WOODWARD

EGCP2-GCP-LSIM
Load Share Interface Module

CAN   RS-485

Manual
Software Version 1.xxxx

Manual 37407A

WARNING

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

The engine, turbine, or other type of prime mover should be equipped with an overspeed (overtemperature, or overpressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

CAUTION

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

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Important definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

NOTE

Provides other helpful information that does not fall under the warning or caution categories.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, Woodward assumes no responsibility unless otherwise expressly undertaken.

Revision History

Rev.	Date	Editor	Changes
NEW	07-09-28	TP	Release
A	07-10-17	TP	Information about galvanic isolator on RS-485 bus added

Content

Figures and Tables

Figures

Tables

Chapter 1.
General Information

Related Documents

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Type		English	German
GCP-31/32 Series			
EGCP2-GCP-LSIM Manual	this manual ⇨	37407	-
GCP-31/32 Packages - Installation		37364	GR37364
GCP-31/32 Packages - Configuration		37365	GR37365
GCP-31/32 - Function/Operation		37238	GR37238
GCP-31/32 - Application		37240	GR37240
GCP-31/RPQ - Installation		37366	GR37366
GCP-31/RPQ - Configuration		37367	GR37367
Option SB - Caterpillar CCM coupling		37200	GR37200
Option SC09/SC10 - CAN bus coupling		37382	GR37382

Type	English	German
EGCP-2 Series		
EGCP-2 - Installation and Operation	26174	-
EGCP-2 - Application	26175	-
EGCP-2 - Communications	26181	-

Type	English	German
Additional Manuals		
IKD 1 - Manual	37135	GR37135
Discrete expansion board with 8 discrete inputs and 8 relay outputs that can be coupled via the CAN bus to the control unit. Assessment of the discrete inputs as well as control of the relay outputs is done via the control unit.		
LeoPC1 - Manual	37146	GR37146
PC program for visualization, configuration, remote control, data logging, language upload, alarm and user management and management of the event recorder. This manual describes the use of the program.		
LeoPC1 - Manual	37164	GR37164
PC program for visualization, configuration, remote control, data logging, language upload, alarm and user management and management of the event recorder. This manual describes the programming of the program.		
GW 4 - Manual	37133	GR37133
Gateway for transferring the CAN bus to any other interface or bus.		
ST 3 - Manual	37112	GR37112
Control to govern the air fuel ratio of a gas engine. The ratio will be directly measured though a Lambda probe and controlled to a configured value.		

Table 1-1: Manual - overview

Overview

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The EGCP2-GCP-LSIM (Load Share Interface Module) is a next-generation communication converter specifically designed to interface Woodward's GCP-30 Series Genset Controls via CAN bus with Woodward EGCP-2 load share networks. The EGCP2-GCP-LSIM supports active and reactive load sharing. Load-dependent start/stop and master handover are not supported. Up to 8 controls (either GCPs or EGCPs) are supported. Each GCP-30 in the system will require its own EGCP2-GCP-LSIM.

The GCP-EGCP Load Share Interface features CAN, serial RS-232 and RS-485 ports and can be mounted on a DIN rail. On the CAN side it implements the Woodward CAL protocol to connect to the GCP 30 series controls. On the serial ports it implements the EGCP-2 load share protocol and accepts connections to Woodward EGCP-2 load share networks.

Connection of the interface module is simple and no configuration of the interface module is necessary.

Intended Use The unit must only be operated in the manner described by this manual. The prerequisite for a proper and safe operation of the product is correct transportation, storage, and installation as well as careful operation and maintenance.

Chapter 2.
Installation

Safety Precautions

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⚠️ **WARNING**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- **Only qualified workers should install this equipment. Such work should be performed only after reading this entire set of instructions.**
- **NEVER work alone.**
- **Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.**
- **Apply appropriate personal protective equipment and follow safe electrical practices.**
- **Turn off all power supplying the equipment in which the EGCP2-GCP-LSIM is to be installed before installing and wiring the EGCP2-GCP-LSIM.**
- **Always use a properly rated voltage sensing device to confirm that power is off.**
- **Beware of potential hazards, wear personal protective equipment, and carefully inspect the work area for tools and objects that may have been left inside the equipment.**
- **The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.**

Failure to follow these instructions will result in death or serious injury!

⚠️ **CAUTION**

No dead bus closure interlock between GCPs or GCPs and the EGCP-2s is provided by the EGCP2-GCP-LSIM. A closure of the GCP-30 onto a dead busbar simultaneously with other controls must be prevented by external means!

The unit does not provide any protection and in addition renders the built-in protection of the GCP-30 dysfunctional!

Regulatory Notes

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- The EGCP2-GCP-LSIM is suitable for use in non-hazardous locations only.

- The EGCP2-GCP-LSIM is not authorized for use in life support devices or systems.

- Wiring and installation must be in accordance with applicable electrical codes in accordance with the authority having jurisdiction.

- The EGCP2-GCP-LSIM is designed for installation into an electrical switchboard or cubical as part of a fixed installation.

Electrostatic Discharge Awareness

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All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).

2. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.

3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.

4. **Opening the Control unit will void the warranty!**
    Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:

    - Make sure that the unit is completely de-energized (all connectors have to be pulled off).

    - Do not touch any part of the PCB except the edges.

    - Do not touch the electrical conductors, connectors, or components with conductive devices or with bare hands.

    - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control unit, place it in the antistatic protective bag.

WARNING

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

DIN Rail Mounting and Removal

The EGCP2-GCP-LSIM is designed to be mounted on a 35 mm DIN rail according to DIN/EN 50022. The enclosure features a 35 mm profile at the back which snaps into the DIN rail. No tools are required for mounting.

To mount the module on a DIN rail, slot the top part of the EGCP2-GCP-LSIM into the upper guide of the rail (1) and lower the enclosure until the bottom of the red hook clicks into place (2) (refer to Figure 2-1).
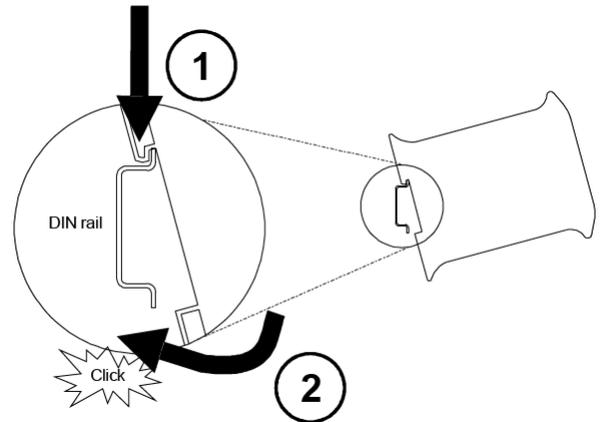

Figure 2-1: DIN rail mounting

To remove the EGCP2-GCP-LSIM from the DIN rail, use a screw driver as a lever by inserting it in the small slot of the red hook and push the red hook downwards (1). Then remove the module from the rail by raising the bottom front edge of the enclosure (2) (refer to Figure 2-2).
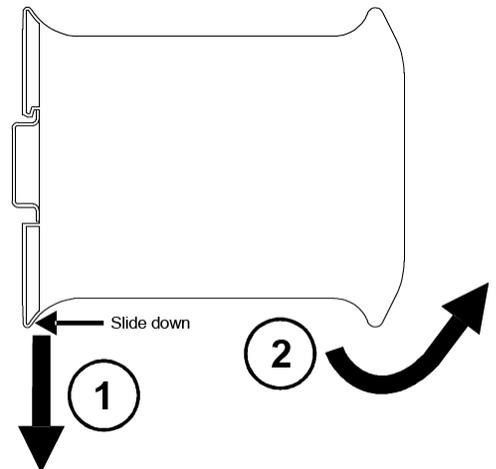
Figure 2-2: DIN rail removal

The enclosure provides protection against solid objects according to IP 20 classification and NEMA Type 1 rating. When mounting the enclosure observe the following rules:

- Avoid splash water and water drops
- Avoid aggressive gas, steam or liquids
- Avoid dusty environments
- Make sure there is sufficient air ventilation and clearance to other devices mounted next to the module
- Do not exceed the specified operational temperatures.
- Mount inside a sealed electrical switchboard or cubicle
- Observe applicable local regulations like EN60204 / VDE0113

Wiring Overview

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One GCP-30 and Three EGCP-2s
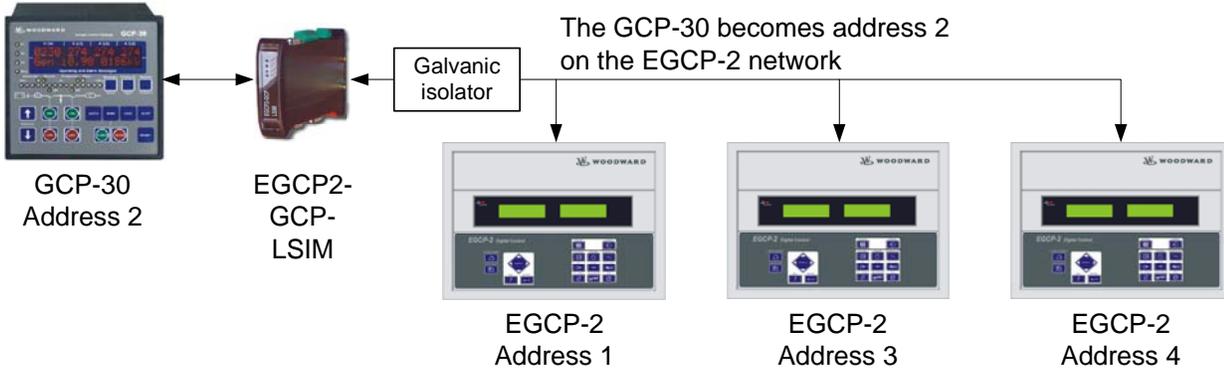
Figure 2-3: Wiring - 1 GCP & 3 EGCP-2s

Three GCP-30s and Three EGCP-2s
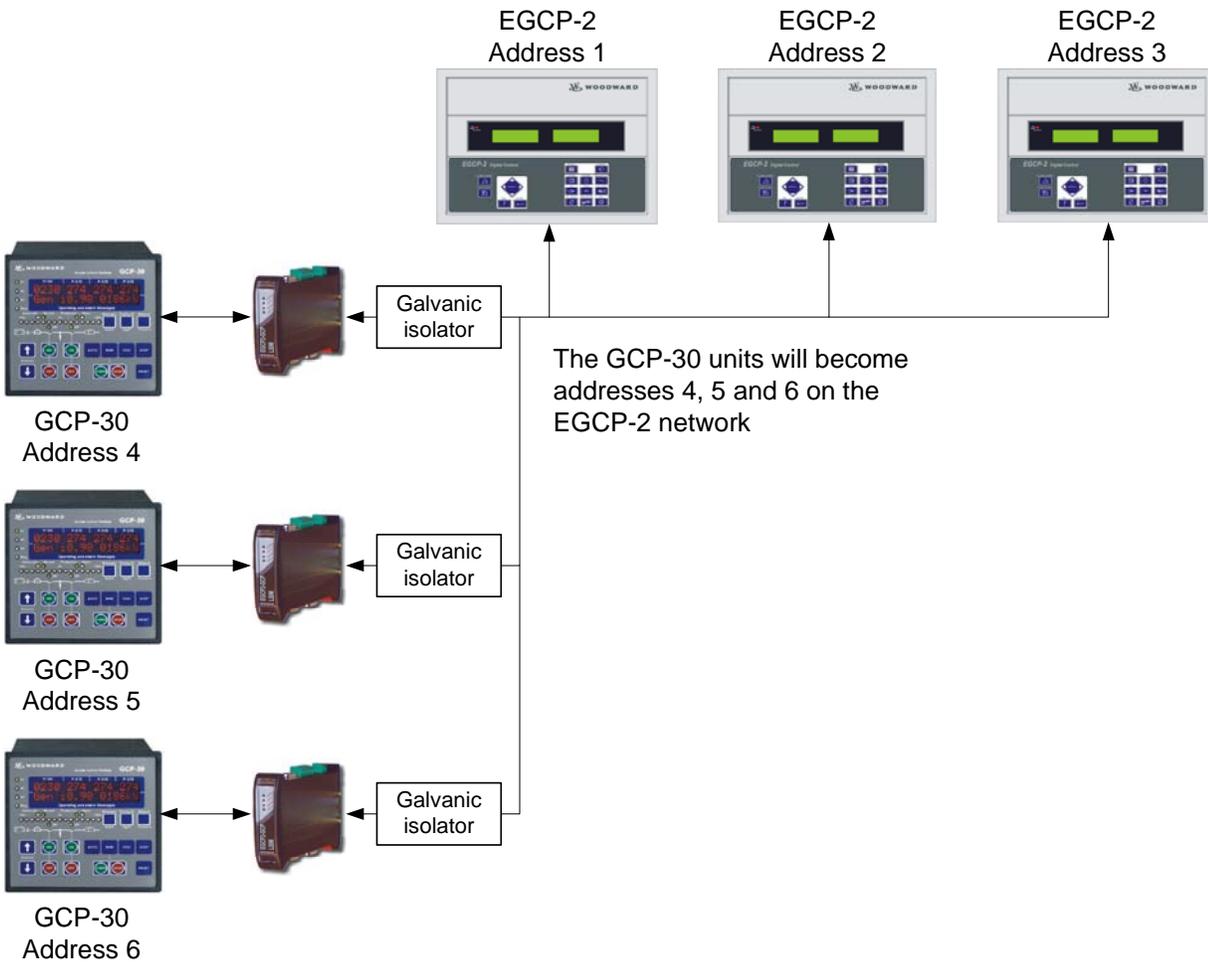
Figure 2-4: Wiring - 3 GCPs & 3 EGCP-2s

Load Share Gateway for Mixed Use of GCP and EGCP-2
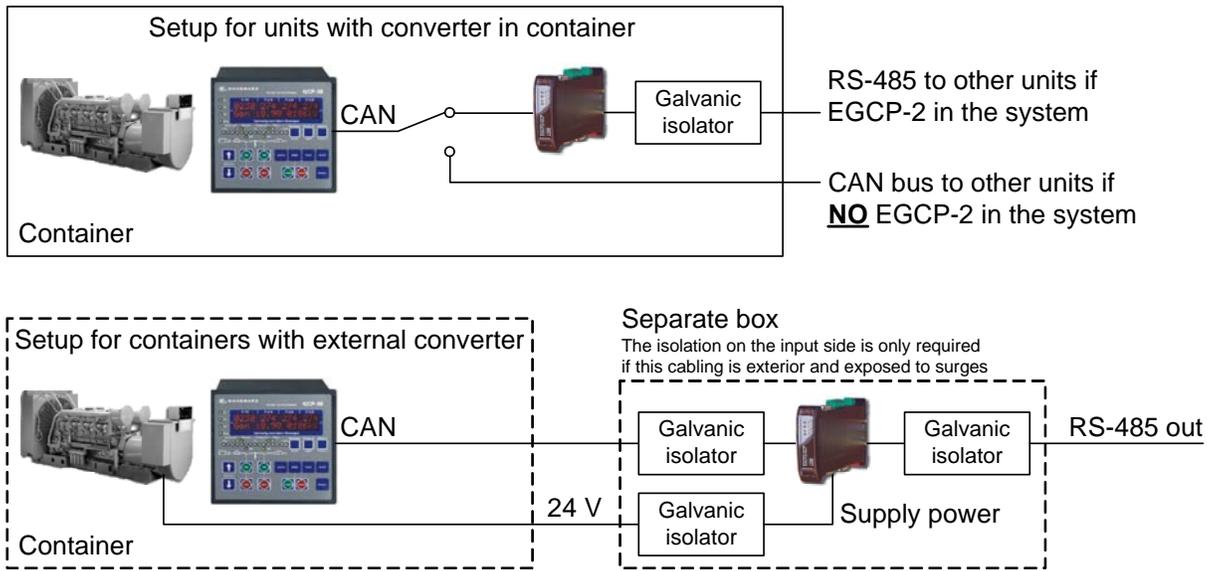
Figure 2-5: Wiring - Load share gateway for mixed use of GCP and EGCP-2

Terminal and Interface Overview

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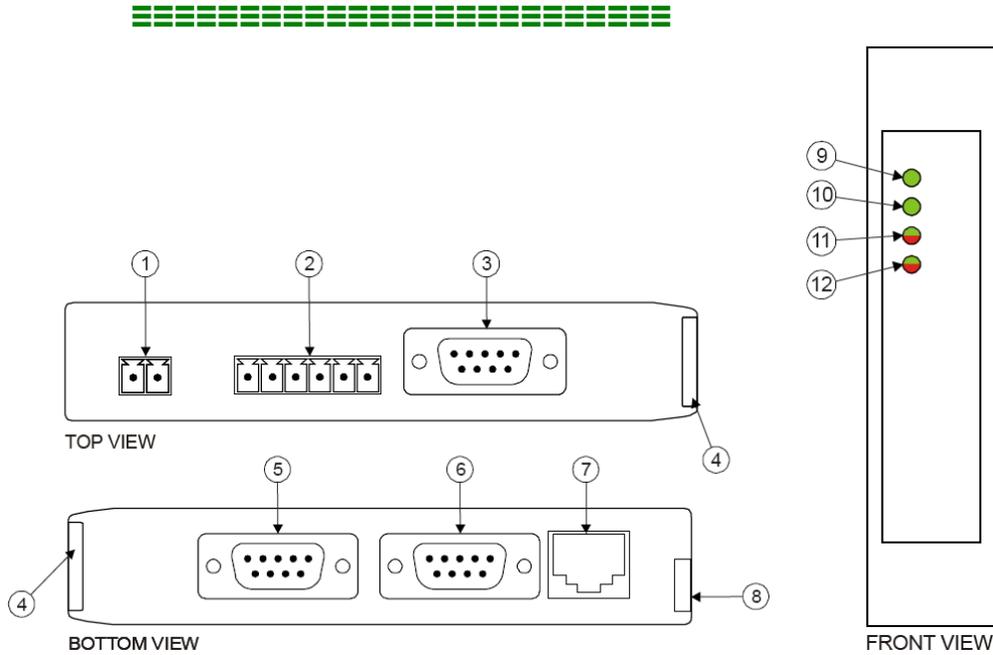
Figure 2-6: Terminal and interface overview

1) Power terminal block socket
2) RS-485 terminal block socket
3) CAN connector
4) Clear front cover
5) Primary RS-232 connector (not used)
6) Secondary RS-232 connector (Diagnostic)
7) Ethernet connector (not used)
8) DIN rail clip
9) Power LED
10) Ethernet Link LED (not used)
11) EGCP-2 Communication Status LED
12) GCP-30 Communication Status LED

Dimensions

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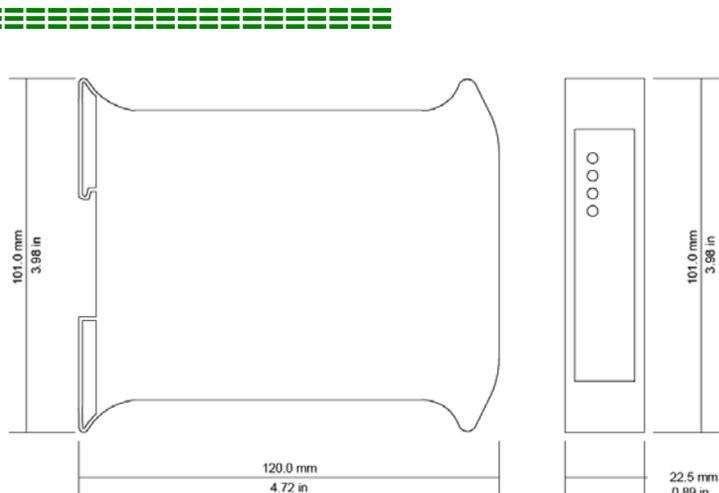
Figure 2-7: Dimensions

Connection

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Power Supply

Power is supplied via a 3.81 mm 2-pin pluggable terminal block (Phoenix Contact Mini Combicon type MC1,5/2-ST-3.81) located at the top side of the mounted module. Figure 2-8 and Table 2-1 show the power terminal socket pinout.
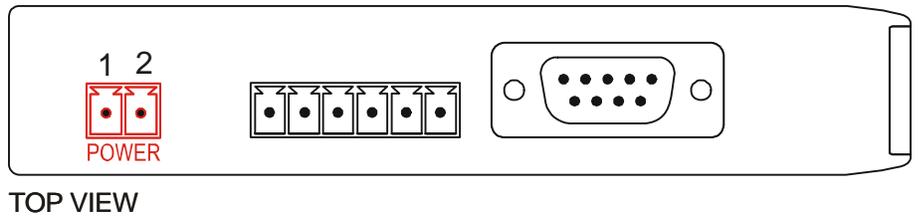
Figure 2-8: Power supply terminals

Terminal	Signal	Description	A_{max}
1	V+	Positive voltage supply (10 to 30 Vdc)	2.5 mm²
2	V-	Negative voltage supply, ground	2.5 mm²

Table 2-1: Terminal assignment - power supply

⚠ **CAUTION**

Make sure that the polarity of the supply voltage is correct before connecting any device to the serial and CAN ports! A wrong polarity can cause high currents on the ground plane between the V- power supply pin and the CAN port and serial port GND pins, which can cause damage to the module.

CAN Interface

The CAN interface connects to the GCP-30.
The connector is a male 9-pin D-sub type located at the top side of the mounted module. It has industry standard CiA DS-102 pinout as shown in Figure 2-9 an Table 2-2.

TOP VIEW
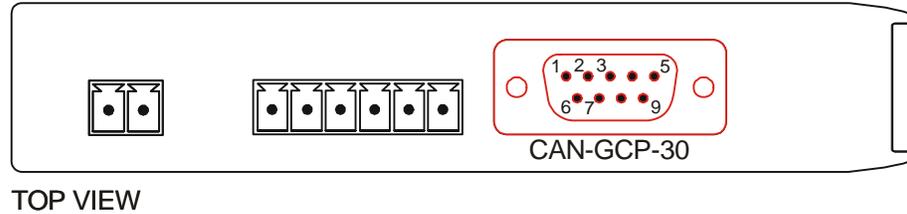
Figure 2-9: CAN interface

Terminal	Signal	Description	A_{max}
1	-	(not connected)	-
2	CAN L	CAN L bus line	-
3	GND	CAN ground	-
4	-	(not connected)	-
5	-	(not connected)	-
6	GND	CAN ground	-
7	CAN H	CAN H bus line	-
8	-	(not connected)	-
9	-	(not connected)	-
	FG	Connector shell is internally connected to ground	

Table 2-2: Terminal assignment - CAN interface

- The bus must be terminated at both ends with its characteristic impedance, typically a 120 Ohm resistor.
- The cable must be a twisted pair (for CAN H/CAN L) and a third wire (for the ground).
- Maximum cable length is 250 m (820 ft).
- Stub connections off the main line should be avoided if possible or at least be kept as short as possible.
- The cable must be shielded and the shield must be connected to a protective ground at a single point to assure a high degree of electromagnetic compatibility and surge protection.
- The shield must not be connected to the GND pins or the connector shell.

NOTE

Refer to the GCP-30 Installation Manual 37364 (or 37366 for the Rental Package) for a detailed description of the CAN bus connection.

RS-485 EGCP-2 Communication Interface

The RS-485 communication port is used for connecting the EGCP2-GCP-LSIM to a the Woodward RS-485 EGCP-2 communication network.
The RS-485 signals are located at the 3.81 mm 6-pin pluggable terminal block (Phoenix Contact Mini Combicon type MC1,5/2-ST-3.81) on the top side of the mounted module. Figure 2-10 and Table 2-3 show the pinout.


TOP VIEW
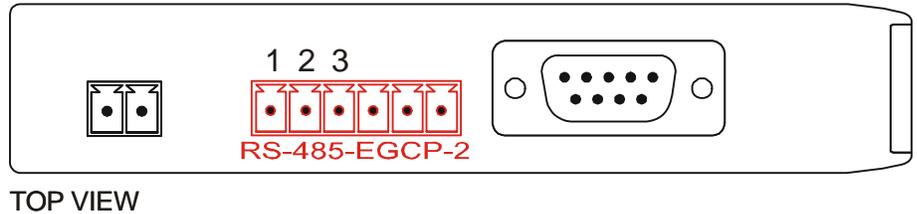
Figure 2-10: RS-485 EGCP-2 interface

Terminal	EIA-485 name	Description	A_{max}
1	C/C'	Signal Common (GND)	2.5 mm²
2	B/B'	Non-inverting Transceiver terminal 1 (RX/TX+)	2.5 mm²
3	A/A'	Inverting Transceiver Terminal 0 (RX/TX-)	2.5 mm²
4	-	(unused, must be left unconnected)	2.5 mm²
5	-	(unused, must be left unconnected)	2.5 mm²
6	-	(unused, must be left unconnected)	2.5 mm²

Table 2-3: Terminal assignment - RS-485 EGCP-2 interface

- The bus must be terminated at both ends with its characteristic impedance, typically a 120 Ohm resistor.
- The bus lines are to be biased (polarized) at one point, typically at the master connection
- The cable must be a twisted pair (for B+/A-) and a third wire (for the common).
- Maximum cable length to 1200 m (4000 ft).
- Stub connections off the main line should be avoided if possible or at least be kept as short as possible.
- To assure a high degree of electromagnetic compatibility and surge protection, the RS-485 cable must be shielded and the shield must be connected to a protective ground at a single point. The shield must not be connected to the GND pin.

CAUTION
A galvanic isolator must be used between the LSIM and the EGCP-2 network.

NOTE
Refer to the EGCP-2 Installation Manual 26174 for a detailed description of the RS-485 connection.

Chapter 3.
Configuration

EGCP2-GCP-LSIM Configuration

The EGCP2-GCP-LSIM does not need to be configured.

GCP-30 Configuration

The GCP device number must not be configured as 1. Device number 1 is reserved for the EGCP2-GCP-LSIM. For multiple GCPs, use address 2,3,4, etc. A GCP-30 that is accidentally configured as address 1 will be ignored.

EGCP-2 Configuration

One EGCP-2 must be configured as the system Master. It is recommended to configure the Master unit with device number 1 and priority number 1.
The EGCP-2 must be operating in the Automatic mode. The Auto discrete input #1 must be closed on this unit at all times.
The configuration item Auto Sequencing must be set to disabled.

Chapter 4.
Operation

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LEDs

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Four LEDs located at the front panel indicate the status of the module. The LEDs assist maintenance personnel in quickly identifying wiring or communication errors.

A LED test is exercised at power-up, cycling each LED off, green and then red for approximately 0.25 seconds. At the same time the power-on self test of the module is performed.

Table 4-1 outlines the indicator condition and the corresponding status after the power-on self test has been completed.

LED	Function	Condition	Indication
Power	Power	Off	No power applied to the device.
		Green	Power supply OK
Link	(not used)	Off	(not applicable)
Status1	EGCP-2 Status (RS-485)	Off	The device has an unrecoverable fault; may need replacing.
		Green	EGCP-2 Master active and communicating.
		Red	No EGCP-2 Master communication.
Status2	GCP-30 Status (CAN bus)	Green	GCP-30 communication OK
		Red	No GCP-30 on CAN.
		Off	The device has an unrecoverable fault; may need replacing.

Table 4-1: Indication LEDs

Functional Test

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Testing the CAN Bus Communication

If the connection between the GCP-30 and the EGCP2-GCP-LSIM is working properly, a second GCP (i.e. the EGCP2-GCP-LSIM) is indicated on the GCP-30 unit. It is not possible to connect more than one GCP-30 to a EGCP2-GCP-LSIM. For systems with more than one GCP-30, each unit will require its own EGCP2-GCP-LSIM.

Testing the EGCP-2 Network Communication

If the connection between the EGCP-2 and the EGCP2-GCP-LSIM is working properly, the EGCP2-GCP-LSIM is indicated on the EGCP-2 Sequence display screen as an EGCP-2 Slave with a device number, which corresponds with the GCP-30 device number connected to this EGCP2-GCP-LSIM.

Chapter 5.
Function

⚠️ **CAUTION**

No dead bus closure interlock between GCPs or GCPs and the EGCP-2s is provided by the EGCP2-GCP-LSIM. A closure of the GCP-30 onto a dead busbar simultaneously with other controls must be prevented by external means!

The unit does not provide any protection and in addition renders the built-in protection of the GCP-30 dysfunctional!

The EGCP2-GCP-LSIM (Load Share Interface Module) is a next-generation Load Share Interface Module specifically designed to interface Woodward's GCP-30 Series Genset Controls via CAN bus with Woodward EGCP-2 communication networks. The EGCP2-GCP-LSIM supports active and reactive load sharing. Load-dependent start/stop and master handover are not supported. Up to 8 controls (either GCPs or EGCPs) are supported.

Each GCP-30 unit, which is intended to participate in a EGCP-2 load sharing network must be equipped with an EGCP2-GCP-LSIM unit. The EGCP2-GCP-LSIM simulates a Master unit on the CAN bus side and an EGCP-2 Slave on the RS-485 side. Figure 5-1 shows a typical EGCP-2 load sharing network topology with additional GCP-30 units connected via EGCP2-GCP-LSIMs.
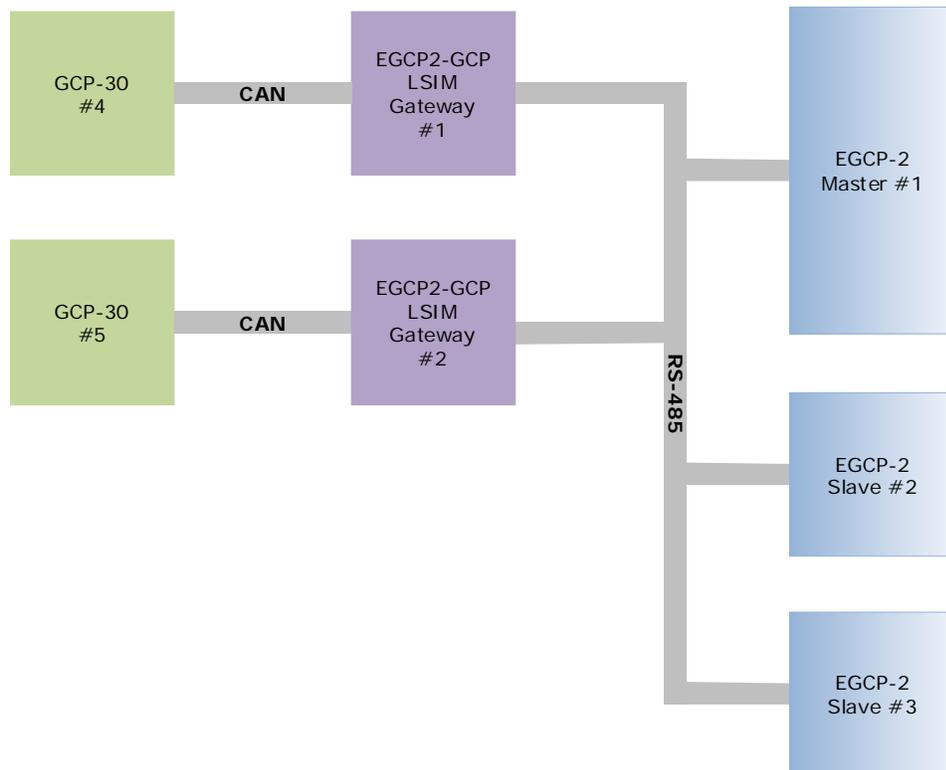
Figure 5-1: Bus topology

ℹ️ **NOTE**

There must be no connection between the GCP-30 units. They may only be connected to their respective EGCP2-GCP-LSIM via CAN bus.

Figure 5-2 shows the control flow for active power load sharing.
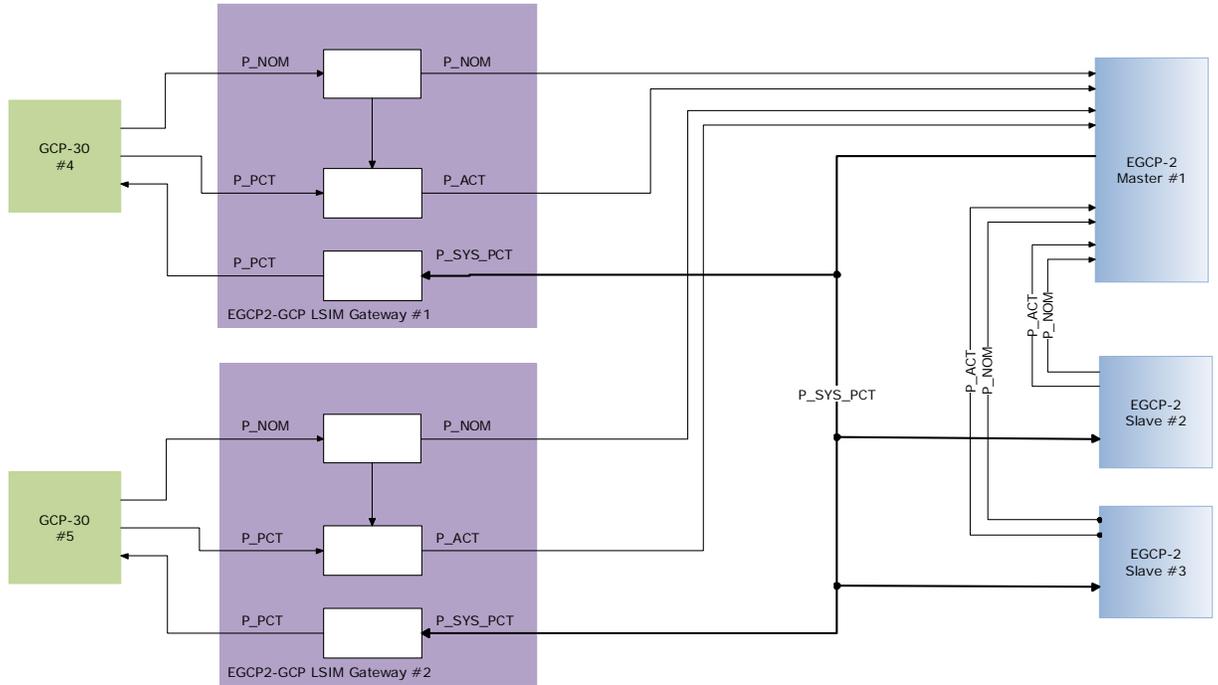
Figure 5-2: Load sharing block diagram

Legend:

P_Nom = Power Nominal - the rated kW setting of the unit

P_PCT = The system Power Percentage - this is the average power of all the units on the bus expressed as a percentage.

Chapter 6.
Technical Data

Ambient variables ---
- Power supply voltage ....12/24 Vdc (10 to 30 Vdc)
- Power supply current ....30 mA typical @ 24 Vdc
- Intrinsic consumption...750 mW
- Degree of pollution 2

Environmental conditions---
- Storage temperature ....-25°C (-13°F) / 85°C (185°F)
- Operating temperature...0°C (32°F) / 60 °C (140°F)
- Humidity ....10 to 95% (without condensation)
- Operating ambiance .... free from corrosive gas, minimal dust

Interfaces --
    User interface ....
- LED indicators ....Power (green), Ethernet (unused, 2 status LEDs (bi-color red/green)
    CAN port .... **non-isolated**
- Physical layer ....ISO 11898
- Speed.. 10 kBit/s to 1 Mbit/s
- Protocol..CAL
- ESD protection.. 6 kV
    RS-485 port... **non-isolated**
- Physical layer EIA-485-A, 2-wire
- Speed.. 300 to 115200 bps
- Protocol...EGCP-2
- ESD protection.. 8 kV

Housing --
- Material ....self-extinguishing PC/ABS blend (UL 94-V0)
- Mounting...35 mm DIN rail (EN 60715)
- Protection rating... IP 20 / NEMA Type 1
- Dimensions (H x W × D)............................... 121 x 22.5 x 120 mm / 3.98" x 0.886" x 4.72"
- Weight.. 120 g / 0.265 lbs

WOODWARD