## **Or**Sense<sup>®</sup> SCU Series Universal Signal Conditioners

#### SCU-2501, SCU-2502, SCU-2503 Signal Conditioners

The SCU-2501, SCU-2502, and SCU-2503 Universal Signal Conditioners from AutomationDirect are extremely versatile, providing the flexibility to convert, transmit, scale, and isolate frequency input signals from a wide variety of process sensors and controller I/O. The input accepts frequency signals up to 100 kHz from NPN, PNP, TTL, Tachometer, and NAMUR sensors. The SCU-2501 provides a range selectable unipolar or bipolar mA or VDC analog output and a programmable relay output. The outputs on the SCU-2502 are two programmable relays used for alarming and control functions. The SCU-2503 outputs provide a range selectable unipolar or bipolar mA or VDC analog signal and scalable frequency output up to 100 kHz. The SCU-2500 series also features the ability to establish a square root relationship between input and output, which is useful in flow measurement applications. An integral excitation power supply output is available to power various types of input sensors. The isolated universal supply voltage input eliminates the need for separate transformers or power supplies. Isolation is also provided

between input and output.

The SCU-2500 series is easily configured with the <u>SCU-PDM2</u> 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. When not used for configuration, the programming/display module can remain on the signal conditioner to display the input signal value, engineering units, and output signal. A process simulation function allows manual manipulation of the input signal to control the output signal for troubleshooting and checkout.

#### **Features**

Part No. SCU-2501 Shown

- Frequency input signals up to 100 kHz from NPN, PNP, TTL, Tachometer, and NAMUR sensors
- <u>SCU-2501</u>: range selectable unipolar or bipolar mA or VDC analog output and a programmable relay output
- SCU-2502: two individually programmable relay outputs
- <u>SCU-2503</u>: range selectable unipolar or bipolar mA or VDC analog signal and scalable frequency output up to 100 kHz
- Available square root function
- Buffered voltage output option to handle high current load devices
- 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 various types of input sensors
- Easy-to-use detachable LCD programming/display module <u>SCU-PDM2</u> (Sold separately and required for programming)
- Transfer configuration settings from one signal conditioner to another with  $\underline{\text{SCU-PDM2}}$
- Integral 35mm DIN rail mounting adapter
- Removable screw terminal blocks are keyed to ensure correct installation
- cULus and CE marked
- 5 year warranty



SCU-2501, SCU-2502, SCU-2503 Universal Signal Conditioners												
Part No.	Application	Isolation	Input	Output	Field Configurable	Operating Voltage	Mounting	Electrical Connection	Quantity	Weight (Ibs)	Drawing Link	Price
<u>SCU-2501</u>				Unipolar or bipolar current, (1) relay					1	0.46	<u>PDF</u>	\$266.00
<u>SCU-2502</u>	Signal conditioner	Yes	Frequency	(2) relays	Yes*	21.6-253 VAC/19.2- 300 VDC	35mm DIN rail	Removable screw terminal plugs	1	0.48	<u>PDF</u>	\$253.00
<u>SCU-2503</u>				Unipolar or bipolar current, voltage, frequency					1	0.44	<u>PDF</u>	\$298.00

\* Requires SCU-PDM2

# SCU-2501, SCU-2502, SCU-2503 Universal Signal Conditioners

SCU-2501, SCU-2502, SC	U-2503 Universal Signal Cond	itioners Technical Specifications			
General Specifications					
Power	AC Power	21.6 to 253 VAC, 50/60 Hz			
Power	DC Power	19.2 to 300 VDC			
Consumption	≤ 2.6 W				
Max. Power Dissipation		≤ 2.1 W			
Fuse	400 mA slow blow /	250 VAC (not user replaceable)			
Auxiliary Power Supply Output	5-17 VDC, 20 m	max (Terminal 43 and 44)			
Isolation Voltage, Test / Operation	2.3	kVAC/250 VAC			
Configuration Interface	Programming/display moo SCU-PDM1 (discontin	dule, SCU-PDM2 (sold separately) or ued and replaced by SCU-PDM2)			
Signal/noise Ratio		Min. 60 dB			
Response Time (0 to 90%, 100 to 10%)	Frequency input	< 30ms			
Calibration Temperature	20 to 2	8°C [68 to 82.4°F]			
Accuracy	The greater of the general a	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			
	Operating Temperature	-20 to +60°C [-4 to 140°F]			
Environmental Conditions	Storage Temperature	-20 to +85°C [-4 to 185°F]			
	Operating and Storage Humidity	95% relative humidity (non-condensing)			
Approvals	UL CE: EMC 2014/30/EU LVD 2014/35/EU RoHS2 2011/65/EU amended by 2015/863				
Construction	IP 20, case body is black h	igh impact plastic. Pollution degree 1.			
	Wire strip length	7.5 mm [0.3 in]			
Connections	Wire gauge	26 - 14 AWG standard wire			
	Torque	0.5 N-m [4.5 inch-lbs]			
	SCU-2501	160g [5.6 oz], 175 g [6.2 oz] with programming module			
Weight	SCU-2502	165g [5.8 oz], 180 g [6.3 oz] with programming module			
	SCU-2503	150g [5.3 oz], 165 g [5.8 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								
input								
Input Type	Basic Accuracy	Absolute Accuracy	Temperature Coefficient					
Frequency	≤ 0.0002 Hz	$\leq \pm 0.01\%$ of input frequency	≤ ±0.0005% / °C					
Output								
Current output	8 μΑ	$\leq \pm 0.05\%$ of span	$\leq\pm0.005\%$ / 0.8 $\mu\text{A}$ / °C					
Voltage output	2 mV	≤ ±0.05% of span	$\leq \pm 0.005\% / 200 \ \mu V / ^{\circ}C$					
Frequency output n.a.		$\leq \pm 0.002\%$ of output frequency +0.0004% of fmax.	≤ ±0.0005% / °C					

### 1-800-633-0405 SCU-2501, SCU-2502, SCU-2503 Universal Signal Conditioners Input/Output Specifications

ModelSCU-2801SCU-2802SCU-2602Frequency Range0.001 Hz to 100 kHzHime ange, line function0.001 Hz to 100 kHzMax. frequency, with input filter ON76HzMin. pulse width with put filter ON8rmsMin. pulse width with input filter ON8rmsMin. pulse width with input filter ON8rmsMin. pulse width with input filter ON30msMin. pulse width with input filter ON30msMin. pulse width with input filter ON30msMay Bell COW2.1 mATag-level HIGH2.1 mABraskage detection5.0 1 mASamsor supply- pin 44, fixed8.3 VSamsor supply- pin 44, fixed3.3 VMax. input vidtage800AC ppMax. input vidtage800AC ppSamsor supply- pin 44, fixed3.1 TV / 23mAMay Bell MEH3.1 TV / 23mAMax. input vidtage800AC ppSamsor supply- pin 44, fixed3.1 TV / 23mATig-level LOW4.4 AUTig-level HIGH2.1 TV / 23mATig-level HIGH3.1 TV / 23mA			Inputs					
Frequency lange0.001 Hz to 100 kbzTime range. time function10 µ to 999.9 sMark. Fequency. with input filter ON75 HzMar. pulse width with input filter OFF4µ sResponse time (090%, 1010%)<30msMARMUR input11 gl-94 val HIGHTig-194 val HIGH2.21 mATig-194 val HIGH2.21 mAInput impedance0.11 mAStort-circuit detection<6.9 mAStort-circuit detection<6.9 mAStort-circuit detection<6.9 mAStort-circuit detection<6.9 mAStort-circuit detection<6.9 mAStort-circuit detection<6.9 mVTig-level HIGH<6.0 mVTig-level LIGW<6.0 mVStort-circuit detection<6.9 mAStort-circuit detection<6.0 mVTig-level HIGH<7.0 VTig-level LIGW<6.1 mAStort-circuit detection<6.0 mVTig-level HIGH<7.0 VTig-level HIGH<7.0 VTig-level HIGH<7.0 VTig-level HIGH<7.0 VTig-level HIGH<2.0 NTig-level HIGH<2.0 NStort Stort Stort<7.0 VTig-level HIGH<2.0 NTig-level HIGH<2.0 NStort Stort Stort<7.0 VTig-level HIGH<2.0 N<	Model		<u>SCU-2501</u>	<u>SCU-2502</u>	<u>SCU-2503</u>			
Frequency input     Time gauge, time function     10 µs to 999 9 s       Max. frequency, with input filter ON     75Hz       Min. pulse width with input filter OFF     4µs       Response time (090%, 10010%)     < 30ms		Frequency Range	0.001 Hz to 100 kHz					
Max. fequency. with input filter ON     75Hz       Mn. pubse with with input filter ON     8ms       Mn. pubse with with input filter OFF     4µs       Response time (090%, 10010%)     < 30ms		Time range, time function	10 µs to 999.9 s					
Presume without     Min. pulse width with input filter ON     Bens       Min. pulse width with input filter OFF     4µ5       Response time (090%)     < 30ms		Max. frequency, with input filter ON	75Hz					
MAMUB inputMun, pulse width with input filter OFF4µsResponse time (090%, 10010%)< 30ms	Frequency input	Min. pulse width with input filter ON		8ms				
Response time (090%, 10010%)< 30msTig-level LOW< 1.2 mA		Min. pulse width with input filter OFF		4µs				
NAMUR input     Tig-level LOW     ≤ 1.2 mA       Input impedance     1 kQ    < 220pF		Response time (090%, 10010%)	< 30ms					
NAMUR input     Trig-level HIGH     ≥ 2.1 mA       Input impedance     1 kG    < 220pF		Trig-level LOW	≤ 1.2 mA					
NAMUR input     Input impedance     1 kΩ    < 220 pF       Breakage detection     ≤ 0.1 mA       Shenci circuit detection     ≤ 0.1 mA       Shenci circuit detection     ≤ 0.1 mA       Shenci circuit detection     ≤ 0.1 mA       Shenci supply - pin 44, fixed     8.3 V       Trig-level LOW     ≤ -50 mV       Input impedance     100 kΩ    - 220 pF       Max. input voltage     800/AC pp       Sensor supply - pin 44, programmable     ≤ 0.1 TV / 23mA       Trig-level HCH     ≥ 7.0 V       Trig-level HCH     ≥ 7.0 V       Input impedance     3.48 kΩ    < 220 pF		Trig-level HIGH	≥ 2.1 mA					
NAMEW Input     Breakage detection     ≤ 0.1 mA       Short-circuit detection     ≥ 6.9 mA       Sensor supply - pin 44, fixed     8.3 V       Trig-level LOW     ≤ -50 mV       Trig-level HIGH     ≥ +50 mV       Sensor supply - pin 44,     517 V / 23mA       Trig-level HIGH     ≥ 7.0 V       Trig-level HIGH     ≥ 7.0 V       Input impedance     3.48 kQ    < 220 pF		Input impedance	1 kΩ    < 220pF					
Shot-circuit detection     ≥ 6.9 mA       Sensor supply - pin 44, fixed     8.3 V       Tirg-level LOW     ≤ -50 mV       Tirg-level HIGH     ≥ +50 mV       Input impedance     100 kG)    < 220 pF	NAMUR INPUT	Breakage detection		≤ 0.1 mA				
Sensor supply - pin 44, fixed8.3 VTacho inputTrig-level LOW≤-50 mVTag-level HIGH≥+50 mVInput impedance100 kΩ    <220 pF		Short-circuit detection		≥ 6.9 mA				
Trig-level LOW     ≤ -50 mV       Trig-level HIGH     ≥ +50 mV       Input impedance     100 kΩ    < 220 pF		Sensor supply - pin 44, fixed		8.3 V				
Tig-level HIGH     ≥ +50 mV       Input impedance     100 kΩ    < 220 pF		Trig-level LOW		≤ -50 mV				
Tacho input     Input impedance     100 kΩ    < 220 pF       Max. input voltage     80VAC pp       Sensor supply - pin 44, programmable     517 V / 23mA       Trig-level LOW     ≤ 4.0 V       Trig-level HIGH     ≥ 7.0 V       Input impedance     3.48 kΩ    < 220 pF		Trig-level HIGH		≥ +50 mV				
Max. input voltage     80VAC pp       Sensor supply - pin 44, programmable     517 V / 23mA       Trig-level LOW     ≤ 4.0 V       Trig-level HIGH     ≥ 7.0 V       Input impedance     3.48 kΩ    < 220 pF	Tacho input	Input impedance		100 kΩ    < 220 pF				
Sensor supply - pin 44, programmable     S.:.17 V / 23mA       Trig-level LOW     ≤ 4.0 V       Trig-level HGH     ≥ 7.0 V       Input impedance     3.48 kΩ    < 220 pF		Max. input voltage		80VAC pp				
programmable     finglevel LOW       Tinglevel LGW     ≤ 4.0 V       Tinglevel LGH     ≥ 7.0 V       Input impedance     3.48 kΩ    < 220 pF		Sensor supply - pin 44,		5 17 V/23mA				
Ingrese LOW     1 + 2.0 °       NPN / PNP input     Trig-level HIGH     ≥ 7.0 ∨       Input impedance     3.48 kΩ    < 220 pF		programmable						
Ingletor Holl     1.3 eV       Input inpedance     3.48 kΩ    < 220 pF			≥70 V					
MPM (PMP Input Trigger edge     NPN = Neg. edge, PNP = Pos. edge.       Trigger edge     NPN = Neg. edge, PNP = Pos. edge.       Trigger edge     Sensor supply - pin 44, programmable     517 V/ 23mA       Trig-level LOW     ≤ 0.8 V       Trig-level HIGH     ≥ 2.0 V       Input impedance     ≥ 100 kΩ    < 220 pF			3.48 kQ II < 220 nF					
Instance     Instance       Sensor supply - pin 44, programmable     517 V / 23mA       TTL input     Trig-level LOW     ≤ 0.8 V       Trig-level HIGH     ≥ 2.0 V       Input impedance     ≥ 100 kΩ    < 220 pF	NPN / PNP Input		NP		anha			
programmable     5 // V / 23/HA       Trig-level LOW     ≤ 0.8 V       Trig-level HIGH     ≥ 2.0 V       Input impedance     ≥ 100 kΩ    < 220 pF		Sensor supply - pin 44,		5 47 \/ / 02 - A	. ougo.			
TTL input   Trig-level LOW   ≤ 0.8 V     Trig-level HIGH   ≥ 2.0 V     Input impedance   ≥ 100 kΩ    < 220 pF		programmable	51/ V / ZJMA					
TTL inputTrig-level HIGH $\geq 2.0 \forall$ Input impedance $\geq 100 k\Omega \parallel < 220 pF$ Sensor supply - pin 44, programmable $517 \lor / 23mA$ S0 inputTrig-level LOW $\leq 2.2 mA$ Trig-level HIGH $\geq 9.0 mA$ Input impedance $758 \Omega \parallel < 220 pF$ Sensor supply - pin 44, fixed. $17\lor$ Special voltage inputUser-programmable trig-levels $-0.056.50 \lor$ *Hysteresis, min $50 m\lor$ Input impedance, programmable:High Z: $\geq 100 k\Omega \parallel < 220 pF$ Programmable sensor supply - pin 44 $517 \lor / 23 mA$ Max. input voltage $17\lor$ Special putrent inputUser-programmable:Input impedance, programmable: $17\lor$ Pull up/down; 3.48 k\Omega \parallel < 220 pFProgrammable sensor supply - pin 44 $517 \lor / 23 mA$ Max. input voltage $1 k\Omega \parallel < 220 pF$ Input impedance $1 k\Omega \parallel < 220 pF$ Special putrent imput $0.2 mA$ Max. input voltage $1 k\Omega \parallel < 220 pF$ Max. input current $1 k\Omega \parallel < 220 pF$ Special manualle $1 k\Omega \parallel < 220 pF$ Special putrent imput $0.2 mA$ Input impedance $1 k\Omega \parallel < 220 pF$ Special putrent $1 k\Omega \parallel < 220 pF$ Special putrent $1 k\Omega \parallel < 220 pF$		Trig-level LOW		≤ 0.8 V				
Input impedance   ≥ 100 kΩ    < 220 pF	TTL input	Trig-level HIGH		≥ 2.0 V				
Seriol supply - μπ 44, programmable 517 V / 23mA   S0 input Trig-level LOW ≤ 2.2 mA   Trig-level HIGH ≥ 9.0 mA   Input impedance 758 Ω    < 220 pF		Input impedance	≥ 100 kΩ    < 220 pF					
S0 inputTrig-level LOW≤ 2.2 mATrig-level HIGH≥ 9.0 mAInput impedance758 Ω    < 220 pF		programmable	517 V / 23mA					
S0 inputTrig-level HIGH≥ 9.0 mAInput impedance758 Ω    < 220 pF		Trig-level LOW	≤ 2.2 mA					
So inputInput impedance758 Ω    < 220 pFSensor supply - pin 44, fixed.17VSpecial voltage inputUser-programmable trig-levels-0.056.50 V*Hysteresis, min50 mVInput impedance, programmable:High Z: ≥100 kΩ    < 220 pF	S0 input	Trig-level HIGH	≥ 9.0 mA					
Sensor supply - pin 44, fixed.17VSpecial voltage inputUser-programmable trig-levels-0.056.50 V*Hysteresis, min50 mV*Hysteresis, min17VInput impedance, programmable:Pull up/down; 3.48 kΩ    < 220 pF	SU IIIput	Input impedance	758 Ω    < 220 pF					
Special voltage inputUser-programmable trig-levels-0.056.50 V*Hysteresis, min50 mVInput impedance, programmable:High Z: ≥100 kΩ    < 220 pF Pull up/down; 3.48 kΩ    < 220 pF		Sensor supply - pin 44, fixed.	17V					
Special voltage input*Hysteresis, min50 mVInput impedance, programmable:High Z: ≥100 kΩ    < 220 pF Pull up/down; 3.48 kΩ    < 220 pF		User-programmable trig-levels	-0.056.50 V					
Special voltage input     Input impedance, programmable:     High Z: ≥100 kΩ    < 220 pF Pull up/down; 3.48 kΩ    < 220 pF       Programmable sensor supply - pin 44     517 V / 23 mA       Max. input voltage     17V       Vser-programmable trig-levels.     0.010.0 mA       *Hysteresis, min     0.2 mA       Input impedance     1 kΩ    < 220 pF		*Hysteresis, min	50 mV					
Programmable sensor supply - pin 44     517 V / 23 mA       Max. input voltage     17V       Very - programmable trig-levels.     0.010.0 mA       *Hysteresis, min     0.2 mA       Input impedance     1 kΩ    < 220 pF	Special voltage input	Input impedance, programmable:	High Z: ≥100 kΩ    < 220 pF Pull up/down; 3.48 kΩ    < 220 pF					
Max. input voltage17VSpecial current inputUser-programmable trig-levels.0.010.0 mA*Hysteresis, min0.2 mAInput impedance1 kΩ    < 220 pF		Programmable sensor supply - pin 44	517 V / 23 mA					
Special current input     User-programmable trig-levels.     0.010.0 mA       *Hysteresis, min     0.2 mA       Input impedance     1 kΩ    < 220 pF		Max. input voltage	17V					
Special current input     *Hysteresis, min     0.2 mA       Input impedance     1 kΩ    < 220 pF		User-programmable trig-levels.	0.010.0 mA					
Special current input     Input impedance     1 kΩ    < 220 pF       Sensor supply - pin 44, programmable     517 V / 23 mA       Max. input current     17mA		*Hysteresis, min	0.2 mA					
Sensor supply - pin 44, programmable     517 V / 23 mA       Max. input current     17mA	Special	Input impedance	1 kΩ    < 220 pF					
Max. input current 17mA	current input	Sensor supply - pin 44,	517 V / 23 mA					
		Max. input current	17mA					
			1					

## SCU-2501, SCU-2502, SCU-2503 Universal Signal Conditioners Input/Output Specifications Continued

Outputs						
Model	<u>SCU-2501</u>	<u>SCU-2502</u>	<u>SCU-2503</u>			
Current output	020, 420, S4-20, ±10 mA, ±20 mA		020, 420, S4-20, ±10 mA, ±20 mA			
Load (max.), current output	≤ 600 Ω		≤ 600 Ω			
Current limit	≤ 28 mA		≤ 28 mA			
Voltage output	05, 15, 010, 210, ±5, ±10 VDC		05, 15, 010, 210, ±5, ±10 VDC			
Load (min.), voltage output	≥ 2 kΩ		≥ 2 kΩ			
Relay output	AC: 230Vrms 2A 500VA / DC: 24V 1A	2 x AC: 230Vrms 2A 500VA / DC: 24V 1A				
Frequency output			0.001 Hz100kHz			
PNP output			24VDC at 30mA max			
NPN output			30VDC at 130mA max			
Push-Pull output			524VDC			

### Wiring Diagrams





## 1-800-633-0405 **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 <u>SCU-PDM2</u> onto the front of the universal signal conditioners.

MHz

P∕M

₽/h

P/d

· Can be installed or removed whether the signal conditioner is powered or not.

### **Selectable Engineering Units**

°C	he	kW	mA	РH
۳F	hPa	kWh	mbar	rem
%	Hz	1	mils	s
A	in	1⁄h	min	S
bar	in/h	l∕min	РР	t
СM	in∕min	l⁄s	mm∕s	t∕h
ft	in⁄s	M	mol	uA
ft/h	ips	m∕h	MPa	um
ft/min	К	m∕min	тV	uS
ft/s	kΑ	M∕S	MW	V
9	k9	m∕s2	MWh	ω
9al⁄h	kJ	mЗ	N	Wh
9al/min	kPa	m3∕h	Ohm	ьq
G₩	kV	m3∕min	Pa	KHz





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

**External Cold Junction** 

**Compensation Connector** 

Installation: Remove terminal block included with <u>SCU-1400</u>, <u>SCU-1600</u>

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
<u>SCU-PDM2</u>	ProSense detachable programming/display module, for use with SCU series signal conditioners.	1	0.04	\$56.00
<u>SCU-CJC1</u>	ProSense external cold junction compensation (CJC) connector, for use with SCU-3100, SCU-1400, SCU-1600 signal conditioners.	1	0.02	\$15.50