MURPHY®

by ENOVATION CONTROLS

PROPULSION PORT ENGINE

34 PSI
236 °F
23 PSI

417 GPH
FUEL RATE

16.5 V

33.0 H
ENG HRS

33 %
FUEL #1

33 %
FUEL #2

1012 °F

33 %
LOAD @RPM

HelmView®
Model HV780

Installation Manual

In order to consistently bring you the highest quality, full-featured products, we reserve the right to change our specifications and designs at any time. The latest version of this manual can be found at enovationcontrols.com.

WARNING

BEFORE BEGINNING INSTALLATION OR OPERATION OF THIS MURPHY PRODUCT:

Read and follow all installation/operation instructions.

Please contact Enovation Controls immediately if you have any questions.

Table of Contents

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Hardware Installation

The following instructions will guide you through installing the HelmView HV780 display.

Inspecting Package Contents

Before attempting to install the product, it is recommended that you ensure all parts are accounted for and inspect each item for damage (which sometimes occurs during shipping). The items included in the box are:

HV780 unit

Installation kit – P/N 78-00-0638 includes:

- 4 ea. machine screws and flat washers
- 4 Nylock nuts
- Installation manual – P/N 00-02-0882
- Operations manual – P/N 00-02-0883

Dash-Mounted Installation

Tools needed.

- Drill with 5/32" size bit
- Jigsaw
- Wrench or socket 6-32 Nylock nuts (provided) to studs

Preparing the Dash

Determine the location of the HelmView in the dash. Use the Installation Template (included at the end of the manual) as a guideline to cut a hole in the dash to the specified dimensions. Drill holes where indicated on the template for the mounting screws.

> **NOTE**: If you downloaded this document from the Murphy website, be aware that the template pdf file may not automatically print to scale. When submitting the file for print, you will need to select None for Page Scaling. Check the accuracy of the printed template by verifying the measurements labeled on the template are correct.
>
> If this manual was supplied with your product, the template will be correct.

Mounting the Unit

1. Place the back side of the display through the opening in the dash.

2. Use the four screws to line up the unit with the drilled holes.

3. Push the unit through the opening and screws through the drilled holes until the back of the case is flush.

4. Use the Nylock nuts provided to tighten unit to the dash. Use the appropriate wrench or socket to tighten. Torque lock nuts to 8-10 inch pounds.
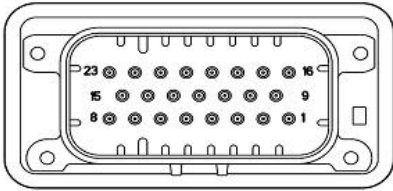
Flush Mounting the Dash

1. Cut the dash to allow for the display without bezel. Ensure enough of the material is available to properly secure the display within the dash.

2. Place the display behind dash and line up the four mounting holes on the display with the holes in dash.

3. Install four bolts and torque the 6-32 Nylock nuts to 5 inch pounds.
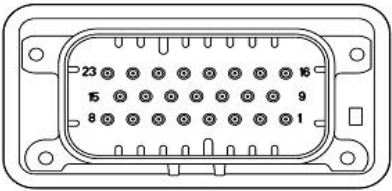
Wiring Information

Pinout Specifications
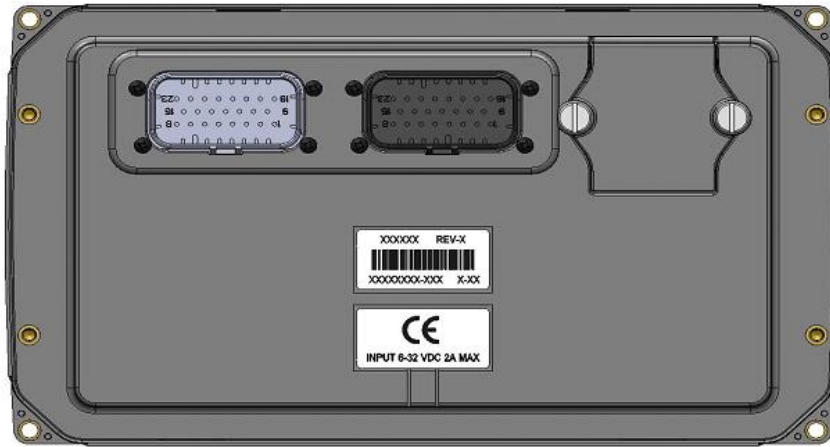
Connector 2 (Gray)		
1	Video Input 1	NTSC/PAL Signal 1
2	Video Input 2	NTSC/PAL Signal 2
3	Video Input 3	NTSC/PAL Signal 3
4	RS-485 High	Data+ (B)
5	RS-485 Low	Data - (A)
6	-	No Connect
7	-	No Connect
8	-	No Connect
9	Video Input 1 Ground	
10	Video Input 2 Ground	
11	Video Input 3 Ground	
12	USB ID	Host (grounded); Slave (not connect)
13	Frequency Input	
14	Frequency Return	
15	-	No Connect
16	USB D-	White (Data -)
17	USB D+	Green (Data +)
18	USB 5V	Red (+5V)
19	USB Ground	Black
20	USB Shield	
21	-	No Connect
22	-	No Connect
23	-	No Connect

Connector 1 (Black)		
1	Digital Input 1	Discrete digital; active high
2	Analog Input 3	0-5V; 4-20mA; resistive analog
3	Analog Input 2	0-5V; 4-20mA; resistive analog
4	Analog Input 1	0-5V; 4-20mA; resistive analog
5	CAN1 L	Green
6	CAN1 H	Yellow
7	Battery	Red (Unswitched 12/24V)
8	Ground	Black (Common 1)
9	Analog Input 3 Ground	
10	Analog Input 2 Ground	
11	Analog Input 1 Ground	
12	Digital Input 3	Discrete digital; active high
13	Digital Input 2	Discrete digital; active high
14	Frequency Output 1	0-10kHz
15	Ignition In	Ignition (Switched 12/24V)
16	CAN2 Ground	NET-C (Black; Common 2)
17	CAN2 Battery	NET-S (Red; Battery 2)
18	CAN2 L	NET-L (Blue)
19	CAN2 H	NET-H (White)
20	Digital Input 4	Discrete digital; active high
21	Digital Input 5	Discrete digital; active high
22	Digital Output	Switched low-side, 500mA
23	-	No Connect

View looking at back of the display
Mating connector P/N: AMP 770680-4

View looking at back of the display
Mating connector P/N: AMP 770680-1

Signal Definitions

CAN: 3 ports according to CAN specification 2: 1 port isolated according to NMEA 2000 USB 2.0 host Video input (optional): NTSC/PAL Inputs (3) 0-5 VDC analog inputs, (1) input configurable to support measurement frequencies from 2 Hz - 10kHz values from 0-100% duty cycle Output: Digital, capable of sinking 500mA.
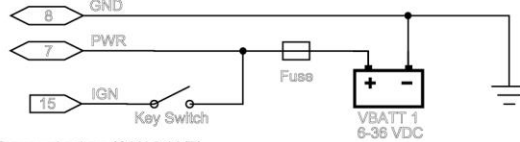
Wiring Schematic – Black Connector

> ⚠️ **WARNING**: Failure to install the unit per the specified wiring diagrams may cause damage to the unit. **DO NOT** connect power to the video ground. Warranty is void for damage caused by incorrect wiring.
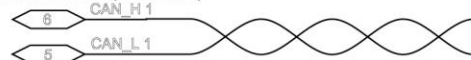
J1 (BLACK CONNECTOR)

Analog Inputs

- 8 — GND
- 7 — PWR
- 15 — IGN

Key Switch, Fuse, VBATT 1 6-36 VDC

NOTES:
- Mating connector AMPSEAL 770680-1 plug with 770854-3 sockets
- Use 20 to 16 AWG (0.5 to 1.4 mm^2)
- Wire diameter of 1.7 to 2.7 mm.
- Install seal plug 770678-1 in perforated connector wire cavities
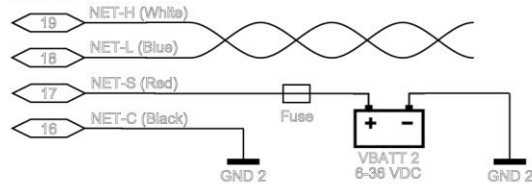- Use 5A Slow Blow Type Fuse

Communications (CAN 2.0A/B)

- 6 — CAN_H 1
- 5 — CAN_L 1

Wire per J1939-11 (STP) or J1939-15 (UTP)
- J1939-11: Keep stub <1m length; up to 30 nodes; 40m max length
- J1939-15: Keep stub <3m length; up to 10 nodes; 40m max length
- Locate display node >0.1m from nearest node
- Space nodes unequally
- Keep CANbus trunk as linear as possible
- Type I - Use external 120 ohm terminator
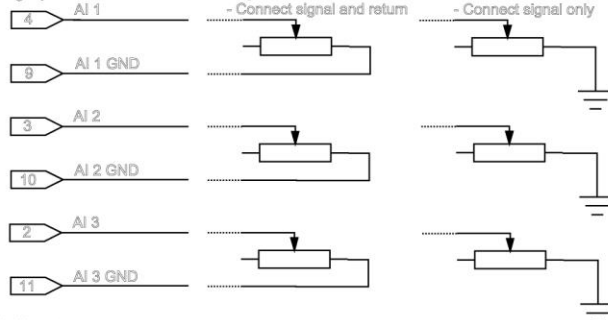- Type II - Enable internal terminator

NMEA 2000

- 19 — NET-H (White)
- 18 — NET-L (Blue)
- 17 — NET-S (Red)
- 16 — NET-C (Black)

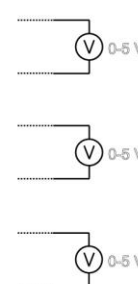Fuse, VBATT 2 6-36 VDC, GND 2

Wire per NMEA 2000 (dual STP with shield)
- Keep stub <6m length; up to 50 nodes; 200m max length
- NMEA interface is optically isolated
- Connect ECU 2 powered by Battery 2 to eliminate ground loop with ECU 1
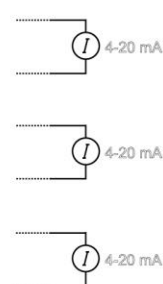- Shield is not connected with display

Analog Inputs | **Ungrounded Senders** - Connect signal and return | **Grounded Senders** - Connect signal only | **0-5 VDC Sensors** | **4-20 mA Sensors**

- 4 — AI 1
- 9 — AI 1 GND
- 3 — AI 2
- 10 — AI 2 GND
- 2 — AI 3
- 11 — AI 3 GND

0-5 V / 4-20 mA

Digital Inputs

- 1 — DI 1
- 13 — DI 2
- 12 — DI 3
- 20 — DI 4
- 21 — DI 5

VBATT

Digital Output

VBATT

- 22 — DO 1

WARNING LAMP OR ALARM (500 mA sink)

Frequency Output

- 14 — FO 1

RPM x 100

TACHOMETER
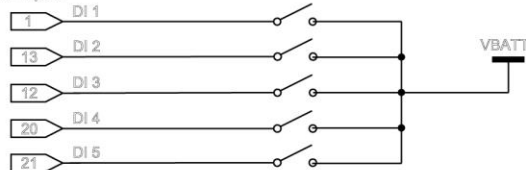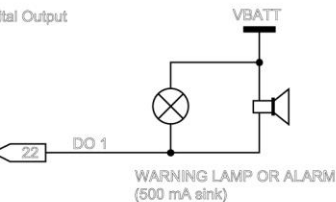
Wiring Schematic – Gray Connector

⚠ **WARNING**: Failure to install the unit per the specified wiring diagrams may cause damage to the unit. **DO NOT** connect power to the video ground. Warranty is void for damage caused by incorrect wiring.

J2 (GRAY CONNECTOR)

NOTES:
- Mating connector AMPSEAL 770680-4 plug with 770854-3 sockets
- Use 20 to 16 AWG (0.5 to 1.4 mm^2)
- Wire diameter of 1.7 to 2.7 mm.
- Install seal plug 770678-1 in perforated connector wire cavities

USB (Programming and Data Logging)

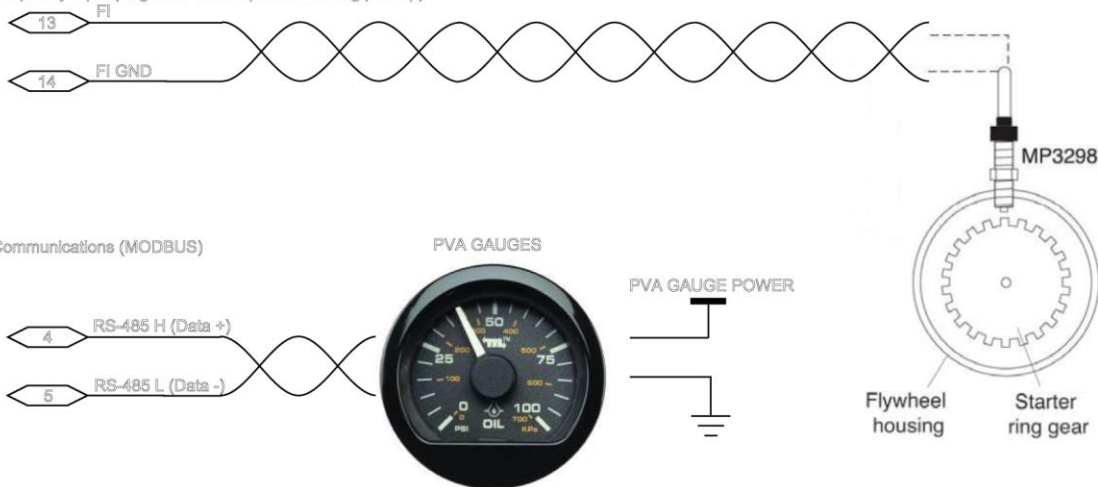| 16 | USB D- | WHT |
17	USB D+	GRN
18	USB 5V	RED
19	USB GND	BLK
20	USB SHLD	SHIELD
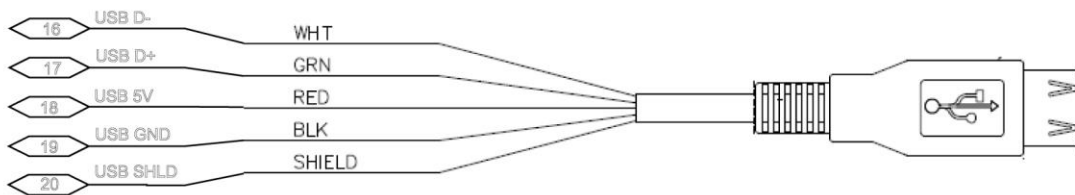
Video Inputs

VIDEO CAMERA NOTES
- NTSC or PAL format
- Do not mix camera types
- Follow camera manufacturer specifications for power
- Do not power camera using VIDEO GND

1	VIDEO 1
9	VIDEO 1 GND
2	VIDEO 2
10	VIDEO 2 GND
3	VIDEO 3
11	VIDEO 3 GND

CAMERA POWER

Frequency Input (Engine or Shaft Speed from mag pick-up)

| 13 | FI |
| 14 | FI GND |

MP3298

Communications (MODBUS)

PVA GAUGES

PVA GAUGE POWER

| 4 | RS-485 H (Data +) |
| 5 | RS-485 L (Data -) |

Flywheel housing

Starter ring gear

Specifications

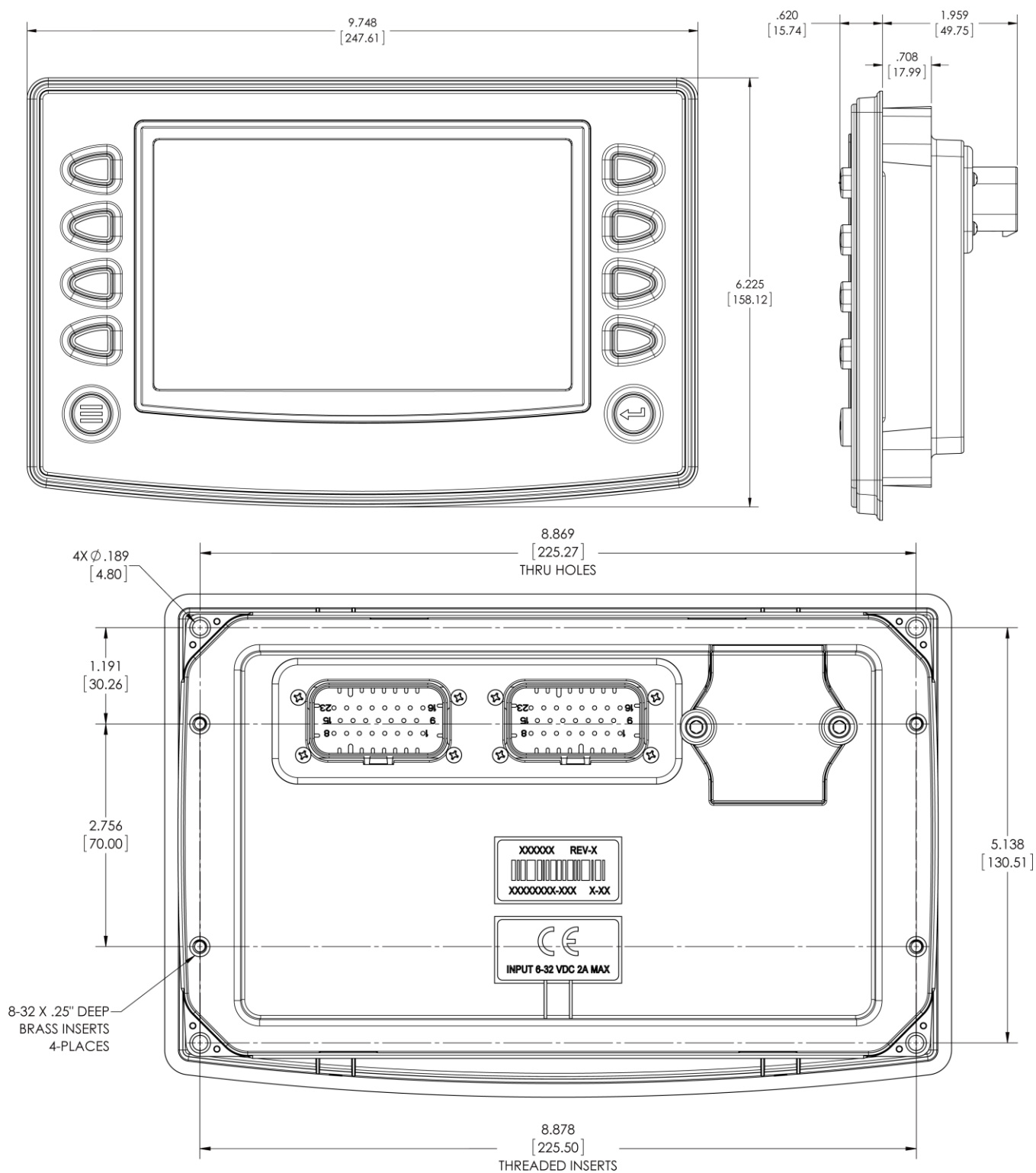## Electrical

Display	7" / 178mm color transmissive TFT LCD
Resolution	WVGA, 800 x 480 pixels, 16-bit color
Aspect Ratio	16:9
Orientation	Landscape
Backlighting	LED, 1000 nit maximum brightness
Contrast	400:1
Refresh Rate	60 Hz
Microprocessor	Freescale™ i.MX357, 32bit, 532 MHz, ARM 11 core
Operating System	QNX® Real-time Operating system
Flash Memory	2 GB, 1 GB available for data logging
RAM	128 Mbytes SRAM
Clock	Real-time clock with rechargeable Li-ion battery
Operating Voltage	6 - 36 VDC, reverse polarity protected
Power Consumption	10 W full backlight 22 W full backlight with heater (< -10º C)
Communication	2) CAN 2.0B with one isolated (NMEA compliant); (1) RS-485 serial (MODBus master/slave)
RS-485	1 MODBUS Master / Slave port, PVA
Protocols	J1939, NMEA 2000 (GPS)
Connection	(2) AMPSEAL 23pin (AMP 770680-1 and AMP 770680-4)
Keyboard	10 tactile pushbuttons
USB	(1) USB 2.0 host (OTG, full speed)
Inputs	(3) 0-5V, 4-20mA, or resistive Analog 0-5V, Analog 4-20 mA, Analog resistive, Digital 0-5V, Digital Active Low (1) Frequency In (20Hz - 10 kHz), 5Vpk-pk.min
Video Input	3 NTSC/PAL, individually viewable
Output	(1) 500mA; switched low-side, (1) Frequency Out (0Hz - 5 kHz), 120Vpk-pk max Vbat rms square wave
SD Storage	For program updates
Landscape or Portrait Mounting Options	Gimbal, Front Panel or Back Mount

Environmental

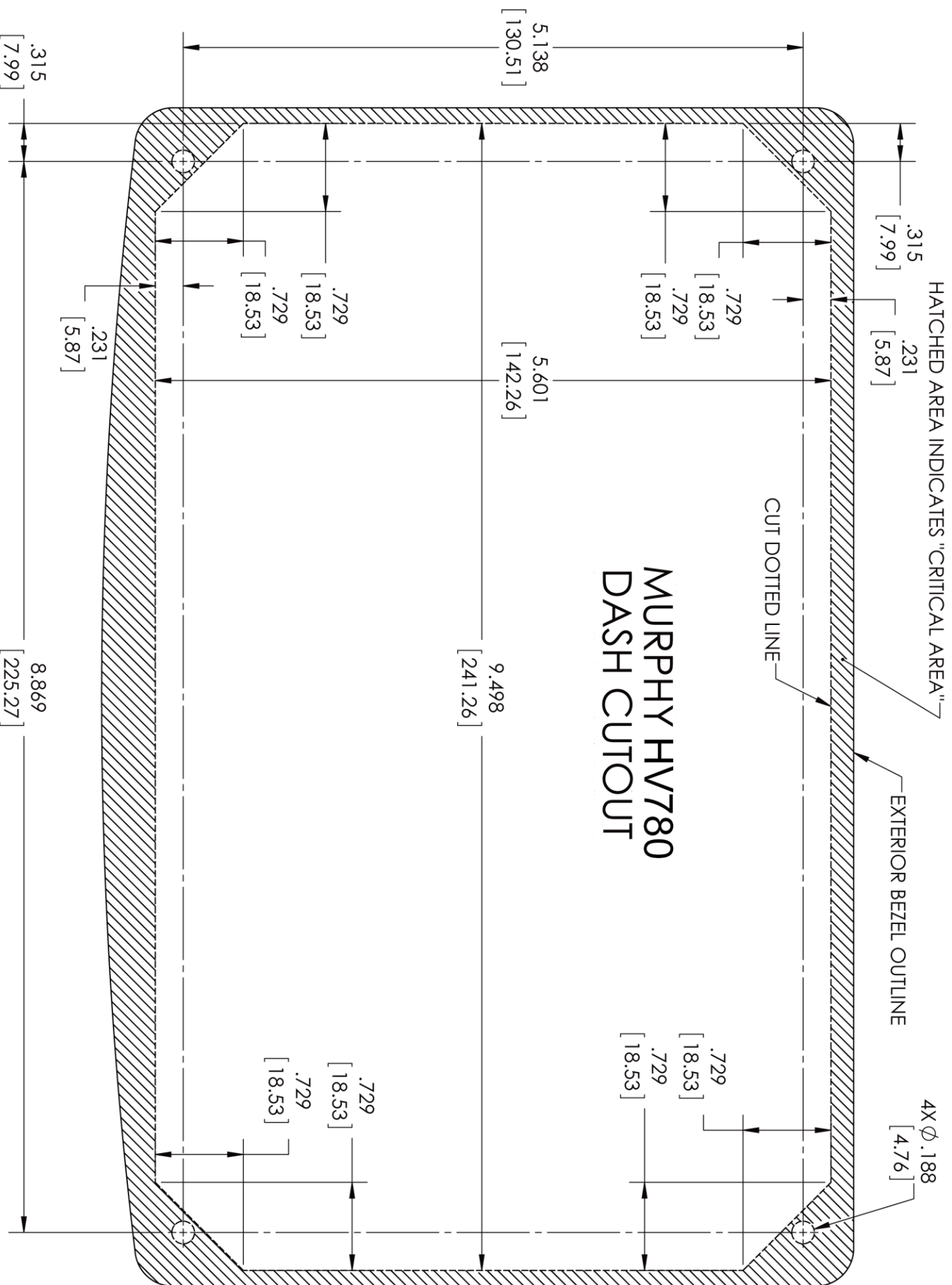| Operating Temperature	-40º C to +85º C
Storage Temperature	-40º C to +85º C
Protection	IP66 and 67, front and back
Emissions	IEC 60945, 95/54/EC
Immunity	SAE J1113
Vibration	Random vibration, 7.86 Grms (5-2000Hz), 3 axis
Shock	± 50G in 3 axes

Mechanical

Dimensions	9.75 x 6.23 in. (247.7 x 158.2mm) landscape Unit Depth – 2.58 in (65.49mm)
Shipping Weight	Approximately 2.5 lbs. (1.13 kg)
Case Material	PC/ABS

Mechanical drawing with the following dimensions and annotations:

9.748 [247.61]

.620 [15.74]

1.959 [49.75]

.708 [17.99]

6.225 [158.12]

8.869 [225.27] THRU HOLES

4X ∅.189 [4.80]

1.191 [30.26]

2.756 [70.00]

5.138 [130.51]

8-32 X .25" DEEP BRASS INSERTS 4-PLACES

XXXXXX   REV-X

XXXXXXXX-XXX   X-XX

C E

INPUT 6-32 VDC 2A MAX

8.878 [225.50] THREADED INSERTS

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MURPHY HV780
DASH CUTOUT

HATCHED AREA INDICATES "CRITICAL AREA"

CUT DOTTED LINE

EXTERIOR BEZEL OUTLINE

5.138
[130.51]

.315
[7.99]

.315
[7.99]

.231
[5.87]

.729
[18.53]

.729
[18.53]

.729
[18.53]

.729
[18.53]

5.601
[142.26]

.231
[5.87]

.729
[18.53]

.729
[18.53]

.729
[18.53]

.729
[18.53]

9.498
[241.26]

8.869
[225.27]

4X ⌀.188
[4.76]

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bsi. ISO 9001 Quality Management

FM 28221 (Tulsa, OK - USA)
FM 29422 (UK)