



DGC-2020ES

Digital Genset Controller

Quick Start Instruction Manual



 **WARNING:** California's Proposition 65 requires special warnings for products that may contain chemicals known to the state of California to cause cancer, birth defects or other reproductive harm. Please note that by posting this Proposition 65 warning, we are notifying you that one or more of the Proposition 65 listed chemicals may be present in products we sell to you. For more information about the specific chemicals found in this product, please visit <https://www.basler.com/Prop65>.

Preface

This instruction manual provides basic installation and setup information for the DGC-2020ES Digital Genset Controller. To accomplish this, the following information is provided:

- Mounting
- Terminals and connectors
- Typical applications
- BESTCOMSP^{Plus}® software
- Configuration
- BESTlogic™ *Plus*
- Controls and indicators

Conventions Used in this Manual

Important safety and procedural information is emphasized and presented in this manual through Warning, Caution, and Note boxes. Each type is illustrated and defined as follows.

Warning!

Warning boxes call attention to conditions or actions that may cause personal injury or death.

Caution

Caution boxes call attention to operating conditions that may lead to equipment or property damage.

Note

Note boxes emphasize important information pertaining to Digital Genset Controller installation or operation.

DGC-2020ES Instruction Manual Catalog

Available instruction manuals for the DGC-2020ES are listed in Table 1.

Table 1. Instruction Manuals

| Part Number | Description |
|--------------------|---------------------------|
| 9469200993 | Quick Start (this manual) |
| 9469200994 | Installation |
| 9469200995 | Configuration |
| 9469200996 | Operation |
| 9469200997 | Accessories |



12570 State Route 143
Highland IL 62249-1074 USA

www.basler.com

info@basler.com

Tel: +1 618.654.2341

Fax: +1 618.654.2351

© 2021 by Basler Electric

All rights reserved

First printing: April 2017

Warning!

READ THIS MANUAL. Read this manual before installing, operating, or maintaining the DGC-2020ES. Note all warnings, cautions, and notes in this manual as well as on the product. Keep this manual with the product for reference. Only qualified personnel should install, operate, or service this system. Failure to follow warning and cautionary labels may result in personal injury or property damage. Exercise caution at all times.

Caution

Installing previous versions of firmware may result in compatibility issues causing the inability to operate properly and may not have the enhancements and resolutions to issues that more recent versions provide. Basler Electric highly recommends using the latest version of firmware at all times. Using previous versions of firmware is at the user's risk and may void the warranty of the unit.

Basler Electric does not assume any responsibility to compliance or noncompliance with national code, local code, or any other applicable code. This manual serves as reference material that must be well understood prior to installation, operation, or maintenance.

For terms of service relating to this product and software, see the *Commercial Terms of Products and Services* document available at www.basler.com/terms.

This publication contains confidential information of Basler Electric Company, an Illinois corporation. It is loaned for confidential use, subject to return on request, and with the mutual understanding that it will not be used in any manner detrimental to the interests of Basler Electric Company and used strictly for the purpose intended.

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. Over time, improvements and revisions may be made to this publication. Before performing any of the following procedures, contact Basler Electric for the latest revision of this manual.

The English-language version of this manual serves as the only approved manual version.

Revision History

A historical summary of the changes made to this instruction manual is provided below. Revisions are listed in reverse chronological order.

Visit www.basler.com to download the latest hardware, firmware, and BESTCOMSPlus® revision histories.

Instruction Manual Revision History

| Manual Revision and Date | Change |
|--------------------------|---|
| C, Dec-2021 | <ul style="list-style-type: none"> • Added firmware downgrade caution box. • Corrected list of protection features in <i>01 Introduction</i>. |
| B, Nov-2019 | <ul style="list-style-type: none"> • Removed Rev Letter from all pages • Changed sequential numbering to sectional numbering • Moved Instruction Manual Revision History into Preface • Removed standalone Revision History chapter |
| A1, Apr-2019 | <ul style="list-style-type: none"> • Added Prop 65 warning on back of cover page |
| A, Sep-2018 | <ul style="list-style-type: none"> • Updated Revision History chapter |
| —, Apr-2017 | <ul style="list-style-type: none"> • Initial release |



Contents

| | |
|-------------------------------|-----|
| Introduction..... | 1-1 |
| Mounting..... | 2-1 |
| Terminals and Connectors..... | 3-1 |
| Typical Connections..... | 4-1 |
| BESTCOMS <i>Plus</i> ®..... | 5-1 |
| Configuration..... | 6-1 |
| BESTlogic™ <i>Plus</i> | 7-1 |
| Controls and Indicators..... | 8-1 |
| Troubleshooting..... | 9-1 |



1 • Introduction

This manual provides basic installation and setup information for the DGC-2020ES Digital Genset Controller. For complete information, refer to the appropriate DGC-2020ES instruction manual.

Caution

This Quick Start manual is intended for use by qualified personnel only.

Default Settings

Each DGC-2020ES is delivered with default settings that are based on average values and may not be appropriate for your application. All settings must be properly configured for your application before running the engine-generator set.

Warning!

Do not place the DGC-2020ES controller into service until all settings have been properly configured.

Features and Functions

The DGC-2020ES Digital Genset Controller provides integrated engine-genset control, protection, and metering in a rugged and economical package. Its features set make the DGC-2020ES ideal for standalone genset applications where paralleling or load sharing is not required. Microprocessor based technology allows for exact measurement, setpoint adjustment, and timing functions. Front panel controls and indicators enable quick and simple DGC-2020ES operation. Basler Electric communication software (BESTCOMSP*lus*®) allows units to be easily customized for each application. Because of the low sensing burden in the DGC-2020ES, dedicated potential transformers (PTs) are not required. A liquid crystal display (LCD) with backlighting can be viewed under a wide range of ambient light and temperature conditions.

The DGC-2020ES Digital Genset Controller has the following features:

- Generator Control
- Engine and Generator Protection
- Automatic Transfer Switch Control (Mains Failure)
- Automatic Generator Configuration Detection
- Programmable Analog Engine Senders
- Seven Programmable Contact Inputs
- Programmable Logic
- Exercise Timer
- ECU Communications via SAE J1939
- Additional contact input/output module available to expand the capabilities of the DGC-2020ES

DGC-2020ES Digital Genset Controllers perform the following functions:

Generator Protection and Metering

Multifunction generator protection guards against generator overvoltage, undervoltage, underfrequency, overfrequency, and overcurrent. Each generator protection function has an adjustable pickup and time delay setting.

Metered generator parameters include voltage, current, real power (watts), apparent power (VA), and power factor (PF).

Engine Protection and Metering

Engine protection features include oil pressure and coolant temperature monitoring, overcrank protection, ECU specific protection elements, and diagnostic reporting.

Metered engine parameters include oil pressure, coolant temperature, battery voltage, speed, fuel level, engine load, coolant level (from ECU), ECU specific parameters, and run-time statistics.

Event Recording

An event log retains a history of system events in nonvolatile memory. Up to 30 event types are retained and each record contains a time stamp of the first and last occurrence, and the number of occurrences for each event.

Contact Inputs and Outputs

DGC-2020ES controllers have seven programmable contact inputs. All contact inputs recognize dry contacts. The programmable inputs can be configured to initiate a pre-alarm or alarm. An input can be programmed to receive an input from an automatic transfer switch. Inputs can also be programmed to override DGC-2020ES alarms and protection functions. Each input can be assigned a user-defined name for easy identification at the front panel display and in fault records.

Output contacts include three dedicated relays for energizing an engine's glow plugs, fuel solenoid, and starter solenoid. Four additional user-programmable output contacts are provided.

Additional contact inputs and output contact requirements can be accommodated with an optional CEM-2020 (Contact Expansion Module). Contact Basler Electric for ordering information.

Automatic Transfer Switch Control (Mains Failure)

The DGC-2020ES can detect a mains failure via a single- or three-phase bus input. A mains failure is established when any one of the following conditions are met:

- Any phase of bus voltage falls below dead the bus threshold
- Any phase of bus voltage is unstable due to overvoltage or undervoltage
- Any phase of bus voltage is unstable due to overfrequency or underfrequency

At this time, the DGC-2020ES will start the genset and when ready, apply power to the load via the genset. The DGC-2020ES implements open transitions to and from the mains. When the mains returns and is considered stable, the DGC-2020ES will transfer the load back to the mains.

Communication

DGC-2020ES communication features include a standard USB port for local (and temporary) communication, SAE J1939 interface for remote communication, and RS-485 interface for communication with an optional Remote Display Panel.

USB Port

The USB communication port can be used with BESTCOMS*Plus* software to quickly configure a DGC-2020ES with the desired settings or retrieve metering values and event log records.

CAN Interface

The CAN interface provides high-speed communication between the DGC-2020ES and the engine control unit (ECU) on an electronically controlled engine. This interface provides access to oil pressure, coolant temperature, and engine speed data by reading these parameters directly from the ECU. When available, engine diagnostic data can also be accessed. The CAN interface supports the following protocols:

- SAE J1939 Protocol - Oil pressure, coolant temperature, and engine speed data are received from the ECU. In addition, DTCs (Diagnostic Trouble Codes) help diagnose any engine or related failures. The engine DTCs are displayed on the front panel of the DGC-2020ES and may be obtained using BESTCOMS*Plus*® software.

- *mtu* Protocol - A DGC-2020ES connected to a genset equipped with an *mtu* ECU receives oil pressure, coolant temperature, and engine speed data from the engine controller, along with various alarms and pre-alarms that are *mtu* specific. In addition, the DGC-2020ES tracks and displays the active fault codes issued by the *mtu* engine ECU.

Style Number

Standard-order DGC-2020ES controllers are identified by a style number which consists of a combination of letters and numbers that define the controller's electrical characteristics and operational features. The model number, together with the style number, describes the options included in a specific controller. Figure 1-1 illustrates the DGC-2020ES style number identification chart.

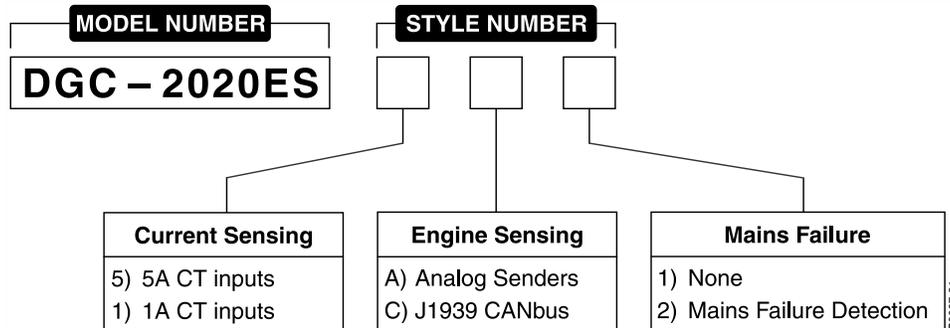


Figure 1-1. DGC-2020ES Style Chart

For example, a DGC-2020ES with style number **5A2**, has the following characteristics and features.

- 5** 5 Aac Current Sensing Inputs
- A** Analog Senders
- 2** Mains Failure Detection

Optional Features and Capabilities

CEM-2020 (Contact Expansion Module)

The optional CEM-2020 provides 10 additional contact inputs and 18 or 24 additional output contacts (depending on module type) to the DGC-2020ES. The CEM-2020 communicates with the DGC-2020ES through a CAN interface. Refer to the *CEM-2020* chapter in the *Accessories* manual for more information.

Remote Display Panel

The optional Remote Display Panel provides remote indication of many pre-alarm and alarm conditions. The DGC-2020ES communicates with the Remote Display Panel through an RS-485 interface. Refer to the *Communication* chapter in the *Configuration* manual for more information.



2 • Mounting

DGC-2020ES controllers are delivered in sturdy cartons to prevent shipping damage. Upon receipt of a unit, check the part number against the requisition and packing list for agreement. Inspect for damage, and if there is evidence of such, immediately file a claim with the carrier and notify the Basler Electric regional sales office or your sales representative.

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

Hardware

The front panel is resistant to moisture, salt fog, humidity, dust, dirt, and chemical contaminants. DGC-2020ES controllers are mounted using the four permanently attached 10-24 studs. The torque applied to the mounting hardware should not exceed 20 inch-pounds (2.2 newton meters).

Dimensions

Panel cutting and drilling dimensions are shown in Figure 2-1. Overall dimensions are shown in Figure 2-2. All dimensions are shown in inches with millimeters in parenthesis.

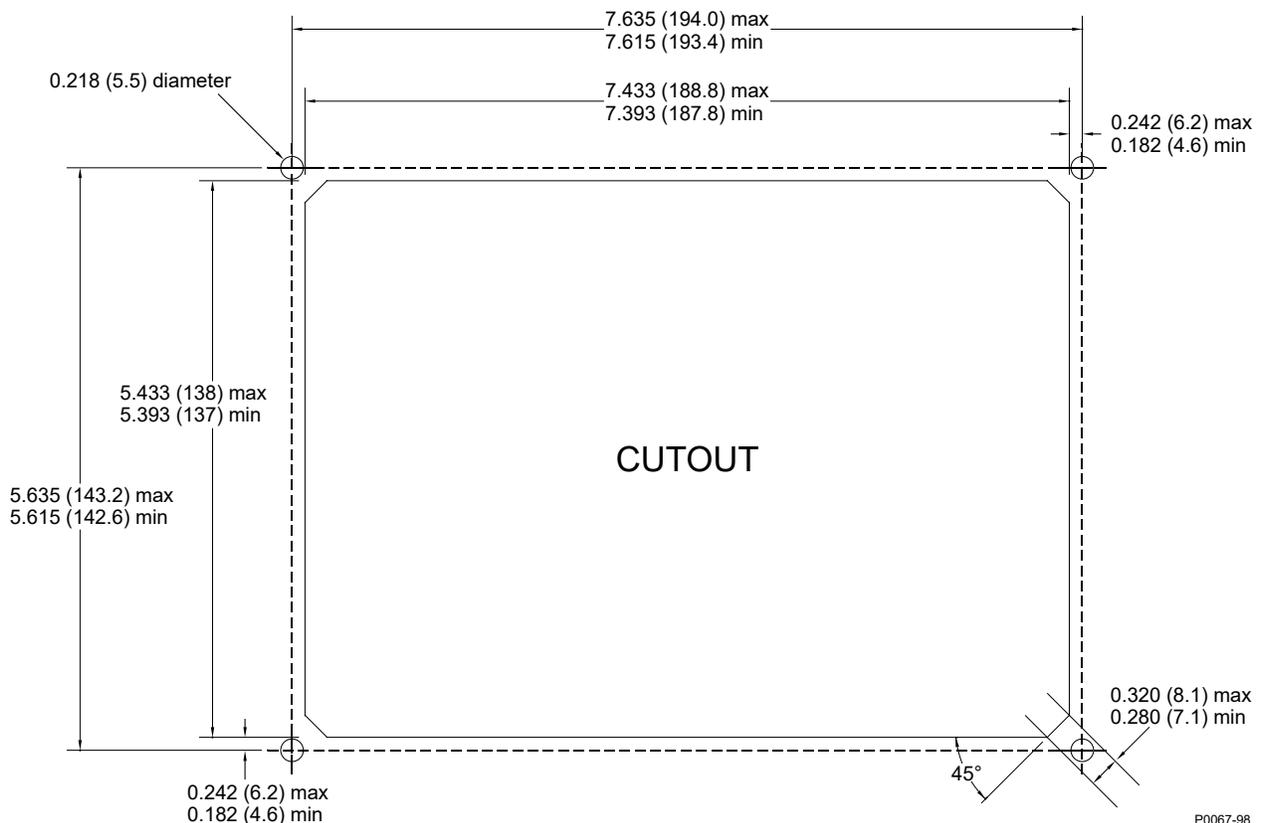


Figure 2-1. Panel Cutting and Drilling Dimensions

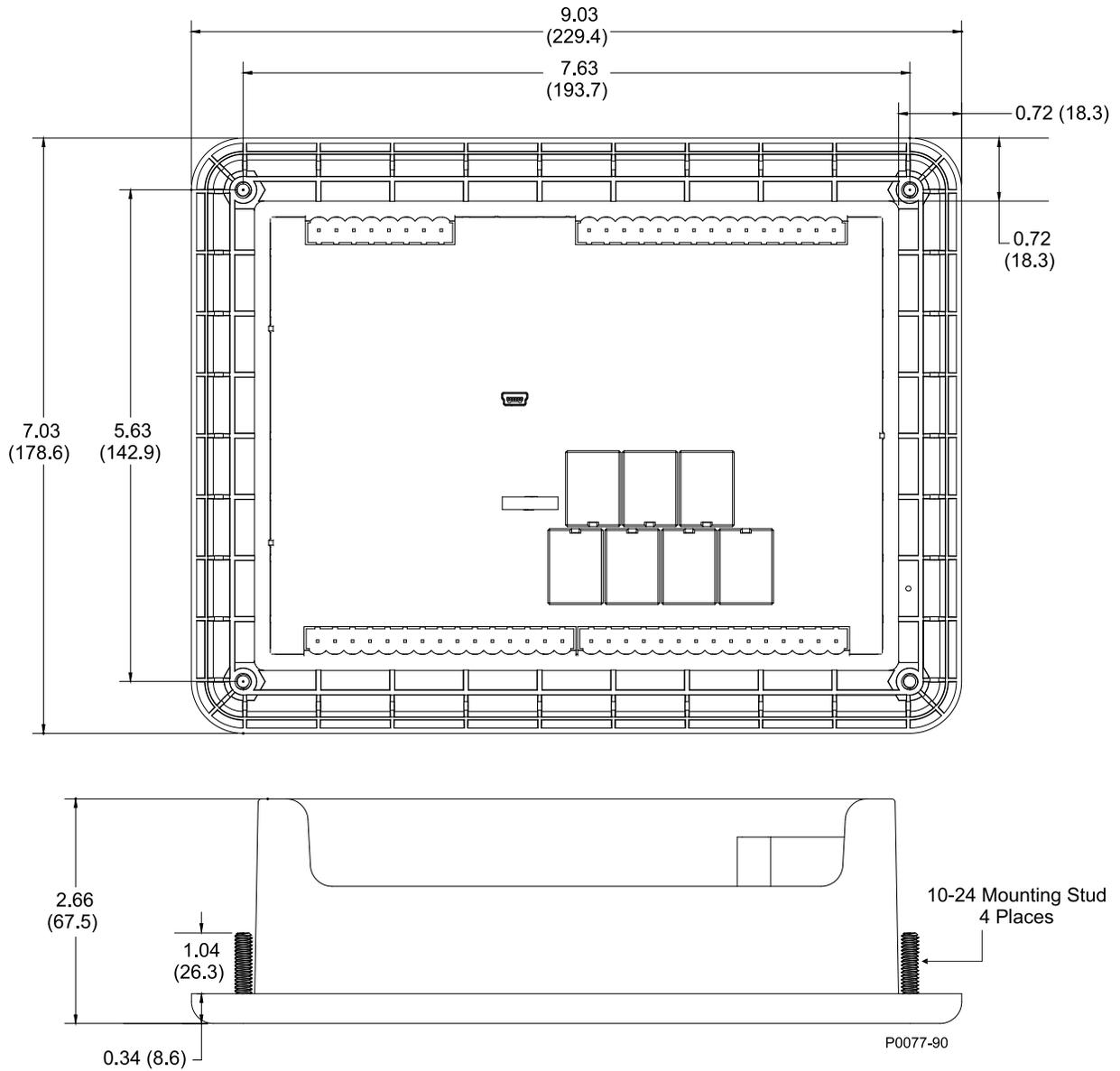
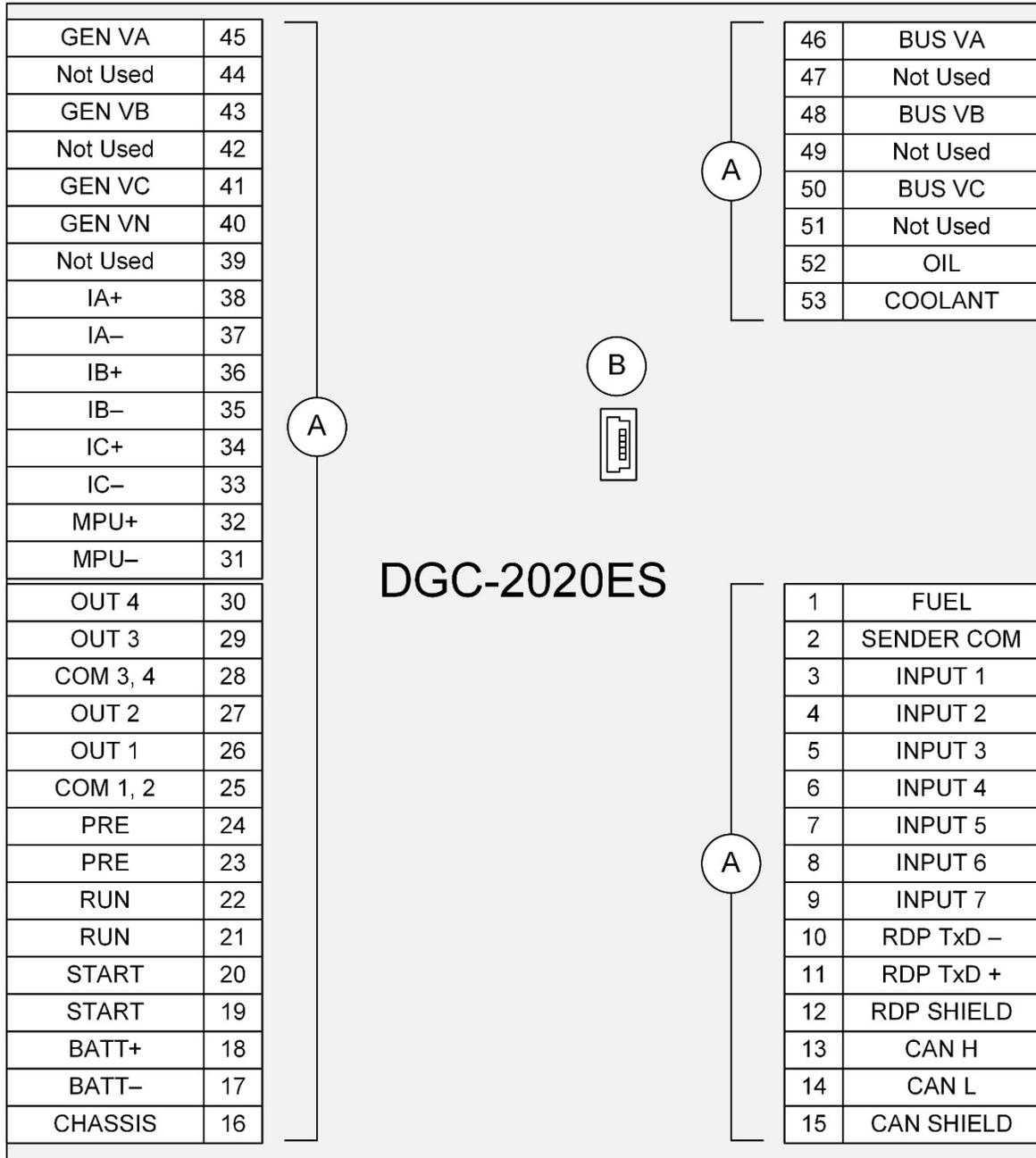


Figure 2-2. Overall Dimensions

3 • Terminals and Connectors

All DGC-2020ES terminals and connectors are located on the rear panel. DGC-2020ES terminals consist of a mini-B USB socket and plug-in connectors with spring clamp terminals.

Figure 3-1 illustrates the rear panel terminals. Locator letters in the illustration correspond to the terminal block and connector descriptions in Table 3-1.



P0067-84

Figure 3-1. Rear Panel

Table 3-1. Rear Panel Terminal and Connector Descriptions

| Locator | Description |
|----------------|---|
| A | The majority of external, DGC-2020ES wiring is terminated at 8- or 15-position connectors with spring clamp terminals. These connectors plug into headers on the DGC-2020ES. The connectors and headers have a dovetailed edge that ensures proper connector orientation. Each connector and header is uniquely keyed to ensure that a connector mates only with the correct header. Spring clamp terminals accept a maximum wire size of 12 AWG. |
| B | The mini-B USB socket mates with a standard USB cable and is used with a PC running BESTCOMSPi ^{us} ® software for local communication with the DGC-2020ES. |

| Note |
|---|
| <p>Be sure that the DGC-2020ES is hard-wired to earth ground with no smaller than 12 AWG copper wire attached to the chassis ground terminal (terminal 16) on the rear of the controller.</p> <p>Operating power from the battery must be of the correct polarity. Although reverse polarity will not cause damage, the DGC-2020ES will not operate.</p> <p>For the DGC-2020ES to correctly meter power factor, the generator must be rotating clockwise (A-B-C).</p> |

4 • Typical Connections

Typical connection diagrams are provided in this chapter as a guide when wiring the DGC-2020ES for communication, mechanical senders, contact inputs and outputs, sensing, and control power.

Connections for Typical Applications

Typical connections for applications using three-phase wye, three-phase delta, single-phase AB, and single-phase AC generator voltage sensing are shown on the following pages.

Figure 4-1 illustrates typical three-phase wye generator voltage sensing connections.

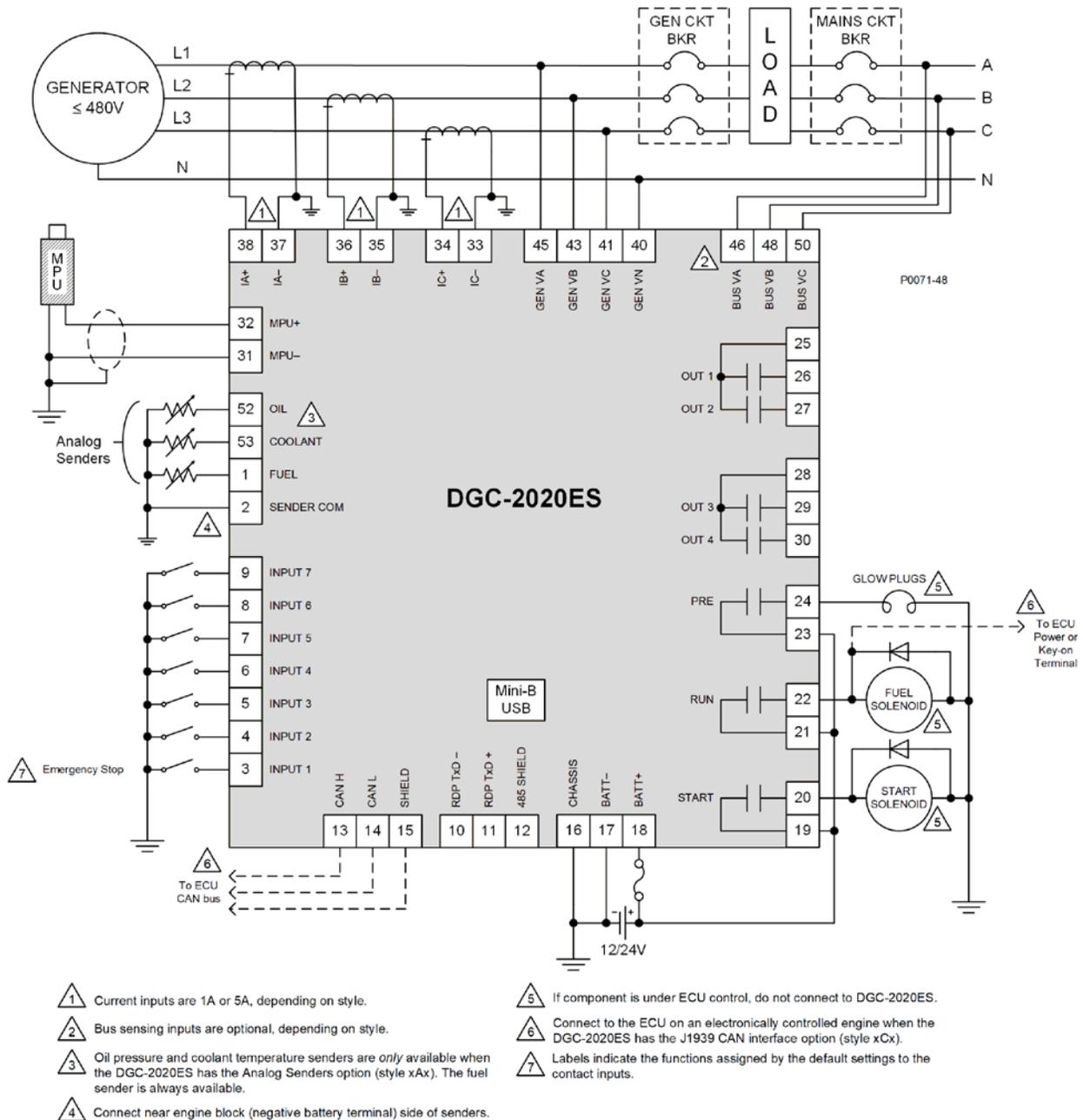


Figure 4-1. Three-Phase Wye Connections for Typical Applications

Figure 4-2 illustrates typical three-phase delta generator voltage sensing connections.

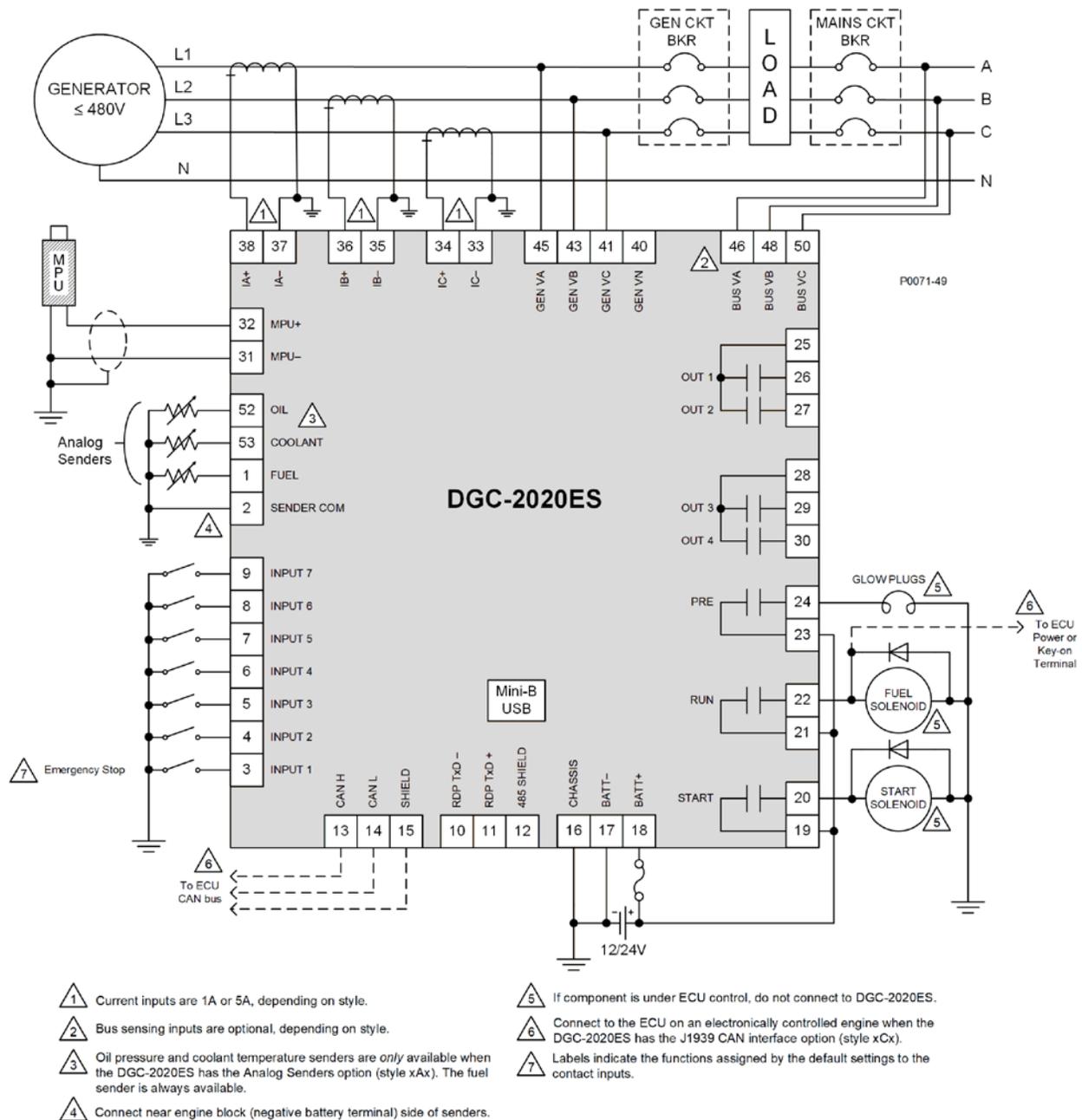


Figure 4-2. Three-Phase Delta Connections for Typical Applications

Figure 4-3 illustrates typical single-phase A-B generator voltage sensing connections.

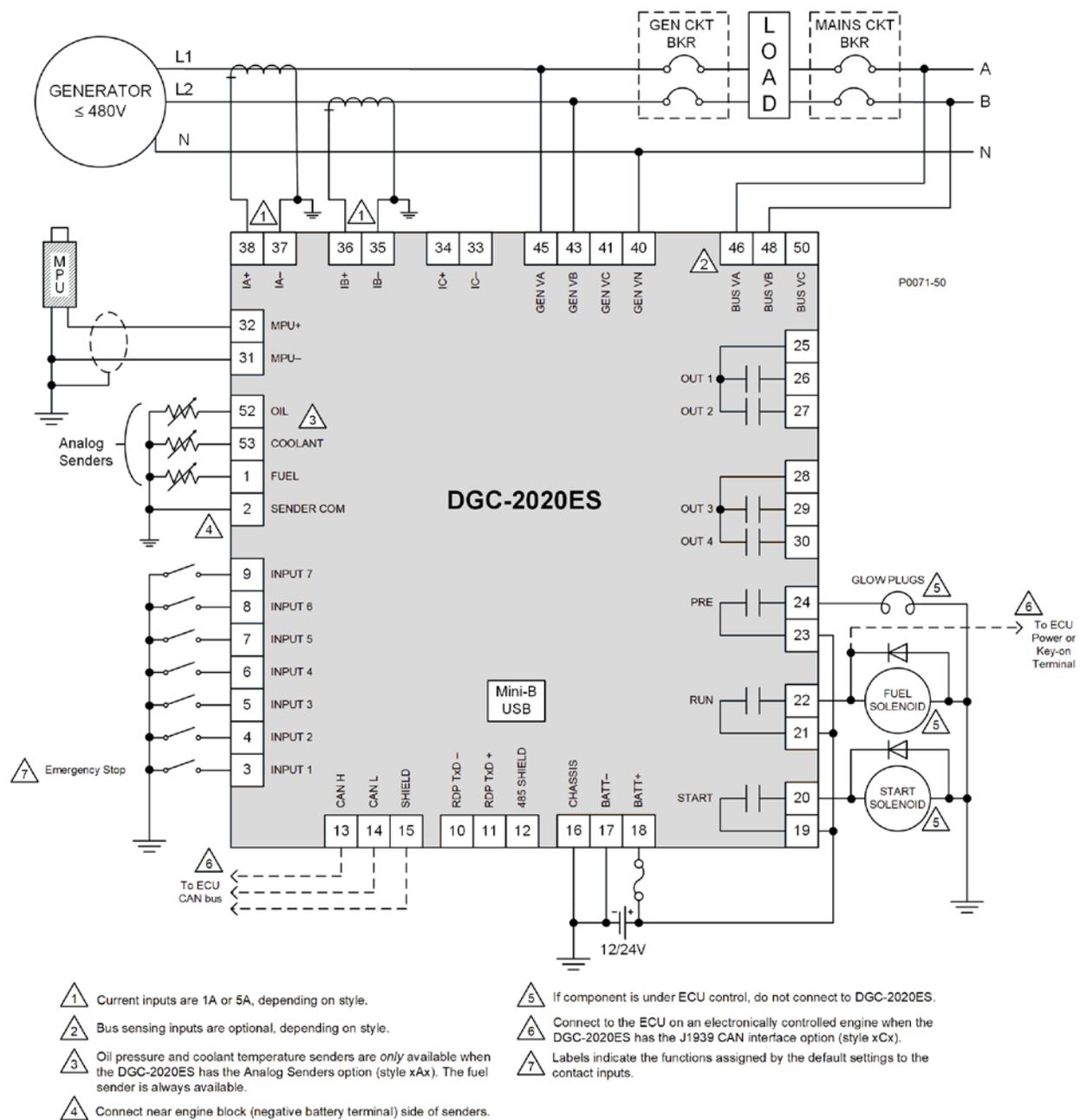
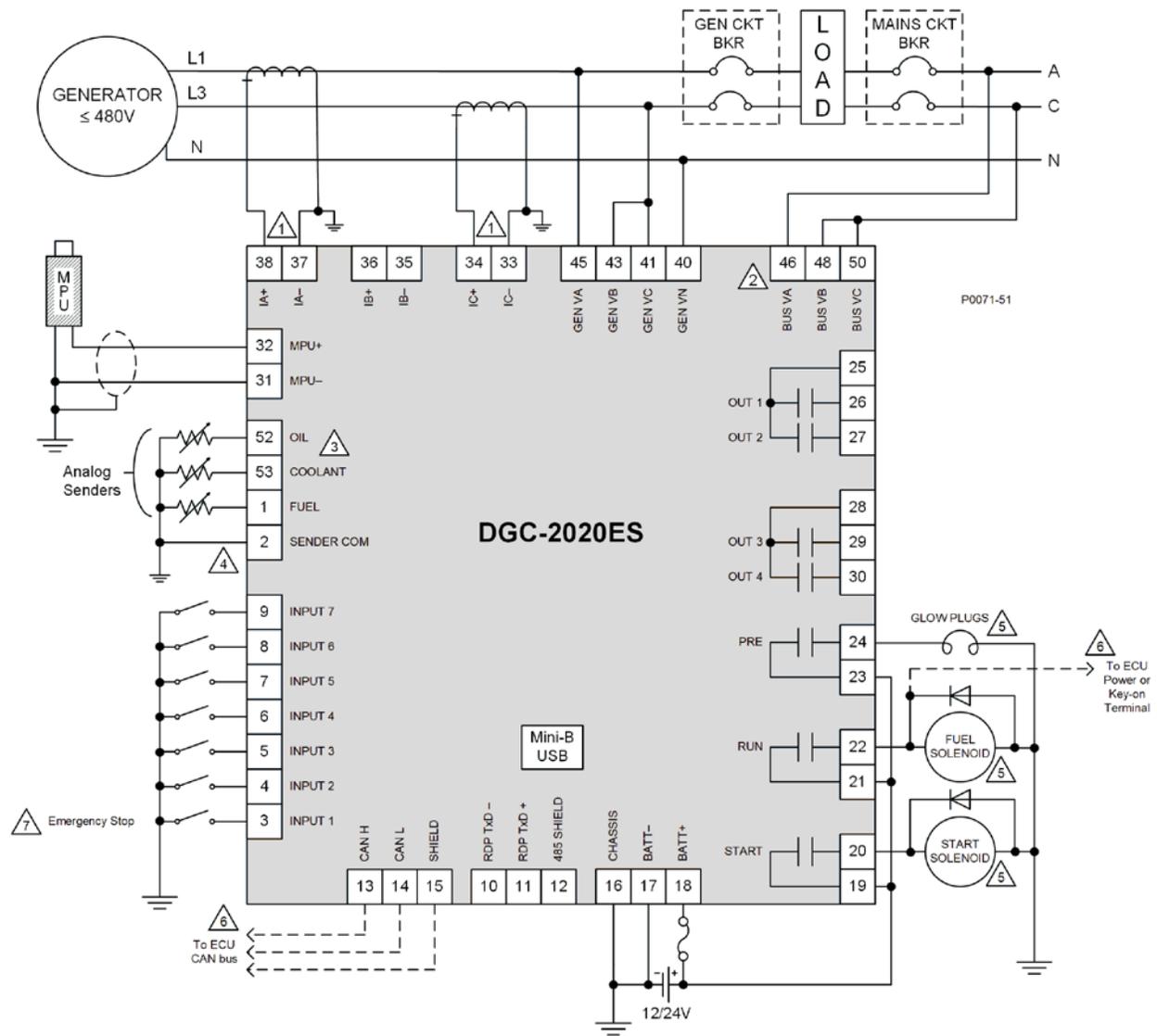


Figure 4-3. Single-Phase A-B Connections for Typical Applications

Figure 4-4 illustrates typical single-phase A-C generator voltage sensing connections.



- 1 Current inputs are 1A or 5A, depending on style.
- 2 Bus sensing inputs are optional, depending on style.
- 3 Oil pressure and coolant temperature senders are *only* available when the DGC-2020ES has the Analog Senders option (style xAx). The fuel sender is always available.
- 4 Connect near engine block (negative battery terminal) side of senders.
- 5 If component is under ECU control, do not connect to DGC-2020ES.
- 6 Connect to the ECU on an electronically controlled engine when the DGC-2020ES has the J1939 CAN interface option (style xCx).
- 7 Labels indicate the functions assigned by the default settings to the contact inputs.

Figure 4-4. Single-Phase A-C Connections for Typical Applications

CAN Connections

Typical CAN connections are shown in Figure 4-5 and Figure 4-6.

Note

1. If the DGC-2020ES is providing one end of the J1939 bus, a 120 ohm, ½ watt terminating resistor should be installed across terminals 14 (CANL) and 13 (CANH).
2. If the DGC-2020ES is not providing one end of the J1939 bus, the stub connecting the DGC-2020ES to the bus should not exceed 914 mm (3 ft) in length.
3. The maximum bus length, not including stubs, is 40 m (131 ft).
4. The J1939 drain (shield) should be grounded at one point only. If grounded elsewhere, do not connect the drain to the DGC-2020ES.

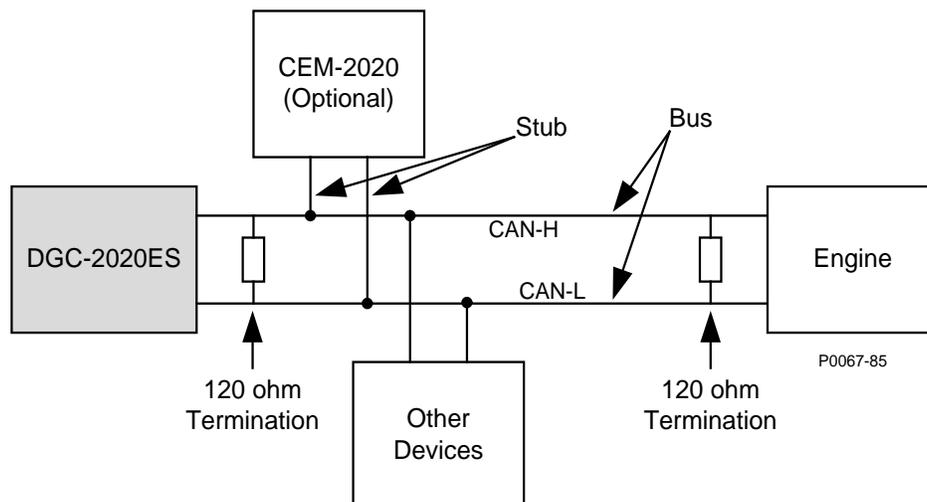


Figure 4-5. CAN Interface with DGC-2020ES Providing One End of the Bus

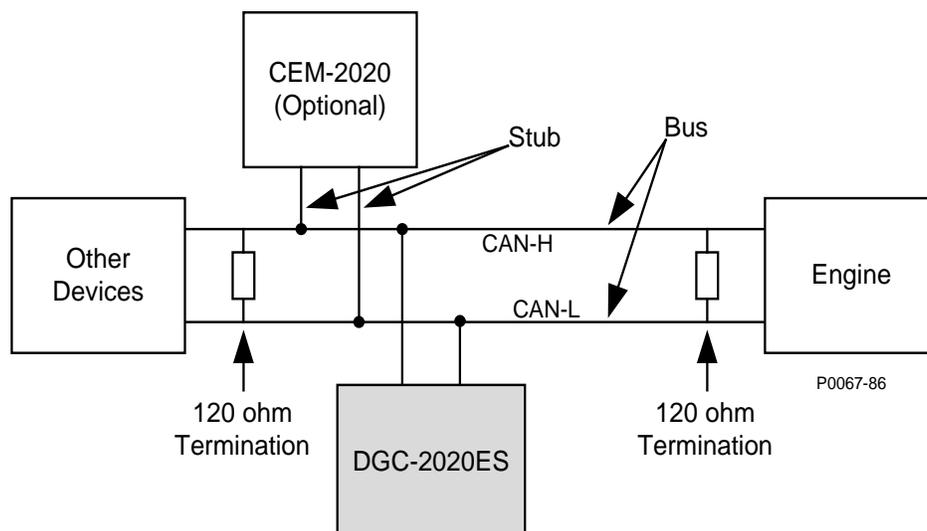
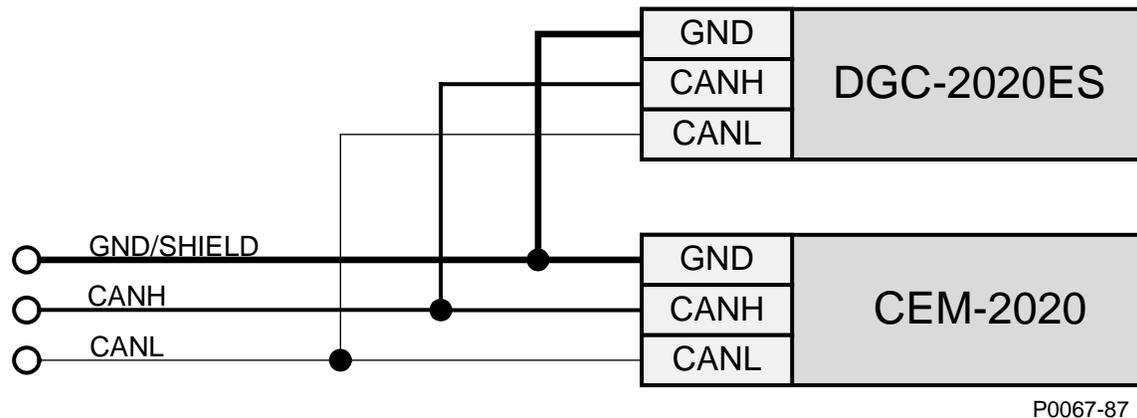


Figure 4-6. CAN Interface with Other Devices

CEM-2020 Connections

The CEM-2020 (Contact Expansion Module) is an optional module that may be installed with the DGC-2020ES. It is a remote auxiliary device that provides additional contact inputs and outputs for the DGC-2020ES. This module interfaces to the DGC-2020ES via CAN, thus the CAN terminals are the only common connections (Figure 4-7) between the DGC-2020ES and CEM-2020. Refer to the *CEM-2020* chapter for more information.

Refer to *Terminals and Connectors* for details on DGC-2020ES CAN connections.



P0067-87

Figure 4-7. DGC-2020ES and CEM-2020 CAN Connections

Installation for CE Systems

For CE compliant systems, it may be required to route ac voltage and current sensing wires separately from other wires.

Installation in an Ungrounded System Application

When the DGC-2020ES is controlling equipment that is part of an ungrounded system, it is recommended that potential transformers be employed on the voltage sensing inputs to provide full isolation between the DGC-2020ES and monitored voltage phases.

5 • BESTCOMSPi^{us}®

BESTCOMSPi^{us} provides the user with a point-and-click means to set and monitor the DGC-2020ES. BESTCOMSPi^{us} uses plugins, allowing the user to manage several different Basler Electric products. The DGC-2020ES plugin must be activated before use. The plugin can be activated automatically by connecting to a DGC-2020ES, or manually by requesting an activation key from Basler Electric.

Figure 5-1 illustrates the typical user interface components of the DGC-2020ES plugin with BESTCOMSPi^{us}.

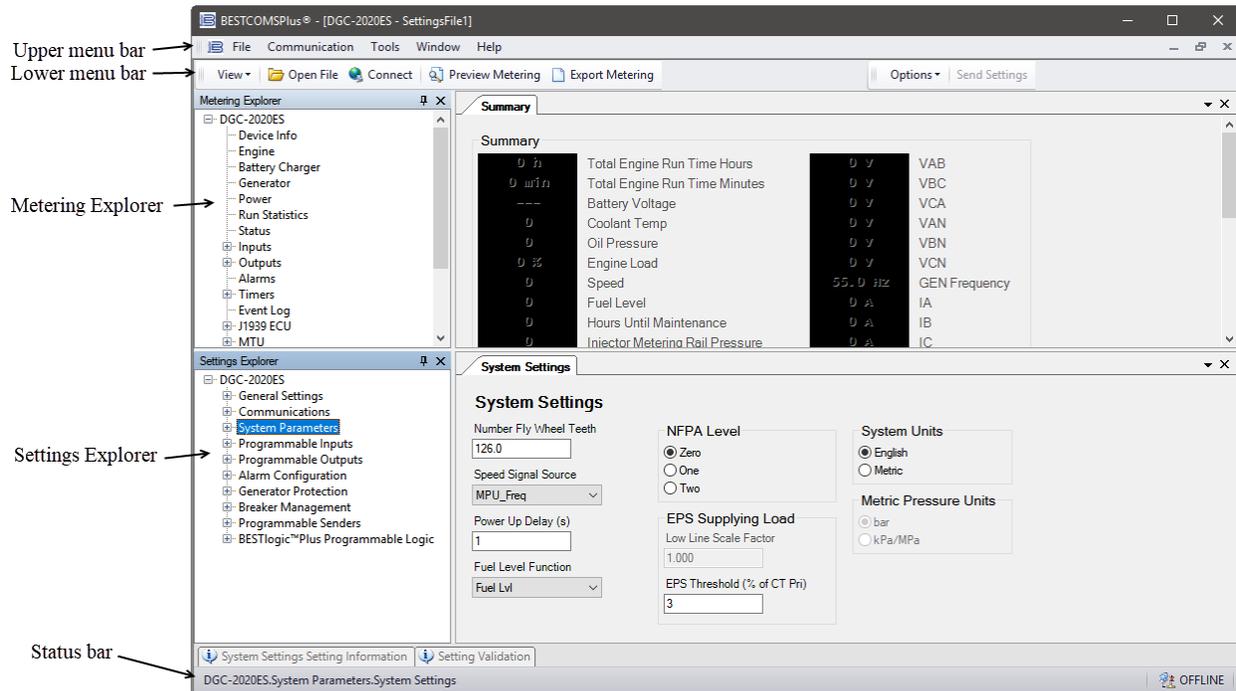


Figure 5-1. Typical User Interface Components

Installation

Note

Do not connect a USB cable until setup completes successfully. Connecting a USB cable before setup is complete may result in errors.

Download BESTCOMSPi^{us}

DGC-2020ES controllers are delivered with a CD-ROM that contains BESTCOMSPi^{us} software and instruction manuals. If a CD-ROM is not available, use the following procedure to download BESTCOMSPi^{us} from the Basler Electric website.

1. Navigate to <https://www.basler.com/Downloads>.
2. Select DGC-2020ES from the model drop down menu.
3. Under the Software heading, click the download link for BESTCOMSPi^{us}.
4. Sign in or create an account to continue with the download.

Install BESTCOMSPPlus from CD

When BESTCOMSPPlus installation is complete, a Basler Electric folder is added to the Windows programs menu. This folder is accessed by clicking the Windows *Start* button and then accessing the Basler Electric folder in the *Programs* menu. The Basler Electric folder contains an icon that starts BESTCOMSPPlus when clicked.

Activation of the DGC-2020ES Plugin

The DGC-2020ES plugin is a module that runs inside the BESTCOMSPPlus shell. The DGC-2020ES plugin contains specific operational and logic settings for only the DGC-2020ES. Uploading settings to the DGC-2020ES is possible only after activating the DGC-2020ES plugin.

The DGC-2020ES plugin can be activated automatically or manually. Automatic activation is achieved by using a USB cable to establish communication between the DGC-2020ES and BESTCOMSPPlus. Manual activation is initiated by contacting Basler Electric for an activation key and entering the key into BESTCOMSPPlus. Manual activation is useful if you want to create a settings file prior to receiving your DGC-2020ES. Refer to *Manual Activation of DGC-2020ES Plugin*.

Connect a USB Cable

The USB driver was copied to your PC during BESTCOMSPPlus installation and is installed automatically after powering the DGC-2020ES. USB driver installation progress is shown in the Windows taskbar area. Windows will notify you when installation is complete.

Connect a USB cable between the PC and your DGC-2020ES. Apply control power to the DGC-2020ES. Wait until the boot sequence is complete.

Start BESTCOMSPPlus® and Activate the DGC-2020ES Plugin Automatically

To start BESTCOMSPPlus, click the Windows *Start* button, point to *Programs*, *Basler Electric*, and then click the *BESTCOMSPPlus* icon. During initial startup, the *BESTCOMSPPlus Select Language* screen is displayed (Figure 5-2). You can choose to have this screen displayed each time BESTCOMSPPlus is started, or you can select a preferred language and this screen will be bypassed in the future. Click *OK* to continue. This screen can be accessed later by selecting *Tools* and *Select Language* from the menu bar.

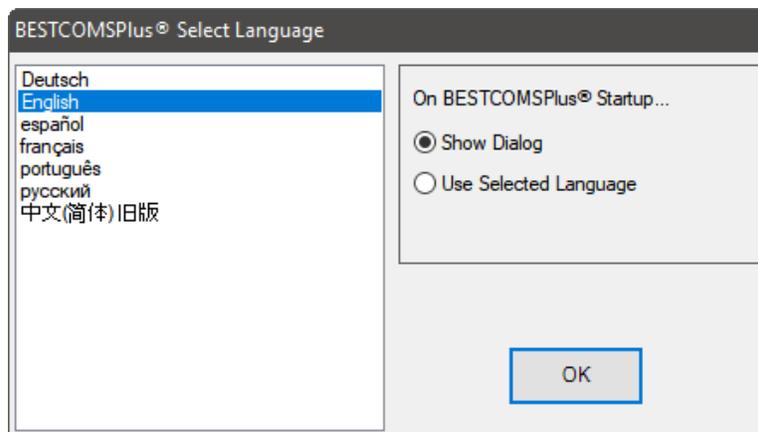


Figure 5-2. BESTCOMSPPlus Language Selection Dialog

The BESTCOMSPPlus platform window opens. Select *New Connection* from the *Communication* pull-down menu and select *DGC-2020ES*. See Figure 5-3. The DGC-2020ES plugin is activated automatically after connecting to a DGC-2020ES.

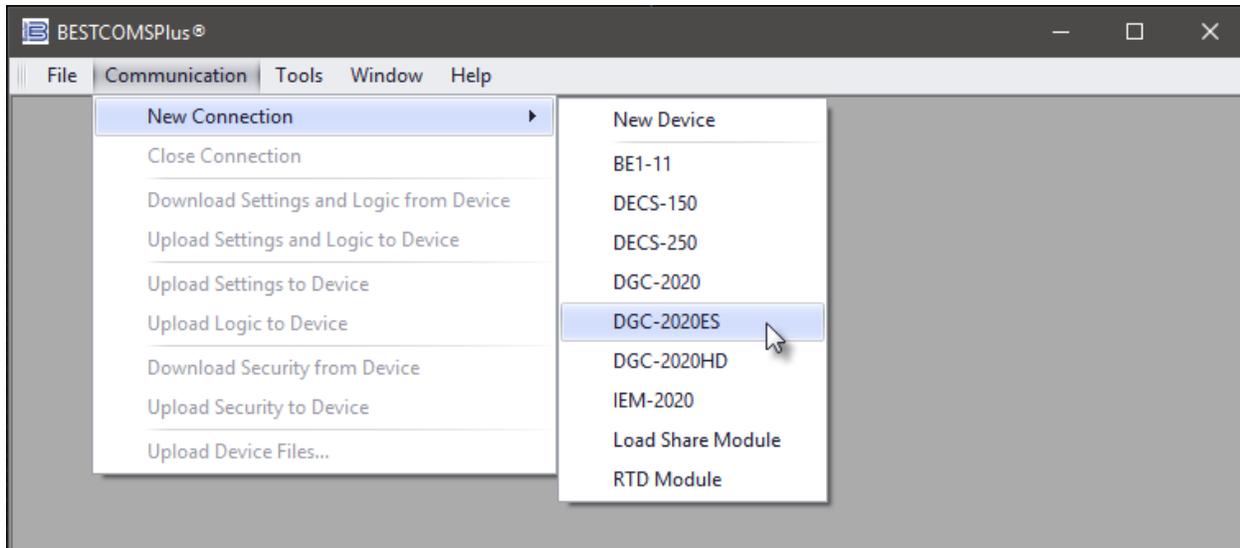


Figure 5-3. Communication Pull-Down Menu

The *DGC-2020ES* Connection screen, shown in Figure 5-4, appears.

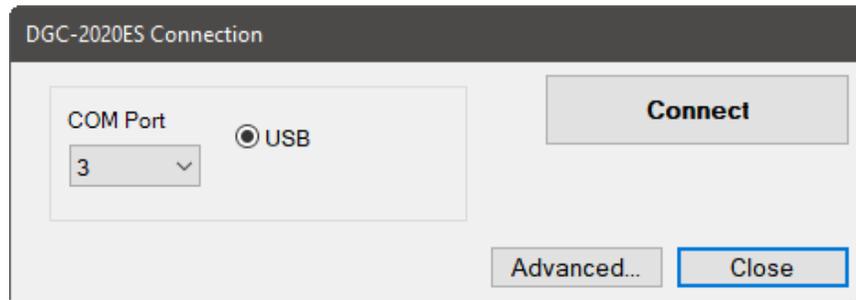


Figure 5-4. DGC-2020ES Connection Dialog

Select *COM Port*. The USB drivers are installed automatically during the BESTCOMSPPlus installation process. To select the correct *COM Port*, open the Windows Device Manager and expand the *Ports (COM & LPT)* branch. Locate the device named *CP2101 USB to UART Bridge Controller (COMx)*. The *COM Port* number will be displayed in parenthesis (*COMx*). Be sure control power is applied to the DGC-2020ES and the USB cable is connected before opening the Device Manager. See Figure 5-5.

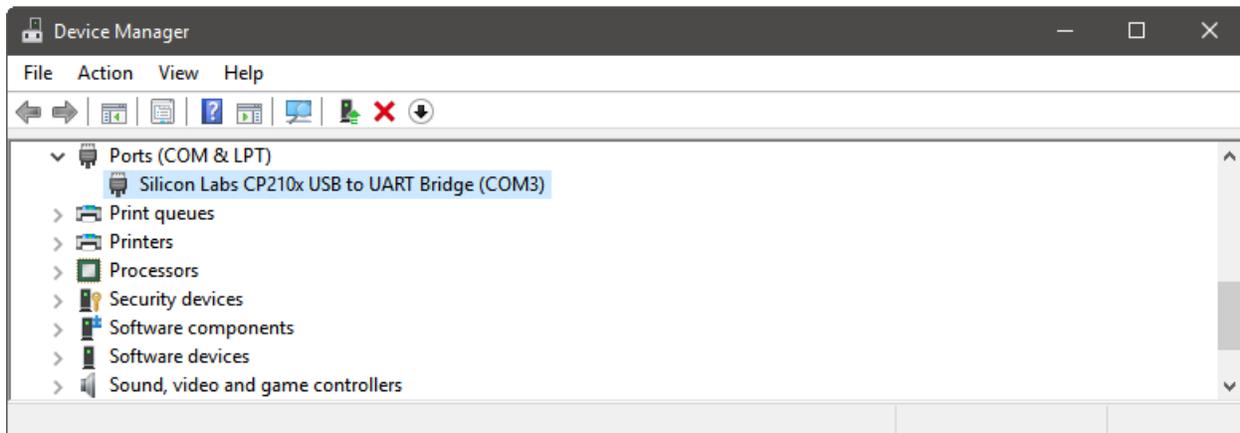


Figure 5-5. Device Manager

The DGC-2020ES plugin opens indicating that activation was successful. You can now configure the DGC-2020ES communication ports and other settings.

Installing the USB Driver if Automatic Installation Fails

To install the USB driver for the DGC-2020ES:

1. Apply control power to the DGC-2020ES and wait for the boot sequence to complete.
2. Connect a USB cable between the PC and DGC-2020ES.
3. The *Found New Hardware Wizard* dialog box appears.
4. Select **"No, not this time"** and select *Next* to continue.
5. Choose to **"Install from a list or specific location (Advanced)"** and select *Next* to continue.
6. Insert the CD-ROM labeled BESTCOMSP*lus* into the PC CD-ROM drive.
7. Navigate to C:\Program Files\Basler Electric\BESTCOMSP*lus*\USBDeviceDrivers\ and select *Next* to continue.

When installation of the driver is complete, you may be asked to restart your computer.

Manual Activation of the DGC-2020ES Plugin

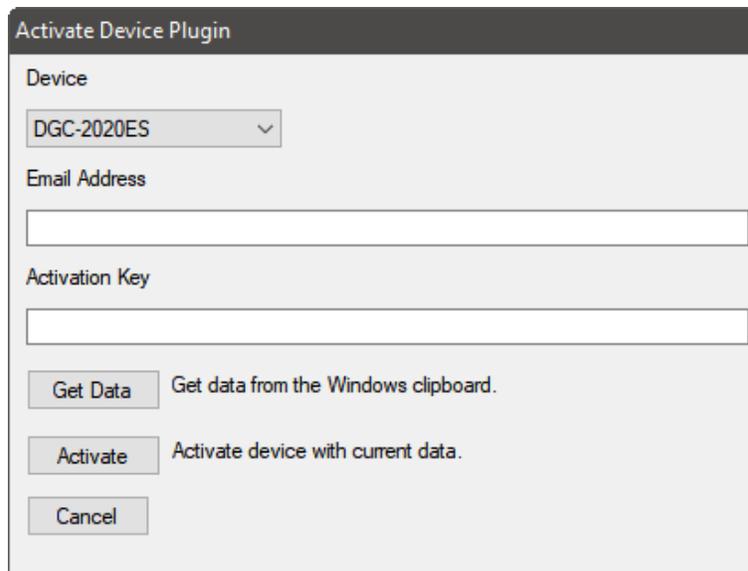
Manual activation of the DGC-2020ES plugin is required only if your initial use of BESTCOMSP*lus* will be on a PC that is not connected to a DGC-2020ES. Manual activation is described in the following paragraphs.

Requesting an Activation Key

When initially running the DGC-2020ES plugin, the *Activate Device Plugin* pop-up appears. You must contact Basler Electric for an activation key before you can activate the DGC-2020ES plugin. You can request an activation key through email or the Basler Electric website. Click either the *Website* or *Email* button. Click the *Activate* button when you are ready to enter the activation key you received from Basler Electric. The *Activate Device Plugin* pop-up appears. Refer to Figure 5-6.

Entering an Activation Key

Select DGC-2020ES from the *Device* pull-down menu. Enter your *Email Address* and *Activation Key* provided by Basler Electric. If you received an email containing the *Activation Key*, you can select all of the text in the email and copy it to the Windows clipboard using normal Windows techniques. The *Get Data* button will extract the *Device*, *Email Address*, and *Activation Key* from the Windows clipboard and paste it into the appropriate fields. Click the *Activate* button to continue. The *Activate Device Plugin* screen is also found by selecting *Activate Device* from the *Tools* pull-down menu of the BESTCOMSP*lus* main screen.



The screenshot shows a dialog box titled "Activate Device Plugin". It features a "Device" dropdown menu currently set to "DGC-2020ES". Below this are two empty text input fields labeled "Email Address" and "Activation Key". At the bottom of the dialog, there are three buttons: "Get Data" (with a tooltip "Get data from the Windows clipboard."), "Activate" (with a tooltip "Activate device with current data."), and "Cancel".

Figure 5-6. Activate Device Plugin

Establishing Communication

Communication between BESTCOMSPi^{us} and the DGC-2020ES is established by clicking on the Connect button on the DGC-2020ES Connection screen (see Figure 5-4) or by clicking on the Connect button on the lower menu bar of the main BESTCOMSPi^{us} screen (Figure 5-1). Download all settings and logic from the DGC-2020ES by selecting Download Settings and Logic from the Communication pull-down menu. BESTCOMSPi^{us} will read all settings and logic from the DGC-2020ES and load them into BESTCOMSPi^{us} memory. See Figure 5-7.

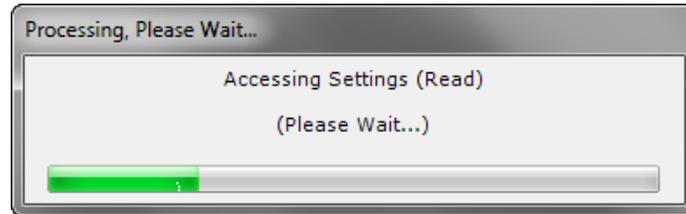


Figure 5-7. Processing, Please Wait...

Advanced Properties

Click the Advanced button on the Connection screen to display the Advanced Properties dialog. Default settings are shown in Figure 5-8.

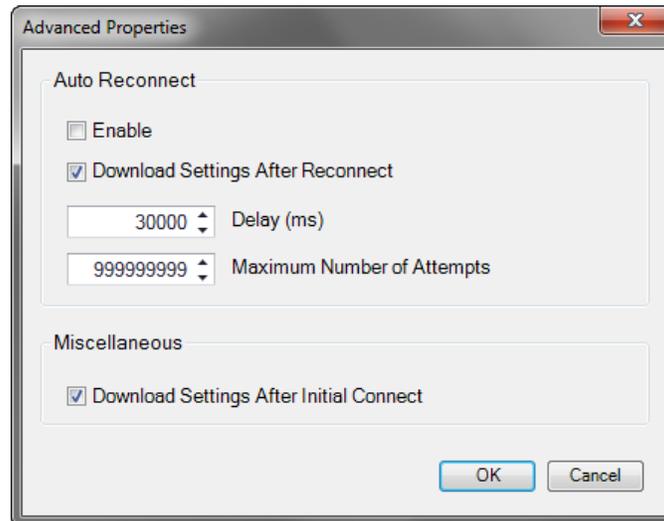
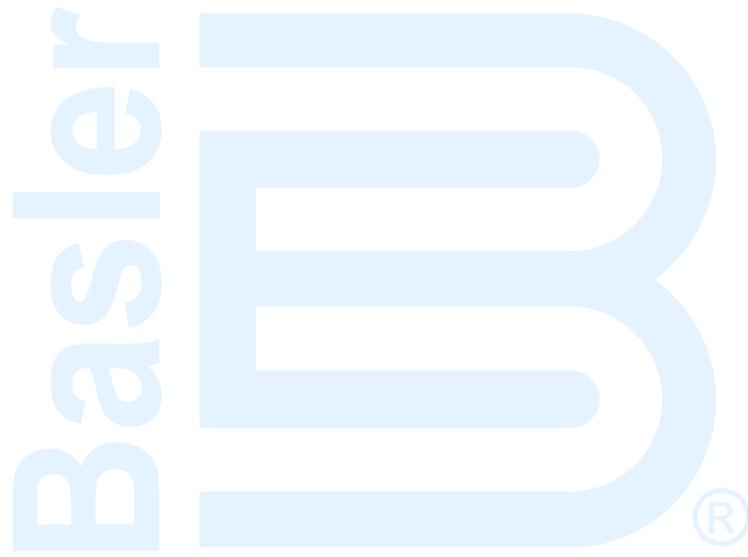


Figure 5-8. Advanced Properties Dialog



6 • Configuration

The DGC-2020ES must be properly configured for operation with a specific application prior to running. An incomplete list of basic settings to consider when configuring the DGC-2020ES is provided below with their locations in BESTCOMS*Plus* and the front panel. Ensure that all settings required for your application are configured in accordance with the generator/engine manufacturer(s) recommendations, authority having jurisdiction, and customer requirements. For detailed information on all settings, refer to the *Configuration* manual.

Basic Settings

For front panel interface components, refer to the *Controls and Indicators* chapter. For BESTCOMS*Plus* interface components, refer to the *BESTCOMSPlus Software* chapter.

System Settings

BESTCOMSPlus Navigation Path: Settings Explorer, System Parameters, System Settings

Front Panel Navigation Path: Settings > System Parameters > System Settings

CAN Bus Setup

BESTCOMSPlus® Navigation Path: Settings Explorer, Communications, CAN Bus, CAN Bus Setup

Front Panel Navigation Path: Settings > Communication > CAN Bus 1 (I/O) Setup and CAN Bus 2 (ECU) Setup

ECU Setup

BESTCOMSPlus® Navigation Path: Settings Explorer, Communications, CAN Bus, ECU Setup

Front Panel Navigation Path: Settings > Communication > CAN Bus 2 (ECU) Setup > ECU Setup

Rated Data

BESTCOMSPlus Navigation Paths:

Settings Explorer, System Parameters, Rated Data, Generator Rated Data

Front Panel Navigation Paths:

Settings > System Parameters > Rated Data, Gen

Remote Module Setup

BESTCOMSPlus Navigation Path: Settings Explorer, System Parameters, Remote Module Setup

Front Panel Navigation Path: Settings > System Settings > Remote Module Setup

Crank Settings

BESTCOMSPlus Navigation Path: Settings Explorer, System Parameters, Crank Settings

Front Panel Navigation Path: Settings > System Parameters > Crank Settings

Relay Control Settings

BESTCOMSPlus Navigation Path: Settings Explorer, System Parameters, Relay Control

Front Panel Navigation Path: Settings > System Parameters > Relay Control

Engine Sender Characteristic Curves Setup: Fuel, Temperature, and Oil

BESTCOMSPlus® Navigation Path: Settings Explorer, Programmable Senders

Front Panel Navigation Path: Not available through the front panel

Contact Inputs

BESTCOMSPlus Navigation Path: Settings Explorer, Programmable Inputs, Contact Inputs

Front Panel Navigation Path: Settings > Programmable Inputs > Contact Inputs

Programmable Functions

BESTCOMSPlus® Navigation Path: Settings Explorer, Programmable Inputs, Programmable Functions

Front Panel Navigation Path: Settings > Programmable Inputs > Programmable Functions

Programmable Output Configuration

BESTCOMSPlus® Navigation Path: Settings Explorer, Programmable Outputs, Contact Outputs

Front Panel Navigation Path: Settings Explorer > Programmable Outputs > Contact Outputs

Configurable Elements

BESTCOMSPlus® Navigation Path: Settings Explorer, Programmable Outputs, Configurable Elements

Front Panel Navigation Path: Settings Explorer > Programmable Outputs > Configurable Elements

Generator Breaker Settings

BESTCOMSPlus® Navigation Path: Settings Explorer, Breaker Management, Breaker Hardware

Front Panel Navigation Path: Settings Explorer > Breaker Management > Breaker Hardware

Mains Breaker Settings

BESTCOMSPlus® Navigation Path: Settings Explorer, Breaker Management, Breaker Hardware

Front Panel Navigation Path: Settings Explorer > Breaker Management > Breaker Hardware

Generator Protection

BESTCOMSPlus Navigation Path: Settings Explorer, Generator Protection

Front Panel Navigation Path: Settings Explorer > Generator Protection

Saving Settings

Front Panel

When settings are configured through the front panel interface, they are automatically saved.

BESTCOMSPlus®

After the desired settings are configured in **BESTCOMSPlus**, the settings must be uploaded to a connected DGC-2020ES. Refer to the following procedure to upload settings via **BESTCOMSPlus**.

1. Ensure that communication between a PC running **BESTCOMSPlus** and the DGC-2020ES is established.
2. In the Upper Menu Bar, Click Communications > Upload Settings to Device
3. You are prompted to enter the password. The default password is "OEM".
4. Press Enter or click Log In and the settings are uploaded to the connected DGC-2020ES.

7 • BESTlogic™ Plus

BESTlogicPlus Programmable Logic is a programming method used for managing the input, output, protection, control, monitoring, and reporting capabilities of Basler Electric's DGC-2020ES Digital Genset Controller.

BESTlogic™ Plus Composition

There are three main groups of objects used for programming BESTlogicPlus. These groups are *I/O*, *Components*, and *Elements*. For details on how these objects are used to program BESTlogicPlus, see the paragraphs on *Programming BESTlogicPlus*, later in this chapter.

Logic Schemes

A logic scheme is a group of logic variables written in equation form that defines the operation of a DGC-2020ES Digital Genset Controller. Each logic scheme is given a unique name. This gives you the ability to select a specific scheme and be confident that the selected scheme is in operation. One logic scheme is configured for typical control applications and is the default active logic scheme. Only one logic scheme can be active at a given time.

In most applications, preprogrammed logic schemes eliminate the need for custom programming. Preprogrammed logic schemes may provide more inputs, outputs, or features than are needed for a particular application. This is because a preprogrammed scheme is designed for a large number of applications with no special programming required. Unneeded logic block outputs may be left open to disable a function or a function block can be disabled through operating settings.

When a custom logic scheme is required, programming time is reduced by modifying the default logic scheme.

The Active Logic Scheme

Digital Genset Controllers must have an active logic scheme in order to function. All Basler Electric DGC-2020ES units are delivered with a default, active logic scheme pre-loaded in memory. If the function block configuration and output logic of the default logic scheme meets the requirements of your application, then only the operating settings (power system parameters and threshold settings) need to be adjusted before placing the DGC-2020ES in service.

Copying and Renaming Preprogrammed Logic Schemes

Copying a saved logic scheme to the active logic and assigning a unique name is accomplished by loading the saved logic scheme into BESTCOMSPPlus and then typing over the logic scheme's name. Changes are not activated until the new settings have been saved and uploaded to the device.

Sending and Retrieving Logic Schemes

To retrieve settings from the DGC-2020ES, it must be connected to a computer through a communications port. Once the necessary connections are made, settings can be downloaded from the DGC-2020ES by selecting *Download Settings and Logic* on the Communication pull-down menu.

To send settings to the DGC-2020ES, it must be connected to a computer through a communications port. Once the necessary connections are made, settings can be uploaded to the DGC-2020ES by selecting *Upload Settings and Logic* on the Communication pull-down menu.

Caution

Always remove the DGC-2020ES from service prior to changing or modifying the active logic scheme. Attempting to modify a logic scheme while the DGC-2020ES is in service could generate unexpected or unwanted outputs.

Modifying a logic scheme in *BESTCOMSPPlus* does not automatically make that scheme active in the DGC-2020ES. The modified scheme must be uploaded into the DGC-2020ES.

Programming *BESTlogic™Plus*

Use *BESTCOMSPPlus* to program *BESTlogicPlus*. Using *BESTCOMSPPlus* is analogous to physically attaching wire between discrete DGC-2020ES terminals. To program *BESTlogicPlus*, use the Settings Explorer within *BESTCOMSPPlus* to open the *BESTlogicPlus Programmable Logic* tree branch as shown in Figure 7-1.

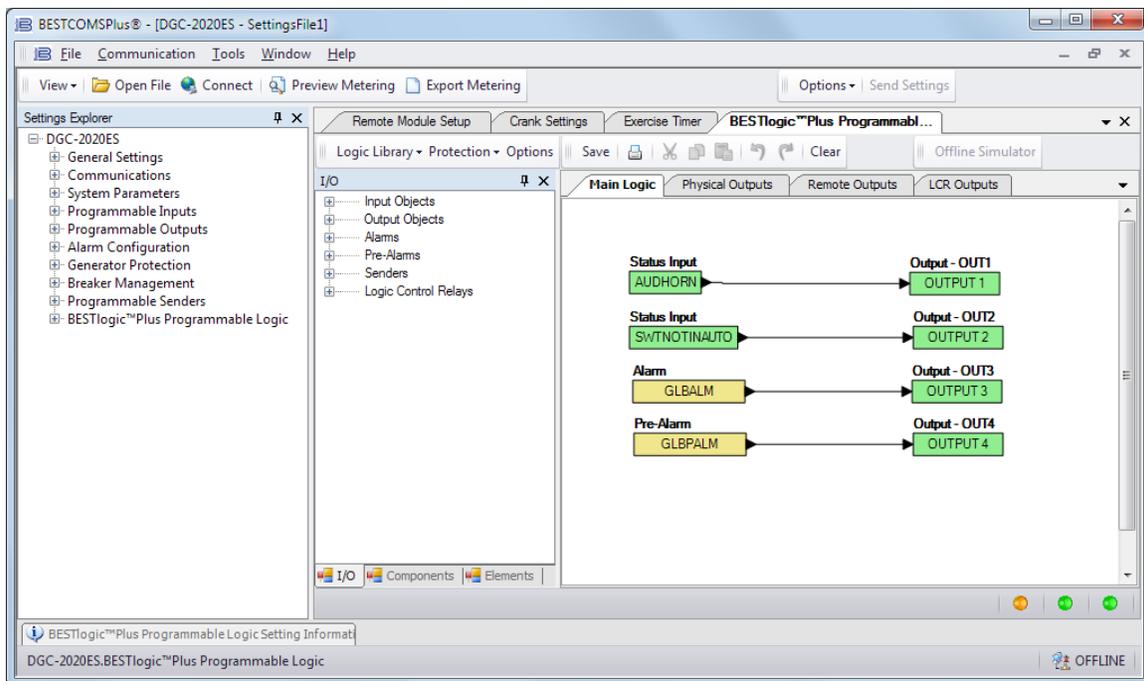


Figure 7-1. Settings Explorer, *BESTlogicPlus* Programmable Logic Screen

The drag and drop method is used to connect a variable or series of variables to the logic inputs, outputs, components, and elements. To draw a wire/link from port to port (triangles), click the left mouse button on a port, pull the wire onto another port, and release the left mouse button. A red port indicates that a connection to the port is required or missing. A black port indicates that a connection to the port is not required. Drawing wires/links from input to input or output to output is not allowed. Only one wire/link can be connected to any one output. If the proximity of the endpoint of the wire/link is not exact, it may attach to an unintended port.

If an object or element is disabled, it will have a yellow X on it. To enable the element, navigate to the settings page for that element. A red X indicates that an object or element is not available per the style number of the DGC-2020ES.

The view of the Main Logic, Physical Outputs, Remote Outputs, and LCR Outputs can be automatically arranged by clicking the right mouse button on the window and selecting *Auto-Layout*.

The following must be met before *BESTCOMSPPlus* will allow logic to be uploaded to the DGC-2020ES:

- A minimum of two inputs and a maximum of four inputs on any multi-port (AND, OR, NAND, NOR, XOR, and XNOR) gate.
- A maximum of five logic levels for any particular path. A path being an input block or an output side of an element block through gates to an output block or an input side of an element block. This is to include any OR gates on the Physical Output or Remote Output tab/pages, but not the matched pairs of Physical Output blocks or Remote Output blocks.
- Only 20 gates per logic level. All output blocks and input sides of element blocks are at the maximum logic level of the diagram. All gates are pushed forward/upwards in logic levels and buffered to reach the final output block or element block if needed. A maximum of 50 gates allowed per diagram.
- At all levels there can only be 64 used link/wired or endpoints. Endpoints being inputs, outputs, both sides of element blocks.

Three status indicators are located in the lower right corner of the BESTlogicPlus window. These indicators show the *Logic Save Status*, *Logic Diagram Status*, and *Logic Layer Status*. Table 7-1 defines the colors for each indicator.

Table 7-1. Status Indicators

| Indicator | Color | Definition |
|--|---|--|
| Logic Save Status (Left Indicator) |  Amber | Logic has changed since last save. |
| |  Green | Logic has NOT changed since last save. |
| Logic Diagram Status (Center Indicator) |  Red | Requirements NOT met as listed above. |
| |  Green | Requirements met as listed above. |
| Logic Layer Status (Right Indicator) |  Red | Requirements NOT met as listed above. |
| |  Green | Requirements met as listed above. |

Offline Logic Simulator

The offline logic simulator allows you to change the state of various logic elements to illustrate how that state travels through the system. Before running the logic simulator, you must click the Save button on the BESTlogicPlus toolbar to save the logic to memory. Changes to the logic (other than changing the state) are disabled when the simulator is enabled. Colors are selected by clicking the Options button on the BESTlogicPlus toolbar. By default, Logic 0 is red and Logic 1 is green. Using your mouse, double-click on a logic element to change its state.

An example of the offline logic simulator is shown in Figure 7-2. Output 1 is Logic 0 (red) when Virtual Switch 1 is Logic 0 (red) and Fixed 1 is Logic 1 (green).

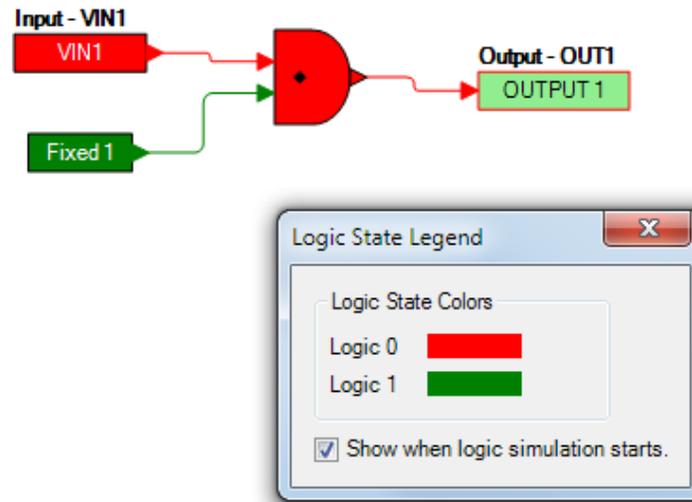


Figure 7-2. Offline Logic Simulator Example

BESTlogic™ Plus Examples

Example 1 - GENBRK Logic Block Connections

Figure 7-3 illustrates the GENBRK logic block, three input logic blocks, and two output logic blocks. Output 3 is active while the GENBRK is sending an “open breaker” command and Output 4 is active while the GENBRK is sending the “close breaker” command.

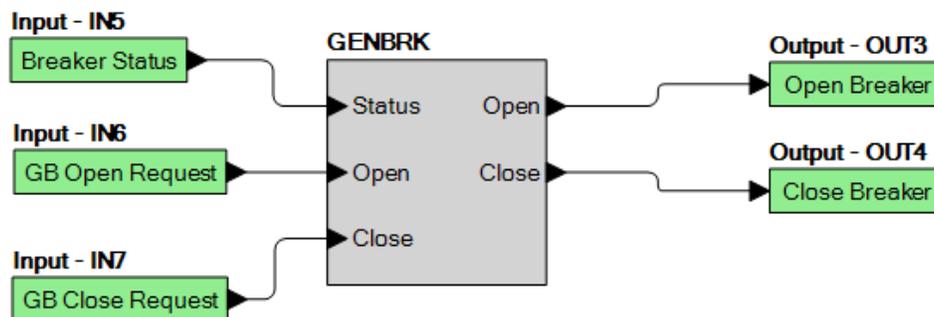


Figure 7-3. Example 1 – GENBRK Logic Block Connections

Example 2 - AND Gate Connections

Figure 7-4 illustrates a typical AND gate connection. In this example, Output 11 will become active when the Low Fuel alarm AND the Low Oil Pressure alarm are true.

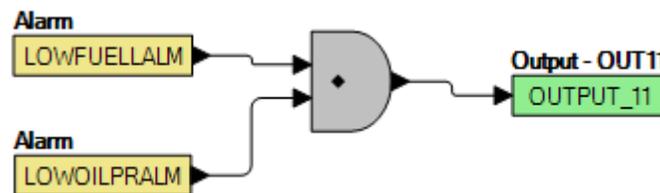


Figure 7-4. Example 2 – AND Gate Connections

Example 3 - Multiple Logic Connections

In this example, there are two comment boxes, which may be placed on the logic diagram. Double-click a comment box to modify the inside text. Output 3 becomes true when the 27TRIP is true. Output 1

becomes true when the High Coolant Temp is true. Output 2 becomes true when the DGC-2020ES is in RUN mode (RUN Mode true). Refer to Figure 7-5.

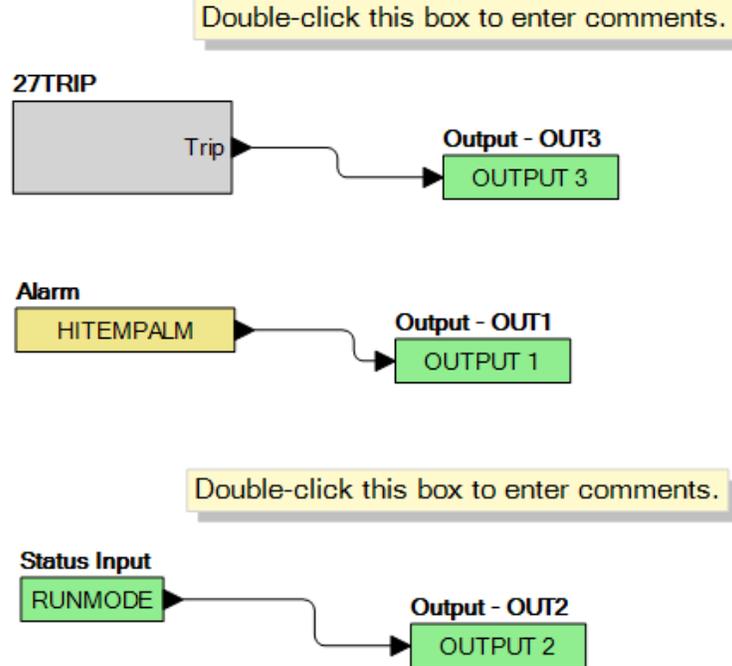
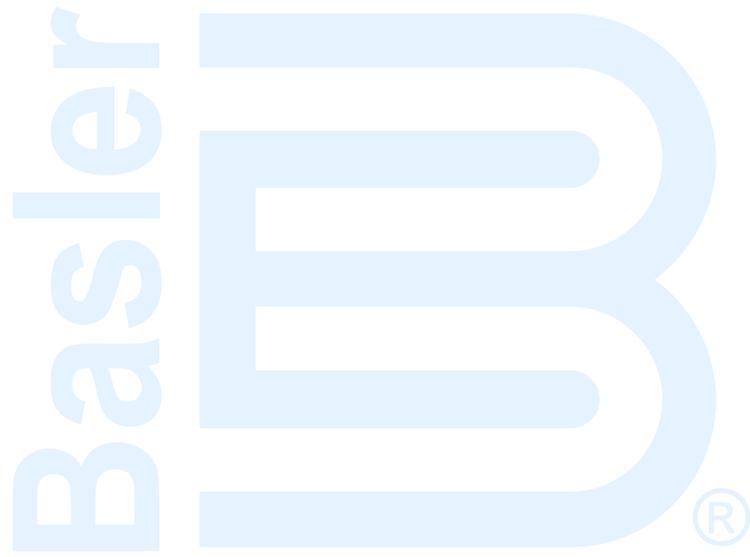


Figure 7-5. Example 3 – Multiple Logic Connections



8 • Controls and Indicators

DGC-2020ES controls and indicators are illustrated in Figure 8-1. Lettered locators in Figure 8-1 correspond to the control and indicator descriptions of Table 8-1.

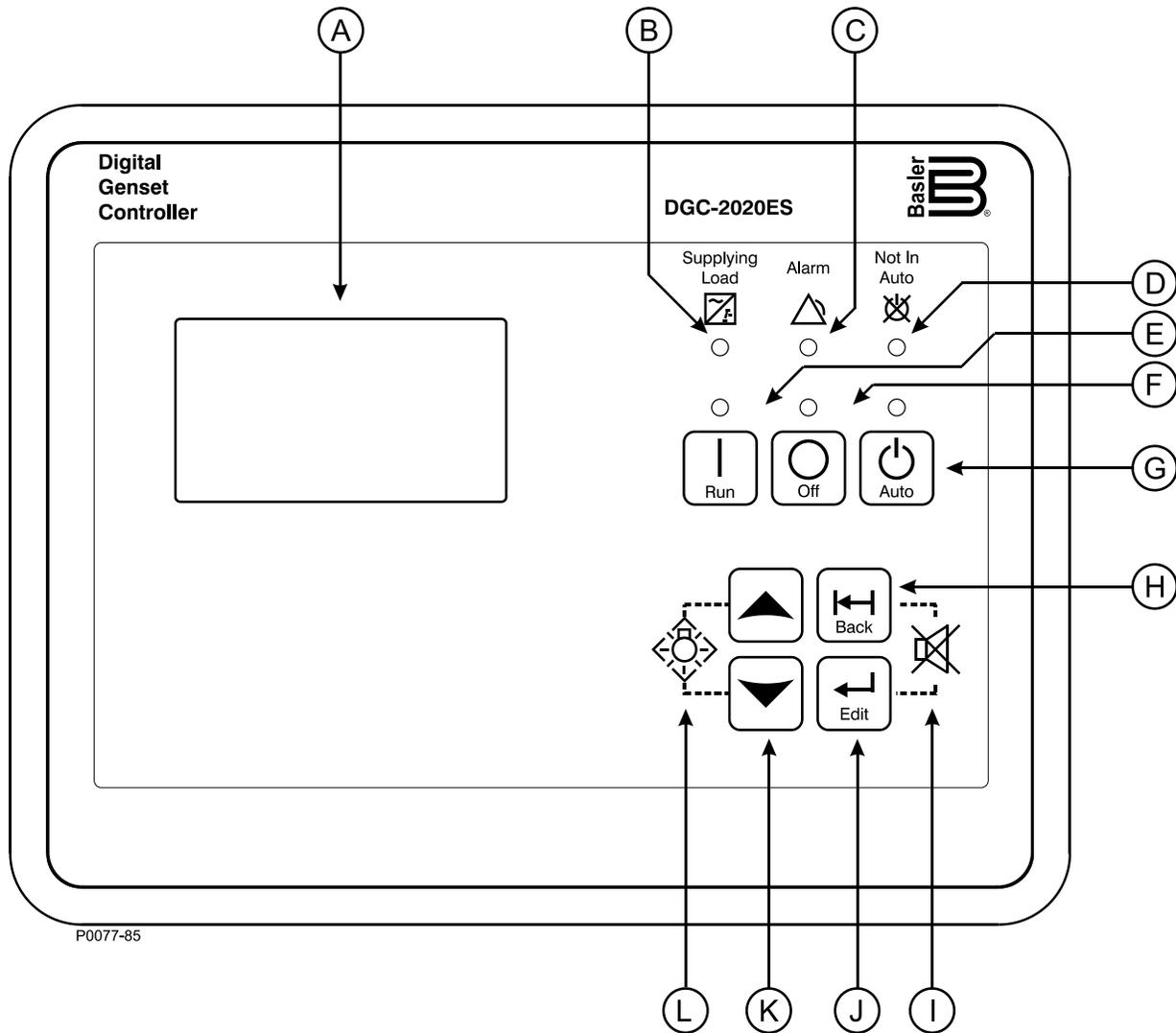


Figure 8-1. Front Panel

Table 8-1. Front-Panel HMI Descriptions

| Locator | Description |
|---------|---|
| A | <i>Liquid Crystal Display.</i> The backlit, 64 by 128 pixel LCD serves as the local information source for metering, alarms, pre-alarms, and protective functions. Display operation is maintained at -40°C . |
| B | <i>Supplying Load Indicator.</i> This green LED lights when the generator current is greater than Emergency Power Supply (EPS) threshold current. |
| C | <i>Alarm Indicator.</i> This red LED lights continuously during alarm conditions and flashes during pre-alarm conditions. |
| D | <i>Not in Auto Indicator.</i> This red LED lights when the DGC-2020ES is not operating in Auto mode. When the DGC-2020ES is operating in Run or Off mode, this LED is on. |

| | |
|---|--|
| E | <i>Run Pushbutton and Mode Indicator.</i> Pressing this button places the DGC-2020ES in Run mode. The green Run mode LED lights when Run mode is active. |
| F | <i>Off Pushbutton and Mode Indicator.</i> Pressing this button places the DGC-2020ES in Off mode. The red Off mode LED lights when the DGC-2020ES is in Off mode. This button also resets the Breaker Management Pre-Alarms and all <i>mtu</i> ECU Alarms. |
| G | <i>Auto Pushbutton and Mode Indicator.</i> Pressing the Auto button places the DGC-2020ES in Auto mode. The green Auto mode LED lights when Auto mode is active. |
| H | <i>Back Pushbutton.</i> This button is pressed to cancel a settings editing session and discard any settings changes. When navigating through menus, pressing this button moves upward a level. When pressed momentarily, this button also resets the Breaker Management Pre-Alarms and all <i>mtu</i> ECU Alarms. This button is also used to reset the Maintenance Interval when pressed for 10 seconds while viewing Hours Until Maintenance or Maintenance Due Pre-Alarm. |
| I | <i>Alarm Silence Pushbutton Combination.</i> Simultaneously pressing both the <i>Back</i> and <i>Edit</i> buttons opens the relay output programmed as the horn output. |
| J | <i>Edit Pushbutton.</i> Pressing this button starts an editing session and enables changes to DGC-2020ES settings. At the conclusion of an editing session, the Edit pushbutton is pressed again to save the setting changes. When navigating through menus, pressing this button moves downward one level. When entering a string, such as a password, this button locks the selected character and moves to the next position. When finished, press Edit twice to submit the string. |
| K | <i>Arrow Pushbuttons.</i> These two buttons are used to navigate through the front-panel display menus and modify settings. Within a level, the up- and down-arrow buttons are used to move among items within the menu level. Pressing the down-arrow button moves to items lower in the list. Pressing the up-arrow button moves to items higher in the list. During a settings editing session, the up- and down-arrow buttons are used to raise and lower the value of the selected setting. |
| L | <i>Lamp Test Pushbutton Combination.</i> Simultaneously pressing both the Up- and Down-arrow buttons tests the DGC-2020ES indicators by exercising all LCD pixels and lighting all LEDs for as long as both buttons are held. |

9 • Troubleshooting

If you do not get the results that you expect from the DGC-2020ES, first check the programmable settings for the appropriate function. Use the following troubleshooting procedures when difficulties are encountered in the operation of your genset control system.

Communications

USB Port Does Not Operate Properly

Step 1. Verify that the proper port of your computer is being used. For more information, refer to the *Communication* chapter in the *Configuration* manual.

CAN Communication Does Not Operate Properly

- Step 1: Verify that there is a 120-ohm termination resistor on each end of the bus section of the wiring, and that there are not any termination resistors at any node connections that are on stubs from the main bus.
- Step 2: Check all CAN wiring for loose connections and verify that the CAN H and CAN L wires have not gotten switched somewhere on the network.
- Step 3: Verify that the cable length of the bus section of the wiring does not exceed 40 meters (131 feet), and verify that any stubs from the main bus do not exceed 3 meters (9.8 feet) in length.
- Step 4: If the engine is equipped with a Volvo or *mtu* ECU, verify that the ECU Configuration setting is set to match the actual ECU configuration.

Inputs and Outputs

Programmable Inputs Do Not Operate as Expected

- Step 1. Verify that all wiring is properly connected. Refer to the *Typical Connections* chapter in the *Installation* manual.
- Step 2. Confirm that the inputs are programmed properly.
- Step 3. Ensure that the input at the DGC-2020ES is actually connected to the BATT– terminal (17).

Programmable Outputs Do Not Operate as Expected

- Step 1. Verify that all wiring is properly connected. Refer to the *Typical Connections* chapter in the *Installation* manual.
- Step 2. Confirm that the outputs are programmed properly.

Metering/Display

Incorrect Display of Battery Voltage, Coolant Temperature, Oil Pressure, or Fuel Level

- Step 1. Verify that all wiring is properly connected. Refer to the *Typical Connections* chapter in the *Installation* manual.
- Step 2. Confirm that the SENDER COM terminal (2) is connected to the negative battery terminal and the engine-block side of the senders. Current from other devices sharing this connection can cause erroneous readings.
- Step 3. If the displayed battery voltage is incorrect, ensure that the proper voltage is present between the BATT+ terminal (18) and the SENDER COM terminal (2).
- Step 4. Verify that the correct senders are being used.

- Step 5. Use a voltmeter connected between the BATT– terminal (17) and the SENDER COM terminal (2) on the DGC-2020ES to verify that there is no voltage difference at any time. Any voltage differences may manifest themselves as erratic sender readings. Wiring should be corrected so that no differences exist.
- Step 6: Check the sender wiring and isolate sender wiring from any of the ac wiring in the system. The sender wiring should be located away from any power ac wiring from the generator and any ignition wiring. Separate conduits should be used for sender wiring and any ac wiring.

Incorrect Display of Generator Voltage

- Step 1. Verify that all wiring is properly connected. Refer to the *Typical Connections* chapter in the *Installation* manual.
- Step 2. Ensure that the proper voltage is present at the DGC-2020ES voltage sensing inputs (40, 41, 43, and 45).
- Step 3. Verify that the voltage transformer ratio and sensing configuration is correct.
- Step 4. Confirm that the voltage sensing transformers are correct and properly installed.

Incorrect Measurement or Display of Generator Current

- Step 1. Verify that all wiring is properly connected. Refer to the *Typical Connections* chapter in the *Installation* manual.
- Step 2. Ensure that the proper current is present at the DGC-2020ES current sensing inputs 33, 34, 35, 36, 37, and 38.
- Step 3. Verify that the current sensing transformer ratios are correct.
- Step 4. Confirm that the current sensing transformers are correct and properly installed.

Incorrect Display of Engine RPM

- Step 1. Verify that all wiring is properly connected. Refer to the *Typical Connections* chapter in the *Installation* manual.
- Step 2. Verify that the flywheel teeth setting is correct.
- Step 3. Verify that the prime mover governor is operating properly.
- Step 4. Verify that the measured frequency of the voltage at the MPU input (31 and 32) is correct.
- Step 5. If the MPU is shared with the governor, verify that the polarity of the MPU input to the governor matches the polarity of the MPU input to the DGC-2020ES.

DGC-2020ES Indicates Incorrect Power Factor

Check the rotation of the machine and the labeling of the A-B-C terminals. The machine must be rotating in the same phase sequence as dictated by the generator phase rotation setting for correct power factor metering. A power factor indication of 0.5 with resistive load present is a symptom of incorrect phase rotation.

LCD is Blank and all LEDs are Flashing at Approximately Two-Second Intervals

This indicates that the DGC-2020ES does not detect that valid application firmware is installed. The unit is running its boot loader program, waiting to accept a firmware upload.

- Step 1. Start *BESTCOMSPi*®. Use the top pull-down menu and select FILE > NEW > DGC-2020ES.
- Step 2. Select COMMUNICATIONS > UPLOAD DEVICE FILES and select the device package file that contains the firmware and language you want to upload.
- Step 3. Check the boxes for DGC-2020ES Firmware and DGC-2020ES Language Module. Click the UPLOAD button to start the upload process.

Ground Faults Detected in Ungrounded System Applications

- Step 1: Verify that there is no connection from the neutral connection of the generator to the system ground.
- Step 2: Perform insulation resistance tests on the system wiring to check for insulation integrity in the overall system.
- Step 3: If ground faults are detected on a DGC-2020ES in an ungrounded system application, it is recommended that potential transformers be employed on the voltage sensing inputs to provide full isolation between the DGC-2020ES and monitored voltage phases.
- Step 4: If potential transformers are in place, remove the connectors from the DGC-2020ES one at a time. If removal of a connector removes the ground fault, check the system wiring to that connector and out into the system to verify that connections are secure and all wiring insulation is in good condition.

Generator Breaker and Mains Breaker

Generator Breaker Will Not Close to a Dead Bus

- Step 1: Review the description of how the generator breaker logic element functions contained in the GENBRK logic element description in the BESTlogic™*Plus* chapter in the *Configuration* manual.
- Step 2: Review the section on breaker close requests in the *Breaker Management* chapter in the *Configuration* manual.
- Step 3: Navigate to the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE > GEN BREAKER screen and set DEAD BUS CL ENBL to ENABLE.
- Step 4: Verify that the Generator status is stable. The breaker will not close if the generator status is not stable. Check status by using the Metering Explorer in BESTCOM*Plus* and verify that when the generator is running, the GEN STABLE status LED is lit. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION screen.
- Step 5: Verify the bus status is DEAD. Check status by using the Metering Explorer in BESTCOM*Plus* and verify that when the generator is running, the BUS DEAD status LED is lit. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION screen.
- Step 6: Verify the connections in BESTlogic*Plus* Programmable Logic to the generator breaker logic element. The *Status* input must be driven by an “A” or normally open contact from the generator breaker. The OPEN and CLOSE command inputs on the left side of the logic block are inputs for open and close commands. These can be wired to physical inputs if it is desired to have open and close command switches. If they are wired, they must either be pulsed inputs, or some logic must be employed so that the open and close command inputs are never driven at the same time. If these are both driven at the same time, the breaker is receiving open and close commands simultaneously. The breaker will not change state if it is being commanded to open and close at the same time.
- Step 7: Verify the breaker is receiving a close command. Breaker close command sources are:
- The DGC-2020ES itself when the automatic mains fail transfer (ATS) feature is enabled.
 - The DGC-2020ES itself when the RUN WITH LOAD logic element receives a *Start* pulse in the programmable logic.
 - The DGC-2020ES itself when started from the Exercise Timer and the Run with Load box is checked in the Generator Exerciser settings.
 - Manual Breaker Close Input Contacts applied to the Open and Close inputs on the left side of the Generator Breaker logic element in the programmable logic.

Step 8: Verify the wiring to the breaker from the DGC-2020ES. If it seems OK, you can do a manual close and open by modifying the programmable logic. Map some unused outputs to the OPEN and CLOSE outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker open output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMSPPlus, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Generator Breaker Does Not Open When It Should

Step 1: Review the description of how the generator breaker logic element functions contained in the GENBRK logic element description in the *BESTlogicPlus* chapter in the *Configuration* manual.

Step 2: Review the section on breaker operation requests in the *Breaker Management* chapter in the *Configuration* manual.

Step 3: Verify the connections in BESTlogicPlus Programmable Logic to the generator breaker logic element. The *Status* input must be driven by an “A” or normally open contact from the generator breaker. The OPEN and CLOSE command inputs on the left side of the logic block are inputs for open and close commands. These can be wired to physical inputs if it is desired to have open and close command switches. If they are wired, they must either be pulsed inputs, or some logic must be employed so that the open and close command inputs are never driven at the same time. If these are both driven at the same time, the breaker is receiving open and close commands simultaneously. The breaker will not change state if it is being commanded to open and close at the same time.

Step 4: Verify the breaker is receiving an open command. Breaker open command sources are:

- The DGC-2020ES itself when the automatic transfer (ATS) feature is enabled.
- The DGC-2020ES itself when the RUN WITH LOAD logic element receives a *Stop* pulse in the programmable logic.
- The DGC-2020ES itself when shutting down the engine due to an active alarm.
- The DGC-2020ES itself when ending a run session from the Exercise Timer and the *Run with Load* box is checked in the Generator Exerciser settings.
- Manual Breaker Open Input Contacts applied to the Open and Close inputs on the left side of the Generator Breaker logic element in the programmable logic.

Step 5: Verify the wiring to the breaker from the DGC-2020ES. If it seems OK, you can do a manual close and open by modifying the programmable logic. Map some unused outputs to the OPEN and CLOSE outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker open output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMSPPlus, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Mains Breaker Does Not Open When Mains Fails

Step 1: Verify that a Mains Breaker has been configured by examining the settings on the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE screen.

Step 2: Verify the mains breaker has been correctly included in the programmable logic.

Step 3: Verify that the MAINS FAIL TRANSFER parameter is set to ENABLE on the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE screen.

Step 4: Verify that a failure of the mains is detected by the DGC-2020ES. Check status using the Metering Explorer in BESTCOMSPPlus and verify that the MAINS FAIL status LED is lit when

the power on the DGC-2020ES bus voltage input is either out of voltage or frequency range. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION screen to achieve correct detection.

Step 5: Verify the wiring to the breaker from the DGC-2020ES. If it seems OK, you can do a manual close and open by modifying the programmable logic. Map some unused outputs to the OPEN and CLOSE outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker close output. Map another virtual switch to the logic output that would normally be the breaker open output. Connect with BESTCOMSP*lus*, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Mains Breaker Does Not Close After Mains Returns

Step 1: Verify that a Mains Breaker has been configured by examining the settings on the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE screen.

Step 2: Verify the mains breaker has been correctly included in the programmable logic.

Step 3: Verify that the MAINS FAIL TRANSFER parameter is set to ENABLE on the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE screen.

Step 4: Verify that stable mains power is detected by the DGC-2020ES. Check status using the Metering Explorer in BESTCOMSP*lus* and verify that the MAINS STABLE status LED is lit when the power on the DGC-2020ES bus voltage input is good. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION screen to achieve correct detection.

Step 5: Verify the wiring to the breaker from the DGC-2020ES. If it seems OK, you can do a manual close and open by modifying the programmable logic. Map some unused outputs to the OPEN and CLOSE outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker open output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMSP*lus*, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

DGC-2020ES Front Panel Debug Screen

There is one debug screen in the DGC-2020ES that can be useful for debugging I/O module related issues. The following debug screen is available: CEM DEBUG

CEM DEBUG

This screen shows the binary data that is being sent between the CEM-2020 (Contact Expansion Module) and the DGC-2020ES.

The CEM DEBUG screen is located on the front panel at SETTINGS > SYSTEM PARAMS > REMOTE MODULE SETUP > CEM SETUP > CEM DEBUG MENU.

The following parameters are visible on the CEM DEBUG screen:

- DGC TO CEM BP: DGC-2020ES to CEM-2020 Binary Points. This is the status of the CEM-2020 output relays being transmitted from the DGC-2020ES to the CEM-2020. This is a 32-bit, bit packed number representing the desired states of the CEM-2020 outputs. The left most bit is the first output, etc.
- CEM TO DGC BP: CEM-2020 to DGC-2020ES Binary Points. This is the status of the CEM-2020 inputs being transmitted from the CEM-2020 to the DGC-2020ES. This is a 32-bit, bit packed number representing the metered states of the CEM-2020 inputs. The left most bit is the first input, etc.



 **Basler Electric®**
www.basler.com

12570 State Route 143
Highland IL 62249-1074 USA
Tel: +1 618.654.2341
Fax: +1 618.654.2351
email: info@basler.com

No. 59 Heshun Road Loufeng District (N)
Suzhou Industrial Park
215122 Suzhou
P.R. CHINA
Tel: +86 512.8227.2888
Fax: +86 512.8227.2887
email: chinainfo@basler.com

111 North Bridge Road
15-06 Peninsula Plaza
Singapore 179098
Tel: +65 68.44.6445
Fax: +65 68.44.8902
email: singaporeinfo@basler.com