



ORB™ 4-20 mA Input Box Installation & Operation Manual

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CONTENTS

I. HANDLING & STORAGE.....	1
Inspection and Handling	
Disposal and Recycling	
Storage	
II. GENERAL SAFETY	2
Authorized Personnel	
Use	
Misuse	
III. PRODUCT DESCRIPTION.....	3
Function	
Features	
Technical Specifications	
IV. MECHANICAL INSTALLATION	4
Figure 1. Enclosure Bottom View	
V. ELECTRICAL INSTALLATION	5
General Safety	
Figure 2. Standard Wiring From 4-20 mA Input Box to ORB	
Figure 3. Board Configuration	
VI. SET-UP	8
VII. MAINTENANCE.....	10
VIII. TROUBLESHOOTING.....	10
IX. DIMENSIONAL DRAWINGS	11

SAFETY SYMBOLS



WARNING:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS INJURY. RISK OF ELECTRICAL SHOCK.



CAUTION:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS DAMAGE OR FAILURE OF THE EQUIPMENT.

ORB™ 4-20 mA Input Box

I. HANDLING AND STORAGE

SAVE THESE INSTRUCTIONS

INSPECTION AND HANDLING

Do not dispose of the carton or packing materials.

Each package should be inspected upon receipt for damage that may have occurred due to mishandling during shipping. If the unit is received damaged, notify the carrier or the factory for instructions. Failure to do so may void your warranty. If you have any problems or questions, consult Customer Support at 1-800-426-9010.

DISPOSAL AND RECYCLING

This product can be recycled by specialized companies and must not be disposed of in a municipal collection site. If you do not have the means to dispose of properly, please contact for return and disposal instructions or options.

STORAGE

If the device is not scheduled for immediate installation following delivery, the following steps should be observed:

1. Following inspection, repackage the unit into its original packaging.
2. Select a clean dry site, free of vibration, shock and impact hazards.
3. If storage will be extended longer than 30 days, the unit must be stored at temperatures between -40° and 158° F (-40° to 70° C) in non-condensing atmosphere with humidity less than 85%.



CAUTION: DO NOT STORE A NON-POWERED UNIT OUTDOORS FOR A PROLONGED PERIOD.

II. GENERAL SAFETY

AUTHORIZED PERSONNEL

All instructions described in the document must be performed by authorized and qualified service personnel only. Before installing the unit, please read these instructions and familiarize yourself with the requirements and functions of the device. The required personal protective equipment must always be worn when servicing this device.

USE

The device is solely intended for use as described in this manual. Reliable operation is ensured only if the instrument is used according to the specifications described in this document. For safety and warranty reasons, use of accessory equipment not recommended by the manufacturer or modification of this device is explicitly forbidden. All servicing of this equipment must be performed by qualified service personnel only. This device should be mounted in locations where it will not be subject to tampering by unauthorized personnel.

MISUSE

Improper use or installation of this device may cause the following:

- Personal injury or harm
- Application specific hazards such as vessel overflow
- Damage to the device or system

If any questions or problems arise during installation of this equipment, please contact Customer Support at 800-426-9010.

III. PRODUCT DESCRIPTION

FUNCTION

The ORB™ 4-20 mA Input Box promotes communication from the 4-20 mA devices and transforms the data to a serial RS-422 communication for interfacing with other instruments and management equipment. The 4-20 mA Input Box enhances the communication ability of all the measuring and weighing devices as well as other devices such as temperature and moisture sensors.

FEATURES

- Converts 4-20 mA data into RS-422

- Allows 20 devices to be connected to a single input box

- Each data stream is addressed and communicated uniquely

- Possible to have four (4) inputs per card; a single input box can have multiple cards

TECHNICAL SPECIFICATIONS

Power Supply	120 VAC; 60 Hz
Communication	RS-422
Input	4-20mA
Addressing	8 position dip switches for binary addressing
Temperature	0 to 120°F (-17° to 48° C) Operating -20 to 150°F (-20° to 65° C) Storage Humidity: 0 to 100% non-condensing
Enclosure Size	6" x 8" x 10"
Board Size	3" x 5" x 0.75"
Enclosure	NEMA-4X, Fiberglass Reinforced Plastic

IV. MECHANICAL INSTALLATION



WARNING: REMOVE POWER FROM THE UNIT BEFORE INSTALLING REMOVING OR MAKING ADJUSTMENTS.



CAUTION: DO NOT ROUTE SERIAL CABLES IN THE SAME CONDUIT WITH AC POWER CABLES.

Notes:

1. Mounting hardware is not supplied by factory
2. When mounting the 4-20 mA Input Box ensure there is enough clearance to open the front door completely. Removal, insertion, and wiring of the modular PCB is done through the front of the unit.



WHEN SEALING CONDUIT CONNECTIONS, ONLY USE SIKAFLEX 1A POLYURETHANE SEALANT OR DOW CORNING RTV 738 OR 739. OTHER SEALANTS MAY CONTAIN ACETIC ACID WHICH IS HARMFUL TO SENSORS AND ELECTRONICS.

DRILLING HOLES IN THE ENCLOSURE

The standard fiberglass 4-20 mA NEMA 4X rated enclosure has no openings through which to route cables or install the conduit. Hole location is critical for proper conduit installation. Check clearances to ensure that the fittings and wire routing will not interfere with the PCB or enclosure door.

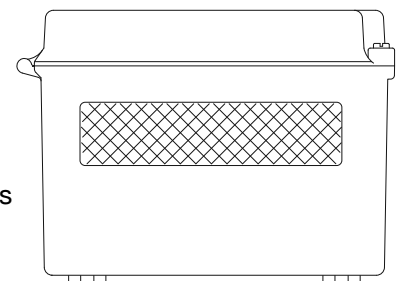


DO NOT DRILL HOLES THROUGH THE TOP OF ENCLOSURE AS THIS MAY ALLOW MOISTURE SEEPAGE, WHICH CAN DAMAGE THE ELECTRONICS AND VOID THE WARRANTY.

PREPARE THE ENCLOSURE FOR CONDUIT

1. Open door of the 4-20 mA Input Box.
2. Remove all four (4) mounting screws that attach the board to the enclosure.
3. Remove entire frame, and place in a safe location.
4. Make a separate hole for the AC cable, the serial and CAT 5 wiring. Holes should be made in the front 2 inches of the bottom of the enclosure (Figure 1); this allows for appropriate spacing for the ORB and cables.
5. Clean enclosure of any debris, replace the board back into the enclosure, using all four (4) mounting screws.
6. Determine desired location for mounting the unit.

Figure 1. Bottom View



TO MOUNT THE 4-20 MA INPUT BOX

1. Install feet to the 4-20 mA Input Box, tightening at the desired angles for mounting location.
2. Hold the enclosure against the wall in the desired location and mark the positions of the mounting holes. Place the enclosure in a safe location.
3. Drill the mounting holes in the wall.
4. Attach the enclosure to the wall using hardware that will secure it firmly in place.

V. ELECTRICAL INSTALLATION



WARNING: REMOVE POWER FROM THE UNIT BEFORE INSTALLING, REMOVING OR MAKING ADJUSTMENTS

GENERAL SAFETY

When using electrical equipment, you should always follow basic safety precautions, including the following:

- The installation/wiring of this product must comply with all national, federal, state, municipal, and local codes that apply.
- Properly ground the enclosure to an adequate earth ground.
- Do not modify any factory wiring. Connections should only be made to the terminals described in this section.
- All connections to the unit must use conductors with an insulation rating of 300 V minimum, rated for 105 C, a minimum flammability rating of VW-1, and be of appropriate gauge for the voltage and current required (see specs).
- Do not allow moisture to enter the electronics enclosure. Conduit should slope downward from the housing. Install drip loops and seal conduit with silicone rubber product.

DISCONNECT REQUIREMENTS FOR PERMANENTLY INSTALLED EQUIPMENT

A dedicated disconnecting device (circuit breaker) must be provided for the proper installation of the unit. If independent circuits are used for power input, individual disconnects are required. Disconnects must meet the following requirements:

- Located in close proximity to the device
- Easily accessible to the operator
- Appropriately marked as the disconnect for the device and associated circuit
- Sized appropriately to the requirements of the protected circuit (See Specifications)

Figure 2. Standard Wiring from 4-20 mA Input Box to ORB

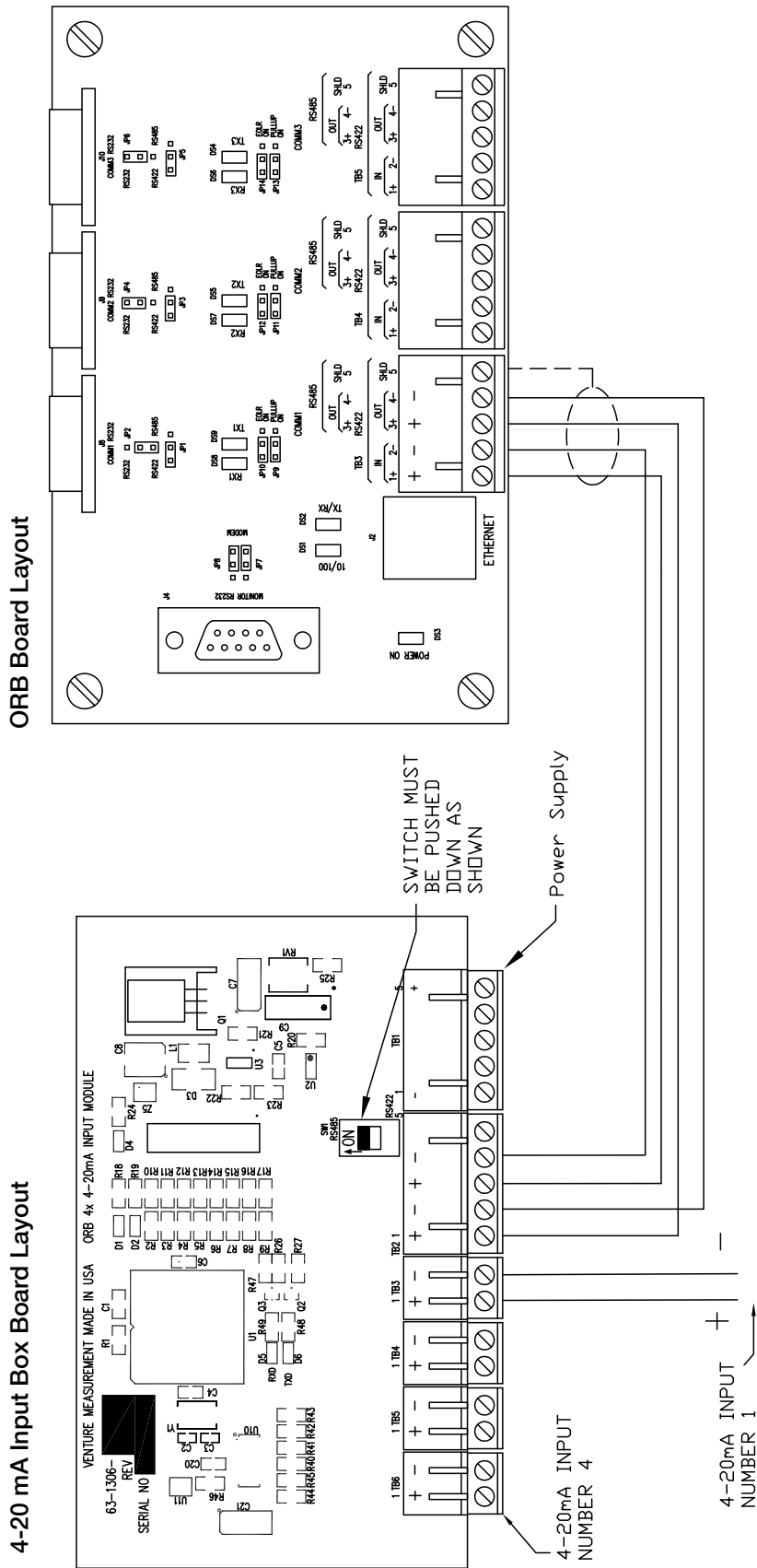
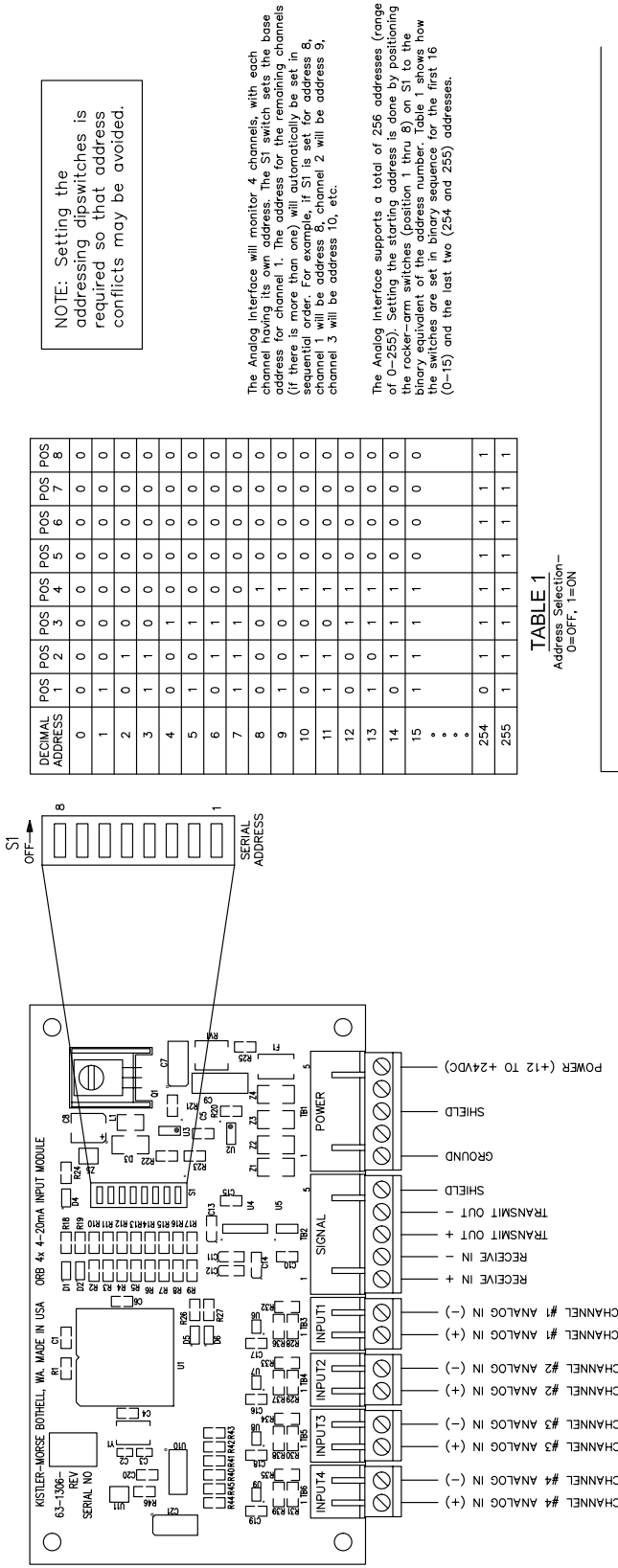


Figure 3. Board Configurations



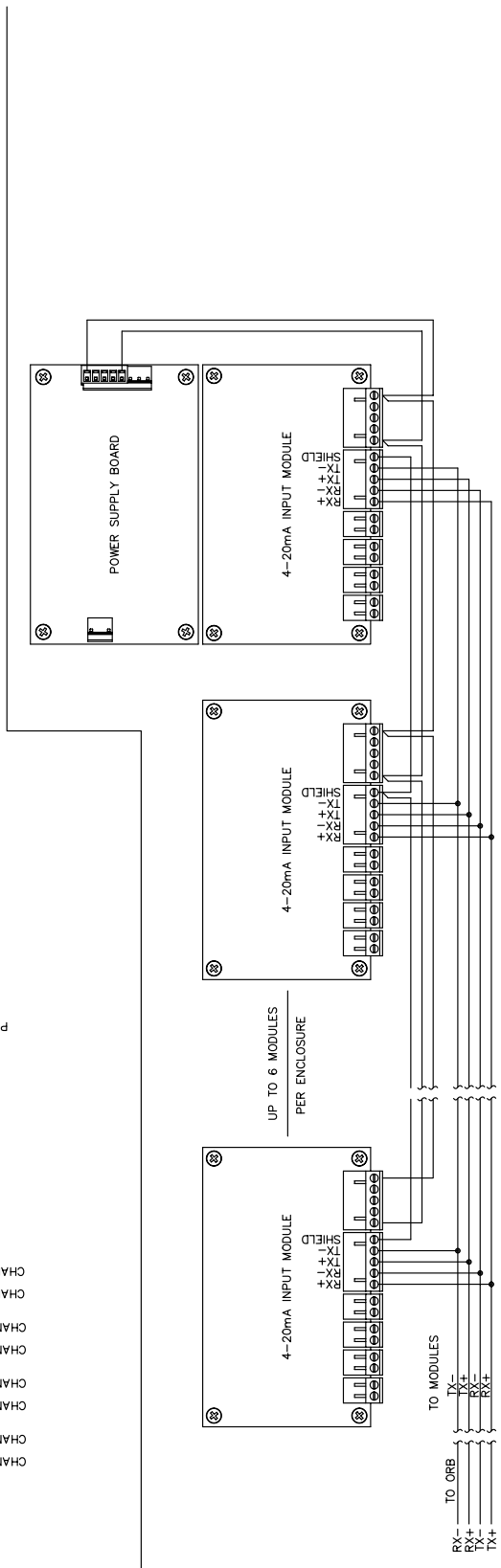
NOTE: Setting the addressing dipswitches is required so that address conflicts may be avoided.

The Analog interface will monitor 4 channels, with each channel having its own address. The S1 switch sets the base address for channel 1. The address for the remaining channels (if there is more than one) will automatically be set in sequential order. For example, if S1 is set for address 8, channel 1 will be address 8, channel 2 will be address 9, channel 3 will be address 10, etc.

The Analog interface supports a total of 256 addresses (range of 0-255). Setting the starting address is done by positioning the rocker-arm switches (position 1 thru 8) on S1 to the desired address. The switches are set in binary sequence for the first 16 (0-15) and the last two (254 and 255) addresses.

DECIMAL ADDRESS	POS 1	POS 2	POS 3	POS 4	POS 5	POS 6	POS 7	POS 8
0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
6	0	1	1	0	0	0	0	0
7	1	1	1	0	0	0	0	0
8	0	0	0	1	0	0	0	0
9	1	0	0	1	0	0	0	0
10	0	1	0	1	0	0	0	0
11	1	1	0	1	0	0	0	0
12	0	0	1	1	0	0	0	0
13	1	0	1	1	0	0	0	0
14	0	1	1	1	0	0	0	0
15	1	1	1	1	0	0	0	0
•								
•								
•								
254	0	1	1	1	1	1	1	1
255	1	1	1	1	1	1	1	1

TABLE 1
Address Selection—
0=OFF, 1=ON



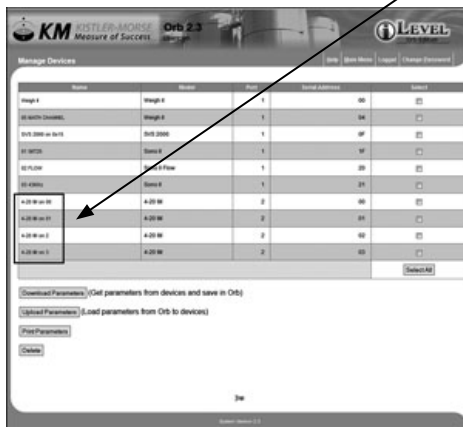
VI. SET-UP

For the 4-20 mA Input Box to be set up, current count values for two different tank volumes must be known or recorded. The values can be determined by:

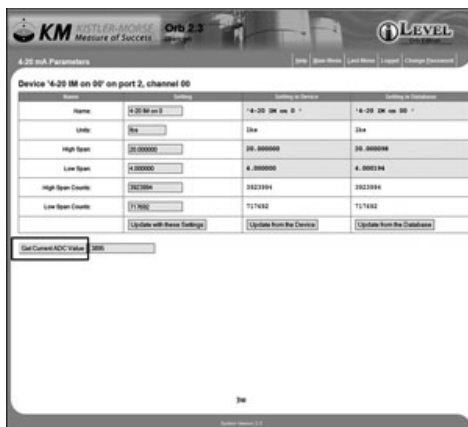
- Using the values provided by the factory
- Using the ORB to obtain a current reading of the device

TO OBTAIN A CURRENT COUNT READING – FOR ORB SOFTWARE VERSION 2.3

1. Log into the ORB normally
2. Choose Manage Devices
3. Click on one of the 4-20 mA names listed



4. Click 'Get Current ADC Value'



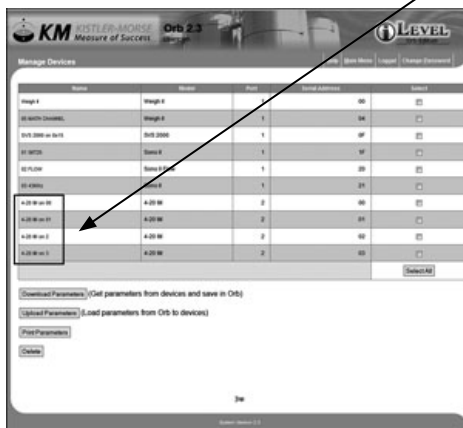
5. Record the value calculated
6. Add or remove material from the vessel
7. Repeat steps listed above when material is now empty/full depending on when the first reading was taken.
8. Record second value.

TO OBTAIN A CURRENT COUNT READING – FOR EARLIER ORB SOFTWARE VERSIONS

1. Log into the ORB normally
2. Click ‘Realtime View’ from the left side navigation on the Main Menu screen
3. Verify that the time value is five (5) seconds or less.
4. Record the ADC value and the weight or level of the material in the vessel.
5. Click Main Menu
6. Add or remove material from the vessel
7. Click ‘Realtime View’ from the left side navigation on the Main Menu screen
8. Verify that the time value is five (5) seconds or less.
9. Record the ADC value and the weight or level of the material in the vessel.

TO SET UP AN INPUT CARD

1. Log into the ORB normally
2. Choose Manage Devices
3. Click on one of the 4-20 mA names listed



4. In the ‘Settings’ column, if desired, change the name to a recognizable description.
5. Change units as desired. Any name or value can be listed in this field.
6. Type in ‘Low Span Counts’ – this is the value predetermined as shown in the steps above. Low Span Counts is the value the device equates to empty (or full).
7. Type in ‘High Span Counts’ – this is the value predetermined as shown in the steps above. High Span Counts is the value the device equates to full (or empty).
8. Type in ‘High Span’ – this is the value the vessel had when the counts were recorded
9. Type in ‘Low Span’ – this is the value the vessel had when the counts were recorded.
10. Click ‘Update with these Settings’

VII. MAINTENANCE

PREVENTATIVE

There are no preventative maintenance actions required for this product.

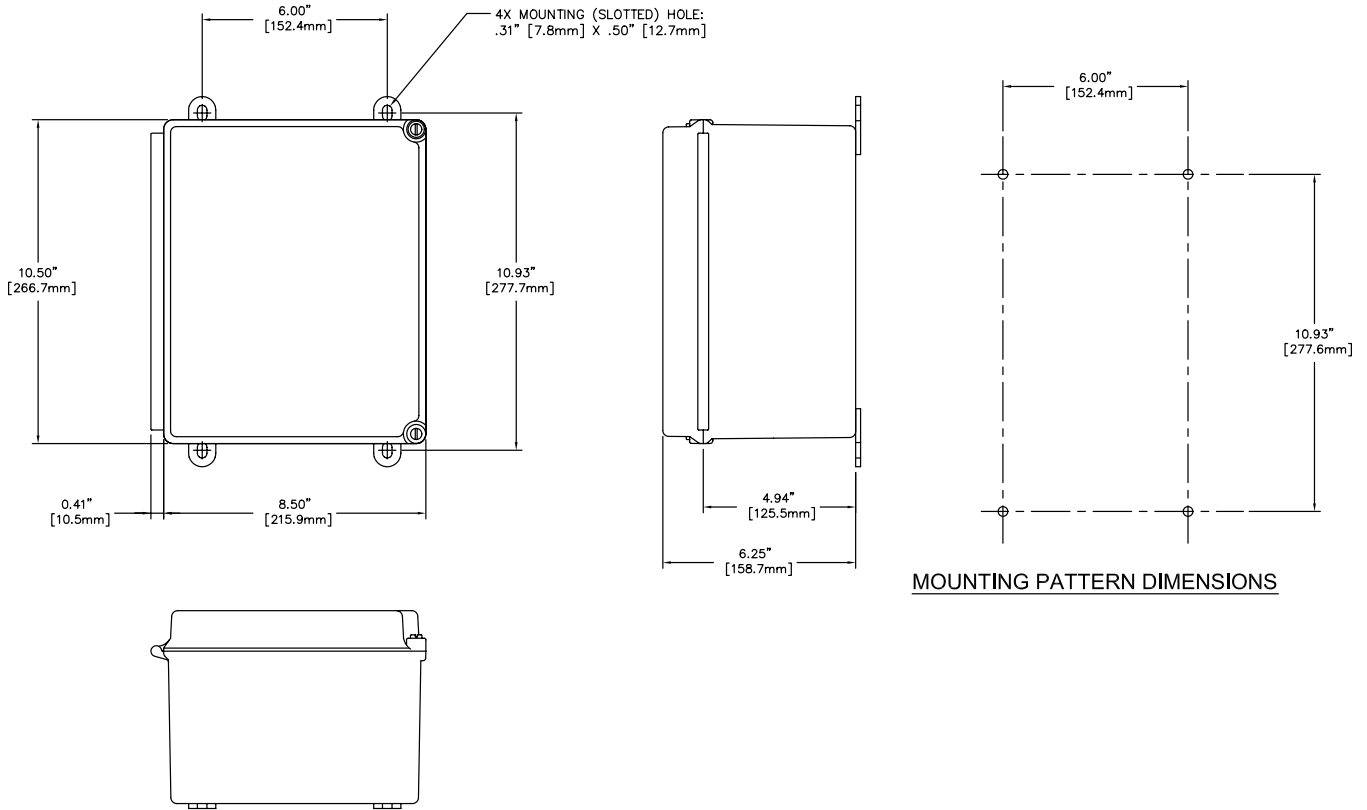
REPLACEMENT PARTS

PART NUMBER	DESCRIPTION
SPK-ORB420-01	4-Channel Input Board with Mounting Hardware

VIII. TROUBLESHOOTING

For technical or service questions, please call the manufacturer.

IX. DIMENSIONAL DRAWINGS





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MEASUREMENT

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