37390B

easYgen-1000
Genset Control

Installation
Software Version 2.1xxx

Manual 37390B

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.

Revision History

Rev.	Date	Editor	Changes
NEW	07-02-02	TP	Release based on manual 37320B
A	07-05-15	TP	Minor corrections; update to reflect new housing
B	08-05-20	TP	Minor corrections

Content

Illustrations and Tables

Illustrations

Tables

Chapter 1.
General Information

Type		English	German
easYgen-1000 Series			
easYgen-1000 - Installation	this manual ⇨	37390	GR37390
easYgen-1000 - Configuration		37391	GR37391
easYgen-1000 - Operation		37392	GR37392
easYgen-1000 - Interfaces		37393	GR37393
easYgen-1000 - Application		37394	GR37394
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. Evaluation of the discrete inputs as well as control of the relay outputs is done via the control unit.			
LeoPC1 - User 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 set up of the program and interfacing with the control unit.			
LeoPC1 - Engineering 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 configuration and customization 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 The unit must only be operated in the manner described by this manual. The prerequisite for a proper and safe operation of the product is correct transportation, storage, and installation as well as careful operation and maintenance.

NOTE

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

The present manual has been prepared to enable the installation and commissioning of the unit. 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 may be taken from the list of parameters enclosed in the configuration manual 37391.

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 easily as synthetics.

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

4. **Opening the control cover may void the unit 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:

   - Ensure that the device is completely voltage-free (all connectors have to be disconnected).
   - 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 cabinet, place it in the antistatic protective bag.

CAUTION

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.*

NOTE

The unit is capable to withstand an electrostatic powder coating process with a voltage of up to 85 kV and a current of up to 40 µA.

Chapter 3.
Marine Usage

CAUTION

The following notes are very important for marine usage of the easYgen genset control and have to be followed.

Application

The easYgen-1000 has no internally isolated power supply. If an electrical isolation is required for certain reasons, an external isolated power supply unit is to be connected to the easYgen-1000.

The configuration interface input (RS-232) using the DPC converter is for maintenance and configuration only. Please refer to chapter DPC - Direct Configuration Cable on page 48 for information about the use of the DPC in normal operation.

If the easYgen is to be used on bridge and deck zones, an EMI filter (i.e. TIMONTA FSS2-65-4/3) must be used for the power supply inputs.

GL

Some additional, independent safety and protection devices are necessary to meet safety requirements of Rules and Regulations of marine Classification Societies.
The easYgen is type approved as a computer system assigned to requirement class 3 (Germanischer Lloyd Regulations-for Use of Computer Systems).
It is at the responsibility of the panel builder not to use easYgen controller to functions requiring systems assigned to requirement classes 4 or 5.

LR

Some additional, independent safety and protection devices are necessary to meet safety requirements of Rules and Regulations of marine Classification Societies.
The easYgen is type approved by LR Lloyd's Register.
Please consider for final functional arrangements to comply with appropriate Lloyd's Register Rules as subject of the Plan Approval process.

Wiring

Terminal 48 must be grounded at the control of the unit.

Chapter 4.
Housing

NOTE

The following description refers to the new easYpack housing, which is delivered starting with software version 2.1xxx. Please refer to the Housing section of the installation manual 37320 of version 2.0xxx if your unit is equipped with the previous housing type.

Panel Cutout

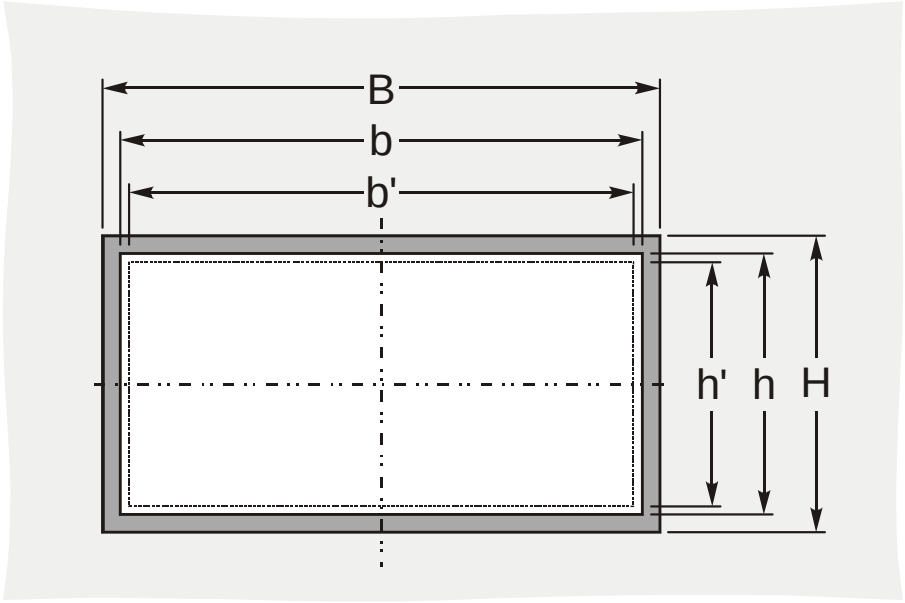


Figure 4-1: Housing - panel-board cutout

Measure	Description			Tolerance
H	Height	Total	171 mm	---
h		Panel cutout	138 mm	+ 1.0 mm
h'		Housing dimension	136 mm	
B	Width	Total	219 mm	---
b		Panel cutout	186 mm	+ 1.1 mm
b'		Housing dimension	185 mm	
	Depth	Total	61 mm	---

Table 4-1: Housing - panel cutout

The maximum permissible corner radius is 3.5 mm.
Refer to Figure 4-3 on page 13 for a cutout drawing.

Dimensions

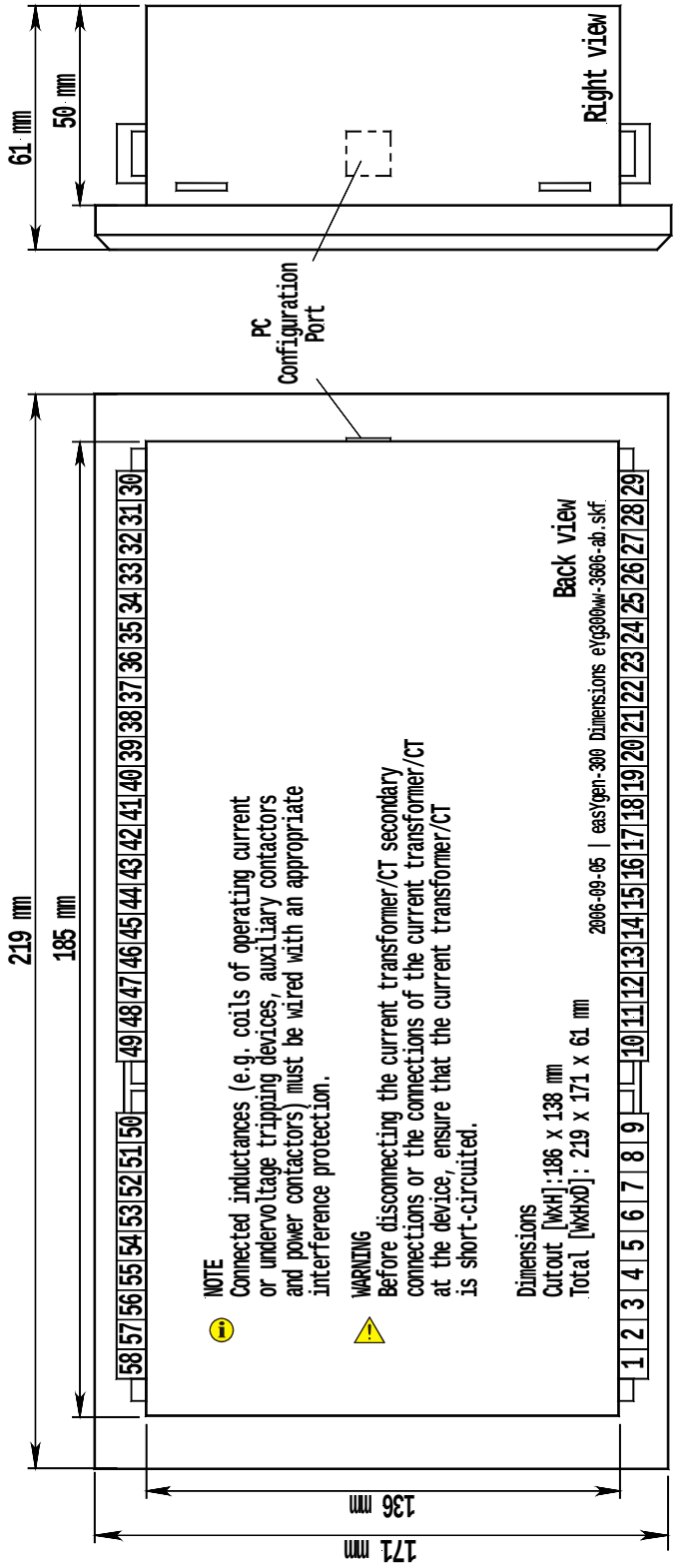
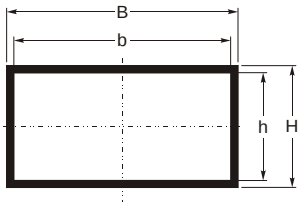


Figure 4-2: Housing - dimensions

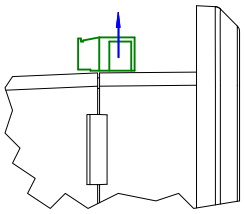
Clamp Fastener Installation

For installation into a panel door with the fastening clamps, please proceed as follows:

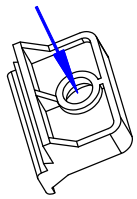
1. **Panel cutout**
   Cut out the panel according to the dimensions in Table 4-1.



2. **Remove terminals**
   Loosen the wire connection terminal screws on the back of the unit and remove the wire connection terminal strip if required.

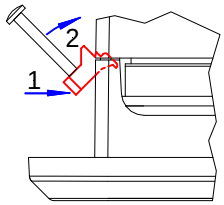


3. **Insert screws in clamps**
   Insert the four clamping screws into the clamp inserts from the shown side (opposite of the nut insert) until they are almost flush. Do not completely insert the screws into the clamp inserts.

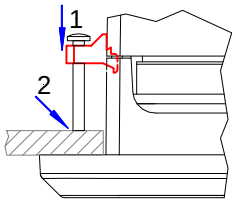


4. **Insert unit into cutout**
   Insert the unit into the panel cutout. Verify that the unit fits correctly in the cutout. If the panel cutout is not big enough, enlarge it accordingly.

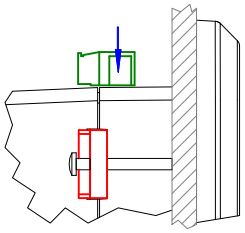
5. **Attach clamp inserts**
   Re-install the clamp inserts by tilting the insert to a 45° angle. (1) Insert the nose of the insert into the slot on the side of the housing. (2) Raise the clamp insert so that it is parallel to the control panel.



6. **Tighten clamping screws**
   Tighten the clamping screws (1) until the control unit is secured to the control panel (2). Over tightening of these screws may result in the clamp inserts or the housing breaking. Do not exceed the recommended tightening torque of 0.1 Nm.



7. **Reattach terminals**
   Reattach the wire connection terminal strip (1) and secure them with the side screws.



Screw Kit Installation

In order to enhance the protection from front to IP 65, it is possible to fasten the unit with a screw kit instead of the clamp fastener hardware.

Proceed as follows to install the unit using the screw kit:

1. Cut out the panel and drill the holes according to the dimensions in Figure 4-3.
2. Insert the unit into the panel cutout. Verify that the unit fits correctly in the cutout. If the panel cutout is not big enough, enlarge it accordingly.
3. Insert the screws and tighten to 0.6 Nm (5.3 pound inches) of torque. Tighten the screws with a cross-wise pattern to ensure even pressure distribution.

NOTE

If the thickness of the panel sheet exceeds 2.5 mm, be sure to use screws with a length of the panel sheet thickness + 4 mm.

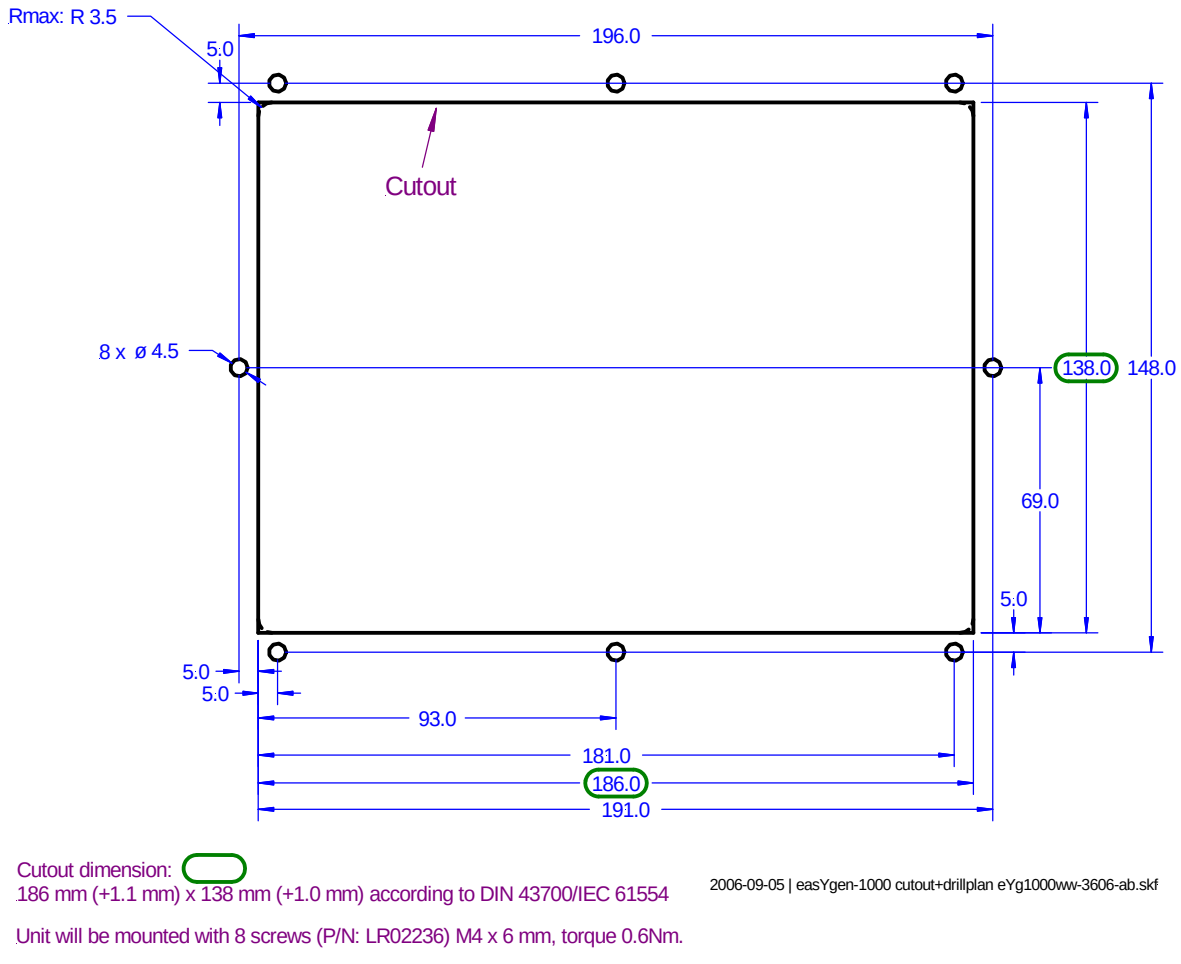


Figure 4-3: Housing - drill plan

Chapter 5.
Wiring Diagrams - Overview

NOTE

Please refer to manual 37392 "Operation Manual" for selection of the application mode. Depending on application different terminals will be utilized.

- Application mode {0} - [BM] - Base Mode - page 18
  - Measuring of engine/generator parameters (i.e. voltages, currents, coolant temperature, oil pressure, etc.)
  - Engine start/stop

- Application mode {1o} - [GCB open] - 1-CB-Mode - page 19
  - Measuring of engine/generator parameters (i.e. voltages, currents, coolant temperature, oil pressure, etc.)
  - Engine start/stop
  - Engine/generator protection (relay output to open GCB)

- Application mode {1oc} - [GCB open/close] - 1-CB-Mode - page 20
  - Measuring of engine/generator parameters (i.e. voltages, currents, coolant temperature, oil pressure, etc.)
  - Engine start/stop
  - Engine/generator protection (relay output to open GCB)
  - GCB operation (relay output to close GCB)

- Application mode {2oc} - [GCB/MCB open/close] - 2-CB-Mode - page 21
  - Measuring of engine/generator parameters (i.e. voltages, currents, coolant temperature, oil pressure, etc.)
  - Engine start/stop
  - Engine/generator protection (relay output to open GCB)
  - GCB operation (relay output to close GCB)
  - MCB operation (relay output to open and close the MCB)
  - Mains failure detection (AMF auto mains failure operation) and automatic engine start/stop

Total Overview

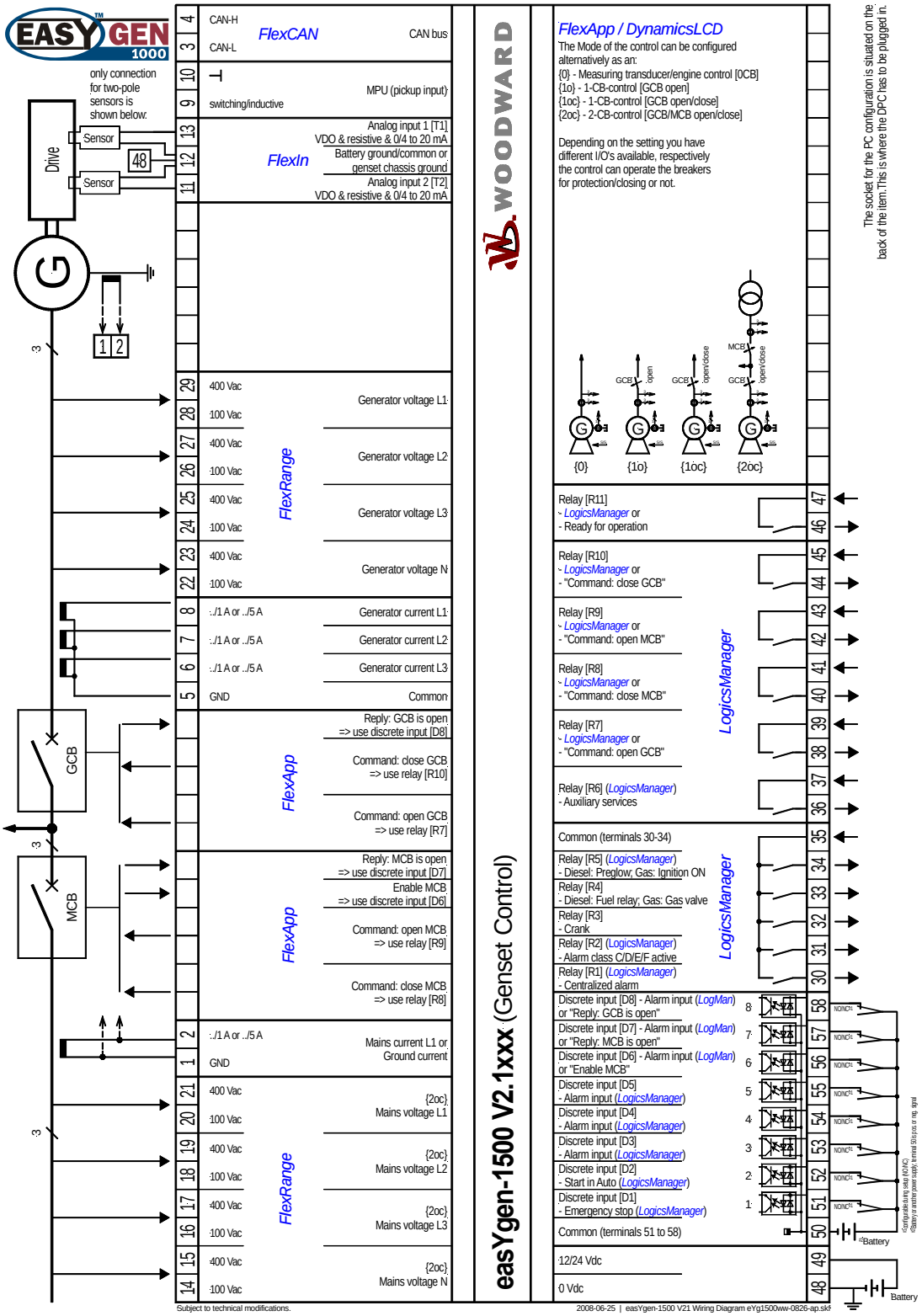
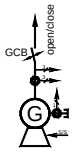
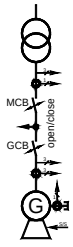


Figure 5-1: Wiring diagram - total overview

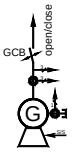
Wiring differences depend on application mode selected

The control may be programmed for one of four possible application modes. Terminals may have different functions depending on which mode is selected. The following table lists all of the control terminals and their associated function for each of the four application modes.

Term.	Description	Type	Hardware	 {0} on page 18	 {1o} on page 19	 {1oc} on page 20	 {2oc} on page 21
1	Ground current #NYI	Measure	GND	✓	✓	✓	✓ #CF alternatively ✓ #CF
2			../1 A or ../5 A #A				
1	Mains current	Measure	GND	---	---	---	
2			L1: ../1 A or ../5 A #A				
3	CAN bus	Interface	CAN-L	✓	✓	✓	✓
4			CAN-H				
5	Generator current	Measure	GND	✓	✓	✓	✓
6			L3: ../1 A or ../5 A #A				
7			L2: ../1 A or ../5 A #A				
8			L1: ../1 A or ../5 A #A				
9	Pickup (magnetic MPU, discrete)	Measure	inductive/switching	✓	✓	✓	✓
10			GND				
11	Analog input	Measure	AI [T2] - alternat. #CF	✓	✓	✓	✓
12			Battery ground/common or chassis ground				
13			AI [T1] - alternat. #CF				
14	Mains voltage	Measure	N: 100 Vac	---	---	---	✓
15			N: 400 Vac				
16			L3: 100 Vac				
17			L3: 400 Vac				
18			L2: 100 Vac				
19			L2: 400 Vac				
20			L1: 100 Vac				
21			L1: 400 Vac				
22	Generator voltage	Measure	N: 100 Vac	✓	✓	✓	✓
23			N: 400 Vac				
24			L3: 100 Vac				
25			L3: 400 Vac				
26			L2: 100 Vac				
27			L2: 400 Vac				
28			L1: 100 Vac				
29			L1: 400 Vac				

#A - alternatively (different hardware); #NYI - not yet implemented; #CF - selection during and through configuration

Table 5-1: Terminal overview, part 1

Term.	Description	Type	Hardware	 {0} on page 18	 {1o} on page 19	 {1oc} on page 20	 {2oc} on page 21
30	Relay [R1]	Relay	Make contact (NO)	*LogMa* #R	*LogMa* #R	*LogMa* #R	*LogMa* #R
31	Relay [R2]		Make contact (NO)	*LogMa* #R	*LogMa* #R	*LogMa* #R	*LogMa* #R
32	Relay [R3]		Make contact (NO)	Crank			
33	Relay [R4]		Make contact (NO)	Diesel: Fuel magnet; Gas: Gas valve			
34	Relay [R5]		Make contact (NO)	*LogMa* #R			
35	Common		Common	✓	✓	✓	✓
36	Relay [R6]	Relay	Make contact (NO)	Auxiliary services			
37			Main contact				
38	Relay [R7]	Relay	Make contact (NO)	*LogMa* #R	Command: open GCB		
39			Main contact				
40	Relay [R8]	Relay	Make contact (NO)	*LogMa* #R	*LogMa* #R	*LogMa* #R	Command: close MCB
41			Main contact				
42	Relay [R9]	Relay	Make contact (NO)	*LogMa* #R	*LogMa* #R	*LogMa* #R	Command: open MCB
43			Main contact				
44	Relay [R10]	Relay	Make contact (NO)	*LogMa* #R	*LogMa* #R	Command: close GCB	
45			Main contact				
46	Relay [R11]	Relay	Make contact (NO)	Ready for operation / *LogMa* #R			
47			Main contact				
48	Power supply	Supply	0 Vdc	✓	✓	✓	✓
49			12/24 Vdc				
50	Common	Input	Common	✓	✓	✓	✓
51	Discrete input [D1]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	*LogMa* #D
52	Discrete input [D2]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	*LogMa* #D
53	Discrete input [D3]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	*LogMa* #D
54	Discrete input [D4]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	*LogMa* #D
55	Discrete input [D5]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	*LogMa* #D
56	Discrete input [D6]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	#1
57	Discrete input [D7]		Contact	*LogMa* #D	*LogMa* #D	*LogMa* #D	Repl:MCB
58	Discrete input [D8]		Contact	*LogMa* #D	*LogMa* #D	Reply: GCB is closed	

#R - *LogMa* - Relay output (via the function ***LogicsManager*** the relays can be programmed freely)
#D - *LogMa* - Discrete input (the discrete input may be used in the ***LogicsManager*** if the alarm class is configured to "Control")
#1 - if the parameter "Enable MCB" is configured to "Always" this DI may be used as alarm input (*LogMa* #D)
if the parameter "Enable MCB" is configured to "DI6" the MCB may be enabled by energizing this DI
Repl:MCB..Reply: MCB is closed

Table 5-2: Terminal overview, part 2

Application Mode {0}

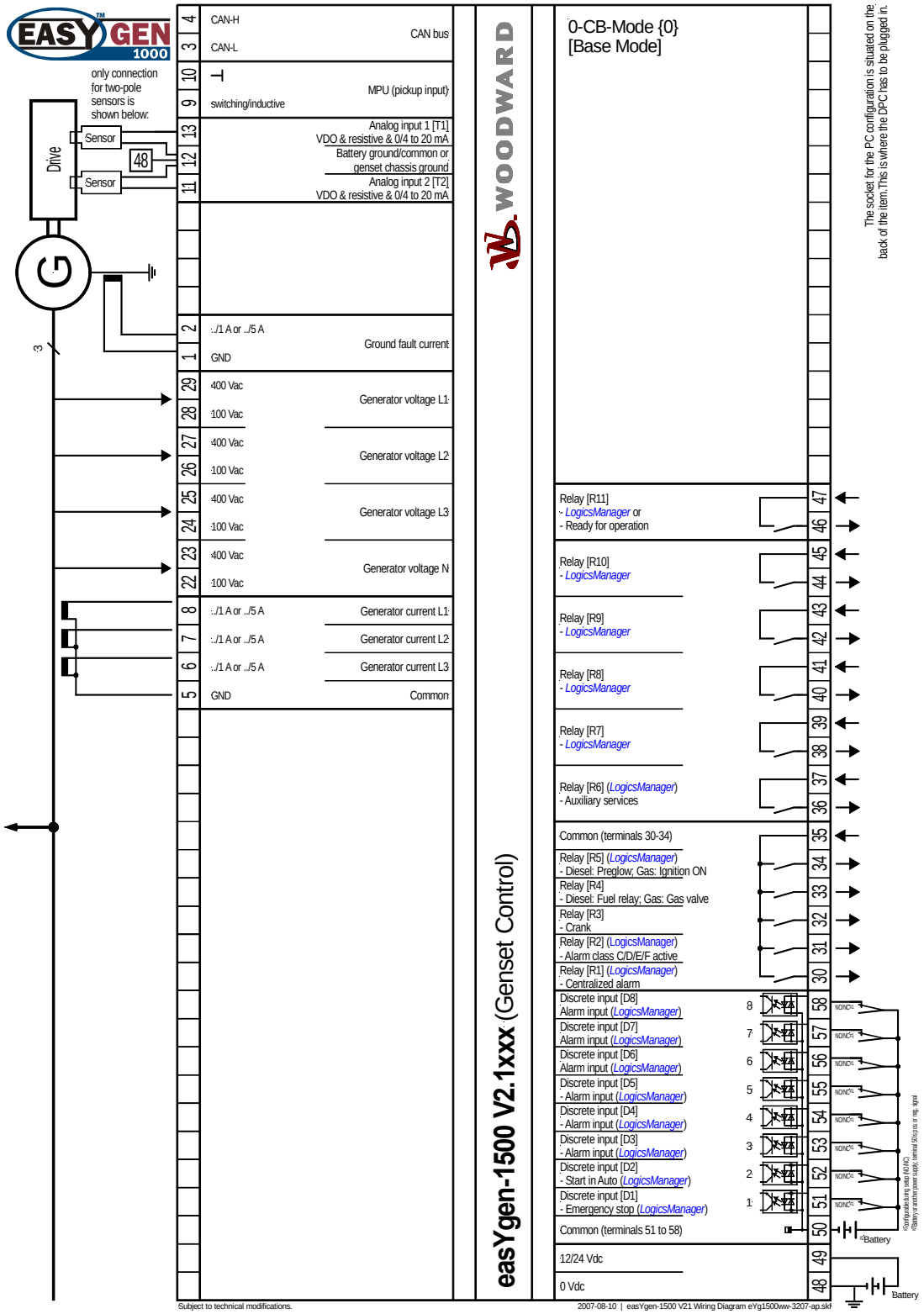


Figure 5-2: Wiring diagram - application mode {0} - base mode

Application Mode {1o}

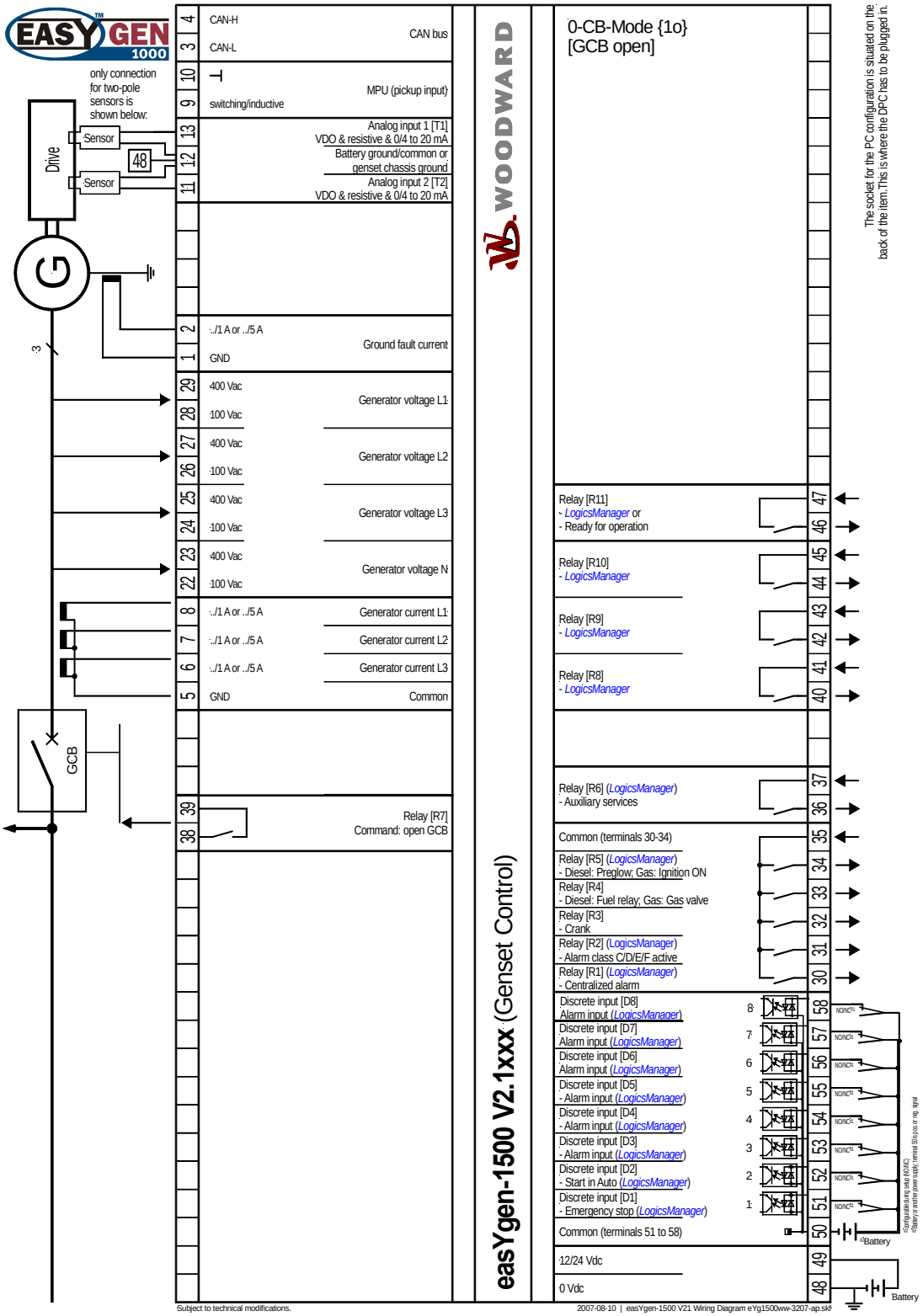


Figure 5-3: Wiring diagram - application mode {1o} - 1 CB mode

Application Mode {1oc}

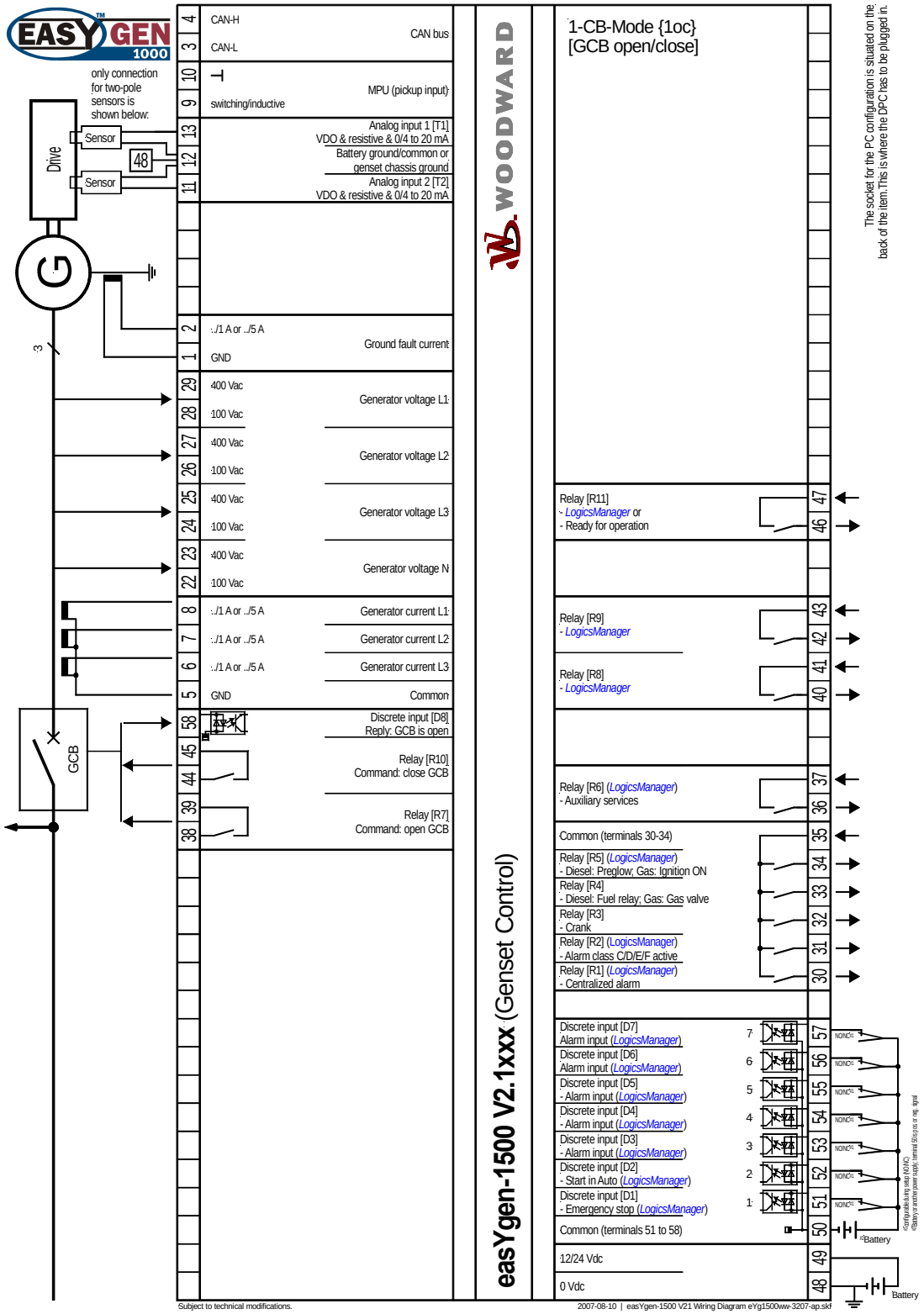


Figure 5-4: Wiring diagram - application mode {1oc} - 1 CB mode

Application Mode {2oc}

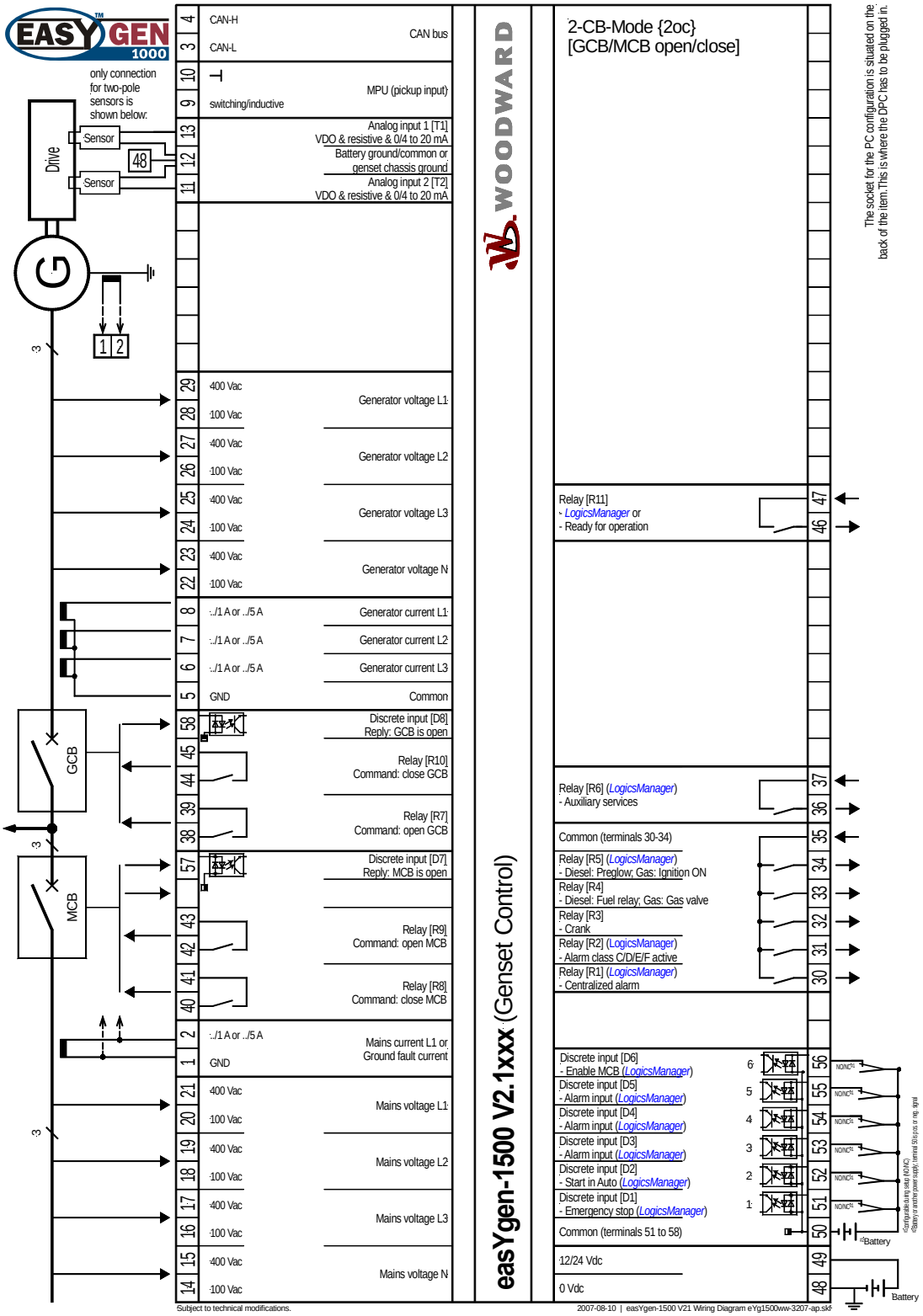


Figure 5-5: Wiring diagram - application mode {2oc} - 2 CB mode

Chapter 6.
Connections

WARNING

All technical data and ratings indicated in this chapter are not definite! Only the values indicated in Chapter 7: Technical Data on page 50 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 6-1: Conversion chart - wire size

Power Supply

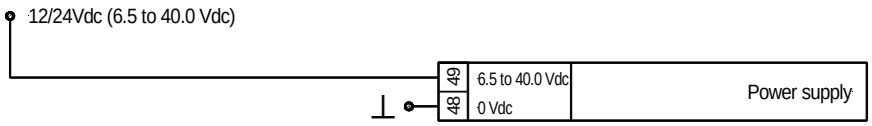


Figure 6-1: Power supply

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓

Terminal	Description	A_{max}
48	0 Vdc reference potential	2.5 mm²
49	12/24Vdc (6.5 to 40.0 Vdc), 15 W	2.5 mm²

Table 6-2: Power supply - terminal assignment

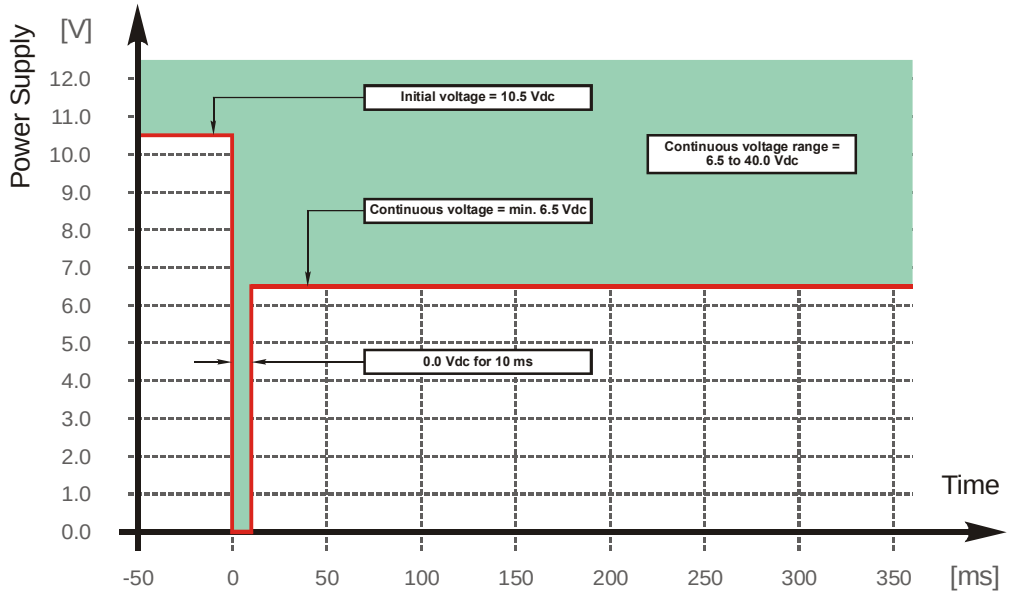


Figure 6-2: Power supply - crank waveform at maximum load

NOTE

Woodward recommends to use one of the following slow-acting protective devices in the supply line to terminal 63:

- **Fuse NEOZED D01 4A or equivalent**

or

- **Miniature Circuit Breaker 4A / Type C (for example: ABB type: S271C4 or equivalent)**

Voltage Measuring (*FlexRange*)

NOTE

DO NOT use both sets of voltage measuring inputs. The control unit will not measure voltage correctly if the 100 V and 400 V inputs are utilized simultaneously.

NOTE

Woodward recommends protecting the voltage measuring inputs with slow-acting fuses rated for 2 to 6 A.

Voltage Measuring: Generator

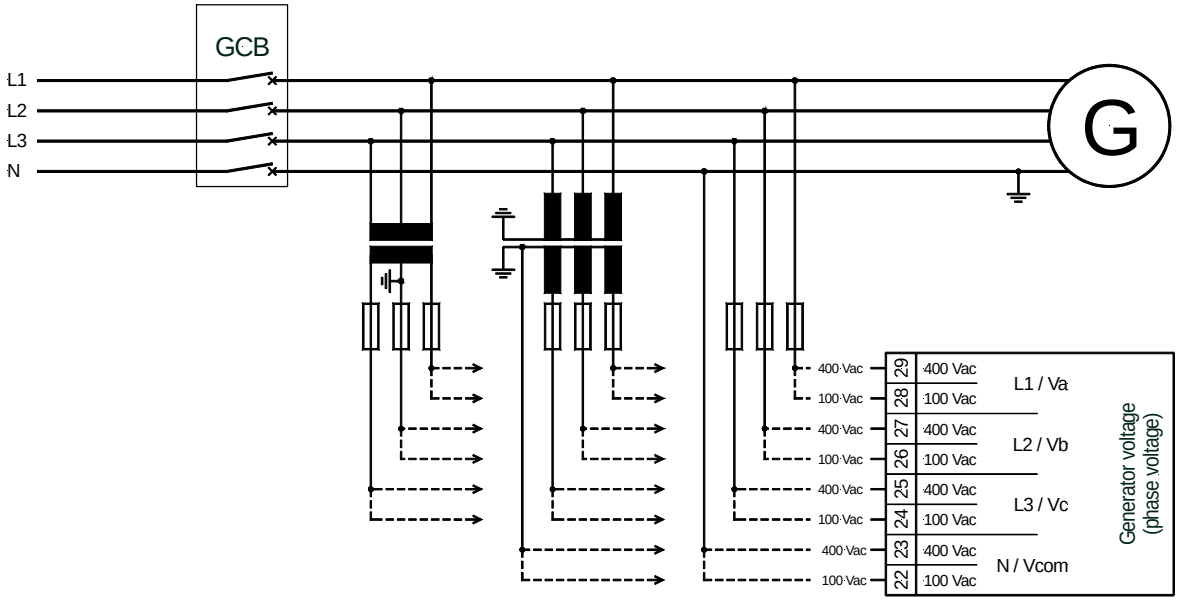


Figure 6-3: Voltage measuring - generator

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

Terminal	Description		A_{max}
22	Generator voltage - phase N	100 Vac	2.5 mm²
23		400 Vac	2.5 mm²
24	Generator voltage - phase L3	100 Vac	2.5 mm²
25		400 Vac	2.5 mm²
26	Generator voltage - phase L2	100 Vac	2.5 mm²
27		400 Vac	2.5 mm²
28	Generator voltage - phase L1	100 Vac	2.5 mm²
29		400 Vac	2.5 mm²

Table 6-3: Voltage measuring - terminal assignment - generator voltage

NOTE

If parameter "Gen. voltage transf. secondary" (refer to Configuration Manual 37391) is configured with a value between 50 and 130 V, the 100 V input terminals must be used for proper measurement.

If parameter "Gen. voltage transf. secondary" (refer to Configuration Manual 37391) is configured with a value between 131 and 480 V, the 400 V input terminals must be used for proper measurement.

Voltage Measuring: Generator, parameter setting '3ph 4w' (3phase, 4wire)

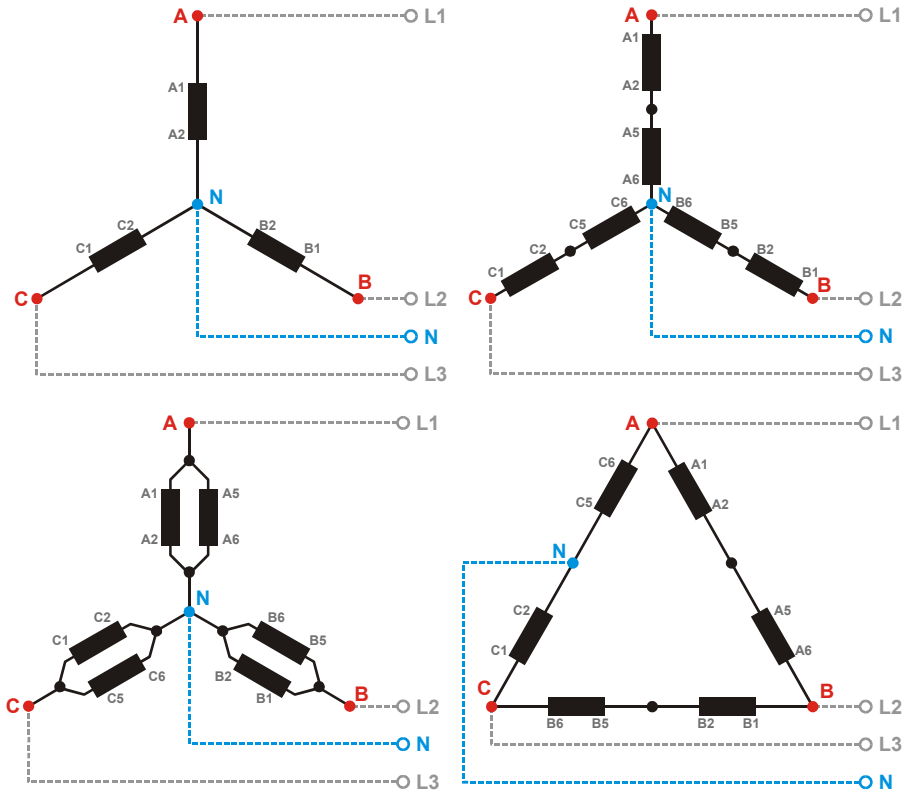


Figure 6-4: Voltage measuring -generator windings, 3ph 4w

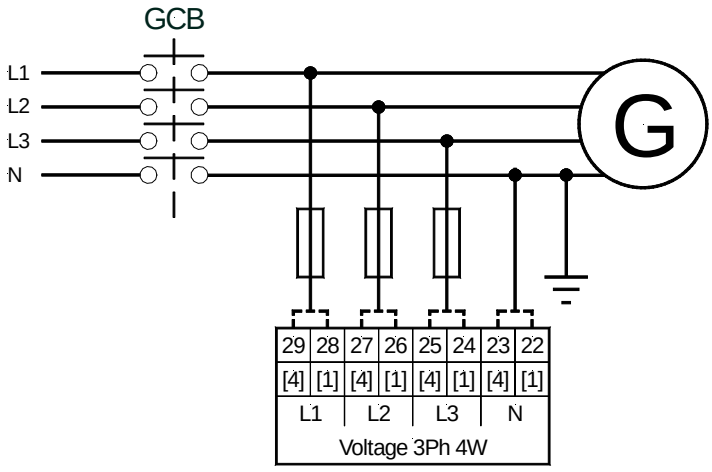


Figure 6-5: Voltage measuring - generator measuring inputs, 3Ph 4W

3ph 4w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 $V_{eff.}$)				[4] 400 V (131 to 480 $V_{eff.}$)				1
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	28	26	24	22	29	27	25	23	
Phase	L1	L2	L3	N	L1	L2	L3	N	

Table 6-4: Voltage measuring - terminal assignment - generator, 3ph 4w

1 For different voltage systems, different wiring terminals have to be used. Incorrect measurements are possible if both voltage systems use the same N terminal..

Voltage Measuring: Generator, parameter setting '3ph 3w' (3phase, 3wire)

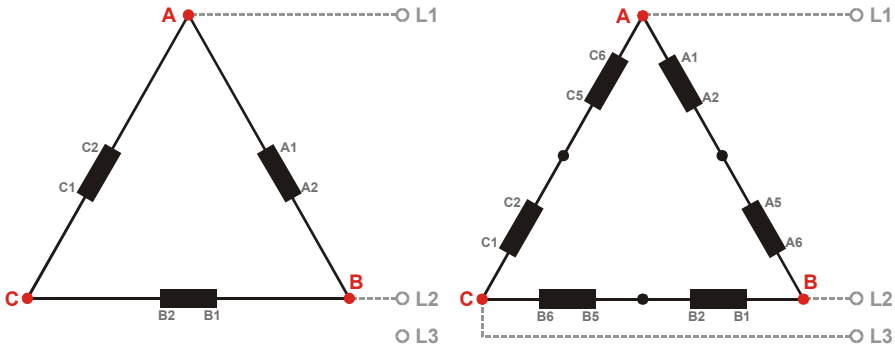


Figure 6-6: Voltage measuring - generator windings, 3ph 3w

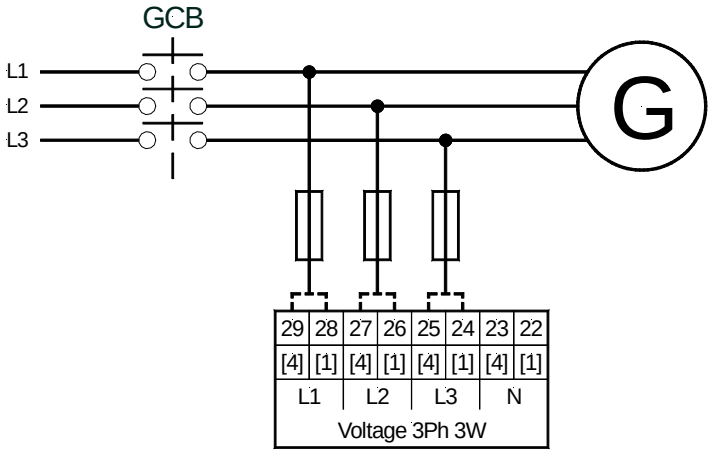


Figure 6-7: Voltage measuring - generator measuring inputs, 3Ph 3W

3ph 3w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 V_{eff})				[4] 400 V (131 to 480 V_{eff})				2
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	28	26	24	22	29	27	25	23	
Phase	L1	L2	L3	---	L1	L2	L3	---	

Table 6-5: Voltage measuring - terminal assignment - generator, 3ph 3w

2 For different voltage systems, different wiring terminals have to be used. Incorrect measurements are possible if both voltage systems use the same N terminal..

Voltage Measuring: Generator, parameter setting '1ph 3w' (1phase, 3wire)

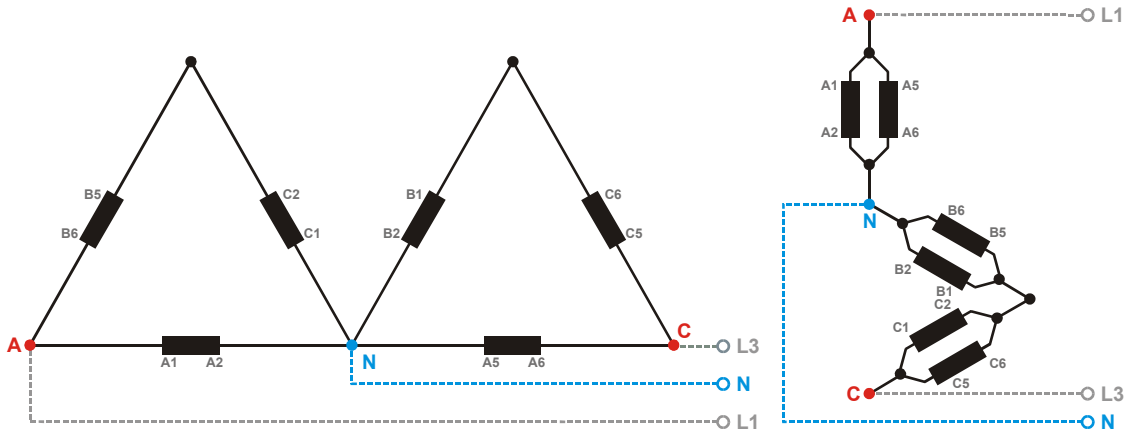


Figure 6-8: Voltage measuring - generator windings, 1ph 3w

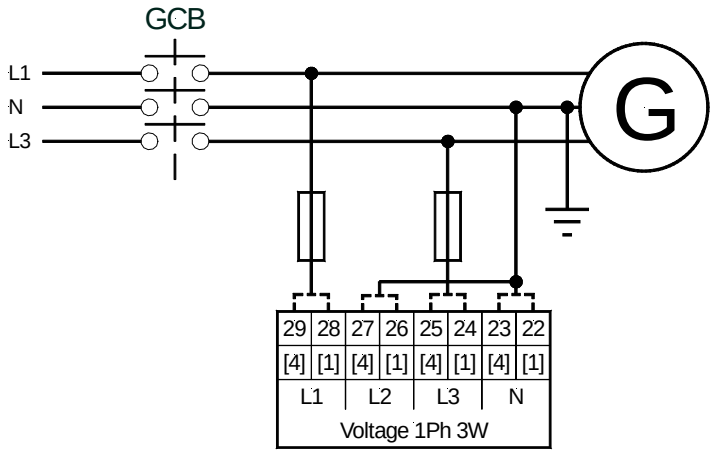


Figure 6-9: Voltage measuring - generator measuring inputs, 1Ph 3W

1p 3w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 $V_{eff.}$)				[4] 400 V (131 to 480 $V_{eff.}$)				3
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	28	26	24	22	29	27	25	23	
Phase	L1	N	L3	N	L1	N	L3	N	

Table 6-6: Voltage measuring - terminal assignment - generator, 1ph 3w

3 For different voltage systems, different wiring terminals have to be used. Incorrect measurements are possible if both voltage systems use the same N terminal..

Voltage measuring: Generator, parameter setting '1ph 2w' (1phase, 2wire)

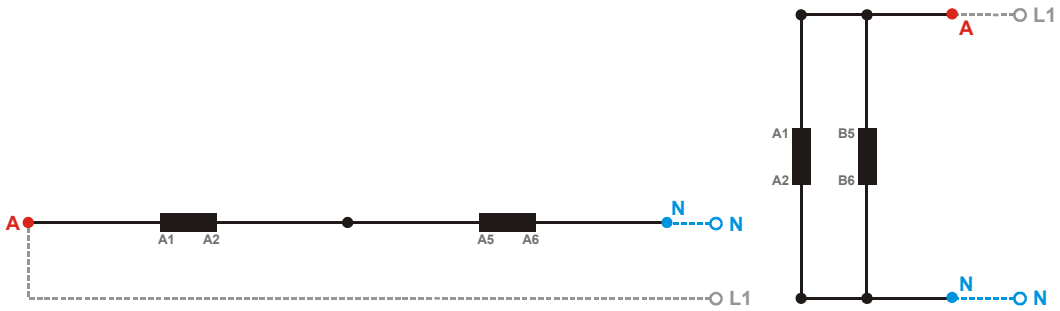


Figure 6-10: Voltage measuring - generator windings, 1ph 2w

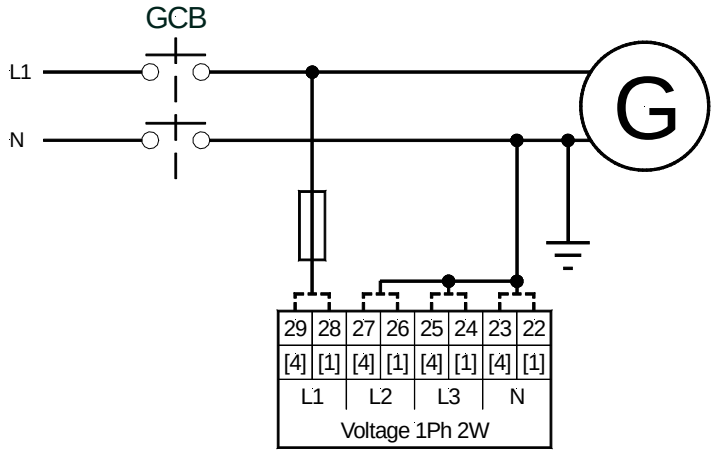


Figure 6-11: Voltage measuring - generator measuring inputs, 1Ph 2W

1ph 2w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 $V_{eff.}$)				[4] 400 V (131 to 480 $V_{eff.}$)				3
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	28	26	24	22	29	27	25	23	
Phase	L1	N	N	N	L1	N	N	N	

Table 6-7: Voltage measuring - terminal assignment - generator, 1ph 2w

Voltage Measuring: Mains

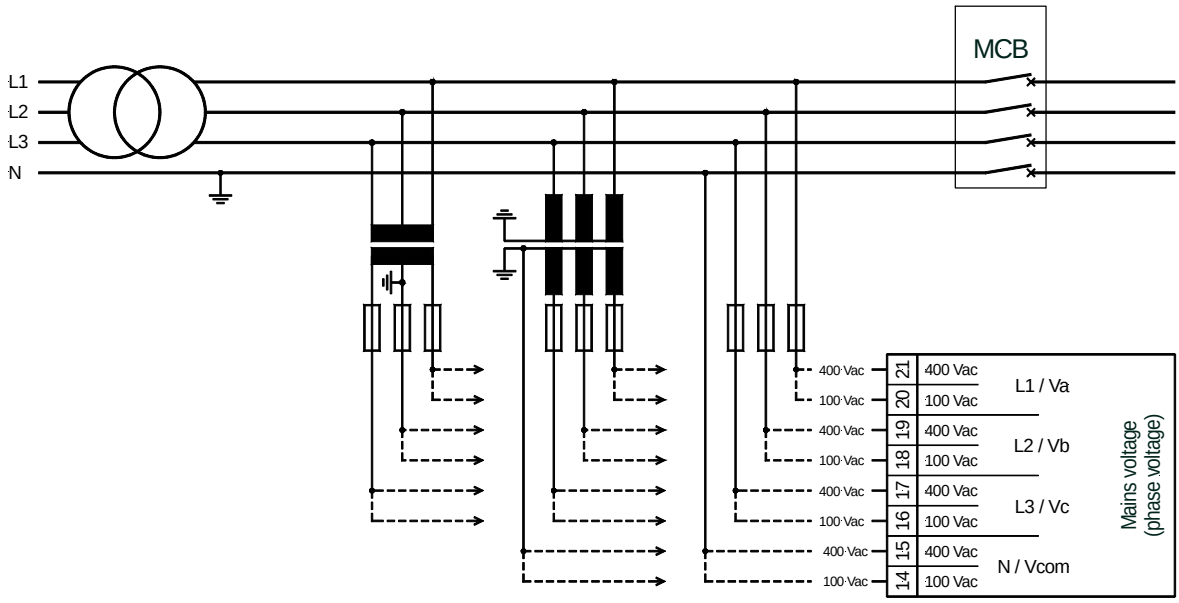


Figure 6-12: Voltage measuring - mains

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
---	---	---	✓
---	---	---	✓
---	---	---	✓
---	---	---	✓
---	---	---	✓
---	---	---	✓
---	---	---	✓
---	---	---	✓

Terminal	Description		A_{max}
14	Mains voltage - phase N	100 Vac	2.5 mm²
15		400 Vac	2.5 mm²
16	Mains voltage - phase L3	100 Vac	2.5 mm²
17		400 Vac	2.5 mm²
18	Mains voltage - phase L2	100 Vac	2.5 mm²
19		400 Vac	2.5 mm²
20	Mains voltage - phase L1	100 Vac	2.5 mm²
21		400 Vac	2.5 mm²

Table 6-8: Voltage measuring - terminal assignment - mains voltage

NOTE

If parameter "Mainsvoltage transf. secondary" (refer to Configuration Manual 37391) is configured with a value between 50 and 130 V, the 100 V input terminals must be used for proper measurement.

If parameter "Mains voltage transf. secondary" (refer to Configuration Manual 37391) is configured with a value between 131 and 480 V, the 400 V input terminals must be used for proper measurement.

Voltage Measuring: Mains, parameter setting '3ph 4w' (3phase, 4wire)

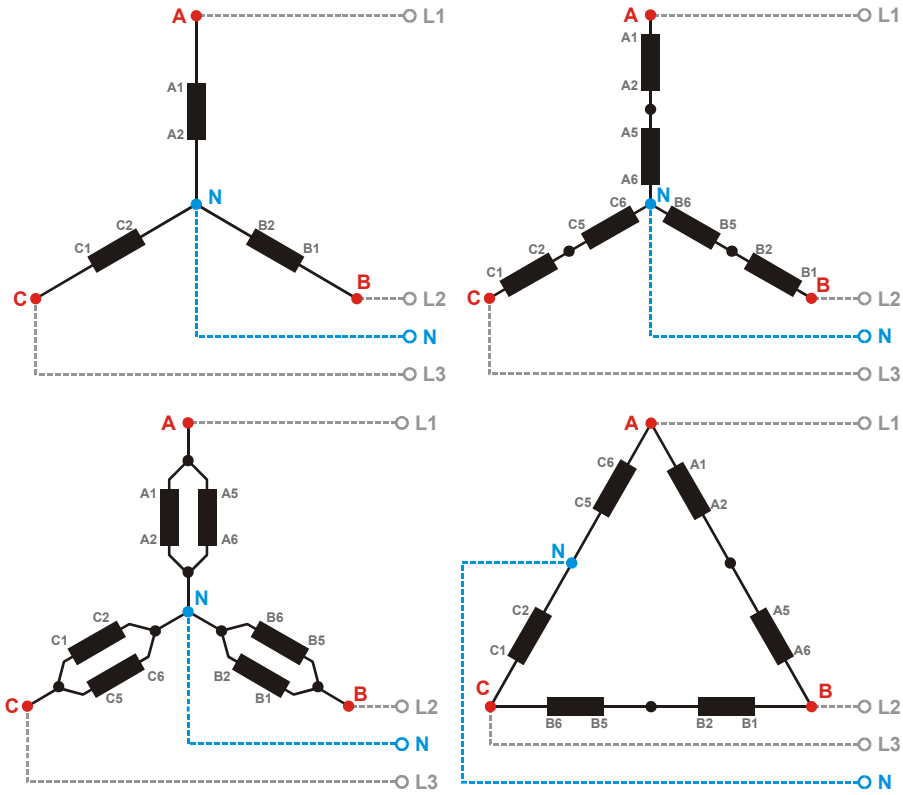


Figure 6-13: Voltage measuring - mains PT windings, 3ph 4w

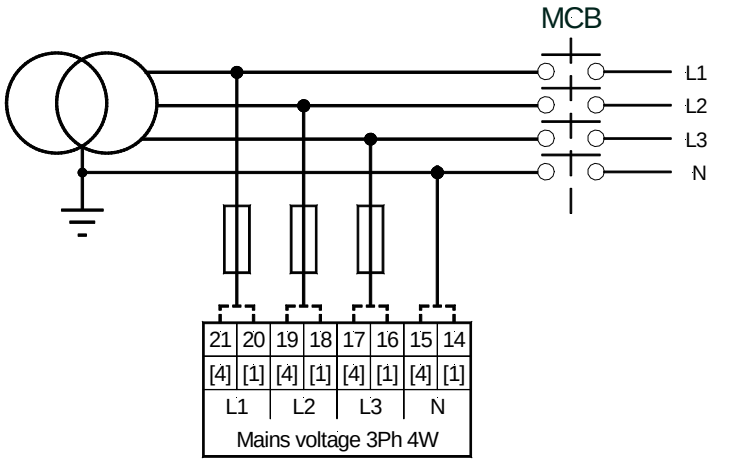


Figure 6-14: Voltage measuring - mains measuring inputs, 3Ph 4W

3ph 4w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 $V_{eff.}$)				[4] 400 V (131 to 480 $V_{eff.}$)				4
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	20	18	16	14	21	19	17	15	
Phase	L1	L2	L3	N	L1	L2	L3	N	

Table 6-9: Voltage measuring - terminal assignment - mains, 3ph 4w

4 For different voltage systems, different wiring terminals have to be used. Incorrect measurements are possible if both voltage systems use the same N terminal..

Voltage Measuring: Mains, parameter setting '3ph 3w' (3phase, 3wire)

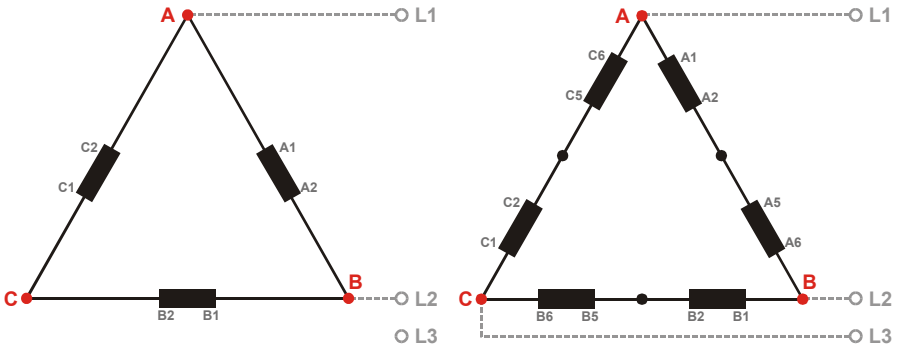


Figure 6-15: Voltage measuring - mains PT windings, 3ph 3w

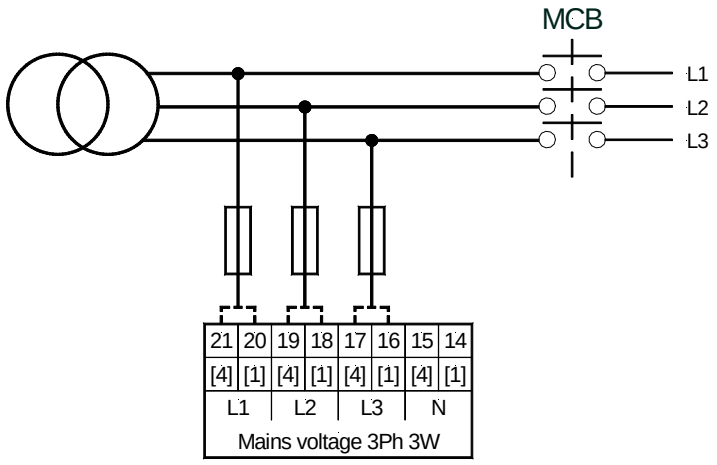


Figure 6-16: Voltage measuring - mains measuring inputs, 3Ph 3W

3ph 3w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 $V_{eff.}$)				[4] 400 V (131 to 480 $V_{eff.}$)				5
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	20	18	16	14	21	19	17	15	
Phase	L1	L2	L3	---	L1	L2	L3	---	

Table 6-10: Voltage measuring - terminal assignment - mains, 3ph 3w

5 For different voltage systems, different wiring terminals have to be used. Incorrect measurements are possible if both voltage systems use the same N terminal..

Voltage Measuring: Mains, parameter setting '1ph 3w' (1phase, 3wire)

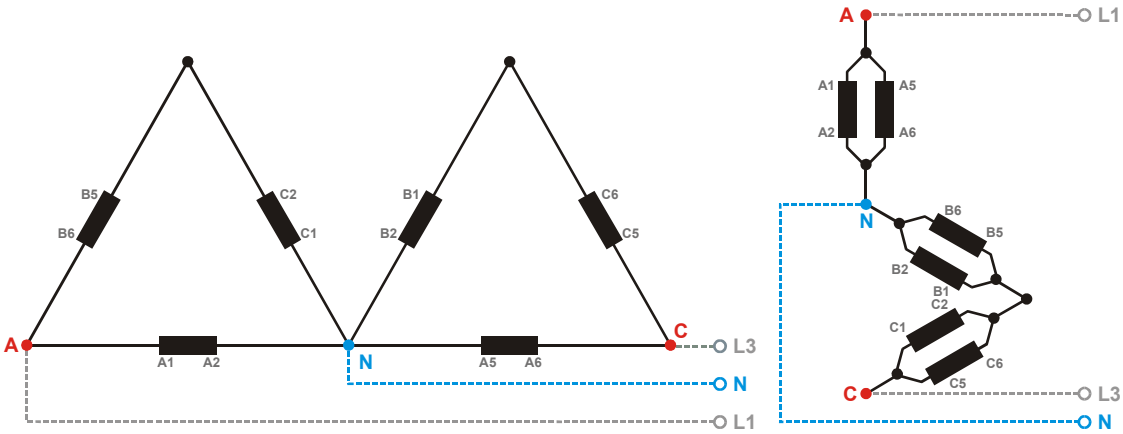


Figure 6-17: Voltage measuring - mains PT windings, 1ph 3w

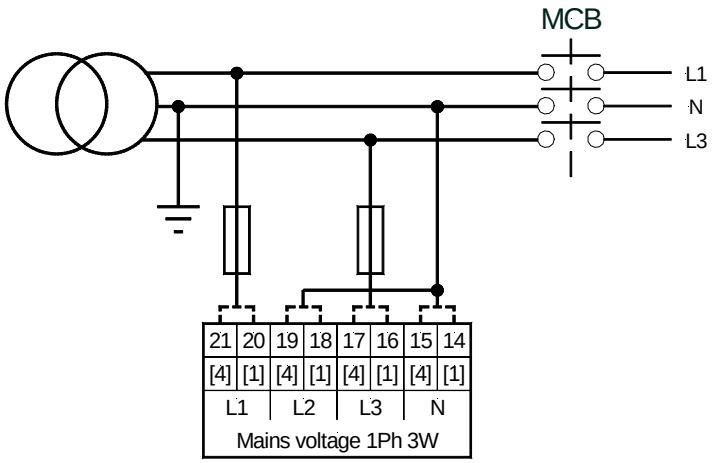


Figure 6-18: Voltage measuring - mains measuring inputs, 1Ph 3W

1p 3w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 V_{eff})				[4] 400 V (131 to 480 V_{eff})				6
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	20	18	16	14	21	19	17	15	
Phase	L1	N	L3	N	L1	N	L3	N	

Table 6-11: Voltage measuring - terminal assignment - mains, 1ph 3w

6 For different voltage systems, different wiring terminals have to be used. Incorrect measurements are possible if both voltage systems use the same N terminal..

Voltage Measuring: Mains, parameter setting '1ph 2w' (1phase, 2wire)

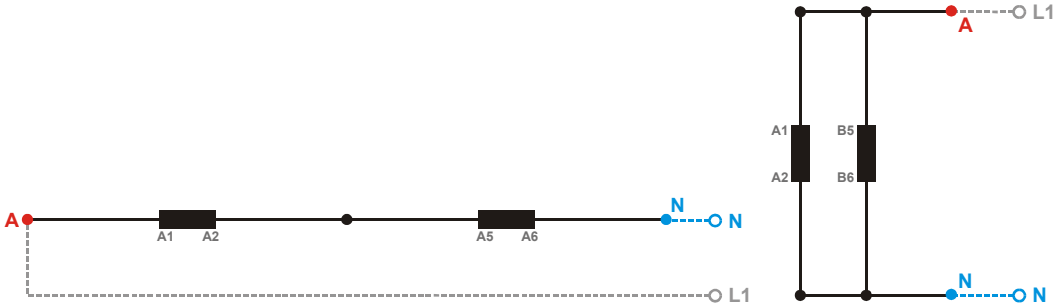


Figure 6-19: Voltage measuring - mains PT windings, 1ph 2w

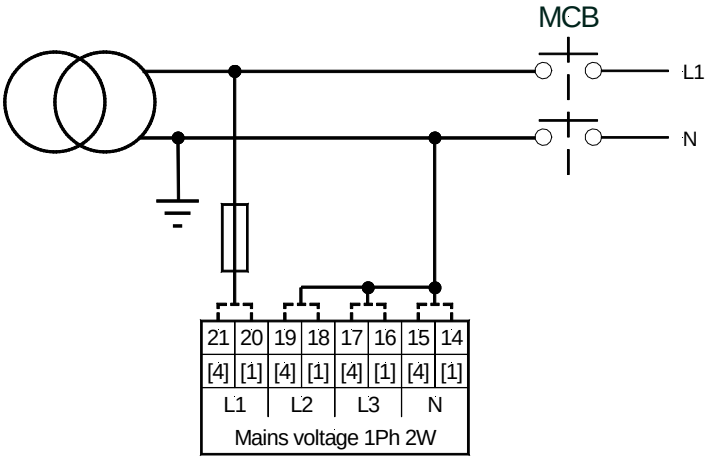


Figure 6-20: Voltage measuring - mains measuring inputs, 1Ph 2W

1p 2w	Wiring terminals								Note
Rated voltage (range)	[1] 100 V (50 to 130 $V_{eff.}$)				[4] 400 V (131 to 480 $V_{eff.}$)				6
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
easYgen terminal	20	18	16	14	21	19	17	15	
Phase	L1	N	N	N	L1	N	N	N	

Table 6-12: Voltage measuring - terminal assignment - mains, 1ph 2w

Current Measuring

CAUTION

Before disconnecting the device, ensure that the current transformer/CT is short-circuited.

Generator

NOTE

Please connect the wires of the current transformer "L (x)" as near as possible to the unit.

NOTE

Generally, one line of the current transformers secondary is to be grounded.

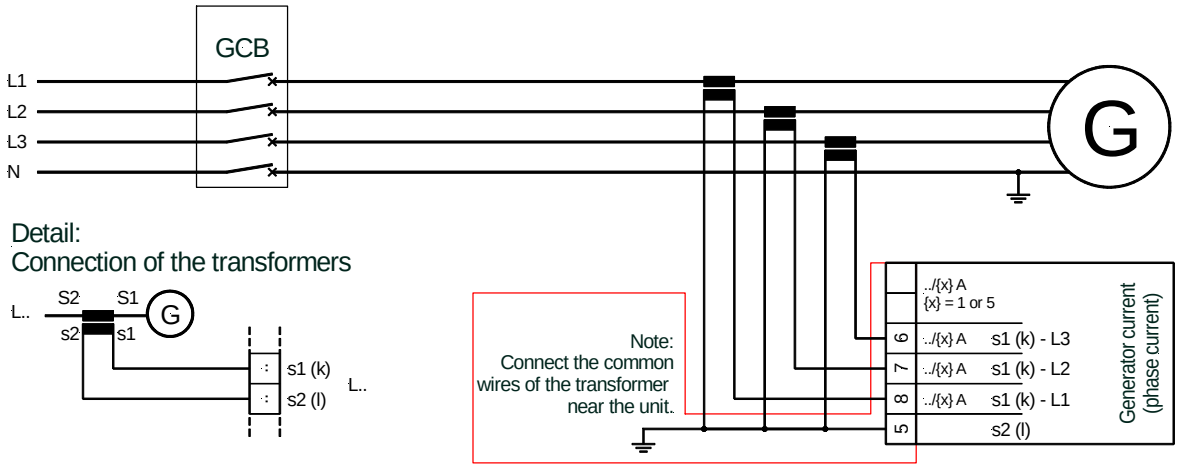


Figure 6-21: Current measuring - generator

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

Terminal	Description	A_{max}
5	Generator current - phases L1/L2/L3 - transformer terminals x2 (l)	2.5 mm²
6	Generator current - phase L3 - transformer terminal s1 (k)	2.5 mm²
7	Generator current - phase L2 - transformer terminal s1 (k)	2.5 mm²
8	Generator current - phase L1 - transformer terminal s1 (k)	2.5 mm²

Table 6-13: Current measuring - terminal assignment - generator current

Current Measuring: Generator, parameter setting 'L1 L2 L3'

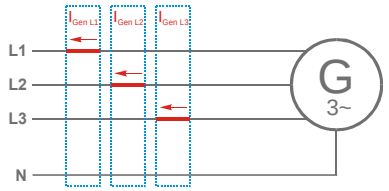


Figure 6-22: Current measuring - generator, L1 L2 L3

L1 L2 L3	Wiring terminals				Notes
easYgen terminal	8	7	6	5	
Phase	L1	L2	L3	GND	

Table 6-14: Current measuring - terminal assignment - generator, L1 L2 L3

Current Measuring: Generator, parameter setting 'Phase L1', 'Phase L2' & 'Phase L3'

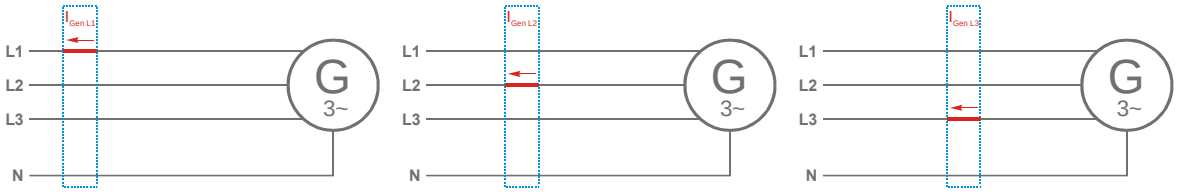


Figure 6-23: Current measuring - Generator, Phase Lx

	Wiring terminals				Notes
Phase L1					
easYgen terminal	8	7	6	5	
Phase	L1	---	---	GND	
Phase L2					
easYgen terminal	8	7	6	5	
Phase	---	L2	---	GND	
Phase L3					
easYgen terminal	8	7	6	5	
Phase	---	---	L3	GND	

Table 6-15: Current measuring - terminal assignment - generator, Phase Lx

Mains Current ({2oc} Only)

NOTE

Generally, one line of the current transformers secondary is to be grounded.

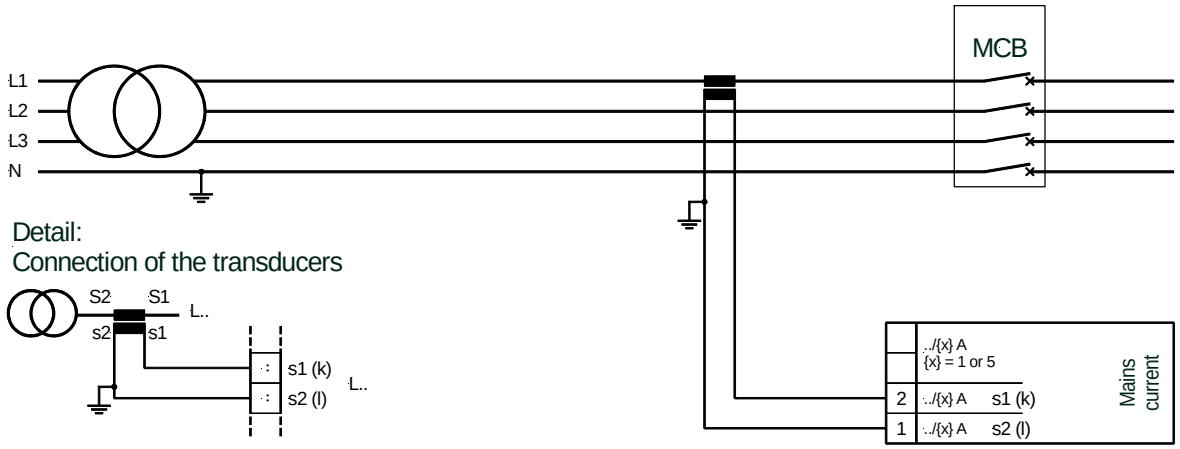


Figure 6-24: Current measuring - mains current

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
---	---	---	☑
---	---	---	☑

Terminal	Description	A_{max}
1	Mains current - phase L1 - transformer terminal s2 (l)	2.5 mm²
2	Mains current - phase L1 - transformer terminal s1 (k)	2.5 mm²

Table 6-16: Current measuring - terminal assignment - mains current

Current Measuring: Mains, parameter setting 'Phase L1', 'Phase L2' & 'Phase L3'

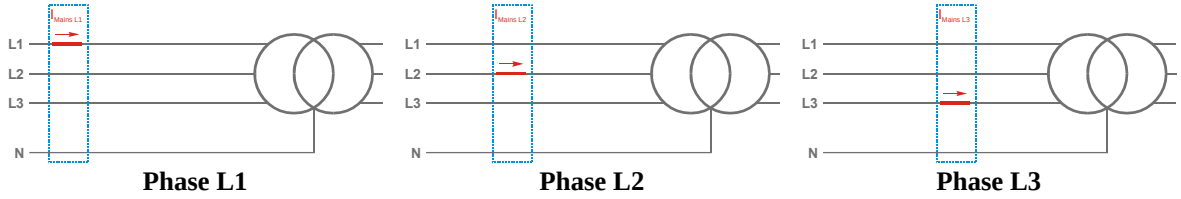


Figure 6-25: Current measuring - generator, Phase Lx

	Wiring terminals		Notes
Phase L1			
easYgen terminal	1	2	
Phase	GND	L1	
Phase L2			
easYgen terminal	1	2	
Phase	GND	L2	
Phase L3			
easYgen terminal	1	2	
Phase	GND	L3	

Table 6-17: current measuring - terminal assignment - generator, Phase Lx

Ground Current

The mains current input can be configured to measure the mains current or ground current. Whether this input is used to measure the mains current (default) or the ground current, depends on how Parameter 'Input mains current as' is configured. Refer to configuration manual 37391 for more information.

NOTE

Generally, one line of the current transformers secondary is to be grounded.

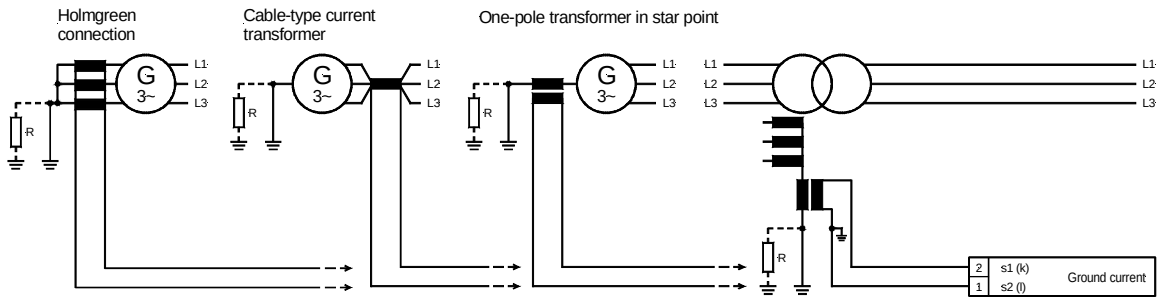


Figure 6-26: Current measuring - ground current

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
☑	☑	☑	☑
☑	☑	☑	☑

Terminal	Description	A_{max}
1	Ground current - transformer terminal s2 (l)	2.5 mm²
2	Ground current - transformer terminal s1 (k)	2.5 mm²

Table 6-18: Current measuring - terminal assignment - ground current

Power Measuring

If the unit's current transformers are wired according to the diagram shown, the following values are displayed.

Parameter	Description	Sign displayed
Generator real power	Genset generating kW	+ Positive
Generator real power	Genset in reverse power	- Negative
Generator power factor (cos φ)	Inductive / lagging	+ Positive
Generator power factor (cos φ)	Capacitive / leading	- Negative
Mains real power	Plant exporting kW +	+ Positive
Mains real power	Plant importing kW -	- Negative
Mains power factor (cos φ)	Inductive / lagging	+ Positive
Mains power factor (cos φ)	Capacitive / leading	- Negative

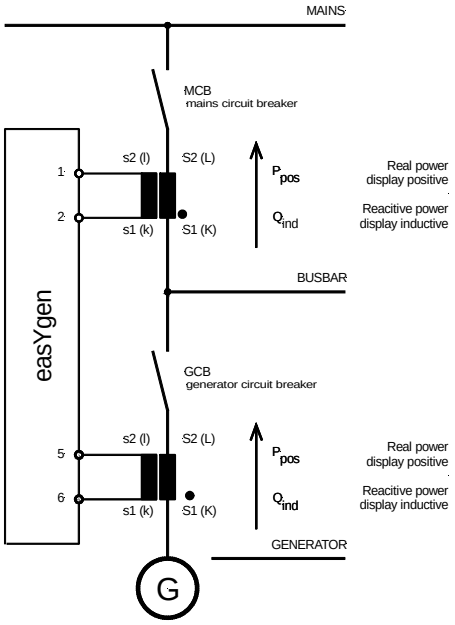


Figure 6-27: Power measuring - direction of power

Power Factor Definition

The phasor diagram is used from the generator's view. Power factor is defined as follows.

Power Factor is defined as a ratio of the real power to apparent power. In a purely resistive circuit, the voltage and current waveforms are instep resulting in a ratio or power factor of 1.00 (often referred to as unity). In an inductive circuit the current lags behind the voltage waveform resulting in usable power (real power) and unusable power (reactive power). This results in a positive ratio or lagging power factor (i.e. 0.85lagging). In a capacitive circuit the current waveform leads the voltage waveform resulting in usable power (real power) and unusable power (reactive power). This results in a negative ratio or a leading power factor (i.e. 0.85leading).

Inductive: Electrical load whose current waveform lags the voltage waveform thus having a lagging power factor. Some inductive loads such as electric motors have a large startup current requirement resulting in lagging power factors.	Capacitive: Electrical load whose current waveform leads the voltage waveform thus having a leading power factor. Some capacitive loads such as capacitor banks or buried cable result in leading power factors.

Different power factor displays at the unit:

i0.91 (inductive) lg.91 (lagging)	c0.93 (capacitive) ld.93 (leading)

Reactive power display at the unit:

70 kvar (positive)	-60 kvar (negative)

Output at the interface:

+ (positive)	- (negative)

In relation to the voltage, the current is

lagging	leading

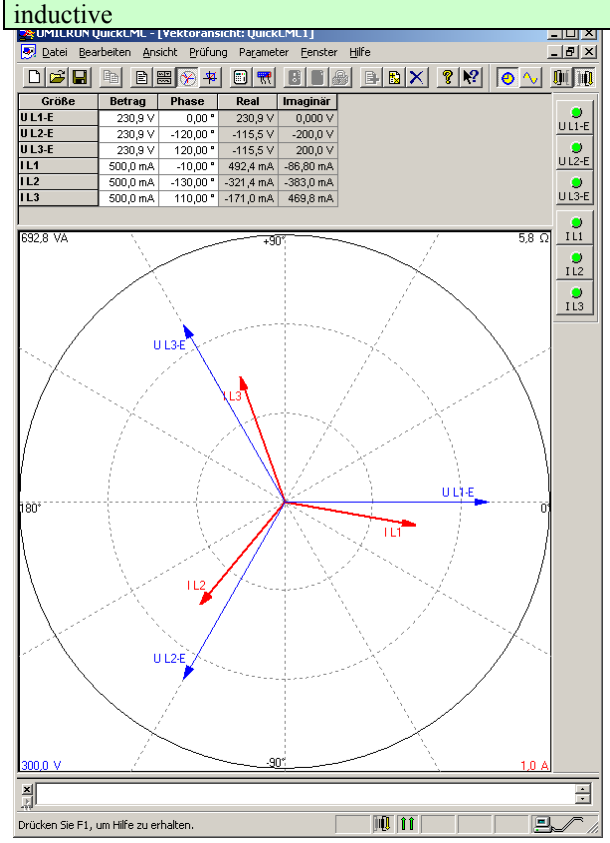
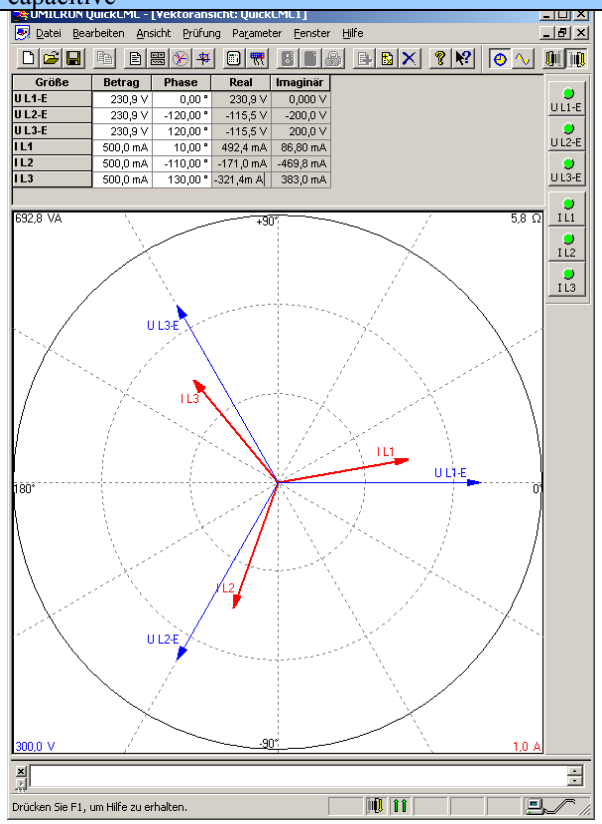
The generator is

over excited	under excited

Control: If the control unit is equipped with a power factor controller while in parallel with the utility:

A voltage lower "-" signal is output as long as the measured value is "more inductive" than the reference set point Example: measured = i0.91; set point = i0.95	A voltage raise "+" signal is output as long as the measured value is "more capacitive" than the reference set point Example: measured = c0.91; set point = c0.95

Phasor diagram:

inductive	capacitive
	

Pickup

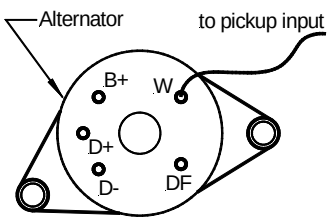


Figure 6-28: Speed input - alternator signal

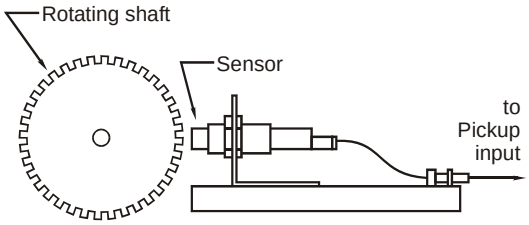


Figure 6-29: Speed input - MPU

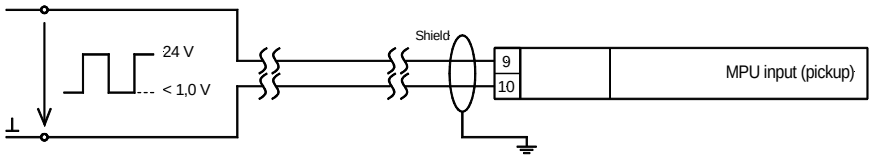


Figure 6-30: Pickup input

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓

Terminal	Description		A_{max}
9	Pickup input	inductive/switching	2.5 mm²
10		GND	2.5 mm²

Table 6-19: Pickup - terminal assignment

NOTE

The shield of the MPU connection cable must be connected on one side to a ground terminal of the cabinet near the easYgen. The shield must not be connected at the MPU side of the cable.

NOTE

The number of teeth on the reference gear and the reference gear speed must be configured so that the magnetic pickup input frequency does not exceed 14kHz.

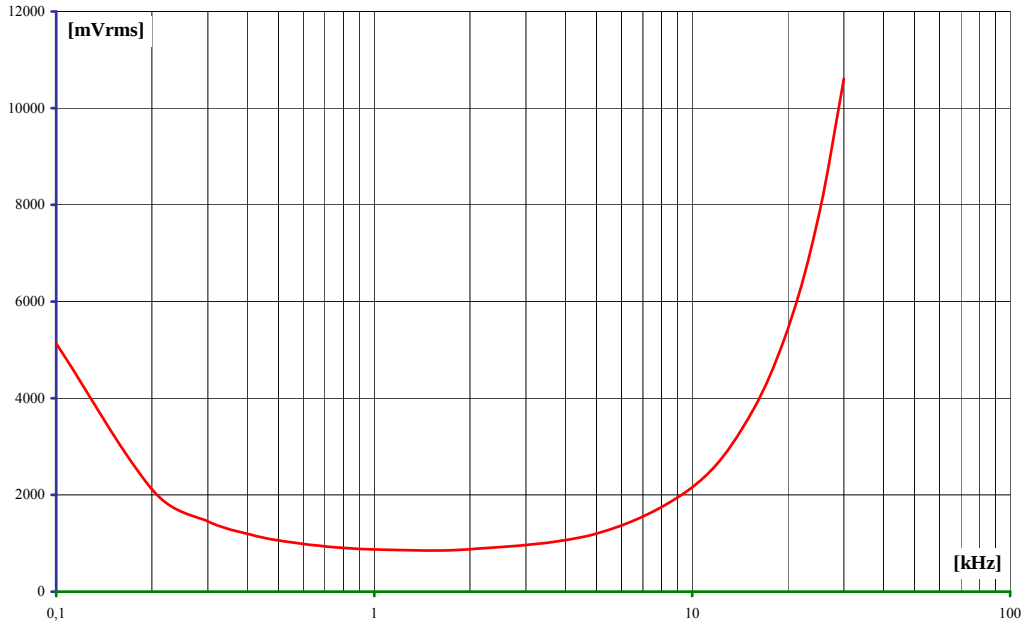


Figure 6-31: Minimal necessary input voltage depending on frequency

Discrete Inputs

Discrete Inputs: Bipolar Signals

The discrete inputs are electrically isolated allowing for a bipolar connection. The discrete inputs are able to handle positive or negative signals.

NOTE

All discrete inputs must use the same polarity, either positive or negative signals, due to the common ground.

Discrete Inputs: Positive / Negative Signal

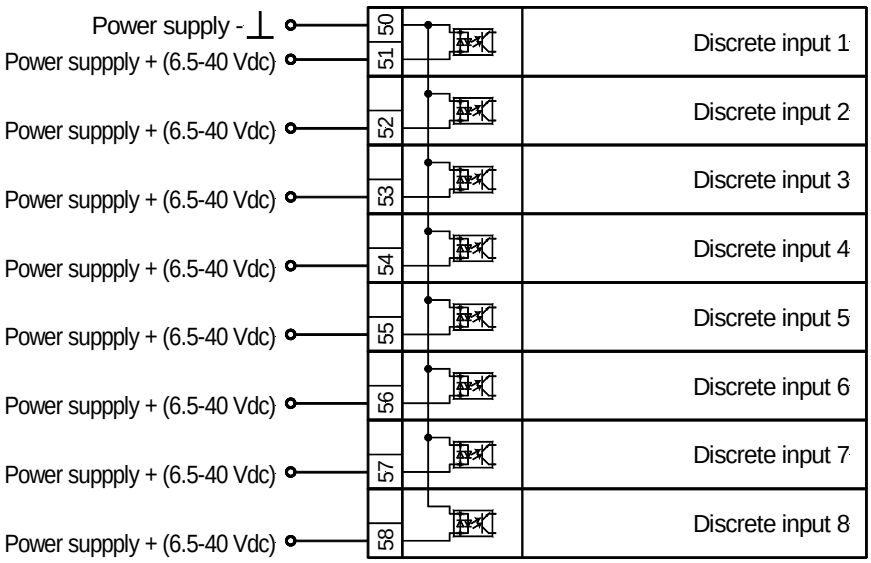


Figure 6-32: Discrete inputs - alarm/control input - positive signal

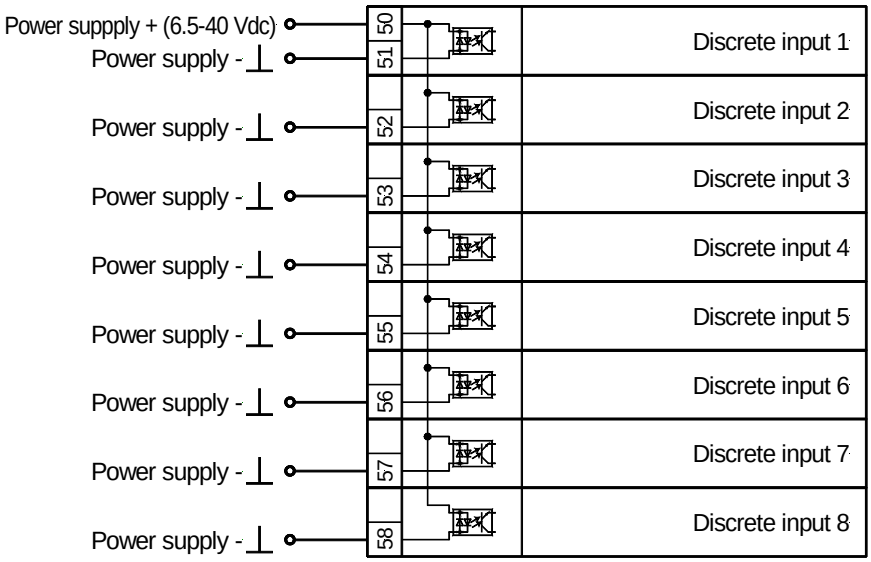


Figure 6-33: Discrete inputs - alarm/control input - negative signal

Connect in application mode ... {0}	{1o}	{1oc}	{2oc}	Terminal Com.	Terminal Signal	Description			Type ⇩	A_{max}
✓	✓	✓	✓	50	51	Discrete input [D1]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -			
							[1CB] -			
							[2CB] -			
✓	✓	✓	✓		52	Discrete input [D2]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -			
							[1CB] -			
							[2CB] -			
✓	✓	✓	✓		53	Discrete input [D3]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -			
							[1CB] -			
							[2CB] -			
✓	✓	✓	✓		54	Discrete input [D4]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -			
							[1CB] -			
							[2CB] -			
✓	✓	✓	✓		55	Discrete input [D5]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -			
							[1CB] -			
							[2CB] -			
✓	✓	✓	✓		56	Discrete input [D6]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -	Alarm input (programmable)	SW	
							[1CB] -	Alarm input (programmable)	SW	
							[2CB] -	Enable MCB	#1	
✓	✓	✓	✓		57	Discrete input [D7]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -	Alarm input (programmable)	SW	
							[1CB] -	Alarm input (programmable)	SW	
							[2CB] -	Reply: MCB is open	#2	
✓	✓	✓	✓		58	Discrete input [D8]	[BM] -	Alarm input (programmable)	SW	2.5 mm²
							[0CB] -	Alarm input (programmable)	SW	
							[1CB] -	Reply: GCB is open	#2	
							[2CB] -	Reply: GCB is open	#2	

SW-switchable via the software, [#1]-type 1 (N.O./make contact), [#2] -type 2 (N.C./break contact)

Table 6-20: Discrete input - terminal assignment - alarm/control inputs

Discrete Inputs: Operation Logic

Discrete inputs may be configured to normally open (N.O.) or normally closed (N.C.) state. In the state N.O., no potential is present during normal operation; if an alarm is issued or control operation is performed, the input is energized. In the state N.C., a potential is continuously present during normal operation; if an alarm is issued or control operation is performed, the input is de-energized.

The N.O. or N.C. contacts may be connected to the signal terminal as well as to the ground terminal of the discrete input. See previous chapter Discrete Inputs: Bipolar Signals on page 41 for details.

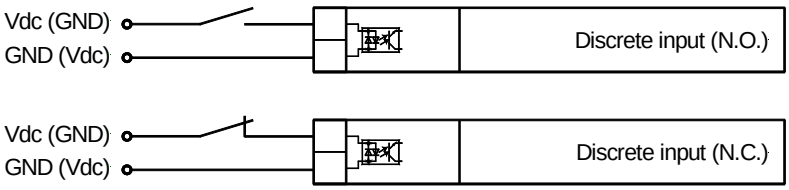


Figure 6-34: Discrete inputs - alarm/control inputs - operation logic

Relay Outputs
(Control Outputs And *LogicsManager*)

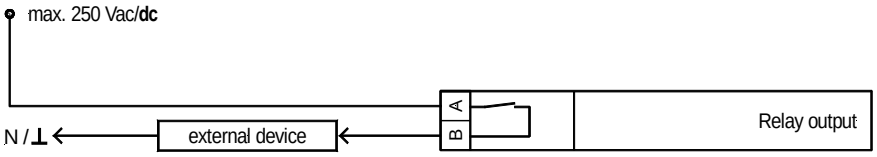


Figure 6-35: Relay outputs

NOTE

Refer to Appendix A: Connecting 24 V Relays on page 55 for interference suppressing circuits when connecting 24 V relays.

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

Terminal Term.	Terminal Com.	Description				A_{max}
A	**B**	**Form A, common contact**			Type ⇩	
30	35	Relay output [R1]	[BM] -	*LogicsManager*	SW	2.5 mm²
			[0CB] -		SW	
			[1CB] -		SW	
			[2CB] -		SW	
31		Relay output [R2]	[BM] -	*LogicsManager*	SW	2.5 mm²
			[0CB] -		SW	
			[1CB] -		SW	
			[2CB] -		SW	
32		Relay output [R3]	[BM] -	Crank	SW	2.5 mm²
			[0CB] -		SW	
			[1CB] -		SW	
			[2CB] -		SW	
33		Relay output [R4]	[BM] -	Diesel: Fuel relay Gas: Gas valve	SW	2.5 mm²
			[0CB] -		SW	
			[1CB] -		SW	
			[2CB] -		SW	
34		Relay output [R5]	[BM] -	*LogicsManager*	SW	2.5 mm²
			[0CB] -		SW	
			[1CB] -		SW	
			[2CB] -		SW	

LogicsManager..using the function ***LogicsManager*** it is possible to freely program the relays
SW-switchable via the software, [#1]-type 1 (N.O./make contact)

Table 6-21: Relay outputs - terminal assignment, part 1

Connect in application mode ...				Terminal		Description			A_{max}
{0}	{1o}	{1oc}	{2oc}	Term.	Com.				
				A	**B**	**Form A, separated contacts**		Type ⇩	
✓	✓	✓	✓	36	37	Relay output [R6]	[BM] -	SW	2.5 mm²
							[0CB] - *LogicsManager*	SW	
							[1CB] -	SW	
							[2CB] -	SW	
✓	✓	✓	✓	38	39	Relay output [R7]	[BM] - *LogicsManager*	SW	2.5 mm²
							[0CB] - Command: open GCB	#1	
							[1CB] - Command: open GCB	#1	
							[2CB] - Command: open GCB	#1	
✓	✓	✓	✓	40	41	Relay output [R8]	[BM] - *LogicsManager*	SW	2.5 mm²
							[0CB] - *LogicsManager*	SW	
							[1CB] - *LogicsManager*	SW	
							[2CB] - Command: close MCB	#1	
✓	✓	✓	✓	42	43	Relay output [R9]	[BM] - *LogicsManager*	SW	2.5 mm²
							[0CB] - *LogicsManager*	SW	
							[1CB] - *LogicsManager*	SW	
							[2CB] - Command: open MCB	#1	
✓	✓	✓	✓	44	45	Relay output [R10]	[BM] - *LogicsManager*	SW	2.5 mm²
							[0CB] - *LogicsManager*	SW	
							[1CB] - Command: close GCB	#1	
							[2CB] - Command: close GCB	#1	
✓	✓	✓	✓	46	47	Relay output [R11]	[BM] - Ready for operation		2.5 mm²
							[0CB] - *LogicsManager*	#1	
							[1CB] - (closed in normal operation		
							[2CB] - state)		

LogicsManager..using the function ***LogicsManager*** it is possible to freely program the relays
SW-switchable via the software, [#1]-type 1 (N.O./make contact)

Table 6-22: Relay outputs - terminal assignment, part 1

Analog Inputs (*FlexIn*)

It is recommended to use two-pole sensors. This ensures an accuracy of ≤ 1%.

Wiring Two-Pole Sensors

NOTE

To ensure accurate measurements of the system, all VDO sending units must utilize insulated wires that are connected to the easYgen-1500 common ground (terminal 12). The return wires should be connected together as close to the easYgen terminals as possible. Terminal 12 must be connected with the battery ground connection (terminal 48).

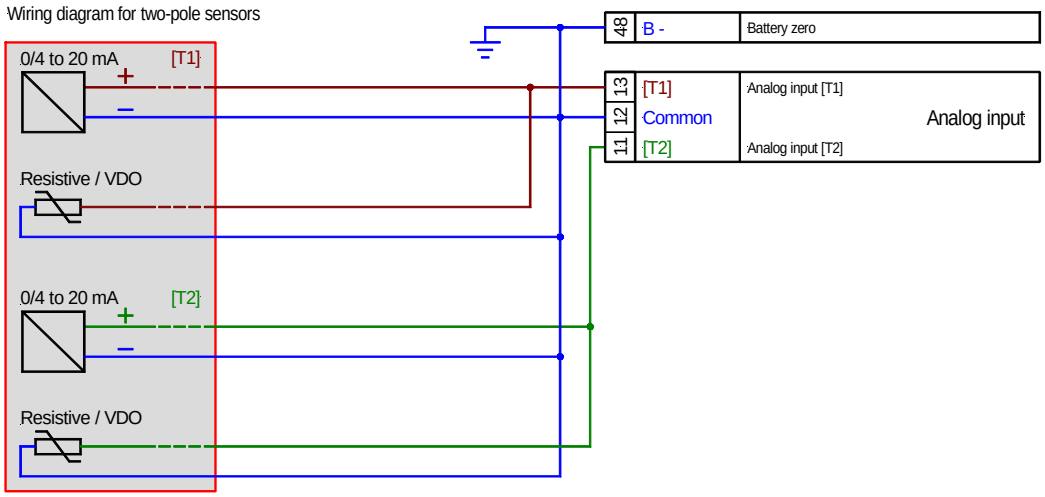


Figure 6-36: Analog inputs - wiring two-pole sensors

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

Terminal	Description	A_{max}
13	Analog input [T1], the following sensors may be used: - 0/4 to 20 mA - resistive - VDO, 0 to 180 Ohm#VDO - VDO, 0 to 380 Ohm#VDO	2.5 mm²
12	Common, connected with battery zero	2.5 mm²
11	Analog input [T2], the following sensors may be used: - 0/4 to 20 mA - resistive - VDO, 0 to 180 Ohm#VDO - VDO, 0 to 380 Ohm#VDO	2.5 mm²

#VDO - please download a catalog of all available VDO sensors at the VDO homepage (http://www.vdo.com/siemens)

Table 6-23: Analog inputs - terminal assignment - wiring two-pole sensors

Wiring Single-Pole Sensors

An accuracy of ≤ 2.5% may be achieved when using single-pole sensors. It is possible to combine single- and two-pole sensors, but then it is only possible to achieve an accuracy of ≤ 2.5% even with two-pole sensors. The specified accuracy of ≤ 2.5% for single-pole sensors can only be achieved if the differential voltage between the genset chassis ground and battery ground does not exceed +/- 2V.

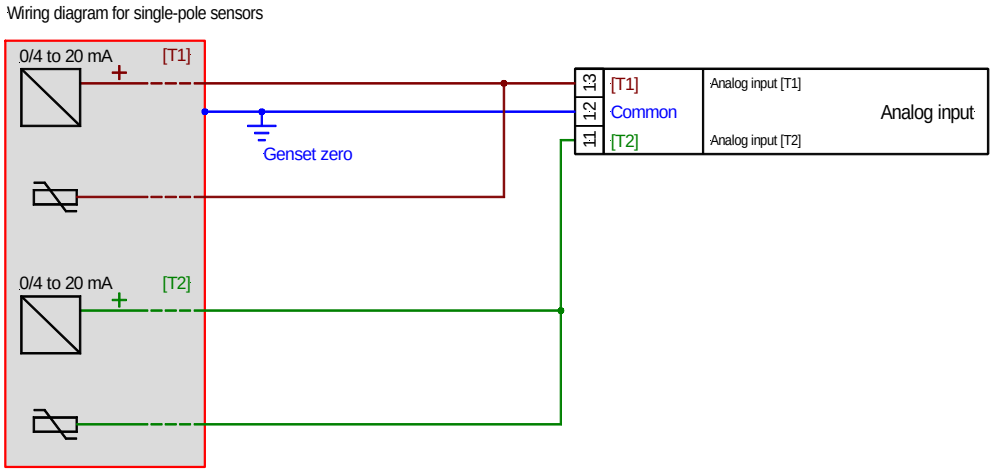


Figure 6-37: Analog inputs - wiring single-pole sensors

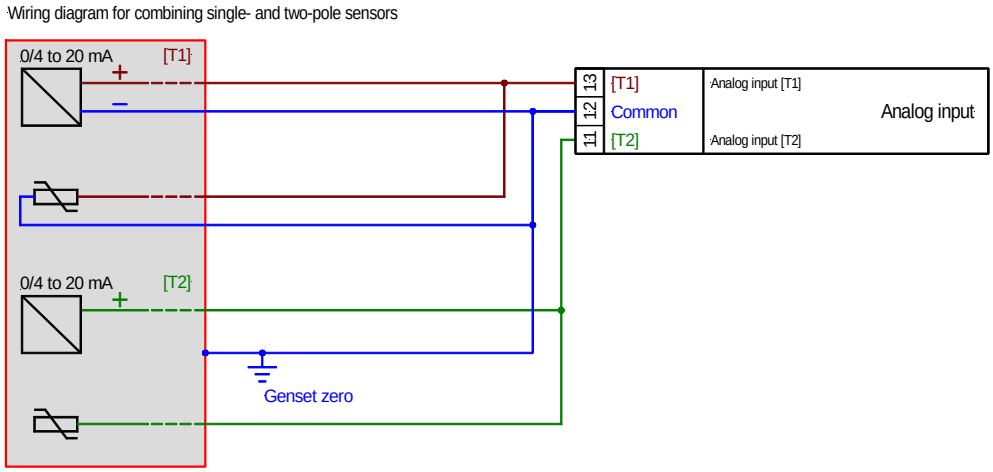


Figure 6-38: Analog inputs - wiring single- and two-pole sensors

Connect in application mode ...				Terminal	Description	A_{max}
{0}	{1o}	{1oc}	{2oc}			
✓	✓	✓	✓	13	Analog input [T1], the following sensors may be used: - 0/4 to 20 mA - resistive - VDO, 0 to 180 Ohm#VDO - VDO, 0 to 380 Ohm#VDO	2.5 mm²
✓	✓	✓	✓	12	Common, connected with genset zero	2.5 mm²
✓	✓	✓	✓	11	Analog input [T2], the following sensors may be used: - 0/4 to 20 mA - resistive - VDO, 0 to 180 Ohm#VDO - VDO, 0 to 380 Ohm#VDO	2.5 mm²

#VDO - please download a catalog of all available VDO sensors at the VDO homepage (http://www.vdo.com/siemens)

Table 6-24: Analog inputs - terminal assignment - wiring single-pole sensors

Interfaces

Overview

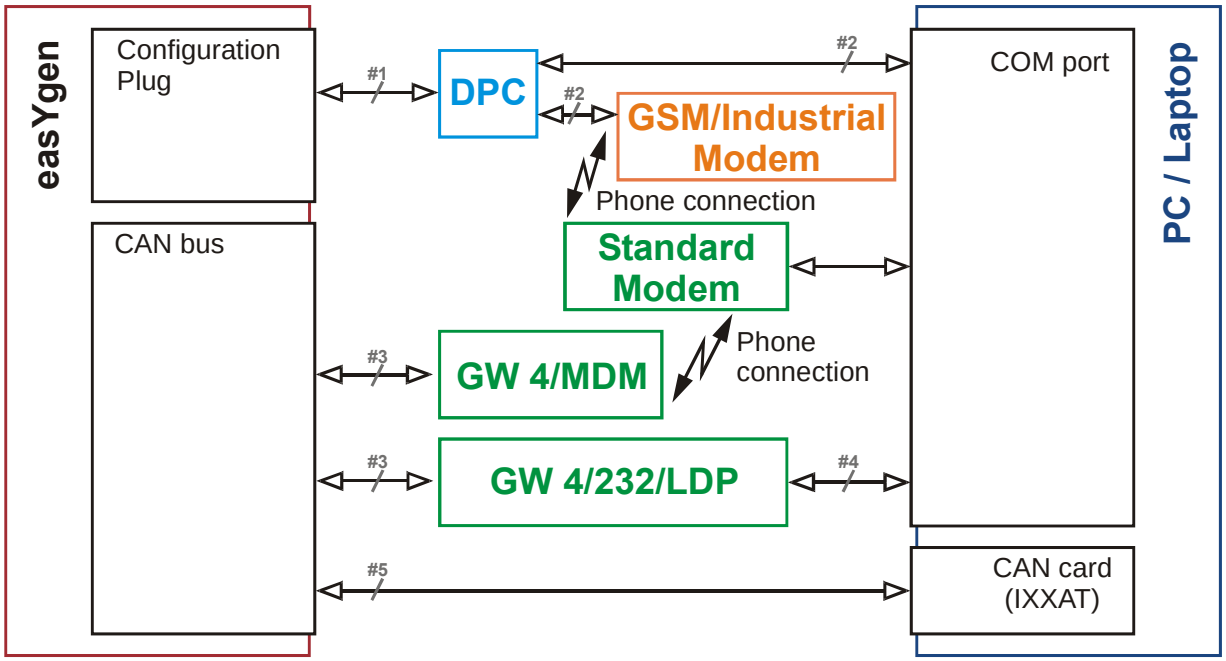


Figure 6-39: Interfaces - overview

Nr.	Connection between ... ... from ...	... to ...
#1	easYgen [DPC connector]	DPC
#2	DPC	PC [COM port]
	PIN 1	---------- PIN 4 (connect with PIN 8)
	PIN 2	---------- PIN 3
	PIN 3	---------- PIN 2
	PIN 4	---------- PIN 1
	PIN 5	---------- PIN 5
	N/A	---------- N/A
	PIN 7	---------- PIN 8 (connect with PIN 4)
	PIN 8	---------- PIN 7
	PIN 9	---------- PIN 9
		Connect PIN4/8
#3	easYgen [CAN terminals]	GW 4 [CAN terminals]
	Terminal 3 - CAN-L	---------- Terminals X5 - CAN-L
	Terminal 4 - CAN-H	---------- Terminals X4 - CAN-H
#4	GW 4 [RS-232 terminals]	PC [COM port, submin-D, 9pole, female]
	Terminal Y1 - RxD	---------- PIN 3 - TxD
	Terminal Y2 - RTS	---------- PIN 8 - CTS
	Terminal Y3 - GND	---------- PIN 5 - GND
	Terminal Y4 - CTS	---------- PIN 7 - RTS
	Terminal Y5 - TxD	---------- PIN 3 - RxD
#5	easYgen [CAN terminals]	PC [CAN port, submin-D, 9pole, female]
	Terminal 3 - CAN-L	---------- PIN 7 - CAN-H
	Terminal 4 - CAN-H	---------- PIN 2 - CAN-L
	CAN termination resistor between terminals 3/4	CAN termination resistor between terminals 2/7

Table 6-25: Interfaces - connection overview

CAN Bus (*FlexCAN*)

Wiring

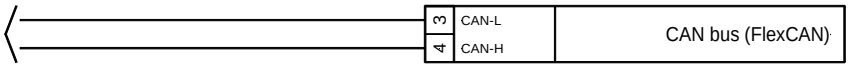


Figure 6-40: Interfaces - CAN bus

Connect in application mode ...			
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓
✓	✓	✓	✓

Terminal	Description		A_{max}
3	CAN bus (*FlexCAN*)	CAN-L	2.5 mm²
4		CAN-H	2.5 mm²

Shielding

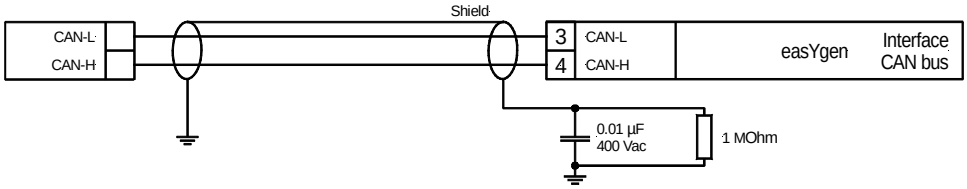


Figure 6-41: Interfaces - CAN bus - wiring of shielding

NOTE

Please note that the CAN bus must be terminated with a resistor, which corresponds to the impedance of the cable (e.g. 120 Ohms, 1/4 W) at both ends. The termination resistor is connected between CAN-H and CAN-L.

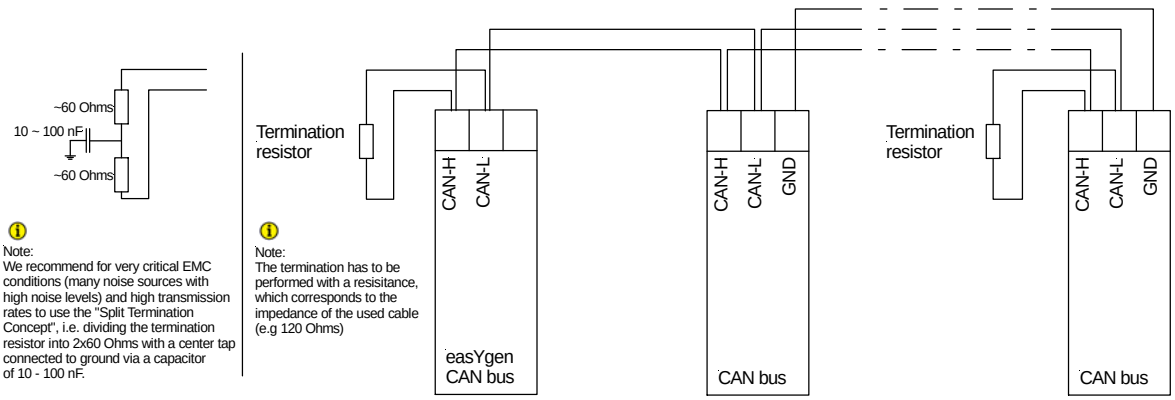


Figure 6-42: Interfaces - CAN bus - termination

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
- CAN-L and CAN-H are interchanged
- Not all devices on the bus are using identical Baud rates
- Terminating resistor are missing
- Baud rate to high for wiring length
- 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 6-26 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 6-26: 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 Cable

The easYgen provides a configuration interface for connecting a computer via the DPC (direct configuration cable). The configuration interface is the RJ45 socket on the side of the easYgen housing.

NOTE

Configuration with the direct configuration cable DPC (P/N 5417-557) is possible. A laptop/PC, the DPC cable, the program LeoPC1 version 3.1.1 or higher (included on CD Rom with control unit), and the proper configuration files are required.

NOTE

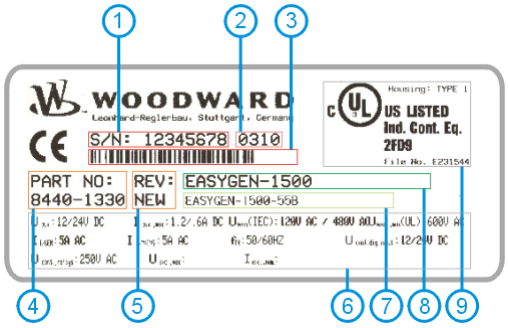
The connection cable delivered with the DPC must be used between DPC and easYgen to ensure proper functionality of the easYgen. An extension or utilization of different cable types for the connection between easYgen and DPC may result a malfunction of the easYgen. This may possibly result in damage to components of the system. If an extension of the data connection line is required, only the serial cable (RS-232) between DPC and laptop/PC may be extended. It is recommended to use an industry standard cable for this.

NOTE

For a continuous operation with the direct configuration cable DPC (e.g. remote control of the easYgen), it is required to use at least revision F (P/N 5417-557 Rev. F) of the DPC. When using a DPC of an earlier revision, problems may occur in continuous operation. It is recommended to use an industry standard serial (RS-232) cable to connect the DPC with the laptop/PC for continuous operation. The shield connector (6.3mm tab connector) at the DPC of revision F (P/N 5417-557 Rev. F) and above must be connected to ground.

Chapter 7.
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 (short)
8	Type	Description (long)
9	UL	UL sign

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

- Measuring voltages

100 V
Rated value (V_{rated}) .....69/120 Vac
Maximum value (V_{max}).....max. 86/150 Vac
Rated voltage phase – ground.....150 Vac
Rated surge voltage ..... 2.5 kV

400 V
Rated value (V_{rated}) .....277/480 Vac
Maximum value (V_{max}).....max. 346/600 Vac
Rated voltage phase – ground.....300 Vac
Rated surge voltage ..... 4.0 kV

- Linear measuring range.....1.25 × V_{rated}
- Measuring frequency .....50/60 Hz (40.0 to 70.0 Hz)
- Accuracy ..... Class 1
- Input resistance per path **100 V** ..... 0.498 MΩ
  400 V ..... 2.0 MΩ
- Maximum power consumption per path .....< 0.15 W

Measuring values, currents ----------isolated

- Measuring current **[1]** Rated value (I_{rated}) ..../1 A
  [5] Rated value (I_{rated}) ..../5 A

- Accuracy ..... Class 1
- Linear measuring range Generator (terminals 5-8) ..... 3.0 × I_{rated}
  Mains/ground current (terminals 1/2). approx. 1.5 × I_{rated}
- Maximum power consumption per path .....< 0.15 VA
- Rated short-time current (1 s) **[1]** ..... 50.0 × I_{rated}
  [5] ..... 10.0 × I_{rated}

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

- Power supply.....12/24 Vdc (6.5 to 40.0 Vdc)
  Battery ground (terminal 48) must be grounded to the chassis
- Intrinsic consumption..... max. 15 W
- Degree of pollution 2

Discrete inputs ---------- isolated
- Input range ($V_{Cont, digital input}$) ..... Rated voltage 12/24 Vdc (6.5 to 40.0 Vdc)
- Input resistance ..... approx. 6.7 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) ($V_{Cont, relay output}$)
  AC B300
  DC ..... 1.00 Adc@24 Vdc
  0.22 Adc@125 Vdc
  0.10 Adc@250 Vdc

Analog inputs ---------- freely scaleable
- Resolution ..... 10 Bit
- 0/4 to 20 mA input ..... internal load 50 Ω
- 0 to 180/380 Ω input ..... load current ≤ 2.3 mA
- Accuracy
  solely two-pole sensors ..... ≤ 1%
  single-pole sensors ..... ≤ 2.5%

Magnetic Pickup Input ---------- capacitively decoupled
- Input impedance ..... min. approx. 17 kΩ
- Input voltage ..... refer to Figure 6-31

Interface ----------

Service interface

- Version RS-232
- Signal level 5V
  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 ----------

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

Housing ----------

- Type ..... easYpack
- Dimensions (W × H × D) ..... 210 × 171 × 61 mm
- Front cutout (W × H) ..... 186 [+1.1] × 138 [+1.0] mm
- Wiring ..... screw-plug-terminals 2.5 mm²
- Recommended locked torque ..... 4 inch pounds / 0.5 Nm
  use 60/75 °C copper wire only
  use class 1 wire only or equivalent
- Weight ..... approx. 800 g

Protection ----------

- Protection system ..... IP54 from front with clamp fastening
  IP65 from front with screw fastening
  IP20 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 8.
Environmental Data

Dynamics

- Frequency Range – Sine Sweep ..... 5Hz to 100Hz
  - Acceleration 4G
- Frequency Range - Random ..... 10Hz to 500Hz
  - Power Intensity 0,015G²/Hz
  - RMS Value ..... 1,04 Grms
- Standards .....

EN 60255-21-1 (EN 60068-2-6, Fc)
EN 60255-21-3
Lloyd's Register, Vibration Test2
SAEJ1455 Chassis Data
MIL-STD 810F, M514.5A, Cat.4,
Truck/Trailer tracked-restrained
cargo, Fig. 514.5-C1

Shock

- Shock ..... 40G, saw tooth pulse, 11ms
- Standards .....

EN 60255-21-2
MIL-STD 810F, M516.5, Procedure 1

Temperature

- Cold, Dry Heat (storage) ..... -30°C (-22°F) / 80°C (176°F)
- Cold, Dry Heat (operating) ..... -20°C (-4°F) / 70 °C (158°F)
- Standards .....

IEC 60068-2-2, Test Bb and Bd
IEC 60068-2-1, Test Ab and Ad

Humidity

- Humidity ..... 60°C, 95% RH, 5 days
- Standards .....

IEC 60068-2-30, Test Db

Marine Environmental Categories

- Bureau Veritas (BV) 33
- Det Norske Veritas (DNV) .....

Temperature Class: ..... B
Vibration Class: ..... B
Humidity Class: ..... B

- Germanischer Lloyd (GL) ..... Environmental Class D
- Lloyd's Register of Shipping (LRS) ..... ENV1, ENV2, ENV3 und ENV4

Chapter 9.
Accuracy

Measuring value		Display	Accuracy	Notes
Frequency				
Generator	f_{L1N}, f_{L2N}, f_{L3N}	15.0 to 85.0 Hz	0.1 %	-
Mains	f_{L1N}, f_{L2N}, f_{L3N}	40.0 to 85.0 Hz	0.1 %	-
Voltage				
Generator	V_{L1N}, V_{L2N}, V_{L3N},	0 to 650 kV	1 %	Transformer ratio selectable
Mains	V_{L1N}, V_{L2N}, V_{L3N},	0 to 650 kV	1 %	Transformer ratio selectable
Current				
Generator	I_{L1}, I_{L2}, I_{L3}	0 to 32,000 A	1 %	-
Max. value	I_{L1}, I_{L2}, I_{L3}	0 to 32,000 A	1 %	Slave pointer
Mains/ground current	I_{L1}	0 to 32,000 A	1 %	-
Real power				
Current total real power value		-2 to 2 GW	2 %	Accuracy depends on the configured transformer ratios
Reactive power				
Current value in L1, L2, L3		-2 to 2 Gvar	2 %	Accuracy depends on the configured transformer ratios
Power factor				
Current value power factor L1		lag0.00 to 1.00 to lead0.00	2 %	-
Miscellaneous				
Real energy		0 to 4,200 GWh		not calibrated
Operating hours		999,999.99 h		-
Maintenance call hours		0 to 9,999 h		-
Maintenance call days		0 to 999 d		-
Start counter		0 to 65,535		-
Battery voltage		6.5 to 40 V	1 %	-
Pickup speed		fn +/- 40 %		-
Analog inputs				
0 to 180 Ohms		freely scaleable	*	for VDO sensors
0 to 360 Ohms		freely scaleable	*	for VDO sensors
0 to 500 Ohms		freely scaleable	*	for resistive sensor
0/4 to 20 mA		freely scaleable	*	-

* 1% for two-pole sensors; 2.5% for single-pole sensors and a combination of single- and two-pole 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

Appendix A.
Useful Information

Connecting 24 V Relays

Interferences in the interaction of all components may affect the function of electronic devices.
One interference factor is disabling inductive loads, like coils of electromagnetic switching devices. When disabling such a device, high switch-off induces voltages may occur, which might destroy adjacent electronic devices or result interference voltage pulses, which lead to functional faults, by capacitive coupling mechanisms.
Since an interference-free switch-off is not possible without additional equipment, the relay coil is connected with an interference suppressing circuit.
If 24 V (coupling) relays are used in an application, it is required to connect a protection circuit to avoid interferences. Figure 9-1 shows the exemplary connection of a diode as an interference suppressing circuit.

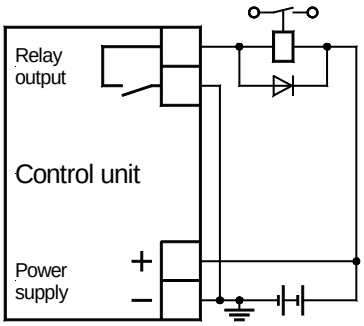


Figure 9-1: Interference suppressing circuit - connection

Advantages and disadvantages of different interference suppressing circuits are described in the following.

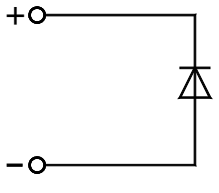
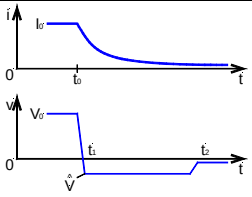
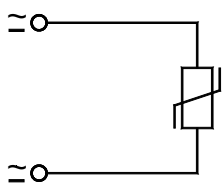
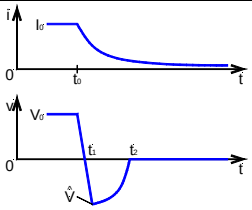
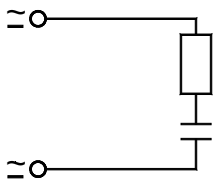
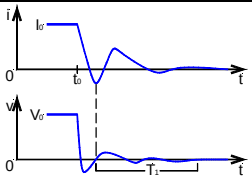
Connection diagram	Load current / voltage curve	Advantages	Disadvantages
		• Uncritical dimensioning • Lowest possible induced voltage • Very simple and reliable	• High release delay
		• Uncritical dimensioning • High energy absorption • Very simple setup • Suitable for AC voltage • Reverse polarity protected	• No attenuation below V_{VDR}
		• HF attenuation by energy storage • Immediate shut-off limiting • Attenuation below limiting voltage • Very suitable for AC voltage • Reverse polarity protected	• Exact dimensioning required

Table 9-1: Interference suppressing circuit for relays

Appendix B.
Declaration Of Conformity

Declaration of Conformity

WOODWARD

Type: easYgen-1000 Series

Manufacturer

Woodward Governor Company
Leonhard-Reglerbau GmbH

Handwerkstrasse 29
70565 Stuttgart - Germany

Tel: +49 (711) 789 54-0
Fax: +49 (711) 789 54-100

E-mail: sales-stuttgart@woodward.com

Type

easYgen-1000 Series
Model: [easYgen-1100, easYgen-1200, easYgen-1400, easYgen-1500]

Product description

Microprocessor driven engine and generator control with integrated monitoring, protection, and control

The named product fulfills the following directives of the European Community:

73/23/EEC Low Voltage Switchgear Directive
'Council directive on the harmonization of the laws of member state relating to electrical equipment designed for use within certain voltage limits '

89/336/EEC Electromagnetic Compatibility Directive
"Council directive on the approximation of the laws of the member states relating to electromagnetic compatibility"

The conformity of the indicated product with the essential safety requirements of the standards is proven by the strict observation of the directives mentioned.

CE The company Woodward Governor Company Leonhard-Reglerbau GmbH, Handwerkstrasse 29, 70565 Stuttgart, Germany, has checked the product and provided it with the opposite indicated sign.

70565 Stuttgart, August 18, 2003

Gerd Zoellmer (Chief R+D Manager)

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Declaration of Conformity

WOODWARD

Type: easYgen-1000 Series

European Norm	German Norm	VDE Classification	Description
73/23/EEC - Low Voltage Switchgear Directive			
EN 50178	DIN EN 50178 Edition: 1998-04	VDE 0160	Electronic equipment for use in electrical power installations and their assembly into electrical power installations
89/336/EEC - Electromagnetic Compatibility Directive			
EN 50081-2	DIN EN 50081-2 Edition: 1994-09	VDE 0839 Part 81-2	Electromagnetic compatibility (EMC) Generic emission standard Part 2: Industrial environment
EN 61000-6-2	DIN EN 61000-6-2 Edition: 2002-08	VDE 0839 Part 6-2	Electromagnetic compatibility (EMC); Part 2: Environment Section 6: Assessment of the emission levels in the power supply of industrial plants as regards low-frequency conducted disturbances
EN 61000-4-2	DIN EN 61000-4-2 Edition: 2001-12	VDE 0847 Part 4-2	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 2: Electrostatic discharge immunity test
EN 61000-4-3	DIN EN 61000-4-3 Edition: 2001-12	VDE 0847 Part 3	Electromagnetic compatibility (EMC) Basic Immunity Standard Part 4-3: Radiated, radio-frequency electromagnetic field – immunity test.
EN 61000-4-4	DIN EN 61000-4-4 Edition: 2002-07	VDE 0847 Part 4-4	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 4: Electrical fast transient/burst immunity test
EN 61000-4-5	DIN EN 61000-4-5 Edition: 2001-12	VDE 0847 Part 4-5	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 5: Surge immunity test
EN 61000-4-6	DIN EN 61000-4-6 Edition: 2001-12	VDE 0843 Part 4-6	Electromagnetic compatibility Basic immunity standard Part 6: Immunity to conducted disturbances, induced by radio frequency fields
EN 55011	DIN EN 55011 Edition: 2000-05	VDE 0875 Part 11	Suppression of radio disturbances caused by electrical appliances and systems; Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment

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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Homepage

http://www.woodward.com/power

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