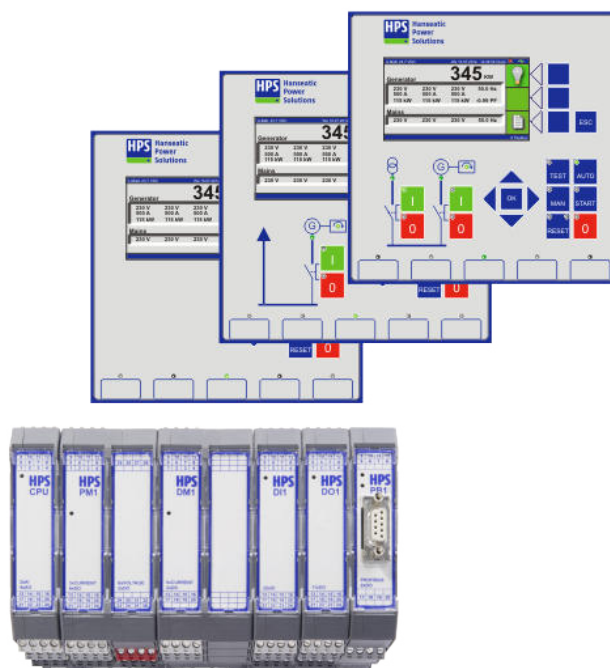


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1 General

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 optionally 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

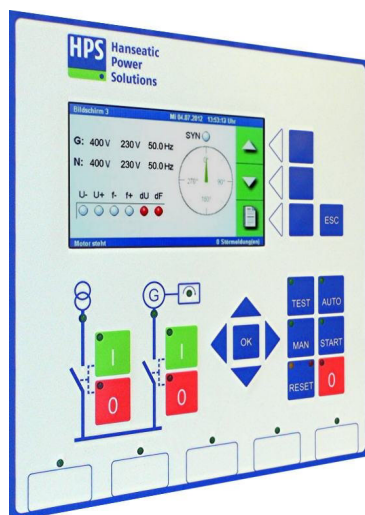
The function unit KAS is a modular system. The display and operating unit is designed for panel mounting with door panel. All further modules are mounted on a DIN rail in random order, connected via bus connector (T-Bus). Power is supplied by the CPU module. Display and operating unit, as well as Profibus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

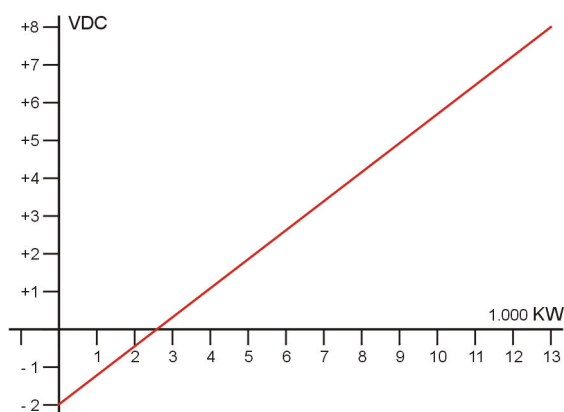
3.1 Analog inputs

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 bus-bar. 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 controlled 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

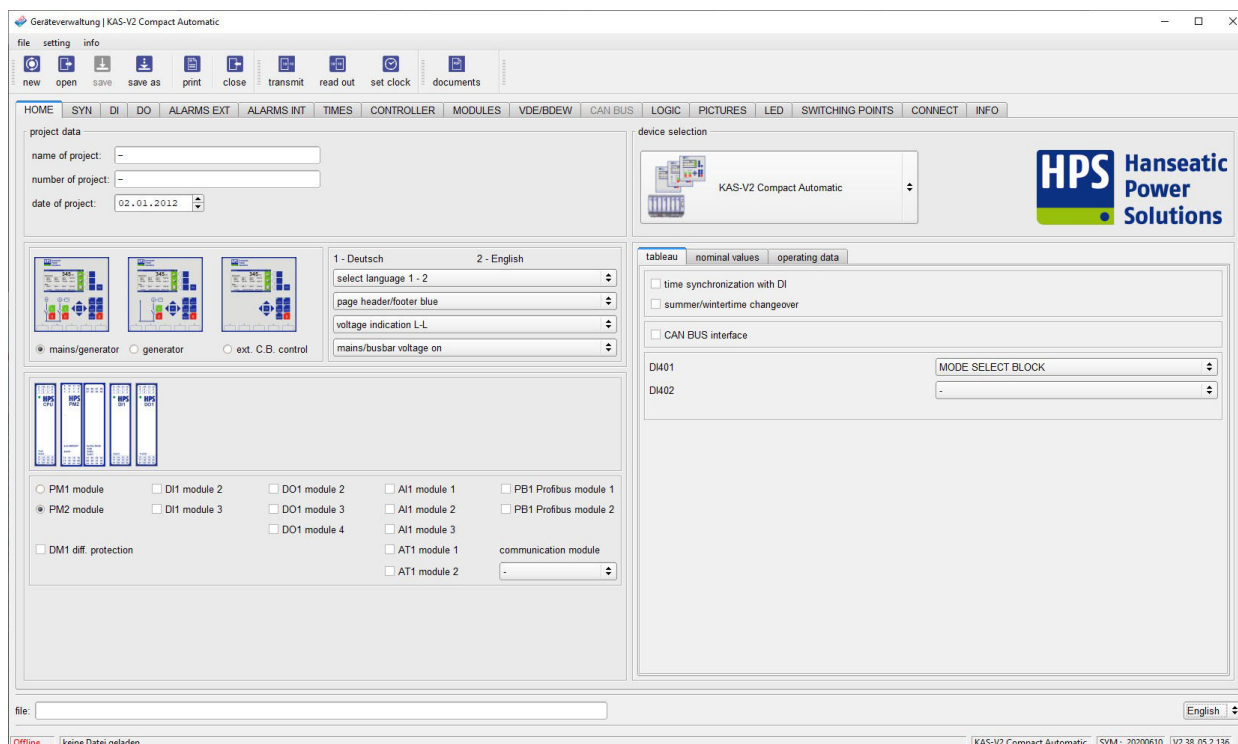
In addition to the load adjustment, the reactive load adjustment between the units can also be regulated via the BUS connection for generator controllers. For this purpose, the Cos Phi controller must also be activated in the menu "Controller → Setpoints". The functionality of the reactive load adjustment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

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4 Setting device management

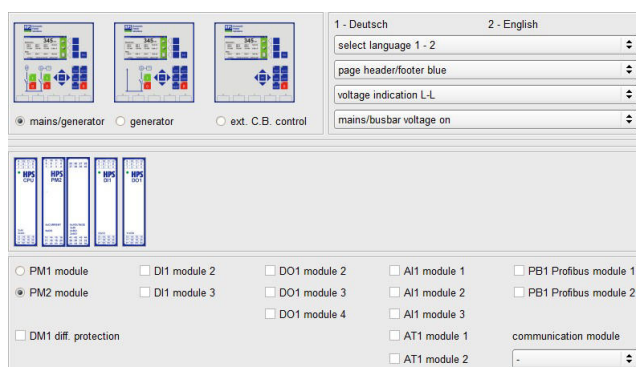
KOP2 parameter setting should be done with the supplied software stored on the SD card, to be found in the folder _Parameter software for data transfer a serial data cable (D-SUB 9pol. – 1:1) is required. Most of the parameters can also be adjusted directly at the panel (Setting→Parameter input). For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

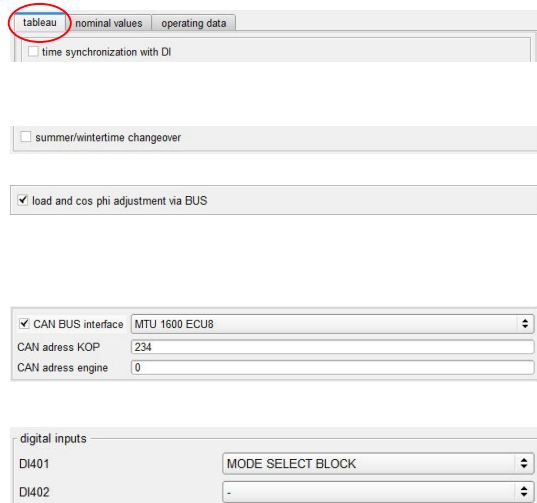
- Select display language
- Color of page header/footer
- Selection of voltage display for mains and generator measurement in the initial screen
- Fade out the mains / busbar voltage

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

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4.1.2 Tableau



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

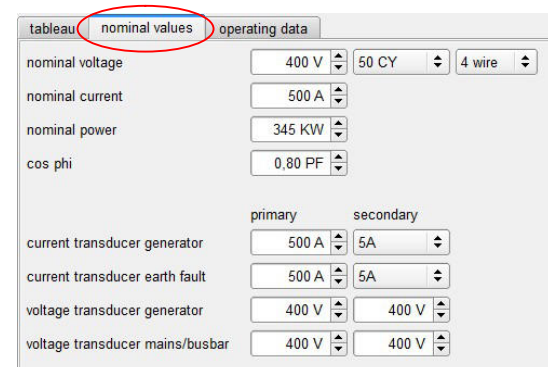
Automatic changeover from summer to winter time.

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.

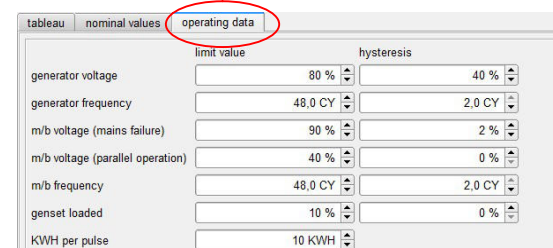
4.1.3 Nominal values



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



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

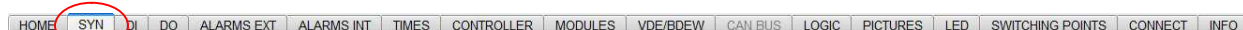
Upon Gen CB deselection it will be switched off after falling below the operating value „Genset loaded“.

KWH value counting unit.

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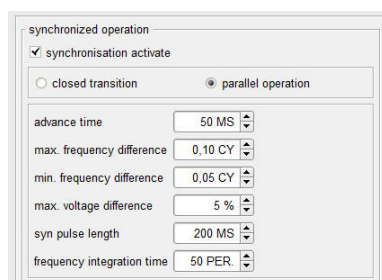
4.2 Synchronization



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

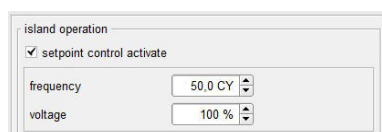


If the synchronization is disabled switching is done with a gap. Synchronization parameters are not displayed.

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



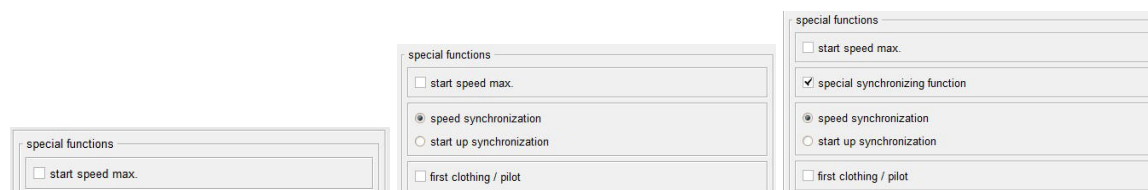
If the setpoint control is active in island operation mode the input voltage and frequency are adjusted accordingly. This adjustment can be blocked via the digital input „Block setpoint control U/F“. If a setpoint value has been set to „0“ this control will be disabled.

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



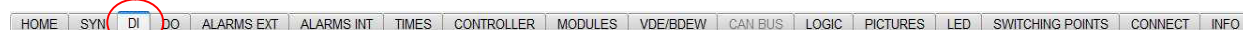
Mains/generator

Generator

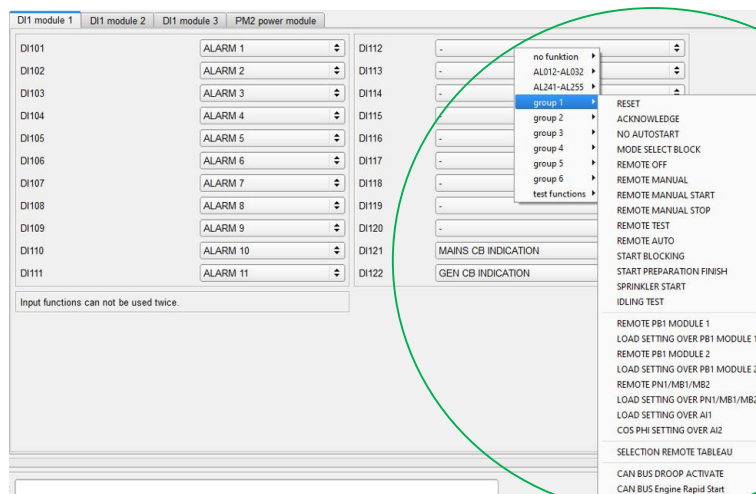
Ext. C.B. Control

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



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.



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 genset.
102	Genset parallel operation	Upon Gen CB deselection the pilot genset 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 genset. The Gen CB is turned off after unloading of genset.
76	Load	If the input is deactivated with active power control, the active controller is adjusted to unload the genset. The Gen CB is turned off after unloading of genset.
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.

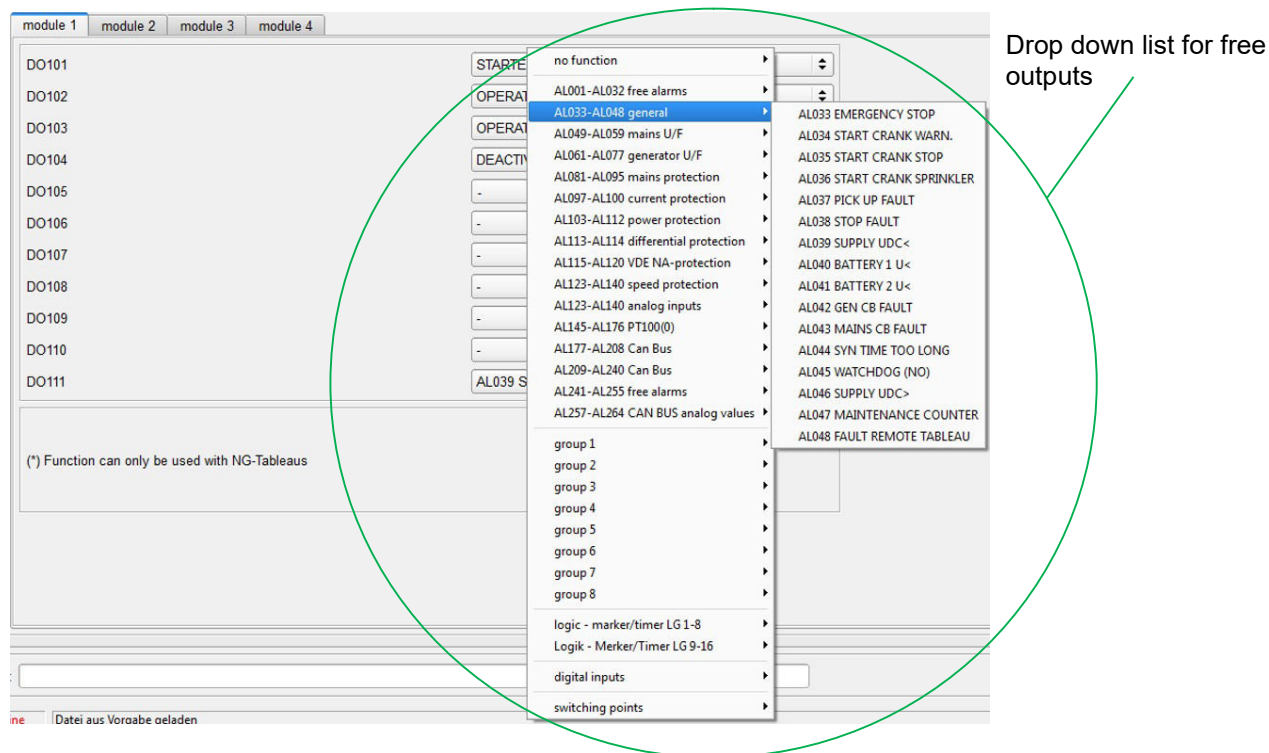
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4.4 Digital outputs

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.



Drop down list for free outputs

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		
1 to 32	AL001 to AL032	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	If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output.
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 <<	If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output.
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	If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output.
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 capacitive	
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. One or several participants are missing on the BUS.
102	AL102 LAAZA participant missing	
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		
		If the value exceeds or falls below the previously input limit value, the released alarm can be output via a digital output.
591 bis 595	AL257 bis AL261	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.
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Group 6

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

Group 7

556 to 563 & 672 to 679	PN1 / MB1 / MB2 Control Bit 1 - 8 PN1 / MB1 / MB2 Control Bit 9 - 16	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.
564 to 571	PB1 Control Bit 1 – 8	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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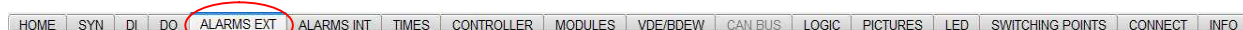
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Group 8		
599 to 608	CAN BUS AIN01 <x or >x to CAN BUS AIN08 <x or >x	For the first 5 analog values coming from the engine (CAN BUS), two limit values are available. The output is set when falling below (<x) or exceeding (>x) the respective limit value.
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.

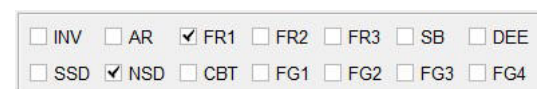
4.5.1 Alarm characteristics



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



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



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/BOEW 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 DE AL033 Not-Halt
EN AL033 Emergency stop delay time ☒ INV ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☒ DEE
☒ SSD ☐ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ FG4

☐ 034 AL034 Fehlstart warnend
ANSI 48 AL034 Start crank warning

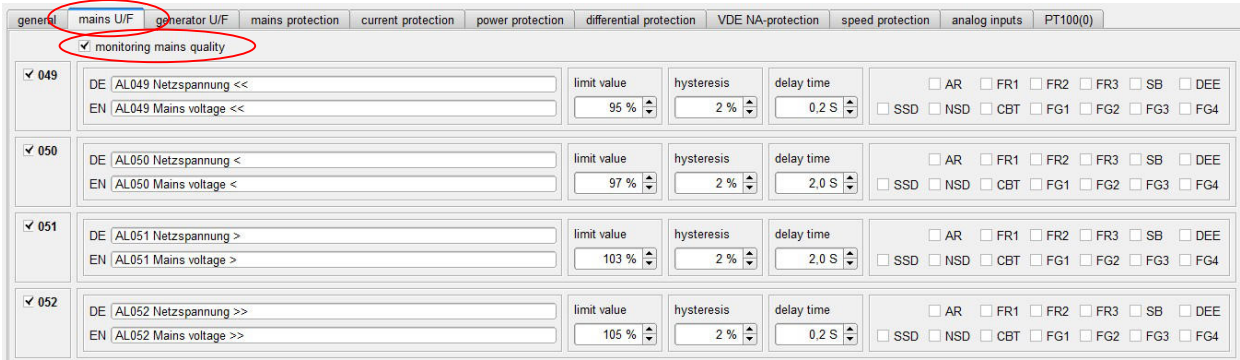
☒ 035 DE AL035 Fehlstart abstellend limit value delay time ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☐ DEE
ANSI 48 EN AL035 Start crank stop 3 Start ☒ SSD ☒ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ FG4

☒ 036 DE AL036 Fehlstart Sprinkler limit value delay time ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☐ DEE
ANSI 48 EN AL036 Start crank sprinkler 10 Start ☒ SSD ☐ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ 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

4.6.2 Mains U/F



The screenshot shows the 'mains U/F' configuration tab. The 'monitoring mains quality' checkbox is checked. Below it, four alarm settings are listed:

- AL049**: DE AL049 Netzspannung <<, EN AL049 Mains voltage <<. Limit value: 95 %, hysteresis: 2 %, delay time: 0.2 S. Outputs: AR, FR1, FR2, FR3, SB, DEE, SSD, NSD, CBT, FG1, FG2, FG3, FG4.
- AL050**: DE AL050 Netzspannung <, EN AL050 Mains voltage <. Limit value: 97 %, hysteresis: 2 %, delay time: 2.0 S. Outputs: AR, FR1, FR2, FR3, SB, DEE, SSD, NSD, CBT, FG1, FG2, FG3, FG4.
- AL051**: DE AL051 Netzspannung >, EN AL051 Mains voltage >. Limit value: 103 %, hysteresis: 2 %, delay time: 2.0 S. Outputs: AR, FR1, FR2, FR3, SB, DEE, SSD, NSD, CBT, FG1, FG2, FG3, FG4.
- AL052**: DE AL052 Netzspannung >>, EN AL052 Mains voltage >>. Limit value: 105 %, hysteresis: 2 %, delay time: 0.2 S. Outputs: AR, FR1, FR2, FR3, SB, DEE, SSD, NSD, CBT, FG1, FG2, FG3, 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 << AL050 Mains voltage < AL051 Mains voltage > AL052 Mains voltage >> AL053 Mains frequency << AL054 Mains frequency < AL055 Mains frequency > AL056 Mains frequency >>	Monitoring of mains quality. 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.
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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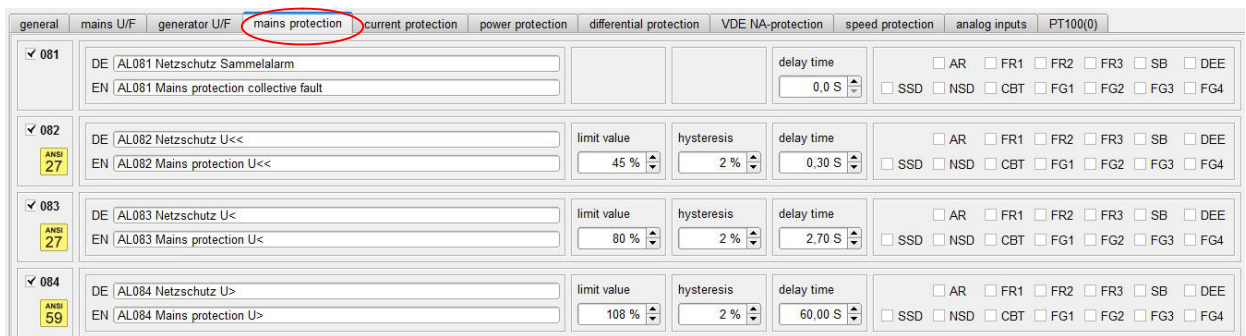
4.6.3 Generator U/F

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

4.6.4 Mains protection

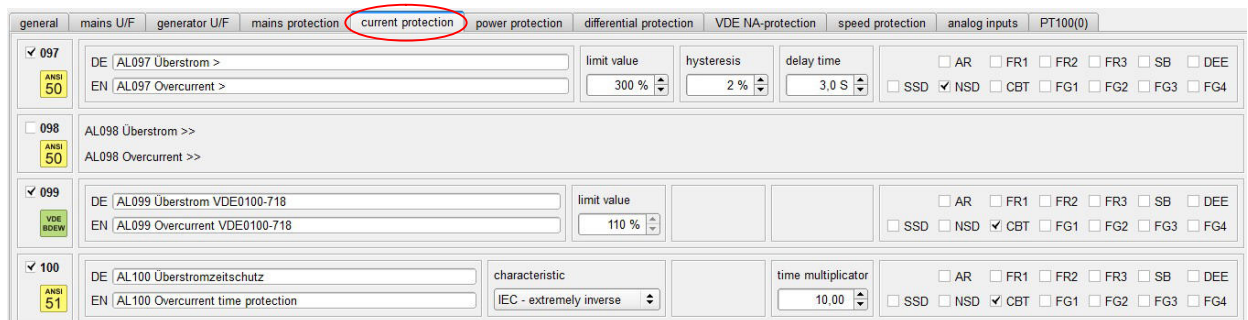


When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.

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.

4.6.5 Current protection



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.

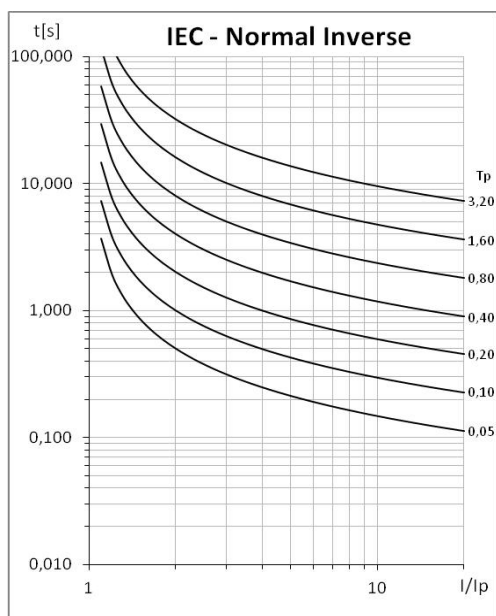
The current protection function of KAS monitors the current in three-phase networks. Current metering takes place as simultaneous 3-phase sampling and is a true effective value measuring. The current measuring circuits and supply voltage are galvanically-isolated (DC) among each other and against electronic 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.

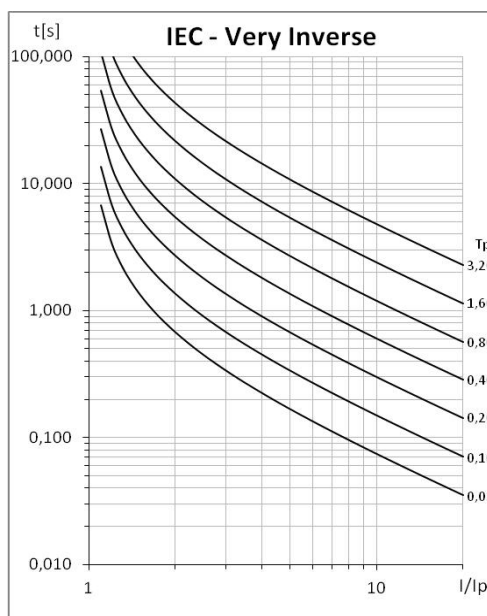
Compact automatic

User manual

4.6.5.1 IEC Characteristics

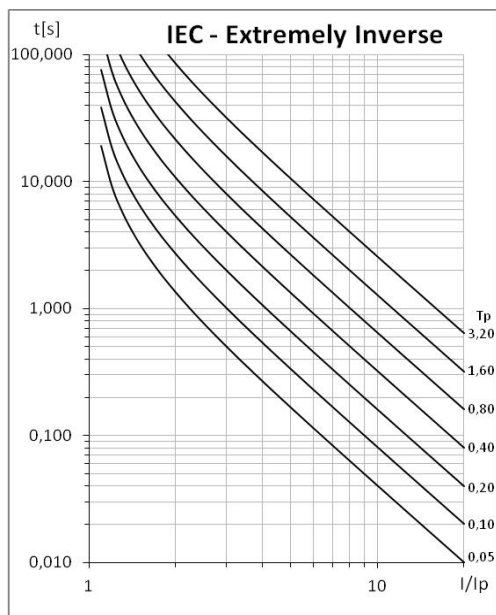


$$t = \frac{0,14}{\left(\frac{I}{I_p}\right)^{0,02} - 1} T_p$$

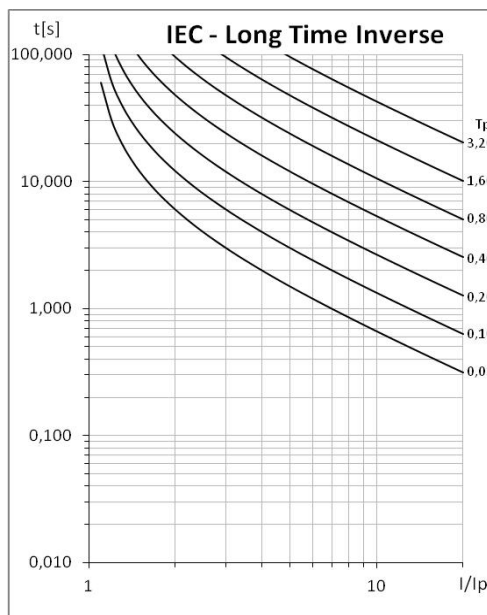


$$t = \frac{13,5}{\left(\frac{I}{I_p}\right)^1 - 1} T_p$$

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



$$t = \frac{80}{\left(\frac{I}{I_p}\right)^2 - 1} T_p$$



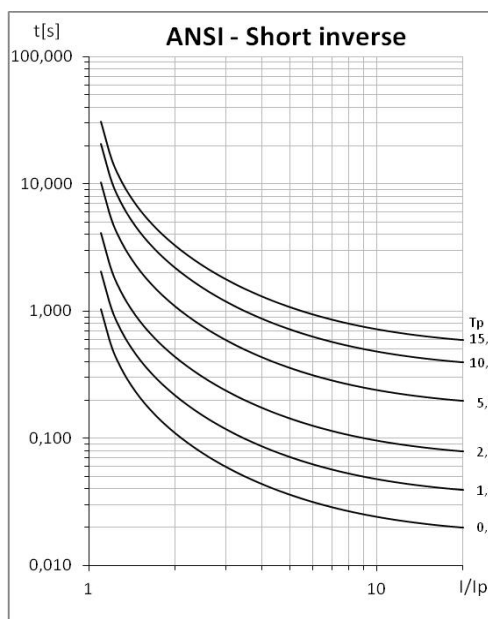
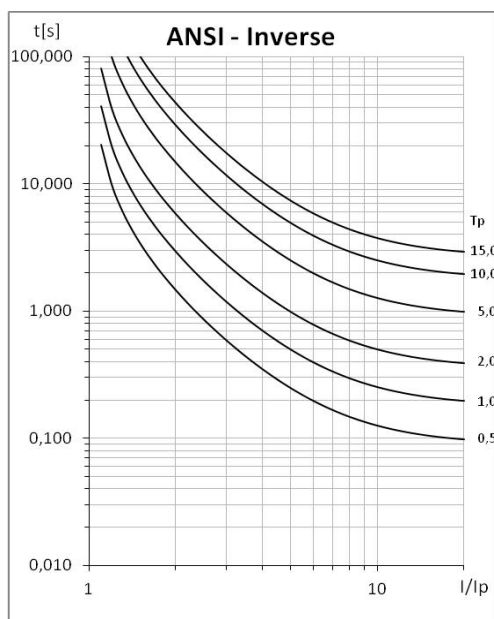
$$t = \frac{120}{\left(\frac{I}{I_p}\right) - 1} T_p$$

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

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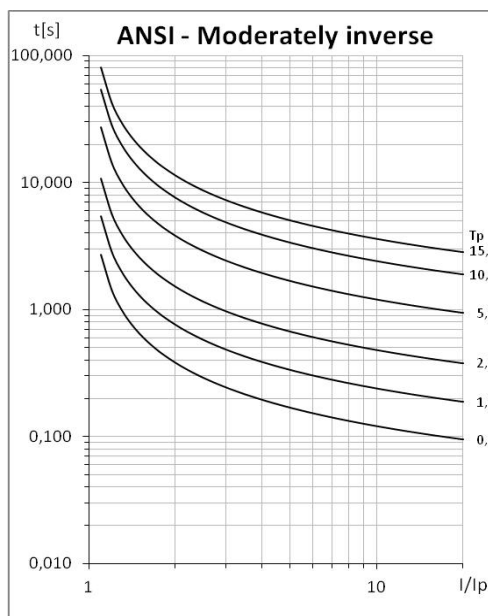
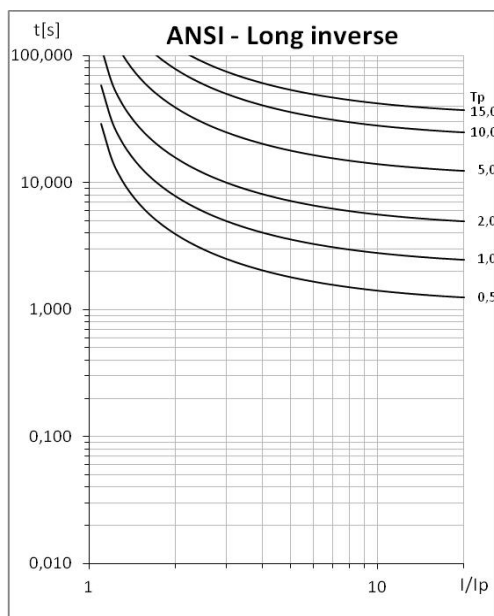
4.6.5.2 ANSI Characteristics



$$t = \left(\frac{8,9341}{\left(\frac{I}{I_p}\right)^{2,0938} - 1} + 0,17966 \right) T_p$$

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

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



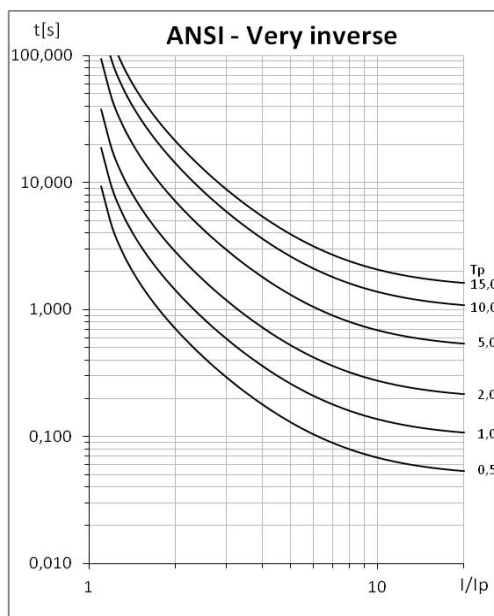
$$t = \left(\frac{5,6143}{\left(\frac{I}{I_p}\right)^1 - 1} + 2,18592 \right) T_p$$

$$t = \left(\frac{0,0103}{\left(\frac{I}{I_p}\right)^{0,02} - 1} + 0,0228 \right) T_p$$

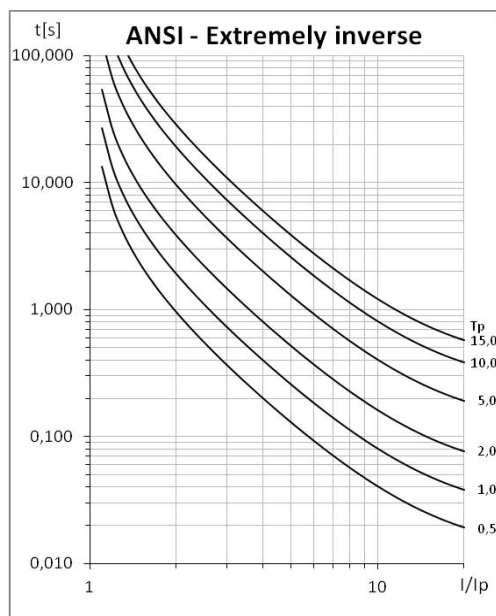
t =delay time / T_p =time multiplier / I = act. current value / I_p =nom. value

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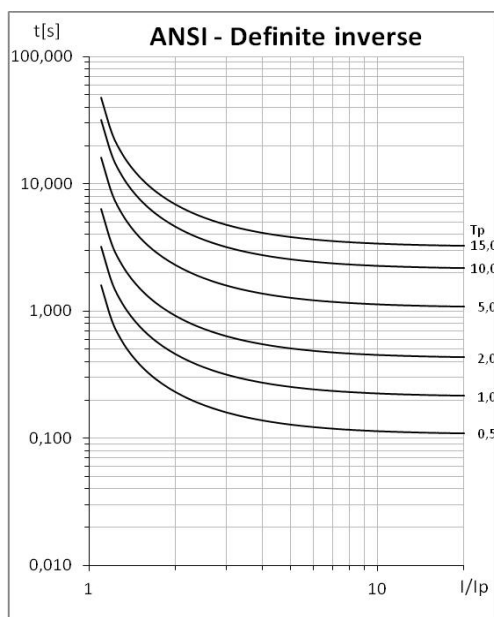


$$t = \left(\frac{3,922}{\left(\frac{I}{I_p}\right)^2} + 0,0982 \right) T_p$$



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

t=delay time / Tp=time multiplier / I= act. current value / Ip=nom. value



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

t=delay time / Tp=time multiplier / I= act. current value / Ip=nom. value

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)

103

VDE 4105

AL103 VDE4105 Leistungsreduzier. gestört

AL103 VDE4105 Power reduction fault

104

ANSI 32

DE | AL104 Leistung >

EN | AL104 Power >

limit value

115 %

hysteresis

2 %

delay time

10.0 S

☐ AR

☐ FR1

☐ FR2

☐ FR3

☐ SB

☐ DEE

☐ SSD

☐ NSD

☐ CBT

☐ FG1

☐ FG2

☐ FG3

☐ FG4

105

ANSI 32

DE | AL105 Leistung >>

EN | AL105 Power >>

limit value

120 %

hysteresis

2 %

delay time

5.0 S

☐ AR

☐ FR1

☐ FR2

☐ FR3

☐ SB

☐ DEE

☐ SSD

☐ NSD

☒ CBT

☐ FG1

☐ FG2

☐ FG3

☐ FG4

106

ANSI 32

DE | AL106 Rückleistung >

EN | AL106 Reverse power >

limit value

-5 %

hysteresis

2 %

delay time

10.0 S

☐ AR

☐ FR1

☐ FR2

☐ FR3

☐ SB

☐ DEE

☐ SSD

☐ NSD

☒ CBT

☐ FG1

☐ FG2

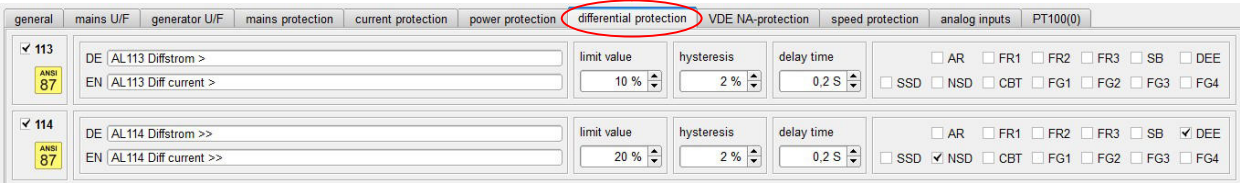
☐ FG3

☐ 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.

4.6.7 Differential protection



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.

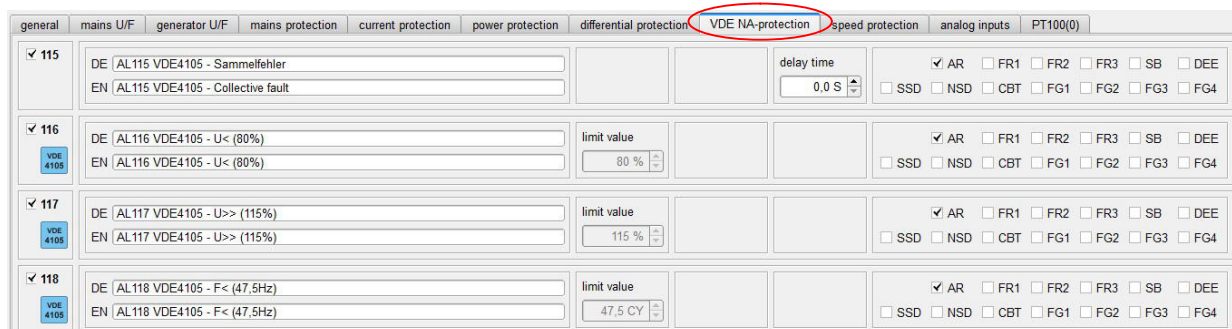
The differential protection measuring is the comparison of currents between generator star point and the outflow of generator or the supply in the switching gear. The sum of all currents must be zero.

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



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.

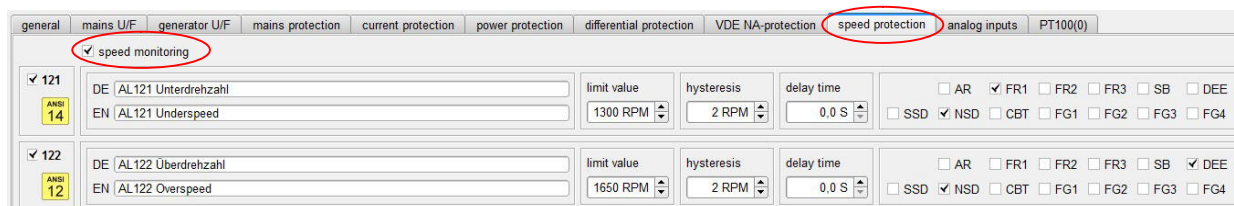
The VDE NA protection alarms are generated from the values measured at the generator voltage input.

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.

Compact automatic

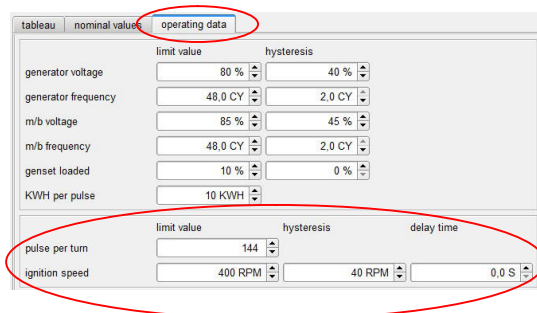
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4.6.9 Speed protection



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

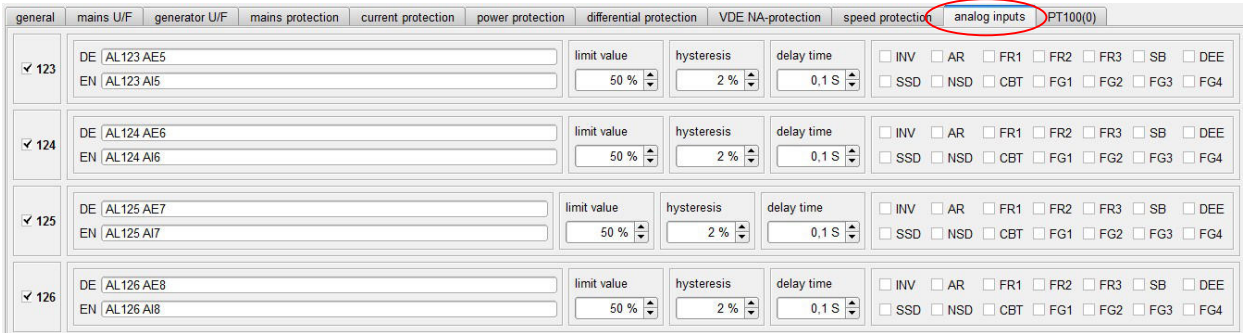
When exceeding or falling below the limit value the alarm is visualized acc. to the alarm behaviour (see Item 4.5.1) and after expiration of the delay time. All alarms can be parameterized to a digital output. It is not possible to modify the alarm message texts as the alarms are linked to internal functions.



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	

4.6.10 Analog inputs



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.
Analog inputs	
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.
Analog inputs	
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>		limit value		hysteresis	delay time	☐ INV ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☐ DEE ☐ SSD ☐ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ FG4			
	EN AL145 PT1>		5,0 °C		0,2 °C	0,1 S				
✓ 146	DE AL146 PT1>>		limit value		hysteresis	delay time	☐ INV ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☐ DEE ☐ SSD ☐ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ FG4			
	EN AL146 PT1>>		5,0 °C		0,2 °C	0,1 S				
✓ 147	DE AL147 PT2>		limit value		hysteresis	delay time	☐ INV ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☐ DEE ☐ SSD ☐ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ FG4			
	EN AL147 PT2>		5,0 °C		0,2 °C	0,1 S				
✓ 148	DE AL148 PT2>>		limit value		hysteresis	delay time	☐ INV ☐ AR ☐ FR1 ☐ FR2 ☐ FR3 ☐ SB ☐ DEE ☐ SSD ☐ NSD ☐ CBT ☐ FG1 ☐ FG2 ☐ FG3 ☐ FG4			
	EN AL148 PT2>>		5,0 °C		0,2 °C	0,1 S				

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.
PT100(0)	
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.

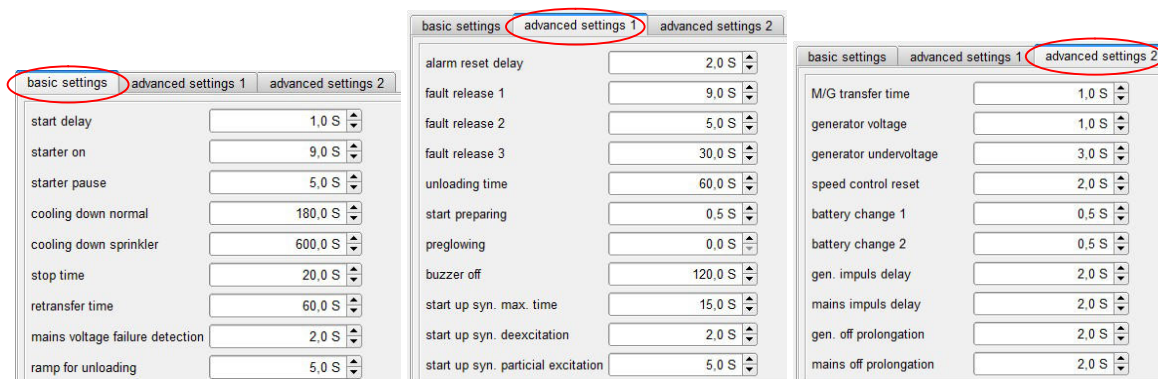
Compact automatic

User manual

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	
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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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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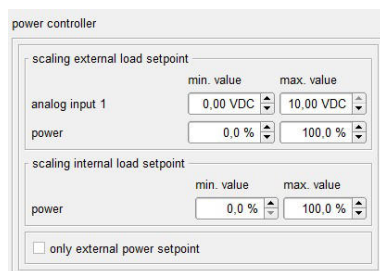
4.8 Controller

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

4.8.1 Setpoint

setpoint analog outputs PID-T1 controller pulse controller electronic potentiometer LAAZA

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	X			X	
	X	X	X	X	X		

Compact automatic

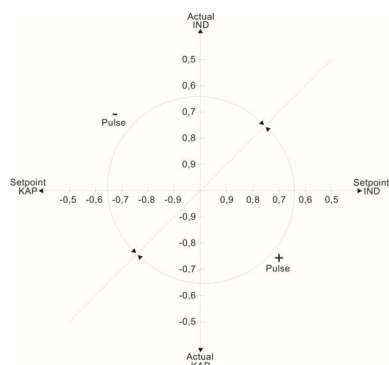
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4.8.1.2 Cos Phi controller

☒ 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.

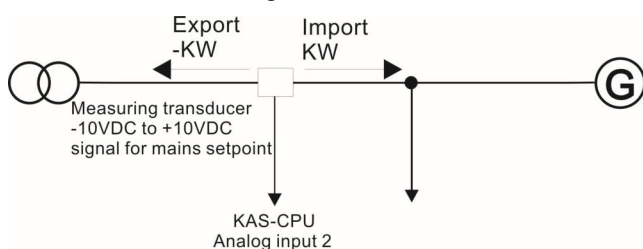
Furthermore the input range for the mains setpoint (panel input) can be limited here.

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.

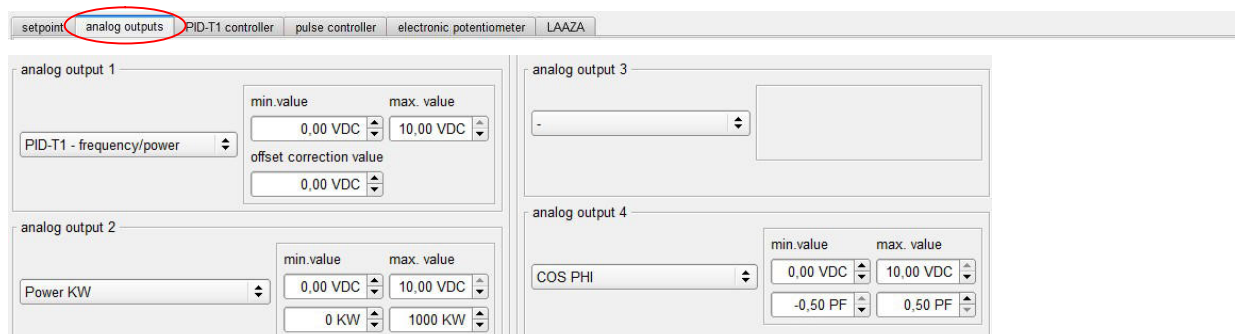
To activate the regulation during mains parallel operation a digital input with the function 'Mains Im./Ex. Contr.' has to be energized.



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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	
El.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.
El.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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4.8.3 PID-T1 controller

setpoint analog outputs **PID-T1 controller** pulse controller electronic potentiometer LAAZA

☐ overwrite controller parameters in the KOP

[1]

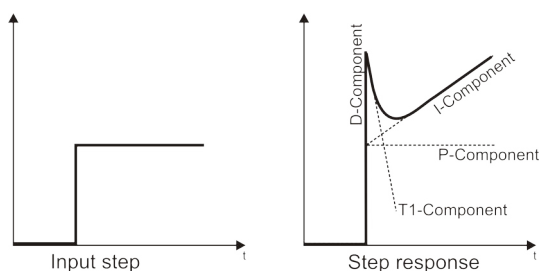
		Kp	Ti	Td	T1	dead zone	release delay
island operation	frequency	3,00	2,00 S	0,00 S	0,2 S	0,05 CY	0,0 S
synchronization operation	frequency	3,00	2,00 S	0,00 S	0,2 S	0,00 CY	0,0 S
mains parallel operation	power	1,00	2,00 S	0,00 S	0,2 S	1,0 %	0,0 S
generator parallel operation	power	3,00	2,00 S	0,00 S	0,2 S	1,0 %	0,0 S

☐ overwrite controller parameters in the KOP

		Kp	Ti	Td	T1	dead zone	release delay
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.

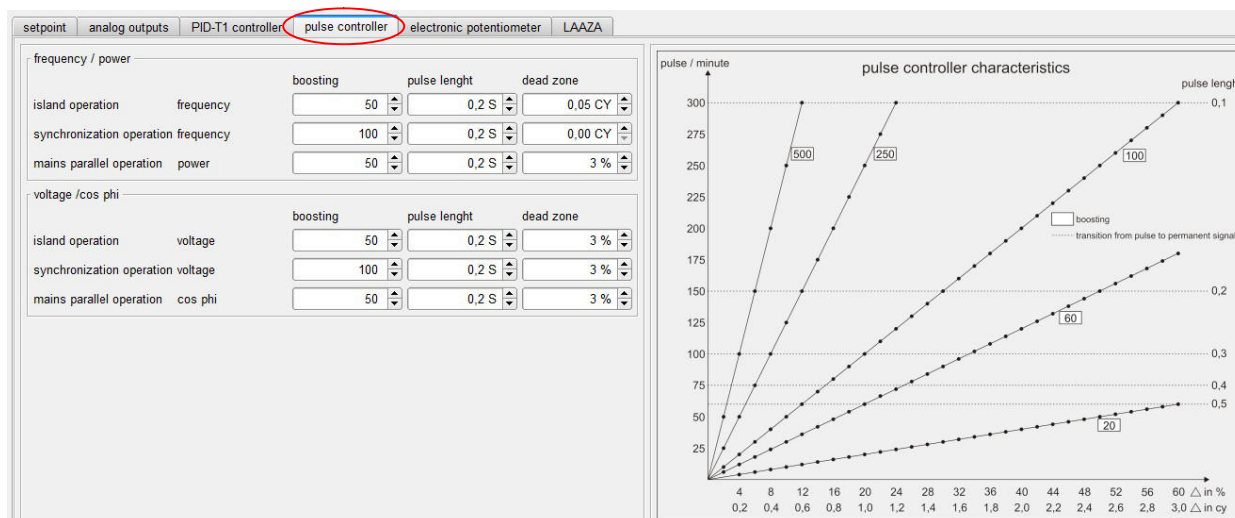


PID-T1 controller	
Kp	Proportional coefficient – The step response is following the trend of the input signal. Only the amplitude changes.
Ti	Integration time – control time, required from the output to reach the height of the controlled variable step at the input.
Td	Derivative action time – An input 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



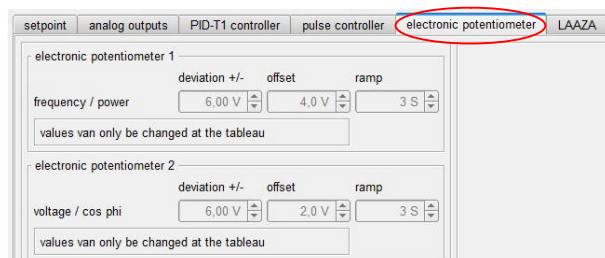
Settings for controller characteristics. Each operation condition has its individual settings. Controller settings affect the pulse controller (output via digital outputs), as well as the electr. potentiometer adjustments.

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

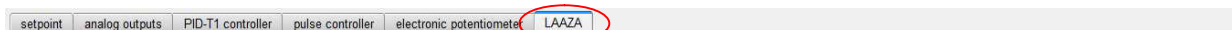


Input of electronic potentiometer values is only possible via panel. When visualizing the parameter data only the values input via panel are displayed.

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4.8.6 Load-dependent dis-/connection



!!! The ID on the panel must be set before commissioning !!!

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

	ID
starting order by	operating hours
number of engines	2
engines for base load	1
engines switch on/off	1
LAAZA delaytime	10 MIN
engine change by time	0 MIN

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.

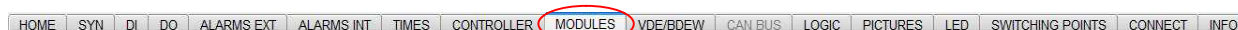
	limit value	delay time
deselection <<	20 %	1,0 S
deselection <	30 %	10,0 S
selection >	80 %	10,0 S
selection >>	90 %	1,0 S

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

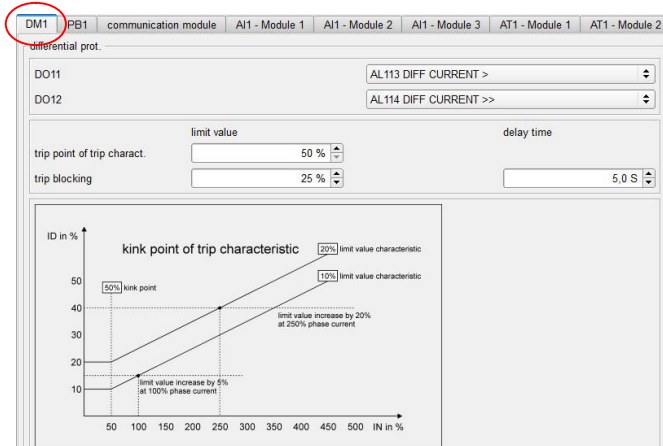
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4.9 Modules



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.

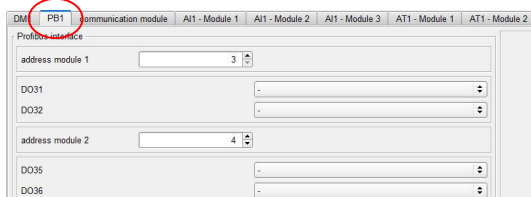
If the residual current in one of the three phases is greater than the pre-selected limit value, the delay time starts to run. Once the delay time is up the appropriate error message is integrated into the KOP 2 display. In addition it is possible to link a digital output to the error message function. 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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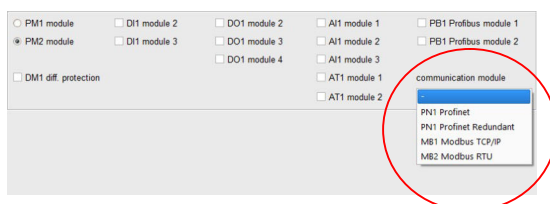
4.9.2 PB1 module



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.

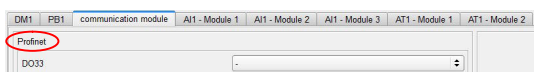
To connect with the PLC the correct address has to be set. Each PB1 module offers two output relays to be assigned to functions according to the dropdown lists.

4.9.3 Communication module

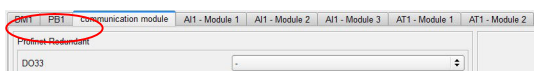


Four BUS modules are available for the communication module. In order to make the settings for the selected BUS connection, the corresponding module must be activated under the "HOME" tab. If the module is activated but not on the bus connector, the "watchdog" error occurs.

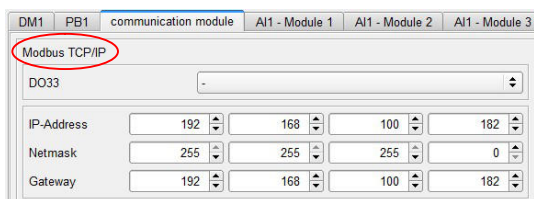
4.9.3.1 PN1 module



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.

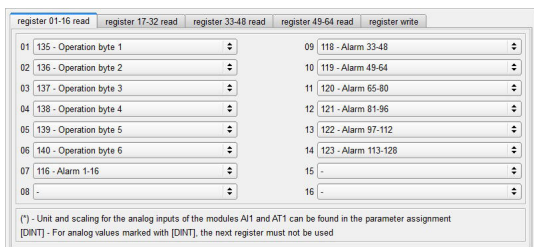


4.9.3.2 MB1 TCP/IP module



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.



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

Assignment example:

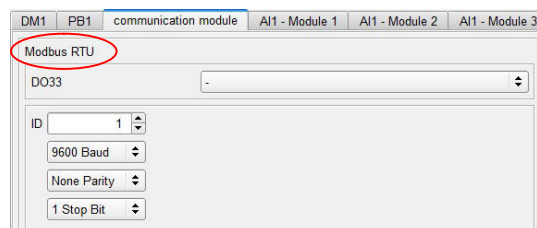
Module number 135 – Operation byte 1

135 - Betriebsbyte 1	OFF	Bit 0	Byte
Operation byte 1	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

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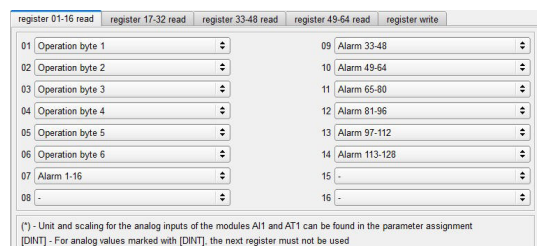
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4.9.3.3 MB2 RTU module



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.



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

135 - Betriebsbyte 1	OFF	Bit 0	Byte
Operation byte 1	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

Pin connection at the Modbus RTU module MB2:

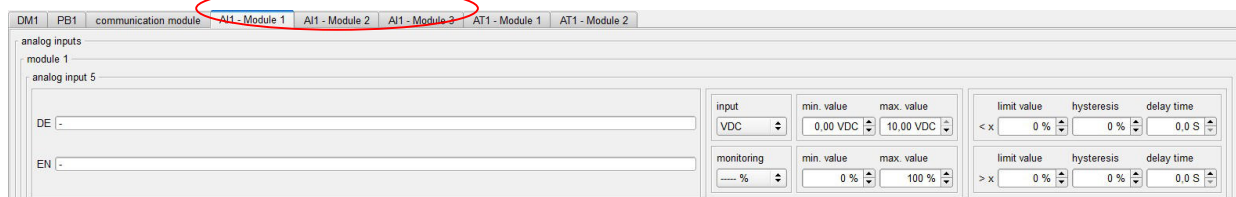
RS-232		
Pin	Signal	Comment
1	GND	Bus polarization, ground (isolated)
2 - 3		Connect pin #2 to pin #3 (jumper)
7	Rx	RS-232 Data Receive
8	Tx	RS-232 Data Transmit

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

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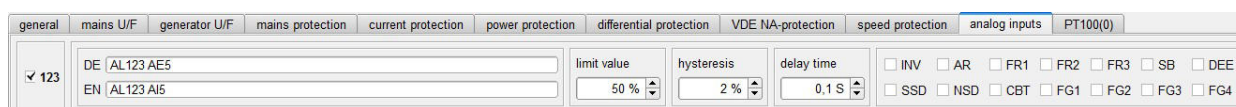
4.9.4 AI1 module



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

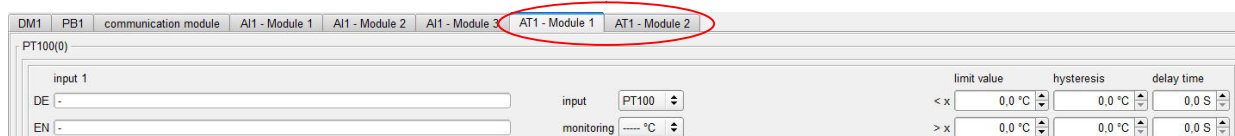
Furthermore there are two adjustable limit values available for selection for each input.

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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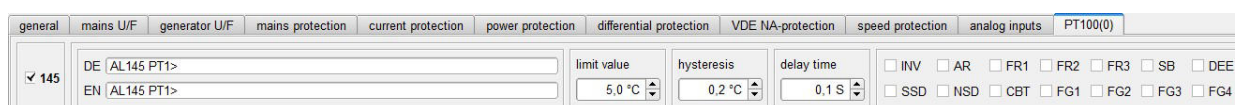
4.9.5 AT1 module



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)“.



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.

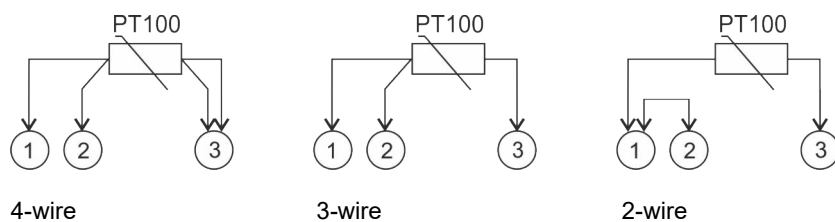
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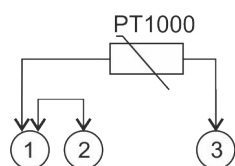
Limit value	
< x / > x	When falling below or exceeding the limit value and after expiration of the delay time the respective output relay will be activated.

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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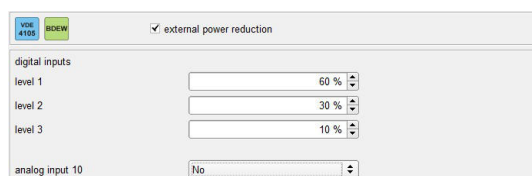
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4.10 VDE/BDEW

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



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

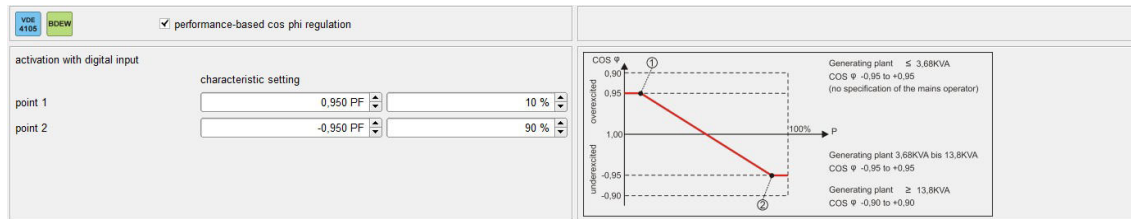


This function has to be enabled. Regarding operation, there are differences between VDE4105 and BDEW.

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%.

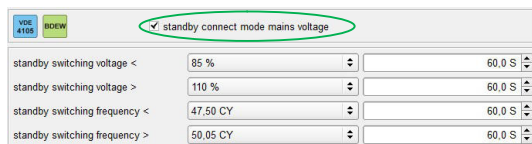
4.10.3 Performance-based Cos ϕ regulation



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.

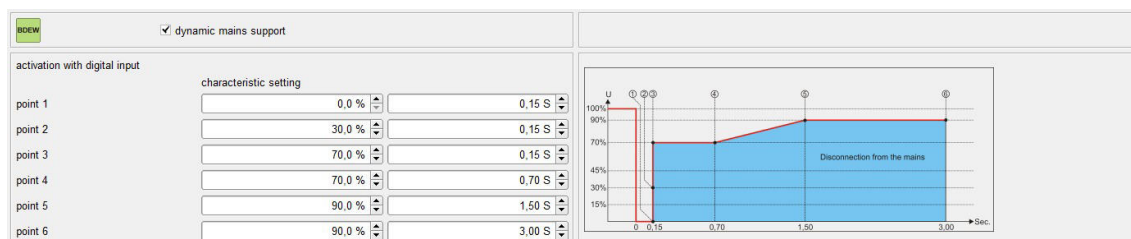
Mains connection is only established if mains voltage and mains frequency are in certain ranges of tolerance. These ranges differ in VDE4105 and BDEW.

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.

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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.

AIN 1-8	AIN 9-16	AIN 17-24	AIN 25-32	BIN 1-8	A/B OUT	alarms 177-192	alarms 193-208	alarms 209-224	alarms 225-240	alarms 257-265
AIN 01	Engine speed	<x	0 rpm	0 rpm	0,0 S	>x	0 rpm	0 rpm	0,0 S	
AIN 02	Coolant temperature	<x	0 °C	0 °C	0,0 S	>x	0 °C	0 °C	0,0 S	
AIN 03	Oil pressure	<x	0,00 bar	0,00 bar	0,0 S	>x	0,00 bar	0,00 bar	0,0 S	
AIN 04	-	<x	0,0 °C	0,0 °C	0,0 S	>x	0,0 °C	0,0 °C	0,0 S	
AIN 05	-	<x	0,0 %	0,0 %	0,0 S	>x	0,0 %	0,0 %	0,0 S	
AIN 06	Battery voltage									
AIN 07	MTU Error code									
AIN 08	-									

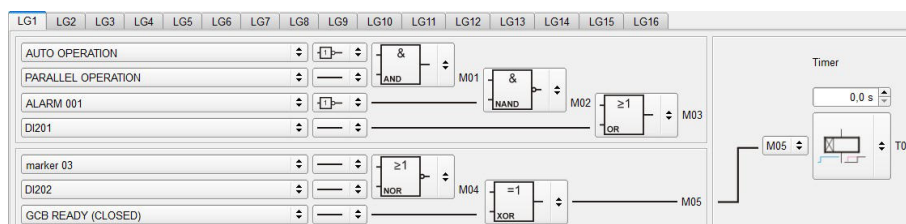
There are two adjustable limit values for the first five analog values, if available on the selected ECU.

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.

M01	START BLOCKING	M04	-
M02	IDLING TEST	M05	-
M03	LOCK SYN OPERATION	T01	-

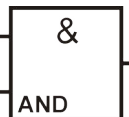
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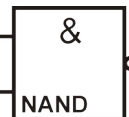
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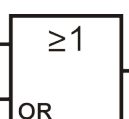
4.12.1 Logic blocks

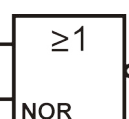
The following functions for the logic blocks are available.

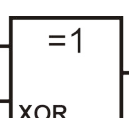
 Via this icon the inputs can be negated.

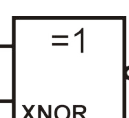
	In1	In2	Out
	0	0	0
	0	1	0
	1	0	0
	1	1	1

	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

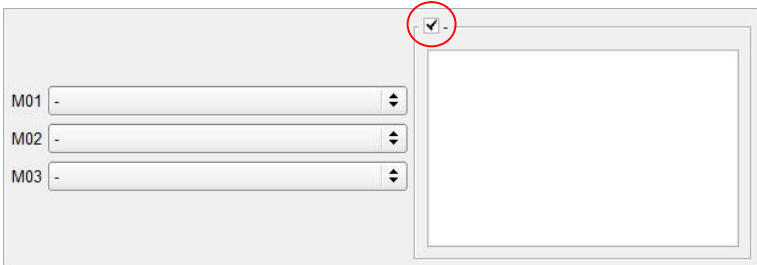
 Timer on-delayed

 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.



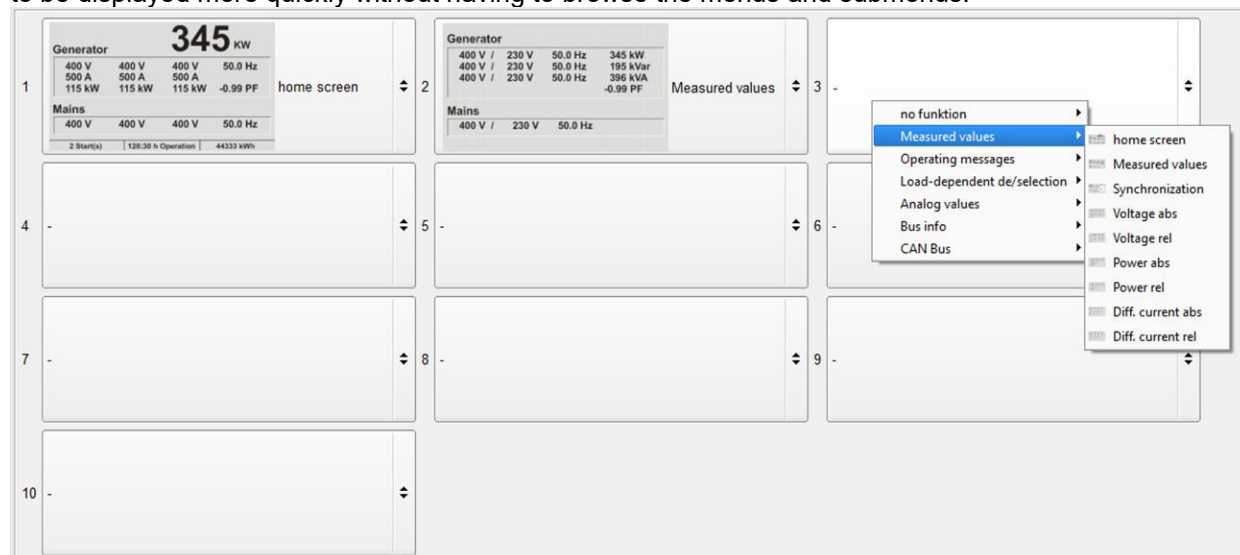
Compact automatic

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

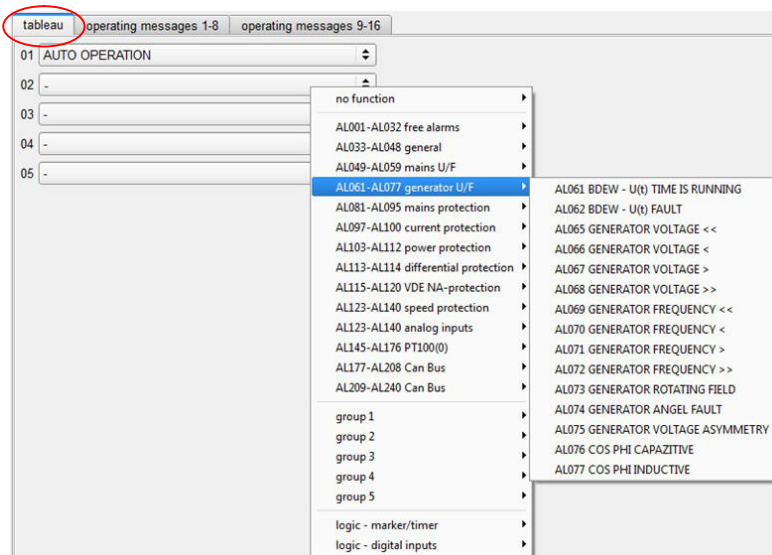
A total of 10 pictures can be selected, which can be browsed through in the main level. This allows them to be displayed more quickly without having to browse the menus and submenus.



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

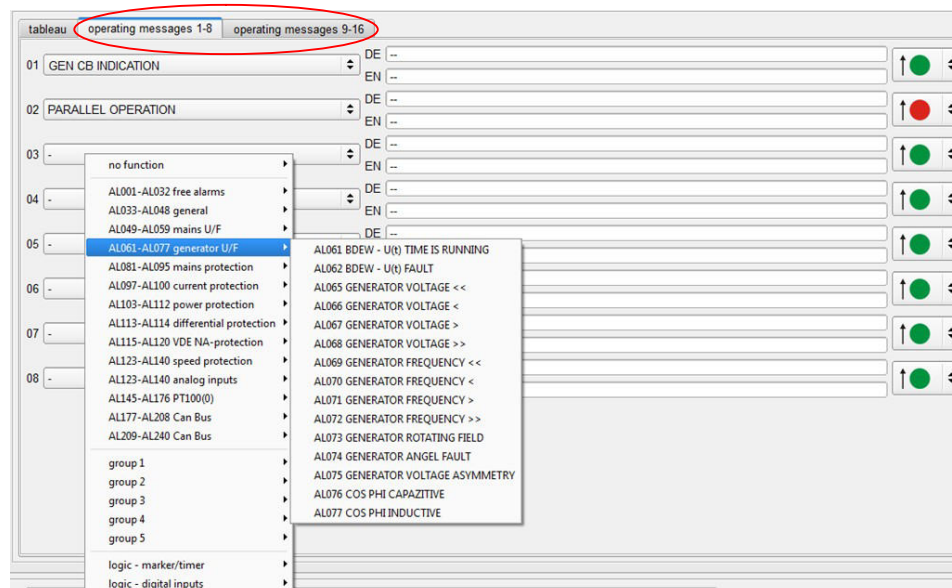


The five LEDs at the bottom of the panel can be linked to internal functions. The functions can be selected via the selection menu.

Compact automatic

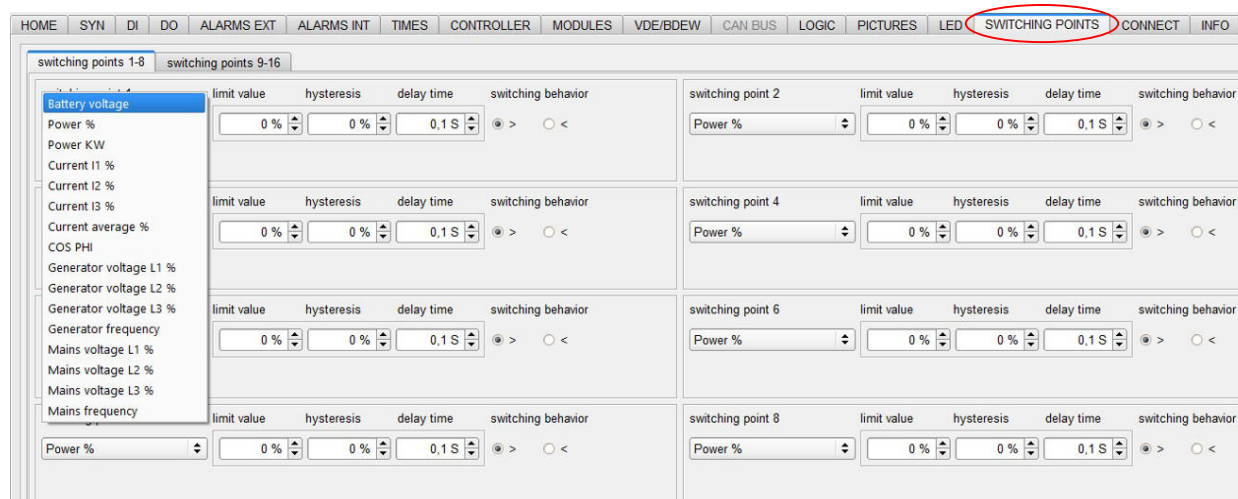
User manual

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

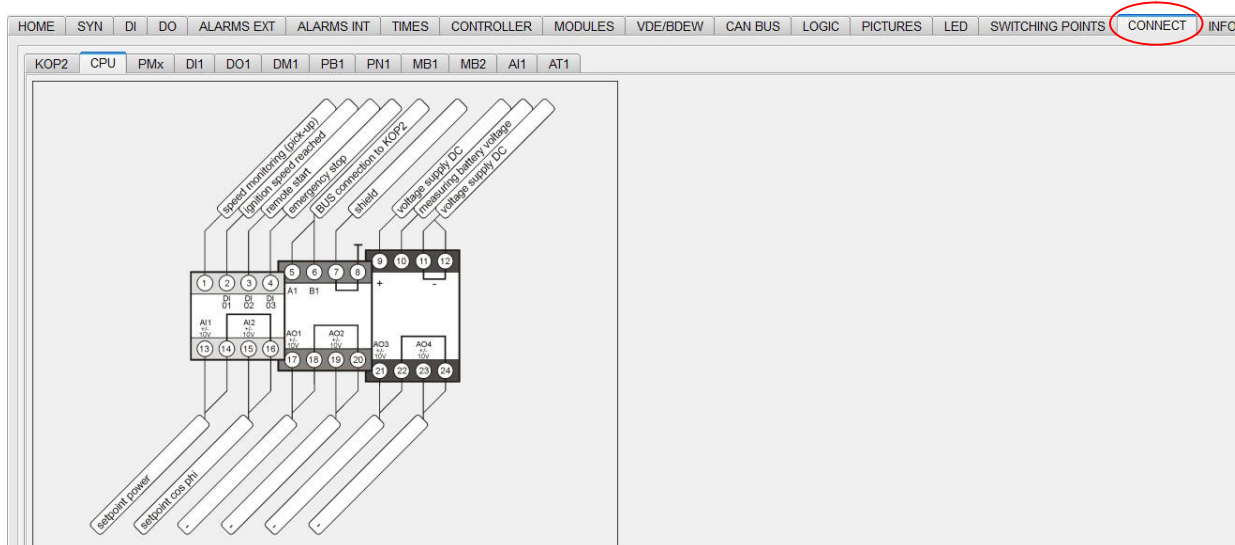


A total of 16 switching points are available. With each, a selected electrical variable can be monitored for falling below or exceeding a set limit value. Each switching point can be assigned to a digital output and / or processed in logic functions.

Compact automatic

User manual

4.16 Connect



Connection diagram for all available modules.

4.17 Info

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

Compact automatic

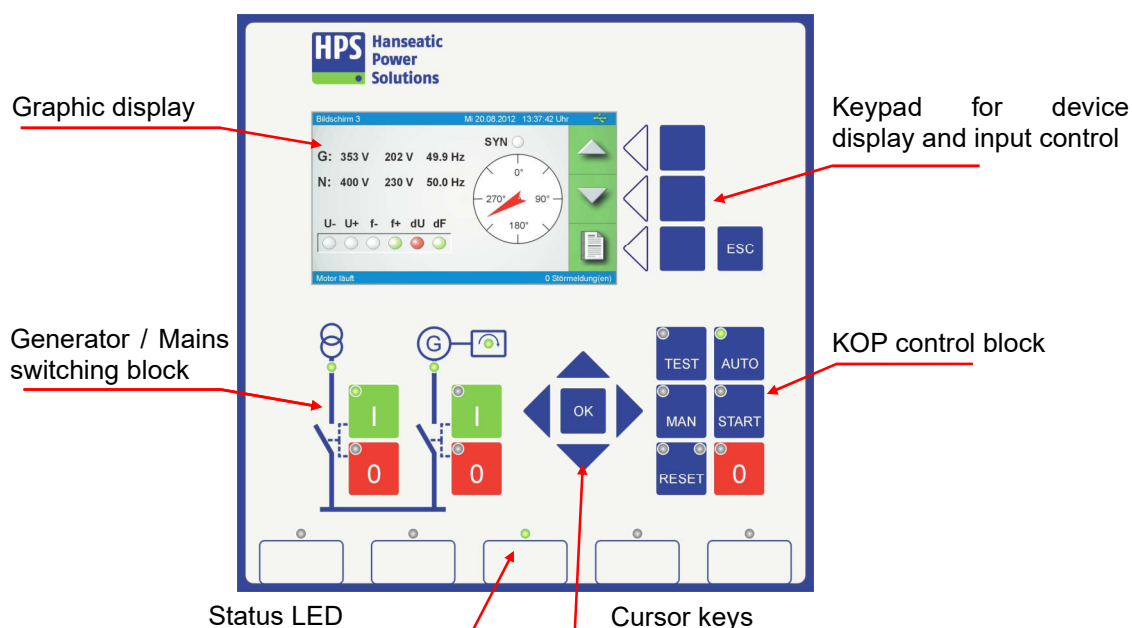
User manual

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

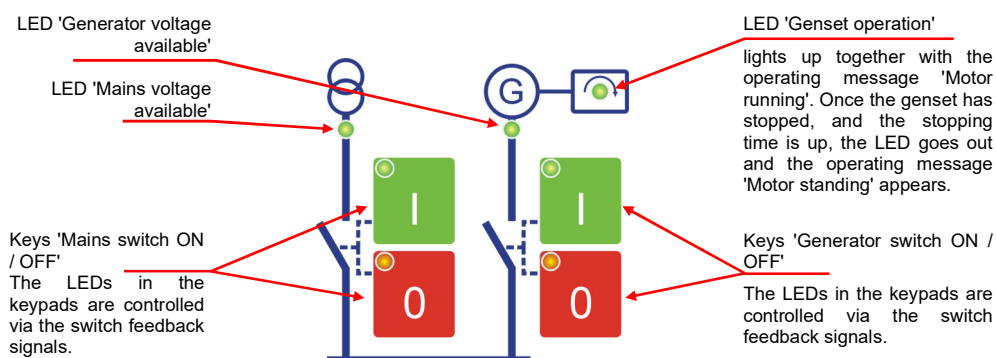
User manual

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 (✓), disabled (✗) 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.

Compact automatic

User manual

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
	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'.
	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. <i>Note:</i> For automatic start remote start input can also be used, e.g. to achieve load test or top load operation with or without synchronisation.

Compact automatic

User manual

Taste	Description
	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.
	The 'START' key is only active in manual operating mode ('MAN'). Genset is started.
	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.
	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.



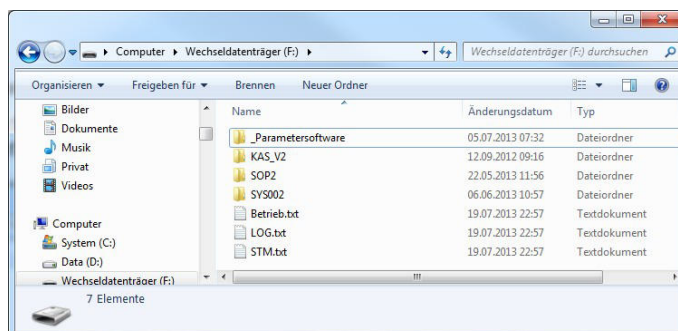
Note: If the SD card is used as a mass storage device it is locked for all access via compact automatic. In this case the protocol files are not updated. The SOP is only able to cope with memory cards up to a size of max. 4GB.

Compact automatic

User manual

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.

Compact automatic

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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.

Compact automatic

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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.



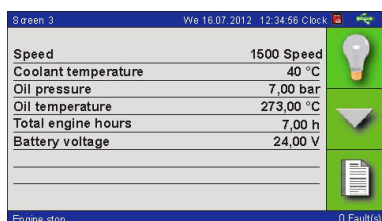
Start screen

Overview of the most important measured values.



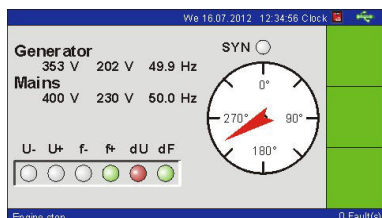
Power values

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 ist available you can scroll through the display images.



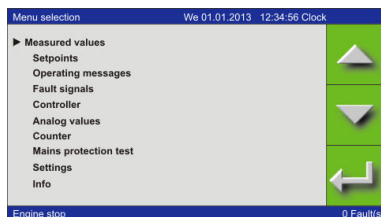
The SYN screen can **not** be selected via arrow keys. During active synchronisation this screen will be displayed automatically and faded out at the end of synchronisation.

Compact automatic

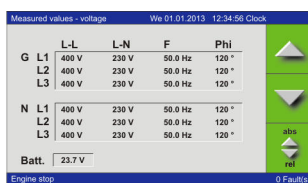
User manual

6.1 Menu selection

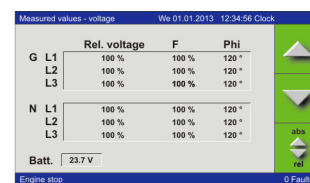
Menu selection is opened with this key . Scrolling through this menu is done with the Up and Down arrow keys. ENTER opens the selected menu item. For submenus selection is done the same way.



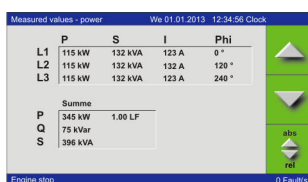
6.2 Measured values

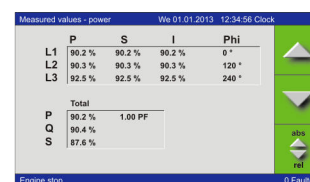
	L-L	L-N	F	Phi
G L1	400 V	230 V	50.0 Hz	120 °
L2	400 V	230 V	50.0 Hz	120 °
L3	400 V	230 V	50.0 Hz	120 °
N L1	400 V	230 V	50.0 Hz	120 °
L2	400 V	230 V	50.0 Hz	120 °
L3	400 V	230 V	50.0 Hz	120 °
Batt.	23.7 V			



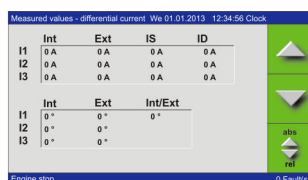
	Rel. voltage	F	Phi
G L1	100 %	100 %	120 °
L2	100 %	100 %	120 °
L3	100 %	100 %	120 °
N L1	100 %	100 %	120 °
L2	100 %	100 %	120 °
L3	100 %	100 %	120 °
Batt.	23.7 V		



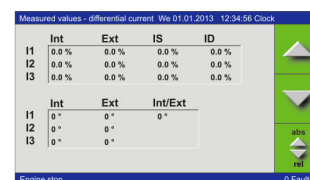
	P	S	I	Phi
L1	115 kW	132 kVA	123 A	0 °
L2	115 kW	132 kVA	123 A	120 °
L3	115 kW	132 kVA	123 A	240 °
Summe	345 kW	1.00 LF		
P	75 kVar			
S	396 kVA			



	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	90.2 %	1.00 PF		
P	90.4 %			
S	87.6 %			



	Int	Ext	IS	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	0 °	0 °	0 °	
I2	0 °	0 °		
I3	0 °	0 °		



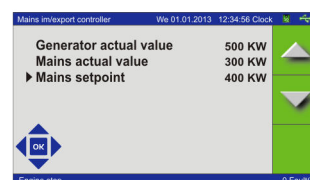
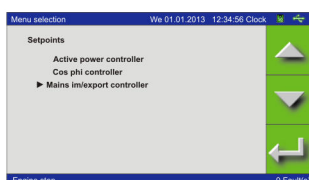
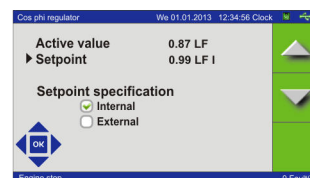
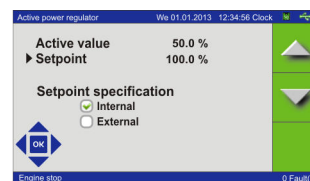
	Int	Ext	IS	ID
I1	0.0 %	0.0 %	0.0 %	0.0 %
I2	0.0 %	0.0 %	0.0 %	0.0 %
I3	0.0 %	0.0 %	0.0 %	0.0 %
Int/Ext	0 °	0 °	0 °	
I2	0 °	0 °		
I3	0 °	0 °		

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.

Compact automatic

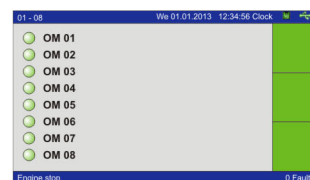
User manual

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.

Compact automatic

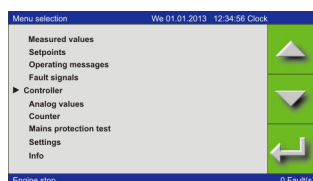
User manual

6.5 Fault signals

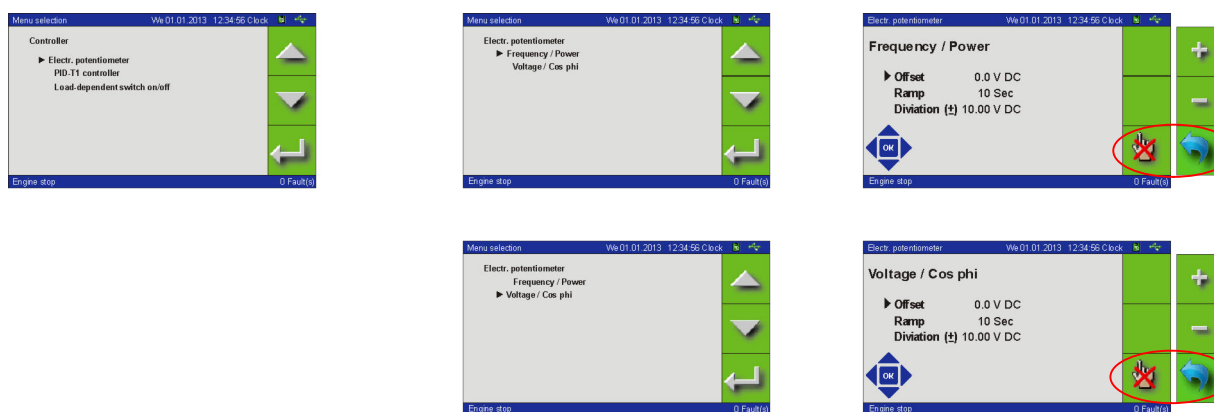


The submenus of this menu item display all currently pending alarm messages, as well as the contents of the alarm message memory. Four messages can be visualised at the same time. If there are more alarm messages available this list can be scrolled with the arrow keys. For a better overview in case of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

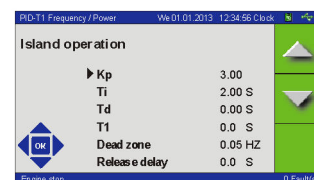
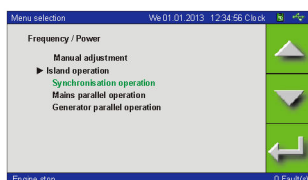
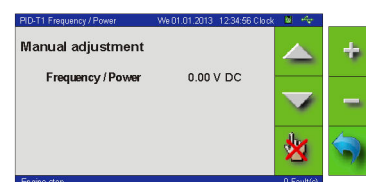
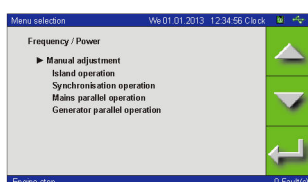
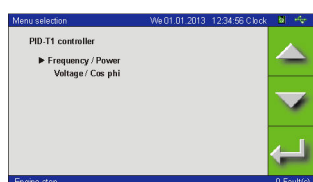
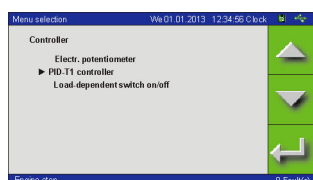
User manual

- ▶ 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: .

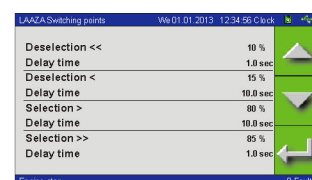
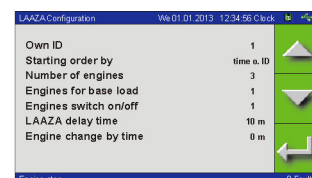
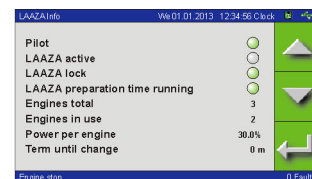
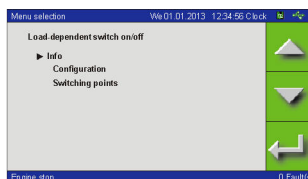
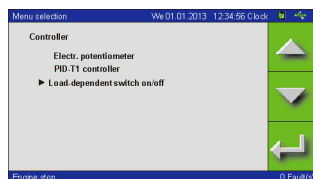
Attention: During manual adjustment the automatic control is disabled, regulation has to be done by the operator at the KOP2. After leaving manual adjustment with the „ESC“ key the automatic adjustment is enabled again.

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.

Compact automatic

User manual

6.6.3 Load-dependent dis-/connection

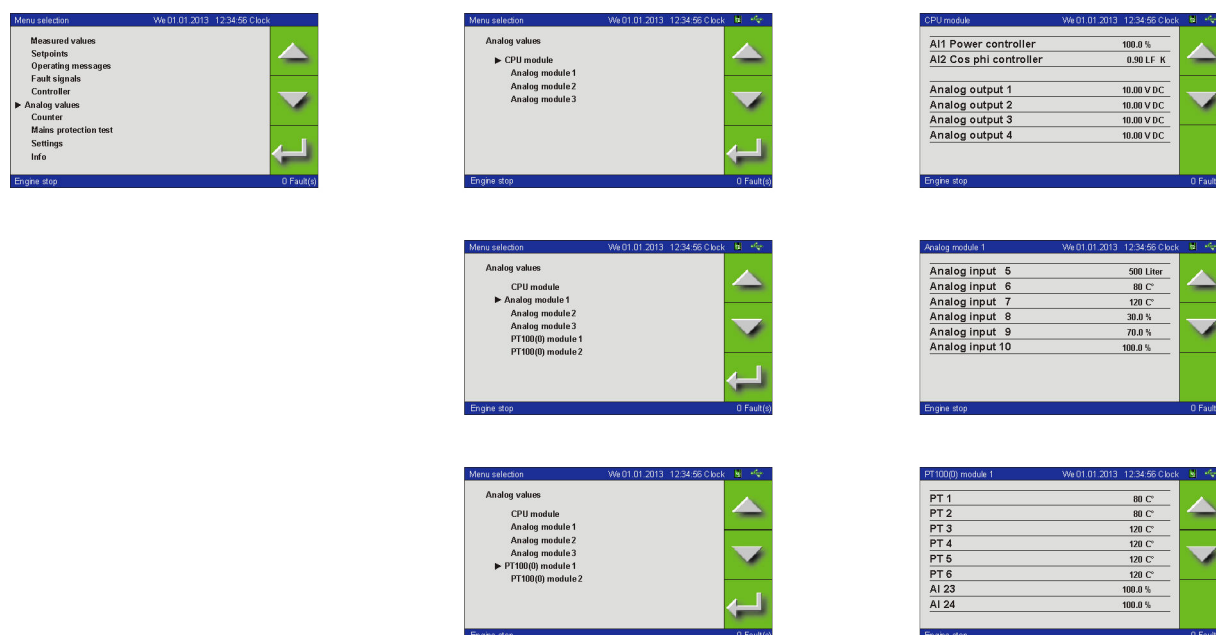


There are three screens available for the load-dependent dis-/connection. „Info“ visualizes information on the operating states. The two other screens display the settings available via the device management (please refer to 4.8.6). All settings of these two screens can be modified at the tableau. After 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).

Compact automatic

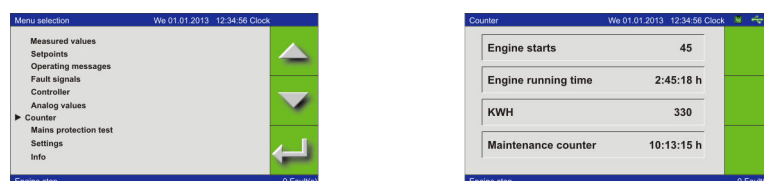
User manual

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).

Compact automatic

User manual

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“.

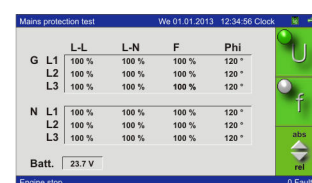
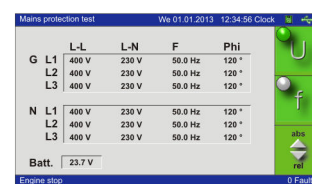
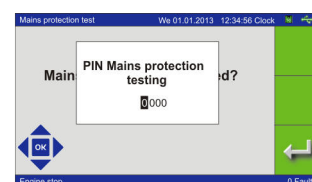
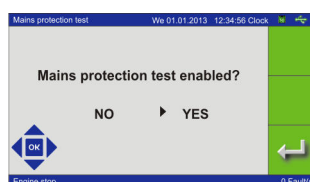
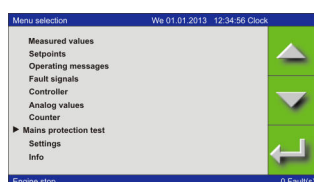
6.8.4 Maintenance counter

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



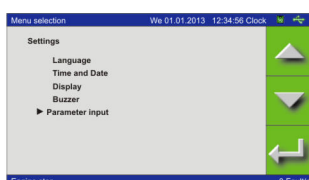
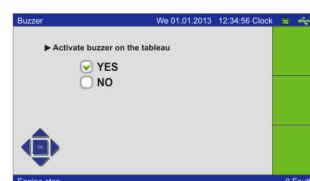
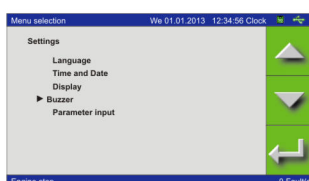
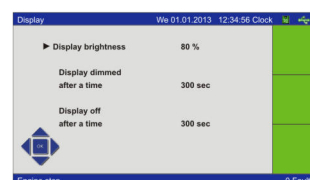
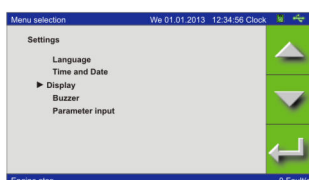
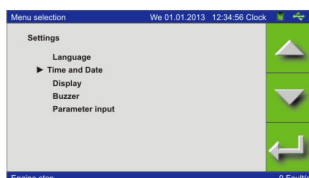
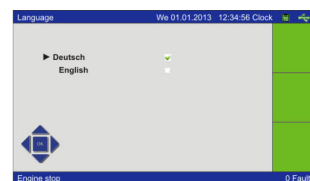
The KAS function Mains protections test enables you the check all limit values and trigger times required for mains protection (during engine shutdown). All conditions for triggering KAS mains protection can be checked without any system interference. For checking voltage or frequency the respective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

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

Compact automatic

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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.

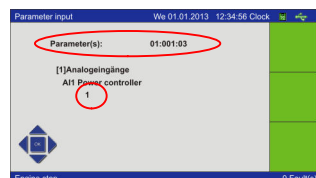
Compact automatic

User manual

6.10.4 Buzzer

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

6.10.5 Parameter input



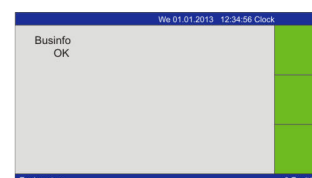
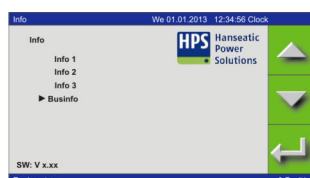
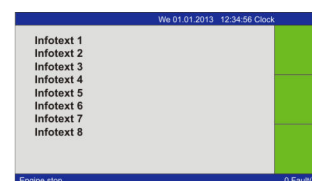
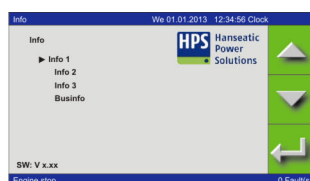
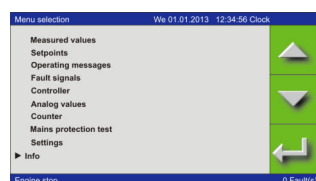
If there is no PC available all parameters can also be adjusted directly at the KOP2. The input is protected by a PIN.

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



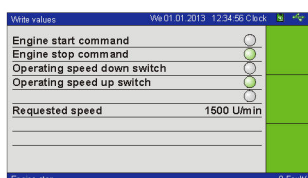
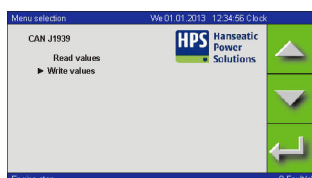
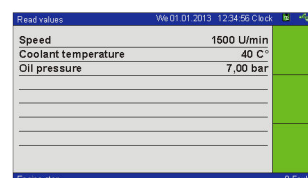
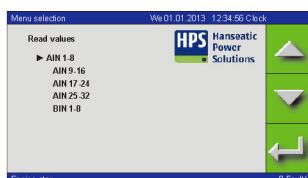
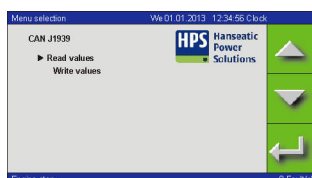
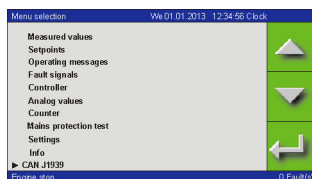
Three information windows are available. All texts input via the device management „Info“ tab will be displayed.

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.

Compact automatic

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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.

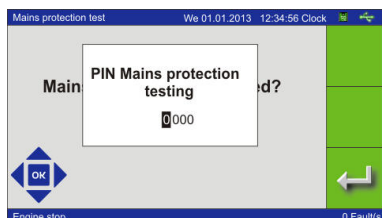
Compact automatic

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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.

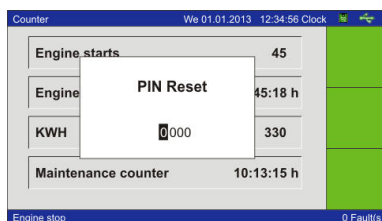
7.1 PIN Mains protection test



PIN number 1000

For mains protections testing please enter PIN number 1000.

7.2 PIN Reset



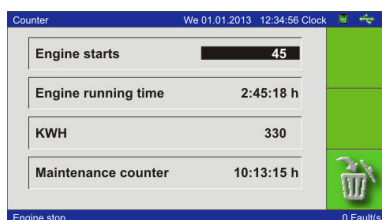
PIN number 1919

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

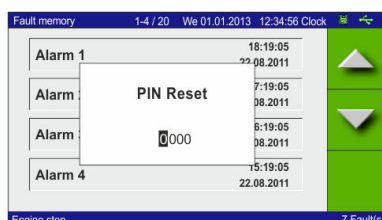


In Edit mode all counters can be reset together at the same time.



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

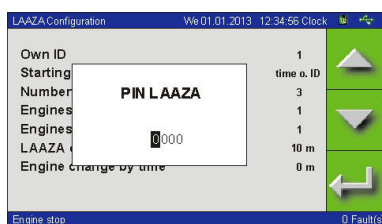


PIN number 9000

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.

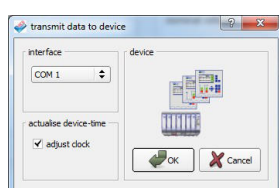
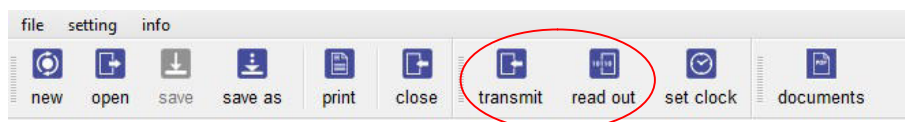
Compact automatic

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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.

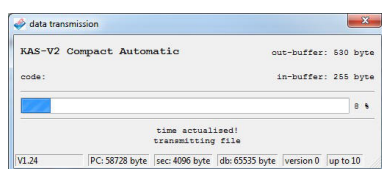
8.1 PC configuration



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

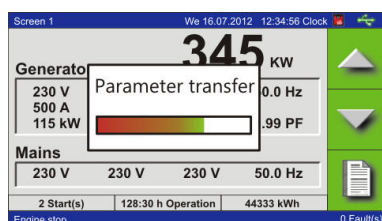
The PC will be connected to the panel via a serial 1:1 cable.

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.

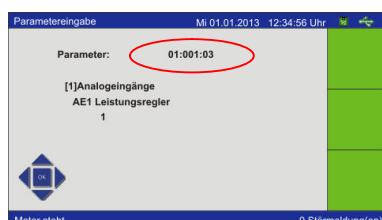


After transmission the panel will do a reset and will then be in normal operating mode.

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.

Compact automatic

User manual

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)	Free 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 Free programmable
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 adress KOP	234	0		
06:034:	CAN adress 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	-	-
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:	AL113 Diff 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: __ to 10:240:	AL177 to AL240 CAN BUS Alarms	AL177 to AL240	AL177 to AL240	xxxxx...	10	External alarm
10:241: __ to 10:255:	AL241 to AL255	AL241 to AL255	AL241 to AL255	xxxxx...	10	External alarm
10:257: __ to 10:264:	AL257 to AL264 CAN BUS Alarms (limit values)	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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User manual

[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

:03	Limit value in %	
:04	Hysteresis in %	
:05	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

:03	Limit value	
:04	Hysteresis	
:05	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

:03	Limit value	Voltage in % Frequency in 1/10 Hz Phi in degrees
:04	Hysteresis	Voltage in % Frequency in 1/10 Hz Phi in degrees
:05	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				
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			to:03	to:04	
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
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:	: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.

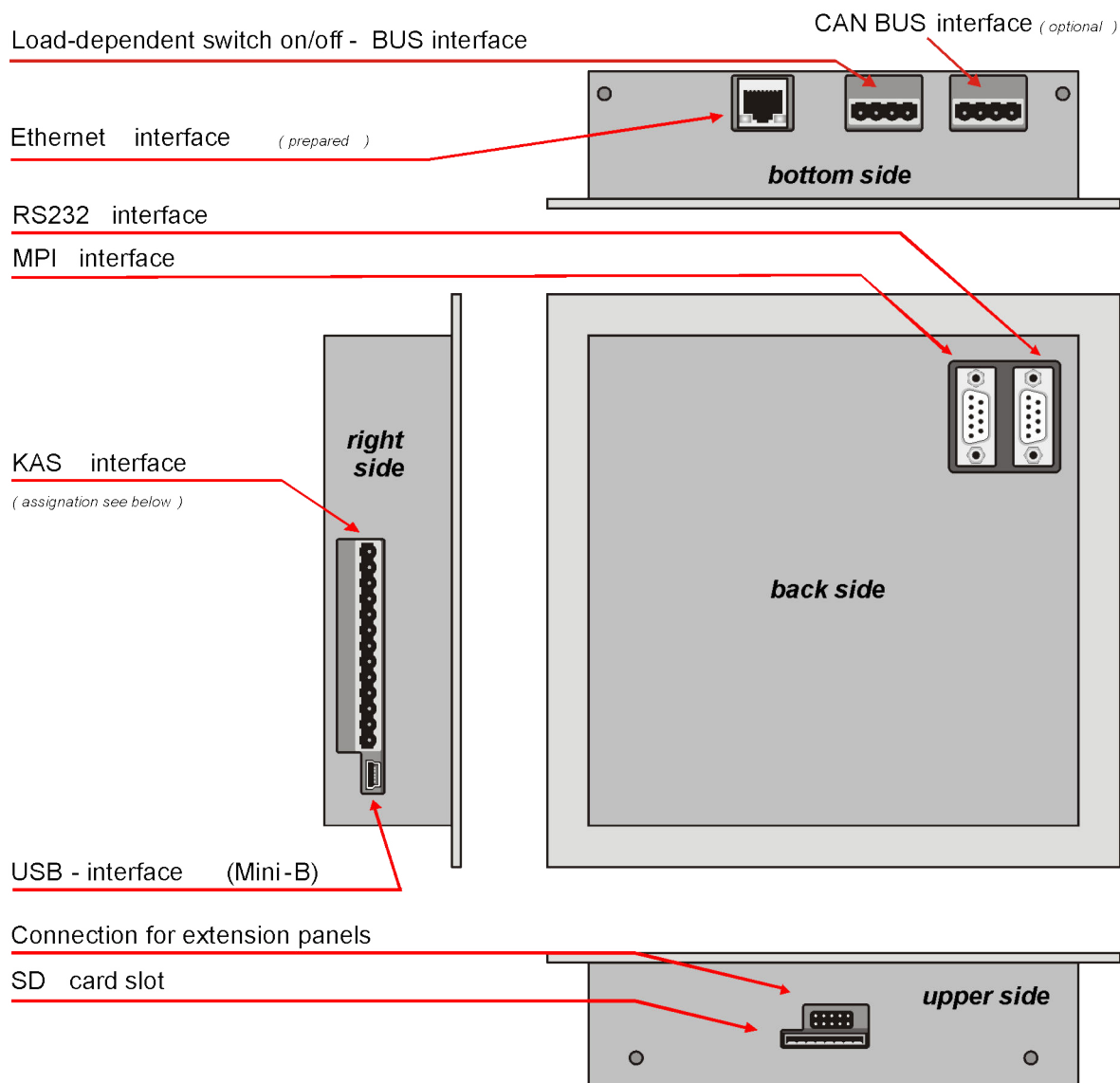
to:04	Function no.	[0] green / event ↑ [1] red / event ↑ [2] yellow / event ↑ [3] blue / event ↑ [4] green / event ↓ [5] red / event ↓ [6] yellow / event ↓ [7] blue / event ↓
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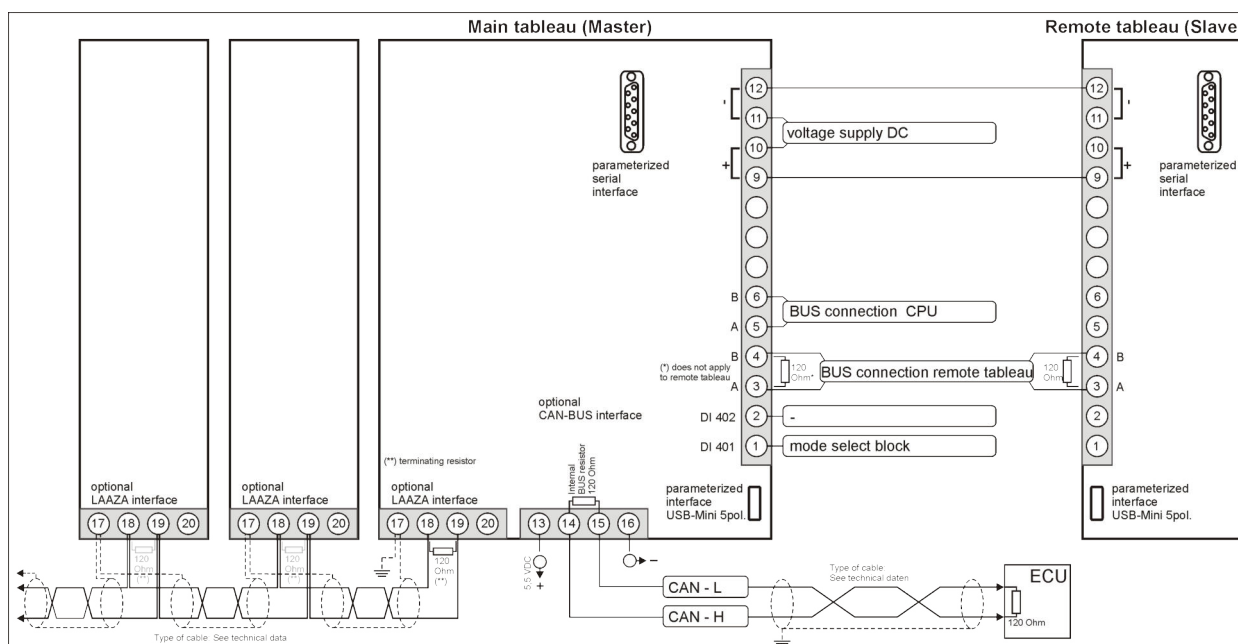
9 Connection diagrams

9.1 Display and operating device KOP 2

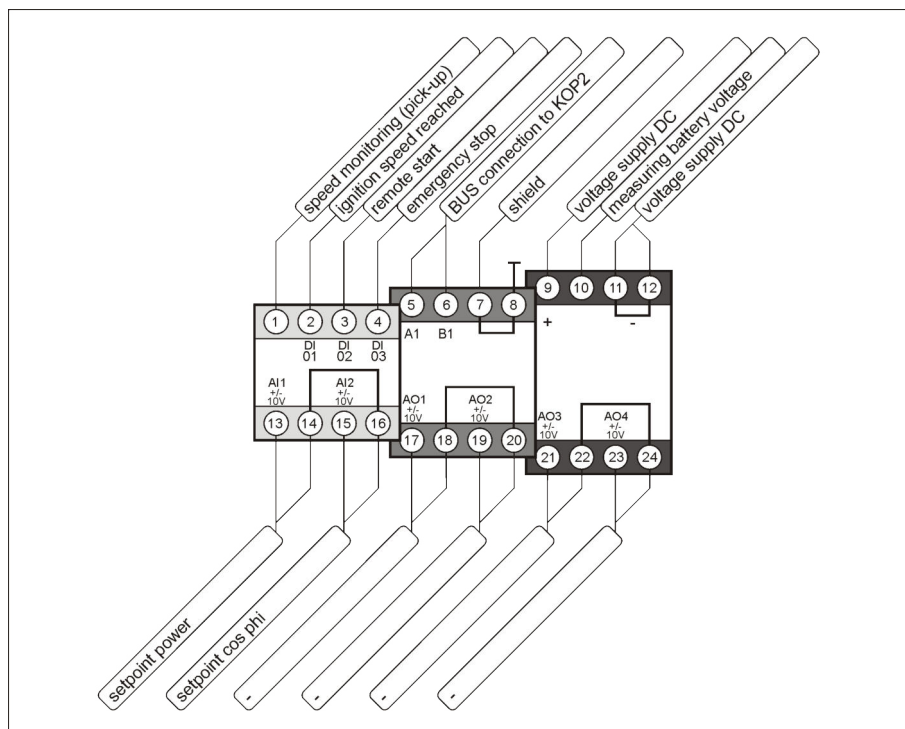


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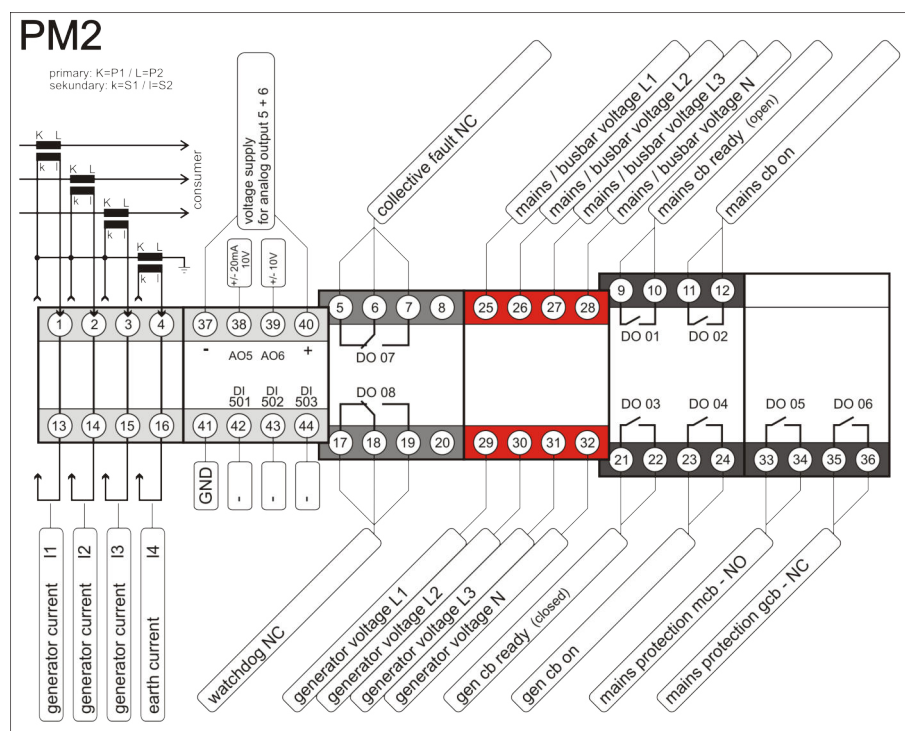
9.2 CPU-Modul



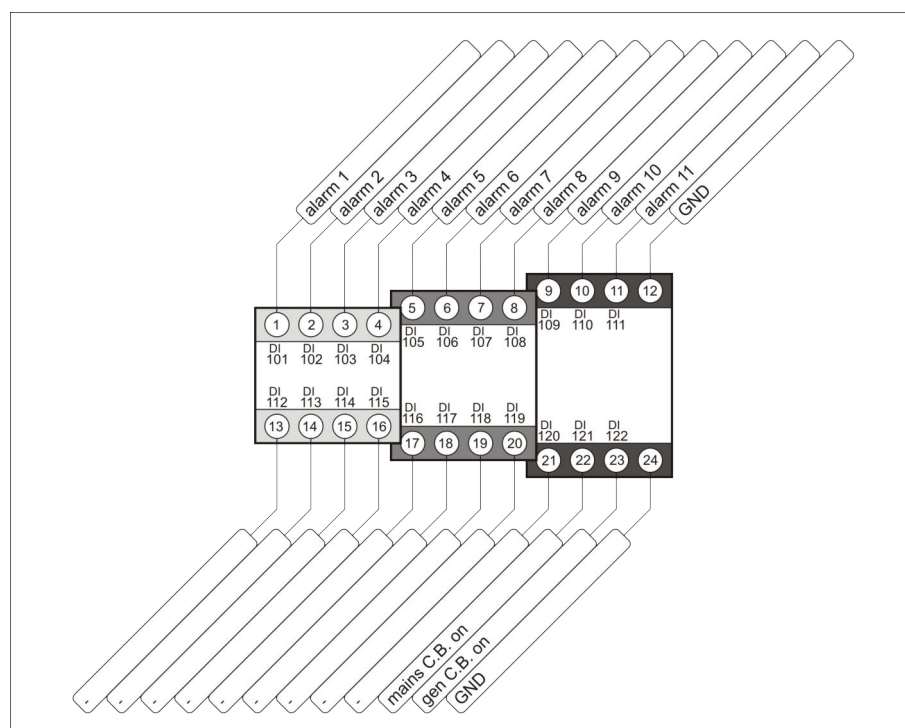
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9.3 Power module PM2



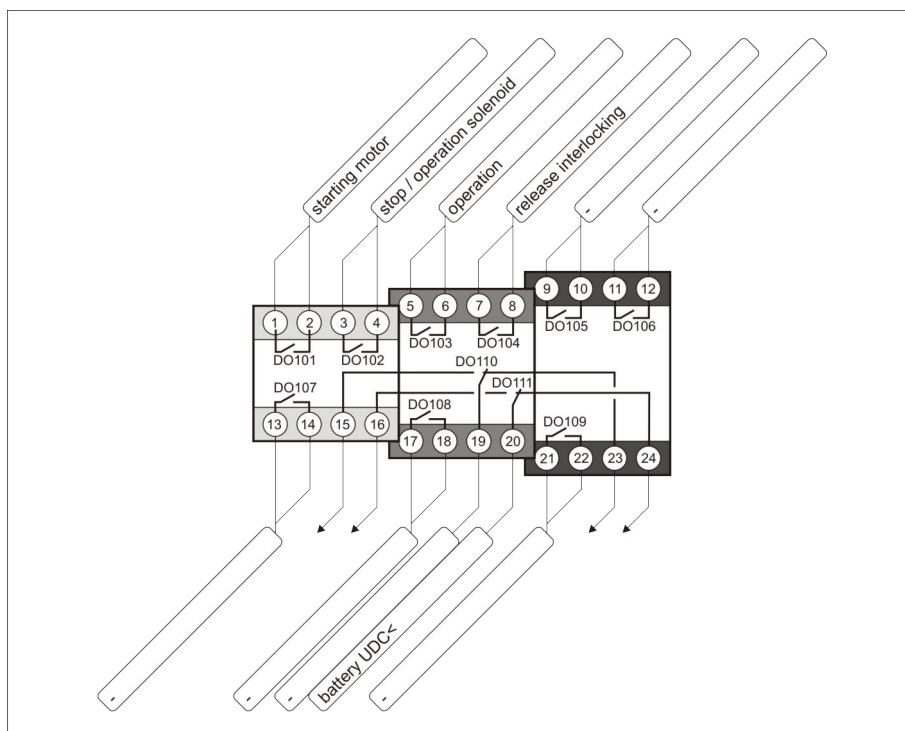
9.4 Input module DI1



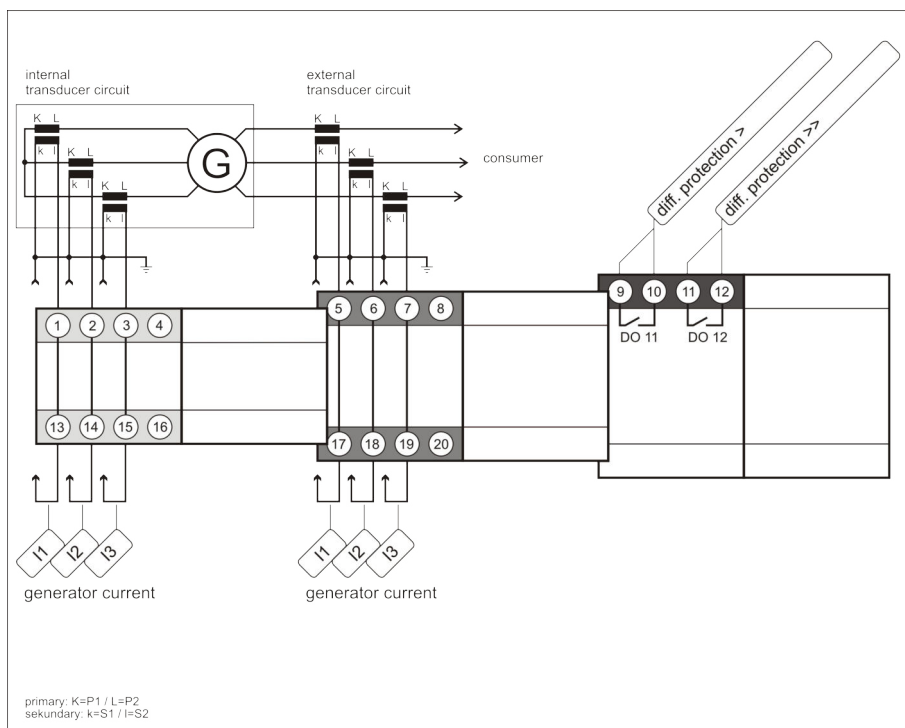
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9.5 Output module DO1



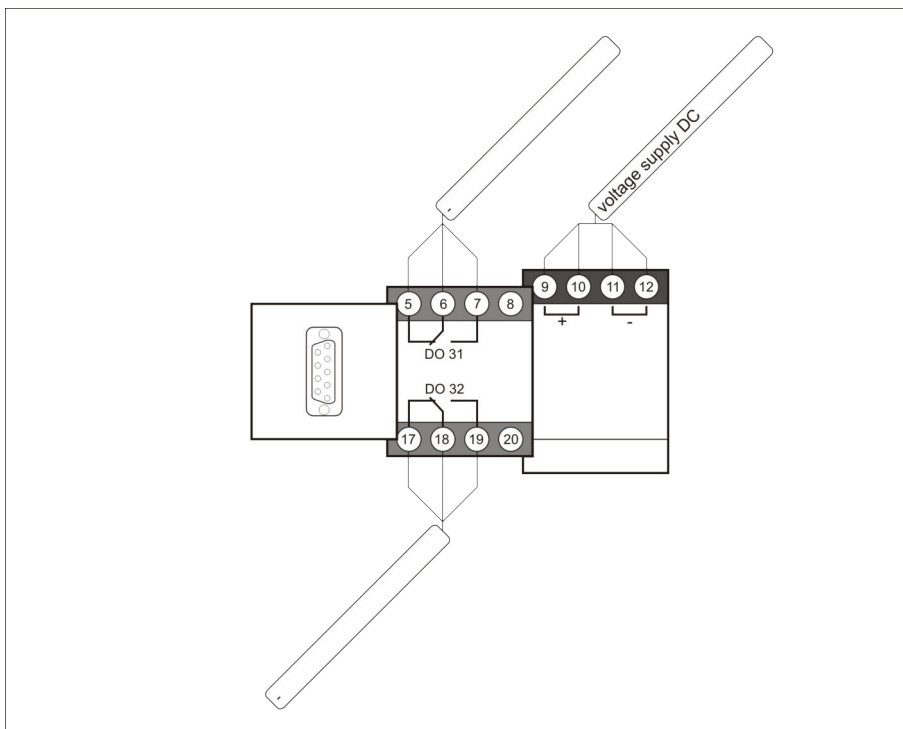
9.6 Diff. Protection module DM1



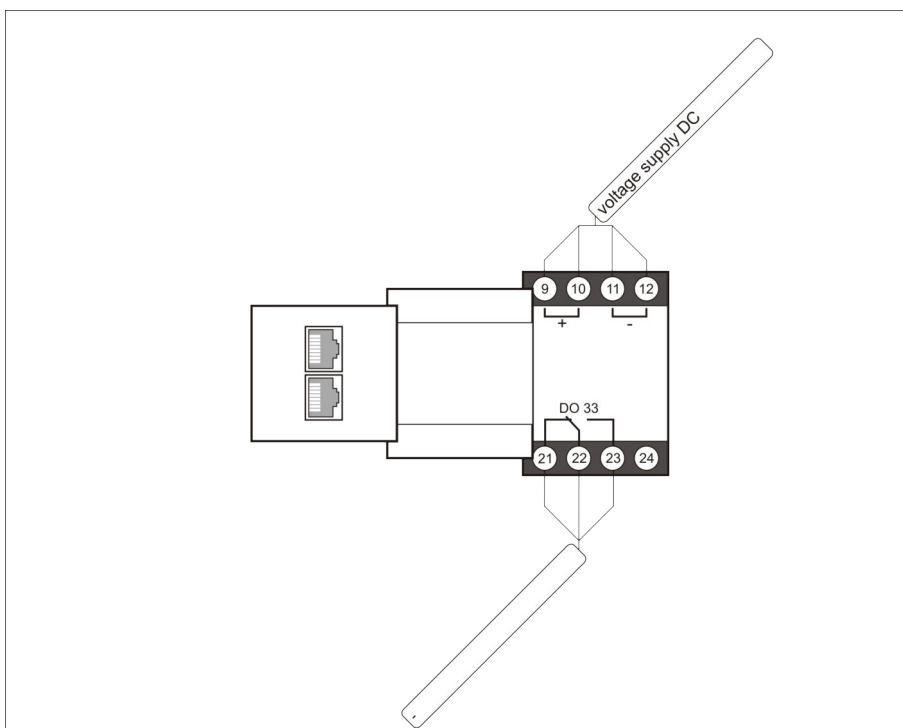
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9.7 Profibus module PB1



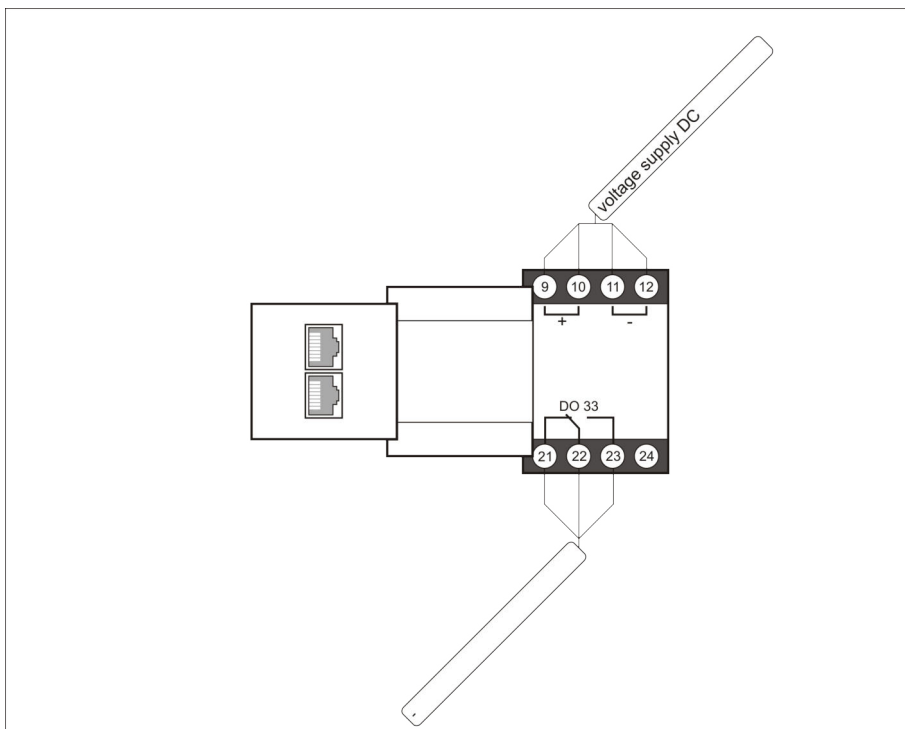
9.8 Profinet module PN1



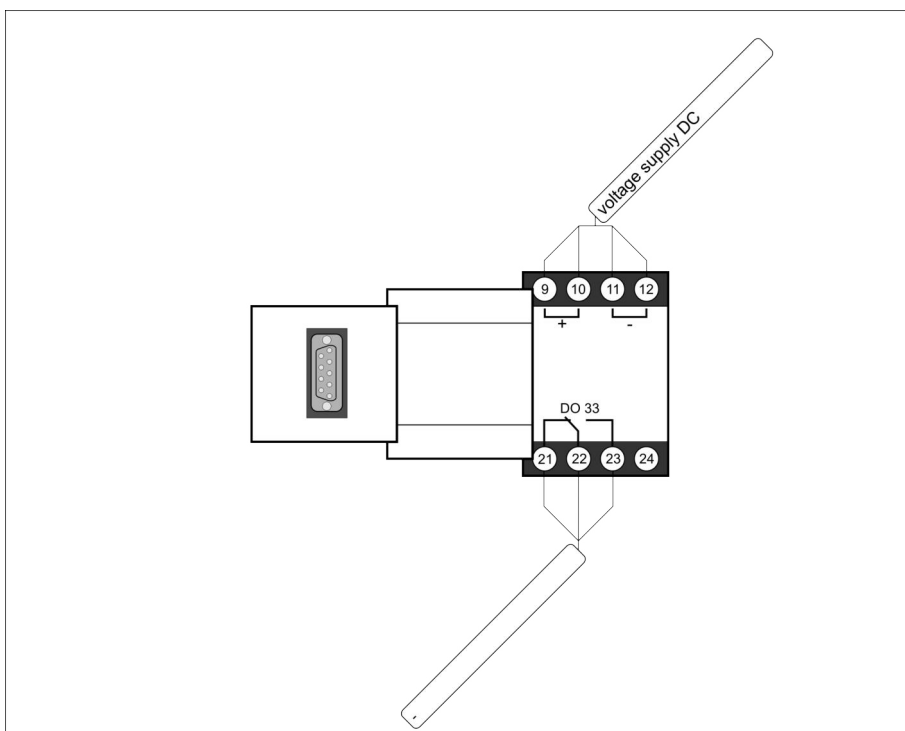
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9.9 Modbus module TCP/IP MB1



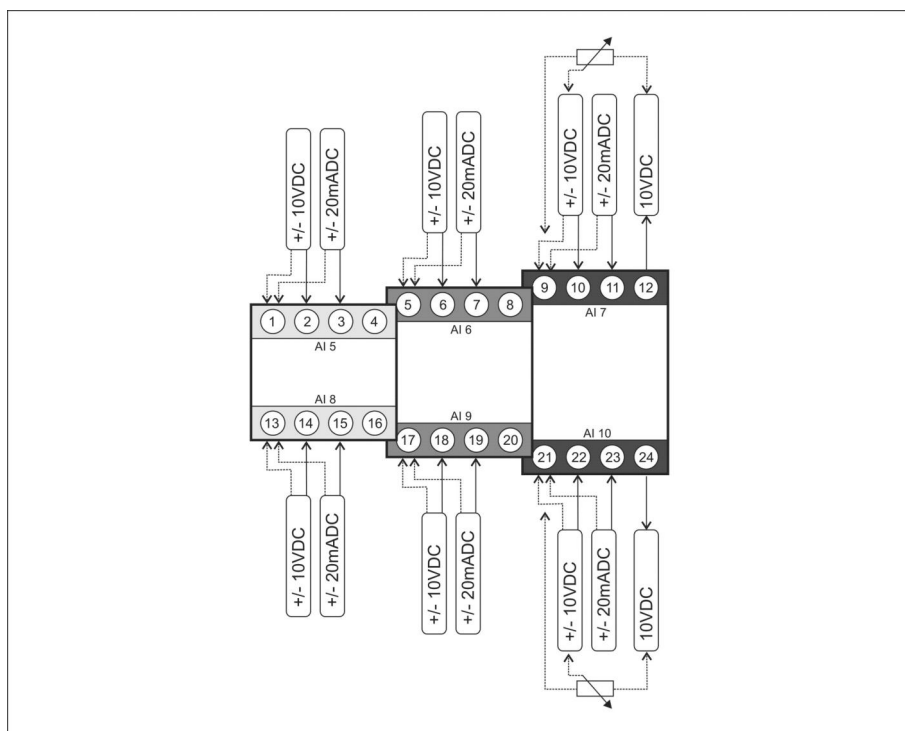
9.10 Modbus module RTU MB2



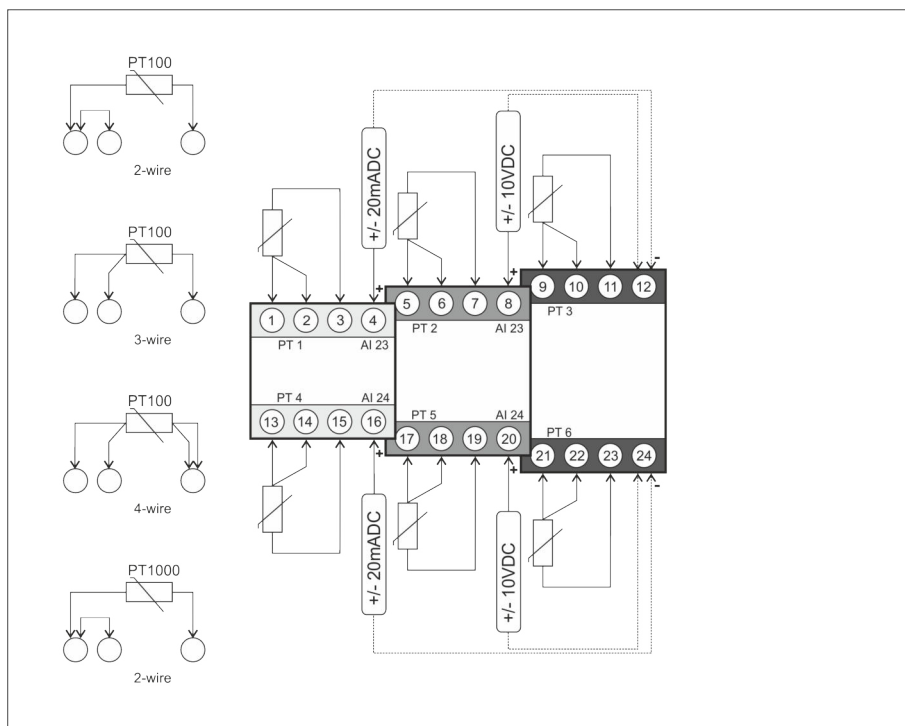
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9.11 Analog input module AI1



9.12 PT100(0) module AT1



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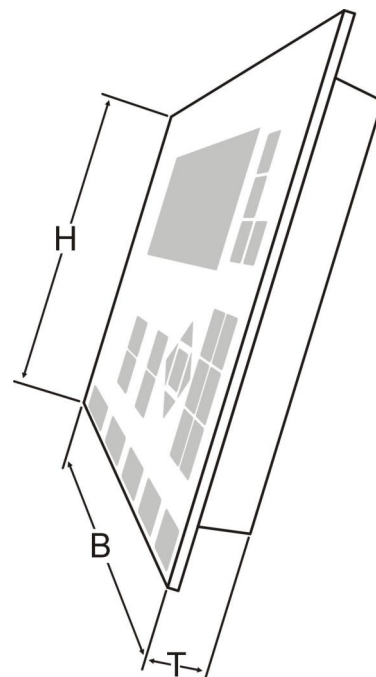
10 Casing variants and dimensions

10.1 KOP 2

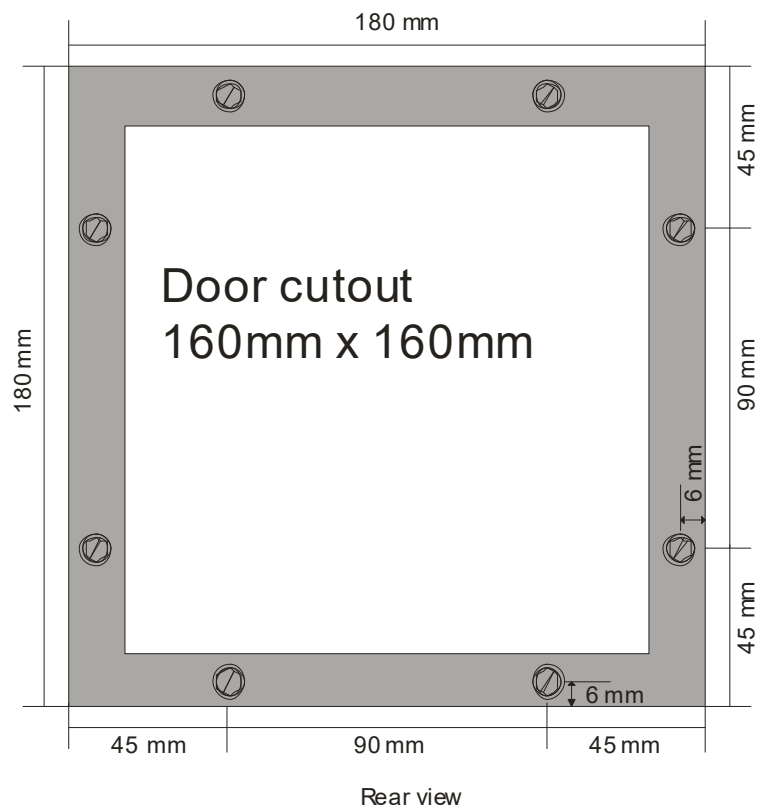
Variant	Metal casing
Weight	1.800 g
Mounting	Stay bolts M4 x 12mm
Protection category	IP 42, with sealing IP 64

Dimensions

With (B)	180 mm
High (H)	180 mm
Depth (T)	43 mm
Mounting depth	approx. 40 mm (without <i>plug</i>)



10.1.1 Dimensions for door fitting



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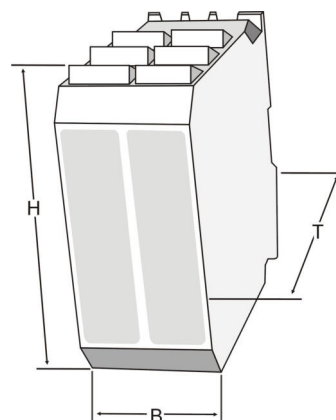
10.2 Modules

Variant

Variant	DIN – plastic casing (<i>Polyamide</i>)
Mounting	On DIN rail
Protection category	IP 40, terminal IP 20

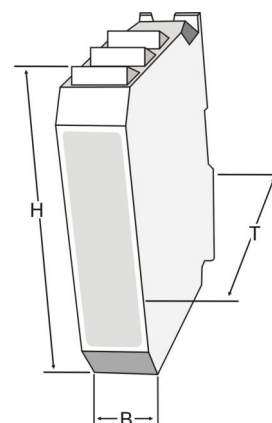
Module dimensions PM2 and DM1

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 x I _{nom.} continuous current 10 x I _{nom.} 10 sec. 50 x I _{nom.} 0,001 sec. apparent ohmic resistance <0,01 Ohm
Recommended transducer type	max. 4 * I _{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 <= 0,5 % current measurement <= 0,5 % power measurement <= 1 % CosPhi <= 1° frequency measurement <= 0,05 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 angle 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

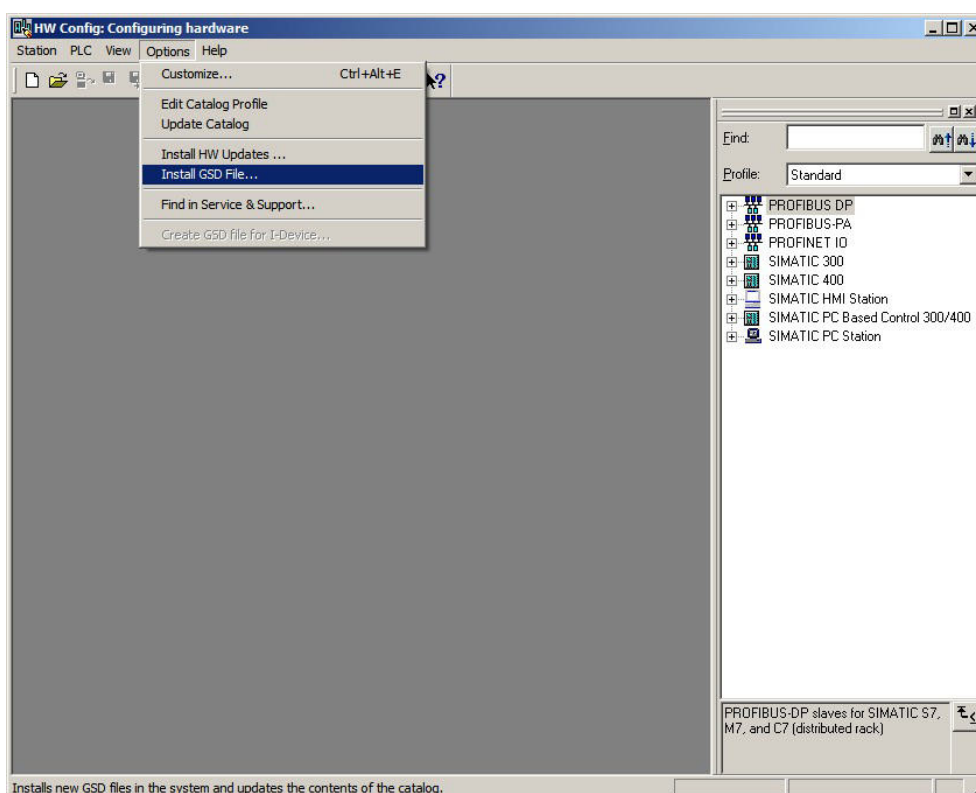
12.1.2 GSD file installation under SIMATIC STEP 7

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.

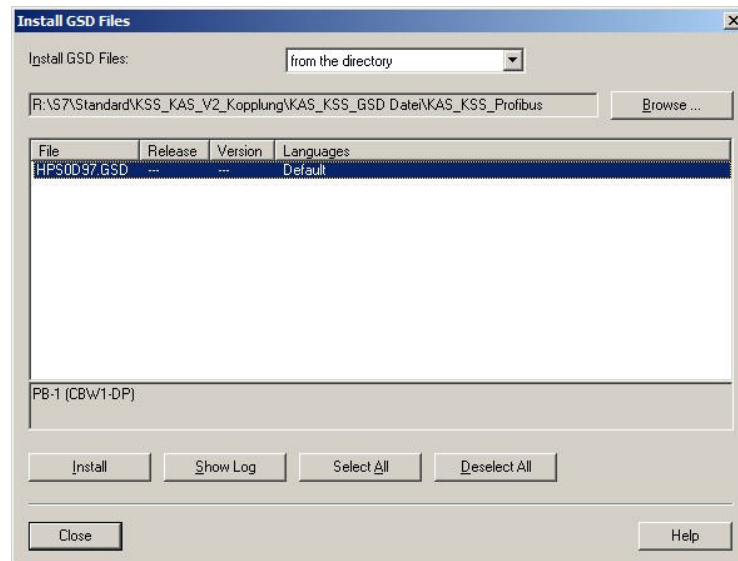
For installation please select Tools – Install GSD files.



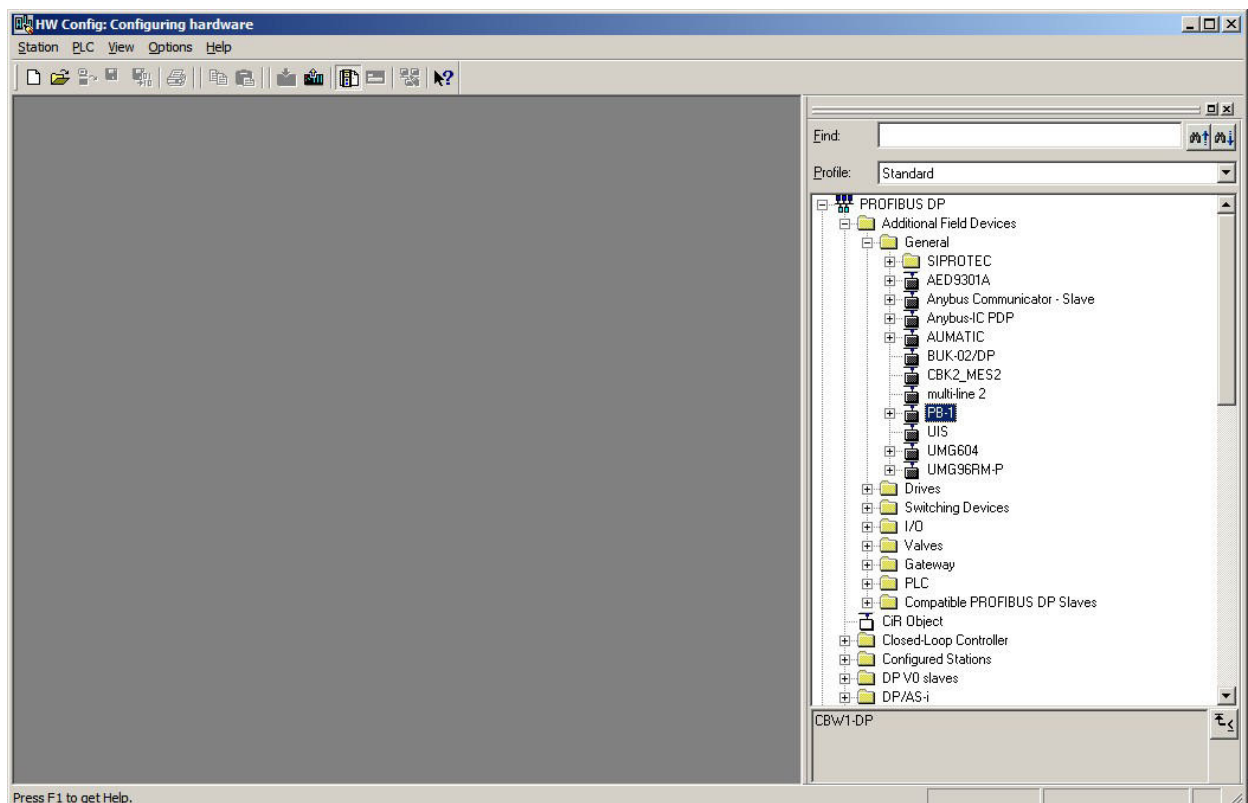
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GSD file selection



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



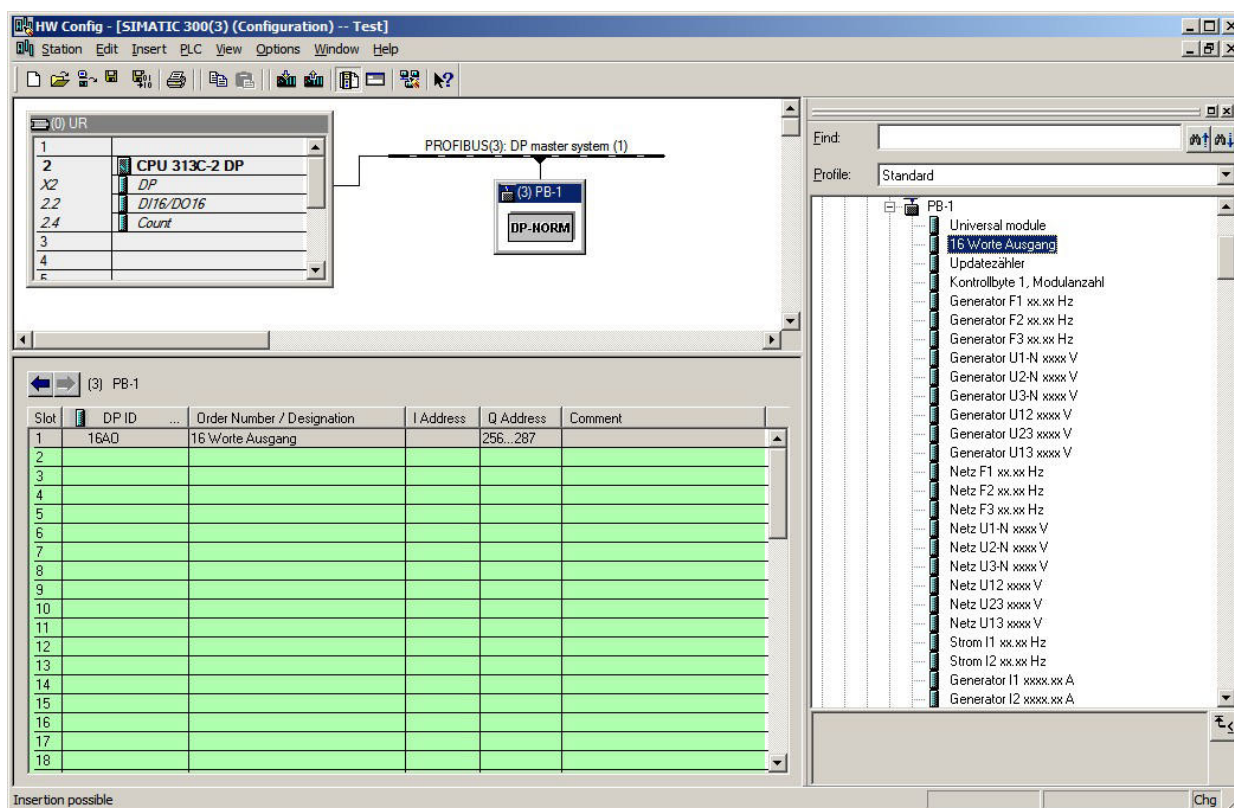
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12.1.3 How to use the GSD file in the S7 project

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.



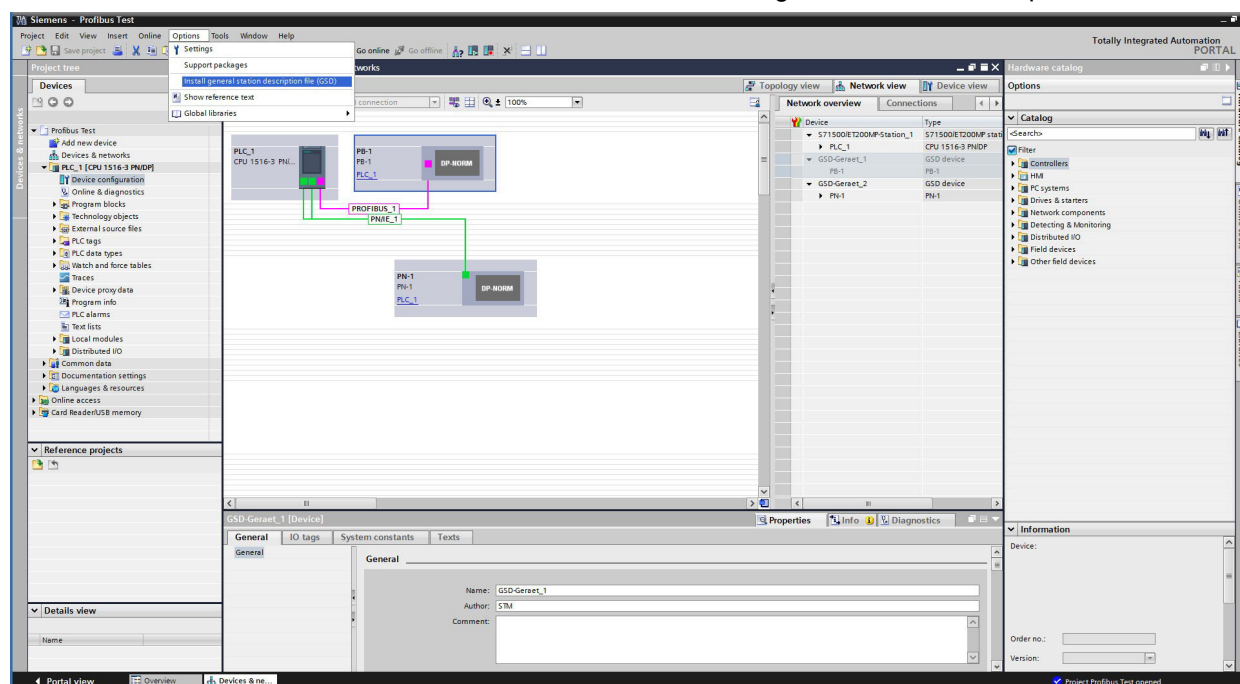
Slot	DP ID	Order Number / Designation	I Address	Q Address	Comment
1	16A0	16 Worte Ausgang		256...287	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

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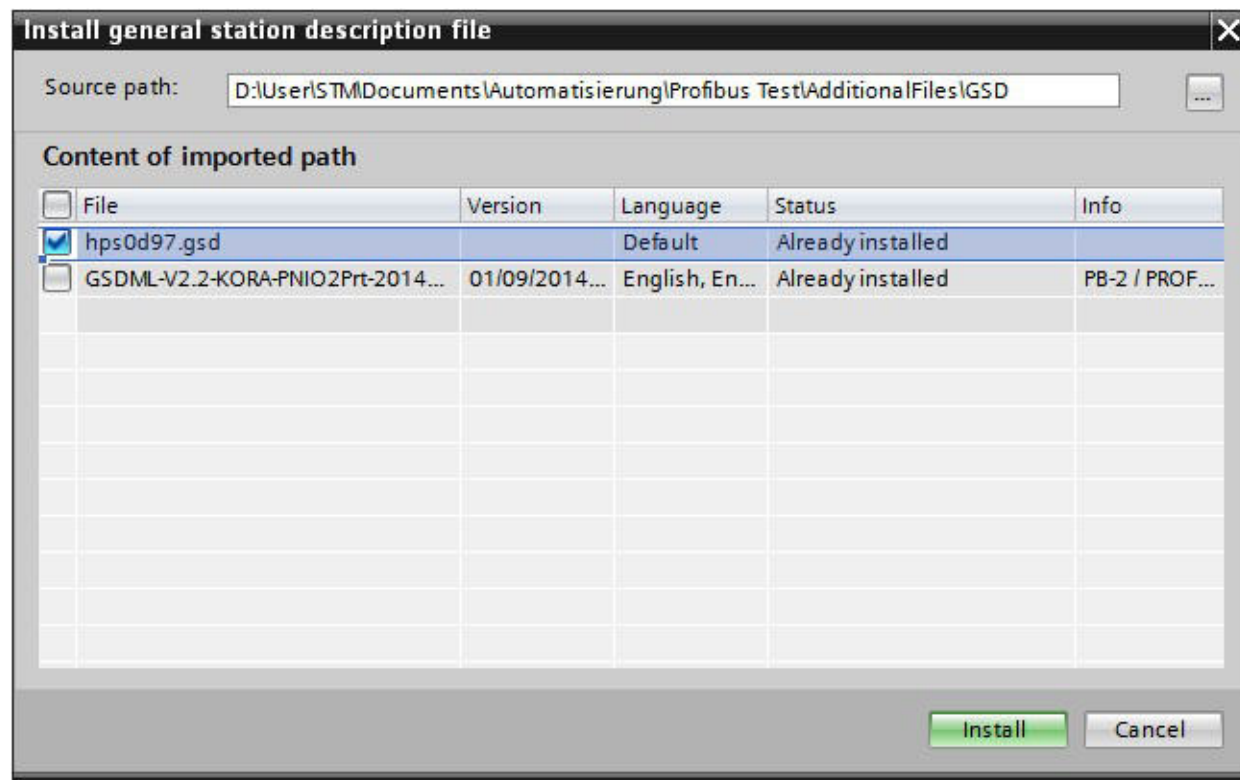
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12.1.4 Installing the GSD file in SIMATIC TIA Portal

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



Selecting the GSD file and installation



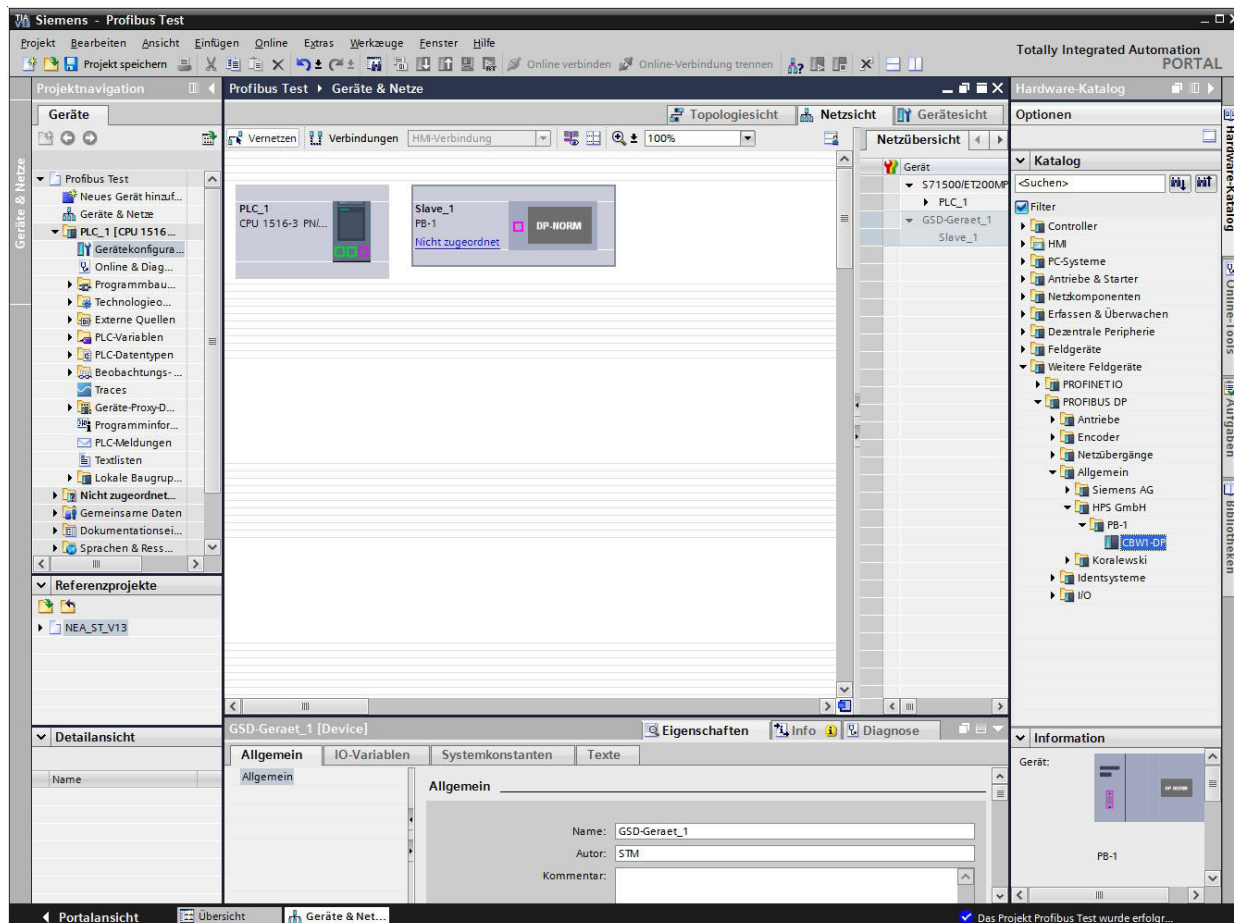
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Application of the GSD file in the TIA Project

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.

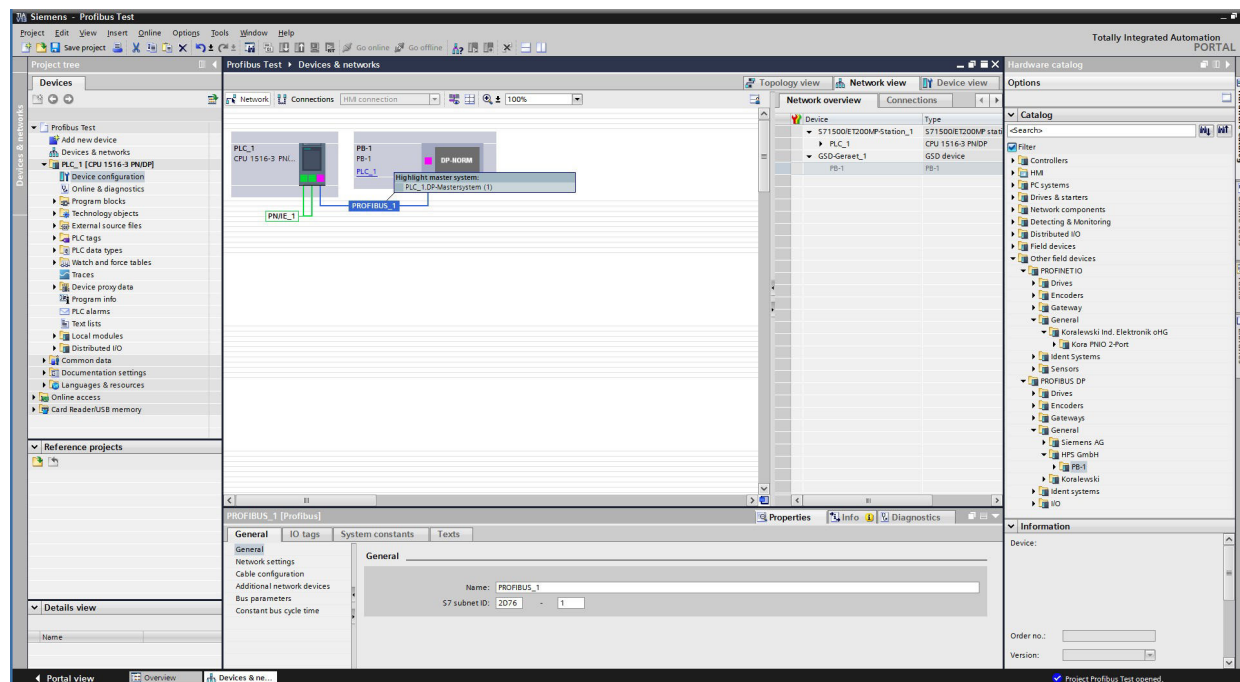
To integrate the Profibus DP node in the configuration of the project, the network view is to choose and select the PB-1 module.



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

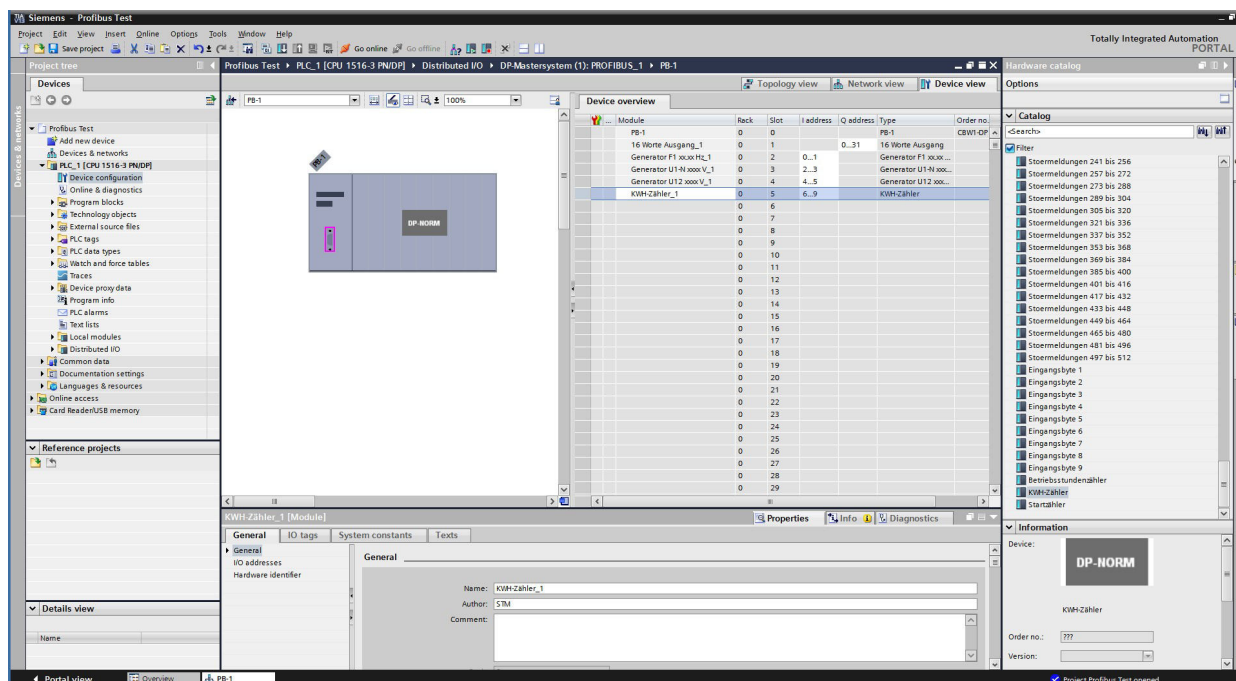


Then a participant address must be set.

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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
		Bit 4	Byte	0x6F Byte1	0x00D1	Bool
	[DS] Remote start command in „AUTO“	Bit 5	Byte	0x6F Byte1	0x00D1	Bool
		Bit 6	Byte	0x6F Byte1	0x00D1	Bool
	[DS] Signal test	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*)	Bit 0	Word	0x0070	0x000A	Bool
	Error messages 002 (Free input*)	Bit 1	Word	0x0070	0x000A	Bool
	Error messages 003 (Free input*)	Bit 2	Word	0x0070	0x000A	Bool
	Error messages 004 (Free input*)	Bit 3	Word	0x0070	0x000A	Bool
	Error messages 005 (Free input*)	Bit 4	Word	0x0070	0x000A	Bool
	Error messages 006 (Free input*)	Bit 5	Word	0x0070	0x000A	Bool
	Error messages 007 (Free input*)	Bit 6	Word	0x0070	0x000A	Bool
	Error messages 008 (Free input*)	Bit 7	Word	0x0070	0x000A	Bool
	Error messages 009 (Free input*)	Bit 8	Word	0x0070	0x000A	Bool
	Error messages 010 (Free input*)	Bit 9	Word	0x0070	0x000A	Bool
	Error messages 011 (Free input*)	Bit 10	Word	0x0070	0x000A	Bool
	Error messages 012 (Free input*)	Bit 11	Word	0x0070	0x000A	Bool
	Error messages 013 (Free input*)	Bit 12	Word	0x0070	0x000A	Bool
	Error messages 014 (Free input*)	Bit 13	Word	0x0070	0x000A	Bool
	Error messages 015 (Free input*)	Bit 14	Word	0x0070	0x000A	Bool
	Error messages 016 (Free input*)	Bit 15	Word	0x0070	0x000A	Bool
117 - Stoermeldungen 17 bis 32 Error message 017 to 032	Error messages 017 (Free input*)	Bit 0	Word	0x0071	0x000B	Bool
	Error messages 018 (Free input*)	Bit 1	Word	0x0071	0x000B	Bool
	Error messages 019 (Free input*)	Bit 2	Word	0x0071	0x000B	Bool
	Error messages 020 (Free input*)	Bit 3	Word	0x0071	0x000B	Bool
	Error messages 021 (Free input*)	Bit 4	Word	0x0071	0x000B	Bool
	Error messages 022 (Free input*)	Bit 5	Word	0x0071	0x000B	Bool
	Error messages 023 (Free input*)	Bit 6	Word	0x0071	0x000B	Bool
	Error messages 024 (Free input*)	Bit 7	Word	0x0071	0x000B	Bool
	Error messages 025 (Free input*)	Bit 8	Word	0x0071	0x000B	Bool
	Error messages 026 (Free input*)	Bit 9	Word	0x0071	0x000B	Bool
	Error messages 027 (Free input*)	Bit 10	Word	0x0071	0x000B	Bool
	Error messages 028 (Free input*)	Bit 11	Word	0x0071	0x000B	Bool
	Error messages 029 (Free input*)	Bit 12	Word	0x0071	0x000B	Bool
	Error messages 030 (Free input*)	Bit 13	Word	0x0071	0x000B	Bool
	Error messages 031 (Free input*)	Bit 14	Word	0x0071	0x000B	Bool
	Error messages 032 (Free input*)	Bit 15	Word	0x0071	0x000B	Bool
118 - Stoermeldungen 33 bis 48 Error message 033 to 048	AL033 Emergency stop	Bit 0	Word	0x0072	0x000C	Bool
	AL034 Start crank warning	Bit 1	Word	0x0072	0x000C	Bool
	AL035 Start crank stop	Bit 2	Word	0x0072	0x000C	Bool
	AL036 Start crank sprinkler	Bit 3	Word	0x0072	0x000C	Bool
	AL037 Pick up fault	Bit 4	Word	0x0072	0x000C	Bool
	AL038 Stop fault	Bit 5	Word	0x0072	0x000C	Bool
	AL039 Supply UDC<	Bit 6	Word	0x0072	0x000C	Bool
	AL040 Battery 1<	Bit 7	Word	0x0072	0x000C	Bool
	AL041 Battery 2 <	Bit 8	Word	0x0072	0x000C	Bool
	AL042 Gen CB fault	Bit 9	Word	0x0072	0x000C	Bool
	AL043 Mains CB fault	Bit 10	Word	0x0072	0x000C	Bool
	A044 Syn time too long	Bit 11	Word	0x0072	0x000C	Bool
	AL045 Watchdog	Bit 12	Word	0x0072	0x000C	Bool
	AL046 Supply UDC>	Bit 13	Word	0x0072	0x000C	Bool
	AL047 Maintenance counter	Bit 14	Word	0x0072	0x000C	Bool
	AL048 Fault remote tableau	Bit 15	Word	0x0072	0x000C	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	0x002E	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 xxxxx kWh	KWH counter		UDINT	0x00CD	0x00D9	DINT
208 - Startzähler xxxxx Start(s)	Start counter		UDINT	0x00CE	0x00DA	DINT
209 - Betriebsstunden xxxxx 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 xxx.x %	Mains/Bus voltage L1		Word	0x0021	0x0085	INT
38 - Netz U2 xxx.x %	Mains/Bus voltage L2		Word	0x0022	0x0086	INT
39 - Netz U3 xxx.x %	Mains/Bus voltage L3		Word	0x0023	0x0087	INT
40 - Generator U1 xxx.x %	Generator voltage L1		Word	0x0024	0x0072	INT
41 - Generator U2 xxx.x %	Generator voltage L2		Word	0x0025	0x0073	INT
42 - Generator U3 xxx.x %	Generator voltage L3		Word	0x0026	0x0074	INT
43 - Generator I1 xxx.x %	Generator current L1		Word	0x0027	0x0090	INT
44 - Generator I2 xxx.x %	Generator current L2		Word	0x0028	0x0091	INT
45 - Generator I3 xxx.x %	Generator current L3		Word	0x0029	0x0092	INT
46 - Generator P1 xxx.x %	Generator active power P1		Word	0x002A	0x009F	INT
47 - Generator P2 xxx.x %	Generator active power P2		Word	0x002B	0x00A0	INT
48 - Generator P3 xxx.x %	Generator active power P3		Word	0x002C	0x00A1	INT
49 - Generator S1 xxx.x %	Generator apparent power S1		Word	0x002D	0x00A2	INT
50 - Generator S2 xxx.x %	Generator apparent power S2		Word	0x002E	0x00A3	INT
51 - Generator S3 xxx.x %	Generator apparent power S3		Word	0x002F	0x00A4	INT
52 - Gen. Scheinleistung xxx.x %	Total apparent power		Word	0x0030	0x00A5	INT
53 - Gen. Blindleistung xxx.x %	Total reactive power		Word	0x0031	0x00A6	INT
54 - Gen. Gesamtleistung xxx.x %	Total active power		Word	0x0032	0x00A7	INT
PM2 Cotrol byte for info word	Frei	Bit 0	Byte	0x0033	0x00A8	Bool
	Winkel für SYN	Bit 1	Byte	0x0033	0x00A8	Bool
	Erdstrom in xxx.x %	Bit 2	Byte	0x0033	0x00A8	Bool
	Erdstrom in xxxx.x A	Bit 3	Byte	0x0033	0x00A8	Bool
	Frei	Bit 4	Byte	0x0033	0x00A8	Bool
	Frei	Bit 5	Byte	0x0033	0x00A8	Bool
	Frei	Bit 6	Byte	0x0033	0x00A8	Bool
	Frei	Bit 7	Byte	0x0033	0x00A8	Bool
PM2 Info word	Show info word		Word	0x0034	0x00A9	INT
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

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Modul - GSD-File	Description	Bit	Length	PB1	PN1	Type
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
64 - Gen. Netzschutzbyte 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. vector surge L1 > (minus)	Bit 3	Byte	0x003D	0x0062	Bool
	Dif. vector surge L2 > (minus)	Bit 4	Byte	0x003D	0x0062	Bool
	Dif. vector 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. vector surge L1 >> (minus)	Bit 3	Byte	0x003E	0x0063	Bool
	Dif. vector surge L2 >> (minus)	Bit 4	Byte	0x003E	0x0063	Bool
	Dif. vector 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 capacitive	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

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Modul - GSD-File	Description	Bit	Length	PB1	PN1	Type
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
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

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Modul - GSD-File	Description	Bit	Length	PB1	PN1	Type
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
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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