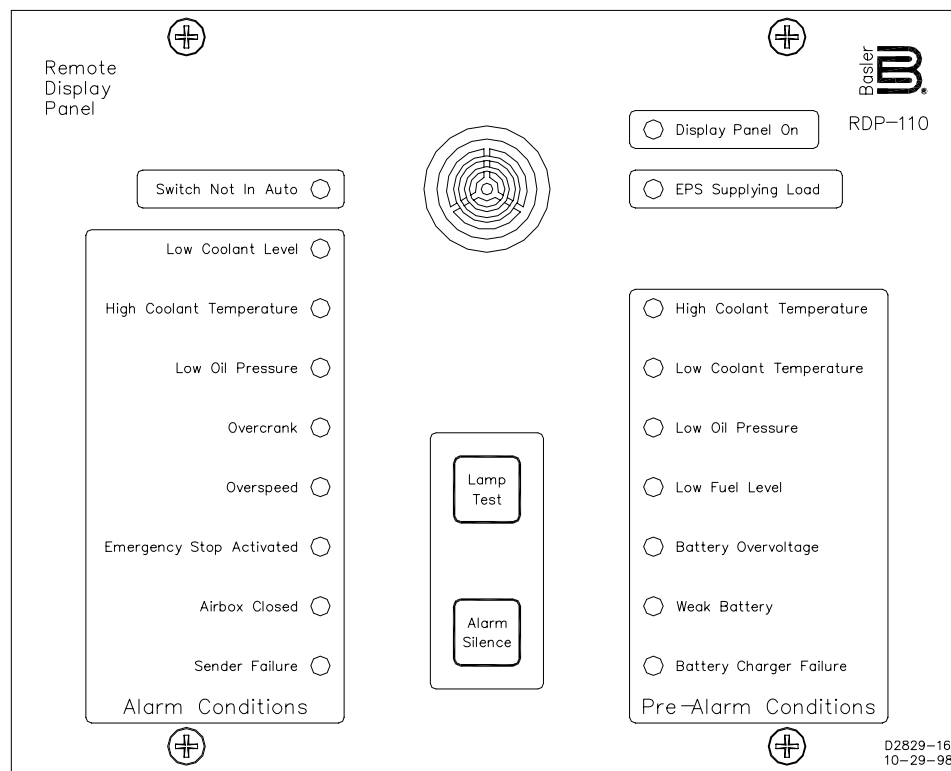


INSTRUCTION MANUAL

FOR

REMOTE DISPLAY PANEL

RDP-110



B Basler Electric

Publication: 9318100990
Revision: E 06/07

INTRODUCTION

This instruction manual provides information about the operation and installation of the RDP-110 Remote Display Panel. To accomplish this, the following information is provided:

- General Information and Specifications
- Human-Machine Interface
- Functional Description
- Installation
- Testing

WARNING!

To avoid personal injury or equipment damage, only qualified personnel should perform the procedures in this manual.

First Printing: June 1998

Printed in USA

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June 2007

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It is not the intention of this manual to cover all details and variations in equipment, nor does this manual provide data for every possible contingency regarding installation or operation. The availability and design of all features and options are subject to modification without notice. Should further information be required, contact Basler Electric.

**BASLER ELECTRIC
ROUTE 143, BOX 269
HIGHLAND IL 62249 USA**

<http://www.basler.com>, info@basler.com

PHONE +1 618.654.2341

FAX +1 618.654.2351

REVISION HISTORY

The following information provides a historical summary of the changes made to this instruction manual (9318100990). Revisions are listed in reverse chronological order.

Manual Revision and Date	Change
E, 06/07	• Updated style chart to include DGC-2020 compatibility. • Added manual part number and revision to footers. • Updated manual to current style used.
D, 04/02	• Added UL and CSA documentation to Section 1. • Updated Figure 2-3 to reflect UL and CSA logos.
C, 01/00	• Added DGC front panel drawing and description to Section 2. • Updated Figure 4-2 to reflect DGC-1000 connections.
B, 07/99	• Added style chart and related information to Section 1. • Corrected controls and indicators on page 2-1 to reflect the changes to the style chart for RDP-110 X2 and RDP-110 X1. • Clarified the display functions for the airbox closed alarm on page 1-1. • Replaced airbox closed alarm on page 5-2 with factor selectable LED.
A, 10/98	• Deleted surface mount and flush mount part numbers from Section 1. • Replaced part numbers for surface and flush mount with “RDP-110-S and RDP-110-P.” • Added “maximum length 4,000 feet” to Figure 4-2. • Added new Section 6, <i>Manual Change Information</i>.
—, 06/98	• Initial release

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SECTION 1 • GENERAL INFORMATION

DESCRIPTION

RDP-110 Remote Display Panels use microprocessor-based technology to provide remote annunciation of engine-generator status. The RDP-110 is designed to be used in conjunction with the Basler DGC-2020, 500, 1000, and 2000 to provide installations with NFPA 110 Level 1 and Level 2 compliance. Microprocessor-based technology allows the use of serial communications for quick and simple connection to the DGC-2020, 500, 1000, and 2000. RS-485 compatible signals insure noise immunity over long distances. This combination of features in the RDP-110 yields significant savings in installation and setup costs.

FEATURES

RDP-110 Remote Display Panels have the following features:

- Packaged in metal cases for improved electromagnetic compatibility
- Designed for use in harsh environments
- Resistant to high moisture, salt fog, humidity, dust, dirt, and chemical contaminants
- Resistant to the entrance of insects and rodents
- Suitable for semi-flush mounting or surface (projection) mounting
- Suitable for controlling isolated generating systems or paralleled generating systems
- Serial communications with the DGC-2020, 500, 1000, and 2000 for easy installation

STYLE CHART

Operational features of the RDP-110 Remote Display Panel are defined by a combination of letters and numbers that constitute the device's style number shown in Figure 1-1. The style number of each unit is displayed in the upper right hand corner on the right side of the case.

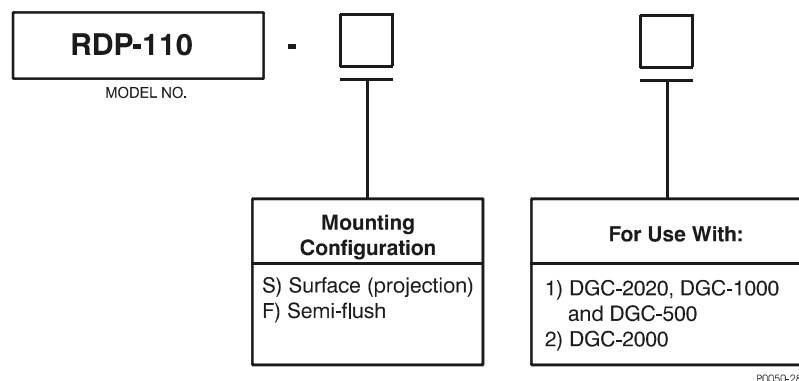


Figure 1-1. Style Chart

Style Number Example

The style number identification chart defines the electrical characteristics and operation features included in the RDP-110 Remote Display Panel. For example, if the style number were RDP-110 S1, the device would have the following

RDP-110

(S) Surface (Projection) Mounting

(1) For use with DGC-2020, DGC-1000, and DGC-500

FUNCTIONS

RDP-110 remote display panel displays the following functions:

- Switch Not in Auto Alarm
- Low Coolant Level Alarm
- High Coolant Temperature Alarm
- Low Oil Pressure Alarm
- Overcrank Alarm
- Overspeed Alarm
- Emergency Stop Alarm
- Airbox Closed Alarm for RDP-110 X2 or fuel leak/Sender failure for RDP-110 X1.
- Sender Failure Alarm
- Display Panel On LED
- Emergency System Supplying Load LED
- High Coolant Temperature Pre-alarm
- Low Coolant Temperature Pre-alarm
- Low Oil Pressure Pre-alarm
- Low Fuel Level Pre-alarm
- Battery Overvoltage Pre-alarm
- Weak Battery Pre-alarm
- Battery Charger Failure Pre-alarm

SPECIFICATIONS

RDP-110 Remote Display Panels have the following specifications.

Electrical

Power Input

DC Range	8 to 32 Vdc, 2 watts maximum
AC Range	84 to 144 Vac, 5 VA maximum

Hardware

Communication Port

Interface	
RS-485	Used to communicate with DGC-2020, 500, 1000, and 2000

Isolation

1800 Vdc for one minute between chassis ground and ac voltage input. 700 Vdc for one minute between any of the following groups

- Chassis ground
- Battery and 485 terminals
- AC voltage inputs

Radio Frequency Interference (RFI)

Type tested using a 5 watt, hand-held transceiver operating at random frequencies centered around 144 and 440 megahertz with the antenna located within 6 inches (15 centimeters) of the device in both vertical and horizontal planes

Environment

Operating Temperature Range	-40°C to 70°C (-40°F to 158°F)
Storage Temperature Range	-40°C to 85°C (-40°F to 185°F)

Salt Fog

Qualified to ASTM-117B-1989 with the device unpowered for the 100 hour test duration

Vibration

The device withstands 2 g in each of three mutually perpendicular planes, swept over the range of 10 to 500 hertz for a total of six sweeps, 15 minutes each sweep, without structural damage or degradation of performance

Shock

15 G

UL Recognition

UL recognized per Standard 508, UL File Number E97035.

CSA Certification

CSA certified per Standard CAN/CSA-C22.2 Number 14-95, CSA File Number LR23-23131.

Weight

3 kilograms (6.6 pounds)

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SECTION 2 • HUMAN-MACHINE INTERFACE

GENERAL

This section provides a description of the RDP-110 Remote Display Panel human machine interface (HMI).

CONTROLS AND INDICATORS

Figure 2-1 shows the front panel HMI for an RDP-110 X1 (DGC-2020, 500, and 1000), Figure 2-2 shows the front panel HMI for an RDP-110 X2 (DGC-2000). Descriptions in Table 2-1 refer to call outs in Figure 2-1 and 2-2.

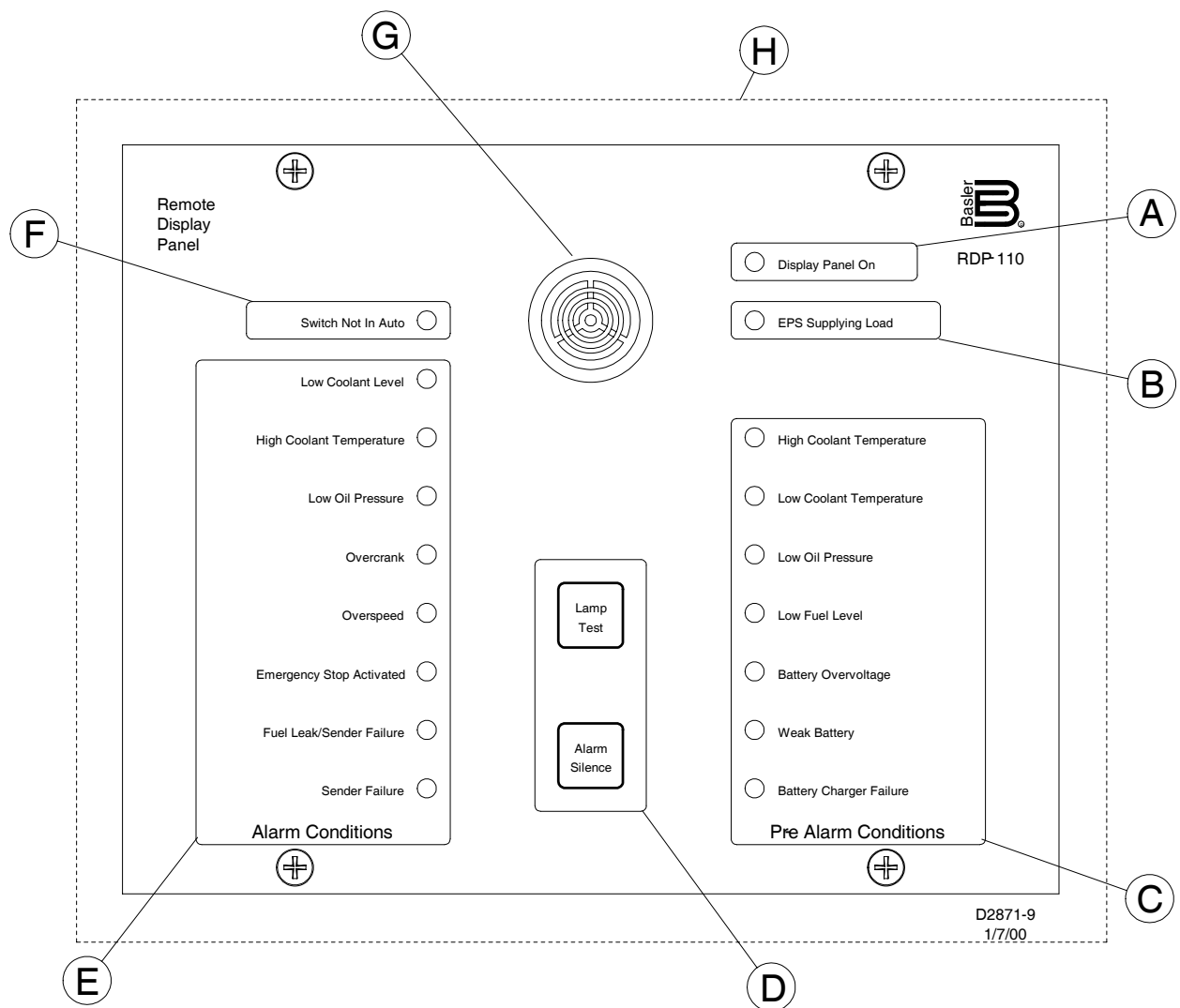


Figure 2-1. RDP-110 Front Panel (DGC-2020, 500, and 1000 Versions)

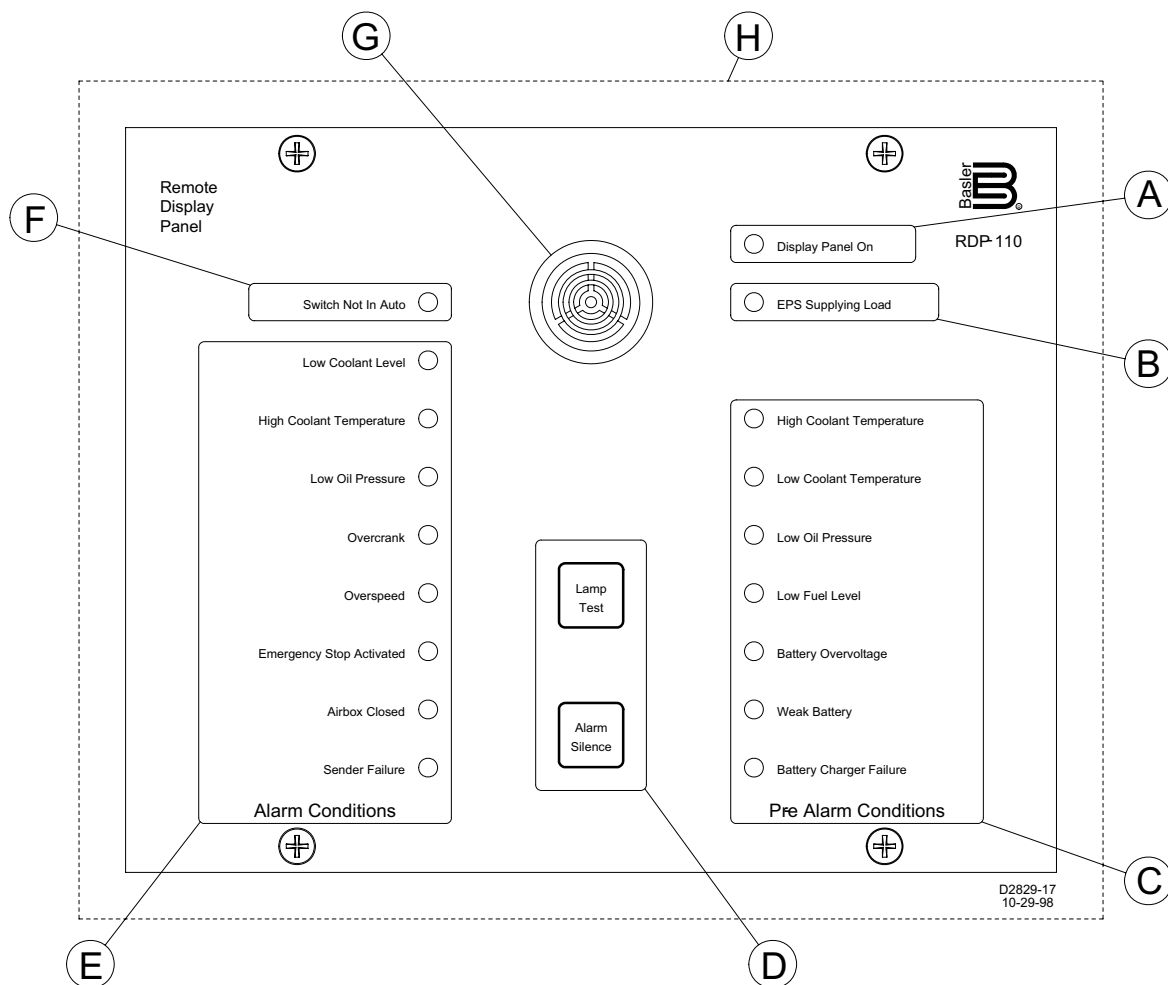


Figure 2-2. RDP-110 Front Panel (DGC-2000 Version)

Table 2-1. RDP-110 HMI (Controls and Indicators)

A	Green LED illuminates when power is applied to the RDP-110.
B	Green LED turns ON when the generator is supplying more than two percent of rated current.
C	Pre-Alarm Conditions - Yellow LED illuminates when the high coolant temperature pre-alarm setting is exceeded. - Yellow LED illuminates when the low coolant temperature pre-alarm setting is exceeded. - Yellow LED illuminates when the low oil pressure pre-alarm setting is exceeded. - Yellow LED illuminates when the low fuel level pre-alarm setting is exceeded. - Yellow LED illuminates when the battery overvoltage pre-alarm setting is exceeded. - Yellow LED illuminates when the weak battery pre-alarm setting is exceeded. - Yellow LED illuminates when the battery charger failure contact has closed.
D	Pushbuttons Lamp Test Pushbutton exercises the audible alarm and tests all LED's. Alarm Silence Pushbutton silences the audible alarm.

E Alarm Conditions

- Red LED illuminates when a low coolant level has occurred.
- Red LED illuminates when the high coolant temperature alarm setting is exceeded.
- Red LED illuminates when the low oil pressure alarm setting is exceeded.
- Red LED illuminates when the overcrank setting is exceeded.
- Red LED illuminates when the overspeed setting is exceeded.
- Red LED illuminates when the emergency stop is activated.
- Red LED illuminates when the airbox damper contact is closed.
- Red LED illuminates when the Fuel Leak/Sender Failure is detected (DGC-2020, 500, and 1000) or Airbox is closed (DGC-2000).
- Red LED illuminates when a sender failure is detected.

F Red LED illuminates when the DGC is not in AUTO.

G Audible alarm annunciates when DGC is not in AUTO and when alarms and Pre-alarms occur.

H Dashed line indicates the front panel outside edges when flush mounted.

RDP-110 CONNECTIONS

Compression type terminal strips make wiring the RDP-110 a simple task. It is necessary to remove the front panel to access the printed circuit board and terminal strips. These terminal strips connections accept one #10 or two #14 AWG wires or smaller. These operations are made even easier by user friendly labeling of the terminal strips on the printed circuit board. Once wired, these connectors can be quickly disconnected to facilitate RDP-110 replacement for out of circuit testing or maintenance. Each connector is keyed to prevent improper connections. Figure 2-3 shows the RDP-110 rear panel terminal connections.

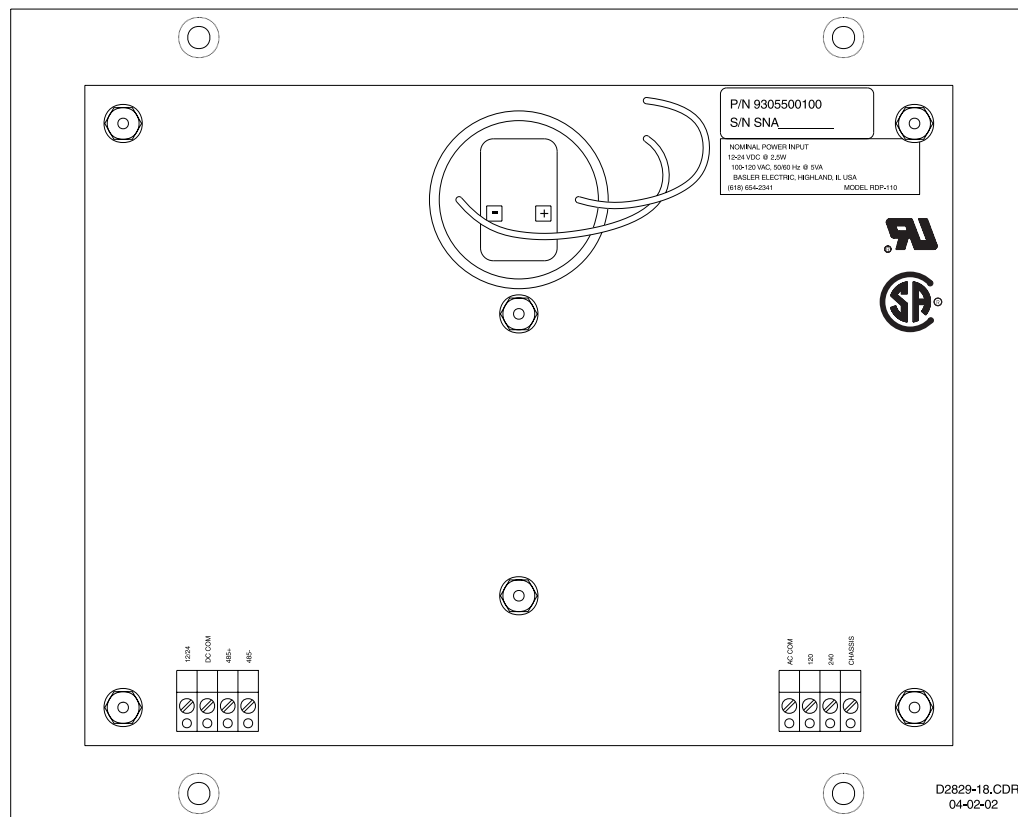


Figure 2-3. RDP-110 Remote Display Panel with Front Panel Removed

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SECTION 3 • FUNCTIONAL DESCRIPTION

GENERAL

RDP-110 Remote Display Panels use microprocessor-based technology to provide remote annunciation of various engine and generator parameters. Refer to the following paragraphs for the RDP-110 functional description.

Circuit functional description is divided into *Inputs*, *Microprocessor*, *Outputs*, and *Software*. Circuit functions illustrated in Figure 3-1 are described in the following paragraphs.

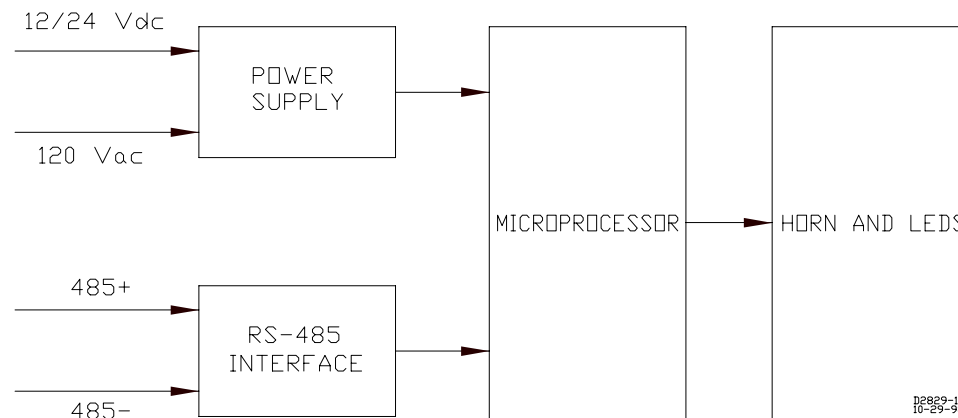


Figure 3-1. RDP-110 Functional Block Diagram

INPUTS

There are three types of inputs to the RDP-110 Display panel. They are:

- Operating (battery) dc power
- Operating (ac) power
- Serial interface

The following paragraphs describe these inputs.

Battery Operating Voltage

Required operating voltage is a nominal 12 or 24 Vdc. Operating voltage may be in the range of 8 to 32 Vdc. An internal switching power supply uses this battery voltage or a rectified and filtered signal from the ac input to generate +5 Vdc. The two power inputs (ac and dc) are isolated from each other and may be applied simultaneously.

AC Operating Voltage

Required operating voltage is a nominal 100/120 Vac 50/60 hertz. Operating voltage may be in the range of 80 to 144 Vac. An internal switching power supply uses this ac input voltage or the battery input voltage to generate +5 Vdc. The two power inputs (ac and dc) are isolated from each other and may be applied simultaneously.

RS-485 Interface

The differential RS-485 input signal is converted to a single-ended signal suitable for use by the microprocessor.

MICROPROCESSOR

Software programmed in the programmable read-only memory (PROM) controls the overall functionality of the device and makes all decisions based on programming and system inputs. Random access memory and electrically erasable memory are also provided on the microprocessor.

SOFTWARE

Software embedded in the RDP-110 controls all aspects of device functionality. This includes power-up initialization, front panel set-up, configuration, and serial communications input monitoring. When power is first applied, the RDP-110 initiates a power-up sequence. The embedded software and the on-board memory are checked, all functions are activated, and input monitoring begins.

Normal Mode

Normal mode displays the alarms and pre-alarms on the RDP-110 front panel. Pressing the front panel **Lamp Test** pushbutton activates the audible alarm and turns on all LEDs. Pressing the **Alarm Silence** pushbutton silences the audible alarm. After the alarm has been silenced only another alarm or pre-alarm will cause the audible alarm to re-activate. LED indicators can only be reset by resetting the DGC locally.

SECTION 4 • INSTALLATION

GENERAL

RDP-110 Remote Display Panels are delivered in sturdy cartons to prevent shipping damages. Upon receipt of the unit, check for damage, and if there is evidence of such, immediately file a claim with the carrier and notify the Basler Electric Regional Sales Office, your Sales Representative or Sales Representative at Basler Electric, Highland, Illinois.

If the remote display is not installed immediately, store it in the original shipping package in a moisture and dust free environment.

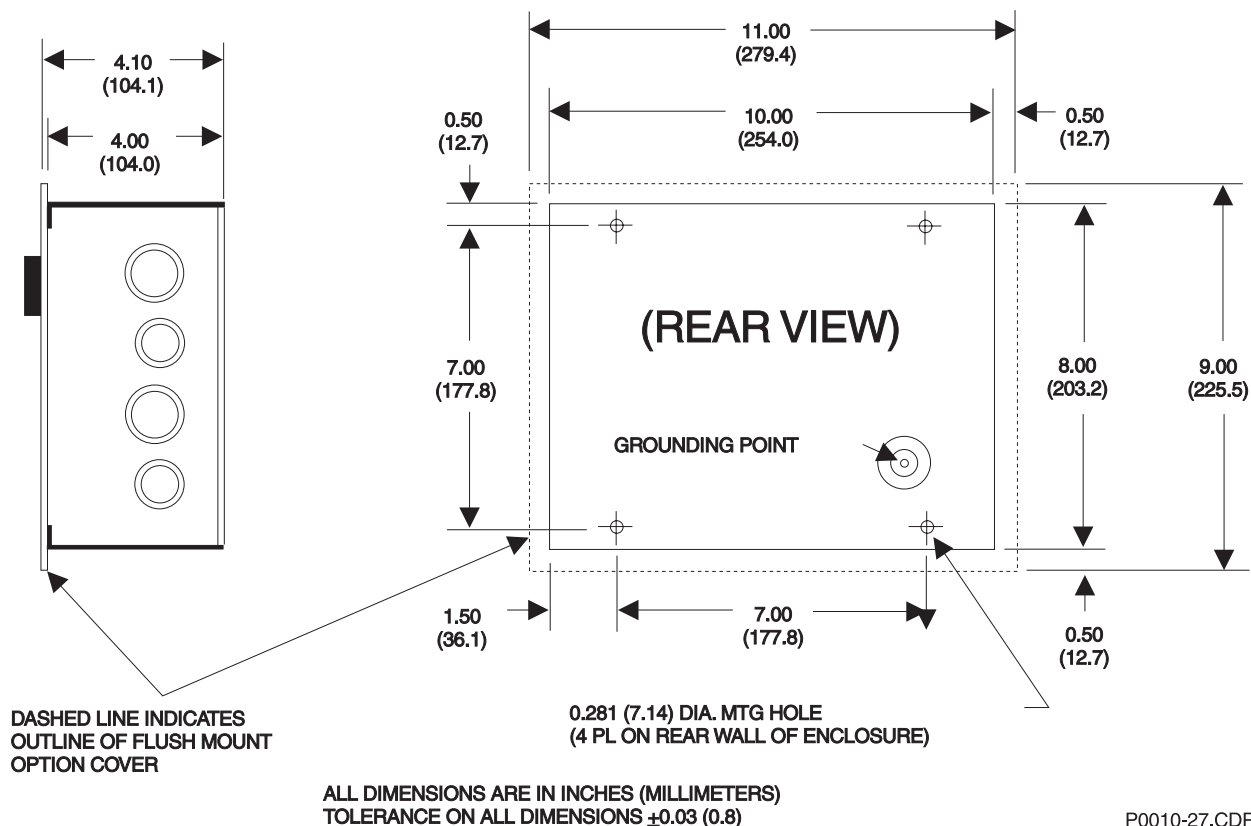
HARDWARE

RDP-110 panels are packaged in NEMA 1 metal cases for improved electromagnetic compatibility and are suitable for either semi-flush mounting or surface (projection) mounting. The metal case is resistant to moisture, salt fog, humidity, dust, dirt, and chemical contaminants. It also inhibits insect and rodent entrance.

MOUNTING

Figure 4-1 provides the overall dimensions, cutout dimensions, and drilling pattern diagram for mounting RDP-110 units. Part numbers for flush mount and projection mount units are as follows:

- Surface (projection) mount units RDP-110-S
- Semi-Flush mount units RDP-110-F



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Figure 4-1. RDP-110 Rear and Side View, Overall Dimensions and Drilling Pattern Diagram

CONNECTIONS

CAUTION

Be sure the controller battery input polarity is wired correctly. Reverse polarity battery power will not allow the unit to be DC powered. Incorrect wiring may result in damage to the remote display.

NOTE

Be sure the remote display panel is hard-wired to earth ground with no smaller than 16 AWG copper wire attached to the chassis terminal on the rear of the remote display. An additional ground connection is on the conduit box.

Except as noted above, connections should be made with minimum wire size of 20 AWG. Be sure to use the correct input power for the power supply. Figure 4-2 is a typical connection diagram.

Each RDP-110 internally terminates the RS-485 connection with a 100-ohm resistance. Connecting multiple remote display panels may require modification of this terminating impedance. The internal terminating resistance can be eliminated by removing R65 from the printed circuit board. R65 is located in the lower left corner near the RS-485 terminal strip. Consult the EIA-RS-485 standard for a complete discussion.

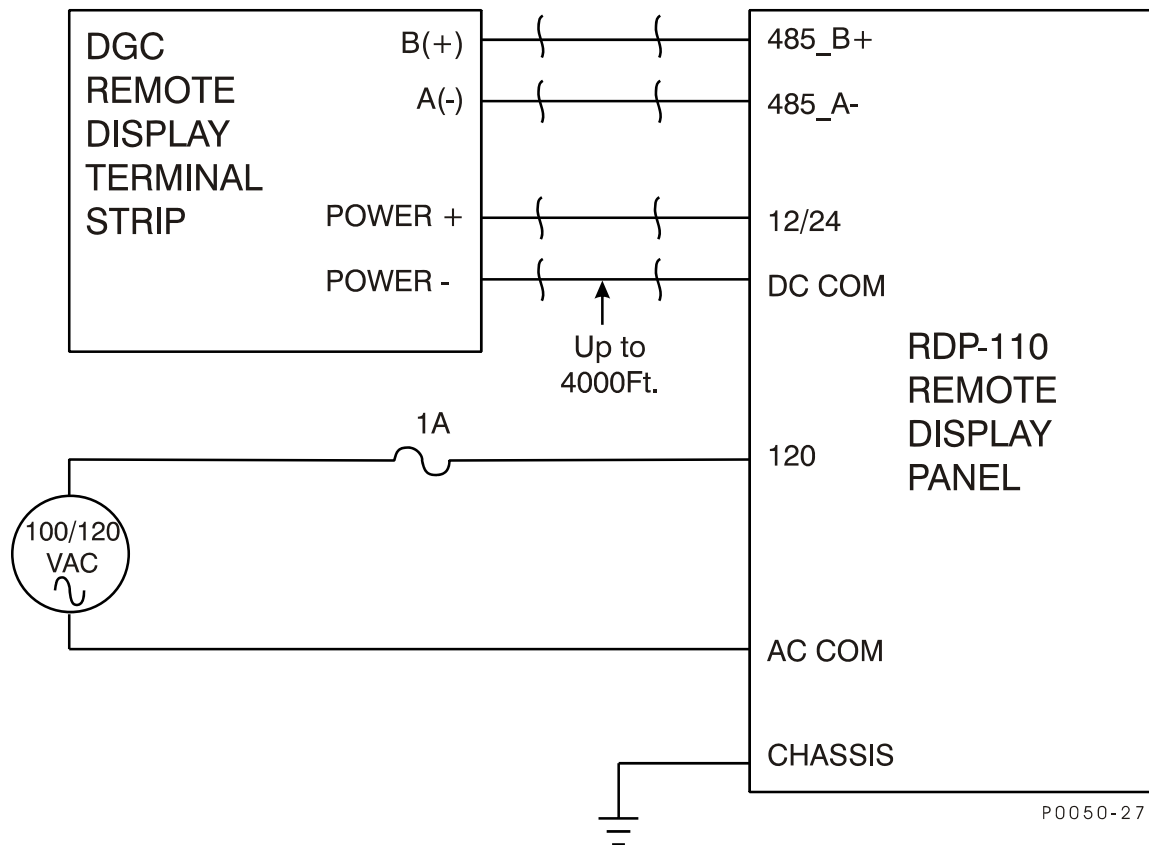


Figure 4-2. RDP-110 Typical Connection Diagram

SECTION 5 • TESTING

INTRODUCTION

This section provides a procedure for testing the RDP-110 using the built-in field test mode.

EQUIPMENT REQUIRED

The following equipment or suitable substitute is required.

- DC power supply, 24 volts
- 2 each, one ampere fuses
- Voltage source, 50/60 hertz, 100/120 volts
- Signal generator, 10.0 hertz, 5 volts peak to peak, square wave

FUNCTIONAL TEST PROCEDURE

To functional test the RDP-110, perform the following the steps.

Step 1. Connect the test setup as shown in Figure 5-1.

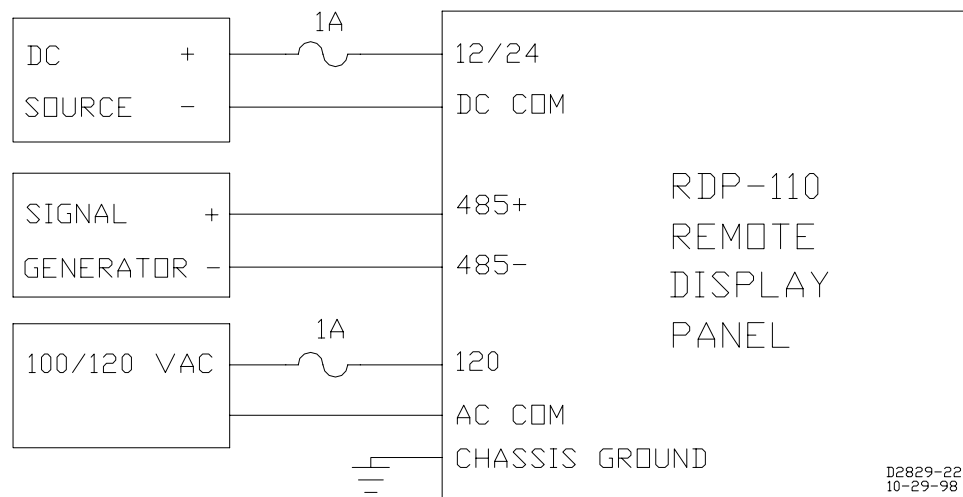


Figure 5-1. Test Set Diagram

- Step 2. Apply dc power.
- Step 3. The Display Panel On LED should turn on.
- Step 4. Press and hold the Lamp Test pushbutton.
- Step 5. The alarm should sound and all LED's should turn on.
- Step 6. Release the pushbutton and the alarm and LED'S should turn off.
- Step 7. Apply the 10 hertz signal.
- Step 8. Press and release the Lamp Test pushbutton.

Step 9. Each LED and the horn should annunciate in the following order before repeating:

- Switch Not in Auto
- Low Coolant Level Alarm
- High Coolant Temperature Alarm
- Low Oil Pressure Alarm
- Overcrank Alarm
- Overspeed Alarm
- Emergency Stop Activated Alarm
- Factory selectable LED
- Sender Failure Alarm
- EPS Supplying Load
- High Coolant Temperature Pre-alarm
- Low Coolant Temperature Pre-alarm
- Low oil Pressure Pre-alarm
- Low Fuel Level Pre-alarm
- Battery Overvoltage Pre-alarm
- Weak Battery Pre-alarm
- Battery Charger Failure Pre-alarm
- Audible Alarm

Step 10. Press and release the Alarm Silence pushbutton.

Step 11. The cycling indicators should stop when the Alarm Silence pushbutton is pressed.

Step 12. Remove the 10 Hz source and the DC power input.

Step 13. Repeat the above test procedure with AC power applied instead of the DC power.

This completes the field test procedures.



ROUTE 143, BOX 269
HIGHLAND, IL 62249 USA
<http://www.basler.com>, info@basler.com

PHONE +1 618-654-2341

FAX +1 618-654-2351