37239B

GCP-30 Series
Genset Control

Installation
Software Version 4.3xxx

Manual 37239B

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 unit(s), that operates totally independently of the prime mover control unit(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 unit(s) fail.

CAUTION

To prevent damage to a control system that uses an alternator or battery-charging unit, make sure the charging unit 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 units.**

Important Definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. Appropriate precautions have to be taken.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment. This note should absolutely be observed when connecting the control.

NOTE

References to other notes and supplements as well as tables and lists are identified by means of the "i" symbol. Most of the referenced sections are included in the Annex.

Revision History

Rev.	Date	Editor	Changes
NEW	04-06-02	Tr	Release
A	04-09-23	TP	Update: wiring of multi-functional three-position controller, functionality V4.3xxx
B	05-06-15	TP	Various minor corrections, update: GCP-31 wiring diagram, housing dimension drawing Description GCP-31 RPQ-SC08 (Rental Package) added

Contents

NOTE

All functions described in this manual are included in all controls (all versions) of the GCP-30 and AMG 2 series. Any differences between the control units will be indicated by having the model number for the applicable control unit at the beginning of the text. Please note that the AMG series controller is not explicitly described in this manual.

[GCP-32] **The functions marked and described for applications with 2 power circuit breakers (control types GCP-32 and AMG 2/N2PB).**

[GCP-31] **The functions marked and described for applications with 1 power circuit breaker (control types GCP-31 and AMG 2/N1PB).**

only B+X **The functions marked and described like this are contained in all units except the Rental Package (unit types GCP-31 and GCP-32, Packages BPD, BPQ, XPD, and XPQ).**

nur RPQ **The functions marked and described like this are ONLY contained in the Rental Package (unit type GCP-31 RPQ+SC08).**

Illustrations and Tables

Illustrations

Tables

Chapter 1.
General Information

Related Documents

Type		English	German
GCP-31/32 Series			
GCP-31/32 - Installation	this manual ⇨	37239	GR37239
GCP-31/32 - Configuration		37278	GR37278
GCP-31/32 - Function/Operation		37238	GR37238
GCP-31/32 - Application		37240	GR37240
Option SB - Caterpillar CCM coupling		37200	GR37200
Option SC06/07/08 - CAN bus coupling		37182	GR37182
Option SC04 - IKD1 and ST3 coupling		37236	GR37236
Option SC02 - IKD1 coupling		37302	GR37302
Option D08- Preglow control		37286	GR37286
Option T7 - 7 analog inputs		37261	GR37261
Option TZ - Temperature-dependent start/stop		37241	GR37241
other options		upon request	
Additional Manuals			
IKD 1 - Manual 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.		37135	GR37135
IKN 1 - Manual 20channel NiCrNi temperature scanner that monitors the temperature values for exceeding or falling below a threshold value, measured through senders on the IKN 1. A configured relay on the board of the IKN 1 will trip. The IKN 1 can be coupled with the control unit using the CAN bus to display measuring values as well as alarms.		37136	GR37136
LeoPC1 - Manual 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.		37146	GR37146
LeoPC1 - Manual 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.		37164	GR37164
GW 4 - Manual Gateway for transferring the CAN bus to any other interface or bus.		37133	GR37133
ST 3 - Manual 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.		37112	GR37112

Table 1-1: Manual - Overview

Intended Use This control is intended to be operated according to the guidelines described in 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.

NOTE

This manual has been developed for a control fitted with all available options. Inputs/outputs, functions, configuration screens and other details described, which do not exist on your control may be ignored.

The present manual has been prepared to enable the installation and commissioning of the control. Due to the large variety of parameter settings, it is not possible to cover every combination. The manual is therefore only a guide. In case of incorrect entries or a total loss of functions, the default settings can be taken from the list of parameters located in the appendix of the Configuration manual.

Chapter 2.
Electrostatic Discharge Awareness

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.*

Chapter 3.
Housing

Dimensions

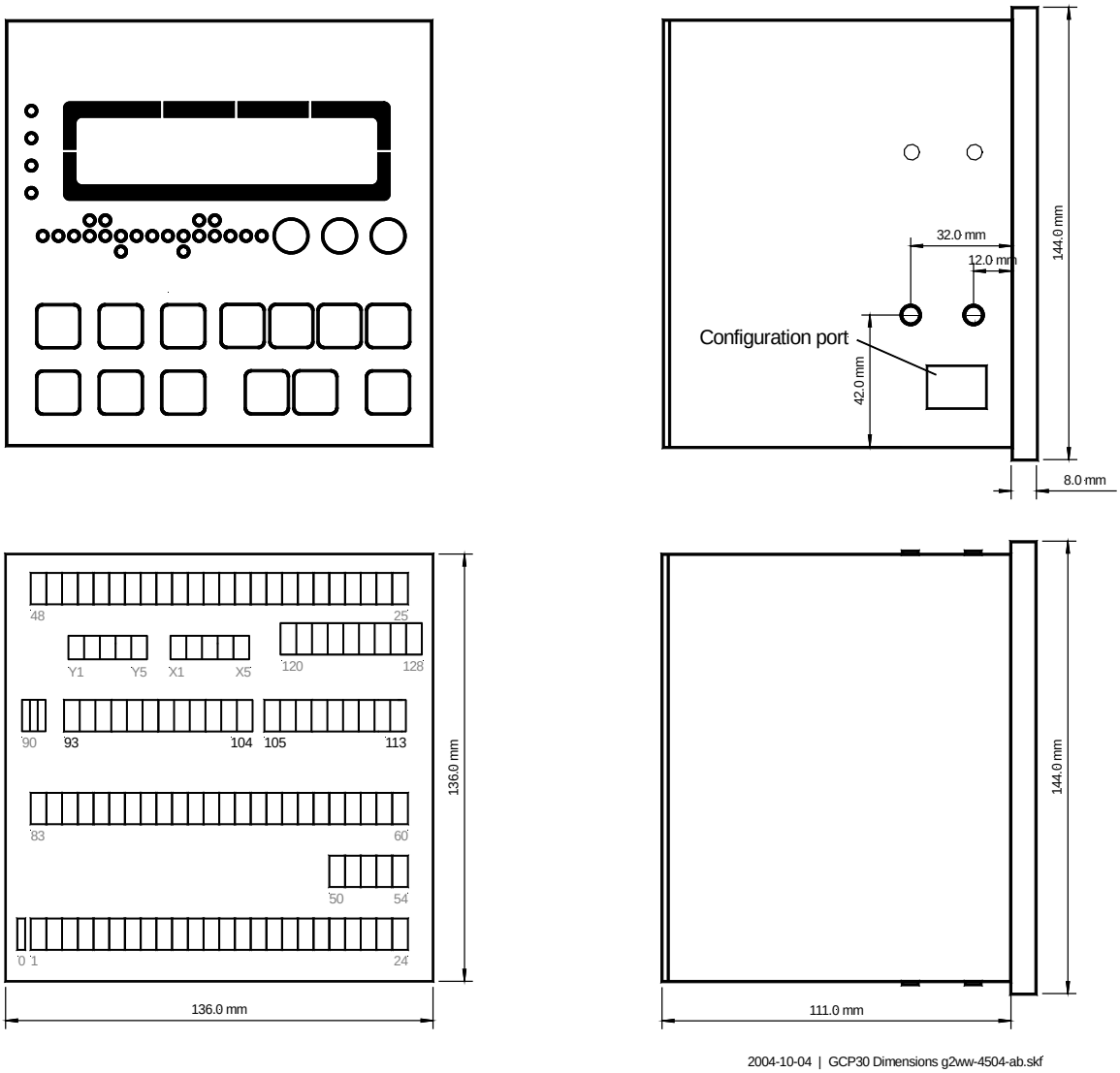


Figure 3-1: Housing - Dimensions

Panel Cut-Out

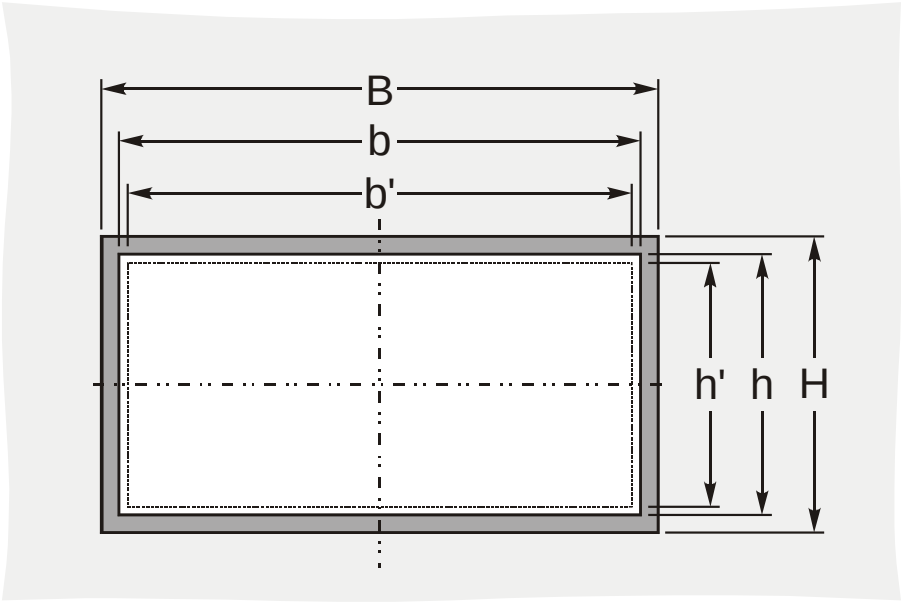


Figure 3-2: Housing - Control panel cut-out

Measure	Description			Tolerance
H	Height	Total	144 mm	---
h		Panel cut-out	138 mm	+ 1.0 mm
h'		Housing dimension	136 mm	
B	Width	Total	144 mm	---
b		Panel cut-out	138 mm	+ 1.0 mm
b'		Housing dimension	136 mm	
	Depth	Total	118	---

Table 3-1: Housing - panel cut-out

Side view

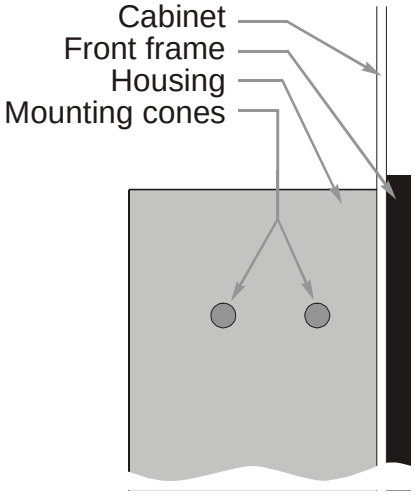


Figure 3-3: Side view – without clamps

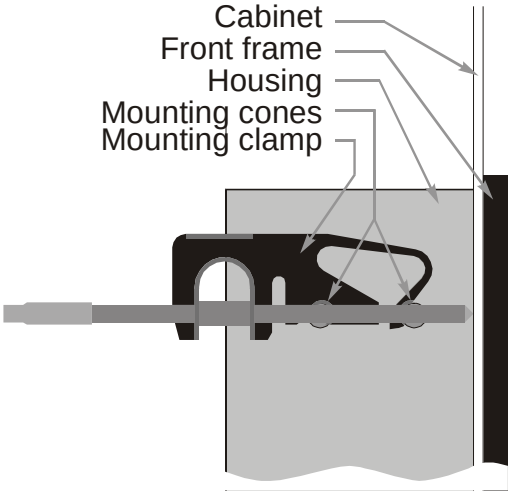
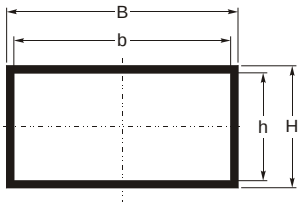


Figure 3-4: Side view – with clamps

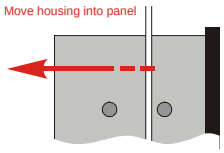
Installation

For installation into a door panel proceed as follows:

1. **Panel cut-out**
   Cut out the panel according to the dimensions in Figure 3-1.

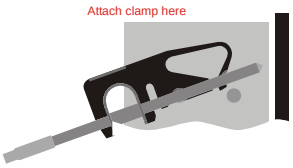


2. **Insert control into cut-out**
   Insert the control into the panel cut-out. Verify that the control fits correctly in the cut-out. If the panel cut-out is not big enough, enlarge it accordingly.

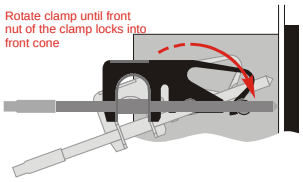


3. **Attach mounting clamps**
   Rotate clamps according to the picture on the right until they snap into the mounting cones.

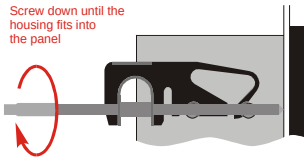
a)



b)



4. **Screw clamps**
   Tighten the screw clamps until the housing is pressed and fixed against the panel. Be careful not to over tighten the clamps which can unsnap the frame from the housing. If this happens remove the control from the panel and reattach the frame by pressing firmly against the housing.



Note: Using the gasket kit (P/N 8923-1043) increases the IP protection from IP42 to IP54 from front. Mounting of the gasket is described in the manual supplied with the gasket kit.

Chapter 4.
Wiring Diagrams - Overview

WARNING

A circuit breaker must be located near to the control and in a position easily accessible to the operator. This must also bear a sign identifying it as an isolating switch for the control.

NOTE

Connected inductances (e.g. operating current coils, undervoltage tripping devices, auxiliary contactors, and/or power contactors) must be wired with an appropriate interference protection.

GCP-31/BPD Package

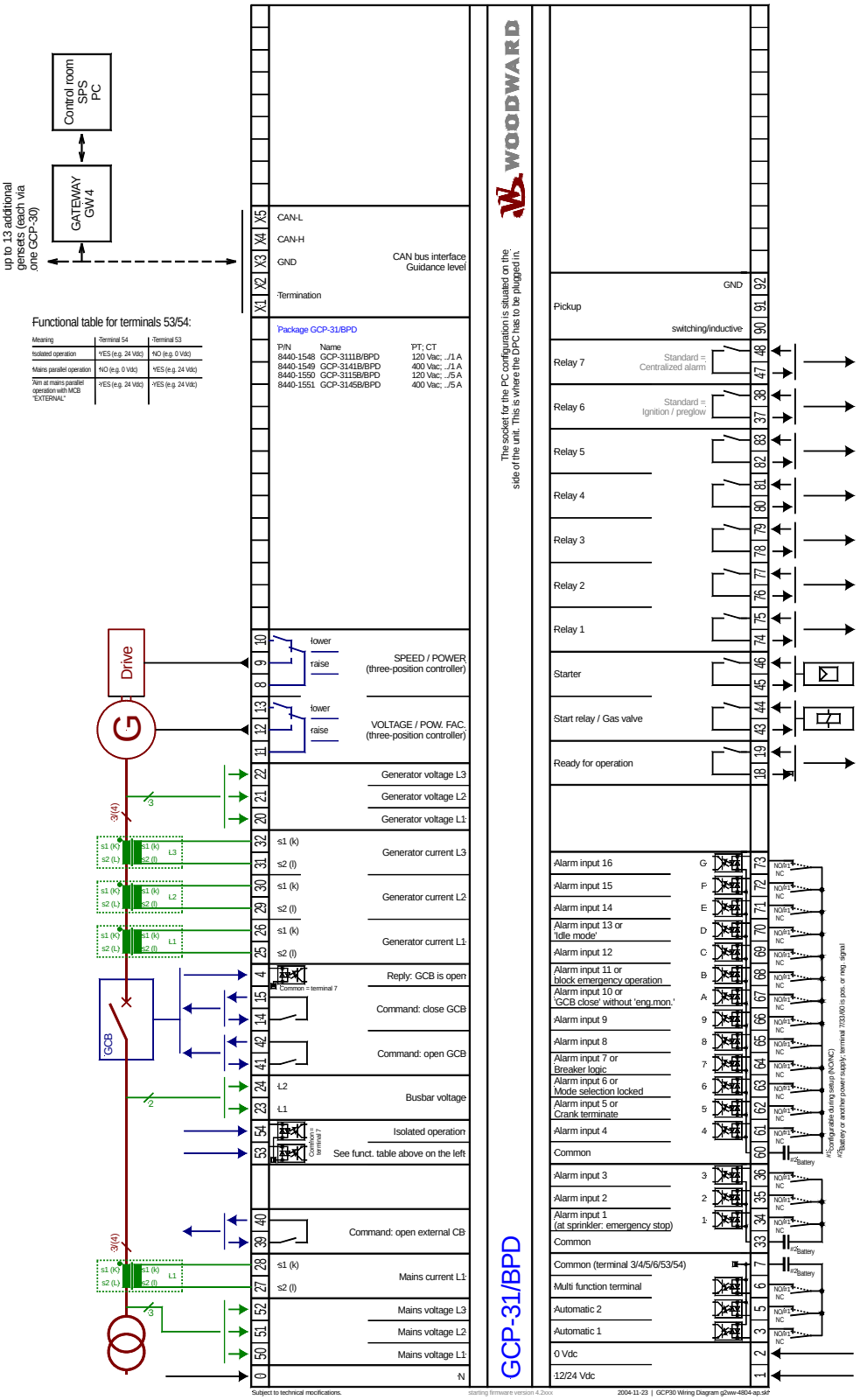


Figure 4-1: Wiring diagram GCP-31/BPD Package

GCP-31/BPQ Package

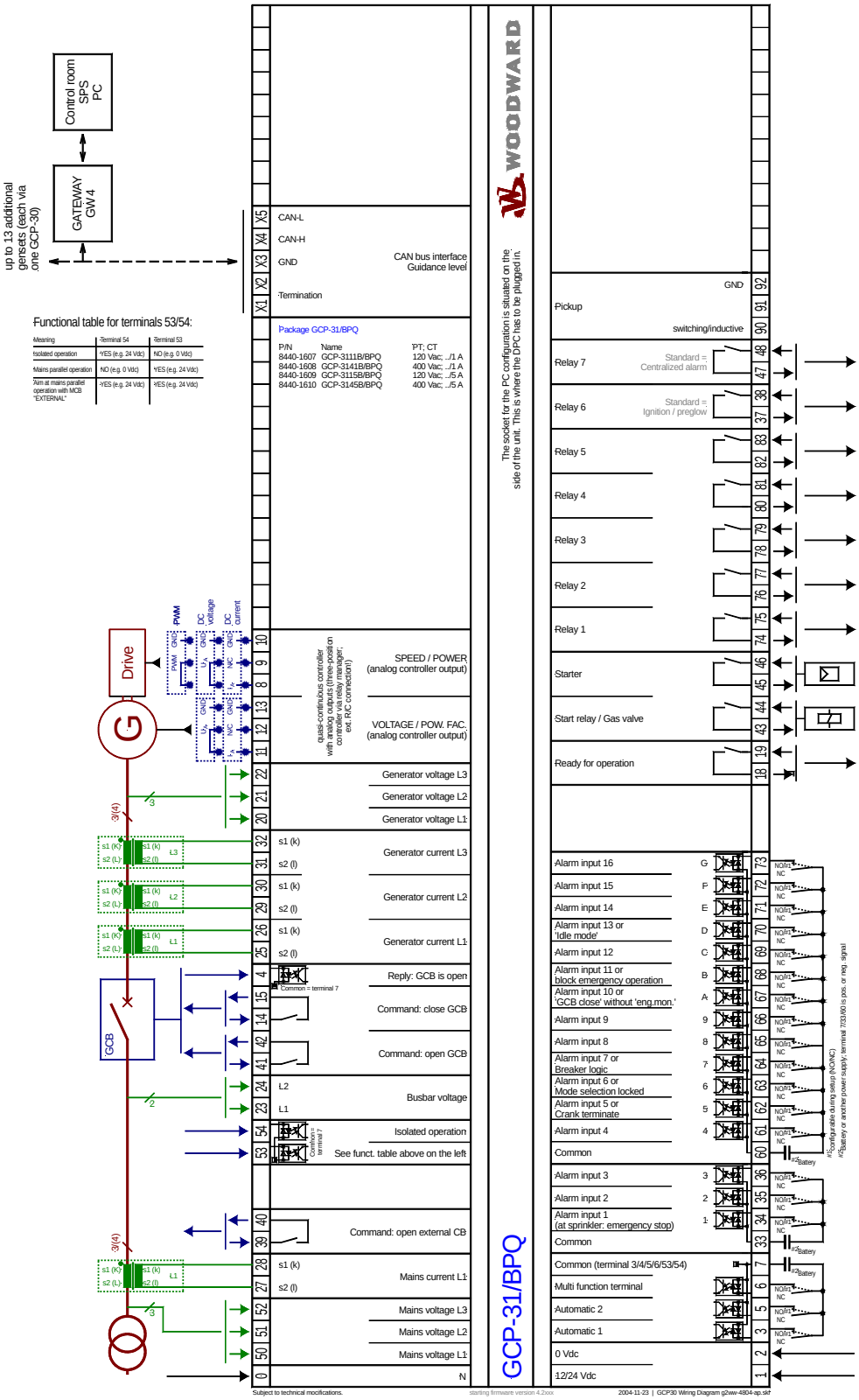


Figure 4-2: Wiring diagram GCP-31/BPQ Package

GCP-31/XPD Package

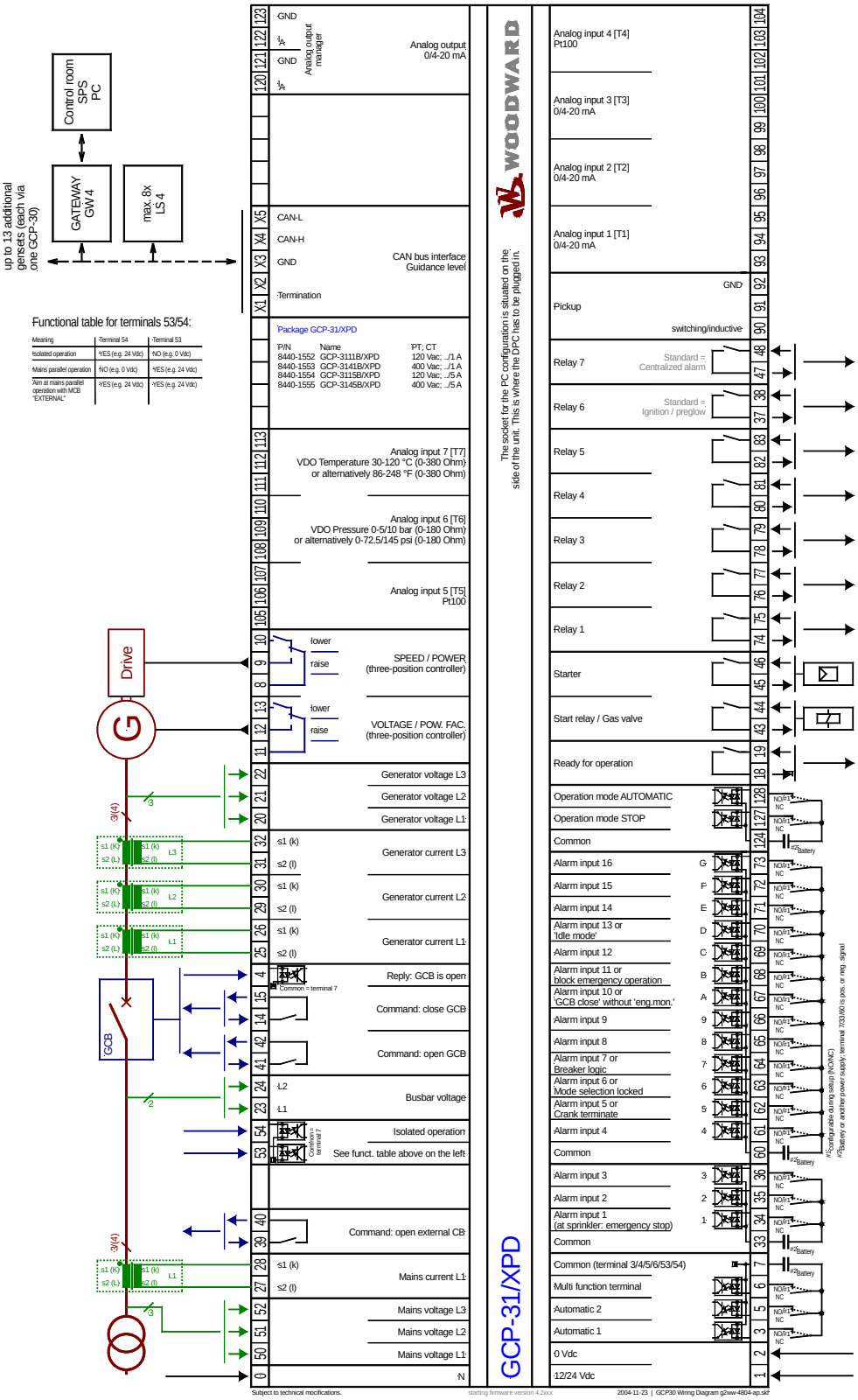


Figure 4-3: Wiring diagram GCP-31/XPD Package

GCP-31/XPQ Package

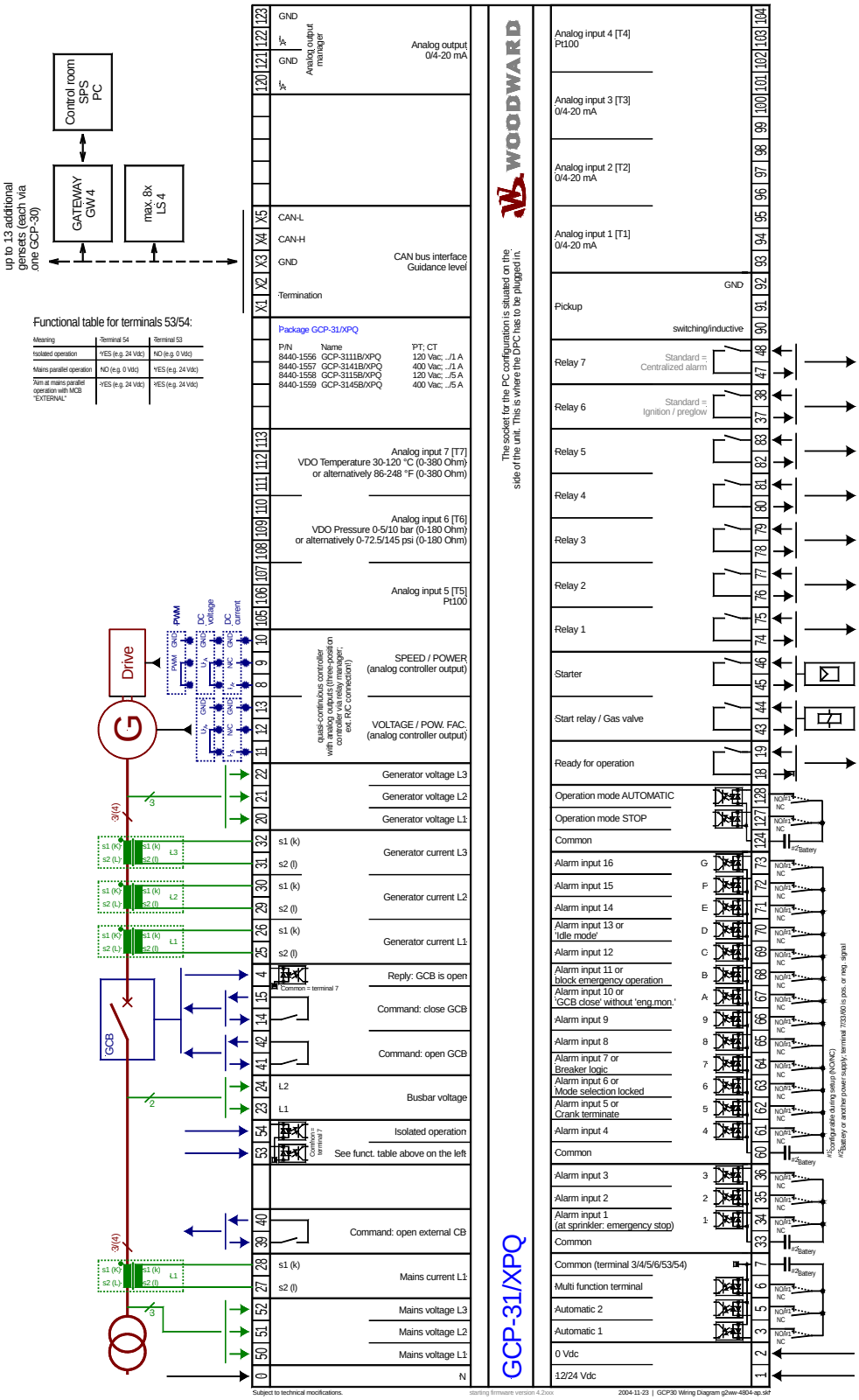


Figure 4-4: Wiring diagram GCP-31/XPQ Package

GCP-31/XPQ+SB03 Package

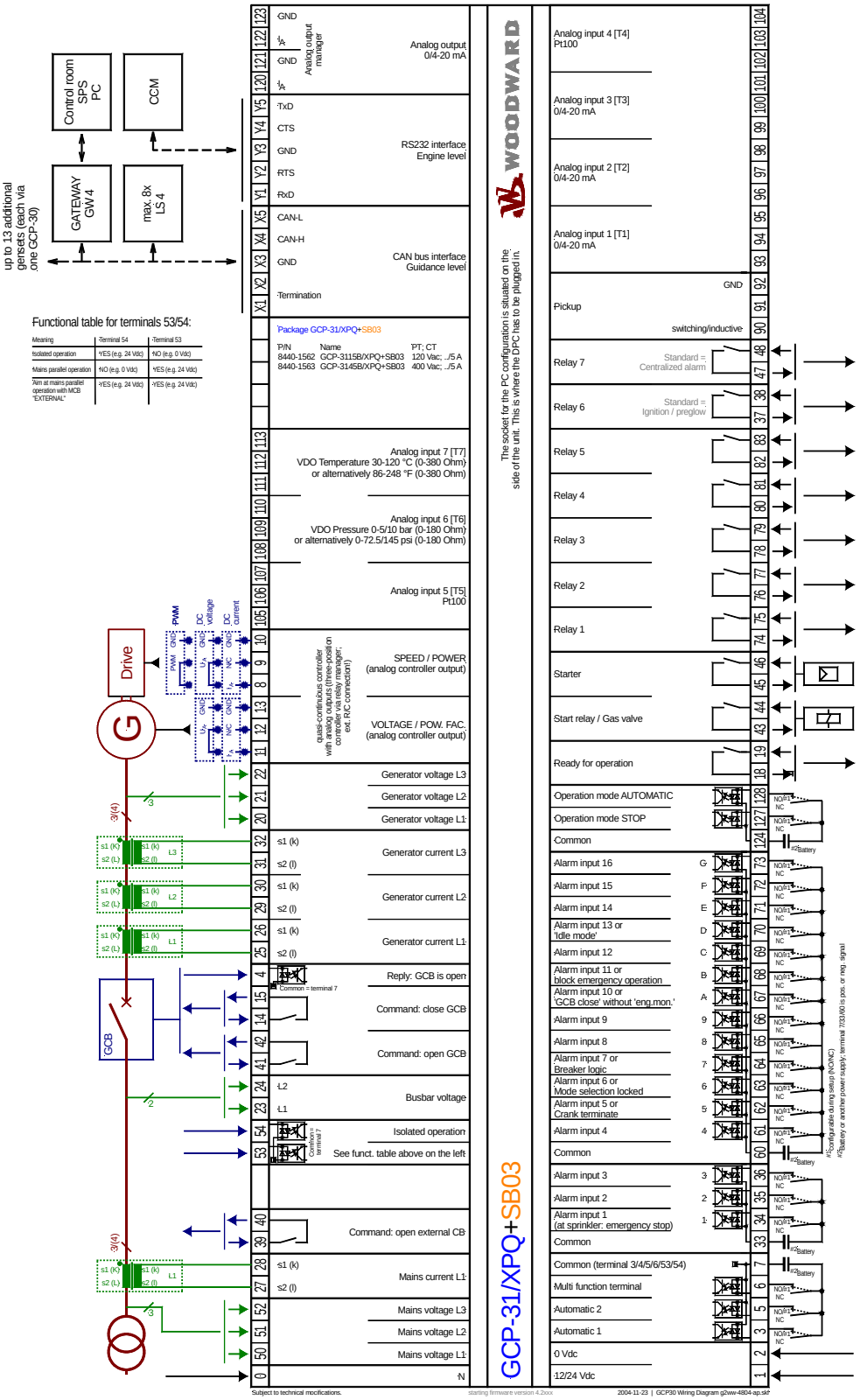


Figure 4-5: Wiring diagram GCP-31/XPQ+SB03 Package

GCP-31/XPQ+SC06 Package

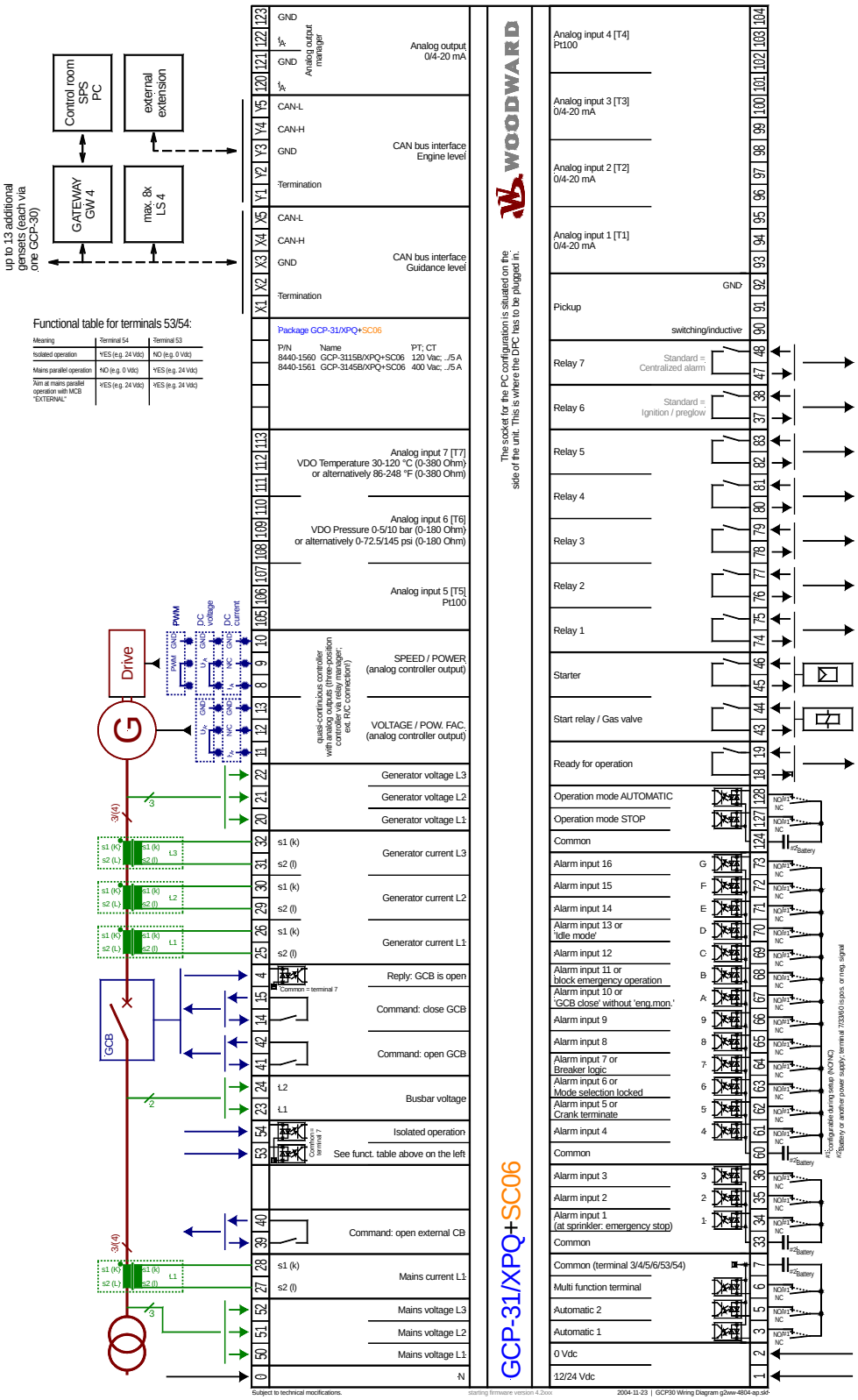


Figure 4-6: Wiring diagram GCP-31/XPQ+SC06 Package

GCP-31/RPQ+SC08 Rental Package

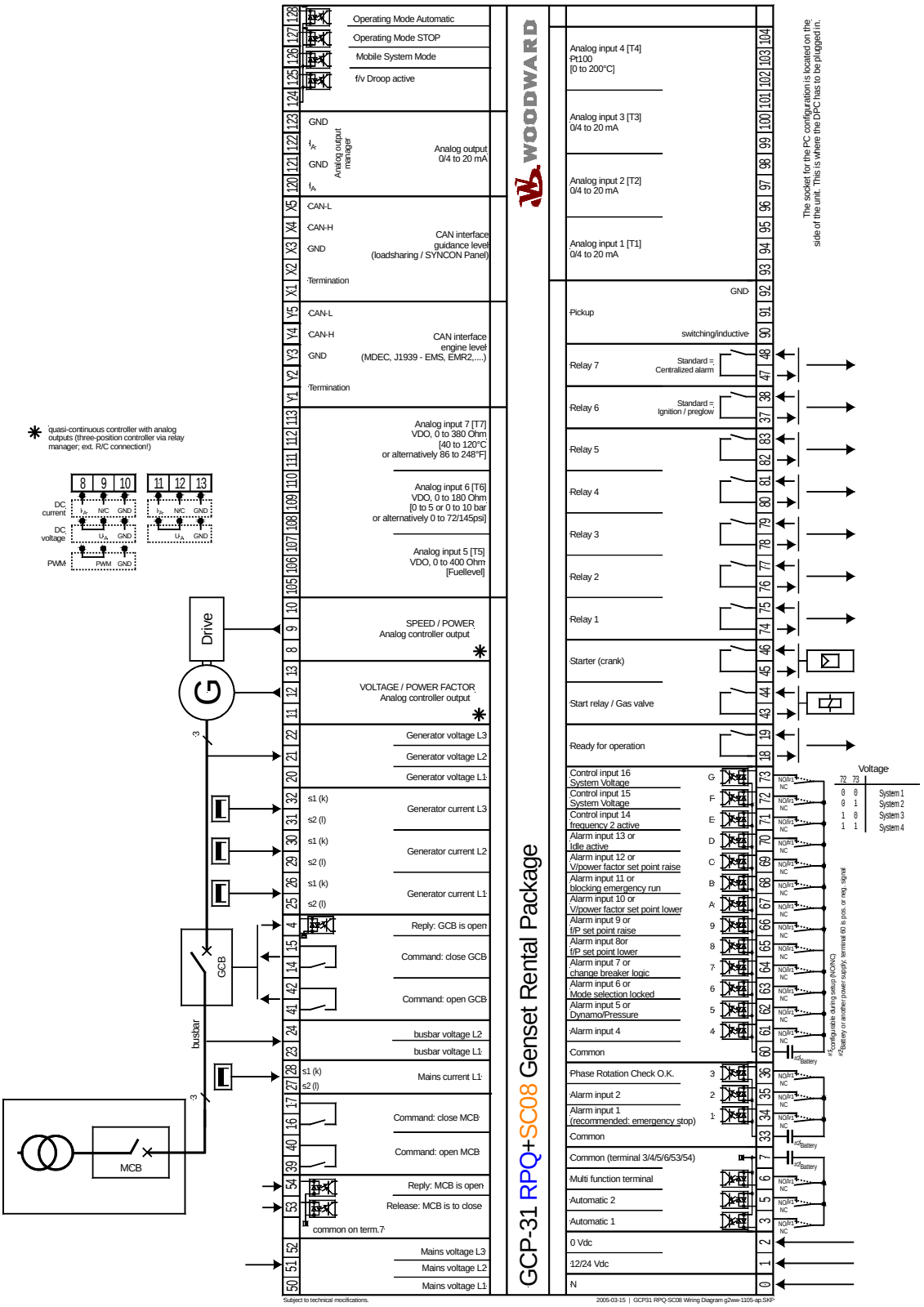


Figure 4-7: Wiring diagram GCP-31/RPQ+SC08 Rental Package

GCP-32/BPD Package

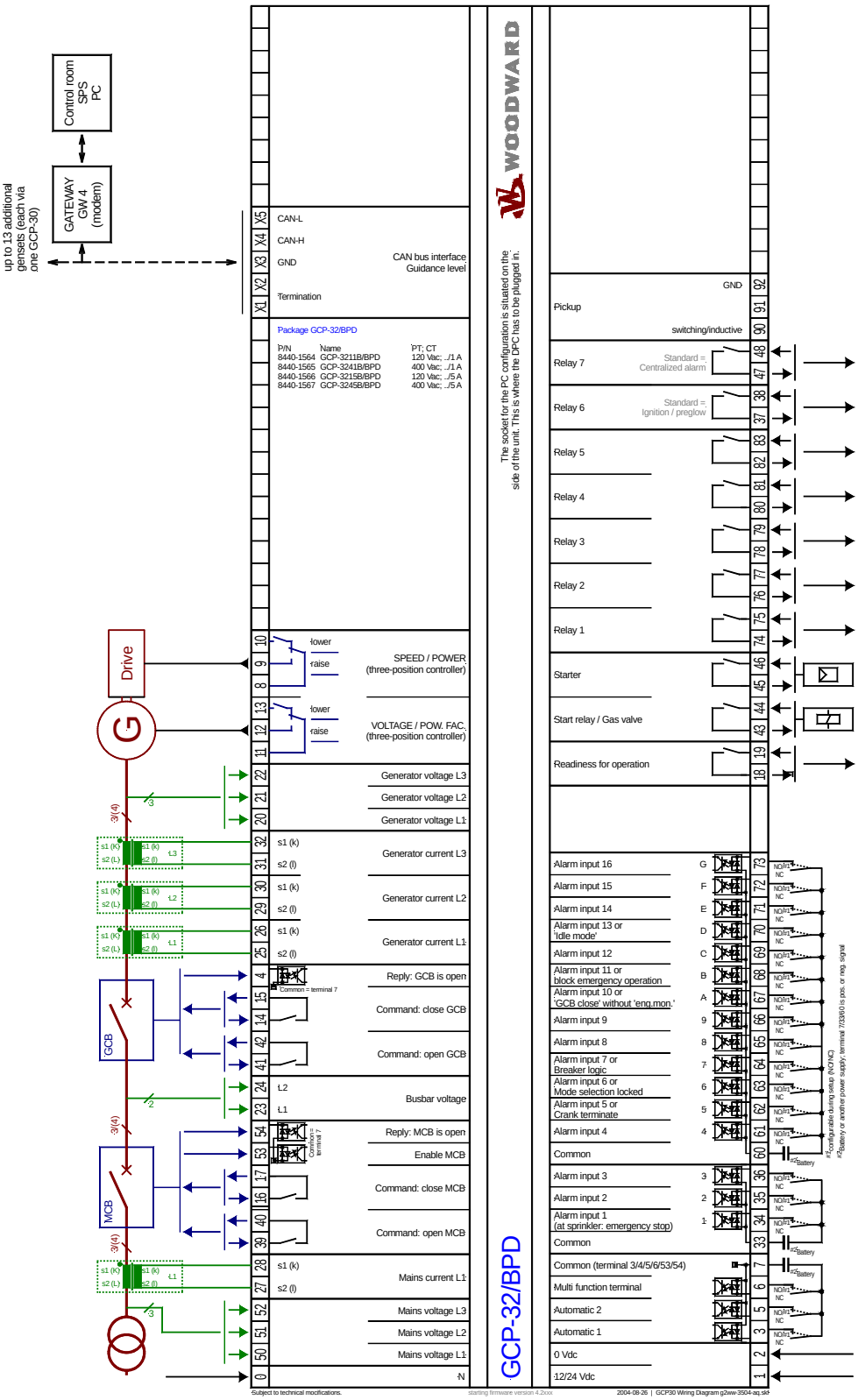


Figure 4-8: Wiring diagram GCP-32/BPD Package

GCP-32/BPQ Package

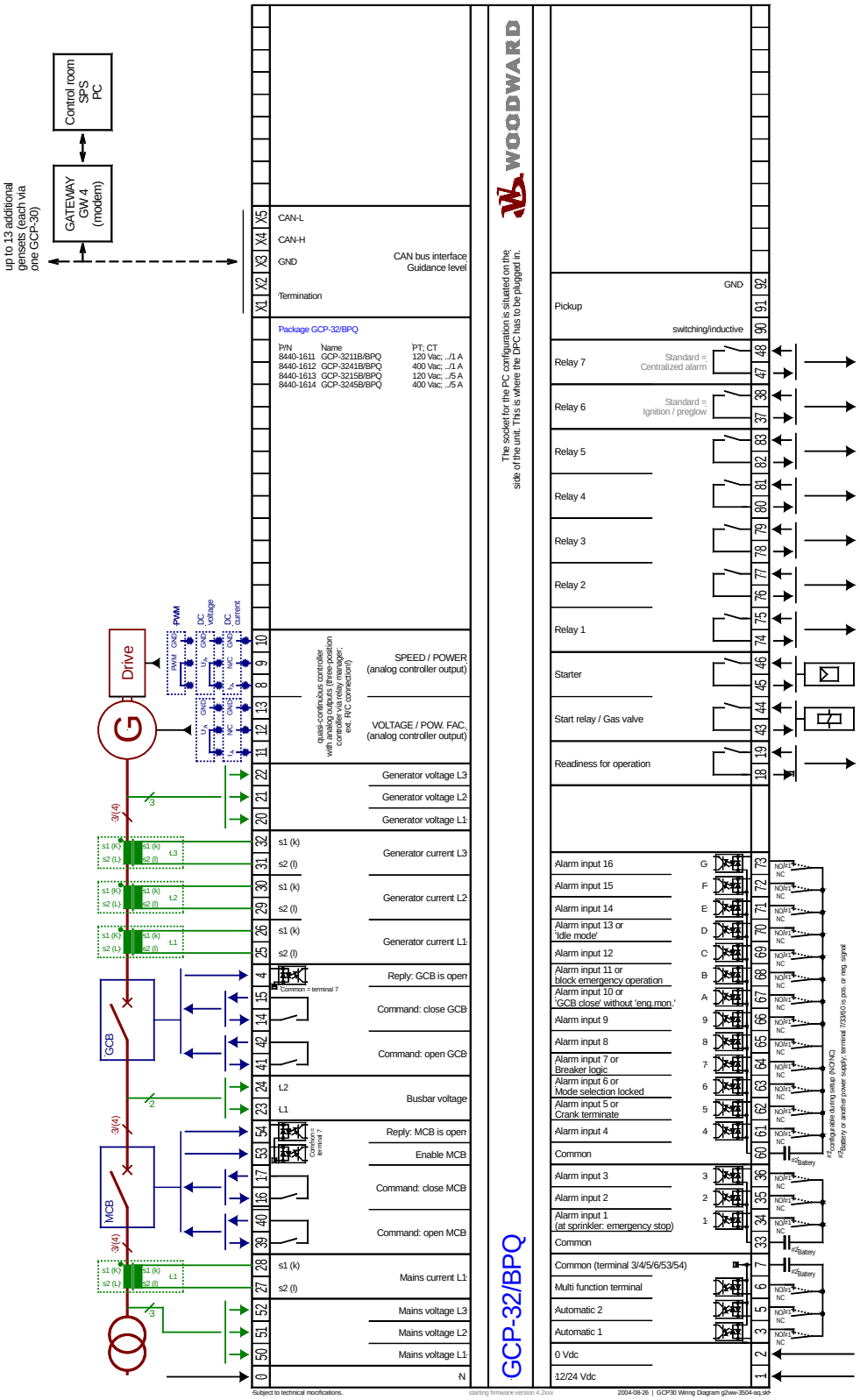


Figure 4-9: Wiring diagram GCP-32/BPQ Package

GCP-32/XPD Package

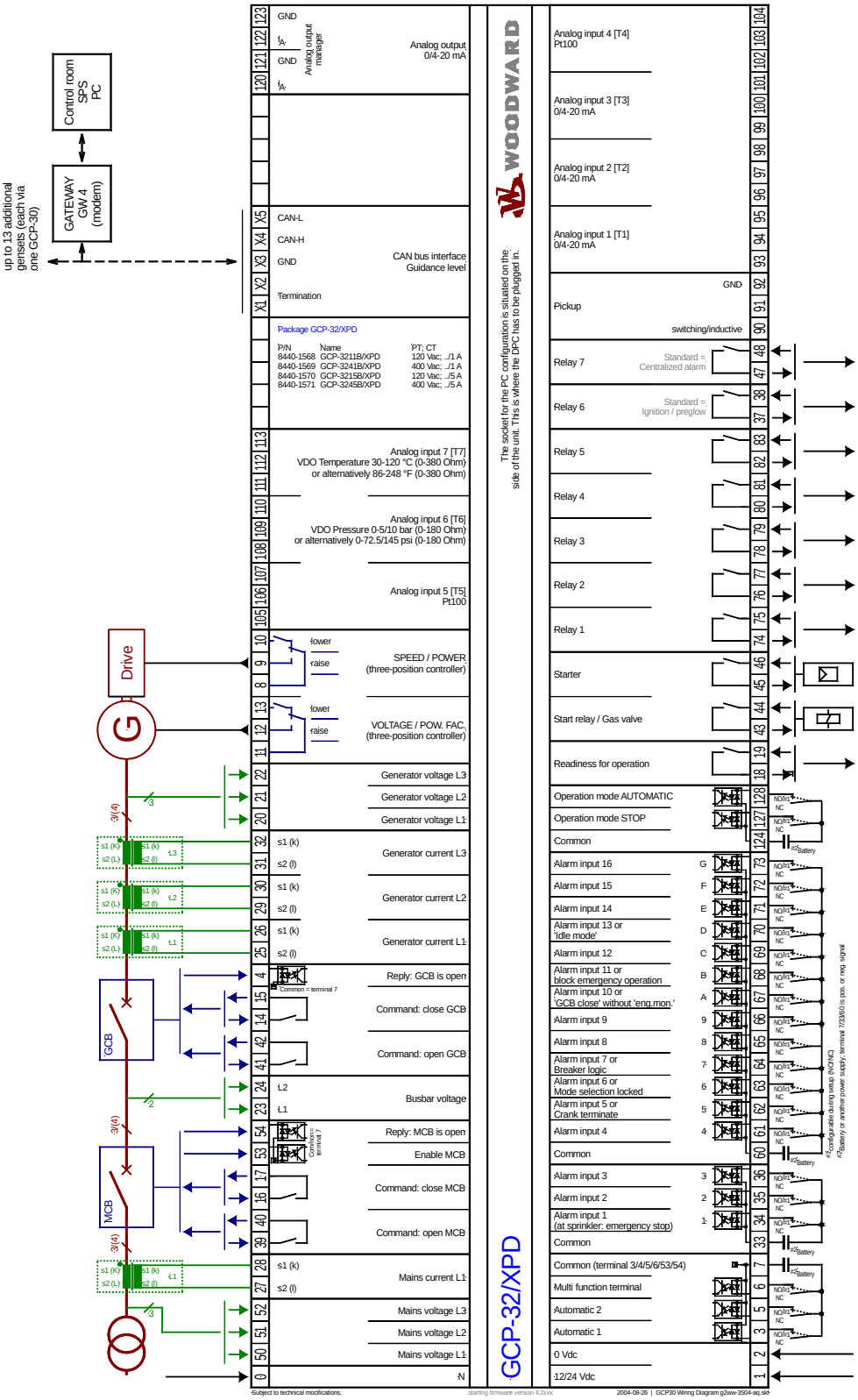


Figure 4-10: Wiring diagram GCP-32/XPD Package

GCP-32/XPQ Package

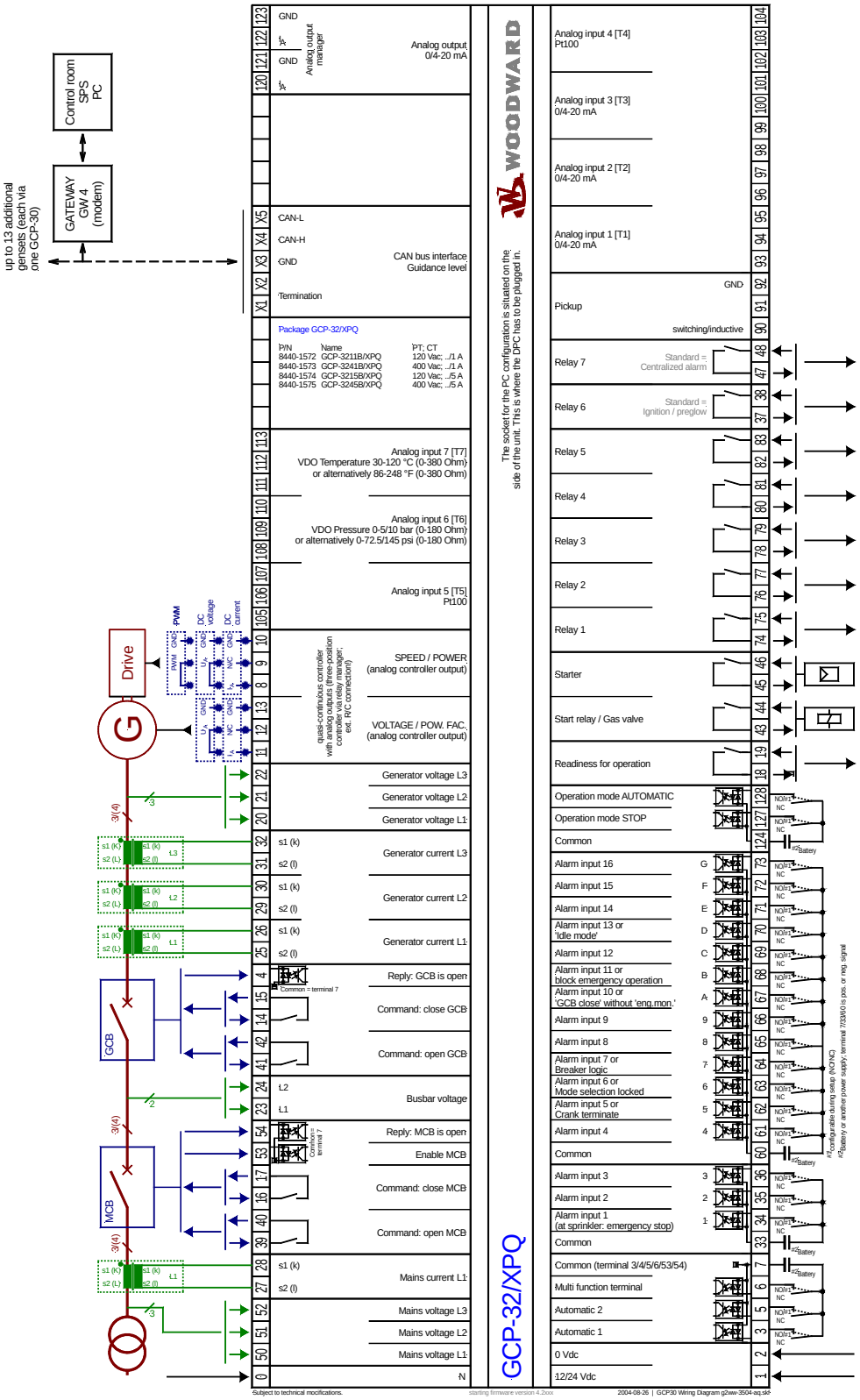


Figure 4-11: Wiring diagram GCP-32/XPQ Package

GCP-32/XPQ+SB03 Package

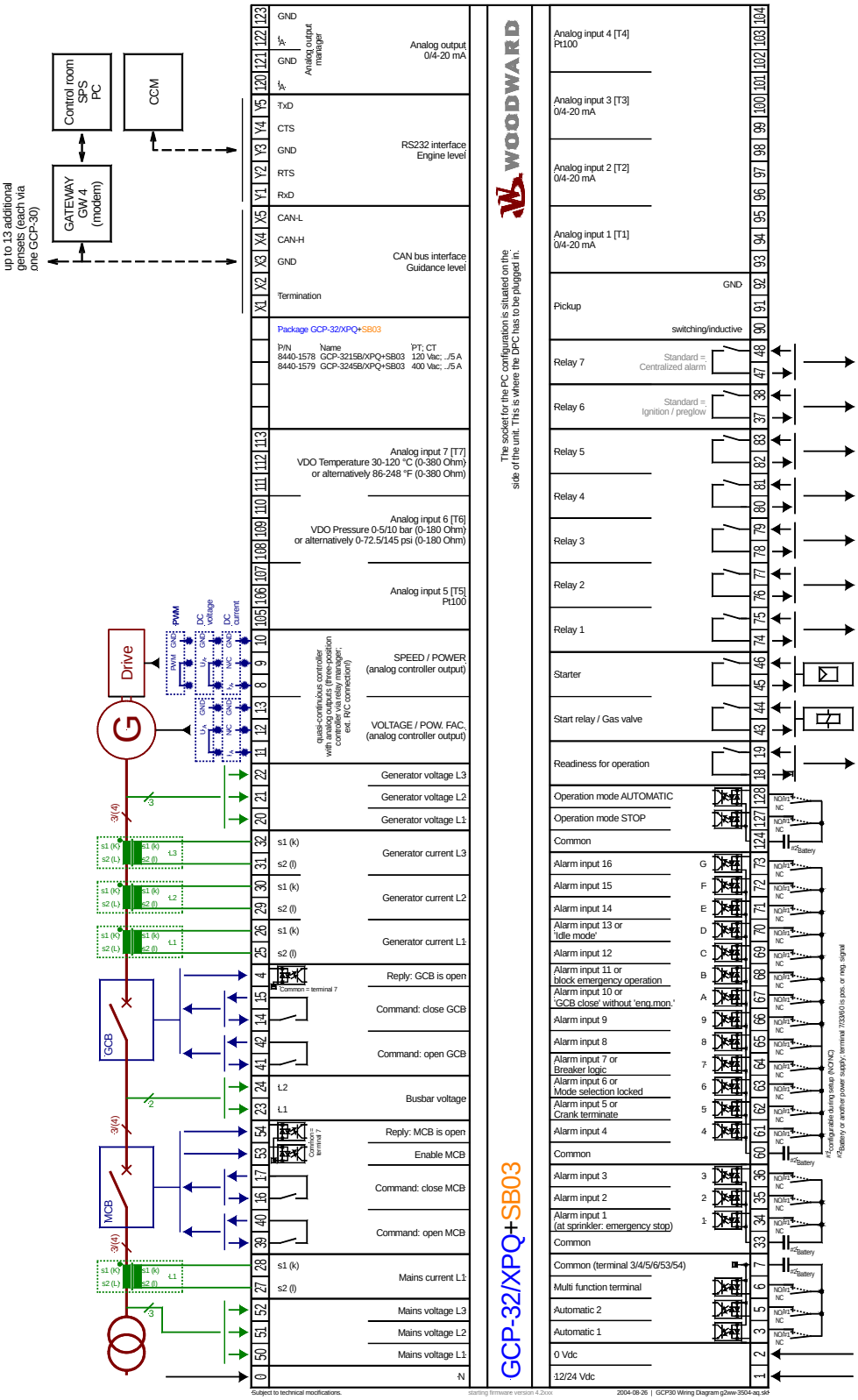


Figure 4-12: Wiring diagram GCP-32/XPQ+SB03 Package

GCP-32/XPQ+SC06 Package

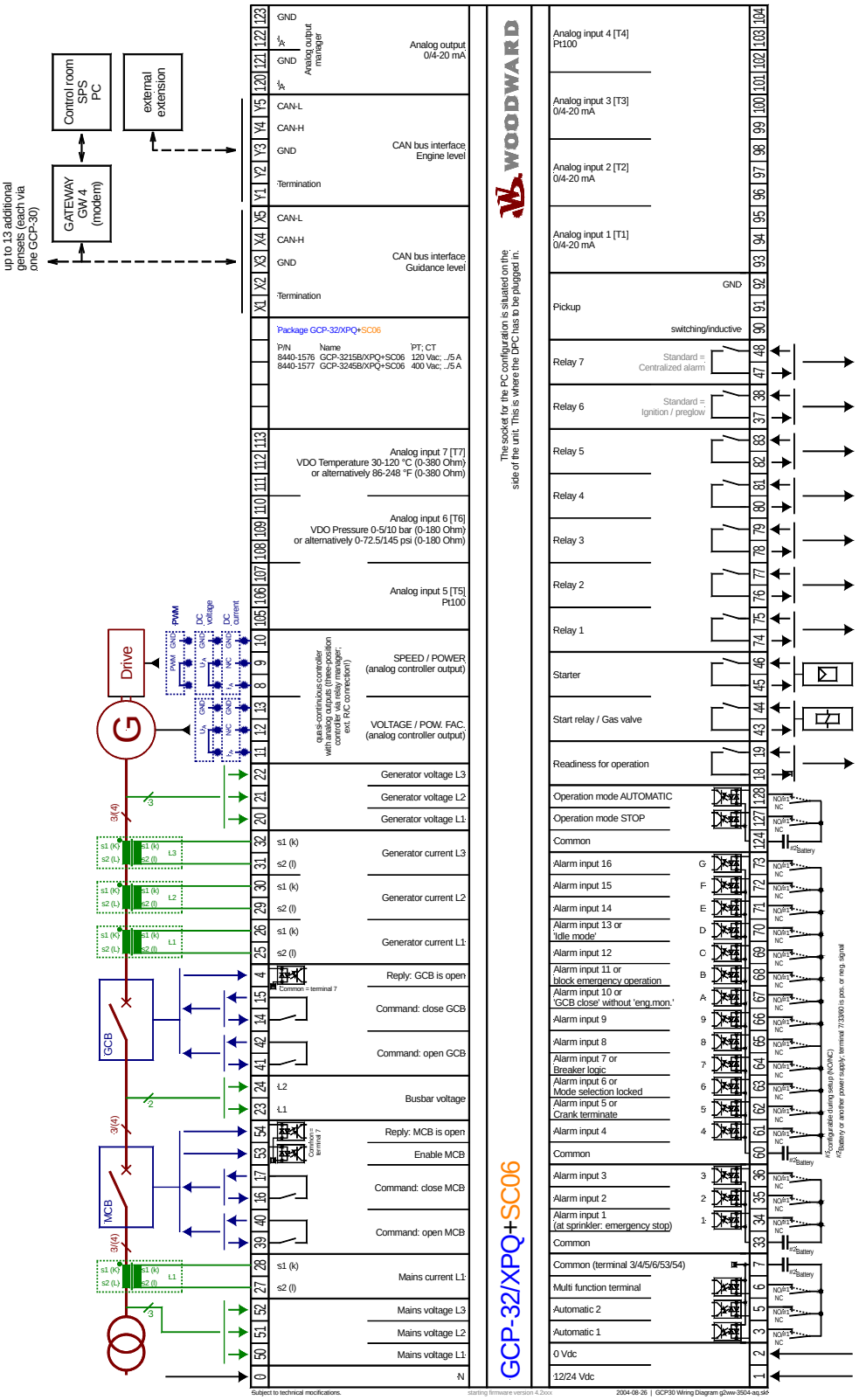


Figure 4-13: Wiring diagram GCP-32/XPQ+SC06 Package

Chapter 5.
Connectors - Details

Power Supply

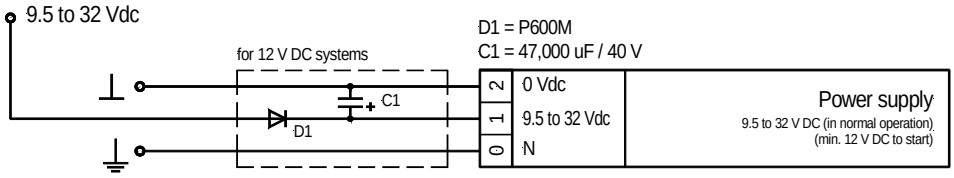


Figure 5-1: Power supply

Terminal	Description	A_{max}
0	Neutral point of the three-phase system or neutral terminal of the voltage transformer (Measuring reference point)	2.5 mm²
1	9.5 to 32 Vdc, 15 W	2.5 mm²
2	0 Vdc reference point	2.5 mm²

Table 5-1: Terminal assignment - power supply

NOTE

Please note the above description in an application with 12 Vdc power supply.

Measuring Inputs

NOTE

Starting with version V4.2000, the unit is equipped with an automatic rotary field detection and may therefore be used in three-phase systems with a dextrorotatory field (right-handed rotary field) as well as with a laevorotatory field (left-handed rotary field).

Voltage

Generator

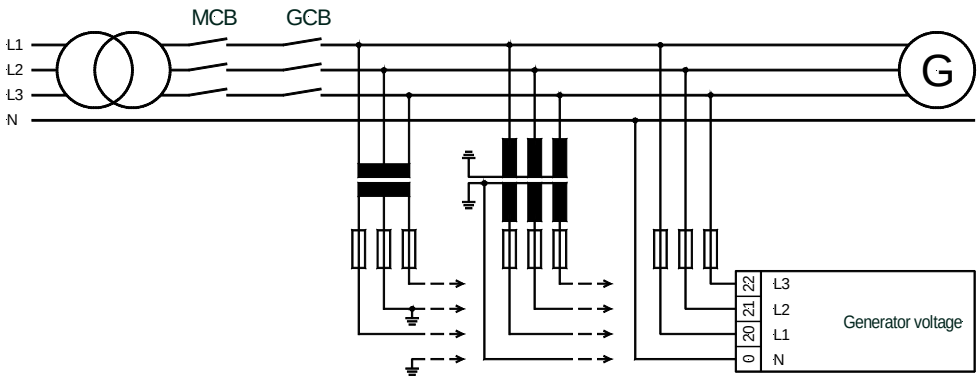


Figure 5-2: Measuring inputs - Voltage - Generator

Terminal	Measurement	Description	A_{max}
20	400 Vac or ../120 Vac	Generator voltage L1	2.5 mm²
21		Generator voltage L2	2.5 mm²
22		Generator voltage L3	2.5 mm²
0		Neutral point of the 3-phase system/transformer	2.5 mm²

Table 5-2: Terminal assignment - generator voltage measuring

NOTE

An operation with 480/(125) Volts is not possible for delta connections, because an overvoltage cannot be detected anymore since the overvoltage threshold would exceed the measuring range.

NOTE

The GCP-31 RPQ+SC08 Rental Package is only designed for measurement voltages up to 480 V with neutral earthing. They are not designed for delta connections. There are no settings for the potential transformers.

Busbar/Remanence

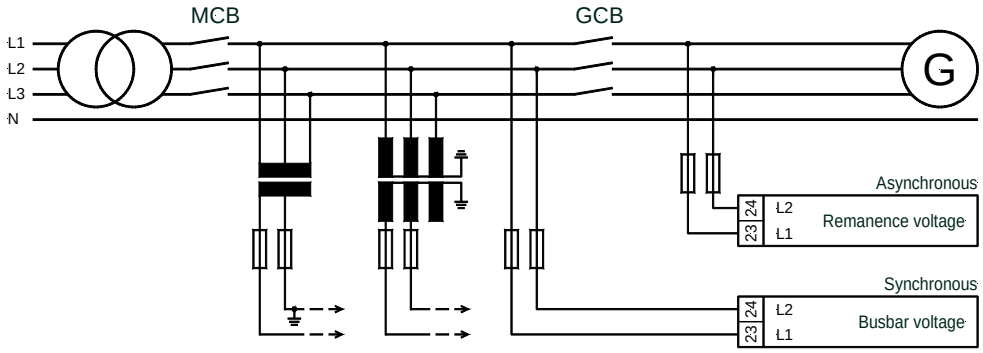


Figure 5-3: Measuring inputs - Voltage - Busbar

Terminal	Measurement	Description	A_{max}
Synchronous generators (standard)			
23	400 Vac or ../120 Vac	Busbar voltage L1	2.5 mm²
24		Busbar voltage L2	2.5 mm²
Induction (asynchronous) generators (Option H0023)			
23	direct	Remanence voltage L1	2.5 mm²
24		Remanence voltage L2	2.5 mm²

Table 5-3: Terminal assignment - busbar voltage measuring

NOTE

The GCP-31 RPQ+SC08 Rental Package expects a "Phase rotation check O.K." signal on terminal 34 for the busbar voltage. If this signal is not present when busbar voltage is detected, the message "Phase sequence" is displayed and closing the CBs is blocked.

If the phase rotation shall not be monitored, the input at terminal 34 must be enrgized.

Mains

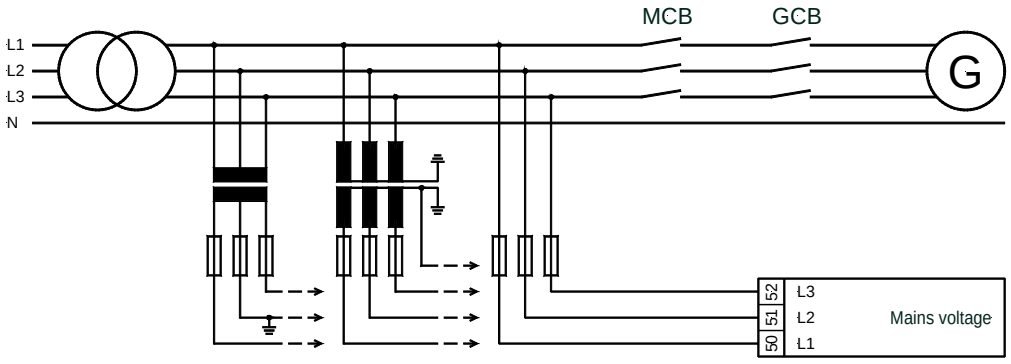


Figure 5-4: Measuring inputs - Voltage - Mains

Terminal	Measurement	Description	A_{max}
50	400 Vac or ../120 Vac	Mains voltage L1	2.5 mm²
51		Mains voltage L2	2.5 mm²
52		Mains voltage L3	2.5 mm²
0		Neutral point of the 3-phase system / transformer	2.5 mm²

Table 5-4: Terminal assignment - mains voltage measuring

Current

WARNING

Before disconnecting the secondary terminals of the current transformer or the connections of the current transformer at the control, ensure that the transformer is short-circuited.

NOTE

Current transducers are generally to be grounded on the secondary and one side.

Generator

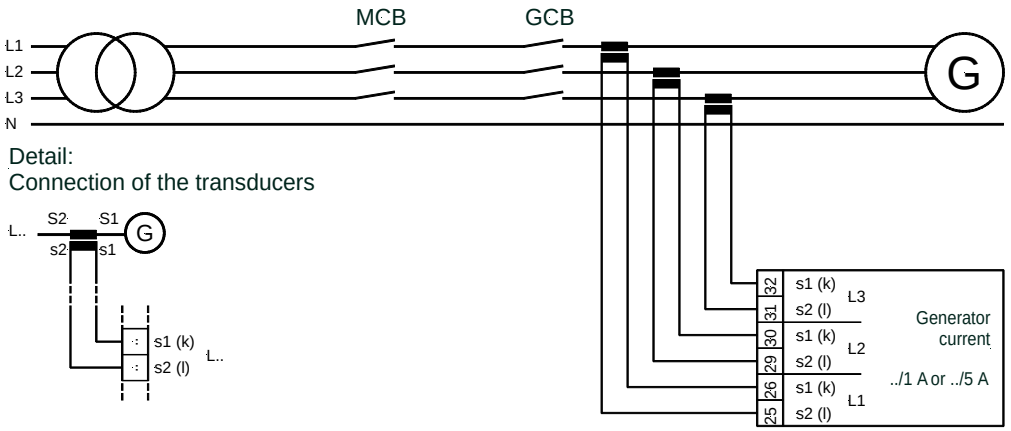


Figure 5-5: Measuring inputs - Current - Generator

Terminal	Measurement	Description	A_{max}
25	Transformer ../1 A or ../5 A	Generator current L1, transformer terminal s2/x2 (l)	2.5 mm²
26		Generator current L1, transformer terminal s1/x1 (k)	2.5 mm²
29		Generator current L2, transformer terminal s2/x2 (l)	2.5 mm²
30		Generator current L2, transformer terminal s1/x1 (k)	2.5 mm²
31		Generator current L3, transformer terminal s2/x2 (l)	2.5 mm²
32		Generator current L3, transformer terminal s1/x1 (k)	2.5 mm²

Table 5-5: Terminal assignment - generator current measuring

Mains (Mains Current Measuring Via Transformer)

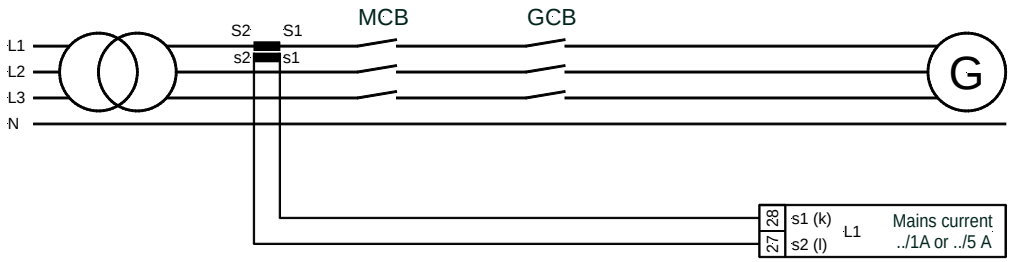


Figure 5-6: Measuring inputs - Current - Mains – via transformer

Terminal	Measurement	Description	A_{max}
27	Transformer	Mains current L1, transformer terminal s2 (l)	2.5 mm²
28	../1A o. ../5A	Mains current L1, transformer terminal s1 (k)	2.5 mm²

Table 5-6: Terminal assignment - mains current measuring

Mains (Mains Interchange Import/Export Real Power Actual Value Via Measuring Transducer)

NOTE

During configuration the free configurable 20 mA inputs can be enabled with the following functions:

- **Mains interchange (import/export) real power actual value**
- **Real power set point value**
- **Alarm input**

Please notice the details in the configuration manual.

NOTE

If several controls are connected to form an interconnection, the 20 mA measuring signal must not be looped through all controls. At each control, a 0/4 to 20 mA buffer amplifier must be connected to the mains interchange (import/export) real power actual value measurement. When selecting the external measuring transformer, please note that this must transmit negative ranges on transmission of supply and reference power.

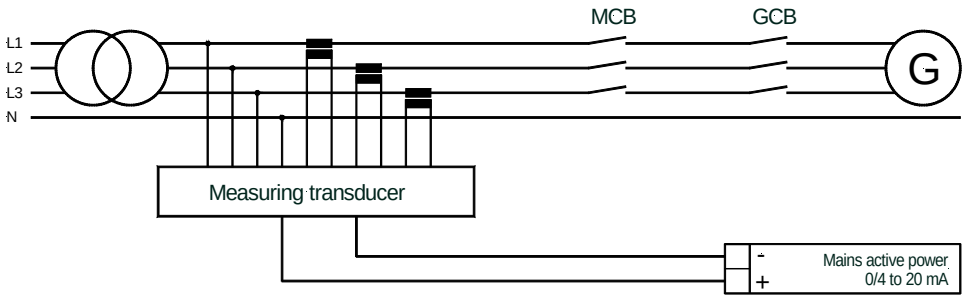


Figure 5-7: Measuring inputs - Real power - Mains – via measuring transducer

Terminal	Measurement	Description	A_{max}
configurable see page 36	0/4 to 20 mA	Mains interchange (import/export) real power actual value via 0/4 to 20 mA signal of an external measuring transducer (e.g. UMT 1)	1.5 mm²

Table 5-7: Terminal assignment - mains real power measuring

Discrete Inputs (only B+Q Packages)

CAUTION

Please note that the maximum voltages, which may be applied at the discrete inputs are defined as follows. Voltages higher than those specified destroy the hardware!

Maximum input range: +/-4 to 40 Vdc.

Control Inputs

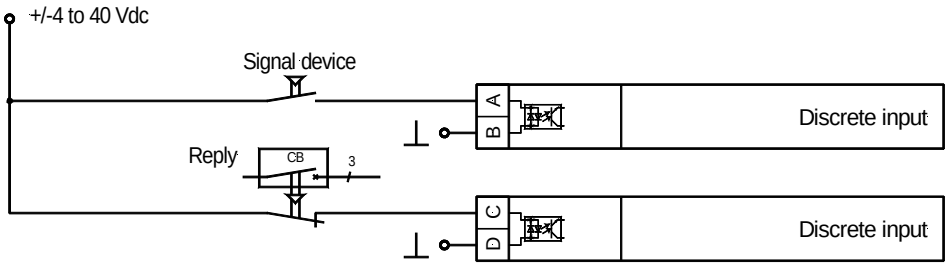


Figure 5-8: Discrete inputs – Control inputs

Terminal	Associated Common	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
A	***B***	**NO contact**	
3	7	Automatic 1	2.5 mm²
5		Automatic 2	2.5 mm²
6		Multi function (selectable in configuration): • Sprinkler operation • Engine enable • External acknowledgement • Engine stop • Operating mode STOP • Start without CB	2.5 mm²
53		*[GCP-31]* Enable externally *[GCP-32]* Enable MCB	2.5 mm²
C	***D***	**NC contact**	
4	7	Reply: GCB is open	2.5 mm²
54		*[GCP-31]* Status: Isolated operation *[GCP-32]* Reply: MCB is open	2.5 mm²

Table 5-8: Terminal assignment - control inputs

Alarm Inputs

The discrete inputs can be connected in positive or negative logic:
- positive logic The discrete input is wired to +/-4 to 40Vdc.
- negative logic The discrete input is wired to GND.

Positive Logic

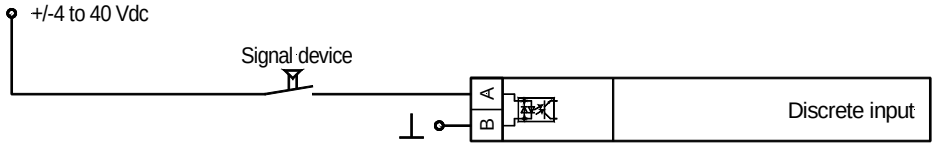


Figure 5-9: Discrete inputs – Alarm inputs - positive logic

Terminal	Associated Common	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
A	***B***		
34	33	Discrete input [D01] - Alarm input - in Sprinkler operation: **EMERGENCY STOP**	2.5 mm²
35		Discrete input [D02] - Alarm input	2.5 mm²
36		Discrete input [D03] - Alarm input	2.5 mm²
61	60	Discrete input [D04] - Alarm input - if discrete input terminal 34 is not available in Sprinkler operation: **EMERGENCY STOP**	2.5 mm²
62		Discrete input [D05] - Alarm input or - Firing speed reached ("Generator")	2.5 mm²
63		Discrete input [D06] - Alarm input or - Operation mode selector blocked	2.5 mm²
64		Discrete input [D07] - Alarm input or - Change breaker logic	2.5 mm²
65		Discrete input [D08] - Alarm input	2.5 mm²
66		Discrete input [D09] - Alarm input	2.5 mm²
67		Discrete input [D10] - Alarm input or - 'Close GCB' before expiration of the del. eng. monit.	2.5 mm²
68		Discrete input [D11] - Alarm input or - Inhibition emergency power (from version 4.3010)	2.5 mm²
69		Discrete input [D12] - Alarm input	2.5 mm²
70		Discrete input [D13] - Alarm input or - No-load operation mode	2.5 mm²
71		Discrete input [D14] - Alarm input	2.5 mm²
72		Discrete input [D15] - Alarm input	2.5 mm²
73		Discrete input [D16] - Alarm input	2.5 mm²

Table 5-9: Terminal assignment - alarm inputs positive logic

Negative Logic

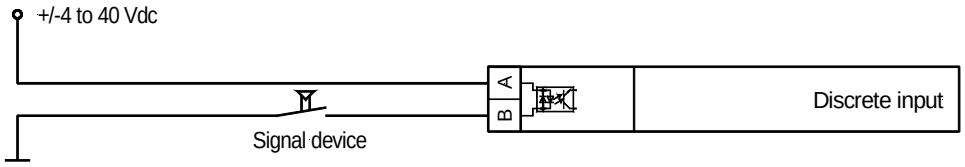


Figure 5-10: Discrete inputs – Alarm inputs - negative logic (Example)

Associated Common	Terminal	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
A	***B***		
33	34	Discrete input [D01] - Alarm input - in Sprinkler operation: **EMERGENCY STOP**	2.5 mm²
	35	Discrete input [D02] - Alarm input	2.5 mm²
	36	Discrete input [D03] - Alarm input	2.5 mm²
60	61	Discrete input [D04] - Alarm input - if discrete input terminal 34 is not available in Sprinkler operation: **EMERGENCY STOP**	2.5 mm²
	62	Discrete input [D05] - Alarm input or - Firing speed reached ("Generator")	2.5 mm²
	63	Discrete input [D06] - Alarm input or - Operation mode selector blocked	2.5 mm²
	64	Discrete input [D07] - Alarm input or - Change breaker logic	2.5 mm²
	65	Discrete input [D08] - Alarm input	2.5 mm²
	66	Discrete input [D09] - Alarm input	2.5 mm²
	67	Discrete input [D10] - Alarm input or - 'Close GCB' before expiration of the delayed engine monitoring	2.5 mm²
	68	Discrete input [D11] - Alarm input or - Inhibition emergency power (from version 4.3010)	2.5 mm²
	69	Discrete input [D12] - Alarm input	2.5 mm²
	70	Discrete input [D13] - Alarm input or - No-load operation mode	2.5 mm²
	71	Discrete input [D14] - Alarm input	2.5 mm²
	72	Discrete input [D15] - Alarm input	2.5 mm²
	73	Discrete input [D16] - Alarm input	2.5 mm²

Table 5-10: Terminal assignment - alarm inputs negative logic

Operation Mode Selection Via DI (Option A2, from V4.3010)

The Option A2 enables to select the operation mode using the terminals 127 and 128 externally from 4.3010. The discrete inputs can be connected using positive or negative logic as described above.

Terminal	Associated common	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
127	124	Control input [terminal 127] - Operation mode **STOP**	2.5 mm²
128		Control input [terminal 128] - Operation mode **AUTOMATIC**	2.5 mm²

Table 5-11: Discrete inputs - operation mode selection

NOTE

The selection of the operation mode is only possible if the discrete input on terminal 63 (Operation mode selector blocked) is energized. More detailed information can be found in the configuration manual (37278A) under 'Block operation mode selector switch via terminal 63'.

Digital Inputs (only RPQ Rental Package)

The Rental Package is a special unit developed for the so called "Rental" marked. It has special functions and also special digital inputs in contrast to the other GCP-30 units.

CAUTION

Please note that the maximum voltages, which may be applied at the discrete inputs are defined as follows. Voltages higher than those specified destroy the hardware!

Maximum input range: +/-4 to 40 Vdc.

Terminal	Associated common	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
3	7	Automatic 1	2.5 mm²
4		Reply: GCB is open	2.5 mm²
5		Automatic 2	2.5 mm²
6		Multi function (selectable in configuration): • Engine enable • External acknowledgement • Engine stop • Operating mode STOP • Start without CB	2.5 mm²
53		Enable MCB	2.5 mm²
54		Status: isolated operation (busbar is not connected with mains)	2.5 mm²
34	33	Digital input [D01] - Alarm input (Emergency Stop recommended)	2.5 mm²
35		Digital input [D02] - Alarm input	2.5 mm²
36		Digital input [D03] "Phase rotation check O.K.": This control input is evaluated if the busbar is energized. In case of a failure, the message "Phase sequence" is displayed and closing the circuit breakers is blocked. If the busbar phase rotation shall not be monitored, this input must be energized permanently.	2.5 mm²

NOTE

Phase rotation monitoring is strongly recommended for the "Rental Package". Otherwise, the input may always be energized if it shall not be evaluated.

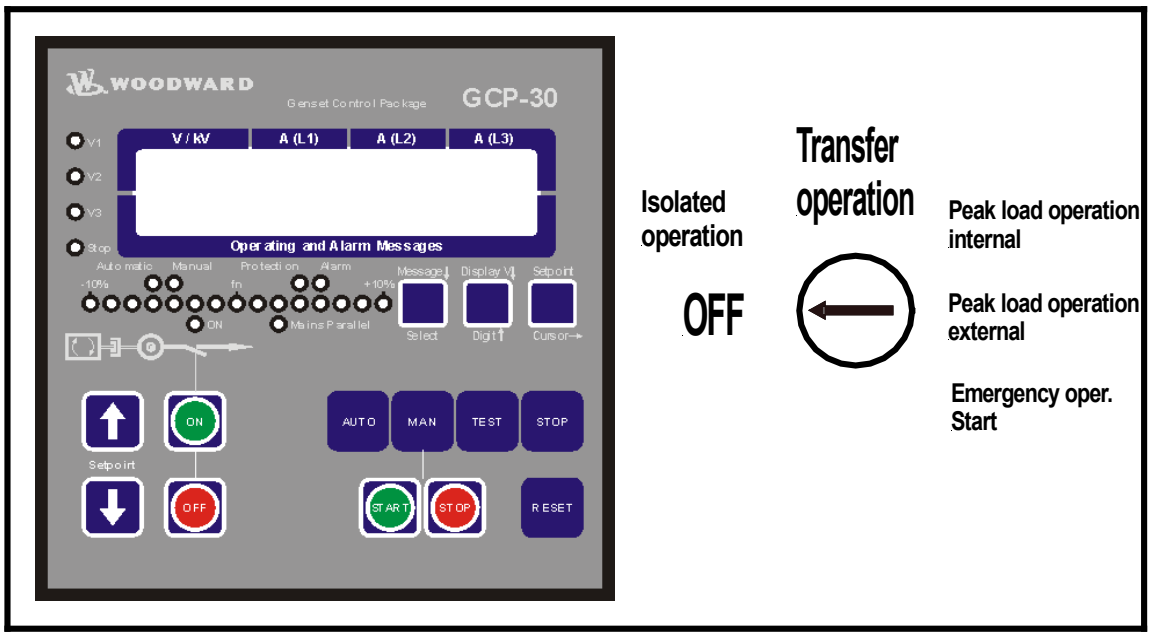
Terminal	Associated common	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
61	60	Digital input [D04] - Alarm input	2.5 mm²
62		Digital input [D05] - Alarm input or - Firing speed reached ("alternator", "oil pressure")	2.5 mm²
63		Discrete input [D06] - Alarm input or - Operation mode selector blocked	2.5 mm²
64		Discrete input [D07] - Alarm input or - Change breaker logic	2.5 mm²
65		Digital input [D08] - A Alarm input or - Frequency/power set point lower	2.5 mm²
66		Digital input [D09] - Alarm input or - Frequency/power set point raise	2.5 mm²
67		Digital input [D10] - Alarm input or - Voltage/power factor set point lower	2.5 mm²
68		Digital input [D11] - Alarm input or - Inhibit emergency run	2.5 mm²
69		Digital input [D12] - Alarm input or - Voltage/power factor set point raise	2.5 mm²
70		Digital input [D13] - Alarm input or - Idle mode	2.5 mm²
71		Frequency system 2 active. This control input allows to change between 2 speed systems. (usually 50/60Hz) The following parameters are considered: • Rated frequency • Set point frequency • Rated speed	2.5 mm²
72,73		Change voltage system 1,2,3,4. The following parameters are considered: • Rated voltage • Set point voltage generator • Current transformer generator • Set point current generator • Rated power generator Terminal 72 / 73 / Result 0 / 0 / System 1 0 / 1 / System 2 1 / 0 / System 3 1 / 1 / System 4	2.5 mm²
125	124	Control input [term. 125] - Frequency/voltage droop ON	2.5 mm²
126		Control input [term. 126] - Mobile Systems Mode ON	2.5 mm²
127		Control input [term. 127] - **STOP** operating mode	2.5 mm²
128		Control input [term. 128] - **AUTOMATIC** operating mode	2.5 mm²

NOTE

The operating mode selection via DI is only possible if the digital input 6 (terminal 63, block operation mode selector) is energized. For detailed information, refer to the Configuration Manual (37278) under "Block operation mode selector switch via terminal 63".

Operating Modes of the Rental Package RPQ+SC08

The operating modes of the Rental Package RPQ+SC08 are usually selected via an external selector switch and the digital inputs. A typical connection of the selector switch and a description of the operating modes belonging to it may be found in the following.



For this, the signals are to be connected as follows:

Signals to be connected Operating mode	Terminal 54 Reply MCB OFF	Terminal 126 Mobile Systems	Terminal 53 Enable MCB	Terminal 68 Inhibit emergency run **	Terminal 3 Automatic 1	Terminal 5 Automatic 2
OFF (de-energized)	irrelevant	irrelevant	irrelevant	irrelevant	irrelevant	irrelevant
Isolated operation	1	0	0	1	remote control	0
Transfer operation	1	1	0 (Syncon Panel) remote control *	1		irrelevant
Peak load operation internal	0	0	1	1	remote control	0
Peak load operation external	0	0	1	1	0	remote control
Emergency operation Start	reply must be connected	0	1	0	0	0

*) If a synchronization between mains and generator busbar voltage is to be performed without SYNCON Panel, this DI must initiate the synchronization.

**) If no emergency power operation is required, the parameter "Emergency run" may be disabled. This allows to use terminal 68 as free alarm input.

Switch Position OFF

The GCP will be de-energized in this operating mode. No actions are initiated by the unit anymore. If you switch to position OFF while the genset is running, the GCB opens and the genset stops immediately (it is assumed that this is provided by the customer).

Switch Position Isolated Operation

The GCP operating modes are enabled:

STOP: Genset stops with cool down or remains stopped. If necessary, the load will be taken off of the genset and the GCB will be opened.
MANUAL: Genset may be started and stopped manually. The generator breaker may be closed and opened using the manual keys. Frequency and voltage are controlled isochronous.
AUTOMATIC: The genset will be started and the GCB will be closed if remote control has been activated.
TEST: The genset will be started. The GCB may be closed and opened using the MANUAL keys.

The set points for frequency and voltage may either be modified using the arrow keys at the unit or via the digital inputs.

Switch Position Transfer Operation

(Function enable station and return to the mains)
The GCP operating modes may be freely available or fixed to **MANUAL** operating mode. The parameter "Interchange mode in Manual", which is responsible for this, is in the parameter group Automatic (refer to Configuration Manual 37278).

The following is valid in general:
Only the GCB will be synchronized. It is not possible to connect to a de-energized generator busbar.
If the GCB is closed, the generator monitoring is loaded with the trigger times mains monitoring, the phase shift monitoring is not active.
The automatic mains connection detection*) will be activated.
If no mains connection is detected, a frequency and voltage control with droop will be performed.
If a mains connection is detected, real and reactive power control will be performed.
A phase relation zero control with the mains may be restarted via the DI at terminal 53 (Enable MCB) or the SYNCON Panel. This will be disabled automatically if a mains connection is detected.
It is principally possible to open the GCB with the Operation mode STOP key for security reasons.

) Automatic mains connection detection:
The GCP detects automatically via phase L1 whether the generator is in parallel with the mains.
If the phase relation between mains and generator busbar is recognized as "fixed", the message "Mains connected" will be displayed. This is the case if the angle of L1 between mains and busbar remains below a certain angle limit for a certain time. Angle and time may be configured with the parameter "Detection mains coupling" under phase controller within the parameter group breaker (refer to Configuration Manual 37278).
This automatic detection is used to decide whether real and reactive power or frequency and voltage control is to be performed.

The following is valid for free operating mode selection at the GCP:

STOP: Genset stops with cool down or remains stopped. If necessary, the load will be taken off of the genset and the GCB will be opened.
MANUAL: Genset may be started and stopped manually. The generator breaker may be closed and opened using the manual keys.
AUTOMATIC: The genset will be started and the GCB will be closed if remote control has been activated.
TEST: Not possible; if transfer operation is selected during TEST operation, an automatic change to MANUAL operating mode will be performed.

The set points for frequency and voltage or real power and power factor may either be modified using the arrow keys at the unit, via the digital inputs, or using the SYNCON Panel.
Only the set points, the control of which is currently active, may be modified via the Dis.

Switch Position Peak Load Operation "Internal"

The GCP operating modes are enabled:

STOP: Genset stops with cool down or remains stopped. If necessary, the load will be taken off of the genset and the GCB will be opened.
MANUAL: Genset may be started and stopped manually.
The generator breaker may be closed and opened using the manual keys. After closing the GCB, real and reactive power are controlled.
AUTOMATIC: The genset will be started and the GCB will be synchronized if remote control has been activated. After closing the GCB, real and reactive power are controlled. The set real power 1 and the power factor are stored **"internally"**.
TEST: The genset will be started. The generator breaker may be closed and opened using the manual keys.

The set points for real power and power factor may either be modified using the arrow keys at the unit or via the digital inputs.

Switch Position Peak Load Operation "External"

The functions correspond with the switch position peak load operation "internal" except the difference that the real power set point is controlled by a 0/4 to 20mA signal or transmitted via an interface.

Switch Position Emergency Power Start

The GCP operating modes are enabled:

STOP: Genset stops with cool down or remains stopped. If necessary, the load will be taken off of the genset and the GCB will be opened.

MANUAL: Genset may be started and stopped manually.
The generator breaker may be closed and opened using the manual keys.
No automatic change-over to emergency power is activated.

AUTOMATIC: If mains fail (measurement via terminals 50, 51, 52) the genset will be started, the MCB will be opened and the GCB will be closed. If mains return, the MCB will be synchronized back after the mains settling time has expired. Then the load will be taken off of the genset and the genset will be stopped.

TEST: The genset will be started. The generator breaker may be closed and opened using the manual keys. An automatic change-over to emergency power will be performed if necessary.

The set points for frequency and voltage may either be modified using the arrow keys at the unit or via the digital inputs.

NOTE

It is required for the emergency power start function that the MCB reply is connected. The start and stop commands from the GCP must also be wired to the MCB to enable an automatic change-over.

Phase Rotation Monitoring Busbar

If the generator busbar is energized, a phase rotation relay is evaluated via DI3 at terminal 36. If the phase rotation relay indicates a failure, this will be indicated by the GCP display and closing the GCB will be blocked.
If no phase rotation relay is used, the DI3 at terminal 36 must be energized to close the GCB. In this case, it must be observed that **no phase rotation protection** exists anymore. It is possible to close the GCB even if the phase rotation is wrong!

Analog Inputs (Packages XP, Option T701)

WARNING

The analog inputs of the GCP are not isolated. When using an isolation monitor, we recommend to use two-pole, isolated transmitters.

The analog inputs for active transmitters (0 to 20 mA, 0 to 10V) should only be operated with two-pole, isolated transmitters.

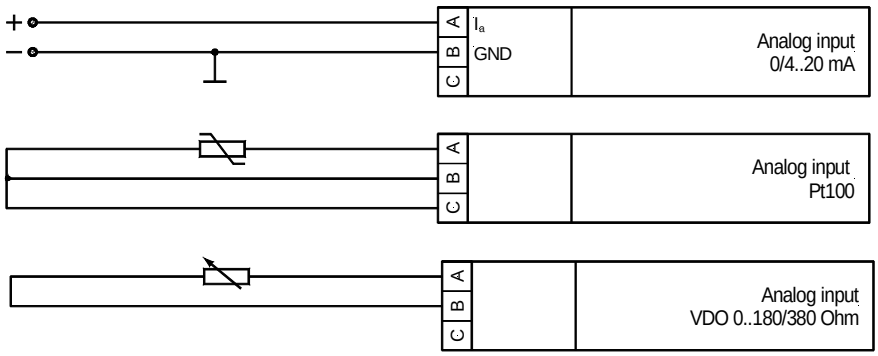


Figure 5-11: Analog inputs - Package XP, Option T701

Terminal A	Terminal B	Terminal C	Description (according to DIN 40 719 Part 3, 5.8.3)	A_{max}
93	94	95	Analog input 1 [T1] **0/4 to 20 mA**, configurable function: - Alarm input / Set value input / Actual value input	1.5 mm²
96	97	98	Analog input 2 [T2] **0/4 to 20 mA**, configurable function: - Alarm input / Set value input / Actual value input	1.5 mm²
99	100	101	Analog input 3 [T3] **0/4 to 20 mA**, configurable function: - Alarm input / Set value input / Actual value input	1.5 mm²
102	103	104	Analog input 4 [T4] **Pt100**, configurable function: - Alarm input / Actual value input	1.5 mm²
105	106	107	Analog input 5 [T5] (only **B+X Packages**) **Pt100**, configurable function: - Alarm input / Actual value input	1.5 mm²
105	106	-	Analog input 5 [T5] (only **RPQ Package**) **VDO 0 to 400 Ohms fuel level freely scaleable**, configurable function: - Alarm input / Actual value input	1.5 mm²
108	109	-	Analog input 6 [T6] **VDO pressure 0 to 5/10 bar or 0 to 72.5/145 psi 0 to 180 Ohm**, configurable function: - Alarm input / Actual value input	1.5 mm²
111	112	-	Analog input 7 [T7] **VDO temperature 30 to 120°C or 86 to 248°F 0 to 380 Ohm**, configurable function: - Alarm input / Actual value input	1.5 mm²

Table 5-12: Analog inputs - terminal assignment

Pick-Up

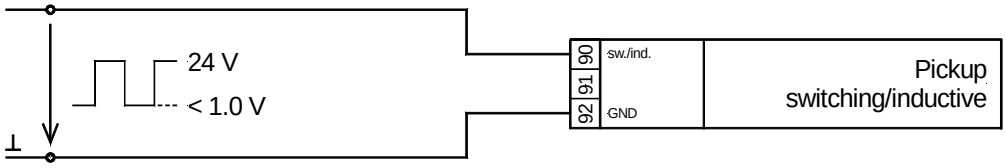


Figure 5-12: Pickup

Terminal	Description		A_{max}
90	Pickup	switching/inductive	2.5 mm²
91			2.5 mm²
92		GND	2.5 mm²

Table 5-13: Pickup - terminal assignment

Specification of the input circuit for inductive speed sensors
Ambient temperature: 25 °C

Signal shape	Sinusoidal
Minimum input voltage in the range of 200 to 10,000 Hz	< 0.5 V_{eff}
Minimum input voltage in the range of 300 to 5,000 Hz	< 0.3 V_{eff}
Maximum input voltage in the range of 0 to 1,500 Hz	30 V_{eff}
Maximum input voltage in the range of 1,500 to 10,000 Hz	30 to 60 V_{eff} (linear increasing)

Table 5-14: Pickup - input voltage

Note: As the ambient temperature increases, the minimum input voltage increases at a rate of approximately 0.3 V/°C.

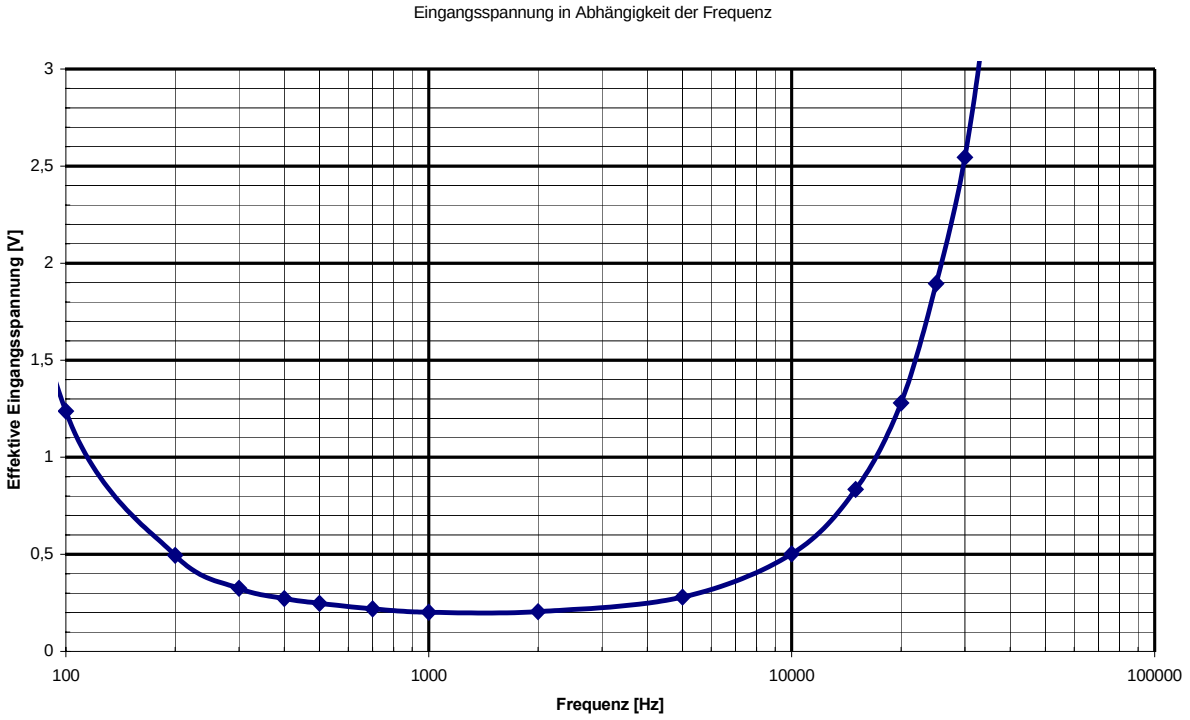


Figure 5-13: Pickup – Typical behavior of the input voltage sensitivity

Relay Outputs

Controller Outputs

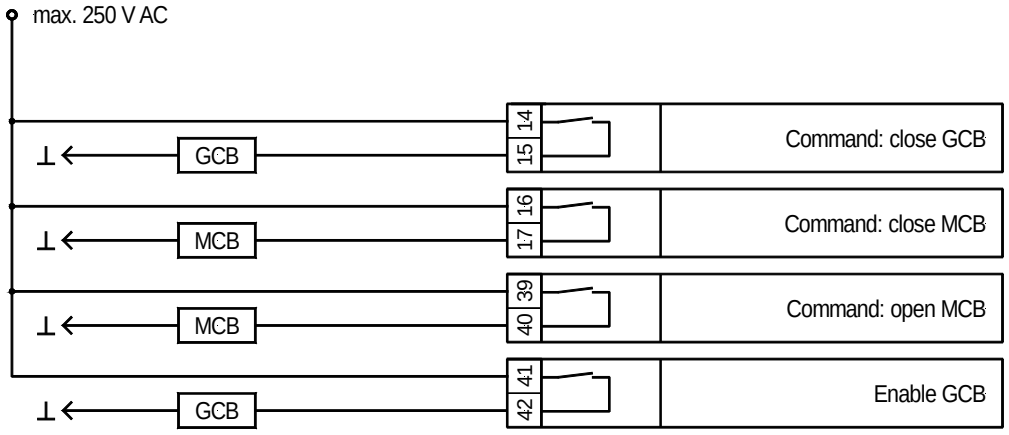


Figure 5-14: Relay outputs – Controller outputs – CB activation

Make cont.	Description	A_{max}
14/15	Command: close GCB	2.5 mm²
16/17	*[GCP-32]* Command: close MCB	2.5 mm²
39/40	*[GCP-32]* Command: open MCB	2.5 mm²
41/42	Command: open GCB	2.5 mm²

Table 5-15: Relay outputs - terminal assignment

Relay Manager

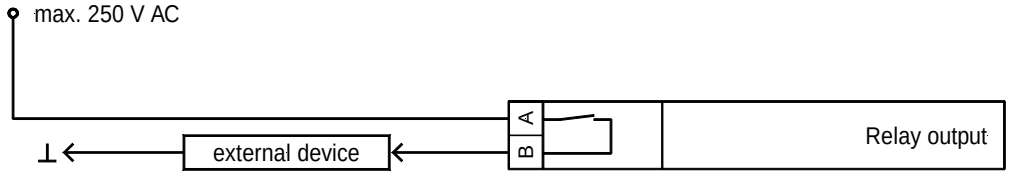


Figure 5-15: Relay outputs – Relay manager

Make cont.	Description	A_{max}
18/19	Readiness for operation	2.5 mm²
43/44	Operating solenoid/Stopping solenoid	2.5 mm²
45/46	Starter	2.5 mm²
74/75	Relay [R1] (Relay manager)	2.5 mm²
76/77	Relay [R2] (Relay manager)	2.5 mm²
78/79	Relay [R3] (Relay manager)	2.5 mm²
80/81	Relay [R4] (Relay manager)	2.5 mm²
82/83	Relay [R5] (Relay manager)	2.5 mm²
37/38	Relay [R6] (Relay manager; pre-assigned: Preheat/Ignition ON)	2.5 mm²
47/48	Relay [R7] (Relay manager; pre-assigned: Centralized alarm horn)	2.5 mm²

Table 5-16: Relay manager - terminal assignment

Analog Outputs (Package XP, Option A2)

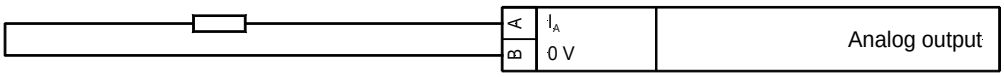


Figure 5-16: Analog outputs

Ia ***A***	GND ***B***	Description	A_{max}
120	121	Analog output [A1] - 0/4 to 20 mA	1.5 mm²
122	123	Analog output [A2] - 0/4 to 20 mA	1.5 mm²

Table 5-17: Analog outputs - terminal assignment

Controller Outputs

In the Packages D, the controller is configured as a three-position controller [made up of a changeover contact and a normally open contact]. In Package Q and with Option Q these outputs are available in different versions dependent on external bridges/jumpers and parameters.

Three-Position Controller (Packages D)

The three-position controller is only included in Package D.

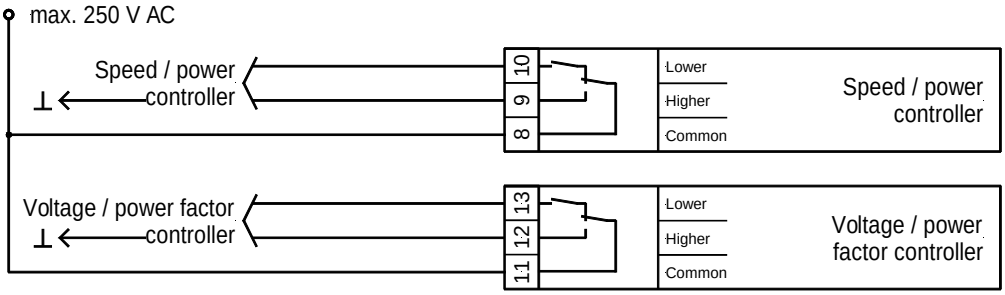


Figure 5-17: Controller – Three-position controller

Terminal		Description	A_{max}
8	common	Speed controller (n/f) / Power controller (P)	2.5 mm²
9	higher		2.5 mm²
10	lower		2.5 mm²
11	common	Voltage controller (V) / Reactive power controller (Q)	2.5 mm²
12	higher		2.5 mm²
13	lower		2.5 mm²

Table 5-18: Controller outputs - terminal assignment

Multi Functional Controller Outputs (Package Q, Option Q)

Configuration and an external jumper can change the multifunction controller outputs. These are only included in package Q and in option Q.

Versions

- **Three-position controller** via relay manager
  - Control of n/f/P: Parameter "**F/P contr.type**" = THREESTEP
    n+/f+/P+ = relay manger parameter 114
    n-/f-/P- = relay manager parameter 115
  - Control of V/Q: Parameter "**V/Q contr.output**" = THREESTEP
    V+/Q+ = relay manager parameter 116
    V-/Q- = relay manager parameter 117

- **Analog controller** output
  - Control of n/f/P: Parameter "**F/P contr.type**" = ANALOG
    Current output (mA) = no jumpers necessary
    Voltage output (V) = jumpers between 8/9
    Connect governor to terminals 9/10
  - Control of V/Q: Parameter "**V/Q contr.output**" = ANALOG
    Current output (mA) = no jumpers necessary
    Voltage output (V) = jumpers between 11/12
    Connect governor to terminals 12/13

- **PWM controller** output
  - Control of n/f/P: Parameter "**F/P contr.type**" = PWM
    PWM output = jumpers between 8/9
    Connect governor to terminals 9/10

Wiring Of Controller

- Setting: THREE-POSITION (Three-position controller)

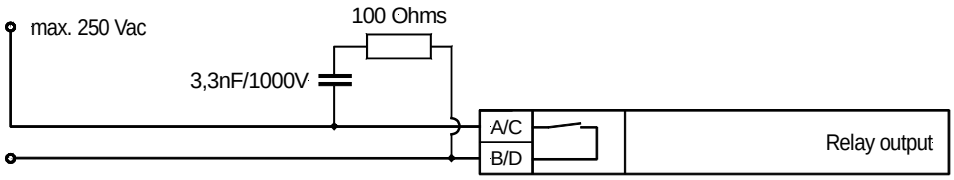


Figure 5-18: Three-position controller – external RC wiring for relay

Terminal		Description	A_{max}
A	higher	Speed / Frequency / Real power (RM: "+" = 114, "-" = 115) or Voltage / Reactive power (RM: "+" = 116, "-" = 117)	2.5 mm²
B			2.5 mm²
C	lower		2.5 mm²
D			2.5 mm²

The selection and programming occurs via the relay manager (RM).

Table 5-19: Controller outputs - three-position

CAUTION

Refer to Technical Data on page 51 for information about current limits. Use an interposing relay if necessary. Currents higher than those specified destroy the hardware!

- Setting: ANALOG or PWM (Analog controller) - Frequency-/Power controller

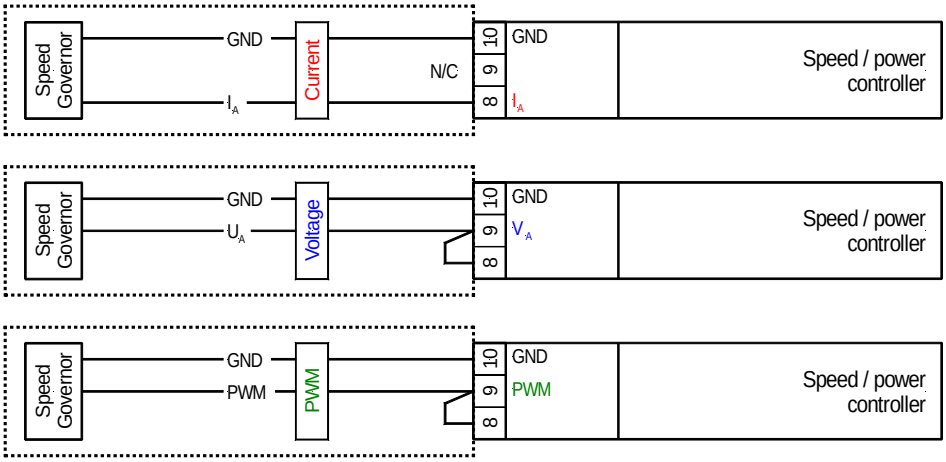


Figure 5-19: Analog controller output n/f/P – Wiring and external jumper setting

Type	Terminal		Description	A_{max}
I Current	8	I_A	Speed controller / Frequency controller / Real power controller	2.5 mm²
	9			2.5 mm²
	10	GND		2.5 mm²
V Voltage	8			2.5 mm²
	9	V_A		2.5 mm²
	10	GND		2.5 mm²
PWM	8			2.5 mm²
	9	PWM		2.5 mm²
	10	GND		2.5 mm²

Table 5-20: Controller outputs - analog or PWM

- Setting: ANALOG (Analog controller) - Voltage-/Reactive power controller

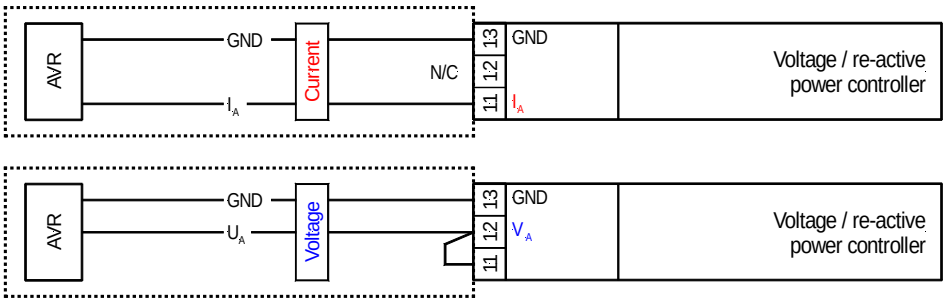


Figure 5-20: Analog controller output V/Q – Wiring and jumper setting

Type	Terminal		Description	A_{max}
I Current	11	I_A	Voltage controller / Reactive power controller	2.5 mm²
	12			2.5 mm²
	13	GND		2.5 mm²
V Voltage	11			2.5 mm²
	12	V_A		2.5 mm²
	13	GND		2.5 mm²

Table 5-21: Controller outputs - analog

Interface

Interface Wiring

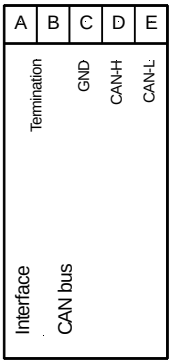


Figure 5-21: Interface - Terminals

Wiring					Description
Whether the terminals are designated X or Y depends on the configuration of the system. Please refer to the wiring diagram (A = X/Y, B = X/Y, etc.)					
all					
A (X1)	B (X2)	C (X3)	D (X4)	E (X5)	
CAN-H	CAN-L	GND	CAN-H	CAN-L	CAN bus

[1].. can be used to loop the CAN bus or/and to connect the termination resistance.

Table 5-22: Interface - terminal assignment

CAN Bus Shielding

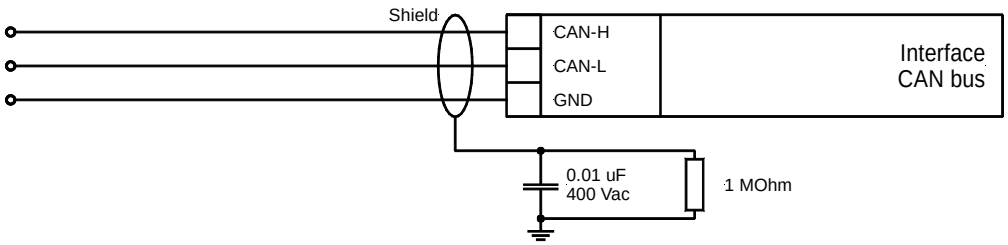


Figure 5-22: Interface – CAN bus shielding

The CAN Bus Loop

NOTE

Please note that the CAN bus must be terminated with an impedance which corresponds to the wave impedance of the cable (e.g. 120 Ohm). The CAN bus is terminated between CAN-H and CAN-L.

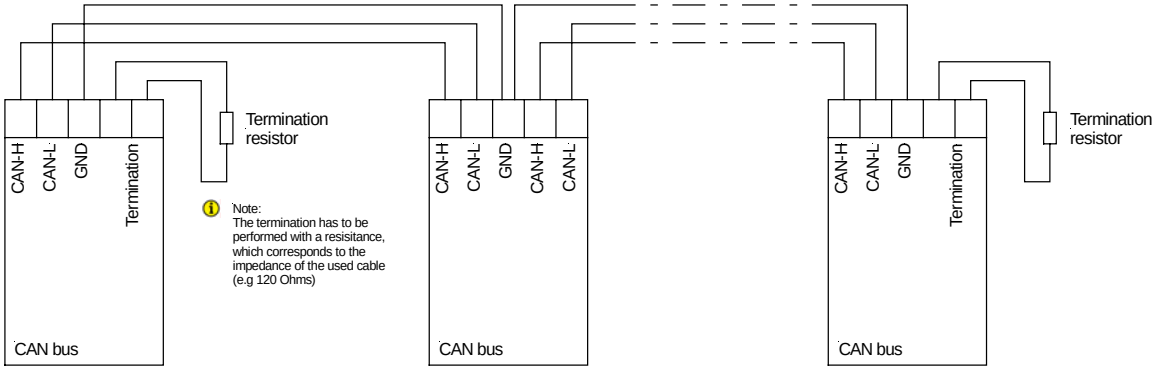


Figure 5-23: Interfaces – Loop the CAN bus

DPC - Direct Configuration Interface

NOTE

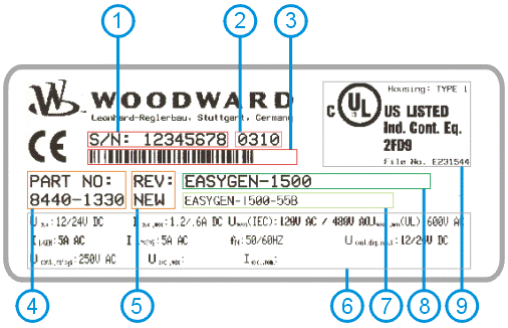
To configure via the configuration interface (direct configuration) you need the configuration cable (ordering code "DPC"), the program LeoPC1 (delivered with the cable) and the corresponding configuration files. Please consult the online help installed when the program is installed for a description of the LeoPC1 program and its setup.

If the parameter "Direct config." is switched to ON the communication via the interface on terminals X1/X5 is disabled.

If the control unit detects that the engine is running (ignition speed exceeded), the direct configuration port is disabled.

Chapter 6.
Technical Data

Name plate ----------



1	S/N	Serial number (numerical)
2	S/N	Date of production (YYMM)
3	S/N	Serial number (Barcode)
4	P/N	Item number
5	REV	Item revision number
6	Details	Technical data
7	Type	Description (long)
8	Type	Description (short)
9	UL	UL sign

Measuring values, voltages---------- ⅄/Δ

- Measuring voltages
  [1] 120 Vac
  Rated value (Vn) ..... 69/120 Vac
  Maximum value (UL max).....max. 150 Vac

  [4] 400 Vac
  Rated value (Vn) ..... 231/400 Vac
  Maximum value (UL max).....max. 300 Vac

- Setting range (prim)..... 0.050 to 65.000 kVac
- Setting range (sec) **[1]**..... ⅄ 50 to 125 Vac.....Δ 50 to 114 Vac
  [4]..... ⅄ 50 to 480 Vac.....Δ 50 to 380 Vac
- Measuring frequency.....50/60 Hz (40.0 to 70.0 Hz)
- Accuracy.....Class 1
- Input resistance per path..... [1] 0.21 MΩ
  [4] 0.7 MΩ
- Maximum power consumption per path..... < 0.15 W

Measuring values, currents ---------- **galvanically isolated**

- Measuring current **[../1]** Rated value (In)..... ../1 A
  [../5] Rated value (In)..... ../5 A

- Accuracy.....Class 1
- Linear measuring range Generator (terminals x/x).....3.0 × In
  Mains/ground current (terminals x/x) ..... 1.5 × In
- Maximum power consumption per path.....< 0.15 VA
- Rated short-time current (1 s) [..1/ A].....50.0 × In
  [../5 A]..... 10.0 × In

Ambient variables ----------

- Power supply .....12/24 Vdc (9.5 to 32.0 Vdc)
- Intrinsic consumption .....max. 20 W
- Ambient temperature Storage ..... -30 to 80 °C / -22 to 176 °F
  Operation.....-20 to 70 °C / -4 to 158 °F
- Ambient humidity.....95 %, non condensing

Discrete inputs ---------- galvanically isolated
- Input range ($U_{Cont, digital input}$) ..... Rated voltage 12/24 Vdc (6 to 32 Vdc)
- Input resistance ..... approx. 6.8 kΩ

Relay outputs ---------- potential free
- Contact material ..... AgCdO
- General purpose (GP) ($U_{Cont, relay output}$)
  AC ..... 2.00 Aac@250 Vac
  DC ..... 2.00 Adc@24 Vdc
  0.36 Adc@125 Vdc
  0.18 Adc@250 Vdc
- Pilot duty (PD) ($U_{Cont, relay output}$)
  AC B300
  DC ..... 1.00 Adc@24 Vdc
  0.22 Adc@125 Vdc
  0.10 Adc@250 Vdc

Analog inputs (Packages XP) ---------- freely scaleable
- Resolution ..... 10 Bit
- 0/4 to 20 mA input ..... Difference measurement, load 150 Ω
- 0 to 5/10 Vdc input ..... Difference measurement, input resistance approx. 16.5 kΩ
- Pt100/Pt1000 input ..... for measuring resistances according to IEC 751
  [Pt100] ..... 2/3-conductor measurement, 0 to 200 °C
  [Pt1000] ..... 2-conductor measurement, -30 to 200 °C
- 0 to 180/380 Ω input ..... difference measurement, sensor current ≤1.9 mA

Analog outputs (Packages XP) ---------- galvanically isolated
- at rated output ..... freely scalable,
- Insulation voltage ..... 3,000 Vdc
- Versions ..... 0 to 5 Vdc, +/-5 Vdc, 0 to 10 Vdc, 0 to 20 mA
- Resolution PWM ..... 8/12 Bit (depending on model)
- 0/4 to 20 mA output ..... maximum load 500 Ω
- 0 to 10 V/+/-5 V output ..... internal resistance ≤1 kΩ

Pickup input---------- capacitive decoupled
- Input impedance ..... min. approx. 17 kΩ
- Input voltage ..... (see Table 5-14: Pickup - input voltage)

Interface ----------

Service interface

- Version RS232
- Signal level ..... 5 V

Level conversion and insulation by using DPC (P/N 5417-557)

CAN bus interface **isolated**

- Insulation voltage ..... 1,500 Vdc
- Version ..... CAN bus
- Internal line termination ..... Not available

Battery (Packages XP) ----------

- Type ..... NiCd
- Durability (at operation without power supply) ..... approx. 5 years
- Battery field replacement ..... not possible

Housing ----------

- Type ..... APRANORM DIN 43 700
- Dimensions (W × H × D) ..... 144 × 144 × 118 mm
- Front cutout (W × H) ..... 138 [+1.0] × 138 [+1.0] mm
- Wiring ..... screw-plug-terminals 1.5 mm² or 2.5 mm²
- Recommended locked torque ..... 0.5 Nm

use 60/75 °C copper wire only
use class 1 wire only or equivalent

- Weight ..... approx. 1,000 g

Protection ----------

- Protection system ..... IP42 from front for proper installation

IP54 from front with gasket (gasket: P/N 8923-1043)
IP21 from back

- Front folio ..... insulating surface
- EMC test (CE) ..... tested according to applicable EN guidelines
- Listings ..... CE marking; UL listing for ordinary locations
- Type approval ..... UL/cUL listed, Ordinary Locations, File No.: 231544

Chapter 7.
Accuracy

Measuring values		Display and ranges	Accuracy	Notes
Frequency				
Generator	f_{L1N}, f_{L2N}, f_{L3N}	15.0 to 85.0 Hz	1 %	-
Busbar	f_{L12}	15.0 to 85.0 Hz	1 %	-
Mains	f_{L1N}, f_{L2N}, f_{L3N}	40.0 to 85.0 Hz	1 %	-
Voltage				
Generator	V_{L1N}, V_{L2N}, V_{L3N}	0 to 400 V	1 %	Transformer ratio adjustable
	V_{L12}, V_{L23}, V_{L31}	0 to 400 V	1 %	
Busbar	V_{L12}	0 to 400 V	1 %	Transformer ratio adjustable
Mains	V_{L1N}, V_{L2N}, V_{L3N}	0 to 400 V	1 %	Transformer ratio adjustable
	V_{L12}, V_{L23}, V_{L31}	0 to 400 V	1 %	
Current				
Generator	I_{L1}, I_{L2}, I_{L3}	0 to 9,999 A	1 %	-
Max. value	I_{L1}, I_{L2}, I_{L3}	0 to 9,999 A	1 %	Slave pointer
Mains	I_{L1}	0 to 9,999 A	1 %	-
Real power				
Current total real power value		-32.0 to 32.0 MW	2 %	-
Reactive power				
Current value in L1, L2, L3		-32.0 to 32.0 Mvar	2 %	-
cos φ				
Current value cos φL1		i0.00 to 1.00 to k0.00	2 %	-
Miscellaneous				
Real energy		0 to 4,200 GWh	2 %	not calibrated
Operating hours		0 to 65,000 h		-
Maintenance call		0 to 9,999 h		-
Start counter		0 to 32,750		-
Battery voltage		10 to 30 V	1 %	-
Pickup speed		f_N +/- 40 %		-
Analog inputs (Packages XP)				
0/4 to 20 mA		freely scaleable		-
Pt100		0 to 250 °C		not calibrated
0 to 180 Ohm		freely scaleable		for VDO sensors
0 to 360 Ohm		freely scaleable		for VDO sensors

Reference conditions (to measure the accuracy):

- Input voltage ..... sinusoidal rated voltage
- Input current..... sinusoidal rated current
- Frequency..... rated frequency +/- 2 %
- Power supply..... rated voltage +/- 2 %
- Power factor cos φ 1.00
- Ambient temperature..... 23 °C +/- 2 K
- Warm-up period..... 20 minutes

We appreciate your comments about the content of our publications.

Please send comments to: stgt-documentation@woodward.com

Please include the manual number from the front cover of this publication.

Woodward Governor Company
Leonhard-Reglerbau GmbH
Handwerkstrasse 29 - 70565 Stuttgart - Germany
Phone +49 (0) 711 789 54-0 • Fax +49 (0) 711 789 54-100
sales-stuttgart@woodward.com

Homepage

http://www.woodward.com/smart-power

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address/phone/fax/e-mail information for all locations is available on our website (www.woodward.com).

05/6/S