ProSense® Universal Signal Conditioners
Quick Start Guide

AUTOMATIONDIRECT

3505 HUTCHINSON ROAD
CUMMING, GA 30040-5860

Models:
SCU-2200 - Universal Analog to Frequency (I/f) Converter

ProSense Universal Analog to Frequency (I/f) Converter model SCU-2200 is a single input device that accepts milliampere, voltage, RTD, thermocouple or potentiometer inputs and provides a selectable single frequency output. It features a plastic slim-line housing, integral 35mm DIN rail mounting adapter, and removable screw terminals. The detachable SCU-PDM2 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.

Note: Additional specifications available at www.AutomationDirect.com

WARNING

This device is designed for connection to hazardous electric voltages. Ignoring this warning can result in severe personal injury or mechanical damage. To avoid the risk of electric shock and fire, the safety instructions of this guide must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following. Prior to the commissioning of the device, this installation guide must be examined carefully. Only qualified personnel (technicians) should install this device. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Until the device is mounted, do not connect hazardous voltages to the device. The following operations should only be carried out on a disconnected device and under ESD safe conditions: General mounting, connection and disconnection of wires.

Do not open the front plate of the device as this will cause damage to the connector for the display / programming front SCU-PDM2. This device contains no DIP-switches or jumpers. Units must be mounted on a DIN rail according to DIN 60715

SAFETY INSTRUCTIONS

Receipt and unpacking
Unpack the device without damaging it. The packing should always follow the device until it has been permanently mounted. Check at the receipt of the device to ensure the type corresponds to the one ordered.

Environment
Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation. All devices can be used for Measurement / Overvoltage Category II and Pollution Degree 2. The module is designed to operate safely at an altitude of 2000m or less.

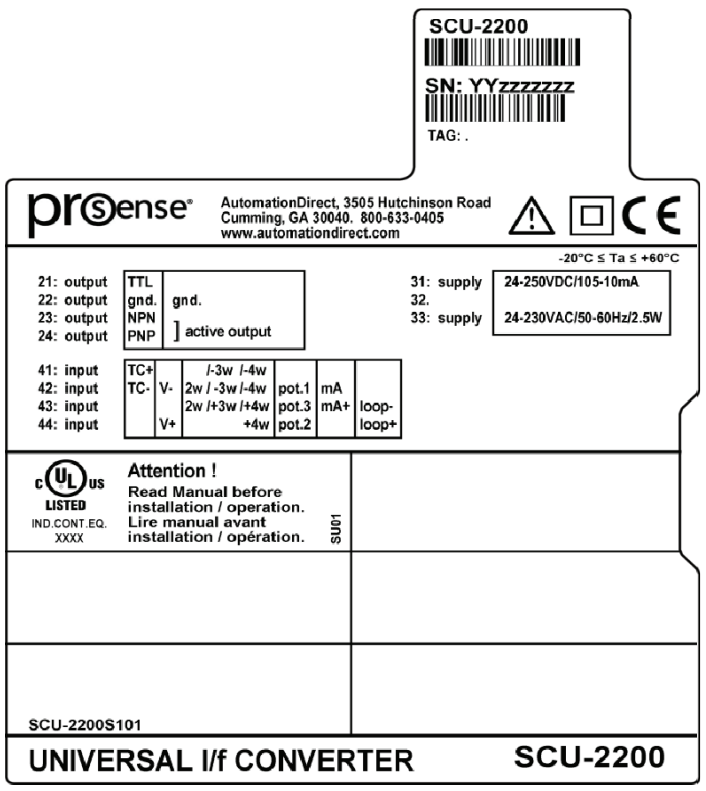
Mounting
Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.e. wire cross section, protective fuse, and location. Descriptions of input / output and supply connections are shown in this installation guide and on the side label. The following apply to hazardous voltage-connected devices:
The max. protective fuse is 10A. A power switch shall be easily accessible and close to the device. The power switch shall be marked as the disconnecting unit for the device.

UL installation requirements
Use 60/75°C copper conductors only.
For use only in pollution degree 2 or better.
Max. ambient temperature ..... 60°C (140°F)
Wire size ..... AWG 26-14
UL file number, SCU-2200..... E191072
The device is an Open Type Listed Process Control Equipment. To prevent injury resulting from accessibility to live parts the equipment must be installed in an enclosure.

Calibration and adjustment
During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this installation guide. The technician must use tools and instruments that are safe to use.

Cleaning
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

Side Label



Technical Specifications

Operating temperature ..... -20°C to +60°C (-4°F to 140°F)
Storage temperature ..... -20°C to +85°C (-4°F to 185°F)
Supply voltage..... ..... 21.6...253 VAC or 19.2...300 VDC
Max. required power..... ≤ 2.5 W
Max. power dissipation..... ≤ 2.0 W
Fuse ..... 400mA SB / 250VAC
Isolation voltage, test / operation..... 2.3 kVAC / 250VAC (reinforced isolation)
EMC immunity influence..... < ±0.5% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst..... < ±1% of span
Conducted emission..... Class A 150kHz - 10MHz
Relative humidity..... < 95% RH (non-cond.)
Dimensions (HxWxD) ..... 109 x 23.5 x 104 mm
Dimensions (HxWxD) w/ SCU-PDM2.....109 x 23.5 x 116mm/131mm
Protection degree IP20

Approvals
UL, Standard for Safety ..... UL 508/C22.2 No. 14

Observed authority requirements:
EMC 2014/30/EU
LVD 2014/35/EU
RoHS 2..... 2011/65/EU

Model		*SCU-2200*
Input		
Input for RTD types		Pt10, Pt20, Pt50, Pt100, Pt200, PT250, Pt300, Pt400, Pt500, Pt1000, Ni50, Ni100, Ni120, Ni1000
Input for TC types		B, E, J, K, L, N, R, S, T, U, W3, W5, LR
Current input ranges		0...20, 4...20 mA
Current input resistance		Nom. 20 Ω + PTC 50 Ω
Input voltage drop, nom.		1.4 V @ 20 mA
Voltage input ranges		0/0.2...1, 0/0.5...2.5, 0/1...5, 0/2...10 VDC
Voltage input resistance		Nom. 10 MΩ
Output		
Frequency output	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	Iout max	30mA
	Vout	24VDC ± 10%
	Cout	10nF
	Rout typ.	20Ω
	Electromechanical counter	24V / 135mA / 20ms / ≤ 10Hz
NPN output	Isink max	150mA
	Isink/source peak	300mA
	External voltage (terminal 23) max	55VDC
	Cout	10nF
	Rout typ	10Ω
TTL output	Isink max	15mA
	Isink/source peak	100mA
	Vout	5 V ±5%
	Cout	10nF
	Rout typ	55Ω
Sensor error detection	Programmable	0...26250 Hz

Installation:

This installation guide for technical personnel covers the following products:

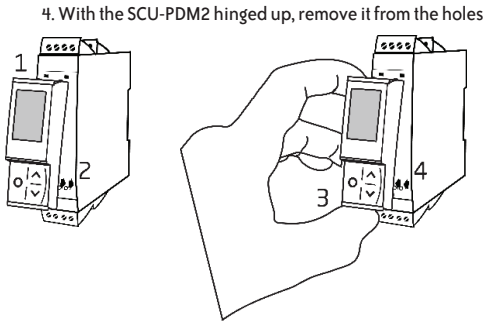
SCU-2200
SCU-PDM2

Mounting SCU-PDM2:

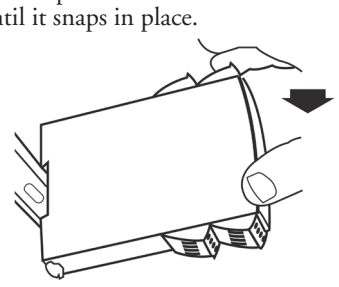
1. Insert the tabs of the SCU-PDM2 into the holes at the top of the device.
2. Swing the SCU-PDM2 down until it snaps into place.

Removing the SCU-PDM2:

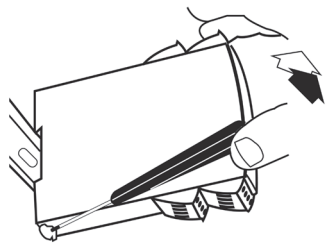
3. Push the release button on the bottom of the SCU-PDM2 and swing out and up.
4. With the SCU-PDM2 hinged up, remove it from the holes at the top of the device.



Mounting on DIN rail:
Place top notch of module onto DIN rail and then press lower portion onto DIN rail until it snaps in place.

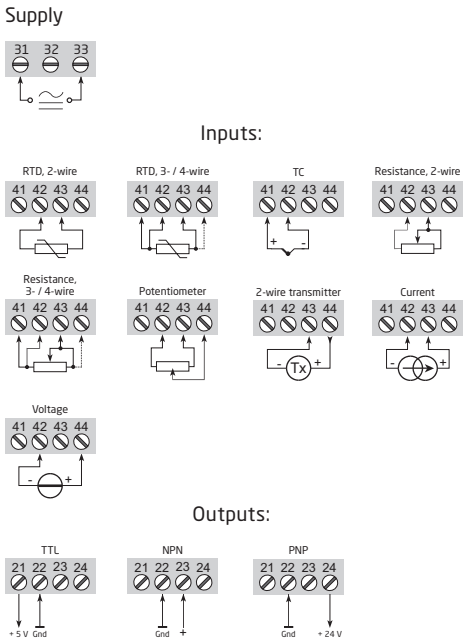


Removing from DIN rail:
Remember to remove the connectors with hazardous voltages. Detach the device from DIN rail by lifting the bottom lock.



Wiring:
Max. wire size 1 x 2.5 mm^2 stranded wire. Screw terminal torque 0.5 Nm.

Wiring Diagrams



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 SCU-PDM2 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 OK once.
- Press OK to begin configuration. Press ^ or v 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 SCU-PDM2 display

FL.CO = flash memory error
C.J.ER = CJC sensor defect
NO.CO = connection error with SCU-PDM2
IN.ER = error levels on input
TY.ER = configuration in SCU-PDM2 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 = display range low
DISP.HI = display range high
OU.UN = set Hz or pulse output
f.min = set 0% frequency input
f.max = set 100% frequency input
CUT.OFF = set cut off frequency
O.TYPE = output pulse type
t.PULSE = pulse time in milliseconds
P.min = set 0% pulse
P.max = set 100% pulse
f.ERR = output frequency on input error
RESP = response time in seconds
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?

Note: Help text for each abbreviation will scroll across the SCU-PDM2

Application Example - 10VDC Input from DC Current Transducer to Frequency Output

Monitoring 10VDC output from a DC current transducer monitoring DC amperage into a pulse/frequency input on a PLC.

- In the configuration menu press ^ or v until VOLT is displayed for IN.TYPE. Press OK.
- Select input range. Press ^ or v until 0-10 is displayed for V.RANGE. Press OK.
- Select input units. Press ^ or v until A is displayed for UNIT. Press OK.
- Select decimal point location. Press ^ or v until 111.1 is displayed for DEC.P. Press OK.
- Set display value for minimum input. Press ^ or v until 0.0 is displayed for DISP.LO. Press OK.
- Set display value for maximum input. Press ^ or v until 100.0 is displayed for DISP. HI. Press OK.
- Select output unit. Press ^ or v until Hz is displayed for OU.UN. Press OK.
- Select output minimum frequency. Press ^ or v until 0 is displayed for F.MIN. Press OK.
- Select output maximum frequency. Press ^ or v until 3.000 kHz is displayed for F.MAX. Press OK.
- Select output cutoff frequency. Press ^ or v until 0 is displayed for CUT.OFF. Press OK.
- Select output error response. Press ^ or v until 0.4 is displayed for RESP. Press OK.
- Wait while the settings are stored and the unit switches to run mode.

The SCU-2200 will provide no output at 0A and a 3kHz output at 100A (10V).

Application Example - Potentiometer Input to Frequency Output

Convert a potentiometer position to a 0-100 percentage frequency signal.

- In the configuration menu Press ^ or v until POTM is displayed for IN.TYPE. Press OK.
- Select input units. Press ^ or v until % is displayed for UNIT. Press OK.
- Select decimal point location. Press ^ or v until 111.1 is displayed for DEC.P. Press OK.
- Set display value for minimum input. Press ^ or v until 0.0 is displayed for DISP.LO. Press OK.
- Set display value for maximum input. Press ^ or v until 100.0 is displayed for DISP.HI. Press OK.
- Select output unit. Press ^ or v until Hz is displayed for OU.UN. Press OK.
- Select output minimum frequency. Press ^ or v until 0 is displayed for F.MIN. Press OK.
- Select output maximum frequency. Press ^ or v until 10.00 kHZ is displayed for F.MAX. Press OK.
- Select output cutoff frequency. Press ^ or v until 0 is displayed for CUT.OFF. Press OK.
- Select no output error frequency. Press ^ or v until NO is displayed for OUT.ERR. Press OK.
- Set frequency output response time. Press ^ or v until 0.4 is displayed for RESP. Press OK.
- Wait while the settings are stored and the unit switches to run mode.

The SCU-2200 will provide no signal when the potentiometer is turned to zero % and 10kHz at 100%.

Application Example - 4-Wire RTD to Frequency Output

- **In the configuration menu press ^ or v until TEMP is displayed for IN.TYPE. Press OK.**
- **Select temperature sensor type. Press ^ or v until Pt is displayed for SENSOR. Press OK.**
- **Select RTD type. Press ^ or v until 100 is displayed for Pt.TYPE. Press OK.**
- **Select RTD connection type. Press ^ or v until 4W is displayed for CONNEC. Press OK.**
- **Select temperature unit. Press ^ or v until °C is displayed for UNIT. Press OK.**
- **Select frequency output. Press ^ or v until Hz is displayed for OU.UN. Press OK.**
- **Select output minimum. Press ^ or v until 0 is displayed for F.MIN. Press OK.**
- **Select output maximum. Press ^ or v until 5.000 kHz is displayed for F.MAX. Press OK.**
- **Select output cutoff frequency. Press ^ or v until 0 is displayed for CUT.OFF. Press OK.**
- **Select no output error frequency. Press ^ or v until NO is displayed for OUT.ERR. Press OK.**
- **Set frequency output response time. Press ^ or v until 1.0 is displayed for RESP. Press OK.**
- **Select temperature for low frequency output. Press ^ or v until 0 is displayed for OUT.LO. Press OK.**
- **Select temperature for high frequency output. Press ^ or v until 100 is displayed for OUT.HI. Press OK.**
- **Wait while the settings are stored and the unit switches to run mode.**

The SCU-2200 will provide a frequency output that correlates to the temperature sensed by the RTD from 0 Hz to 5 kHz representing a temperature range of 0 to 100 C.

Advanced Operations

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

The configuration of the SCU-2200 can be saved into the SCU-PDM2. The SCU-PDM2 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 v until MEM is displayed for SETUP. Press OK.
- *To save the configuration into the SCU-PDM2.* Press ^ or v until SAVE is displayed for MEMORY. Press OK.
- *To load the configuration from the SCU-PDM2 into the SCU-2200.* Press ^ or v 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 SCU-PDM2 is left mounted to the front of the signal conditioner.

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

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.
- For additional technical support and questions, call out Technical Support team @ 1-800-633-0405 or 770-844-4200