega.com

For Other Locations Visit
omega.com/worldwide

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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.
OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.
CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.
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 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 RETURNS**, 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 customers the latest technology and engineering. OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

omega.com

DRI-U-DC

DC Powered Universal Input DIN Rail Signal Conditioner

INSTRUCTION SHEET

M5471/0715

Shop online at omega.com℠ e-mail: info@omega.com
For latest product manuals: www.omegamanual.info

Provides an Isolated DC Output
in Proportion to the Temperature Signal Input

- Rapid Accuracy Accuracy
- Field Configurable Input Ranges
- DIP Switch Configuration
- Eliminates Ground Loops
- Touch Calibration Technology
- High Density DIN Rail Mounting
- Flexible DC Power Supply 9 to 30VDC
- Plug-in Terminals

Description

The DRI-U-DC is a DC powered, DIN rail mount, RTD, thermocouple, mV or Ohm input signal conditioner with 1800V isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for most temperature signal conditioning applications.

The DRI-U-DC is configured via DIP switch for the thermocouple type (B, C, E, J, K, N, R, S, T) or the RTD type (Pt, Ni & Cu). Additionally, functions such as signal linearization, up or down scale burnout, number of RTD leads (2, 3, 4) and voltage or current output are also set via dip switches (see Tables).

Rapid Accuracy Adjustment

Accuracy and performance are maximized during warmup and during changes in ambient temperature. The patented cold-junction compensation technique utilizes two temperature sensors to measure the differential temperature near the terminal block. Using heat transfer calculations with the measured differential temperature and the known thermal conductivity of the PCB, the terminal junction temperature is determined with extreme accuracy. Even during unstable thermal states such as start-up, ambient temperature changes or changing load or power, the DRI-U-DC performs extremely accurate thermocouple temperature measurement.

System performance and productivity are improved due to reduced warm up time, fewer temperature measurement errors and tighter process control for higher quality. Most significantly, it allows calibration to be checked quickly and accurately without the effects of rapid ambient temperature changes due to opening a control panel door, which often causes erroneous readings and miscalibrations; a common cause of measurement errors.

Touch Calibration Technology

Touch Calibration technology allows easy field ranging for any of the thermocouple or RTD input types. For example, the dip switch configured range for the J type thermocouple is -210 to 760°C. Using a thermocouple simulator as a reference, the model DRI-U-DC could be ranged for 0 to 50°C or 0 to 500°C by simply applying the desired minimum and maximum input levels and pushing the range button to store the levels in non-volatile memory. The output is ranged by applying an input signal to achieve an accurate output level and pushing the range button.

Applications

The model DRI-U-DC field configurable thermocouple or RTD input isolator is useful in eliminating ground loops and interfacing temperature sensors to data acquisition and control systems.

Three-way isolation completely eliminates ground loops from any source. Isolation protects expensive SCADA systems from ground faults and allows the noise reduction benefits of grounded thermocouples or sensors to be realized.

The DRI-U-DC employs the latest analog to digital signal processing technology and advanced low-power microprocessors. Instant Accuracy cold-junction-compensation (CJC) of thermocouples, and lead length compensation for RTDs ensures an extremely accurate and stable signal for virtually any temperature sensor to DC signal conversion.

High density DIN rail mounting offers a very compact solution and saves valuable panel space. Power is delivered to the DRI-U-DC using the exclusive DCPB rail which reduces wiring requirements and the need to daisy-chain power. Plug-in terminals ensure easy installation and low Mean-Time-To-Repair (MTTR).

Diagnostic LEDS

The DRI-U-DC is equipped with front panel LEDs for input power (green-on), input overrange and underrange; input open circuit (yellow-on); and switch setting error (red-on).

Configuration

The DRI-U-DC can be configured via DIP switchs for a wide variety of temperature input ranges for RTD, thermocouple, ohm and millivolt sensors. Inputs can be offset by >90% or adjusted

down to <10% of the full scale span.

Unless a specific customer range is ordered, the factory presets the DRI-U-DC as follows:

Input Type:	Thermocouple, J-Type
Input Range:	0 to 500°C
Burnout:	Up Scale
Output Range:	4/20mA

Refer to the tables for other I/O ranges.

1. With power off, snap off the faceplate by lifting the right edge away from the heatsink.

2. For RTD or Resistance inputs, set position 1 and 2 of SW2 for 2, 3 or 4 wire resistance input (see Table 1). For thermocouple inputs these switches ignored and can be in any position.

3. Configure the output for voltage or current using position 3 of SW2 (see Table 2).

4. If the input range desired is the full scale range for the input type (e.g. Pt100 Ohm = -200°C to 850°C), then set position 4 of SW2 to ON (or closed) for this default range (see Table 3). If configuration of a sub-range is preferred (e.g. Pt100 Ohm, 0 to 500°C), then set position 4 of SW2 to OFF (or open) to enable use of the ranging pushbutton adjustment.

5. If the output range desired is the full scale range for the output type (e.g. 4-20mA or 2-10V), then set position 5 of SW2 to ON for either of the full scale default output ranges (see Table 4). If configuration of a sub-range is preferred (e.g. 12-20mA or 1-5V), then set position 5 of SW2 to OFF (or open) to enable use of the ranging pushbutton adjustment.

6. Set Burnout detection with position 6 of SW2 (see Table 6). The ON position (up scale) will force the output beyond full scale when the t/c input is open circuit. The OFF position (down scale) will force the output below 0% when the input is open circuit.

7. Set the t/c Linearization function with position 7 of SW2 (see Table 7). The ON position will provide an output linear to the temperature input signal. The OFF position will provide an output directly proportional to the thermoelectric (mV) input (i.e. not linearized to temperature).

Note: The unit must be configured with linearization turned ON. Once the configuration is saved, linearization can then be turned OFF.

8. Set the Configuration Mode with position 8 of SW2 (see Table 8). The ON position is for DIP switch configuration. The OFF position is for configuring via PC using a serial interface cable (consult factory regarding cable and software).

9. Set the Input Type with position 1 and 2 of SW3 (see Table 5).

10. Set the specific RTD, thermocouple, millivolt or resistance input with position 3 through 6 of SW3 (see Table 9).

Table 1: RTD Type

RTD Type	SW2 1	SW2 2
3-Wire	■	■
4-Wire	■	
2-Wire		■
Key: ■ = 1 = On or Closed		

Table 2: Output Type

Output	SW2 3
Current	■
Voltage	
Key: ■ = 1 = On or Closed	

Table 3: Input Range Type*

Input Range	SW2 4
Default	■
User Defined	
Key: ■ = 1 = On or Closed	

Table 4: Output Range Type*

Output Range	SW2 5
Default	■
User Defined	
Key: ■ = 1 = On or Closed	

Table 5: Input Type

Input Type	SW3 1	SW3 2
Thermocouple	■	■
RTD	■	
mV or Ohms		■
Key: ■ = 1 = On or Closed		

Table 6: Burnout Detection

Burnout Detection	SW2 6
Upscale	■
Downscale	
Key: ■ = 1 = On or Closed	

Table 7: Output Linearization

Output Linear to Temperature	SW2 7
On	■
Off	
Key: ■ = 1 = On or Closed	

Table 8: Config Mode

Configuration Mode	SW2 8
By DIP Switch	■
By PC	
Key: ■ = 1 = On or Closed	

*Default for Outputs is either 2-10V or 4-20mA. Default for Inputs is the "Input Range" specified in Table 9. Note that if the input or output is set for default, then the input or output calibration will be skipped in the pushbutton programming sequence.

Table 9: Input Select

T/C Type	SW3 3	SW3 4	SW3 5	SW3 6	Input Range	Accuracy Range	Input (A/D) Accuracy
R	■	■	■	■	0 to +1760°C	+200 to +1760°C	+/-1.0°C
J	■		■	■	-210 to +760°C	-100 to +760°C	+/-0.25°C
S	■	■	■		0 to +1760°C	+400 to +1760°C	+/-1.0°C
B	■	■		■	0 to +1800°C	+400 to +1800°C	+/-2.0°C
T	■	■			-270 to +400°C	0 to +400°C	+/-0.25°C
K	■		■		-270 to +1370°C	-100 to +1370°C	+/-0.3°C
N	■			■	-270 to +1300°C	70 to +1300°C	+/-0.4°C
C	■				0 to +2320°C	0 to +2320°C	+/-0.5°C
E		■	■	■	-270 to +1000°C	-100 to +1000°C	+/-0.25°C

RTD Type	SW3 3	SW3 4	SW3 5	SW3 6	Input Range	Input (A/D) Accuracy
Cu-9.035	■	■	■	■	-40 to +260°C	+/-0.25°C
Ni-120 067	■		■	■	-80 to +320°C	+/-0.15°C
Pt-100 385	■	■	■		-200 to +850°C	+/-0.15°C
Pt-100 3911	■	■		■	-200 to +630°C	+/-0.15°C
Pt-100 392	■	■			-200 to +630°C	+/-0.15°C
Pt-200 385	■		■		-200 to +850°C	+/-0.20°C
Pt-200 392	■			■	-200 to +630°C	+/-0.20°C
Pt-500 385	■				-200 to +850°C	+/-0.20°C
Pt-500 3911		■	■	■	-200 to +630°C	+/-0.20°C
Pt-500 392		■	■		-200 to +630°C	+/-0.20°C
Pt-1000 385		■		■	-200 to +850°C	+/-0.20°C

mV & Ohm Type	SW3 3	SW3 4	SW3 5	SW3 6	Input Range	Accuracy Range	Input (A/D) Accuracy	Minimum Span
+/- 90mV	■	■	■	■	-90 to +90mV	-90 to +90mV	+/-12uV	3mV
+/- 900mV	■	■	■		-100 to 900mV	-100 to 900mV	+/-25uV	3mV
0 to 4000 Ohms	■	■		■	10 to 4000 Ohms	10 to 4000 Ohms	+/-1.0 Ohms	10 Ohms
Key: ■ = 1 = ON or Closed								

Input to Output error at 25°C is less than or equal to the Input Accuracy, plus the Linearization Accuracy, plus the Output Accuracy (plus the CJC Error for T/C Inputs).

Calibration

The DRI-U-DC is a microprocessor based circuit with internal references that are factory calibrated to better than 0.000005V. For this reason the DRI-U-DC does not need field calibration, but it can be configured (ranged) in the field for virtually any temperature to DC I/O combination.

For best results ranging should be performed in the operating installation, allowing at least 30 minutes for thermal equilibrium of the system. If ranging on a test bench is preferred, then an output load equal to the input impedance of the device connected to the output is recommended, along with a 30 minute warm up period.

1. After configuring the unit, install the module onto a piece of DIN rail and the DCPB rail mounting combination. See the DCPB rail data sheet for details.

2. Connect the input to a calibrated thermocouple simulator or resistance source and the output to a voltage or current meter. Apply power and allow the system to reach thermal equilibrium (approx. 30 minutes).

3. Adjust the input signal to the desired maximum and observe that the green LED is on. Push the CAL button and hold it down for more than 5 seconds (until the yellow and red LEDs are on).

Note: To quit the calibration mode and reset the unit, push the CAL button and hold for more than 5 seconds. Or, wait for more than five minutes and the unit will time-out and automatically reset to the previously stored calibration.

4. Push the CAL button momentarily (the yellow and green LEDs will now be on).

5. Apply the maximum input signal level, then push the CAL button to store. The yellow LED will now be on.

6. Apply the minimum input signal level, then push the CAL button to store. The green and red LEDs will now be on.

7. Adjust the input signal while monitoring the output signal until the output is at the desired maximum level (e.g. 20.00mA), then push the CAL button to store (the red LED will be on).

8. Adjust the input signal while monitoring the output signal until the output is at the desired minimum level (e.g. 4.00mA), then push the CAL button to store (the yellow, green and red LEDs will be on).0

9. To finish calibration, push the CAL button once again. The green LED will be on if the input is within the calibrated range.

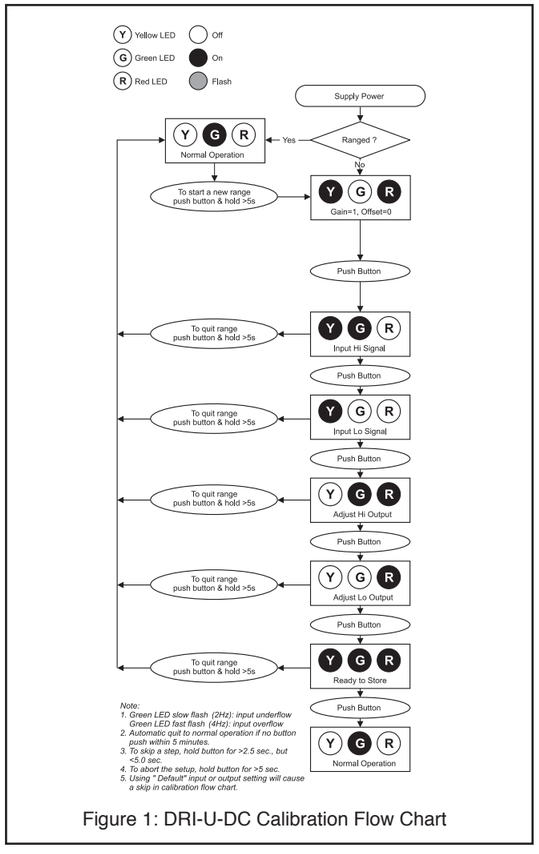


Figure 1: DRI-U-DC Calibration Flow Chart

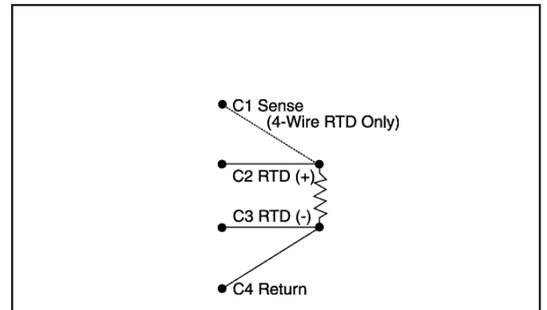


Figure 2: RTD Wiring Detail

Terminal	Connection	Terminal	Connection
A1	Current Output (+)	C3	RTD Input (-) or Resistance
A2	Voltage Output (+)	C4	RTD Return
A3	Output Common (-)	C5	T/C Input (-) or mV (-)
A4	Not Used	C6	T/C Input (+) or mV (+)
A5	DC Power (+)	P1	Not Used
A6	DC Power (-)	P2	Not Used
C1	RTD Sense	P3	DC Power (+)
C2	RTD Input (+) or Resistance	P4	DC Power (-)