



GCP-30 Packages Genset Control



Installation
Software Version from V4.3046

**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.

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Revision History

Rev.	Date	Editor	Changes
NEW	06-01-11	TP	Release
A	07-02-07	TP	Technical Data and CAN bus section updated; minor corrections

Contents



NOTE

The functions described in this manual are included in all GCP-30 series controls (all packages). Functionality that is specific to particular models of GCP-30 controls will be differentiated by having the model number at the beginning of the text for the function.

- [GCP-32]** Functionality for 2 circuit breaker applications (GCP-32 control types).
- [GCP-31]** Functionality for single circuit breaker applications (GCP-31 control types).
- BPQ** Functionality for all units with the **BPQ** Package (unit types GCP-31/**BPQ** and GCP-32/**BPQ**).
- XPD** Functionality for all units with the **XPD** Package (unit types GCP-31/**XPD** and GCP-32/**XPD**).
- XPQ** Functionality for all units with the **XPQ** Package (unit types GCP-31/**XPQ** and GCP-32/**XPQ**).
- SB03** Functionality for all units with the **SB03** Option (unit types GCP-31/**XPQ**+**SB03** and GCP-32/**XPQ**+**SB03**).
- SC10** Functionality for all units with the **SC10** Option (unit types GCP-31/**XPQ**+**SC10** and GCP-32/**XPQ**+**SC10**).

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Chapter 1.

General Information

Type	English	German	
GCP-31/32 Series			
GCP-31/32 Packages - Installation	this manual ⇨	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

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

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.

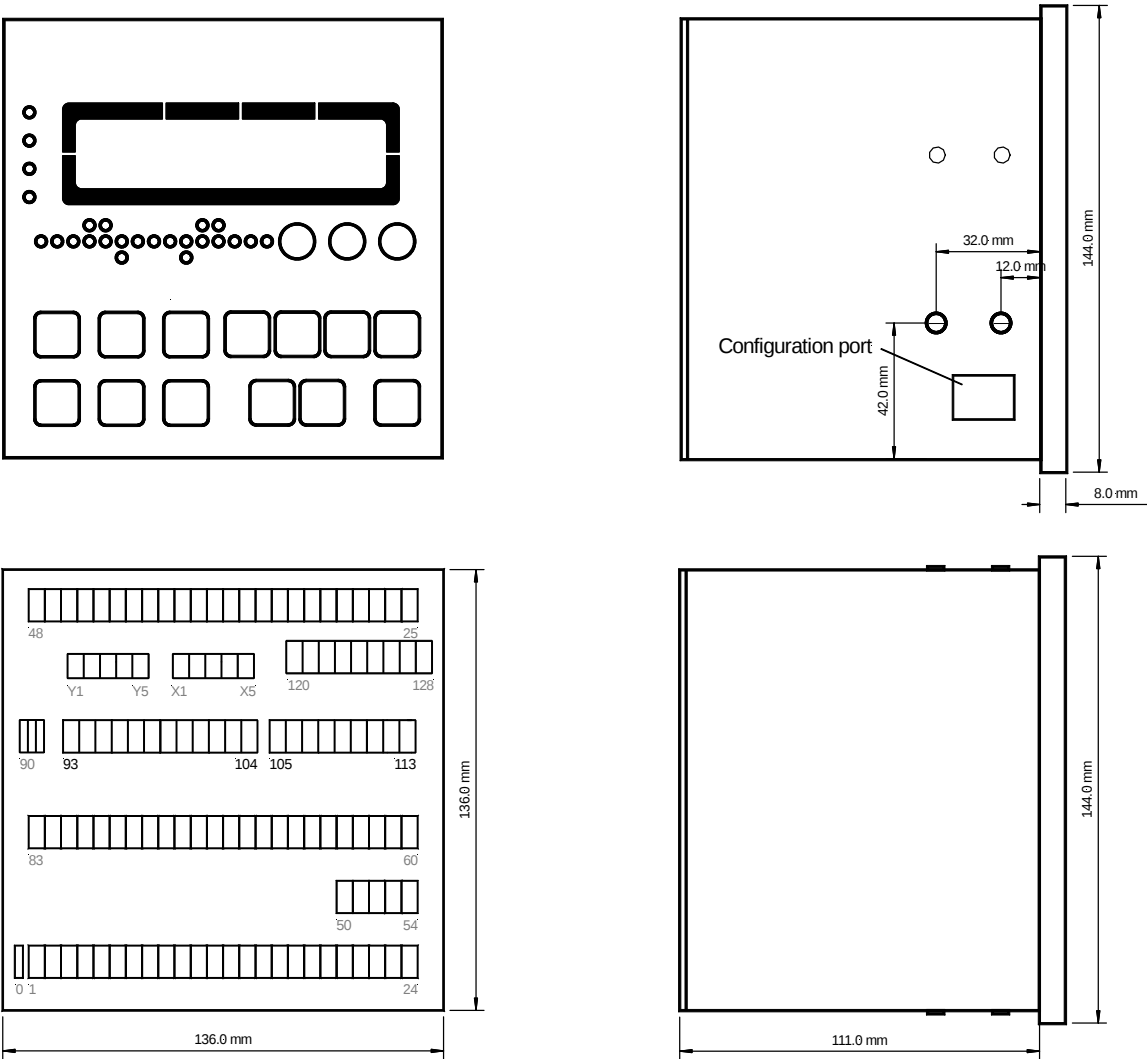


WARNING

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



2004-10-04 | GCP30 Dimensions g2ww-4504-ab.skf

Figure 3-1: Housing - Dimensions

Panel Cut-Out

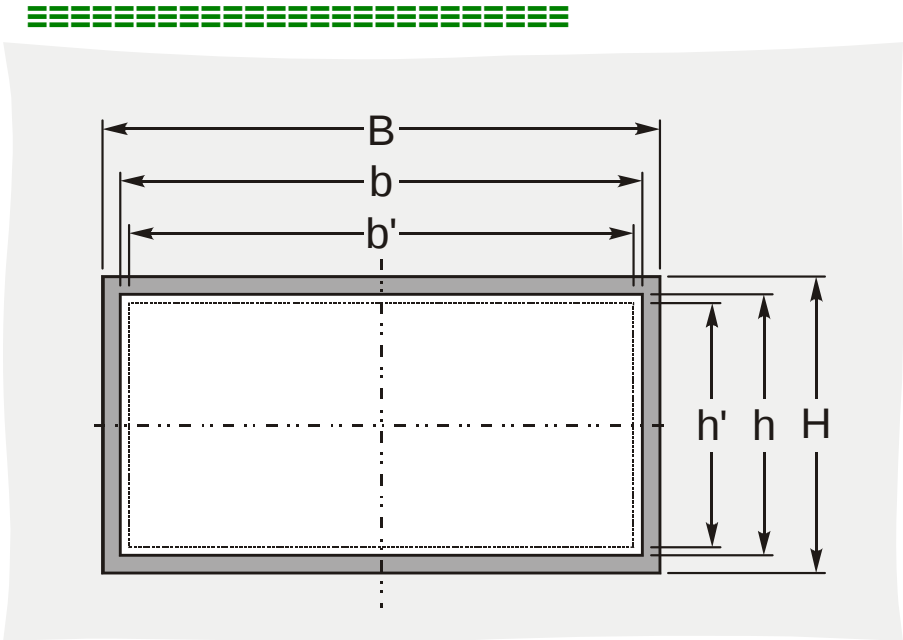


Figure 3-2: Housing - Control panel cut-out

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

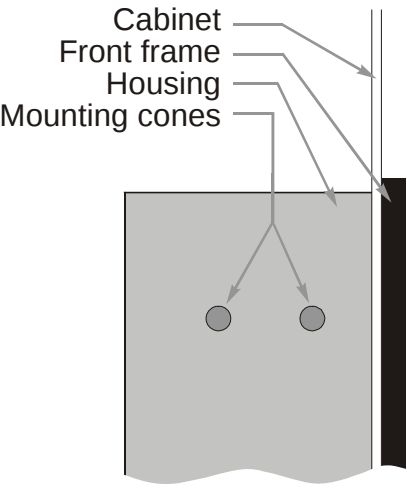


Figure 3-3: Side view - without clamps

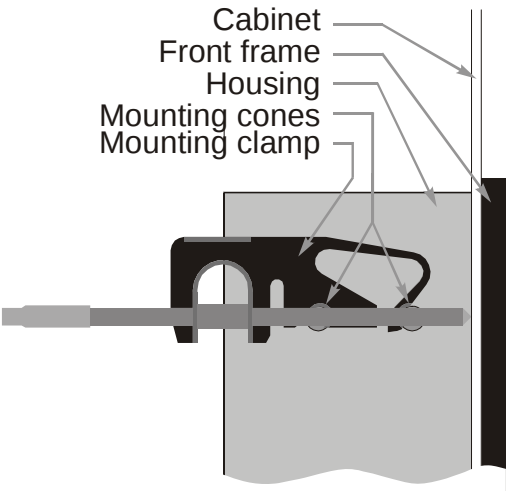


Figure 3-4: Side view - with clamps

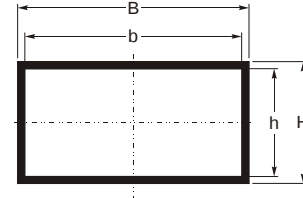
Installation



For installation into a door panel proceed as follows:

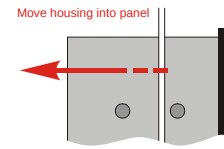
1. **Panel cut-out**

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



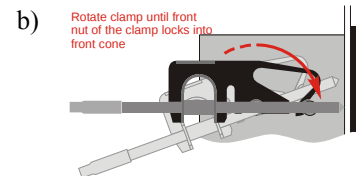
2. **Insert control into cut-out**

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.



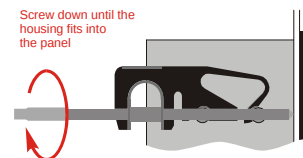
3. **Attach mounting clamps**

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



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 front 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/BPQ Package

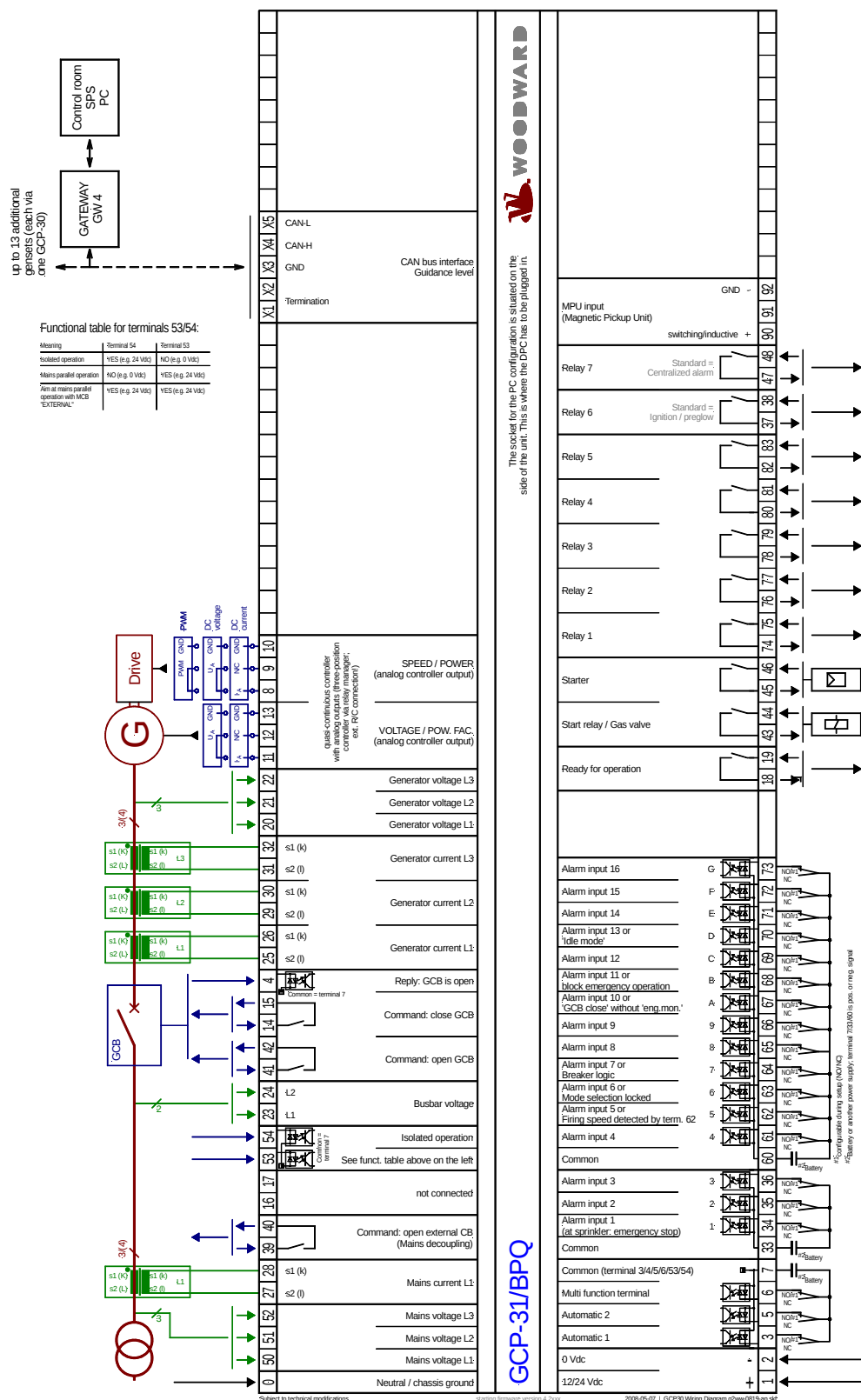


Figure 4-1: Wiring diagram GCP-31/BPQ Package

[illegible]

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GCP-31/XPQ Package

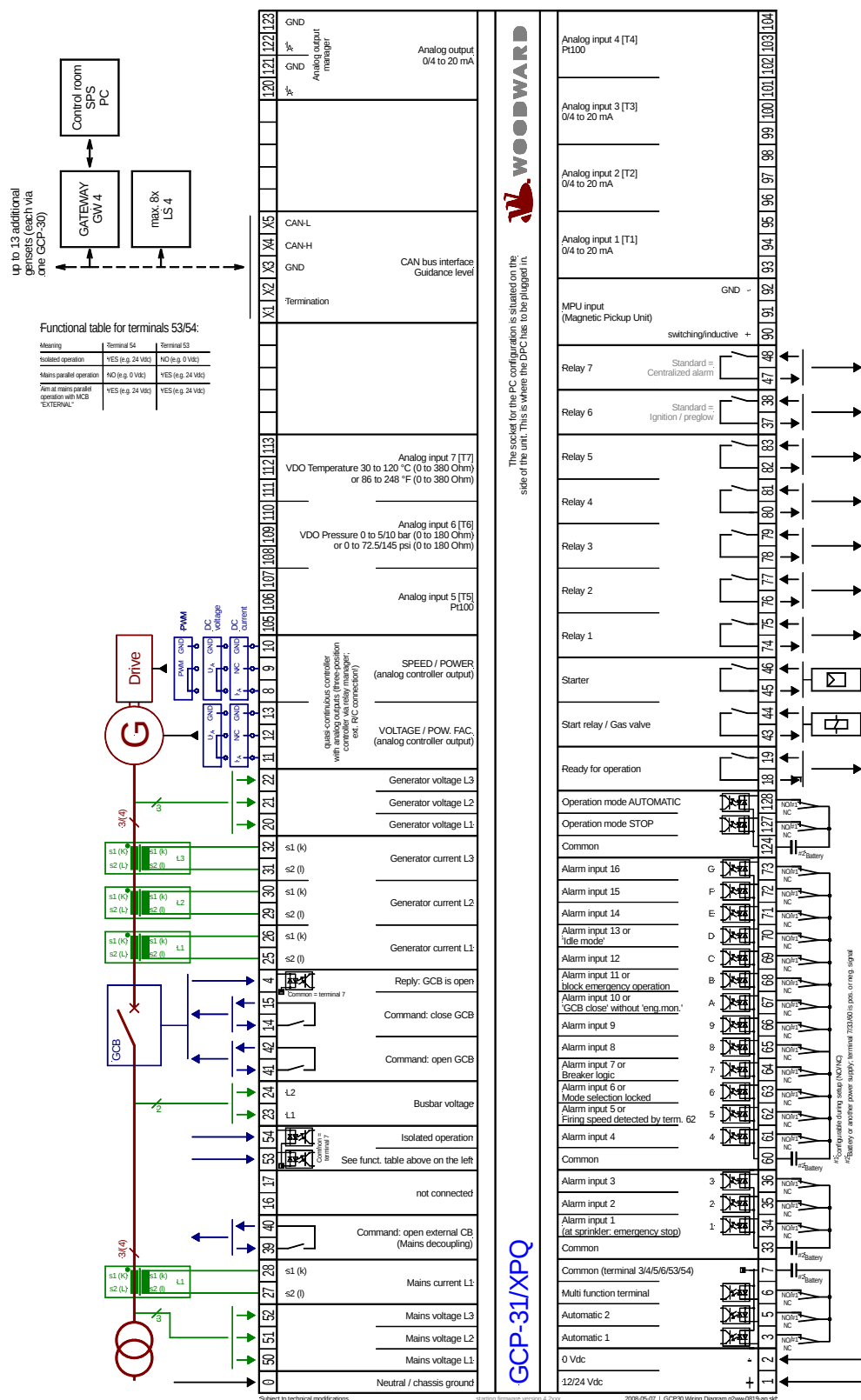


Figure 4-3: Wiring diagram GCP-31/XPQ Package

GCP-31/XPQ+SB03 Package

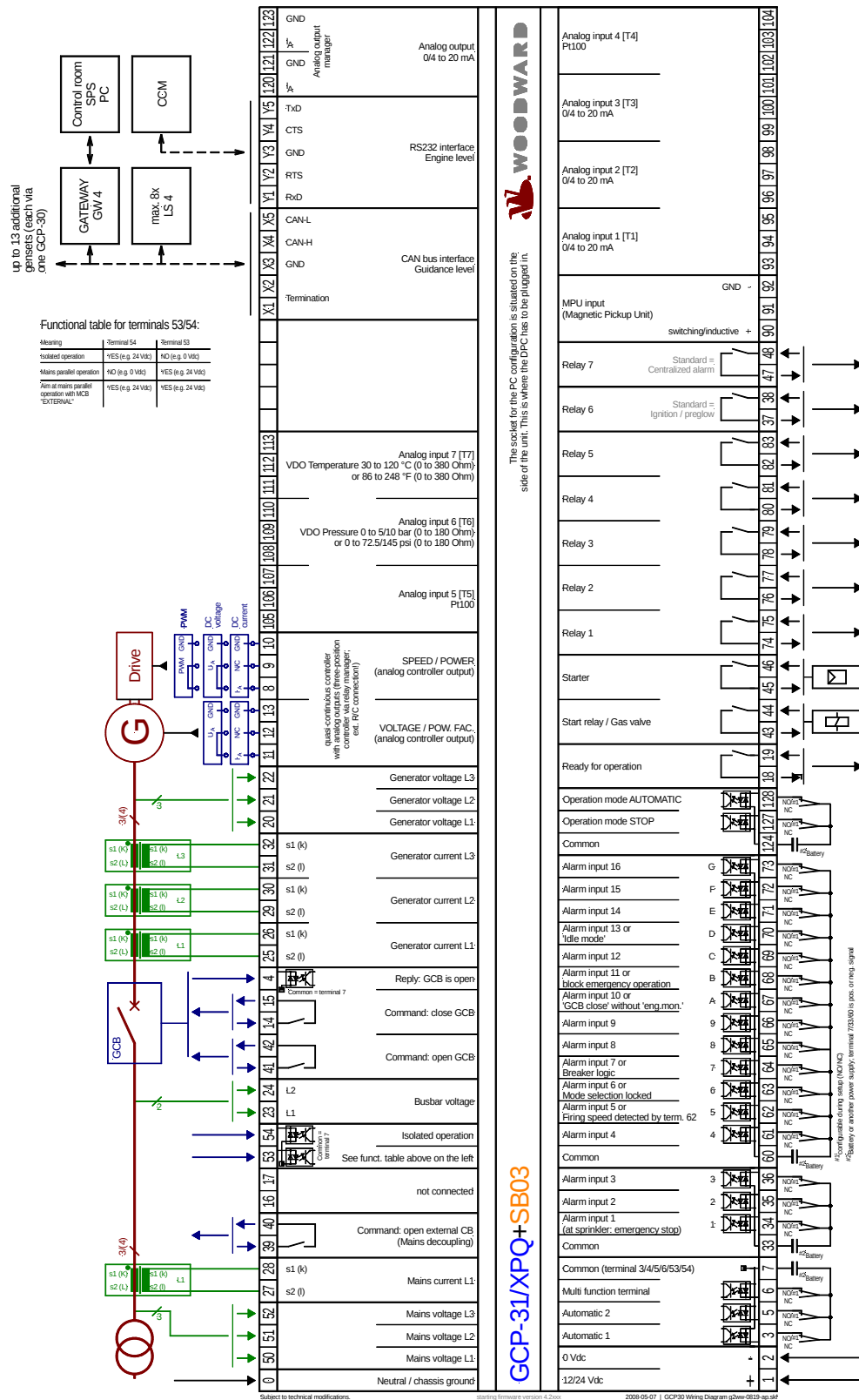


Figure 4-4: Wiring diagram GCP-31/XPQ+SB03 Package

GCP-31/XPQ+SC10 Package

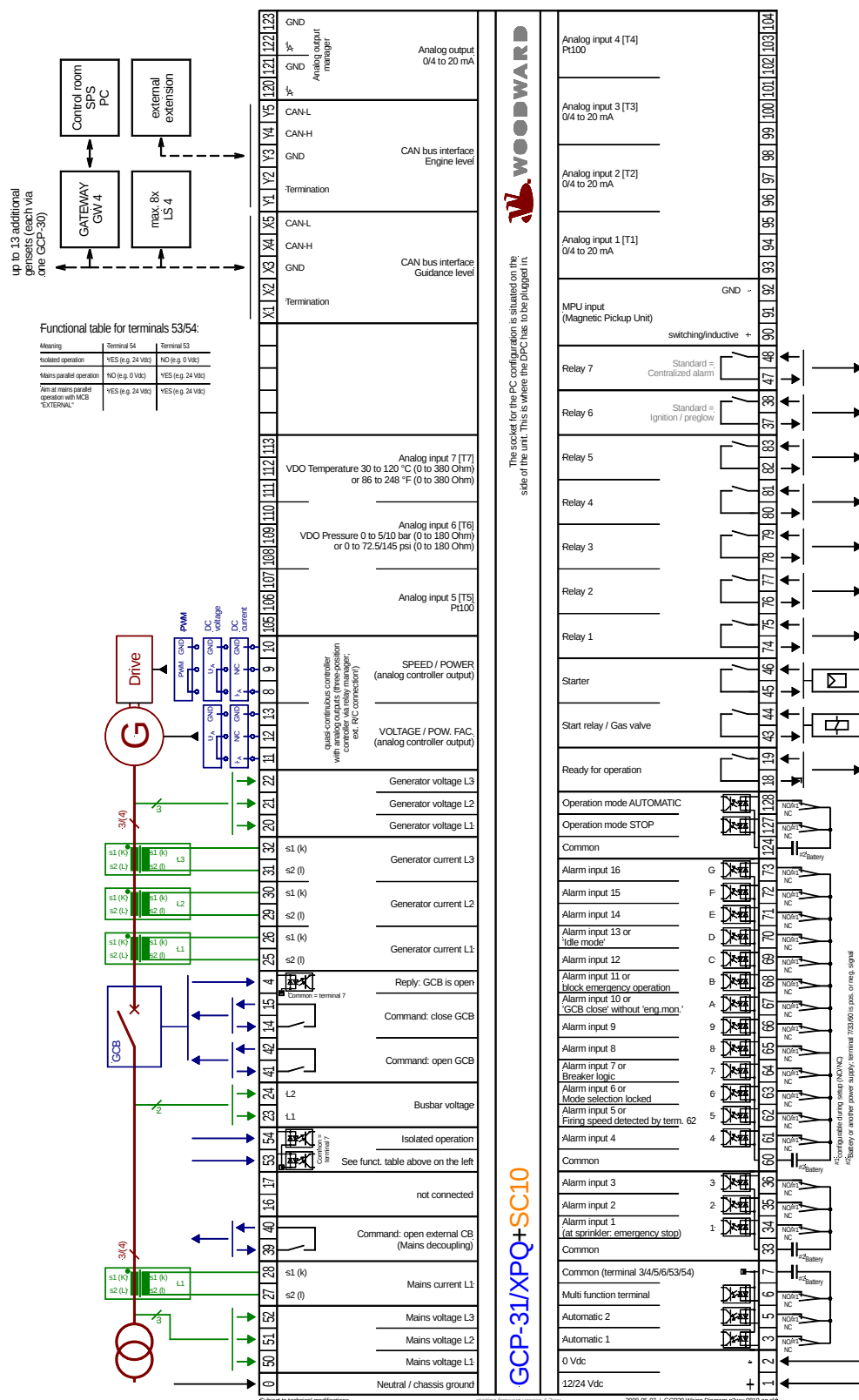


Figure 4-5: Wiring diagram GCP-31/XPQ+SC10 Package

GCP-32/BPQ Package

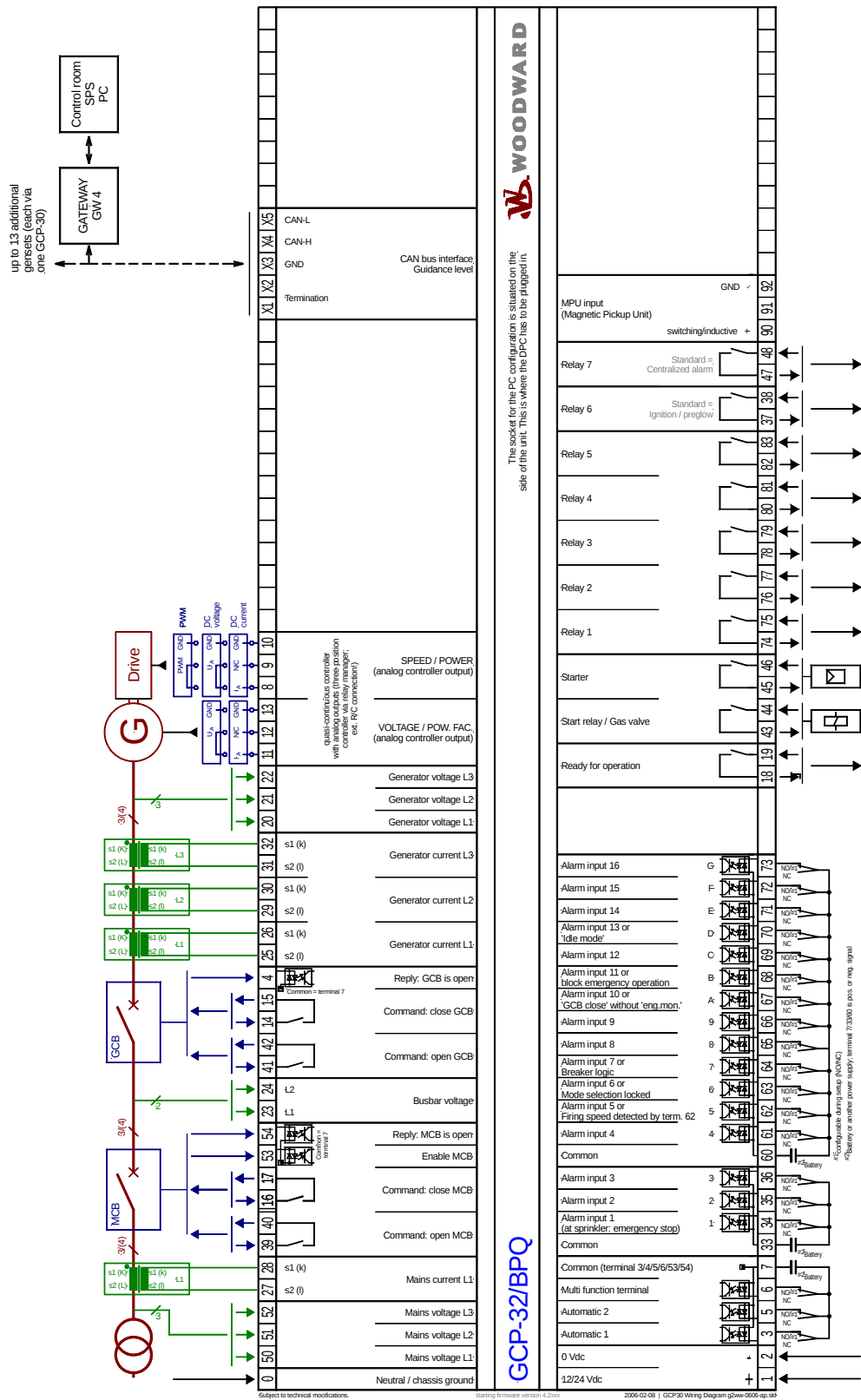


Figure 4-6: Wiring diagram GCP-32/BPQ Package

GCP-32/XPD Package

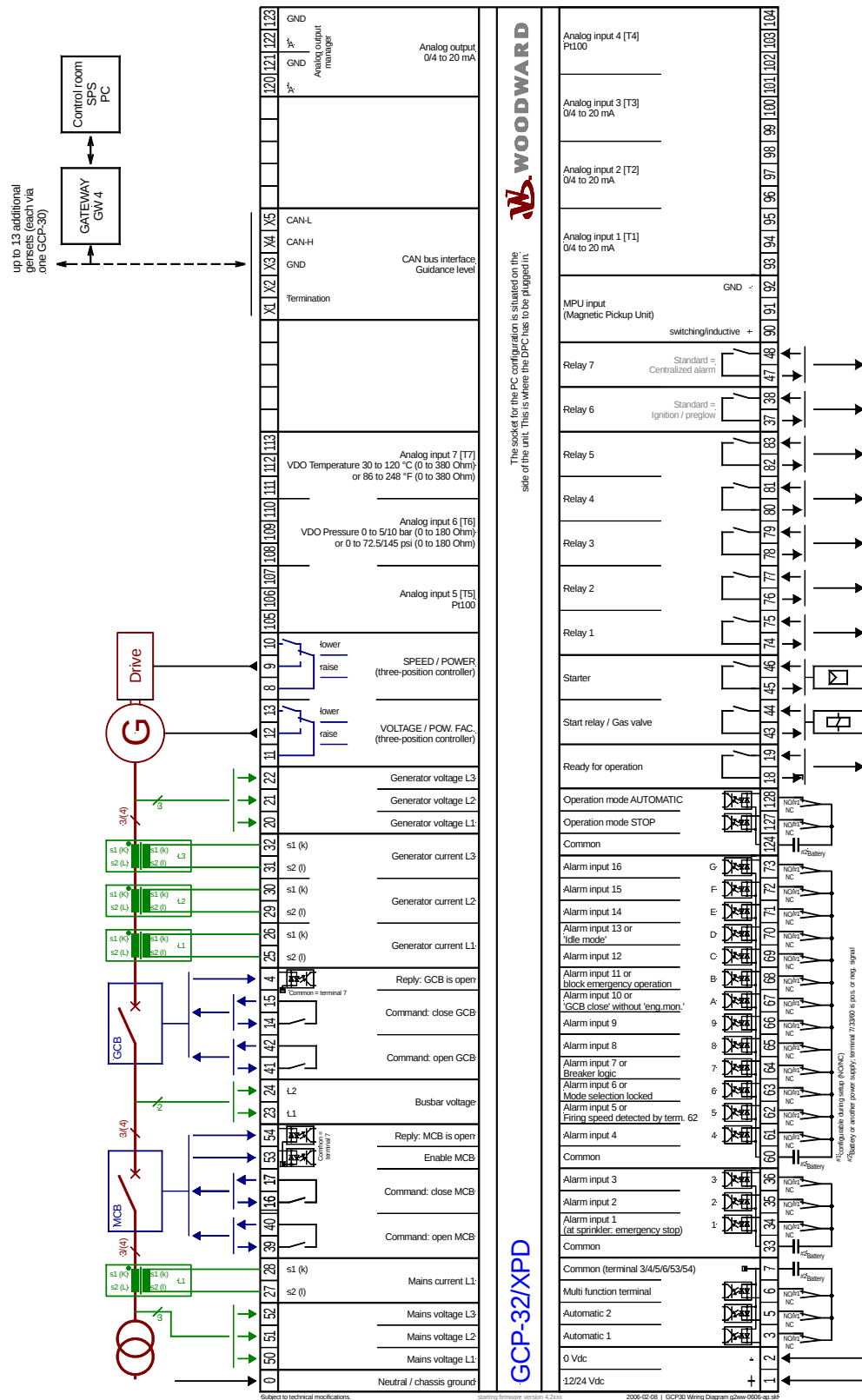


Figure 4-7: Wiring diagram GCP-32/XPD Package

GCP-32/XPQ Package

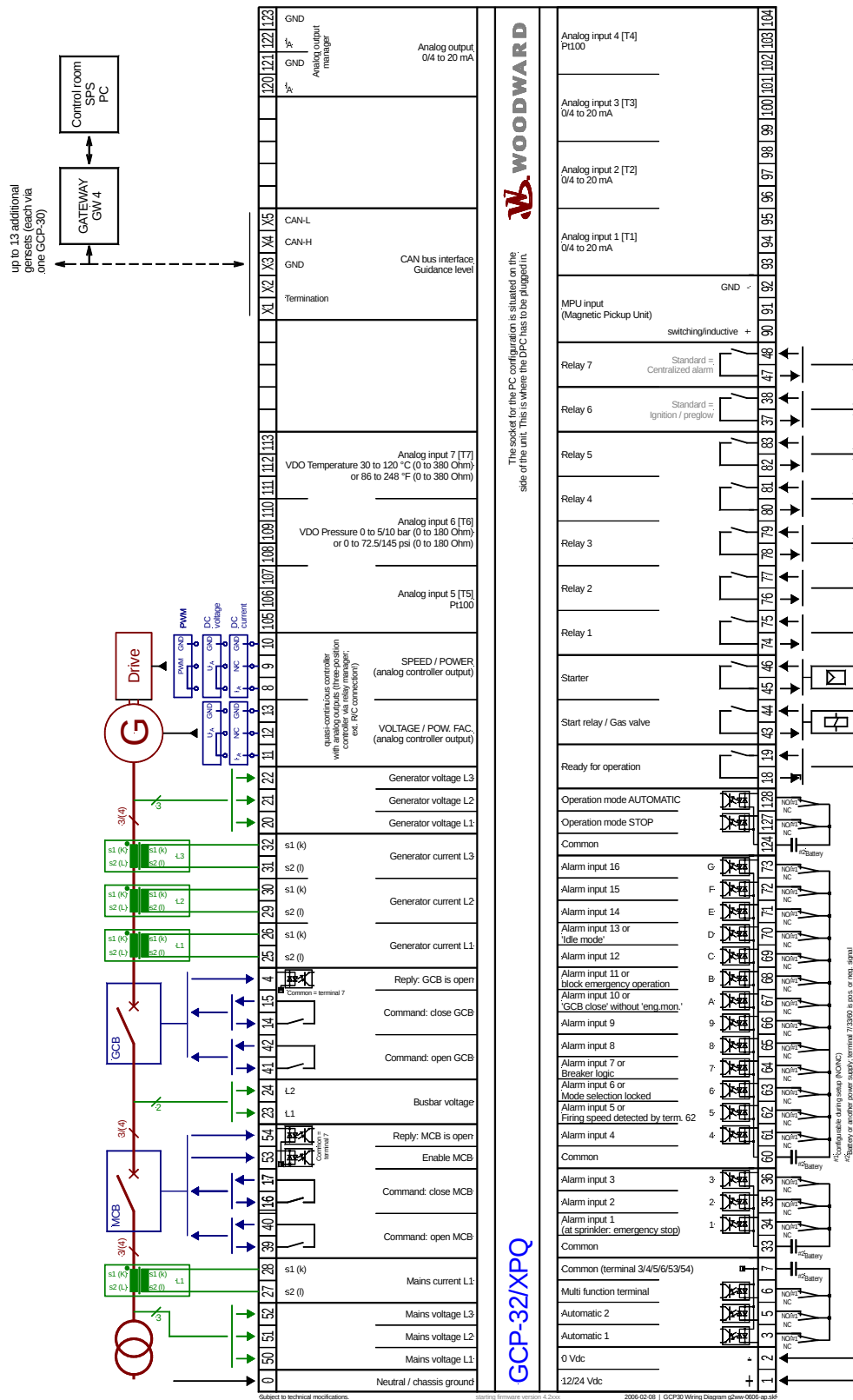


Figure 4-8: Wiring diagram GCP-32/XPQ Package

GCP-32/XPQ+SB03 Package

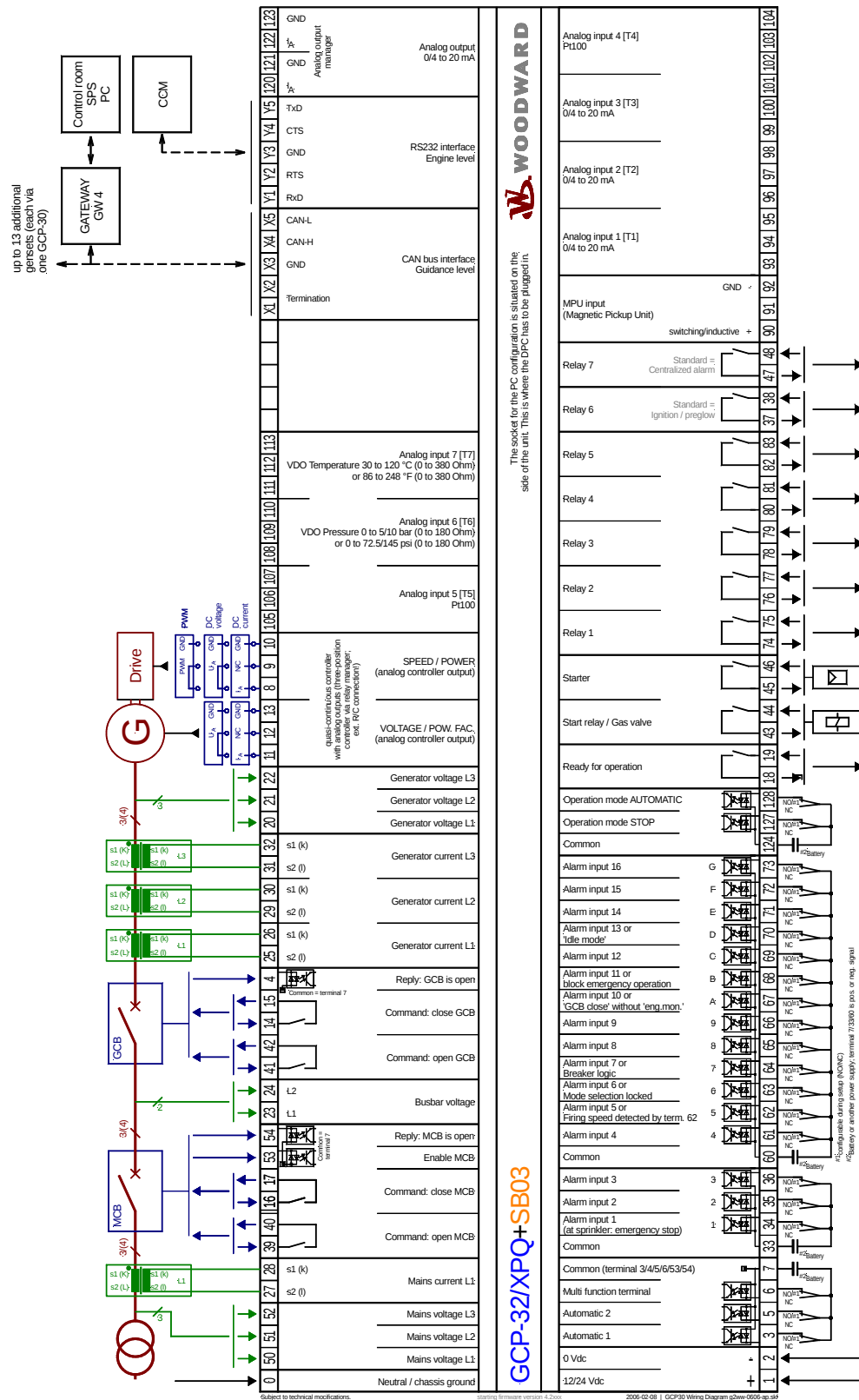


Figure 4-9: Wiring diagram GCP-32/XPQ+SB03 Package

GCP-32/XPQ+SC10 Package

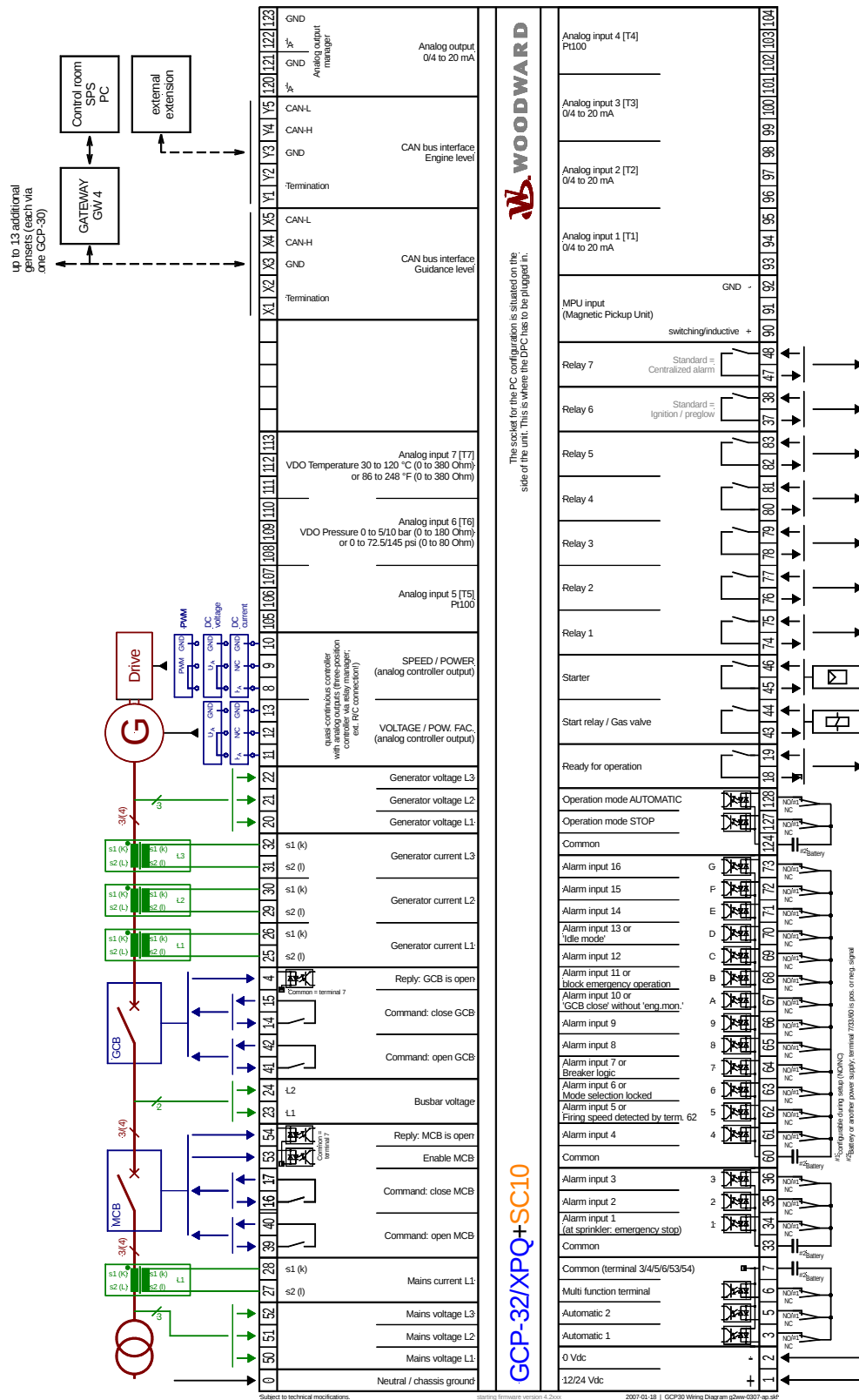


Figure 4-10: Wiring diagram GCP-32/XPQ+SC10 Package

Chapter 5.

Connectors - Details



WARNING

All technical data and ratings indicated in this chapter are not definite! Only the values indicated in Technical Data on page 42 are valid!

The following chart may be used to convert square millimeters [mm²] to AWG and vice versa:

AWG	mm²	AWG	mm²	AWG	mm²	AWG	mm²	AWG	mm²	AWG	mm²
30	0.05	21	0.38	14	2.5	4	25	3/0	95	600MCM	300
28	0.08	20	0.5	12	4	2	35	4/0	120	750MCM	400
26	0.14	18	0.75	10	6	1	50	300MCM	150	1000MCM	500
24	0.25	17	1.0	8	10	1/0	55	350MCM	185		
22	0.34	16	1.5	6	16	2/0	70	500MCM	240		

Table 5-1: Conversion chart - wire size

Power Supply

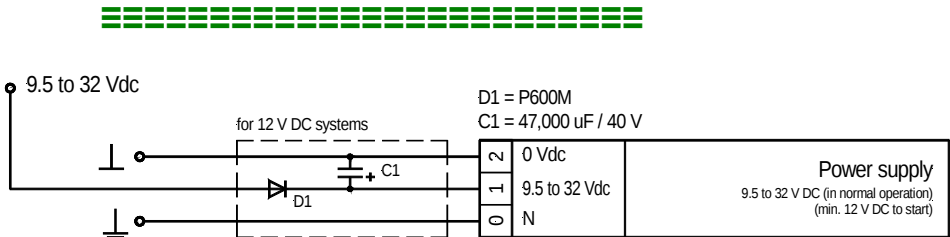


Figure 5-1: Power supply

Terminal	Description	A _{max}
0	Neutral point of the three-phase wye 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 5-2: Terminal assignment - power supply



NOTE

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

Measuring Inputs



Voltage

Generator

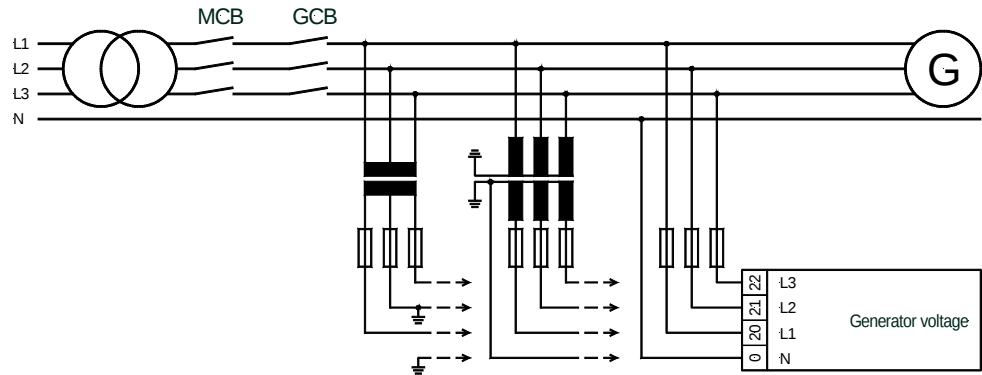


Figure 5-2: Measuring inputs - Voltage - Generator

Terminal	Measurement	Description	A _{max}
20	400 Vac or ./100 Vac	Generator voltage L1	2.5 mm ²
21		Generator voltage L2	2.5 mm ²
22		Generator voltage L3	2.5 mm ²
0		Neutral point of the 3-phase wye system/transformer	2.5 mm ²

Table 5-3: Terminal assignment - generator voltage measuring



NOTE

A GCP-30 controller with 400V PT inputs and potential transformers with 100V secondary outputs must be used for 480V delta applications. The GCP-30 will not properly protect the generator or system from overvoltage fault conditions if a GCP-30 with 100V PT inputs is used with 100V potential transformers or a 400V PT input unit is directly connected to a 480V system. The 100V model inputs are limited to measuring voltage up to 125V and an overvoltage fault would exceed this range. The 400V model of the GCP-30 is also unable to monitor for overvoltage faults if potential transformers are not utilized due to the overvoltage fault exceeding the voltage monitoring range of maximum 500V as well.



NOTE

If a three-wire system is connected, terminal 0 must remain disconnected. If terminal 0 is connected, the control may monitor a voltage that exceeds the permissible limits.

Busbar

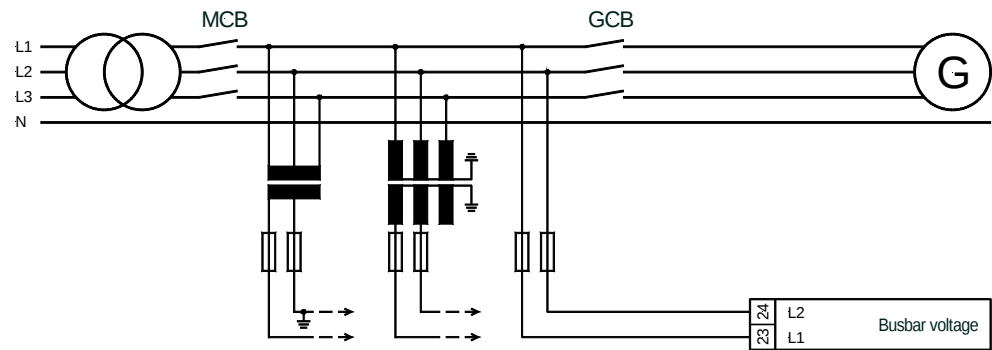


Figure 5-3: Measuring inputs - Voltage - Busbar

Terminal	Measurement	Description	A _{max}
23	400 Vac or ../100 Vac	Busbar voltage L1	2.5 mm ²
24		Busbar voltage L2	2.5 mm ²

Table 5-4: Terminal assignment - busbar voltage measuring

Mains

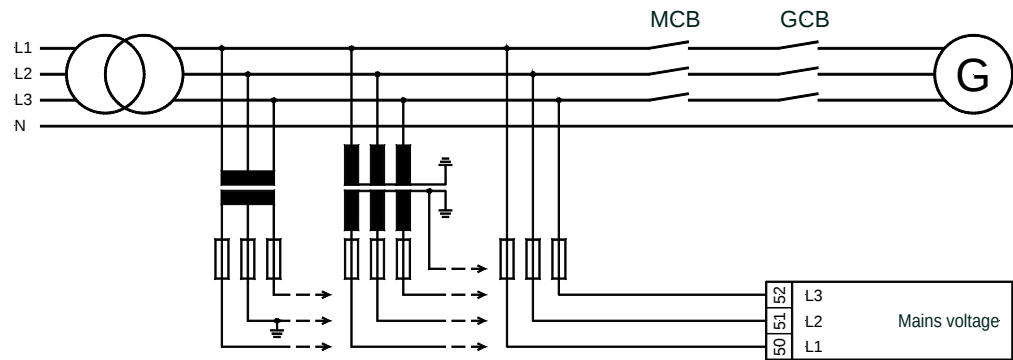


Figure 5-4: Measuring inputs - Voltage - Mains

Terminal	Measurement	Description	A _{max}
50	400 Vac or ../100 Vac	Mains voltage L1	2.5 mm ²
51		Mains voltage L2	2.5 mm ²
52		Mains voltage L3	2.5 mm ²
0		Neutral point of the 3-phase system / transformer	2.5 mm ²

Table 5-5: Terminal assignment - mains voltage measuring



NOTE

The mains voltage measuring inputs must be connected if a GCP-31 is used in mains parallel operation.

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 transformers are generally to be grounded on one side of the secondary.

Generator

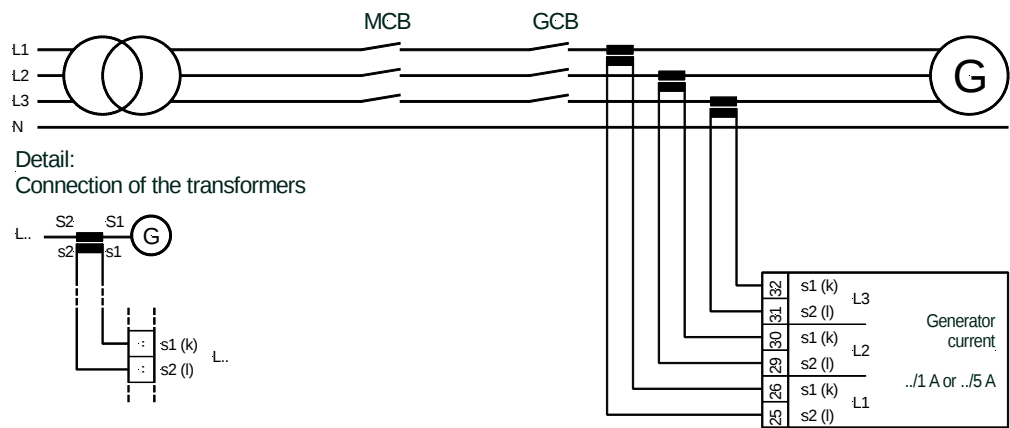


Figure 5-5: Measuring inputs - Current - Generator

Terminal	Measurement	Description	A_{max}
25	Transformer ../1 A or ../5 A	Generator current L1, transformer terminal s2 (l)	2.5 mm ²
26		Generator current L1, transformer terminal s1 (k)	2.5 mm ²
29		Generator current L2, transformer terminal s2 (l)	2.5 mm ²
30		Generator current L2, transformer terminal s1 (k)	2.5 mm ²
31		Generator current L3, transformer terminal s2 (l)	2.5 mm ²
32		Generator current L3, transformer terminal s1 (k)	2.5 mm ²

Table 5-6: Terminal assignment - generator current measuring

Mains (Mains Current Measuring Via Transformer)

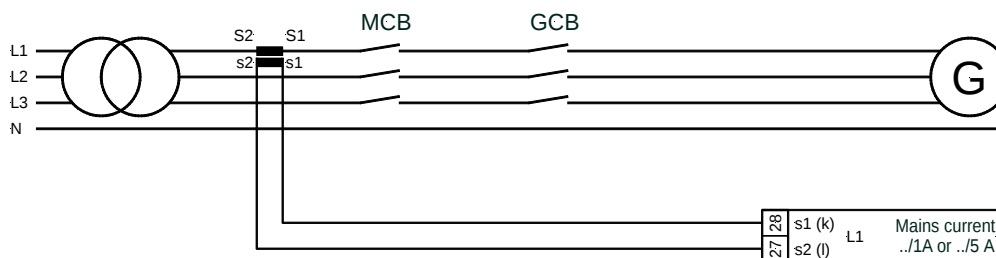


Figure 5-6: Measuring inputs - Current - Mains - via transformer

Terminal	Measurement	Description	A _{max}
27	Transformer	Mains current L1, transformer terminal s2 (l)	2.5 mm ²
28	../1A or ../5A	Mains current L1, transformer terminal s1 (k)	2.5 mm ²

Table 5-7: Terminal assignment - mains current measuring

Mains (Mains Interchange Import/Export Real Power **Actual Value** Via Measuring Transducer [XPD and XPQ])

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 note the details in the configuration manual 37365.

NOTE
If several controls are interconnected, 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 measurement output signal. When selecting the external measuring transducer, please note that this must transmit both positive and negative ranges when transmitting the supply and reference power values.

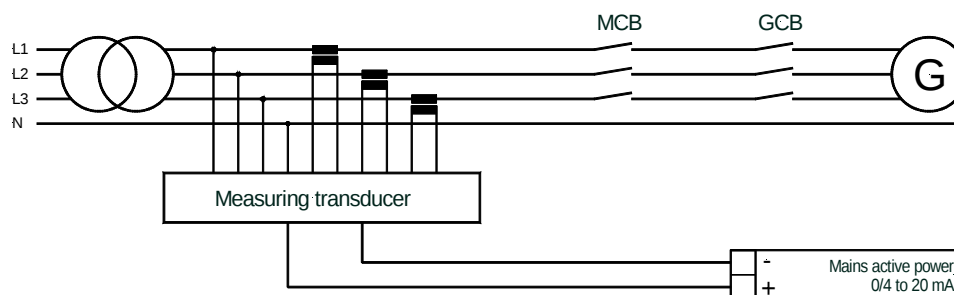


Figure 5-7: Measuring inputs - Real power - Mains - via measuring transducer

Terminal	Measurement	Description	A _{max}
configurable see page 33	0/4 to 20 mA	Mains interchange (import/export) real power measured value via 0/4 to 20 mA signal of an external measuring transducer (e.g. UMT 1)	1.5 mm ²

Table 5-8: Terminal assignment - mains real power measuring

Discrete Inputs



CAUTION

Please note that the operating voltages recommended for the discrete inputs range from 4 to 40Vdc. The voltage potential may be applied with either a positive or negative polarity without causing damage. Voltages higher than the recommended range may result in damage or destruction of the hardware!

Control Inputs

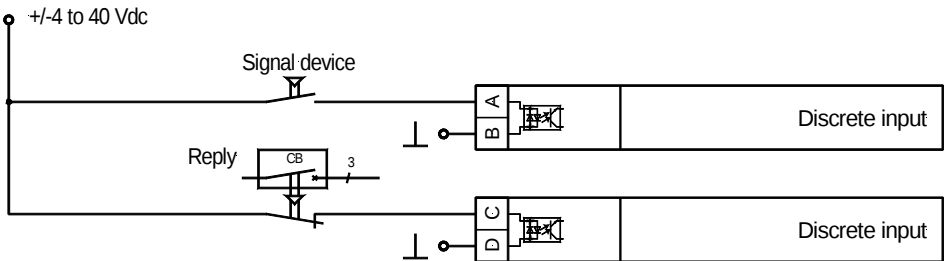


Figure 5-8: Discrete inputs - Control inputs

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 mm ²
5		Automatic 2	2.5 mm ²
6		Multi function (selectable in configuration): • Sprinkler operation • Engine enable • External acknowledgement • Engine stop • Operating mode STOP • Start without CB	2.5 mm ²
53		[GCP-31] Enable externally [GCP-32] Enable MCB	2.5 mm ²
C	D	NC contact	
4	7	Reply: GCB is open	2.5 mm ²
54		[GCP-31] Status: Isolated operation [GCP-32] Reply: MCB is open	2.5 mm ²

Table 5-9: Terminal assignment - control inputs

Alarm Inputs

The discrete inputs can be connected in positive or negative logic:

- positive logic The DI is connected to +4 to 40Vdc and common is connected to chassis ground/batt. negative.
- negative logic The DI is connected to chassis ground/batt. negative and common is connected to +4 to 40Vdc.

Positive Logic

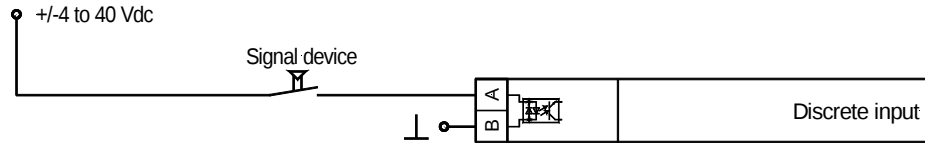


Figure 5-9: Discrete inputs - Alarm inputs - positive logic

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 mm ²
35		Discrete input [D02] - Alarm input	2.5 mm ²
36		Discrete input [D03] - Alarm input	2.5 mm ²
61	60	Discrete input [D04] - Alarm input - If discrete input terminal 34 is not available in Sprinkler operation: EMERGENCY STOP	2.5 mm ²
62		Discrete input [D05] - Alarm input or - Firing speed reached ("Generator")	2.5 mm ²
63		Discrete input [D06] - Alarm input or - Operation mode selector blocked	2.5 mm ²
64		Discrete input [D07] - Alarm input or - Change breaker logic	2.5 mm ²
65		Discrete input [D08] - Alarm input	2.5 mm ²
66		Discrete input [D09] - Alarm input	2.5 mm ²
67		Discrete input [D10] - Alarm input or - 'Close GCB' before expiration of delayed engine monitoring	2.5 mm ²
68		Discrete input [D11] - Alarm input or - Inhibition emergency power (from software version 4.3010 or higher)	2.5 mm ²
69		Discrete input [D12] - Alarm input	2.5 mm ²
70		Discrete input [D13] - Alarm input or - No-load operation mode	2.5 mm ²
71		Discrete input [D14] - Alarm input	2.5 mm ²
72		Discrete input [D15] - Alarm input	2.5 mm ²
73		Discrete input [D16] - Alarm input	2.5 mm ²

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

Negative Logic

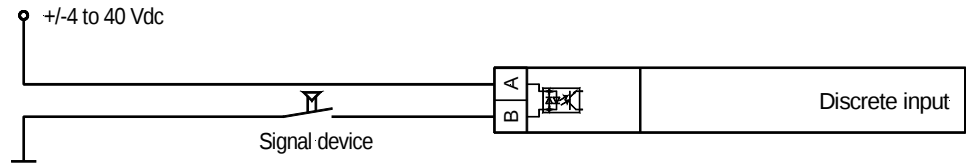


Figure 5-10: Discrete inputs - Alarm inputs - negative logic (Example)

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 mm ²
	35	Discrete input [D02] - Alarm input	2.5 mm ²
	36	Discrete input [D03] - Alarm input	2.5 mm ²
60	61	Discrete input [D04] - Alarm input - If discrete input terminal 34 is not available in Sprinkler operation: EMERGENCY STOP	2.5 mm ²
	62	Discrete input [D05] - Alarm input or - Firing speed reached ("Generator")	2.5 mm ²
	63	Discrete input [D06] - Alarm input or - Operation mode selector blocked	2.5 mm ²
	64	Discrete input [D07] - Alarm input or - Change breaker logic	2.5 mm ²
	65	Discrete input [D08] - Alarm input	2.5 mm ²
	66	Discrete input [D09] - Alarm input	2.5 mm ²
	67	Discrete input [D10] - Alarm input or - 'Close GCB' before expiration of delayed engine monitoring	2.5 mm ²
	68	Discrete input [D11] - Alarm input or - Inhibition emergency power (from software version 4.3010 or higher)	2.5 mm ²
	69	Discrete input [D12] - Alarm input	2.5 mm ²
	70	Discrete input [D13] - Alarm input or - No-load operation mode	2.5 mm ²
	71	Discrete input [D14] - Alarm input	2.5 mm ²
	72	Discrete input [D15] - Alarm input	2.5 mm ²
	73	Discrete input [D16] - Alarm input	2.5 mm ²

Table 5-11: Terminal assignment - alarm inputs negative logic

Operation Mode Selection Via DI (XPD, XPQ)

This functionality enables external selection of the operation mode using terminals 127 and 128. 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 mm ²
128		Control input [terminal 128] - Operation mode AUTOMATIC	2.5 mm ²

Table 5-12: Discrete inputs - operation mode selection



NOTE

The selection of the operation mode via discrete inputs 127/128 is only possible if the discrete input on terminal 63 (Operation mode selector blocked) is energized. More detailed information may be found in the configuration manual (37365) under 'Block operation mode selector switch via terminal 63'.

Analog Inputs (XPD, XPQ)



WARNING

The analog inputs of the GCP are not isolated. When utilizing an isolation monitor, use of two-pole, isolated transmitters is recommended.

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

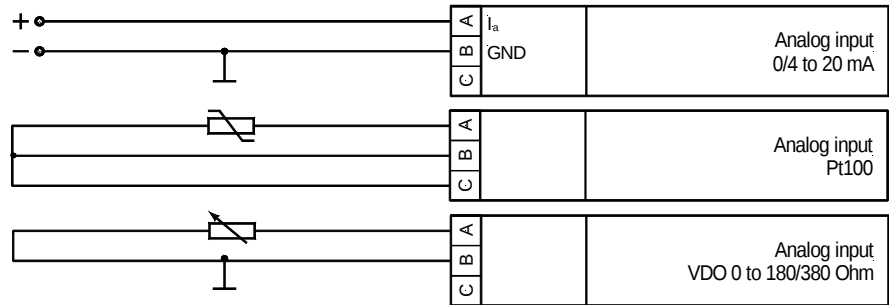


Figure 5-11: Analog inputs

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

Table 5-13: Analog inputs - terminal assignment

MPU

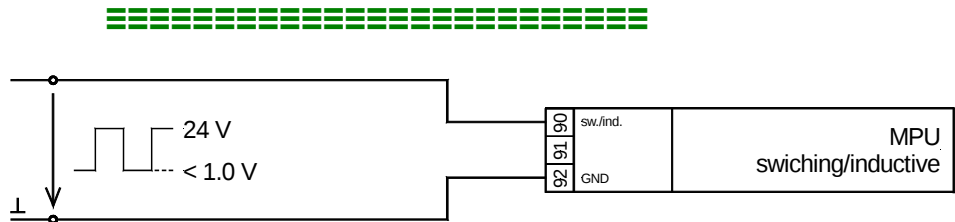


Figure 5-12: MPU

Terminal	Description	A _{max}
90	MPU switching/inductive	2.5 mm ²
91	(Magnetic Pickup Unit)	2.5 mm ²
92	GND	2.5 mm ²

Table 5-14: MPU - 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 5-15: MPU - input voltage

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

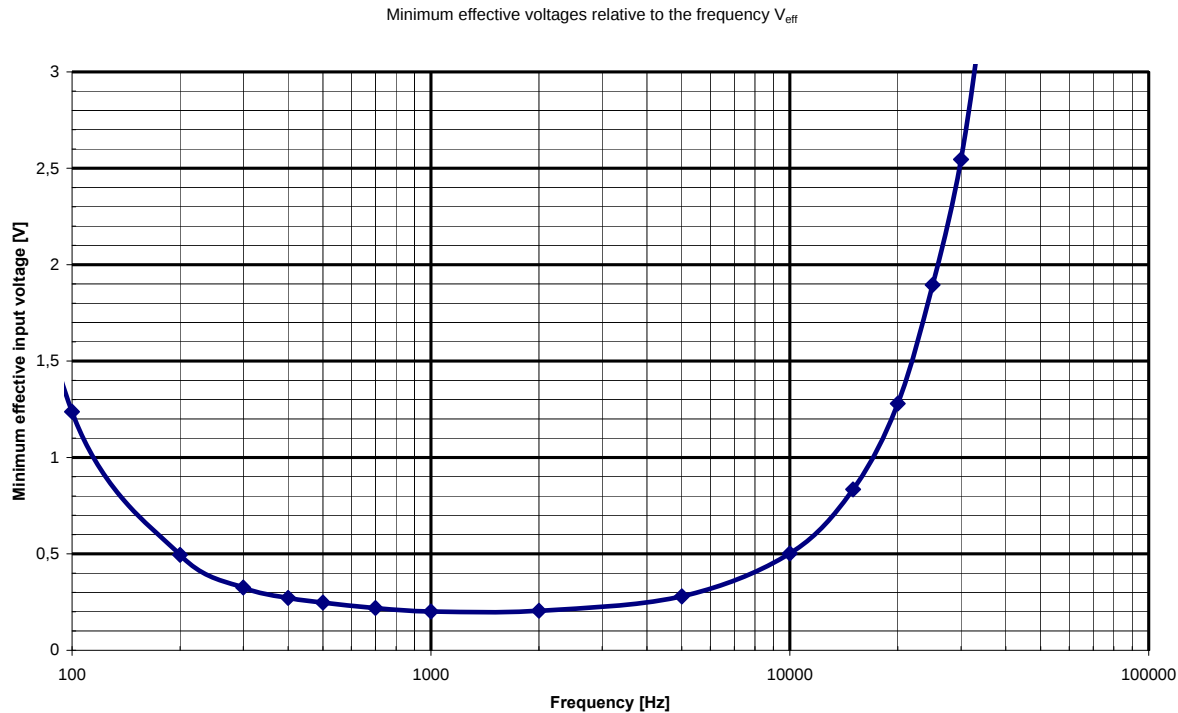


Figure 5-13: MPU - Typical behavior of the input voltage sensitivity

Relay Outputs



Controller Outputs

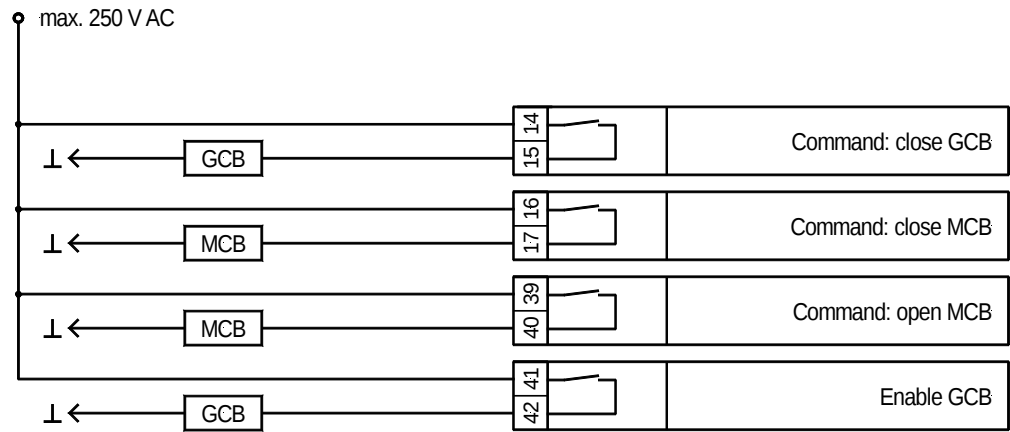


Figure 5-14: Relay outputs - Controller outputs - CB activation

Make cont.	Description	A_{max}
14/15	Command: close GCB	2.5 mm ²
16/17	[GCP-32] Command: close MCB; [GCP-31] not connected	2.5 mm ²
39/40	[GCP-32] Command: open MCB; [GCP-31] Comm.: open ext. CB	2.5 mm ²
41/42	Command: open GCB	2.5 mm ²

Table 5-16: Relay outputs - terminal assignment

Relay Manager

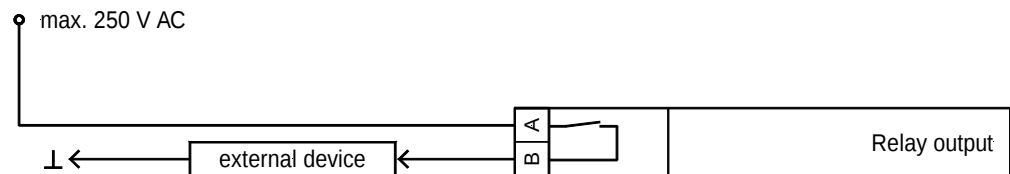
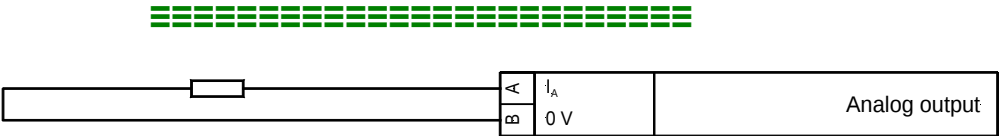


Figure 5-15: Relay outputs - Relay manager

Make cont.	Description	A_{max}
18/19	Ready for operation	2.5 mm ²
43/44	Fuel solenoid relay/gas valve	2.5 mm ²
45/46	Starter	2.5 mm ²
74/75	Relay [R1] (Relay manager)	2.5 mm ²
76/77	Relay [R2] (Relay manager)	2.5 mm ²
78/79	Relay [R3] (Relay manager)	2.5 mm ²
80/81	Relay [R4] (Relay manager)	2.5 mm ²
82/83	Relay [R5] (Relay manager)	2.5 mm ²
37/38	Relay [R6] (Relay manager; pre-assigned: Preheat/Ignition ON)	2.5 mm ²
47/48	Relay [R7] (Relay manager; pre-assigned: Centralized alarm horn)	2.5 mm ²

Table 5-17: Relay manager - terminal assignment

Analog Outputs (XPD, XPQ)



Ia A	GND B	Description	A _{max}
120	121	Analog output [A1] - 0/4 to 20 mA	1.5 mm ²
122	123	Analog output [A2] - 0/4 to 20 mA	1.5 mm ²

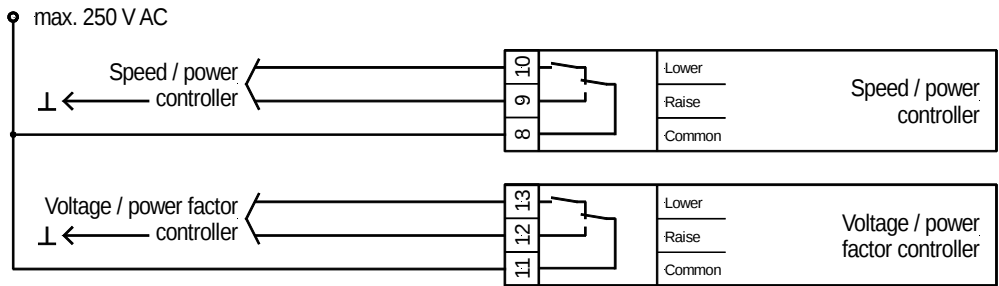
Table 5-18: Analog outputs - terminal assignment

Controller Outputs

The voltage and speed controller outputs in the **XPD Package** are three-position contacts [made up of a changeover contact and a normally open contact]. The voltage and speed controller outputs in the **BPQ** and **XPQ Packages** are configurable as voltage, current, or PWM output signals.

Three-Position Controller (XPD)

The three-position controller is only included in the **XPD Package**.



Terminal		Description	A _{max}
8	common	Speed controller (n/f) / Power controller (P)	2.5 mm ²
9	raise		2.5 mm ²
10	lower		2.5 mm ²
11	common	Voltage controller (V) / Reactive power controller (Q)	2.5 mm ²
12	raise		2.5 mm ²
13	lower		2.5 mm ²

Table 5-19: Controller outputs - terminal assignment

Multi Functional Controller Outputs (BPQ, XPQ)

Configuration and an external jumper can change the multifunction controller outputs.

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 speed control 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 voltage regulator 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 speed control to terminals 9/10

Wiring Of Controller

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

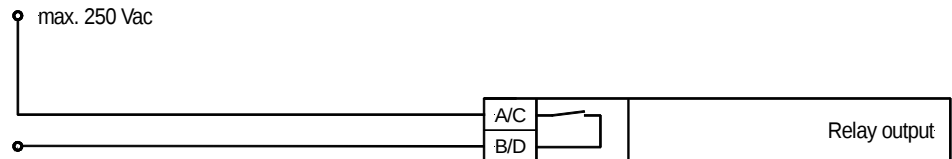


Figure 5-18: Three-position controller

Terminal		Description	A _{max}
A	raise	Speed / Frequency / Real power (RelayManager: "raise" = 114, "lower" = 115) or	2.5 mm ²
B			2.5 mm ²
C	lower	Voltage / Reactive power (RelayManager: "raise" = 116, "lower" = 117)	2.5 mm ²
D			2.5 mm ²

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

Table 5-20: Controller outputs - three-position



CAUTION

Refer to Technical Data on page 42 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

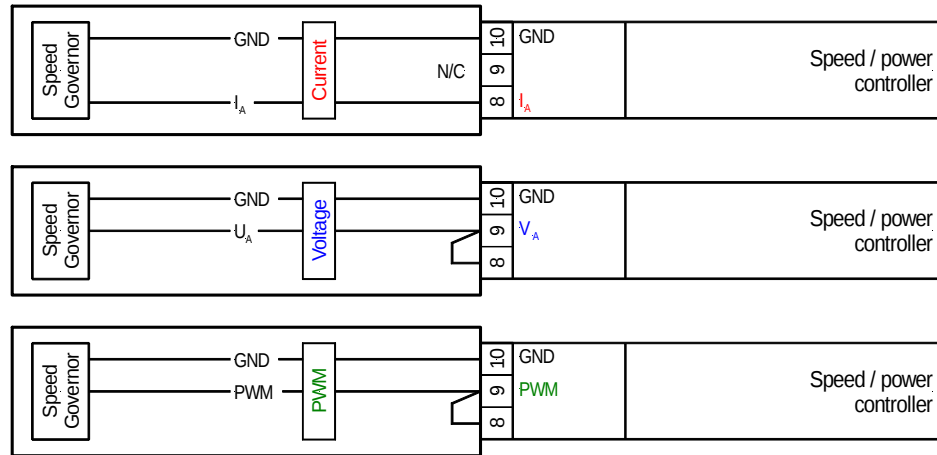


Figure 5-19: Analog controller output n/f/P - Wiring and external jumper setting

Type	Terminal		Description	A_{max}
I Current	8	I_A	Speed controller / Frequency controller / Real power controller	2.5 mm ²
	9			2.5 mm ²
	10	GND		2.5 mm ²
V Voltage	8			2.5 mm ²
	9	V_A		2.5 mm ²
	10	GND		2.5 mm ²
PWM	8			2.5 mm ²
	9	PWM		2.5 mm ²
	10	GND		2.5 mm ²

Table 5-21: Controller outputs - analog or PWM

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

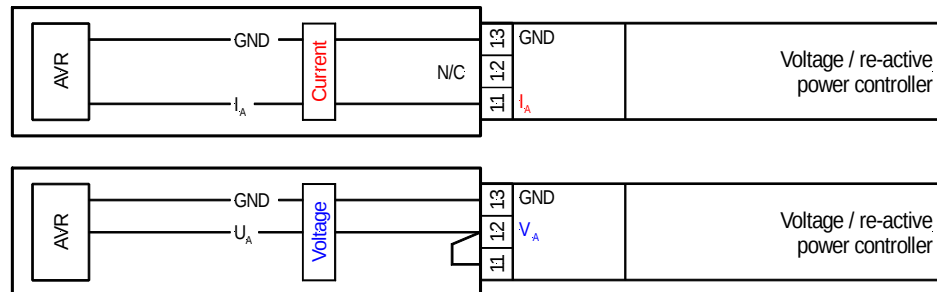


Figure 5-20: Analog controller output V/Q - Wiring and jumper setting

Type	Terminal		Description	A_{max}
I Current	11	I_A	Voltage controller / Reactive power controller	2.5 mm ²
	12			2.5 mm ²
	13	GND		2.5 mm ²
V Voltage	11			2.5 mm ²
	12	V_A		2.5 mm ²
	13	GND		2.5 mm ²

Table 5-22: Controller outputs - analog

Interface



Interface Wiring

A	B	C	D	E
CAN-H	CAN-L	GND	CAN-H	CAN-L
Interface		CAN bus		

Figure 5-21: Interface - Terminals

Terminal					Description
A	B	C	D	E	
X1*	X2*	X3	X4*	X5*	CAN bus guidance level
CAN-H	CAN-L	GND	CAN-H	CAN-L	

* may be used to connect to the CAN bus and/or to connect the termination resistor.

Table 5-23: Interface - terminal assignment



NOTE

Refer to the respective manuals for a description of the Engine Control Unit interface (terminals Y1 to Y5):

- Option **SB03** (37200)
- Option **SC10** (37382)

CAN Bus Shielding

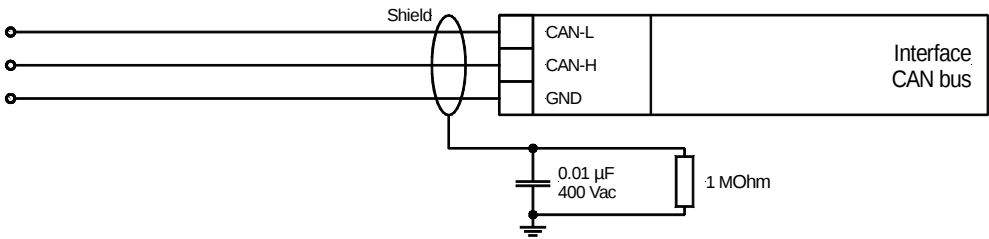


Figure 5-22: Interface - CAN bus shielding

CAN Bus Topology



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 Ω). The CAN bus is terminated between CAN-H and CAN-L.

The two CAN-H and CAN-L terminals in the unit are hard-wired internally and can be used to feed the CAN bus through. However, if you want to avoid a break of the bus when a unit is unplugged, you may connect the incoming and outgoing bus line in the same terminal.

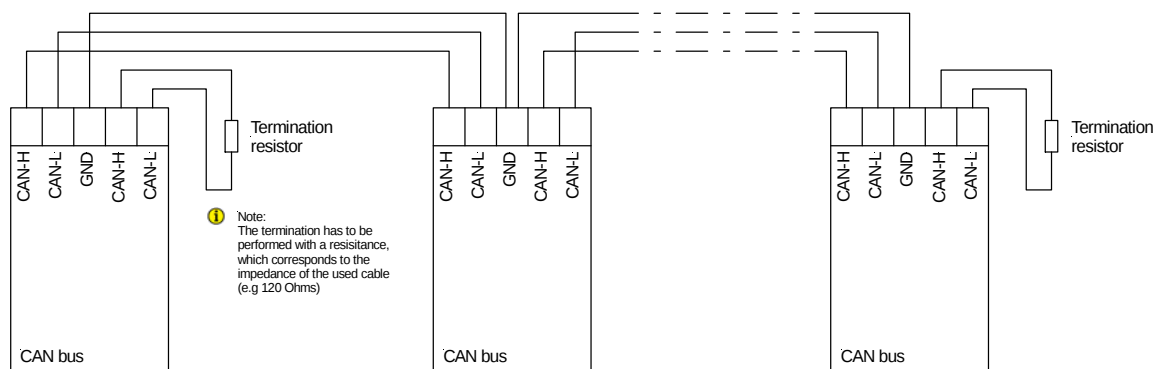


Figure 5-23: Interfaces - CAN bus topology

Possible CAN Bus Problems

If no data is transmitted on the CAN bus, check the following for common CAN bus communication problems:

- T structure bus is utilized (stub-end feeders or branch lines are not recommended)
- CAN-L and CAN-H are interchanged
- Not all devices on the bus are using identical Baud rates
- Correct terminating resistor(s) is/are missing
- Incorrect baud rate (too high) for length of CAN bus
- The CAN bus cable is co-routed with power cables

Woodward recommends the use of twisted-pair cables for the CAN bus (i.e.: Lappkabel Unitronic LIYCY (TP) 2×2×0.25, UNITRONIC-Bus LD 2×2×0.22).

Maximum CAN Bus Length

The maximum length of the communication bus wiring is dependent on the configured Baud rate. Refer to Table 5-24 for the maximum bus length (Source: CANopen; Holger Zeltwanger (Hrsg.); 2001 VDE VERLAG GMBH, Berlin und Offenbach; ISBN 3-8007-2448-0).

Baud rate	Max. length
1000 kbit/s	25 m
800 kbit/s	50 m
500 kbit/s	100 m
125 kbit/s	250 m
50 kbit/s	1000 m
20 kbit/s	2500 m

Table 5-24: Maximum CAN bus length

The maximum specified length for the communication bus wiring might not be achieved if poor quality wire is utilized, there is high contact resistance, or other conditions exist. Reducing the baud rate may overcome these issues.

DPC - Direct Configuration Interface



NOTE

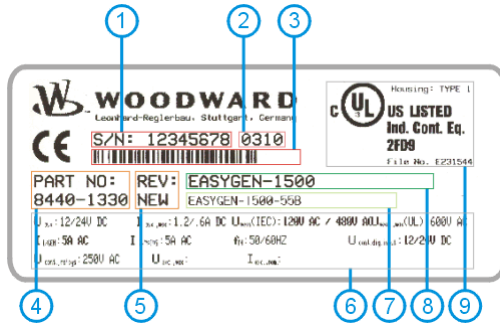
To configure via the configuration interface (direct configuration), you need the configuration cable (part number 5417-557), the program LeoPC1 (delivered with the cable), and the corresponding configuration files. Please consult the online help installed when the program is installed for a description of the LeoPC1 program and its setup.

If the parameter "Direct para." is enabled on the control, communication via the CAN bus 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

Nameplate -----



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 -----

- Measuring voltage
 - Rated value (V_{rated}) $\sqrt{2}/\Delta$ [1] 66/115 Vac
[4] 230/400 Vac
 - Maximum value V_{Ph-Ph} (UL/cUL) [1] max. 150 Vac
[4] max. 300 Vac
 - Rated voltage $V_{Ph-ground}$ [1] 150 Vac
[4] 300 Vac
 - Rated surge voltage [1] 2.5 kV
[4] 4.0 kV
- Setting range (prim) 0.050 to 65.000 kVac
- Linear measuring range $1.3 \times V_{rated}$
- Measuring frequency 50/60 Hz (40.0 to 70.0 Hz)
- Accuracy Class 1
- Input resistance per path [1] 0.21 M Ω
[4] 0.7 M Ω
- Maximum power consumption per path < 0.15 W

Measuring values, currents -----isolated

- Measuring current
 - Rated value (I_{rated}) $\sqrt{2}/5$ A
- Accuracy Class 1
- Linear measuring range
 - Generator $3.0 \times I_{rated}$
 - Mains/ground current $1.5 \times I_{rated}$
- Maximum power consumption per path < 0.15 VA
- Rated short-time current (1 s) $10.0 \times I_{rated}$

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 ----- **isolated**

- Input range (V_{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) (V_{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) (V_{Cont} , relay output) | |
| DC | 1.00 Adc@24 Vdc |
| | 0.22 Adc@125 Vdc |
| | 0.10 Adc@250 Vdc |

Analog inputs (XPD, XPQ) -----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 k Ω
- Pt100/Pt1000 input..... for measuring resistances according to IEC 751
 - [Pt100] 2/3-conductor measurement, 0 to 200 $^{\circ}\text{C}$
 - [Pt1000] 2-conductor measurement, -30 to 200 $^{\circ}\text{C}$
- 0 to 180/380 Ω input..... difference measurement, sensor current ≤ 1.9 mA

Analog outputs (XPD, XPQ) ----- 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 k Ω

MPU input----- isolated

- Input impedance min. approx. 17 kΩ
- Input voltage (see Table 5-15: MPU - input voltage)

Interface -----**Service interface**

- Version.....RS-232
 - 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 (XPD, XPQ) -----

- 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 tightening 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 %	-
Power Factor (cos φ)				
Current value power factor (cos φ) L1		i0.00 to 1.00 to c0.00	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 (XPD, XPQ)				
0/4 to 20 mA		freely scaleable		-
Pt100		0 to 250 °C		not calibrated
0 to 180 Ω		freely scaleable		for VDO sensors
0 to 360 Ω		freely scaleable		for VDO sensors

Reference conditions (to measure the accuracy):

- Input voltage.....sinusoidal rated voltage
- Input currentsinusoidal rated current
- Frequencyrated frequency $\pm 2 \%$
- Power supplyrated voltage $\pm 2 \%$
- Power factor (cos ϕ)1.00
- Ambient temperature23 °C ± 2 K
- Warm-up period20 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.



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