HD 978TR3
HD 978TR4

SIGNAL CONVERTERS / AMPLIFIERS WITH 4÷20mA OR 0÷10Vdc OUTPUT CONFIGURABLE WITH HD788-TCAL BY PC THROUGH RS232C

HD978TR3 - HD978TR4
Configurable signal converters/amplifiers with current and/or voltage output

HD978TR3 and HD978TR4 are signal converters/amplifiers that can be configured using mV input. The mV input signal range can be configured from -10mV to +60mV through a button, by using the HD778-TCAL simulator and the DeltaLog7 software or a gauge with mV output. HD978TR3 has a 4…20mA current output. HD978TR4 has a 0…10Vdc voltage output, with 0…1Vdc, 0…5Vdc and 1…5Vdc outputs available upon request.
A led signals the alarm situations and helps the user during the programming phases. The tool is also protected against polarity inversion.
The input and the output are electrically isolated so as to eliminate the problems caused by the reciprocal influence of the devices originating in the disturbances caused across the various grounding/earthing routes.
The tool is housed in a 2 DIN module container (width 35 mm) with normalized connection for 35 mm omega bars.
The 4…20mA current output stage of HD978TR3 is a two-wired passive type and supplies power to the converter through the same current loop.

Technical information @ 25°C and 24Vdc

INPUT	HD978TR3	HD978TR4
Measurement range	-10mV … +60mV which can be configured	
Default range	0 … 20mV	
Minimum measurement range	2mV	
Input impedance	> 1 MOhm	
Speed of conversion	2 measurements per second	
Precision	±0.04%F.S.±20µV	
Functioning temperature	-30 … +70°C	
Storage temperature	-40 … +80°C	
Relative humidity	0…90%RH (without condensation)	
OUTPUT	**HD978TR3**	**HD978TR4**
Type of output (note 1)	4...20 mA (or 20...4 mA) two-wired 22 mA, in case of unconnected input	0 … 10Vdc (0…1Vdc, 0…5Vdc, 1…5Vdc upon request)
Resolution	4 µA	20µV
Power	9...30Vdc for the 4…20mA current output	15…30Vdc (4mA) for the 0 … 10Vdc current output, 10…30Vdc (4mA) for the other outputs
Protection against polarity inversion	40Vmax	
Sensitivity to Vcc power voltage variations	0.4 µA/V	2µA/V
Load resistance	R_LMax = (Vdc-9)/0.022 R_LMax = 625Ω with Vcc = 24 Vdc	> 10kΩ
Input/output galvanic isolation	50Vdc (checked at 250V)	
Red led	Turns on during the programming phase if the input is unconnected or outside the programmed scale.	
Warm-up time	2 minutes	
Thermal shift	0.02% F.S./°C	

Note 1: If the measured voltage V goes out of the V1...V2 (V1<V2) set range, the transmitters linearly regulate the output for V<V1 and V>V2 for an interval of 0.1mV. (See the diagrams of the outputs.)

Installation and connection
Fig. 1 shows the mechanical dimensions of HD978TR3 and TR4: the container's width is 2 DIN modules (35 mm). Fig. 5 outlines the HD978TR3 connection scheme to a Delta Ohm pyranometer. Fig. 6 shows the typical HD978TR4 connection.
In order to obtain the maximum precision, the connection concerning the input should not exceed 3 meters in length and must be carried out using a shielded cable. We also recommend not laying the wiring near power signal cables (electric

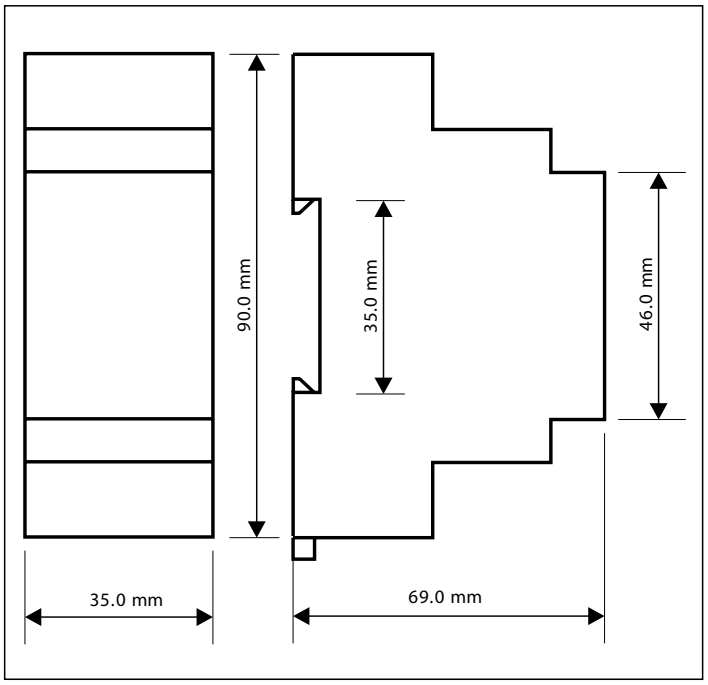


Fig.1 Mechanical dimensions.

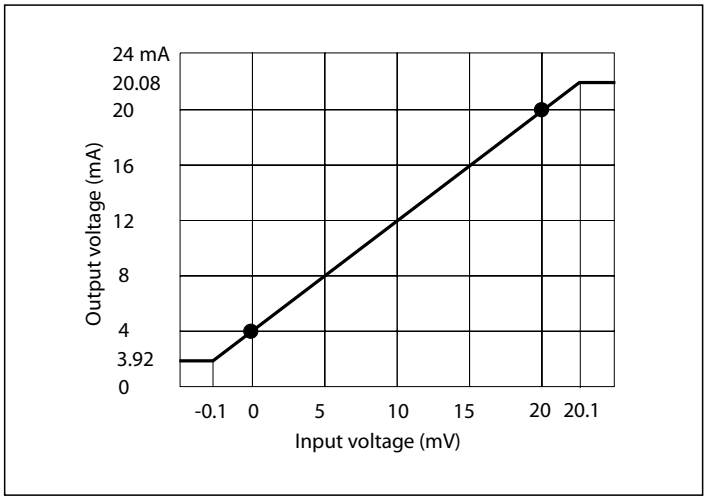


Fig.2 HD978TR3: input range 0…20mV, output current with relation to input voltage.

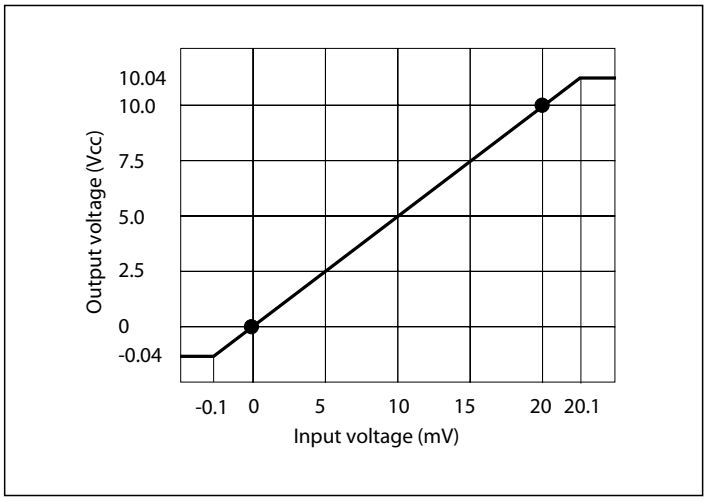


Fig.3 Input range 0…20mV, output voltage with relation to input voltage.

engines, induction furnaces, inverters, etc.) The working temperature must be included in the defined range of function.
In the diagrams attached, the R_L(Load) symbol represents any device inserted in the current loop, that is to say, an indicator, a controller, a data logger or a register. The two clamps marked EARTH are connected internally between themselves and are used, as you can see in the schemes, to connect the earth terminal coming, for example, from the pyranometer to the system's grounding.
The response curves of the tools are reported in figures 2 (HD978TR3 current output) and 3 (HD978TR4 voltage output).
Fig. 7 outlines, as an example, the connection used in order to read the voltage detected across a direct current shunt: the CONVERTER ensures the galvanic isolation between the device and the voltage or current output. Furthermore the fact that it can be configured allows the best correlation between read voltage and amplified output to be obtained. We recommend collecting the signal by using a shielded cable and connecting the shield (braid) to clamp 9.

Programming the range of functioning.

HD978TR3 and HD978TR4 converters are supplied with a default range of 0…20mV . The user can set a different input range according to his requirements, with a **minimum span of 2mV**. The correspondence between the read current and the current or voltage output can be direct (e.g. 0mV = 4mA and 20mV = 20mA) or inverse (e.g. 0mV = 20mA and 20mV = 4mA).

Avail yourself of the following programming tools:
- Direct current power source of suitable value (see the table of characteristics),
- Gauge with mV output,
- Connection cables,
- Precision ammeter with 0...25 mA minimum range or 0…10Vdc voltmeter.

The set up process must be carried out with the device already turned on.

Set the gauge in order to generate the voltage corresponding to the output at the beginning of the converter scale (4mA or 0V according to the models), **paying attention to the polarity.** Wait 30 seconds until the voltage stabilizes.

Press and keep the button pressed until the led starts blinking. Release the button. The device acquires the first value of the transmitter work range, and the led continues blinking. The tool now waits for the second data of the end of scale range.

Set the gauge so that it generates the voltage corresponding to the end of scale range (20mA or 10Vdc).

Press and keep the button pressed until the led stops blinking.

Release the button and wait 20 seconds, **without modifying the gauge data**, so that the transmitter memorizes the calibration data and is ready to function normally. The operation is complete when the led blinks once.

The device has acquired the second point corresponding to the range you wish to configure and starts to function normally.

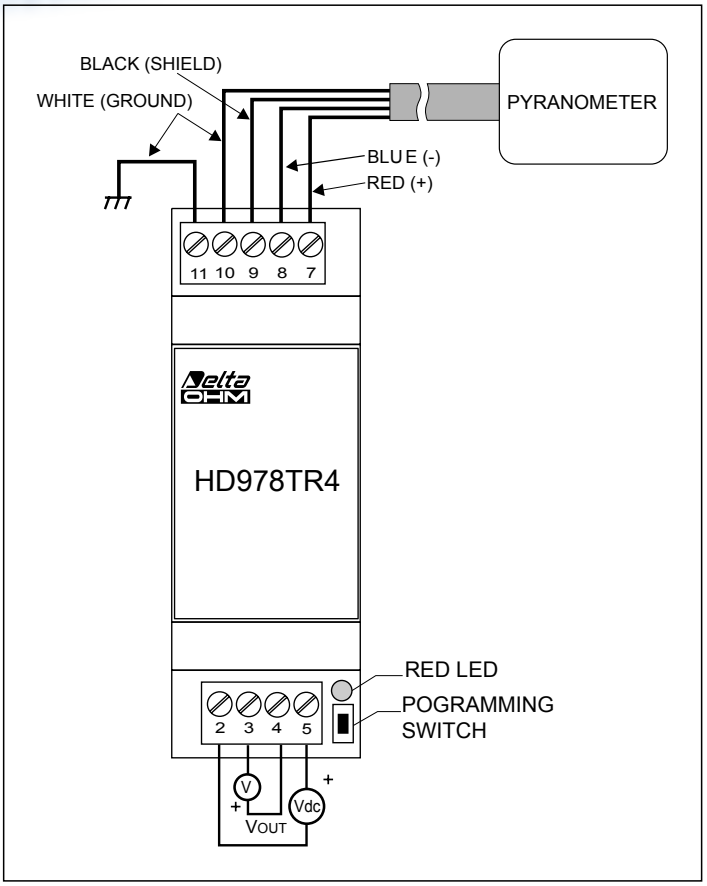


Fig.6 Connection diagram of the HD978TR4 to pyranometer.

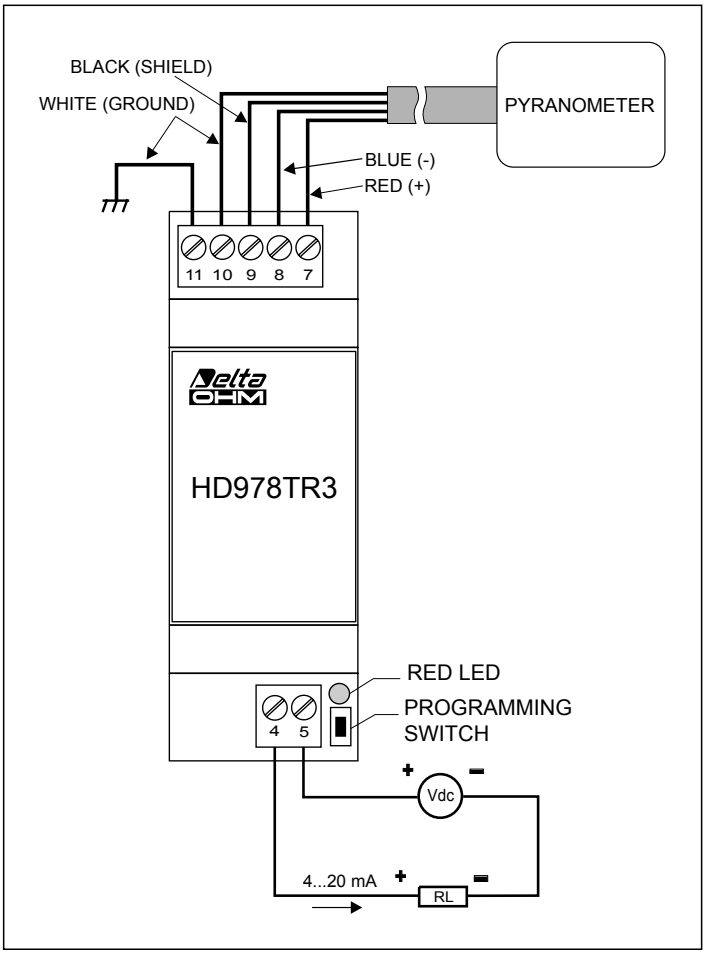


Fig.5 Connection diagram of the HD978TR3 to a pyranometer.

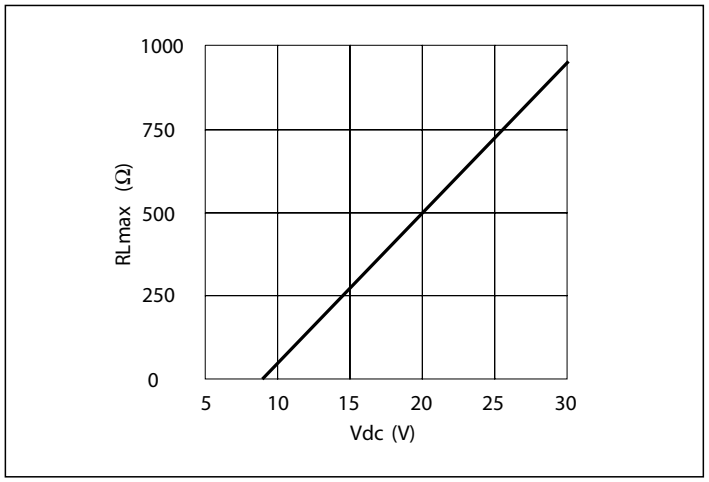
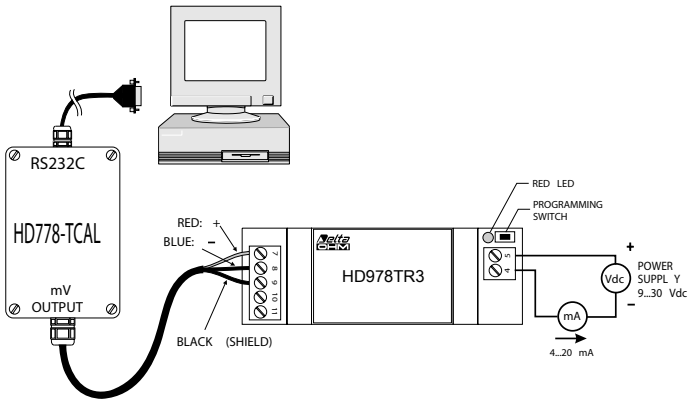


Fig.4 Load resistance with relation to power supply (output 4…20mA)

The minimum span value accepted by the device is 2mV. If, after entering the first value V1 of the range, the user tries to enter a second value V2 with V2-V1 lower than 2mV, the device does not accept it and remains in the waiting status with the led continuing to blink.

Note: The **HD778-TCAL** Delta Ohm can be used, in place of the current/voltage gauge. This device must be connected to the PC's serial port, and by using the special DELTALOG7 software it automates all the steps described below for the programmed range of functioning.



HD778-TCAL is provided with its software. After it has been connected by the programmer to a serial port on the PC, the operator can configure the HD978TR3 (4…20mA o 20…4mA current) or HD978TR4 (0…10Vdc or 10…Vdc voltage) by following the instructions on the screen.

ORDER CODE:

HD978TR3 Configurable signal converter amplifier with 4÷20mA (20÷4mA) output.
Input measuring range –10..+60mV. Default setting 0÷20mV.
Minimum measuring range 2mV.

HD978TR4 Configurable signal converter amplifier with 0÷10 (10÷0Vdc) output.
Input measuring range –10..+60mV. Default setting 0÷20mV.
Minimum measuring range 2mV.

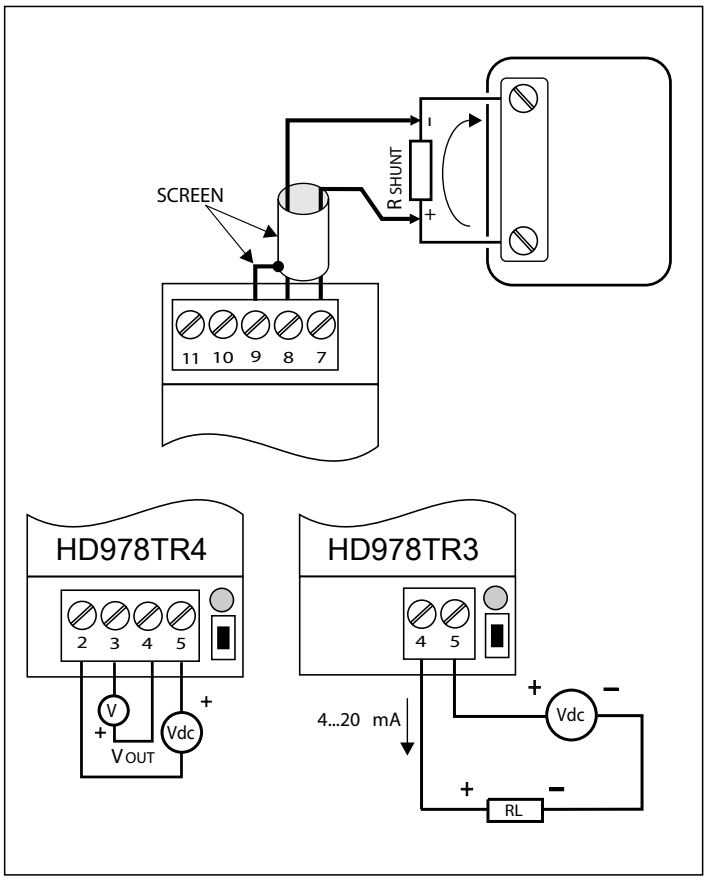


Fig.7 Connection diagram of the HD978TR3 and HD978TR4 to a shunt.