prosense®

SCU Series Universal Signal Conditioners

SCU-3100, SCU-1400, SCU-1600, SCU-2200 Signal Conditioners

Part No. SCU-1400 Shown

CE cULus FM APPROVED

(SCU-3100/1400/1600 only when SCU-PDM2 is not attached)

The Universal Signal Conditioners from AutomationDirect are extremely versatile, providing the flexibility to convert, transmit, scale, and isolate signals from a wide variety of process sensors and controller I/O. Scalable input signal types supported include mA, VDC, thermocouple with internal or optional external cold junction compensation, 2-, 3-, 4-wire RTDs, linear resistance or potentiometer signals. Numerous selectable input and output ranges, two-point field scalability, and configuration for direct or inverse acting signals will handle hundreds of applications. The SCU-3100 has two individually programmable relay outputs used for alarming and control functions. The output on the SCU-1400 is a range selectable mA or VDC analog signal while the SCU-1600 provides both selectable mA or VDC analog signal and two individually programmable relays. The SCU-2200 offers NPN, PNP, and TTL frequency outputs that are scalable from 0 to 25,000 Hz. An integral excitation power supply output is available to power a 2-wire transmitter or a 3-wire potentiometer. The isolated universal supply voltage input eliminates the need for separate transformers or power supplies. Isolation is also provided between input and output.

The signal conditioners are easily configured with the SCU-PDM2 menu-structured LCD programming/display module (a computer running special calibration software is not required, and there are no confusing DIP switches or jumpers to set). Automatic scrolling Help text identifies each menu item. The detachable programming/display module can store and transfer configuration parameters from one signal conditioner to another, minimizing set-up time in multiple unit applications. Programming is available in seven different languages, and the programming/display module can be password protected to prevent unauthorized changes to the configuration. A process simulation function allows manual manipulation of the input signal to control the output signal for trouble-shooting and checkout. When not used for configuration, the programming/display module can remain on the signal conditioner in non-hazardous locations to display the input signal value and engineering units, output signal, and relay status (if equipped). The SCU-PDM2 and SCU-2200 are NOT approved for use in Hazardous Locations.

Features

- Flexibility to accept mA, VDC, thermocouple, RTD, linear resistance or potentiometer signal types
- Selectable input and output ranges, two-point field scalability, and direct or reverse signal configuration to handle hundreds of applications
- SCU-3100: two individually programmable relay outputs
- SCU-1400: selectable direct or reverse acting mA or VDC analog output signal
- SCU-1600: selectable direct or reverse acting mA or VDC analog output signal and two programmable relay outputs.
- SCU-2200: NPN, PNP, and TTL frequency outputs scalable from 0 to 25,000 Hz.
- Universal supply voltage, 21.6 to 253 VAC or 19.2 to 300 VDC, polarity insensitive
- 3-way isolation between input, output, and power

- Auxiliary power supply output for 2-wire transmitters and 3-wire potentiometers
- Easy-to-use detachable LCD programming/display module SCU-PDM2
  (Sold separately and required for programming)
- Transfer configuration settings from one signal conditioner to another with SCU-PDM2
- LEDs indicate operation and relay status (SCU-3100, SCU-1600) when display module is not installed
- Integral 35mm DIN rail mounting adapter
- Removable screw terminal blocks are keyed to ensure correct installation
- cULus, FM (when SCU-PDM2 is not attached. SCU-2200 not FM approved.), and CE marked
- 5 year warranty

Part No.	Application	Isolation	Input	Output	Field Configurable	Operating Voltage	Mounting	Electrical Connection	Quantity	Weight (lbs)	Drawing Link	Price
SCU-3100	Limit alarm			(2) relays					1	0.32	PDF	$252.00
SCU-1400		Yes	Current, potentiometer, RTD, thermocouple, voltage	Current, voltage	Yes*	21.6-253 VAC/19.2-300 VDC	35mm DIN rail	Removable screw terminal plugs	1	0.38	PDF	$274.00
SCU-1600	Signal conditioner			Current, voltage, (2) relays					1	0.38	PDF	$299.00
SCU-2200				Frequency					1	0.44	PDF	$397.00

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* Requires SCU-PDM2

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SCU-3100, SCU-1400, SCU-1600, SCU-2200 Universal Signal Conditioners Technical Specifications

General Specifications		
Power	AC Power	21.6 to 253 VAC, 50/60 Hz
	DC Power	19.2 to 300 VDC
Consumption	≤ 2.0W (SCU-3100 & SCU-1400) ≤ 2.5W (SCU-1600)	
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, SCU-PDM2 (sold separately) or SCU-PDM1 (discontinued and replaced by SCU-PDM2)	
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	≤ 400ms
Calibration Temperature	20 to 28°C [68 to 82.4°F]	
Accuracy	The greater of the general and basic values (See Accuracy Table)	
Vibration	IEC 60068-2-6, UL 508/C22.2 No. 14 2 to 13.2 Hz...± 1mm 13.2 to 100Hz...± 0.7 g	
EMC Immunity	≤ ± 0.5% of span	
Extended EMC Immunity: NAMUR NE 21, A criterion, burst	≤ ± 1% of span	
Environmental Conditions	Operating Temperature	-20 to +60°C [-4 to 140°F]
	Storage Temperature	-20 to +85°C [-4 to 185°F]
	Operating and Storage Humidity	95% relative humidity (non-condensing)
Approvals	UL: E191072, UL 508/C22.2 No. 14 FM: FM19US0054X, 3600, 3611, 3819, ISA 61010-1, Class I, Div. 2, Group A-D, T5, Class I, Div. 2, Group IIC, T5 Zone 2 (SCU-3100/1400/1600 only when SCU-PDM2 is not attached). The SCU-PDM2 and SCU-2200 are NOT approved for use in Hazardous Locations. CE: EMC 2014/30/EU LVD 2014/35/EU RoHS2 2011/65/EU amended by 2015/863	
Construction	IP 20, case body is black high impact plastic. Pollution degree 1.	
Connections	Wire strip length	7.5 mm [0.3 in]
	Wire gauge	26 - 14 AWG standard wire
	Torque	0.5 N-m [4.5 inch-lbs]
Weight	SCU-1400	145g [5.1 oz], 160 g [5.6 oz] with programming module
	SCU-1600	170g [5.9 oz], 185 g [6.5 oz] with programming module
	SCU-2200	155g [5.9 oz], 170 g [6.5 oz] with programming module
	SCU-3100	170g [5.9 oz], 185 g [6.5 oz] with programming module
Dimensions (HxWxD)	109 x 23.5 x 104mm [4.3 x 0.93 x 4.1 in], 109 x 23.5 x 116 or 131mm depending on which programming module, PDM1 or PDM2 [4.3 x 0.93 x 4.6 or 5.16 in] with programming module	

Accuracy Table

General Values		
Input Type	**Absolute Accuracy**	**Temperature Coefficient**
All	≤ ± 0.1% of span	≤ ± 0.01% of span/°C [± 0.01% of span/°F]

Basic Values		
Input Type	**Basic Accuracy**	**Temperature Coefficient**
mA	≤ ± 4 µA	≤ ± 0.4 µA/°C [w0.22µA/°F]
Volt	≤ ± 20 µV	≤ ± 2 µV/°C [w1.1µV/°F]
Pt100	≤ ± 0.2°C [w0.36°F]	≤ ± 0.01°C/°C [w0.001°F/°F]
Linear resistance	≤ ± 0.1 Ω	≤ ± 0.01 Ω/°C [w0.0056Ω/°F]
Potentiometer	≤ ± 0.1 Ω	≤ ± 0.01 Ω/°C [w0.0056Ω/°F]
TC Type: E, J, K, L, N, T, U	≤ ± 1°C [w1.8°F]	≤ ± 0.05°C/°C [w0.05°F/°F]
TC Type: B, R, S, W3, W5, LR	≤ ± 2°C [3.6°F], TC Type B ≤ ± 4°C, 200...1820°C	≤ ± 0.2°C/°C [w0.2°F/°F], TC Type B ≤ ± 4°C, 200...1820°C

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Input/Output Specifications

Inputs	
Current Input	
Programmable Ranges	0 to 20 and 4 to 20 mA DC
Measurement Range	0 to 20 mA (0 to 23mA SCU-2200)
Input Resistance	Nom. 70Ω
Sensor Error Detection	4 to 20 loop break, ≤3.6mA; ≥21mA
Voltage Input	
Voltage Input drop, nom.	1.4 V @ 20 mA
Programmable Ranges	0 to 1, 0.2 to 1, 0 to 5, 1 to 5, 0 to 10, and 2 to 10 VDC (0 to 2.5 / 0.5 to 2.5 SCU-2200)
Measurement Range	0V 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] (+ 0.4°C * Δt), Δt = internal temperature - ambient temperature Via external sensor in connector SCU-CJC1: 20 to 28°C [68 to 82.4°F] m ± 1°C [1.8°F] and -20 to 20°C / 8 to 70°C [-4 to 68°F / 82.4 to 158°F] m ± 2°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	0°C [+32°F] (204.4°C [+400°C] SCU-2200)	+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, Ni1000, (Cu10, Cu20, Cu50, Cu100 only SCU-3100/1400/1600)
Cable Resistance per Wire	RTD, 50 Ω max
Sensor Current	RTD, Nom. 0.2 mA
Sensor Error Detection	Sensor break >15kΩ Sensor short <15Ω (N/A for Cuxx, Pt10, Pt20, Pt50)

Input type	Min. value	Max. value	Standard
Pt10 to Pt1000	-200°C [-328°F]	+850°C [+1562°F]	IEC60751
Ni50 to Ni1000	-60°C [-76°F]	+250°C [+482°F]	DIN 43760
Cu10 to Cu100	-200°C [-328°F]	-260°C [-436°F]	α = 0.00427 (only SCU-3100/1400/1600)
Linear Resistance	0Ω	10kΩ	–
Potentiometer	10Ω	100kΩ	–

SCU-3100, SCU-1400, SCU-1600, SCU-2200
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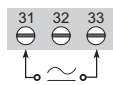| Outputs	
Analog Output - Current (SCU-1400 and SCU-1600)	
Signal Range	0 to 20 mA
Programmable Signal Range	0 to 20, 4 to 20, 20 to 0, and 20 to 4 mA
Load Resistance	800Ω max, 20mA, 16VDC
Load Stability	0.01% of span, 100Ω load
Output state on sensor error detection	0 / 3.5 mA / 23 mA / none selectable
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	≤28mA
Analog Output - Voltage (SCU-1400 and SCU-1600)	
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	500kΩ min
Relay outputs (SCU-3100 and SCU-1600)	
Relay Functions	Setpoint, Window, Sensor Error, Latch, Power and Off
Hysteresis	0 to 100%
On and Off Delay	0 to 3600 sec
Relay state on sensor error detection	Break / Make / Hold selectable
Relay contact ratings	AC: 230Vrms 2A 500VA / DC: 24V 1A
Frequency output (SCU-2200)	
Frequency range	0...25000 Hz
Min. frequency (span)	0 Hz
Duty cycle (0...25000 Hz)	50% or
Programmable pulse time (f ≤ 500 Hz)	1...1000 ms (max. 90% duty cycle)
PNP output (SCU-2200)	
Iout max	30mA
Vout	24VDC ± 10%
Cout	10nF
Rout typ.	20Ω
Electromechanical counter	24V / 135mA / 20ms / ≤ 10Hz
NPN output (SCU-2200)	
Isink max	150mA
Isink/source peak	300mA
External voltage (terminal 23) max	55VDC
Cout	10nF
Rout typ	10Ω
TTL output (SCU-2200)	
Isink max	15mA
Isink/source peak	100mA
Vout	5 V ±5%
Cout	10nF
Rout typ	55Ω
Sensor and error detection (SCU-2200)	
Programmable	0...26250 Hz

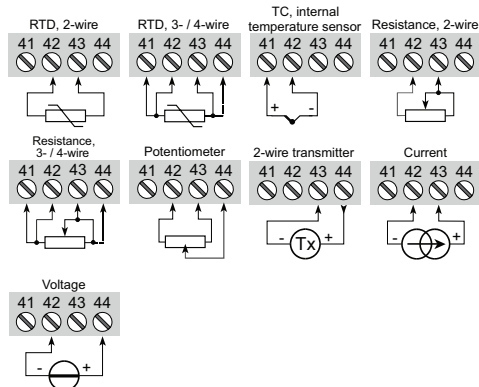# SCU-3100, SCU-1400, SCU-1600, SCU-2200
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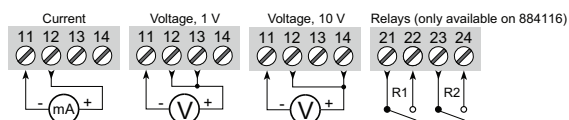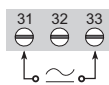## Wiring Diagrams
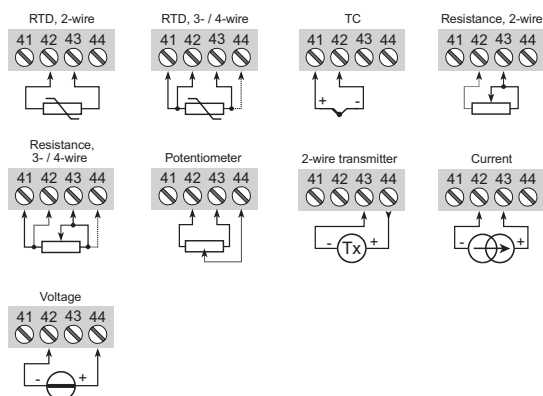
Models SCU-1400/1600/3100

Supply

Inputs:

RTD, 2-wire · RTD, 3- / 4-wire · TC, internal temperature sensor · Resistance, 2-wire

Resistance, 3- / 4-wire · Potentiometer · 2-wire transmitter · Current

Voltage

Outputs:

Current · Voltage, 1 V · Voltage, 10 V · Relays (only available on 884116)

Model SCU-2200

Supply

Inputs:

RTD, 2-wire · RTD, 3- / 4-wire · TC · Resistance, 2-wire

Resistance, 3- / 4-wire · Potentiometer · 2-wire transmitter · Current

Voltage

Outputs:

TTL · NPN · PNP

+ 5 V Gnd · Gnd + 55 V Max · Gnd + 24 V
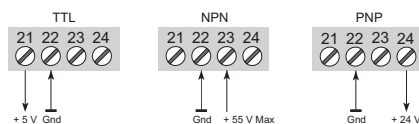
SCU Series Universal Signal Conditioner Accessories

Programming/Display Module SCU-PDM2

Application:
- The AutomationDirect SCU-PDM2 module easily connects to the front of the Universal Signal Conditioners and is used as a display and to enter or adjust the programming of the module.
- Can be moved from one module to another and download the configuration of the first transmitter to subsequent transmitters.
- Fixed display for visualization of process data and status.
- Required for programming all SCU Series Universal Signal Conditioner models.
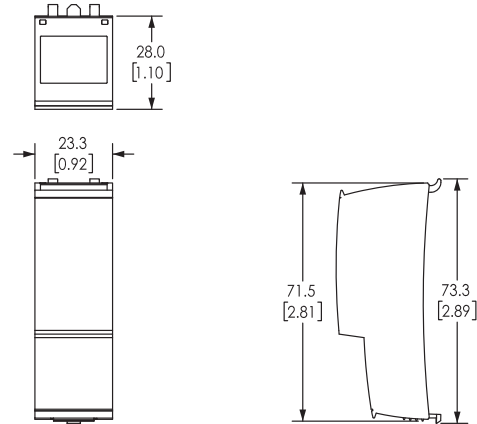
Technical characteristics:
- LCD display with 4 lines; Line 1 (H = 5mm, 0.20 in) shows input signal, line 2 (H = 3.5 mm, 0.14 in) shows units, line 3 (H = 3.5 mm, 0.14 in) shows analog output or user defined text and line 4 shows communication and relay status.
- Programming access can be blocked by assigning a password. The password is saved in the transmitter in order to ensure against unauthorized modifications to the configuration.
- Not capable of standalone or remote operation.
- For Use With: SCU-3100, SCU-1400, SCU-1600, SCU-8400, SCU-7900, SCU-2200, SCU-2501, SCU-2502, SCU-2503

Mounting/Installation:
- Snap SCU-PDM2 onto the front of the universal signal conditioners.
- Can be installed or removed whether the signal conditioner is powered or not.

Selectable Engineering Units

°C	hp	kW	mA	pH	MHz
°F	hPa	kWh	mbar	rpm	p/m
%	Hz	l	mils	s	p/h
A	in	l/h	min	S	p/d
bar	in/h	l/min	mm	t	
cm	in/min	l/s	mm/s	t/h	
ft	in/s	m	mol	uA	
ft/h	ips	m/h	MPa	um	
ft/min	K	m/min	mV	uS	
ft/s	kA	m/s	MW	V	
g	kg	m/s2	MWh	W	
gal/h	kJ	m3	N	Wh	
gal/min	kPa	m3/h	Ohm	yd	
GW	kV	m3/min	Pa	KHz	

28.0 [1.10]

23.3 [0.92]

71.5 [2.81] 73.3 [2.89]

See our website www.AutomationDirect.com for complete Engineering drawings.

External Cold Junction Compensation Connector

Installation:
- Remove terminal block included with SCU-1400, SCU-1600 or SCU-3100 signal conditioner and replace with SCU-CJC1.

Part No. SCU-CJC1

SCU Series Signal Conditioner Accessories				
Part No.	Description		Weight (lb)	Price
SCU-PDM2	ProSense detachable programming/display module, for use with SCU series signal conditioners.		1 0.04	$65.00
SCU-CJC1	ProSense external cold junction compensation (CJC) connector, for use with SCU-3100, SCU-1400, SCU-1600 signal conditioners.		1 0.02	$20.00