

37385A



## DTSC-200 ATS Controller



**Installation**  
Software Version 1.0xxx

**Manual 37385A**

**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	07-12-12	TP	Release
A	08-11-25	TE	Minor corrections

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# Chapter 1. General Information



Type	English	German
<b>DTSC-200 Series</b>		
DTSC-200 - Installation	<a href="#">this manual</a> ⇔	37385
DTSC-200 - Configuration		37386
DTSC-200 - Operation		37387
DTSC-200 - Application		37388
DTSC-200 - Interfaces		37389
<b>Additional Manuals</b>		
LeoPC1 - User Manual <small>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.</small>	37146	GR37146
LeoPC1 - Engineering Manual <small>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.</small>	37164	GR37164

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 37386.

## 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*.

# Chapter 3. Housing

## Panel Cutout

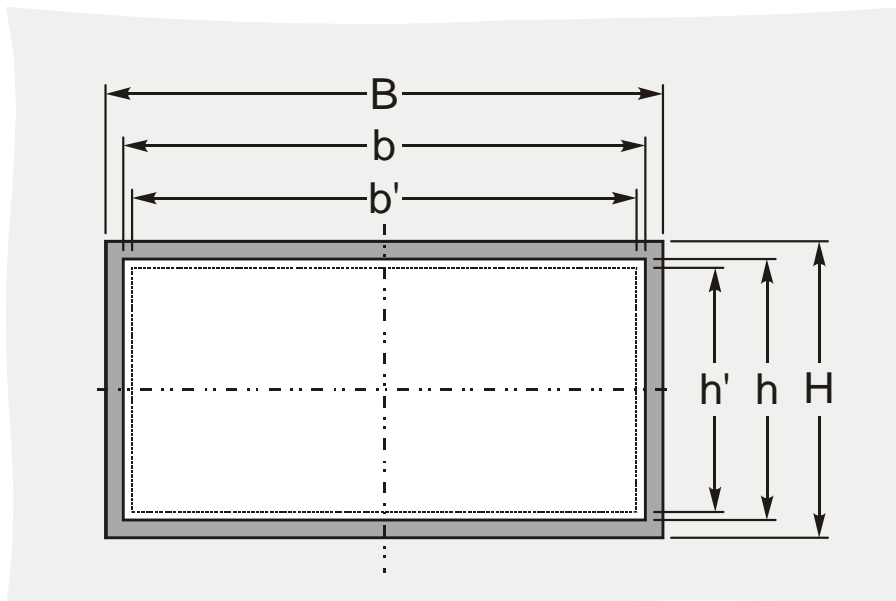


Figure 3-1: Housing - panel-board cutout

Measure	Description		Tolerance
H	Height	Total	171 mm (6.73 in) ---
		Panel cutout	138 mm (5.43 in) + 1.0 mm (0.04 in)
		Housing dimension	136 mm (5.35 in)
B	Width	Total	219 mm (8.62 in) ---
		Panel cutout	186 mm (7.32 in) + 1.1 mm (0.04 in)
		Housing dimension	185 mm (7.28 in)
	Depth	Total	61 mm (2.40 in) ---

Table 3-1: Housing - panel cutout

The maximum permissible corner radius is 3.5 mm (0.14 in).  
Refer to Figure 3-3 on page 11 for a cutout drawing.



# Dimensions

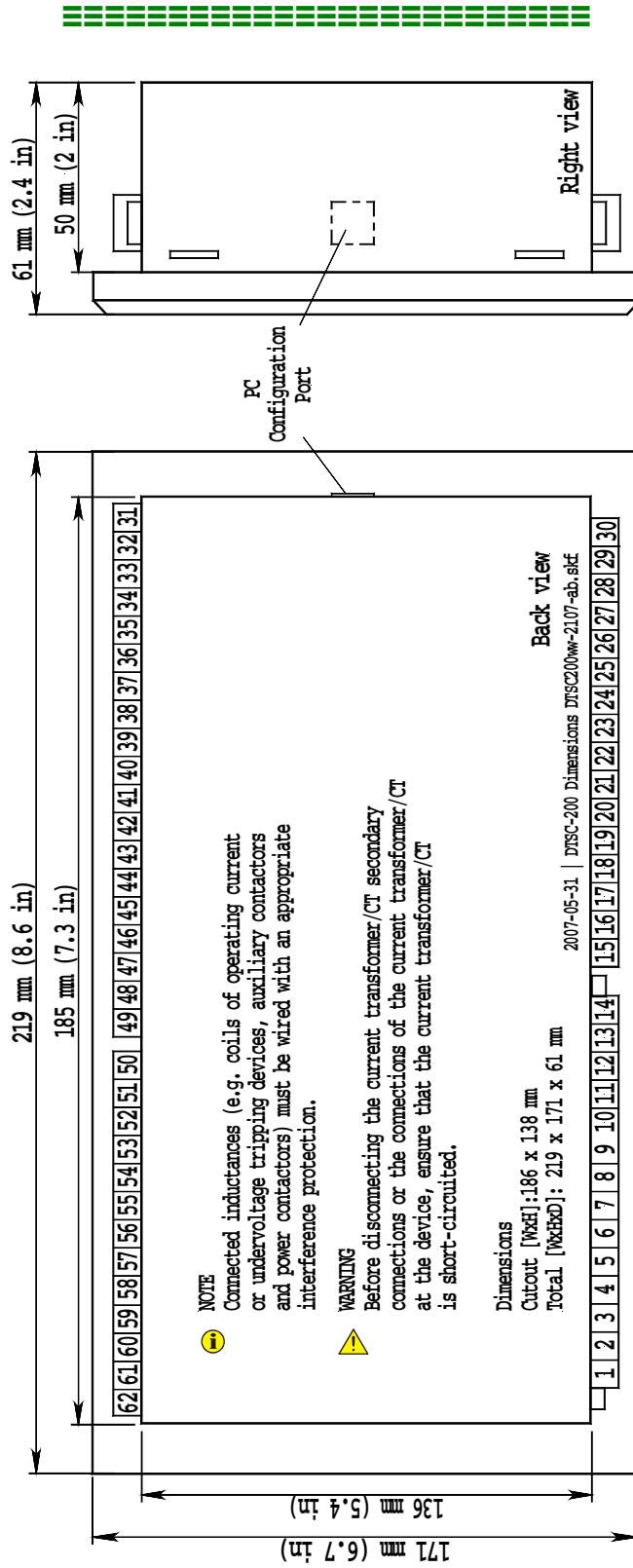


Figure 3-2: Housing - dimensions

# Installation

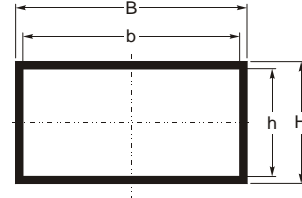


For installation into a panel door with the fastening clamps, please proceed as follows:

1. **Panel cutout**

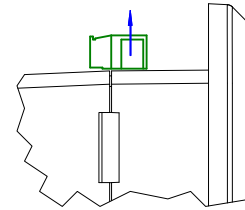
Cut out the panel according to the dimensions in Figure 3-3.

**Note:** It is not necessary to drill the holes if the fastening clamps are used.



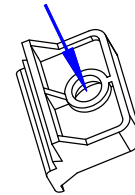
2. **Remove terminals**

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.

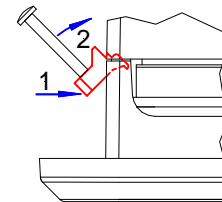


4. **Insert unit into cutout**

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.

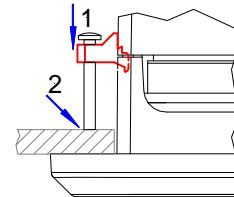
5. **Attach clamp inserts**

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.



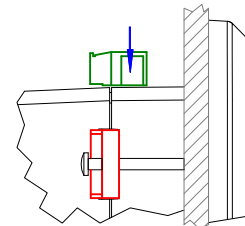
6. **Tighten clamping screws**

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 (0.9 pound-force inches).



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.

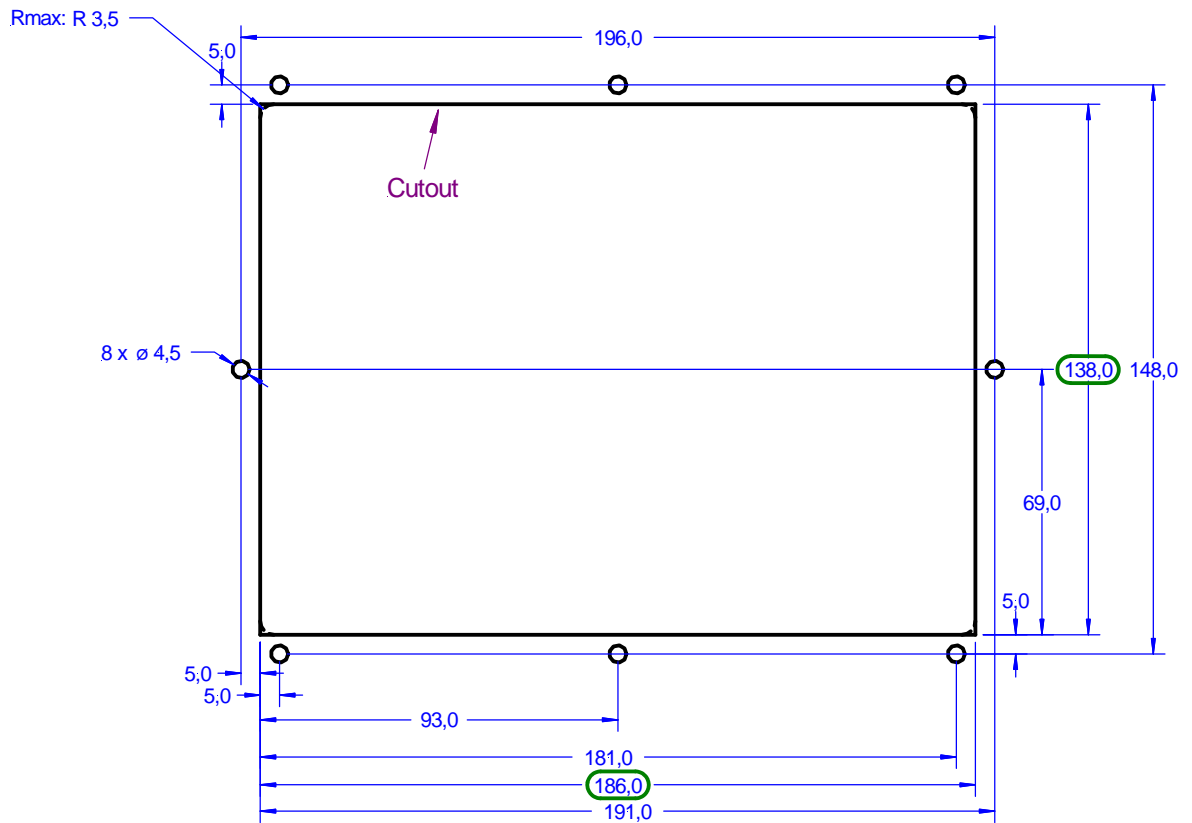
Proceed as follows to install the unit using the screw kit:

1. Cut out the panel and drill the holes according to the dimensions in Figure 3-3.
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-force 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 (0.1 in), be sure to use screws with a length of the panel sheet thickness + 4 mm (0.16 in).



Cutout dimension: 186.0  
 186 mm (+1.1 mm) x 138 mm (+1.0 mm) according to DIN 43700/IEC 61554  
 7.32 in (+0.045 in) x 5.43 in (+0.04 in)

2006-09-05 | DTSC-200 cutout+drillplan DTSC200ww-3606-ab.SKF

Unit will be mounted with 8 screws (P/N: LR02236) M4 x 6 mm, torque 0.6Nm.

Figure 3-3: Housing - drill plan



# Chapter 5. Connections



## WARNING

All technical data and ratings indicated in this chapter are not definite! Only the values indicated in Chapter 6: Technical Data on page 35 are valid!

The following chart may be used to convert square millimeters [mm<sup>2</sup>] to AWG and vice versa:

AWG	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG	mm <sup>2</sup>
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

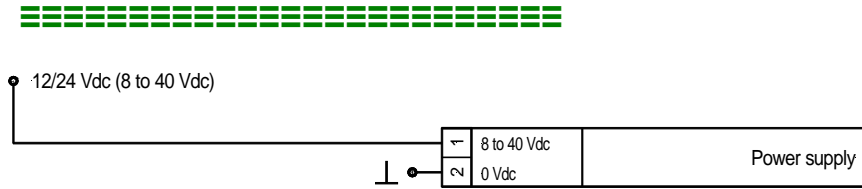


Figure 5-1: Power supply

Terminal	Description	A <sub>max</sub>
1	12/24Vdc (8 to 40 Vdc), 15 W	2.5 mm <sup>2</sup>
2	0 Vdc reference potential	2.5 mm <sup>2</sup>

Table 5-2: Power supply - terminal assignment

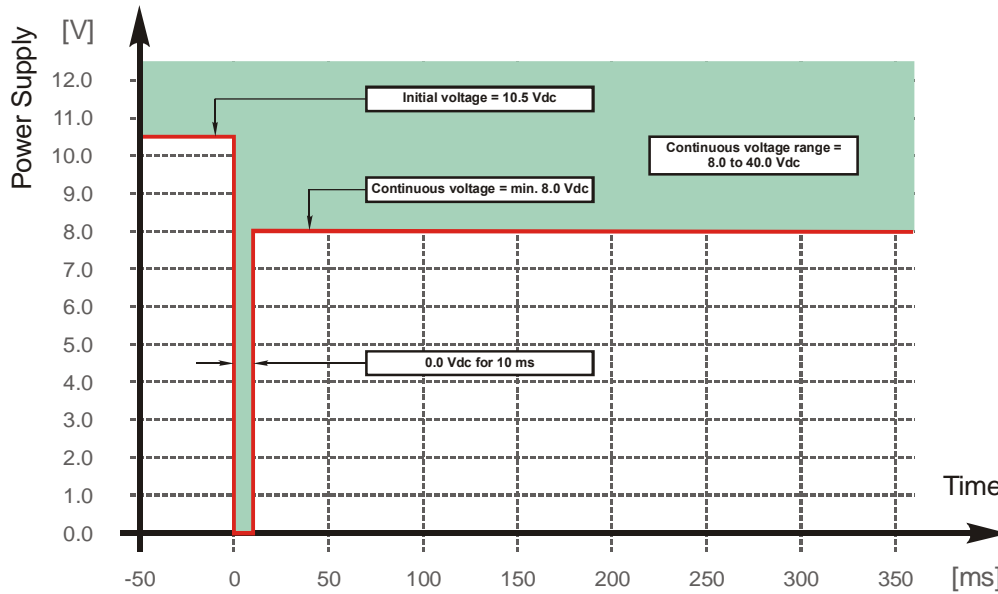


Figure 5-2: Power supply - crank waveform at maximum load



**NOTE**

Woodward recommends to fuse-protect all lines according to their rated load (rated current). Refer to Appendix A: Recommended Power Supply Units on page 40 for suitable power supply units.

### Earth Ground

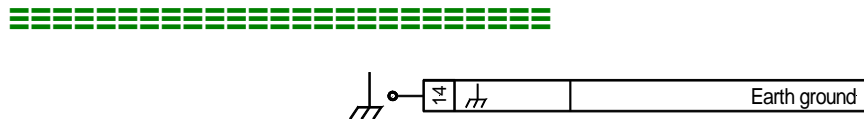


Figure 5-3: Earth ground

Terminal	Description	A <sub>max</sub>
14	Earth ground connection	2.5 mm <sup>2</sup>

Table 5-3: Earth ground - terminal assignment



**NOTE**

Woodward recommends to connect this terminal to ground to comply with the EMC directives.

## 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: Source 1

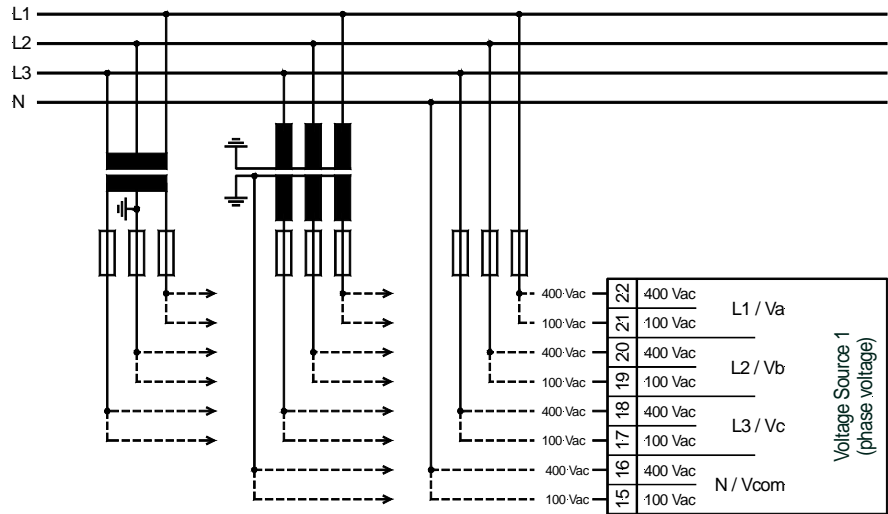


Figure 5-4: Voltage measuring - source 1

Terminal	Description		A <sub>max</sub>
15	Source 1 voltage - phase N	100 Vac	2.5 mm <sup>2</sup>
16		400 Vac	2.5 mm <sup>2</sup>
17	Source 1 voltage - phase L3	100 Vac	2.5 mm <sup>2</sup>
18		400 Vac	2.5 mm <sup>2</sup>
19	Source 1 voltage - phase L2	100 Vac	2.5 mm <sup>2</sup>
20		400 Vac	2.5 mm <sup>2</sup>
21	Source 1 voltage - phase L1	100 Vac	2.5 mm <sup>2</sup>
22		400 Vac	2.5 mm <sup>2</sup>

Table 5-4: Voltage measuring - terminal assignment - source 1



**NOTE**

The 100 V input terminals must be used, if parameter "S1 voltage transf. secondary" (refer to Configuration Manual 37386) is configured with a value between 50 and 130 V for proper measurement.

The 400 V input terminals must be used, if parameter "S1 voltage transf. secondary" (refer to Configuration Manual 37386) is configured with a value between 131 and 480 V for proper measurement.

Voltage Measuring: Source 1, parameter setting '3ph 4w' (3phase, 4wire)

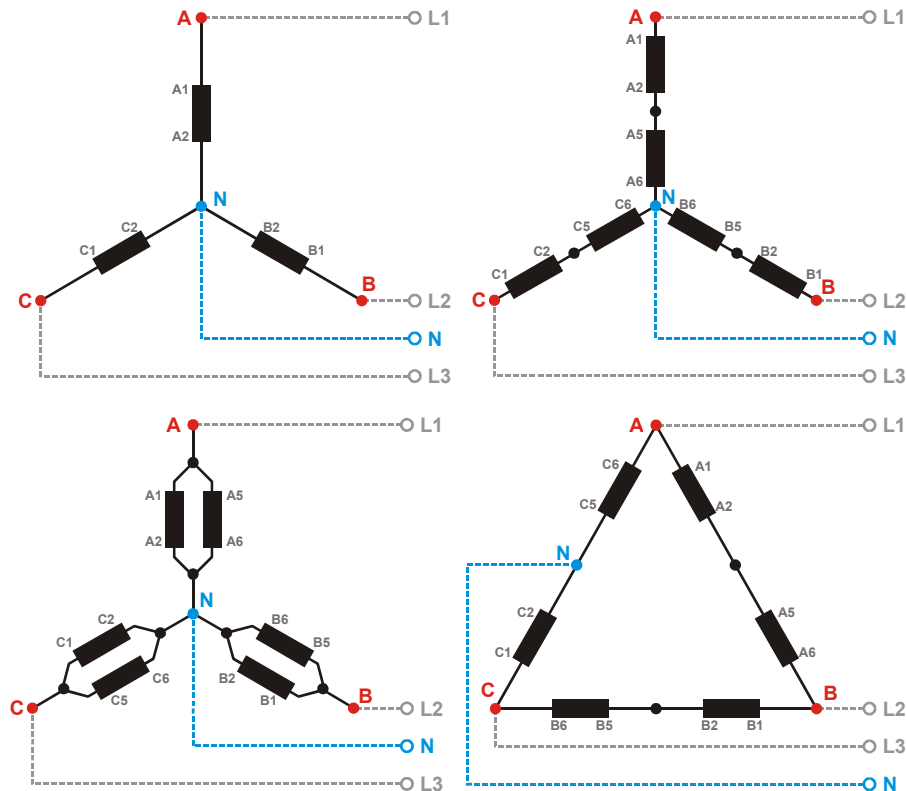


Figure 5-5: Voltage measuring -source 1 PT windings, 3ph 4w

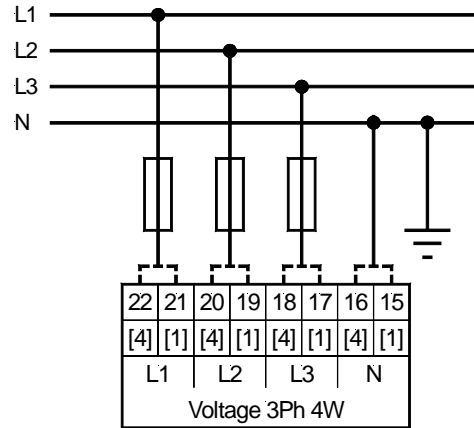


Figure 5-6: Voltage measuring -source 1 measuring inputs, 3ph 4w

3ph 4w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	21	19	17	15	22	20	18	16	
Phase	L1	L2	L3	N	L1	L2	L3	N	

Table 5-5: Voltage measuring - terminal assignment - source 1, 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: Source 1, parameter setting '3ph 3w' (3phase, 3wire)

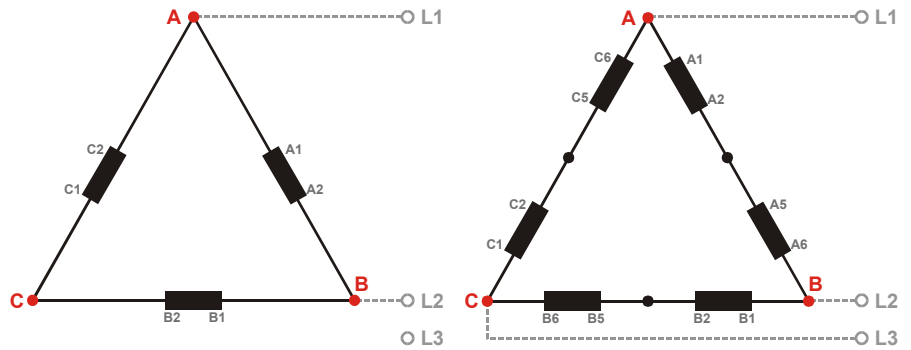


Figure 5-7: Voltage measuring - source 1 PT windings, 3ph 3w

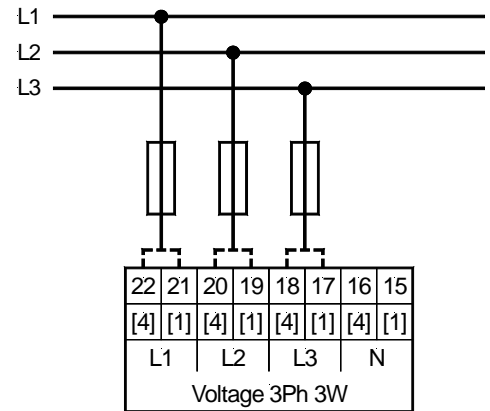


Figure 5-8: Voltage measuring -source 1 measuring inputs, 3ph 3w

3ph 3w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	21	19	17	15	22	20	18	16	
Phase	L1	L2	L3	---	L1	L2	L3	---	

Table 5-6: Voltage measuring - terminal assignment - source 1, 3ph 3w

2 For different voltage systems, different wiring terminals have to be used.

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

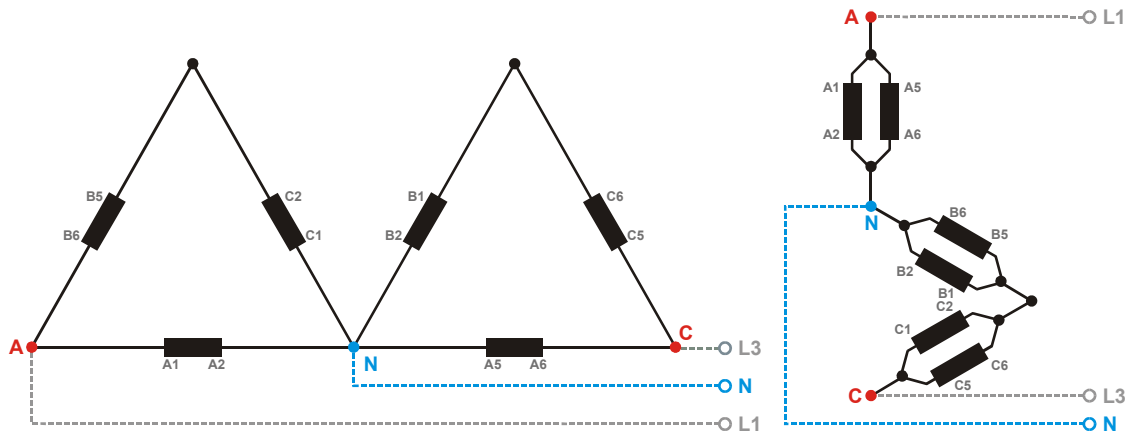


Figure 5-9: Voltage measuring - source 1 PT windings, 1ph 3w

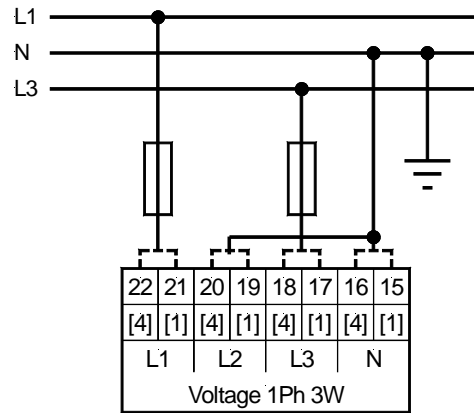


Figure 5-10: Voltage measuring -source 1 measuring inputs, 1ph 3w

1p 3w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	21	19	17	15	22	20	18	16	
Phase	L1	N	L3	N	L1	N	L3	N	

Table 5-7: Voltage measuring - terminal assignment - source 1, 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: Source 1, parameter setting '1ph 2w' (1phase, 2wire)

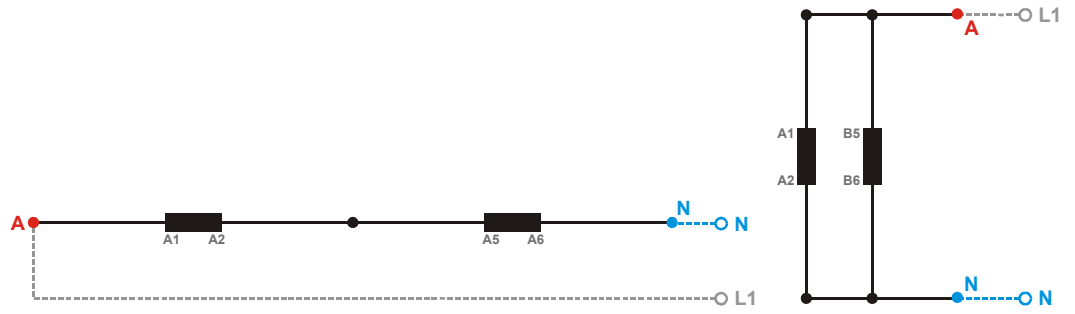


Figure 5-11: Voltage measuring - source 1 PT windings, 1ph 2w

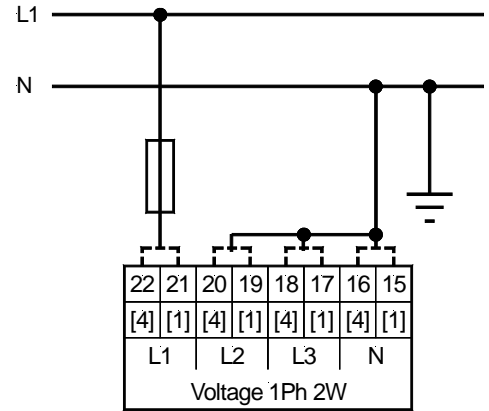


Figure 5-12: Voltage measuring -source 1 measuring inputs, 1ph 2w

1ph 2w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	21	19	17	15	22	20	18	16	
Phase	L1	N	N	N	L1	N	N	N	

Table 5-8: Voltage measuring - terminal assignment - source 1, 1ph 2w

## Voltage Measuring: Source 2

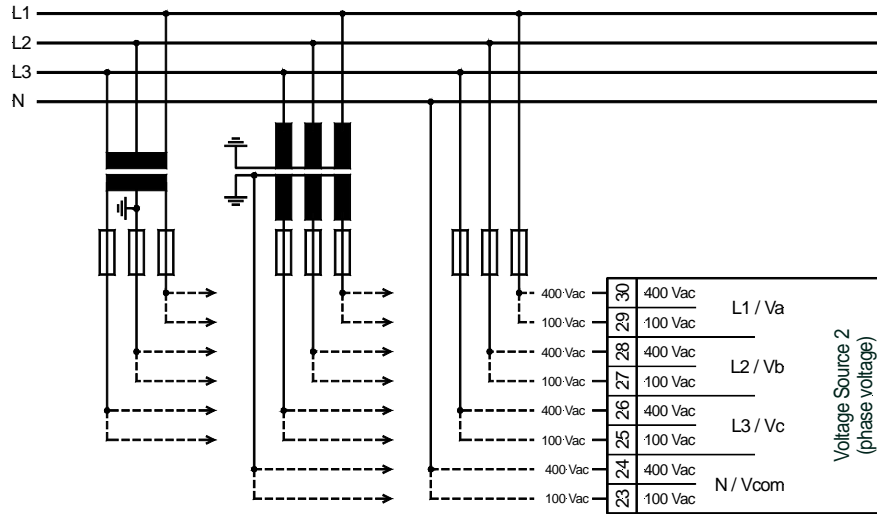


Figure 5-13: Voltage measuring - source 2

Terminal	Description		A <sub>max</sub>
23	Source 2 voltage - phase N	100 Vac	2.5 mm <sup>2</sup>
24		400 Vac	2.5 mm <sup>2</sup>
25	Source 2 voltage - phase L3	100 Vac	2.5 mm <sup>2</sup>
26		400 Vac	2.5 mm <sup>2</sup>
27	Source 2 voltage - phase L2	100 Vac	2.5 mm <sup>2</sup>
28		400 Vac	2.5 mm <sup>2</sup>
29	Source 2 voltage - phase L1	100 Vac	2.5 mm <sup>2</sup>
30		400 Vac	2.5 mm <sup>2</sup>

Table 5-9: Voltage measuring - terminal assignment - source 2 voltage



### NOTE

The 100 V input terminals must be used, if parameter "S2 voltage transf. secondary" (refer to Configuration Manual 37386) is configured with a value between 50 and 130 V for proper measurement.

The 400 V input terminals must be used, if parameter "S2 voltage transf. secondary" (refer to Configuration Manual 37386) is configured with a value between 131 and 480 V for proper measurement.

Voltage Measuring: Source 2, parameter setting '3ph 4w' (3phase, 4wire)

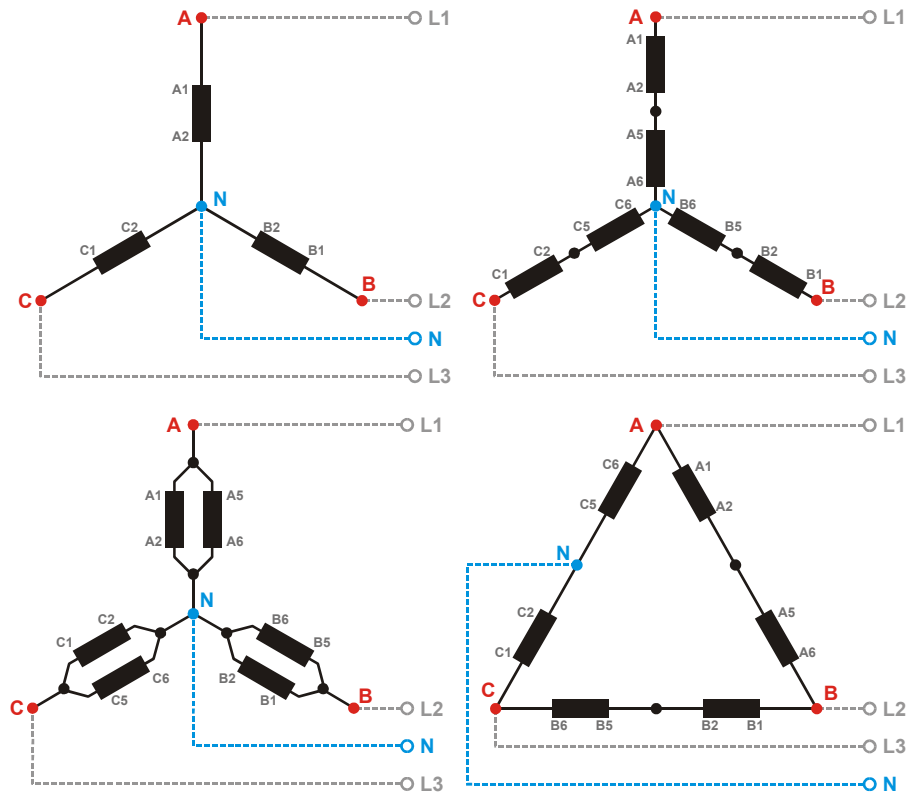


Figure 5-14: Voltage measuring - source 2 PT windings, 3ph 4w

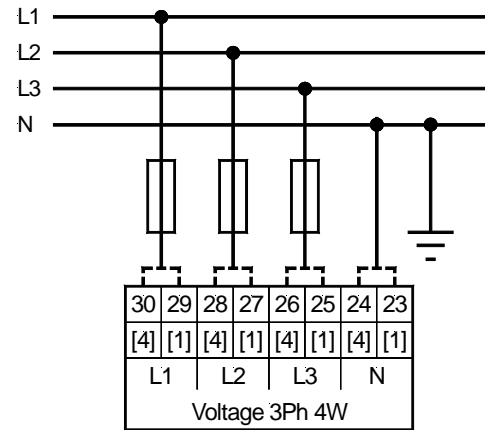


Figure 5-15: Voltage measuring -source 2 measuring inputs, 3ph 4w

3ph 4w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	29	27	25	23	30	28	26	24	
Phase	L1	L2	L3	N	L1	L2	L3	N	

Table 5-10: Voltage measuring - terminal assignment - source 2, 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: Source 2, parameter setting '3ph 3w' (3phase, 3wire)

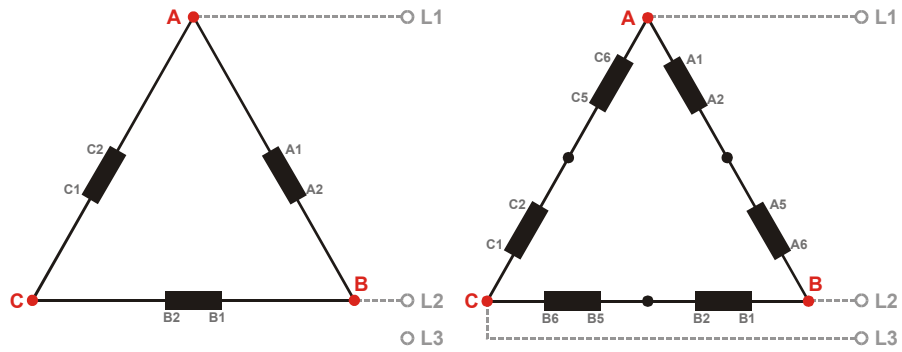


Figure 5-16: Voltage measuring - source 2 PT windings, 3ph 3w

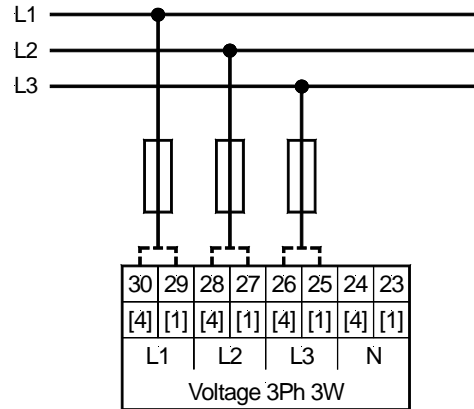


Figure 5-17: Voltage measuring -source 2 measuring inputs, 3ph 3w

3ph 3w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	29	27	25	23	30	28	26	24	
Phase	L1	L2	L3	---	L1	L2	L3	---	

Table 5-11: Voltage measuring - terminal assignment - source 2, 3ph 3w

5 For different voltage systems, different wiring terminals have to be used.

Voltage Measuring: Source 2, parameter setting '1ph 3w' (1phase, 3wire)

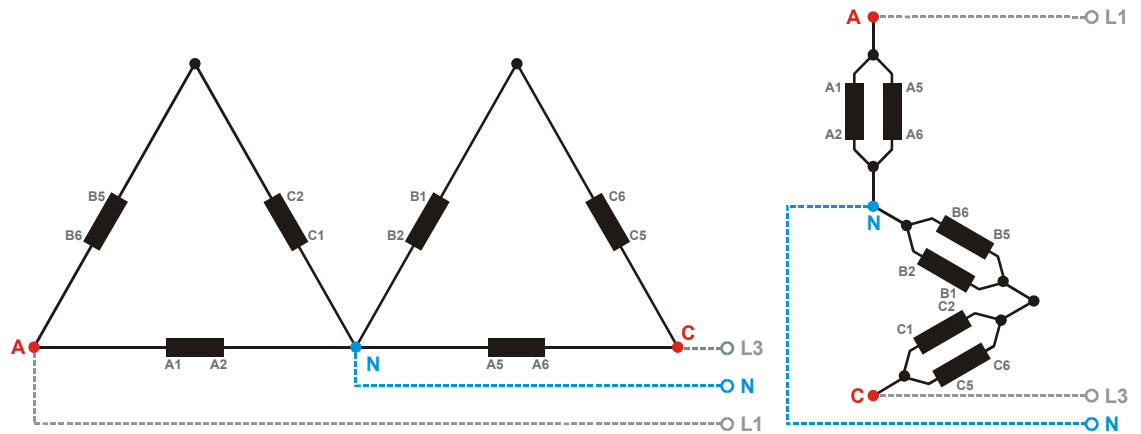


Figure 5-18: Voltage measuring - source 2 PT windings, 1ph 3w

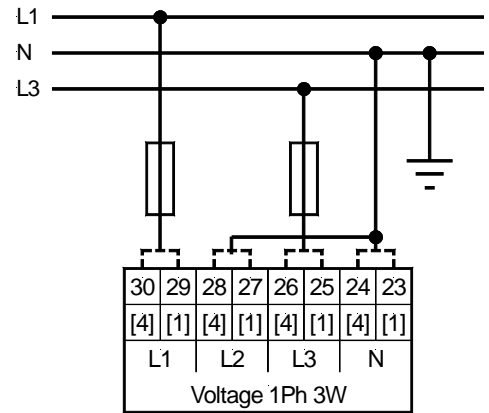


Figure 5-19: Voltage measuring -source 2 measuring inputs, 1ph 3w

1p 3w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	29	27	25	23	30	28	26	24	
Phase	L1	N	L3	N	L1	N	L3	N	

Table 5-12: Voltage measuring - terminal assignment - source 2, 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: Source 2, parameter setting '1ph 2w' (1phase, 2wire)

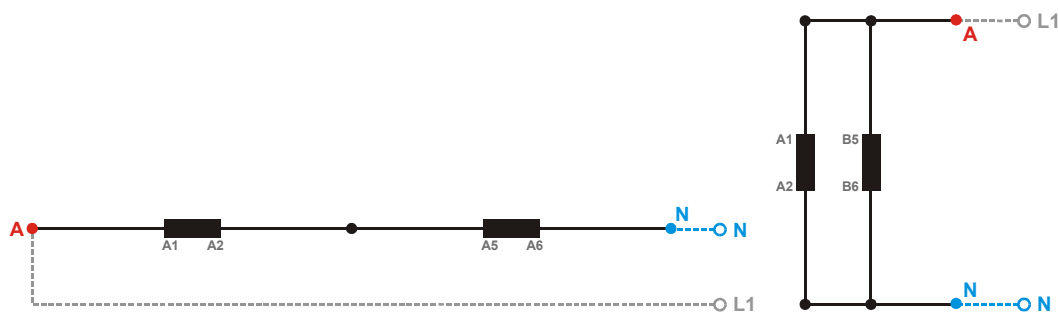


Figure 5-20: Voltage measuring - source 2 PT windings, 1ph 2w

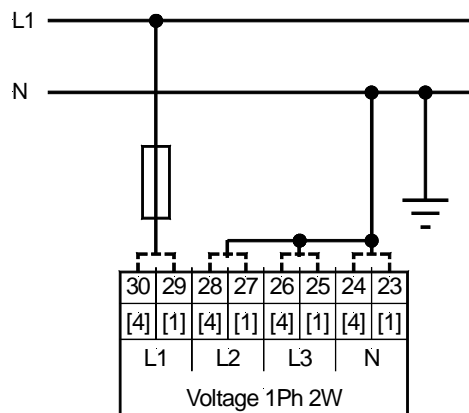


Figure 5-21: Voltage measuring -source 2 measuring inputs, 1ph 2w

1p 2w	Wiring terminals								Note
	Rated voltage (range)	[1] 100 V (50 to 130 V <sub>eff</sub> )				[4] 400 V (131 to 480 V <sub>eff</sub> )			
Measuring range (max.)	[1] 0 to 150 Vac				[4] 0 to 600 Vac				
DTSC-200 terminal	29	27	25	23	30	28	26	24	
Phase	L1	N	N	N	L1	N	N	N	

Table 5-13: Voltage measuring - terminal assignment - source 2, 1ph 2w



# Current Measuring



## CAUTION

Before disconnecting the current transformer/CT secondary connections or the connections of the current transformer/CT at the device, ensure that the current transformer/CT is short-circuited.

## Load



## 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.

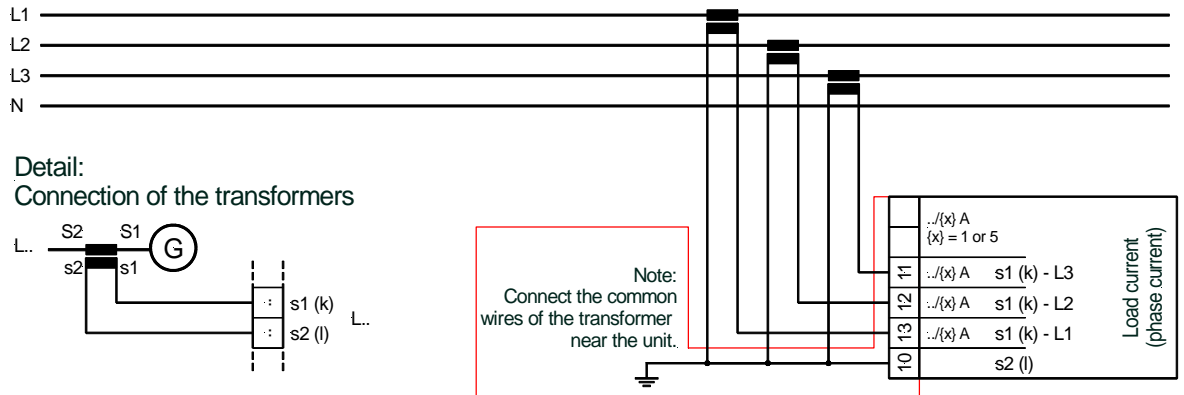


Figure 5-22: Current measuring - load

Terminal	Description	A <sub>max</sub>
10	Load current - phases L1/L2/L3 - transformer terminals x2 (l)	2.5 mm <sup>2</sup>
11	Load current - phase L3 - transformer terminal s1 (k)	2.5 mm <sup>2</sup>
12	Load current - phase L2 - transformer terminal s1 (k)	2.5 mm <sup>2</sup>
13	Load current - phase L1 - transformer terminal s1 (k)	2.5 mm <sup>2</sup>

Table 5-14: Current measuring - terminal assignment - load current

**Current Measuring: Load, parameter setting 'L1 L2 L3'**

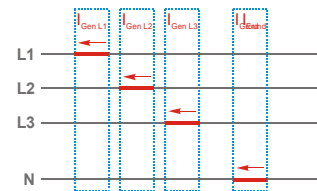


Figure 5-23: Current measuring - load, L1 L2 L3

<b>L1 L2 L3</b>	Wiring terminals				Notes
DTSC-200	13	12	11	10	
Phase	L1	L2	L3	GND	

Table 5-15: Current measuring - terminal assignment - load, L1 L2 L3

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

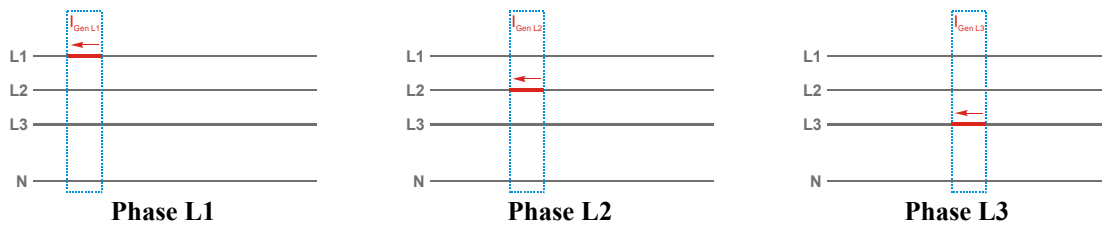


Figure 5-24: Current measuring - load, Phase Lx

	Wiring terminals				Notes
<b>Phase L1</b>					
DTSC-200	13	12	11	10	
Phase	L1	---	---	GND	
<b>Phase L2</b>					
DTSC-200	13	12	11	10	
Phase	---	L2	---	GND	
<b>Phase L3</b>					
DTSC-200	13	12	11	10	
Phase	---	---	L3	GND	

Table 5-16: Current measuring - terminal assignment - load, Phase Lx

# 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

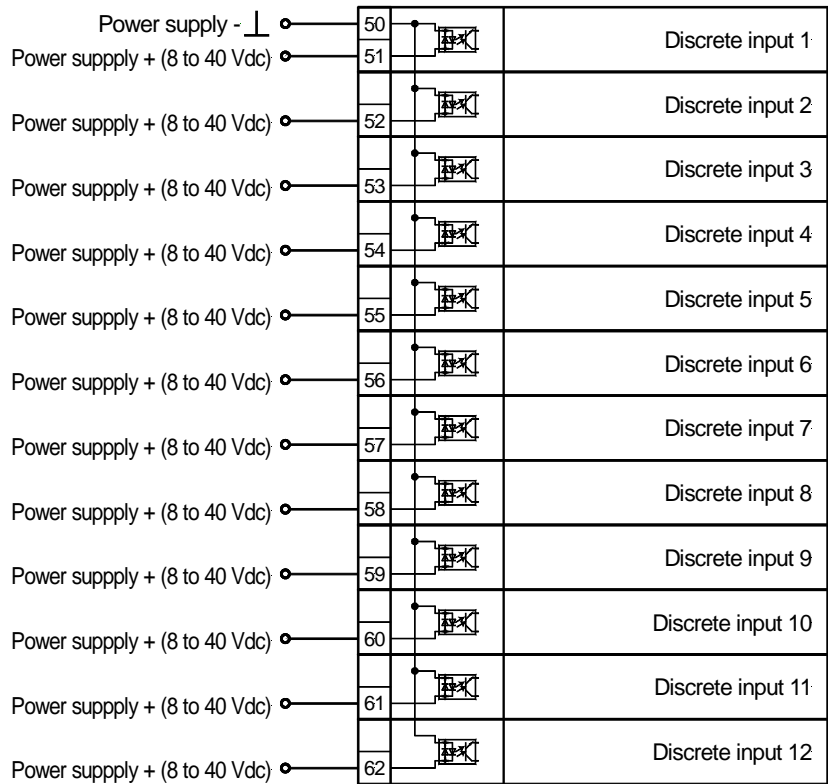


Figure 5-25: Discrete inputs - alarm/control input - positive signal

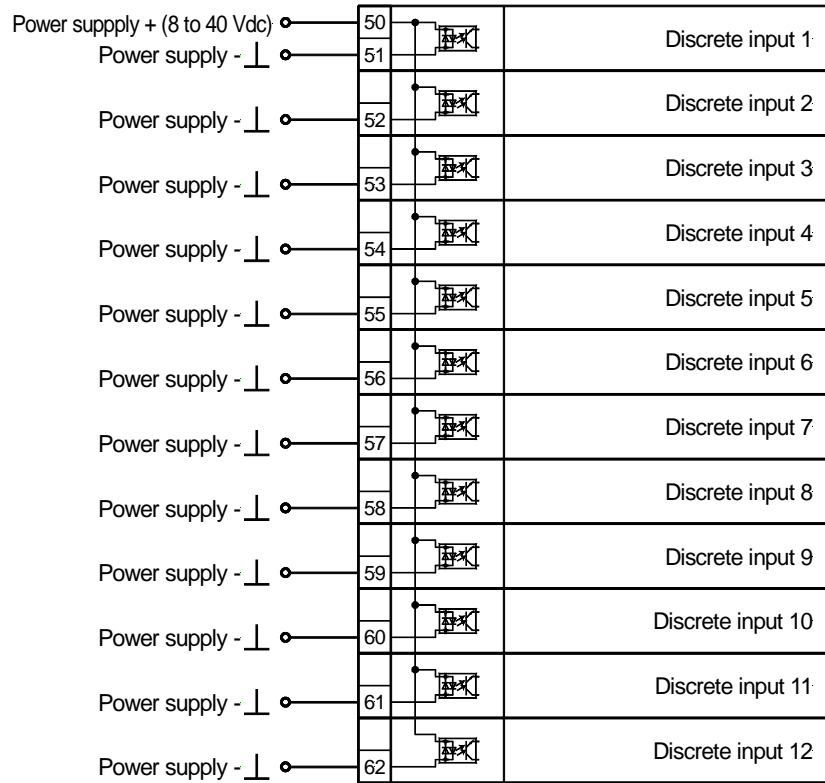


Figure 5-26: Discrete inputs - alarm/control input - negative signal

Terminal Com.	Signal	Description	Type ↕	A <sub>max</sub>
50	51	Discrete input [DI 1] [S1] Reply from ATS limit switch: Breaker in source 1 position	NC	2.5 mm <sup>2</sup>
	52	Discrete input [DI 2] [S2] Reply from ATS limit switch: Breaker in source 2 position	NC	2.5 mm <sup>2</sup>
	53	Discrete input [DI 3] [S10] Reply from ATS limit switch: Breaker in source 2 open position	NC	2.5 mm <sup>2</sup>
	54	Discrete input [DI 4] [S20] Reply from ATS limit switch: Breaker in source 1 open position	NC	2.5 mm <sup>2</sup>
	55	Discrete input [DI 5] Inhibit ATS	SW (NC)	2.5 mm <sup>2</sup>
	56	Discrete input [DI 6] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>
	57	Discrete input [DI 7] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>
	58	Discrete input [DI 8] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>
	59	Discrete input [DI 9] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>
	60	Discrete input [DI 10] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>
	61	Discrete input [DI 11] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>
	62	Discrete input [DI 12] Alarm input (programmable)	SW	2.5 mm <sup>2</sup>

SW-switchable via the software, [NO]-type 1 (N.O./make contact), [NC] -type 2 (N.C./break contact)

Table 5-17: Discrete input - terminal assignment - alarm/control inputs



**NOTE**

The discrete inputs for the breaker position reply messages (DIs 1 through 4) are fixed to N.C. and are evaluated as N.C., i.e. the breaker is considered as "in position" if the respective DI is de-energized.

## Discrete Inputs: Operation Logic

Discrete inputs may be configured to normally open (N.O.) or normally closed (N.C.) states. In the state N.O., no potential is present during normal operation; if a control operation is performed, the input is energized. In the state N.C., a potential is continuously present during normal operation; if a 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 27 for details.

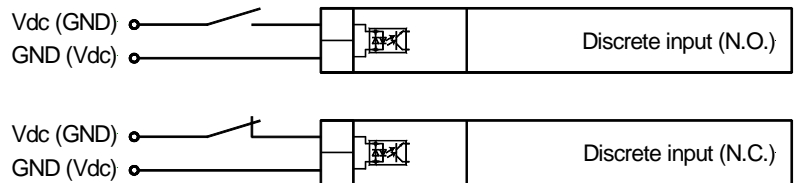


Figure 5-27: Discrete inputs - alarm/control inputs - operation logic

## Discrete Outputs (Control Outputs And *LogicsManager*)

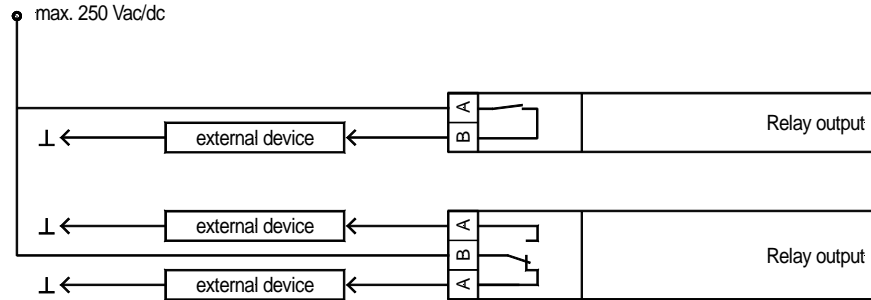


Figure 5-28: Discrete outputs

Terminal Term.	Com.	Description	$A_{max}$	
<b>A</b>	<b>B</b>	<b>Form A, common contact</b>	Type ↓	
32	31	Discrete output [R 1]	<i>LogicsManager</i>	SW 2.5 mm <sup>2</sup>
33		Discrete output [R 2]	<i>LogicsManager</i>	SW 2.5 mm <sup>2</sup>
34		Discrete output [R 3]	<i>LogicsManager</i>	SW 2.5 mm <sup>2</sup>
<b>A</b>	<b>B</b>	<b>Form C, separate contacts</b>	Type ↓	
35	36	Discrete output [R 4]	<i>LogicsManager</i>	NC 2.5 mm <sup>2</sup>
37		Discrete output [R 4]		NO 2.5 mm <sup>2</sup>
39	40	Discrete output [R 5]	Engine start	NO 2.5 mm <sup>2</sup>
41		Discrete output [R 5]		NC 2.5 mm <sup>2</sup>
<b>A</b>	<b>B</b>	<b>Form A, separate contacts</b>	Type ↓	
43	42	Discrete output [R 6]	[C1] Command: close to source 1 position	NO 2.5 mm <sup>2</sup>
45	44	Discrete output [R 7]	[C2] Command: close to source 2 position	NO 2.5 mm <sup>2</sup>
47	46	Discrete output [R 8]	[C10] Command: open from source 1 to neutral position	NO 2.5 mm <sup>2</sup>
49	48	Discrete output [R 9]	[C20] Command: open from source 2 to neutral position	NO 2.5 mm <sup>2</sup>

*LogicsManager*..using the function *LogicsManager* it is possible to freely program the relays SW-switchable via the software, [NO]-type 1 (N.O./make contact), [NC]-type 1 (N.C./break contact)

Table 5-18: Discrete outputs - terminal assignment

# Interfaces



## RS-485 Modbus RTU Slave

	5	6	7	8
Interface	RS-485-A	RS-485-B	RS-485-A'	RS-485-B'
	RS-485 Modbus RTU Slave (isolated, full duplex)			

Figure 5-29: Interface

Terminal				Description
5	6	7	8	
RS-485-A (TxD-)	RS-485-B (TxD+)	RS-485-A' (RxD-)	RS-485-B' (RxD+)	RS-485, Modbus RTU Slave

Table 5-19: RS-485 Modbus interface - terminal assignment

### Half-Duplex with Modbus on RS-485

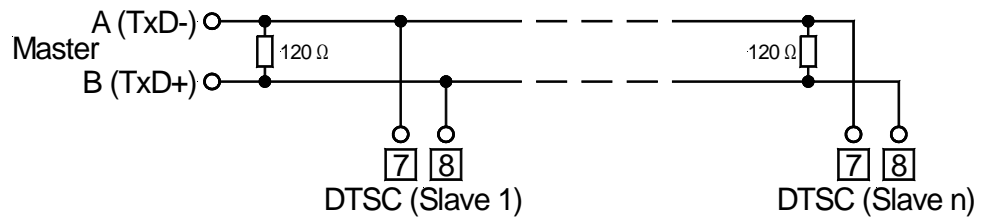


Figure 5-30: RS-485 Modbus - connection for half-duplex operation

### Full-Duplex with Modbus on RS-485

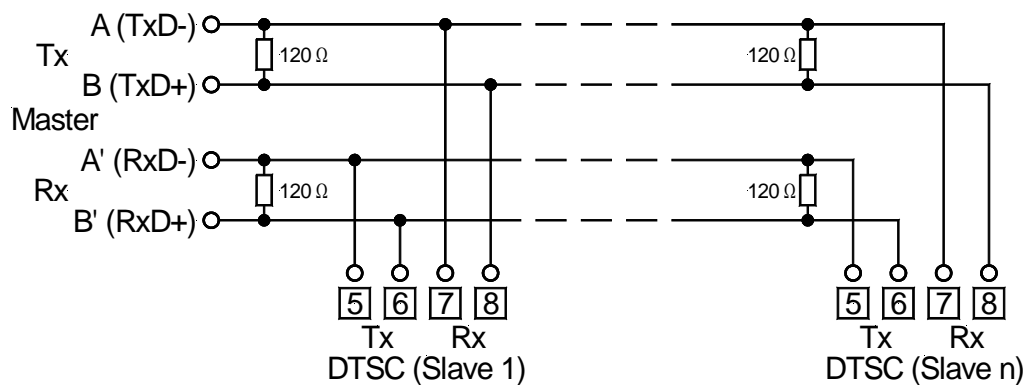


Figure 5-31: RS-485 Modbus - connection for full-duplex operation



**NOTE**

Please note that the DTSC must be configured for half- or full-duplex configuration (refer to parameter 3173 in the Configuration Manual 37385).

## CAN Bus (*FlexCAN*)

### Wiring

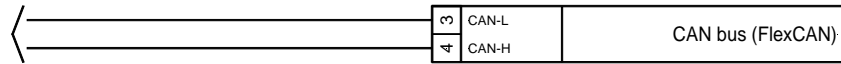


Figure 5-32: Interfaces - CAN bus (*FlexCAN*)

Terminal	Description	$A_{max}$
3	CAN bus ( <i>FlexCAN</i> )	CAN-L 2.5 mm <sup>2</sup>
4		CAN-H 2.5 mm <sup>2</sup>

Table 5-20: CAN bus interface - terminal assignment

### Shielding

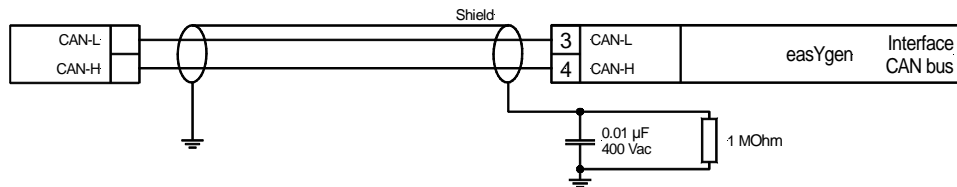


Figure 5-33: Interfaces - CAN bus - wiring of shielding



### 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.

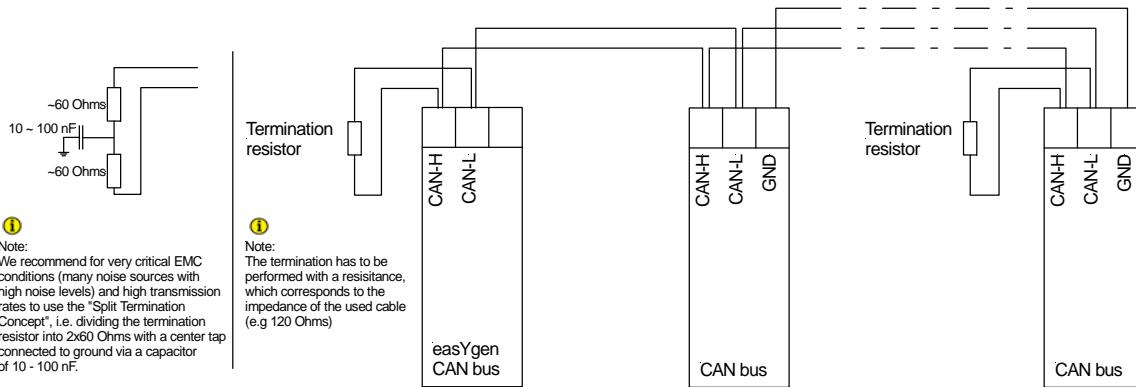


Figure 5-34: Interfaces - CAN bus - termination

### 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 5-21 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 5-21: 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.

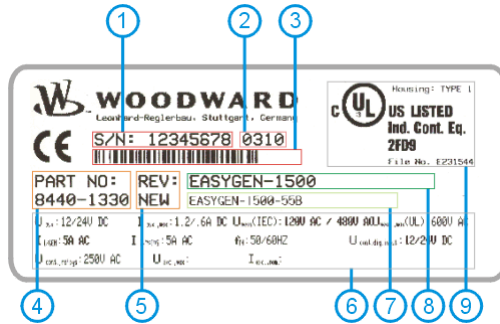


### NOTE

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 6. Technical Data

### Nameplate -----



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

### Measuring values, voltages -----

- 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 .....  $1.25 \times V_{rated}$
- Measuring frequency ..... 50/60 Hz (40.0 to 70.0 Hz)
- Accuracy ..... Class 1
- Input resistance per path **100 V** ..... 0.498 M $\Omega$
- 400 V** ..... 2.0 M $\Omega$
- Maximum power consumption per path ..... < 0.15 W

### Measuring values, currents -----

- Measuring current

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

- Accuracy ..... Class 1
- Linear measuring range Load (terminals 10 through 13) .....  $3.0 \times I_{rated}$
- Maximum power consumption per path ..... < 0.15 VA
- Rated short-time current (1 s) **[1]** .....  $50.0 \times I_{rated}$   
**[5]** .....  $10.0 \times I_{rated}$

### Ambient variables -----

- Power supply ..... 12/24 Vdc (8 to 40 Vdc; not buffered)  
 Battery ground (terminal 2) must be grounded to the chassis
- Inrush current ..... max. 50 A peak, 1 ms
- Input capacitance ..... 2000  $\mu$ F
- Intrinsic consumption ..... max. 8 W  
 in power save mode (backlight, relays off) ..... 3 W
- Degree of pollution ..... 2





# Chapter 7. Environmental Data



### Dynamics -----

- Frequency Range – Sine Sweep.....5Hz to 150Hz
  - Acceleration ..... 4G
  - Frequency Range - Random.....10Hz to 500Hz
  - Power Density ..... 0,015G<sup>2</sup>/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 Chasis Data  
 MIL-STD 810F, M514.5A, Cat.4,  
 Truck/Trailer tracked-restrained  
 cargo, Fig. 514.5-C1

### Shock -----

- .....40G, Sawtooth Puls, 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) / 60 °C (140°F)
  - Standards.....
- IEC 60068-2-2, Test Bb and Bd  
 IEC 60068-2-1, Test Ab and Ad

### Humidity -----

- .....60°C, 95% RH, 5 days
  - Standards.....
- IEC 60068-2-30, Test Db

### Altitude -----

- Maximum operating altitude ..... 2000 m (6,500 ft)

## Chapter 8. Accuracy

Measuring value		Display	Accuracy	Notes
<b>Frequency</b>				
Source 1	$f_{L1N}, f_{L2N}, f_{L3N}$	15.0 to 85.0 Hz	0.1 %	-
Source 2	$f_{L1N}, f_{L2N}, f_{L3N}$	40.0 to 85.0 Hz	0.1 %	-
<b>Voltage</b>				
Source 1	$V_{L1N}, V_{L2N}, V_{L3N},$	0 to 650 kV	1 %	Transformer ratio selectable
Source 2	$V_{L1N}, V_{L2N}, V_{L3N},$	0 to 650 kV	1 %	Transformer ratio selectable
<b>Current</b>				
Load	$I_{L1}, I_{L2}, I_{L3}$	0 to 32,000 A	1 %	-
Max. value	$I_{L1}, I_{L2}, I_{L3}$	0 to 32,000 A	1 %	Slave pointer
<b>Real power</b>				
Current total real power value		-2 to 2 GW	2 %	Accuracy depends on the configured transformer ratios
<b>Reactive power</b>				
Current value in L1, L2, L3		-2 to 2 Gvar	2 %	Accuracy depends on the configured transformer ratios
<b>cos <math>\phi</math></b>				
Current value cos $\phi$ L1		lag0.00 to 1.00 to lead0.00	2 %	-
<b>Miscellaneous</b>				
Real energy		0 to 4,200 GWh		not calibrated
Battery voltage		6.5 to 40 V	1 %	-

### 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  $\phi$ .....1.00
- Ambient temperature .....23 °C +/- 2 K
- Warm-up period .....20 minutes

## Appendix A. Recommended Power Supply Units

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Woodward recommends the use of the following external power supply units:

- Mean Well: DR-30-24
- Phoenix Contact: MINI-PS-100-240AC/24DC/1

An external buffered power supply solution may be achieved using the following devices:

- 2x Phoenix Contact: MINI-PS-100-240AC/24DC/1
- 1x Phoenix Contact: Quint-Buffer/24DC/20



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



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