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# User's Guide



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## DRF-POT FOR POTENTIOMETER INPUT, DRF-RES FOR RESISTANCE INPUT DRF Series Signal Conditioners

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The information contained in this document is believed to be correct, but OMEGA 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, human applications.

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### SAFETY CONSIDERATIONS

PRESCRIPTION.- Before starting any operation of adjustment, replacement, maintenance or repair, the unit must be disconnected



from any kind of power supply. Keep the unit clean, to assure good functioning and performance. To prevent electrical or fire hazard, do not expose the unit to excessive moisture. Do not operate the unit in the presence of flammable gases or fumes, such an environment definitely constitutes a safety hazard. The unit is designed to be mounted on a metal panel.

If the unit shows signs of damage, is not able to show the expected measures, has

been stored in a bad conditions or a protection failure happened, then do not attempt to operate, keep the unit out of service and send for repair.

### IN CASE OF FIRE

- 1.- Disconnect the unit from the power supply
- 2.- Give the alarm according to the local rules
- 3.- Switch off all air conditioning devices
- 4.- Attack the fire with carbonic snow, do not use water in any case



**WARNING: In closed areas do not use systems with vaporized liquids.**

## GENERAL INFORMATION

The DRF series of Isolated Signal Converters, allow to convert process signals, temperatures, electrical signals, etc, to current loops or voltage signals for further retransmission, while introducing into the system galvanic isolation barriers between the input, the output and the power supply circuits.

The DRF series of Isolated Signal Converters, offer an excellent relation between signal conversion speed and measurement accuracy. Offering up to a 0.2% accuracy and down to 70ms response time, these units can process information coming from probes or transducers, in such a way that can be quickly retransmitted in a fast and accurate form to remote data acquisition systems or PLC's. The isolated signal converters of the DRF series are ideal to integrate into 12 bit data acquisition systems.

Its powerful galvanic isolation of 3500 V introduces high security to the measuring systems, preventing the propagation of those phenomenon which usually cause damage, such as transient peaks or energy shocks in any of the circuits of the system. The galvanic isolation also acts as a strong CE barrier. The decoupling created between the circuits avoids pernicious effects on the output, such as ground loops or signal leaks, which distort the acquired data and are extremely difficult to isolate once introduced into the signal.

The isolation offered by the DRF series of Isolated Signal Converters is a 3 way isolation. Thus, all the benefits exposed above are applicable to any of the three circuits composing the instrument : input, output and power.

Recalibration of the instruments is realized in a fast and easy way. Opening the front cover grants access to the configuration jumpers. Additional Span and Offset potentiometers are directly accessible from the frontal part. These potentiometers are highly decoupled, minimizing the iterations needed to obtain a correct adjustment.

In order to obtain a higher and quickest benefit of the DRF units, we recommend you to read carefully the information provided in this manual before proceeding to the installation of the instrument. In this manual you will find all technical data, both electrical and mechanical, needed for a correct installation and utilization.

**Note : The DRF Series Isolated Signal Converters have a characteristics label attached on the side of the instrument. Check that this information matches with your requirements for the specific application, and especially check the value and type of the Power Supply.**

## QUICK GUIDE

The DRF units have a front cover which can be opened down. This cover gives access to the Span and Offset potentiometers, and to the selection jumpers for input and output signal ranges.

To open the front cover, press slightly the sides of the cover at the upper side, close to the OUTPUT terminals, as indicated on Figure1.

The cover is free to open down, as shown on Figure2.

## POWER SUPPLY CONNECTIONS

DRF units are powered through the plug-in terminal positioned on the upper side of the instrument. This terminal is placed in a transverse axis, different from the other terminals. Close to the power supply terminal there is a small yellow label with indications on the connections for AC and DC

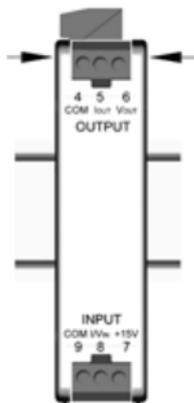
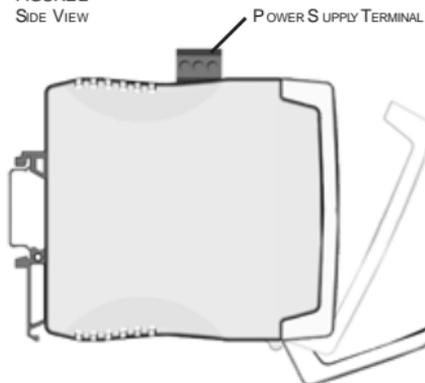


FIGURE 1  
FRONT VIEW WITH COVER

**IMPORTANT !!** Check that the power supply indicated on the white label attached to the side of the instrument, matches with the power supply you want to connect.

For more accurate information on the power supply connections, please see page 6 of this manual.

FIGURE 2  
SIDE VIEW



**FRONT COVER OPENING:**  
ACCESS TO JUMPERS FOR  
INPUT AND OUTPUT RANGE  
SELECTION, AND ACCESS TO  
SPAN AND OFFSET ADJUST  
POTENTIOMETERS

## SIGNAL ADJUSTMENT

To proceed to adjust a range of input and output signals, first select with the appropriate jumpers, the signal ranges

which include your desired adjustment. Then proceed to the adjustment.

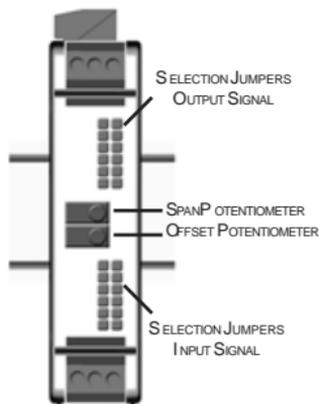
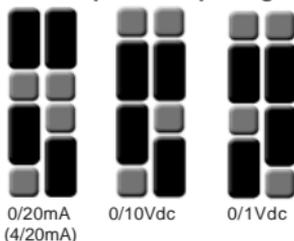


FIGURE 3  
FRONT VIEW  
WITHOUT COVER

### Selection Jumpers : Output Signal Range



### Selection Jumpers : Input Signal Range (See next page)

#### Adjustment Example for model DRF-POT

- 1.- Connect potentiometer to input terminals (8 «term+», 9 «term-» and 7 «signal»)
- 2.- Connect a multimeter to the output signal terminals (4 and 5 for mA or 4 and 6 for Vdc).

(Values in brackets are examples for a calibration  $0/100\% = 0/10Vdc$ )

- 3.- Input a zero signal (0 %).  
Operate offset potentiometer until getting a zero output (0Vdc).
- 4.- Input the difference between the high and low input levels ( $100-0=100\% Aac$ ).  
Operate span potentiometer until

getting an output which is the difference between the high and low output levels ( $10-0=10Vdc$ ).

- 5.- Input low input level (0 %).  
Operate offset potentiometer until getting the low level output (0Vdc).
- 6.- Input high input level and check that that the output also matches the desired level ( $100\% = 10Vdc$ ).

If more accurate measurement is needed, repeat steps 5 and 6.

Most of the input / output combinations will be properly adjusted within the instrument accuracy after these steps. Close front cover once calibration is finished.

**SELECTION JUMPERS: INPUT SIGNAL RANGE**

## DRF-POT for POTENTIOMETER SIGNALS



Range : 100% FS



Range : 25% FS



Range : 50% FS

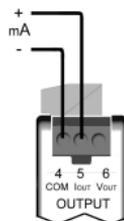
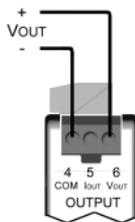
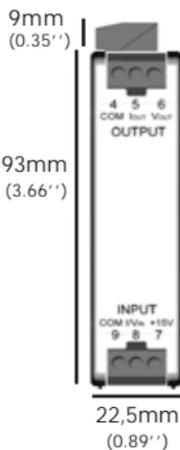


Range : 12.5% FS

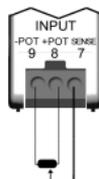
## DRF-RES for RESISTANCE SIGNALS

Range : 10 KOHms  
Range Min : 5 KOHmsRange : 3 KOHms  
Range Min : 1.5 KOHmsRange : 5 KOHms  
Range Min : 3 KOHmsRange : 1.5 KOHms  
Range Min : 750 Ohms

## DIMENSIONS AND CONNECTIONS



Output Connections

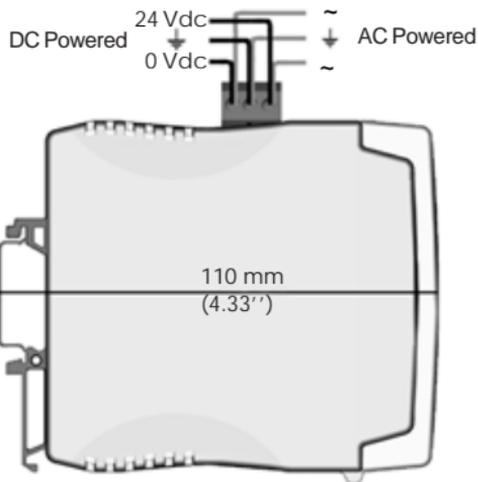


Input Connections

POTENTIOMETER

RESISTANCE

Special Width for  
AC Power models



**TECHNICAL DATA : Models DRF-POT and DRF-RES****INPUT SIGNAL for POTENTIOMETER**

<b>RANGES</b>	0/100 %
	0/50 %
	0/25 %
	0/12.5%
	(minimum 8%)

Potentiometer value min 100Ohms  
max 1MOhm  
3 Wire System, 1 Vdc Excitation

**INPUT SIGNAL in RESISTANCE**

<b>RANGES</b>	0/10 KOhms
	0/5 KOhms
	0/3 KOhms
	0/1.5 KOhms
	(minimum 750 Ohms)

2 Wire System, 0.2 mA Excitation

**OUTPUT SIGNAL in VDC**

<b>RANGES</b>	0/10 Vdc
	0/1 Vdc
Max Output	11Vdc approx.
Min Output	-1Vdc approx.
Min Load R	$\geq 1\text{K}\Omega$

**OUTPUT SIGNAL in mA**

<b>RANGES</b>	0/20mA (4/20mA)
Max Output	22mA approx.
Min Output	-1.5mA approx.
Max Load R	$\leq 400\ \Omega$

**POWER SUPPLY**

DC Power	24Vdc $\pm 10\%$
AC Power	230Vac $\pm 10\%$ 50/60 Hz 115Vac $\pm 10\%$ 50/60 Hz
Consumption	<3.8VA

**MECHANICAL DIMENSIONS**

DC Units	22.5 x 93 x 110 mm
AC Units	37.0 x 93 x 110 mm
Weight DC	120 gr.
Weight AC	200 gr.

Standard DIN rail mounting, as specified  
on DIN46277 and DINEN50022  
37.5 x 7.5 mm (1.38 x 0.3 ")

**GALVANIC ISOLATION LEVELS****DC Units**

Input - Output	3.5 KV (60 seconds)
Power-Input	3.5 KV (60 seconds)
Power-Output	1 KV (60 seconds)

**AC Units**

Input - Output	3.5 KV (60 seconds)
Power-Input	3.5 KV (60 seconds)
Power - Output	3.5 KV (60 seconds)

*All isolation levels are tested during a time  
of 60 seconds, with current leaks <1mA*

*Note : Indicated isolation levels are also  
sometimes named as STRENGTHENED  
ISOLATION levels, for systems with  
Pollution Level 2*

**GENERAL SPECIFICATIONS**

Accuracy	<0.2% F.S.
Optimized for	12 bit systems
Linearity	<0.1% F.S.
Thermal Drift	<250 ppm/ $^{\circ}\text{C}$ Typical
Warm-Up Time	5 minutes
Response Time	<70mS (90% of signal)

Plug-In Screw Terminals  
Maximum Wire Section 2.5 mm<sup>2</sup>  
Protection IP-30  
Temp.Operation from 0 to 60 $^{\circ}\text{C}$   
Temp.Storage from -20 to +70 $^{\circ}\text{C}$

**MATERIALS**

Box and Cover in Poliamide PA6 UL94  
V-2 blue color  
Terminals in Poliamide UL94 V-0

## CAUTIONS, WARNINGS AND NOTES

## INSTALLATION

**PRECAUTIONS.**- The installation and the future use of this unit must be done by qualified personnel. The unit has not AC (mains) switch, neither internal protection fuse. It will be in operation as soon as power is connected. The installation must incorporate an external mains switch with a protection fuse and also the necessary devices to protect the operator and the process when using the unit to a control machine or process where injury to personnel or damage to equipment or process may occur as a result of failure of the unit.



## RECOMMENDED FUSES

24 Vdc      230 Vac      115 Vac  
 250mA      70 mA 100 mA  
 All fuses .-Time Lag Fuse

**SAFETY PRESCRIPTIONS.**- The unit has been designed and tested under EN-61010-1 rules and is delivered in good conditions. This User's Manual contains useful information the user has to respect in order to warrant a proper function of the unit, and good security conditions. The unit is designed for internal applications, with good ventilation to avoid excessive heating. It can **occasionally** be applied to temperatures down to 10°C or up to 70°C without security degradation. Do all connections before applying power to the unit. Do not make wiring changes until power is disconnected from the unit.

Install the unit far from elements generating electric noise, or magnetic

fields, such as power relays, electrical engines, speed regulators, etc. Do not use until installation is completed.

**POWER SUPPLY.**- The power supply must be connected to the adequate terminals 1, 2 and 3. The characteristics of the power supply are shown on the side label. Please make sure that the unit is correctly connected to a power supply of the correct voltage and frequency. Do not connect the unit to lines which are overloaded or which provide power to systems working on ON-OFF cycles or inductive loads.

**ATTENTION :** If the power supply is DC voltage, be careful with the polarity indicated for each terminal.

**SIGNAL WIRING .-** Certain considerations must be given when installing the signal input wires. If the wires are long, they can act as an antenna introducing electrical noise into the unit. Therefore :

Do not install the signal input wires in the same conduit with power lines, heaters, solenoids, SCR controls, etc ... and always far from these elements.

When shielded wires are used, leave unconnected the shield on the transmitter side and connect the other end of the shield to the ground terminal of the machine.

**EXCITATION VOLTAGE.**- Model DRF-PR incorporates an internal power supply for transducers. The output of this power supply is connected to terminals 7 and 9. Do not connect these terminals to an external power supply, because both units will be permanently damaged.

## 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.

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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 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:

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2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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