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INSTRUCTIONS FOR THE SCU

UNIVERSAL TRANSMITTER / ISOLATOR

If all else fails, please read these instructions

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CONTENTS

GETTING STARTED

1. Install the SCU Universal Transmitter / Isolator as described on page 3.

2. Wire your SCU following the instructions on pages 4 and 5.

3. Follow the programming set up instructions for the input on Page 9, and the output on Page 10.

NOTE:

The SCU contains no user servicable parts. Opening the unit will subject it to possibly damaging electro-static discharge (ESD). Do not attempt to open the unit.

MODEL IDENTIFICATION

The SCU is a universal input, loop powered transmitter / isolater. It has no options or variables in the part number. It is identified only as SCU.

INSTALLATION

Mount the unit in a panel that will not be subject to excessive temperature, shock, or vibration. All models are designed for mounting on an industry standard 35 mm DIN rail. An optional surface mounting kit is available from the factory (P/N 35DINADPTR).

To install hold the SCU so that is the front is higher than the rear. Place the upper slot on the rear of the SCU on the top edge of the DIN rail. Slowly rotate the front down until the bottom spring clip snaps over the bottom edge of the DIN rail.

To remove from the DIN rail, place a small slotted screwdriver in the slot in the spring clip under the housing. Pry the slot downward to release the SCU from the bottom of the rail.

Spring clip slot

WIRING

Do not run thermocouple or other class 2 wiring in the same conduit as power leads. Use only the type of thermocouple or RTD probe for which the transmitter has been programmed. Maintain separation between wiring of sensor, auxiliary in or out, and other wiring. See the "Secure Menu" for input selection.

For thermocouple input always use extension leads of the same type designated for your thermocouple.

Input wiring for thermocouple, current, voltage, and RTD is rated CLASS 2.

The wiring terminals for the SCU are compression type. To open the wiring terminal, turn the screw for that terminal counterclockwise. Slide the wire into the terminal space. While holding the wire in place, turn the screw counter-clockwise to tighten. Do not over-tighten. The wire should be held snugly in place.

See the wiring diagram on the next page.

Wire thermocouple inputs to terminals 1(+) and 2 (-).

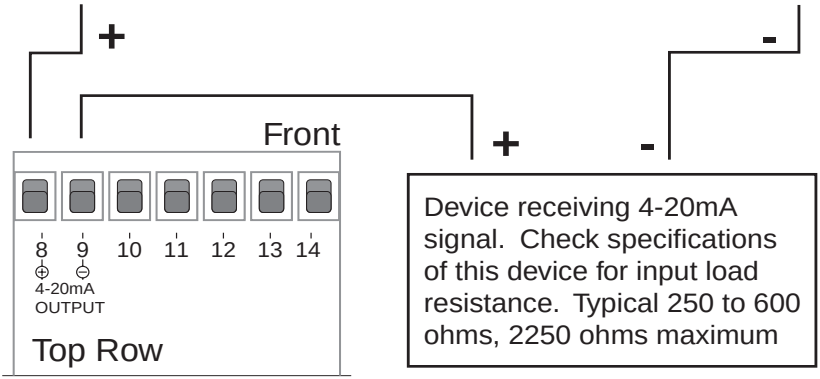
Wire RTD inputs to terminals 1 and 2. Three wire RTDs should have the third wire (common with the wire on terminal 2) connected to terminal 3.

Wire 0 to 20mA or 4 to 20 mA inputs to terminals 2 (-) and 4 (+).

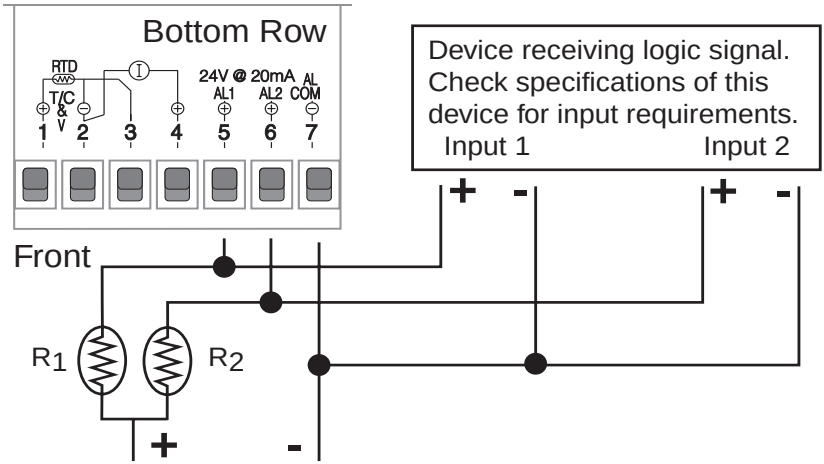
Wire 0 to 10 Vdc inputs to terminals 1 (+) and 2 (-).

DO NOT RUN SIGNAL WIRING IN THE SAME CONDUIT OR CHASE AS POWER WIRING. ERRATIC OPERATION OR DAMAGE TO THE TRANSMITTER CIRCUITRY WILL RESULT.

EXTERNAL POWER SUPPLY
24 Vdc typical, 45 Vdc maximum.
Minimum voltage = (Load resistance X .020) +10



Device receiving 4-20mA signal. Check specifications of this device for input load resistance. Typical 250 to 600 ohms, 2250 ohms maximum



Device receiving logic signal. Check specifications of this device for input requirements.
Input 1 Input 2

EXTERNAL POWER SUPPLY
5, 12, or 24 Vdc typical, 24 Vdc maximum.

R_1 and R_2, selected for voltage of power supply to limit current through SCU open collectors.

DO NOT WIRE THE 24 VOLT POWER SUPPLY ACROSS THE INPUT OF THE UNIT. DAMAGE TO THE UNIT INPUT CIRCUITRY WILL RESULT.

ALARM WIRING

The alarm outputs of the SCU are open collector type. They share a common ground with the input. The alarm outputs require an external power supply and external current limiting resistors to operate correctly. The value of the external resistors will vary with the type of power supply and the amount of current required by the device intended to receive the alarm signal(s).

To determine the value of the external resistors, divide the value of the power supply by the amount of current needed. This will give you the value of resistance needed. The formula is $E \div I = R$.

Depending on the voltage and current requirements, you may need a resistor rated at a minimum of 1/2 Watt (500mW). Calculate the Watt rating of the resister by multiplying the current by itself and then by the resistance. The formula is $I \times I \times R = P$ (I^2R).

EXAMPLES:

Given a 5 Vdc power supply and a 10 mA requirement, the resistance should be 500 ohms and will generate 50mW. ($5 \div 0.010 = 500$ and $0.010^2 \times 500 = 0.050$)

Given a 12 Vdc power supply and a 15mA requirement, the resistance should be 800 ohms and will generate 180mW. ($12 \div 0.015 = 800$ and $0.015^2 \times 800 = 0.180$)

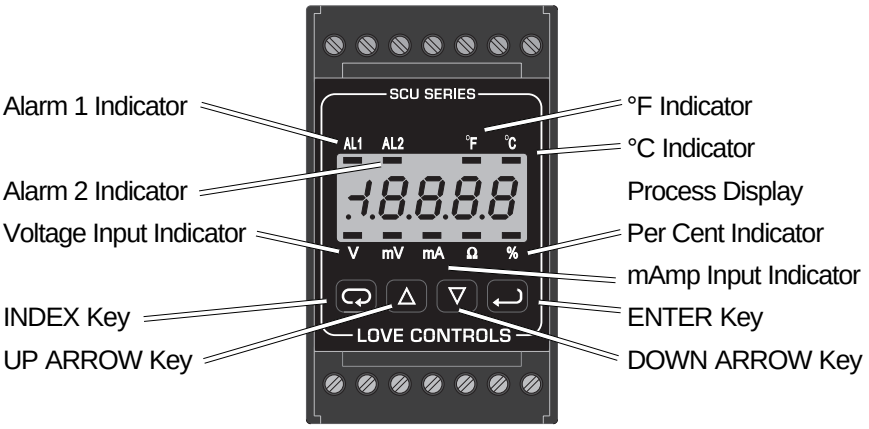
Given a 24 Vdc power supply and a 10mA requirement, the resistance should be 2400 ohms and will generate 240mW. ($24 \div 0.010 = 2400$ and $0.010^2 \times 2400 = 0.240$)

Given a 24 Vdc power supply and a 20mA requirement (maximum rating), the resistance should be 1200 ohms and will generate 480mW. ($24 \div 0.020 = 1200$ and $0.020^2 \times 1200 = 0.480$)

ALARM OPERATION

AL1 is set up as a low alarm. It will turn on when the input value is below the AL1 setting. AL2 is set up as a high alarm. It will turn on when the input value is above the AL2 setting.

FRONT PANEL KEY FUNCTIONS



Key functions are as follows:

INDEX: Pressing the INDEX key advances the display to the next menu item. May also be used in conjunction with other keys as noted below.

UP ARROW: Increments a value, changes a menu item, or selects the item to ON. The maximum value obtainable is 19999 regardless of decimal point placement.

DOWN ARROW: Decrements a value, changes a menu item, or selects the item to OFF. The minimum value obtainable is -19999 regardless of decimal point placement.

ENTER: Pressing ENTER stores the value or the item changed. If not pressed, the previously stored value or item will be retained. The display will flash once when ENTER is pressed.

UP ARROW & ENTER: Pressing these keys simultaneously brings up the **secure menu** starting at the **SECr** menu item.

While in the **Primary Menu** or **Secure Menu,** if no key is pressed for a period of 60 seconds, the display will return to the HOME position displaying the temperature value.

SECURITY LEVEL SELECTION

Three levels of security are provided. The display shows the current security level. To change security levels change the password value using the **UP** & **DOWN ARROW** keys and pressing the **ENTER** key. Refer to the password table (following) for the correct value to enter for the security level desired. The **SECr** menu item security level may be viewed or changed at any time regardless of the present security level.

To set the access level to, for example, **2**, at the **SECr** menu item press the **UP ARROW** key until the upper display show the password, **1101**. Press the **ENTER** key. The display will blink, and return with the level value, **2**, in the upper display.

The password values shown in the table cannot be altered, so retain a copy of these pages for future reference. This is the only reference made to password values in this instruction book.

PASSWORD TABLE

Security Level Menu	Security Level Status	Displayed Value When Viewed	Password Value To Enter
Primary Secure	Locked Locked	1	1110
Primary Secure	Unlocked Locked	2	1101
Primary Secure	Unlocked Unlocked	3	1011

THE HOME DISPLAY

The home display is the normal display while the control is operating. If no errors or functions are active, the HOME display will indicate the Process Variable (the temperature, pressure, flow, RH, etc., that is being measured).

Items that can change the HOME display are the Percent Output indication and error messages. Information on the Percent Output indication feature is found on page 12.

Error messages are listed on Page 13.

OPERATION AND PROGRAMMING OF INPUT

The input of the SCU can be programmed for thermocouple, RTD, Voltage (0 to 10 Vdc), or milliamp (0 to 20 or 4 to 20 mA) inputs.

Wire the SCU as shown on page 5.

After the unit is powered, press and hold the UP ARROW and ENTER keys to enter the **secure menu**. Press INDEX once to display **InP**. Press the UP ARROW or DOWN ARROW key to display the desired input. When the desired input is displayed, press the ENTER key to retain setting.

Press the INDEX key again to display **Unit**. If the input is measuring temperature, Select **F** or **C**. IF the input is measuring a variable other than temperature, Select **nonE**. Remember to press ENTER after making your selection.

Press the INDEX key again to display **dPt**. If the input is a J, K, E, T, N thermocouple or an RTD, you may select 0 or 0.0 (whole degree or 1/10th degree resolution). If the input is a voltage or current type, you may select 0, 0.0, 0.00, 0.000, or 0.0000 resolution. Use the UP ARROW or DOWN ARROW keys to make your selection and the ENTER key to retain your setting.

If the input is a voltage or current type, press INDEX until **SCAL** is displayed. This represents the value (in engineering units) that is represented by the low end of the analog input. Set **SCAL** to the appropriate value and press ENTER. If the input is 4 to 20 mA, the actual SCAL setting must be offset by 20% to allow for the difference between 0 mA (the actual low end of the analog signal) and 4 mA (the desired low end analog signal). Use the following formula to calculate the **SCAL** setting:
SCAL = Desired scale low end - ((Desired SCAH - Desired scale low end) ÷ 4)

If the input is a voltage or current type, press INDEX until **SCAH** is displayed. This represents the value (in engineering units) that is represented by the high end of the analog input. Set **SCAH** to the appropriate value and press ENTER.

An example is a differential pressure transmitter with a -0.25 to +0.25 inch of water column range with an output of 4 to 20 mA. In this case, the **SCAL** would be set to -0.37 (or -0.375) and the **SCAH** would be set to +0.25 (or +0.250).
[**SCAL** = -0.250 - ((+0.250 - -0.250) ÷ 4) = -0.250 - (0.500 ÷ 4) = -0.250 - 0.125 = -0.375]

OPERATION AND PROGRAMMING OF OUTPUT

The output of the SCU allows the Process Variable to be sent as an analog signal to an external device. The signal is 4 to 20 mADC and is powered by the output loop.

Wire the SCU as shown on page 5.

To set up the output, first determine the scale range that the analog signal will represent. The maximum for thermocouple and RTD inputs is the maximum programmed span for the selected sensor. The maximum span for a process input (Voltage or Current) is -19999 to -19999 counts. In the Secure Menu set **POL** for the scale value that will be represented by the low end of the analog signal (4 mA). Set **POH** for the scale value that will be represented by the high end of the analog signal (20 mA).

MENU SELECTIONS

PRIMARY MENU

Press **INDEX** to advance to the next menu item. Press **UP ARROW** or **DOWN ARROW** to change the value in the display. Press **ENTER** to retain the value.

AL1 Alarm 1. Low Alarm

AL2 Alarm 2. High Alarm

SECURE MENU

Press **UP ARROW** & **ENTER**. Press **INDEX** to advance to the next menu item. Press **UP ARROW** or **DOWN ARROW** to change the value in the display. Press **ENTER** to retain the value.

OUTPUT IS ACTIVE WHILE SCU IS IN SECURE MENU. ALARMS REMAIN ACTIVE.

SECr Security Code: See the Security Level Selection and the Password Table in this manual, in order to enter the correct password.

InP Input Type: Select one of the following. Refer to the Input wiring section for the proper wiring.

J-IC	Type "J" Thermocouple, Iron/Constantan (NIST)
CA	Type "K" Thermocouple Chromel/Alumel
E-	Type "E" Thermocouple Chromel/Constantan
t-	Type "T" Thermocouple Copper/Constantan
n-	Type "N" Thermocouple Nicrosil/Nisil
r-13	Type "R" Thermocouple Pt 13%Rh/Pt
S-10	Type "S" Thermocouple Pt 10%Rh/Pt
b-	Type "B" Thermocouple Pt 6%Rh/Pt 30%Rh
C-	Type "C" Thermocouple W 5%Re/W 26%Re
n120	120 ohm Nickel
P385	100 ohm Platinum (DIN 0.00385 Ω/Ω/°C)
1P38	1000 ohm Platinum (DIN 0.00385 Ω/Ω/°C)
Curr	DC Current Input 0 to 20 mA.
UoLt	DC Voltage Input 0 to 10 V.
- - - -	Reserved
id##	Hardware version identification number.

Unit **F**, **C** or **None**.

F	°F descriptor is On and temperature inputs will be displayed in actual degrees Fahrenheit.
C	°C descriptor is On and temperature inputs will be displayed in actual degrees Celsius.
nonE	°F and °C descriptors will be Off.

dPt Decimal Point Positioning: Select **0**, **0.0**, **0.00**, **0.000, or .0000**. On temperature type inputs this will only effect the Process Value, SP1, SP2, ALLo, ALHi, and InPC. For Current and Voltage Inputs all Menu Items related to the Input will be affected.

- **0** No decimal Point is selected. This is available for all Input Types.
- **0.0** One decimal place is available for Type J, K, E, T, L, RTD's, Current and Voltage Inputs.
- **0.00** Two decimal places is only available for Current and Voltage Inputs.
- **0.000** Three decimal places is only available for Current and Voltage inputs.
- **.0000** Four decimal places is only available for Current and Voltage inputs.

PctO Percent Output Feature: Select **On** or **OFF**.

- **On** When selected **On,** the display will indicate the output of the transmitter in percent. The "%" indicator will appear.
- **OFF** Percent Output display is disabled.

ALSt Alarm Output State: Select **CLOS** or **OPEn.**

- **CLOS** Output goes low at Alarm Set Point (output transistor is on).
- **OPEn** Opens goes high at Alarm Set Point output transistor is off).

InEr Input Error Action: Select **UP** or **dn**. An input error will drive the output up (20mA) or down (4mA).

Lin Input Linearizer: Select **On** or **OFF**. Thermocouple or RTD inputs will product linearized output if **On**, non-linerarized if **OFF**.

POL Process Output Low end scaling: Select desired scale value for 4 mA output.

POH Process Output High end scaling: Select desired scale value for 20 mA.

SCAL Scale Low: Select any value between -19999 and +19998. The total span between **SCAL** and **SCAH** must be within 32000 counts. Setting range is -19999 to +19998 counts. For Current and Voltage inputs, this will set the low range end. For Thermo-couple and RTD ranges this will set a low end limit on the setting of **AL1** and **AL2**.

SCAH Scale High: Select from -19998 to +19999. The total span between **SCAL** and **SCAH** must be within 32000 counts. Setting range is -19998 to +19999 counts. For Current and Voltage inputs, this will set the high range end. For Thermocouple and RTD ranges this will set the high end limit for setting **AL1** and **AL2**.

DIAGNOSTIC ERROR MESSAGES

DISPLAY	MEANING	OUTPUTS	ACTION REQUIRED
UFL or **OFL**	Underflow or Overflow: Process value has exceeded input range ends.	Output per **InEr** setting Alarm active	Input signals may normally go above or below range ends. If not, check input and correct.
bAd3	Open RTD third wire.	Output per **InEr** setting Alarm active	Correct or replace sensor. To reset use the **INDEX** & **DOWN ARROW** keys.
bAd1	bAd1 appears if there is a failure of the A/D Converter.	Output per **InEr** setting Alarm active.	Remove the instrument for service.
bAd2	bAd2 appears if there is a failure in the non-volitile memory.	Output per **InEr** setting Alarm Active	Remove the instrument for service.
ArEA	This message appears if the ambient temperature of the control is out of range or RJC sensor is broken.	Output active Alarms active	Correct the ambient temperature conditions. Ventilate the area of the cabinet or check for clogged filters. If RJC broken, return to factory for service.
InEr	This message appears if the input exceeds the range of the A/D converter.	Output per InEr setting Alarms active	Check input polarity, input signal value, and correct.

SPECIFICATIONS

Selectable Inputs: Thermocouple, RTD, DC Voltage, or DC Current selectable.

Input Impedance:

Thermocouple = 3 megohms minimum. RTD current = 200 μA.
Current = 10 ohms. Voltage = 5000 ohms.

Sensor Break Protection: Output programmable to protect system by going to upscale or downscale value. (See **InEr** in Secure Menu.)

Display: One 4 1/2 digit, 7 segment 7.62mm (0.3") high LCD.

Alarm On - Off Differential: 1° F, 1° C, or 1 count.

Accuracy: ±0.25% of span, ±1 least significant digit.

Resolution: 1 count, 1 degree or 0.1 degree, selectable.

Input Resolution:

High gain (Type T, R, S, B thermocouples): 1.0 μV per count
Low gain (All other inputs): 2.1 μV per count

Input / Output Accuracy: ±0.1% of full span of selected input

Drift: ±0.02% (200 ppm) per °C typical, ±0.05% (500 ppm) per °C maximum

Power Supply Requirements: (Load resistance x .020) + 10 Vdc minimum, 45 Vdc maximum (maximum load 2250 Ω)

Input Isolation: 1500 V

Alarm Outputs: Open collector, 24 Vdc @ 20 mA maximum, non-isolated

Mounting: Industry standard 35mm DIN rail, DIN EN50022-35. Surface mount adaptor available.

Power Consumption: 5VA maximum.

Operating Temperature: -10 to +55 °C (+23 to 131 °F).

Storage Temperature: -40 to +80 °C (-40 to 176 °F).

Humidity Conditions: 0 to 90% up to 40 °C non-condensing 10 to 50% at 55 °C non-condensing.

Memory Backup: Nonvolatile memory. No batteries required.

Weight: 230g (8 oz.)

Input Ranges (Field Selectable)

Thermocouple Types

Input Type	Type J or L* Iron-Constantan	Type K* Chromel-Alumel	Type T* Copper-Constantan	Type E* Chromel-Constantan
Range				
1°F	-100 to +1607	-200 to +2500	-350 to +750	-100 to +1800
1°C	-73 to +871	-129 to +1371	-212 to +398	-73 to +982

Input Type	Type R PT 13%-PT	Type S PT 10%-PT	Type B PT 6% RE-PT 30% RE	Type N* Ni Chr Si-Ni Si
Range				
1°F	0 to 3200	0 to 3200	+75 to 3276	-100 to +2372
1°C	-17 to +1760	-17 to +1760	+24 to 1802	-73 to +1300

* These Input Types can be set for 0.1° display. If temperature goes above 1999.9° the display will return to whole degree resolution. The display will revert to 0.1° display when the temperature falls back below 2000°.

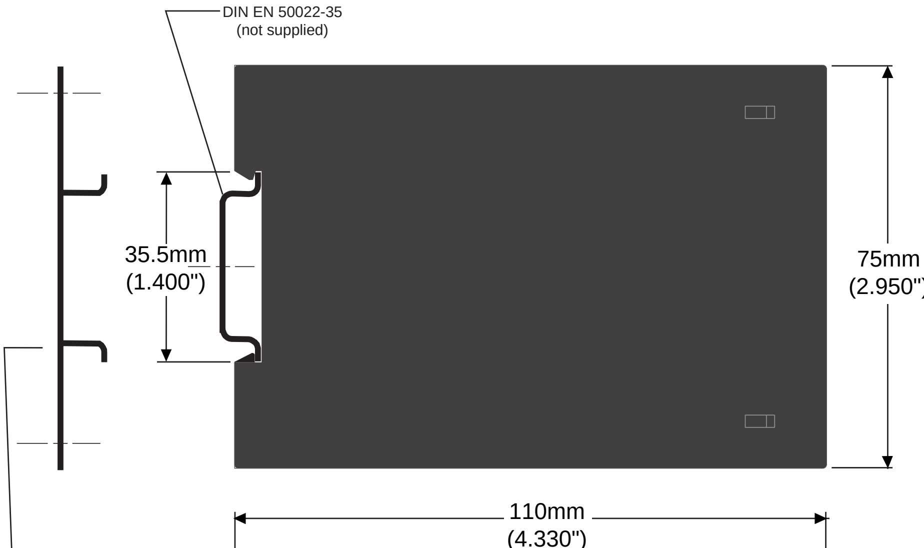
RTD Types

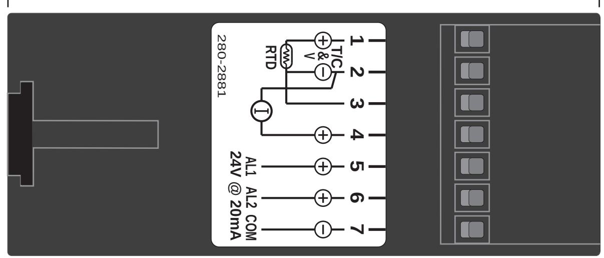
Input Type	100 Ohm Platinum 0.00385 DIN Curve*	120 Ohm Nickel 0.00628 US Ind. Curve*	1000 Ohm Platinum 0.00385 DIN Curve*
Range			
1°F	-328 to +1607	-112 to +608	-328 to +1607
1°C	-200 to +875	-80 to +320	-200 to +875

Process Input Types

The 0 to 20 mAdc and 0 to 10 Vdc inputs are fully scalable with a maximum of 32000 counts span placed anywhere within the within the range of -19999 to +19999. Decimal point position is adjustable from the zero place (19999), tenths (1999.9), hundredths (199.99), thousandths (19.999), or ten thousandths (1.9999).

DIMENSIONS





Optional adapter bracket for surface mounting,
Cat. # 35DINADPTR

Dimensions in millimeters with inches in parenthesis

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