Universal Signal Conditioners
Quick Start Guide

AUTOMATIONDIRECT.com

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CUMMING, GA 30040-5860

Models:

884114 - Universal Transmitter

884116 - Universal Transmitter with (2) relay outputs

884501 - Display / Programming Module

Universal Transmitter Signal Conditioner models 884114 and 884116 are single input devices that accept milliampere, voltage, RTD, thermocouple or potentiometer inputs. Both models support a selectable single analog output. They feature a plastic slim-line housing, integral 35mm DIN rail mounting adapter, and removable screw terminals. The detachable 884501 programming / display module (purchased separately) is required for unit configuration. The programming / display module may remain affixed for operational display of input and output values.

Configuring a new unit

- Mount the unit on a 35mm DIN rail and connect supply, input and output wires to the appropriate terminals based on the connection diagrams in this Quick Start Guide.
- Snap the 884501 Programming Module on the front of the unit.
- Power up the unit.
- The unit should display the configuration menu similar to the figure below. If not, press ⌄ once.

Note: If no sensor is connected to the input terminals, SE.BR will flash in the display when the unit is powered up. Press OK once to acknowledge the error and then press OK again to display the first screen of the menu as shown above.

- Press OK to begin configuration. Press ⌃ or ⌄ to scroll through options on each step. Press OK to confirm an option and move to the next step.
- Press and hold OK to step backwards through the configuration menu.

Abbreviations used on the 884501 display

FL.ER = flash memory error
AO.ER = no load for current output (4-20 mA only)
NO.CO = connection error
IN.ER = error levels on input
TY.ER = configuration in 884501 doesn't match this product
ADV.SET = advanced settings
IN TYPE = input type
V.RANGE = voltage range
I.RANGE = current range
CONNEC. = connecting wires
Pt TYPE = Platinum RTD type
Ni TYPE = Nickel RTD type
TC.TYPE = thermocouple type
DEC.P = decimal place location
SE.BR = a sensor wire is not connected
DECR = decreasing
ACT.DIR = action direction
DISP.LO = low display range
DISP.HI = high display range
REL.UN = relays set in units or % range
Rx.FUNC = relay 1 / 2 function
Rx.CONT = relay 1 / 2 contact type
Rx.SETP = relay 1 / 2 setpoint
Rx.HYST = relay 1 / 2 hysteresis
ERR.ACT = relay action on error
ON.DEL = relay on delay
OFF.DEL = relay off delay
ANA.OUT = analog output
O.RANGE = output range
OUT.ERR = output action on error
OUT.LO = temp for low output
OUT.HI = temp for high output
EN.PASS = enable password
NEW.PAS = new password
CAL.LO = calibrate input low to process value?
CAL.HI = calibrate input high to process value?
USE.CAL = Use process calibration value?

Application Example - Voltage Input to Current Output

A level sensor with 0-5 VDC output needs to be connected to a 4-20 mA input on a PLC. The sensor measures fluid level between 0 and 60" in a tank. When using the 884116, low and high alarms will be set at 5" and 55" respectively with a 3" hysteresis and 5 second on delay set for each alarm. In the event of a sensor error, both relays will hold in their current state when the error occured. Relay switching will work as follows:

- In the configuration menu press ⌃ or ⌄ until VOLT is displayed on line 1. Press OK.
- *Select input range.* Press ⌃ or ⌄ until 0-5 is displayed for V.RANGE. Press OK.
- *Select input units.* Press ⌃ or ⌄ until IN is displayed for UNIT. Press OK.
- *Select decimal point location.* Press ⌃ or ⌄ until 111.1 is displayed for DEC.P. Press OK.
- *Set display value for minimum input.* Press ⌃ or ⌄ until 0.0 is displayed for DISP.LO. Press OK.
- *Set display value for maximum input.* Press ⌃ or ⌄ until 60.0 is displayed for DISP.HI. Press OK.
  - *884116 only - select relay 1 function.* Press ⌃ or ⌄ until SETP is displayed for R1.FUNC. Press OK.
  - *884116 only - select relay contact type.* Press ⌃ or ⌄ until N.O. is displayed for R1.CONT. Press OK.
  - *884116 only - set relay setpoint.* Press ⌃ or ⌄ until 5.0 is displayed for R1.SETP. Press OK.
  - *884116 only - select relay activation decreasing mode.* Press ⌃ or ⌄ until DECR is displayed for ACT.DIR. Press OK.
  - *884116 only - set relay hysteresis.* Press ⌃ or ⌄ until 3.0 is displayed for R1.HYST. Press OK.
  - *884116 only - select to hold relay status on error.* Press ⌃ or ⌄ until HOLD is displayed for ERR.ACT. Press OK.
  - *884116 only - set relay on delay in seconds.* Press ⌃ or ⌄ until 5 is displayed for ON.DEL. Press OK.
  - *884116 only - set relay off delay in seconds.* Press ⌃ or ⌄ until 0 is displayed for OFF.DEL. Press OK.
  - *884116 only - select relay 2 function.* Press ⌃ or ⌄ until SETP is displayed for R2.FUNC. Press OK.
  - *884116 only - select contact type.* Press ⌃ or ⌄ until N.O. is displayed for R2.CONT. Press OK.
  - *884116 only - set relay setpoint.* Press ⌃ or ⌄ until 60.0 is displayed for R2.SETP. Press OK.
  - *884116 only - select relay activation increasing mode.* Press ⌃ or ⌄ until INCR is displayed for ACT.DIR. Press OK.
  - *884116 only - set relay hysteresis.* Press ⌃ or ⌄ until 3.0 is displayed for R2.HYST. Press OK.
  - *884116 only - select to hold relay status on error.* Press ⌃ or ⌄ until HOLD is displayed for ERR.ACT. Press OK.
  - *884116 only - set relay on delay in seconds.* Press ⌃ or ⌄ until 5 is displayed for ON.DEL. Press OK.
  - *884116 only - set relay off delay in seconds.* Press ⌃ or ⌄ until 0 is displayed for OFF.DEL. Press OK.
- *Select output mode.* Press ⌃ or ⌄ until CURR is displayed for ANA.OUT. Press OK.
- *Select output range.* Press ⌃ or ⌄ until 4-20 is displayed for O.RANGE. Press OK.
- *Set NAMUR NE43 upscale at error.* Press ⌃ or ⌄ until 23mA is displayed for OUT.ERR. Press OK.
- Wait while the settings are stored and the unit switches to run mode.

Once the 884116 has been configured, the relay setpoints can be adjusted very quickly. Press ⌃ to adjust RELAY1 and ⌄ to adjust RELAY2. Adjust the setpoint up or down and then press OK to save the setting and exit the menu. Pressing ⌃ and ⌄ simultaneously will change the relay's state.

Application Example - Thermocouple Input

An oven's temperature is to be monitored using a type K thermocouple. The unit will output a 0-10 VDC signal for a temperature range of 100-400 °F

- In the configuration menu press ⌃ or ⌄ until TEMP is displayed on line 1. Press OK.
- *Select sensor type.* Press ⌃ or ⌄ until TC is displayed for SENSOR. Press OK.
- *Select TC type.* Press ⌃ or ⌄ until TC.K is displayed for TC.TYPE. Press OK.
- *Select temperature units.* Press ⌃ or ⌄ until °F is displayed for UNIT. Press OK.
  - *884116 only - select relay 1 function.* Press ⌃ or ⌄ until OFF is displayed for R1.FUNC. Press OK.
  - *884116 only - select relay 2 function.* Press ⌃ or ⌄ until OFF is displayed for R2.FUNC. Press OK.
- *Select output mode.* Press ⌃ or ⌄ until VOLT is displayed for ANA.OUT. Press OK.
- *Select output range.* Press ⌃ or ⌄ until 0-10 is displayed for O.RANGE. Press OK.
- *Set temperature for analog output low.* Press ⌃ or ⌄ until 100.0 is displayed for OUT.LO. Press OK.
- *Set temperature for analog output high.* Press ⌃ or ⌄ until 400.0 is displayed for OUT.HI. Press OK.
- Wait while the settings are stored and the unit switches to run mode.

Application Example - Voltage Input to Voltage Output with Custom Scaling

A flow sensor delivers a 3-7 VDC output over a range of 0-80 gallons per minute. The signal conditioner will convert the 3-7 VDC input signal to a 0-10 VDC output signal. The unit must first be configured to the voltage output range. The two-point calibration mode in Advanced Settings is then used to set the custom input range.

- In the configuration menu press ⌃ or ⌄ until VOLT is displayed on line 1. Press OK.
- *Select input range.* Press ⌃ or ⌄ until 0-10 is displayed for V-RANGE. Press OK.
- *Select input units.* Press ⌃ or ⌄ until gal/min is displayed for UNIT. Press OK.
- *Select decimal point location.* Press ⌃ or ⌄ until 111.1 is displayed for DEC.P. Press OK.
- *Set display for minimum input.* Press ⌃ or ⌄ until 0.0 is displayed for DISP.LO. Press OK.
- *Set display for maximum input.* Press ⌃ or ⌄ until 80.0 is displayed for DISP.HI. Press OK.
  - *884116 only - select relay 1 function.* Press ⌃ or ⌄ until OFF is displayed for R1.FUNC. Press OK.
  - *884116 only - select relay 2 function.* Press ⌃ or ⌄ until OFF is displayed for R2.FUNC. Press OK.
- *Select output mode.* Press ⌃ or ⌄ until VOLT is displayed for ANA.OUT. Press OK.
- *Set output range.* Press ⌃ or ⌄ until 0-10 is displayed for O.RANGE. Press OK.
- Wait while these settings are stored and the unit switches to run mode.
- Press OK to return to the configuration menu.

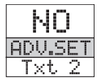
Application Example Continued above.

Application Example - Voltage Input to Voltage Output with Custom Scaling - Cont'd

- *Enter Advanced Settings Mode.* Press ⌃ or ⌄ until YES is displayed for ADV.SET. Press OK.
- *Select custom scaling mode.* Press ⌃ or ⌄ until CAL is displayed for SETUP. Press OK.
- Drive the input to a low value. The value does not have to be a minimum. In this example we will use 5.0 VDC (40 gallons per minute).
- *Select lowpoint.* Press ⌃ or ⌄ until YES is displayed for CAL.LO Press OK.
- *Set low point.* Press ⌃ or ⌄ until 40.0 is displayed for gal/min. Press OK.
- Drive the input to a high value. The value does not have to be a maximum. In this example we will use 6.0 VDC (60 gallons per minute).
- *Select high point.* Press ⌃ or ⌄ until YES is displayed for CAL.HI. Press OK.
- *Set high point.* Press ⌃ or ⌄ until 60.0 is displayed for gal/min. Press OK.
- *Confirm to use custom scaling.* Press ⌃ or ⌄ until YES is displayed for USE.CAL. Press OK.
- Wait while the settings are stored and the unit switches to run mode.

Advanced Operations

Several useful functions are in the Advanced Settings Menu. To get to the Advanced Settings Menu, Press ⌃ or ⌄ until YES is displayed for the first screen of the configuration menu that looks like this:



The configuration of the 884114 or 884116 can be saved into the 884501. The 884501 can then be moved to another unit (must be the same part number) and the configuration loaded into the new unit.

- Enter Advanced Settings menu and then press ⌃ or ⌄ until MEM is displayed for SETUP. Press OK.
- *To save the configuration into the 884501.* Press ⌃ or ⌄ until SAVE is displayed for MEMORY. Press OK.
- *To load the configuration from the 884501 into the 884114 or 884116.* Press ⌃ or ⌄ until LOAD is displayed for MEMORY. Press OK.

Password Protection allows the user to create a 4-digit password (0000-9999) to prevent tampering with configuration settings if the 884501 is left mounted to the front of the signal conditioner.

- Enter Advanced Settings menu and then press ⌃ or ⌄ until PASS is displayed for SETUP. Press OK.
- *To enable password protection.* Press ⌃ or ⌄ until YES is displayed for EN.PASS. Press OK.
- *To set a password.* Press ⌃ or ⌄ until the desired code is displayed for NEW.PAS. Press OK.

Note: The default password 2008 allows access to all configuration menus. The default password cannot be changed.

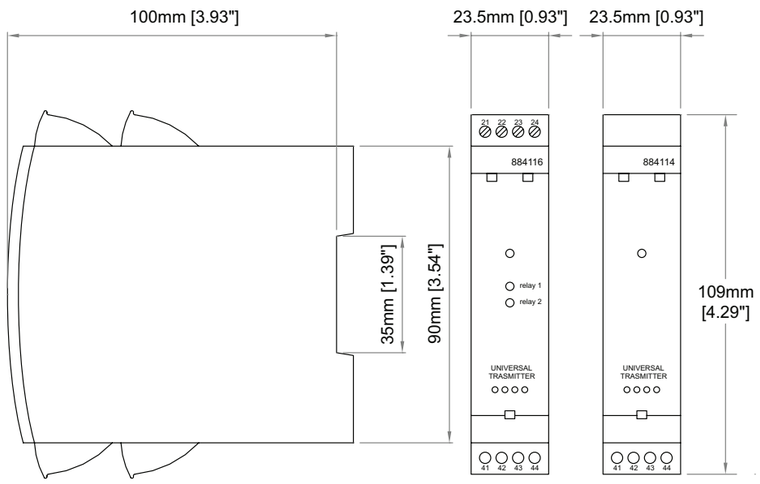
Additional Help and Support

- For product support, specifications, installation and troubleshooting, a Hardware User Manual can be downloaded from the On-line Documentation area of the ***AutomationDirect*** web site.
- Links to overview, application, programming and setup videos are available on the back of this document.
- For additional technical support and questions, call out Technical Support team @ 1-800-633-0405 or 770-844-4200

Universal Signal Conditioner Specifications

Universal Signal Conditioners 884114/884116 Specifications (with or without 884501)		
General Specifications		
Temperature Range	-20°C to + 60°C [-4°F to 140°F]	
Power	AC Power	21.6 to 253 VAC, 50/60 Hz
	DC Power	19.2 to 300 VDC
Consumption	≤ 2.5W	
Fuse	400 mA slow blow / 250 VAC (not user replaceable)	
Auxiliary Power Supply Output	16-25 VDC, 20 mA max (Terminal 43 and 44)	
Isolation Voltage, Test/Operation	2.3 kVAC/250 VAC	
Configuration Interface	Programming/display module, 884501	
Signal/noise Ratio	Min. 60 dB (0 to 100 kHz)	
Response Time (0 to 90%, 100 to 10%)	Temperature input	≤ 1 sec
	mA / V input	≤ 400 ms
Calibration Temperature	20 to 28°C (68 to 82.4°F)	
Accuracy	Dependant upon input type (See hardware user manual for more information)	
Shock	EN61010-1	
Vibration	IEC 60068-2-6, IEC 60068-2-64	
EMC Immunity	≤ ±0.5% of span	
Extended EMC Immunity: NAMUR NE 21, A criterion, burst	≤ ±0.1% of span	
Environmental Conditions	Operating and Storage Temperature	-20 to +60°C [-4 to 140°F]
	Operating and Storage Humidity	95% relative humidity (non-condensing)
Approvals	CE, UL (#E314521, UL 508), EMC 2004/108/EC (EN 61326-1) LVD 2006/95/EC (EN61010-1) RoHS	
Construction	IP 50 enclosure, IP 20 terminals Touch Safe, case body is black high impact plastic. Pollution degree 1.	
Connections	Wire strip length	7.5mm [0.3 in]
	Wire gauge	26 - 14 AWG standard wire
	Torque	0.5 N-m [4.5 inch-lbs]
Weight	884114	145 g [5.1 oz], 160 g [5.6 oz] with programming/display module
	884116	170 g [5.9 oz], 185 g [6.5 oz] with programming/display module
	884501	15g [0.5 oz]
Dimensions	109 x 23.5 x 100mm [4.3 x .93 x 3.93 in], 109 x 23.5 x 116mm [4.3 x .93 x 4.6 in] with programming module	

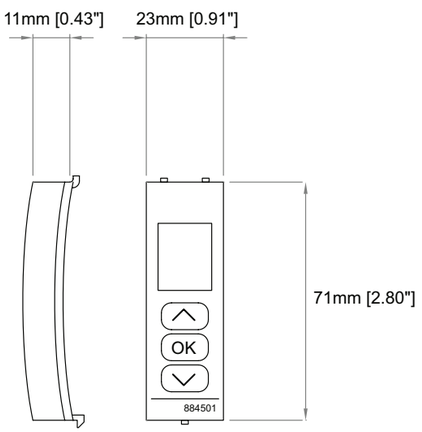
884114 and 884116 Dimensions



Input Specifications

Inputs			
Current Input			
Programmable Ranges		0 to 20 and 4 to 20 mA DC	
Measurement Range		-1 to 25 mA	
Input Resistance		Nom. 20 Ω + PTC 50 Ω	
Sensor Error Detection		4 to 20 loop break, ≤3.6mA; ≥21mA	
Voltage Input			
Programmable Ranges		0 to 1, 0.2 to 1, 0 to 5, 1 to 5, 0 to 10, and 2 to 10 VDC	
Measurement Range		-20 mV to 12 VDC	
Input Resistance		Nom. 10 MΩ	
Thermocouple Inputs			
Thermocouple Type		B, E, J, K, L, N, R, S, T, U, W3, W5, and LR	
Cold Junction Compensation		Via internally mounted sensor < ± 2.0°C [< ± 3.6°F]	
Sensor Error Detection		Sensor break, >750kOhm/(1.25V)	
Sensor Error Current		When detecting 2µA, otherwise 0 µA	
Type	***Min. value***	***Max. value***	***Standard***
B	+400°C [+752°F]	+1820°C [+3308°F]	IEC 60584-1
E	-100°C [-148°F]	+1000°C [+1832°F]	IEC 60584-1
J	-100°C [-148°F]	+1200°C [+2192°F]	IEC 60584-1
K	-180°C [-292°F]	+1372°C [+2502°F]	IEC 60584-1
L	-200°C [-328°F]	+900°C [+1652°F]	DIN 43710
N	-180°C [-292°F]	+1300°C [+2372°F]	IEC 60584-1
R	-50°C [-58°F]	+1760°C [+3200°F]	IEC 60584-1
S	-50°C [-58°F	+1760°C [+3200°F]	IEC 60584-1
T	-200°C [-328°F]	+400°C [+752°F]	IEC 60584-1
U	-200°C [-328°F]	+600°C [+1112°F]	DIN 43710
W3	0°C [+32°F]	+2300°C [+4172°F]	ASTM E988-90
W5	0°C [+32°F]	+2300°C [+4172°F]	ASTM E988-90
LR	-200°C [-328°F]	+800°C [+1472°F]	GOST 3044-84
RTD, Linear Resistance, Potentiometer Inputs			
RTD Types		Pt10, Pt20, Pt50, Pt100, Pt200, Pt250, Pt300, Pt400, Pt500, Pt1000, Ni50, Ni100, Ni120, and Ni1000	
Cable Resistance per Wire		RTD, 50 Ω max	
Sensor Current		RTD, Nom. 0.2 mA	
Sensor Error Detection		Sensor break >15kOhm Sensor short <15 Ohm (N/A for Pt10, Pt20, Pt50)	
Input type	***Min. value***	***Max. value***	***Standard***
Pt100	-200°C [-328°F]	+850°C [+1562°F]	IEC60751
Ni100	-60°C [-76°F]	+250°C [+482°F]	DIN 43760
Linear Resistance	0 Ω	10kΩ	–
Potentiometer	10 Ω	100 kΩ	–

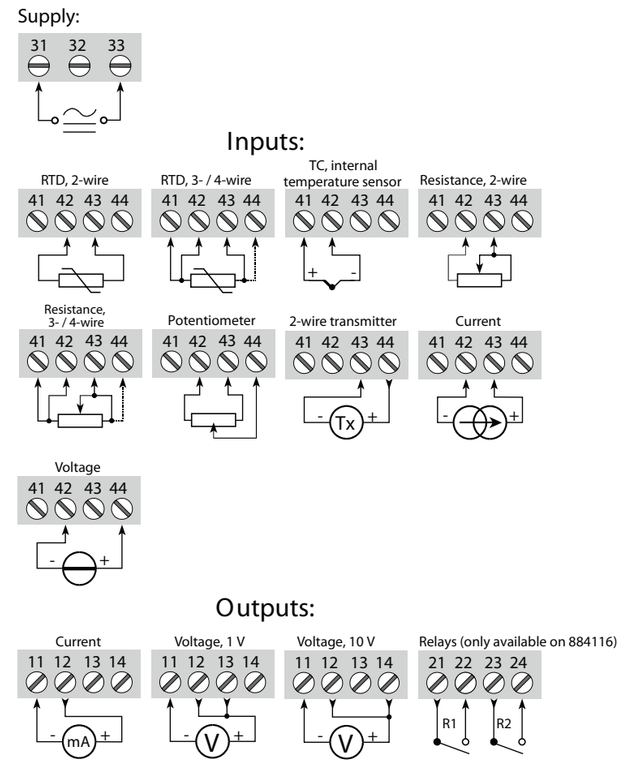
884501 Dimensions



Ouput Specifications

Outputs	
Analog Output - Current	
Signal Range	0 to 20 mA
Programmable Signal Range	0 to 20, 4 to 20, 20 to 0, and 20 to 4 mA
Load Resistance	800 Ω max, 20mA, 16 VDC
Load Stability	0.01% of span, 100 Ω load
Output state on sensor error detection	0 / 3.5 mA / 23 mA / none selectable
Output Limitation	For 4 to 20 and 20 to 4 mA signals: 3.8 to 20.5 mA
	For 0 to 20 and 20 to 0 mA signals: 0 to 20.5 mA
Current Limit	≤28 mA
Analog Output - Voltage	
Signal Range (Span)	0 to 10 VDC
Programmable Signal Ranges	0 to 1, 0.2 to 1, 0 to 10, 0 to 5, 1 to 5, 2 to 10, 1 to 0, 1 to 0.2, 5 to 0, 5 to 1, 10 to 0, and 10 to 2 V
Load	500 k Ω min
Relay outputs (884116 only)	
Relay Functions	Setpoint, Window, Sensor Error, Power and Off
Hysteresis	0.1 to 25% (1 to 2999 display counts)
On and Off Delay	0 to 3600 sec
Relay state on sensor error detection	Break / Make / Hold selectable
Relay contact ratings	250 Vrms max; 2 A AC or 1 A DC max; 500 VA max

Wiring Diagrams



Video Links

Click or scan the QR code to the right for an Overview and Applications video on the Universal Signal Conditioners

Click or scan the QR code to the right for a Programming and Setup video on the Universal Signal Conditioners