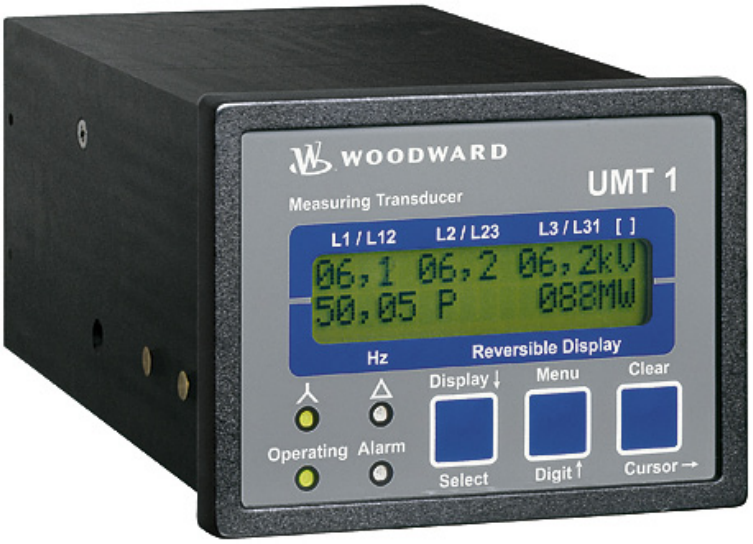
37139C

UMT 1
Measuring Transducer



Manual
Version 1.9xx / 2.0xx / 2.1xx / 3.0xx / 3.1xx

Manual 37139C

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	03-05-06	Tr	Release
A	05-09-29	TP	Re-release in new format with minor corrections and language revision
B	06-04-04	TP	Wiring diagram and technical data updated
C	11-04-29	TE	Wiring diagram updated; Technical data updated

INACTIVE – FOR REFERENCE ONLY

The information in this publication is no longer current, and may not reflect changes or safety issues that have occurred since the publication was originally released.

Refer to the UMT 1 Packages manual 37356 for more recent information about the UMT 1 unit.

Contents

Illustrations and Tables

Illustrations

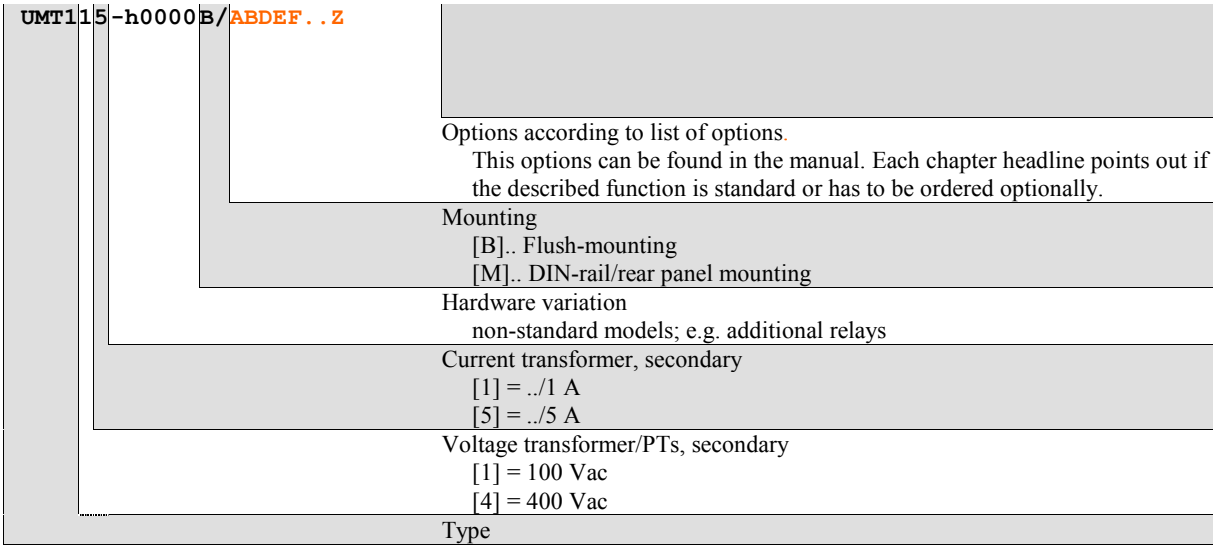
Tables

Chapter 1.
General Information

Introduction

The UMT 1 is a measuring transducer for true RMS values. The UMT 1 can measure an electrical three-phase system with current and voltage measuring inputs. The primary measured values are calculated and displayed on the two-line, 16 character LC Display, and also transmitted by either analog outputs (configurable as -20 to 20 mA, 0 to 20 mA, or 4 to 20 mA) or a communication interface to a higher level-control system. Different packages offer additional functionality.

The detailed model description for the UMT 1 reads as follows:



Examples:

- UMT141B/A3SU (flush mounted, standard unit with 400 Vac PT and 1 A CT with the Options A3 & SU [Modbus])
- UMT115B/A6 (flush mounted, standard unit with 100 Vac PT and 5 A with the Option A6 [6 configurable analog outputs])

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 at the rear of this manual.

Chapter 2.
Electrostatic Discharge Awareness

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

Follow these precautions when working with or near the control.

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

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

Wiring Diagram 100/400 V Version

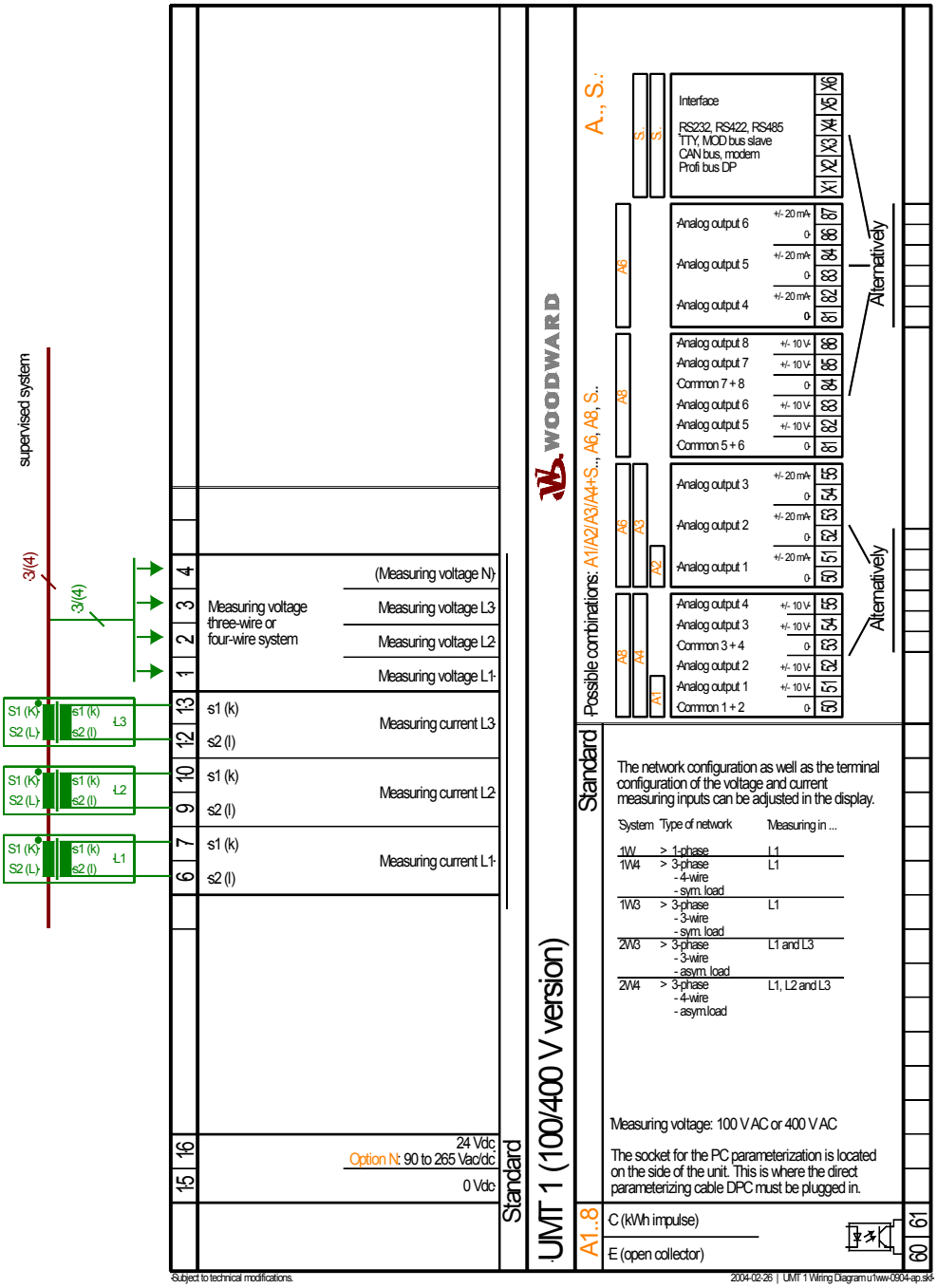


Figure 3-1: Wiring diagram 100/400 V version

Wiring Diagram 690 V Version

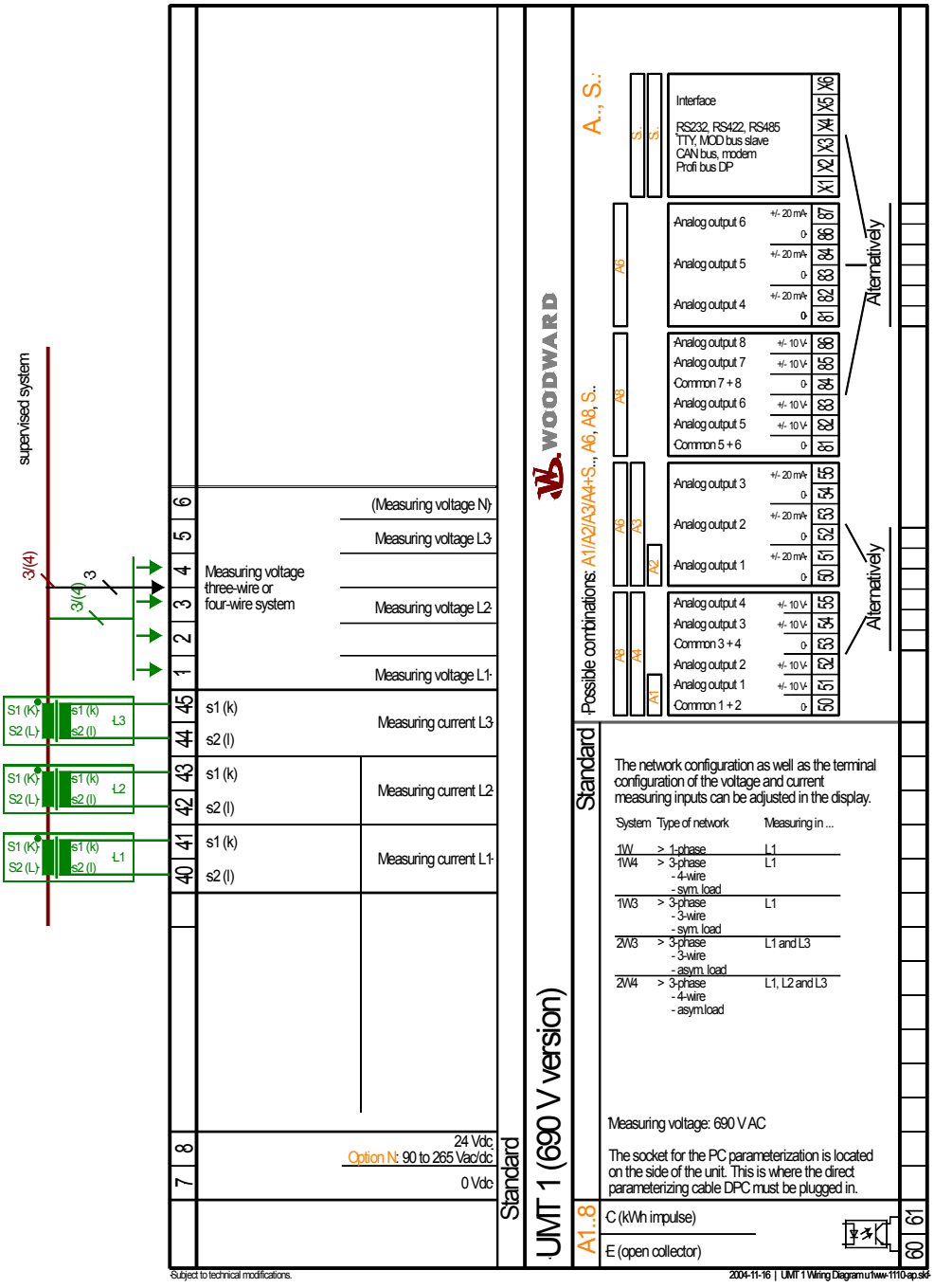


Figure 3-2: Wiring diagram 690 V version

WARNING

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

CAUTION

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

NOTE

Inductive devices connected to the system (such as operating current coils, undervoltage tripping units, or auxiliary/power contacts) must be connected to a suitable interference suppressor.

Power Supply (Standard / Option N)

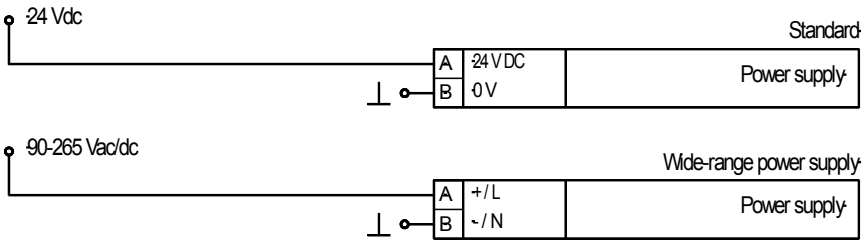


Figure 3-3: Power supply

Terminal		Description	A_{max}
120/400 V version			
A	16	24 Vdc (18 to 30 Vdc), max. 10 W 90 to 265 Vac/dc, max. 10 W (Option N)	2.5 mm²
B	15	0 V reference point	2.5 mm²
690 V version			
A	8	24 Vdc (18 to 30 Vdc), max. 10 W 90 to 265 Vac/dc, max. 10 W (Option N)	2.5 mm²
B	7	0 V reference point	2.5 mm²

Measuring Inputs

NOTE

The various distribution systems (w-system) must be taken into account when configuring the monitoring devices. Refer to “Measuring Systems” on page 29 for a description of these systems.

Voltage

100/400 V version

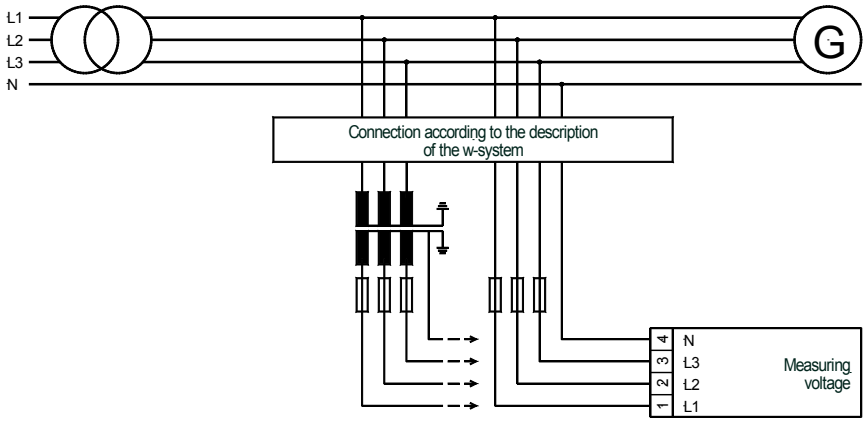


Figure 3-4: Measuring inputs - voltage 100/400 V versions

Terminal	Measurement	Description	A_{max}
1	400V direct or transformer ../100V	Measuring voltage L1	2.5 mm²
2		Measuring voltage L2	2.5 mm²
3		Measuring voltage L3	2.5 mm²
4		Neutral point of the 3-phase system/transformer	2.5 mm²

690 V version

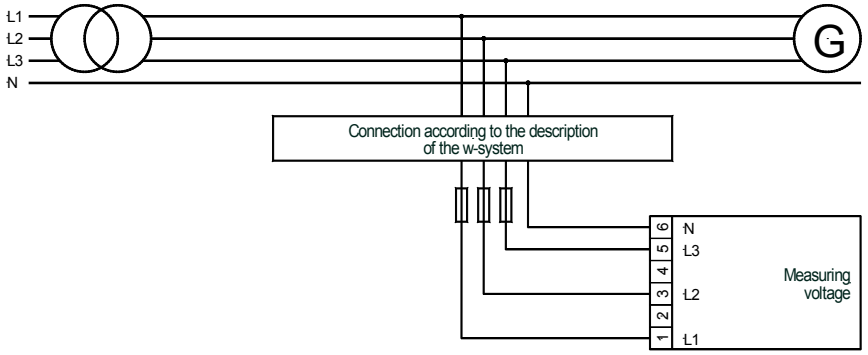


Figure 3-5: Measuring inputs - voltage, 690 V version

Terminal	Measurement	Description	A_{max}
1	690 V direct	Measuring voltage L1	2.5 mm²
2		-N/A-	2.5 mm²
3		Measuring voltage L2	2.5 mm²
4		-N/A-	2.5 mm²
5		Measuring voltage L3	2.5 mm²
6		Neutral point of the 3-phase system/transformer	2.5 mm²

Currrent

WARNING

Before disconnecting the secondary terminals of the transformer or the connection of the transformer at the control unit ensure that the transformer is short-circuited.

NOTE

Current transformers are secondary and should be connected to ground single-sided.

100/400 V version

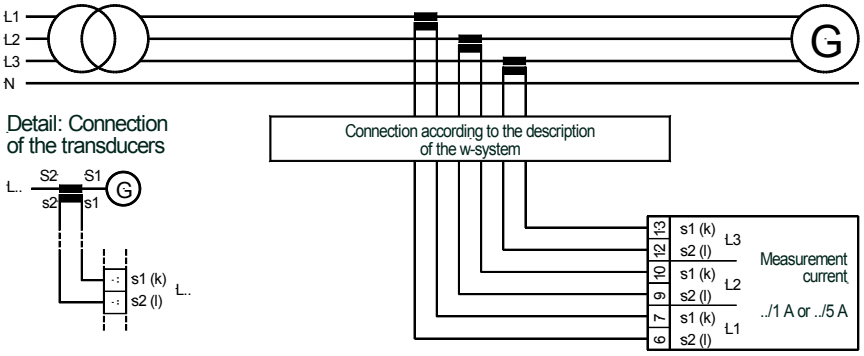


Figure 3-6: Measuring inputs - current 100/400 V versions

Terminal	Measurement	Description	A_{max}
6	Transformer ../1 A or ../5 A	Measuring current L1, transformer terminal s2 (l)	2.5 mm²
7		Measuring current L1, transformer terminal s1 (k)	2.5 mm²
9		Measuring current L2, transformer terminal s2 (l)	2.5 mm²
10		Measuring current L2, transformer terminal s1 (k)	2.5 mm²
12		Measuring current L3, transformer terminal s2 (l)	2.5 mm²
13		Measuring current L3, transformer terminal s1 (k)	2.5 mm²

690 V version

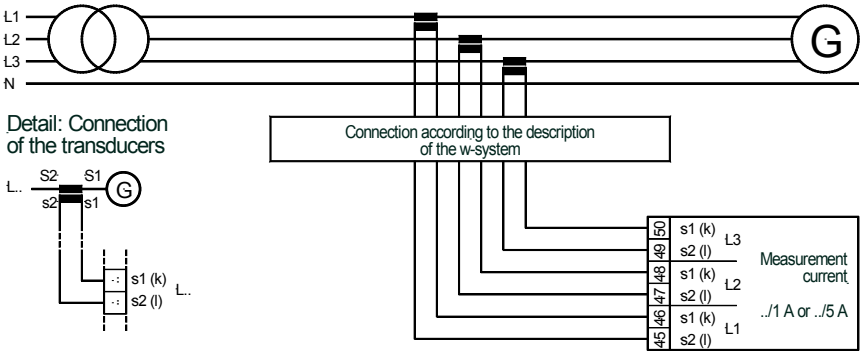


Figure 3-7: Measuring inputs - current, 690 V version

Terminal	Measurement	Description	A_{max}
40	Transformer ../1 A or ../5 A	Measuring current L1, transformer terminal s2 (l)	2.5 mm²
41		Measuring current L1, transformer terminal s1 (k)	2.5 mm²
42		Measuring current L2, transformer terminal s2 (l)	2.5 mm²
43		Measuring current L2, transformer terminal s1 (k)	2.5 mm²
44		Measuring current L3, transformer terminal s2 (l)	2.5 mm²
45		Measuring current L3, transformer terminal s1 (k)	2.5 mm²

Outputs

Analog Outputs (Options A1 to A8)

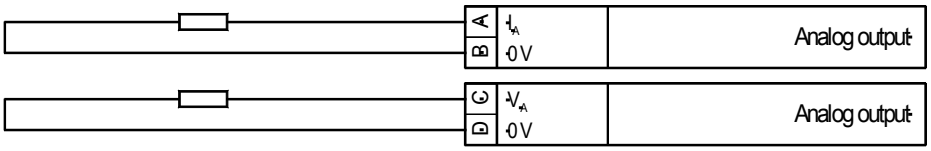


Figure 3-8: Analog outputs

		Description		A_{max}
0 to 20 / 4 to 20 / -20 to +20 mA ***I_A*** ***A***	***0 V*** ***B***			
51	50	Analog output 1	Option A2/3/6	1.5 mm²
53	52	Analog output 2	Option A3/6	1.5 mm²
55	54	Analog output 3	Option A3/6	1.5 mm²
82	81	Analog output 4	Option A6	1.5 mm²
84	83	Analog output 5	Option A6	1.5 mm²
87	86	Analog output 6	Option A6	1.5 mm²
0 to 10 / -10 to +10 V ***V_A*** ***C***	***0 V*** ***D***			
51	50	Analog output 1	Option A1/4/8	1.5 mm²
52		Analog output 2	Option A4/8	1.5 mm²
54	53	Analog output 3	Option A4/8	1.5 mm²
55		Analog output 4	Option A4/8	1.5 mm²
82	81	Analog output 5	Option A8	1.5 mm²
83		Analog output 6	Option A8	1.5 mm²
85	84	Analog output 7	Option A8	1.5 mm²
86		Analog output 8	Option A8	1.5 mm²

Pulse Output (Options A1 to A8)

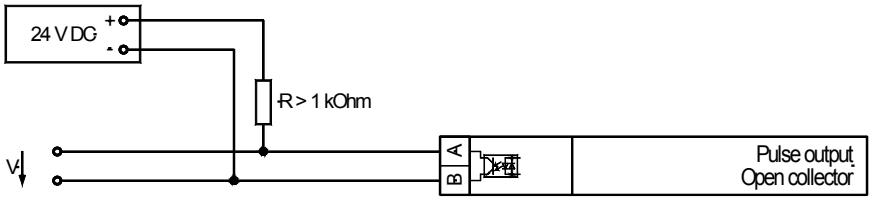


Figure 3-9: Impulse output

Terminal		Description	A_{max}
A	60	Pulse output (Open Collector): ON: 30 mA max.; OFF: 27 V	2.5 mm²
B	61		

Interface (Options SU)

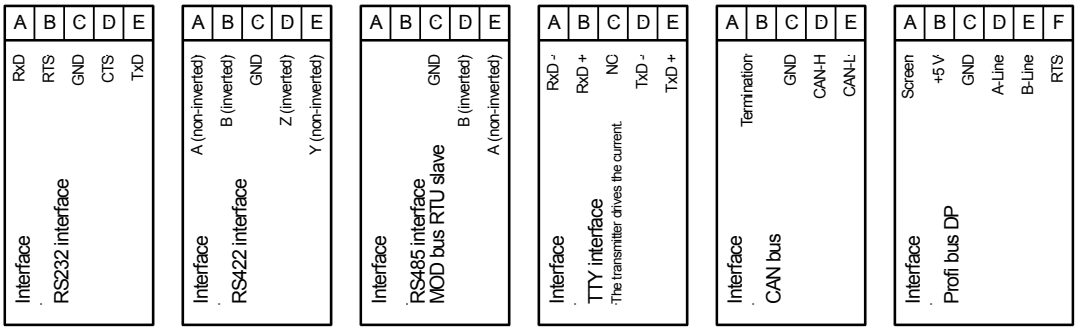


Figure 3-10: Interfaces

Terminal					Description
A (X1)	**B** (X2)	**C** (X3)	**D** (X4)	**E** (X5)	
RxD	RTS	GND	CTS	TxD	RS-232
A	B	GND	Z		RS-422
B	A	GND	B	A	RS-485, Modbus RTU Slave
RxD-	RxD+	NC	TxD-	TxD+	TTY (transmitter drives current)
		GND	CAN-H	CAN-L	CAN bus

A (X1)	**B** (X2)	**C** (X3)	**D** (X4)	**E** (X5)	**F** (X6)	
Screen	+5 V	GND	A-Line	B-Line	RTS	Profibus DP (the file LEON00D9.GSD has to be used)

NOTE

Please note that the CAN bus must be terminated with an impedance which corresponds to the wave impedance of the cable (i.e. 120 Ohm resistor).

Shielded Wiring

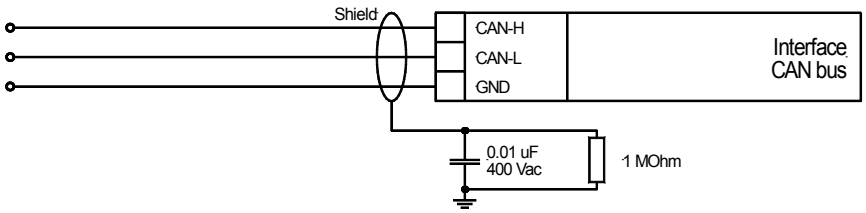


Figure 3-11: Shielded wiring

Chapter 4.
Functional Description

Direction of Power

In the event that the current transformers of the unit are wired according to the wiring picture below, the following values are displayed:

- **Positive generator active power** The generator releases active power.
- **Inductive generator power factor positive re-active power** The generator is overexcited and releases inductive re-active power.

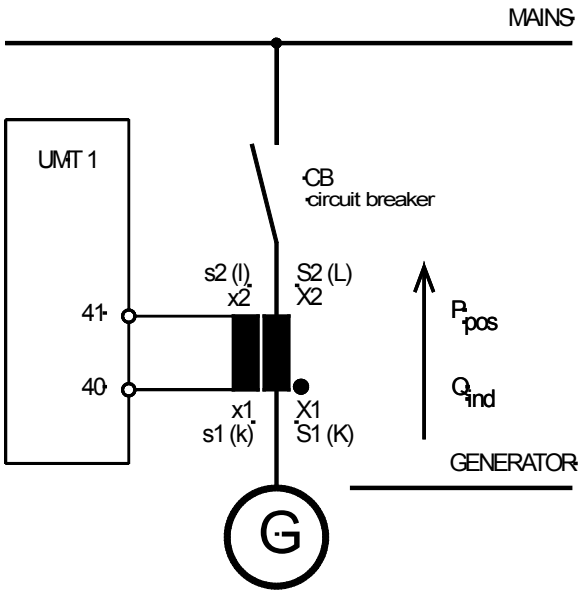


Figure 4-1: Direction of power

Power Factor Definition

The phasor diagram is used from the generator's view. This defines the following definitions.

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)

Compared with the voltage, the current is …

lagging	leading

The generator is …

over excited	under excited

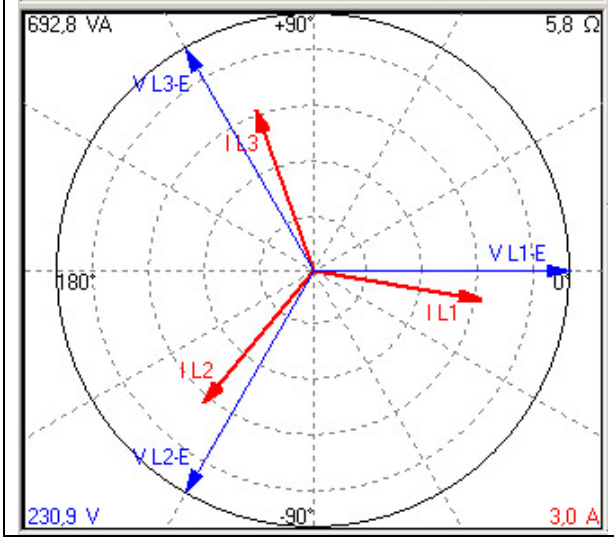
Control: If the control unit is equipped with a power factor controller, …

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

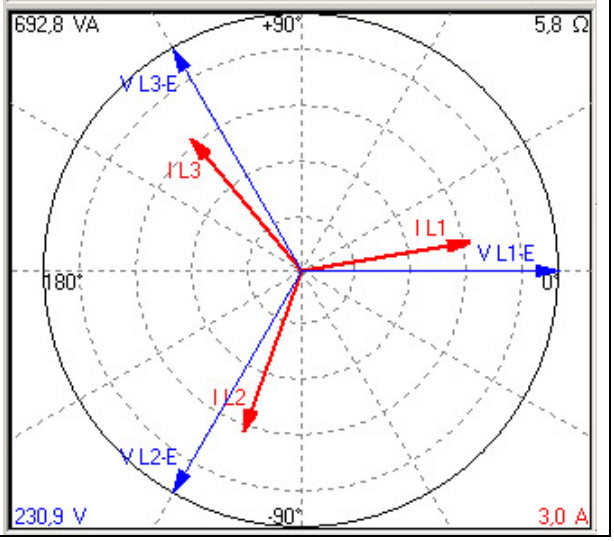
Phasor diagram:

inductive	capacitive

Signal	Magnitude	Phase	Real	Imaginary
V L1-E	230,9 V	0,00 °	230,9 V	0,000 V
V L2-E	230,9 V	-120,00 °	-115,5 V	-200,0 V
V L3-E	230,9 V	120,00 °	-115,5 V	200,0 V
I L1	2,000 A	-10,00 °	1,970 A	-347,3 mA
I L2	2,000 A	-130,00 °	-1,286 A	-1,532 A
I L3	2,000 A	110,00 °	-684,0 mA	1,879 A



Signal	Magnitude	Phase	Real	Imaginary
V L1-E	230,9 V	0,00 °	230,9 V	0,000 V
V L2-E	230,9 V	-120,00 °	-115,5 V	-200,0 V
V L3-E	230,9 V	120,00 °	-115,5 V	200,0 V
I L1	2,000 A	10,00 °	1,970 A	347,3 mA
I L2	2,000 A	-110,00 °	-684,0 mA	-1,879 A
I L3	2,000 A	130,00 °	-1,286 A	1,532 A



Chapter 5.
Display and Operating Elements

The pressure-sensitive membrane of the front panel consists of a plastic coating. All keys have been designed as touch-sensitive membrane switch elements. The display is a LC-display, consisting of 2 rows of 16 characters each, with indirect green lighting. The contrast of the display can be infinitely adjusted via a rotary potentiometer positioned on the right side of the control.

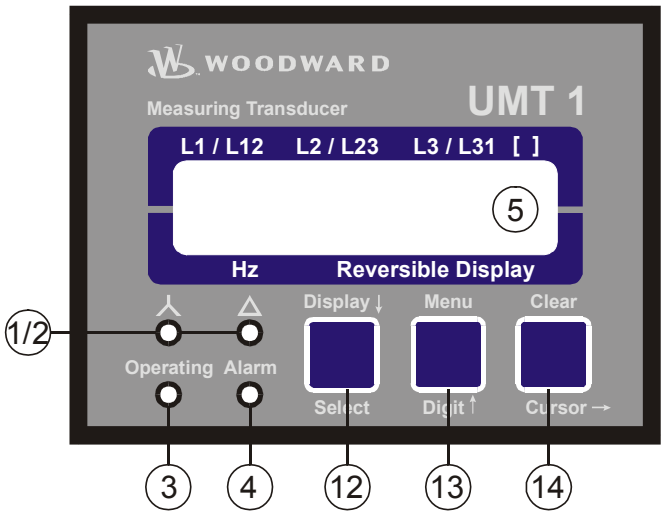


Figure 5-1: Front panel

Brief Description of LEDs and Push Buttons

LEDs

Nr.	Description	Function
1	"Wye"	Indication of the wye (star) voltages
2	"Delta"	Indication of the delta voltages
3	"Operating"	Automatic mode
4	"Alarm"	Alarm occurred

Push Buttons

Nr.	Description	Function
12	Display↓	Advance to next screen
12	Select	Confirm selection
13	Menu	Select menu
13	Digit↑	Increase the digit
14	Clear	Acknowledgement of alarm messages
14	Cursor→	Move cursor one position to the right

Miscellaneous

Nr.	Description	Function
5	LC Display	LC Display
6	Potentiometer	Adjust LCD contrast

LEDs

NOTE

If neither of the "Wye" and "Delta" LEDs is illuminated, the first line of the display indicates the wire current values.

1	**"Wye"** Color: Yellow	**Indication of the wye voltages** If this LED is illuminated, the values indicated on the display are the wye (star) voltages (phase-neutral).
2	**"Delta"** Color: Yellow	**Indication of the delta voltages** If this LED is illuminated, the values indicated on the display are the delta voltages (phase-phase).
3	**"Operation "** Color: Green	**Operation** This LED is illuminated constantly when the control unit is in the Automatic mode. If this LED is flashing, the control is in the configuration mode.
4	**"Alarm"** Color: Red	**Alarm** This LED illuminates if an alarm condition has occurred.

Push-Buttons

In order to facilitate the setting of the parameters the buttons are equipped with an "AUTOSCROLL" function while the controller is in the configuration mode. It permits the user to rapidly advance to the next setting and configuration screens, the digits, or the cursor position. The "AUTOSCROLL" function will only be enabled when the user presses and holds the corresponding buttons.

12 **Display↓ / Select**
Color: none

Display↓ / Select

Automatic mode: Display↓ - By pressing this button, the user advances through the display of operating (wye voltages, delta voltages, wire currents) and alarm messages. The "Wye" and "Delta" LEDs are illuminated accordingly.

Configuration: Select - By pressing this button, the user advances to the next configuration screen. If the value originally displayed has been changed via the "Digit↑" or "Cursor→" push buttons, the newly set value is saved by pressing the "Select" push button once. By pressing the button again, the user causes the system to advance to the next configuration screen.

13 **Menu / Digit↑**
Color: none

Menu / Digit↑

Automatic mode: Menu - By pressing this button, the user advances through the messages displayed on the second line of the display. (Various measured values and any alarm messages that have not been cleared are indicated.)

Configuration: Digit↑ - By pressing this button, the position at which the cursor is presently located is increased by one digit. The increase is restricted by the permissible limits (see list of parameters included in **Fehler! Verweisquelle konnte nicht gefunden werden.**). If the highest permissible number has been reached, the number automatically returns to the lowest permissible number.

14 **Clear / Cursor →**
Color: none

Clear / Cursor →

Automatic mode: Clear - Individual alarm messages are deleted by pressing this button provided the fault is no longer present.

Configuration: Cursor→ - This button moves the cursor one position to the right. When the cursor reaches the extreme right position it may be returned to the extreme left position by pressing the Cursor→ button again.

LC-Display

5 LC Display LC display

Performance values can be monitored from the two-line display, provided that the control is in automatic mode. In configuration mode, the individual parameters are displayed.

Display in Automatic Mode (First Line of the Display: Measured Values)

NOTE

The user can scroll through the first display line with the button "Display ↓".

"Wye" = on, "Delta" = off
Wye voltages

```
230  230  230 V
----------------
```

"Wye" = off, "Delta" = on
Delta voltages

```
400  400  400 V
----------------
```

"Wye" = off, "Delta" = off
Phase currents

```
314  314  314 A
----------------
```

Display in automatic mode, first line: measuring values

The following measured values are displayed (depending on the parameter "**Connecting type**"):

- The "Wye" LED is illuminated, and the "Delta" LED is off.
  The wye (star) voltages (V_{L1-N}, V_{L2-N} and V_{L3-N}) are indicated only if the configuration screen "**Connecting type**" is configured to "**1W**", "**1W4**", or "**2W4**".

- The "Wye" LED is off and the "Delta" LED is illuminated.
  The delta voltages (V_{L1-L2}, V_{L2-L3} and V_{L3-L1}) are indicated only if the configuration screen "**Connecting type**" is configured to "**1W4**", "**1W3**", "**2W3**", or "**2W4**".

- The "Wye" LED is off and the "Delta" LED is off.
  The phase currents (I_{L1}, I_{L2} and I_{L3}) are displayed

Display in Automatic Mode (Second Line of the Display: Measured Values)

NOTE

The "Menu" button may be used to scroll through the messages shown on the second line of the display.

```
----------------
00.00 xxxxxxxxxx
```

Display in automatic mode, second line: Measuring Values

The frequency is always indicated in [Hz].
Instead of "**xxxxxxxxxx**" the measured values are indicated according to Table 5-1:

Parameter displayed on the unit	Engineering unit
Total real power P	[kW / MW]
power factor (L1)	[1,00]
Total re-active power Q	[kvar / Mvar]
Total apparent power S	[kVA / MVA]
Voltage (avrg. value) $V_{L12-23-31}$	[V / kV]
Voltage (max. value) V_{High}	[V / kV]
Voltage (min. value) V_{Low}	[V / kV]
Current (avrg. value) I_{L1-2-}	[A / kA]
Current (max. value) I_{Hig}	[A / kA]
Current (min. value) I_{Low}	[A / kA]
Real power P_{L1}	[kW / MW]
Real power P_{L2}	[kW / MW]
Real power P_{L3}	[kW / MW]
Real energy (positive)	[+kWh / +MWh]
Real energy (negative)	[-kWh / -MWh]
Re-active energy (inductive)	[+kvarh / +Mvarh]
Re-active energy (capacitive)	[-kvarh / -Mvarh]

Table 5-1: Parameter display

Chapter 6.
Configuration

Configuration can be done via the front panel push buttons and the front panel LC display.

CAUTION

Please note that configuration only should be done while the system is not in operation.

NOTE

A list of all parameters may be found in Appendix F of this manual.

You can advance through the individual parameter screens if you are in configuration mode (simultaneously pressing of "Digit↑" and "Cursor→" push buttons permits access to the configuration mode) by using the "Select" button. If you press and hold the "Select" push button, the scroll function will be activated, allowing for the parameter screens to be advanced through more rapidly. The control unit will permit the operator to reverse up to four previous screens (exception: it is not possible to reverse from the first parameter to the last parameter or to back-up through the service screens). To perform the reverse function through the parameter screens, the "Select" and "Cursor→" push buttons must be pressed and released simultaneously. The control unit will revert to automatic mode if an entry isn't performed, a change made, or any other action performed for 120 seconds.

NOTE

There are three different hardware versions described in this operating manual: A 100 V version [1], a 400 V version [4] and a 690 V version [7]. The versions vary as far as the configuration screens and the parameter input ranges are concerned. The three types are differentiated by indicating the voltage: ([1] ..., [4] ... or [7] ...).

```
Adjust Settings:
SELECT (ANWAHL)
```

Configuration mode **Button "Select"**

After the configuration mode is enabled, the subsequent screens can be viewed and modified within the preset limits. Please note, that by depressing the "Select" button, the following screens are advanced by one screen each. If a parameter is configured "OFF", the related screens are not displayed or monitored by the control. Pressing the "Select" button will advance the displayed screen to the next parameter.

Basic Data

```
Software version
     X.xxxx
```

Software version

This screen displays the software version loaded into the control (the last two xx are for software revisions which do not affect the function of the unit).

```
SPRACHE/LANGUAGE
----------------
```

Language selection **Deutsch/English**

The screens (configuration screens and indication screens) may be indicated in German or English, at your choice.

Configuration Access

Sealing (Until Version 1.9xx)

NOTE

If no protection against modification of the setting values has been ordered, then it is advisable not to turn on the sealing function; Parameters on "OFF". If, on the other hand, a sealing function is necessary, it is advisable to activate it only after setup is complete!

➔ **SEQUENCE DIAGRAM on the following page!**

By entering a five-character code number, the input operation can be protected from unauthorized access, operation and modifications. The function represents the exact software emulation of a mechanical seal.

```
Coding (seal)
             ON
```

Sealing function **ON/OFF**

ON .....The input of the following values is protected by a code word. The subsequent screens of this option are being displayed.
OFF .....There is no protection through sealing, and the subsequent screens of this option are not shown. (default)

```
Code no. 000
Code?      ?????
```

Sealing function **00000 to 60000**

Correct code If the code number has been correctly entered for the active seal, the values are entered in the sequence of the screens. (default 00100)
Wrong code .If the code number has been incorrectly entered for the active seal, the following seals are indicated.

```
Incorrect entry!
[Next: SELECT]
```

Incorrect code was indicated **Button "Select"**

The code number for the active seal was incorrectly entered! Please confirm this message using the button "Select".

```
Code  no. 000
Break?      YES
```

Breaking the seal number XXX **YES/NO**

By entering "**YES**", you can break the seal and release the input mode. However, the sealing number is then increased by 1. Thus, it is possible at any time to check whether modifications have been made without the correct code number having been entered. If you select "**NO**" the code is inquired again. Leaving the inquiry is only possible by terminating input mode.


```
Code no. 000
New code:  ?????
```

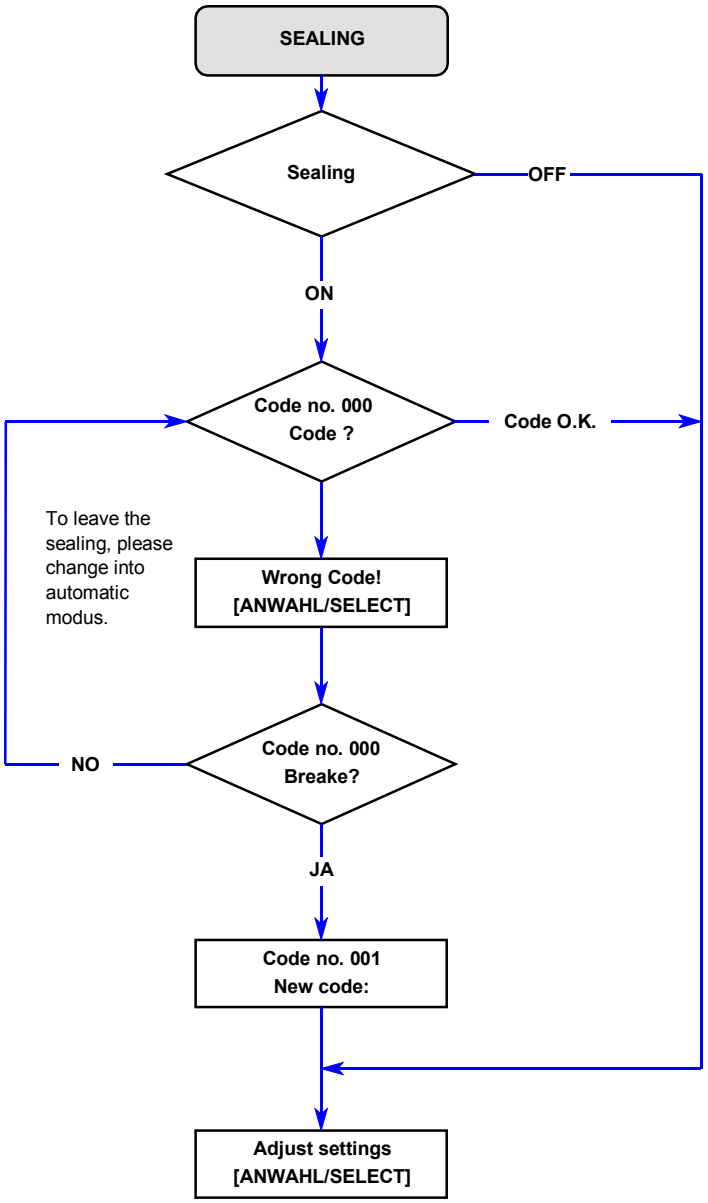
Code for seal 001 (new entry) **00000 to 60000**

After breaking the old seal, the unit requests the code number for the new seal. Sealing can now be effected with a new code number.

```
Enter value
[Next: SELECT]
```

Enter values **Button "Select"**

Press the button "Select" for input.



Password (Starting with Version 2.0xx / 3.0xx)

The unit is equipped with a three-level code and configuration hierarchy, which allows different user access to the control. A distinction is made between:

Code level CS0 ***(User Level)*** Factory password = none
This code level allows for monitoring of the system and does not permit access to the parameters. Configuration is blocked.

Code level CS1 ***(Basis Service Level)*** Factory password = "**0 0 0 1**"
This code level entitles the user to change selected parameters, like setting Bar/PSI, °C/°F, and clock adjustment. Changing a password is not permitted at this level. This password expires two hours after entering the password and the user is returned to the CS0 level.

Code level CS2 ***(Commissioning Level)*** Factory password = "**0 0 0 2**"
Allows direct access to all parameters (displaying and changing). In addition, the user may also set the password for levels CS1 and CS2. This password expires two hours after entering the password and the user is returned to the CS0 level.

NOTE

Once the code level is entered, access to the configuration menus will be allowed for two hours or until another password is entered into the control. If a user needs to exit a code level, then code level CS0 should be entered. This will block any configuration of the control. A user may return to CS0 by allowing the entered password to expire after two hours or by changing any one digit on the random number generated on the password screen and entering it into the unit.

NOTE (Starting with Version 2.1xx / 3.1xx)

The following configuration screen "enter code number" only appears if the parameter "pass-word protection" is switched ON (see below).

```
Enter code
number      0000
```

Enter code number **0000 to 9999**

Upon enabling the configuration mode, the user is required to enter an access code number, which identifies the various users. The displayed number XXXX is a randomly generated number (RN). If the random number is confirmed by pressing the "Select" button without being changed, the current level of access maintained. Upon entering either a level 1 or level 2 access code, the corresponding level of access is granted. If an incorrect access code is entered the control unit changes to code level 0 and all access is blocked until a code level 1 or 2 access code is entered.

```
Password
Protection   ON
```

Password protection **ON/OFF**

ON .....Password protection is enabled. Configuration access is enabled by entering the appropriate password (Code level 1/2). If an incorrect code number has been entered, configuration is blocked.

OFF .....Password protection is disabled. Access to configuration screens is permanently set to code level 2 and the code number is not queried. This parameter can only be changed if the code number of code level 2 has been entered.

Change Passwords (Starting with Version 2.0xx / 3.0xx)

NOTE

Once the code level is set, it will not be changed even after entering the configuration repeatedly an incorrect code number has been entered, the code level is set to CS0, thus locking the device for external persons.

If for 2 hours uninterruptedly supply voltage is applied, the device automatically switches to code level 0.

```
Define level 1
code          0000
```

Define level 1 password **0000 to 9999**

This screen appears only when the level 2 password has been entered. After entering the digits into this screen, the code level for level 1 (client) is set. After entering this code, the user only has the access rights assigned to this code level.
This code level (CS) is preset to **CS1 = 0 0 0 1**

```
Define level 2
code          0000
```

Define level 2 password **0000 to 9999**

This screen appears only when the level 2 password has been entered. After entering the digits into this screen, the code level for level 2 (technician) is set. After entering the code, the technician has the access rights with which he was assigned.
This code level (CS) is preset to **CS2 = 0 0 0 2**

Measurement

WARNING

The following values must be entered correctly for the generator to be monitored. Failure to do so may lead to incorrect measuring of parameters resulting in damage to or destruction of the generator and/or personal injury or death.

Potential Transformer Configuration

NOTE

The screens described below are not available in the 690 V-version.

```
Volt.transformer
secondary  000V
```

Voltage transformer secondary **[1] 50 to 125 V; [4] 50 to 480 V**

The secondary voltage is set here in V. This parameter displays the primary voltage on the control unit LC display. For measuring voltages of 400 V without the use of a measurement transformer, the voltage must be set to "**400V**".

```
Volt.transformer
primary 00.000kV
```

Voltage transformer primary **00.100 to 65.000 kV**

The primary voltage is set here in kV. This parameter displays the primary voltage on the control unit LC display. For measuring voltages of 400 V without the use of a measurement transformer the voltage must be set "**00.400kV**".

Current Transformer Configuration

```
Current transf.
          0000/0
```

Current transformer ratio **1 to 9999/x A**

The input of the current transformer ratio is necessary for the indication and control of the actual value. The ratio should be selected so that at maximum performance, a minimum of 60 % of the transformer rated current will flow. A smaller percentage may affect the function. Moreover, this may lead to additional inaccuracies of the control and monitoring functions.
The control can be optionally equipped with ../1 A or with ../5 A current transformer inputs. Depending on the version there are two different specifications of the parameter, which control the same memory location. You can find this value at the unit on the data plate.

{x} = 1 UMT1x**1**B/xxx = Current transformer with ../1 A rated current
{x} = 5 UMT1x**5**B/xxx = Current transformer with ../5 A rated current

Example for current transformer ratio 300/1:
Current in the primary winding = 300 A -> current in the secondary winding = 1 A
Current in the primary winding = 150 A -> current in the second. winding = 0,5 A

Measuring System

NOTE

The measuring transformer must be connected in accordance with the measuring system. Refer to Measuring Systems on page 38

```
Connection type
```

Measuring system **1W, 1W4, 1W3, 2W3, 2W4**

Select the measuring configuration to be utilized by the control unit. For a description of each configuration refer to Appendix A: Measuring Systems starting on page 38.

Pulse Output for Energy Counter

NOTE

The pulse output of the energy counter is not calibrated. All units manufactured up to version 2.0xx have a fixed signal output of 100ms. All units manufactured after version 2.1xx are equipped with a variable signal output duty cycle (length of output).

```
Pulse output
P.duration 0.00s
```

Length of the output signal **0.04 to 1.00 s**

The length of the output signal of the "Open Collector" output (terminal 60/61) may be set here. With this parameter is possible to adjust exactly to the time of an external pulse counter (i.e. the input of an PLC).

```
Pulse output
            +kWh
```

Selecting the energy output **+kWh / -kWh / +kvarh / -kvarh**

With this screen the type of the output of the energy pulses may be determined on the pulse output (terminal 60/61). It is possible to select between the positive or negative real power, the inductive or capacitive re-active power. Only one type of the operating pulse may be output. According to this setting the following screens will be different.

Screens for "+kvarh" and "-kvarh" Setting

```
Pulse/kvarh
logic   negative
```

Counter pulse to measure the re-active energy **positive/negative**

The output of the kvarh pulse (inductive as well as capacitive) may occur both negative (per kvarh pulse the Open Collector output [terminal 60/61] is opened) and positive (per kvarh pulse the Open Collector output [terminal 60/61] is closed).

```
Reactive energy
Pulse/kvah 000.0
```

Counter pulse of the re-active energy **0.1 to 150.0**

The number of the pulses/kvarh can be entered in this screen.

Screens for "+kWh" and "-kWh" Setting

```
Pulse/kWh
logic   negative
```

Counter pulse to measure the real energy **positive/negative**

The output of the kWh pulse (inductive as well as capacitive) may occur both negative (per kWh pulse the Open Collector output [terminal 60/61] is opened) and positive (per kWh pulse the Open Collector output [terminal 60/61] is closed).

```
Active energy
Pulse/kWh  000.0
```

Counter pulse of the active energy **0.1 to 150.0**

The number of the pulses/kWh can be entered in this screen.

Energy Counter Display

```
Display kWh   +-
on?           YY
```

Activate kWh display **Y/N**

The kWh counter (positive real energy = [+]; negative real energy = [-]) is calculated by this parameter being enabled. This function is not required for the control unit to operate properly. If this parameter is configured as "N", second line of the display does not occur in the automatic mode.

```
Display kvarh +-
on?           YY
```

Activate kvarh display **Y/N**

The Kvarh counter (inductive re-active energy = [+]; capacitive re-active energy= [-]) is calculated by this parameter being enabled. This function is not required for the control unit to operate properly. If this parameter is configured as "N", second line of the display does not occur in the automatic mode

Common Screens

```
RESET kWh/kvarh
              ON
```

Activate kWh display **Y/N**

If this parameter is configured as "ON", the energy counter may be reset to zero by pressing the pushbuttons "Select" and "Digit↑" simultaneously.

NOTE

The kWh-counter is reset in automatic mode by ...

- **visualizing the kWh-counter in the lower display line and by**
- **depressing the buttons "Select" and "Digit" for at least 5 seconds.**

After successful reset, the screens will display "`0000.0 kWh`" and/or "`0000.0kvarh`".

Display Refresh Time

NOTE

From version 2.1xx the refresh rate of the display (cycle time) can be adjusted.

```
Refresh time
Display      01s
```

Refresh time display **1 to 5 s**

This parameter determines how often the display is updated/refreshed. This parameter only affects the display. The time configured for this parameter has no effect upon interface or analog outputs.

Measuring Filter

NOTE

Voltage, current, frequency and power may be monitored though a filter on all control units from version 2.1xx on.

Function:

A first order digital low pass filter is used to filter noise from the measured values (one measuring period is 20 ms at 50 Hz). The time constants of this filter may be adjusted. Different effects are possible when the time constraints are adjusted:

Faster output and display of measuring values

If a small time constant is configured, a fast output of measuring values without additional delay due to digital filtering is achieved. If the filter is configured to OFF, a direct output without filtering the measuring value occurs.

Settling of the display with oscillating measured value outputs

If the measuring value under normal conditions is oscillating causing the displayed value to fluxuate, the filter constant may be increased. This will allow the measured outputs (via analog outputs or interface) to fluxuate less and allow for a display that is steadier.

```
Measuring filter
Voltage     0.00s
```

Measuring filter voltage **OFF / 0.04 to 2.56 s**

The measuring intervals of the voltage measuring may be adjusted here. With this filter the measuring can be steadied and oscillations during actual value measuring can be settled.

```
Measuring filter
Current     0.00s
```

Measuring filter current **OFF / 0.04 to 2.56 s**

The measuring intervals of the current measuring may be adjusted here. With this filter the measuring can be steadied and oscillations during actual value measuring can be settled.

```
Measuring filter
Power       0.00s
```

Measuring filter power **OFF / 0.04 to 2.56 s**

The measuring intervals of the power measuring may be adjusted here. With this filter the measuring can be steadied and oscillations during actual value measuring can be settled.

```
Measuring filter
Frequency   0.00s
```

Measuring filter frequency **OFF / 0.04 to 2.56 s**

The measuring intervals of the frequency measuring may be adjusted here. With this filter the measuring can be steadied and oscillations during actual value measuring can be settled.

Analog Outputs (Options A1/2/3/4/6/8)

It is possible to apply a certain measuring quantity (according to the table below) to each available analog output via the push buttons. At the -20/0/4 to 20 mA analog outputs, the signal may be transmitted as a –20 to 20 mA, a 0 to 20 mA, or a 4 to 20 mA value. At -10/0 to 10 V analog outputs, the output signal may be transmitted as a -10 to 10 V or a 0 to 10 V value. The value to be transmitted may be scaled via an upper and a lower entry value. The scaling is linear. The inputs may also be through the use of positive and negative signs.

Value	Lower and upper setting value	
	0 V, -10 V 0 mA, 4 mA, -20 mA	10 V, 20 mA
U L1-N	0 to 65,000 V	
U L2-N	0 to 65,000 V	
U L3-N	0 to 65,000 V	
U L-N mean value	0 to 65,000 V	
U L-N max. value	0 to 65,000 V	
U L-N min value	0 to 65,000 V	
U L1-L2	0 to 65,000 V	
U L2-L3	0 to 65,000 V	
U L3-L1	0 to 65,000 V	
U L-L mean value	0 to 65,000 V	
U L-L max. value	0 to 65,000 V	
U L-L min. value	0 to 65,000 V	
Frequency	30.00 to 80.00 Hz	
I L1	0 to 9,999 A	
I L2	0 to 9,999 A	
I L3	0 to 9,999 A	
I 1-3 middle value	0 to 9,999 A	
I 1-3 max.value	0 to 9,999 A	
I 1-3 min.value	0 to 9,999 A	
I L1 (+/-)*	-9,999 to 9,999 A	
I L2 (+/-)*	-9,999 to 9,999 A	
I L3 (+/-)*	-9,999 to 9,999 A	
I 1-3 (+/-)midd. *	-9,999 to 9,999 A	
I 1-3 (+/-)max. *	-9,999 to 9,999 A	
I 1-3 (+/-)min. *	-9,999 to 9,999 A	
Active power	-32,000 to 32,000 kW	
Reactive power	-32,000 to 32,000 kvar	
Apparent power	0 to 32,000 kVA	
power factor	i0.50 to 1.00 to c0.50	

* The symbol of the current values is defined via the polarity of the active components.

Table 6-1: Analog outputs, table of values

Example: analog output 2 (-10/0 to 10 V: terminals 50/52, -20/0/4 to 20 mA: terminals 52/53)
Output of the phase-phase voltage L12:

20 mA-output

```
Analog output 2
      0 .. 00 mA
```

10 V-Ausgang

```
Analog output 2
      0 .. 00 V
```

Output range of the analog output 2 — **(20 mA) -20 to +20 / 0 to 20 / 4 to 20 mA / OFF**
(10 V) -10 to +10 / 0 to 10 V / OFF

20 mA-analog output (the upper value is always +20 mA)
-20 to **20 mA** For the output of the lower value, -20 mA are output.
0 to **20 mA** ... For the output of the lower value, 0 mA are output.
4 to **20 mA** ... For the output of the lower value, 4 mA are output.
OFF..... If this function is set to "OFF", 0 mA are output, and the subsequent screens of this function are not indicated.

10 V-analog output (the upper value is always +10 V)
-10 to **+10 V** . For the output of the lower value, -10 V are output.
0 to **10 V**..... For the output of the lower value,0 V are output.
AUS..... If this function is set to "OFF", 0 V are output, and the subsequent screens of this function are not indicated.

```
Analog output 2
----------------
```

Output value of the analog output 2 — **see above table**

Selection of the quantity to be output (please refer to above table).

```
Analog output
  0mA =   00000V
```

Example for 20 mA-output

Scaling of the lower output value — **see above table**

This parameter assigns the lower limit for power that corresponds to the lower limit for the analog output.

```
Analog output
20mA =   00000V
```

Example for 20 mA-output

Scaling of the upper output value — **see above table**

This parameter assigns the upper limit for power that corresponds to the upper limit for the analog output.

Interface (Option SU)

Screens for Protocol DK3964 (Option SU)

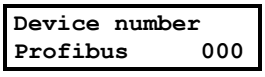
Data block RK512 **0 to 255**

Data block address in receiver (i.e. PLC).

Data word RK512 **0 to 255**

Data word address in receiver (i.e. PLC).

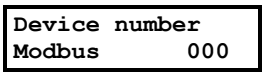
Screens for Protocol Profibus DP Slave (Option SU)



Device number profi-bus DP slave **0 to 126**

Device number for the profi-bus DP slave.

Screens for Protocol Modbus RTU Slave (Option SU)

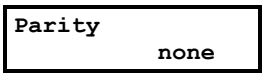


Device number Modbus RTU Slave **1 to 255**

Device number for the Modbus RTU Slave.

Baudrate Modbus RTU Slave **1,200 / 2,400 / 4,800 / 9,600 / 19,200 Baud**

The baud rate of the Modbus RTU Slave is defined here.

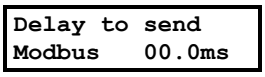


Parity Modbus RTU Slave **none / even / odd**

The parity of the Modbus RTU Slave is defined here.

Stop bits Modbus RTU Slave **one / two**

The number of stop bits of the Modbus RTU Slave is defined here.



Waiting time transmission after read request **0.2 to 50.0 ms**

After the read request by the master, the minimum waiting time before transmitting the answer is the time previously set. This allows to adjust the time response to the master so that it can process the answer.

Screens for Protocol CAN Bus (Options SU/SB)

NOTE

Please note that IDs must not be allocated twice. This applies to all units linked to the bus system. Moreover, all IDs adjusted at the unit must be set to different values.

Procedure for transmission-IDs: The same "Basic-ID Transmission" is allocated to all units existing within the bus system. This allows a grouping of the various types of information. (Example: The same "Basic-ID Transmission" = 800 is allocated to all units. By means of the different unit numbers, the individual IDs are then allocated; unit number 1: ID = 801; unit number 2: ID = 802; etc.)

```
CAN No.
                0
```

Device number CAN-bus **1 to 8**

The CAN bus device number is entered here. The device number affects the calculation of the transmitting and controlling IDs.

```
Baudrate
          0000
```

Baudrate CAN-Bus **125/250/500kBaud**

Setting the baud rate.

```
Base-ID (send)
             0000
```

Basic - ID Transmission **0 to 2015**

The ID, from which the device is transmitting its operating data, is calculated from the Basic-ID Transmission + Device Number CAN-Bus.

```
Base-ID (remote)
             0000
```

Basic - ID control **0 to 2015**

The ID, at which the device receives control data, is calculated from the Basic-ID-Control + Device Number CAN-Bus.

Chapter 7.
Commissioning

DANGER - HIGH VOLTAGE

When commissioning the control, please observe all safety rules that apply to the handling of live equipment. Ensure that you know how to provide first aid in the event of an uncontrolled release of energy and that you know where the first aid kit and the nearest telephone are. Never touch any live components of the system or on the back of the system:

L I F E T H R E A T E N I N G

CAUTION

Only a qualified technician may commission unit. The "EMERGENCY-STOP" function must be operational prior to commissioning of the system, and must not depend on the unit for its operation.

CAUTION

Prior to commissioning ensure that all measuring devices are connected in correct phase sequence. The connect command for the unit circuit breaker must be disconnected at the unit circuit breaker. The field rotation must be monitored for proper rotation. Any absence of or incorrect connection of voltage measuring devices or other signals may lead to malfunctions and damage the unit, the engine, and/or components connected to the unit!

Procedure

1. After wiring the unit and ensuring all voltage-measuring devices are phased correctly, apply the control system voltage (i.e. 12/24 Vdc). The "Operation" LED will illuminate.

2. After applying the measured variables, the unit will display the measured values. These values should be confirmed with a calibrated measuring instrument.

3. By simultaneously pressing the two push buttons "Digit↑" and "Cursor→", the configuration mode is accessed. After entering the access code number, the unit may be configured according to the application requirements (see the chapter regarding the parameters).

4. Now, proceed as follows to change the code level:

until version 1.9xx:

Coding ON	**Sealing function** Enter: **"ON"** select and confirm using the "Select" button
Code no. 000 Code? ?????	**Code input** Enter: Button "Select".
Incorrect entry [Next: Select]	**Incorrect input** Enter: Button "Select".
Code no. 000 Break? NO	**Break seal** Enter: **"YES"** Select and confirm using "Select" button
Code no. 000 New code: ?????	**Enter new code** Enter: Enter new code number and confirm using "Select" button

from version 2.0xx:

Enter code number 0000	**Enter code number** **0 to 9999** On accessing the parameterization mode, a code number, which identifies the various users, is first requested. The indicated number XXXX is a random number (ZU) and is confirmed using the "Select" button. If the random number was confirmed without modification using "Select", the code level remains as it was. Two four-digit code numbers (0000 to 9999) exist for changing the code level and setting up new code words for the users. No assignment is required for the "third party" user level, as the user does not usually receive access to the parameterization level (protected via the code).

5. After the unit has been configured for the application, the configuration mode is exited by simultaneously pressing the "Digit↑" and "Cursor→" buttons.

Appendix A.
Measuring Systems

CAUTION

The grounding of the N-wire in the voltage measurement must not be done at the UMT 1, but must be done at a central location (PEN-System).

Measuring System 1W

Single-phase mains

- Voltage measurement in L1 ($P = V_{L1N} \times I_{L1} \times \cos\varphi$)
- Current measurement in L1
- Grounding of the transformer terminal pointing into the direction of the generator

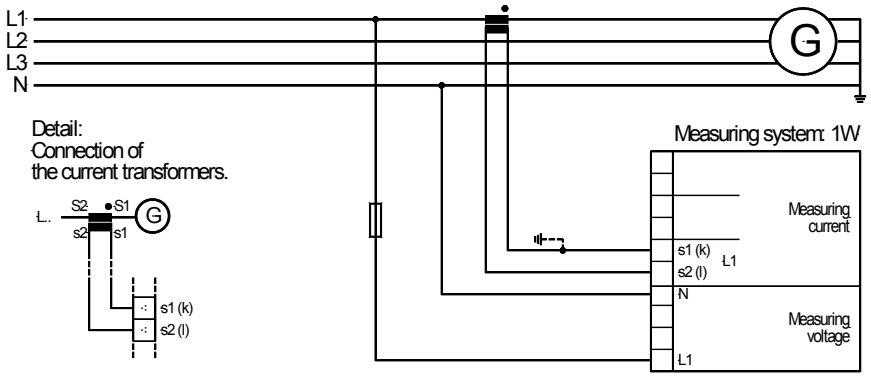


Figure 7-1: 1W measuring system

Measuring System 1W4

Three-phase mains

- 4-wire (wye) system ($P = \sqrt{3} \times V_{L12} \times I_{L1} \times \cos\varphi$)
- Symmetrical (balanced) load
- Voltage measurement in L1, L2 and L3
- Current measurement in L1
- Grounding of the transformer terminal pointing into the direction of the generator

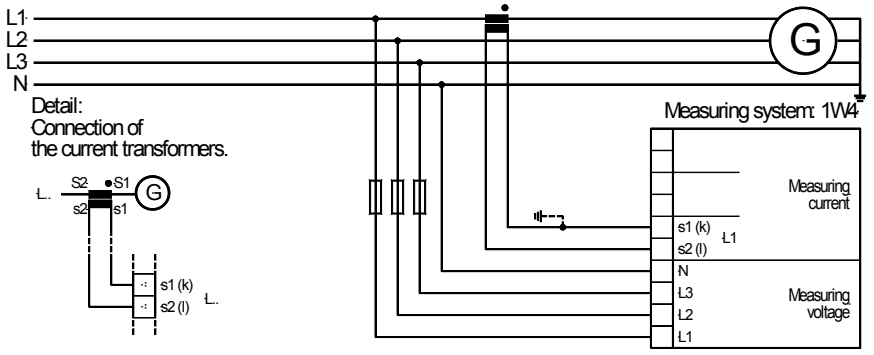


Figure 7-2: 1W4 measuring system

Measuring System 1W3

Three-phase mains

- 3-wire (delta) system
- Symmetrical (balanced) load
- Voltage measurement in L1, L2 and L3
- Current measurement in L1
- Grounding of the transformer terminal pointing into the direction of the generator

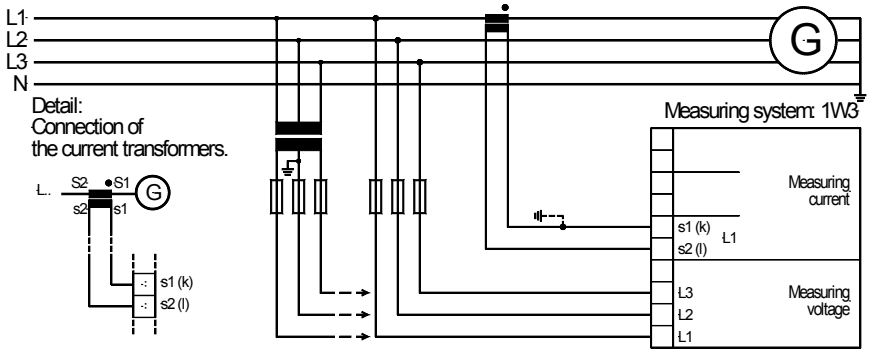


Figure 7-3: 1W3 measuring system

Measuring System 2W3

Three-phase mains

- 3-wire (delta) system
- Asymmetrical (unbalanced) load
- Voltage measurement in L1, L2 and L3
- Current measurement in L1 and L3 (open delta connection)
- Grounding of the neutral point (connected transformer terminals)

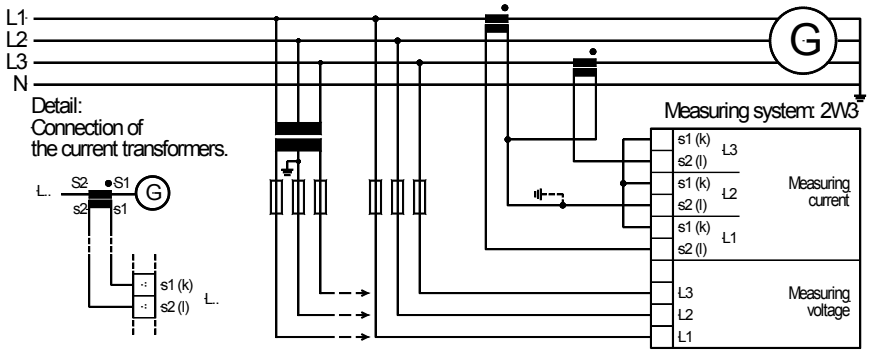


Figure 7-4: 2W3 measuring system

Measuring System 2W4

Three-phase mains

- 4-wire (wye) system
- Asymmetrical (unbalanced) load
- Voltage measurement in L1, L2 and L3
- Current measurement in L1, L2 and L3
- Grounding of the transformer terminal pointing into the direction of the generator

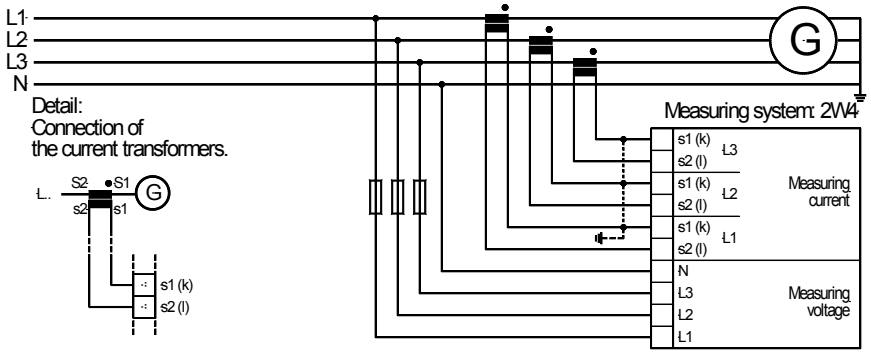


Figure 7-5: 2W4 measuring system

Appendix B.
Dimensions

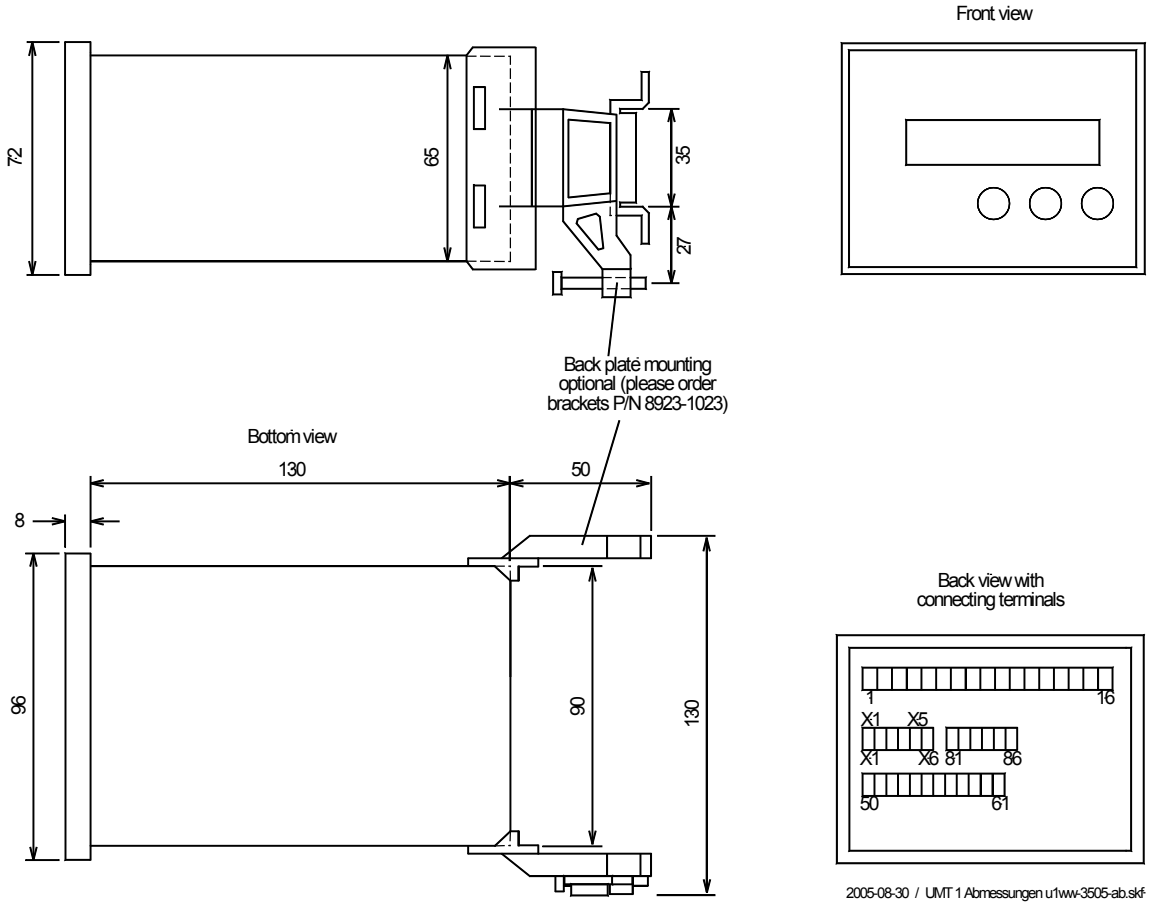


Figure 7-6: Dimensions

Appendix C.
Technical Data

Voltage measuring ----------

- Measuring voltage
  - Rated value (V_{rated}) ⅄/Δ ..... [1] 66/115 Vac
    [4] 230/400 Vac
    [7] 398/690 Vac
  - Maximum value $V_{ph\text{-}ph}$ (UL/cUL) ..... [1] max. 150 Vac
    [4] max. 300 Vac
    [7] max. 600 Vac
  - Rated voltage $V_{ph\text{-}ground}$ ..... [1] 150 Vac
    [4] 300 Vac
    [7] 400 Vac
  - Rated surge voltage ..... [1] 2.5 kV
    [4] 4.0 kV
    [7] 4.0 kV
- Measuring frequency ..... 40.0 to 80.0 Hz
- Accuracy ..... Class 0.5
- Linear measuring range ..... 1.3 × V_{rated}
- Input resistance ..... [1] 0.21 MΩ
  [4] 0.7 MΩ
- Maximum power consumption per path ..... 0.15 W

Current measuring ---------- **isolated**

- Measuring current ..... [1] ../1 A
  [5] ../5 A
- Accuracy ..... Class 0.5
- Linear measuring range ..... 1.5 × I_{rated}
- Rated short-time current (1 s) ..... [1] 50.0 × I_{rated}
  [5] 10.0 × I_{rated}
- Max. power consumption per path ..... <0.15 VA

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

- Power supply
  - Standard ..... 24 Vdc (18 to 30 Vdc)
  - Wide range power supply (Option N) ..... 90 to 265 Vac/dc
- Intrinsic consumption
  - Standard ..... max. 10 W
  - Wide range power supply (Option N) ..... max. 10 W
- Ambient temperature (operation) ..... -20 to +70 °C
- Ambient temperature (storage) ..... -30 to +80 °C
- Ambient temperature (storage - only valid for P/N 8444-1084) ..... -40 to +80 °C
- Ambient humidity ..... 95 %, not condensing

Analog outputs ---------- **isolated**

- At rated value ..... freely scaleable
- Insulation voltage ..... 1,500 Vdc
- Resolution PWM ..... 12 Bit
- -20/0/4 to +20 mA output ..... Maximum load 500 Ω
- -10/0 to 10 Vdc output ..... Internal resistance 100 Ω

Pulse outputs ----------

- Type ..... transistor output
- Rated gate voltage ..... 24 Vdc
- Maximum gate voltage ..... 32 Vdc
- Minimum gate current ..... 10 mAdc
- Maximum gate current ..... 30 mAdc (0.5 Vdc)

Interface ---------- isolated

- Insulation voltage.....dependent on model: 500 to 1,500 Vdc
- Version .....variable

Housing ----------

- Type..... APRANORM DIN 43 700
- Dimensions (B × H × T) ..... 96 × 72 × 130 mm
- Front cutout (B×H) ..... 91 [+1.0] × 67 [+0.7] mm

- Wiring..... Screw-type terminals
  depending on plug connector 1.5 mm² or 2.5 mm²
  use 60/75 °C copper wire only
  use class 1 wire only or equivalent
- Recommended tightening torque ..... 0.4 or 0.5 Nm
- Weight .....approx. 800 g

Protection----------

- Protection system..... IP42 from front at professional mounting
  IP54 from front with gasket (gasket: P/N 8923-1036)
  IP21 from back
- Front foil.....insulating surface
- EMC test (CE) .....tested according to applicable EN guidelines
- Listings .....CE marking; UL listing for ordinary locations
  UL/cUL listed, Ordinary Locations, File No.: E231544
  (Note: there is no UL/cUL listing for units equipped with Option N!)

Appendix D.
Measured Quantities and Accuracy

Measuring value	Display/range	Accuracy	Note
Frequency			
f_{L1}, f_{L2}, f_{L3}	40.0 to .80.0 Hz	0.05 Hz	
Voltage			
V_{L1}, V_{L2}, V_{L3}, V_{L12}, V_{L23}, V_{L31}	0 to 520 V / 0 to 65 kV	0.5 %	Accuracy depending on the configured transformer ratio
Current			
I_{L1}, I_{L2}, I_{L3}	0 to 9,999 A	0.5 %	Accuracy depending on the configured transformer ratio
Real power			
Total active power value	-32.0 to 32.0 MW	1 %	Accuracy depending on the configured transformer ratio
Reactive power			
Actual value in L1, L2, L3	-32.0 to 32.0 Mvar	1 %	Accuracy depending on the configured transformer ratio
Apparent power			
Actual value in L1, L2, L3	0 to 45.0 MVA	1 %	Accuracy depending on the configured transformer ratio
Power factor cos φ			
Actual cos φ_{L1}	i0.00 to 1.00 to c0.00	1.5°	
Miscellaneous			
Active power	0 to 4.200 GWh		Not PTB standardized
Active power (pulse)			Pulse output
Reactive power	0 to 4.200 Gvarh		Not PTB standardized
Reactive power (pulse)			Pulse output

Reference conditions: The data apply to the following reference conditions:

- Input voltage = sinusoidal rated voltage
- Input current = sinusoidal rated current
- Frequency = rated frequency ± 2 %
- Power supply = rated voltage ± 2 %
- Power factor cos φ = 1
- Ambient temperature 23 °C ± 2 K
- Warm-up period = 20 minutes.

Appendix E.
Interface Telegram

Communication Interface Addresses

Number		Content (words)	Unit	Remark
Modbus	Profibus			
1 (02, 03)	**0**	Telegram header	"305"	Telegram type
2 (04, 05)	**1**	Voltage L12	V	
3 (06, 07)	**2**	Voltage L23	V	
4 (08, 09)	**3**	Voltage L31	V	
5 (10, 11)	**4**	Voltage L1N	V	
6 (12, 13)	**5**	Voltage L2N	V	
7 (14, 15)	**6**	Voltage L3N	V	
8 (16, 17)	**7**	Frequency L12	Hz × 100	
9 (18, 19)	**8**	Current L1	A	Internal
10 (20, 21)	**9**	Current L2	A	Internal
11 (22, 23)	**10**	Current L3	A	Internal
12 (24, 25)	**11**	Power factor cosphi	dim.less × 100	Internal
13 (26, 27)	**12**	Real power	kW	Internal
14 (28, 29)	**13**	Reactive power	kvar	Internal
15 (30, 31)	**14**	Internal		
16 (32, 33)	**15**	Internal		
17 (34)	**16**	Exponent	dim.less	VGN
17 (35)	**16**		dim.less	IGN
18 (36)	**17**	Exponent	dim.less	PGN/QGN
18 (37)	**17**		dim.less	VSS
19 (38, 39)	**18**	Generator real energy	kWh	High Word
20 (40, 41)	**19**			Low Word
21 (42, 43)	**20**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal

Number		Content (words)	Unit	Remark
Modbus	Profibus			
22 (44, 45)	**21**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal
23 (46, 47)	**22**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal
24 (48, 49)	**23**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal

Number		Content (words)	Unit	Remark
Modbus	Profibus			
25 (50, 51)	**24**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal
26 (52, 53)	**25**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal
27 (54, 55)	**26**	Internal	Bit 15 = 1 \ Bit 14 = 0 /	Internal
			Bit 13 = 1 \ Bit 12 = 0 /	Internal
			Bit 11 = 1 \ Bit 10 = 0 /	Internal
			Bit 9 = 1 \ Bit 8 = 0 /	Internal
			Bit 7 = 1 \ Bit 6 = 0 /	Internal
			Bit 5 = 1 \ Bit 4 = 0 /	Internal
			Bit 3 = 1 \ Bit 2 = 0 /	Internal
			Bit 1 = 1 \ Bit 0 = 0 /	Internal
28 (56, 57)	**27**	Real energy, negative	kWh	High word
29 (58, 59)	**28**			Low word
30 (60, 61)	**29**	Re-active energy, positive	kvarh	High word
31 (62, 63)	**30**			Low word
32 (64, 65)	**31**	Re-active energy, negative	kvarh	High word
33 (66, 67)	**32**			Low word

Description of the Data Format

NOTE

Certain addresses have two parts, the measured value and the exponent multiplier!

Voltage and current	0 to 9.999 without sign	measured in [V, A]
Real power	0 to 9.999 with sign (+/-)	measured in [W] positive = positive power negative = negative power (reverse power)
Re-active power	0 to 9.999 with sign (+/-)	measured in [var] positive = inductive negative = capacitive
Frequency		measured in [Hz × 100]
Real energy	32 Bit	measured in [kWh] positive = supplied real power negative = received real power
Re-active energy	32 Bit	measured in [kvarh] positive = inductive re-active energy negative = capacitive re-active energy
cos phi (power factor)	-99 to 100	measured in [cos phi × 100] positive = inductive, "generator" overexcited negative = capacitive, "generator" underexcited

Definition of power factor scaling: According to the scaling of the analog output, the power factor can be output within the range from capacitive values ranging from c0.00 to unity power factor = 1 to inductive values up to i0.00.

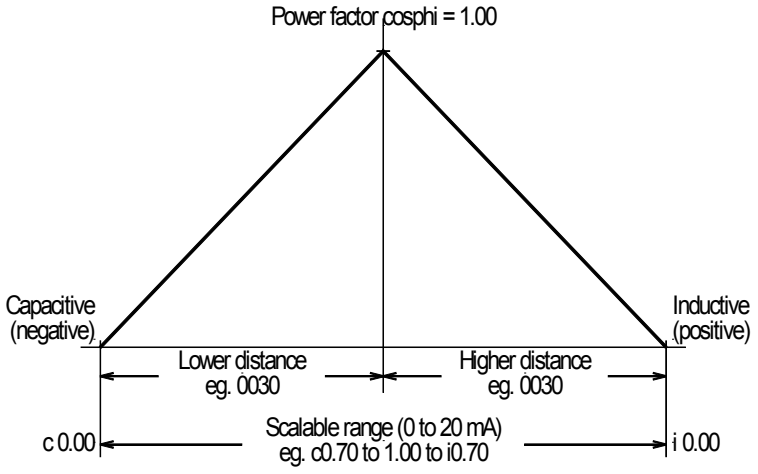


Figure 7–7: Analog outputs - power factor scaling

Examples

V_{G12} = 103, Exponent = 2
103 x 10^2 [V] = 1,030 [V] = 10.3 kV

I_{G1} = 80, Exponent = -1
80 x 10^{-1} [A] = 8.0 [A] = 8.0 A

P_{GN} = 123, Exponent = 4
123 x 10^4 [W] = 1,230,000 [W] = 1.23 MW

P_{GN} = 803, Exponent = 2
803 x 10^2 [W] = 80,300 [W] = 80.3 kW

f_{GN} = 5230
5230 [Hz / 100] = 52.30 [Hz] = 52.3 Hz

Cos phi = 87
87 [Cos phi / 100] = 0.87 [Cos phi] = i0.87

Framework Data for the Interfaces

Framework Data to Procedure 3964 (TTY, RS-232, RS-485)

String length.....8 bit
Stop bit.....1 bit
Parity bit .....1 bit with even parity
Idle state.....This corresponds to the state log. "1" (20 mA with TTY)
Data format .....16 bit binary value
Transmission rate.....9,600 Baud.
Other baud rates on request. The records are transferred cyclically.

RK 512 interpreter procedure: See Siemens documentation on procedure 3,964.

Framework Data for Hardware Handshaking RTS/CTS (RS-232, RS-422)

String length.....8 bit
Stop bit.....1 bit
Parity bit .....1 bit with even parity
Idle state.....This corresponds to the state log. "1" (20 mA with TTY)
Data format .....16 bit binary value
Transmission rate.....9,600 Baud.
Other baud rates on request. The records are transferred cyclically.

Procedure: When the transmitter is ready for data transmission, it notifies the receiver of this by switching its control line RTS to "ON". The prerequisite of this is that no data are received (CTS = "OFF"). The receiver registers this status and indicates its readiness to receive by switching its RTS line to "ON". The transmitter can then begin transmitting when it detects this "ON" status on its CTS line. As soon as the receiver withdraws its RTS signal (RTS = "OFF"), the transmitter interrupts its transmission and waits until the receiver is ready to receive again. The initialization conflict (both subscribers set the RTS line simultaneously) and timeout (one subscriber waits in vain for a reply) must be taken into consideration.

Framework Data for Modbus RTU Slave

Transmitting protocol .....Modbus RTU Slave
Hardware .....Interface RS-485
Transmission rate.....adjustable
Slave address .....adjustable
Parity.....adjustable

A maximum of 10 words can be read or 4 words written with one command. Modbus function codes 03, 04, 06 and 16 are supported.

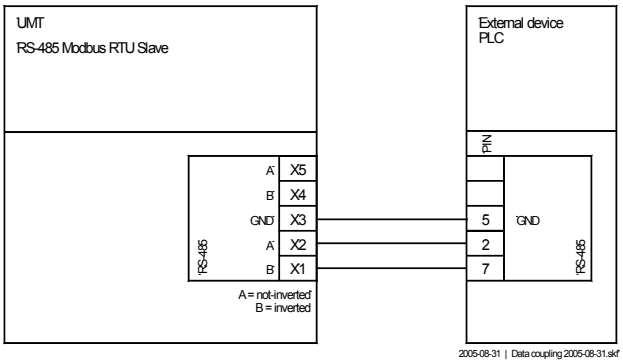


Figure 7–8: Interface - Modbus connection

Framework Data for CAN Bus

Transmitting protocol.....CAN (CiA)
Hardware.....CAN bus
Transmission rate .....adjustable
Special characteristic.....Bt0 = 03, Bt1 = 1C

Every 200 ms a data telegram of 8 bytes is sent, which is structured as follows (all word variables are in the high byte / low byte format):

Transmission Data

ID .....Base ID sending + CAN number

Byte 1 .....Multiplexer [1 to 9]
Byte 2 .....always 221
Byte 3/4 .....1. data word (note table, no. 1), multiplexed (MUX = 1, 1)
Byte 5/6 .....2. data word (note table, no. 2), multiplexed (MUX = 1, 2)
Byte 7/8 .....3. data word (note table, no. 3), multiplexed (MUX = 1, 3)
Byte 9/10 .....4. data word (note table, no. 4), multiplexed (MUX = 2, 1)
Byte 11/12 .....5. data word (note table, no. 5), multiplexed (MUX = 2, 2)
etc.

General

No IDs can be assigned twice in the system. This applies for all devices coupled to the CAN bus system. Likewise all IDs set on the unit must be set to different values.

Procedure for base-ID transmission: All units available in the bus system are assigned to the same "Base ID transmission". The types of information are grouped in this way.

Example: The base ID transmission = 800 is used with all units. The individual ID's are assigned to the various unit numbers.

Unit number 1: ID = 801
Unit number 2: ID = 802
etc.

Procedure for base ID control: The same procedure applies for base-ID control. (Standard value 224)

Framework Data for Profibus DP

Receiving Range

Byte 0 and the following..... Telegram according to description

Example:..... No. 1 - Byte 0/1 = telegram header "302"
No. 2 - Byte 2/3 = voltage L12
No. 3 - Byte 4/5 = voltage L23
No. 4 - Byte 6/7 = voltage L31
etc.

Byte 185..... The bit 0 toggles every 2.5 seconds. This can be used for control if the interface still functions flawlessly.

Transmitting Range (Option SB)

Byte 0..... Block pre-selection (is not taken into account)
Byte 1..... The bit 0 is used as a watchdog. If monitoring is enabled in the configuration screen, this bit must be toggle every 4 seconds. The unit monitors this and possibly triggers a fault and reinitializes the interface.
Byte 8/9 ..... Control word 1
Byte 10/11 ..... Control word 2
Byte 12/13 ..... Control word 3

Connection Example

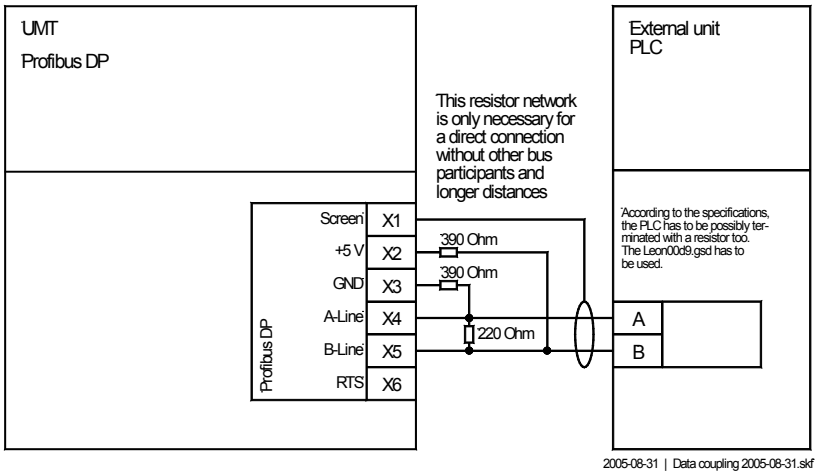


Figure 7-9: Interface - Profibus DP slave

Appendix F.
List of Parameters

Product number P/N _____ Rev _____

Version UMT 1 _____

Project _____

Serial number S/N _____ Date _____

Option	Parameter	Setting range 100/400/690 V	Default setting	Customer setting	
BASIC DATA					
	Software version	-	-		
	SPRACHE/LANGUAGE	German/English	German	☐ G ☐ E	☐ G ☐ E
	Coding	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
	Enter code number	0000 to 9999	-		
	Password Protection	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Define level 1 code	0000 to 9999	0001		
	Define level 2 code	0000 to 9999	0002		
	Direct para.	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
MEASUREMENT					
	Volt. transformer secondary	50 to 125 / 50 to 480 V	100/400 V		
	Volt. transformer primary	00.100 to 65.000 kV	00.400 kV		
	Current transf.	1 to 9999/1 A 1 to 9999/5 A	1000/1 A 1000/5 A		
	Connection type	1W / 1W4 / 1W3 / 2W3 / 2W4	2W4		
	Voltage transd. secondary	50 to 120 / 50 to 480 V	100/400 V		
	Gen voltage primary	0.10 to 650.00 kV	0.40 kV		
	Current transd.	10 to 9,990/1 A 10 to 9,990/5 A	1,000/1 A 1,000/5 A		
	Measurement	1W / 1W4 / 1W3 / 2W3 / 2W4	2W4		
	Pulse output P.duration	0.04 to 1.00 s	0.10 s		
	Pulse output	+kWh / -kWh / +kvarh / -kvarh	+kWh		
	Pulse/kvarh Logic	positive/negative	negative	☐ p ☐ n	☐ p ☐ n
	Reactive energy Pulse/kvah	0.1 to 150.00	1.0		
	Pulse/kWh Logic	positive/negative	negative	☐ p ☐ n	☐ p ☐ n
	Active energy Pulse/kWh	0.1 to 150.00	1.0		
	Display kWh +- on?	YES/NO	YY		
	Display kvarh +- on?	YES/NO	YY		
	RESET kWh/kvarh	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
	Refresh time Display	1 to 5 s			
	Measuring filter Voltage	OFF / 0.04 to 2.56 s			
	Measuring filter Current	OFF / 0.04 to 2.56 s			
	Measuring filter Power	OFF / 0.04 to 2.56 s			
	Measuring filter Frequency	OFF / 0.04 to 2.56 s			

Option	Parameter	Setting range 100/400/690 V	Default setting	Customer setting	
ANALOG OUTPUT CONFIGURATION					
A2/3/6 A1/4/8	**Analog output 1**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
..	**Analog output 1**	see table at the end of this parameter list	Active power		
	Analog output 0/-10 mA 0/4/-20 mA		0 kW		
A2/3/6 A1/4/8	**Analog output 10 V 20 mA**		500 kW		
A3/6 A4/8	**Analog output 2**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
..	**Analog output 2**	see table at the end of the list of parameters	cosphi		
	Analog output 0/-10 mA 0/4/-20 mA		cap 0.50		
A3/6 A4/8	**Analog output 10 V 20 mA**		ind 0.50		
A3/6 A4/8	**Analog output 3**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
..	**Analog output 3**	see table at the end of the list of parameters	Current L1		
	Analog output 0/-10 mA 0/4/-20 mA		0 A		
A3/6 A4/8	**Analog output 10 V 20 mA**		1,000 A		
A4/6/8	**Analog output 4**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
..	**Analog output 4**	see table at the end of the list of parameters	Current L2		
..	**Analog output 0/-10 mA 0/4/-20 mA**		0 A		
A4/6/8	**Analog output 10 V 20 mA**		1,000 A		
A6/8	**Analog output 5**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
..	**Analog output 5**	see table at the end of the list of parameters	Current L3		
..	**Analog output 0/-10 mA 0/4/-20 mA**		0 A		
A6/8	**Analog output 10 V 20 mA**		1,000 A		

Option	Parameter	Setting range 100/400/690 V	Default setting	Customer setting	
ANALOG OUTPUT CONFIGURATION					
A6/8	**Analog output 6**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
	Analog output 6	see table at the end of the list of parameters	Frequency		
	Analog output 0/-10 mA 0/4/-20 mA		45.00 Hz		
A6/8	**Analog output 10 V 20 mA**		55.00 Hz		
A8	**Analog output 7**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
	Analog output 7	see table at the end of the list of parameters	Re-active power		
	Analog output 0/-10 mA 0/4/-20 mA		0 kvar		
A8	**Analog output 10 V 20 mA**		500 kvar		
A8	**Analog output 8**	OFF -20 to +20mA 0 to 20 mA 4 to 20 mA	-20 to.+20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA	☐ OFF ☐ -/+20mA ☐ 0-20mA ☐ 4-20mA
		OFF -10 to +10 V 0 to 10 V	-10 to +10V	☐ OFF ☐ -/+10V ☐ 0-10V	☐ OFF ☐ -/+10V ☐ 0-10V
	Analog output 8	see table at the end of the list of parameters	Apparent power		
	Analog output 0/-10 mA 0/4/-20 mA		0 kVA		
A8	**Analog output 10 V 20 mA**		500 kVA		
INTERFACE CONFIGURATION					
S3964	**Data block RK512**	0 to 255	0		
S3964	**Data word RK512**	0 to 255	0		
SPRO	**Device number Profibus**	0 to 126	1		
SMOD	**Device number Modbus**	1 to 255	1		
	Baudrate	1200 / 2400 / 4800 / 9600 / 19200 Baud	9600 Baud		
	Parity	none/even/odd	none		
	Stopbits	one/two	one		
SMOD	**Delay to send Modbus**	0.2 to 50.0 ms	0.0 ms		
SCAN	**CAN no.**	1 to 8	1		
	Baudrate	125 / 250 / 500 kBaud	125 kBaud		
	Base-ID (send)	0 to 2,015	800		
SCAN	**Base-ID (remote)**	0 to 2,015	224		

Value	Lower and upper setting value	
	0 V, -10 V 0 mA, 4 mA, -20 mA	10 V, 20 mA
U L1-N	0 to 65,000 V	
U L2-N	0 to 65,000 V	
U L3-N	0 to 65,000 V	
U L-N mean value	0 to 65,000 V	
U L-N max. value	0 to 65,000 V	
U L-N min value	0 to 65,000 V	
U L1-L2	0 to 65,000 V	
U L2-L3	0 to 65,000 V	
U L3-L1	0 to 65,000 V	
U L-L mean value	0 to 65,000 V	
U L-L max. value	0 to 65,000 V	
U L-L min. value	0 to 65,000 V	
Frequency	30.00 to 80.00 Hz	
I L1	0 to 9,999 A	
I L2	0 to 9,999 A	
I L3	0 to 9,999 A	
I 1-3 middle value	0 to 9,999 A	
I 1-3 max.value	0 to 9,999 A	
I 1-3 min.value	0 to 9,999 A	
I L1 (+/-)*	-9,999 to 9,999 A	
I L2 (+/-)*	-9,999 to 9,999 A	
I L3 (+/-)*	-9,999 to 9,999 A	
I 1-3 (+/-)midd. *	-9,999 to 9,999 A	
I 1-3 (+/-)max. *	-9,999 to 9,999 A	
I 1-3 (+/-)min. *	-9,999 to 9,999 A	
Active power	-32,000 to 32,000 kW	
Reactive power	-32,000 to 32,000 kvar	
Apparent power	0 to 32,000 kVA	
power factor	i0.50 to 1.00 to c0.50	

* The symbol of the current values is defined via the polarity of the active components.

Table 7-1: Analog outputs, table of values

Appendix G.
Service Options

Product Service Options

The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed. If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned to Woodward for repair, please contact Woodward in advance to obtain a Return Authorization Number. When shipping the unit(s), attach a tag with the following information:

- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part numbers (P/N) and serial number (S/N);
- description of the problem;
- instructions describing the desired repair.

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.*

Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

Return Authorization Number RAN

When returning equipment to Woodward, please telephone and ask for the Customer Service Department in Stuttgart [+49 (711) 789 54-0]. They will help expedite the processing of your order through our distributors or local service facility. To expedite the repair process, contact Woodward in advance to obtain a Return Authorization Number, and arrange for issue of a purchase order for the unit(s) to be repaired. No work can be started until a purchase order is received.

NOTE

We highly recommend that you make arrangement in advance for return shipments. Contact a Woodward customer service representative at +49 (711) 789 54-0 for instructions and for a Return Authorization Number.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part numbers P/N (XXXX-XXX) that is on the enclosure nameplate;
- the unit serial number S/N, which is also on the nameplate.

How to Contact Woodward

Please contact following address if you have questions or if you want to send a product for repair:

Woodward GmbH
Handwerkstrasse 29
70565 Stuttgart - Germany

Phone: +49 (711) 789 54-0 (8.00 - 16.30 German time)
Fax: +49 (711) 789 54-100
e-mail: stgt-info@woodward.com

For assistance outside Germany, call one of the following international Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Facility	Phone number
USA	+1 (970) 482 5811
India	+91 (129) 409 7100
Brazil	+55 (19) 3708 4800
Japan	+81 (476) 93 4661
The Netherlands	+31 (23) 566 1111

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**www.woodward.com**) for the name of your nearest Woodward distributor or service facility. [For worldwide directory information, go to **www.woodward.com/ic/locations**.]

Engineering Services

Woodward Industrial Controls Engineering Services offers the following after-sales support for Woodward products. For these services, you can contact us by telephone, by e-mail, or through the Woodward website.

- Technical support
- Product training
- Field service during commissioning

Technical Support is available through our many worldwide locations, through our authorized distributors, or through GE Global Controls Services, depending on the product. This service can assist you with technical questions or problem solving during normal business hours. Emergency assistance is also available during non-business hours by phoning our toll-free number and stating the urgency of your problem. For technical engineering support, please contact us via our toll-free or local phone numbers, e-mail us, or use our website and reference technical support.

Product Training is available on-site from several of our worldwide facilities, at your location, or from GE Global Controls Services, depending on the product. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability. For information concerning training, please contact us via our toll-free or local phone numbers, e-mail us, or use our website and reference ***customer training***.

Field Service engineering on-site support is available, depending on the product and location, from our facility in Colorado, or from one of many worldwide Woodward offices or authorized distributors. Field engineers are experienced on both Woodward products as well as on much of the non-Woodward equipment with which our products interface. For field service engineering assistance, please contact us via our toll-free or local phone numbers, e-mail us, or use our website and reference ***field service***.

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Contact

Your company _____

Your name _____

Phone number _____

Fax number _____

Control (see name plate)

Unit no. and Revision: P/N: _____ REV: _____

Unit type UMT 1_____

Serial number S/N _____

Description of your problem

_____

_____

_____

_____

_____

_____

Please be sure you have a list of all parameters available.

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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