	www.basler.com +1 618.654.2341 (USA) info@basler.com	Model **RDP-110C**
B Basler Electric®		Description **Remote Display Panel**

CONTENTS

INTRODUCTION

The RDP-110C Remote Display Panel provides remote annunciation of engine/generator status. When used with Basler Digital Genset Controllers DGC-2020, DGC-2020ES, DGC-2020HD, DGC-500, or DGC-1000, the RDP-110C provides compliance with NFPA 110 Level 1 and Level 2 requirements. The RDP-110C is suitable for use with isolated generators or paralleled generating systems.

The RDP-110C serves as the successor to the RDP-110. The RDP-110C features identical functionality in a more compact size, enabling its use in a broader range of applications. An optional adaptor plate enables convenient replacement of an RDP-110 with an RDP-110C.

Comprehensive Annunciation Capabilities

The RDP-110C is equipped with the following LED indicators:

- RDP-110C control power applied
- Genset supplying load
- DGC not operating in Auto mode
- Six fixed-function alarms
- Two programmable alarms

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- Five fixed-function pre-alarms
- Two programmable pre-alarms

An audible alarm indicates the presence of alarms, pre-alarms, and when the DGC is taken out of Auto mode. An Alarm Silence pushbutton resets the audible alarm.

Operation of the audible alarm and all visual indicators can be verified with the Lamp Test pushbutton.

Rugged and Flexible Construction

A rugged, compact metal case provides improved electromagnetic compatibility and make the RDP-110C resistant to moisture, salt fog, dust, dirt, and chemical contaminants. Two available mounting configurations provide the option of semi-flush mounting or surface (projection) mounting. Conduit knockouts on the case enable the RDP-110C to be used as a "pass-through" or junction box for other site wiring.

Simple Connections

RDP-110C connections consist of control power wiring and wiring for communication between the DGC and RDP-110C. Two-wire, RS-485 communication between the RDP-110C and DGC simplifies wiring and ensures electrical noise immunity over long distances.

STYLE NUMBER

A style number defines the RDP-110C mounting configuration and Digital Genset Controller compatibility. The style number appears on a label located on the right side of the case. Figure 1 illustrates the RDP-110C style chart.
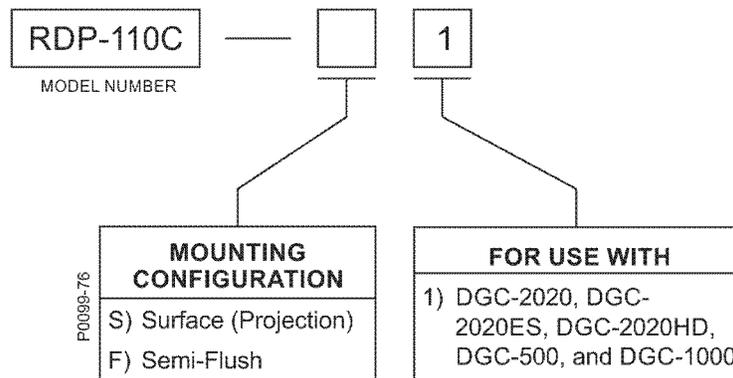

Figure 1. RDP-110C Style Chart

SPECIFICATIONS

Control Power

Range: 8 to 32 Vdc
Burden: 2 W maximum

Power Dissipation

Continuous: 3.5 W
Maximum: 5.3 W

Communication

The RDP-110C communicates through a serial, RS-485 port terminated with a 100 Ω resistor.

Audible Alarm

Frequency: 2.9 kHz, ±500 Hz
Sound level: 90 DB(A) at 24 in. (61 cm)

Temperature

Operating range: –40 to 70°C (–40 to 158°F)
Storage range: –40 to 85°C (–40 to 185°F)

Weight

F1 style: 1.04 kg (2.3 lb.)
S1 style: 1.25 kg (2.75 lb.)

Type Test Data

Dielectric Strength

Withstood 500 Vdc for 1 minute between chassis ground and the circuit grouping of the control power and RS-485 terminals.

Radio Frequency Interference (RFI)

Tested using a 5-wattt handheld transceiver operating at random frequencies centered around 144 MHz and 440 MHz with the antenna located within 6 inches (15 centimeters) of the device in both the vertical and horizontal planes.

Vibration

Withstood 2 G over a range of 10 to 500 Hz for three hours in each of the three mutually perpendicular planes, 15 sweeps at 12 minutes each, for a total of nine hours of vibration. No structural damage or degradation of performance was observed.

Shock

Withstood three 15 G shocks in each direction in each of the three mutually perpendicular planes for a total of 18 shocks.

Agency Certification

UL recognized per Standard 508.

FUNCTIONAL DESCRIPTION

The RDP-110C uses microprocessor-based technology to provide remote annunciation of engine and generator parameters. RDP-110C function blocks are illustrated in Figure 2 and described in the following paragraphs.
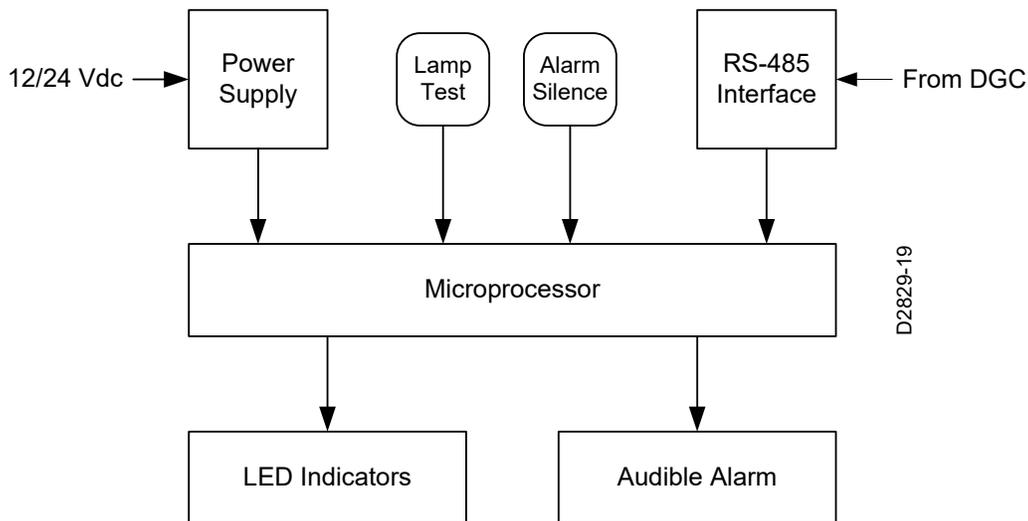

Figure 2. RDP-110C Function Blocks

Inputs

RDP-110C inputs consist of a control power input, a communication interface, and pushbuttons. Control power and communication connections are made on the circuit board attached to the front panel.

Control Power

The dc control power input is applied to an internal switching power supply that provides filtered 5 Vdc operating power for the RDP-110C circuitry.

The control power input accepts nominal battery voltage of 12 Vdc or 24 Vdc. The acceptable range of dc control power is 8 to 32 Vdc.

Communication Interface

RDP-110C annunciation commands are received from the DGC over an RS-485 serial communication bus. Received communication inputs are converted to signals suitable for use by the RDP-110C.

Pushbuttons

Two front panel pushbuttons accept local inputs: Lamp Test and Alarm Silence.

LED and horn operation can be verified by pressing the Lamp Test pushbutton.

An audible alarm is reset by pressing the Alarm Silence pushbutton. Once reset, the horn is reactivated only by the occurrence of another separate pre-alarm or alarm condition.

Microprocessor

The microprocessor executes embedded firmware which interprets commands received from the DGC and annunciates pre-alarm and alarm conditions by lighting the appropriate indicators and sounding the horn.

Firmware

Embedded firmware controls power-up initialization, annunciation element setup, and serial communication. When control power is applied to the RDP-110C, the firmware initiates a power-up sequence, checks the onboard memory, activates all annunciation functions, and begins monitoring for inputs from the DGC.

CONTROLS AND INDICATORS

RDP-110C controls and indicators consist of pushbuttons, LEDs, and an audible alarm (horn). These front panel elements are illustrated in Figure 3 and described in Table 1. The lettered locators in Figure 3 correspond to the lettered descriptions of Table 1.
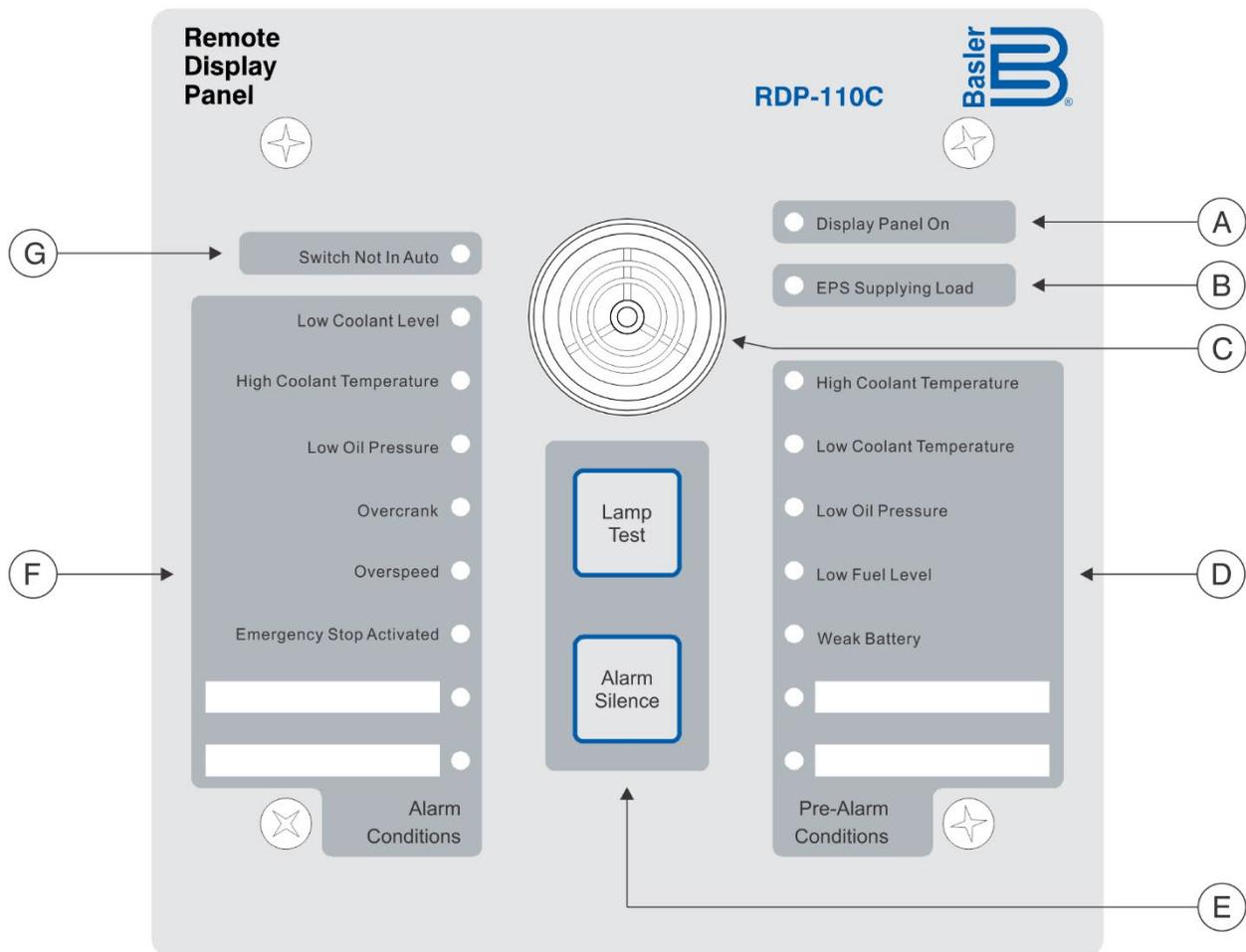

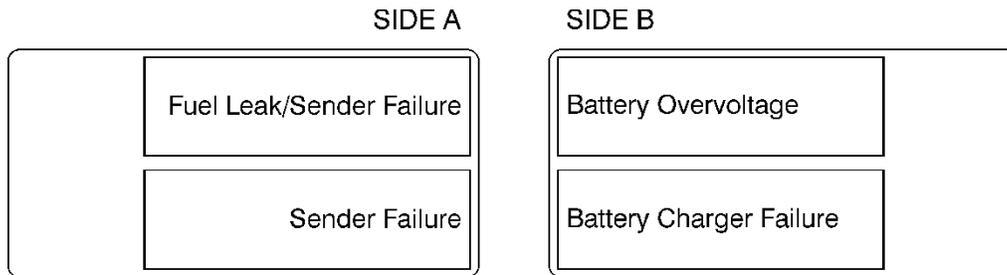**Figure 3. Controls and Indicators**

Table 1. Control and Indicator Descriptions

Locator	Description
A	Green *Display Panel On* LED lights when control power is applied to the RDP-110C.
B	Green *EPS Supplying Load* LED lights when the genset is supplying more than 2% of rated load.
C	The horn sounds when an alarm or pre-alarm exists or the connected DGC is not operating in Auto mode. The horn is silenced by pressing the *Alarm Silence* pushbutton (locator E).
D	The amber *Pre-Alarm* LEDs light when the corresponding pre-alarm setting is exceeded. Conditions annunciated by the pre-alarm LEDs include: • High coolant temperature, • Low coolant temperature, • Low oil pressure, • Low fuel level, • Weak battery, • Battery overvoltage, and • Battery charger failure. When the RDP-110C is used with a DGC-2020, the bottom two LEDs (Battery Overvoltage and Battery Charger Failure) can be reprogrammed to indicate other pre-alarm conditions. See *Programmable Alarm and Pre-Alarm Configuration* for information about configuring the two programmable pre-alarm indicators.
E	RDP-110C controls consist of two pushbuttons. • The *Alarm Silence* pushbutton silences the horn (locator C). • The *Lamp Test* pushbutton can be used to verify operation of all RDP-110C LEDs and the horn.
F	The red *Alarm* LEDs light when the corresponding alarm settings are exceeded. Conditions annunciated by the alarm LEDs include: • Low coolant level, • High coolant temperature, • Low oil pressure, • Overcrank, • Overspeed, • Emergency stop activated, • Fuel leak/sender failure, and • Sender failure. When the RDP-110C is used with a DGC-2020, DGC-2020ES, or DGC-2020HD, the bottom two LEDs (Fuel Leak/Sender Failure and Sender Failure) can be reprogrammed to indicate other alarm conditions. See *Programmable Alarm and Pre-Alarm Configuration* for information about configuring the two programmable alarm indicators.
G	Red *Switch Not in Auto* LED lights when the DGC is not operating in Auto mode.

PROGRAMMABLE ALARM AND PRE-ALARM INDICATOR CONFIGURATION

When used with a DGC-2020, DGC-2020ES, or DGC-2020HD, the RDP-110C has the added capability of programmable alarm and pre-alarm indicators. This ability applies only to the DGC-2020, DGC-2020ES, or DGC-2020HD and is not available when the RDP-110C is paired with the DGC-500 or DGC-1000.

Up to two alarm LEDs and two pre-alarm LEDs may be reprogrammed to suit the needs of a particular application. The two bottommost alarm LEDs are preconfigured in DGC logic to annunciate a fuel leak/sender failure and sender failure. The two bottommost pre-alarm LEDs are preconfigured in DGC logic to annunciate battery overvoltage and a battery charger failure. These LEDs are labeled as such with replaceable cards (Figure 4) that can be relabeled to match the function of each programmable indicator.

SIDE A	SIDE B
Fuel Leak/Sender Failure	Battery Overvoltage
Sender Failure	Battery Charger Failure

P0068-46

Figure 4. Programmable Alarm and Pre-Alarm Label Cards

Information about configuring DGC logic to provide other alarm and pre-alarm annunciations is available in the appropriate DGC instruction manual. To relabel the RDP-110C programmable alarm and pre-alarm LEDs, perform the following steps.

1. Print the label text on readily-available address label sheets. The label cards accommodate adhesive-backed labels measuring 0.25 by 1.5 inches. Brady® B33-45-423 or similar is suitable for this purpose.

2. Remove all control power from the RDP-110C.

3. Remove the four Phillips screws from the front panel and separate the front panel from the conduit box. Disconnect the connector attached to the circuit board mounted to the front panel. When handling the front panel, avoid touching the circuit board.

4. Lay the front panel face-down on a suitable work surface.

5. Grasp the tab of the label card to be changed and pull it free. The two label cards are located near the two lower corners of the circuit board. When facing the back of the panel, the pre-alarm label card is on the left and the alarm label card is on the right.

6. Apply the labels created in step 1 to the label cards. The rectangle outlines on each label card serve as guides for attaching the labels.

7. After applying the new labels, insert each label card into the appropriate panel slot. Ensure that each label card is oriented properly by viewing the custom labels through the label windows of the front panel.

8. Move the panel assembly adjacent to the conduit box and reconnect the cables to the two circuit board connectors.

9. Secure the front panel to the conduit box with the four Phillips screws removed in step 3. Maximum torque for these screws is 17 inch-pounds or 2 newton meters.

10. If desired, verify the function of the reprogrammed indicators before returning the RDP-110C to service.

INSTALLATION

A NEMA 1 enclosure makes the RDP-110C resistant to moisture and dust infiltration. Its metal construction improves immunity to electromagnetic interference. Conduit knockouts on the case enable the RDP-110C to be used as a "pass-through" or junction box for other site wiring. Two available mounting configurations provide the option of semi-flush mounting or surface (projection) mounting.

If the RDP-110C will not be installed immediately, store it in the original shipping package in a moisture- and dust-free environment.

Mounting

RDP-110C mounting dimensions are illustrated in Figure 5, Figure 6, and Figure 7. Dimensions ae shown in inches with millimeters in parenthesis.

RDP-110 Replacement

An optional adaptor plate (P/N 9318100009) is available for replacement of an RDP-110 with an RDP-110C. The replacement process is as follows.

1. Remove the RDP-110C front panel from its enclosure and attach it to the adaptor plate using the same screws removed from the RDP-110C.

2. Remove the RDP-110 from its enclosure and secure the RDP-110C and adaptor plate assembly to the RDP-110 enclosure using the screws removed from the RDP-110.

RDP-110C - F1

6.00 (152)
5.00 (127)
3.25 (83)

6.00 (152)
5.00 (127)
3.25 (83)

Mounting holes, 0.281 (7), four places

RDP-110C - S1

6.00 (152)
3.25 (83)

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6.00 (152)
3.25 (83)

Mounting holes, 0.281 (7), four places
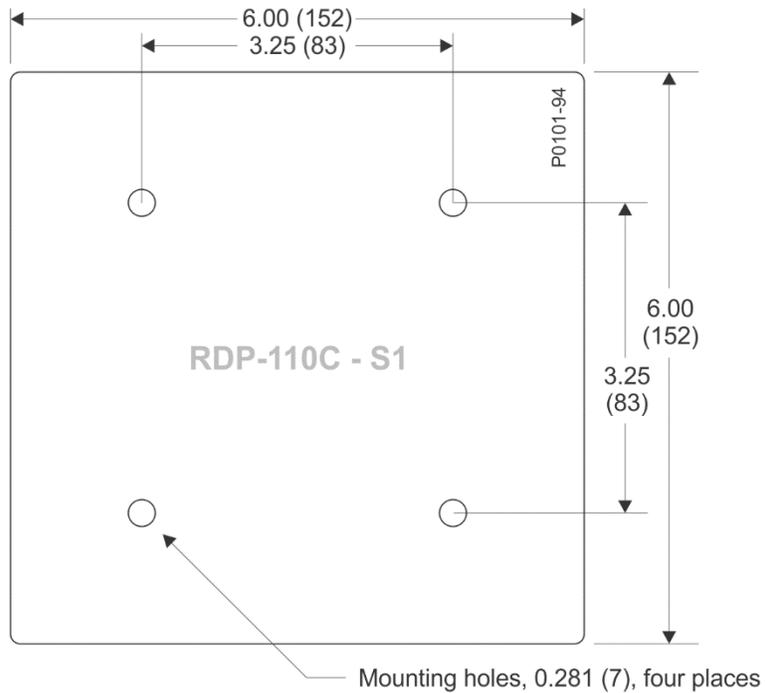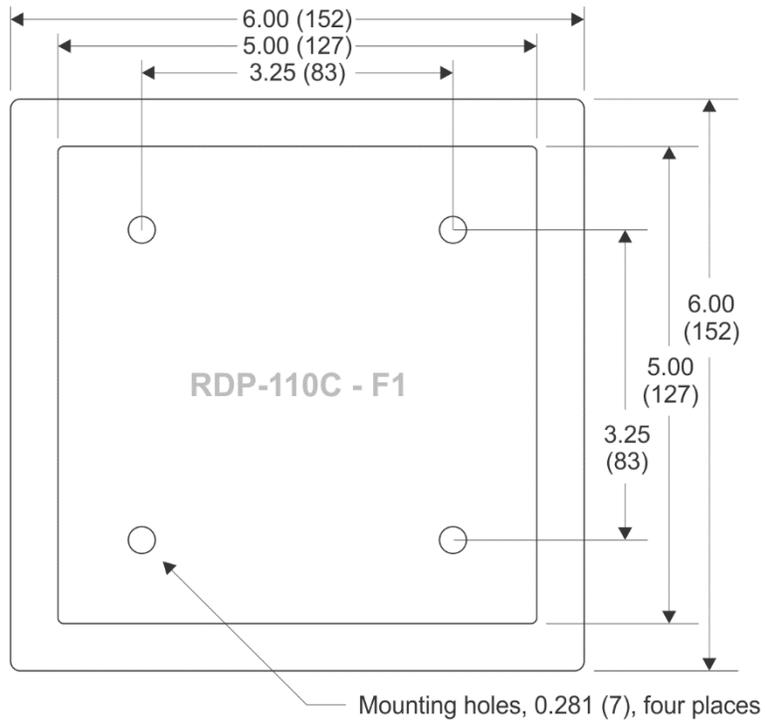
Figure 5. Mounting Dimensions, Rear, F1 and S1 Styles

RDP-110C - F1

4.50 (114)
4.11 (104)
6.00 (152)
5.00 (127)
1.50 (38)
1.50 (38)

1.50 (38)
1.50 (38)
5.00 (127)
6.00 (152)
4.50 (114)
4.11 (104)

RDP-110C - F1

RDP-110C - S1

4.50 (114)
4.11 (104)
6.00 (152)
1.50 (38)
1.50 (38)

1.50 (38)
1.50 (38)
6.00 (152)
6.00 (152)
4.50 (114)
4.11 (104)

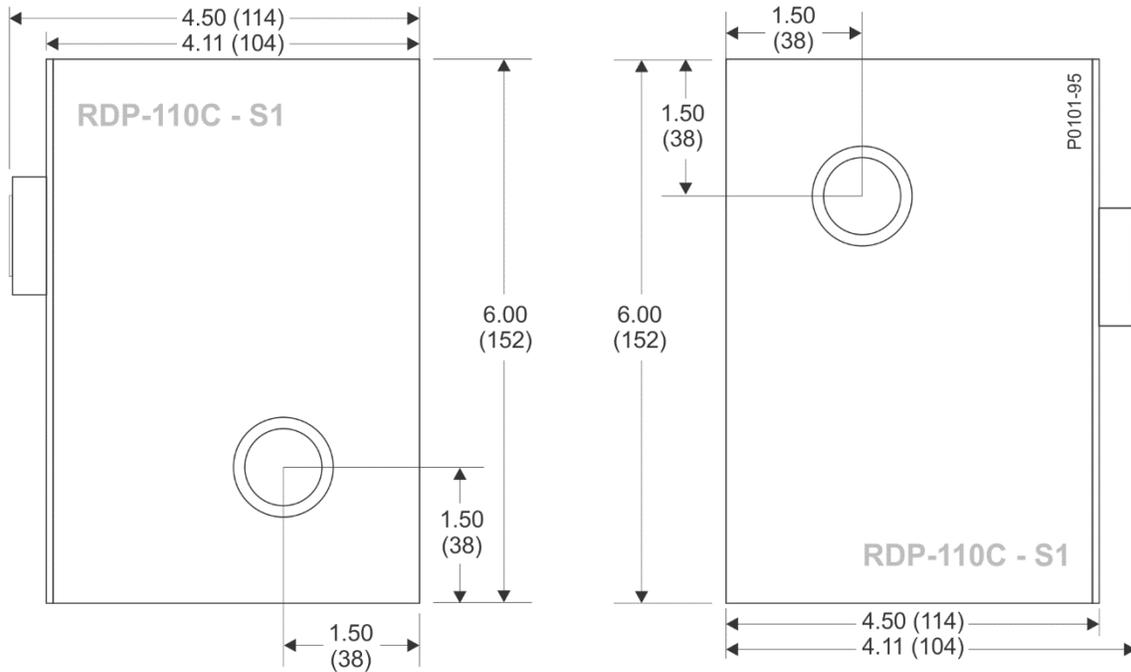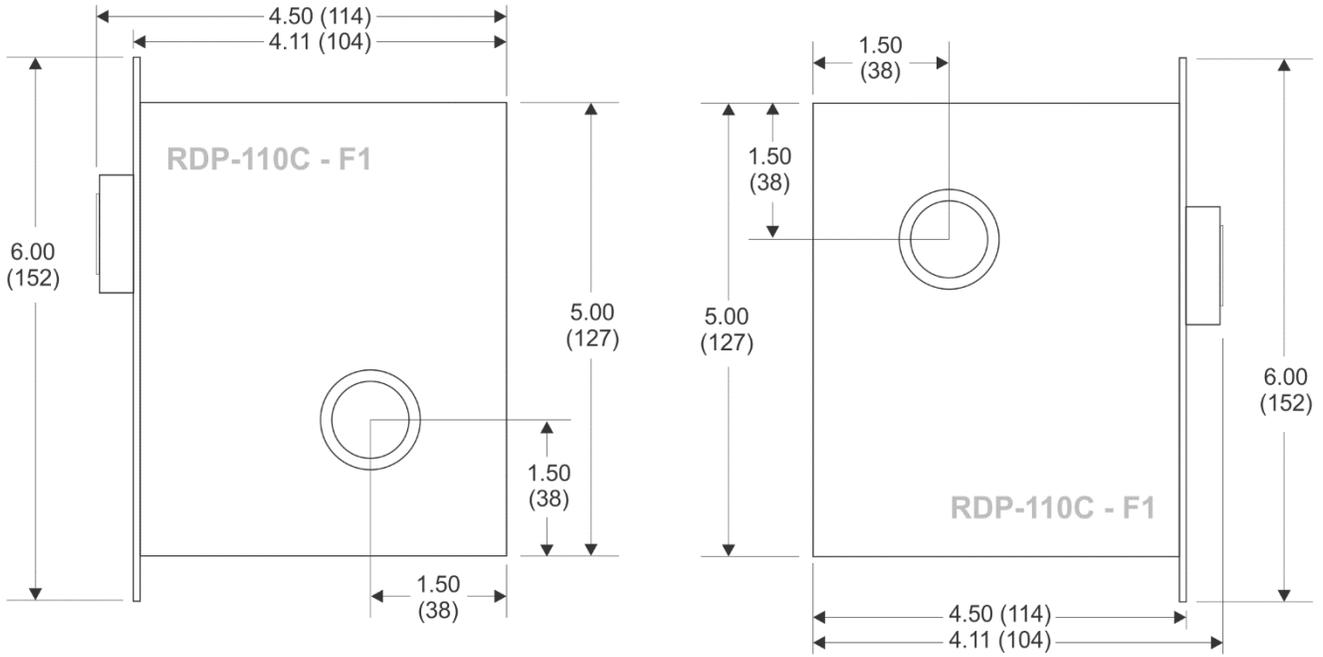RDP-110C - S1

P0101-95

Figure 6. Mounting Dimensions and Knockout Locations, Sides, F1 and S1 Styles
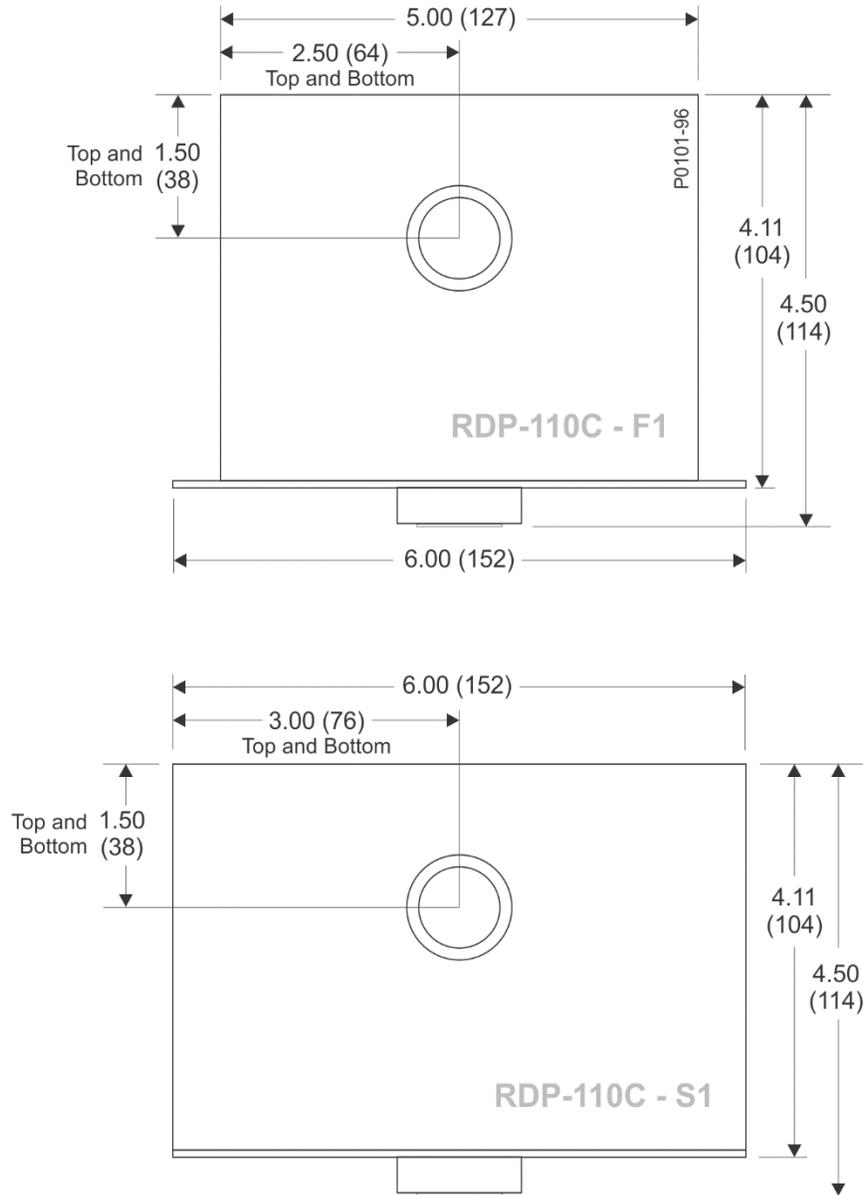
Figure 7. Mounting Dimensions and Knockout Locations, Top and Bottom, F1 and S1 Styles

Connections

RDP-110C connections are made with a plug-in connector that mates with a header on the lower edge of the RDP-110C circuit board. The circuit board connections, illustrated in Figure 8, are accessed by removing the front panel from the conduit box.

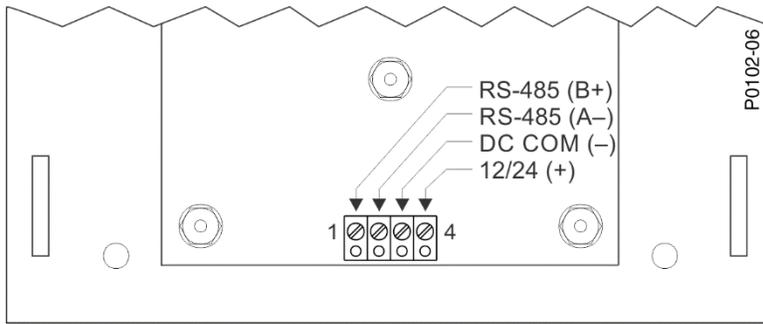| Note |
| --- |
| Ensure that the RDP-110C is hard-wired to earth ground with no smaller than 16 AWG (1.5 mm^2) copper wire attached to the conduit box ground connection. |
| DC control power applied to the 12/24 (+) and DC COM (−) terminals must be of the correct polarity. Incorrect dc control power polarity will prevent the RDP-110C from functioning. |

Figure 8. Circuit Board Connections

Ground Connection

The RDP-110C grounding point consists of a 10-32 threaded hole located on the back of the enclosure. The ground connection should be made with wire no smaller than 16 AWG (1.5 mm^2).

Connector Wiring

Note the following guidelines when wiring the circuit board connector:

- Connections should be made with wire no smaller than 20 AWG (0.5 mm^2)
- Maximum conductor size for each terminal is 12 AWG (4 mm^2)
- Strip the insulation from each wire to reveal 0.28 inches (7 millimeters) of exposed conductor
- Apply no more than 4.4 in-lb (0.5 N•m) of torque to each terminal screw

RS-485 Communication Connections

Twisted-pair conductors are recommended for the communication wiring between the DGC and RDP-110C.

Overly long wiring runs may impair communication between the DGC and RDP-110C. Do not exceed an RS-485 conductor length of 4,000 feet (1,219 meters).

RS-485 Terminating Resistor

The RS-485 communication connection is internally terminated with a 100 Ω resistor. Connecting multiple display panels may necessitate removal of this terminating resistor (R65). R65 is located on the back side of the circuit board so the circuit board must be separated from the front panel in order to remove the surface-mount resistor. Remove the five nuts from the front panel studs to free the circuit board and gain access to R65. Figure 9 illustrates the location of R65 on the back side of the circuit board.

Consult standard TIA/EIA-485 for guidance on the electrical requirements of multipoint communication systems.
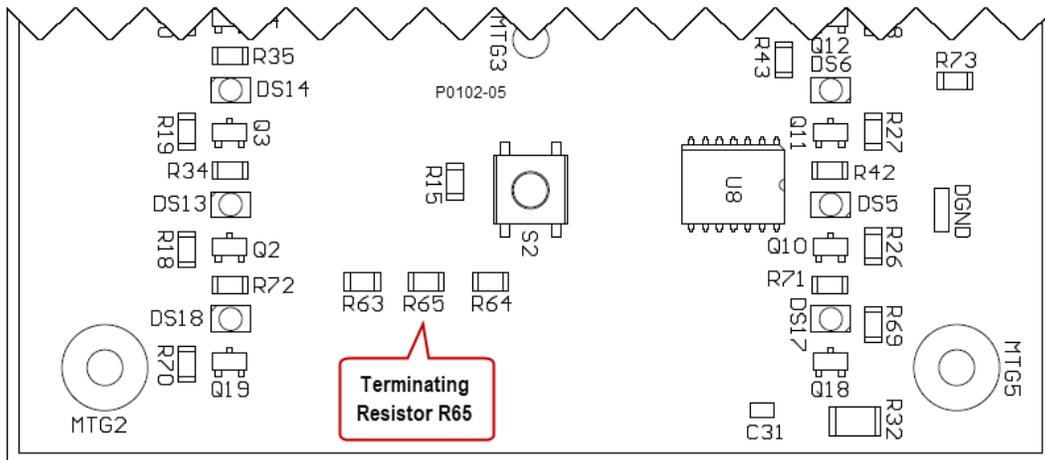

Figure 9. RS-485 Terminating Resistor Location

Typical Connections
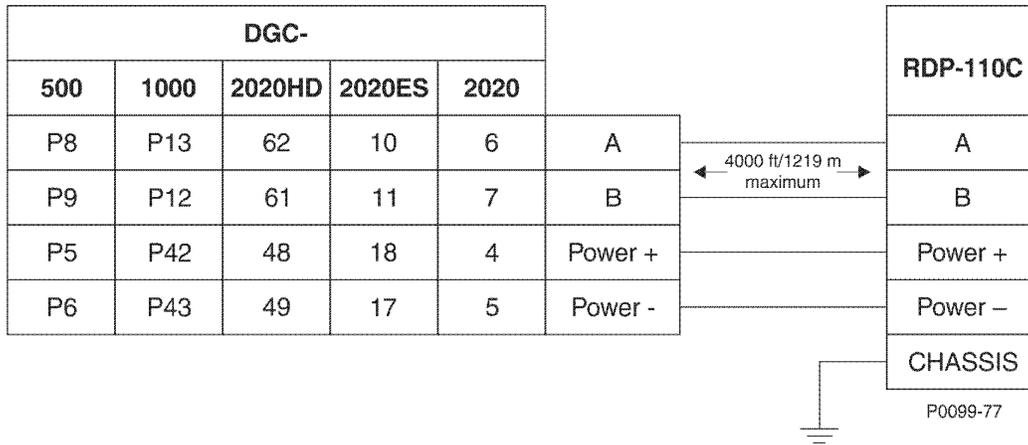
Typical RDP-110C connections are shown in Figure 10.

DGC-							RDP-110C
500	**1000**	**2020HD**	**2020ES**	**2020**			
P8	P13	62	10	6	A		A
P9	P12	61	11	7	B		B
P5	P42	48	18	4	Power +		Power +
P6	P43	49	17	5	Power -		Power –
							CHASSIS

4000 ft/1219 m maximum

P0099-77

Figure 10. Typical Connections

TESTING

A built-in test mode enables field testing of RDP-110C operation.

Test Equipment and Setup

Equipment needed for testing RDP-110C operation is listed below. Connections for the test are illustrated in Figure 11.

- Power supply, 24 Vdc
- Fuse, 1 ampere
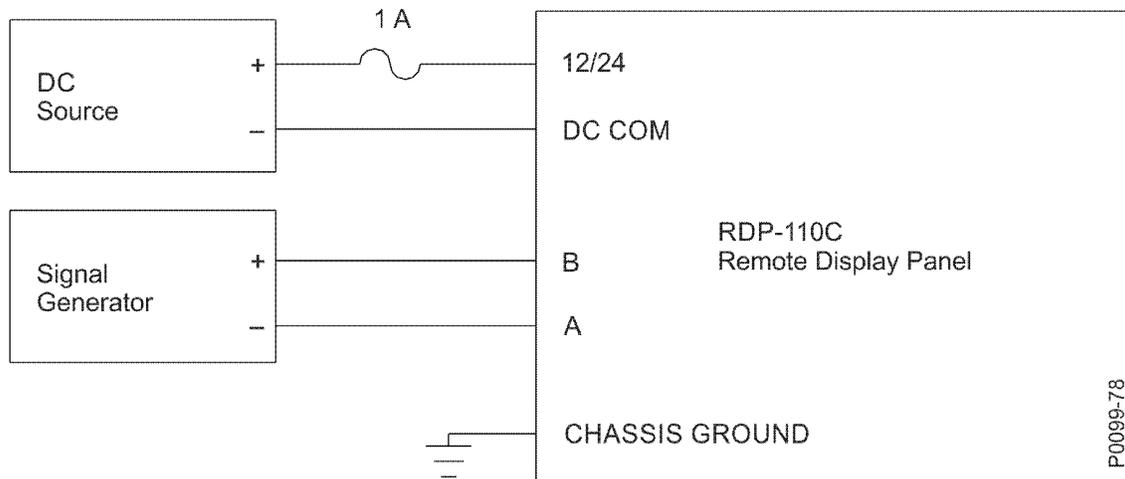- Signal generator, 10 Hz, square wave, 5 volts peak-to-peak

P0099-78

Figure 11. RDP-110C Test Setup

Test Procedure

1. Connect the RDP-110C test setup as shown in Figure 11.

2. Apply 24 Vdc control power. The Display Panel On LED should light.

3. Press and hold the Lamp Test pushbutton. All LEDs should light and the horn should sound.

4. Release the Lamp Test pushbutton to reset the indicators and horn.

5. Apply the 10 Hz signal.

6. Press and release the Lamp Test pushbutton. Observe that the LEDs and horn annunciate in the following sequence. This sequence will repeat until the Alarm Silence pushbutton is operated.

a. Switch Not in Auto
b. Low Coolant Level Alarm
c. High Coolant Temperature Alarm
d. Low Oil Pressure Alarm
e. Overcrank Alarm
f. Overspeed Alarm
g. Emergency Stop Activated Alarm
h. Factory Selectable LED
i. Sender Failure Alarm
j. EPS Supplying Load
k. High Coolant Temperature Pre-Alarm
l. Low Coolant Temperature Pre-Alarm
m. Low Oil Pressure Pre-Alarm
n. Low Fuel Level Pre-Alarm
o. Battery Overvoltage Pre-Alarm
p. Weak Battery Pre-Alarm
q. Battery Charger Failure Pre-Alarm
r. Audible Alarm (Horn)

7. Press and release the Alarm Silence pushbutton to end the annunciation sequence.

8. Remove the 10 Hz signal and 24 Vdc control power.