



VRU Pro™ and WellPro II™ Controllers

Installation Manual

Warranty - A limited warranty on materials and workmanship is given with this FW Murphy product.
A copy of the warranty may be viewed or printed by going to <http://www.fwmurphy.com/warranty>



BEFORE BEGINNING INSTALLATION OF THIS FW MURPHY
PRODUCT:

- Read and follow all installation instructions.
- Visually inspect this product before installation for any damage during shipping.
- Before proceeding please visit our website and review our support documentation including Wiring the Murphy Way www.fwmurphy.com/uploaded/WIR_Murphy_Way.pdf
- Disconnect all electrical power to the machine. Failure to do this before welding can result in damage to the panel and/or its components.
- It is your responsibility to have a qualified technician install the unit and make sure the installation conforms to local codes including but not limited to double insulation and fire containment.
- Observe all Warnings and Cautions in each section of these instructions.
- Device shall be wired in accordance with Class I, Division 2 wiring methods.
- This equipment is suitable for use in Class I, Division 2, Groups B, C and D hazardous areas.
- **WARNING**–Explosion Hazard–Substitution of components may impair suitability for Class I, Division 2.

Contact FW Murphy production Controls Technical Service if you have any questions or concerns at: +1 918-957-1000.

IMPORTANT! Improper use and operation of electronic products can be dangerous. It is required that point-of-operation guarding devices be installed and maintained. All such devices must meet OSHA and ANSI Machine safety standards. The manufacturer shall not accept any responsibility for installation, application or safety of systems.

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Operation Manual Location

After installation, please review the appropriate Operations Manual prior to placing the controller into service.

To access the VRU Pro™ Operation Manual, please visit the Product Literature Archive page to download or print a copy at www.fwmurphy.com.

To access the WellPro II™ Operation Manual, please use the Sequence of Operation document provided with the panel and specifically customized for your controller application.

Controller Kit and Tools

The following instructions will guide you through installing the following controllers.

VRU Pro controller

WellPro II controller

Throughout this document the word controller refers to both the VRU Pro controller and the WellPro II controller. Both controllers and the harnesses are mechanically identical and will be treated the same during Installation.

Inspecting Package Contents

Before attempting to install the product, ensure all parts are accounted for and inspect each item for damage (which sometimes occurs during shipping).

VRU Pro Controller kit – P/N 50-70-3841 includes:

- VRU Pro Controller
- 4 (6-32) mounting screws
- 4 (#6) lock washers
- P/N 00-02-0956 VRU Pro / WellPro II Installation Manual (this document)

WellPro II Controller kit – P/N 50-70-3842 includes:

- WellPro II Controller
- 4 (6-32) mounting screws
- 4 (#6) lock washers
- P/N 00-02-0956 VRU Pro / WellPro II Installation Manual (this document)

Tools Needed

- Use a 1/4 in. drill bit to make the approximately sized 0.250 in. mounting holes.
- Use a #2 Phillips screwdriver to secure mounting screws.
- Use a cutout tool (i.e. saw, punch press or cutting wheel.) to create the mounting hole according to the template dimensions.

Installation

Prepare the Panel

The suitability of the enclosure is subject to investigation by the local authority having jurisdiction at the time of the installation.



IMPORTANT: When using the paper template from the manual, please be aware that the drawing is not represented to scale. The measurements provided are accurate and should be referred to when preparing the placement of the unit.

1. Determine the location of the controller on the customer-supplied flat or enclosed panel. Plan the controller mounting for easy wiring and access.

NOTE: The Mounting Template and Dimensions are located in at the back of this manual.

2. Measure the specified measurements shown in the Dimensions Front View diagram. Doing so will ensure there is adequate real estate to provide clearance for the front edges of the controller housing to mount flush against the outside surface of your panel. This is not your cut measurement.
3. Centered inside the first measurement, measure and mark the specified dimensions shown in the Mounting Template diagram. This is your cut measurement.
4. Cut the hole in the panel following your marks matching the Mounting Template as a guideline. This cut is centered inside the earlier measurement of the Front View dimensions.

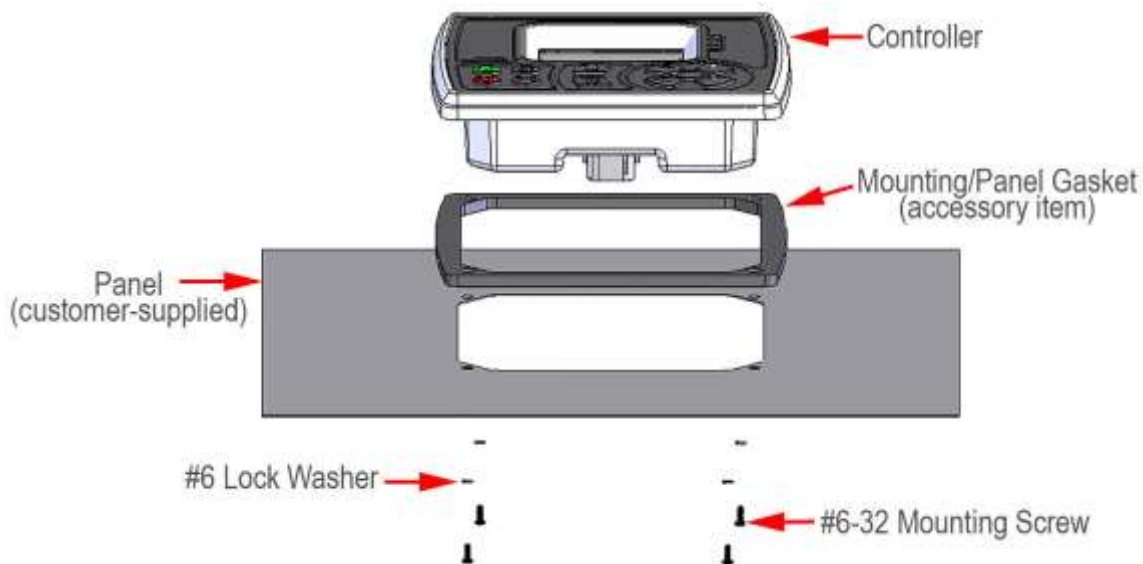
NOTE: Check for clearance fit of controller in cutout before proceeding with drilling mounting holes.

5. Drill holes where indicated on the Mounting Template for the mounting screws.



Install the Display

1. If using the Mounting Panel Gasket, place it on the front side of the panel with the mounting holes aligned.
2. Insert the controller backside first, from the front side of the panel.
3. Ensure that there is adequate clearance for the edges of the controller housing and the back of the case is flush against the outside surface of your panel.
4. Apply blue polycarbonate compatible thread lock to the threads of the mounting screws if thread lock is desired for your application. It is not a requirement of installing the controller.
5. Install the four mounting screws and lock washers from the backside of the panel to the controller housing.
6. Tighten the mounting screws to 8 in. lbs. (0.9 Nm). Do not over tighten.
7. Ensure that there is a good seal between the controller, the gasket (if used) and the mounting panel.



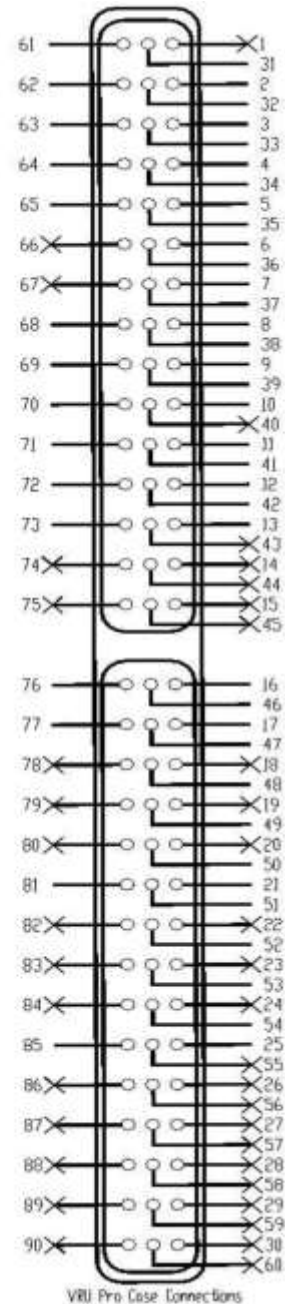
Wiring

PIN Specifications for FCI Connection

Wiring of this device must meet all applicable electrical codes. All battery lines to the unit must come through a single 10 Amp or less fuse or circuit breaker to retain the controller's CSA rating.

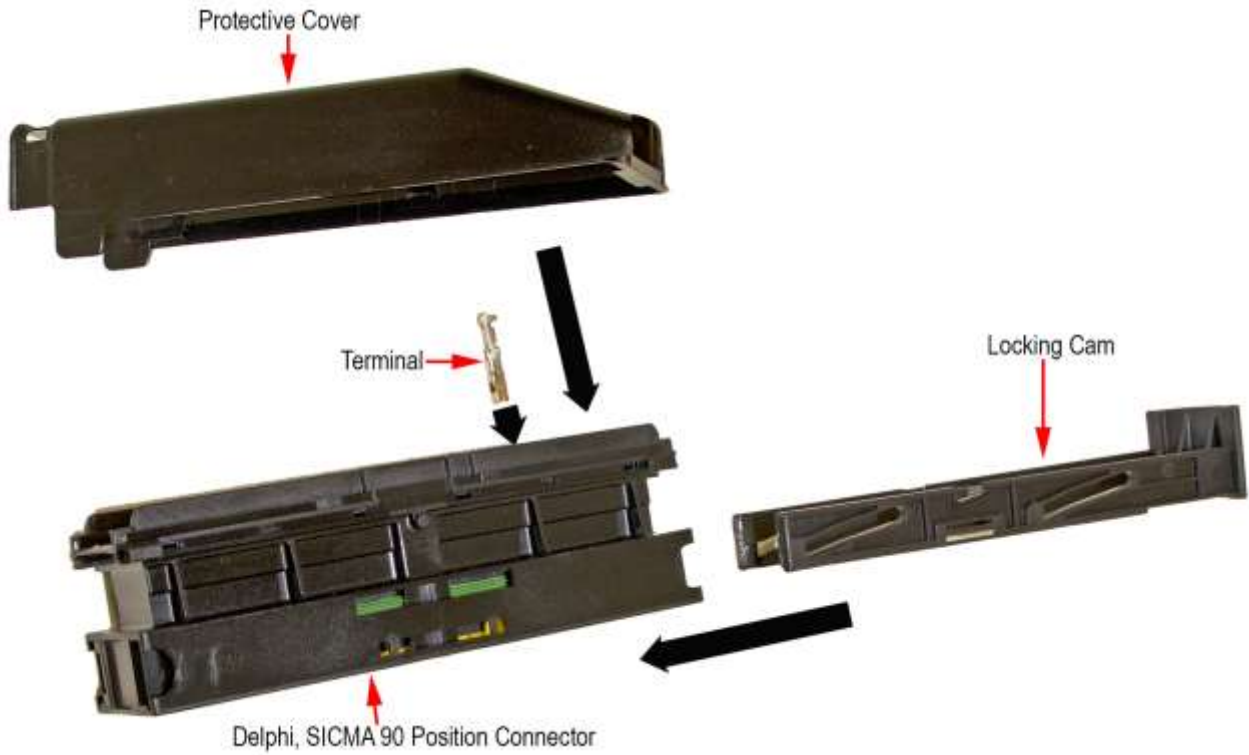
NOTE: A factory harness is available to simplify installation. Typical installation will use this harness and terminate to customer terminal blocks for field connections. See Accessories list for more information.

Pin #	Pin Assignments	Pin #	Pin Assignments	Pin #	Pin Assignments
1	Reserved	31	BATT	61	BATT
2	GND	32	GND	62	GND
3	AN1_IN	33	DIG_IN1	63	DIG_IN2
4	AN2_IN	34	DIG_IN3	64	DIG_IN4
5	AN3_IN	35	DIG_IN5	65	DIG_IN6
6	AN4_IN	36	DIG_IN7	66	Reserved
7	AN5_IN	37	TC_COMMON	67	Reserved
8	TC_IN1	38	TC_COMMON	68	DIG_IN8
9	TC_IN2	39	TC_COMMON	69	FREQ_IN
10	TC_IN3	40	Reserved	70	GND
11	TC_IN4	41	TC_COMMON	71	TC_IN5
12	RS485_L	42	TC_COMMON	72	CAN1L
13	RS485_H	43	Reserved	73	CAN1H
14	Reserved	44	Reserved	74	Reserved
15	Reserved	45	Reserved	75	Reserved
16	USB_DP_OUT	46	USB_DM_OUT	76	USB1_VBUS
17	USB_GND	47	USB_SHLD	77	USB_ID
18	Reserved	48	LS_1.5A_OUT_1	78	Reserved
19	Reserved	49	LS_1.5A_OUT_2	79	Reserved
20	Reserved	50	LS_1.5A_OUT_3	80	Reserved
21	IOUT1_RET	51	LS_1.5A_OUT_4	81	IOUT+1
22	Reserved	52	LS_1.5A_OUT_5	82	Reserved
23	Reserved	53	LS_1.5A_OUT_6	83	Reserved
24	Reserved	54	LS_1.5A_OUT_7	84	Reserved
25	IOUT2_RET	55	Reserved	85	IOUT+2
26	Reserved	56	Reserved	86	Reserved
27	Reserved	57	Reserved	87	Reserved
28	Reserved	58	Reserved	88	Reserved
29	Reserved	59	Reserved	89	Reserved
30	Reserved	60	Reserved	90	Reserved

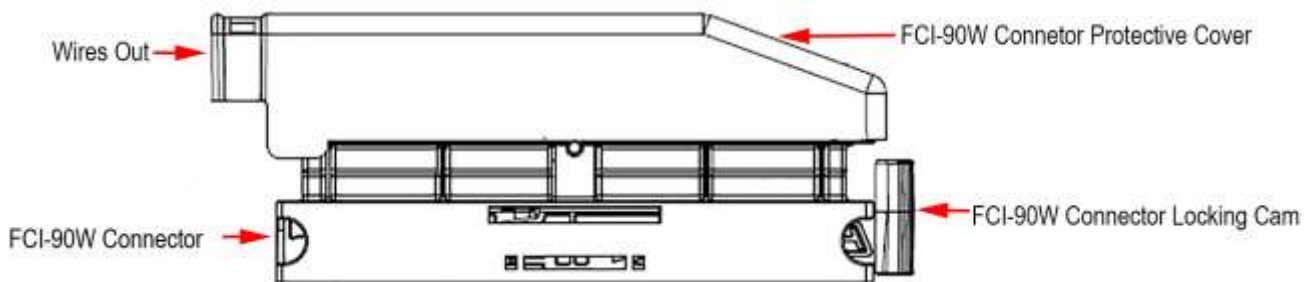


Connector

Exploded View



Assembled View



Power Connection (PWR)

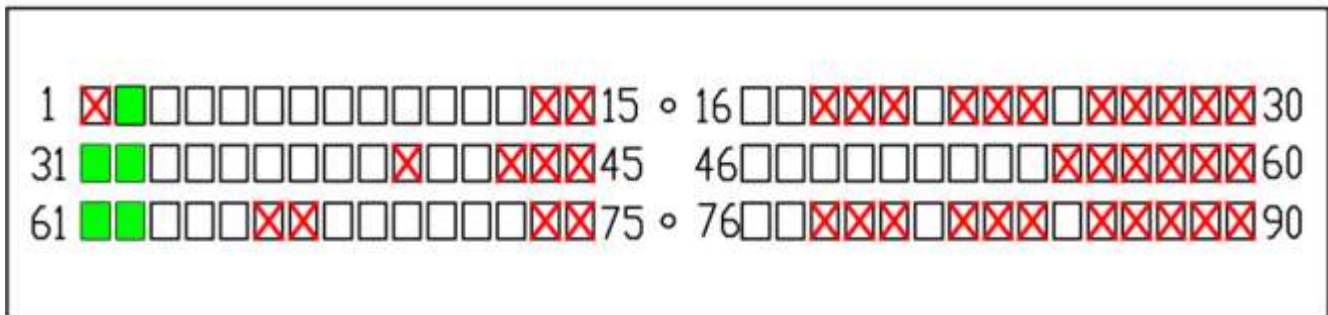
The 12-24 VDC power for the controller is applied to the harness connector at pins marked 31/61 BATT (+) and 2/32/62 GND (-).

An external 10 amp replaceable fuse should be used to protect the system from overcurrents.

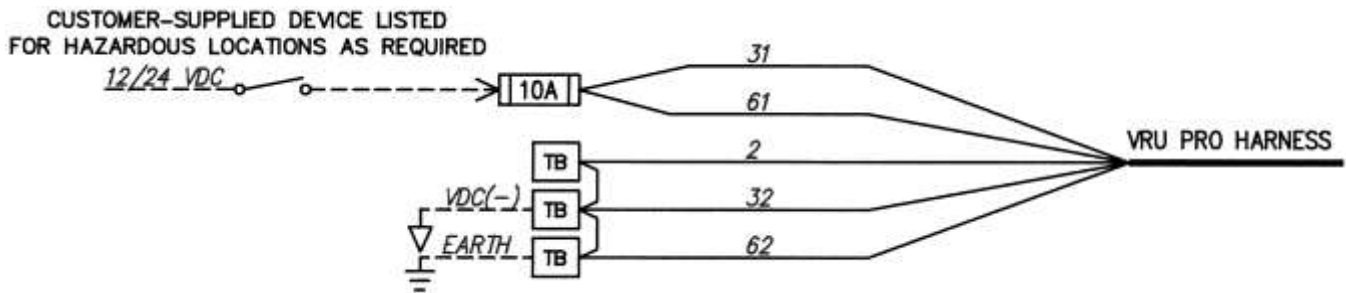
NOTE: Run power directly from battery posts to controller power terminals when battery is the power supply.

Maximum power ratings based on all I/O operating in the ON position with 10 V supply. Typical based on 24 V supply.

PWR Connections



Typical Panel Wiring for DC Version



Magnetic Pickup Connection (MPU)

A magnetic pickup is an AC generator used to measure the speed of the engine. It is normally installed into the flywheel housing of an internal combustion engine. The flywheel ring gear acts upon it to generate a voltage pulse each time a gear tooth passes the end of the sensor. The MPU sends the pulses to the controller, which calculates the engine speed. The engine speed is necessary for the proper operation of the controller.

NOTE: The MPU input requires a minimum signal of 2Hz - 10KHz, 2VAC - 120VAC (RMS) when connected.

We recommend using the FW Murphy Magnetic Pickups. (Use the link below or search for Magnetic Pickup on our website). A threaded hole is tapped into the flywheel housing, perpendicular to the center of the ring gear with an air gap. The assembly is a 20 gauge, two conductor, shielded cable (10 turns per foot), with a standard length of 50 feet, terminated on one end with a military style Cannon Plug type connector for the Magnetic Pickup. The maximum recommended length of this cable is 100 feet. Harness sheath color is black.

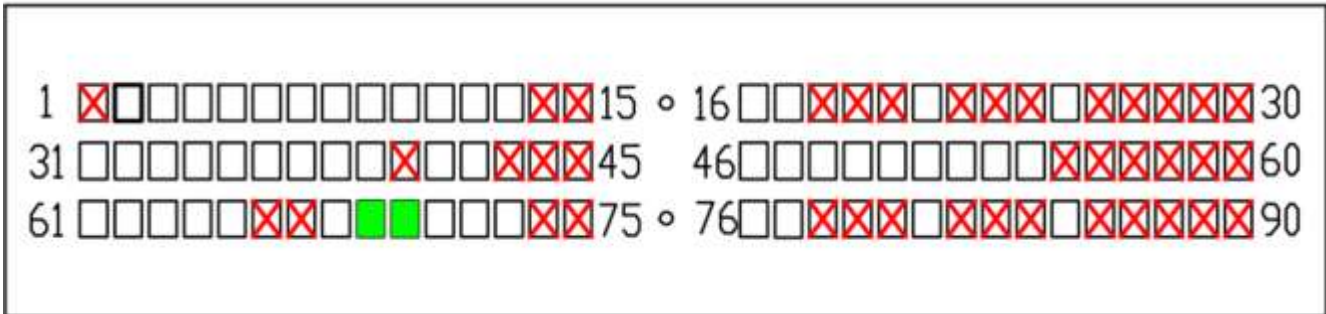


www.fwmurphy.com/products/sensors/magnetic-pickups

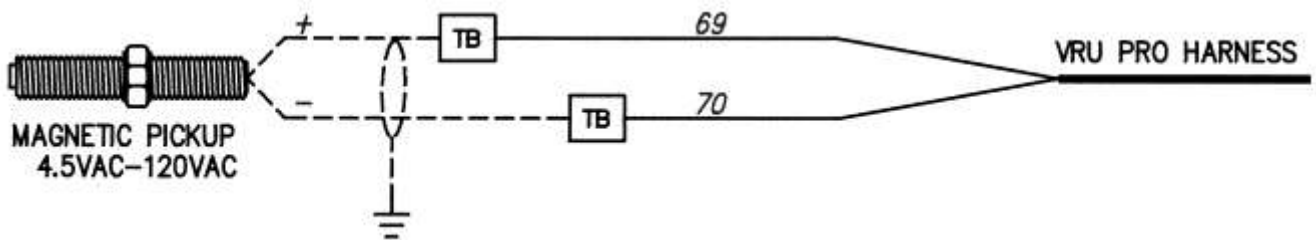
The MPU for the controller is applied to the harness connector at pins marked 69 FREQ_IN (MPU+) and 70 GND (MPU-), MPU 5-120 Vrms 30-10 kHz.

If used, the foil shield and drain wire of the cable assembly may be terminated at pin 70.

MPU Connections



Typical Panel Wiring for MPU



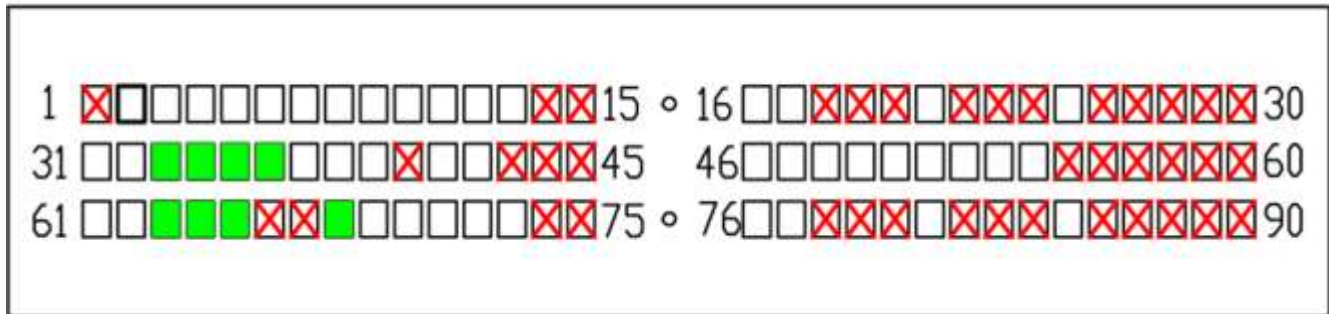
Digital Inputs

The controller is equipped with eight (8) switch inputs. End-device switch inputs are applied to the harness connector at pins marked 33-36/63-65/68 DIG_IN.

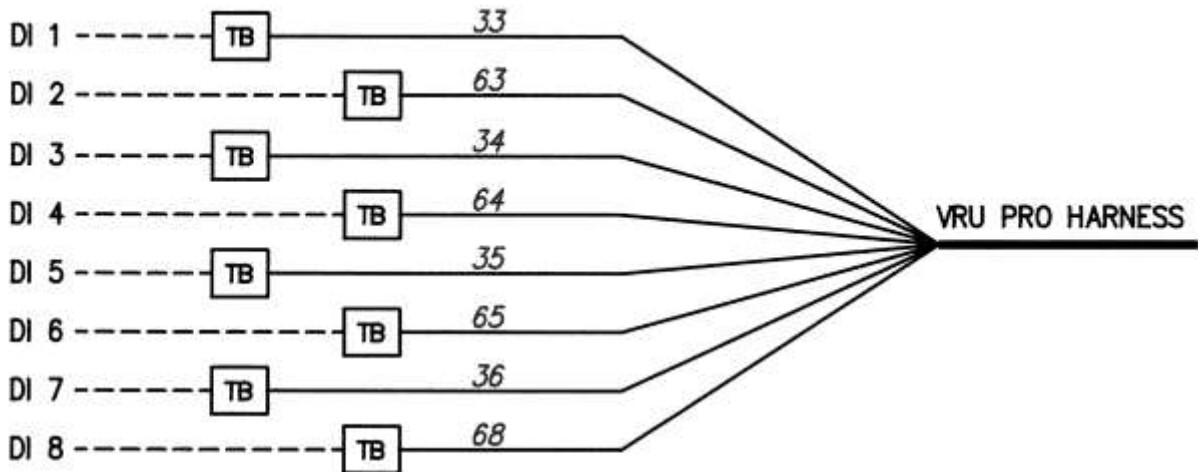
These digital inputs can be activated when the associated pin is grounded to the same reference as GND (-) or BATT (+) on the harness.

Inputs can be wired as Normally Open (N.O.) or Normally Closed (N.C.).

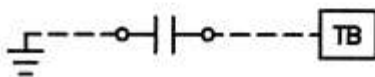
Digital Input Connections



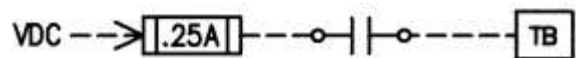
Typical Panel Wiring for Digital Input



TYPICAL DI SENSOR WIRING
NORMALLY OPEN



TYPICAL DI SENSOR WIRING
NORMALLY CLOSED



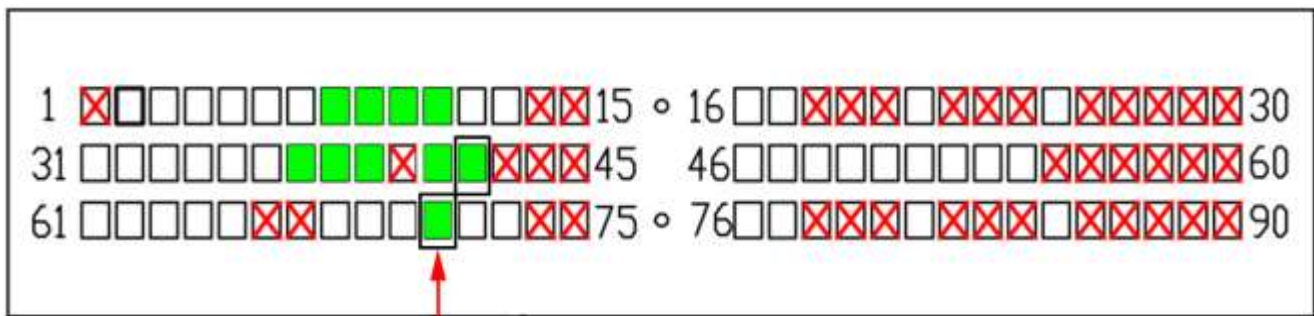
Thermocouple Inputs

The controller is equipped with four (4) thermocouple inputs. Type J or K thermocouple sensor inputs are applied to the harness connector at pins marked 8-11 TC_IN (white/yellow) and 37-39/41 TC_COMMON (red).

NOTE: Grounded TCs cannot be used with this system.

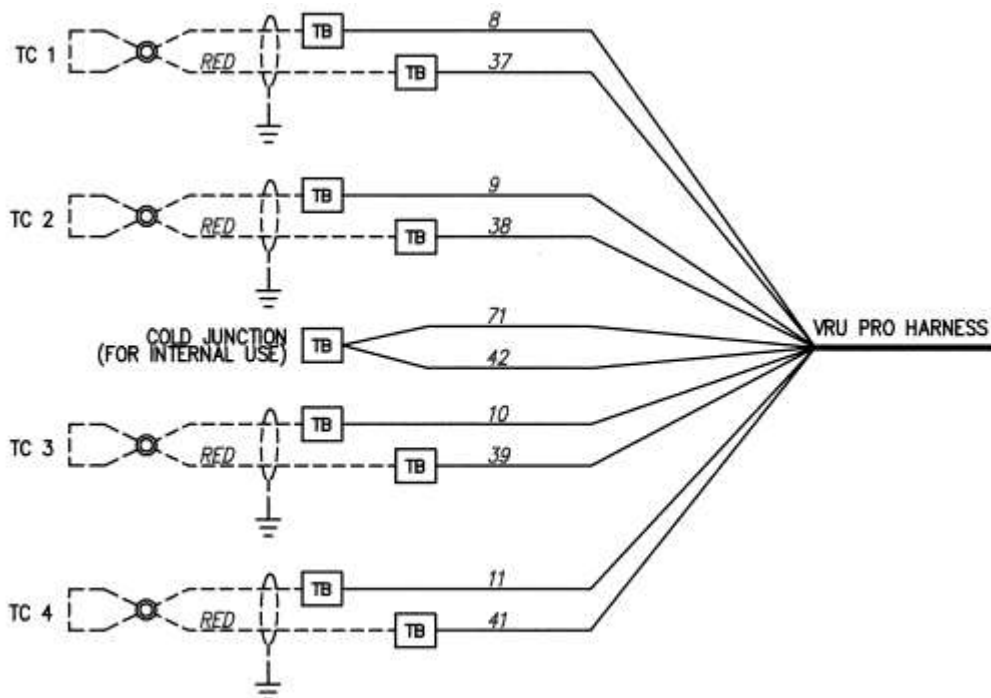
A fifth thermocouple input is also present in the harness connector at pins marked 71 TC_IN5 and 42 TC_COMMON. This sensor is used to measure the temperature at the customer terminal block where the four thermocouple inputs are wired. This measurement is the Cold Junction Compensation (CJ) used to account for offset between the thermocouple wire and the terminal blocks.

Thermocouple Input Connections



Only use connections 42 and 71 for the Cold Junction Sensor

Typical Panel Wiring for Thermocouple Input

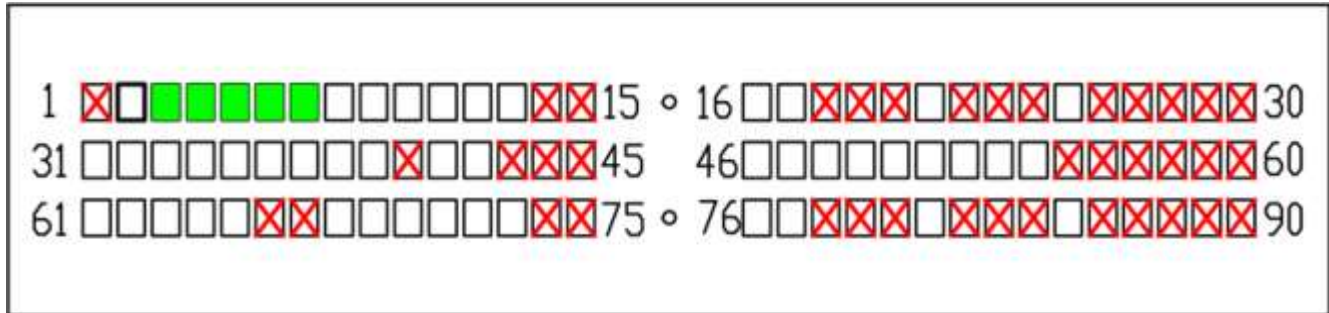


Analog Inputs

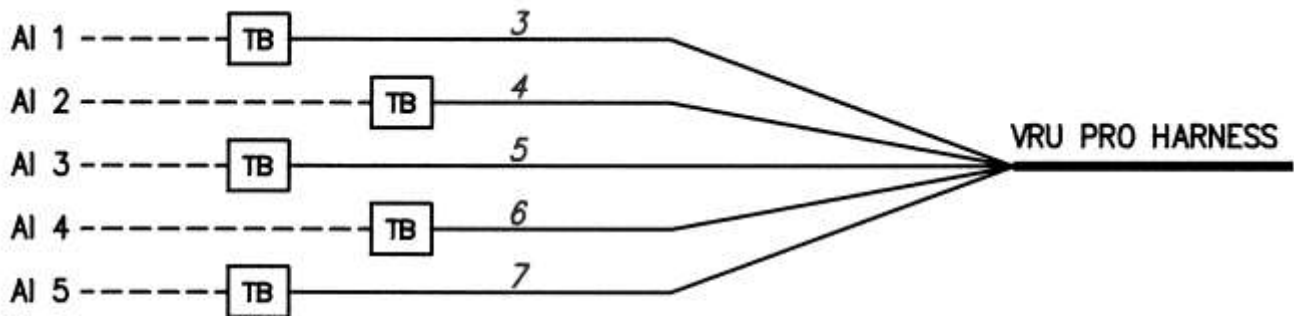
The controller is equipped with five (5) current loop analog inputs. These current loops are designed for a nominal range of 4-20 mA. Sensor returns are applied to the harness connector at pins marked 3-7 AN_IN (SIG).

Supply voltage is supplied by the customer and should be at the same level as BATT (+) on pins 31/61 of the harness connector.

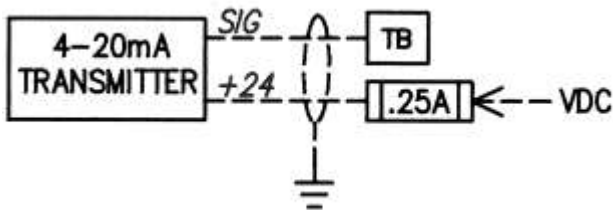
Analog Input Connections



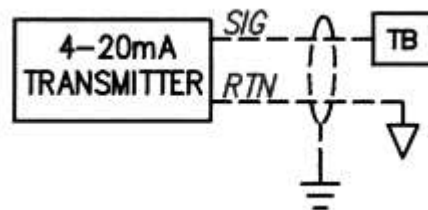
Typical Panel Wiring for Analog Input



*TYPICAL AI SENSOR WIRING
LOOP POWERED*



*TYPICAL AI SENSOR WIRING
EXTERNAL POWER*



Digital Output

The controller is equipped with seven (7) FET sinking outputs. A ground signal is supplied by the controller on the harness connector at pins marked 48-54 LS_1.5A_OUT (FET -).

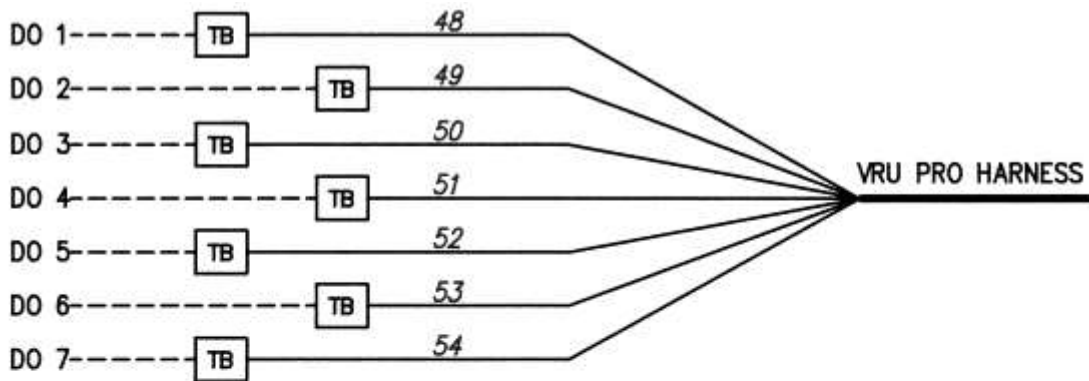
End devices operated by these outputs are supplied a ground common to GND on the harness connector when the output is activated.

NOTE: Interposing relays are recommended to interface with end devices that require high current ratings or alternative voltage supplies. Consult the document General Cautions for Solid State Devices at www.fwmurphy.com for best practices when connecting to external inductive load devices such as relays or solenoids.

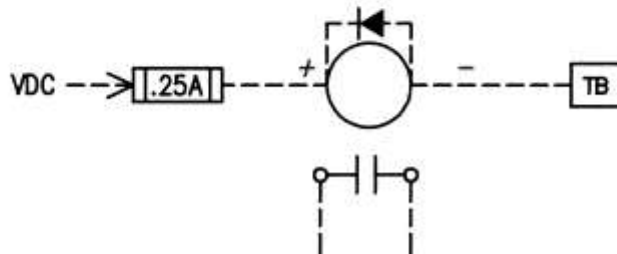
Digital Output Connections



Typical Panel Wiring for Digital Output



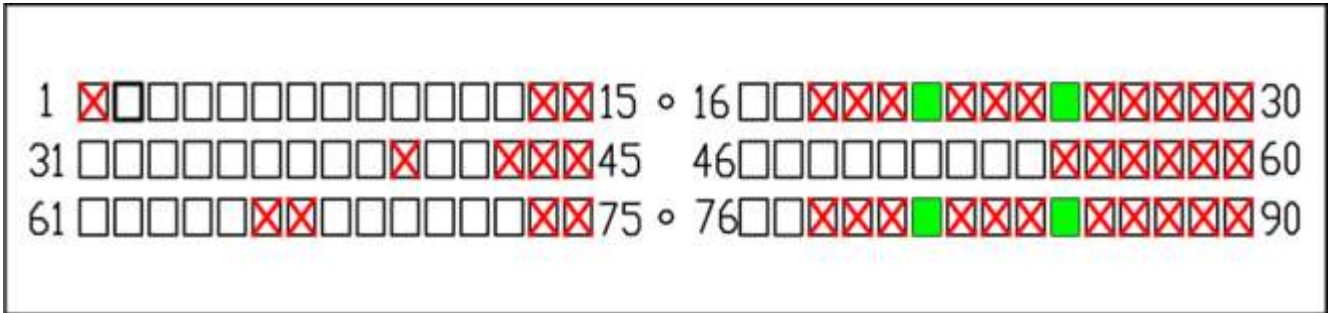
TYPICAL OUTPUT WIRING



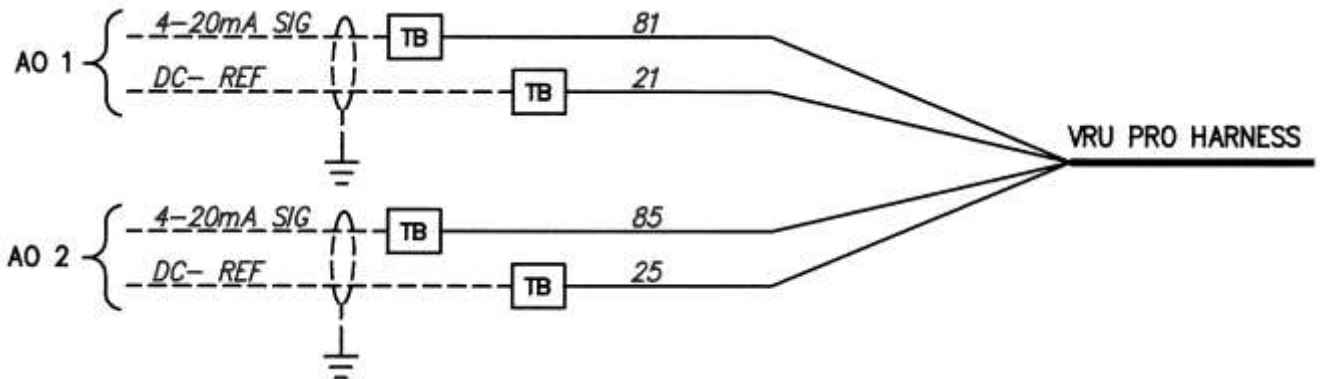
Analog Outputs

The controller is equipped with two (2) analog outputs for controlling various processes. These analog outputs are outputting 4-20 mA range of current. The supply voltage and measuring currents are supplied by the controller on the harness connector at pins marked 81/85 IOU+ and 21/25 IOU_RET.

Analog Output Connections



Typical Panel Wiring for Analog Output



Communications

The controller is equipped with communications ports for RS-485 and CAN applied to the harness connector at pins marked 12-13 for RS-485 and 72-73 for CAN.

These bus networks use a differential signal and are simply labeled as H(igh) and L(ow). If communications is not working on initial installation, reversing these connections for related port may resolve the issue.

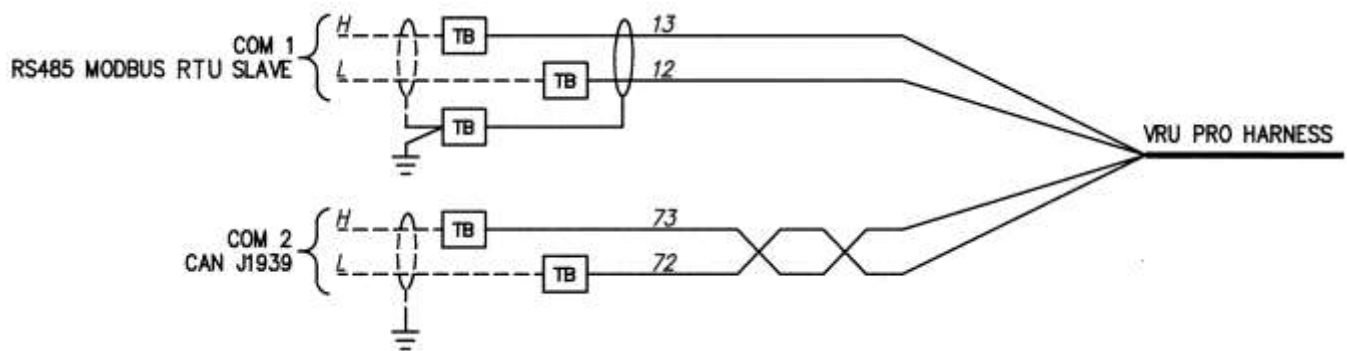
NOTE: Consult RS-485 the Murphy Way for information on best practices for connecting and communicating on RS-485.

www.fwmurphy.com/uploaded/documents/pdfs/rs-485murphyway.pdf

Communications Connections

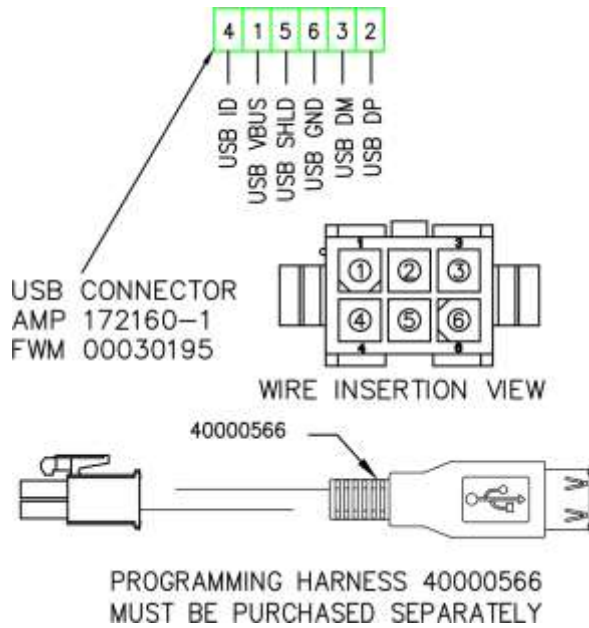


Typical Panel Wiring for Communications



USB Host Connections

The USB Host connection on the controller consists of a mating connector on the harness at pins marked 16-17, 46-47, 76-77 and an accessory cable assembly, the Programming Harness.



NOTE: The accessory cable assembly for USB connection is intended to be used for programming. Do not leave external devices, such as flash drive devices, connected to the cable when unattended.

Accessories

Part Number	Description
50001188	VRU Pro / Well Pro II Harness
40051031	IP66 Panel Gasket
40000566	Programming Harness
53702325	RS485 PC Interface Kit

Specifications

Electrical

Display: 3.8 in. Monochrome, Transflective, White Backlight LCD

Operating Voltage: 12 or 24 VDC, protected against reverse battery polarity and load-dump

Power Consumption:

18 W max without two 2 A High-sides active

146 W max with two 2 A High-sides active

Communications

1-CAN: J1939

USB: 2.0B (Only supported for programming)

RS485: Modbus RTU Slave

Connection: Delphi SICMA 90 way connector, 1.5 mm

Keyboard: 11 tactile feedback buttons

Inputs

8-Digital Inputs: Active high (+DC) or Active low (DC-)

5-Analog Inputs: 4-20 mA, 0-5 V, resistive

4-Thermocouple Inputs: Type J or K

1-Frequency Input: Supporting Magnetic Pickup (2 Hz – 10 KHz, 3.6 VAC – 120 VAC)

Outputs

7-FET Outputs: 1.5 A DC- (sinking)

2-Analog Output: 4-20 mA

Real-Time Clock: With battery backup

Environmental

Operating Temperature: -40° F to 185° F (-40° C to 85° C)

Storage Temperature: -40° F to 185° F (-40° C to 85° C)

Protection: IP67 front and back, when using accessory gasket and properly mounted the panel seal retains IP66

Emissions: SAE J1113

Immunity: SAE J1113

Vibration: Random vibration, 7.86 Grms (5-2000 Hz), 3 axes

Shock: ± 50 G in axis

Mechanical

Case Material: Polycarbonate/ABS

Keypad/Gasket Material: Silicone

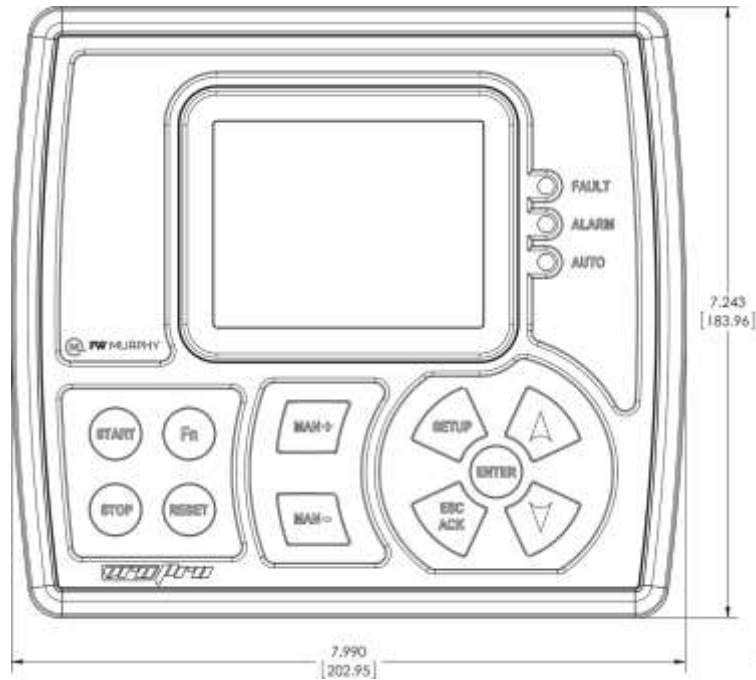
Approvals

CSA, CLASS 1, DIVISION 2, Groups B, C and D certifications

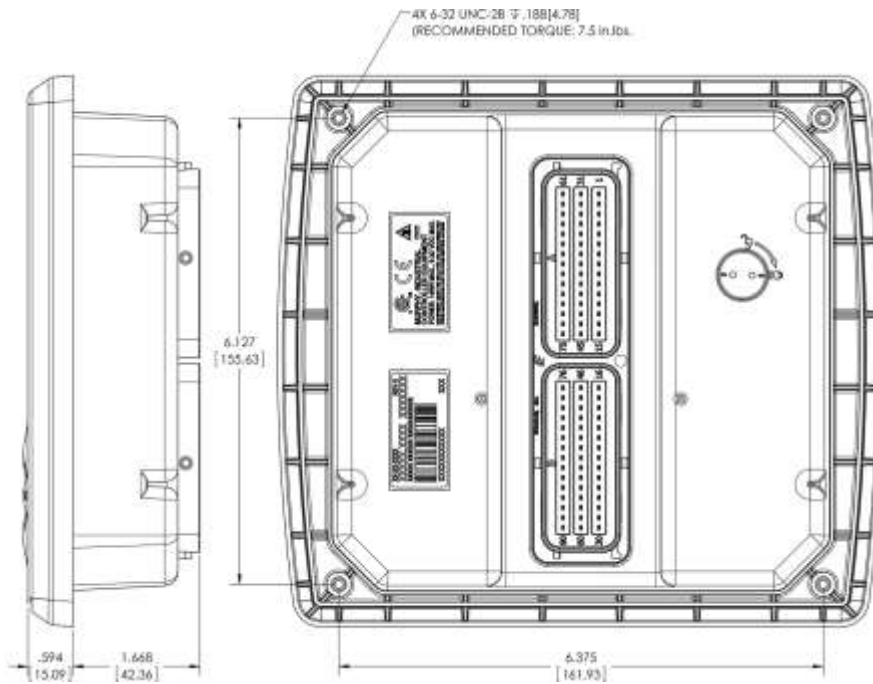
Dimensions

The drawings are for dimensions only. Measurements are in inches [mm].

Front View

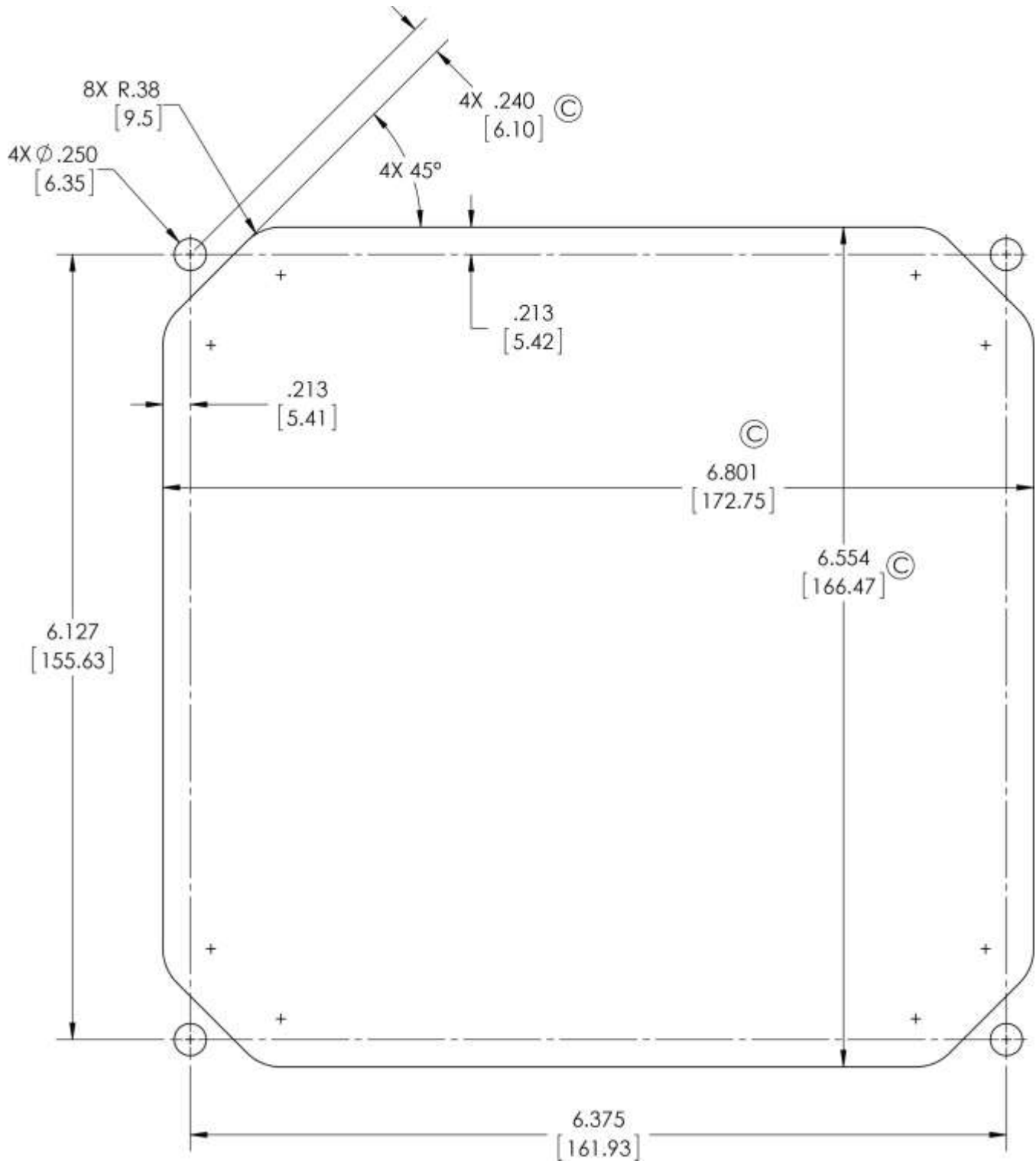


Back and Side View



Mounting Template

This template is for reference dimensions only. Measurements are in inches [mm].



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