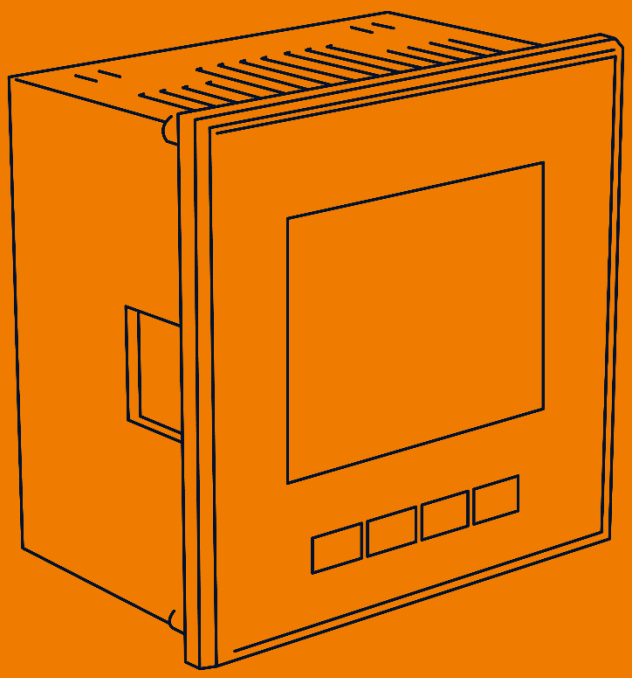
wöhner



MIEZ

Multifunctional Measuring Device

ALLES MIT SPANNUNG

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Content

1 Connecting the device

1.1 Mounting

The 37000/37001/37002 front panel device is built into a plastic housing and mounted on a distribution panel. The position of the device must be fixed with a securing means.
There should be natural air circulation inside the distribution cabinet and in the area around the unit (especially below it). No other device with a heat source should be installed, otherwise the measured temperature values could be incorrect.

1.2 Power supply

The supply voltage (according to technical specifications) is connected to terminals AV1 (no. 9) and AV2 (no. 10) via a disconnecting element (switch - see wiring diagram). This must be located near the device, easily accessible to the user and labeled as such. A disconnector with a rated current of 1 A is suitable for this. However, its functional and operational positions must be clearly marked. The maximum cross-section of the connecting cable is 2.5 mm².
With DC supply voltage, the polarity of the connection is generally free. It is recommended to connect the grounded terminal to the AV2 terminal.

Following table specifies power supply according to modell number:

Modell	37000, 37001	37002
Power supply	85 ÷ 275 VAC / 40 ÷ 100 Hz 80 ÷ 350 VDC	20 ÷ 50 VAC / 40 ÷ 100 Hz 20 ÷ 75 VDC

1.3 Measured voltages

The measured phase voltages are connected via the terminals L1 (12), L2 (13) and L3 (14). The usual terminal for the connection of the neutral conductor is marked N (No. 11; remains unused with a delta circuit and an Aron circuit). For the protection of the voltage lines, 1 A fuses are suitable, for example. Measuring voltages can also be connected via voltage transformers.
The maximum connectable conductor cross-section of the connecting cable is 2.5 mm².

1.4 Measured currents

The devices were developed only for indirect current measurement via external current transformers. The correct signal polarity (S1, S2- connection) must be observed. The polarity can be checked by the sign of the phase powers on the instrument display (if the direction of energy transfer is known).
The voltage signals of 5 A or 1 A measuring current transformers (or 0.1 A for the "X/100mA" models) must be connected to the I1k, I1l, I2k, I2l, I3k, I3l terminal pairs (nos. 1÷ 6). And in parameter P.01 (see below) the current transformer ratio must be set.
The connections I2k, I2l remain free with the Aron circuit.
The maximum connectable conductor cross-section of the connecting cable is 2.5 mm².

2 Basic operation

When the power supply is connected, the display shows all the segments and then, step by step, the type of device and the settings of the basic parameters.

1. Row 1 133 - Number device type
   Row 2 5A Current input type:
   Row 3 r1- Digital output type: relay (r), pulse (i) or none (n)
2. When connecting the voltage via voltage transformer (otherwise this screen is skipped):
   Row 1 Ut - ID of the connected voltage transformer
   Row 2 Nominal primary voltage [kV]
   Row 3 0.1 Nominal secondary voltage [kV]
3. Row 1 Ct- Specification current transformer/range
   Row 2 Nominal primary current [A]
   Row 3 Nominal secondary current [A]
4. Row 1 FU - Nominal frequency and voltage
   Row 2 Nominal frequency
   Row 3 Nominal voltage

After that, the device displays the actual measured values. If the device has a data cable, it can be configured at the same time so that the measured values can be read out on a PC via a communication link.

2.1 Setup

Next, the device parameters that are most important for a proper measurement must be set:

- Current transformer ratio - parameter 01 (and its multiplier, optional)
- Connection type - parameter 02 (wye, Delta, Aron)
- Connection mode - parameter 04 (direct or via voltage transformer, voltage transformer ratio and its multiplier, optional).
- Nominal frequency $\mathbf{f_{NOM}}$ and nominal voltage $\mathbf{U_{NOM}}$ - double parameter 05

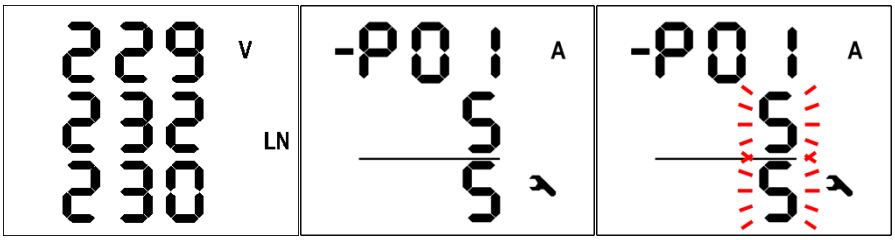
Normally, only the current transformer ratio needs to be set.

This is illustrated in the example below:

Here it is assumed that the ratio of the current transformers used is 750/1 A. First, it is necessary to switch the display from the Measurement Data mode (the ULN screen in the following example) to the Parameter mode using the key P.

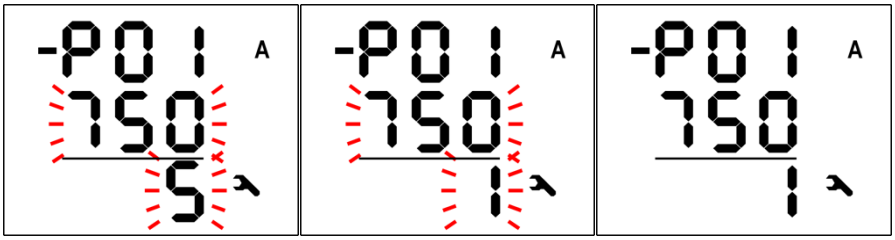
The range is displayed above the icon . Parameter 01 is displayed - this parameter is the current transformer ratio. The default value is 5/5 A.

To change this, activate the edit mode by pressing and holding P until the value starts blinking. Then you can release P .



Now you can change the values. The first one is increased by pressing ▲, and if you keep the key pressed, the value increases faster. For fine adjustment, press ▲ and ▼ .

To change the second value, press M. This key allows toggling between 5 and 1.



The target value for the current transformer is now set and the editing mode can be ended by (briefly) pressing P. The value is then stored in the device memory and no longer flashes.

After returning to the parameter selection by pressing P you can switch over to other parameters and change these in the same way by pressing ▲ and ▼, or you can return to the Measured data area by pressing M .

A summary of all device parameters is given in the table *Device parameters*. The corresponding descriptions are set out in the following chapters.

2.2 Measurement data

After start-up, the device displays the actual measured values and shows the screen used the last time before the unit was switched off. You can switch across all measured and selected values by using the keys ▲ , ▼ and M as shown below in the table *Navigation measured data*.

When phase values are displayed, the individual phase values for L1 / L2 / L3 are shown in lines 1 / 2 / 3. If a three-phase value is displayed, it will be displayed in line 2 and the symbol **Σ** will appear.

The meanings and evaluation formulas for the quantities are included in the corresponding chapter below.

Most of the data is arranged in four columns:

- Actual Actual values, updated every 3 measuring cycles (30/36 main cycles)
- Avg Average values per corresponding averaging period (see below)
- AvgMax Maximum value of the average vale since the last deletion
- AvgMin Minimum value of the average value since the last deletion

You can scroll up and down within a column using the ▲ and ▼ keys and move horizontally to the next column in sequence using the key M.

Exception: Only actual values of harmonics and electrical energy are available. These values are displayed in a different way - see below.

2.3 Average values

Average values are processed according to the set method of average calculation and the length of the average calculation window (individually for "U/I" group and "P/Q/S" group of the quantities). Maximum and minimum values are stored in the device memory. The maximum values are displayed in the "AvgMax" column and marked with the symbol ▲ in front of the value. Similarly, the minimum values in the "AvgMin" column are marked with the symbol ▼.

! **Neither the maximum nor the minimum value of cosφ are evaluated due to the special properties of the quantity. Similarly, these extreme values are also not evaluated for harmonics.**

You can delete the values for "AvgMax" and "AvgMin". All maximum/minimum values of the corresponding variable group are erased at the same time. This will be carried out as follows:

- Go to the corresponding value for AvgMax or AvgMin.

- Press the key M until the value flashes.
- Use the key ▲ or the key ▼ to select the option CLr.
- Then press M to confirm this.

! **The corresponding group (U/I or P/Q/S) of the average maximum/minimum values is deleted by simple deletion alone! Each group must be deleted individually.**

Deletion is not possible when the device is locked.

2.4 Full spectrum values P/Q/PF & fund. frequency harmonic values Pfh/Qfh/cos φ

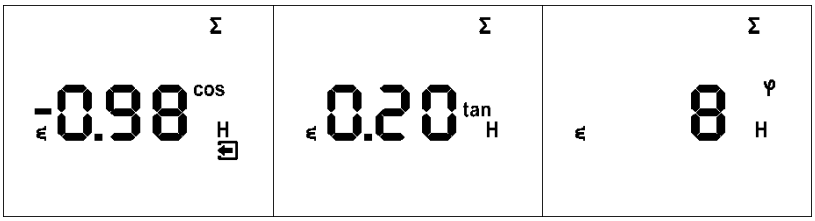
By default, active and reactive powers (and so the power factor) are evaluated over the full spectrum of the harmonic components of voltage and current.
Sometimes (for example for testing the compensation system) it is helpful to know also the fundamental frequency part of these quantities. These quantities are labeled as Pfh, Qfh and cos φ.
As can be seen from the navigation overview, you can switch back and forth between the *Full Spectrum Values* area and the *Fundamental Frequency Harmonic Values* area by pressing the key M. To be able to distinguish between these, the symbol **H** appears when Fundamental Frequency Harmonic Values is selected.
Exception: Actual values only of fundamental frequency harmonic power factor - cos φ - are evaluated (no average values available). Then this fundamental frequency harmonic power factor can be expressed not only as cos φ, but also as tan φ or φ, depending on parameter 09.

2.5 Fundamental frequency harmonic power factor formats cosφ/tanφ/φ

The power factor of the fundamental frequency can not only be expressed as cos φ, but also as tan φ oder φ, depending on parameter 09.
To fully specify the quadrant, the power factor of the fundamental frequency harmonic component has two attributes:

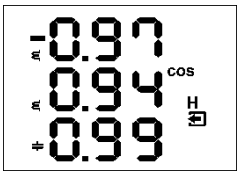
- a sign (+ or -) indicating the polarity of the corresponding active power
- a symbol ∈ or ∋, indicating the type of power factor

Examples of three-phase fundamental frequency power factor displays are shown in the following figures.



- Left figure: **Σcos φ** = 0.98 inductive (choke coil symbol displayed). The active three-phase power is negative, so a "minus" sign is used as a sign (and the symbol is displayed).
- Middle figure: **Σtan φ** = 0.20 inductive. Active three-phase power is positive.
- Right figure **Σφ** = 8 degrees inductive. Active three-phase power is positive.

The following figure contains examples of phase cos φ:



- cos φ1 = 0.97 inductive. L1-phase active power is currently negative (due to the preceding "minus" sign)
- cos φ2 = 0.94 inductive (L2- phase active power is currently positive)
- cos φ3 = 0.99 capacitive (L3-phase aktive power is currently positive)

2.6 THDs and harmonic components

You can check the actual values of the THDs and harmonic components for voltage and current in the corresponding lines (see *Measurement data navigation*).
If you scroll to one of these lines, all THD values of all measured phases are displayed by default. The symbols **THD - V - LN** or **THD - A** indicate THD values for phase voltage and phase current, respectively.

Use key M to switch to the harmonic components. The symbol **H** is displayed and stands for harmonic components (of voltage or current). The symbol % means that the values are expressed as a percentage of the fundamental frequency harmonic component. The order of the harmonic currently displayed flashes regularly in the middle line of the display. For example, **H03** stands for the 3rd harmonic.

By pressing the key M repeatedly, you can check other harmonics. Even though the unit internally evaluates all harmonic components up to the 40th order, only odd components up to the 25th order can be shown in the display (the full spectrum is only available via the communication interface).

2.7 Electricity meter

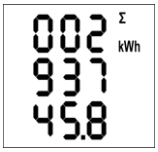
The electricity meter includes three-phase energy data and the maximum three-phase setpoint for the active power. The values are arranged in a specific line.
Depending on parameter 08, two display modes can be selected for the electricity meter:

- “4E+Pmax" mode (default)
- "8E" mode

2.7.1 "4E+Pmax" display mode

In this mode, the first four windows contain the three-phase energies for four quadrants:

- **ΣEP+** three-phase imported active energy given by **Σ - kWh** (or **MWh** or **kMWh** = GWh)
- **ΣEP-** three-phase exported active energy indicated by **Σ - kWh** and with sign **-**
- **ΣEQL** three-phase inductive reactive energy indicated by **Σ** – **kVArh** - **L**
- **ΣEQC** three-phase capacitive reactive energy indicated by **Σ** – **kVArh** - **C**



Each value uses three display lines, 8 digits before the decimal point and one after. Example on the left, ΣEP+ = 293745.8 kWh.
Values are recorded since the last deletion. To delete the energies, you must display them and then use the same procedure as for the max/min averages. All energies are deleted at the same time and counting starts again from zero.
In the 5th window there is

- **ΣPavgmaxE** Maximum value of the average three-phase active power (power demand), indicated by **Σ** - **kW** - ▲ and dash above the value (drag pointer value)

The value is the maximum of the average three-phase active power since the last deletion. The method and time interval for averaging this value can be set independently, regardless of the method for the default averages as described above. This quantity is marked with the letter "E" to distinguish it from the standard average quantities for the maximum value. Similar to the energies, the value can be deleted independently.

Deletion is not possible when the device is locked.

! **If the unit is equipped with a communication interface, the values can be deleted remotely.**

2.7.2 "8E" display mode

In this mode, the separately registered reactive energies are displayed according to the sign of the three-phase actual power (ΣP) ("six-quadrant" mode; this format can be useful for monitoring renewable sources.)

For example:

- **ΣEP+** three-phase imported active energy given by **Σ - kWh** (or **MWh** or **kMWh** = GWh)
- **ΣEP-** three-phase exported active energy indicated by **Σ - kWh** and with sign **–**
- **ΣEQL+** three-phase inductive reactive energy registered while ΣEP value was positive (import); indicated by **Σ - kVArh - L**
- **ΣEQL-** three-phase inductive reactive energy registered while ΣEP value was negative (export); indicated by **Σ - kVArh - L** and signed **–**
- **ΣEQC+** three-phase capacitive reactive energy registered while ΣEP was positive; indicated by **Σ - kVArh - C**
- **ΣEQC-** three-phase capacitive reactive energy registered while ΣEP value was negative; indicated by **Σ - kVArh - C** and signed **–**

Furthermore, energies in VAh are available:

- **ΣES+** three-phase apparent energy registered while ΣEP value was positive; indicated by **Σ - kVAh**
- **ΣES-** three-phase apparent energy registered while ΣEP value was negative; indicated by **Σ - kVAh** and signed **–**
  The demand for three-phase active power $\mathbf{\Sigma P_{avgmaxE}}$ is not displayed in this mode.

2.8 Symbols device state

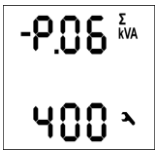
With the exception of the measurement data, the unit displays the following states with corresponding symbols:

- Export of three-phase active power. Displayed when the ΣP value is negative.
- A1 (top) and A2 (bottom) alarm lights off/on.
  See output setting below (Table 1, No. 11).
- DI1 Digital input is active.
- Device parameters are displayed.

2.9 Device parameters

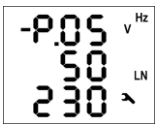
The device must be setup beforehand to work properly. This is done via the parameters, e.g. for current transformer setting, type of voltage connection (direct connection or via voltage transformer and its ratio) and type of connection (wye/Delta/Aron). An overview of all parameters is given in the Table 1.

To check or edit the parameters, press the key **P**. By default, parameter group 01 is displayed and the symbol (spanner) indicates that setup data can now be displayed and changed.



The parameters are arranged in groups, numbered from 00 upwards. The number of the group is shown in the first line in the format - P.nn (preceded by a dash). You can move through the parameter groups with the keys ▲ and ▼..

If there is only one parameter in the group, the corresponding value is displayed in the bottom line, as shown in the example (nominal power 400 kVA).



If there are two parameters in the group, the first of them is normally displayed in the 2nd line and the second in the 3rd line (nominal frequency 50 Hz and nominal voltage 230 V).

To edit a specific parameter, scroll to the appropriate group. Then keep the key **P** pressed until the value flashes. Now release the key and set the target value with ▲ or ▼, or press **M** for some parameters. You can change the values more quickly by holding down the arrow keys. To store the value in the memory, press **P** .

If the group contains several parameters, the first value is selected when the editing mode is started for the first time. If you only want to change the second parameter, simply stop editing the first parameter without making any change and go back to edit mode. Now the second parameter is selected.

To return to the display of the measured values, simply press the key **M**.

2.10 Device setting Lock/Unlock

In the delivery setting, the parameter editing is unlocked, i.e.:

- all parameters can be edited
- standard values for average maximum/minimum, energies of the electricity meter ΣEP+, ΣEP- etc. and the maximum power demand of the electricity meter $\Sigma P_{avgmaxE}$ can be deleted

After commissioning, this function can be locked to protect the unit from unauthorised modifications. Then the operator can only check the readings and parameters, but cannot change anything about them, except for the special parameter 00, which is used to lock/unlock the unit. It has two values:

LOC Device is locked

OPn Device is not locked (open)

If the unit is locked, you can unlock it as follows (similar to editing other parameters):

1. Press the key P and scroll to parameter group 00 with the arrow keys - the value LOC is displayed.
2. Keep the key pressed until the value is replaced by a flashing number between 000 and 999. For example, assume that 345 is flashing.
3. Press the following sequence: ▼, ▲, ▲, ▼.. The value changes step by step to 344, 345, 346, 345 so that at the end the same value is displayed as at the beginning.
4. Press P. The flashing number is replaced by OPn and the device is now unlocked.

The number displayed when entering the key sequence is chosen at random and is not relevant for correct unlocking (it is only meant to confuse). Only the order in which the keys are pressed is important and must be followed exactly.

The device can also be locked again in the same way as it is unlocked. However, it is necessary to correctly enter each key sequence that differs from the unlock sequence above.

2.11 Display contrast

As the display contrast depends on the environmental conditions, fine adjustment may be necessary. To do this, press and hold the keys ▲ and ▼ simultaneously.

After that, the message COn is displayed in the first line and the contrast value in the second line.

If the display is too bright, hold down the key ▼ and adjust the setting by repeatedly pressing the key ▲.

If the display is too dark, hold down the key ▲ and adjust the setting with ▼ .

Then release the key to set the new contrast.

Table 1 Multifunction meter 3700X Parameters

#	Parameter group	Domain	Default	Comment
00	Lock	LOC / OPN	OPN	see device setting Lock/Unlock
01	Current transformer ratio Page 1 Line 2: primary current rating Line 3: secondary current rating (Models: X/100mA, X/333mV; fixed setting.) Page 2 MUL - Factor current	 primary 1A ÷ 10 kA sec.: 5A/1A (0.1A) (0.1A, 0.333V) 0.001 - 999	5 / 5 A 1	Select secondary current with key M .
02	Connection type	3Y / 3D / 3A	3Y	3Y = TN network 3D = IT network 3A = Aron circuit
04	Connection mode direct (- -) or voltage transformer Page 1 Line 2: U primary [kV] Line 3: U secondary (0.1 kV fixed) Page 2 MUL – Factor voltage	 0.001 kV÷65 kV 0.001kV÷0.999 kV 0.001 - 999	direct (- - -) 1	
05	f_{NOM}, U_{NOM} Line 2: f_{NOM} [Hz] Line 3: U_{NOM} [V / kV]	 50 / 60 Hz 50 V ÷ 1 MV	 50 230	U_{NOM} specification depending on connection mode: - direct: outer conductor-neutral conductor - via voltage transformer: outer conductor-outer conductor

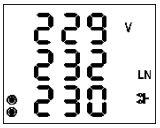
06	ΣP_{NOM} [kVA / MVA]	1 kVA ÷ 999 MVA	-	
07	Averaging time Line 2: for U/I group Line 3: for P/Q/S group	0.01 ÷ 60 (1 s ÷ 60 min)	 1 min 15 min	floating window, by default averaging method; thermal method shown with symbol ▲
08	Averaging time for $\Sigma P_{avgmaxE}$. Electr. measurement display mode Line 2: Averaging time for $\Sigma P_{avgmaxE}$ Line 3: Electricity meter Display mode	0.01 ÷ 60 (1 s ÷ 60 min) "4E+Pmax" / "8E"	 15 min "4E+ Pmax"	floating window, averaging method
09	Fund. frequency - harmonic PF Display format	cos / tan / phi	cos	
10	Backlight	AUT / ON	ON	AUT mode If no key is pressed, the backlighting switches off after approx. 5 minutes.
11	Output settings Line 2: Output DO1 Line 3: Output DO2 Default type "-O-" Pulse type: Pulses / kWh (kvarh) Control energy icon: None ΣEP+ - ΣEP- ε ΣEQL ⫩ ΣEQC	" - - -" = OFF "-O-" = standard output 0.001 - 999 = pulse output	- - - OFF	Selecting control energy with key M Standard output can be only set via communication line, but not directly on the unit. The symbol ▲ indicates that the settings of the alarm light A1 regarding DO1 and A2 regarding DO2 are different. If the pulse output has been set on the unit, A1 and A2 are set identical to DO1 and DO2.

15	Communication for Ethernet: Page 1 DHCP Page 2-5 IP1-IP4 (IP) Page 6-9: MA1-MA4 (Subnet mask) Page 10-13: Gt1-Gt4 (Gateway)	 ON / OFF 0 – 255 0 – 255 0 – 255	 OFF 10.0.0.1 24 Bit 10.0.0.138	KMB / Modbus protocol automatic detection; set to "8" for KMB protocol
19	Device status (read only) Line 2: Error specification Line 3: Serial number & device version (scroll)	 0 ÷ 255 -	 0 -	Line 2: 0 = error-free Line 3: S Serial number F Firmware version b Bootloader version H Hardware version

2.12 Digital outputs & inputs

The units can optionally be equipped with a combination of outputs and inputs. A summary of the possible variations and connection examples is set out at the end of these instructions.
The following inputs and outputs are available:

- two digital outputs - relay (electromechanical, **R**) or pulse (solid-state, **I**)
- one digital input



Furthermore, all device models have two "alarm" lights **A1** and **A2** to indicate various states. These can be considered as additional special digital outputs. The function of these lights can be set like the standard digital outputs.

The behaviour of the digital outputs can be programmed as follows, depending on the requirements:

- *as pulse output mode of the electricity meter*
- *as standard output mode, e.g.* as a simple two-position controller or as a defined status display
- *as remote-control output mode (under external control via a communication link)*

The status of digital input **DI1** is indicated by the symbol and can be used for status monitoring via a communication link.

2.12.1 Terminals Outputs & Inputs

The digital inputs and outputs are connected to terminals on the back of a device according to the following table. The maximum cross-section of the connection cable is 1.5 mm².

Table 2 Connection of digital outputs and inputs (connection example on page 25)

Pin no.	Signal
15, 16	DO1A, DO1B ... digital output DO1
17, 18	DO2A, DO2B ... digital output DO2
19, 20	DI1A, DI1B ..... digital input DI1

All digital outputs and inputs are not only insulated with respect to the internal circuits of the unit, but also mutually. The strength of the connected signal must correspond to the technical I/O data. Signal polarity is free. The maximum conductor cross-section of the connecting cable is 2.5 mm².

2.12.2 Setting the outputs

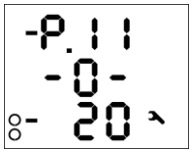
The function of the digital outputs (including alarm lights) can be set either as standard output or as pulse output of the electricity meter.

The function of output DO1 / DO2 can be checked in parameter group 11. Possible adjustment options are:

- - - - output DO1/2 is deactivated
- - 0 - the output DO1/2 is set to the standard output mode (detailed setting only available when using the Wöhner ServieTool via the communication line)
- n n n the output DO1/2 is set to pulse output mode with nnn pulses per kWh; the control variable is ΣEP+ (no symbol displayed).

Further control variable options according to the attached symbol:

- - ΣEP-
- ΣEQL
- ΣEQC



Example:

Output DO1: set to standard output mode (details only via communication link)

Output DO2: set to pulse mode, 20 pulses/kWh for energy ΣEP-.

The setting of the alarm lights A1 and A2 is not displayed. It is only available via a communication line. You can only check if the setting is in line with the corresponding setting for DO1/DO2 - see below.

The pulse output function can be set on the device via parameter group 11.

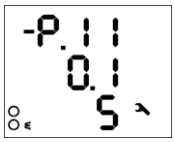
The standard output function can only be used on units that are equipped with a communication link - it can only be adjusted via a connected PC using the Wöhner ServiceTool.
When one of the signal lights (A1, A2) is set, the display shows an overview for both lights. This is hidden when both lights are deactivated.

2.12.3 Pulse output mode

Any of the digital outputs or alarm lights can be set as a pulse output. The frequency of the generated pulses can be adjusted by the electricity meter, depending on the values of the measured electrical energy.

! **You can set not only the I-type (solid-state) outputs to pulse output mode, but also the R-type (electromechanical relay) outputs. Please bear the service life of electromechanical relays in mind since they only have a limited number of switching operations.**

The DO1/2 outputs can be set to pulse output mode manually on the device and via the programming software. Manual setting is done through parameter group 11. In the edit mode, set the parameter (range 0.001÷999) with the arrow keys and select the desired energy with the key M .



Example:
Output DO1: 0.1 pulses / kWh = 1 pulse / 10 kWh, energy ΣEP+ (no additional symbol)
Output DO2: 5 pulses / kvarh, energy ΣEQL (due to symbol ε)

! **By setting one of the outputs DO1/02 on the unit, the corresponding alarm lights A1/A2 are also set automatically. Thus, the activity of DO1/DO2 can be monitored via lights A1/A2 on the unit's display. Separate adjustment of the lights is only possible via the Wöhner ServiceTool. If a light is set differently from the corresponding DO1/DO2 output, the symbol ▲ is displayed in front of the respective setting.**

! **Even if a device is neither equipped with digital output nor with a communication line, you can still set the pulse function of the alarm lights A1, A2 by setting the outputs DO1/DO2.**

If the pulse function mode has been set, the unit evaluates the measured electrical energy every 200 milliseconds. If the increase in recorded electrical power is greater than or equal to the size of a pulse, the unit will send one or two pulses. The mentioned description shows that the flow of the pulse transmissions is +/- 200 ms.

The pulse cycle is 50/50 ms (according to the SO output definition). The maximum frequency is 10 pulses per second.

2.13 Communication interface

Monitoring of the actual values of the measured quantities and the device setting can be be done with a remote computer by means of a communication link. This operation allows you to access also those setting options that are not available on the control panel of the device itself.
The following chapter describes the communication hardware of the device.

2.13.1 Ethernet (IEEE802.3) interface

This interface allows direct integration of the module into a local computer network (LAN). Devices with this interface have therefore a corresponding RJ-45 connector with eight signals (according to ISO 8877). The physical layer corresponds to 100 BASE-T.
The type and maximum length of the required cable must comply with IEEE 802.3.
Each unit must have a different IP address, which is preset during installation. The address can be set either from the instrument panel or by means of the ServiceTool-DAQ. For proof of the actual IP address, you can use the locator function. **(IP address in the delivery state: 10.0.0.1).** The description for the setting procedure can be found in the manual under point 2.1 and 2.11.
On the unit, you can configure the DHCP function (parameter 15, line 2) for a dynamic assignment of the IP address. The actual IP address can be checked in line 3 (the value scrolls).

3 Technical specifications

Accuracy classes* specified in IEC 61557-12	
Voltage:	Cl. 0.5
Current:	Cl. 0.5
Frequency:	Cl. 0.05
Active power:	Cl. 0.5
Reactive power:	Cl. 1
Apparent power:	Cl. 0.5
Harmonics:	Cl. 0.5
Power factor:	Cl. 0.5
cos phi:	Cl. 0.5
Active work:	Cl 0.5S
Reactive work:	Cl. 1S
Apparent work:	Cl. 0.5

* Measurement uncertainties under certain ambient conditions are listed separately for the following measurands.

Measurement variables Frequency & Voltage	
f_{NOM} – Rated frequency	50 / 60 Hz
Frequency measuring range	42 ÷ 57 / 51 ÷ 70 Hz
Measurement uncertainty of frequency	+/- 10 mHz
Model Voltage	„230“(Standard)
U_{NOM} (U_{DIN}) – (U_{L-N})	180 ÷ 250 VAC
Measuring range (U_{L-N})	6 ÷ 375 VAC
Measuring range (U_{L-L})	8 ÷ 660 VAC
Measurement uncertainty (t_A=23±2°C)	+/- 0.05 % of rdg +/- 0.02 % of rng
Measurement category	300V CAT III
Permanent overload	600 VAC ($U_{L–N}$)
Peak overload ($U_{L–N}$ / 1 Sec.)	800 VAC
Load current, impedance	< 0,025 VA Ri = 3,6 MΩ

Current	
I_{NOM} (I_B) – Rated current	1 / 5 AAC
Measuring range	0.005 ÷ 7 AAC
Measurement uncertainty (tA=23±2°C)	+/- 0.05 % of rdg +/- 0.02 % of rng
Measurement category	150V CAT III
Permanent overload (IEC 258)	7.5 AAC
Peak overload - for 1 second, max. repetition rate > 5 minutes	70 AAC
Load current, impedance)	< 0.5 VA (Ri < 10 mΩ)

Temperature (internal temperature sensor)	
Measuring range	-40 ÷ 80°C
Measurement uncertainty	± 2 ºC

Auxiliary voltage (depending on model)		
Range	85 ÷ 275 VAC / 40 ÷ 100 Hz 80 ÷ 350 VDC	20 ÷ 50 VAC / 40 ÷ 100 Hz 20 ÷ 75 VDC
Power	8 VA / 3 W	
Overvoltage cat.	III	
Pollution level	2	
Terminal	insulated, polarity-free	

Digital outputs & Digital inputs	
Relay outputs (optional)	
Type	N.O. contact
Power rating	250 VAC / 30 VDC, 4 A
Digital/pulse output (standard)	
Type	Opto-MOS, bipolar
Power rating	60 VAC / 100 VDC, 100 mA
Digital input (standard)	
Type	opto-coupling, bipolar
Maximum voltage	100 VDC / / 60 VAC
Voltage for "logical 1”	> 10 VDC

Voltage for “logical 0”	< 3 VDC
Input current	1 mA @ 10V / 5 mA @ 24V / 10 mA @ 48V

Other specifications	
Operating temperature	-25 bis 60°C
Storage temperature	-40 to 85°C
Rel. humidity	< 95 % - non-condensing environment
EMC interference immunity	EN 61000 – 4 - 2 (4kV / 8kV); EN 61000 - 4 - 3 (10 V/m up to 1 GHz); EN 61000 – 4 - 4 (2 kV); EN 61000 – 4 - 5 (2 kV); EN 61000 – 4 - 6 (3 V); EN 61000 - 4 - 11 (5 periods)
EMC interference emission	EN 55011, Class A EN 55022, Class A (not for household use)
Remote control connection (opt.)	Ethernet 10/100 Base-T / DHCP, web server, Modbus-TCP
Display	Segment LCD FSTN with backlight
Protection class: **Front** **Rear**	 IP 40 (IP 54 with cover foil) IP 20
Dimensions HxWxD:	96 x 96 x 80 mm
Installation cut-out HxW:	92^{+1} x 92^{+1} mm
Weight:	max. 0.3 kg

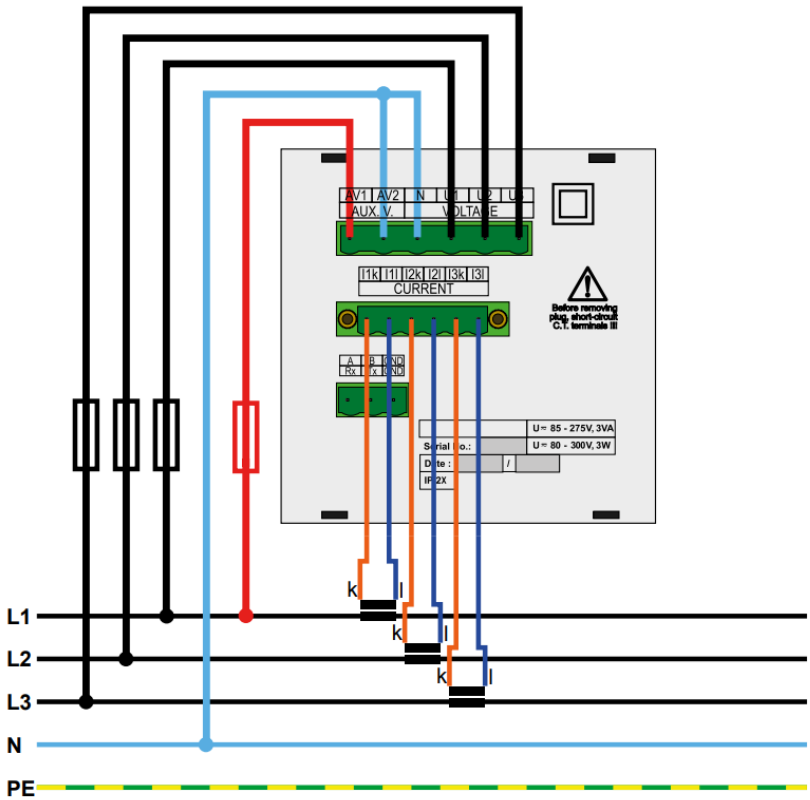


Figure 1: Multifunctional Measuring Device 3700X typical installation TN network, direct star connection ("3Y")

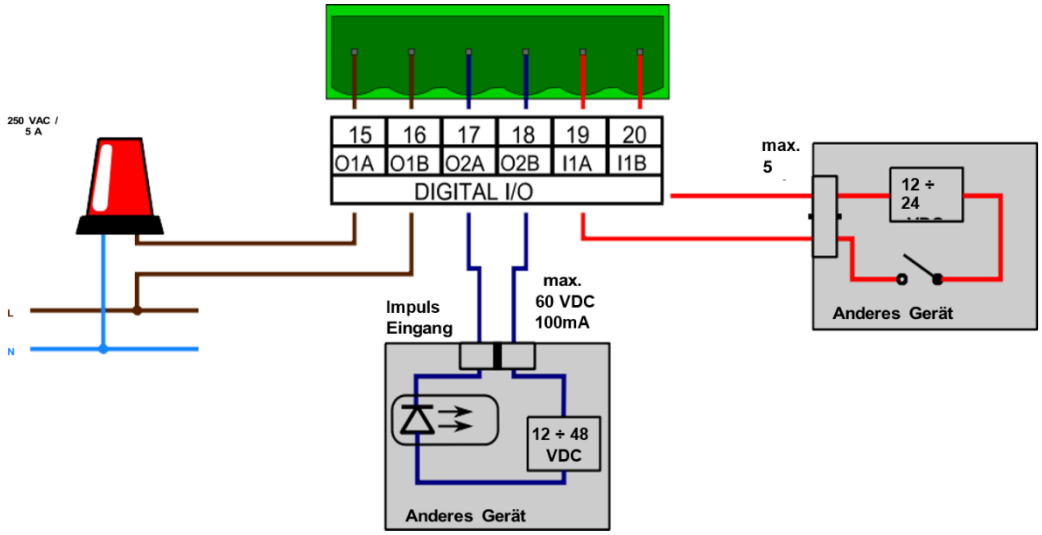


Figure 2: Connection example of the digital inputs/outputs. Output 1 in this example is a relay output (not standard)

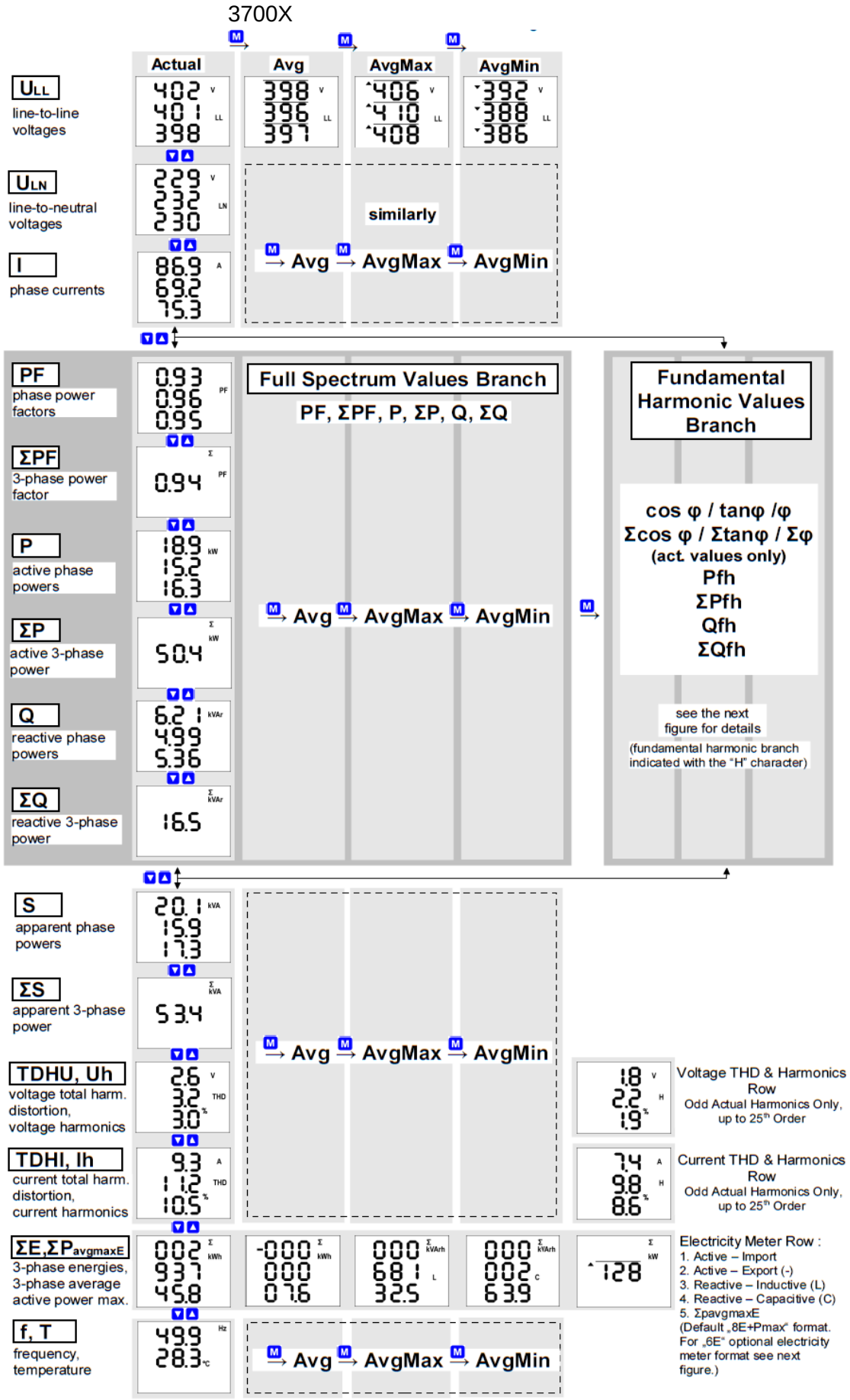


Figure 3: Navigation map measurement data

4 Maintenance, service, warranty

Maintenance: The multifunction meter requires no maintenance during operation. For reliable operation, only the specified operating conditions must be met. The unit must not be subjected to force and must not come into contact with water or chemicals that can cause mechanical damage.

BA 10-2023 94 229 000 B

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