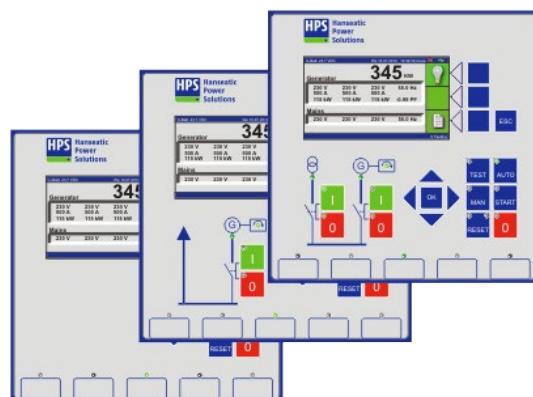


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KAS



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1 General

The compact automatic KAS is a function automatic to control and monitor combustion engines for sprinkler, emergency power, generator parallel and mains parallel systems. The device comes in different assembly variants; standard is a supply voltage of 24 V DC. 12 VDC versions may be supplied on request. The adaptation to different units / systems is carried out conveniently with a modern parameterization software or directly on the display and operating unit KOP 2.

Depending on expansion stage and variant assembly, analogue values can be connected as standardised signals or directly (mains, generator voltage and generator currents). This allows the integration of various protection and function units such as power control, power system protection, synchronization and differential protection. Likewise, supply voltage and optional transmitters (pick-up) can be monitored.

The mains and generator switch are controlled automatically or manually according to the selected operating mode. This also applies to starting and stopping the combustion engine. In using the widely adjustable times and counters, the automatic system can be adapted easily and optimally to any requirement. The presetting of all parameters corresponds to DIN6280 or VDE0100 T718. All parameters are stored zero-voltage-safe in a flash memory.

Extensive internal and external monitoring circles (inputs for error messages) guarantee a safe operation of the system, in which all electrical, mechanical operating equipment and system parts are monitored.

1.1 Functioning

The KAS is a microprocessor-controlled protection device for the collection of all measured values of the monitored system. The system is modular in design. All components are connected via a bus connector (T bus) on the DIN rail. Measurement of the relevant values is a real r.m.s. measurement, by means of simultaneous detection. The value collection includes phase currents, phase voltages, conductor currents, active power, apparent power, reactive power, CosPhi and frequency. Depending on the selected method measuring is performed with or without star point. When measuring without a star point it is not necessary to connect a neutral wire.

All measured values are shown on the graphic display. Limit values, resp. limit value messages can be set to the output relays. A total of 128 messages can be created. 32 freely configurable messages are available for the user.

Frequency measurement will only start at a measuring voltage above 45 V. Below this voltage the KAS works with a preset base frequency of 50 or 60 Hz.

The active power is calculated acc. to the formula:

Therefore the active power derives from the sum of the instantaneous power over a certain period.

$$P = \int_0^t u(t) * i(t) dt$$

The apparent power is calculated from:

It derives from the sum of the r.m.s-values of voltage and current.

$$U = \sqrt{\frac{1}{T} \int_0^T u^2 dt}; I = \sqrt{\frac{1}{T} \int_0^T i^2 dt}$$

The reactive power is calculated from:

$$Q = \sqrt{S^2 - P^2}$$

For integration the period is defined with a frequency measurement. One period means 16 scans. Scanning and evaluation are done with a resolution of 10 bit, appropriately signed.

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1.2 Commissioning

Please connect the KAS acc. to the connecting diagram. After connection of the auxiliary voltage the operating LEDs are flashing and will switch to steady light as soon as all modules are correctly working. The display and operating device will then visualize the initialisation screen. As soon as the system is correctly working all current values will be displayed.

The bus connection to KAS must be shielded. The maximum output length should not exceed 500m. Furthermore an output resistance of 50 Ohm should not be exceeded.

The device has been calibrated ex works, containing the relevant factory default settings. Monitoring starts at an input voltage of approx. 45 V Phase - N. For correct adaptation to each application parameter setting is necessary. The setpoint and trip values have to be checked and adapted to the system, if necessary).



Connection acc. to VDE 0160. Installation and commissioning should only be carried out by skilled and trained professionals.

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2 Device assembly

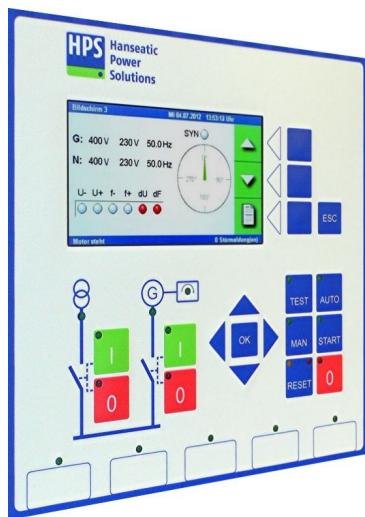
The function unit KAS is a modular system. The display and operating unit is designed for panel mounting with door panel. All further modules are mounted on a DIN rail in random order, connected via bus connector (T-Bus). Power is supplied by the CPU module. Display and operating unit, as well as Profibus module include a separate power supply. The following modules are available:

- ◆ KOP2 - Display and operating module
- ◆ KOP 2-FM - Display and operating module as a remote tableau
- ◆ CPU - Central control
- ◆ PM2 - Power module
- ◆ DI1 - Digital input module
- ◆ DO1 - Digital output module

The following modules are available for system extension:

- ◆ DM1 - Diff. protection module (additional module)
- ◆ PB1 - Profibus DP module (additional module)
- ◆ PN1 - Profinet module (additional module)
- ◆ MB1 - Modbus TCP/IP (Slave) module (additional module)
- ◆ MB2 - Modbus RTU (Slave) module (additional module)
- ◆ AI1 - Analog input module (additional module)
- ◆ AT1 - PT100(0) measuring module (additional module)

2.1 Display and operating unit



The display and operating device KOP2 can be used as the main tableau and additionally as a remote tableau:

- Visualization of the measured values
- Parameterization via parameter software
- Direct device parameter input
- Manual system control

It offers:

- a memory for up to 192 error messages,
- its own galvanically isolated power supply,
- the internal data bus interface (T-Bus),
- the external data bus interface for other components and
- real-time clock with a minimum of 72 hours for data retention

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2.2 CPU Module



The CPU module includes:

- ◆ the power supply of the components
- ◆ 3 digital inputs, and a pick-up input
- ◆ 2 +/- 10 V analog inputs for external predetermined nominal values
- ◆ 4 +/- 10 V analog outputs (of which 2 at a time share ground)
- ◆ internal data bus interface (T bus)
- ◆ external data bus interface for further components

2.3 Power Module PM2



The power module offers:

- ◆ 2 x 3-phase voltage and frequency measurements
- ◆ 3-phase current measurement
- ◆ 1-phase current measurement (earth / neutral current)
- ◆ 8 digital outputs and 3 digital inputs
- ◆ 1 analog output (+/- 20 mA or +/- 10 V)
- ◆ 1 analog output (+/- 10 V)
- ◆ internal data bus interface (T bus)

2.4 Digital Input Module DI1

The digital input module includes:

- ◆ 22 digital inputs
- ◆ internal data bus interface (T bus)



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2.5 Digital Output Module DO1

The digital output module offers:

- ◆ 11 potential-free digital outputs (9 x NO and 2 x CO)
- ◆ internal data bus interface (T bus)



2.6 Diff. Protection Module DM1

The diff. Protection module contains:

- ◆ 2 x 3-phase current measurement
- ◆ 2 digital outputs
- ◆ internal data bus interface (T bus)



2.7 Profibus DP Module PB1

The Profibus DP module contains:

- ◆ galvanically isolated power supply
- ◆ Profibus DP interface (D-Sub 9)
- ◆ 2 potential-free digital outputs (NO)
- ◆ internal data bus interface (T bus)



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2.8 Profinet Module PN1

The Profinet module contains:

- ◆ a galvanically isolated power supply
- ◆ 2 Profinet interfaces; RJ45 100Mbit/s full duplex
- ◆ 1 potential-free digital output (CO)
- ◆ internal data bus interface (T bus)
- ◆ integrated switch functionality



2.9 Modbus TCP/IP Module MB1

The Modbus module contains:

- ◆ Galvanically isolated power supply
- ◆ 2 Modbus TCP/IP interfaces; RJ45 100Mbit/s full duplex
- ◆ 1 potential-free digital output (CO)
- ◆ internal data bus interface (T bus)
- ◆ integrated switch functionality



2.10 Modbus RTU Module MB2

The Modbus RTU module contains:

- ◆ Galvanically isolated power supply
- ◆ Modbus RTU interface (D-Sub 9); RS232/RS485
- ◆ 1 potential-free digital output (CO)
- ◆ internal data bus interface (T bus)



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2.11 Analog Input Module AI1

The analog input module offers:

- ◆ 6 galvanically isolated measurement inputs
- ◆ Input range from -10V to +10V or from -20mA to +20mA
- ◆ 2 inputs for direct potentiometer connection



2.12 PT100(0) Measurement module AT1

The analog input module offers:

- ◆ 6 PT100(0) measurement inputs
- ◆ 2 measurement inputs -10V to +10V or -20mA to +20mA



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3 Functions

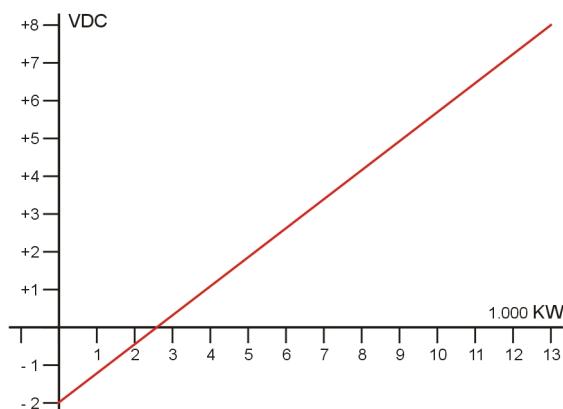
3.1 Analog inputs

The basic setup of the KAS offers two analog inputs, set by default from -10 to +10 V DC, and assigned fixed functions, for the supply of external setpoint values.

- The analog input 1 is used to capture the external setpoint specification of power in mains or generator parallel operation.
- The analog input 2 is used to capture the external setpoint specification for the power factor in mains or generator parallel operation. In case of a mains im-/export controller regulation during mains parallel operation this input is for capturing the actual mains output.

All currently applied voltage values can be scaled. For all details regarding the parameterization of analog outputs please see Item 5.8.1

3.2 Analog outputs



The KAS has 6 analog outputs, set by default to +/- 10 V. One of the two analog outputs on the PM2 power module can be switched to +/- 20 mA.

Different functions can be assigned to the outputs.

The voltage/current range of the respective analog output can be scaled.

Example: The power values collected by the KAS within a range of 0 (start value) to 13.000 kW (final value) are visualized at the analog output via a voltage range between -2,00 (start value) and +8,00 V DC (final value) (see Fig. to the left).

3.3 Digital In- and Outputs

Depending on the version and setup of the compact automatic KAS a variable number of digital in- and outputs is available, partly with functions assigned ex works. More functions may be assigned to spare in- and outputs.

3.4 Limit values

Depending on expansion stage and variant assembly a number of minimum and maximum values are set by default from the operating and limit values for genset control. If one of the measured values turns out to be higher or lower than the respective preset limit value, an output relay – parameterized accordingly – can be energized, and the respective switching behaviour can be coded to closed or open circuit principle. As soon as the measured value returns within its preset limit, the switching step switches back to normal position with hysteresis.

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3.5 Alarms

Alarm parameterization activates the visualization of error messages in case of tripped limit values. In addition to the permanently assigned alarms there are 47 configurable alarms. The respective switching mode upon tripping can be coded acc. to the closed- or open-circuit principle.

Reset after an error message is automatically done, acc. to parameterization, via an input or the RESET key of the display and operating device KOP 2.

3.6 Generator programme

The generator programme offers several operating modes.

3.6.1 Isolation operation

In automatic operation the unit is started via the input 'remote start'. If the generator voltage and frequency exceed the minimum limit values, the output 'Generator - CB ready' is closed. In order to switch on the GLS, the input 'first closing / pilot' also must be set. If the input remains set even after the connection, the 50 Hz pilot control is enabled. If the input is deactivated again after connection, the power control is enabled.

GLS is deselected by deactivating the input 'remote start'. If the 50Hz control is enabled, the GLS is switched off immediately and the unit stops once the preset follow-up time expires. If, however, the power control is enabled and the power output is greater than the limit value 'unit charged', this is unloaded first. After unloading or after the 'unloading time' is up the GLS is switched off.

For genset parallel operation the input 'Genset parallel operation' is available. If this input is set the pilot genset is unloaded first upon deselection of the Gen. CB. The Gen CB deselection is signalled to the PLC via the output 'Gen. CB ready central', and the PLC initiates pilot switching.

3.6.2 Parallel operation

The selection and de-selection of GLS is made just as in isolated operation. Should the bus bar voltage be available, the GLS is not switched on via the input 'initial connection release / pilot', but the synchronisation is activated and the GLS is switched on via the syn pulse, which affects the output 'GLS On'. If panel setpoint values are set to „Internal“, the setpoint values of the analogue inputs are taken for Genset parallel operation. In mains parallel operation the setpoint value set at the panel is used.

3.6.3 Special synchronizing function

The selection and de-selection of GLS is made just as in isolated operation. The synchronisation described in parallel operation is not active with the 'special synchronising function'. As soon as the bus bar voltage is available and the GLS is closed, the syn pulse is displayed at the output 'NLS on / Syn pulse'. For giving the syn impulse while gen c.b. is open, the digital input 'release special syn function' has to be energized. The synchronisation is used as an independent function. The use of an external synchronising device is not applicable.

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3.6.4 Start up synchronizing

Activating start up synchronising takes place via a pulse to the digital input, reserved for the DI function 'release start up syn', and is only effective for a specific adjustable time.

With the activation of the start up synchronisation the digital output DO 'GLS Ready' is set and the connection of the GLS takes place via the digital input DI 'GLS On Start up syn'. All modules with a closed GLS are started. The voltage and the frequency of the alternators build up together and equalise with each other.

If, in case of an activated start up synchronising, the machine does not start on the first try, then the DO 'GLS Ready' is deactivated and the GLS is switched off. If the machine only starts on the second or third try, then the connection with the synchronisation takes place. The alarm 'GEN undervoltage' is disabled during the start up synchronising.

3.6.5 Speed synchronizing

The special function must be activated. The activation takes place via a pulse to the digital input, reserved for the DI function 'release start up syn', and is only effective for a specific adjustable time.

All modules are started simultaneously and a deexcitation of the alternators takes place. After expiry of the deexcitation time the 'GLS Ready' message is transmitted to the control centre. This takes over the connection of the GLS with the DI function 'GLS on Start up syn' in a voltage-free condition on the busbar. The excitation is switched on again and together the voltage builds up. The frequency of the alternators equalise with each other.

If, in case of an activated start up synchronising, the genset does not start on the first try, then the DO 'automatic operation' is deactivated. The alarm 'GEN undervoltage' is disabled during the start up synchronisation.

3.7 Mains- / Generator programme

Several operating modes are available within this programme.

3.7.1 Changeover with gap

In automatic operation the genset is started via the input 'remote start'. When the generator voltage and frequency have reached their operating values, the mains CB NLS is switched off and the GLS switched on. Speed reduction is effected after mains return and deactivation of the input 'remote start'. For speed reduction and stopping the genset, the speed reduction time and the follow-up times must have expired.

3.7.2 Overlapping synchronizing

3.7.2.1 Selection on remote start

The selection is made via the input 'remote start'. When the generator voltage has reached its operating value, the output 'cancel locking' is set and synchronisation is triggered. If voltage and frequency are within the preset limits, synchronous transfer takes place. During transfer both switches are closed for approx. 50ms.

After deactivating the input 'remote start', once the speed reduction time is up, the output 'cancel locking' is set and synchronisation is triggered. If voltage and frequency are within the preset limits, synchronous transfer takes place. During transfer both switches are closed for approx. 50 ms. After transfer the follow-up time expires and the genset stops.

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3.7.2.2 Selection on mains power failure

In the event of power failure the genset starts. If the generator voltage has reached its operating value, the NLS is switched off and the GLS switched on.

In the event of reset after the speed reduction time is up the output 'cancel locking' is set and synchronisation is triggered. If voltage and frequency are within the preset limits, synchronous transfer takes place. During transfer both switches are closed for approx. 0.2 seconds. After the transfer the follow-up time expires and the genset stops.

3.7.3 Mains parallel operation

3.7.3.1 Selection on remote start

The selection is made via the input 'remote start'. If the generator voltage has reached its operating value, the output 'cancel locking' is set and synchronisation is triggered. If voltage and frequency are within the preset limits, the GLS is switched on in the synchronous moment. Both switches are now on and the output 'parallel operation'. The power control is switched on.

After deactivating the input 'remote start', if the power is greater than the limit value 'genset loaded' this is first unloaded. Once unloaded or when the 'unloading time' is up the GLS is switched off, the follow-up time elapses and the genset stops.

3.7.3.2 Selection on mains power failure

In the event of mains power failure the genset starts. If the generator voltage has reached its operating value, the NLS is switched off and the GLS switched on.

In the event of reset, once the speed reduction time has elapsed, the output 'Cancel locking' is set and synchronisation is triggered. If voltage and frequency are within the preset limits, transfer takes place. During transfer both switches are closed for approx. 0.2 seconds. After transfer the follow-up time elapses and the unit stops.

3.8 Synchronization

The synchronization of the compact automatic KAS is used for automatic parallel switching of three-phase rotary current generators or to another three-phase rotary current system. Voltage and frequency are therefore adapted. Generator isolated operation is controlled to a pre-specified basic frequency or voltage.

3.8.1 Method of operation

Using differential amplifiers the voltage and the frequency are captured by two three-phase rotary current supply networks. Measuring for synchronisation is made between L1 and L2. During operation the voltages and the averaged frequencies are continually displayed.

If synchronising process is introduced, the corresponding output for switch "ready" is. The frequency adjustment pulses (F+ and F-) can be specified for the speed governor of the genset via two freely configurable outputs. In addition it is possible to use two configurable outputs with the function for the voltage adjustment pulse.

The synchronizing pulse is given on a digital output of the PM2 module. If the synchronization is not made within the preset time, the error message 'Synchronising time too long' appears.

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3.9 Remote tableau KOP 2-FM

It is possible to connect the compact automatic with a second – remote - tableau. Switching between main and remote tableau is done via DI „Selection remote tableau“. The upper display status line will then visualize which tableau is active. The active tableau is marked with a „green check mark“, the inactive one with a „red cross“. For the bus connection to the remote tableau a 2-conductor shielded cable with a max. length of 500m is recommended. The shield should be grounded on one side.

Setting of date and time as well as counter re-/setting is only possible at the main tableau. Values will be synchronized between both tableaus.

Setpoint values for power and Cos Phi can be set via the active tableau. The set value will then be transferred additionally to the inactive tableau. This ensures that there are no jumps at the analog outputs when switching between tableaus.

Save for a few exceptions the remote tableau offers the same functionality as the main tableau (please refer to Items 5 and 6). The menu items „Controller“ and „Network protection test“ are only available via the main tableau. The panel is monitored with the alarm 48 "Fault remote tableau".

3.10 Load adjustment via BUS

For generator controls the load adjustment between the gensets can be controlled via a BUS connection. This function can be enabled via menu „Home→Tableau“ in the device management GV2 with the checkbox “load and cos phi adjustment via BUS”. The display tableaus have to be connected via a 2-wire bus connection (see terminal assignment). Load adjustment and selection of pilot genset are controled via BUS between the controls. Two alarm messages (please refer to 4.6.6) are responsible for controlling the BUS communication. There are two different functional modes for the load adjustment.

3.10.1 Load adjustment via BUS with load-dependent dis-/connection

Must be set to activate the load-dependent dis-/connection of aggregates one of the two input functions "Lock LAAZA" or "Release LAAZA".

Genset start and stop is controlled by the load-dependent dis-/connection according to performance requirement. The starting order and de-/selection are selected according to the set ID or the operating hours. There are two adjustable limit values for de-/selection.

Operating mode AUTO

Initial startup of control. For all tableaus the operating mode „0“ has been selected. If LAAZA has been enabled by one of these two input functions, the first genset having been selected via „AUTO“ starts, switches on the GLS and takes over the frequency control pilot function. Then the other gensets selected via „AUTO“ are started and synchronized on the busbar, and then control the power according to the nominal value indicated by the pilot. As soon as the first genset is started the „LAAZA preparation time“ starts. After expiry of this delay the LAAZA remains active and the gensets will be deselected according to the performance requirements. The „LAAZA preparation time“ can be disabled earlier via the DI „LAAZA preparedness finished“.

During active LAAZA operation the gensets will be enabled or disabled according to the performance requirements. It is possible to set a sequence according to ID numbers or operating hours. The minimum number of gensets running, as well as the number of gensets to be enabled or disabled according to the performance requirements can be set via parameterization.

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Operating mode TEST

The operating mode „TEST“ enables switching of the pilot genset during operation of the gensets. The pilot genset has to be switched to „TEST“ mode. According to the starting order the next running genset, being in operating mode „AUTO“, will take over the pilot function. Now the genset that leaves the pilot function can be switched back to „AUTO“.

All other units are started via the "TEST" and then on the "GCB ON" button been selected on the tableau, to be switched on via the synchronization. If a changeover to "AUTO" is made, the units are switched off and on according to the performance requirements. Gensets in „TEST“ mode with closed GCB, will be included in the load-dependent dis-/connection.

If there is only one genset connected to the busbar it is not possible to switch off the GCB in „TEST“ mode.

Operating mode MAN

In operating mode „MAN“ the gensets can be started at the tableau with the button START. The GCB can be switched via the respective buttons. If the busbar is de-energized the GCB will be switched on directly. If the busbar is energized the GCB will be switched on via synchronization. If the GCB is closed, the control is selected by the DI "First closing / Pilot". With GCB open the frequency control is active. If no regulation takes place, then this is to be linked via the logic. The exception is when only one unit is connected to the busbar. In this unit, the frequency control is active.

Regardless of the GLS switching status, gensets in „MAN“ mode will not be included in the load-dependent dis-/connection.

3.10.2 Load adjustment via BUS without load-dependent dis-/connection

The load-dependent dis-/connection of gensets must be locked. This is what the two input functions "Block LAAZA" or "released LAAZA" available. If neither of these two inputs is parameterized, the LAAZA is disabled.

Starting and stopping of gensets in „AUTO“ operating mode will only depend on the input „REMOTE START“. Load adjustment and pilot genset selection will still be done via BUS between the controls.

Operating mode AUTO

Starting and stopping of the genset will only depend on the DI „Remote start“. The genset selected first via „Remote start“ will start, switch on the GLS and take over the frequency control pilot function. All other gensets selected via „Remote start“ are started and synchronized on the busbar, and then control the power according to the nominal value indicated by the pilot

Operating mode TEST

The operating mode „TEST“ enables switching of the pilot genset during operation of the gensets. The pilot genset has to be switched to „TEST“ mode. According to the starting order the next running genset, being in operating mode „AUTO“, will take over the pilot function. Now the genset that leaves the pilot function can be switched back to „AUTO“.

All other units are started via the "TEST" and then on the "GCB ON" button been selected on the tableau, to be switched on via the synchronization.

Switching the operating mode from „TEST“ to „AUTO“ will stop all gensets without „Remote start“ set.

Are the gensets started via „TEST“, the genset that has been connected to the busbar first will take over the pilot function. If there is more than one genset connected to the busbar, the GLS can be switched off via the button at the tableau. If there is only one genset connected to the busbar it is not possible to switch off the GLS in „TEST“ mode.

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Operating mode MAN

In operating mode „MAN“ the gensets can be started at the tableau with the button START. The GLS can be switched via the respective buttons. If the busbar is de-energized the GCB will be switched on directly. If the busbar is energized the GCB will be switched on via synchronization. If the GCB is closed, the control is selected over the DI "First closing / Pilot". With GCB open the frequency control is active. If no regulation takes place, then this is to be linked via the logic. The exception is when only one unit is connected to the busbar. In this unit, the frequency control is active.

If more than one unit is connected to the busbar, and there is no pilot, then the last setpoint that was detected before being switched to "MAN" mode is controlled.

3.11 Reactive load adjustment via BUS

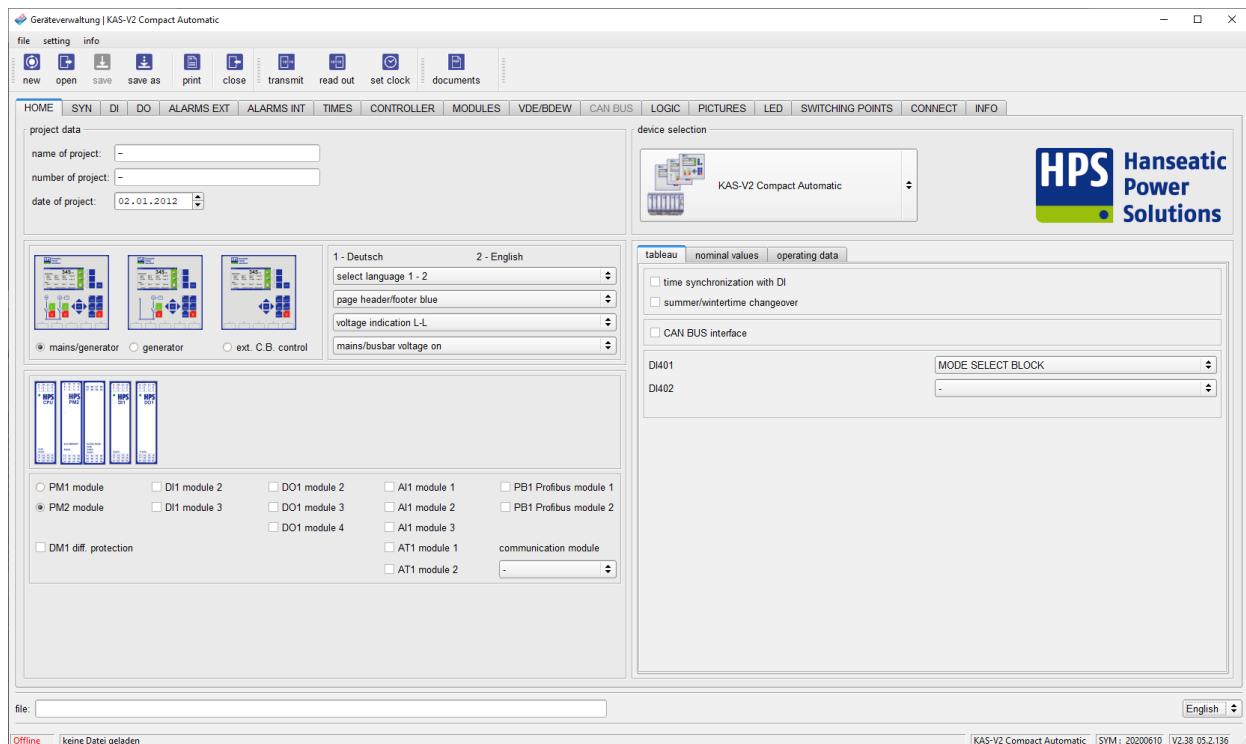
In addition to the load adjustment, the reactive load adjustment between the units can also be regulated via the BUS connection for generator controllers. For this purpose, the Cos Phi controller must also be activated in the menu "Controller → Setpoints". The functionality of the reactive load adjustment corresponds to the load adjustment and is described under point 3.10 and the corresponding subpoints.

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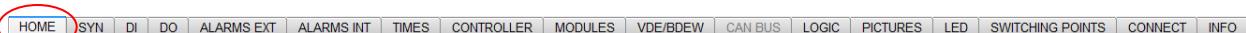
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4 Setting device management

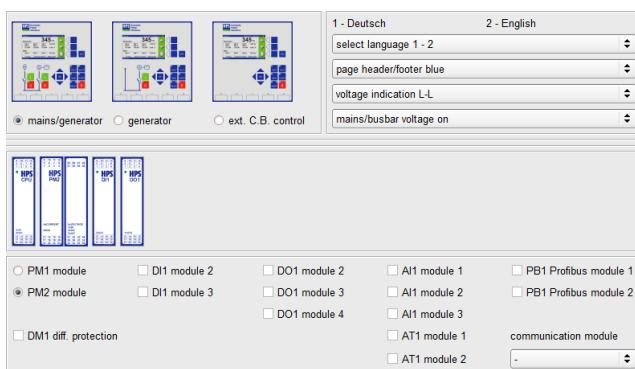
KOP2 parameter setting should be done with the supplied software stored on the SD card, to be found in the folder _Parameter software for data transfer a serial data cable (D-SUB 9pol. – 1:1) is required. Most of the parameters can also be adjusted directly at the panel (Setting→Parameter input). For an overview of all parameters please refer to Item 8.2.1. It is also possible to import software modifications via the SD card.



4.1 Basic settings



4.1.1 Hardware configuration



Selection of the different controls and display settings.

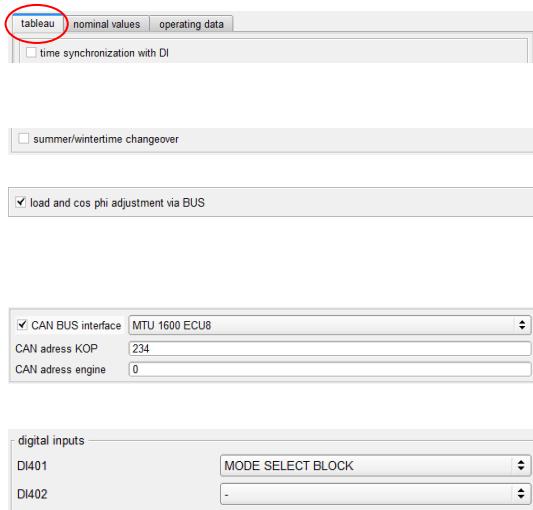
- Select display language
- Color of page header/footer
- Selection of voltage display for mains and generator measurement in the initial screen
- Fade out the mains / busbar voltage

Selection of modules to be installed in addition to the basic configuration.

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4.1.2 Tableau



The screenshot shows the 'Tableau' configuration page with several sections:

- tableau** (highlighted with a red circle)
- nominal values**
- operating data**
- time synchronization with DI** (checkbox)
- summer/wintertime changeover** (checkbox)
- load and cos phi adjustment via BUS** (checkbox)
- CAN BUS interface**: MTU 1600 ECU8
 - CAN adress KOP: 234
 - CAN adress engine: 0
- digital inputs**:
 - DI401: MODE SELECT BLOCK
 - DI402: -

It is possible to set panel time to preset synchronization time via an appropriately configured digital input.

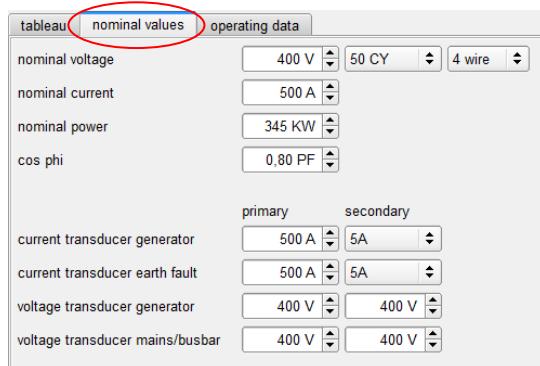
Automatic changeover from summer to winter time.

For generator controls, the load and Cos Phi adjustment and selection of pilots is controlled via a BUS connection.

Activate the CAN BUS interface and selecting the motor type. This function is only available when the interface is installed on the KOP.

Two digital inputs are available on the panel. DI401 is assigned to a fixed function. DI402 is freely configurable.

4.1.3 Nominal values



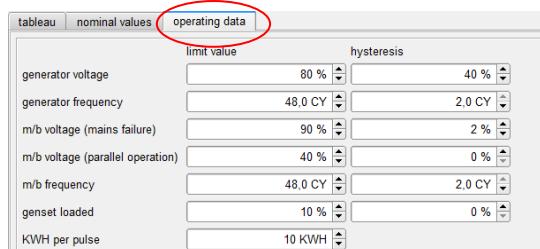
The screenshot shows the 'nominal values' configuration page with the following settings:

| | | | |
|---------------------------------|---------|-------|--------|
| nominal voltage | 400 V | 50 CY | 4 wire |
| nominal current | 500 A | | |
| nominal power | 345 KW | | |
| cos phi | 0.80 PF | | |
| current transducer generator | 500 A | 5A | |
| current transducer earth fault | 500 A | 5A | |
| voltage transducer generator | 400 V | 400 V | |
| voltage transducer mains/busbar | 400 V | 400 V | |

Input of nominal data for voltage, current, power and transducer values. All limit values derive by percentage from the nominal data. Frequency limit values are indicated in absolute values.

The Cos Phi is given for the correct display of the percentage values of apparent power and reactive power.

4.1.4 Operating data



The screenshot shows the 'operating data' configuration page with the following limit values and hysteresis settings:

| | limit value | hysteresis |
|----------------------------------|-------------|------------|
| generator voltage | 80 % | 40 % |
| generator frequency | 48.0 CY | 2.0 CY |
| m/b voltage (mains failure) | 90 % | 2 % |
| m/b voltage (parallel operation) | 40 % | 0 % |
| m/b frequency | 48.0 CY | 2.0 CY |
| genset loaded | 10 % | 0 % |
| KWH per pulse | 10 KWH | |

When exceeding the operating values for voltage and frequency these values are declared as „Available“ and the corresponding internal operating procedures are activated.

Upon Gen CB deselection it will be switched off after falling below the operating value „Genset loaded“.

KWH value counting unit.

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4.2 Synchronization

[HOME](#) **[SYN](#)** [DI](#) [DO](#) [ALARMS EXT](#) [ALARMS INT](#) [TIMES](#) [CONTROLLER](#) [MODULES](#) [VDE/BDEW](#) [CAN BUS](#) [LOGIC](#) [PICTURES](#) [LED](#) [SWITCHING POINTS](#) [CONNECT](#) [INFO](#)

Setting parameters for synchronization and island mode. If the synchronization mode is disabled switching is done with a gap. The availability of special functions depends on panel selection.

Voltage and frequency of two three-phase currents are monitored via differential amplifiers. Measurement for synchronization is done between L1 and L2. During operation the voltages and the averaged frequencies are displayed continuously.

4.2.1 Synchronized operation

| synchronized operation | |
|--|---|
| <input checked="" type="checkbox"/> synchronization activate | |
| <input type="radio"/> closed transition | <input checked="" type="radio"/> parallel operation |
| advance time | 50 MS |
| max. frequency difference | 0.10 CY |
| min. frequency difference | 0.05 CY |
| max. voltage difference | 5 % |
| syn pulse length | 200 MS |
| frequency integration time | 50 PER. |

If the synchronization is disabled switching is done with a gap. Synchronization parameters are not displayed.

If the synchronized operation is active it is possible to choose between closed transition and parallel operation.

| Synchronized operation | |
|----------------------------|--|
| Advance time | Serves to compensate delays caused by auxiliary switching elements. The synchronous pulse is emitted, corrected by the advance time, before the calculated synchronous moment has reached; typical delay of a breaker: 50ms. |
| Max. frequency difference | Max. permissible frequency deviation at which connection can take place. |
| Min. frequency difference | At synchronizing operation the generator is always regulated to a small frequency deviation to the mains frequency in order to keep the generator frequency in beat with the mains frequency, to make synchronizing possible at all. |
| Max. voltage difference | Max. permissible deviation of generator voltage against the synchronizing voltage, at which connection to the system can take place. |
| Syn pulse length | Time for control of the output relay. |
| Frequency integration time | The frequency, which is taken as the actual value for the frequency control, is averaged over several periods to steady the control circuit. |

4.2.2 Island operation

| island operation | |
|---|---------|
| <input checked="" type="checkbox"/> setpoint control activate | |
| frequency | 50.0 CY |
| voltage | 100 % |

If the setpoint control is active in island operation mode the input voltage and frequency are adjusted accordingly. This adjustment can be blocked via the digital input „Block setpoint control U/F“. If a setpoint value has been set to „0“ this control will be disabled.

| Island operation | |
|------------------|---|
| Frequency | Set frequency value in island operation. If this value is set to „0“, the control will be disabled. |
| Voltage | Set voltage value in island operation. If this value is set to „0“, the control will be disabled. |

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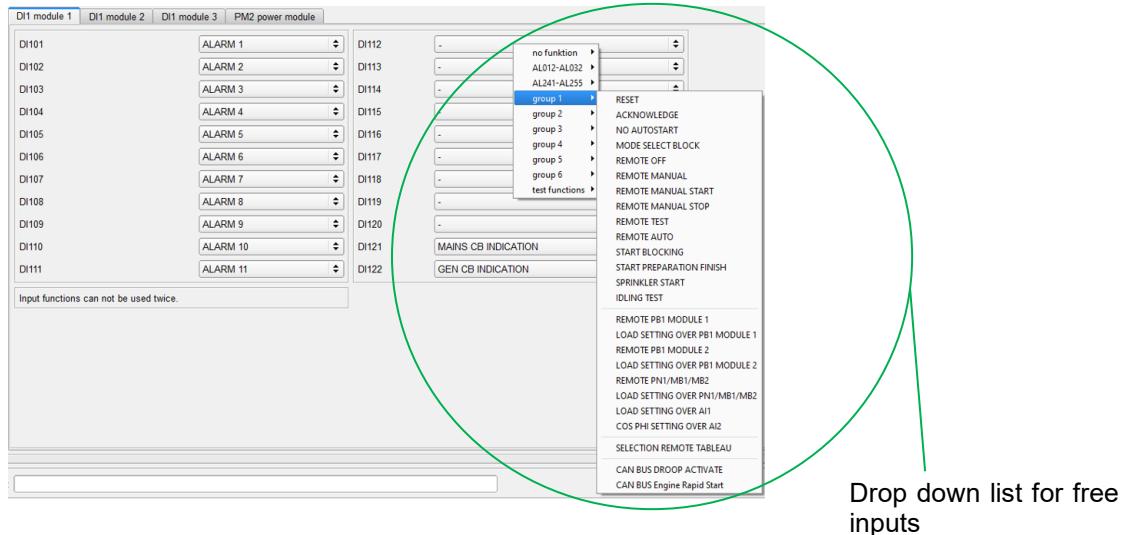
4.2.3 Special functions

| Mains/generator | Generator | Ext. C.B. Control |
|--|--|-------------------|
| Special functions | | |
| Start speed max. | If this function is active the output „Increase speed“ is set. The output remains set until reception of feedback „Gen CB ON message“. Then the speed control is active. | |
| Start up synchronisation / Speed synchronisation | See Items 4.1.4 and 4.1.5 | |
| First closing / pilot | This function will be permanently enabled. The genset will always be controlled in 50Hz operation with Gen CB enabled. The digital input with the same function is not active anymore. | |
| Special synchronizing function | See Item 4.1.3 | |

4.3 Digital inputs

HOME SYN DI DO ALARMS EXT ALARMS INT TIMES CONTROLLER MODULES VDE/BDEW CAN BUS LOGIC PICTURES LED SWITCHING POINTS CONNECT INFO

There are three modules with a total of 66 digital inputs. There are also three further digital inputs on the PM2 module. The inputs DI101 to DI111 and DI121 to DI122 on the first module DI1 are assigned to fixed functions. All other inputs can be assigned to functions according to the drop down lists. These function lists are separated into several sub-lists.



The screenshot shows the software interface for configuring digital inputs. The top navigation bar includes tabs for HOME, SYN, DI (highlighted with a red circle), DO, ALARMS EXT, ALARMS INT, TIMES, CONTROLLER, MODULES, VDE/BDEW, CAN BUS, LOGIC, PICTURES, LED, SWITCHING POINTS, CONNECT, and INFO. The main window displays a list of digital inputs (DI101 to DI122) with dropdown menus for assigning functions. A green circle highlights the dropdown menu for DI115, which contains a large number of options. A text box below the menu states "Input functions can not be used twice." A red circle highlights the "DI" tab in the top navigation bar.

Drop down list for free inputs

Below the first menu item (without function) there are two info texts which make visible that this input is used for another function.

| Info texts | |
|----------------|--|
| Query via BUS | Indicates that this input is requested via an external data communication. |
| Logic function | Indicates that this input is used as an input variable in the logic. |

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Overview of all inputs with fixed functions.

| Fixed input functions | | |
|-----------------------|---------------------|---|
| DI101 to DI111 | AL001 – AL011 | External alarms. Texts and alarm behaviour can be adjusted under tab „Free alarms“. |
| DI121 | Mains CB indication | For indication to the control that the power switch is ON. With this input the internal blocking with the Gen CB is set up. |
| DI122 | Gen CB indication | For indication to the control that the Gen CB is ON. With this input the internal blocking with the power switch is set up. |

Overview of the functions assigned to the free inputs.

| Function number | | |
|-----------------|-------------|---|
| AL012-AL032 | | |
| 12 to 32 | AL012-AL032 | 21 free alarms. Texts and alarm behaviour can be adjusted under tab „ALARMS EXT“. |
| AL241-AL255 | | |
| 117 to 131 | AL241-AL255 | 15 free alarms. Texts and alarm behaviour can be adjusted under tab „ALARMS EXT“. |

| Group 1 | | |
|---------|-----------------------------------|---|
| 33 | Reset | Remote control corresponds to key function 'RESET'. |
| 34 | Acknowledge | Remote control corresponds to key function 'RESET'. |
| 35 | No auto start | Interlocking of automatic function, no start in case of mains; start may be aborted, genset will stop immediately upon input set. |
| 84 | Mode select block | A change of operating modes is no longer possible, as long as this function is activ, both on the panel and via remote (Remote PB1/PN1/MB1/MB2). |
| 36 | Remote off | Remote control corresponds to key function '0'. |
| 37 | Remote manual | Remote control corresponds to key function 'MAN'. |
| 174 | Remote manual start | Function corresponds to the button function "START" in "MAN" mode. |
| 185 | Remote manual stop | The stop sequence is initiated with a rising edge at the input. |
| 38 | Remote test | Remote control corresponds to key function 'TEST'. |
| 39 | Remote auto | Remote control corresponds to key function 'AUTO'. |
| 115 | Start blocking | Start blocking in all operating modes. DO „Operating mode Auto“ will be disabled. |
| 43 | Start preparation finish | After expiration of the start preparation delay the start command is given. The start command is given immediately if the digital input „Start preparation finish“ is set before the expiration of the delay. |
| 80 | Sprinkler start | Starts sprinkler operation and stops mains parallel mode. Closing alarms will get warning, unless they are coded to „Sprinkler stop“. |
| 112 | Idling test | Starts genset in „Operating mode Auto“. The Gen CB will not be switched on. |
| 57 | Remote PB1 module 1 | Remote control of KOP 2 via bus coupling. (Without load setting) |
| 116 | Load setting over PB1 module 1 | Only the setpoint value for the power control comes over bus coupler PB1. |
| 179 | Remote PB1 module 2 | Remote control of KOP 2 via bus coupling. (Without load setting) |
| 180 | Load setting over PB1 module 2 | Only the setpoint value for the power control comes over bus coupler PB1. |
| 149 | Remote PN1 / MB1 / MB2 | Remote control of KOP 2 via bus coupling. (Without load setting) |
| 150 | Load setting over PN1 / MB1 / MB2 | Only the setpoint value for the power control comes over bus coupler PN1 / MB1 / MB2. |
| 164 | Load setting over AE1 | Change-over of the setpoint from the panel to the analog input 1. |

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| | | |
|-----|----------------------------|--|
| 165 | Cos Phi setting over AE2 | Change-over of the setpoint from the panel to the analog input 2. |
| 48 | Selection remote tableau | Switching between the main and the remote tableau. |
| 156 | CAN BUS DROOP activate | The "DROOP" is activated via the CAN BUS. |
| 178 | CAN BUS engine rapid start | Activates the rapid engine start function via the CAN BUS in case of an emergency start in the MTU ECU9 (4000 series). |

| Group 2 | | |
|---------|-------------------------------|--|
| 40 | Lock syn operation | Locking of synchronization. Switching with a gap. |
| 41 | Lock mains parallel operation | Active mains parallel operation is locked. Switching as closed transition. |
| 153 | Lock setpoint control U | In island mode the setpoint control for voltage is locked. |
| 154 | Lock setpoint control F | In island mode the setpoint control for frequency is locked. |
| 47 | Lock setpoint control U/F | In island mode the setpoint control for voltage and frequency is locked. |
| 49 | Lock load control | Lock load control. |
| 70 | Lock cos phi control | Lock cos phi control. |
| 75 | Lock current protection | Lock current protection triggers. |
| 77 | Lock differential protection | Lock diff. protection triggers. |
| 78 | Diff. prot. ext. release lock | Lock diff. protection triggers. Locking time starts with the rising edge at the input and ends after the preset delay. Re-locking will only be possible after signal cancellation at the input (edge-triggered). |
| 79 | Lock mains protection | Lock mains protection. |
| 81 | Lock all tripping | Lock all protection tripping. |
| 87 | Block PID controller U/PHI | Block PID controller for voltage and Cos Phi adjustment. |
| 88 | Block PID controller F/P | Block PID controller for frequency and power adjustment. |
| 152 | Lock alarms GEN U/F | Lock the generator alarms for voltage and frequency so that only the mains protection alarms are active in parallel operation. |
| 157 | Lock retransfer time | If the input is set, the retransfer time is stopped. Once the input is no longer active, the time with the parameterized value begins to run again. |
| 162 | Lock Pilot | In generator parallel operation, the frequency control is disabled in the pilot unit and the power control is activated. |
| 175 | Lock Load adjustment via BUS | The complete function for load adjusting via the bus connection is disabled. The corresponding pictures in the KOP are hidden. The function of the system corresponds to an island system. |
| 182 | Lock group 1 | With this function alarms can be suppressed in certain situations. Either by connecting a digital input or with a logical function. |
| 183 | Lock group 2 | |

| Group 3 | | |
|---------|--------------------------|--|
| 52 | Speed up | External adjustment pulses. The pulses affect the digital output (speed up) and the electr. potentiometer. |
| 53 | Speed down | External adjustment pulses. The pulses affect the digital output (speed down) and the electr. potentiometer. |
| 71 | Speed controller reset | Reset of frequency and power controller (edge-triggered). The reset affects the electr. potentiometer and the PID controller. |
| 62 | Voltage up | External adjustment pulses. The pulses affect the digital output (voltage up) and the electr. potentiometer. |
| 63 | Voltage down | External adjustment pulses. The pulses affect the digital output (voltage down) and the electr. potentiometer. |
| 64 | Voltage controller reset | Reset of voltage and CosPhi controller (edge-triggered). The reset affects the electr. potentiometer and the PID controller. |

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| Group 4 | |
|------------|---|
| 51 | First closing/pilot |
| | For switching on a dead bar the first closing release for the Gen CB is required for gensets. If the input remains set, the 50 Hz pilot control is enabled, otherwise the power control will affect the gensex. |
| 102 | Genset parallel operation |
| | Upon Gen CB deselection the pilot gensex will be unloaded. |
| 163 | Mains CB off |
| | Blocks Mains CB connection, an already enabled switch will be disabled. |
| 58 | Gen CB off |
| | Blocks Gen CB connection, an already enabled switch will be disabled. |
| 50 | Manual synchronisation on |
| | Automatic adjustment signals for synchronisation will be disabled. Adjustment is done via the digital inputs. |
| 65 | Release spec. syn. func. |
| | See Item 3.6.3 |
| 68 | Release speed syn. func. |
| | Release of speed synchronisation function. See Item 3.6.4 . |
| 69 | Gen CB on speed syn func. |
| | Enables Gen CB when speed synchronisation function is active. See Item 6.6.4. |
| 176 | Speed syn. func. only 1 engine |
| | The Gen CB remains closed for further starts after the first start attempt. |
| 46 | Generator loaded |
| | The input allows for mains parallel operation to signal a generator load, and to enable a subsequent defined unloading of the generator before switching off the Gen CB. |
| 67 | Unload |
| | If the input is activated with active power control, the active controller is adjusted to unload the gensex. The Gen CB is turned off after unloading of gensex. |
| 76 | Load |
| | If the input is deactivated with active power control, the active controller is adjusted to unload the gensex. The Gen CB is turned off after unloading of gensex. |
| 42 | Mains available |
| | Voltage monitoring with an external mains voltage monitor. In case of mains failure the input to the internal mains voltage monitor is ANDed. When mains is available again the input is ORed. |
| 66 | Mains im-/export controller |
| | To switch on mains im-/export controller, if previously released. |
| 44 | Battery 1 fault |
| | For monitoring of two battery sets with external monitoring devices. The inputs affect the alarms 40 and 41, responsible for switching of the battery sets via digital outputs. |
| 45 | Battery 2 fault |
| | See „BATTERY 1 FAULT“ |
| 151 | Time synchronisation |
| | With the rising edge at the digital input panel time will be set to the parameter software time. |
| 159 | LAAZA preparation completed |
| | The preparation time for the LAAZA can thus be terminated prematurely. Once the input is set, the LAAZA is active |
| 160 161 | Lock LAAZA Release LAAZA |
| | If the load adjustment is controlled via BUS, the load-dependent dis-/connection can be locked. If the load adjustment is controlled via BUS, the load-dependent dis-/connection can be enabled or disabled of one of the input functions. If neither of the two inputs is parameterized, the LAAZA is disabled. Starting and stopping of the gensets is then controlled by the DI "Remote start". |
| | |

| Group 5 | |
|---------|---|
| 54 | LED F1 |
| | If the function key F1 has been set to an output relay, the LED symbol can be controlled in the function field. |
| 55 | LED F2 |
| | If the function key F2 has been set to an output relay, the LED symbol can be controlled in the function field. |
| 91 | LED 1 |
| | Direct control of the LED above the title block via the input. |
| 92 | LED 2 |
| | Direct control of the LED above the title block via the input. |
| 93 | LED 3 |
| | Direct control of the LED above the title block via the input. |
| 94 | LED 4 |
| | Direct control of the LED above the title block via the input. |
| 95 | LED 5 |
| | Direct control of the LED above the title block via the input. |

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| Group 6 | | |
|---------|---|---|
| 103 | VDE4105 - Ext. setpoint reduct. 1 (pulse) | Limits the power setpoint to the value specified by parameterization. |
| 104 | VDE4105 - Ext. setpoint reduct. 2 (pulse) | Limits the power setpoint to the value specified by parameterization. |
| 105 | VDE4105 - Ext. setpoint reduct. 3 (pulse) | Limits the power setpoint to the value specified by parameterization. |
| 108 | VDE4105 - Ext. setpoint reduct. reset (pulse) | Reset of setpoint limit, set via pulse inputs. |
| 109 | VDE4105 - Ext. setpoint reduct. 1 (contin.) | Limits the power setpoint to the value specified by parameterization. If several levels are set at once, the lowest value will be taken for the limitation. |
| 110 | VDE4105 - Ext. setpoint reduct. 2 (contin.) | Limits the power setpoint to the value specified by parameterization. If several levels are set at once, the lowest value will be taken for the limitation. |
| 111 | VDE4105 - Ext. setpoint reduct. 3 (contin.) | Limits the power setpoint to the value specified by parameterization. If several levels are set at once, the lowest value will be taken for the limitation. |
| 106 | VDE4105 – Cos Phi contr. / power | Activates the performance-based CosPhi control. |
| 107 | BDEW - Dynamic mains support | Activates the dynamic mains support. |
| 114 | VDE4105 - Lock standby switching mains | Locks the function „VDE4105 Standby switching mains“. |

| Test functions | | |
|----------------|-----------|---|
| 177 | Omicron | Function to simplify the testing procedures. The following alarms are inhibited by this function: AL066, AL070, AL104 and AL105 |
| 181 | Test room | Function to simplify the testing procedures. Several times are shortened. |

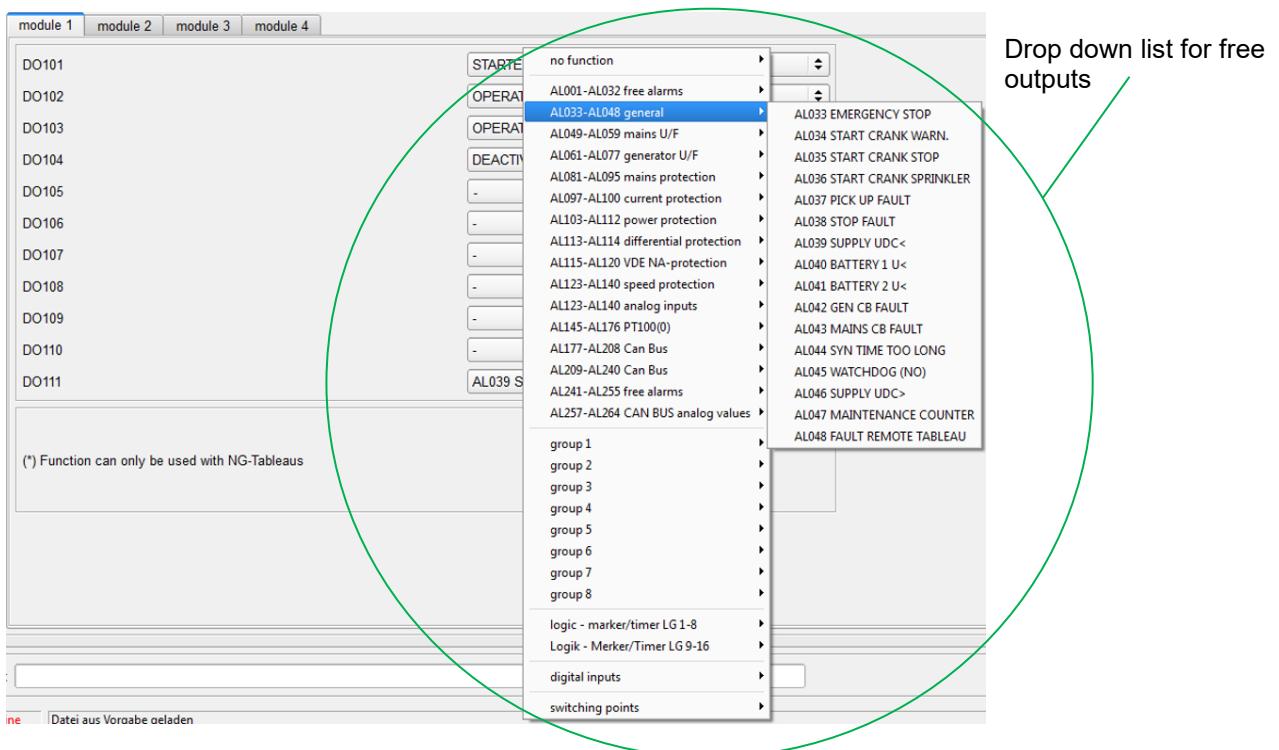
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4.4 Digital outputs

HOME SYN DI DO ALARMS EXT ALARMS INT TIMES CONTROLLER MODULES VDE/BDEW CAN BUS LOGIC PICTURES LED SWITCHING POINTS CONNECT INFO

There are four modules with a total of 44 digital outputs. The inputs DI101 to DI103 and DI111 on the first module DO1 are assigned to fixed functions. All outputs can be assigned to functions according to the drop down lists. These function lists are separated into several sub-lists.



Overview of all outputs with fixed functions.

| Fixed output functions | | |
|------------------------|--------------------|--|
| DO101 | Starter | Output is active at the end of starting preparation and preglowing time. |
| DO102 | Operation solenoid | Output is enabled with start command and disabled when motor is stopped. For all safety related circuits an operation solenoid should be used. |
| | Stop solenoid | Output enabled when motor is stopped. |
| DO103 | Operation | Output enabled when „Motor running“ is detected, and disabled after expiry of stopping time. |
| DO111 | AL039 Supply UDC< | With the alarm released it can be output via a digital output upon exceeding or falling below the input limit value. |

Overview of all functions assigned to free outputs.

| Function number | | |
|-----------------|-------------|--|
| AL001-AL032 | Free alarms | 32 free alarms. Texts and alarm behaviour can be adjusted under tab „Free alarms“. |

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| | | |
|---------------|--------------------------------|--|
| AL033-AL048 | | |
| Common | | |
| 33 | AL033 Emergency stop | |
| 34 | AL034 Start crank warn. | |
| 35 | AL035 Start crank stop | |
| 36 | AL036 Start crank sprinkler | |
| 37 | AL037 Pick up fault | |
| 38 | AL038 Stop fault | |
| 39 | AL039 Supply UDC< | |
| 40 | AL040 Battery 1 U< | |
| 41 | AL041 Battery 2 U< | |
| 42 | AL042 Gen CB fault | |
| 43 | AL043 Mains CB fault | |
| 44 | AL044 Syn time too long | |
| 45 | AL045 Watchdog (NO) | |
| 46 | AL046 Supply UDC> | |
| 47 | AL047 Maintenance counter | |
| 48 | AL048 Fault remote tableau | |
| AL049-AL059 | | |
| Mains U/F | | |
| 49 | AL049 Mains voltage << | |
| 50 | AL050 Mains voltage < | |
| 51 | AL051 Mains voltage > | |
| 52 | AL052 Mains voltage >> | |
| 53 | AL053 Mains frequency << | |
| 54 | AL054 Mains frequency < | |
| 55 | AL055 Mains frequency > | |
| 56 | AL056 Mains frequency >> | |
| 57 | AL057 Mains rotating field | |
| 58 | AL058 Mains angle fault | |
| 59 | AL059 Mains voltage asymmetry | |
| AL061-AL077 | | |
| Generator U/F | | |
| 61 | AL061 BDEW U(t) time runs | |
| 62 | AL062 BDEW U(t) fault | |
| 65 | AL065 Generator voltage << | |
| 66 | AL066 Generator voltage < | |
| 67 | AL067 Generator voltage > | |
| 68 | AL068 Generator voltage >> | |
| 69 | AL069 Generator frequency << | |
| 70 | AL070 Generator frequency < | |
| 71 | AL071 Generator frequency > | |
| 72 | AL072 Generator frequency >> | |
| 73 | AL073 Generator rotating field | |
| 74 | AL074 Generator rotating field | |
| 75 | AL075 Generator voltage asym. | |
| 76 | AL076 Cos Phi capazitive | |
| 77 | AL077 Cos Phi inductive | |

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|--------------------|--|---|
| AL081-AL095 | | |
| Mains protection | | |
| 81 | AL081 Mains protect. col. fault | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 82 | AL082 Mains protection U<< | |
| 83 | AL083 Mains protection U< | |
| 84 | AL084 Mains protection U> | |
| 85 | AL085 Mains protection U>> | |
| 86 | AL086 Mains protection F<< | |
| 87 | AL087 Mains protection F< | |
| 88 | AL088 Mains protection F> | |
| 89 | AL089 Mains protection F>> | |
| 90 | AL090 Mains protect. vector > | |
| 91 | AL091 Mains protect. vector >> | |
| 92 | AL092 Dif. vector surge > | |
| 93 | AL093 Dif. vector surge >> | |
| 94 | AL094 Q-U protection < | |
| 95 | AL095 Q-U protection << | |
| AL097-AL100 | | |
| Current protection | | |
| 97 | AL097 Overcurrent > | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 98 | AL098 Overcurrent >> | |
| 99 | AL099 Overcur. VDE0100-718 | |
| 100 | AL100 Inv. Overcur. time prot. | |
| 79 | AL079 Earth current > | |
| 80 | AL080 Earth current >> | |
| AL101-AL112 | | |
| Power protection | | |
| 101 | AL101 LAAZA BUS fault | Interface or BUS on the tableau is disturbed. |
| 102 | AL102 LAAZA participant missing | One or several participants are missing on the BUS. |
| 103 | AL103 VDE4105 Ext. power reduct. fault | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 104 | AL104 Power > | |
| 105 | AL105 Power >> | |
| 106 | AL106 Reverse power > | |
| 107 | AL107 Reverse power >> | |
| 108 | AL108 Apparent power > | |
| 109 | AL109 Apparent power >> | |
| 110 | AL110 Reactive power > | |
| 111 | AL111 Reactive power >> | |
| 112 | AL112 Unbalanced load | |
| AL113-AL114 | | |
| Differentialschutz | | |
| 113 | AL113 Diffstrom > | Wenn der Alarm freigegeben ist, kann beim Überschreiten des eingegebenen Grenzwertes der Alarm auf einem digitalen Ausgang ausgegeben werden. |
| 114 | AL114 Diffstrom >> | |

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|----------------------------------|---------------------------------|--|
| AL115-AL120 VDE NA-protection | | |
| 115 | AL115 VDE4105- Collective fault | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 116 | AL116 VDE4105 - U< (80%) | |
| 117 | AL117 VDE4105 - U>> (115%) | |
| 118 | AL118 VDE4105 - F< (47,5Hz) | |
| 119 | AL119 VDE4105 - F> (51,5Hz) | |
| 120 | AL120 VDE4105 – U> (Quality) | |
| AL121-AL122 Speed protection | | |
| 121 | AL121 Underspeed | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 122 | AL122 Overspeed | |
| AL123-AL140 Analog inputs | | |
| | | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 123 to 128 | AL123 to AL128 | AI1 Module1 Analog input 5 to 10 |
| 225 to 230 | AL129 to AL134 | AI1 Module2 Analog input 11 to 16 |
| 231 to 236 | AL135 to AL140 | AI1 Module3 Analog input 17 to 22 |
| AL145-AL176 PT100(0) | | |
| | | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. |
| 237 to 252 | AL145 to AL160 | AT1 Module1 PT1 to PT6 Analog input 23 to 24 |
| 253 to 268 | AL161 to AL176 | AT1 Module2 PT7 to PT12 Analog input 25 to 26 |
| AL177-AL240 Can Bus alarms | | |
| 308 to 371 | AL177 to AL240 | 64 alarms coming from the engine via Can bus connection. Texts and alarm behaviour can be adjusted under tab „Can Bus“. |

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|--|--|--|
| AL241-AL255 Free alarms | | |
| 422 to 436 | AL241 to AL255 | 15 free alarms. Texts and alarm behaviour can be adjusted under tab „ALARMS EXT“. |
| AL257-AL261 Can Bus analog values | | |
| 591 bis 595 | AL257 bis AL261 | If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output. 5 alarms, which are created from analog values over the engine - Can Bus. Texts and alarm behaviour can be adjusted under tab „CAN BUS“. |
| Group 1 | | |
| 129 | Fault release 1 | Output is set after expiry of „Fault release 1“. Time starts running with „Operation“. |
| 130 | Fault release 2 | Output is set after expiry of „Fault release 2“. Time starts running with „Gen CB ON“. |
| 131 | Fault release 3 | Output is set after expiry of „Fault release 3“. Time starts running with „Gen CB ON“ or „Mains CB ON“. |
| 199 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 | Fault stop Fault warning Fault CB trip Collective fault Fault start blocking (NO) Deexcitation (NO) Fault group 1 (NO) Fault group 2 (NO) Fault group 3 (NO) Fault group 4 (NO) Start blocking (NC) Deexcitation (NC) Fault group 1 (NC) Fault group 2 (NC) Fault group 3 (NC) Fault group 4 (NC) | The digital output is set according to alarm coding. For some messages it is possible to select the output switching behaviour - NO or NC. |
| 148 | Buzzer | The output is set and reset together with the internal buzzer. |
| 163 | Signal test | The output is set via the panel signal test function. |
| 164 165 | Reset Acknowledge | Output for the control of external control circuits via „RESET“. The output is set as long as the key is pressed. |
| Group 2 | | |
| 152 | Stop operation | Output is set with panel operating mode OFF selected. |
| 153 | Manual operation | Output is set with panel operating mode MAN selected. |
| 154 | Test operation | Output is set with panel operating mode TEST selected |
| 178 | Auto operation | Output is set with panel operating mode AUTO selected |
| 155 | Aggregate ready | Output is set with panel operating mode AUTO selected. If a CBT alarm is pending in automatic mode the output will not be set. |
| 149 | Remote start | A remote start demand is pending. |
| 156 | Manual start | The output is set as long the key START is pressed in operating mode MAN. |

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| | | |
|-----|-----------------------|---|
| 224 | Start blocking active | As long as the digital input „Start blocking“ is active, the output remains set. |
| 176 | Preglowing | The output is set when the starter is active. If a preglowing time has been set the start will be delayed for the input time. The output remains also set during preglowing time. |
| 177 | Start preparing | Output to initialize a start preparation. For activation a start preparation time has to be input. The start will be delayed for the input time. The relay will drop out at the beginning of the start command. If the output „Start preparation finished“ is set before the expiration of the time the start command will follow immediately. |
| 182 | Operation | As soon as firing speed or alternator or U-Gen are detected the relay will pull in. After expiry of the stopping time the relay will drop out. |
| 183 | Operation solenoid | The relay will pull in upon start demand. |
| 671 | Stop solenoid | The relay is energized during the entire stop sequence and drops out after the stop time has elapsed. |
| 193 | Starter | Upon start demand and after start preparation time the output will be set. |
| 196 | MDEC Stop | Output for the MDEC controller. The output will always be set when the genset is in operation or stopped. The output is disabled with the stop command, and enabled again after expiration of the stopping time. |
| 184 | Watchdog | The output is set permanently as long as the internal functionality of the control is given and all parameterized modules are plugged onto the T bus and work properly. |

| Group 3 | | |
|---------|-----------------------------|---|
| 173 | Standby switching | When exceeding the limit values for generator voltage and frequency, previously set in operating data, the output is set. If the Gen.CB is closed, only voltage will be monitored. |
| 170 | SYN release | The output is set if the SYN release is active during internal operation. |
| 171 | SYN pulse | The output is set as long as a SYN pulse. |
| 179 | Deactivate CB interlocking | This output is used for deactivating the external key locking during synchronization. It is set with pending output „NLS or GLS Ready“ and will be switched off with key feedback. |
| 191 | Delta U OK | The output is set if the voltage is between the limits of „Max. diff. voltage“, previously adjusted for synchronization. |
| 192 | Delta F OK | The output is set if the frequency is between the limits of „Max. diff. frequency“, previously adjusted for synchronization. |
| 205 | Deexcitation (Start up syn) | The output is set if an active alarm is coded to „Deexcitation“, or if deexcitation is addressed via the fast synchronisation (see Item 4.5.1). |
| 206 | Parallel operation | Feedbacks for Gen.CB and Mains CB are pending. Detection of parallel operation. |
| 204 | Load | MG controls offer the same functionality as „Parallel operation“. For G controls the output is set when the Gen CB is closed. |
| 166 | Loaded | The output is set when the operating value „Genset loaded“ has been exceeded. When falling below this value the output will be deactivated again. |
| 167 | KWH pulse | When reaching the counter value previously input under operating data a pulse will be output. KWH counting starts again. |
| 198 | Partial excitation on | The output is set with the Gen CB feedback during start up synchronisation. The output is disabled after expiration of „HLSYN partial excitation“ time. |
| 200 | GCB ready (on) | When Gen CB ready for power-on, the output is closed. |
| 201 | MCB ready (off) | When mains CB is ready for power-on, the output is open. |
| 202 | GCB on impulse | Power indicator for Gen CB |
| 203 | MCB on impulse | Power indicator for mains CB |
| 222 | Gen CB indication | Output is set when feedback for Gen.CB is pending at the respective digital input. |
| 221 | Mains CB indication | Output is set when feedback for Mains CB is pending at the respective digital input. |
| 615 | MCB trip monitoring on | There is an internal monitoring of the chronological order, whether a trip comes from the circuit breaker or from the controller itself. The output is active when a trip is detected externally and not from the controller. |

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| | | |
|-----|-------------------------------------|---|
| 616 | GCB trip monitoring on | There is an internal monitoring of the chronological order, whether a trip comes from the circuit breaker or from the controller itself. The output is active when a trip is detected externally and not from the controller. |
| 215 | Gen ready for central | Indication to central that closed Gen CB has been deselected. |
| 180 | VDE 0108/1 Mains | The output is set with running genset, existing voltage and closed mains CB. |
| 181 | VDE 0108/2 Gen | The output is set with running genset, existing voltage and closed Gen CB. |
| 168 | Mains fault | As soon as mains fault is detected, the contact is closed. Function can only be used with 'mains-generator' – tableau. |
| 220 | Mains voltage available | The output is set when reaching the operating value for mains voltage. Function can only be used with 'mains-generator' – tableau. |
| 169 | Generator voltage available | The output is set upon reaching the operating value for generator voltage. |
| 572 | Busbar voltage available | The output is set when reaching the operating value for mains voltage. This function is not dependent on the used tableau. |
| 150 | Release mains im-/export contr. | The output is set upon setting the digital output for the mains im-/export control release. |
| 555 | Last participant in AUTO/TEST - BUS | During load adjusting via BUS, the output is active when the last participant is in "AUTO" or "TEST" mode. |
| 589 | Last GCB on – BUS | During load adjusting via BUS, the output is active if only one GCB is closed. |
| 590 | Last GCB on (own) - BUS | During load adjusting via BUS, the output is active if the own GCB is closed. This message is not sent to all participants but signaled only on the own control. |

| Group 4 | | |
|---------|------------------------|--|
| 158 | Speed down | Digital control signals for frequency and power control. |
| 157 | Speed up | Digital control signals for frequency and power control. |
| 159 | Speed controller reset | Output will be set for 1.5 secs., in compliance with one of the following requirements: Start command, Stop command or GenCB OFF. |
| 160 | Speed controller on | The output is set with speed controller ON. |
| 162 | Voltage down | Digital control signals for voltage and cos phi control. |
| 161 | Voltage up | Digital control signals for voltage and cos phi control. |
| 174 | Battery pack 1 | Outputs for switching on the battery packs. The outputs are interlocked. Switching is done delayed. Starter only enabled after switching. |
| 175 | Battery pack 2 | |
| 185 | F1 Push-Button | If this function is set to an output this operating function will be displayed automatically. The output remains set as long as the button is pushed. |
| 186 | F1 Switch | If this function is set to an output this operating function will be displayed automatically. The output is set and locked with pushing the button. The output is reset with pushing the button again. |
| 187 | F2 Push-Button | If this function is set to an output this operating function will be displayed automatically. The output remains set as long as the button is pushed. |
| 188 | F2 Switch | If this function is set to an output this operating function will be displayed automatically. The output is set and locked with pushing the button. The output is reset with pushing the button again. |
| 195 | Remote control active | The output is set if one of the functions for remote control or load setting via a BUS coupler (PB1 / PN1 / MB1 / MB2) is active through a digital input or a logical function. |
| 372 | Remote tableau active | The output is set if the remote tableau is selected. |
| 373 | Main tableau active | The output is set if the main tableau is selected. |

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| | | |
|-----|---|---|
| 197 | Sprinkler operation | The output is set if the function „Sprinkler operation“ is enabled via the digital input. |
| 207 | Pilot | Output function for G controls. The output is set if the Gen CB is ON and the function „Initial connection release/Pilot“ is enabled via the digital input. |
| 216 | VDE4105 – Standby switching (NC) | Output is set with mains within preset limit values. See Item 4.10.4 |
| 217 | VDE4105 - Standby switching (NO) | Output is reset with mains within preset limit values. See Item 4.10.4 |
| 218 | VDE4105 – Ext. setpoint reduct. select. | The output is set if setpoint reduction is selected via a digital input. |
| 219 | VDE4105 – Ext. setpoint reduct. active | The output is set if selected setpoint reduction is active. |
| 305 | VDE4105 – Ext. setpoint reduct. 1 | The output is set if setpoint reduction 1 was activated by an input. |
| 306 | VDE4105 – Ext. setpoint reduct. 2 | The output is set if setpoint reduction 2 was activated by an input. |
| 307 | VDE4105 – Ext. setpoint reduct. 3 | The output is set if setpoint reduction 3 was activated by an input. |

| Group 5 | |
|------------------|-------------|
| 269 to 304 | AI5 to AI22 |

Each analog input of modules AI1 has two limit values. The output is set when falling below (<x) or exceeding (>x) the respective limit value.

| Group 6 | |
|---------|---------|
| 374 | PT1<x |
| 376 | PT2<x |
| 378 | PT3<x |
| 380 | PT4<x |
| 382 | PT5<x |
| 384 | PT6<x |
| 386 | AE23<x |
| 388 | AE24<x |
| 390 | PT7<x |
| 392 | PT8<x |
| 394 | PT9<x |
| 396 | PT10<x |
| 398 | PT11<x |
| 400 | PT12<x |
| 402 | AE25<x |
| 404 | AE26<x |
| 375 | PT1>x |
| 377 | PT2>x |
| 379 | PT3>x |
| 381 | PT4>x |
| 383 | PT5>x |
| 385 | PT6>x |
| 387 | AE23>x |
| 389 | AE24>x |
| 391 | PT7>x |
| 393 | PT8>x |
| 395 | PT9>x |
| 397 | PT10>x |
| 399 | PT11>x |
| 401 | PT12><x |
| 403 | AE25>x |
| 405 | AE26>x |

Each measurement input of modules AT1 has two limit values. The output is set when falling below (<x) or exceeding (>x) the respective limit value.

| Group 7 | |
|---|---|
| 556 to 563 & 672 to 679 | PN1 / MB1 / MB2 Control Bit 1 - 8 PN1 / MB1 / MB2 Control Bit 9 - 16 |
| 564 to 571 | PB1 Control Bit 1 – 8 |
| | There are 16 control bits available for the Profinet (PN1) or Modbus (MB1 / MB2) bus couplers, which are connected directly to digital outputs. In addition, these control bits can be integrated into logic functions. |
| | There are 8 control bits available for the Profibus coupler (PB1), which are applied directly to digital outputs. In addition, these control bits can be integrated into logic functions. |

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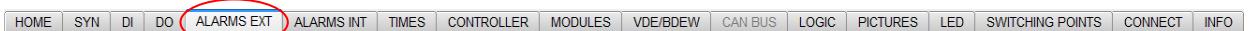
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| | | |
|--|--|--|
| Group 8 | | |
| 599 to 608 | CAN BUS AIN01 <x or >x CAN BUS AIN08 <x or >x | For the first 5 analog values coming from the engine (CAN BUS), two limit values are available. The output is set when falling below (<x) or exceeding (>x) the respective limit value. |
| Gruppe 9 | | |
| 668 | Blink Bit 0,5s | The output is set and reset in a 2cy interval. |
| 669 | Blink Bit 1,0s | The output is set and reset in a 1cy interval. |
| 670 | Blink Bit 2,0s | The output is set and reset in a 0,5cy interval. |
| Logic – Marker/Timer | | |
| 438 to 485 | Marker 01 to 40 Timer 01 to 08 | 40 logic blocks and 8 timer blocks can be configured. The respective outputs of the blocks can be assigned to digital outputs or used for other shortcuts. |
| 617 to 664 | Marker 41 to 80 Timer 09 to 16 | 40 logic blocks and 8 timer blocks can be configured. The respective outputs of the blocks can be assigned to digital outputs or used for other shortcuts. |
| Digital inputs | | |
| 486 to 554 665 to 667 | DI001 to 003 DI101 to 122 DI201 to 222 DI301 to 322 DI501 to 503 | The digital inputs can be linked directly to the digital outputs or used for controlling the logic blocks. |
| Switching points | | |
| 573 to 588 | Switching point 1 to Switching point 16 | For a certain selection of electrical quantities, e.g. the percentage active power, one limit value is available for each switching point. The output is set when falling below (<x) or exceeding (>x) the respective limit value. |

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4.5 External alarms



47 free alarms are available. The alarms can be set to free digital inputs. Text, alarm behaviour as well as delays can be selected separately for each alarm.

4.5.1 Alarm characteristics

| | | |
|---|----------|-----------|
| 1 - 16 | 17 - 32 | 241 - 255 |
| <input checked="" type="checkbox"/> 001 | DE AL001 | EN AL001 |
| <input type="checkbox"/> 002 | | |

Any alarm to be visualized has to be released before. Alarms not yet released are hidden.

| | | |
|---------------------|-------------------|---------------------|
| limit value 85 % | hysteresis 2 % | delay time 1,0 S |
|---------------------|-------------------|---------------------|

For internal alarms the alarm message is visualized acc. to the preset limit value and after expiration of the delay time.

| | | | | | | |
|------------------------------|---|---|------------------------------|------------------------------|------------------------------|------------------------------|
| <input type="checkbox"/> INV | <input type="checkbox"/> AR | <input checked="" type="checkbox"/> FR1 | <input type="checkbox"/> FR2 | <input type="checkbox"/> FR3 | <input type="checkbox"/> SB | <input type="checkbox"/> DEE |
| <input type="checkbox"/> SSD | <input checked="" type="checkbox"/> NSD | <input type="checkbox"/> CBT | <input type="checkbox"/> FG1 | <input type="checkbox"/> FG2 | <input type="checkbox"/> FG3 | <input type="checkbox"/> FG4 |

With the coding the alarms can be customized to the corresponding applications.

| | |
|------------|---|
| INV | Inverted alarm behaviour. |
| AR | Auto reset – There will be an automatic reset when the alarm is not pending anymore, and the alarm reset delay has elapsed. |
| FR1 | Release delay 1 – time runs upon detection of „Operation“. Time is set under tab „Times→Advanced settings 1“. |
| FR2 | Release delay 2 – time runs upon detection of „Gen CB ON“. Time is set under tab „Times→Advanced settings 1“. |
| FR3 | Release delay 3 – time runs upon detection of „mains CB ON“ or „Gen CB ON“. Time is set under tab „Times→Advanced settings 1“. |
| SB | Start blocking – No start as long as alarm is pending. |
| DEE | Deexcitation – The corresponding output, set to the function „Deexcitation“, will be adjusted. |
| SSD | Sprinkler stop – The motor will be stopped also in sprinkler operating mode. |
| NSD | Normal stop – Stop command to motor. Acc. to settings the output Stop/Operation solenoid will be enabled or disabled. |
| CBT | CB ejection – leads to switching off the Gen CB. If the alarm remains pending for more than 3 mins, a stop command is sent to the motor. |
| FG1 to FG4 | Fault group 1 to 4 – The alarms can be grouped in six different groups. These groups can be adjusted to a digital output acc. to the function list. |
| LC1 / LC2 | Lock group 1 & 2 - By connecting a digital input or creating a logic function, conditions can be created that define a lock group. This means that an alarm can be blocked in certain states. |

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4.6 Internal alarms

HOME | SYN | DI | DO | ALARMS EXT | **ALARMS INT** (TIMES | CONTROLLER | MODULES | VDE/BDEW | CAN BUS | LOGIC | PICTURES | LED | SWITCHING POINTS | CONNECT | INFO)

4.6.1 General

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|------------------|--|-------------------------|------------------|---------------------|---------------------|--|--|---|---|----------|
| ✓ 033 ANSI 48 | DE AL033 Not-Halt EN AL033 Emergency stop | | | | delay time 0.0 S | | ✓ INV <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input checked="" type="checkbox"/> DEE | | ✓ SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |
| 034 ANSI 48 | AL034 Fehlstart warnend AL034 Start crank warning | | | | | | | | | |
| ✓ 035 ANSI 48 | DE AL035 Fehlstart abstellend EN AL035 Start crank stop | limit value 3 Start | | delay time 0.0 S | | ✓ AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | | ✓ SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |
| ✓ 036 ANSI 48 | DE AL036 Fehlstart Sprinkler EN AL036 Start crank sprinkler | limit value 10 Start | | delay time 0.0 S | | ✓ AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | | ✓ SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |

When exceeding or falling below the limit value the alarm is visualized acc. To the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

| General | |
|-----------------------------|--|
| AL033 Emergency stop | Definitely stops the genset, also in sprinkler operation mode. Processing takes place in the closed-circuit principle. |
| AL034 Start crank warning | A warning alarm will be issued if the start attempts exceed the input limit value. |
| AL035 Start crank stop | If the start attempts exceed the input limit value a warning alarm will be issued. |
| AL036 Start crank sprinkler | Upon sprinkler request „Aborted start stopping“ is disabled. If the start attempts exceed the input limit value a warning alarm will be issued. |
| AL037 Pick up fault | Elimination of the signal „Firing speed reached“ (LIMA). |
| AL038 Stop fault | The delay time will be started with „Stop command“. After expire of the delay the LIMA input and generator voltage must not be present anymore; otherwise the alarm will be set. |
| AL039 Supply UDC< | Monitoring of KAS supply voltage for undervoltage. |
| AL040 Battery 1 U< | Alarm will be set via the digital input „Battery 1 fault“. |
| AL041 Battery 2 U< | Alarm will be set via the digital input „Battery 2 fault“. |
| AL042 Gen CB fault | No CB feedback after start command. |
| AL043 Mains CB fault | No CB feedback after start command. |
| AL044 Syn time too long | Synchronization has to be completed with the preset time. |
| AL045 Watchdog | Monitoring of active BUS modules. |
| AL046 Supply UDC> | Monitoring of KAS supply voltage for overvoltage. |
| AL047 Maintenance counter | Alarm will be set after expiry of maintenance counter. See Item 7.8.4 |
| AL048 Fault remote tableau | Monitoring of the remote panel |

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4.6.2 Mains U/F

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|---------|--|---------------|----------------------|--------------------|---------------------|-------------------------|---|------------------|---------------|----------|
| | <input checked="" type="checkbox"/> monitoring mains quality | | | | | | | | | |
| ✓ 049 | DE AL049 Netzspannung << EN AL049 Mains voltage << | | limit value 95 % | hysteresis 2 % | delay time 0.2 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| ✓ 050 | DE AL050 Netzspannung < EN AL050 Mains voltage < | | limit value 97 % | hysteresis 2 % | delay time 2.0 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| ✓ 051 | DE AL051 Netzspannung > EN AL051 Mains voltage > | | limit value 103 % | hysteresis 2 % | delay time 2.0 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| ✓ 052 | DE AL052 Netzspannung >> EN AL052 Mains voltage >> | | limit value 105 % | hysteresis 2 % | delay time 0.2 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |

When the mains quality monitoring is activated the available alarms can be released.

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

| Mains U/F | |
|----------------------------------|--|
| AL049 Mains voltage << | Monitoring of mains quality. |
| AL050 Mains voltage < | Monitoring of under-/overvoltage and under-/overfrequency of mains voltage. Monitoring only starts when mains voltage has reached its operating value. If one of the alarm values exceeds or falls below the alarm limit values the respective alarm message will be visualized after expiration of the delay time. The LED for „Mains voltage available“ is flashing and the start sequence is initiated. |
| AL051 Mains voltage > | |
| AL052 Mains voltage >> | |
| AL053 Mains frequency << | |
| AL054 Mains frequency < | |
| AL055 Mains frequency > | |
| AL056 Mains frequency >> | |
| AL057 Mains rotating field | Monitoring of right or left rotating field. |
| AL058 Mains angle fault | Maximum deviation angle for external conductors. |
| AL059 Mains voltage asymmetry | The input limit value refers to the nominal voltage. Phase current deviations may not exceed this value. |

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4.6.3 Generator U/F

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|--|--|---------------|------------------|---------------------|-------------------|-------------------------|---|---|---------------|----------|
| <input type="checkbox"/> 061 BDEW | AL061 BDEW - U(t) Zeit lauft AL061 BDEW - U(t) Time is running | | | | | | | | | |
| <input type="checkbox"/> 062 BDEW | AL062 BDEW - U(t) Auslösung AL062 BDEW - U(t) Fault | | | | | | | | | |
| <input checked="" type="checkbox"/> 065 ANSI 27 | DE AL065 Generatorspannung << EN AL065 Generator voltage << | | | limit value 85 % | hysteresis 2 % | delay time 1.0 S | <input type="checkbox"/> AR <input checked="" type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | <input type="checkbox"/> SSD <input checked="" type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |
| <input checked="" type="checkbox"/> 066 ANSI 27 | DE AL066 Generatorspannung < EN AL066 Generator voltage < | | | limit value 90 % | hysteresis 2 % | delay time 2.0 S | <input type="checkbox"/> AR <input checked="" type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | <input type="checkbox"/> SSD <input checked="" type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

| Generator U/F | |
|--|---|
| AL061 BDEW–U(t) Time is running | Dynamic mains support. Alarm is set while time for trigger curve is running. For control if there has been a voltage drop that has not led to tripping. |
| AL062 BDEW–U(t) Fault | Dynamic mains support. Alarm is set if voltage has not been reestablished within the preset time or disconnected from mains. |
| AL065 Generator voltage << AL066 Generator voltage < AL067 Generator voltage > AL068 Generator voltage >> AL069 Generator frequency << AL070 Generator frequency < AL071 Generator frequency > AL072 Generator frequency >> | Monitoring of generator voltage and frequency. |
| AL073 Generator rotating field | Monitoring of right or left rotating field. |
| AL074 Generator angle fault | Maximum deviation angle for external conductors. |
| AL075 Generator voltage asymmetry | The input limit value refers to the nominal voltage. Phase current deviations may not exceed this value. |
| AL076 Cos phi capacitive | Monitoring of power factor. Capacitive limit value. |
| AL077 Cos phi inductive | Monitoring of power factor. Inductive limit value. |

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4.6.4 Mains protection

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|------------------|---|---------------|-------------------------|--------------------|-----------------------|-------------------------|---|------------------|---------------|----------|
| ✓ 081 ANSI 27 | DE AL081 Netzschutz Sammelalarm EN AL081 Mains protection collective fault | | | | delay time 0,0 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| ✓ 082 ANSI 27 | DE AL082 Netzschutz U<< EN AL082 Mains protection U<< | | limit value 45 % | hysteresis 2 % | delay time 0,30 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| ✓ 083 ANSI 27 | DE AL083 Netzschutz U< EN AL083 Mains protection U< | | limit value 80 % | hysteresis 2 % | delay time 2,70 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| ✓ 084 ANSI 59 | DE AL084 Netzschutz U> EN AL084 Mains protection U> | | limit value 108 % | hysteresis 2 % | delay time 60,00 S | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

The mains protection alarms are generated from the values measured at the generator voltage input.

| Mains protection | |
|---|--|
| AL081 Mains protection collective fault | The mains protections collective fault is affected by all alarms activated in tab „Mains protection“. The collective fault is permanently assigned to two relays on the PM2 module. Operation of both relays is based on the closed-circuit current principle. One relay has a normally-closed contact, the other one has a normally-open contact. Which relay is used depends on whether the mains protection has to affect the MCB or the GCB. |
| AL082 Mains protection U<< AL083 Mains protection U < AL084 Mains protection U > AL085 Mains protection U >> AL086 Mains protection F << AL087 Mains protection F < AL088 Mains protection F > AL089 Mains protection F >> | Monitoring of generator voltage and frequency. |
| AL090 Mains protect. vector > AL091 Mains protect. vector >> | Alarm is set with vector surge in one phase. |
| AL092 Dif. vector surge > AL093 Dif. vector surge >> | Alarm is set with a simultaneous vector surge in all three phases in the same direction. |
| AL094 Q-U protection < AL095 Q-U protection << | If the voltage value falls below its limit value in all three phases and if the generating plant simultaneously receives inductive reactive power from mains, the alarm is set. The limit value set for the angle Phi is capacitive. |

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4.6.5 Current protection

| | general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|--|--|-----------|---|----------------------|----------------------|-----------------------------|-------------------------|---|---|---------------|----------|
| <input checked="" type="checkbox"/> 097 <small>ANSI 50</small> | DE AL097 Überstrom > EN AL097 Overcurrent > | | | | limit value 300 % | hysteresis 2 % | delay time 3.0 S | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | <input type="checkbox"/> SSD <input checked="" type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |
| <input type="checkbox"/> 098 <small>ANSI 50</small> | AL098 Überstrom >> AL098 Overcurrent >> | | | | | | | | | | |
| <input checked="" type="checkbox"/> 099 <small>VDE 0100</small> | DE AL099 Überstrom VDE0100-718 EN AL099 Overcurrent VDE0100-718 | | | limit value 110 % | | | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input checked="" type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |
| <input checked="" type="checkbox"/> 100 <small>ANSI 51</small> | DE AL100 Überstromzeitschutz EN AL100 Overcurrent time protection | | characteristic IEC - extremely inverse | | | time multiplicator 10,00 | | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE | <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input checked="" type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

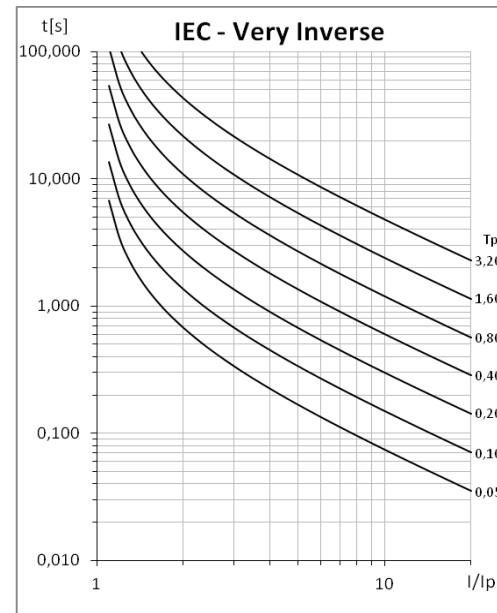
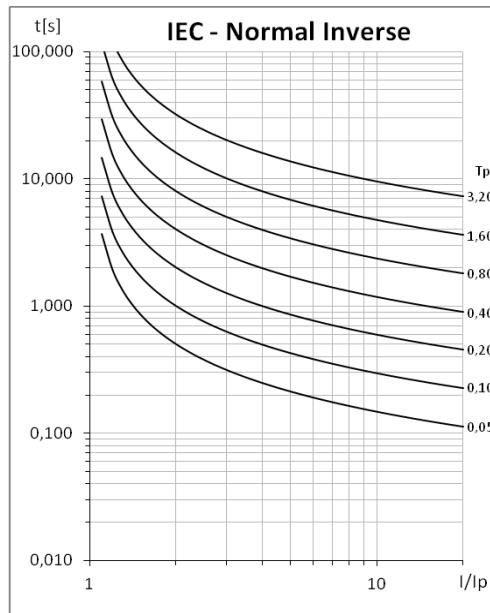
The current protection function of KAS monitors the current in three-phase networks. Current metering takes place as simultaneous 3-phase sampling and is a true effective value measuring. The current measuring circuits and supply voltage are galvanically-isolated (DC) among each other and against electronic measuring equipment. An influence e.g. by earth loop is excluded. For this reason direct current metering is possible even without current transformer in a nominal current range up to 5A. The limit value refers to the generator nominal current which is set.

| Current protection | |
|---|--|
| AL097 Overcurrent > AL098 Overcurrent >> | If the current exceeds the limit value in one phase, the alarm will be set. |
| AL099 Overcurrent VDE100-718 | The compact automatic KAS complies with the requirements of the DIN VDE 0108 and DIN VDE 0100-718 (Erection of low-voltage installations - Requirements for special installations or locations - Part 718: Installations for gathering of people), according to which only for up to 60 minutes 110 % of the rated current may be delivered within a 12 hour period. |
| AL100 Overcurrent time protection | According to the selected ANSI or IEC curves and the adjusted time multiplier tripping is delayed depending on the overcurrent. |
| AL079 Earth current > | If the earth current exceeds the limit value, the alarm will be set. |
| AL080 Earth current >> | If the earth current exceeds the limit value, the alarm will be set. |

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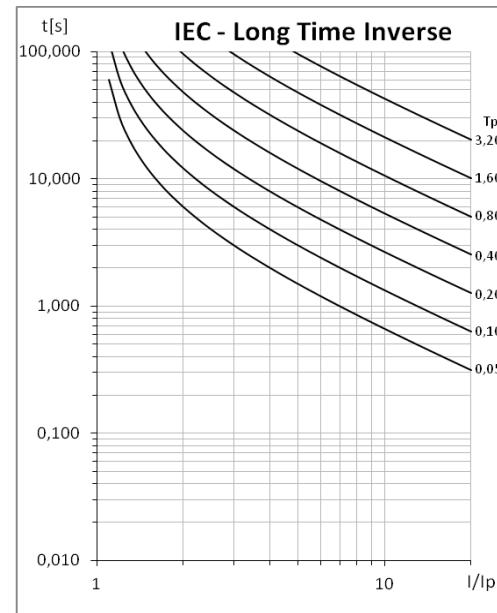
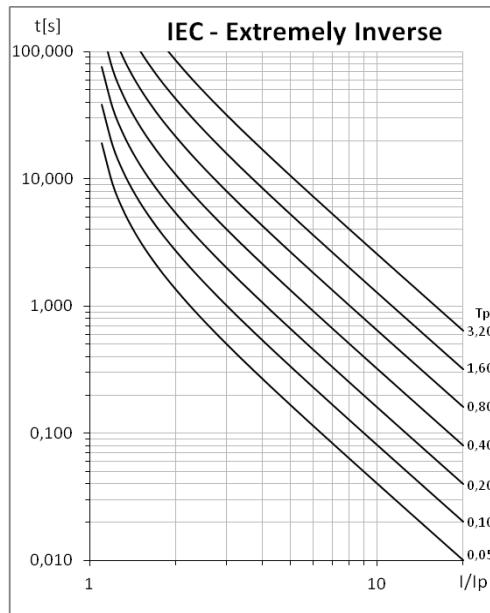
4.6.5.1 IEC Characteristics



$$t = \frac{0,14}{\left(\frac{I}{I_p}\right)^{0,02}} - T_p$$

$$t = \frac{13,5}{\left(\frac{I}{I_p}\right)^1} - T_p$$

t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value



$$t = \frac{80}{\left(\frac{I}{I_p}\right)^2} - T_p$$

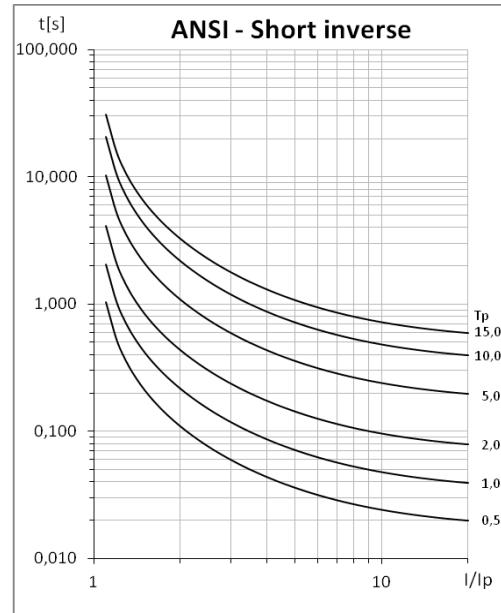
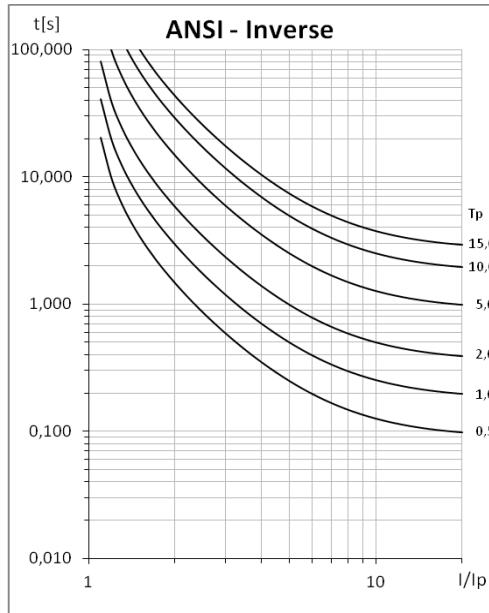
$$t = \frac{120}{\left(\frac{I}{I_p}\right)} - T_p$$

t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value

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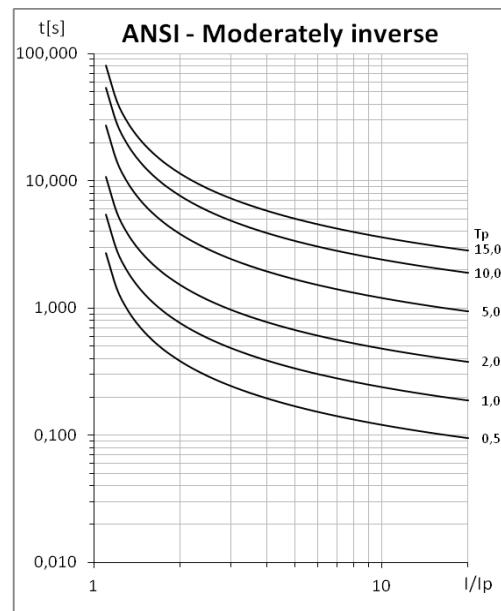
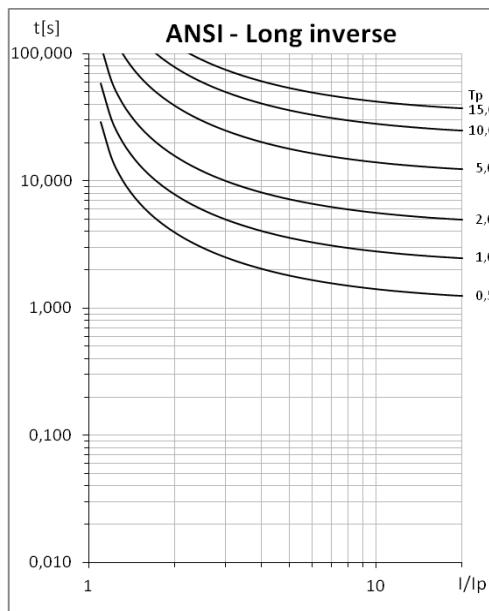
4.6.5.2 ANSI Characteristics



$$t = \left(\frac{8,9341}{\left(\frac{I}{I_p}\right)^{2,0938}} + 0,17966 \right) T_p$$

$$t = \left(\frac{0,2663}{\left(\frac{I}{I_p}\right)^{1,2969}} + 0,03393 \right) T_p$$

t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value



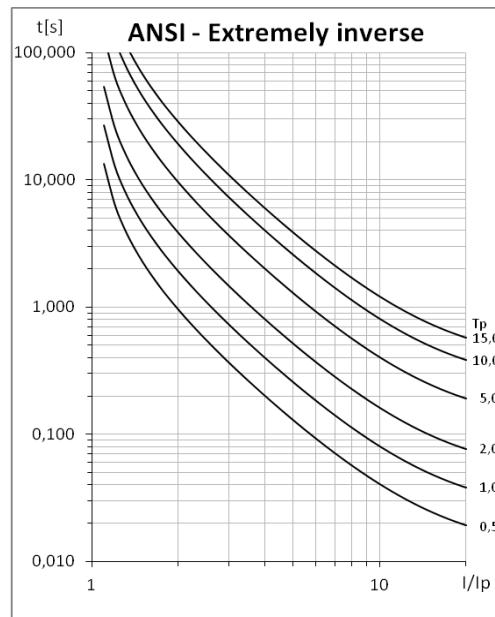
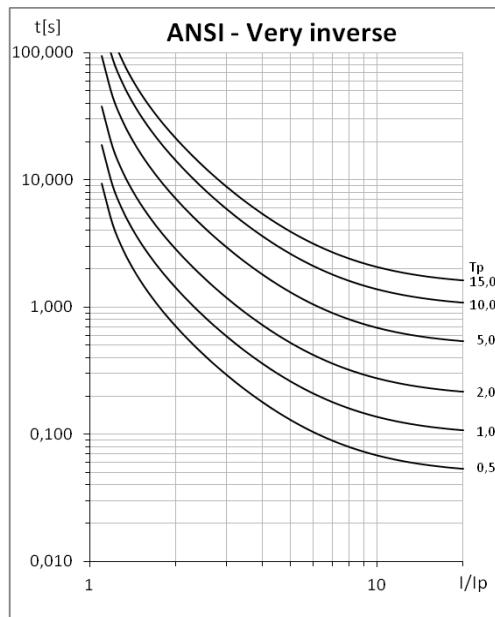
$$t = \left(\frac{5,6143}{\left(\frac{I}{I_p}\right)^1} + 2,18592 \right) T_p$$

$$t = \left(\frac{0,0103}{\left(\frac{I}{I_p}\right)^{0,02}} + 0,0228 \right) T_p$$

t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value

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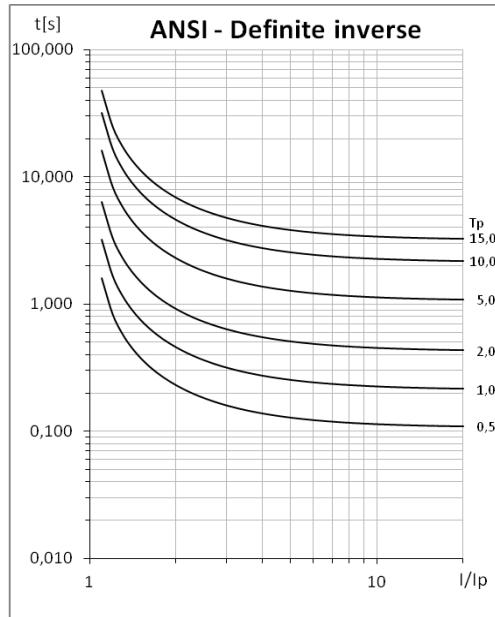
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$$t = \left(\frac{3,922}{\left(\frac{I}{I_p}\right)^2} + 0,0982 \right) T_p$$

$$t = \left(\frac{5,64}{\left(\frac{I}{I_p}\right)^2} + 0,0243 \right) T_p$$

t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value



$$t = \left(\frac{0,4797}{\left(\frac{I}{I_p}\right)^{1,5625}} + 0,21359 \right) T_p$$

t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value

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4.6.6 Power protection

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|--|---|---------------|----------------------|--------------------|----------------------|--|-------------------|------------------|---------------|----------|
| <input type="checkbox"/> 103 VDE 4105 | AL103 VDE4105 Leistungsreduzier. gestört | | | | | | | | | |
| | AL103 VDE4105 Power reduction fault | | | | | | | | | |
| <input checked="" type="checkbox"/> 104 ANSI 32 | DE AL104 Leistung > EN AL104 Power > | | limit value 115 % | hysteresis 2 % | delay time 10,0 S | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | | |
| <input checked="" type="checkbox"/> 105 ANSI 32 | DE AL105 Leistung >> EN AL105 Power >> | | limit value 120 % | hysteresis 2 % | delay time 5,0 S | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input checked="" type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | | |
| <input checked="" type="checkbox"/> 106 ANSI 32 | DE AL106 Rückleistung > EN AL106 Reverse power > | | limit value -5 % | hysteresis 2 % | delay time 10,0 S | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input checked="" type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

| Power protection | |
|--|--|
| AL101 LAAZA BUS fault AL102 LAAZA participants missing | Interface or BUS on the tableau is disturbed. One or several participants are missing on the BUS. |
| AL103 Power reduction fault | If the setpoint value given by the external power reduction is not reached within the adjusted delay, the alarm will be set. |
| AL104 Power > AL105 Power >> AL106 Reverse power > AL107 Reverse power >> AL108 Apparent power > AL109 Apparent power >> AL110 Reactive power > AL111 Reactive power >> | Monitoring of power data. |
| AL112 Unbalanced load | The input limit value refers to the nominal power. Phase power deviations may not exceed this value. |

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4.6.7 Differential protection

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|--|---|---------------|------------------|--------------------|------------------|-------------------------|-------------------|---------------------|---|----------|
| <input checked="" type="checkbox"/> 113 ANSI 87 | DE AL113 Diffstrom > EN AL113 Diff current > | | | | | limit value 10 % | hysteresis 2 % | delay time 0.2 S | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |
| <input checked="" type="checkbox"/> 114 ANSI 87 | DE AL114 Diffstrom >> EN AL114 Diff current >> | | | | | limit value 20 % | hysteresis 2 % | delay time 0.2 S | <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input checked="" type="checkbox"/> DEE <input type="checkbox"/> SSD <input checked="" type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

The diff.prot. alarms are visible when diff.prot. has been activated on tab „HOME“, and the DM1 Module has to be connected to the BUS. If the module is not yet connected the alarm „Watchdog“ will appear.

The differential protection function of the compact automatic KAS is to be used to protect three-phase rotary current generators or three-phase rotary current synchronous and asynchronous motors. It senses the residual currents within the protected zone, triggers when reaching the preset limit values and the corresponding error messages are displayed.

The differential protection measuring is the comparison of currents between generator star point and the outflow of generator or the supply in the switching gear. The sum of all currents must be zero.

| Differential protection | |
|---|--|
| AL113 Diff current > AL114 Diff current >> | Differential currents are monitored within the protection range; tripped when preset limit values have been reached. |

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4.6.8 VDE-NA protection

| general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|--|--|---------------|------------------------|--------------------|------------------|-------------------------|--|------------------|---------------|----------|
| <input checked="" type="checkbox"/> 115  | DE AL115 VDE4105 - Sammelfehler EN AL115 VDE4105 - Collective fault | | | | | delay time 0,0 S | <input checked="" type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| <input checked="" type="checkbox"/> 116  | DE AL116 VDE4105 - U< (80%) EN AL116 VDE4105 - U< (80%) | | limit value 80 % | | | | <input checked="" type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| <input checked="" type="checkbox"/> 117  | DE AL117 VDE4105 - U>> (115%) EN AL117 VDE4105 - U>> (115%) | | limit value 115 % | | | | <input checked="" type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |
| <input checked="" type="checkbox"/> 118  | DE AL118 VDE4105 - F< (47,5Hz) EN AL118 VDE4105 - F< (47,5Hz) | | limit value 47,5 CY | | | | <input checked="" type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | | | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

All active VDE NA-protection alarms affect the relays on the PM2, assigned to the function Mains protection. The relay operation is based on the closed-circuit current principle. One relay has a normally-closed contact, the other one has a normally-open contact. Which relay is used depends on whether the mains protection has to affect the MCB or the GCB.

In case of inadmissible voltage and frequency values NA protection, acc. to VDE4105, is for disconnecting the system from mains. NA protection is active after release of the corresponding alarms. The alarms have been set to fixed values. The only adjustable value is the 10 minutes average value protection, against exceeding the upper voltage limit. This value can be adjusted between 110% and 115%, and is generated Alarm 120.

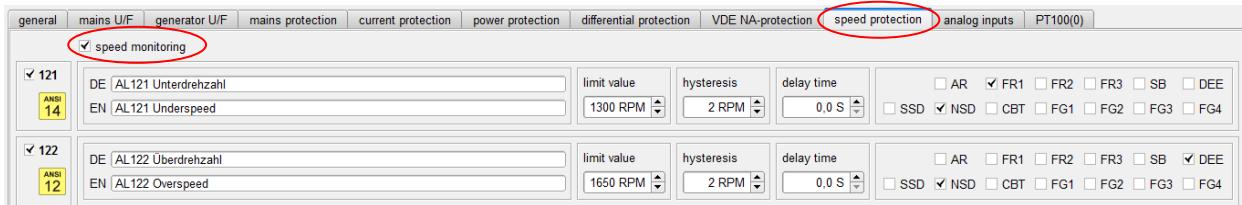
The VDE NA protection alarms are generated from the values measured at the generator voltage input.

| VDE NA-protection | |
|--|---|
| AL115 VDE4105 - Coll. fault | The coll. fault is affected by all alarms activated in tab „VDE NA-protection“. |
| AL116 VDE4105 - U< (80%) AL117 VDE4105 - U>> (115%) AL118 VDE4105 - F< (47,5Hz) AL119 VDE4105 - F> (51,5Hz) | Monitoring of voltage and frequency. It is not possible to modify the limit values. |
| AL120 VDE4105 - U> (Quality) | Monitoring of the 10-mins-average-voltage-value. |

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4.6.9 Speed protection

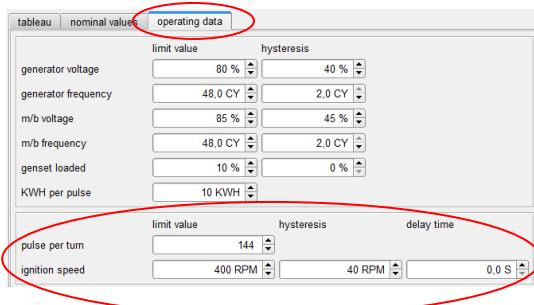


The screenshot shows the 'speed protection' configuration tab. It contains two entries:

- AL121:** DE | AL121 Unterdrehzahl (DE | AL121 Underspeed) with limit value 1300 RPM, hysteresis 2 RPM, delay time 0.0 S, and alarm options AR, FR1, FR2, FR3, SB, DEE.
- AL122:** DE | AL122 Überdrehzahl (EN | AL122 Overspeed) with limit value 1650 RPM, hysteresis 2 RPM, delay time 0.0 S, and alarm options AR, FR1, FR2, FR3, SB, DEE.

When the speed monitoring is activated the available alarms can be released.

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.



| Parameter | Limit Value | Hysteresis | Delay Time |
|---------------------|-------------|------------|------------|
| generator voltage | 80 % | 40 % | |
| generator frequency | 48,0 CY | 2,0 CY | |
| m/b voltage | 85 % | 45 % | |
| m/b frequency | 48,0 CY | 2,0 CY | |
| genset loaded | 10 % | 0 % | |
| KWH per pulse | 10 KWH | | |
| | | | |
| pulse per turn | 144 | | |
| ignition speed | 400 RPM | 40 RPM | 0,0 S |

If the speed protection is enabled a Pick-Up has to be connected for speed measurement. In order to display the correct speed and to monitor the speed, the pulses per turn and the ignition speed have to be input under tab Basic settings→Operating data. Furthermore two alarms can be activated for speed monitoring for under- or overspeed.

| Speed protection | |
|------------------|----------------------------|
| AL121 Underspeed | Monitoring of motor speed. |
| AL122 Overspeed | |

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4.6.10 Analog inputs

| | | | | | | | | | | analog inputs | PT100(0) |
|-------|------------------------------|--|---------------------|-------------------|---------------------|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| ✓ 123 | DE AL123 AE5 EN AL123 AI5 | | limit value 50 % | hysteresis 2 % | delay time 0.1 S | | <input type="checkbox"/> INV | <input type="checkbox"/> AR | <input type="checkbox"/> FR1 | <input type="checkbox"/> FR2 | <input type="checkbox"/> FR3 |
| ✓ 124 | DE AL124 AE6 EN AL124 AI6 | | limit value 50 % | hysteresis 2 % | delay time 0.1 S | | <input type="checkbox"/> SB | <input type="checkbox"/> DEE | <input type="checkbox"/> SSD | <input type="checkbox"/> NSD | <input type="checkbox"/> CBT |
| ✓ 125 | DE AL125 AE7 EN AL125 AI7 | | limit value 50 % | hysteresis 2 % | delay time 0.1 S | | <input type="checkbox"/> INV | <input type="checkbox"/> AR | <input type="checkbox"/> FR1 | <input type="checkbox"/> FR2 | <input type="checkbox"/> FR3 |
| ✓ 126 | DE AL126 AE8 EN AL126 AI8 | | limit value 50 % | hysteresis 2 % | delay time 0.1 S | | <input type="checkbox"/> SB | <input type="checkbox"/> DEE | <input type="checkbox"/> SSD | <input type="checkbox"/> NSD | <input type="checkbox"/> CBT |
| | | | | | | | <input type="checkbox"/> FG1 | <input type="checkbox"/> FG2 | <input type="checkbox"/> FG3 | <input type="checkbox"/> FG4 | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

The alarms will only be displayed with the AI1 modules enabled under tab "HOME".

| Analog inputs | |
|--|--|
| AL123 Analog input 5 to AL128 Analog input 10 | Module 1 – Each analog input on the additional modules is assigned to an alarm. The alarm is set if the value exceeds or falls below the limit value. It is possible to edit the alarm text. |
| AL129 Analog input 11 to AL134 Analog input 16 | Module 2 – Each analog input on the additional modules is assigned to an alarm. The alarm is set if the value exceeds or falls below the limit value. It is possible to edit the alarm text. |
| AL135 Analog input 17 to AL140 Analog input 22 | Module 3 – Each analog input on the additional modules is assigned to an alarm. The alarm is set if the value exceeds or falls below the limit value. It is possible to edit the alarm text. |

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4.6.11 PT100 (0)

| | general | mains U/F | generator U/F | mains protection | current protection | power protection | differential protection | VDE NA-protection | speed protection | analog inputs | PT100(0) |
|-------|----------------------------------|-----------|---------------|------------------|--------------------|------------------|-------------------------|----------------------|---------------------|--|----------|
| ✓ 145 | DE AL145 PT1> EN AL145 PT1> | | | | | | limit value 5.0 °C | hysteresis 0.2 °C | delay time 0.1 S | <input type="checkbox"/> INV <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |
| ✓ 146 | DE AL146 PT1>> EN AL146 PT1>> | | | | | | limit value 5.0 °C | hysteresis 0.2 °C | delay time 0.1 S | <input type="checkbox"/> INV <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |
| ✓ 147 | DE AL147 PT2> EN AL147 PT2> | | | | | | limit value 5.0 °C | hysteresis 0.2 °C | delay time 0.1 S | <input type="checkbox"/> INV <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |
| ✓ 148 | DE AL148 PT2>> EN AL148 PT2>> | | | | | | limit value 5.0 °C | hysteresis 0.2 °C | delay time 0.1 S | <input type="checkbox"/> INV <input type="checkbox"/> AR <input type="checkbox"/> FR1 <input type="checkbox"/> FR2 <input type="checkbox"/> FR3 <input type="checkbox"/> SB <input type="checkbox"/> DEE <input type="checkbox"/> SSD <input type="checkbox"/> NSD <input type="checkbox"/> CBT <input type="checkbox"/> FG1 <input type="checkbox"/> FG2 <input type="checkbox"/> FG3 <input type="checkbox"/> FG4 | |

When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

The alarms will only be displayed with the AT1 modules enabled under tab "HOME".

| PT100(0) | |
|---|---|
| AL145 to AL156 PT1 to PT6 AL156 to AL160 AE23 to AE24 | Module 1 – Each measurement input on the additional modules is assigned to two alarms. The alarm is set if the value exceeds or falls below the limit value. It is possible to edit the alarm text. |
| AL161 to AL172 PT7 to PT12 AL173 to AL176 AE25 to AE26 | Module 2 – Each measurement input on the additional modules is assigned to two alarms. The alarm is set if the value exceeds or falls below the limit value. It is possible to edit the alarm text. |

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4.7 Times

HOME | SYN | DI | DO | ALARMS EXT | ALARMS INT | **TIMES** | CONTROLLER | MODULES | VDE/BDEW | CAN BUS | LOGIC | PICTURES | LED | SWITCHING POINTS | CONNECT | INFO

For some function sequences it is important to adapt times to the specific application. The tab „Times“ offers a multitude of adjustable parameters.

| basic settings | | advanced settings 1 | advanced settings 2 |
|---------------------------------|---------|----------------------------------|---------------------|
| start delay | 1.0 S | 2.0 S | |
| starter on | 9.0 S | 9.0 S | |
| starter pause | 5.0 S | 5.0 S | |
| cooling down normal | 180.0 S | 30.0 S | |
| cooling down sprinkler | 600.0 S | 60.0 S | |
| stop time | 20.0 S | 0.5 S | |
| retransfer time | 60.0 S | 0.0 S | |
| mains voltage failure detection | 2.0 S | 120.0 S | |
| ramp for unloading | 5.0 S | 15.0 S | |
| | | start up syn. max. time | 2.0 S |
| | | start up syn. deexcitation | 5.0 S |
| | | start up syn. partial excitation | |

| basic settings | | advanced settings 1 | advanced settings 2 |
|------------------------|-------|---------------------|---------------------|
| M/G transfer time | 1.0 S | 1.0 S | |
| generator voltage | 1.0 S | 3.0 S | |
| generator undervoltage | 2.0 S | 0.5 S | |
| speed control reset | 2.0 S | 0.5 S | |
| battery change 1 | 2.0 S | 2.0 S | |
| battery change 2 | 2.0 S | 2.0 S | |
| gen. impuls delay | 2.0 S | 2.0 S | |
| mains impuls delay | 2.0 S | 2.0 S | |
| gen. off prolongation | 2.0 S | 2.0 S | |
| mains off prolongation | 2.0 S | | |

| Basic settings | |
|---------------------------------|---|
| Start delay | In case of mains failure the start command is given after expiry of „mains voltage failure detection“ and „Start delay“. |
| Starter on | The output „Starter“ is set. |
| Starter pause | Time between start attempts. |
| Cooling down normal | After reset the genset cools down without load. |
| Cooling down sprinkler | After reset in sprinkler operation mode the genset cools down without load. „Cooling down sprinkler“ is added to „Cooling down normal“. |
| Stop time | Genset has been detected as shutdown, the output remains set for this delay. |
| Retransfer time | Mains CB has to be enabled again upon mains return. |
| Mains voltage failure detection | Delay for mains voltage failure detection. |
| Ramp for unloading | The generator is relieved linearly in the set time window. |

| Advanced settings 1 | |
|----------------------------------|--|
| Alarm reset delay | Reset of inactive alarms is only possible after expiry of this delay. |
| Fault release 1 | Delay for monitoring of fault messages. Time starts running with „Operation“. |
| Fault release 2 | Delay for monitoring of fault messages. Time starts running with „Gen CB ON“. |
| Fault release 3 | Delay for monitoring of fault messages. Time starts running with „mains CB ON“ or „Gen CB ON“. |
| Unloading time | If genset is not unloaded within this delay the Gen CB will be switched off anyway. |
| Start preparing | Delay time of start command. Delay can be set to 0 with the DI „Start preparing“. |
| Preglowing | Start command is delayed by preglowing time. The function Preglowing can be set to a digital output. |
| Buzzer off | Delay time for switching the buzzer off automatically. |
| Start up syn. max. time | After release of start up syn. the corresponding functions will be active for this delay time. |
| Start up syn. deexcitation | Upon activation the relay will remain set for the preset delay. |
| Start up syn. partial excitation | Upon activation the relay will remain set for the preset delay. |

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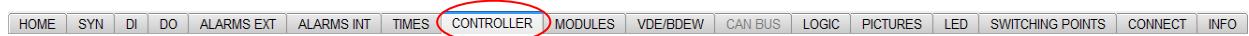
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| Advanced settings 2 | |
|------------------------|---|
| M/G transfer time | For M/G controls the time runs from CB selection to message „CB ready“. |
| Generator voltage | Refers to the operating values. The voltage must exceed the limit value for the specified time so that the voltage is detected as “Present” for the internal functional processes. |
| Generator undervoltage | Refers to the operating values. The voltage must be below the limit value for the specified time so that the voltage is detected as „Failure“ for the internal functional processes. |
| Speed control reset | During speed control reset the output remains set. |
| Battery change 1 | Changeover gap between two battery sets. |
| Battery change 2 | Changeover gap between two battery sets. |
| Gen. pulse delay | Time between CB „Ready“ and CB „ON“. Not in syn. mode. |
| Mains pulse delay | Time between CB „Ready“ and CB „ON“. Not in syn. mode. |
| Gen. off prolongation | When deselecting the CB it can be selected again only after the expiry of the delay. Upon CB feedback failure the output „Gen CB Ready“ will be disabled and only reset after the expiry of the delay. Then the CB will be enabled again via the input “Gen CB ON”. If the delay is set to „0“, upon CB feedback failure, the output „Gen CB Ready“ will remain set and the CB will be enabled again via „Gen CB ON“. |
| Mains off prolongation | When deselecting the CB it can be selected again only after the expiry of the delay. Upon CB feedback failure the output „Mains CB OFF“ will be set and only disabled after the expiry of the delay. Then the CB will be enabled again via the input “Mains CB ON”. If the delay is set to „0“, upon CB feedback failure, the output „Mains CB Ready“ will be disabled and the CB will be enabled again via „Mains CB ON“. |

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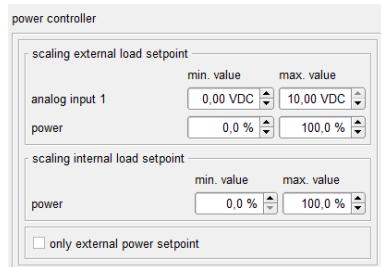
4.8 Controller



4.8.1 Setpoint



4.8.1.1 Power controller



Scaling of the load setpoint, given from analog input 1.

Furthermore the panel load setpoint input range can be defined.

If „Only external power setpoint“ has been selected, it is not possible anymore to modify the setpoint at the panel. Setpoint adjustment has always to be done via analog input.

Power control is active in mains or generator parallel operation mode of the compact automatic, for gen-set regulation to a preset power export value. The KAS will compare the actual power with the expected power. The output value is specified directly at the KOP 2 by external control via a 0 ... 10 VDC input. The preset values are also kept if the 24V voltage supply fails.

In mains parallel operation mode power control is permanently active. In generator parallel operation mode will be selected via the configurable digital input 'first clothing/pilot', if power control or the 50 Hz control (Pilot) are active after having switched the Gen. CB on.

In generator switchgear the Gen. CB needs the initial connection release for connection onto a dead bus bar. If the input continues to remain set the 50Hz control affects the unit. If the input is deactivated again after connection, the power control affects the unit. In generator switchgear the Gen. CB needs the initial connection release for connection onto a dead bus bar. If the input continues to remain set the 50Hz control affects the unit. If the input is deactivated again after connection, the power control affects the unit.

4.8.1.1.1 Control of the power setpoint specification via a bus coupler

| Preselection of the setpoint specification on the panel (KOP2) | | Input functions that can be set by connecting a digital inputs or creating a logic function. | | Control byte 1 (TASTF01) | Active Setpoint | | |
|--|----------|--|----------------------|---------------------------------|-----------------|----------------|---------|
| Internal | External | Remote control via BUS | Load setting via BUS | Bit 5 External(1) / Internal(0) | SPS | Analog input 1 | Tableau |
| X | | | | | | | X |
| X | | | | X | | | X |
| X | | | X | | | | X |
| X | | | X | X | | | |
| X | X | | | | | | |
| X | X | | | X | | | |
| X | X | X | | | | | |
| X | X | X | X | X | | | |
| | X | | | | | | |
| | X | | | X | | | |
| X | | X | | | | | |
| X | | X | | X | | | |
| X | X | | | | | | |
| X | X | | | X | | | |
| X | X | X | | | | | |
| X | X | X | X | X | | | |

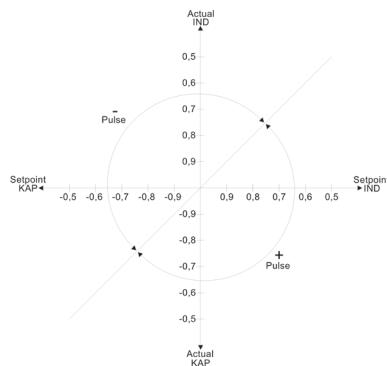
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4.8.1.2 Cos Phi controller

cos phi controller

| | | |
|-----------------------------------|------------|------------|
| scaling external cos phi setpoint | min. value | max. value |
| analog input 2 | 0.00 VDC | 10.00 VDC |
| cos phi | -0.50 PF | 0.50 PF |
| scaling internal cos phi setpoint | min. value | max. value |
| cos phi | -0.50 PF | 0.50 PF |



For adjustment of cos phi controller this must be enabled.

Scaling of cos phi setpoint, given via analog input 2.

Furthermore the panel scaling range for the cos phi setpoint can be limited.

!!! If at the same time the mains im-/export controller is enabled, setpoint adjustment will only be possible at the panel !!!

In order to avoid transmission losses a power factor as high as possible is the aim. With its Cos Phi controller the compact automatic KAS meets the corresponding demands for power-factor-related system control.

The Cos Phi controller is only active in parallel operation mode. In island operation mode the voltage is adjusted. In order to deactivate the controller in parallel operation mode, a digital input, assigned with the function 'Lock Cos Phi controller', has to be accessed.

4.8.1.3 Mains im-/export controller

mains im-/export controller

| | | |
|-------------------------------------|------------|------------|
| scaling external mains actual value | min. value | max. value |
| analog input 2 | 0.00 VDC | 10.00 VDC |
| power | 0 KW | 100 KW |
| scaling internal mains setpoint | min. value | max. value |
| power | -500 KW | 500 KW |

To be able to do adjustments on the mains im-/export controller it has to be enabled.

Scaling of mains actual value, provided by analog input 2.

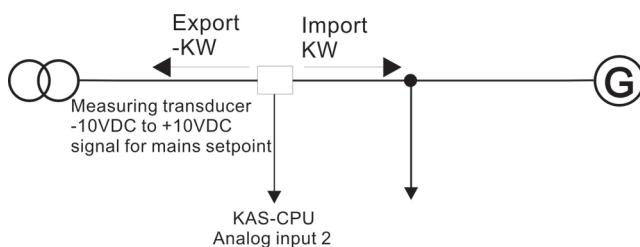
Furthermore the input range for the mains setpoint (panel input) can be limited here.

Scaling of power values is done in KW.

The Mains Im./Ex. Contr. controls the generator power in mains parallel operation up to reaching the preset mains setpoint value. Upon adjusting the setpoint value please consider if power is exported to mains or imported from mains. For export the setpoint has to be negative, for import positive.

A measuring transducer, connected to analogue input 2, monitors the actual mains value. The input range for the analogue input is from -10VDC to +10VDC. The analogue input can be scaled. All measuring values will be indicated in KW.

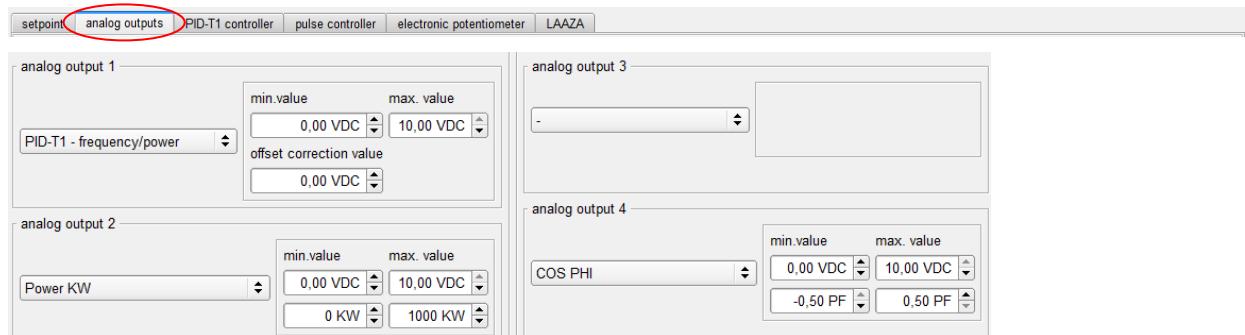
To activate the regulation during mains parallel operation a digital input with the function 'Mains Im./Ex. Contr.' has to be energized.



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4.8.2 Analog outputs



A total of six analog outputs are available, four on the CPU module and two more on the PM2 module. Different functions can be assigned to these outputs. Depending on the functions the outputs can be scaled. The analog outputs 1+2 as well as 3+4 share a common potential. The four outputs on the CPU module are electrically isolated to the supply voltage. The two outputs on the PM2 module require an external auxiliary voltage and are galvanically separated from the internal electronics. Only the output of analog output 5 can be switched from V to mA.

| Analog outputs | |
|-----------------------------|--|
| EI.Poti 1 – frequency/power | Adjustment range will be entered at the panel under „Electr. Potentiometer“. The other regulation parameters are to be input via tab Controller→Pulse controller. |
| EI.Poti 2 – voltage/cos phi | Adjustment range will be entered at the panel under „Electr. Potentiometer“. The other regulation parameters are to be input via tab Controller→Pulse controller. |
| PID-T1 – frequency/power | Input of adjustment range. Via „Offset“ the centre of the adjustment range can be moved. The other regulation parameters are to be input via tab Controller→PID-T1 controller. |
| PID-T1 – voltage/cos phi | Input of adjustment range. Via „Offset“ the centre of the adjustment range can be moved. The other regulation parameters are to be input via tab Controller→PID-T1 controller. |
| Power % | Scaling of output range. For power control in genset parallel operation. |
| Power KW | Scaling of output range. For connection of a measurement device. |
| Cos phi | Scaling of output range. For Cos Phi control in genset parallel operation. |
| Generator frequency | Scaling of output range. |
| Mains frequency | Scaling of output range. |
| Apparent power kVA | Scaling of output range. |
| Apparent power % | Scaling of output range. |
| Battery voltage | Scaling of output range. |
| CAN Bus – Engine speed | Scaling of output range. |
| CAN Bus – Coolant temp. | Scaling of output range. |
| CAN Bus – Oil pressure | Scaling of output range. |
| CAN Bus – Oil temperature | Scaling of output range. |

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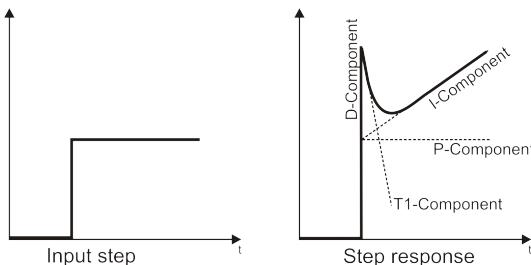
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4.8.3 PID-T1 controller

| setpoint | analog outputs | PID-T1 controller | pulse controller | electronic potentiometer | LAAZA |
|--|----------------|-------------------|------------------|--------------------------|-------|
| <input type="checkbox"/> overwrite controller parameters in the KOP [1] island operation frequency 3.00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 0,05 CY ▲ 0,0 S ▲ synchronization operation frequency 3.00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 0,00 CY ▲ 0,0 S ▲ mains parallel operation power 1,00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 1,0 % ▲ 0,0 S ▲ generator parallel operation power 3.00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 1,0 % ▲ 0,0 S ▲ | | | | | |
| <input type="checkbox"/> overwrite controller parameters in the KOP island operation voltage 3.00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 1,0 % ▲ 0,0 S ▲ synchronization operation voltage 3.00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 0,0 % ▲ 0,0 S ▲ mains parallel operation cos phi 1,00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 1,0 % ▲ 0,0 S ▲ generator parallel operation cos phi 3.00 ▲ 2,00 S ▲ 0,00 S ▲ 0,2 S ▲ 1,0 % ▲ 0,0 S ▲ | | | | | |

Settings for controller characteristics are made to the KOP2 (see point 6.6.2). The set values can be read and stored with the parameter software. When transferring parameter data set on KOP2 values are not overwritten. However, it is possible the stored values in the KOP2 to overwrite with the parameter software. Here the function [1] must “overwrite controller parameters in the KOP” enabled. Each operation condition has its individual settings. They will only be displayed if PID-T1 controllers are set to an analog output.

The PID-T1 controller settings affect the KAS controller characteristics. Different parameters can be entered for the operation conditions island mode, synchronization, generator and mains parallel operation and acc. to the controlled variable the output is done via the analog outputs. Two controllers are available. One controller is for frequency / power control, the other for voltage / Cos Phi control.

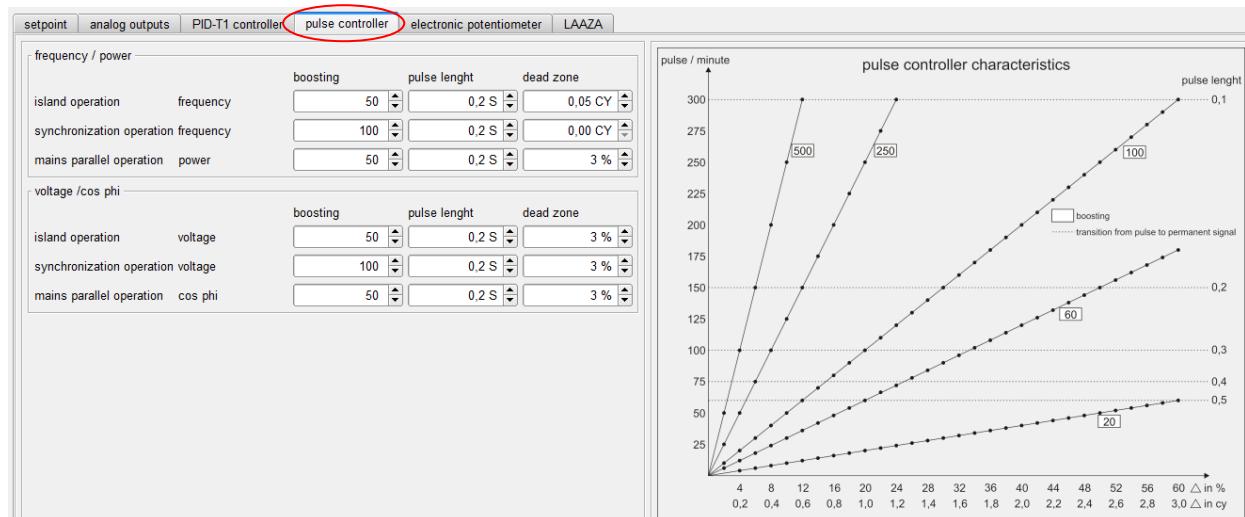


| PID-T1 controller | |
|-------------------|---|
| Kp | Proportional coefficient – The step response is following the trend of the input signal. Only the amplitude changes. |
| Ti | Integration time – control time, required from the output to reach the height of the controlled variable step at the input. |
| Td | Derivative action time – An input step leads to an output pulse. |
| T1 | Time to delay signal drop. Reduces oscillation. |
| Dead zone | Within dead zone only control with P part. |
| Release delay | The time that elapses after entering a new operating mode before the control begins. |

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4.8.4 Pulse controller



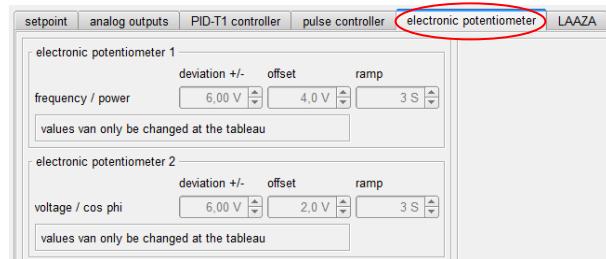
Settings for controller characteristics. Each operation condition has its individual settings. Controller settings affect the pulse controller (output via digital outputs), as well as the electr. potentiometer adjustments.

The pulse controller affects the KAS controller characteristics at the respective outputs. Different parameters can be entered for the operation conditions island mode, synchronization and parallel operation. The output is done acc. to the controlled variable via the digital outputs 'Decrease speed', 'Increase speed', 'Voltage lower' and 'Voltage higher'.

With the pulse controller characteristics various settings are shown for which deviation how many pulses have to be output, and when a continuous pulse occurs.

| Pulse controller | |
|------------------|---|
| Boosting | Depending on the preset boosting value more pulses per minute will be output with increasing deviation. With the increasing number of pulses the pulse off time will be reduced. If the pulse off time is lower than the preset pulse length a permanent signal will be output. |
| Pulse length | Pulse length corresponds always to the preset value. |
| Death zone | Controller is disabled within dead zone. |

4.8.5 Electronic potentiometer

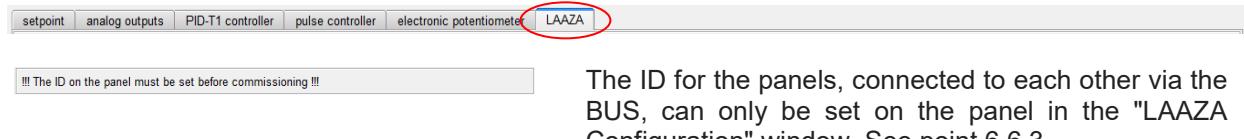


Input of electronic potentiometer values is only possible via panel. When visualizing the parameter data only the values input via panel are displayed.

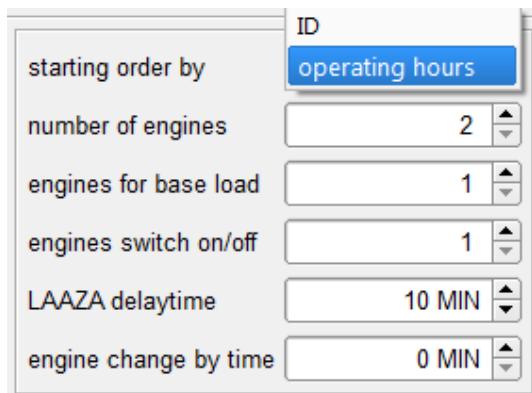
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4.8.6 Load-dependent dis-/connection



The ID for the panels, connected to each other via the BUS, can only be set on the panel in the "LAAZA Configuration" window. See point 6.6.3



This screenshot shows the same configuration window as above, but with the 'starting order by' setting highlighted. The value 'operating hours' is selected.

Starting order: The order in which the gensets are switched off or on. There are two selection criteria.

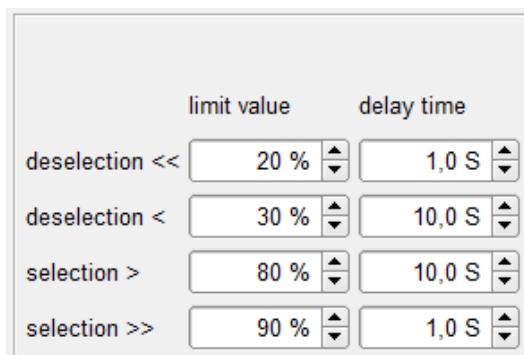
Number of engines: Total number of gensets connected via BUS interface.

Engines for base load: Minimum number of gensets running.

Engines switch on/off: Number of gensets that will be switched on or off upon exceeding or falling below the limit value.

LAAZA delaytime: After expiry of this delay the load-dependent dis-/connection will be enabled. The delay starts when the first genset takes over the pilot function.

Engine change by time: After expiry of the adjusted delay gensets are switched. Therefore equal runtimes of the gensets are obtained. A „0“ input disables this function.



This screenshot shows the 'limit values' section of the configuration window. It lists four entries: 'deselection <<', 'deselection <', 'selection >', and 'selection >>'. Each entry has a 'limit value' field and a 'delay time' field.

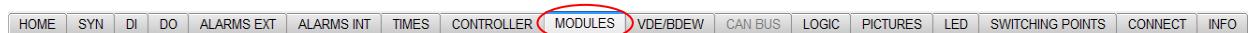
| Condition | limit value | delay time |
|----------------|-------------|------------|
| deselection << | 20 % | 1,0 S |
| deselection < | 30 % | 10,0 S |
| selection > | 80 % | 10,0 S |
| selection >> | 90 % | 1,0 S |

Limit values for the de-/selection of the gensets.

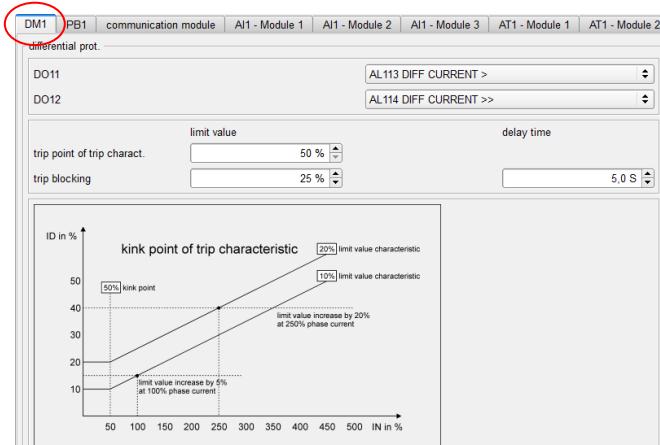
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4.9 Modules



4.9.1 DM1 module



For adjustment of differential protection settings the DM1 module has to be enabled via tab „HOME“. „Watchdog“ alarm will be tripped if the module is enabled but not connected to bus.

During operation, once the sampling interval is up, the measured values are compared with the preset limit values for pre-warning and cut-out. Upon reaching the limit values the corresponding error messages are displayed. If the phase current exceeds the inflection point, preset in a range from 50 to 500 %, the pre-warning and cut-out characteristics for the residual current are increased by 1 % per 10 % phase current above the kink-point.

If the limit is exceeded for trigger locked the trigger will be disabled for the duration of the delay time. The trigger lock can be also activated via a digital input (edge-triggered).

The differential protection function is to be used to protect three-phase rotary current generators or three-phase rotary current synchronous and asynchronous motors. It senses the residual currents within the protected zone, triggers when reaching the preset limit values and the corresponding error messages are displayed.

The differential protection measuring is the comparison of currents between generator star point and the outflow of generator or the supply in the switching gear. The sum of all currents must be zero.

Three transformer circuits capture the current in the star point of the generator (internal electric circuit), three other transformer circuits are to be arranged by the customer and capture the consumer current (external electric circuit). The measuring in the six current paths is made as simultaneous sampling of all six measuring circuits with 16 samplings per cycle and path. For each current value the real effective value is calculated and evaluated once a cycle is up. The minimal disconnection delay amounts to approx. 130 ms.

The DM1 module offers two output relays permanently assigned to the alarms 113 and 114. To avoid accidental tripping, e.g. during start of large electrical drives, tripping can be suppressed for a set time.

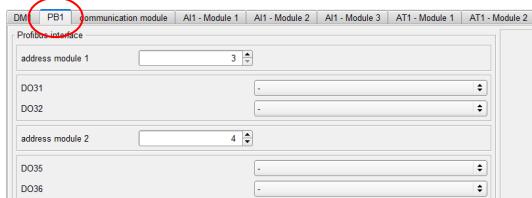
If the residual current in one of the three phases is greater than the pre-selected limit value, the delay time starts to run. Once the delay time is up the appropriate error message is integrated into the KOP 2 display. In addition it is possible to link a digital output to the error message function. If the limit value falls below the preset hysteresis value, it automatically resets.

The difference between internal and external current is calculated from the instantaneous values of the currents, so that it is also possible to identify and evaluate a phase difference.

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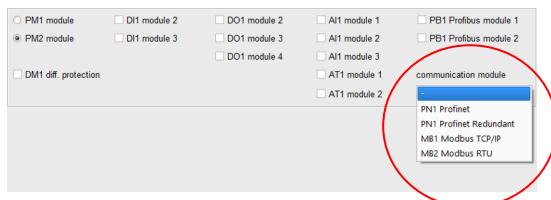
4.9.2 PB1 module



Up to two Profibus modules can be operated on one KAS. For adjustment of profibus coupling settings the respective PB1 module has to be enabled via tab „HOME“. „Watchdog“ alarm will be tripped if the module is enabled but not connected to bus.

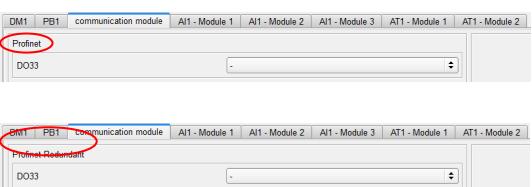
To connect with the PLC the correct address has to be set. Each PB1 module offers two output relays to be assigned to functions according to the dropdown lists.

4.9.3 Communication module



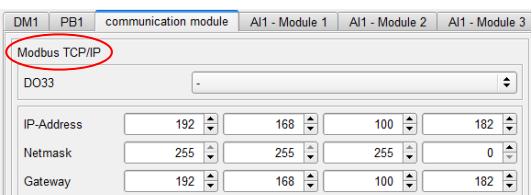
Four BUS modules are available for the communication module. In order to make the settings for the selected BUS connection, the corresponding module must be activated under the "HOME" tab. If the module is activated but not on the bus connector, the "watchdog" error occurs.

4.9.3.1 PN1 module



In order to establish a connection to the PLC, the PLC must assign an address to the PN1 module. An output relay is available to which functions can be assigned according to the selection list.

4.9.3.2 MB1 TCP/IP module



In order to establish a connection to the BUS module, an address must be set. The setting applies via IP address, netmask and gateway.

An output relay is available to which functions can be assigned according to the selection list.

| register 01-16 read | | register 17-32 read | | register 33-48 read | | register 49-64 read | | register write | |
|---------------------|------------------------|---------------------|--|---------------------|---------------------|---------------------|--|----------------|--|
| 01 | 135 - Operation byte 1 | | | 09 | 118 - Alarm 33-48 | | | | |
| 02 | 136 - Operation byte 2 | | | 10 | 119 - Alarm 49-64 | | | | |
| 03 | 137 - Operation byte 3 | | | 11 | 120 - Alarm 65-80 | | | | |
| 04 | 138 - Operation byte 4 | | | 12 | 121 - Alarm 81-96 | | | | |
| 05 | 139 - Operation byte 5 | | | 13 | 122 - Alarm 97-112 | | | | |
| 06 | 140 - Operation byte 6 | | | 14 | 123 - Alarm 113-128 | | | | |
| 07 | 116 - Alarm 1-16 | | | 15 | - | | | | |
| 08 | - | | | 16 | - | | | | |

(*): Unit and scaling for the analog inputs of the modules AI1 and AT1 can be found in the parameter assignment [DINT]. For analog values marked with [DINT], the next register must not be used.

There are 64 read and 4 write registers. It is selectable which data should be available in each address register, according to the pull-down selection list. The assignment of the address register can be found in the parameterization of the system (GV2). Which individual signals the byte / word contains is listed in the attached data point list. A secure assignment is made via the module number.

Addressing example:

Address register 01 = Modbus address 30001

| | | | |
|--|----------------------------|-------|------|
| 135 - Betriebsbyte 1 Operation byte 1 | OFF | Bit 0 | Byte |
| | Manual | Bit 1 | Byte |
| | Test | Bit 2 | Byte |
| | Auto | Bit 3 | Byte |
| | Start | Bit 4 | Byte |
| | Internal setpoint value ON | Bit 5 | Byte |
| | Operation | Bit 6 | Byte |
| | Signal test | Bit 7 | Byte |

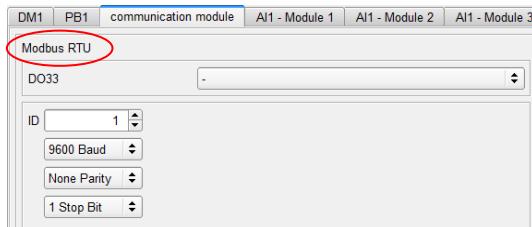
Assignment example:

Module number 135 – Operation byte 1

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4.9.3.3 MB2 RTU module



In order to establish a connection to the BUS module, some settings have to be done. The setting applies via IP address, netmask and gateway.

An output relay is available to which functions can be assigned according to the selection list.

| register 01-16 read | register 17-32 read | register 33-48 read | register 49-64 read | register write |
|--|---------------------|---------------------|---------------------|----------------|
| 01 Operation byte 1 | 09 Alarm 33-48 | | | |
| 02 Operation byte 2 | 10 Alarm 49-64 | | | |
| 03 Operation byte 3 | 11 Alarm 65-80 | | | |
| 04 Operation byte 4 | 12 Alarm 81-96 | | | |
| 05 Operation byte 5 | 13 Alarm 97-112 | | | |
| 06 Operation byte 6 | 14 Alarm 113-128 | | | |
| 07 Alarm 1-16 | 15 - | | | |
| 08 - | 16 - | | | |
| (*) - Unit and scaling for the analog inputs of the modules AI1 and AT1 can be found in the parameter assignment [DINT] - For analog values marked with [DINT], the next register must not be used | | | | |

| | | | |
|--|----------------------------|-------|------|
| 135 - Betriebsbyte 1 Operation byte 1 | OFF | Bit 0 | Byte |
| | Manual | Bit 1 | Byte |
| | Test | Bit 2 | Byte |
| | Auto | Bit 3 | Byte |
| | Start | Bit 4 | Byte |
| | Internal setpoint value ON | Bit 5 | Byte |
| | Operation | Bit 6 | Byte |
| | Signal test | Bit 7 | Byte |

There are 64 read and 4 write registers. It is selectable which data should be available in each address register, according to the pull-down selection list. The assignment of the address register can be found in the parameterization of the system (GV2). Which individual signals the byte / word contains is listed in the attached data point list. A secure assignment is made via the module number.

Addressing example:

Address register 01 = Modbus address 30000

Assignment example:
Module number 135 – Operation byte 1

Pin connection at the Modbus RTU module MB2:

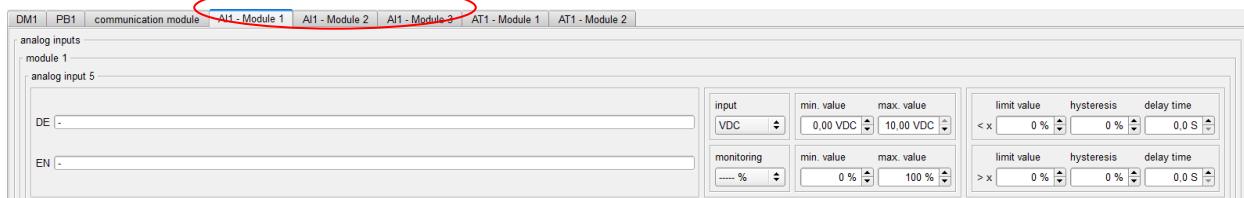
| RS-232 | | |
|--------|--------|-------------------------------------|
| Pin | Signal | Comment |
| 1 | GND | Bus polarization, ground (isolated) |
| 2 - 3 | | Connect pin #2 to pin #3 (jumper) |
| 7 | Rx | RS-232 Data Receive |
| 8 | Tx | RS-232 Data Transmit |

| RS-485 | | |
|--------|--------|-------------------|
| Pin | Signal | Comment |
| 5 | B-Line | RS-485 B-Line (+) |
| 9 | A-Line | RS-485 A-Line (-) |
| | | |
| | | |

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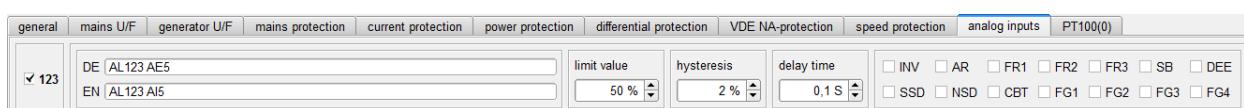
4.9.4 AI1 module



There are 3 analog modules with each 6 inputs available. The description is an example at the analog input 5 on the module 1.

For adjustment of analog input settings the AI1 module has to be enabled via tab „HOME“. „Watchdog“ alarm will be tripped if the module is enabled but not connected to bus.

Each input is assigned to an error message. For adjustment please refer to tab „ALARMS INT →Analog inputs“. The alarm has to be activated via a check box on the left side.



For each input or a current or a voltage signal can be selected. The input signal operating range is set via start and stop value.

| Input | |
|-------|--|
| VDC | Operating range from -10VDC to +10VDC. |
| mA | Operating range from -20mA to +20mA. |

Depending on the selected display mode the analog values will be visualized on the panel via menu item „Analog values“. Depending on the input signal operating range the displayed values can be scaled with start and stop value. 7 different display units are available. If the panel analog value should not be displayed a „-“ character has to be input.

| Monitoring | |
|------------------------|---------------------|
| ---- % or ----,- % | 5 digits in percent |
| ---- Liter | 5 digits in liter |
| ---- bar or ---,- bar | 5 digits in bar |
| ---- C° or ----,- C° | 5 digits in C° |
| ---- rpm | 5 digits in rpm |
| ---- VDC or ----,- VDC | 5 digits in VDC |
| ---- ADC or ----,- ADC | 5 digits in ADC |
| ---- A | 5 digits in A |
| ---- h | 5 digits in h |

Furthermore there are two adjustable limit values available for selection for each input.

| Limit value | |
|-------------|---|
| < x / > x | When falling below or exceeding the limit value and after expiration of the delay time the respective output relay will be activated. |

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4.9.5 AT1 module

The screenshot shows the software interface for the AT1 module. The top navigation bar includes tabs for DM1, PB1, communication module, AI1 - Module 1, AI1 - Module 2, AI1 - Module 3, AT1 - Module 1 (which is highlighted with a red circle), and AT1 - Module 2. Below the tabs, there is a section for 'input 1' with fields for DE and EN, and dropdowns for input type (set to PT100) and monitoring. There are also limit value, hysteresis, and delay time settings for both < x and > x conditions.

There are two measurement modules, each with 6 PT100(0) inputs and two analog inputs. The description is an example at the analog input 1 on the module 1.

For adjustment of the PT100 (0) measurement inputs the module has to be enabled via tab „HOME“. „Watchdog“ alarm will be tripped if the module is enabled but not connected to bus.

Two error messages are assigned to each input. For adjustment please refer to tab „ALARMS INT →PT100 (0)“.

The screenshot shows the software interface for the PT100(0) configuration. The top navigation bar includes tabs for general, mains U/F, generator U/F, mains protection, current protection, power protection, differential protection, VDE NA-protection, speed protection, analog inputs, and PT100(0) (which is highlighted with a red circle). The main panel displays input selection (DE: AL145 PT1> and EN: AL145 PT1>), limit values (5.0 °C, 0.2 °C, 0.1 S), and a list of available inputs (INV, AR, FR1, FR2, FR3, SB, DEE, SSD, NSD, CBT, FG1, FG2, FG3, FG4).

For the PT100 (0) measuring inputs selection is possible between PT100 and PT1000.

For each input or a current or a voltage signal can be selected. The input signal operating range is set via start and stop value.

| Input | |
|--------|--------------------------------|
| PT100 | Working range -50°C to 220°C |
| PT1000 | Working range -50°C to 220°C |
| VDC | Working range -10VDC to +10VDC |
| mA | Working range -20mA to +20mA |

The display is always in °C.

| Monitoring PT100(0) | |
|----------------------|----------------|
| ---- C° or ----,- C° | 4 digits in C° |

Depending on the selected display mode the analog values will be visualized on the panel via menu item „Analog values“. Depending on the input signal operating range the displayed values can be scaled with start and stop value. 7 different display units are available. If the panel analog value should not be displayed a „-“ character has to be input.

| Monitoring analog input | |
|-------------------------|---------------------|
| ---- % or ----,- % | 5 digits in percent |
| ---- Liter | 5 digits in liter |
| ---- bar or ---,- bar | 5 digits in bar |
| ---- C° or ----,- C° | 5 digits in C° |
| ---- rpm | 5 digits in rpm |
| ---- VDC or ----,- VDC | 5 digits in VDC |
| ---- ADC or ----,- ADC | 5 digits in ADC |
| ---- A | 4 digits in A |

Furthermore there are two adjustable limit values available for each input.

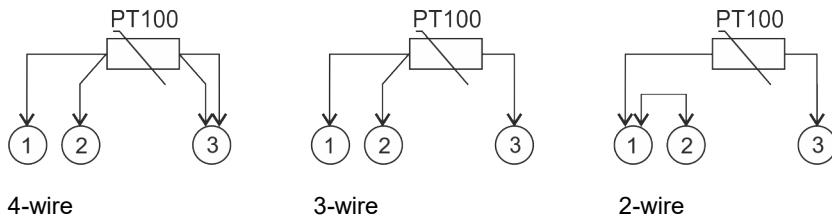
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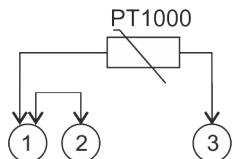
| Limit value | |
|-------------|---|
| < x / > x | When falling below or exceeding the limit value and after expiration of the delay time the respective output relay will be activated. |

4.9.5.1 PT100 (0) connection examples

Connection examples for the PT100 on measurement input 1.



Connection example for the PT1000 on measurement input 1.



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4.10 VDE/BDEW

[HOME](#) [SYN](#) [DI](#) [DO](#) [ALARMS EXT](#) [ALARMS INT](#) [TIMES](#) [CONTROLLER](#) [MODULES](#) [VDE/BDEW](#) [CAN BUS](#) [LOGIC](#) [PICTURES](#) [LED](#) [SWITCHING POINTS](#) [CONNECT](#) [INFO](#)

A selection of functions required by VDE4105 (VDE=Association for Electrical, Electronic & Information Technologies) or BDEW (German Association of Energy and Water Industries).

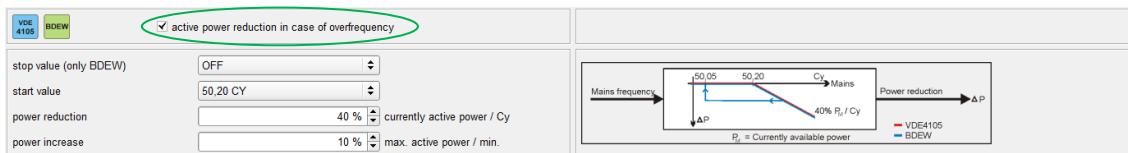
4.10.1 External power reduction

| digital inputs | level 1 | 60 % |
|-----------------|---------|------|
| | level 2 | 30 % |
| | level 3 | 10 % |
| analog input 10 | No | |

In mains parallel operation the system operator may require an external power reduction. This reduction is done with a setpoint value in steps or continuously. The steps are freely configurable via three digital inputs, or continuously limited via analogue input 10. The set percentage values indicate to which active power the output is reduced. Digital inputs are controlled with a continuous signal or via pulse. If the setpoint values are input via pulses Reset must be assigned to a fourth digital input. The system will be 100% ready for operation with Reset set, resp. no more continuous signal. If the power reduction is done with a continuous signal, always the lowest selected level is set. A -10 to +10VDC signal can be assigned to the analogue input. The input signal is freely configurable. If the preset setpoint value is not reached within five minutes, Alarm 103 will be displayed.

Note: The setpoint set internally on the panel (KOP2) should be above the highest level if necessary.

4.10.2 Active power reduction in case of overfrequency



This function has to be enabled. Regarding operation, there are differences between VDE4105 and BDEW.

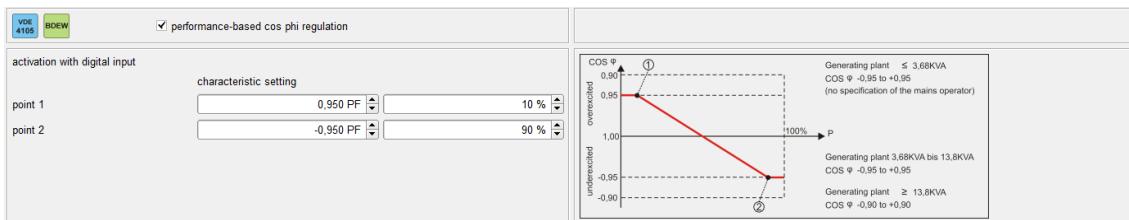
VDE4105 - In case of a mains frequency exceeding 50.2Cy, in mains parallel operation, the currently generated active power will be „frozen“. If the frequency continues to rise, 40% of this „frozen“ power will be decreased or increased per Hertz. In the frequency range between 50.2 Cy and 51.5 Cy, the active power moves permanently on the curve up and down ("driving on the curve"). If mains frequency falls again below the value of 50.2Cy (stop value setting is "OFF"), and the power setpoint value exceeds the „frozen“ active power, it will be adjusted in 10% steps to the maximum active power per minute. Active power reduction is limited to 0%.

BDEW - In case of a mains frequency exceeding 50.2Cy, in mains parallel operation, the currently generated active power will be „frozen“. If the frequency continues to rise, 40% of this „frozen“ power will be decreased per Hertz. The active power can be increased only when you return to a value of ≤ 50.05 Hz again (stop value setting is "50.05 Cy"). The gradient for the active power increase to the set point is adjustable. Active power reduction is limited to 0%.

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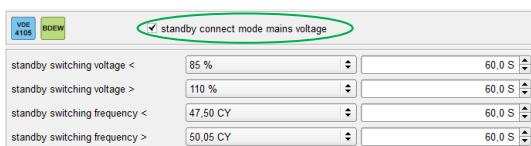
4.10.3 Performance-based Cos φ regulation



This function is activated via digital input.

Depending on the increasing active power the Cos Phi setpoint value changes from the inductive to the capacitive range. There are two configurable points to fix the characteristic curve. The settings of the regulation speed correspond to the settings of the Cos Phi controller.

4.10.4 Standby connect mode mains voltage



This function has to be activated. If this function should not be enabled permanently it is possible to lock it via a digital output parameterized accordingly.

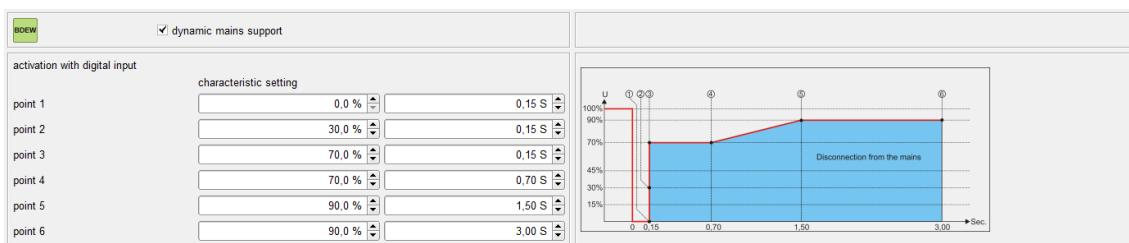
Mains connection is only established if mains voltage and mains frequency are in certain ranges of tolerance. These ranges differ in VDE4105 and BDEW.

VDE4105 – A connection or reconnection is allowed only if the mains voltage has to be between 85% and 110% of the rated voltage and the frequency between 47,5Hz and 50,05Hz. The mains voltage must be located over a period of at least 60 seconds within these tolerances.

BDEW – A connection or reconnection is allowed only if the mains voltage is at least 95% of the rated voltage and the frequency between 47,5Hz and 50,05Hz.

Additionally connection release can be output via a digital output. The contact can be used as NC or NO. If the ranges for voltage and/or frequency are left for up to three seconds, another connection is possible even if the tolerance ranges are kept for only five seconds without interruption. As long as standby connect mode has not been released the LED „Mains voltage available“ is flashing.

4.10.5 Dynamic mains support



This function is enabled via a digital input parameterized accordingly.

The dynamic mains support has been designed for voltage continuity in case of mains voltage dips. For a certain period after mains breakdown it is made sure that connection to mains is not cut. Connection to mains will be cut if the voltage has not increased to the set value within the set time. The voltage time curve has to be set with six points. Alarm 61 and 62 are for the control of the characteristic setting.

Compact automatic

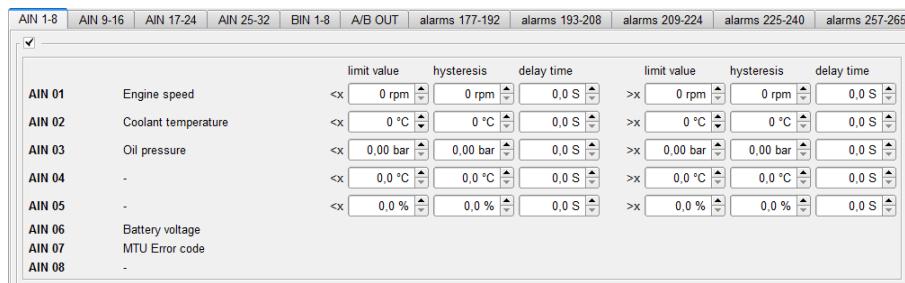
User manual

4.11 CAN BUS



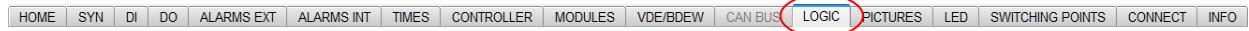
The CAN BUS interface is available as standard in the KAS. The connectors are located on the KOP2. To unlock settings for the CAN BUS, the coupling must be activated under "HOME".

According to the ECU in use there are various analogue and digital signals for each motor, coming from or being sent to the motor. When changing the motor type selection, these values are automatically switched over and displayed on KOP2. Error messages coming from the motor are displayed on the KOP2 and processed according to the error message coding.



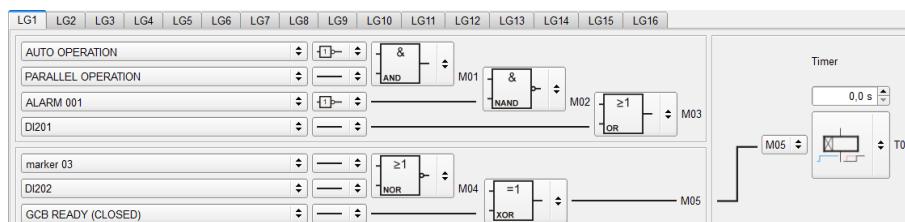
There are two adjustable limit values for the first five analog values, if available on the selected ECU.

4.12 Logic

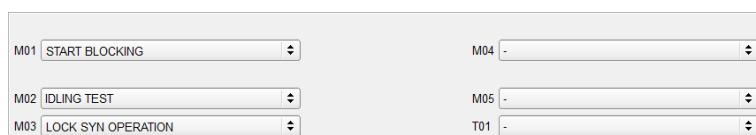


For the integration of logic functions in the control of the KAS are 80 logic blocks and 16 Timer blocks available. Each logic block can be assigned with functions according to the available list (NAND, OR, ...). For the timers 3 functions are available. Each input can be linked with a function from the selection list. In addition, each function that has been switched to a logic module can be negated. The outputs of the logic blocks can be assigned to digital outputs or linked to other logic blocks.

The logic blocks are divided into 16 groups of logic.



The markers of the logic functions can be linked to the internal functions can that also be controlled via the digital inputs. Inputs and markers with the same function are be "OR" linked.



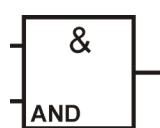
Compact automatic

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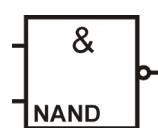
4.12.1 Logic blocks

The following functions for the logic blocks are available.

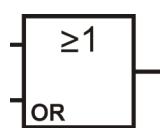
 Via this icon the inputs can be negated.



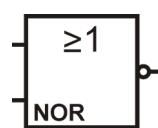
| In1 | In2 | Out |
|-----|-----|-----|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |



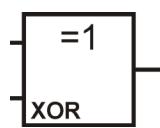
| In1 | In2 | Out |
|-----|-----|-----|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |



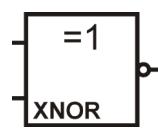
| In1 | In2 | Out |
|-----|-----|-----|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |



| In1 | In2 | Out |
|-----|-----|-----|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |



| In1 | In2 | Out |
|-----|-----|-----|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |



| In1 | In2 | Out |
|-----|-----|-----|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |



Timer on-delayed



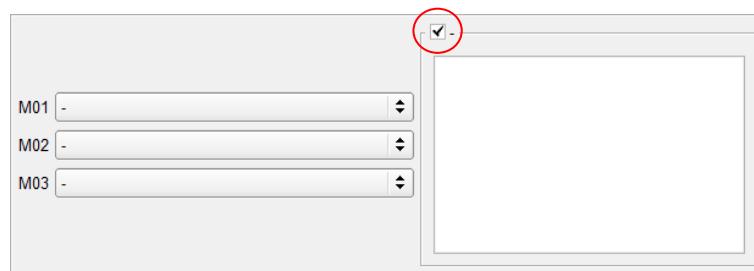
Timer off-delayed



Timer Impulse

4.12.2 Info texts

In order to be able to describe functions or flags that have been programmed in the logic, a freely writable text field can be activated via a checkbox.



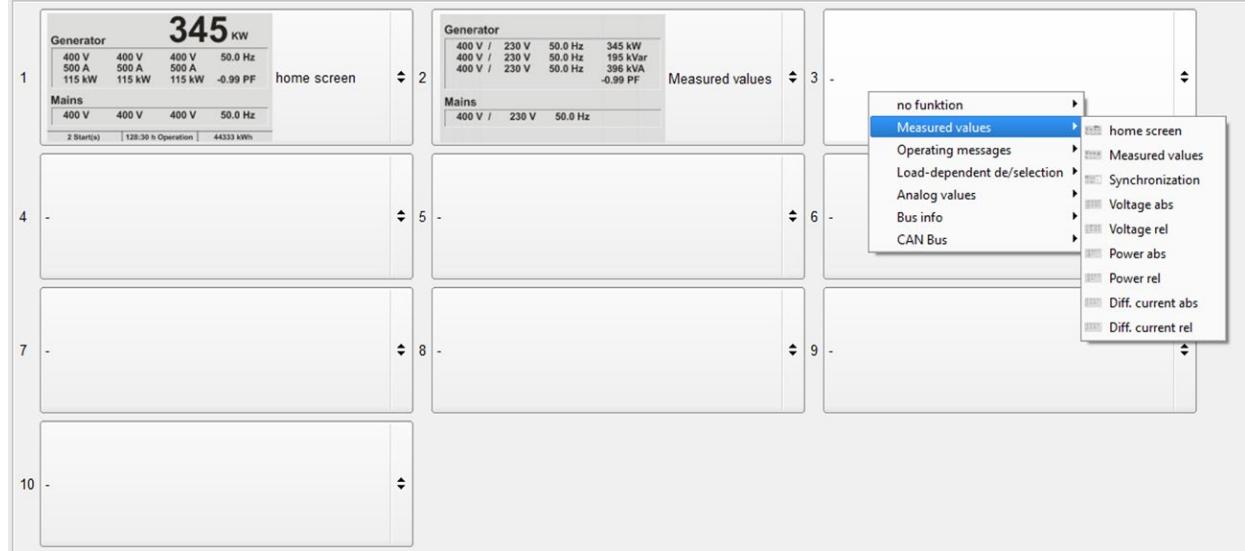
Compact automatic

User manual

4.13 Pictures

HOME SYN DI DO ALARMS EXT ALARMS INT TIMES CONTROLLER MODULES VDE/BDEW CAN BUS LOGIC PICTURES LED SWITCHING POINTS CONNECT INFO

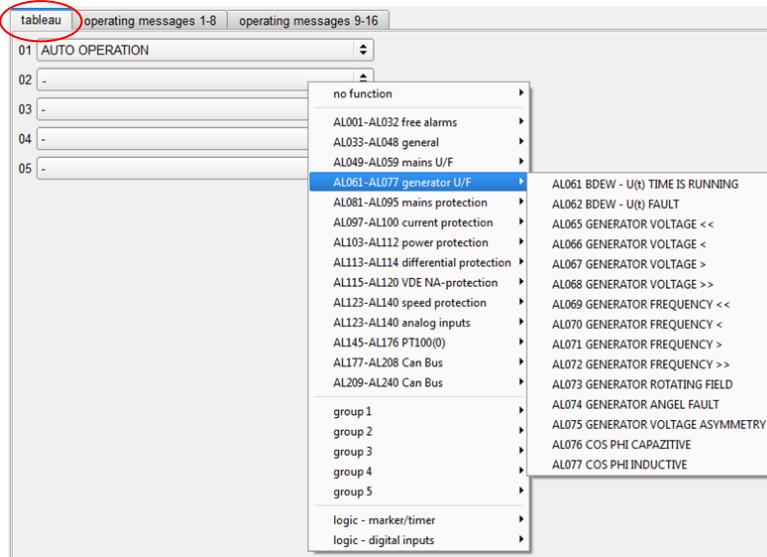
A total of 10 pictures can be selected, which can be browsed through in the main level. This allows them to be displayed more quickly without having to browse the menus and submenus.



4.14 LED

HOME SYN DI DO ALARMS EXT ALARMS INT TIMES CONTROLLER MODULES VDE/BDEW CAN BUS LOGIC PICTURES LED SWITCHING POINTS CONNECT INFO

4.14.1 Tableau

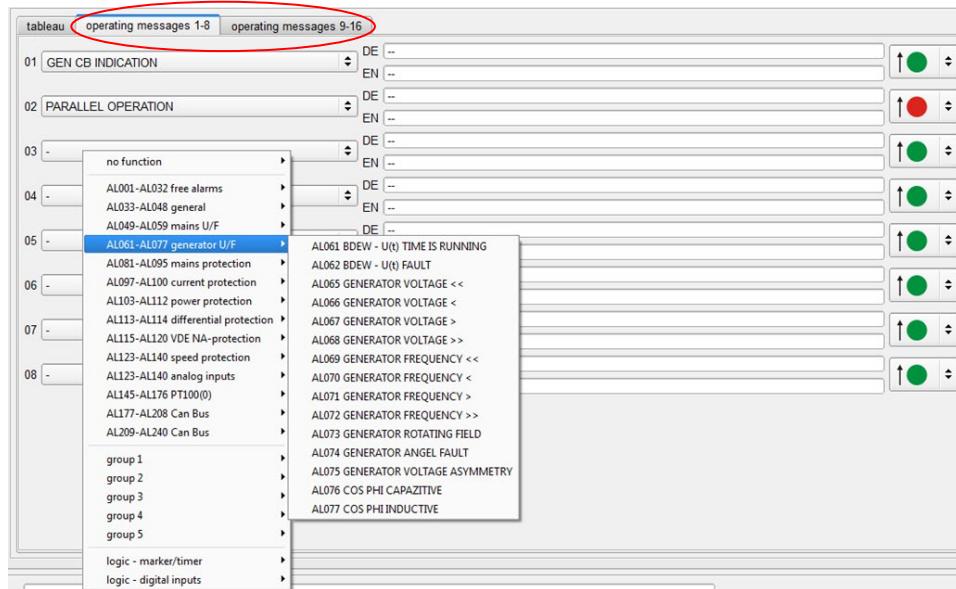


The five LEDs at the bottom of the panel can be linked to internal functions. The functions can be selected via the selection menu.

Compact automatic

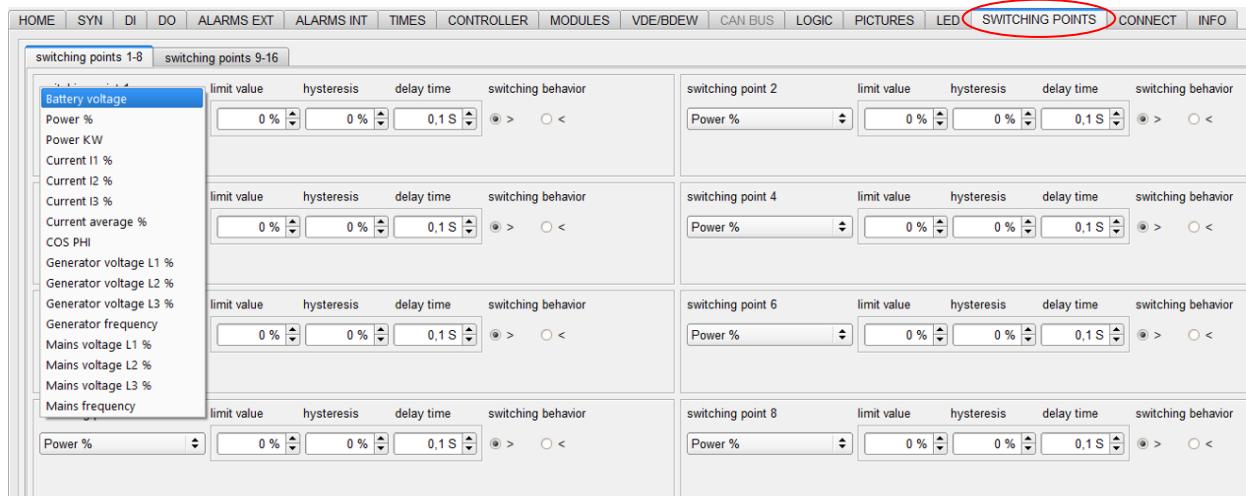
User manual

4.14.2 Operating messages



On the panel 16 operating messages can be displayed. The windows in which the messages are displayed can be selected via the menu level or the main level, if they have been selected there. The messages are linked to internal messages via the selection menu. The displayed text in the display is freely selectable. To display the operating messages, LEDs in four different colors can be selected in the right-hand area.

4.15 Switching points

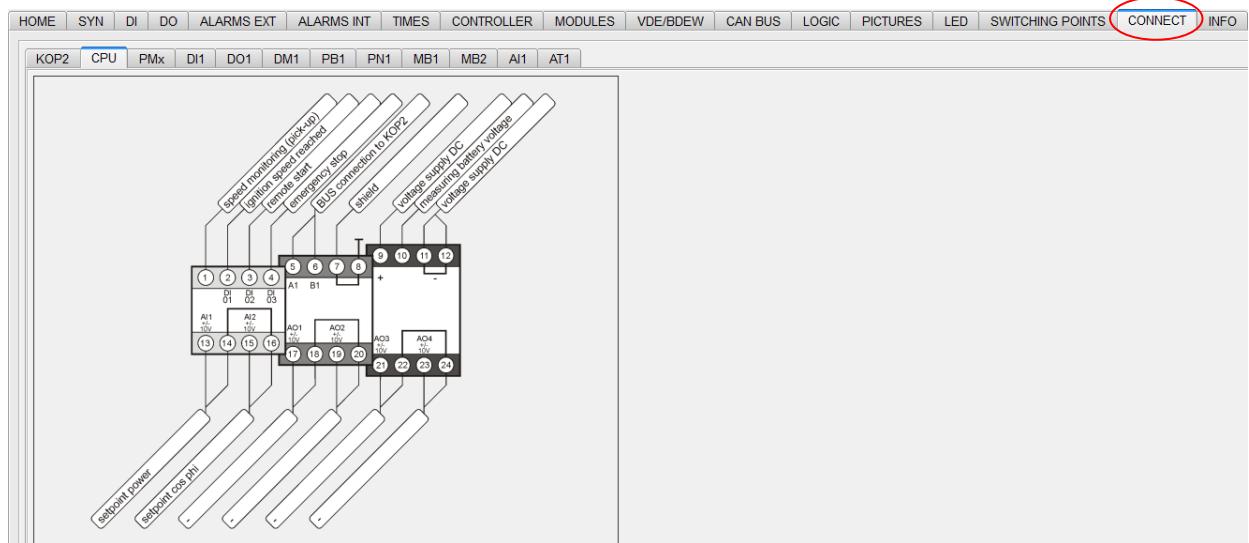


A total of 16 switching points are available. With each, a selected electrical variable can be monitored for falling below or exceeding a set limit value. Each switching point can be assigned to a digital output and / or processed in logic functions.

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4.16 Connect



Connection diagram for all available modules.

4.17 Info

The information window displays the following contact details:

- HPS
- Hanseatic Power Solutions GmbH
- Oststraße 67
- 22844 Norderstedt
- Tel.: +49 (0)40 5303479-0
- Fax.: +49 (0)40 5303479-90
- Email: info@hps-power.com
- Internet: www.hps-power.com

Three information windows for free text input are available. Input texts can be displayed via panel menu item „Info“.

Compact automatic

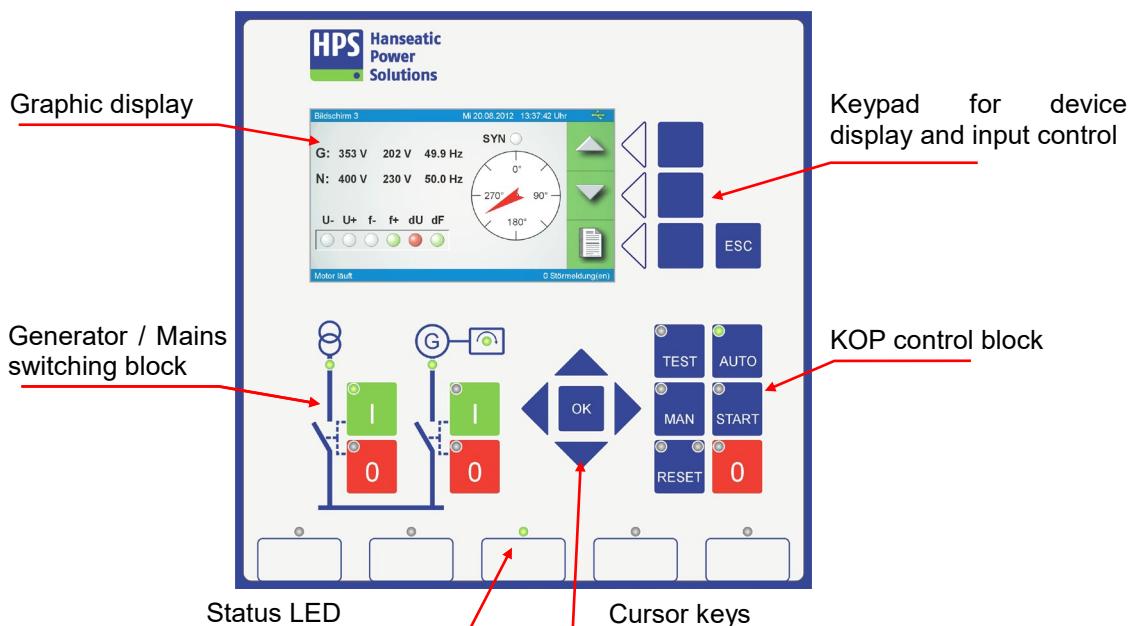
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5 KOP2 operation

Direct operation of the compact automatic KAS protection device is done via display and operation device KOP 2. Further control options are available via input functions. For device parameterization, also to be done via KOP 2, it is recommended to use the configuration software 'Device Management 2'.

5.1 Overview

The following figures are exemplary; they may differ acc. to device variant, intended use and firmware version of the respective device. As a warranty for completeness the controls will be described for the panel variant NG.



5.2 Keys, symbols and their functions

For all displayed information please use the keypad for display control and the cursor keys.

| Key | Description |
|-----|--|
| | Three keys for display control. The relevant function (<i>Meaning see below</i>) is shown on the graphic display to the left of the respective key. |
| | During parameter setting the cursor keys navigate you through the input values (arrow keys), and are also used for their modification as well as input acknowledgement (OK key). If menu items require a cursor key input the corresponding symbol is visualized via the KOP 2 graphic display (<i>see below</i>). |
| | The ESC key aborts the currently active process. When navigating through the menus the ESC key is for selecting the previous menu. Using the ESC key will discard all modifications done in the active menu. |

Compact automatic

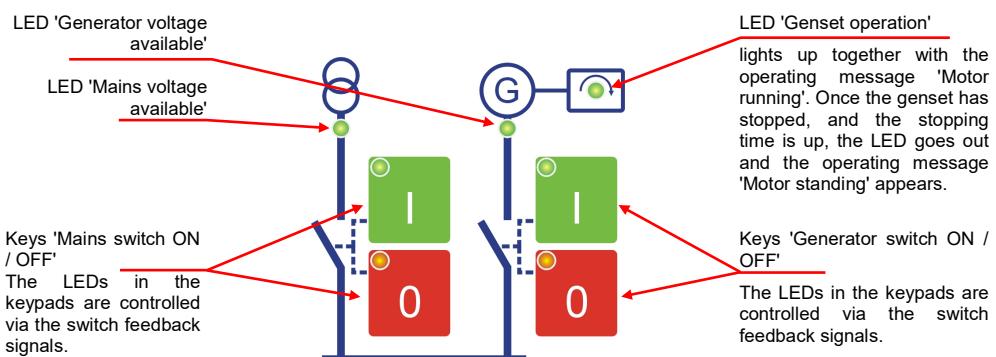
User manual

| Symbol | Function / Meaning |
|--------|---|
| | UP key – function for scrolling (up) through all screens, resp. the displayed menu items. |
| | DOWN key – function for scrolling (down) through all standard screens (Screen 1-4), resp. the displayed menu items. |
| | Menu selection – function for switching from standard display mode to menu display mode (e.g. for device parameter setting). |
| | The Enter key confirms the selection of a menu item. |
| | The access key (locked / released) handles the input interlock for adjustment of the electronic potentiometer. |
| | Plus/Minus key – for the motorpoti adjustment. |
| | This function key switches the displayed values from absolute to relative values, and vice versa. |
| | Function keys Fct 1 and Fct 2 – these keys are assigned with an output function, for direct manual access. Via an assigned output function an LED symbol indicates if the function is active (green) or not (grey). |
| | This function key is for resetting the service counter. |
| | When the mains protection test is active this function key enables switching between voltage and frequency test. |
| | The respective checkbox symbol shows if the assigned element is active (green), disabled (red) or not set. |
| | For analog display of measured values and the synchronoscope. |
| | This symbol visualizes the current connection status with an inserted SD card. |
| | The USB symbol indicates the connection KOP 2 – PC system. |
| | If the cursor key symbol is displayed the inputs for the relevant menu item have to be done with the cursor keys. |
| | Lamp test for the LEDs on the tableau. When the lamp test function is parameterized to an output it will be activated. |

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5.3 Generator- / Mains switching block



Important:

- The keys 'Mains switch ON / OFF' are only enabled in manual and test operation. By means of software the mains switch release and generator switch release are locked. These should also be locked externally using breakers, as the internal software locking is cancelled by introducing synchronisation.
- The keys 'Generator switch ON / OFF' are only enabled in manual and test operation with the available generator power (see Chap. 7.2.3). By means of software the generator switch release and mains switch release are locked. The generator and mains switches have to be locked externally using breakers. The internal software locking is cancelled during synchronisation.

5.4 KAS – control block

The keys / LEDs combined in this group are for the direct control and operating modes' reselection of the compact automatic.

| Key | Description |
|--|--|
|  TEST | With this key the operation mode 'Test' is selected. In this operating mode the genset will be automatically started and controlled. The genset runs without load. Keys for mains and generator switches are active, for manual on/off switching. In case of a mains failure while running in test mode an automatic emergency operation. Change back to mains supply after mains returns can be done manually or by selecting the operation mode 'Automatic'. |
|  AUTO | With the selection of 'Automatic' mode the automatic operating mode of the respective control is initiated. In case of the mains-generator control (NG) the genset is prepared for automatic start. In the event of power failure this leads to automatic replacement power operation. The genset is automatically started, the mains switch release is cancelled and the generator switch release is set. The consumer loads are supplied by the generator. Upon mains return the loads are automatically set to the mains, the genset is stopped after a cooling run. Note: For automatic start remote start input can also be used, e.g. to achieve load test or top load operation with or without synchronisation. |

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| Taste | Description |
|---|---|
|  MAN | With the key 'MAN' (manual) manual operation is selected. In this operating mode the genset can only be stopped with the 0 key. The control does not respond to a power failure. All switching has to be done manually via the mains and generator switch keys. |
|  START | The 'START' key is only active in manual operating mode ('MAN'). Genset is started. |
|  RESET | This key is for acknowledging and resetting of error messages. The yellow LED indicates a warning error message, in case of a disconnecting error message yellow and red LEDs are flashing simultaneously. By pressing the 'RESET' key for the first time (Acknowledge error message) the LEDs switch to constant light, the acoustic alarm signal (Horn) is switched off. If the failure is eliminated pressing the key for the 2nd time results in the LEDs going out, and the error messages are not displayed anymore. If the failure is not eliminated, pressing the 'RESET' key for the 2nd time results in setting the horn again, and the LEDs start flashing again. |
|  0 | With the selection of the operating mode 'Off' (key '0') the generator switch is switched off and the genset is stopped. Furthermore a general mains switch release is set, and is switched on when there is mains power available. |

5.5 Status LED

The use of an SD card in the SD card slot, accessible at the upper part of the enclosure backside of the KOP 2, offers a variety of additional options.

5.6 SD card

The use of an SD card in the SD card slot, accessible at the upper part of the enclosure backside of the KOP 2, offers a variety of additional options.

5.6.1 Use of the SD card as a mass storage device

If there is a connection between SOP 2 and a PC system, it is possible to select the SD card upon insertion as mass storage device for the connected PC system. In this case the SD card will be shown as an additional drive on the user interface of the PC system, and the SOP 2 represents the SD card reader.



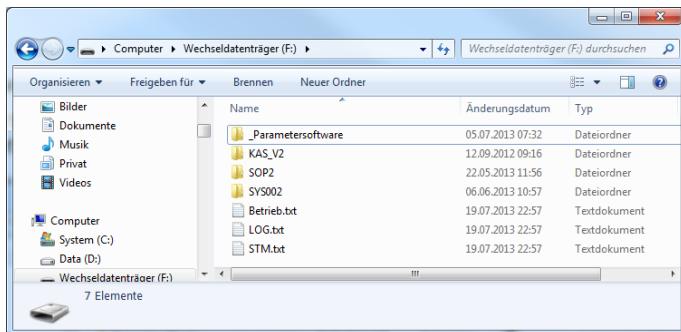
Note: If the SD card is used as a mass storage device it is locked for all access via compact automatic. In this case the protocol files are not updated. The SOP is only able to cope with memory cards up to a size of max. 4GB.

Compact automatic

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5.6.2 Contents of the SD card

The SD card, part of the scope of supply of the compact automatic, contains the following files and directories, visible via PC:



- The directory 'KAS_V2→FAC_DIR' includes the file 'KAS_FAC(fmt'. This file contains the parameter data set at the time of delivery of the switchboard. Therefore this file enables the reset of the switchboard to its status at the time of delivery.
- The directory 'KAS_V2→STD_DIR' contains the current configuration file 'KAS_STD(fmt' of the KAS, this file is updated with a backup function each time the settings are modified. The backup function guarantees storage of previous settings, and enables reset of the switchboard to previous versions in case of modifications.
- The directory 'Parameter software' includes the file 'HPS_GV2_Install_JJJJMMTT.exe' (the character string JJJJMMTT means the release date: J = Jahr/Year, M = Monat/Month, T = Tag/Day). Double clicking on the file icon (or selection via the context menu 'open') starts the installation of the parameter setting software 'Device management 2'; this software enables comfortable setting parameter edition for the compact automatic via PC.
System requirements for the installation are: MS Windows operating system, a minimum of 60 MB hard disk memory available. For data transfer a USB connecting cable (A : Mini-B) or a 1:1 extension cable SUB-D 9-pol. is required..
- The directory SYS002 contains manufacturer-specific information; these data may only be changed by the user upon instruction from the manufacturer.
- The files 'Betrieb.txt', 'LOG.txt' and 'STM.txt' (the file name extension '.txt' may be hidden, depending on the respective PC operating system settings) are part of the SD card master directory and can be opened with any text editor; they contain data for switchboard operation (Betrieb.txt), event protocols (LOG.txt), and a list of all error messages.

5.6.3 Backup and recovery functions

For backup and reset to the delivery status the following functions are available.

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5.6.4 Back-Up function

After each reset the KOP 2 stores the current settings in a file named 'KAS-STD(fmt', this file is saved in the directory 'STD_DIR'. If there is already an existing file with the same name, this file is renamed first as a backup file as follows: 'JJMMTT_hhmmss(fmt' (the file name indicates the date of renaming: J = Jahr/Year, M = Monat/Month, T = Tag/Day, h = Stunde/Hour, m = Minute, s = Sekunde/Second). It is possible to use the file 'KAS_STD(fmt' for reset of all current settings in the KOP 2.



Note: A reset happens after modification of data in the edit menu, transfer of parameter data from a PC, or the SOP2 restart after power failure. Renaming an older backup file, from e.g. '120807_115338(fmt' to 'KAS_STD(fmt' enables the recovery of earlier parameter setting versions

5.6.5 Reset to current settings

Switch off supply voltage with inserted SD card. Press the upper key  and turn on again the supply voltage. The file 'STD_FILE.FMT' will be imported into the compact automatic.

5.6.6 Reset to delivery status

Switch off supply voltage with inserted SD card. Press the middle key  and turn on again the supply voltage. The file 'FAC_FILE.FMT' will be imported into the compact automatic.

5.6.7 SD card status display

The status of an SD card inserted in the KOP2 SD card slot, correctly detected by the device, will be displayed as follows:

-  The SD card has been accepted and can be used from the KOP2.
-  The SD card has been accepted but is temporarily locked, i.e. current write access by the KOP2 or use of the card as mass storage device. When this status is displayed do not remove the SD card.
-  The SD card cannot be used by the KOP2.

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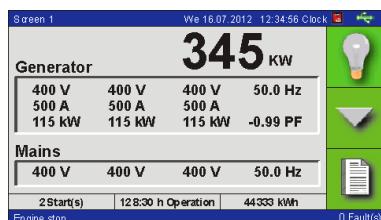
6 KOP2 functions

The display and operating device KOP2 has a high-resolution graphic display, providing the user with a quick overview of the device status and an easy input control.

A keypad, located beside the display, controls the display contents and enables navigation for parameter inputs. For each key the corresponding function is visualized in the green area of the graphic display.

The KOP2 display shows different areas, the displayed contents differ acc. to application or display mode. Header and Footer (blue) visualize the currently displayed contents (Screen / Menu), date and time, as well as status information regarding connected devices, operation mode and error messages. The central area (grey) visualizes the respective current values, and the area to the right (green) indicates the corresponding function for each key.

After switching on the compact automatic and the following initialisation the start screen will be displayed on the KOP2. With the ESC key it is always possible to return to this start screen. Use the arrow keys other displays can be called up.



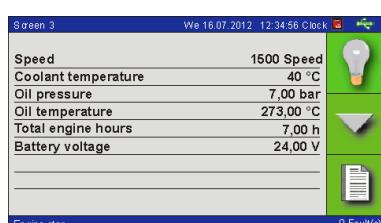
Start screen

Overview of the most important measured values.



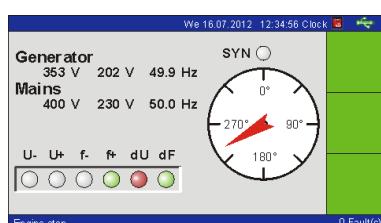
Power values

Phase-to-phase and phase voltages of the generator, as well as frequency for each conductor is displayed. Additionally active power, reactive power, active power and power factor (Cos Phi) will be output.



CAN Bus values

If on the tableau a CAN Bus connection is available you can scroll through the display images.



The SYN screen can **not** be selected via arrow keys. During active synchronization this screen will be displayed automatically and faded out at the end of synchronization.

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6.1 Menu selection

Menu selection is opened with this key  . Scrolling through this menu is done with the Up and Down arrow keys. ENTER opens the selected menu item. For submenus selection is done the same way.



6.2 Measured values



| Measured values - voltage | Measured values - voltage | Measured values - voltage |
|--|--|---|
| G L1 400 V 230 V 50.0 Hz 120 ° L2 400 V 230 V 50.0 Hz 120 ° L3 400 V 230 V 50.0 Hz 120 ° N L1 400 V 230 V 50.0 Hz 120 ° L2 400 V 230 V 50.0 Hz 120 ° L3 400 V 230 V 50.0 Hz 120 ° Batt. 23.7 V | Rel. voltage F Phi G L1 100 % 100 % 120 ° L2 100 % 100 % 120 ° L3 100 % 100 % 120 ° N L1 100 % 100 % 120 ° L2 100 % 100 % 120 ° L3 100 % 100 % 120 ° Batt. 23.7 V | Rel. voltage F Phi G L1 90.2 % 90.2 % 90.2 % 0 ° L2 90.3 % 90.3 % 90.3 % 120 ° L3 92.5 % 92.5 % 92.5 % 240 ° Total P 90.2 % 1.00 PF Q 90.4 % S 87.6 % |
| Measured values - power | Measured values - power | Measured values - power |
| P S I Phi L1 115 kW 132 kVA 123 A 0 ° L2 115 kW 132 kVA 132 A 120 ° L3 115 kW 132 kVA 123 A 240 ° Summe P 345 kW 1.00 LF Q 75 kVar S 396 kVA | P S I Phi L1 90.2 % 90.2 % 90.2 % 0 ° L2 90.3 % 90.3 % 90.3 % 120 ° L3 92.5 % 92.5 % 92.5 % 240 ° Total P 90.2 % 1.00 PF Q 90.4 % S 87.6 % | P S I ID I1 0 A 0 A 0 A 0 A I2 0 A 0 A 0 A 0 A I3 0 A 0 A 0 A 0 A Int Ext IS ID I1 0 ° 0 ° 0 ° 0 ° I2 0 ° 0 ° 0 ° 0 ° I3 0 ° 0 ° 0 ° 0 ° |
| Measured values - differential current | Measured values - differential current | Measured values - differential current |
| I1 Int Ext IS ID I2 0.0 % 0.0 % 0.0 % 0.0 % I3 0.0 % 0.0 % 0.0 % 0.0 % | I1 Int Ext IS ID I2 0.0 % 0.0 % 0.0 % 0.0 % I3 0.0 % 0.0 % 0.0 % 0.0 % | I1 Int Ext Int/Ext I2 0 ° 0 ° 0 ° I3 0 ° 0 ° 0 ° |

Three views are available. Scrolling through the measured values is done with the arrow keys. For each screen switching between absolute and relative values is possible.

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6.3 Setpoints



Setpoints can be set for three different regulators. For the setpoint specification selection is possible between the setpoint adjusted at the panel (internal) or the analog value (external). When not activated via parameterization the menus for these regulators are greyed out and cannot be selected.

6.4 Operating messages

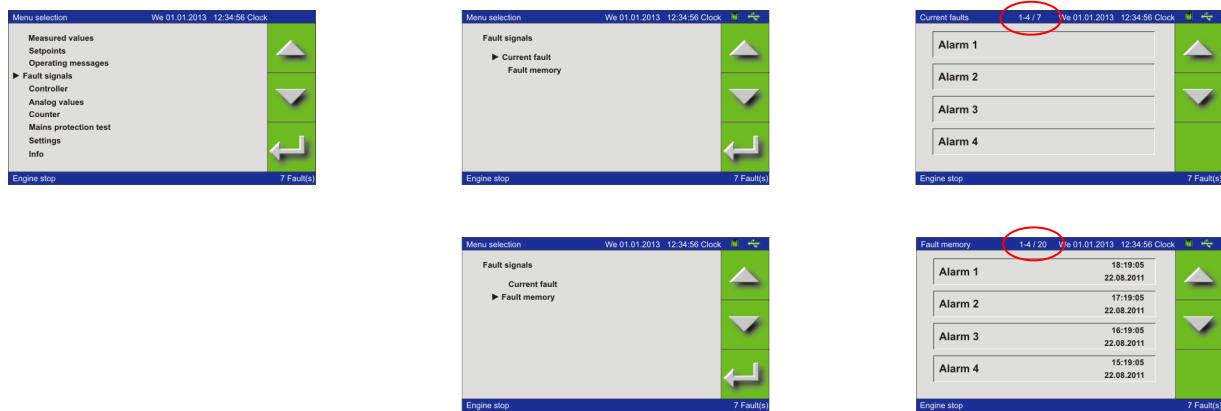


16 operating messages can be displayed. As long as the operating message is active, the LED symbol is displayed in green. The selection of operating messages and the color of the LED symbol is described in section 4.14.2.

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6.5 Fault signals

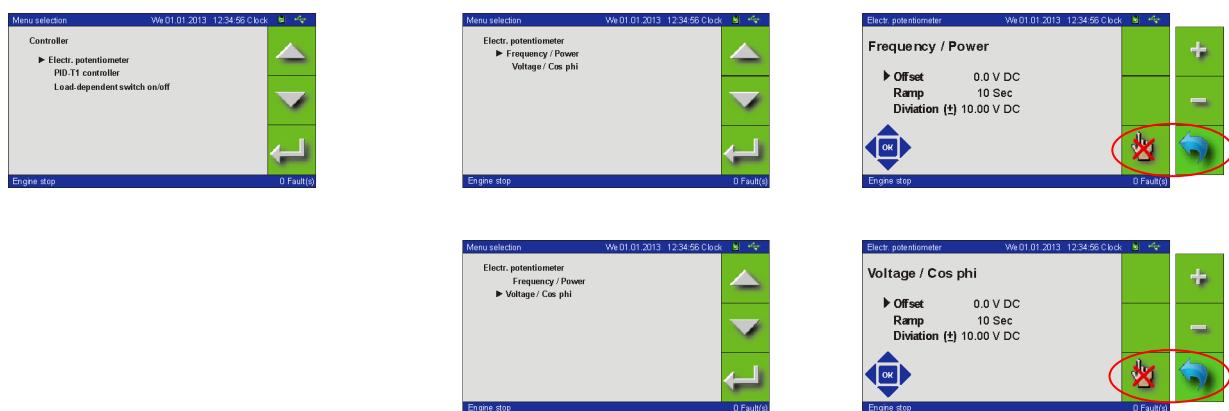


The submenus of this menu item display all currently pending alarm messages, as well as the contents of the alarm message memory. Four messages can be visualised at the same time. If there are more alarm messages available this list can be scrolled with the arrow keys. For a better overview in case of longer lists the upper status line shows the number of pending messages as well as the page where you currently are.

6.6 Controller



6.6.1 Electr. potentiometer



Two electronic potentiometers are available. The potentiometers have to be assigned to an analog output to be able to do adjustments via panel. The internal signals of the pulse controller influence the adjustment of the electr. potentiometers. Setting of the adjustment range of the electr. potentiometer is solely done via KOP2. However the values can be read and displayed with the configuration software Device Management 2.

Compact automatic

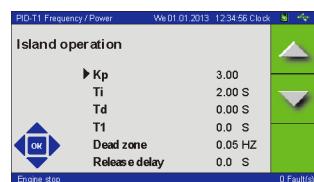
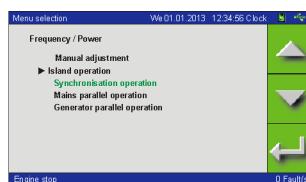
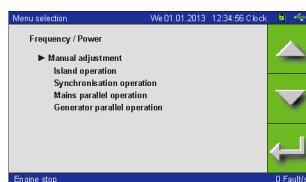
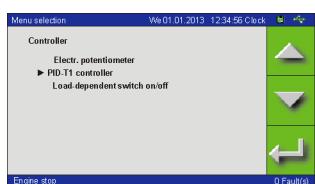
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- ▶ Offset : Basic voltage value at analogue output, the output will be reset to this value when the speed governor is reset (e.g. in case of Gen. CB – OFF, start and stop command).
- ▶ Ramp : Setting of the delay for voltage variation at analogue output;
- ▶ Deviation : Input of adjustment range (+/-) with reference to the Offset value.

For test purposes manual adjustment can be activated. If manual adjustment is active the output can be set manually with the Plus / Minus keys. Manual reset is possible with this key:

Attention: During manual adjustment the automatic control is disabled, regulation has to be done by the operator at the KOP2. After leaving manual adjustment with the „ESC“ key the automatic adjustment is enabled again.

6.6.2 PID-T1



The two available PID-T1 controllers have to be assigned to an analog output. Setting of the adjustment range is solely done via the parameter software.

The controller parameters can be transmitted via the software parameters in the KOP, also a change of values during operation on the display is possible. There are four different operating modes for the separate controller parameters can be entered. The active mode is displayed in the menu selection for the PID-T1 controller green.

For test purposes manual adjustment can be activated. If manual adjustment is active the output can be set manually with the Plus / Minus keys. Manual reset is possible with this key:

Attention: During manual adjustment the automatic control is disabled, regulation has to be done by the operator at the KOP2. After leaving manual adjustment with the „ESC“ key the automatic adjustment is enabled again.

If the input "Lock setpoint control U / F" is set, the automatic control of the island and synchronization mode is disabled. The corresponding controller output can about the input functions "speed down", "speed up", "voltage down" and "voltage up" be changed.

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6.6.3 Load-dependent dis-/connection



There are three screens available for the load-dependent dis-/connection. „Info“ visualizes information on the operating states. The two other screens display the settings available via the device management (please refer to 4.8.6). All settings of these two screens can be modified at the tableau. After acknowledgement of their input the modifications will be transferred to the other tableaus connected via BUS. Therefore it is not required to transfer each modification via the device management to each tableau. Input is protected by PIN (please refer to 7.4).

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6.7 Analog values



The analog values of the CPU module are always available. The selection of analog input modules and the PT100(0) modules is only visible with the module activated. The windows show the measured values with the selected unit.

6.8 Counter



All counter values are also displayed on the start screen, with the exception of the maintenance counter. If the maintenance counter is enabled, the time will only be displayed via the counter menu.

All values are saved in case of a power failure. For value reset/setting a PIN has to be entered.

6.8.1 Start counter

The maximum number of counts that can be done are 32000 starts.

6.8.2 Operating hour counter

An operating hour counter is integrated into the automatic. The maximum motor running time that can be counted is 1 million hours (114 years).

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6.8.3 KWh counter

The maximum value that can be displayed is 999.999.999 kWh. The counter increments are dependent on the configured value set via configuration software under „HOME→operating data→KWH per pulse“.

6.8.4 Maintenance counter

The maintenance counter outputs a message regarding the need for maintenance of the genset, depending on its service life. The counter start value is adjusted via 'Alarm 47' in Limit values / Protection settings. The maximum adjustable time is 999 hours. During genset operation the counter counts down. An alarm message will be displayed when the counter has run out. Alarm message acknowledgement will only be possible after resetting the maintenance counter to its start value.



Note: Maintenance counter reset is only possible after counter expiration.

6.9 Mains protection test



| | L-L | L-N | F | Phi |
|---|------------|-------|---------|-------|
| G | L1 400 V | 230 V | 50.0 Hz | 120 ° |
| | L2 400 V | 230 V | 50.0 Hz | 120 ° |
| | L3 400 V | 230 V | 50.0 Hz | 120 ° |

| | L-L | L-N | F | Phi |
|---|------------|-------|---------|-------|
| N | L1 400 V | 230 V | 50.0 Hz | 120 ° |
| | L2 400 V | 230 V | 50.0 Hz | 120 ° |
| | L3 400 V | 230 V | 50.0 Hz | 120 ° |

| | L-L | L-N | F | Phi |
|---|------------|-------|-------|-------|
| G | L1 100 % | 100 % | 100 % | 120 ° |
| | L2 100 % | 100 % | 100 % | 120 ° |
| | L3 100 % | 100 % | 100 % | 120 ° |

| | L-L | L-N | F | Phi |
|---|------------|-------|-------|-------|
| N | L1 100 % | 100 % | 100 % | 120 ° |
| | L2 100 % | 100 % | 100 % | 120 ° |
| | L3 100 % | 100 % | 100 % | 120 ° |

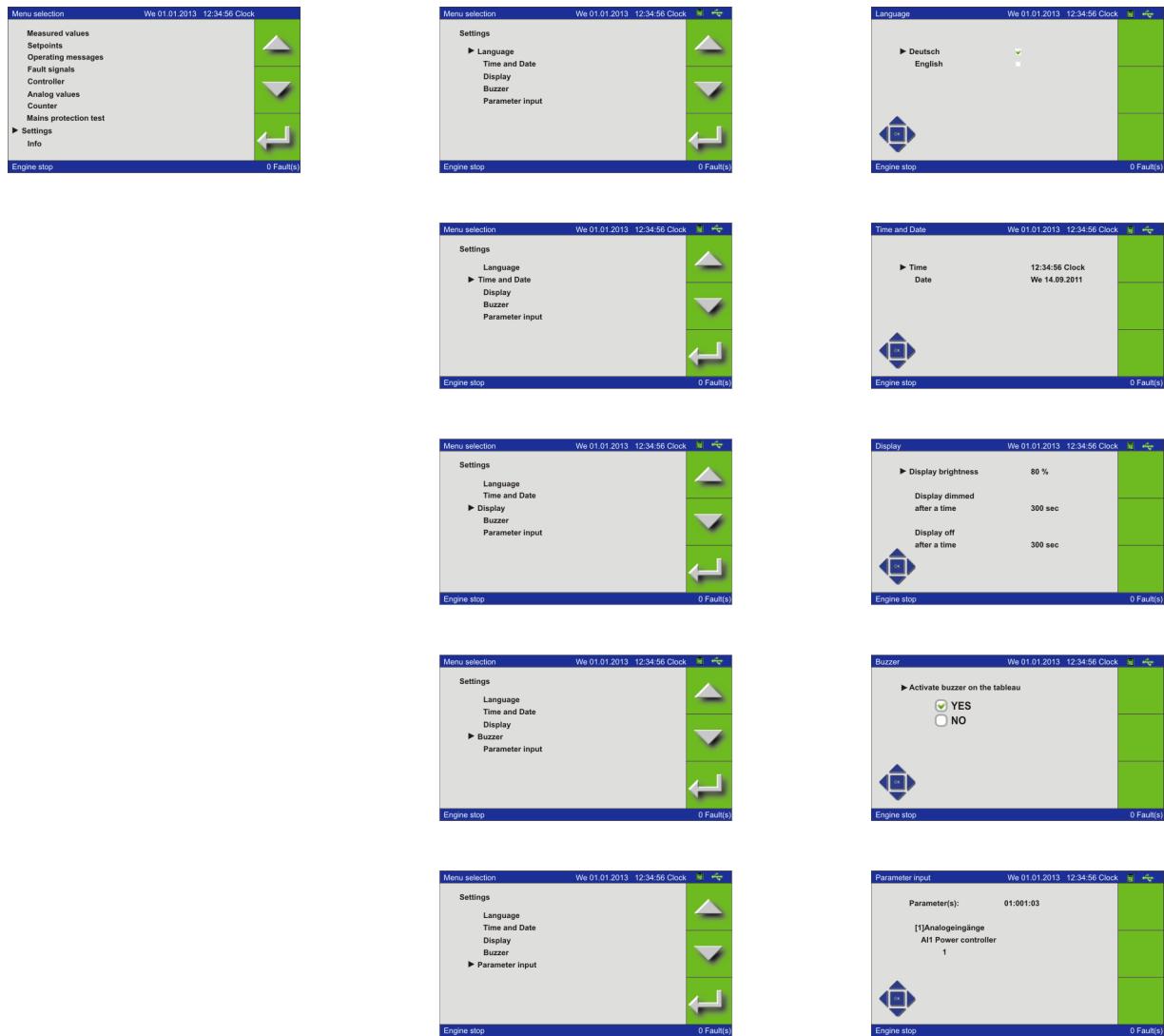
The KAS function Mains protections test enables you the check all limit values and trigger times required for mains protection (during engine shutdown). All conditions for triggering KAS mains protection can be checked without any system interference. For checking voltage or frequency the respective keys have to be enabled. Active testing is visualized with the LED symbol. During testing measured values can be checked. These can be displayed as absolute or relative values.

Note: a PIN has to be entered for the activation of mains protection.

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6.10 Settings



6.10.1 Language

Language selections for the displayed texts. Default languages are German and English.

6.10.2 Time and date

Setting of time and date in order to enable correct chronological recording of all locked entries in the fault message memory. If a data base is loaded to the SOP2 synchronization with PC date and time will be possible.

Date and time will be stored for approx. 72 hs in case of a voltage drop.

6.10.3 Display

Settings for brightness and display time (min. 10 sec.), to dim or switch off the display when inactive. The display is reactivated via a keystroke or it as reactivated with incoming messages.

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6.10.4 Buzzer

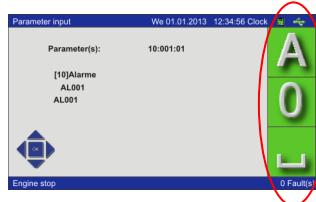
The buzzer, available on the panel, may be disabled.

6.10.5 Parameter input



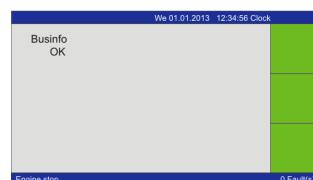
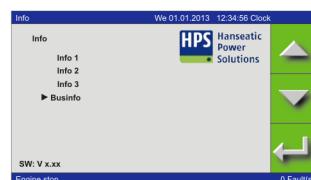
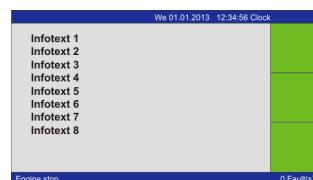
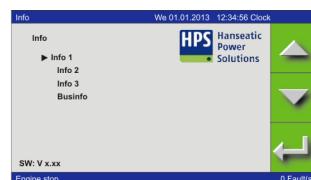
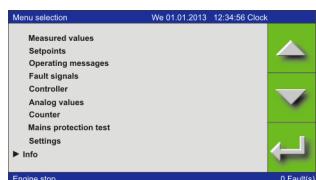
If there is no PC available all parameters can also be adjusted directly at the KOP2. The input is protected by a PIN.

Acc. to the parameter list the 3-digit parameter number has to be input (xx:xxx:xx), to be able to modify the parameter.



In parameters 10:xxx:01 and 10:xxx:02 the alarm texts for both languages can be edited. To simplify text editing there are three default values. Letters, numbers and a blank space.

6.11 Info



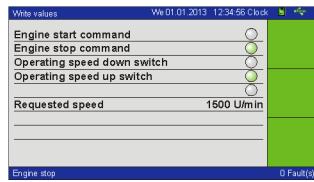
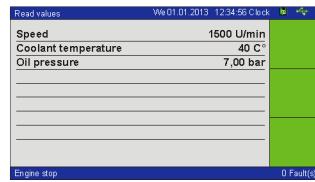
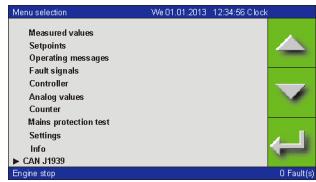
Three information windows are available. All texts input via the device management „Info“ tab will be displayed.

The modules set in the project will be monitored via menu item Businfo. If all modules are working without error the text message displays „OK“. If one of the modules doesn't work anymore the name of this module will be visualized.

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6.12 CAN J1939



The menu item CAN J1939 is only visible and can be selected when the CAN BUS coupling has been activated.

Various images will be selected on which the values provided by the ECU can be displayed.

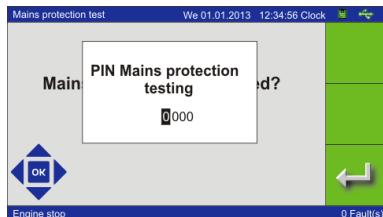
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7 PIN protections

Several panel input modes are protected with a PIN number. Modification of this PIN is only possible via panel.

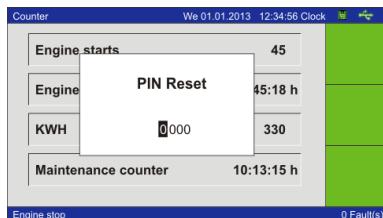
7.1 PIN Mains protection test



PIN number 1000

For mains protections testing please enter PIN number 1000.

7.2 PIN Reset



PIN number 1919

For counter edition please press the arrow keys Left and Right together at the same time (counter screen). After entering and confirming of PIN number 1919 it is possible to edit or delete counters.

7.2.1 Counter

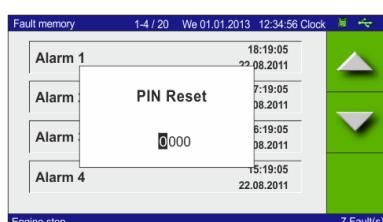


In Edit mode all counters can be reset together at the same time.



If you do not want to reset all counters together at the same time please select counters one by one with the arrow keys. The selected counter may then be modified or reset.

7.2.2 Fault memory



After entering and confirming the PIN number 1919, all stored fault messages are deleted immediately.

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7.3 PIN Edit mode

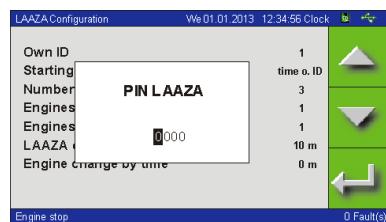


PIN number 9000

The PIN number 9000 has to be entered to modify the electr. potentiometers or parameters.



7.4 PIN Load-dependent dis-/connection



PIN number 0001

To change the parameters in the pictures "Configuration" and "Switching points" the PIN number 0001 has to be entered.

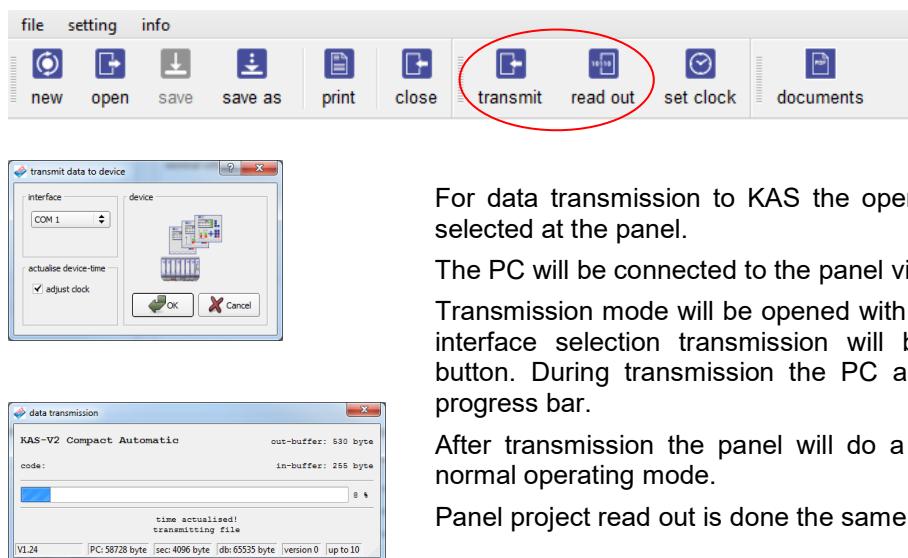
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8 KAS configuration

In order to meet each possible application the respective parameterization is required. Before commissioning the nominal values have to be set, i.e. rated voltage, rated current and rated power, as well as the trip values for the alarm and protection settings. All settings are stored in a flash memory, and are also kept in case of power failure.

8.1 PC configuration



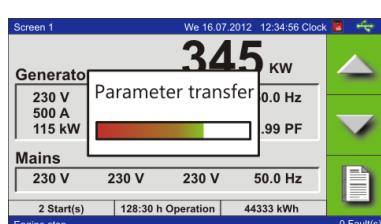
For data transmission to KAS the operating mode „0“ has to be selected at the panel.

The PC will be connected to the panel via a serial 1:1 cable.

Transmission mode will be opened with the button „transmit“. After interface selection transmission will be started with the „OK“ button. During transmission the PC and the panel will show a progress bar.

After transmission the panel will do a reset and will then be in normal operating mode.

Panel project read out is done the same way.



8.2 Tableau configuration



For parameter edition the menu Parameter input has to be opened in item Settings. SOP edition with the help of the cursor keys the position of the value to be modified will be selected in the upper line of the displayed dialogue.

Positions selection has to be confirmed with OK and the value to be adjusted will be selected. Modification has also to be confirmed with „OK“. Parameter input is left with the „ESC“ key. All modified values are now stored safely.

With the help of the parameter list it is possible to modify all parameters via panel.

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8.2.1 Parameter list

[1] Analog inputs

| | Description | :03 | :04 | :05 | :06 | :07 | :08 | :09 |
|---------|---------------------------------|-----|-----|------|-----|------|-----|-----|
| 01:001: | AI01 Power controller | 1 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:002: | AI02 Cos Phi controller | 2 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:003: | AI03 Mains im/export controller | 3 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:004: | - | - | - | - | - | - | - | - |
| 01:005: | AI05 – AI1 Module (ADR0) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:006: | AI06 – AI1 Module (ADR0) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:007: | AI07 – AI1 Module (ADR0) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:008: | AI08 – AI1 Module (ADR0) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:009: | AI09 – AI1 Module (ADR0) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:010: | AI10 – AI1 Module (ADR0) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:011: | AI11 – AI2 Module (ADR1) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:012: | AI12 – AI2 Module (ADR1) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:013: | AI13 – AI2 Module (ADR1) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:014: | AI14 – AI2 Module (ADR1) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:015: | AI15 – AI2 Module (ADR1) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:016: | AI16 – AI2 Module (ADR1) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:017: | AI17 – AI3 Module (ADR2) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:018: | AI18 – AI3 Module (ADR2) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:019: | AI19 – AI3 Module (ADR2) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:020: | AI20 – AI3 Module (ADR2) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:021: | AI21 – AI3 Module (ADR2) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:022: | AI22 – AI3 Module (ADR2) | 0 | 0 | 1000 | 0 | 1000 | 0 | 0 |
| 01:023: | PT1 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:024: | PT2 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:025: | PT3 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:026: | PT4 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:027: | PT5 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:028: | PT6 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:029: | AE23 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 1000 | 0 | 83 |
| 01:030: | AE24 – AT1 Module (ADR0) | 0 | 0 | 100 | 0 | 1000 | 0 | 83 |
| 01:031: | PT7 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:032: | PT8 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:033: | PT9 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:034: | PT10 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:035: | PT11 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:036: | PT12 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 0 | 0 | 88 |
| 01:037: | AE25 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 1000 | 0 | 83 |
| 01:038: | AE26 – AT1 Module (ADR1) | 0 | 0 | 100 | 0 | 1000 | 0 | 83 |
| 01:039: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:040: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:041: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:042: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:043: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:044: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:045: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:046: | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:047: | Switching point 1 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:048: | Switching point 2 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:049: | Switching point 3 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:050: | Switching point 4 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:051: | Switching point 5 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:052: | Switching point 6 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:053: | Switching point 7 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:054: | Switching point 8 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:055: | Switching point 9 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:056: | Switching point 10 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:057: | Switching point 11 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:058: | Switching point 12 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:059: | Switching point 13 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:060: | Switching point 14 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:061: | Switching point 15 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |
| 01:062: | Switching point 16 | 5 | 0 | 0 | 1 | 0 | 255 | 0 |

Do not modify input fields

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| | | |
|-----|-----------------------------------|---|
| :03 | Function no. | Only for switching points: [5] Power % [6] Power kW [7] COS PHI [14] Generator frequency [15] Mains frequency |
| :04 | Scaling of SOP display | Start value Limit value (switching points) |
| :05 | Scaling of SOP display | Final value Hysteresis (switching points) |
| :06 | Scaling of input signal | Start value Delay time (switching points) |
| :07 | Scaling of input signal | Final value |
| :08 | Selection of input signal | Analog inputs : VDC [0] / mA [1] PT100(0) : PT100 [0] / PT1000 [1] Switching behavior (Switching points) = > [255] / < [0] |
| :09 | Selection of unit to be displayed | See parameterization KAS |

[2] Analog outputs

| | Description | :03 | :04 | :05 | :06 | :07 | :08 | |
|---------|-----------------|-----|-----|------|-----|------|-----|--|
| 02:001: | Analog output 1 | 9 | 0 | 1000 | 0 | 1000 | 0 | |
| 02:002: | Analog output 2 | 6 | 0 | 1000 | 0 | 1000 | 0 | |
| 02:003: | Analog output 3 | 0 | 0 | 1000 | 0 | 1000 | 0 | |
| 02:004: | Analog output 4 | 7 | -50 | 50 | 0 | 1000 | 0 | |
| 02:005: | Analogausgang 5 | 0 | 0 | 1000 | 0 | 1000 | 0 | |
| 02:006: | Analogausgang 6 | 0 | 0 | 1000 | 0 | 1000 | 0 | |

Do not modify input fields

| | | |
|-----|-------------------------|--|
| :03 | Function no. | [0] without function [3] Electr. Poti 1 – frequency/power [4] Electr. Poti 2 – voltage/Cos Phi [5] power in % [6] power in KW [7] Cos Phi [8] PID-T1 – voltage/Cos Phi [9] PID-T1 – frequency/power |
| :04 | Scaling of SOP display | Start value |
| :05 | Scaling of SOP display | Final value |
| :06 | Scaling of input signal | Start value |
| :07 | Scaling of input signal | Final value |
| :08 | Without function | |

[3] Digital inputs

| | Description | :03 | | |
|--------------------------|----------------|-----|-------------------|------------------------|
| 03:001: | DI001 | 85 | CPU-Module | Ignition speed reached |
| 03:002: | DI002 | 61 | CPU-Module | Remote start |
| 03:003: | DI003 | 86 | CPU-Module | Emergency stop |
| 03:004: | DI101 | 1 | DI1-Module (ADR0) | Alarm 1 |
| 03:005: | DI102 | 2 | DI1-Module (ADR0) | Alarm 2 |
| 03:006: | DI103 | 3 | DI1-Module (ADR0) | Alarm 3 |
| 03:007: | DI104 | 4 | DI1-Module (ADR0) | Alarm 4 |
| 03:008: | DI105 | 5 | DI1-Module (ADR0) | Alarm 5 |
| 03:009: | DI106 | 6 | DI1-Module (ADR0) | Alarm 6 |
| 03:010: | DI107 | 7 | DI1-Module (ADR0) | Alarm 7 |
| 03:011: | DI108 | 8 | DI1-Module (ADR0) | Alarm 8 |
| 03:012: | DI109 | 9 | DI1-Module (ADR0) | Alarm 9 |
| 03:013: | DI110 | 10 | DI1-Module (ADR0) | Alarm 10 |
| 03:014: | DI111 | 11 | DI1-Module (ADR0) | Alarm 11 |
| 03:015: to 03:023: | DI112 to DI120 | 0 | DI1-Module (ADR0) | Fee programmable |
| 03:024: | DI121 | 73 | DI1-Module (ADR0) | Mains CB indication |
| 03:024: | DI122 | 74 | DI1-Module (ADR0) | Gen CB indication |
| 03:026: to 03:047: | DI201 to DI222 | 0 | DI1-Module (ADR1) | Free programmable |

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| | | | | |
|----------------------------|----------------|-----|-------------------|---------------------------|
| 03:048:__ to 03:069: | DI301 to DI322 | 0 | DI1-Module (ADR2) | Free programmable |
| 03:070:__ | DI401 | 84 | KOP2 | Mode select block |
| 03:071:__ | DI402 | 177 | KOP2 | Test function for Omicron |
| 03:072:__ | DI501 | 0 | PM2-Module | Free programmable |
| 03:073:__ | DI502 | 0 | PM2-Module | Free programmable |
| 03:074:__ | DI503 | 0 | PM2-Module | Free programmable |

 Do not modify input fields

| | | |
|-----|---|--------------|
| :03 | Selection of input functions acc. to function no. | see Item 4.3 |
|-----|---|--------------|

[4] Digital outputs

| | Description | :03 | | |
|------------------------------|----------------|-----|----------------------|--------------------------------|
| 04:001:__ | DO001 | 201 | PM2-Module | Mains CB ready (open) |
| 04:002:__ | DO002 | 203 | PM2-Module | Mains CB on |
| 04:003:__ | DO003 | 200 | PM2-Module | Gen CB ready (closed) |
| 04:004:__ | DO004 | 202 | PM2-Module | Gen CB on |
| 04:005:__ | DO005 | 81 | PM2-Module | Mains protection Mains CB – NO |
| 04:006:__ | DO006 | 81 | PM2-Module | Mains protection Gen CB – NC |
| 04:007:__ | DO007 | 135 | PM2-Module | Collective fault |
| 04:008:__ | DO008 | 184 | PM2-Module | Watchdog (NC) |
| 04:009:__ | DO011 | 113 | DM1-Module | Diff current > |
| 04:010:__ | DO012 | 114 | DM1-Module | Diff current >> |
| 04:011:__ to 04:015:__ | - | 0 | - | - |
| 04:016:__ | DO031 | 0 | PB1-Module | Free programmable |
| 04:017:__ | DO032 | 0 | PB1-Module | Free programmable |
| 04:018:__ | DO033 | 0 | Communication module | Free programmable |
| 04:019:__ | - | 0 | - | - |
| 04:020:__ | DO101 | 193 | DA1-Module (ADR0) | Starting motor |
| 04:021:__ | DO102 | 172 | DA1-Module (ADR0) | Operation solenoid |
| 04:022:__ | DO103 | 182 | DA1-Module (ADR0) | Operation |
| 04:023:__ | DO104 | 179 | DA1-Module (ADR0) | Deactivate C.B. interlocking |
| 04:024:__ to 04:029:__ | DO105 to DO110 | 0 | DA1-Module (ADR0) | Free programmable |
| 04:030:__ | DO111 | 39 | DA1-Module (ADR0) | Supply UDC < |
| 04:031:__ to 04:041:__ | DO201 to DO211 | 0 | DA2-Module (ADR1) | Free programmable |
| 04:042:__ to 04:052:__ | DO301 to DO311 | 0 | DA3-Module (ADR2) | Free programmable |
| 04:053:__ to 04:063:__ | DO401 to DO411 | 0 | DA4-Module (ADR3) | Free programmable |

 Do not modify input fields

| | | |
|-----|--|--------------|
| :03 | Selection of output functions acc. to function no. | see Item 4.4 |
|-----|--|--------------|

[5] Transducer

| | Description | :03 | :04 | | | to:03 | to:04 | |
|-----------|------------------------------|-----|-----|--|--|-------|-------|--|
| 05:001:__ | Voltage transducer mains | 400 | 400 | | | V | V | |
| 05:002:__ | Voltage transducer generator | 400 | 400 | | | V | V | |
| 05:003:__ | CT ratio | 500 | 5 | | | A | A | |
| 05:004:__ | CT ratio differential | 500 | 5 | | | A | A | |
| 05:005:__ | CT ratio earth current | 500 | 5 | | | A | A | |
| :03 | Transducer primary | | | | | | | |
| :04 | Transducer secondary | | | | | | | |

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[6] Configuration

| | Description | :03 | :04 | to:03 | to:04 |
|----------------|--------------------------------|------|-----|--------------------------------------|--------------------|
| 06:003: | Device identity | 4 | 1 | | |
| 06:004: | Language | 1 | 0 | Tableau language – [1] A-B / [2] B-A | |
| 06:005: | Pulse factor | 144 | 0 | Pulse per turn | |
| 06:006: | Nominal voltage | 400 | 0 | in V | |
| 06:007: | Nominal current | 500 | 0 | in A | |
| 06:008: | Nominal power | 345 | 80 | in KW | |
| 06:009: | Nominal frequency | 0 | 0 | [0]=50Hz / [1]=60Hz | |
| 06:010: | Mains form | 0 | 255 | [0]=4-wire / [1]=3-wire | |
| 06:011: | PID parameter overwrite | 0 | 0 | | |
| 06:012: | Color header/footer | 0 | 0 | 0=blue 1=black | |
| 06:013: | VDE/BDEW pictures fade in | 0 | 0 | | |
| 06:014: | Mains control active | 255 | 1 | [255]=Yes / [0]=No | |
| 06:015: | Synchronizing active | 255 | 0 | [255]=Yes / [0]=No | |
| 06:016: | Diff protection active | 0 | 0 | [255]=Yes / [0]=No | |
| 06:018: | Device identity | 0 | 0 | | |
| 06:019: | Mains view | 255 | 0 | [255]=Yes / [0]=No | |
| 06:020: | DE / EN | 0 | 0 | | |
| 06:021: | PIN Mains protection testing | xxxx | 0 | | |
| 06:022: | PIN Counter reset | xxxx | 0 | | |
| 06:023: | PIN Edit | xxxx | 0 | | |
| 06:024: | AI/AT Modules | 0 | 0 | | see 06:024:04 |
| 06:025: | DI/DO Modules | 0 | 0 | | see 06:025:04 |
| 06:026: | Profibus module 1 | 0 | 3 | [255]=Yes / [0]=No | see 06:026:04 |
| 06:027: | Profibus module 2 | 0 | 0 | | |
| 06:028: | Profinet module 1 | 0 | 0 | [255]=Yes / [0]=No | |
| 06:029: | Profinet module 2 | 0 | 0 | | |
| 06:030: | Type of plant | 2 | 0 | | |
| 06:031: | CAN active | 0 | 1 | [255]=Yes / [0]=No | |
| 06:032: | CAN Baudrate [kBaud] | 250 | 0 | | |
| 06:033: | CAN address KOP | 234 | 0 | | |
| 06:034: | CAN address engine | 0 | 0 | | |
| 06:035: | Type of engine | 1 | 0 | | |
| 06:036: | CAN DROOP activate | 255 | 0 | [255]=Yes / [0]=No | |
| 06:037: | CAN Engine protection override | 255 | 0 | [255]=Yes / [0]=No | |
| 06:038: | Summer / Wintertime | 0 | 0 | [255]=Yes / [0]=No | |
| 06:039: | Time SYN with DI | 0200 | 0 | SYN time | [255]=Yes / [0]=No |
| 06:040: | LAAZA Engine selection | 2 | 0 | [1]=ID / [2]=Hours | |
| 06:041: | PIN LAAZA | 1 | 1 | | |
| 06:042: | - | 0 | 0 | - | - |
| bis 06:049: | | | | | |
| 06:050: | Picture selection 1 | 11 | 0 | | see 06:050:03 |
| 06:051: | Picture selection 2 | 12 | 0 | | see 06:050:03 |
| 06:052: | Picture selection 3 | 157 | 0 | | see 06:050:03 |
| 06:053: | Picture selection 4 | 0 | 0 | | see 06:050:03 |
| 06:054: | Picture selection 5 | 0 | 0 | | see 06:050:03 |
| 06:055: | Picture selection 6 | 0 | 0 | | see 06:050:03 |
| 06:056: | Picture selection 7 | 0 | 0 | | see 06:050:03 |
| 06:057: | Picture selection 8 | 0 | 0 | | see 06:050:03 |
| 06:058: | Picture selection 9 | 0 | 0 | | see 06:050:03 |
| 06:059: | Picture selection 10 | 0 | 0 | | see 06:050:03 |

Do not modify input fields

| | | | |
|------------------------------|---|---|---|
| 06:025:04 | Activate AI1 and AT1 modules | AI1 – Modul 1 = 1 AI1 – Modul 2 = 2 AI1 – Modul 3 = 4 | AT1 – Modul 1 = 8 AT1 – Modul 2 = 16 |
| 06:024:04 | Activate DI1 and DO1 modules | | DI1 – Module 1 = always active DI1 – Module 2 = 1 DO1 – Module 1 = always active DO1 – Module 2 = 4 DO1 – Module 3 = 8 DO1 – Module 4 = 16 |
| 06:026:04 | Address Profibus module | | 3 to 32 |
| 06:050:03 to 06:059:03 | The picture selection is made only on the basis of the selection list via the parameter software GV2. | | |

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[7] Options

| | Description | :03 | | | | to:03 | | |
|------------------------|---------------------------------|-----|--|--|--|---------------------|--|--|
| 07:001: | Operation solenoid | 255 | | | | [255]=Yes / [0]=No | | |
| 07:002: | Speed monitoring | 0 | | | | [255]=Yes / [0]=No | | |
| 07:003: | Special synchronizing function | 0 | | | | [255]=Yes / [0]=No | | |
| 07:004: | Ext CB control | 0 | | | | [255]=Yes / [0]=No | | |
| 07:005: | Power reduction F> | 0 | | | | [255]=Yes / [0]=No | | |
| 07:006: | Standby switching mains voltage | 0 | | | | [255]=Yes / [0]=No | | |
| 07:007: | Isochron | 255 | | | | [255]=Yes / [0]=No | | |
| 07:008: | DI: First clothing / Pilot | 0 | | | | [255]=Yes / [0]=No | | |
| 07:009: | Cos phi controller | 0 | | | | [255]=Yes / [0]=No | | |
| 07:010: | Mains parallel possible | 255 | | | | [255]=Yes / [0]=No | | |
| 07:011: | Start speed max | 0 | | | | [255]=Yes / [0]=No | | |
| 07:012: | Only ext. load control | 0 | | | | [255]=Yes / [0]=No | | |
| 07:013: | Communication AS511 | 0 | | | | [255]=Yes / [0]=No | | |
| 07:014: | Mains im-/export controller | 0 | | | | [255]=Yes / [0]=No | | |
| 07:015: | Monitoring mains quality | 0 | | | | [255]=Yes / [0]=No | | |
| 07:016: | Speed synchronization | 255 | | | | [255]=Yes / [0]=No | | |
| 07:017: | LAAZA | 0 | | | | [255]=Ja / [0]=Nein | | |
| 07:018: bis 07:136: | BUS Einstellungen für Modbus | xxx | | | | | | |

Do not modify input fields

[8] Operating data

| | Description | :03 | :04 | :05 | | to:03 | to:04 | |
|---------|--------------------------------|------|-----|-----|--|--------|--------|--|
| 08:001: | Ignition speed | 400 | 40 | 0 | | rpm | rpm | |
| 08:002: | CAN BUS Nominal speed | 1500 | 50 | 0 | | rpm | rpm | |
| 08:003: | CAN BUS idle speed | 500 | 10 | 0 | | rpm | rpm | |
| 08:004: | CAN BUS maximum speed | 2000 | 10 | 0 | | rpm | rpm | |
| 08:005: | Gen. nominal voltage | 80 | 40 | 0 | | % | % | |
| 08:006: | Gen. nominal frequency | 480 | 20 | 0 | | 1/10Hz | 1/10Hz | |
| 08:007: | Mains nominal voltage | 90 | 2 | 0 | | % | % | |
| 08:008: | Mains nominal frequency | 480 | 20 | 0 | | 1/10Hz | 1/10Hz | |
| 08:009: | Min current AL076 | 10 | 1 | 0 | | % | % | |
| 08:010: | Min current AL077 | 10 | 1 | 0 | | % | % | |
| 08:011: | M/B voltage parallel operation | 40 | 0 | 0 | | % | % | |

Do not modify input fields

| | | | | | | | | |
|---|-----|-------------|--|--|--|--|--|--|
| : | :03 | Limit value | | | | | | |
| : | :04 | Hysteresis | | | | | | |

[9] Limit values

| | Description | :03 | :04 | :05 | | to:03 | to:04 | |
|---------|------------------------|------|-----|-----|--|--------|--------|--|
| 09:001: | Supply UDC< | 240 | 2 | 0 | | 1/10V | 1/10V | |
| 09:002: | Battery 1 U< | 240 | 2 | 0 | | | | |
| 09:003: | Battery 2 U< | 240 | 2 | 0 | | | | |
| 09:004: | Speed < | 1300 | 2 | 0 | | rpm | rpm | |
| 09:005: | Speed > | 1650 | 2 | 0 | | rpm | rpm | |
| 09:006: | Generator voltage > | 115 | 2 | 0 | | % | % | |
| 09:007: | Generator voltage < | 90 | 2 | 0 | | % | % | |
| 09:008: | Generator frequency > | 540 | 2 | 0 | | 1/10Hz | 1/10Hz | |
| 09:009: | Generator frequency < | 480 | 2 | 0 | | 1/10Hz | 1/10Hz | |
| 09:010: | Generator voltage >> | 120 | 2 | 0 | | % | % | |
| 09:011: | Generator voltage << | 85 | 2 | 0 | | % | % | |
| 09:012: | Generator frequency >> | 560 | 2 | 0 | | 1/10Hz | 1/10Hz | |
| 09:013: | Generator frequency << | 470 | 2 | 0 | | 1/10Hz | 1/10Hz | |
| 09:014: | Mains voltage > | 103 | 2 | 0 | | % | % | |
| 09:015: | Mains voltage < | 97 | 2 | 0 | | % | % | |
| 09:016: | Mains frequency > | 502 | 1 | 0 | | 1/10Hz | 1/10Hz | |
| 09:017: | Mains frequency < | 498 | 1 | 0 | | 1/10Hz | 1/10Hz | |
| 09:018: | Mains voltage >> | 105 | 2 | 0 | | % | % | |
| 09:019: | Mains voltage << | 95 | 2 | 0 | | % | % | |
| 09:020: | Mains frequency >> | 530 | 2 | 0 | | 1/10Hz | 1/10Hz | |
| 09:021: | Mains frequency << | 470 | 2 | 0 | | 1/10Hz | 1/10Hz | |

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| | | | | | | | |
|--------------------------|--|-----|----|---|--|----------------------|--------|
| 09:022: | Supply UDC > | 290 | 1 | 0 | | 1/10V | 1/10V |
| 09:023: | Battery 1 U > | 270 | 1 | 0 | | | |
| 09:024: | Battery 2 U > | 270 | 1 | 0 | | | |
| 09:025: | Mains rotating field | 1 | 2 | 0 | | [1]=Right / [2]=Left | |
| 09:026: | Gen rotating field | 1 | 2 | 0 | | [1]=Right / [2]=Left | |
| 09:027: | Mains voltage asymmetry | 30 | 2 | 0 | | % | % |
| 09:028: | Gen voltage asymmetry | 10 | 2 | 0 | | % | % |
| 09:029: | Mains angle fault | 10 | 2 | 0 | | Degree | Degree |
| 09:030: | Gen angle fault | 10 | 2 | 0 | | Degree | Degree |
| 09:031: | Cos Phi capacitive | 800 | 50 | 0 | | 1/1000 | 1/1000 |
| 09:032: | Cos Phi inductive | 800 | 50 | 0 | | 1/1000 | 1/1000 |
| 09:033: | Start crank warning | 1 | 0 | 0 | | Starts | |
| 09:034: | Start crank stop | 3 | 0 | 0 | | Starts | |
| 09:035: | Start crank sprinkler | 10 | 0 | 0 | | Starts | |
| 09:036: | Maintenance counter | 0 | 0 | 0 | | Hours | |
| 09:037: to 09:054: | Analog input 5 to Analog input 22 | 50 | 2 | 0 | Limit values for the alarms 123 to 140 | | |
| 09:055: to 09:090: | Analog input 5 to Analog input 22 | 50 | 2 | 0 | Limit values for the relay outputs | | |
| 09:091: to 09:122: | Analog input PT1 to PT12 Analog input 23 to 26 | 50 | 2 | 0 | Limit values for the alarms 145 to 176 | | |
| 09:123: to 09:154: | Analog input PT1 to PT12 Analog input 23 to 26 | 50 | 2 | 0 | Limit values for the relay outputs | | |
| 09:187: to 09:194: | Can Bus limit value AIN 01 (alarm) to Can Bus limit value AIN 08 (alarm) | 0 | 0 | 0 | Limit values for the alarms 257 to 264 | | |
| 09:195: to 09:210: | Can Bus limit value AIN 01 to Can Bus limit value AIN 08 | 0 | 0 | 0 | Limit values for the relay outputs | | |

Do not modify input fields

| | | |
|-------|-------------|--|
| : :03 | Limit value | When entering the numerical values the selected unit has to be input with decimals |
| : :04 | Hysteresis | |

[10] Alarms

| | Description | :01 | :02 | :03 | :04 | | |
|--------------------------|-----------------------------|----------------------|----------------------|----------|------|----------------|--|
| 10:001: to 10:032: | AL001 to AL032 | AL001 to AL032 | AL001 to AL032 | xxxxx... | 10 | External alarm | |
| 10:033: | AL033 Emergency stop | AL033 | AL033 | xxxxx... | 0 | Internal alarm | |
| 10:034: | AL034 Start crank warning | AL034 | AL034 | xxxxx... | 0 | Internal alarm | |
| 10:035: | AL035 Start crank stop | AL035 | AL035 | xxxxx... | 0 | Internal alarm | |
| 10:036: | AL036 Start crank sprinkler | AL036 | AL036 | xxxxx... | 0 | Internal alarm | |
| 10:037: | AL037 Pick up fault | AL037 | AL037 | xxxxx... | 20 | Internal alarm | |
| 10:038: | AL038 Stop fault | AL038 | AL038 | xxxxx... | 600 | Internal alarm | |
| 10:039: | AL039 Supply UDC< | AL039 | AL039 | xxxxx... | 300 | Internal alarm | |
| 10:040: | AL040 Battery 1 U< | AL040 | AL040 | xxxxx... | 300 | Internal alarm | |
| 10:041: | AL041 Battery 2 U< | AL041 | AL041 | xxxxx... | 300 | Internal alarm | |
| 10:042: | AL042 Gen CB fault | AL042 | AL042 | xxxxx... | 60 | Internal alarm | |
| 10:043: | AL043 Mains CB fault | AL043 | AL043 | xxxxx... | 30 | Internal alarm | |
| 10:044: | AL044 Syn time too long | AL044 | AL044 | xxxxx... | 1800 | Internal alarm | |
| 10:045: | AL045 Watchdog | AL045 | AL045 | xxxxx... | 20 | Internal alarm | |
| 10:046: | AL046 Supply UDC> | AL046 | AL046 | xxxxx... | 2 | Internal alarm | |
| 10:047: | AL047 Maintenance counter | AL047 | AL047 | xxxxx... | 2 | Internal alarm | |
| 10:048: | AL048 Fault remote tableau | AL048 | AL048 | xxxxx... | 2 | Internal alarm | |
| 10:049: | AL049 Mains voltage << | AL049 | AL049 | xxxxx... | 2 | Internal alarm | |
| 10:050: | AL050 Mains voltage < | AL050 | AL050 | xxxxx... | 20 | Internal alarm | |
| 10:051: | AL051 Mains voltage > | AL051 | AL051 | xxxxx... | 20 | Internal alarm | |
| 10:052: | AL052 Mains voltage >> | AL052 | AL052 | xxxxx... | 2 | Internal alarm | |
| 10:053: | AL053 Mains frequency << | AL053 | AL053 | xxxxx... | 2 | Internal alarm | |
| 10:054: | AL054 Mains frequency < | AL054 | AL054 | xxxxx... | 20 | Internal alarm | |
| 10:055: | AL055 Mains frequency > | AL055 | AL055 | xxxxx... | 20 | Internal alarm | |

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|---------|---|-------|-------|----------|------|----------------|
| 10:056: | AL056 Mains frequency >> | AL056 | AL056 | xxxxx... | 2 | Internal alarm |
| 10:057: | AL057 Mains rotating field | AL057 | AL057 | xxxxx... | 10 | Internal alarm |
| 10:058: | AL058 Mains angle fault | AL058 | AL058 | xxxxx... | 10 | Internal alarm |
| 10:059: | AL059 Mains voltage asymmetry | AL059 | AL059 | xxxxx... | 10 | Internal alarm |
| 10:060: | - | AL060 | AL060 | xxxxx... | 2 | Internal alarm |
| 10:061: | AL061 BDEW - U(t) time runs | AL061 | AL061 | xxxxx... | 2 | Internal alarm |
| 10:062: | AL062 BDEW - U(t) fault | AL062 | AL062 | xxxxx... | 2 | Internal alarm |
| 10:063: | - | AL063 | AL063 | xxxxx... | 2 | Internal alarm |
| 10:064: | - | AL064 | AL064 | xxxxx... | 2 | Internal alarm |
| 10:065: | AL065 Generator voltage << | AL065 | AL065 | xxxxx... | 10 | Internal alarm |
| 10:066: | AL066 Generator voltage < | AL066 | AL066 | xxxxx... | 10 | Internal alarm |
| 10:067: | AL067 Generator voltage > | AL067 | AL067 | xxxxx... | 10 | Internal alarm |
| 10:068: | AL068 Generator voltage >> | AL068 | AL068 | xxxxx... | 10 | Internal alarm |
| 10:069: | AL069 Generator frequency << | AL069 | AL069 | xxxxx... | 10 | Internal alarm |
| 10:070: | AL070 Generator frequency < | AL070 | AL070 | xxxxx... | 10 | Internal alarm |
| 10:071: | AL071 Generator frequency > | AL071 | AL071 | xxxxx... | 10 | Internal alarm |
| 10:072: | AL072 Generator frequency >> | AL072 | AL072 | xxxxx... | 10 | Internal alarm |
| 10:073: | AL073 Generator rotating field | AL073 | AL073 | xxxxx... | 10 | Internal alarm |
| 10:074: | AL074 Generator angle fault | AL074 | AL074 | xxxxx... | 10 | Internal alarm |
| 10:075: | AL075 Generator voltage asymmetry | AL075 | AL075 | xxxxx... | 10 | Internal alarm |
| 10:076: | AL076 Cos Phi capacitive | AL076 | AL076 | xxxxx... | 10 | Internal alarm |
| 10:077: | AL077 Cos Phi inductive | AL077 | AL077 | xxxxx... | 10 | Internal alarm |
| 10:078: | - | AL078 | AL078 | xxxxx... | 2 | Internal alarm |
| 10:079: | - | AL079 | AL079 | xxxxx... | 2 | Internal alarm |
| 10:080: | - | AL080 | AL080 | xxxxx... | 2 | Internal alarm |
| 10:081: | AL081 Mains protection collective fault | AL081 | AL081 | xxxxx... | 0 | Internal alarm |
| 10:082: | AL082 Mains protection U<< | AL082 | AL082 | xxxxx... | 0 | Internal alarm |
| 10:083: | AL083 Mains protection U< | AL083 | AL083 | xxxxx... | 0 | Internal alarm |
| 10:084: | AL084 Mains protection U> | AL084 | AL084 | xxxxx... | 0 | Internal alarm |
| 10:085: | AL085 Mains protection U>> | AL085 | AL085 | xxxxx... | 0 | Internal alarm |
| 10:086: | AL086 Mains protection F<< | AL086 | AL086 | xxxxx... | 0 | Internal alarm |
| 10:087: | AL087 Mains protection F< | AL087 | AL087 | xxxxx... | 0 | Internal alarm |
| 10:088: | AL088 Mains protection F> | AL088 | AL088 | xxxxx... | 0 | Internal alarm |
| 10:089: | AL089 Mains protection F>> | AL089 | AL089 | xxxxx... | 0 | Internal alarm |
| 10:090: | AL090 Mains protection vector surge > | AL090 | AL090 | xxxxx... | 0 | Internal alarm |
| 10:091: | AL091 Mains protection vector surge>> | AL091 | AL091 | xxxxx... | 0 | Internal alarm |
| 10:092: | AL092 Dif. vector surge > | AL092 | AL092 | xxxxx... | 0 | Internal alarm |
| 10:093: | AL093 Dif. vector surge >> | AL093 | AL093 | xxxxx... | 0 | Internal alarm |
| 10:094: | AL094 Q-U protection > | AL094 | AL094 | xxxxx... | 0 | Internal alarm |
| 10:095: | AL095 Q-U protection >> | AL095 | AL095 | xxxxx... | 0 | Internal alarm |
| 10:096: | - | AL096 | AL096 | xxxxx... | 0 | Internal alarm |
| 10:097: | AL097 Overcurrent > | AL097 | AL097 | xxxxx... | 10 | Internal alarm |
| 10:098: | AL098 Overcurrent >> | AL098 | AL098 | xxxxx... | 10 | Internal alarm |
| 10:099: | AL099 Overcurrent VDE0100-718 | AL099 | AL099 | xxxxx... | 10 | Internal alarm |
| 10:100: | AL100 Inv. time overcurrent prot. | AL100 | AL100 | xxxxx... | 10 | Internal alarm |
| 10:101: | AL101 LAAZA BUS fault | AL101 | AL101 | xxxxx... | 10 | Internal alarm |
| 10:102: | AL102 LAAZA participant missing | AL102 | AL102 | xxxxx... | 10 | Internal alarm |
| 10:103: | AL103 VDE4105 Power reduction | AL103 | AL103 | xxxxx... | 3000 | Internal alarm |
| 10:104: | AL104 Power > | AL104 | AL104 | xxxxx... | 100 | Internal alarm |
| 10:105: | AL105 Power >> | AL105 | AL105 | xxxxx... | 2 | Internal alarm |
| 10:106: | AL106 Reverse power > | AL106 | AL106 | xxxxx... | 100 | Internal alarm |
| 10:107: | AL107 Reverse power >> | AL107 | AL107 | xxxxx... | 2 | Internal alarm |
| 10:108: | AL108 Apparent power > | AL108 | AL108 | xxxxx... | 100 | Internal alarm |
| 10:109: | AL109 Apparent power >> | AL109 | AL109 | xxxxx... | 2 | Internal alarm |
| 10:110: | AL110 Reactive power > | AL110 | AL110 | xxxxx... | 100 | Internal alarm |
| 10:111: | AL111 Reactive power >> | AL111 | AL111 | xxxxx... | 2 | Internal alarm |
| 10:112: | AL112 Unbalanced load | AL112 | AL112 | xxxxx... | 100 | Internal alarm |
| 10:113: | AL113Diff current > | AL113 | AL113 | xxxxx... | 2 | Internal alarm |
| 10:114: | AL114 Diff current >> | AL114 | AL114 | xxxxx... | 2 | Internal alarm |
| 10:115: | AL115 VDE4105 – Coll. Fault | AL115 | AL115 | xxxxx... | 0 | Internal alarm |
| 10:116: | AL116 VDE4105 – U< (80%) | AL116 | AL116 | xxxxx... | 0 | Internal alarm |
| 10:117: | AL117 VDE4105 – U>> (115%) | AL117 | AL117 | xxxxx... | 0 | Internal alarm |
| 10:118: | AL118 VDE4105 – F< (47,5Hz) | AL118 | AL118 | xxxxx... | 0 | Internal alarm |
| 10:119: | AL119 VDE4105 – F> (51,5Hz) | AL119 | AL119 | xxxxx... | 0 | Internal alarm |
| 10:120: | AL120 VDE4105 – U> (Quality) | AL120 | AL120 | xxxxx... | 0 | Internal alarm |
| 10:121: | AL121 Underspeed | AL121 | AL121 | xxxxx... | 2 | Internal alarm |
| 10:122: | AL122 Overspeed | AL122 | AL122 | xxxxx... | 2 | Internal alarm |

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|---------|---------------------------------|----------------------|----------------------|----------|----|----------------|
| 10:123: | AL123 Analog input 5 | AL123 | AL123 | xxxxx... | 0 | External alarm |
| 10:124: | AL124 Analog input 6 | AL124 | AL124 | xxxxx... | 0 | External alarm |
| 10:125: | AL125 Analog input 7 | AL125 | AL125 | xxxxx... | 0 | External alarm |
| 10:126: | AL126 Analog input 8 | AL126 | AL126 | xxxxx... | 0 | External alarm |
| 10:127: | AL127 Analog input 9 | AL127 | AL127 | xxxxx... | 0 | External alarm |
| 10:128: | AL128 Analog input 10 | AL128 | AL128 | xxxxx... | 0 | External alarm |
| 10:129: | AL129 Analog input 11 | AL129 | AL129 | xxxxx... | 0 | External alarm |
| 10:130: | AL130 Analog input 12 | AL130 | AL130 | xxxxx... | 0 | External alarm |
| 10:131: | AL131 Analog input 13 | AL131 | AL131 | xxxxx... | 0 | External alarm |
| 10:132: | AL132 Analog input 14 | AL132 | AL132 | xxxxx... | 0 | External alarm |
| 10:133: | AL133 Analog input 15 | AL133 | AL133 | xxxxx... | 0 | External alarm |
| 10:134: | AL134 Analog input 16 | AL134 | AL134 | xxxxx... | 0 | External alarm |
| 10:135: | AL135 Analog input 17 | AL135 | AL135 | xxxxx... | 0 | External alarm |
| 10:136: | AL136 Analog input 18 | AL136 | AL136 | xxxxx... | 0 | External alarm |
| 10:137: | AL137 Analog input 19 | AL137 | AL137 | xxxxx... | 0 | External alarm |
| 10:138: | AL138 Analog input 20 | AL138 | AL138 | xxxxx... | 0 | External alarm |
| 10:139: | AL139 Analog input 21 | AL139 | AL139 | xxxxx... | 0 | External alarm |
| 10:140: | AL140 Analog input 22 | AL140 | AL140 | xxxxx... | 0 | External alarm |
| 10:141: | - | AL141 | AL141 | xxxxx... | 10 | External alarm |
| 10:142: | - | AL142 | AL142 | xxxxx... | 10 | External alarm |
| 10:143: | - | AL143 | AL143 | xxxxx... | 10 | External alarm |
| 10:144: | - | AL144 | AL144 | xxxxx... | 10 | External alarm |
| 10:145: | AL145 PT1> | AL145 | AL145 | xxxxx... | 10 | External alarm |
| 10:146: | AL146 PT1>> | AL146 | AL146 | xxxxx... | 10 | External alarm |
| 10:147: | AL147 PT2> | AL147 | AL147 | xxxxx... | 10 | External alarm |
| 10:148: | AL148 PT2>> | AL148 | AL148 | xxxxx... | 10 | External alarm |
| 10:149: | AL149 PT3> | AL149 | AL149 | xxxxx... | 10 | External alarm |
| 10:150: | AL140 PT3>> | AL150 | AL150 | xxxxx... | 10 | External alarm |
| 10:151: | AL151 PT4> | AL151 | AL151 | xxxxx... | 10 | External alarm |
| 10:152: | AL152 PT4>> | AL152 | AL152 | xxxxx... | 10 | External alarm |
| 10:153: | AL153 PT5> | AL153 | AL153 | xxxxx... | 10 | External alarm |
| 10:154: | AL154 PT5>> | AL154 | AL154 | xxxxx... | 10 | External alarm |
| 10:155: | AL155 PT6> | AL155 | AL155 | xxxxx... | 10 | External alarm |
| 10:156: | AL156 PT6>> | AL156 | AL156 | xxxxx... | 10 | External alarm |
| 10:157: | AL157 AE23> | AL157 | AL157 | xxxxx... | 10 | External alarm |
| 10:158: | AL158 AE23>> | AL158 | AL158 | xxxxx... | 10 | External alarm |
| 10:159: | AL159 AE24> | AL159 | AL159 | xxxxx... | 10 | External alarm |
| 10:160: | AL160 AE24>> | AL160 | AL160 | xxxxx... | 10 | External alarm |
| 10:161: | AL161 PT7> | AL161 | AL161 | xxxxx... | 10 | External alarm |
| 10:162: | AL162 PT7>> | AL162 | AL162 | xxxxx... | 10 | External alarm |
| 10:163: | AL163 PT8> | AL163 | AL163 | xxxxx... | 10 | External alarm |
| 10:164: | AL164 PT8>> | AL164 | AL164 | xxxxx... | 10 | External alarm |
| 10:165: | AL165 PT9> | AL165 | AL165 | xxxxx... | 10 | External alarm |
| 10:166: | AL166 PT9>> | AL166 | AL166 | xxxxx... | 10 | External alarm |
| 10:167: | AL167 PT10> | AL167 | AL167 | xxxxx... | 10 | External alarm |
| 10:168: | AL168 PT10>> | AL168 | AL168 | xxxxx... | 10 | External alarm |
| 10:169: | AL169 PT11> | AL169 | AL169 | xxxxx... | 10 | External alarm |
| 10:170: | AL170 PT11>> | AL170 | AL170 | xxxxx... | 10 | External alarm |
| 10:171: | AL171 PT12> | AL171 | AL171 | xxxxx... | 10 | External alarm |
| 10:172: | AL172 PT12>> | AL172 | AL172 | xxxxx... | 10 | External alarm |
| 10:173: | AL173 AE25> | AL173 | AL173 | xxxxx... | 10 | External alarm |
| 10:174: | AL174 AE25>> | AL174 | AL174 | xxxxx... | 10 | External alarm |
| 10:175: | AL175 AE26> | AL175 | AL175 | xxxxx... | 10 | External alarm |
| 10:176: | AL176 AE26>> | AL176 | AL176 | xxxxx... | 10 | External alarm |
| 10:177: | AL177 to AL240 to 10:240: | AL177 to AL240 | AL177 to AL240 | xxxxx... | 10 | External alarm |
| 10:241: | AL241 to AL255 to 10:255: | AL241 to AL255 | AL241 to AL255 | xxxxx... | 10 | External alarm |
| 10:257: | AL257 to AL264 to 10:264: | AL257 to AL264 | AL257 to AL264 | xxxxx... | 10 | External alarm |

Do not modify input fields

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| | | |
|-------|------------------------------|----------------------------|
| : :01 | Text for language 1 | |
| : :02 | Text for language 2 | |
| : :03 | Numbers acc. to alarm coding | [0]=Disabled / [1]=Enabled |
| : :04 | Delay in 1/10 secs. | |

[11] Logic

Due to its complexity, the logic should only be set and changed via the parameterization surface of the GV2.

[12] Times

| | Description | :03 | | | zu:03 | |
|---------|---------------------------------|------|--|--|----------|--|
| 12:001: | - | 0 | | | | |
| 12:002: | Start delay | 10 | | | 1/10 Sec | |
| 12:003: | Starter on | 90 | | | 1/10 Sec | |
| 12:004: | Starter break | 50 | | | 1/10 Sec | |
| 12:005: | Cooling down normal | 1800 | | | 1/10 Sec | |
| 12:006: | Cooling down sprinkler | 4200 | | | 1/10 Sec | |
| 12:007: | Stop time | 200 | | | 1/10 Sec | |
| 12:008: | Retransfer time | 600 | | | 1/10 Sec | |
| 12:009: | M/G transfer time | 10 | | | 1/10 Sec | |
| 12:010: | Fault release1 | 90 | | | 1/10 Sec | |
| 12:011: | Fault release 2 | 50 | | | 1/10 Sec | |
| 12:012: | Fault release 3 | 300 | | | 1/10 Sec | |
| 12:013: | Generator voltage | 10 | | | 1/10 Sec | |
| 12:014: | Generator undervoltage | 30 | | | 1/10 Sec | |
| 12:015: | Unloading time | 600 | | | 1/10 Sec | |
| 12:016: | Speed controller reset | 20 | | | 1/10 Sec | |
| 12:017: | Battery change over 1 | 5 | | | 1/10 Sec | |
| 12:018: | Battery change over 2 | 5 | | | 1/10 Sec | |
| 12:019: | Start preparing | 5 | | | 1/10 Sec | |
| 12:020: | Preglowing | 0 | | | 1/10 Sec | |
| 12:021: | Buzzer off | 1200 | | | 1/10 Sec | |
| 12:022: | Syn monitoring | 0 | | | | |
| 12:023: | Gen. impulse delay | 20 | | | 1/10 Sec | |
| 12:024: | Mains impulse delay | 20 | | | 1/10 Sec | |
| 12:025: | Gen. off prolongat. | 20 | | | 1/10 Sec | |
| 12:026: | Mains off prolongat. | 20 | | | 1/10 Sec | |
| 12:027: | Gen. voltage failure detection | 10 | | | | |
| 12:028: | Mains voltage failure detection | 20 | | | 1/10 Sec | |
| 12:029: | Delay ident. parallel operation | 10 | | | | |
| 12:030: | - | 0 | | | | |
| 12:031: | - | 0 | | | | |
| 12:032: | - | 0 | | | | |
| 12:033: | Motor valve | 20 | | | | |
| 12:034: | Fuel valve | 50 | | | | |
| 12:035: | Emergency light | 1800 | | | | |
| 12:036: | Room fan | 300 | | | | |
| 12:037: | Prelub.break counter | 90 | | | | |
| 12:038: | Prelub.break | 600 | | | | |
| 12:039: | Prelub. time | 1200 | | | | |
| 12:040: | - | 0 | | | | |
| 12:041: | Start up syn. max time | 150 | | | 1/10 Sec | |
| 12:042: | Start up syn. deexcitation | 20 | | | 1/10 Sec | |
| 12:043: | Start up syn. part. excitation | 50 | | | 1/10 Sec | |
| 12:044: | Ramp for unloading | 50 | | | 1/10 Sec | |

Do not modify input fields

| | | |
|-------|-------|--|
| : :03 | Times | |
|-------|-------|--|

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[13] Diff protection

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|-----------------------------|-----|-----|-----|--|-------|-------|----------|
| 13:001: | Diff current > | 10 | 2 | 0 | | % | % | |
| 13:002: | Diff current >> | 20 | 2 | 0 | | % | % | |
| 13:003: | Trip point of trip charact. | 50 | 2 | 0 | | % | | |
| 13:004: | Trip blocking | 25 | 2 | 50 | | % | | 1/10 Sec |

 Do not modify input fields

| | | |
|---------|---------------------|--|
| __ : __ | Limit value in % | |
| __ : __ | Hysteresis in % | |
| __ : __ | Times in 1/10 secs. | |

[14] Current protection

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|-----------------------------|-----|-----|------|--|----------|-------|-------|
| 14:001: | Overcurrent VDE 100-718 | 110 | 2 | 0 | | | | |
| 14:002: | Overcurrent > | 300 | 2 | 0 | | % | % | |
| 14:003: | Overcurrent >> | 350 | 2 | 0 | | % | % | |
| 14:004: | Overcurrent time protection | 3 | 0 | 1000 | | Fct.-No. | | 1/100 |
| 14:005: | Earth current > | 10 | 2 | 0 | | % | % | |
| 14:006: | Earth current >> | 20 | 2 | 0 | | % | % | |

 Do not modify input fields

| | | |
|---------|--------------------|--|
| __ : __ | Limit value | |
| __ : __ | Hysteresis | |
| __ : __ | Time multiplicator | |

| | | |
|-----------|-----------------------|--|
| 14:004:03 | Select characteristic | [1] IEC-inverse [2] IEC-very inverse [3] IEC-extremely inverse [4] IEC-long inverse [5] ANSI-inverse [6] ANSI-short inverse [7] ANSI-long inverse [8] ANSI-moderately inverse [9] ANSI- very inverse [10] ANSI- extremely inverse [11] ANSI-definite inverse |
|-----------|-----------------------|--|

[15] Mains protection

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|-----------------------|-----|-----|-----|--|---------|---------|-----------|
| 15:001: | Mains protection U<< | 80 | 2 | 4 | | % | % | 1/100 Sec |
| 15:002: | Mains protection U < | 80 | 2 | 4 | | % | % | 1/100 Sec |
| 15:003: | Mains protection U > | 110 | 2 | 4 | | % | % | 1/100 Sec |
| 15:004: | Mains protection U >> | 115 | 2 | 4 | | % | % | 1/100 Sec |
| 15:005: | Mains protection F<< | 475 | 2 | 4 | | 1/10 Hz | 1/10 Hz | 1/100 Sec |
| 15:006: | Mains protection F< | 492 | 2 | 4 | | 1/10 Hz | 1/10 Hz | 1/100 Sec |
| 15:007: | Mains protection F> | 508 | 2 | 4 | | 1/10 Hz | 1/10 Hz | 1/100 Sec |
| 15:008: | Mains protection F>> | 515 | 2 | 4 | | 1/10 Hz | 1/10 Hz | 1/100 Sec |
| 15:009: | Mains prot vector > | 6 | 2 | 0 | | degree | | |
| 15:010: | Mains prot vector >> | 12 | 2 | 0 | | degree | | |
| 15:011: | Reset time | 3 | 0 | 0 | | | | |
| 15:012: | Q-U protection U< | 85 | 2 | 50 | | % | | 1/100 Sec |
| 15:013: | Q-U protection Q< | 6 | 0 | 0 | | degree | | |
| 15:014: | Q-U protection U<< | 85 | 2 | 50 | | % | | 1/100 Sec |
| 15:015: | Q-U protection Q<< | 3 | 0 | 0 | | degree | | |

 Do not modify input fields

| | | |
|---------|------------------------|--|
| __ : __ | Limit value | Voltage in % Frequency in 1/10 Hz Phi in degrees |
| __ : __ | Hysteresis | Voltage in % Frequency in 1/10 Hz Phi in degrees |
| __ : __ | Times in 1/100 Seconds | |

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[16] Power protection

| | Description | :03 | :04 | :05 | | to:03 | to:04 | |
|---------|------------------------------|-----|-----|-----|--|-------|-------|----------|
| 16:001: | Active power loaded | 10 | 0 | 0 | | % | % | |
| 16:002: | Active power > | 115 | 2 | 0 | | % | % | |
| 16:003: | Active power >> | 120 | 2 | 0 | | % | % | |
| 16:004: | Reverse power >> | -5 | 2 | 0 | | % | % | |
| 16:005: | Reverse power >> | -10 | 2 | 0 | | % | % | |
| 16:006: | Unbalanced load | 30 | 2 | 0 | | % | % | |
| 16:007: | KWH Pulse | 10 | 2 | 0 | | KW | | |
| 16:008: | Apparent power > | 115 | 2 | 0 | | % | % | |
| 16:009: | Apparent power >> | 120 | 2 | 0 | | % | % | |
| 16:010: | Reactive power > | 15 | 2 | 0 | | % | % | |
| 16:011: | Reactive power >> | 20 | 2 | 0 | | % | % | |
| 16:012: | LAAZA Number of engines | 2 | 0 | 0 | | | | |
| 16:013: | LAAZA Engines base load | 1 | 0 | 0 | | | | |
| 16:014: | LAAZA Engines switch on/off | 1 | 0 | 0 | | | | |
| 16:015: | LAAZA Deselection << | 20 | 0 | 10 | | % | | 1/10 Sec |
| 16:016: | LAAZA Deselection < | 30 | 0 | 100 | | % | | 1/10 Sec |
| 16:017: | LAAZA Selection > | 80 | 0 | 100 | | % | | 1/10 Sec |
| 16:018: | LAAZA Selection >> | 90 | 0 | 10 | | % | | 1/10 Sec |
| 16:019: | LAAZA Engines change by time | 0 | 0 | 0 | | | | Minutes |
| 16:020: | LAAZA Delaytime | 0 | 0 | 10 | | | | Minutes |

 Do not modify input fields

| | | |
|-------|-------------|--|
| : :03 | Limit value | |
| : :04 | Hysteresis | |

[17] Synchronization

| | Description | :03 | | | | to:03 | | |
|---------|----------------------------|-----|--|--|--|----------|--|--|
| 17:001: | Advance time | 50 | | | | msec | | |
| 17:002: | Max. frequency diff. | 10 | | | | 1/100 Hz | | |
| 17:003: | Min. frequency diff. | 5 | | | | 1/100 Hz | | |
| 17:004: | Max. voltage diff. | 5 | | | | % | | |
| 17:005: | Syn pulse length | 200 | | | | msec | | |
| 17:006: | - | 0 | | | | | | |
| 17:007: | - | 0 | | | | | | |
| 17:008: | - | 0 | | | | | | |
| 17:009: | - | 0 | | | | | | |
| 17:010: | Frequency integration time | 50 | | | | Periods | | |
| 17:011: | Setpoint frequency | 500 | | | | 1/10 Hz | | |
| 17:012: | Setpoint voltage | 100 | | | | % | | |

 Do not modify input fields

| | | |
|-------|------------|--|
| : :03 | Adjustment | |
|-------|------------|--|

[18] Controller

| | Description | :03 | :04 | :05 | :06 | :07 | :08 | :10 |
|---------|------------------------------|-----|------|-----|-----|-----|-----|-----|
| 18:001: | PID U island | 0 | 1000 | 200 | 0 | 2 | 10 | 0 |
| 18:002: | PID U syn | 0 | 1000 | 200 | 0 | 2 | 0 | 0 |
| 18:003: | PID cos phi mains parallel | 0 | 1000 | 200 | 0 | 2 | 10 | 0 |
| 18:004: | PID cos phi gen parallel | 0 | 1000 | 200 | 0 | 2 | 10 | 0 |
| 18:005: | - | 0 | 1000 | 200 | 0 | 2 | 5 | 0 |
| 18:006: | PID F island | 0 | 1000 | 200 | 0 | 2 | 5 | 0 |
| 18:007: | PID F syn | 0 | 1000 | 200 | 0 | 2 | 0 | 0 |
| 18:008: | PID power mains parallel | 0 | 1000 | 200 | 0 | 2 | 10 | 0 |
| 18:009: | PID power gen parallel | 0 | 1000 | 200 | 0 | 2 | 10 | 0 |
| 18:010: | - | 0 | 1000 | 100 | 0 | 2 | 5 | 0 |
| 18:011: | PID CAN BUS frequency island | 14 | 300 | 200 | 0 | 2 | 5 | 0 |

 Do not modify input fields

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| | | | | | | | | |
|-------|-----------------|--|--|---|--|--|--|--|
| : :03 | - | | | | | | | |
| : :04 | P-part | | | Kp in 1/100 | | | | |
| : :05 | I-part | | | Ti in 1/100 Secs | | | | |
| : :06 | D-part | | | Td in 1/100 Secs | | | | |
| : :07 | T1-factor | | | T1 in 1/10 Secs | | | | |
| : :08 | Neutral zone | | | Frequency in 1/100 Hz All other values in 1/10 % | | | | |
| : :09 | - | | | | | | | |
| : :10 | Delayed release | | | In 1/10 Secs | | | | |

[19] Pulse controller

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|------------------|-----|-----|-----|--|-------|----------|----------|
| 19:001: | Voltage island | 50 | 2 | 1 | | | 1/10 Sec | % |
| 19:002: | Frequency island | 50 | 2 | 5 | | | 1/10 Sec | 1/100 Hz |
| 19:003: | Voltage syn | 100 | 2 | 1 | | | 1/10 Sec | % |
| 19:004: | Frequency syn | 100 | 2 | 0 | | | 1/10 Sec | 1/100 Hz |
| 19:005: | Cos phi parallel | 50 | 2 | 1 | | | 1/10 Sec | % |
| 19:006: | Power parallel | 50 | 2 | 1 | | | 1/10 Sec | % |

| | | | | | | | | |
|-------|--------------|--|--|--|--|--|--|--|
| : :03 | Boosting | | | | | | | |
| : :04 | Pulse length | | | | | | | |
| : :05 | Death zone | | | | | | | |

[20] Motorpoti

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|---------------|------|-----|-----|--|-------|-------|-------|
| 20:001: | El. Poti F/P | 200 | 35 | 10 | | | | |
| 20:002: | El. Poti U/PF | 1000 | 0 | 10 | | | | |

Do not modify input fields

[21] Int. Setpoints

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|------------------|------|------|-----|--|----------|----------|-------|
| 21:001: | Generator power | 1000 | 0 | | | 1/10 % | 1/10 % | |
| 21:002: | Mains im-/export | 500 | -500 | | | KW | KW | |
| 21:002: | Cos Phi | 50 | -50 | | | 1/100 LF | 1/100 LF | |

| | | | | | | | | |
|-------|-----------|--|--|--|--|--|--|--|
| : :03 | Max value | | | | | | | |
| : :04 | Min value | | | | | | | |

[22] VDE table

| | Description | :03 | :04 | :05 | | to:03 | to:04 | to:05 |
|---------|----------------------------------|------|------|-----|--|----------|----------|-----------|
| 22:001: | Standby switching U> | 85 | 1 | 600 | | % | | 1/10 Sec. |
| 22:002: | Standby switching U< | 110 | 1 | 600 | | % | | 1/10 Sec. |
| 22:003: | Standby switching F> | 4750 | 1 | 600 | | 1/100 Hz | | 1/10 Sec. |
| 22:004: | Standby switching F< | 5005 | 1 | 600 | | 1/100 Hz | | 1/10 Sec. |
| 22:005: | VDE NA-protection U< | 80 | 1 | 0 | | % | | |
| 22:006: | VDE NA-protection U> | 115 | 1 | 0 | | % | | |
| 22:007: | VDE NA-protection F< | 475 | 1 | 0 | | 1/10 Hz | | |
| 22:008: | VDE NA-protection F> | 515 | 1 | 0 | | 1/10 Hz | | |
| 22:009: | VDE NA-protection U>(Quality) | 110 | 1 | 0 | | % | | |
| 22:010: | Ext. power red. level 1 | 60 | 0 | 0 | | % | | |
| 22:011: | Ext. power red. level 2 | 30 | 0 | 0 | | % | | |
| 22:012: | Ext. power red. level 3 | 10 | 0 | 0 | | % | | |
| 22:013: | VDE Power red. F> | 5020 | 5150 | 0 | | 1/100 Hz | 1/100 Hz | |
| 22:014: | VDE Power red. - % / Hz | 40 | 10 | 0 | | | | |
| 22:015: | Cos Phi in response of power - 1 | 950 | 10 | 0 | | 1/1000 | % | |
| 22:016: | Cos Phi in response of power - 2 | -950 | 90 | 0 | | 1/1000 | % | |
| 22:017: | Dyn. Mains support - U(t) 1 | 0 | 0 | 15 | | % | | 1/100 Sec |
| 22:018: | Dyn. Mains support - U(t) 2 | 300 | 0 | 15 | | % | | 1/100 Sec |
| 22:019: | Dyn. Mains support - U(t) 3 | 700 | 0 | 15 | | % | | 1/100 Sec |
| 22:020: | Dyn. Mains support - U(t) 4 | 700 | 0 | 70 | | % | | 1/100 Sec |
| 22:021: | Dyn. Mains support - U(t) 5 | 900 | 0 | 150 | | % | | 1/100 Sec |
| 22:022: | Dyn. Mains support - U(t) 6 | 900 | 0 | 300 | | % | | 1/100 Sec |

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| | |
|--|----------------------------|
| | Do not modify input fields |
|--|----------------------------|

| | | |
|-------|---------------|--|
| : :03 | Limit value 1 | |
| : :04 | Limit value 2 | |
| : :04 | Times | |

[23] CAN J1939

The assignment of the analogue and digital signals in this table are motor-dependent and can be found in the project-related parameterization at the CAN BUS tab.

[24] LED

| | Description | :03 | :04 | | | | | |
|---------|----------------------|-----|-----|--|--|--|--|--|
| 24:001: | LED 1 | 0 | 0 | | | | | |
| 24:002: | LED 2 | 0 | 0 | | | | | |
| 24:003: | LED 3 | 0 | 0 | | | | | |
| 24:004: | LED 4 | 0 | 0 | | | | | |
| 24:005: | LED 5 | 0 | 0 | | | | | |
| 24:006: | Operating message 1 | 170 | 0 | | | | | |
| 24:007: | Operating message 2 | 179 | 0 | | | | | |
| 24:008: | Operating message 3 | 206 | 0 | | | | | |
| 24:009: | Operating message 4 | 166 | 0 | | | | | |
| 24:010: | Operating message 5 | 158 | 2 | | | | | |
| 24:011: | Operating message 6 | 157 | 2 | | | | | |
| 24:012: | Operating message 7 | 0 | 0 | | | | | |
| 24:013: | Operating message 8 | 0 | 0 | | | | | |
| 24:014: | Operating message 9 | 0 | 0 | | | | | |
| 24:015: | Operating message 10 | 0 | 0 | | | | | |
| 24:016: | Operating message 11 | 0 | 0 | | | | | |
| 24:017: | Operating message 12 | 0 | 0 | | | | | |
| 24:018: | Operating message 13 | 0 | 0 | | | | | |
| 24:019: | Operating message 14 | 0 | 0 | | | | | |
| 24:020: | Operating message 15 | 0 | 0 | | | | | |
| 24:021: | Operating message 16 | 0 | 0 | | | | | |

| | | |
|-------|--|------------------|
| : :03 | Selection of output functions acc. to function no. | see Item 4.4 |
| : :04 | Selection of the LED colour and its appearance | see function no. |

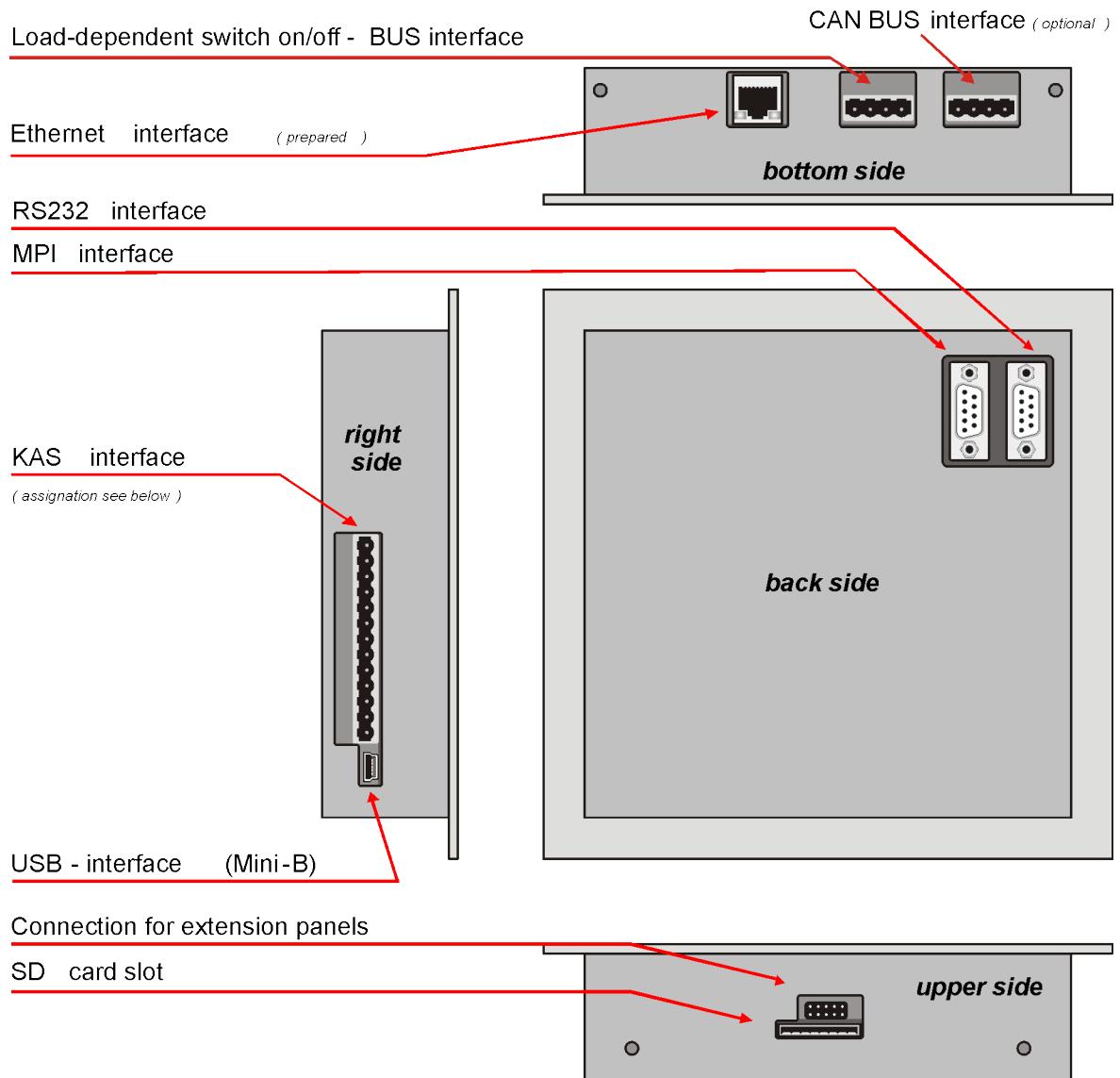
| | | |
|-------|--------------|--|
| to:04 | Function no. | [0] green / event ↑ [1] red / event ↑ [2] yellow / event ↑ [3] blue / event ↑ [4] green / event ↓ [5] red / event ↓ [6] yellow / event ↓ [7] blue / event ↓ |
|-------|--------------|--|

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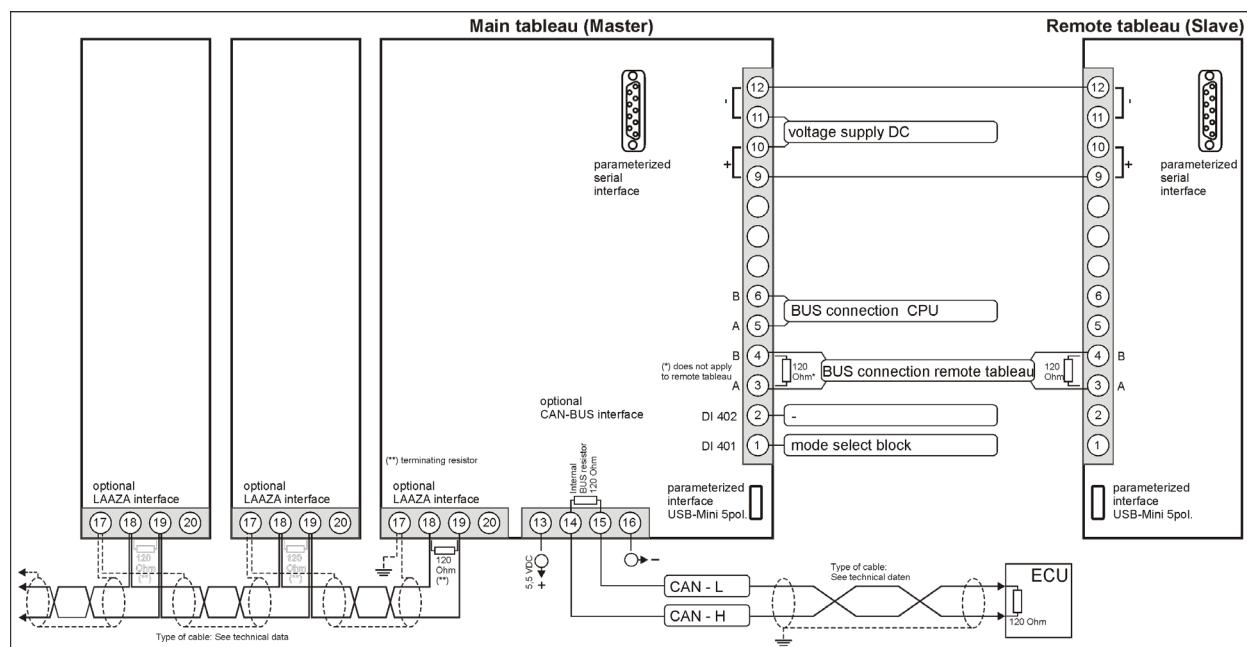
9 Connection diagrams

9.1 Display and operating device KOP 2

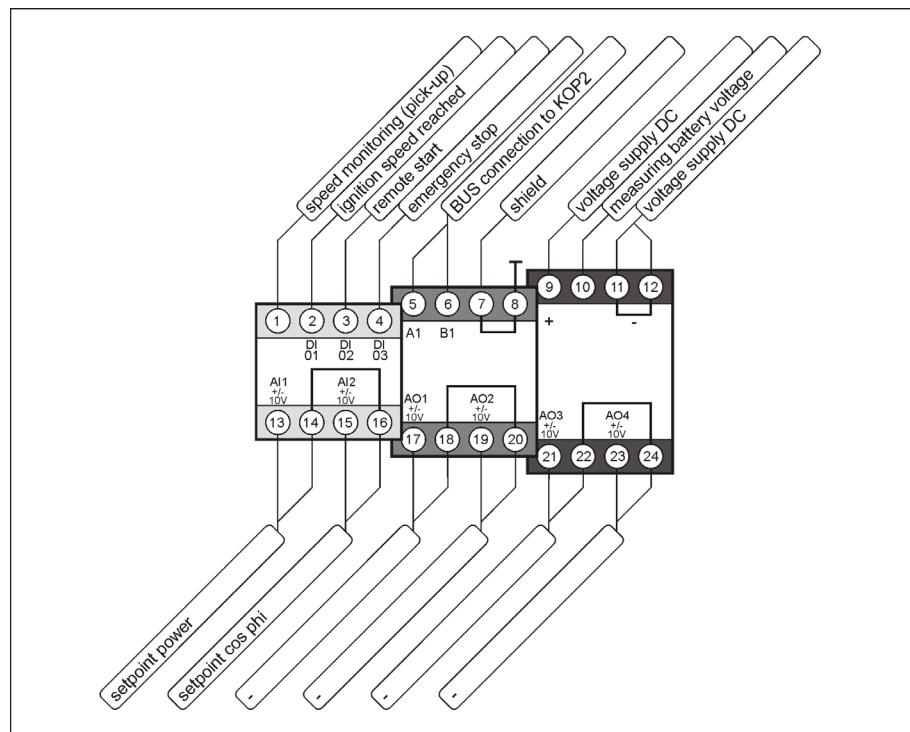


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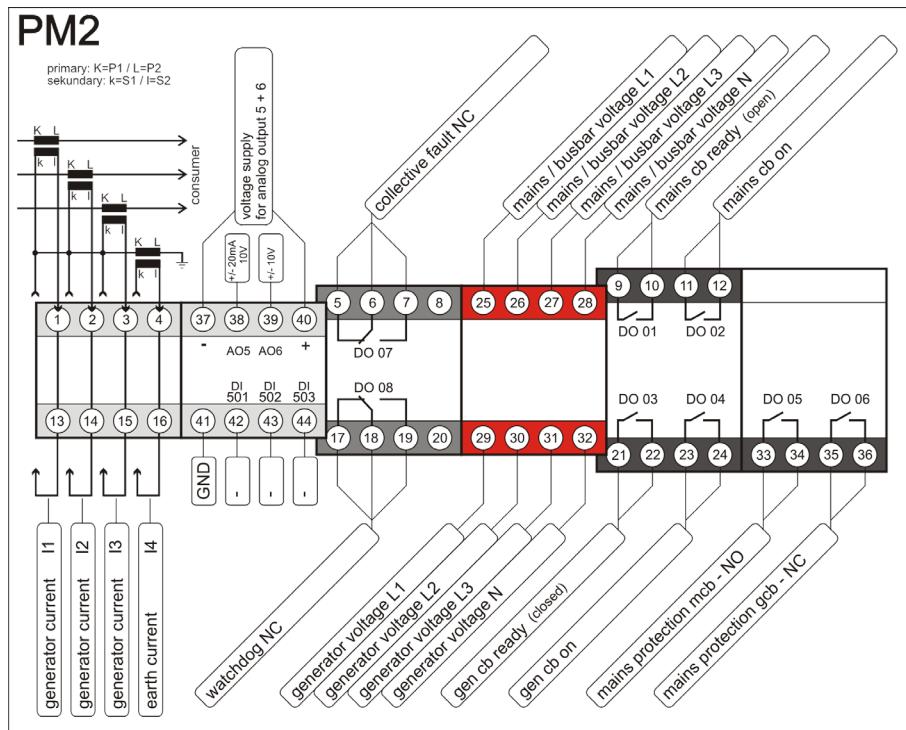
9.2 CPU-Modul



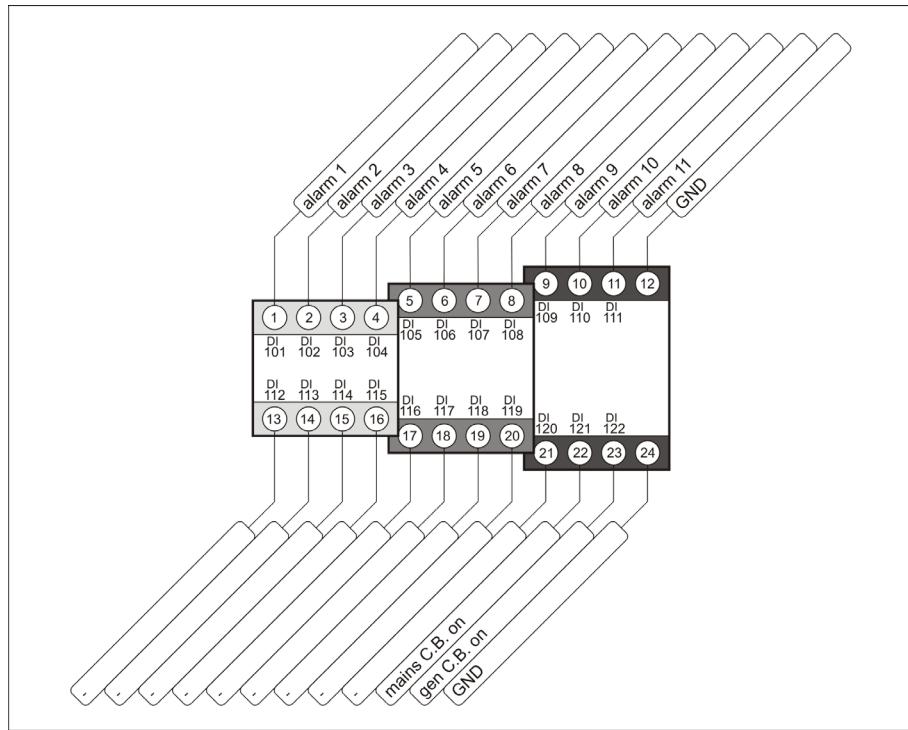
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9.3 Power module PM2



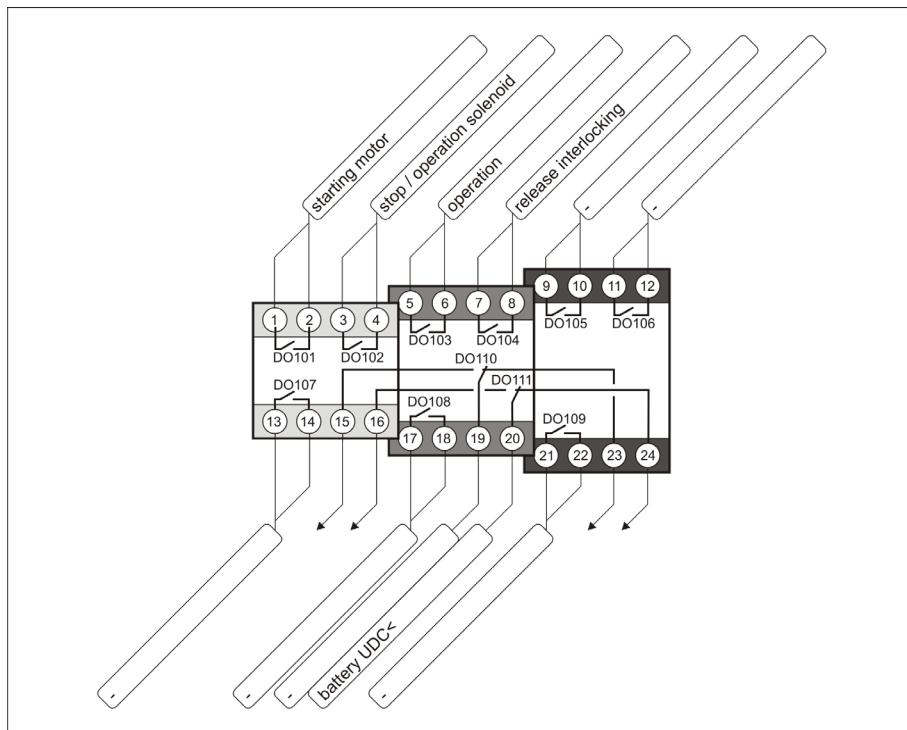
9.4 Input module DI1



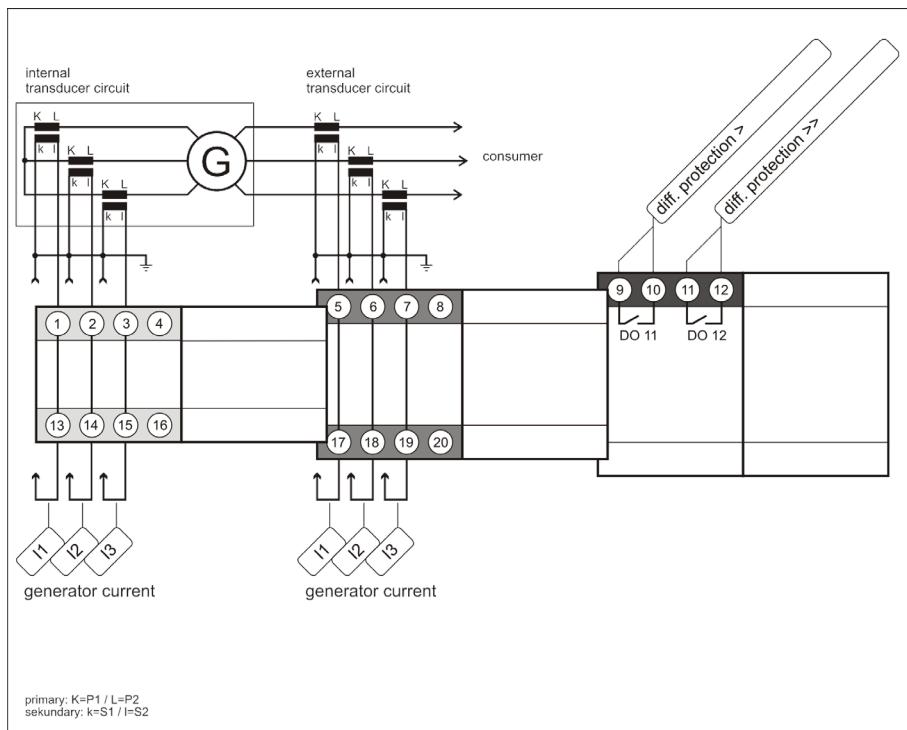
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9.5 Output module DO1



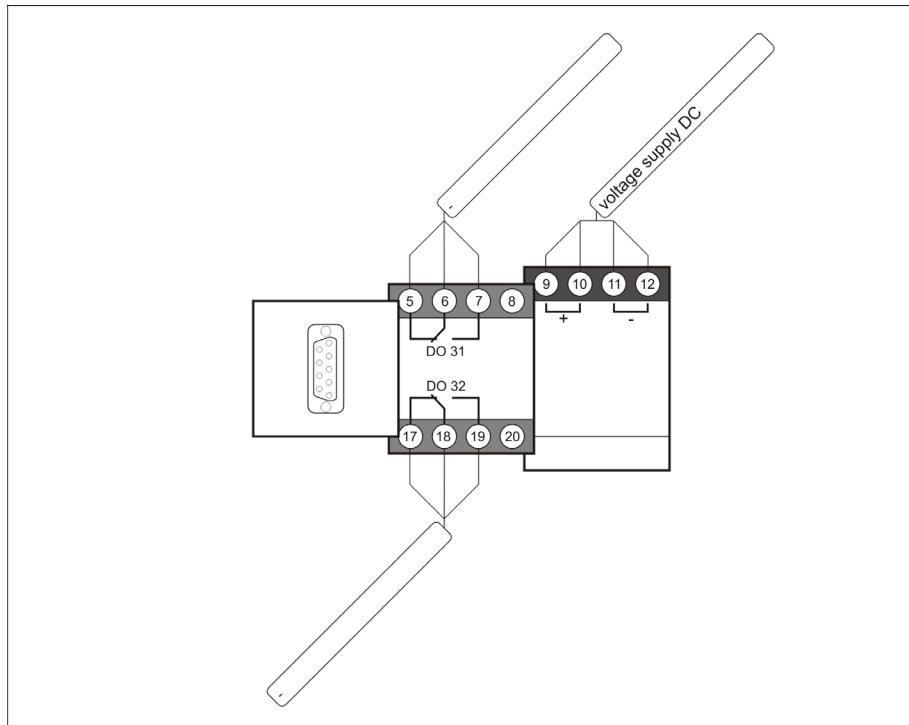
9.6 Diff. Protection module DM1



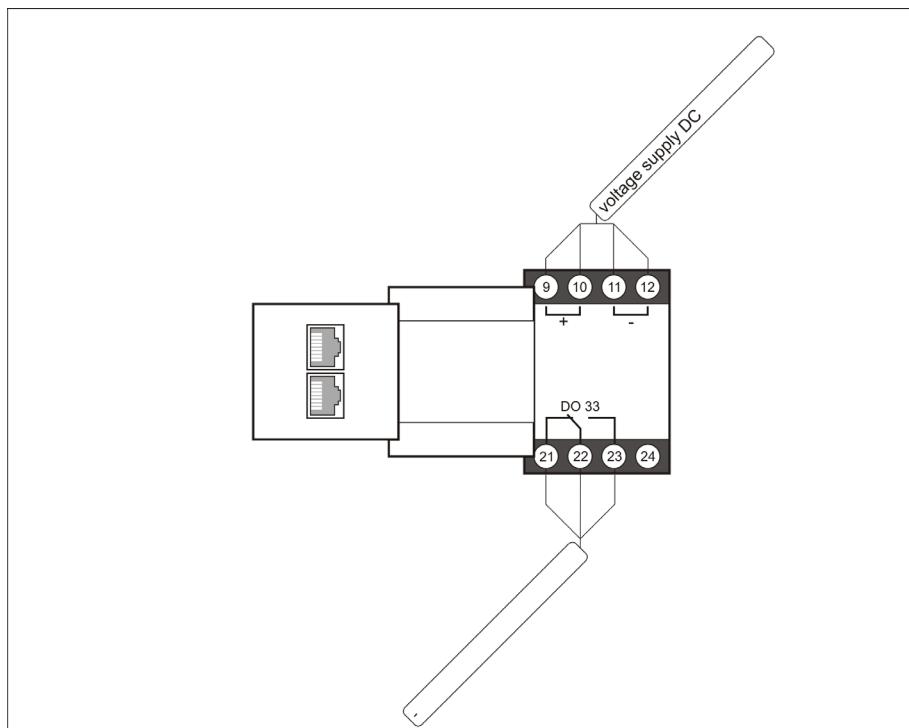
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9.7 Profibus module PB1



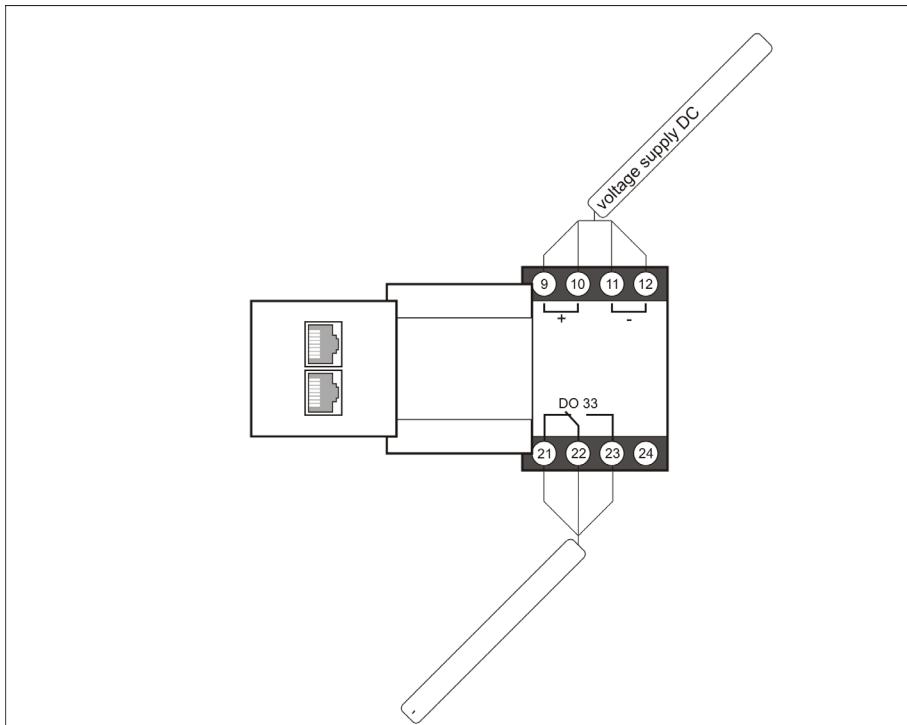
9.8 Profinet module PN1



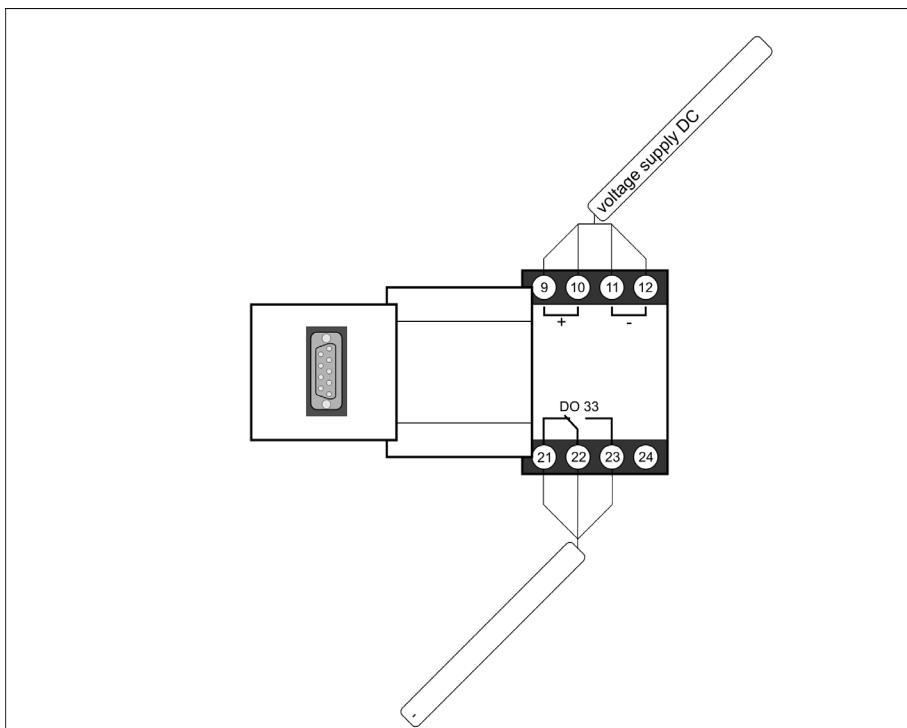
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9.9 Modbus module TCP/IP MB1



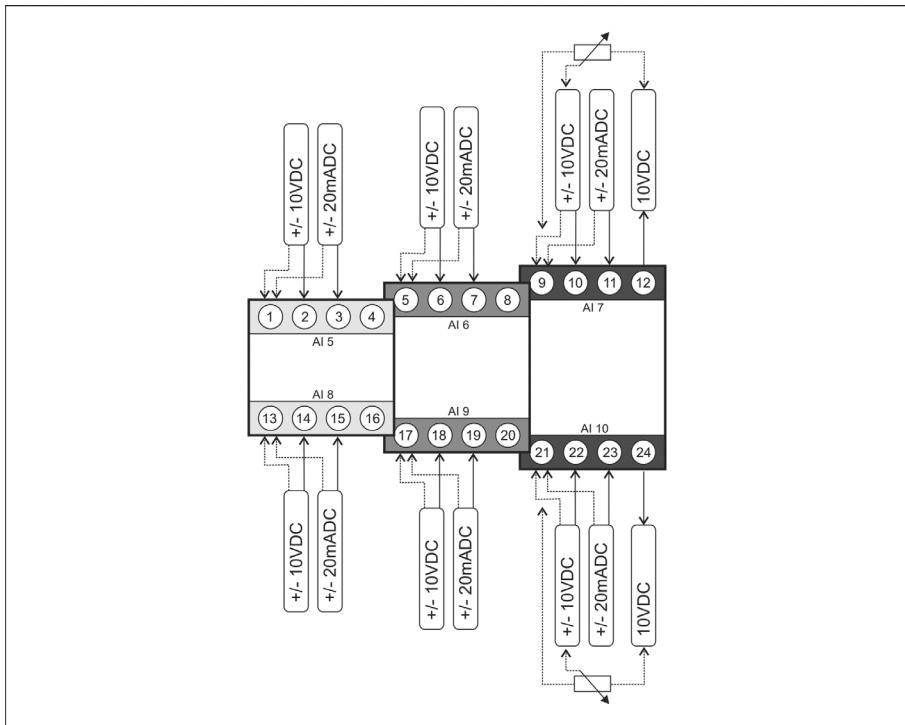
9.10 Modbus module RTU MB2



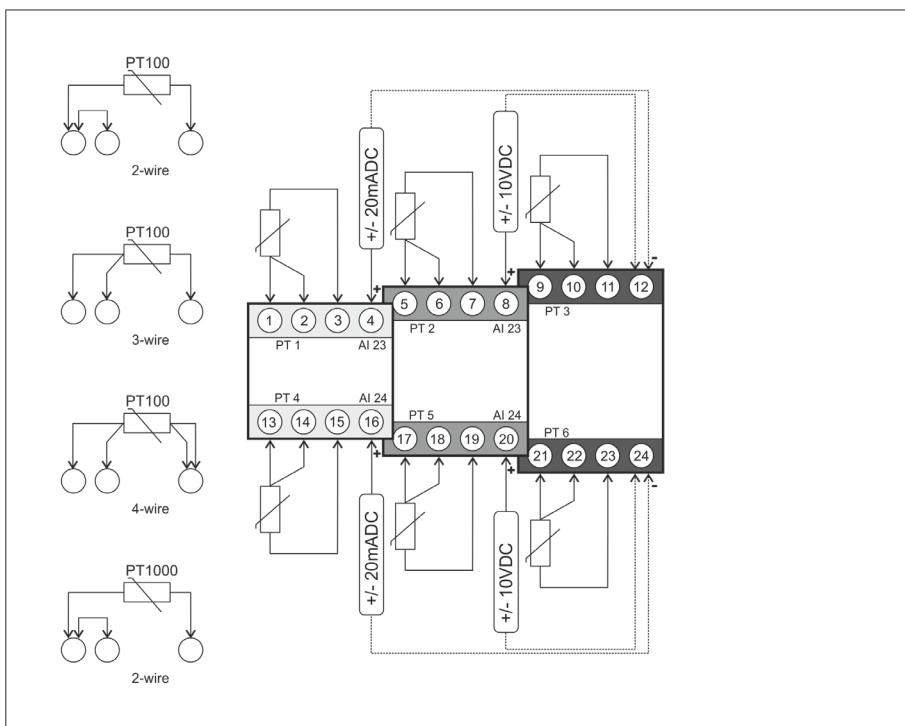
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9.11 Analog input module AI1



9.12 PT100(0) module AT1



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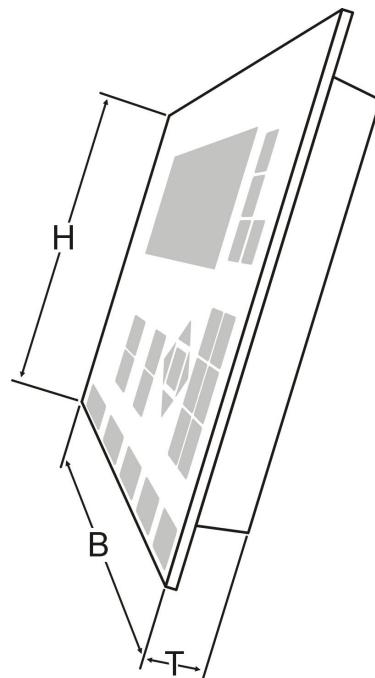
10 Casing variants and dimensions

10.1 KOP 2

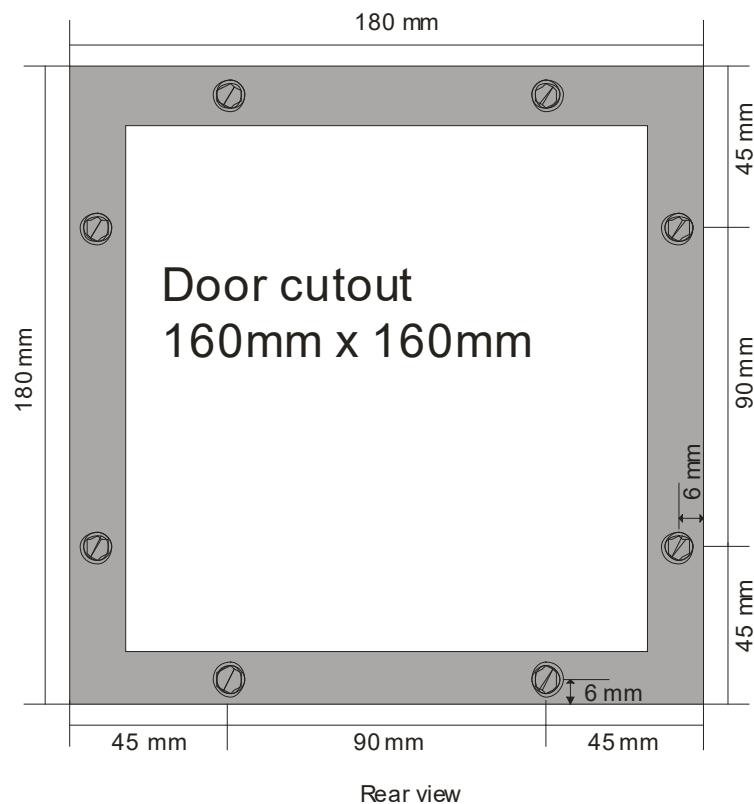
| | |
|----------------------------|---------------------------|
| Variant | Metal casing |
| Weight | 1.800 g |
| Mounting | Stay bolts M4 x 12mm |
| Protection category | IP 42, with sealing IP 64 |

Dimensions

| | |
|-----------------------|-----------------------------------|
| With(B) | 180 mm |
| High (H) | 180 mm |
| Depth (T) | 43 mm |
| Mounting depth | approx. 40 mm (without plug) |



10.1.1 Dimensions for door fitting



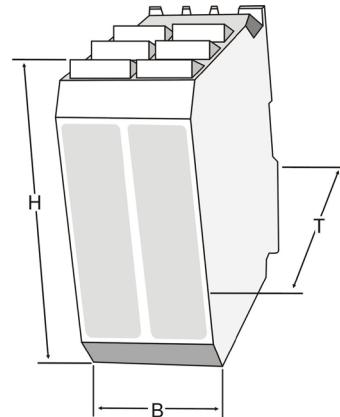
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10.2 Modules

Variant

| | |
|----------------------------|---------------------------------------|
| Variant | DIN – plastic casing (Polyamide) |
| Mounting | On DIN rail |
| Protection category | IP 40, terminal IP 20 |

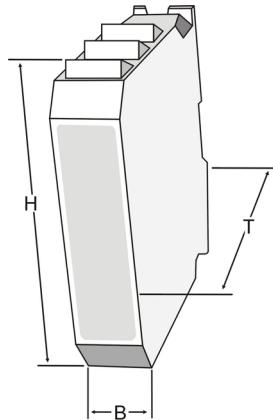


Module dimensions PM2 and DM1

| | |
|---------------------|----------|
| With(B) | 45,0 mm |
| Height (H) | 99,0 mm |
| Depth (T) | 114,5 mm |

Module dimensions CPU, DI1, DO1, PB1, PN1, MB1, MB2, AI1 and AT1

| | |
|---------------------|----------|
| With (B) | 22,5 mm |
| Height (H) | 99,0 mm |
| Depth (T) | 114,5 mm |



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11 Technical data

Installation and commissioning should only be carried out by skilled and trained professionals. Connection acc. to VDE 0160!



| | |
|---|--|
| Auxiliary voltage | 24 V (18 ... 34 V) DC |
| Power consumption | KOP2 max. 3VA ; CPU max. 8VA ; PB1 max. 3VA ; PN1 max. 3VA ; MB1 max. 3VA ; MB2 max. 3VA |
| Digital inputs | 24 V 8 mA (optically decoupled), input resistance > 3 kΩ, cable length should not exceed 2,5 m input OFF < 7V, input ON > 8V |
| Measuring voltage | 40/70 ... 280/484 VAC power consumption: max. 0,35VA/phase impulse-resistant up to 4 kV |
| Measuring current | nominal current: -/5 A (0,15 ... 18 A) AC; -/1 A (0,03 ... 3,5 A)AC power consumption: max. 0,50VA/Phase $4 \times I_{\text{nom.}}$ continuous current $10 \times I_{\text{nom.}}$ 10 sec. $50 \times I_{\text{nom.}}$ 0,001 sec. apparent ohmic resistance <0,01 Ohm |
| Recommended transducer type | max. $4 * I_{\text{Nom}}$ |
| Analogue outputs | +/-10 V (U_{max} approx. 11 V) DC, 12 bit resolution minimum step width 5 mV / digit reproducibility +/- 5 mV, apparent ohmic resistance > 1 kΩ galvanic isolation max. 500V PM2 module (AI5): +/-20mA (I_{max} approx. 21 mA), load < 400Ω |
| Relay outputs | NO/CO 250 VAC, 2 A galvanically isolated |
| Nominal frequency | 50 / 60 Hz (adjustable) |
| Frequency measurement | 30 ... 70 Hz, +/- 0,05 Hz |
| Measurement accuracy (with nominal frequency 100 % sinus) | voltage measurement $\leq 0,5\%$ current measurement $\leq 0,5\%$ power measurement $\leq 1\%$ CosPhi $\leq 1^\circ$ frequency measurement $\leq 0,05\text{ Hz}$ |
| Protection category | casing: IP 40, terminal IP 20 |
| Ambient air temperature | -20 ... +55 °C |
| Height above sea level | max. 1000 m |
| Humidity | max. 90 % without condensation |
| Software | Parameter software device management 2 (GV_2.exe) |
| System requirements | IBM compatible PC, min. 1,2 GHz, 512 MB RAM Operating system MS Windows: XP (SP3), Vista (SP1) or Windows 7 |
| Type of cable for interfaces | CAN-Bus – Lappkabel Deutschland Unitronic Bus CAN FD P 1x2x0,5 mm ² (Best-Nr 2170278) LAAZA – Lappkabel Deutschland Unitronic Li2YCY(TP) 1x2x0,5mm ² (Best-Nr 0031336) |

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11.1 Protection functions with ANSI-Code

| | | |
|----------|--|--|
| ANSI 12 | Overspeed | AL122 Overspeed |
| ANSI 14 | Underspeed | AL121 Underspeed |
| ANSI 27 | Undervoltage protection | AL065 Generator voltage << AL066 Generator voltage < AL082 Mains protection U<< AL083 Mains protection U< |
| ANSI 32 | Active power protection | AL104 Power > AL105 Power >> |
| ANSI 32R | Reverse power protection | AL106 Reverse power > AL107 Reverse power >> |
| ANSI 32Q | Reactive power protection | AL110 Reactive power > AL111 Reactive power >> |
| ANSI 46 | Phase balance current relay | AL112 Unbalanced load |
| ANSI 47 | Phase sequence voltage relay | AL073 Generator rotating field |
| ANSI 48 | Incomplete sequence relay | AL034 Start crank warning AL035 Start crank stop AL036 Start crank sprinkler |
| ANSI 50 | Instantaneous overcurrent relay | AL097 Overcurrent > AL098 Overcurrent >> |
| ANSI 50N | Overcurrent protection (ground) | AL079 Erdstrom > AL080 Erdstrom >> |
| ANSI 51 | AC Time overcurrent relay | AL100 Overcurrent time protection |
| ANSI 52 | AC Circuit breaker | AL042 Gen CB fault |
| ANSI 55 | Power factor relay | AL076 Cos Phi capacitive AL077 Cos Phi inductive |
| ANSI 59 | Overvoltage relay | AL068 Generator voltage > AL069 Generator voltage >> AL084 Mains protection U> AL085 Mains protection U>> |
| ANSI 78 | Phase angel measuring „Out-of-Step“ relay | AL074 Generator angle fault AL090 Mains protection vector > AL091 Mains protection vector >> |
| ANSI 81 | Frequency relay | AL069 Generator frequency << AL070 Generator frequency < AL071 Generator frequency > AL071 Generator frequency >> AL086 Mains protection F<< AL087 Mains protection F< AL088 Mains protection F> AL089 Mains protection F>> |
| ANSI 87 | Differential protective relay | AL113 Diff current > AL114 Diff current >> |

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12 Data transfer

12.1 Profibus / Profinet

It is possible to upgrade the KAS with a Profibus DP Module PB1 or with a Profinet Module PN1 for the connection with a PLC. The corresponding module must be configured via the respective GSD file within a PLC project. A random combination of the values to be transmitted is possible. A maximum of 60 modules out of a selection of 209 modules is available. The maximum data length is 244 bytes. It is only supported the Profibus Master DPV0.

Profibus Master DPV1 is not supported.

The use of the universal module of the GSD file is not supported.



The **participant address** of the Profibus module can be configured. (See Chap. 4.9.2)

12.1.1 Device master file

The name of the device master file for the KAS Profibus connection via the PB1 has the file name: HPS0D97.gsd.

The name of the device master file for the KAS Profinet connection via the PN1 has the file names:

Profinet Standard M30 module: GSDML-V2.2-KORA-PNIO2Prt-20170911.xml

Profinet Redundancy-Master M40 module: GSDML-V2.33-KORA-PNIO2PrtR-20170911.xml

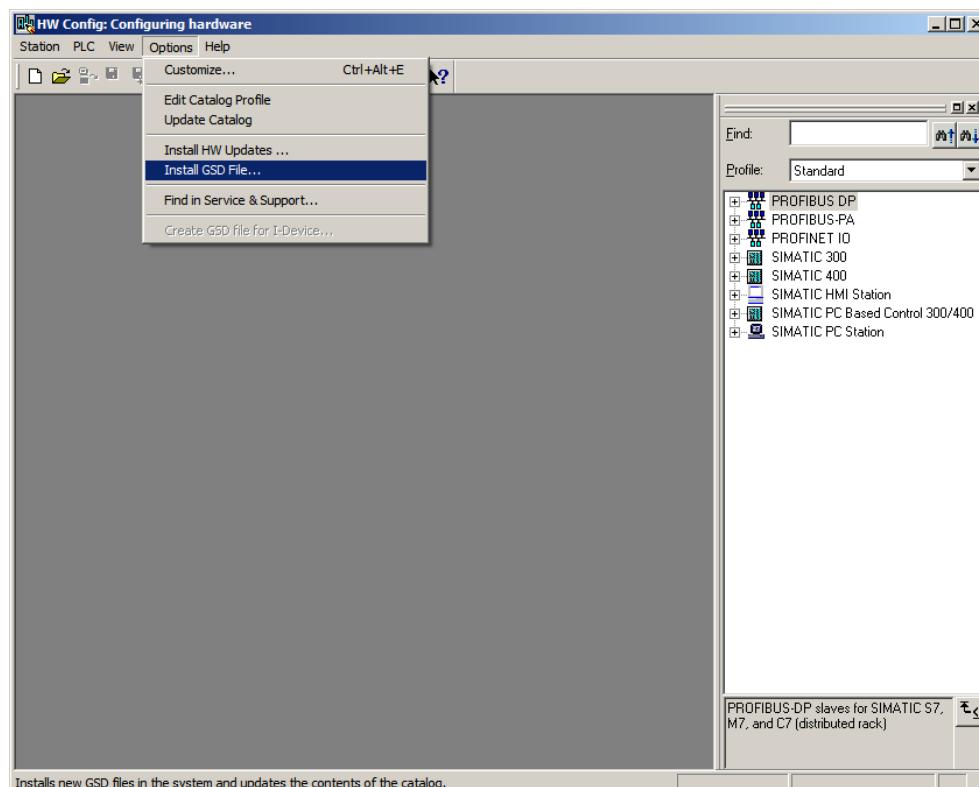
12.1.2 GSD file installation under SIMATIC STEP 7

The installation for Profibus DP is illustrated below as an example.

The hardware configuration of the SIMATIC manager has to be used for the installation of the GSD file under S7.

First open the hardware configuration.

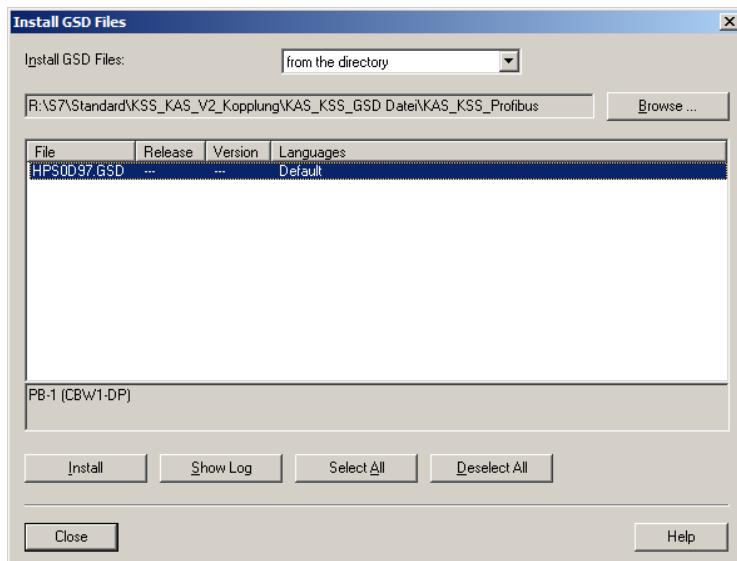
For installation please select Tools – Install GSD files.



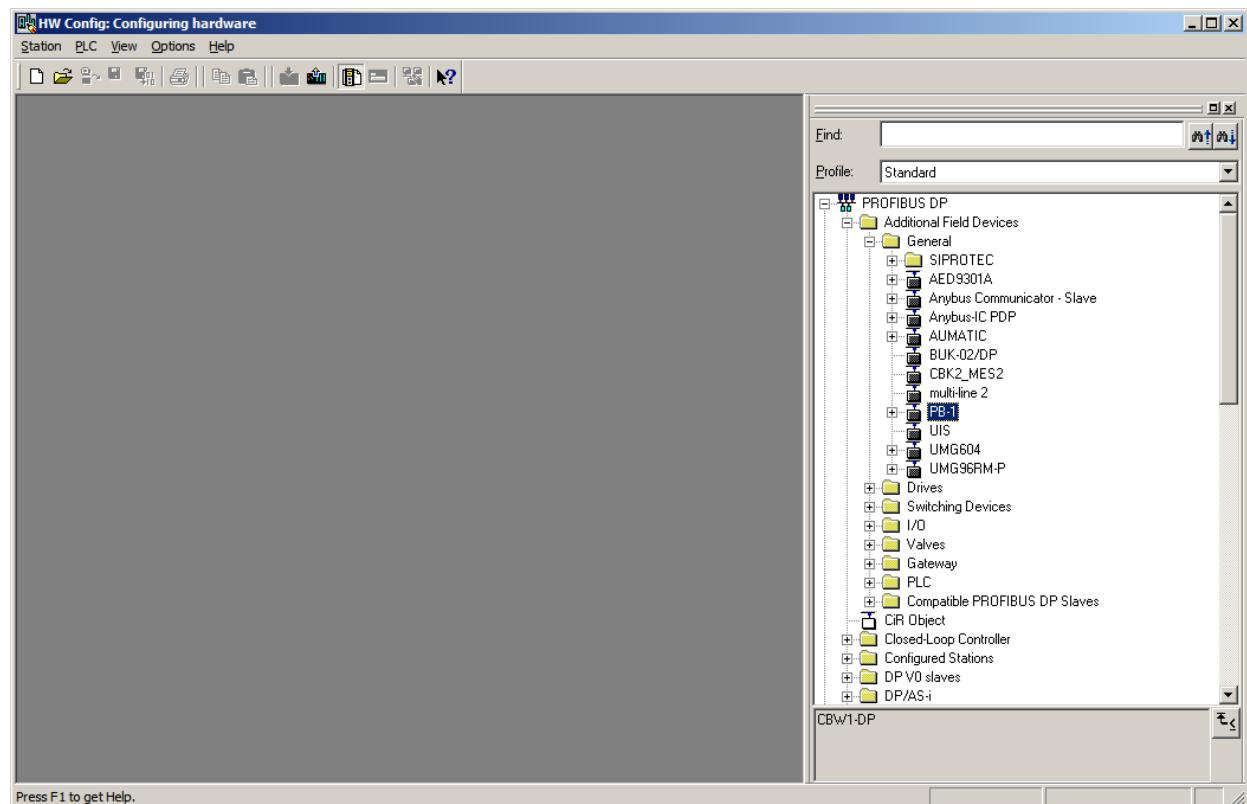
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GSD file selection



After installation the GSD file can be found in the directory ProfibusDP/ Further field devices/ General, and is named PB-1.



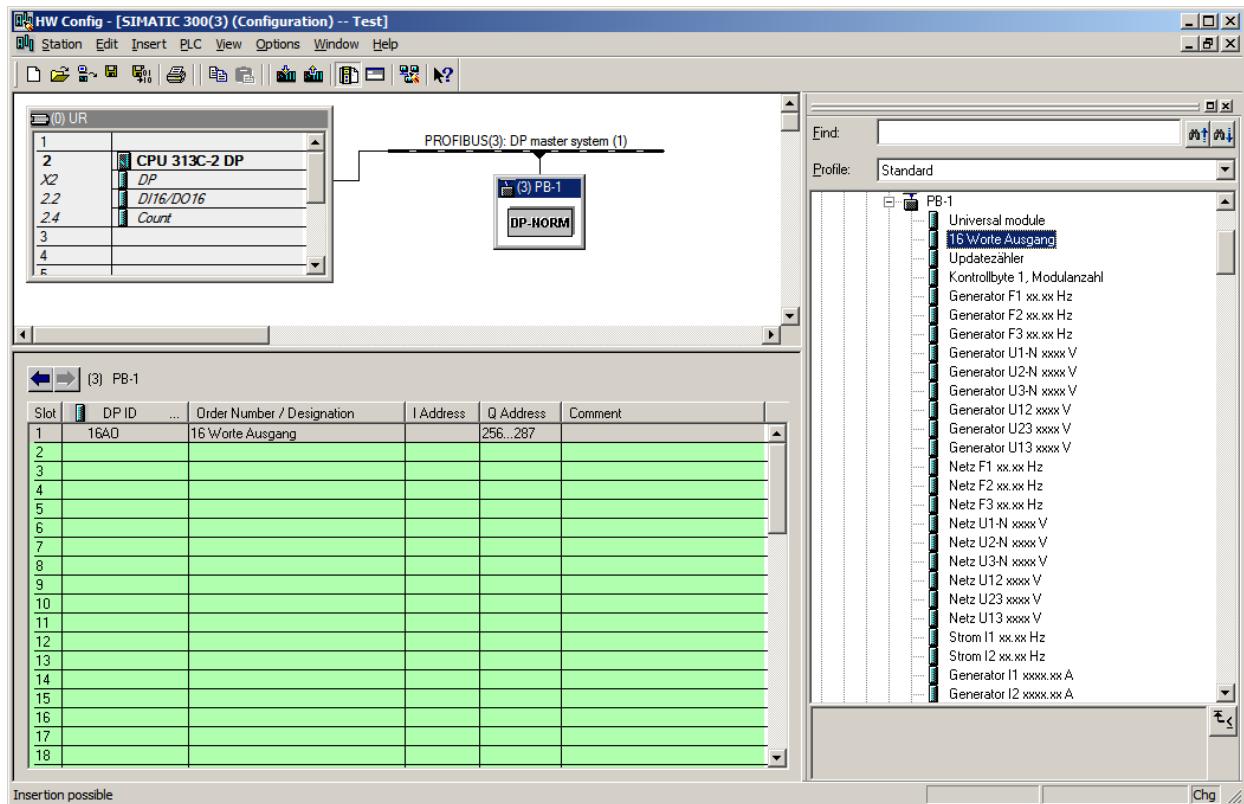
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12.1.3 How to use the GSD file in the S7 project

After installation the Profibus DP participant will be integrated into the project configuration.

It is now possible to select the required data from the respective modules.

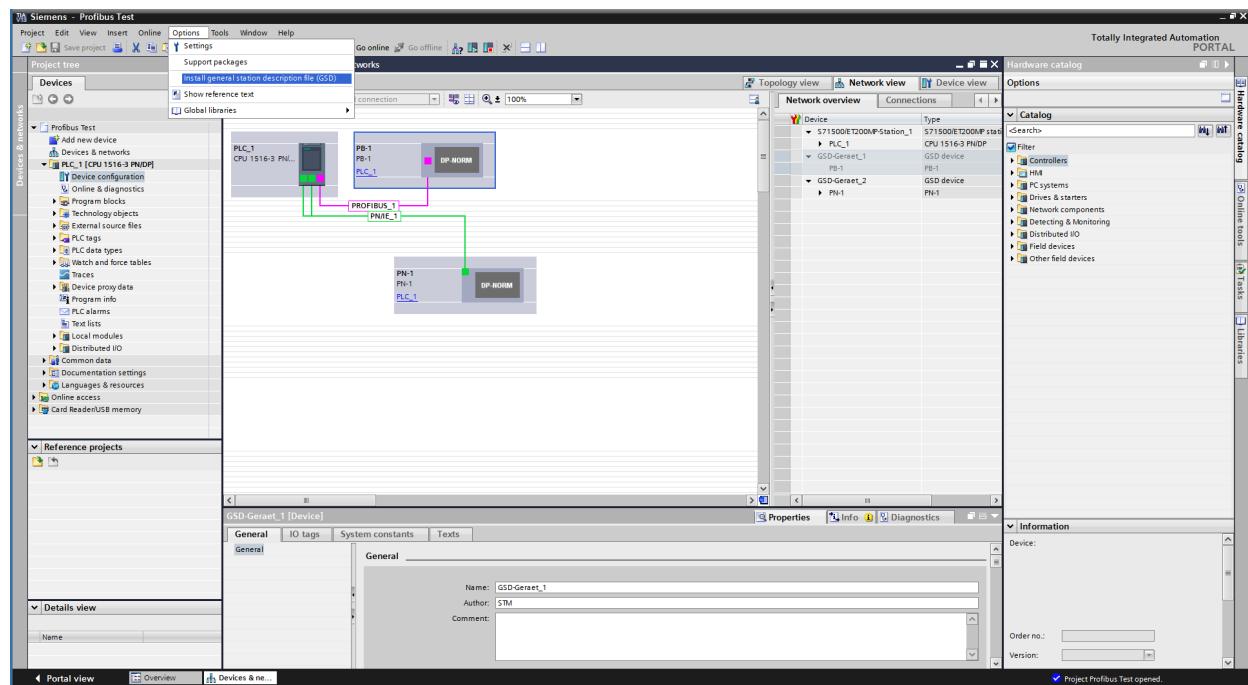


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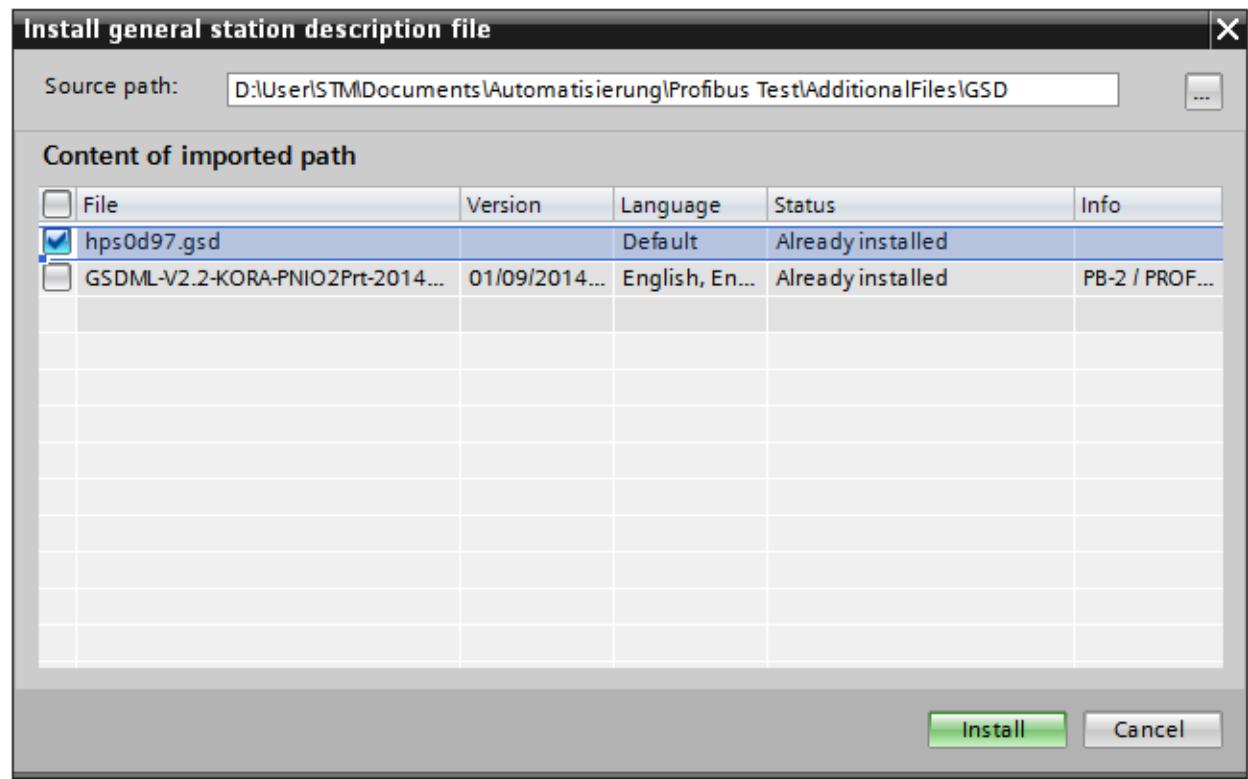
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12.1.4 Installing the GSD file in SIMATIC TIA Portal

The installation of the GSD file under the TIA Portal via -> Install general station description.



Selecting the GSD file and installation



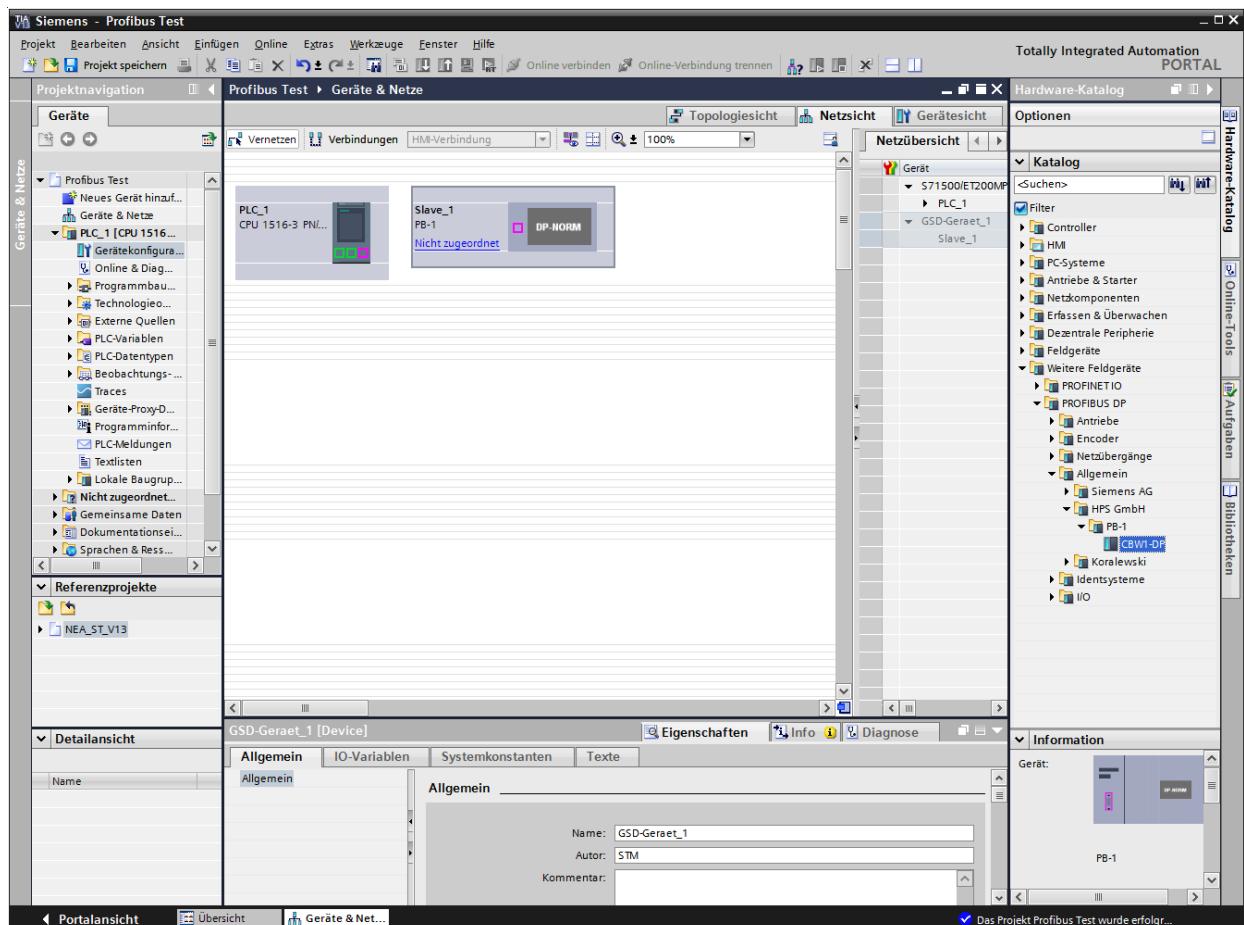
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Application of the GSD file in the TIA Project

After the installation is the GSD file in the hardware catalogue under Other field devices/ Profibus DP/General/HPSGmbH and has the name PB-1.

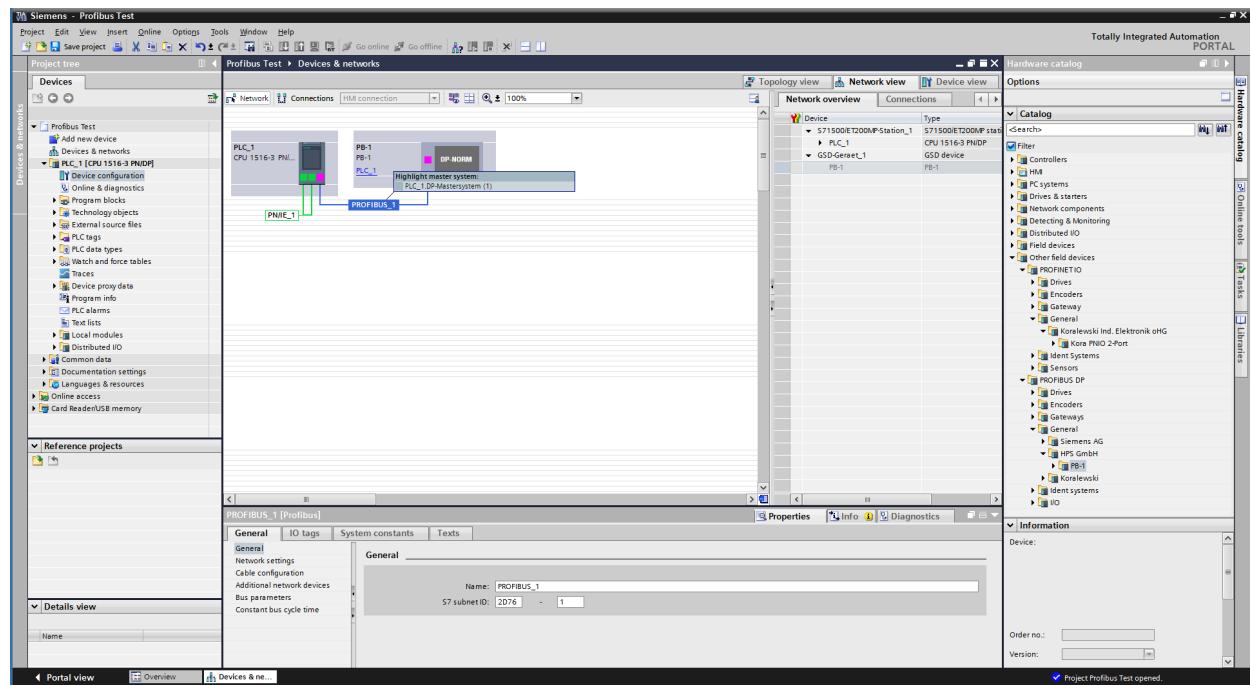
To integrate the Profibus DP node in the configuration of the project, the network view is to choose and select the PB-1 module.



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Now the PB-1 module with the corresponding master CPU must be connected.

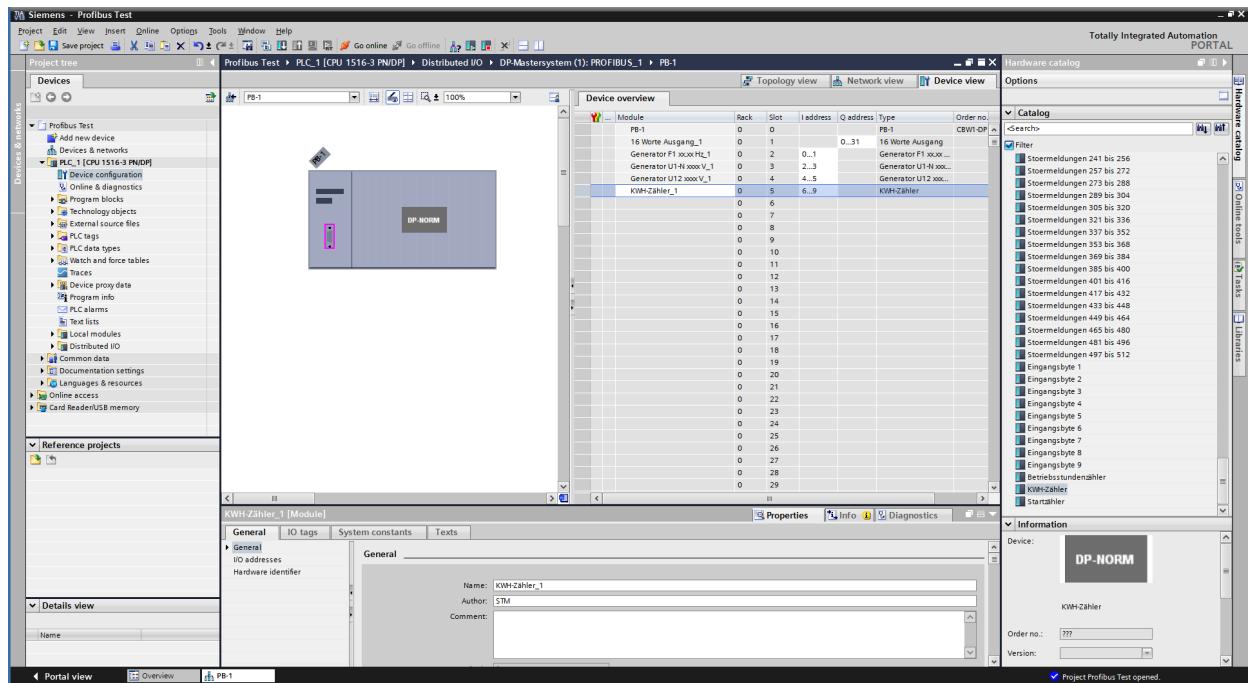


Then a participant address must be set.

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In the device view of the PB-1 module, it is now possible from the corresponding modules select the required data.



Note: The Profinet configuration takes place in a similar way as the Profibus configuration.

12.2 Modbus Server/Slave

If necessary, the KAS can be expanded with a Modbus TCP/IP module (MB1) or a Modbus RTU module (MB2) for connection to a Modbus client/master. For this purpose, 64 registers for reading and four registers for writing can be selected via the parameter software. The selection is made by a combo box for the respective register. The data length for each register is a "word". Some analog values require a double word (D word). If a double word is selected, the next register cannot be used. Double words are indicated by the suffix [DINT]. If binary values are selected, the transmission list shows which bit the messages are on. The addressing of the respective module is set in the parameter software depending on the type of communication (see *Chapter 4.9.3.2* or *Chapter 4.9.3.3*).

Modbus functions

| Modbus address | Modbus - function code | HPS-parameter software | Modbus Port number |
|----------------|-----------------------------|------------------------|--------------------|
| 30001 to 30064 | 04 – Read all registers | register 01-64 read | 502 |
| 40001 to 40008 | 06 – Write to one register | register 01-08 write | 502 |
| 40001 to 40008 | 16 – Write to all registers | register 01-08 write | 502 |

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13 Data transfer modules outputs



The data transfer module outputs may only be present once per device.

If a remote control function is required, the digital input for remote control via PB1, PN1, MB1 or MB2 has to be set.

Please note the basic safety regulations.

If the bit "Power setpoint" is set, then the input via the analog setpoint value is used as the setpoint.

Which bit is set via a pulse or continuous signal is indicated as follows: [IMP] = pulse; [DS] = continuous signal. Note that the pulse remains until the command has been executed.

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1/MB1/2 | Type |
|--------------------------------|---|-------|--------|----------------|-----------|------|
| TASTF01 Control Byte 1 | [IMP] Select operation mode „OFF“ | Bit 0 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [IMP] Select operation mode „MAN“ | Bit 1 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [IMP] Select operation mode „TEST“ | Bit 2 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [IMP] Select operation mode „AUTO“ | Bit 3 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [DS] Motor start in operation mode „MAN“ | Bit 4 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [DS] Power setpoint extern(1) / intern(0) | Bit 5 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [IMP] Switch off the buzzer | Bit 6 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| | [IMP] Reset von Error messages | Bit 7 | Byte | 0x6F Byte0 | 0x00D0 | Bool |
| TASTF02 Control Byte 2 | [IMP] Switching on the GCB in „MAN“ mode | Bit 0 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | [IMP] Switching off the GCB in „MAN“ mode | Bit 1 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | [IMP] Switching on the MCB in „MAN“ mode | Bit 2 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | [IMP] Switching off the MCB in „MAN“ mode | Bit 3 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | [DS] Remote start command in „AUTO“ | Bit 4 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | [DS] Signal test | Bit 5 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | | Bit 6 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| | | Bit 7 | Byte | 0x6F Byte1 | 0x00D1 | Bool |
| TASTF03 Free | | Bit 0 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 1 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 2 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 3 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 4 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 5 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 6 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| | | Bit 7 | Byte | 0x6F Byte2 | 0x00D2 | Bool |
| TASTF04 Control Byte 4 | Control Bit 9 | Bit 0 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 10 | Bit 1 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 11 | Bit 2 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 12 | Bit 3 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 13 | Bit 4 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 14 | Bit 5 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 15 | Bit 6 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| | Control Bit 16 | Bit 7 | Byte | 0x6F Byte3 | 0x00D3 | Bool |
| TASTF05 Control Byte 5 | Control Bit 1 | Bit 0 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 2 | Bit 1 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 3 | Bit 2 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 4 | Bit 3 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 5 | Bit 4 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 6 | Bit 5 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 7 | Bit 6 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| | Control Bit 8 | Bit 7 | Byte | 0x6F Byte4 | 0x00D4 | Bool |
| (only with PB1) Free | | Bit 0 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 1 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 2 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 3 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 4 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 5 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 6 | Byte | 0x6F Byte5 | | Bool |
| | | Bit 7 | Byte | 0x6F Byte5 | | Bool |
| 1 - 16 Worte Ausgang (SOLLF01) | Setpoint power in xxx.x % | | Word | 0x6F Byte6 + 7 | 0x00D5 | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte8 + 9 | 0x00D6 | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte10+11 | 0x00D7 | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte12+13 | 0x00D8 | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte14+15 | | INT |

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| | | | | | | |
|----------------------|------|--|------|----------------|--|-----|
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte16+17 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte18+19 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte20+21 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte22+23 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte24+25 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte26+27 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte28+29 | | INT |
| 1 - 16 Worte Ausgang | Free | | Word | 0x6F Byte30+31 | | INT |

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14 Data transfer input modules

14.1 ProfibusDP (L2-Bus)

| Modul - GSD-File | Description | | Length | PB1 | | |
|--|--|--|--------|--------|--|--|
| 2 - Updatezähler Update counter | xxxx xxxx xxxx 1111 -> Flow counter 1 to 15 1xxx xxxx -> Internal Bus OK(0 at fault) | | Byte | 0x0097 | | |
| 3 - Kontrollbyte 1 Supervision byte 1 | Number of parameterized modules | | Byte | 0x0098 | | |

14.2 CPU Module

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|--|--|--------|--|--|--|
| 114 - Drehzahl xxxx U/min | Speed | | Word | 0x006E | 0x0008 | INT |
| 115 - Versorgungsspg. xx.x V | Supply voltage | | Word | 0x006F | 0x0009 | INT |
| 116 - Stoermeldungen 1 bis 16 Error message 001 to 016 | Error messages 001 (Free input*) Error messages 002 (Free input*) Error messages 003 (Free input*) Error messages 004 (Free input*) Error messages 005 (Free input*) Error messages 006 (Free input*) Error messages 007 (Free input*) Error messages 008 (Free input*) Error messages 009 (Free input*) Error messages 010 (Free input*) Error messages 011 (Free input*) Error messages 012 (Free input*) Error messages 013 (Free input*) Error messages 014 (Free input*) Error messages 015 (Free input*) Error messages 016 (Free input*) | Bit 0 Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 Bit 8 Bit 9 Bit 10 Bit 11 Bit 12 Bit 13 Bit 14 Bit 15 | Word | 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 0x0070 | 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A 0x000A | Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool |
| 117 - Stoermeldungen 17 bis 32 Error message 017 to 032 | Error messages 017 (Free input*) Error messages 018 (Free input*) Error messages 019 (Free input*) Error messages 020 (Free input*) Error messages 021 (Free input*) Error messages 022 (Free input*) Error messages 023 (Free input*) Error messages 024 (Free input*) Error messages 025 (Free input*) Error messages 026 (Free input*) Error messages 027 (Free input*) Error messages 028 (Free input*) Error messages 029 (Free input*) Error messages 030 (Free input*) Error messages 031 (Free input*) Error messages 032 (Free input*) | Bit 0 Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 Bit 8 Bit 9 Bit 10 Bit 11 Bit 12 Bit 13 Bit 14 Bit 15 | Word | 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 0x0071 | 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B 0x000B | Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool |
| 118 - Stoermeldungen 33 bis 48 Error message 033 to 048 | AL033 Emergency stop AL034 Start crank warning AL035 Start crank stop AL036 Start crank sprinkler AL037 Pick up fault AL038 Stop fault AL039 Supply UDC< AL040 Battery 1< AL041 Battery 2 < AL042 Gen CB fault AL043 Mains CB fault A044 Syn time too long AL045 Watchdog AL046 Supply UDC> AL047 Maintenance counter AL048 Fault remote tableau | Bit 0 Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 Bit 8 Bit 9 Bit 10 Bit 11 Bit 12 Bit 13 Bit 14 Bit 15 | Word | 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 0x0072 | 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C 0x000C | Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool Bool |

* See parameterization KAS

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|---|---|--------|--------|--------|--------|------|
| 119 - Stoermeldungen 49 bis 64 Error message 049 to 064 | AL049 Mains voltage << | Bit 0 | Word | 0x0073 | 0x000D | Bool |
| | AL050 Mains voltage < | Bit 1 | Word | 0x0073 | 0x000D | Bool |
| | AL051 Mains voltage > | Bit 2 | Word | 0x0073 | 0x000D | Bool |
| | AL052 Mains voltage >> | Bit 3 | Word | 0x0073 | 0x000D | Bool |
| | AL053 Mains frequency << | Bit 4 | Word | 0x0073 | 0x000D | Bool |
| | AL054 Mains frequency < | Bit 5 | Word | 0x0073 | 0x000D | Bool |
| | AL055 Mains frequency > | Bit 6 | Word | 0x0073 | 0x000D | Bool |
| | AL056 Mains frequency >> | Bit 7 | Word | 0x0073 | 0x000D | Bool |
| | AL057 Mains rotating field | Bit 8 | Word | 0x0073 | 0x000D | Bool |
| | AL058 Mains angle fault | Bit 9 | Word | 0x0073 | 0x000D | Bool |
| | AL059 Mains voltage asymmetry | Bit 10 | Word | 0x0073 | 0x000D | Bool |
| | Free | Bit 11 | Word | 0x0073 | 0x000D | Bool |
| | AL061 BDEW –U(t) Time is running | Bit 12 | Word | 0x0073 | 0x000D | Bool |
| | AL062 BDEW –U(t) Fault | Bit 13 | Word | 0x0073 | 0x000D | Bool |
| | Free | Bit 14 | Word | 0x0073 | 0x000D | Bool |
| | Free | Bit 15 | Word | 0x0073 | 0x000D | Bool |
| 120 - Stoermeldungen 65 bis 80 Error message 065 to 080 | AL065 Generator voltage << | Bit 0 | Word | 0x0074 | 0x000E | Bool |
| | AL066 Generator voltage < | Bit 1 | Word | 0x0074 | 0x000E | Bool |
| | AL067 Generator voltage > | Bit 2 | Word | 0x0074 | 0x000E | Bool |
| | AL068 Generator voltage >> | Bit 3 | Word | 0x0074 | 0x000E | Bool |
| | AL069 Generator frequency << | Bit 4 | Word | 0x0074 | 0x000E | Bool |
| | AL070 Generator frequency < | Bit 5 | Word | 0x0074 | 0x000E | Bool |
| | AL071 Generator frequency > | Bit 6 | Word | 0x0074 | 0x000E | Bool |
| | AL072 Generator frequency >> | Bit 7 | Word | 0x0074 | 0x000E | Bool |
| | AL073 Generator rotating field | Bit 8 | Word | 0x0074 | 0x000E | Bool |
| | AL074 Generator angle fault | Bit 9 | Word | 0x0074 | 0x000E | Bool |
| | AL075 Generator voltage asymmetry | Bit 10 | Word | 0x0074 | 0x000E | Bool |
| | AL076 Cos Phi capacitive | Bit 11 | Word | 0x0074 | 0x000E | Bool |
| | AL077 Cos Phi inductive | Bit 12 | Word | 0x0074 | 0x000E | Bool |
| | Free | Bit 13 | Word | 0x0074 | 0x000E | Bool |
| | Free | Bit 14 | Word | 0x0074 | 0x000E | Bool |
| | Free | Bit 15 | Word | 0x0074 | 0x000E | Bool |
| 121 - Stoermeldungen 81 bis 96 Error message 081 to 096 | AL081 Mains protection collective fault | Bit 0 | Word | 0x0075 | 0x000F | Bool |
| | AL082 Mains protection U<< | Bit 1 | Word | 0x0075 | 0x000F | Bool |
| | AL083 Mains protection U< | Bit 2 | Word | 0x0075 | 0x000F | Bool |
| | AL084 Mains protection U> | Bit 3 | Word | 0x0075 | 0x000F | Bool |
| | AL085 Mains protection U>> | Bit 4 | Word | 0x0075 | 0x000F | Bool |
| | AL086 Mains protection F<< | Bit 5 | Word | 0x0075 | 0x000F | Bool |
| | AL087 Mains protection F< | Bit 6 | Word | 0x0075 | 0x000F | Bool |
| | AL088 Mains protection F> | Bit 7 | Word | 0x0075 | 0x000F | Bool |
| | AL089 Mains protection F>> | Bit 8 | Word | 0x0075 | 0x000F | Bool |
| | AL090 Mains protection vector > | Bit 9 | Word | 0x0075 | 0x000F | Bool |
| | AL091 Mains protection vector >> | Bit 10 | Word | 0x0075 | 0x000F | Bool |
| | AL092 Dif vector surge > | Bit 11 | Word | 0x0075 | 0x000F | Bool |
| | AL093 Dif vector surge >> | Bit 12 | Word | 0x0075 | 0x000F | Bool |
| | AL094 Q-U protection < | Bit 13 | Word | 0x0075 | 0x000F | Bool |
| | AL095 Q-U protection << | Bit 14 | Word | 0x0075 | 0x000F | Bool |
| | Free | Bit 15 | Word | 0x0075 | 0x000F | Bool |
| 122 - Stoermeldungen 97 bis 112 Error message 097 to 112 | AL097 Overcurrent I> | Bit 0 | Word | 0x0076 | 0x0010 | Bool |
| | AL098 Overcurrent I>> | Bit 1 | Word | 0x0076 | 0x0010 | Bool |
| | AL099 Overcurrent VDE0100-718 | Bit 2 | Word | 0x0076 | 0x0010 | Bool |
| | AL100 Overcurrent time protection | Bit 3 | Word | 0x0076 | 0x0010 | Bool |
| | Free | Bit 4 | Word | 0x0076 | 0x0010 | Bool |
| | Free | Bit 5 | Word | 0x0076 | 0x0010 | Bool |
| | AL103 Power reduction fault | Bit 6 | Word | 0x0076 | 0x0010 | Bool |
| | AL104 Power >> | Bit 7 | Word | 0x0076 | 0x0010 | Bool |
| | AL105 Power > | Bit 8 | Word | 0x0076 | 0x0010 | Bool |
| | AL106 Reverse power > | Bit 9 | Word | 0x0076 | 0x0010 | Bool |
| | AL107 Reverse power >> | Bit 10 | Word | 0x0076 | 0x0010 | Bool |
| | AL108 Apparent power > | Bit 11 | Word | 0x0076 | 0x0010 | Bool |
| | AL109 Apparent power >> | Bit 12 | Word | 0x0076 | 0x0010 | Bool |
| | AL110 Reactive power > | Bit 13 | Word | 0x0076 | 0x0010 | Bool |
| | AL111 Reactive power >> | Bit 14 | Word | 0x0076 | 0x0010 | Bool |
| | AL112 Unbalanced load | Bit 15 | Word | 0x0076 | 0x0010 | Bool |

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|---------------------------------|--------|--------|--------|---------|------|
| 123 - Stoermeldungen 113 bis 128 Error message 113 to 128 | AL113 Diff current > | Bit 0 | Word | 0x0077 | 0x0012 | Bool |
| | AL114 Diff current >> | Bit 1 | Word | 0x0077 | 0x0012 | Bool |
| | AL115 VDE4105 Collective fault | Bit 2 | Word | 0x0077 | 0x0012 | Bool |
| | AL116 VDE4105 U < (80%) | Bit 3 | Word | 0x0077 | 0x0012 | Bool |
| | AL117 VDE4105 U > (115%) | Bit 4 | Word | 0x0077 | 0x0012 | Bool |
| | AL118 VDE4105 F < (47,5Hz) | Bit 5 | Word | 0x0077 | 0x0012 | Bool |
| | AL119 VDE4105 F > (51,5Hz) | Bit 6 | Word | 0x0077 | 0x0012 | Bool |
| | AL120 VDE4105 U > (Quality) | Bit 7 | Word | 0x0077 | 0x0012 | Bool |
| | AL121 Underspeed | Bit 8 | Word | 0x0077 | 0x0012 | Bool |
| | AL122 Overspeed | Bit 9 | Word | 0x0077 | 0x0012 | Bool |
| | AL123 AI1 Module 1 – AI05 | Bit 10 | Word | 0x0077 | 0x0012 | Bool |
| | AL124 AI1 Module 1 – AI06 | Bit 11 | Word | 0x0077 | 0x0012 | Bool |
| | AL125 AI1 Module 1 – AI07 | Bit 12 | Word | 0x0077 | 0x0012 | Bool |
| | AL126 AI1 Module 1 – AI08 | Bit 13 | Word | 0x0077 | 0x0012 | Bool |
| | AL127 AI1 Module 1 – AI09 | Bit 14 | Word | 0x0077 | 0x0012 | Bool |
| | AL128 AI1 Module 1 – AI10 | Bit 15 | Word | 0x0077 | 0x0012 | Bool |
| 124 - Analogeingang 1 (Analog input 1) xxx.x % | Power setpoint value | | Word | 0x0078 | 0x002B | INT |
| 125 - Analogeingang 2 (Analog input 2) x.xxx cos | Cos Phi setpoint value | | Word | 0x0079 | 0x002C | INT |
| 126 - Analogausgang 1 (Analog output 1) xx.xx V | See project planning | | Word | 0x007A | 0x002D | INT |
| 127 - Analogausgang 2 (Analog output 2) xx.xx V | See project planning | | Word | 0x007B | 0x0002E | INT |
| 128 - Analogausgang 3 (Analog output 3) xx.xx V | See project planning | | Word | 0x007C | 0x002F | INT |
| 129 - Analogausgang 4 (Analog output 4) xx.xx V | See project planning | | Word | 0x007D | 0x0030 | INT |
| 130 - Sollwert 1 (Setpoint value 1) xxx.x % | Power setpoint value | | Word | 0x007E | 0x003E | INT |
| 131 - Sollwert 2 (Setpoint value 2) x.xxx cos | Cos Phi setpoint value | | Word | 0x007F | 0x003F | INT |
| 132 - Sollwert 3 (Setpoint value 3) xxx.x % | Speed setpoint CAN | | Word | 0x0080 | 0x0040 | INT |
| 133 - Sollwert 4 (Setpoint value 4) xxx.x | Free | | Word | 0x0081 | 0x0041 | INT |
| 134 - Info/Funktionswort (Info word) CPU | Depending on STEUBYTEA01 | | Word | 0x0082 | 0x0043 | INT |
| 135 - Betriebsbyte 1 Operation byte 1 | OFF | Bit 0 | Byte | 0x0083 | 0x0001 | Bool |
| | Manual | Bit 1 | Byte | 0x0083 | 0x0001 | Bool |
| | Test | Bit 2 | Byte | 0x0083 | 0x0001 | Bool |
| | Auto | Bit 3 | Byte | 0x0083 | 0x0001 | Bool |
| | Start | Bit 4 | Byte | 0x0083 | 0x0001 | Bool |
| | Internal setpoint value ON | Bit 5 | Byte | 0x0083 | 0x0001 | Bool |
| | Operation | Bit 6 | Byte | 0x0083 | 0x0001 | Bool |
| | Signal test | Bit 7 | Byte | 0x0083 | 0x0001 | Bool |
| 136 - Betriebsbyte 2 Operation byte 2 | Gen CB ON | Bit 0 | Byte | 0x0084 | 0x0002 | Bool |
| | Mains CB ON | Bit 1 | Byte | 0x0084 | 0x0002 | Bool |
| | Impurity release dir.1 | Bit 2 | Byte | 0x0084 | 0x0002 | Bool |
| | Mains parallel operation | Bit 3 | Byte | 0x0084 | 0x0002 | Bool |
| | 50Hz regulation | Bit 4 | Byte | 0x0084 | 0x0002 | Bool |
| | DeltaF_release | Bit 5 | Byte | 0x0084 | 0x0002 | Bool |
| | Syn release | Bit 6 | Byte | 0x0084 | 0x0002 | Bool |
| | Load control ON | Bit 7 | Byte | 0x0084 | 0x0002 | Bool |
| 137 - Betriebsbyte 3 Operation byte 3 | Stopping | Bit 0 | Byte | 0x0085 | 0x0003 | Bool |
| | Warning | Bit 1 | Byte | 0x0085 | 0x0003 | Bool |
| | Operating modes selection block | Bit 2 | Byte | 0x0085 | 0x0003 | Bool |
| | Sprinkler operation | Bit 3 | Byte | 0x0085 | 0x0003 | Bool |
| | Speed down | Bit 4 | Byte | 0x0085 | 0x0003 | Bool |
| | Speed up | Bit 5 | Byte | 0x0085 | 0x0003 | Bool |
| | Speed governor reset | Bit 6 | Byte | 0x0085 | 0x0003 | Bool |
| | Remote start | Bit 7 | Byte | 0x0085 | 0x0003 | Bool |
| 138 - Betriebsbyte 4 Operation byte 4 | Generator voltage | Bit 0 | Byte | 0x0086 | 0x0004 | Bool |
| | Mains voltage | Bit 1 | Byte | 0x0086 | 0x0004 | Bool |
| | Spare input Fct 1 | Bit 2 | Byte | 0x0086 | 0x0004 | Bool |
| | Spare input Fct 2 | Bit 3 | Byte | 0x0086 | 0x0004 | Bool |
| | Spare input Fct 3 | Bit 4 | Byte | 0x0086 | 0x0004 | Bool |
| | Mains protection U | Bit 5 | Byte | 0x0086 | 0x0004 | Bool |
| | Mains protection F | Bit 6 | Byte | 0x0086 | 0x0004 | Bool |
| | Sprinkler demand | Bit 7 | Byte | 0x0086 | 0x0004 | Bool |

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|--------------------------------------|-------|--------|--------|--------|------|
| 139 - Betriebsbyte 5 Operation byte 5 | Horn (new error message) | Bit 0 | Byte | 0x0087 | 0x0005 | Bool |
| | Collective fault | Bit 1 | Byte | 0x0087 | 0x0005 | Bool |
| | Mains protection release | Bit 2 | Byte | 0x0087 | 0x0005 | Bool |
| | CosPhi control ON | Bit 3 | Byte | 0x0087 | 0x0005 | Bool |
| | Voltage down | Bit 4 | Byte | 0x0087 | 0x0005 | Bool |
| | Voltage up | Bit 5 | Byte | 0x0087 | 0x0005 | Bool |
| | Voltage control reset | Bit 6 | Byte | 0x0087 | 0x0005 | Bool |
| | Diff protection blocking edge contr. | Bit 7 | Byte | 0x0087 | 0x0005 | Bool |
| 140 - Betriebsbyte 6 Operation byte 6 | Override interlocking | Bit 0 | Byte | 0x0088 | 0x0006 | Bool |
| | Ready for operation | Bit 1 | Byte | 0x0088 | 0x0006 | Bool |
| | Stop valve ON | Bit 2 | Byte | 0x0088 | 0x0006 | Bool |
| | Speed reduction delay running | Bit 3 | Byte | 0x0088 | 0x0006 | Bool |
| | Initial connection release Pilot_FE | Bit 4 | Byte | 0x0088 | 0x0006 | Bool |
| | Remote control active (PB1) | Bit 5 | Byte | 0x0088 | 0x0006 | Bool |
| | BDEW Release U(t) | Bit 6 | Byte | 0x0088 | 0x0006 | Bool |
| | Start blocking active | Bit 7 | Byte | 0x0088 | 0x0006 | Bool |
| 141 - Eingangsbyte CPU Input byte 1 | Ignition speed reached | Bit 0 | Byte | 0x0089 | 0x0007 | Bool |
| | Remote start | Bit 1 | Byte | 0x0089 | 0x0007 | Bool |
| | Emergency stop | Bit 2 | Byte | 0x0089 | 0x0007 | Bool |
| | Speed monitoring (pick-up) | Bit 3 | Byte | 0x0089 | 0x0007 | Bool |
| | Standby connect mode VDE4105 | Bit 4 | Byte | 0x0089 | 0x0007 | Bool |
| | Lock setpoint control U (DE153) | Bit 5 | Byte | 0x0089 | 0x0007 | Bool |
| | Lock setpoint control F (DE154) | Bit 6 | Byte | 0x0089 | 0x0007 | Bool |
| | Free | Bit 7 | Byte | 0x0089 | 0x0007 | Bool |
| 142 - Ausgangsbyte 1 Output byte 1 | DO101* | Bit 0 | Byte | 0x008A | 0x0031 | Bool |
| | DO102* | Bit 1 | Byte | 0x008A | 0x0031 | Bool |
| | DO103* | Bit 2 | Byte | 0x008A | 0x0031 | Bool |
| | DO104* | Bit 3 | Byte | 0x008A | 0x0031 | Bool |
| | DO105* | Bit 4 | Byte | 0x008A | 0x0031 | Bool |
| | DO106* | Bit 5 | Byte | 0x008A | 0x0031 | Bool |
| | DO107* | Bit 6 | Byte | 0x008A | 0x0031 | Bool |
| | DO108* | Bit 7 | Byte | 0x008A | 0x0031 | Bool |
| 143 - Ausgangsbyte 2 Output byte 2 | DO109* | Bit 0 | Byte | 0x008B | 0x0032 | Bool |
| | DO110* | Bit 1 | Byte | 0x008B | 0x0032 | Bool |
| | DO111* | Bit 2 | Byte | 0x008B | 0x0032 | Bool |
| | Free | Bit 3 | Byte | 0x008B | 0x0032 | Bool |
| | Free | Bit 4 | Byte | 0x008B | 0x0032 | Bool |
| | Free | Bit 5 | Byte | 0x008B | 0x0032 | Bool |
| | Free | Bit 6 | Byte | 0x008B | 0x0032 | Bool |
| | Free | Bit 7 | Byte | 0x008B | 0x0032 | Bool |
| 144 - Ausgangsbyte 3 Output byte 3 | DO201* | Bit 0 | Byte | 0x008C | 0x0033 | Bool |
| | DO202* | Bit 1 | Byte | 0x008C | 0x0033 | Bool |
| | DO203* | Bit 2 | Byte | 0x008C | 0x0033 | Bool |
| | DO204* | Bit 3 | Byte | 0x008C | 0x0033 | Bool |
| | DO205* | Bit 4 | Byte | 0x008C | 0x0033 | Bool |
| | DO206* | Bit 5 | Byte | 0x008C | 0x0033 | Bool |
| | DO207* | Bit 6 | Byte | 0x008C | 0x0033 | Bool |
| | DO208* | Bit 7 | Byte | 0x008C | 0x0033 | Bool |
| 145 - Ausgangsbyte 4 Output byte 4 | DO209* | Bit 0 | Byte | 0x008D | 0x0034 | Bool |
| | DO210* | Bit 1 | Byte | 0x008D | 0x0034 | Bool |
| | DO211* | Bit 2 | Byte | 0x008D | 0x0034 | Bool |
| | Free | Bit 3 | Byte | 0x008D | 0x0034 | Bool |
| | Free | Bit 4 | Byte | 0x008D | 0x0034 | Bool |
| | Free | Bit 5 | Byte | 0x008D | 0x0034 | Bool |
| | Free | Bit 6 | Byte | 0x008D | 0x0034 | Bool |
| | Free | Bit 7 | Byte | 0x008D | 0x0034 | Bool |
| 146 - Ausgangsbyte 5 Output byte 5 | DO301* | Bit 0 | Byte | 0x008E | 0x0035 | Bool |
| | DO302* | Bit 1 | Byte | 0x008E | 0x0035 | Bool |
| | DO303* | Bit 2 | Byte | 0x008E | 0x0035 | Bool |
| | DO304* | Bit 3 | Byte | 0x008E | 0x0035 | Bool |
| | DO305* | Bit 4 | Byte | 0x008E | 0x0035 | Bool |
| | DO306* | Bit 5 | Byte | 0x008E | 0x0035 | Bool |
| | DO307* | Bit 6 | Byte | 0x008E | 0x0035 | Bool |
| | DO308* | Bit 7 | Byte | 0x008E | 0x0035 | Bool |

* See parameterization KAS

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|---|--|-------|--------|--------|--------|------|
| 147 - Ausgangsbyte 6 Output byte 6 | DO309* | Bit 0 | Byte | 0x008F | 0x0036 | Bool |
| | DO310* | Bit 1 | Byte | 0x008F | 0x0036 | Bool |
| | DO311* | Bit 2 | Byte | 0x008F | 0x0036 | Bool |
| | Free | Bit 3 | Byte | 0x008F | 0x0036 | Bool |
| | Free | Bit 4 | Byte | 0x008F | 0x0036 | Bool |
| | Free | Bit 5 | Byte | 0x008F | 0x0036 | Bool |
| | Free | Bit 6 | Byte | 0x008F | 0x0036 | Bool |
| | Free | Bit 7 | Byte | 0x008F | 0x0036 | Bool |
| 148 - Ausgangsbyte 7 Output byte 7 | DO401* | Bit 0 | Byte | 0x0090 | 0x0037 | Bool |
| | DO402* | Bit 1 | Byte | 0x0090 | 0x0037 | Bool |
| | DO403* | Bit 2 | Byte | 0x0090 | 0x0037 | Bool |
| | DO404* | Bit 3 | Byte | 0x0090 | 0x0037 | Bool |
| | DO405* | Bit 4 | Byte | 0x0090 | 0x0037 | Bool |
| | DO406* | Bit 5 | Byte | 0x0090 | 0x0037 | Bool |
| | DO407* | Bit 6 | Byte | 0x0090 | 0x0037 | Bool |
| | DO408* | Bit 7 | Byte | 0x0090 | 0x0037 | Bool |
| 149 - Ausgangsbyte 8 Output byte 8 | DO409* | Bit 0 | Byte | 0x0091 | 0x0038 | Bool |
| | DO410* | Bit 1 | Byte | 0x0091 | 0x0038 | Bool |
| | DO411* | Bit 2 | Byte | 0x0091 | 0x0038 | Bool |
| | Free | Bit 3 | Byte | 0x0091 | 0x0038 | Bool |
| | Free | Bit 4 | Byte | 0x0091 | 0x0038 | Bool |
| | Free | Bit 5 | Byte | 0x0091 | 0x0038 | Bool |
| | Free | Bit 6 | Byte | 0x0091 | 0x0038 | Bool |
| | Free | Bit 7 | Byte | 0x0091 | 0x0038 | Bool |
| 150 - Ausgangsbyte 9 Output byte 9 | DO501* | Bit 0 | Byte | 0x0092 | 0x0039 | Bool |
| | DO502* | Bit 1 | Byte | 0x0092 | 0x0039 | Bool |
| | DO503* | Bit 2 | Byte | 0x0092 | 0x0039 | Bool |
| | DO504* | Bit 3 | Byte | 0x0092 | 0x0039 | Bool |
| | DO505* | Bit 4 | Byte | 0x0092 | 0x0039 | Bool |
| | DO506* | Bit 5 | Byte | 0x0092 | 0x0039 | Bool |
| | DO507* | Bit 6 | Byte | 0x0092 | 0x0039 | Bool |
| | DO508* | Bit 7 | Byte | 0x0092 | 0x0039 | Bool |
| 151 - Ausgangsbyte 10 Output byte 10 | DO509* | Bit 0 | Byte | 0x0093 | 0x003A | Bool |
| | DO510* | Bit 1 | Byte | 0x0093 | 0x003A | Bool |
| | DO511* | Bit 2 | Byte | 0x0093 | 0x003A | Bool |
| | Free | Bit 3 | Byte | 0x0093 | 0x003A | Bool |
| | Free | Bit 4 | Byte | 0x0093 | 0x003A | Bool |
| | Free | Bit 5 | Byte | 0x0093 | 0x003A | Bool |
| | Free | Bit 6 | Byte | 0x0093 | 0x003A | Bool |
| | Free | Bit 7 | Byte | 0x0093 | 0x003A | Bool |
| 152 - Ausgangsbyte 11 Output byte 11 | PM2 - DO01 – MCB ready (open) | Bit 0 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO02 – MCB on | Bit 1 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO03 – GCB ready (closed) | Bit 2 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO04 – GCB on | Bit 3 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO05 – Mains protection MCB (NO) | Bit 4 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO06 – Mains protection GCB (NC) | Bit 5 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO07 – Collective fault (NC) | Bit 6 | Byte | 0x0094 | 0x003B | Bool |
| | PM2 - DO08 – Watchdog (NC) | Bit 7 | Byte | 0x0094 | 0x003B | Bool |
| 153 - Ausgangsbyte 12 Output byte 12 | DM1 - DO11 – Diff current > | Bit 0 | Byte | 0x0095 | 0x003C | Bool |
| | DM1 - DO12 – Diff current >> | Bit 1 | Byte | 0x0095 | 0x003C | Bool |
| | Free | Bit 2 | Byte | 0x0095 | 0x003C | Bool |
| | LED1 on the tableau (DIG_LED1)* | Bit 3 | Byte | 0x0095 | 0x003C | Bool |
| | LED2 on the tableau (DIG_LED2)* | Bit 4 | Byte | 0x0095 | 0x003C | Bool |
| | LED3 on the tableau (DIG_LED3)* | Bit 5 | Byte | 0x0095 | 0x003C | Bool |
| | LED4 on the tableau (DIG_LED4)* | Bit 6 | Byte | 0x0095 | 0x003C | Bool |
| | LED5 on the tableau (DIG_LED5)* | Bit 7 | Byte | 0x0095 | 0x003C | Bool |
| 154 - Ausgangsbyte 13 Output byte 13 | Free | Bit 0 | Byte | 0x0096 | 0x003D | Bool |
| | Free | Bit 1 | Byte | 0x0096 | 0x003D | Bool |
| | Free | Bit 2 | Byte | 0x0096 | 0x003D | Bool |
| | Free | Bit 3 | Byte | 0x0096 | 0x003D | Bool |
| | PB1 – DO31* | Bit 4 | Byte | 0x0096 | 0x003D | Bool |
| | PB1 – DO32* | Bit 5 | Byte | 0x0096 | 0x003D | Bool |
| | PN1/MB1/MB2 – DO33* | Bit 6 | Byte | 0x0096 | 0x003D | Bool |
| | Free | Bit 7 | Byte | 0x0096 | 0x003D | Bool |

* See parameterization KAS

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|--|--------|--------|--------|--------|------|
| 174 - Stoermeldungen 129 bis 144 Error message 129 to 144 | AL129 AI1 Modul2 – Input AI11 | Bit 0 | Word | 0x00AC | 0x0013 | Bool |
| | AL130 AI1 Modul2 – Input AI12 | Bit 1 | Word | 0x00AC | 0x0013 | Bool |
| | AL131 AI1 Modul2 – Input AI13 | Bit 2 | Word | 0x00AC | 0x0013 | Bool |
| | AL132 AI1 Modul2 – Input AI14 | Bit 3 | Word | 0x00AC | 0x0013 | Bool |
| | AL133 AI1 Modul2 – Input AI15 | Bit 4 | Word | 0x00AC | 0x0013 | Bool |
| | AL134 AI1 Modul2 – Input AI16 | Bit 5 | Word | 0x00AC | 0x0013 | Bool |
| | AL135 AI1 Modul3 – Input AI17 | Bit 6 | Word | 0x00AC | 0x0013 | Bool |
| | AL136 AI1 Modul3 – Input AI18 | Bit 7 | Word | 0x00AC | 0x0013 | Bool |
| | AL137 AI1 Modul3 – Input AI19 | Bit 8 | Word | 0x00AC | 0x0013 | Bool |
| | AL138 AI1 Modul3 – Input AI20 | Bit 9 | Word | 0x00AC | 0x0013 | Bool |
| | AL139 AI1 Modul3 – Input AI21 | Bit 10 | Word | 0x00AC | 0x0013 | Bool |
| | AL140 AI1 Modul3 – Input AI22 | Bit 11 | Word | 0x00AC | 0x0013 | Bool |
| | Free | Bit 12 | Word | 0x00AC | 0x0013 | Bool |
| | Free | Bit 13 | Word | 0x00AC | 0x0013 | Bool |
| | Free | Bit 14 | Word | 0x00AC | 0x0013 | Bool |
| | Free | Bit 15 | Word | 0x00AC | 0x0013 | Bool |
| 175 - Stoermeldungen 145 bis 160 Error message 145 to 160 | AL145 AT1 Modul1 – Input PT1 > * | Bit 0 | Word | 0x00AD | 0x0014 | Bool |
| | AL146 AT1 Modul1 – Input PT1 >> * | Bit 1 | Word | 0x00AD | 0x0014 | Bool |
| | AL147 AT1 Modul1 – Input PT2 > * | Bit 2 | Word | 0x00AD | 0x0014 | Bool |
| | AL148 AT1 Modul1 – Input PT2 >> * | Bit 3 | Word | 0x00AD | 0x0014 | Bool |
| | AL149 AT1 Modul1 – Input PT3 > * | Bit 4 | Word | 0x00AD | 0x0014 | Bool |
| | AL150 AT1 Modul1 – Input PT3 >> * | Bit 5 | Word | 0x00AD | 0x0014 | Bool |
| | AL151 AT1 Modul1 – Input PT4 > * | Bit 6 | Word | 0x00AD | 0x0014 | Bool |
| | AL152 AT1 Modul1 – Input PT4 >> * | Bit 7 | Word | 0x00AD | 0x0014 | Bool |
| | AL153 AT1 Modul1 – Input PT5 > * | Bit 8 | Word | 0x00AD | 0x0014 | Bool |
| | AL154 AT1 Modul1 – Input PT5 >> * | Bit 9 | Word | 0x00AD | 0x0014 | Bool |
| | AL155 AT1 Modul1 – Input PT6 > * | Bit 10 | Word | 0x00AD | 0x0014 | Bool |
| | AL156 AT1 Modul1 – Input PT6 >> * | Bit 11 | Word | 0x00AD | 0x0014 | Bool |
| | AL157 AT1 Modul1 – Input AI23 > * | Bit 12 | Word | 0x00AD | 0x0014 | Bool |
| | AL158 AT1 Modul1 – Input AI23 >> * | Bit 13 | Word | 0x00AD | 0x0014 | Bool |
| | AL159 AT1 Modul1 – Input AI24 > * | Bit 14 | Word | 0x00AD | 0x0014 | Bool |
| | AL160 AT1 Modul1 – Input AI24 >> * | Bit 15 | Word | 0x00AD | 0x0014 | Bool |
| 176 - Stoermeldungen 161 bis 176 Error message 161 to 176 | AL161 AT1 Modul2 – Input PT7 > * | Bit 0 | Word | 0x00AE | 0x0015 | Bool |
| | AL162 AT1 Modul2 – Input PT7 >> * | Bit 1 | Word | 0x00AE | 0x0015 | Bool |
| | AL163 AT1 Modul2 – Input PT8 > * | Bit 2 | Word | 0x00AE | 0x0015 | Bool |
| | AL164 AT1 Modul2 – Input PT8 >> * | Bit 3 | Word | 0x00AE | 0x0015 | Bool |
| | AL165 AT1 Modul2 – Input PT9 > * | Bit 4 | Word | 0x00AE | 0x0015 | Bool |
| | AL166 AT1 Modul2 – Input PT9 >> * | Bit 5 | Word | 0x00AE | 0x0015 | Bool |
| | AL167 AT1 Modul2 – Input PT10 > * | Bit 6 | Word | 0x00AE | 0x0015 | Bool |
| | AL168 AT1 Modul2 – Input PT10 >> * | Bit 7 | Word | 0x00AE | 0x0015 | Bool |
| | AL169 AT1 Modul2 – Input PT11 > * | Bit 8 | Word | 0x00AE | 0x0015 | Bool |
| | AL170 AT1 Modul2 – Input PT11 >> * | Bit 9 | Word | 0x00AE | 0x0015 | Bool |
| | AL171 AT1 Modul2 – Input PT12 > * | Bit 10 | Word | 0x00AE | 0x0015 | Bool |
| | AL172 AT1 Modul2 – Input PT12 >> * | Bit 11 | Word | 0x00AE | 0x0015 | Bool |
| | AL173 AT1 Modul2 – Input AI25 > * | Bit 12 | Word | 0x00AE | 0x0015 | Bool |
| | AL174 AT1 Modul2 – Input AI25 >> * | Bit 13 | Word | 0x00AE | 0x0015 | Bool |
| | AL175 AT1 Modul2 – Input AI26 > * | Bit 14 | Word | 0x00AE | 0x0015 | Bool |
| | AL176 AT1 Modul2 – Input AI26 >> * | Bit 15 | Word | 0x00AE | 0x0015 | Bool |
| 177 - Stoermeldungen 177 bis 192 Error message 177 to 192 | AL177 J1939 Amber warning lamp | Bit 0 | Word | 0x00AF | 0x0016 | Bool |
| | AL178 J1939 Red stop lamp | Bit 1 | Word | 0x00AF | 0x0016 | Bool |
| | AL179 J1939 Alarm - Motor type depend. | Bit 2 | Word | 0x00AF | 0x0016 | Bool |
| | AL180 J1939 Alarm - Motor type depend. | Bit 3 | Word | 0x00AF | 0x0016 | Bool |
| | AL181 J1939 Alarm - Motor type depend. | Bit 4 | Word | 0x00AF | 0x0016 | Bool |
| | AL182 J1939 Alarm - Motor type depend. | Bit 5 | Word | 0x00AF | 0x0016 | Bool |
| | AL183 J1939 Alarm - Motor type depend. | Bit 6 | Word | 0x00AF | 0x0016 | Bool |
| | AL184 J1939 Alarm - Motor type depend. | Bit 7 | Word | 0x00AF | 0x0016 | Bool |
| | AL185 J1939 Alarm - Motor type depend. | Bit 8 | Word | 0x00AF | 0x0016 | Bool |
| | AL186 J1939 Alarm - Motor type depend. | Bit 9 | Word | 0x00AF | 0x0016 | Bool |
| | AL187 J1939 Alarm - Motor type depend. | Bit 10 | Word | 0x00AF | 0x0016 | Bool |
| | AL188 J1939 Alarm - Motor type depend. | Bit 11 | Word | 0x00AF | 0x0016 | Bool |
| | AL189 J1939 Alarm - Motor type depend. | Bit 12 | Word | 0x00AF | 0x0016 | Bool |
| | AL190 J1939 Alarm - Motor type depend. | Bit 13 | Word | 0x00AF | 0x0016 | Bool |
| | AL191 J1939 Alarm - Motor type depend. | Bit 14 | Word | 0x00AF | 0x0016 | Bool |
| | AL192 J1939 Alarm - Motor type depend. | Bit 15 | Word | 0x00AF | 0x0016 | Bool |

* See parameterization KAS

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|--|--------|--------|--------|--------|------|
| 178 - Stoermeldungen 193 bis 208 Error message 193 to 208 | AL193 J1939 Alarm - Motor type depend. | Bit 0 | Word | 0x00B0 | 0x0017 | Bool |
| | AL194 J1939 Alarm - Motor type depend. | Bit 1 | Word | 0x00B0 | 0x0017 | Bool |
| | AL195 J1939 Alarm - Motor type depend. | Bit 2 | Word | 0x00B0 | 0x0017 | Bool |
| | AL196 J1939 Alarm - Motor type depend. | Bit 3 | Word | 0x00B0 | 0x0017 | Bool |
| | AL197 J1939 Alarm - Motor type depend. | Bit 4 | Word | 0x00B0 | 0x0017 | Bool |
| | AL198 J1939 Alarm - Motor type depend. | Bit 5 | Word | 0x00B0 | 0x0017 | Bool |
| | AL199 J1939 Alarm - Motor type depend. | Bit 6 | Word | 0x00B0 | 0x0017 | Bool |
| | AL200 J1939 Alarm - Motor type depend. | Bit 7 | Word | 0x00B0 | 0x0017 | Bool |
| | AL201 J1939 Alarm - Motor type depend. | Bit 8 | Word | 0x00B0 | 0x0017 | Bool |
| | AL202 J1939 Alarm - Motor type depend. | Bit 9 | Word | 0x00B0 | 0x0017 | Bool |
| | AL203 J1939 Alarm - Motor type depend. | Bit 10 | Word | 0x00B0 | 0x0017 | Bool |
| | AL204 J1939 Alarm - Motor type depend. | Bit 11 | Word | 0x00B0 | 0x0017 | Bool |
| | AL205 J1939 Alarm - Motor type depend. | Bit 12 | Word | 0x00B0 | 0x0017 | Bool |
| | AL206 J1939 Alarm - Motor type depend. | Bit 13 | Word | 0x00B0 | 0x0017 | Bool |
| | AL207 J1939 Alarm - Motor type depend. | Bit 14 | Word | 0x00B0 | 0x0017 | Bool |
| | AL208 J1939 Alarm - Motor type depend. | Bit 15 | Word | 0x00B0 | 0x0017 | Bool |
| 179 - Stoermeldungen 209 bis 224 Error message 209 to 224 | AL209 J1939 Alarm - Motor type depend. | Bit 0 | Word | 0x00B1 | 0x0018 | Bool |
| | AL210 J1939 Alarm - Motor type depend. | Bit 1 | Word | 0x00B1 | 0x0018 | Bool |
| | AL211 J1939 Alarm - Motor type depend. | Bit 2 | Word | 0x00B1 | 0x0018 | Bool |
| | AL212 J1939 Alarm - Motor type depend. | Bit 3 | Word | 0x00B1 | 0x0018 | Bool |
| | AL213 J1939 Alarm - Motor type depend. | Bit 4 | Word | 0x00B1 | 0x0018 | Bool |
| | AL214 J1939 Alarm - Motor type depend. | Bit 5 | Word | 0x00B1 | 0x0018 | Bool |
| | AL215 J1939 Alarm - Motor type depend. | Bit 6 | Word | 0x00B1 | 0x0018 | Bool |
| | AL216 J1939 Alarm - Motor type depend. | Bit 7 | Word | 0x00B1 | 0x0018 | Bool |
| | AL217 J1939 Alarm - Motor type depend. | Bit 8 | Word | 0x00B1 | 0x0018 | Bool |
| | AL218 J1939 Alarm - Motor type depend. | Bit 9 | Word | 0x00B1 | 0x0018 | Bool |
| | AL219 J1939 Alarm - Motor type depend. | Bit 10 | Word | 0x00B1 | 0x0018 | Bool |
| | AL220 J1939 Alarm - Motor type depend. | Bit 11 | Word | 0x00B1 | 0x0018 | Bool |
| | AL221 J1939 Alarm - Motor type depend. | Bit 12 | Word | 0x00B1 | 0x0018 | Bool |
| | AL222 J1939 Alarm - Motor type depend. | Bit 13 | Word | 0x00B1 | 0x0018 | Bool |
| | AL223 J1939 Alarm - Motor type depend. | Bit 14 | Word | 0x00B1 | 0x0018 | Bool |
| | AL224 J1939 Alarm - Motor type depend. | Bit 15 | Word | 0x00B1 | 0x0018 | Bool |
| 180 - Stoermeldungen 225 bis 240 Error message 225 to 240 | AL225 J1939 Alarm - Motor type depend. | Bit 0 | Word | 0x00B2 | 0x0019 | Bool |
| | AL226 J1939 Alarm - Motor type depend. | Bit 1 | Word | 0x00B2 | 0x0019 | Bool |
| | AL227 J1939 Alarm - Motor type depend. | Bit 2 | Word | 0x00B2 | 0x0019 | Bool |
| | AL228 J1939 Alarm - Motor type depend. | Bit 3 | Word | 0x00B2 | 0x0019 | Bool |
| | AL229 J1939 Alarm - Motor type depend. | Bit 4 | Word | 0x00B2 | 0x0019 | Bool |
| | AL230 J1939 Alarm - Motor type depend. | Bit 5 | Word | 0x00B2 | 0x0019 | Bool |
| | AL231 J1939 Alarm - Motor type depend. | Bit 6 | Word | 0x00B2 | 0x0019 | Bool |
| | AL232 J1939 Alarm - Motor type depend. | Bit 7 | Word | 0x00B2 | 0x0019 | Bool |
| | AL233 J1939 Alarm - Motor type depend. | Bit 8 | Word | 0x00B2 | 0x0019 | Bool |
| | AL234 J1939 Alarm - Motor type depend. | Bit 9 | Word | 0x00B2 | 0x0019 | Bool |
| | AL235 J1939 Alarm - Motor type depend. | Bit 10 | Word | 0x00B2 | 0x0019 | Bool |
| | AL236 J1939 Alarm - Motor type depend. | Bit 11 | Word | 0x00B2 | 0x0019 | Bool |
| | AL237 J1939 Alarm - Motor type depend. | Bit 12 | Word | 0x00B2 | 0x0019 | Bool |
| | AL238 J1939 Alarm - Motor type depend. | Bit 13 | Word | 0x00B2 | 0x0019 | Bool |
| | AL239 J1939 Alarm - Motor type depend. | Bit 14 | Word | 0x00B2 | 0x0019 | Bool |
| | AL240 J1939 Alarm - CAN BUS fault | Bit 15 | Word | 0x00B2 | 0x0019 | Bool |
| 181 - Stoermeldungen 241 bis 256 | Error messages 241 (Free input*) | Bit 0 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 242 (Free input*) | Bit 1 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 243 (Free input*) | Bit 2 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 244 (Free input*) | Bit 3 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 245 (Free input*) | Bit 4 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 246 (Free input*) | Bit 5 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 247 (Free input*) | Bit 6 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 248 (Free input*) | Bit 7 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 249 (Free input*) | Bit 8 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 250 (Free input*) | Bit 9 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 251 (Free input*) | Bit 10 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 252 (Free input*) | Bit 11 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 253 (Free input*) | Bit 12 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 254 (Free input*) | Bit 13 | Word | 0x00B3 | 0x001A | Bool |
| | Error messages 255 (Free input*) | Bit 14 | Word | 0x00B3 | 0x001A | Bool |
| | Error message 256 - Blocked | Bit 15 | Word | 0x00B3 | 0x001A | Bool |

* See parameterization KAS

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|----------------------------------|---|----------|-----------|--------|--------|------|
| 182 - Stoermeldungen 257 bis 272 | Error message 257-272 (Not released in the KAS) | Bit 0-15 | Word | 0x00B4 | 0x001B | Bool |
| 183 - Stoermeldungen 273 bis 288 | Error message 273-288 (Not released in the KAS) | Bit 0-15 | Word | 0x00B5 | 0x001C | Bool |
| 184 - Stoermeldungen 289 bis 304 | Error message 289-304 (Not released in the KAS) | Bit 0-15 | Word | 0x00B6 | 0x001D | Bool |
| 185 - Stoermeldungen 305 bis 320 | Error message 305-320 (Not released in the KAS) | Bit 0-15 | Word | 0x00B7 | 0x001E | Bool |
| 186 - Stoermeldungen 321 bis 336 | Error message 321-336 (Not released in the KAS) | Bit 0-15 | Word | 0x00B8 | 0x001F | Bool |
| 187 - Stoermeldungen 337 bis 352 | Error message 337-352 (Not released in the KAS) | Bit 0-15 | Word | 0x00B9 | 0x0020 | Bool |
| 188 - Stoermeldungen 353 bis 368 | Error message 353-368 (Not released in the KAS) | Bit 0-15 | Word | 0x00BA | 0x0021 | Bool |
| 189 - Stoermeldungen 369 bis 384 | Error message 369-384 (Not released in the KAS) | Bit 0-15 | Word | 0x00BB | 0x0022 | Bool |
| 190 - Stoermeldungen 385 bis 400 | Error message 385-400 (Not released in the KAS) | Bit 0-15 | Word | 0x00BC | 0x0023 | Bool |
| 191 - Stoermeldungen 401 bis 416 | Error message 401-416 (Not released in the KAS) | Bit 0-15 | Word | 0x00BD | 0x0024 | Bool |
| 192 - Stoermeldungen 417 bis 432 | Error message 417-432 (Not released in the KAS) | Bit 0-15 | Word | 0x00BE | 0x0025 | Bool |
| 193 - Stoermeldungen 433 bis 448 | Error message 433-448 (Not released in the KAS) | Bit 0-15 | Word | 0x00BF | 0x0026 | Bool |
| 194 - Stoermeldungen 449 bis 464 | Error message 449-464 (Not released in the KAS) | Bit 0-15 | Word | 0x00C0 | 0x0027 | Bool |
| 195 - Stoermeldungen 465 bis 480 | Error message 465-480 (Not released in the KAS) | Bit 0-15 | Word | 0x00C1 | 0x0028 | Bool |
| 196 - Stoermeldungen 481 bis 496 | Error message 481-496 (Not released in the KAS) | Bit 0-15 | Word | 0x00C2 | 0x0029 | Bool |
| 197 - Stoermeldungen 497 bis 512 | Error message 497-512 (Not released in the KAS) | Bit 0-15 | Word | 0x00C3 | 0x002A | Bool |
| 207 - KWH-Zähler xxxx kWh | KWH counter | | UDINT | 0x00CD | 0x00D9 | DINT |
| 208 - Startzähler xxxx Start(s) | Start counter | | UDINT | 0x00CE | 0x00DA | DINT |
| 209 - Betriebsstunden xxxx h | Operation counter | | UDINT | 0x00CF | 0x00DB | DINT |
| 234 - CAN Bild1 / Wort 1-8 | Multiplexwort CAN picture 1 (Analog values read) | | 8 x UDINT | 0x00E8 | 0x00F4 | DINT |
| 235 - CAN Bild2 / Wort 1-8 | Multiplexwort CAN picture 2 (Analog values read) | | 8 x UDINT | 0x00E9 | 0x00F5 | DINT |
| 236 - CAN Bild3 / Wort 1-8 | Multiplexwort CAN picture 3 (Analog values read) | | 8 x UDINT | 0x00EA | 0x00F6 | DINT |
| 237 - CAN Bild4 / Wort 1-8 | Multiplexwort CAN picture 4 (Analog values read) | | 8 x UDINT | 0x00EB | 0x00F7 | DINT |
| 238 - CAN Bild5 | Multiplexwort CAN picture 5 (Binär values read) | | 8 x UDINT | 0x00EC | 0x00F8 | DINT |
| 239 - CAN Bild6 | Multiplexwort CAN picture 6 (5 Binär values write) | | 5 x UDINT | 0x00ED | 0x00F9 | DINT |
| 240 - CAN Bild6 | Multiplexwort CAN picture 6 (3 Analog values write) | | 3 x UDINT | 0x00EE | 0x00FA | DINT |

* See parameterization KAS

14.3 PM2 Module

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1/MB1 | Type |
|-----------------------------|----------------------------|-----|--------|--------|---------|------|
| 4 - Generator F1 xx.xx Hz | Generator frequency L1 | | Word | 0x0000 | 0x0066 | INT |
| 5 - Generator F2 xx.xx Hz | Generator frequency L2 | | Word | 0x0001 | 0x0067 | INT |
| 6 - Generator F3 xx.xx Hz | Generator frequency L3 | | Word | 0x0002 | 0x0068 | INT |
| 7 - Generator U1-N xxxx V | Generator voltage L1-N | | Word | 0x0003 | 0x006C | INT |
| 8 - Generator U2-N xxxx V | Generator voltage L2-N | | Word | 0x0004 | 0x006D | INT |
| 9 - Generator U3-N xxxx V | Generator voltage L3-N | | Word | 0x0005 | 0x006E | INT |
| 10 - Generator U1-U2 xxxx V | Generator voltage L1-2 | | Word | 0x0006 | 0x006F | INT |
| 11 - Generator U2-U3 xxxx V | Generator voltage L2-3 | | Word | 0x0007 | 0x0070 | INT |
| 12 - Generator U3-U1 xxxx V | Generator voltage L3-1 | | Word | 0x0008 | 0x0071 | INT |
| 13 - Netz F1 xx.xx Hz | Mains/Bus frequency L1 | | Word | 0x0009 | 0x0079 | INT |
| 14 - Netz F2 xx.xx Hz | Mains/Bus frequency L2 | | Word | 0x000A | 0x007A | INT |
| 15 - Netz F3 xx.xx Hz | Mains/Bus frequency L3 | | Word | 0x000B | 0x007B | INT |
| 16 - Netz U1-N xxxx V | Mains/Bus voltage L1-N | | Word | 0x000C | 0x007F | INT |
| 17 - Netz U2-N xxxx V | Mains/Bus voltage L2-N | | Word | 0x000D | 0x0080 | INT |
| 18 - Netz U3-N xxxx V | Mains/Bus voltage L3-N | | Word | 0x000E | 0x0081 | INT |
| 19 - Netz U1-U2 xxxx V | Mains/Bus voltage L1-2 | | Word | 0x000F | 0x0082 | INT |
| 20 - Netz U2-U3 xxxx V | Mains/Bus voltage L2-3 | | Word | 0x0010 | 0x0083 | INT |
| 21 - Netz U3-U1 xxxx V | Mains/Bus voltage L3-1 | | Word | 0x0011 | 0x0084 | INT |
| 22 - Strom I1 xx.xx Hz | Freq. generator current L1 | | Word | 0x0012 | 0x008A | INT |
| 23 - Strom I2 xx.xx Hz | Freq. generator current L2 | | Word | 0x0013 | 0x008B | INT |
| 24 - Generator I1 xxxx.xx A | Generator current L1 | | D-Word | 0x0014 | 0x008D | DINT |

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|---------------------------------|------------|--------|--------|--------|------|
| 25 - Generator I2 xxxx.xx A | Generator current L2 | | D-Word | 0x0015 | 0x008E | DINT |
| 26 - Generator I2 xxxx.xx A | Generator current L3 | | D-Word | 0x0016 | 0x008F | DINT |
| 27 - Generator P1 xxxx.xx kW | Active power P1 | | D-Word | 0x0017 | 0x0095 | DINT |
| 28 - Generator P2 xxxx.xx kW | Active power P2 | | D-Word | 0x0018 | 0x0096 | DINT |
| 29 - Generator P3 xxxx.xx kW | Active power P3 | | D-Word | 0x0019 | 0x0097 | DINT |
| 30 - Generator S1 xxxx.xx kVA | Apparent power S1 | | D-Word | 0x001A | 0x0098 | DINT |
| 31 - Generator S2 xxxx.xx kVA | Apparent power S2 | | D-Word | 0x001B | 0x0099 | DINT |
| 32 - Generator S3 xxxx.xx kVA | Apparent power S3 | | D-Word | 0x001C | 0x009A | DINT |
| 33 - Gen. Wirkleistung xxxx.xx kW | Total active power | | D-Word | 0x001D | 0x009B | DINT |
| 34 - Gen. Blindleistung xxxx.xx kVAR | Total reactive power | | D-Word | 0x001E | 0x009C | DINT |
| 35 - Gen. Scheinleistung xxxx.xx kVA | Total apparent power | | D-Word | 0x001F | 0x009D | DINT |
| 36 - Generator CosPhi +/- 1.xxx | Generator Cos Phi | | Word | 0x0020 | 0x009E | INT |
| 37 - Netz U1 xxxx.x % | Mains/Bus voltage L1 | | Word | 0x0021 | 0x0085 | INT |
| 38 - Netz U2 xxxx.x % | Mains/Bus voltage L2 | | Word | 0x0022 | 0x0086 | INT |
| 39 - Netz U3 xxxx.x % | Mains/Bus voltage L3 | | Word | 0x0023 | 0x0087 | INT |
| 40 - Generator U1 xxxx.x % | Generator voltage L1 | | Word | 0x0024 | 0x0072 | INT |
| 41 - Generator U2 xxxx.x % | Generator voltage L2 | | Word | 0x0025 | 0x0073 | INT |
| 42 - Generator U3 xxxx.x % | Generator voltage L3 | | Word | 0x0026 | 0x0074 | INT |
| 43 - Generator I1 xxxx.x % | Generator current L1 | | Word | 0x0027 | 0x0090 | INT |
| 44 - Generator I2 xxxx.x % | Generator current L2 | | Word | 0x0028 | 0x0091 | INT |
| 45 - Generator I3 xxxx.x % | Generator current L3 | | Word | 0x0029 | 0x0092 | INT |
| 46 - Generator P1 xxxx.x % | Generator active power P1 | | Word | 0x002A | 0x009F | INT |
| 47 - Generator P2 xxxx.x % | Generator active power P2 | | Word | 0x002B | 0x00A0 | INT |
| 48 - Generator P3 xxxx.x % | Generator active power P3 | | Word | 0x002C | 0x00A1 | INT |
| 49 - Generator S1 xxxx.x % | Generator apparent power S1 | | Word | 0x002D | 0x00A2 | INT |
| 50 - Generator S2 xxxx.x % | Generator apparent power S2 | | Word | 0x002E | 0x00A3 | INT |
| 51 - Generator S3 xxxx.x % | Generator apparent power S3 | | Word | 0x002F | 0x00A4 | INT |
| 52 - Gen. Scheinleistung xxxx.x % | Total apparent power | | Word | 0x0030 | 0x00A5 | INT |
| 53 - Gen. Blindleistung xxxx.x % | Total reactive power | | Word | 0x0031 | 0x00A6 | INT |
| 54 - Gen. Gesamtleistung xxxx.x % | Total active power | | Word | 0x0032 | 0x00A7 | INT |
| - | Counter (0 to 3) | Bit 0 .. 7 | Byte | | 0x00A8 | |
| 55 - Gen. Winkel L1-2 xxx° | Generator voltage angle L1-2 | | Word | 0x0033 | 0x0069 | INT |
| 56 - Gen. Winkel L2-3 xxx° | Generator voltage angle L2-3 | | Word | 0x0034 | 0x006A | INT |
| 57 - Gen. Winkel L3-1 xxx° | Generator voltage angle L3-1 | | Word | 0x0035 | 0x006B | INT |
| 58 - Netz Winkel L1-2 xxx° | Mains voltage angle L1-2 | | Word | 0x0036 | 0x007C | INT |
| 59 - Netz Winkel L2-3 xxx° | Mains voltage angle L2-3 | | Word | 0x0037 | 0x007D | INT |
| 60 - Netz Winkel L3-1 xxx° | Mains voltage angle L3-1 | | Word | 0x0038 | 0x007E | INT |
| 61 - Strom Winkel L1-2 xxx° | Generator current angle L1-2 | | Word | 0x0039 | 0x008C | INT |
| 62 - Gen. Spannungsbyte Generator voltage byte | Generator voltage detected L1 | Bit 0 | Byte | 0x003A | 0x005F | Bool |
| | Generator voltage detected L2 | Bit 1 | Byte | 0x003A | 0x005F | Bool |
| | Generator voltage detected L3 | Bit 2 | Byte | 0x003A | 0x005F | Bool |
| | Nom. voltage detected L1+2+3 | Bit 3 | Byte | 0x003A | 0x005F | Bool |
| | Voltage > | Bit 4 | Byte | 0x003A | 0x005F | Bool |
| | Voltage < | Bit 5 | Byte | 0x003A | 0x005F | Bool |
| | Voltage >> | Bit 6 | Byte | 0x003A | 0x005F | Bool |
| | Voltage << | Bit 7 | Byte | 0x003A | 0x005F | Bool |
| 63 - Gen. Frequenzbyte Generator frequency byte | Generator frequency detected L1 | Bit 0 | Byte | 0x003B | 0x0060 | Bool |
| | Generator frequency detected L2 | Bit 1 | Byte | 0x003B | 0x0060 | Bool |
| | Generator frequency detected L3 | Bit 2 | Byte | 0x003B | 0x0060 | Bool |
| | Nom frequency detected L1+2+3 | Bit 3 | Byte | 0x003B | 0x0060 | Bool |
| | Frequency > | Bit 4 | Byte | 0x003B | 0x0060 | Bool |
| | Frequency < | Bit 5 | Byte | 0x003B | 0x0060 | Bool |
| | Frequency >> | Bit 6 | Byte | 0x003B | 0x0060 | Bool |
| | Frequency << | Bit 7 | Byte | 0x003B | 0x0060 | Bool |

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|-----------------------------------|-------|--------|--------|--------|------|
| 64 - Gen. Netzschatzbyte Mains protection byte | Mains protection vector > | Bit 0 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection vector >> | Bit 1 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection U> | Bit 2 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection U< | Bit 3 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection F> | Bit 4 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection F< | Bit 5 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection collective fault | Bit 6 | Byte | 0x003C | 0x0061 | Bool |
| | Mains protection released | Bit 7 | Byte | 0x003C | 0x0061 | Bool |
| | | | | | | |
| 65 - Gen. Vektorbyte 1 Generator vector byte 1 | Dif. vector surge L1 > (plus) | Bit 0 | Byte | 0x003D | 0x0062 | Bool |
| | Dif. vector surge L2 > (plus) | Bit 1 | Byte | 0x003D | 0x0062 | Bool |
| | Dif. vector surge L3 > (plus) | Bit 2 | Byte | 0x003D | 0x0062 | Bool |
| | Dif. vektor surge L1 > (minus) | Bit 3 | Byte | 0x003D | 0x0062 | Bool |
| | Dif. vektor surge L2 > (minus) | Bit 4 | Byte | 0x003D | 0x0062 | Bool |
| | Dif. vektor surge L2 > (minus) | Bit 5 | Byte | 0x003D | 0x0062 | Bool |
| | Mains protection U<< | Bit 6 | Byte | 0x003D | 0x0062 | Bool |
| | Mains protection U>> | Bit 7 | Byte | 0x003D | 0x0062 | Bool |
| | | | | | | |
| 66 - Gen. Vektorbyte 2 Generator vector byte 2 | Dif. vector surge L1 >> (plus) | Bit 0 | Byte | 0x003E | 0x0063 | Bool |
| | Dif. vector surge L2 >> (plus) | Bit 1 | Byte | 0x003E | 0x0063 | Bool |
| | Dif. vector surge L3 >> (plus) | Bit 2 | Byte | 0x003E | 0x0063 | Bool |
| | Dif. vektor surge L1 >> (minus) | Bit 3 | Byte | 0x003E | 0x0063 | Bool |
| | Dif. vektor surge L2 >> (minus) | Bit 4 | Byte | 0x003E | 0x0063 | Bool |
| | Dif. vektor surge L2 >> (minus) | Bit 5 | Byte | 0x003E | 0x0063 | Bool |
| | Mains protection F<< | Bit 6 | Byte | 0x003E | 0x0063 | Bool |
| | Mains protection F>> | Bit 7 | Byte | 0x003E | 0x0063 | Bool |
| | | | | | | |
| 67 - Gen. Winkelbyte Generator angle byte | Generator rotating field error | Bit 0 | Byte | 0x003F | 0x0064 | Bool |
| | Voltage angle error L1 | Bit 1 | Byte | 0x003F | 0x0064 | Bool |
| | Voltage angle error L2 | Bit 2 | Byte | 0x003F | 0x0064 | Bool |
| | Voltage angle error L3 | Bit 3 | Byte | 0x003F | 0x0064 | Bool |
| | Voltage asymmetry | Bit 4 | Byte | 0x003F | 0x0064 | Bool |
| | Q-U protection < | Bit 5 | Byte | 0x003F | 0x0064 | Bool |
| | Cos Phi capazitive | Bit 6 | Byte | 0x003F | 0x0064 | Bool |
| | Cos Phi inductive | Bit 7 | Byte | 0x003F | 0x0064 | Bool |
| | | | | | | |
| 68 - Gen. Synchronisationsbyte Synchronization byte | SYN-Pulse | Bit 0 | Byte | 0x0040 | 0x0065 | Bool |
| | Delta F OK | Bit 1 | Byte | 0x0040 | 0x0065 | Bool |
| | Delta U OK | Bit 2 | Byte | 0x0040 | 0x0065 | Bool |
| | Pulse voltage + | Bit 3 | Byte | 0x0040 | 0x0065 | Bool |
| | Pulse voltage - | Bit 4 | Byte | 0x0040 | 0x0065 | Bool |
| | Pulse frequency + | Bit 5 | Byte | 0x0040 | 0x0065 | Bool |
| | Pulse frequency - | Bit 6 | Byte | 0x0040 | 0x0065 | Bool |
| | Q-U protection << | Bit 7 | Byte | 0x0040 | 0x0065 | Bool |
| | | | | | | |
| 69 - Netz Spannungsbyte Mains voltage byte | Mains voltage detected L1 | Bit 0 | Byte | 0x0041 | 0x0075 | Bool |
| | Mains voltage detected L2 | Bit 1 | Byte | 0x0041 | 0x0075 | Bool |
| | Mains voltage detected L3 | Bit 2 | Byte | 0x0041 | 0x0075 | Bool |
| | Nom. Voltage detected L1+2+3 | Bit 3 | Byte | 0x0041 | 0x0075 | Bool |
| | Voltage > | Bit 4 | Byte | 0x0041 | 0x0075 | Bool |
| | Voltage < | Bit 5 | Byte | 0x0041 | 0x0075 | Bool |
| | Voltage >> | Bit 6 | Byte | 0x0041 | 0x0075 | Bool |
| | Voltage << | Bit 7 | Byte | 0x0041 | 0x0075 | Bool |
| | | | | | | |
| 70 - Netz Frequenzbyte Mains frequency byte | Mains frequency detected L1 | Bit 0 | Byte | 0x0042 | 0x0076 | Bool |
| | Mains frequency detected L2 | Bit 1 | Byte | 0x0042 | 0x0076 | Bool |
| | Mains frequency detected L3 | Bit 2 | Byte | 0x0042 | 0x0076 | Bool |
| | Nom frequency detected L1+2+3 | Bit 3 | Byte | 0x0042 | 0x0076 | Bool |
| | Frequency > | Bit 4 | Byte | 0x0042 | 0x0076 | Bool |
| | Frequency < | Bit 5 | Byte | 0x0042 | 0x0076 | Bool |
| | Frequency >> | Bit 6 | Byte | 0x0042 | 0x0076 | Bool |
| | Frequency << | Bit 7 | Byte | 0x0042 | 0x0076 | Bool |
| | | | | | | |
| 71 - Netz Winkelbyte Mains angle byte | Mains rotating field error | Bit 0 | Byte | 0x0043 | 0x0078 | Bool |
| | Voltage angle error L1 | Bit 1 | Byte | 0x0043 | 0x0078 | Bool |
| | Voltage angle error L2 | Bit 2 | Byte | 0x0043 | 0x0078 | Bool |
| | Voltage angle error L3 | Bit 3 | Byte | 0x0043 | 0x0078 | Bool |
| | Voltage asymmetry | Bit 4 | Byte | 0x0043 | 0x0078 | Bool |
| | Free | Bit 5 | Byte | 0x0043 | 0x0078 | Bool |
| | BDEW U(t) time is running | Bit 6 | Byte | 0x0043 | 0x0078 | Bool |
| | BDEW U(t) fault | Bit 7 | Byte | 0x0043 | 0x0078 | Bool |
| | | | | | | |

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--|-------------------------------|-------|--------|--------|--------|------|
| 72 - Gen Strombyte Generator current byte 1 | Generator current detected I1 | Bit 0 | Byte | 0x0044 | 0x0088 | Bool |
| | Generator current detected I2 | Bit 1 | Byte | 0x0044 | 0x0088 | Bool |
| | Generator current detected I3 | Bit 2 | Byte | 0x0044 | 0x0088 | Bool |
| | Nom. current detected L1+2+3 | Bit 3 | Byte | 0x0044 | 0x0088 | Bool |
| | Overcurrent > | Bit 4 | Byte | 0x0044 | 0x0088 | Bool |
| | Overcurrent >> | Bit 5 | Byte | 0x0044 | 0x0088 | Bool |
| | Overcurrent VDE100-718 | Bit 6 | Byte | 0x0044 | 0x0088 | Bool |
| | Overcurrent time protection | Bit 7 | Byte | 0x0044 | 0x0088 | Bool |
| 73 - Gen. Leistungsbyte Generator power byte 1 | Loaded | Bit 0 | Byte | 0x0045 | 0x0093 | Bool |
| | Power > | Bit 1 | Byte | 0x0045 | 0x0093 | Bool |
| | Power >> | Bit 2 | Byte | 0x0045 | 0x0093 | Bool |
| | Reverse power > | Bit 3 | Byte | 0x0045 | 0x0093 | Bool |
| | Reverse power >> | Bit 4 | Byte | 0x0045 | 0x0093 | Bool |
| | Unbalanced load | Bit 5 | Byte | 0x0045 | 0x0093 | Bool |
| | KWH Pulse | Bit 6 | Byte | 0x0045 | 0x0093 | Bool |
| | Free | Bit 7 | Byte | 0x0045 | 0x0093 | Bool |
| 74 - Gen. S/Q-byte Generator power byte 2 | Apparent power > | Bit 0 | Byte | 0x0046 | 0x0094 | Bool |
| | Apparent power >> | Bit 1 | Byte | 0x0046 | 0x0094 | Bool |
| | Reactive power > | Bit 2 | Byte | 0x0046 | 0x0094 | Bool |
| | Reactive >> | Bit 3 | Byte | 0x0046 | 0x0094 | Bool |
| | Free | Bit 4 | Byte | 0x0046 | 0x0094 | Bool |
| | Free | Bit 5 | Byte | 0x0046 | 0x0094 | Bool |
| | Free | Bit 6 | Byte | 0x0046 | 0x0094 | Bool |
| | Free | Bit 7 | Byte | 0x0046 | 0x0094 | Bool |
| 75 - Gen. Stromrichtungsbyte Generator current byte 2 | Current rotating field right | Bit 0 | Byte | 0x0047 | 0x0089 | Bool |
| | Current rotating field left | Bit 1 | Byte | 0x0047 | 0x0089 | Bool |
| | Free | Bit 2 | Byte | 0x0047 | 0x0089 | Bool |
| | Free | Bit 3 | Byte | 0x0047 | 0x0089 | Bool |
| | Free | Bit 4 | Byte | 0x0047 | 0x0089 | Bool |
| | Free | Bit 5 | Byte | 0x0047 | 0x0089 | Bool |
| | Free | Bit 6 | Byte | 0x0047 | 0x0089 | Bool |
| | Free | Bit 7 | Byte | 0x0047 | 0x0089 | Bool |
| 173 - VDE4105 Zustandsbyte VDE4105 NA-protection byte | VDE4105 Collective fault | Bit 0 | Byte | 0x00AB | 0x0077 | Bool |
| | VDE4105 U< (80%) | Bit 1 | Byte | 0x00AB | 0x0077 | Bool |
| | VDE4105 U> (115%) | Bit 2 | Byte | 0x00AB | 0x0077 | Bool |
| | VDE4105 F< (47,5Hz) | Bit 3 | Byte | 0x00AB | 0x0077 | Bool |
| | VDE4105 F> (51,5Hz) | Bit 4 | Byte | 0x00AB | 0x0077 | Bool |
| | VDE4105 U> (Quality) | Bit 5 | Byte | 0x00AB | 0x0077 | Bool |
| | Free | Bit 6 | Byte | 0x00AB | 0x0077 | Bool |
| | VDE4105 Standby switching | Bit 7 | Byte | 0x00AB | 0x0077 | Bool |

14.4 DM1 Module

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1/MB1 | Type |
|----------------------------------|---------------------------|-----|--------|--------|---------|------|
| 76 - F intern Strom L1 xx.xx Hz | Frequency int. current L1 | | Word | 0x0048 | 0x00AD | INT |
| 77 - F intern Strom L2 xx.xx Hz | Frequency int. current L2 | | Word | 0x0049 | 0x00AE | INT |
| 78 - F extern Strom L1 xx.xx Hz | Frequency ext. current L1 | | Word | 0x0048 | 0x00AD | INT |
| 79 - F extern Strom L2 xx.xx Hz | Frequency ext. current L2 | | Word | 0x0049 | 0x00AE | INT |
| 80 - stabiler Strom L1 xxx.xx A | Stable current L1 | | D-Word | 0x004C | 0x00C3 | DINT |
| 81 - stabiler Strom L2 xxx.xx A | Stable current L2 | | D-Word | 0x004D | 0x00C4 | DINT |
| 82 - stabiler Strom L3 xxx.xx A | Stable current L3 | | D-Word | 0x004E | 0x00C5 | DINT |
| 83 - interner Strom L1 xxx.xx A | Current internal L1 | | D-Word | 0x004F | 0x00B2 | DINT |
| 84 - interner Strom L2 xxx.xx A | Current internal L2 | | D-Word | 0x0050 | 0x00B3 | DINT |
| 85 - interner Strom L3 xxx.xx A | Current internal L3 | | D-Word | 0x0051 | 0x00B4 | DINT |
| 86 - externer Strom L1 xxx.xx A | Current external L1 | | D-Word | 0x0052 | 0x00BD | DINT |
| 87 - externer Strom L2 xxx.xx A | Current external L2 | | D-Word | 0x0053 | 0x00BE | DINT |
| 88 - externer Strom L3 xxx.xx A | Current external L3 | | D-Word | 0x0054 | 0x00BF | DINT |
| 89 - Differenz Strom L1 xxx.xx A | Diff. current L1 | | D-Word | 0x0055 | 0x00C6 | DINT |
| 90 - Differenz Strom L2 xxx.xx A | Diff. current L2 | | D-Word | 0x0056 | 0x00C7 | DINT |

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|---|-------------------------------|-------|--------|--------|--------|------|
| 91 - Differenz Strom L3 xxx.xx A | Diff. current L3 | | D-Word | 0x0057 | 0x00C8 | DINT |
| 92 - stabiler Strom I1 xxx.x % | Stable current L1 | | Word | 0x0058 | 0x00C9 | INT |
| 93 - stabiler Strom I2 xxx.x % | Stable current L2 | | Word | 0x0059 | 0x00CA | INT |
| 94 - stabiler Strom I3 xxx.x % | Stable current L3 | | Word | 0x005A | 0x00CB | INT |
| 95 - interner Strom I1 xxx.x % | Current internal L1 | | Word | 0x005B | 0x00B5 | INT |
| 96 - interner Strom I2 xxx.x % | Current internal L2 | | Word | 0x005C | 0x00B6 | INT |
| 97 - interner Strom I3 xxx.x % | Current internal L3 | | Word | 0x005D | 0x00B7 | INT |
| 98 - externer Strom I1 xxx.x % | Current external L1 | | Word | 0x005E | 0x00C0 | INT |
| 99 - externer Strom I2 xxx.x % | Current external L2 | | Word | 0x005F | 0x00C1 | INT |
| 100 - externer Strom I3 xxx.x % | Current external L3 | | Word | 0x0060 | 0x00C2 | INT |
| 101 - Differenz Strom I1 xxx.x % | Diff. current L1 | | Word | 0x0061 | 0x00CC | INT |
| 102 - Differenz Strom I2 xxx.x % | Diff. current L2 | | Word | 0x0062 | 0x00CD | INT |
| 103 - Differenz Strom I3 xxx.x % | Diff. current L3 | | Word | 0x0063 | 0x00CE | INT |
| 104 - Winkel intern I1-I2 xxx° | Angle internal L1-L2 | | Word | 0x0064 | 0x00AF | INT |
| 105 - Winkel intern I2-I3 xxx° | Angle internal L2-L3 | | Word | 0x0065 | 0x00B0 | INT |
| 106 - Winkel intern I3-I1 xxx° | Angle internal L3-L1 | | Word | 0x0066 | 0x00B1 | INT |
| 107 - Winkel extern I1-I2 xxx° | Angle external L1-L2 | | Word | 0x0067 | 0x00BA | INT |
| 108 - Winkel extern I2-I3 xxx° | Angle external L2-L3 | | Word | 0x0068 | 0x00BB | INT |
| 109 - Winkel extern I3-I1 xxx° | Angle external L3-L1 | | Word | 0x0069 | 0x00BC | INT |
| 110 - Winkel intern/extern L1 xxx° | Angle internal/external L1 | | Word | 0x006A | 0x00CF | INT |
| 111 - Diff.byte Intern Diff. current byte internal | Current internal detected I1 | Bit 0 | Byte | 0x006B | 0x00AA | Bool |
| | Current internal detected I2 | Bit 1 | Byte | 0x006B | 0x00AA | Bool |
| | Current internal detected I3 | Bit 2 | Byte | 0x006B | 0x00AA | Bool |
| | Nom. current detected L1+2+3 | Bit 3 | Byte | 0x006B | 0x00AA | Bool |
| | Free | Bit 4 | Byte | 0x006B | 0x00AA | Bool |
| | Free | Bit 5 | Byte | 0x006B | 0x00AA | Bool |
| | Diff current > | Bit 6 | Byte | 0x006B | 0x00AA | Bool |
| | Diff current >> | Bit 7 | Byte | 0x006B | 0x00AA | Bool |
| 112 - Diff.byte Extern Diff. current byte external | Current external detected I1 | Bit 0 | Byte | 0x006C | 0x00AB | Bool |
| | Current external detected I2 | Bit 1 | Byte | 0x006C | 0x00AB | Bool |
| | Current external detected I3 | Bit 2 | Byte | 0x006C | 0x00AB | Bool |
| | Nom. current detected L1+2+3 | Bit 3 | Byte | 0x006C | 0x00AB | Bool |
| | Free | Bit 4 | Byte | 0x006C | 0x00AB | Bool |
| | Free | Bit 5 | Byte | 0x006C | 0x00AB | Bool |
| | 85% ID at 500% triggering off | Bit 6 | Byte | 0x006C | 0x00AB | Bool |
| | 100% ID triggering off | Bit 7 | Byte | 0x006C | 0x00AB | Bool |
| 113 - Diff. Sperrbyte Diff. lock byte | Triggering disabled via DI | Bit 0 | Byte | 0x006D | 0x00AC | Bool |
| | Triggering disabled Delta ID | Bit 1 | Byte | 0x006D | 0x00AC | Bool |
| | Free | Bit 2 | Byte | 0x006D | 0x00AC | Bool |
| | Free | Bit 3 | Byte | 0x006D | 0x00AC | Bool |
| | Free | Bit 4 | Byte | 0x006D | 0x00AC | Bool |
| | Free | Bit 5 | Byte | 0x006D | 0x00AC | Bool |
| | Free | Bit 6 | Byte | 0x006D | 0x00AC | Bool |
| | Free | Bit 7 | Byte | 0x006D | 0x00AC | Bool |

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14.5 DI1 Module

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1/MB1 | Type |
|--------------------------------------|-------------|-------|--------|--------|---------|------|
| 198 - Eingangsbyte 1 Input byte 1 | DI101* | Bit 0 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI102* | Bit 1 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI103* | Bit 2 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI104* | Bit 3 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI105* | Bit 4 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI106* | Bit 5 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI107* | Bit 6 | Byte | 0x00C4 | 0x0056 | Bool |
| | DI108* | Bit 7 | Byte | 0x00C4 | 0x0056 | Bool |
| 199- Eingangsbyte 2 Input byte 2 | DI109* | Bit 0 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI110* | Bit 1 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI111* | Bit 2 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI112* | Bit 3 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI113* | Bit 4 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI114* | Bit 5 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI115* | Bit 6 | Byte | 0x00C5 | 0x0057 | Bool |
| | DI116* | Bit 7 | Byte | 0x00C5 | 0x0057 | Bool |
| 200 - Eingangsbyte 3 Input byte 3 | DI117* | Bit 0 | Byte | 0x00C6 | 0x0058 | Bool |
| | DI118* | Bit 1 | Byte | 0x00C6 | 0x0058 | Bool |
| | DI119* | Bit 2 | Byte | 0x00C6 | 0x0058 | Bool |
| | DI120* | Bit 3 | Byte | 0x00C6 | 0x0058 | Bool |
| | DI121* | Bit 4 | Byte | 0x00C6 | 0x0058 | Bool |
| | DI122* | Bit 5 | Byte | 0x00C6 | 0x0058 | Bool |
| | Free | Bit 6 | Byte | 0x00C6 | 0x0058 | Bool |
| | Free | Bit 7 | Byte | 0x00C6 | 0x0058 | Bool |
| 201 - Eingangsbyte 4 Input byte 4 | DI201* | Bit 0 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI202* | Bit 1 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI203* | Bit 2 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI204* | Bit 3 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI205* | Bit 4 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI206* | Bit 5 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI207* | Bit 6 | Byte | 0x00C7 | 0x0059 | Bool |
| | DI208* | Bit 7 | Byte | 0x00C7 | 0x0059 | Bool |
| 202 - Eingangsbyte 5 Input byte 5 | DI209* | Bit 0 | Byte | 0x00C8 | 0x005A | Bool |
| | DI210* | Bit 1 | Byte | 0x00C8 | 0x005A | Bool |
| | DI211* | Bit 2 | Byte | 0x00C8 | 0x005A | Bool |
| | DI212* | Bit 3 | Byte | 0x00C8 | 0x005A | Bool |
| | DI213* | Bit 4 | Byte | 0x00C8 | 0x005A | Bool |
| | DI214* | Bit 5 | Byte | 0x00C8 | 0x005A | Bool |
| | DI215* | Bit 6 | Byte | 0x00C8 | 0x005A | Bool |
| | DI216* | Bit 7 | Byte | 0x00C8 | 0x005A | Bool |
| 203 - Eingangsbyte 6 Input byte 6 | DI217* | Bit 0 | Byte | 0x00C9 | 0x005B | Bool |
| | DI218* | Bit 1 | Byte | 0x00C9 | 0x005B | Bool |
| | DI219* | Bit 2 | Byte | 0x00C9 | 0x005B | Bool |
| | DI220* | Bit 3 | Byte | 0x00C9 | 0x005B | Bool |
| | DI221* | Bit 4 | Byte | 0x00C9 | 0x005B | Bool |
| | DI222* | Bit 5 | Byte | 0x00C9 | 0x005B | Bool |
| | Free | Bit 6 | Byte | 0x00C9 | 0x005B | Bool |
| | Free | Bit 7 | Byte | 0x00C9 | 0x005B | Bool |
| 204 - Eingangsbyte 7 Input byte 7 | DI301* | Bit 0 | Byte | 0x00CA | 0x005C | Bool |
| | DI302* | Bit 1 | Byte | 0x00CA | 0x005C | Bool |
| | DI303* | Bit 2 | Byte | 0x00CA | 0x005C | Bool |
| | DI304* | Bit 3 | Byte | 0x00CA | 0x005C | Bool |
| | DI305* | Bit 4 | Byte | 0x00CA | 0x005C | Bool |
| | DI306* | Bit 5 | Byte | 0x00CA | 0x005C | Bool |
| | DI307* | Bit 6 | Byte | 0x00CA | 0x005C | Bool |
| | DI308* | Bit 7 | Byte | 0x00CA | 0x005C | Bool |
| 205 - Eingangsbyte 8 Input byte 8 | DI309* | Bit 0 | Byte | 0x00CB | 0x005D | Bool |
| | DI310* | Bit 1 | Byte | 0x00CB | 0x005D | Bool |
| | DI311* | Bit 2 | Byte | 0x00CB | 0x005D | Bool |
| | DI312* | Bit 3 | Byte | 0x00CB | 0x005D | Bool |
| | DI313* | Bit 4 | Byte | 0x00CB | 0x005D | Bool |
| | DI314* | Bit 5 | Byte | 0x00CB | 0x005D | Bool |
| | DI315* | Bit 6 | Byte | 0x00CB | 0x005D | Bool |
| | DI316* | Bit 7 | Byte | 0x00CB | 0x005D | Bool |

* See parameterization KAS

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| Modul - GSD-File | Description | Bit | Length | PB1 | PN1 | Type |
|--------------------------------------|-------------|-------|--------|--------|--------|------|
| 206 - Eingangsbyte 9 Input byte 9 | DI317* | Bit 0 | Byte | 0x00CC | 0x005E | Bool |
| | DI318* | Bit 1 | Byte | 0x00CC | 0x005E | Bool |
| | DI319* | Bit 2 | Byte | 0x00CC | 0x005E | Bool |
| | DI320* | Bit 3 | Byte | 0x00CC | 0x005E | Bool |
| | DI321* | Bit 4 | Byte | 0x00CC | 0x005E | Bool |
| | DI322* | Bit 5 | Byte | 0x00CC | 0x005E | Bool |
| | Free | Bit 6 | Byte | 0x00CC | 0x005E | Bool |
| | Free | Bit 7 | Byte | 0x00CC | 0x005E | Bool |

* See parameterization KAS

14.6 AI1 Module

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1/MB1 | Type |
|---|------------------------|-----|--------|--------|---------|------|
| 155 - Analogeingangswort U101 +/- 32767 * | Analog input 5 (V/mA) | | INT | 0x0099 | 0x0044 | INT |
| 156 - Analogeingangswort U102 +/- 32767 * | Analog input 6 (V/mA) | | INT | 0x009A | 0x0045 | INT |
| 157 - Analogeingangswort U103 +/- 32767 * | Analog input 7 (V/mA) | | INT | 0x009B | 0x0046 | INT |
| 158 - Analogeingangswort U104 +/- 32767 * | Analog input 8 (V/mA) | | INT | 0x009C | 0x0047 | INT |
| 159 - Analogeingangswort U105 +/- 32767 * | Analog input 9 (V/mA) | | INT | 0x009D | 0x0048 | INT |
| 160 - Analogeingangswort U106 +/- 32767 * | Analog input 10 (V/mA) | | INT | 0x009E | 0x0049 | INT |
| 161 - Analogeingangswort U201 +/- 32767 * | Analog input 11 (V/mA) | | INT | 0x009F | 0x004A | INT |
| 162 - Analogeingangswort U202 +/- 32767 * | Analog input 12 (V/mA) | | INT | 0x00A0 | 0x004B | INT |
| 163 - Analogeingangswort U203 +/- 32767 * | Analog input 13 (V/mA) | | INT | 0x00A1 | 0x004C | INT |
| 164 - Analogeingangswort U204 +/- 32767 * | Analog input 14 (V/mA) | | INT | 0x00A2 | 0x004D | INT |
| 165 - Analogeingangswort U205 +/- 32767 * | Analog input 15 (V/mA) | | INT | 0x00A3 | 0x004E | INT |
| 166 - Analogeingangswort U206 +/- 32767 * | Analog input 16 (V/mA) | | INT | 0x00A4 | 0x004F | INT |
| 167 - Analogeingangswort U301 +/- 32767 * | Analog input 17 (V/mA) | | INT | 0x00A5 | 0x0050 | INT |
| 168 - Analogeingangswort U302 +/- 32767 * | Analog input 18 (V/mA) | | INT | 0x00A6 | 0x0051 | INT |
| 169 - Analogeingangswort U303 +/- 32767 * | Analog input 19 (V/mA) | | INT | 0x00A7 | 0x0052 | INT |
| 170 - Analogeingangswort U304 +/- 32767 * | Analog input 20 (V/mA) | | INT | 0x00A8 | 0x0053 | INT |
| 171 - Analogeingangswort U305 +/- 32767 * | Analog input 21 (V/mA) | | INT | 0x00A9 | 0x0054 | INT |
| 172 - Analogeingangswort U306 +/- 32767 * | Analog input 22 (V/mA) | | INT | 0x00AA | 0x0055 | INT |

* Unit and scaling is the parameterization refer to

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14.7 AT1 Module

| Modul - GSD-File | Description | Bit | Length | PB1 | PN1/MB1 | Type |
|---|---------------------------|-----|--------|--------|---------|------|
| 210 - AT-1 / 1 Temperatur 1 in xxx.x ° | PT100(0) Measurement PT1 | | INT | 0x00D0 | 0x00DC | INT |
| 211 - AT-1 / 1 Temperatur 2 in xxx.x ° | PT100(0) Measurement PT2 | | INT | 0x00D1 | 0x00DD | INT |
| 212 - AT-1 / 1 Temperatur 3 in xxx.x ° | PT100(0) Measurement PT3 | | INT | 0x00D2 | 0x00DE | INT |
| 213 - AT-1 / 1 Temperatur 4 in xxx.x ° | PT100(0) Measurement PT4 | | INT | 0x00D3 | 0x00DF | INT |
| 214 - AT-1 / 1 Temperatur 5 in xxx.x ° | PT100(0) Measurement PT5 | | INT | 0x00D4 | 0x00E0 | INT |
| 215 - AT-1 / 1 Temperatur 6 in xxx.x ° | PT100(0) Measurement PT6 | | INT | 0x00D5 | 0x00E1 | INT |
| 216 - AT-1 / 1 Analog 1 +/- 32767 * | Analog input 23 (V/mA) | | INT | 0x00D6 | 0x00E2 | INT |
| 217 - AT-1 / 1 Analog 2 +/- 32767 * | Analog input 24 (V/mA) | | INT | 0x00D7 | 0x00E3 | INT |
| 218 - AT-1 / 2 Temperatur 1 in xxx.x ° | PT100(0) Measurement PT7 | | INT | 0x00D8 | 0x00E4 | INT |
| 219 - AT-1 / 2 Temperatur 2 in xxx.x ° | PT100(0) Measurement PT8 | | INT | 0x00D9 | 0x00E5 | INT |
| 220 - AT-1 / 2 Temperatur 3 in xxx.x ° | PT100(0) Measurement PT9 | | INT | 0x00DA | 0x00E6 | INT |
| 221 - AT-1 / 2 Temperatur 4 in xxx.x ° | PT100(0) Measurement PT10 | | INT | 0x00DB | 0x00E7 | INT |
| 222 - AT-1 / 2 Temperatur 5 in xxx.x °* | PT100(0) Measurement PT11 | | INT | 0x00DC | 0x00E8 | INT |
| 223 - AT-1 / 2 Temperatur 6 in xxx.x °* | PT100(0) Measurement PT12 | | INT | 0x00DD | 0x00E9 | INT |
| 224 - AT-1 / 2 Analog 1 +/- 32767 * | Analog input 25 (V/mA) | | INT | 0x00DE | 0x00EA | INT |
| 225 - AT-1 / 2 Analog 2 +/- 32767 * | Analog input 26 (V/mA) | | INT | 0x00DF | 0x00EB | INT |

* Unit and scaling is the parameterization refer to

Subject to technical modifications!

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