

Universal Transmitter Signal Conditioner

Part 1 - Overview & Applications

VID: L-PROC-SC-001

A Few Applications For Signal Conditioners

Signal Conditioners are used to isolate, amplify, filter, and convert a variety of input signals to clean output signals that can be more easily handled by process controllers or PLCs.



**884116 &
884501**

- Ground loop protection
- Temperature measurement
- Sensor output range adjustment
- Convert one type of signal to another



884114

Part Numbers & Descriptions

- 884114 signal conditioner
- 884116 signal conditioner with (2) relay outputs
- 884501 programming/display module



884114



884501



884116

Features

- 35mm DIN rail mounted
- Removable, keyed terminal plugs
- Status LED or 3-line LCD display
- 21.6 to 253 VAC / 19.2 to 300 VDC
- No DIP switches
- No software/computer required to program
- 3-way isolation between power/in/out
- 884501 can remain on unit as a process display or it can be removed
- Program can be copied and transferred to other units using the 884501, as long as same model
- Scrolling help messages on display during setup programming
- Password protection available



884116



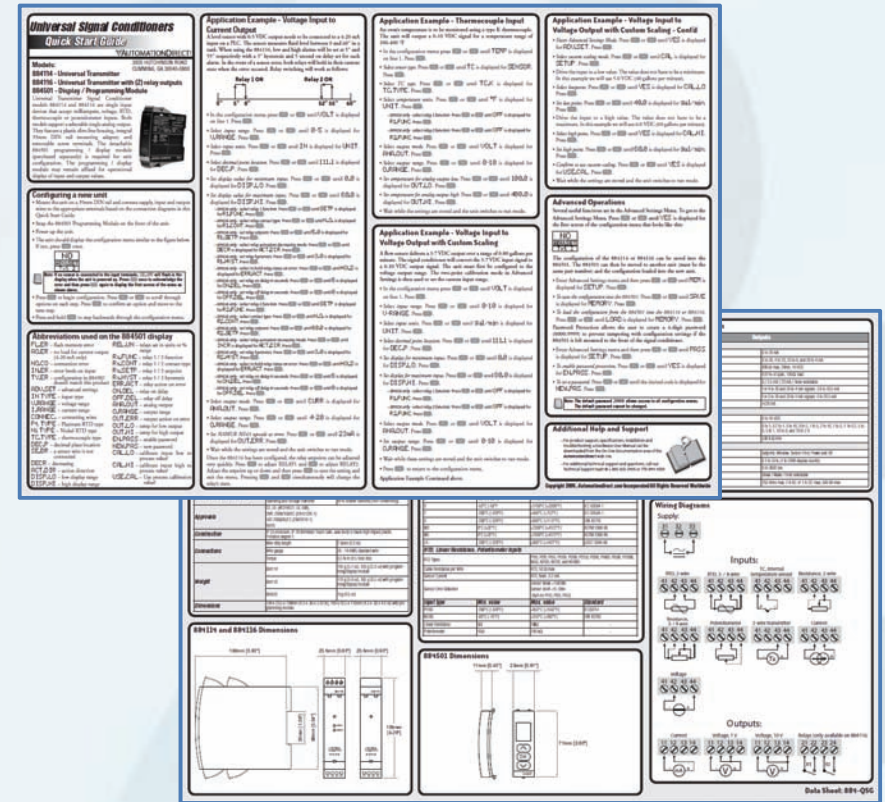
884501

Models:

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 milliamperes, 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.



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	

Specifications



884114



884501



884116

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 [$\pm 3.6^{\circ}\text{F}$]	
Sensor Error Detection		Sensor break, >750kΩ(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 >15kΩhm Sensor short <15 Ωhm (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	0Ω	10kΩ	-
Potentiometer	10Ω	100 kΩ	-

Available Inputs

- 2-, 3- and 4-wire RTD (10 Pt & 4 Ni types)
- 2-, 3- and 4-wire linear resistor
- Thermocouple types
B, E, J, K, L, N, R, S, T, U, W3, W5, LR
- 3-wire potentiometer
- 0 to 20 and 4 to 20 mA DC
- 0 to 1, 0.2 to 1, 0 to 5, 1 to 5, 0 to 10, and 2 to 10 VDC

Available Outputs

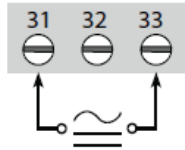
Output Specifications

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 (886116 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

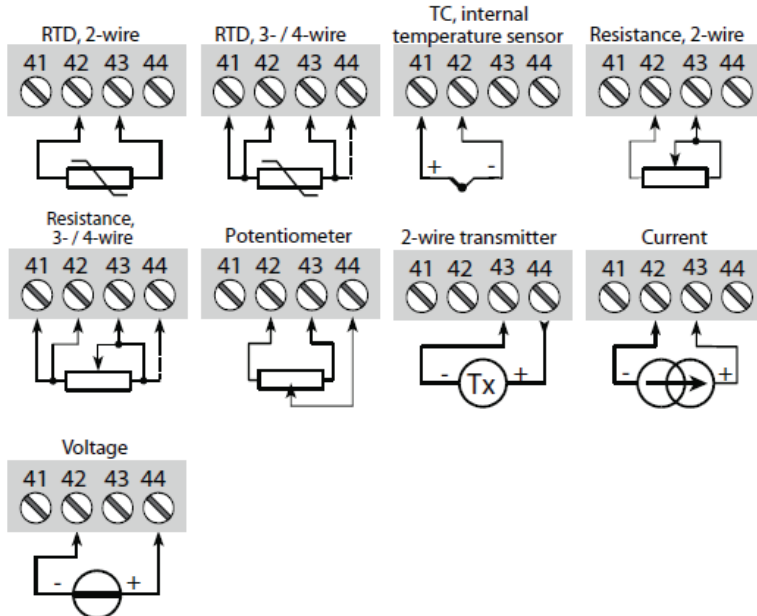
- (2) programmable relays on 884116
 - N.O. / N.C.
 - Setpoint, window, error, power, or off function
- 0 to 20, 4 to 20, 20 to 4, and 20 to 0 mA
- 0 to 1, 0.2 to 1, 0 to 5, 1 to 5, 0 to 10, 2 to 10, 1 to 0, 1 to 0.2, 5 to 0, 5 to 1, 10 to 0, 10 to 2 VDC

Wiring Diagrams

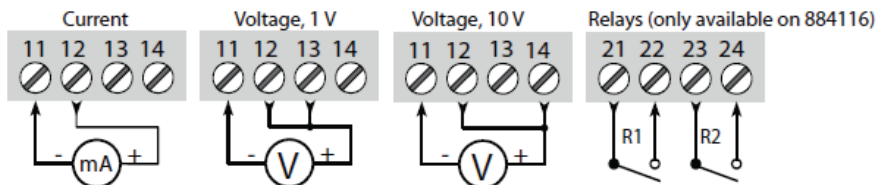
Supply:



Inputs:



Outputs:

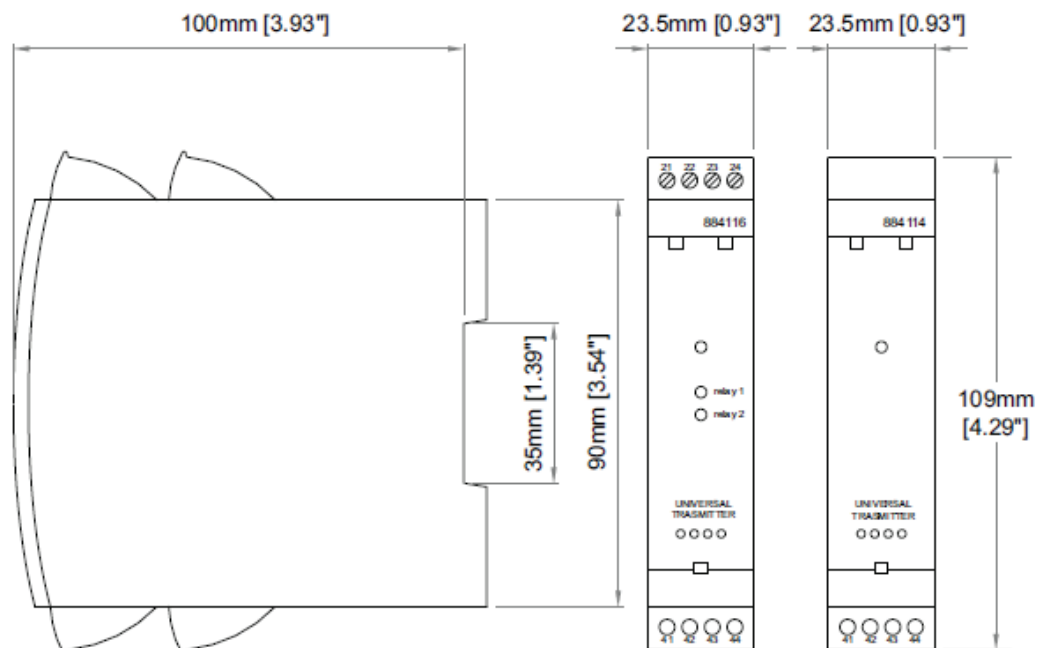


Wiring Diagrams

- Power wired to terminals 31 & 33 (terminal 32 not used)
- Inputs wired to terminals 41 -44
- Outputs wired to terminals 11-14
- Relay contacts wired to terminals 21-22 and 23-24

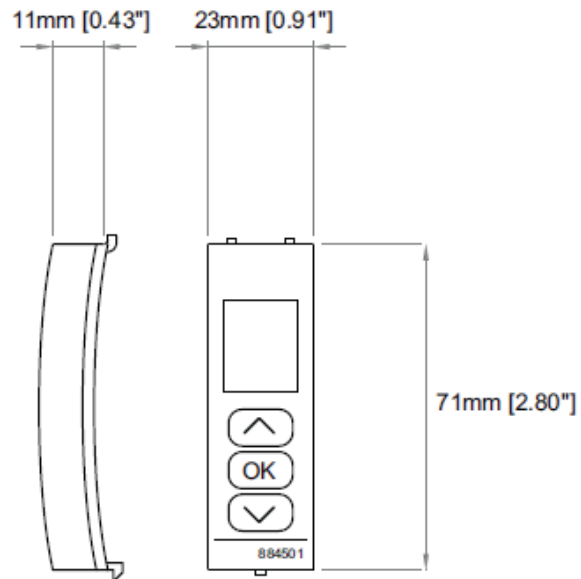
Dimensions – 884114 & 884116

884114 and 884116 Dimensions



Dimensions – 884501

884501 Dimensions



Programming Abbreviations

Abbreviations used on the 884501 display

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

These are the abbreviations that are used on the 884501 Programming / Display Module. The abbreviations are covered in more detail in Part 2 – Programming & Setup in this series of videos.

Application Example – Convert Signal Type

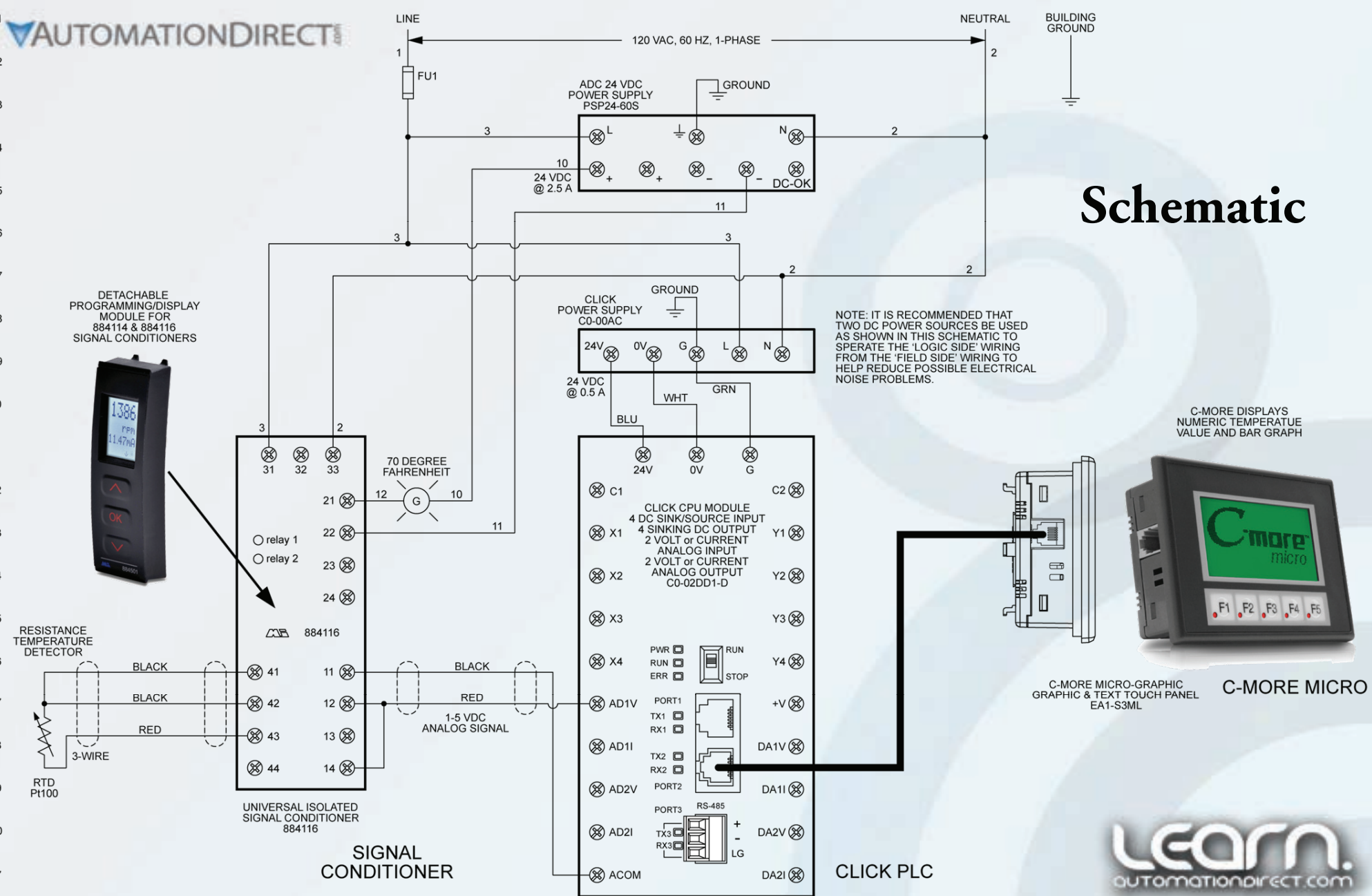
A signal conditioner is used in applications where you have a signal and you need to bring that signal into an input device and the 2 signals don't match. In our example, we have an RTD (resistance temperature detector) mounted on equipment that is used for reading a process temperature, such as a curing oven. The controller we have will not accept RTD inputs. It only has 0-5 VDC or 4-20 mA inputs, such as the CLICK PLC shown in the schematic on the next slide.

We can resolve the problem by taking the RTD, wire it into terminals 41-43 on the signal conditioner, setup the input of the signal conditioner for 3 wire RTD, then wire the output of the signal conditioner to the analog input of the CLICK PLC. We then set them both for a range of 1-5 VDC.

In the CLICK PLC we set the scaling of the analog input to read 0 to 100 degrees Fahrenheit, and also use a C-more Micro-Graphic panel to display the temperature, both as a numeric value and also as a bar graph indicator.

We also take advantage of the model 884116's relay contact output and use a set point of 70 degrees Fahrenheit to turn on an indicator pilot light.

Schematic



Other available videos in this series.

Title	VID Number
Part 2 – Programming & Setup	L-PROC-SC-002

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