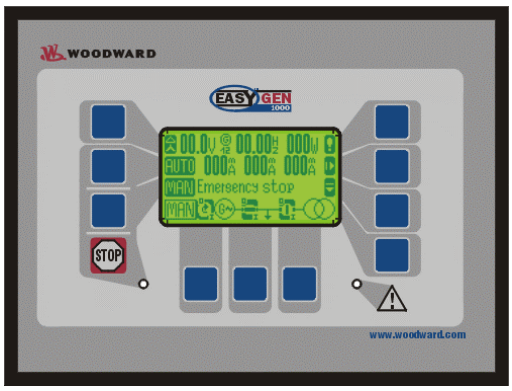
37204

easYgen-1000
Genset Control



Configuration
Software Version 1.0xxx

Manual 37204

WARNING

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

The engine, turbine, or other type of prime mover should be equipped with an overspeed (overtemperature, or overpressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

CAUTION

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

Important definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

NOTE

Provides other helpful information that does not fall under the warning or caution categories.

Content

Illustrations and Tables

Illustrations

Tables

Chapter 1.
General Information

Type		English	German
easYgen-1000 Series			
easYgen-1000 - Installation		37203	GR37203
easYgen-1000 - Configuration	this manual ⇨	37204	GR37204
easYgen-1000 - Operation		37181	GR37181
easYgen-1000 - Application		37205	GR37205
easYgen-1000 - Interfaces		37262	GR37262
Additional Manuals			
IKD 1 - Manual		37135	GR37135
Discrete expansion board with 8 discrete inputs and 8 relay outputs that can be coupled via the CAN bus to the control unit. Evaluation of the discrete inputs as well as control of the relay outputs is done via the control unit.			
IKN 1 - Manual		37136	GR37136
20channel NiCrNi temperature scanner that monitors the temperature values for exceeding or falling below a threshold value, measured through senders on the IKN 1. A configured relay on the board of the IKN 1 will trip. The IKN 1 can be coupled with the control unit using the CAN bus to display measuring values as well as alarms.			
LeoPC - Manual		37146	GR37146
PC program for visualization, for configuration, for remote control, for data logging, for language upload, for alarm and user management and for management of the event recorder. This manual describes the use of the program.			
LeoPC - Manual		37164	GR37164
PC program for visualization, for configuration, for remote control, for data logging, for language upload, for alarm and user management and for management of the event recorder. This manual describes the programming of the program.			
GW 4 - Manual		37133	GR37133
Gateway for transferring the CAN bus to any other interface or bus.			
ST 3 - Manual		37112	GR37112
Control to govern the Lambda value of a gas engine. The Lambda value will be directly measured though a Lambda probe and controlled to a configured value.			

Table 1-1: Manual - overview

Intended Use The unit must only be operated for the uses described in this manual. The prerequisite for a proper and safe operation of the product is correct transportation, storage, and installation as well as careful operation and maintenance.

NOTE

This manual has been developed for a unit fitted with all available options. Inputs/outputs, functions, configuration screens and other details described, which do not exist on your unit may be ignored.

The present manual has been prepared to enable the installation and commissioning of the unit. On account of the large variety of parameter settings, it is not possible to cover every possible combination. The manual are therefore only a guide. In case of incorrect entries or a total loss of functions, the default settings can be taken from the enclosed list of parameters.

Chapter 2.
Configuration

Configuration via the front panel

How to operate the unit via the front panel is explained in manual "37181". Please acquaint yourself with the unit, the buttons and their meaning/operating and the display monitoring using this manual. The display of the parameter via the front panel deviates from the display of the parameters via the PC program described in this manual. The sequence, the meaning and the setting limits are identical.

Configuration using the PC

CAUTION

For the configuration of the unit via the PC please use the LeoPC software with the following software version:

LeoPC from 3.1.xxx

NOTE

Please note that configuration using the direct configuration cable DPC (product number 5417-557) is possible starting with revision B of the DPC (first delivered July 2003). If you have an older model please contact our sales department.

For configuration of the unit via PC program please proceed as follows:

- Install the PC program on your laptop/PC according to the provided installation manual. Consider the options that are given during the installation.
- Briefly before the end of the installation you are requested to select the language with which you want to start the PC program. You can change the language at any time. The selection of the language refers only to language with which the menus and subprograms of the PC program works. The language of the unit will not be changed by this setting.
- After the installation of the PC program please reboot your laptop/PC.
- Establish the connection between your laptop/PC and the unit via the DPC. Plug one side to the configuration plug of the unit and the other side to the COM1 port of your laptop/PC (other possibilities are described in the provided installation manual).
- You can now start the PC program as follows:
  - by "Start..Program..Woodward..LeoPC" (starting at version 3.1.xxx), or
  - by a double click on a file ending ".cfg" in the sub list "..LeoPC".
- After the PC program was started, please establish the online connection by pressing the button "F2". Now there is a data link between the unit and the laptop/PC.
- Start the sub program "Unit..Configuration" and adjust the parameter of the unit to your application using this manual.

Function of the inputs and outputs

Discrete inputs

The discrete inputs can be grouped into two categories:

- ***pre-allocated***
  The discrete input has been pre-allocated (programmed) with this function using the *LogicsManager* (which will be described in the following). The function can be changed all the time using the *LogicsManager*.

- ***fixed***
  The discrete input has a special function that can not be changed. The discrete input is not visible in the *LogicsManager*.

- **Note**
  Dependent of the application mode (see page 20) the discrete inputs can "***pre-allocated***" or "***fixed***". Please note the table on page 91.

Automatic {all} ***pre-allocated*** to discrete input [D2],terminal 52/50

Activated in the operation mode AUTOMATIC

TRUE ..... If the unit is in the operating mode AUTOMATIC (selected with the operating mode selection push button on the front foil) the controlled engine is automatically started.

FALSE ..... The engine will be stopped.

Reply: GCB is open {1oc}+{2oc} ***fixed*** to discrete input [D8], terminals 58/50

⇨ Note: Negative function logic!

This discrete input (logic "1") signalizes the control that the GCB is open. This operating status will be displayed in the LCD.

Reply: MCB is open{2oc} ***fixed*** to discrete input [D7], terminals 57/50

⇨ Note: Negative function logic!

This discrete input (logic "1") signalizes the control that the MCB is open. This operating status will be displayed in the LCD.

Enable MCB {2oc} ***fixed*** to discrete input [D6], terminals 56/50

Set..... The MCB is served.

Reset..... The MCB is not served and switching back to mains supply following a emergency power operation will be blocked.

Alarm inputs {all}

All discrete inputs which are not lodged with a function can be used as alarm inputs. The alarm or control inputs can be configured freely. Please attend chapter Discrete inputs at page 10.

Relay outputs

The discrete outputs can be grouped into two categories:

- ***pre-allocated***
  The relay output has been pre-allocated (programmed) with this function using the *LogicsManager* (which will be described in the following). The function can be changed all the time using the *LogicsManager*.

- ***fixed***
  The relay output has a special function that can not be changed. The relay output is not visible in the *LogicsManager*.

- **Note**
  Dependent of the application mode (see page 20) the relay outputs can "***pre-allocated***" or "***fixed***". Please note the table on page 94.

Ready for operation {all} ***fixed*** to relay [R11], terminals 46/47

By setting this relay ready for operation of the unit is signalized. If the relay drops out no faultless function of the unit can be guaranteed. Appropriate arrangements must be initiated if the relay has dropped out (e.g. open GCB, stop engine).

Pre-glow (Diesel engine) **{all}** ***pre-allocated*** to relay [R5], terminals 34/35

By setting this relay preheating of the diesel engine is carried out. Please note the parameter "Preglow modus" in the chapter "Engine".

Ignition ON (Gas engine) **{all}** ***pre-allocated*** on relay [R5], terminals 34/35

By setting this relay the ignition of the gas engine is switched on.

Crank (diesel engine) **{all}** ***fixed*** to relay [R4], terminals 33/35

By setting this relay start release for the engine is issued. If the engine should be stopped the relay drops out immediately (or picks up immediately depending on the configuration). If the engine speed drops below the adjustable ignition speed this relay drops out (or picks up) as well. Please note the parameter "Fuel magnet" in the chapter "Engine".

Gas valve (Gas engine) **{all}** ***fixed*** to relay [R4], terminals 33/35

By setting this relay the gas valve for the gas engine is opened. If the engine should be switched off, this relay drops out immediately. If the engine speed drops below the ignition speed the relay drop out as well.

Starter {all} ***fixed*** to relay [R4], terminals 32/35

By setting this relay the starter will be engaged and the engine is started. By reaching the ignition speed or in case of a stop, the starter will be taken back/cranked off.

Centralized alarm {all} *pre-allocated* to relay [R1], terminals 30/35

By setting this relay a centralized alarm is output. Here e.g. a horn or a buzzer can be activated. By pressing the quit button, the relay can be reset. It will be set again in case of a new alarm. The centralized alarm will be set by alarms of alarm class B or higher.

Command: close GCB {1oc}+{2oc} *fixed* to relay [R10], terminals 44/45

By setting this relay the GCB will be closed. If closing of the GCB is configured as an continuous impulse, the relay is kept in closed status by the non existence of the discrete input "Reply GCB is open". If an alarm of alarm class C or higher occurs or if the GCB shall be opened, this relay drops out. If closing of the GCB is not configured to an on continuous impulse, this relay drops out after an issued impulse (please note page 36).

Command: open GCB {1o}+{1oc}+{2oc} *fixed* to relay [R7], terminals 38/39

By setting this relay the GCB will be opened or closed. If "Reply: GCB is open" occurs, the relay output will be taken back. In application mode {1o} this relay remains pulled until it is allowed to close the GCB.

Command: close MCB {2oc} *fixed* to relay [R8], terminals 40/41

By setting this relay the MCB will be closed. This output is always a closing impulse i.e. the lock of the mains circuit breaker must be arranged externally.

Command: open MCB {2oc} *fixed* to relay [R9], terminals 42/43

By setting this relay the MCB will be opened. If "Reply MCB is open" occurs the relay output will be taken back.

Auxiliary services *pre-allocated* to relay [R6], terminals 36/37

Prior to engine start:
Before each starting sequence a relay output can be set for an adjustable time (example: opening a sunblind). By setting the relay output an additional message is monitored in the display. In operating mode "MAN" this relay output is always set. The signal remains ON until the operating mode is changed.

During engine run:
The relay remains pulled during the engine is running.

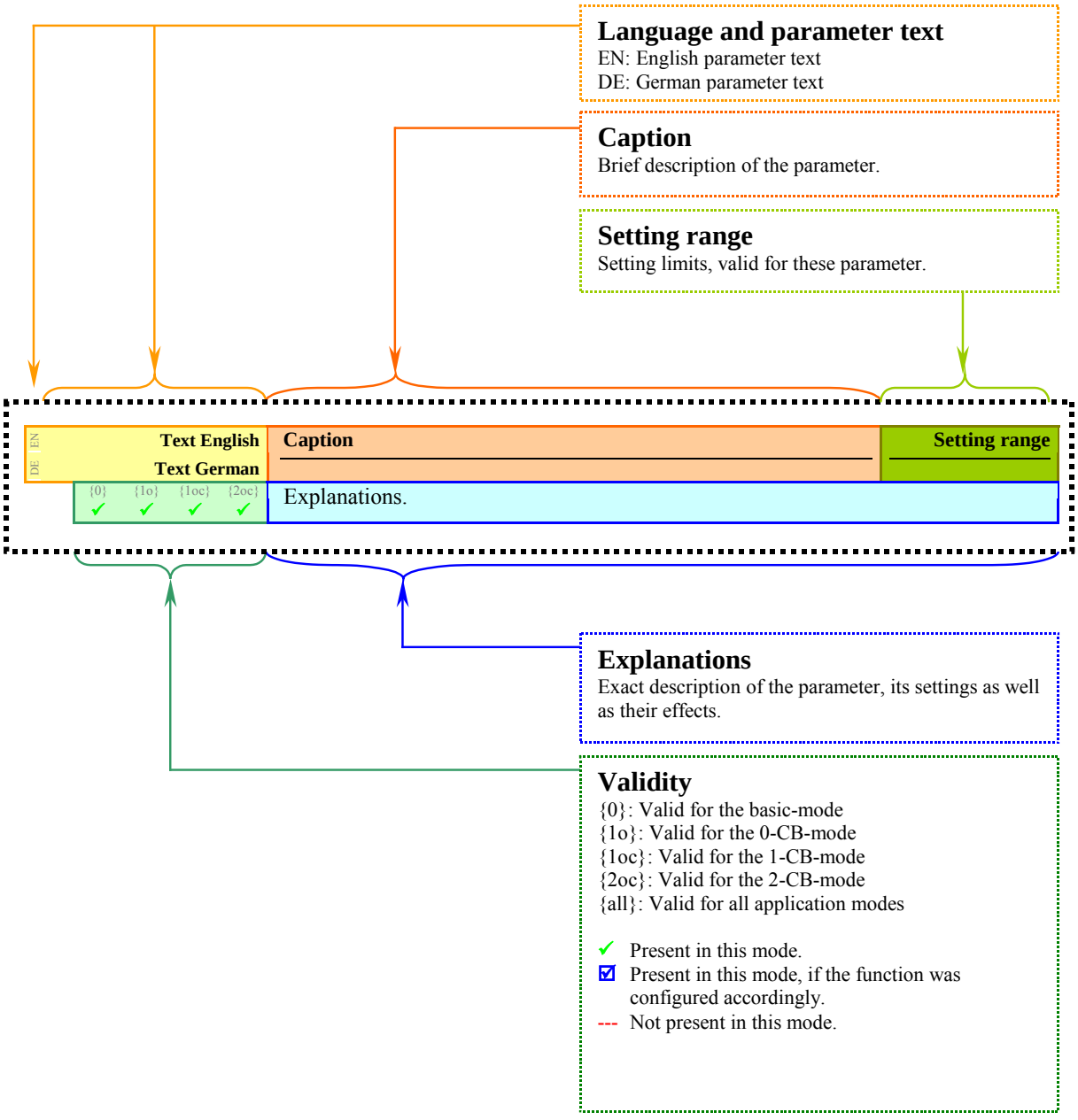
Following an engine stop:
After each engine stop (after speed is no longer detected) a relay output can be set for an adjustable time (example: to operate a cooling pump). If the operating mode is changed from MANUAL to STOP or to AUTOMATIC without start command the relay keeps set for this time. A message is monitored in the display.

LogicsManager **Relay {all}**

All relays which are not provided to a determined function, can be configured via the *LogicsManager*.

Chapter 3.
Parameters

The description of the parameters is confined to the illustration via the PC-program. The parameters are thereby described as follows.



Password

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

Code level CS0 ***(User Level)*** Standard password = every un-defined password
This code level enables no access to the parameters. Configuration is blocked.

Code level CS1 ***(Basis Service Level)*** Standard password = "**0 0 0 1**"
This code level entitles the user to change a few selected parameters. Changing a password is not possible in this case. This password expires two hours after entering the password and must be entered again.

Code level CS3 ***(Commissioning Level)*** Standard password = "**0 0 0 3**"
Allows direct access to all parameters (displaying and changing). In addition, the user may also set the password for levels 1 and 2. This password expires two hours after entering the password and must be entered again.

NOTE

Once the code level is entered, access to the configuration menus will be allowed for two hours or until another password is entered into the control. If a user needs to exit a code level then code level CS0 should be entered. This will block any configuration of the control. Two hours after entering the password of the unit, code level CS0 is automatically set.

By setting "0000" the current password level remains active.

EN Password CAN
DE Passwort CAN

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Password: Entry via CAN bus **0000..9999**

To configure the control via CAN bus enter "password CAN"..

EN Password DPC
DE Passwort RS232 / DPC

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Password: Entry via DPC **0000..9999**

To configure the via DPC please enter "password DPC".

Measuring

NOTE

There are two different types of hardware, which are described in this manual: A current transformer ../1 A-version [../1] and a current transformer ../5 A-version [../5]. The setting limits of these two versions are different.

Measuring: Rated values

EN Rated system frequency
DE Nennfrequenz im System
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Rated system frequency **50/60 Hz**

The rated frequency of the system.

EN Rated voltage generator
DE Nennspannung Generator
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Rated generator voltage **50..650,000 V**

ⓘ This value is the primary voltage of the generator voltage transformers.

The rated voltage of the generator. The secondary voltages and their terminals are given below:

- Rated voltage: 120 Vac
  - Generator voltage: Terminals 22/24/26/28
- Rated voltage: 480 Vac
  - Generator voltage: Terminals 23/25/27/29

EN Rated voltage mains
DE Nennspannung Netz
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Rated mains voltage **50..650,000 V**

ⓘ This value is the primary voltage of the mains voltage transformers.

The rated voltage of the mains. The secondary voltages and their terminals are given below:

- Rated voltage: 120 Vac
  - Mains voltage: Terminals 14/16/18/20
- Rated voltage: 480 Vac
  - Mains voltage: Terminals 15/17/19/21

EN Gen.voltage measuring
DE Gen.Spannungsmessung

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Measurement principle: Generator **3Ph 4W / 3Ph 3W / 1Ph 2W / 1Ph 3W**

ⓘ Please review the comments on measuring principles in the installation manual 37203.

3Ph 4W .....Measurement is performed Line-Neutral (WYE connected system). Phase voltages and the neutral must be connected for proper calculation. The measurement, display and protection are adjusted according to the rules for WYE or delta connected systems. Monitoring refers to the following voltages:
- V_{L12}, V_{L23}, and V_{L31}, or
- V_{L1N}, V_{L2N} and V_{L3N}.

3Ph 3W .....Measurement is performed Line-Line (Delta connected system). Phase voltages must be connected for proper calculation. The measurement, display and protection are adjusted according to the rules for Delta connected systems. Monitoring refers to the following voltages:
- V_{L12}, V_{L23}, V_{L31}.

1Ph 2W .....Measurement is performed for single phase systems. The measurement, display and protection are adjusted according to the rules for single phase systems. Monitoring refers to the following voltages:
- V_{L1N}.

1Ph 3W .....Measurement is performed for single phase systems. The measurement, display and protection are adjusted according to the rules for single phase systems. Monitoring refers to the following voltages:
- V_{L1N}, V_{L3N}.

EN Gen.current measuring
DE Gen.Strommessung

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Measurement principle: Generator **L1 L2 L3 / Phase L1 / Phase L2 / Phase L3**

ⓘ Please consider the comments to the measuring principles in the installation manual 37203.

L1 L2 L3 .....Measurement is performed for all three phases. The measurement, display and protection are adjusted according to the rules for 3 phase measurement. Monitoring refers to the following currents:
- I_{L1}, I_{L2}, I_{L3}.

Phase L{1} ...Measurement is performed for one phase only. The measurement, display and protection are adjusted according to the rules for 1 phase measurement. Monitoring refers to the selected phase.

EN Mains.voltage measuring
DE Netz.Spannungsmessung

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Measurement principle: Mains **3Ph 4W / 3Ph 3W / 1Ph 2W / 1Ph 3W**

ⓘ Please review the comments on measuring principles in the installation manual 37203.

3Ph 4W ..... Measurement is performed Line-Neutral (WYE connected system). Phase voltages and the neutral must be connected for proper calculation. The measurement, display and protection are adjusted according to the rules for WYE or delta connected systems. Monitoring refers to the following voltages:
- VL12, VL23, and VL31, or
- VL1N, VL2N and VL3N.

3Ph 3W ..... Measurement is performed Line-Line (Delta connected system). Phase voltages must be connected for proper calculation. The measurement, display and protection are adjusted according to the rules for Delta connected systems. Monitoring refers to the following voltages:
- VL12, VL23, VL31.

1Ph 2W ..... Measurement is performed for single phase systems. The measurement, display and protection are adjusted according to the rules for single phase systems. Monitoring refers to the following voltages:
- VL1N.

1Ph 3W ..... Measurement is performed for single phase systems. The measurement, display and protection are adjusted according to the rules for single phase systems. Monitoring refers to the following voltages:
- VL1N, VL3N.

EN Mains.current measuring
DE Netz.Strommessung

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Measurement principle: Mains **Phase L1 / Phase L2 / Phase L3**

ⓘ Please consider the comments to the measuring principles in the installation manual 37203.

Phase L{1} ... For the measurement of the current the configured phase has to be attached. The measurement, the display and the protection are adjusted according to the rules for this measurement principle. Monitoring refers to the selected phase.

NOTE

The exact values of the rated power and the rated current are absolutely necessary, as many measurement and monitoring functions refer to these values.

EN Rated active power[kW]
DE Nennwirkleistung[kW]

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Rated active power **0.5..99,999.9 kW**

This value specifies the generator rated power.

EN Rated current
DE Nennstrom Generator

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Rated current **5..32.000 A**

This value specifies the generator rated current.

Measuring: Transformers

Voltage transformer

EN Gen.volt. transf. primary
DE Gen.Spg.Wandler primär

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Voltage transformer, generator, primary **50..650,000 V**

The primary generator voltage in V.

EN Gen.volt. transf. secondary
DE Gen.Spg.Wandler sekundär

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Voltage transformer, generator, secondary **50..480 V**

ⓘ The control is equipped with two rated voltage ranges, which are determined via different terminals (see below). This value refers to the secondary voltages of the voltage transformers, which are directly connected to the control.

The secondary generator voltage in V.

- Rated voltage: 120 Vac (for PT's up to 120 Vac)
  - Generator voltage: Terminals 22/24/26/28
- Rated voltage: 480 Vac
  - Generator voltage: Terminals 23/25/27/29

EN Mains.volt. transf. primary
DE Netz.Spg.Wandler primär

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Voltage transformer, mains, primary **50..650,000 V**

The primary mains voltage in V.

EN Mains.volt. transf. secondary
DE Netz.Spg.Wandler sekundär

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Voltage transformer, mains, secondary **50..480 V**

ⓘ The control is equipped with two rated voltage ranges, which are determined via different terminals (see below). This value refers to the secondary volt-ages of the voltage transformers, which are directly connected to the control.

The secondary mains voltage in V.

- Rated voltage: 120 Vac (for PT's up to 120 Vac)
  - Mains voltage: Terminals 14/16/18/20
- Rated voltage: 480 Vac
  - Mains Voltage: Terminals 15/17/19/21

Current transformer

EN Generator current transf.
DE Generator Stromwandler

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Current transformer, generator **1..32,000/{x} A**

ⓘ Current transformer ratio for the generator.

The control can be optionally equipped with ../1 A or with ../5 A current transformer inputs. Depending on the version there are two different specifications of the parameter. You can find this value either on the type plate or via the software.

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

EN Mains currrent transformer
DE Netz Stromwandler

{0}	{1o}	{1oc}	{2oc}
---	---	---	☑

Current transformer, mains **1..32,000/{x} A**

ⓘ Current transformer ratio for the generator.

The control can be optionally equipped with ../1 A or with ../5 A current transformer inputs. Depending on the version there are two different specifications of the parameter. You can find this value either on the type plate or via the software.

{x} = 1 ..... easYgen-1xxx-51B = Current transformer with ../1 A rated current,
{x} = 5 ..... easYgen-1xxx-55B = Current transformer with ../5 A rated current.

Application

Application: Application mode

NOTE

The once configured parameters will not be changed through the adjustment of the application mode.

EN Application mode
DE Betriebsmodus

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Application modes **"None" / "GCB open" / "GCB" / "GCB/MCB"**

The unit can be configured for four different application modes. Dependent from the selected application mode the discrete inputs and relay outputs are pre-allocated with defined functions. Furthermore different mimic diagrams are monitored in the display which stands for the selected application mode. Dependent from the selected application mode different functions can be realized. Please also note the additional "Operation manual" (37181).

None .....Application mode **{0}** "Engine Control" [BM]
The unit will be pre-allocated with the functionality of an engine control. All necessary inputs and outputs are assigned and pre-allocated.

GCB open ....Application mode **{1o}** "Protection" [open GCB]
The unit will be pre-allocated with the functionality of an engine control with generator and engine protection. The GCB can only be opened. All necessary inputs and outputs are assigned and pre-allocated .

GCB .....Application mode **{1oc}** "1-CB control" [open/close GCB]
The unit will be pre-allocated with the functionality of a 1 CB unit. The GCB can be opened and closed. All necessary inputs and outputs are assigned and pre-allocated.

GCB/MCB ...Application mode **{2oc}** "2 CB control" [open/close GCB/MCB]
The unit will be pre-allocated with the functionality of a 2 CB unit. The GCB and the MCB can be opened and closed. All necessary inputs and outputs are assigned and pre-allocated.

Application: Start in operating mode AUTOMATIC (*LogicsManager*)

The start of the engine can be performed via different logical conditions. This can be e.g.:

- a discrete input,
- a temperature level
- a timer
- any logical combination

EN Start req. in Auto
DE Startanf. in Auto

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Start request in operation mode AUTOMATIC *LogicsManager*

The *LogicsManager* and its default settings are explained on page 116 in chapter "*LogicsManager*".

Application: Stop in operating mode AUTOMATIC (*LogicsManager*)

Stopping of the engine can be initiated from externally via a discrete input. If there are simultaneously an engine start and an engine stop active the engine stop has priority.

EN Stop req. in Auto
DE Stopanf. in Auto

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Stop request in operation mode AUTOMATIC *LogicsManager*

The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

Application: Operating mode

EN Start w/o load
DE Start ohne Übernahme

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Start without load assumption *LogicsManager*

If this *LogicsManager* condition is TRUE switching from mains to generator supply following an engine start is blocked (the GCB operation is blocked). This function can e.g. be used to realize a test operation. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

EN Startup in mode
DE Einschalten in Betriebsart

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Operating mode after applying the power supply **Stop / Auto / Manual / last**

Once the power supply is applied to the unit this configured operating mode is activated.

Stop..... The unit starts in operating mode STOP.
Auto ..... The unit starts in operating mode AUTOMATIC.
Manual ..... The unit starts in operating mode MANUAL.
last..... The unit starts in that operating mode, that has been selected last.

NOTE

For the selection of the operating mode via the *LogicsManager* (if two different operating modes have been selected simultaneously) the following priority is valid:

- **At first operating mode STOP,**
- **then operating mode MANUAL and**
- **finally operating mode AUTOMATIC.**

EN Operation mode AUTO
DE Betriebsart AUTO

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Activate operating mode AUTOMATIC *LogicsManager*

Once the conditions of the *LogicsManager* have been fulfilled the unit will change into operating mode AUTOMATIC. During selection if the operating mode via the *LogicsManager* the change of the operating mode via the front panel is locked. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

EN Operation mode MAN
DE Betriebsart MAN

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Activate operating mode MANUAL *LogicsManager*

Once the conditions of the *LogicsManager* have been fulfilled the unit will change into operating mode MANUAL. During selection if the operating mode via the *LogicsManager* the change of the operating mode via the front panel is locked. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

EN Operation mode STOP
DE Betriebsart STOP

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Activate operating mode STOP *LogicsManager*

Once the conditions of the *LogicsManager* have been fulfilled the unit will change into operating mode STOP. During selection if the operating mode via the *LogicsManager* the change of the operating mode via the front panel is locked. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

Application: LC display

EN Alternative screen
DE Alternative Anzeigemasken

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Show alternative screens **YES / NO**

YES .....In the LC display the alternative screens would be displayed. Please note manual 37181.
NO .....In the LC display the standard screens would be displayed. Please note manual 37181.

EN Show mains data
DE Netzdaten anzeigen

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Show mains data **YES / NO**

YES .....In the LC display the mains data would be displayed. Please note manual 37181.
NO .....In the LC display the mains data would not be displayed. Please note manual 37181.

Application: Critical mode (Sprinkler operation, *LogicsManager*)

The critical mode can be initiated from externally via a discrete input. Therefore the *LogicsManager* is used (for conditions and explanation of programming please note page 21 in chapter "Application: Start in operating mode AUTOMATIC (LogicsManager)").

Alarm classes

By the activation of the critical mode the alarm classes are rewritten as follows:

	Alarm classes					
Normal operation	A	B	C	D	E	F
Critical mode	A	B	B	B	B	B

Critical mode "ON"

A critical mode will be initiated/started once the following logical equation becomes TRUE: If the signal at this discrete input drops a critical mode is released. A message is displayed. The engine is started with up to 10 starting attempts (otherwise as configured) if it is not running yet. All shutdown alarms become messages (see above).

Critical mode "OFF"

A critical mode will be interrupted/stopped once the following logical equation (Critical mode "ON") becomes FALSE: To idle 10 minutes the pre-programmed internal flag 3 can be used. (also note Applications manual 37205). With termination off the critical mode a normal cooldown is performed.

Critical mode and emergency power {2oc}

The emergency power operation has priority. If there will be a mains failure during the critical mode, the generator will supply the busbar. Therefore the MCB will be opened and the GCB will be closed. A message is displayed. Additionally all shutdown alarms become warning alarms.

- ⇨ Critical mode ends before mains recovery: The emergency power operation will be continued and all shutdown alarms will become active again. If the mains returns, the unit transfers the load after the expiration of the mains delay from generator supply back to mains supply.
- ⇨ Emergency power operation ends before the end of the critical mode: The critical mode is maintained and after the expiration of the mains settling time the load is transferred from generator supply to mains supply. The engine remains running until the conditions for the critical mode are no longer existent.

Critical mode and start request

The critical mode operation has priority. If there is a critical mode request during the generator is running, the GCB will be opened (in application mode {2oc} there will be a change from generator supply to mains supply of the busbar). A message is displayed. Additionally all shutdown alarms become warning alarms.

- ⇨ Critical mode ends before the start request is terminated: The engine continues running (and in application mode {2oc} there will be a change from mains supply to generator supply of the busbar. All shut-down alarms will become active again. By resetting the start request the GCB will be opened and the engine will be stopped.
- ⇨ Start request will be terminated before the critical mode is terminated: The critical mode operation is continued. The engine keeps running until the conditions for the critical mode are not fulfilled anymore.

Parameters

EN Critical mode
DE Sprinklerbetrieb

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Critical mode request *LogicsManager*

The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

EN close GCB in override
DE GLS schließen bei Sprinkler

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Close GCB in critical mode **YES / NO**

YES .....If a critical mode has been detected the GCB would be closed.
NO .....The GCB could not be closed at a critical mode.

EN over. alarm cl. also. in MAN
DE Sprinkler Alarmkl. in MAN

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Alarm classes of critical mode active in operating mode MANUAL **YES / NO**

YES .....In operating mode MANUAL the alarm classes will be changed, too, if the critical mode has been selected via the *LogicsManager*.
NO .....The alarm classes will not be changed in operating mode MANUAL.

EN Break emergency in override
DE Pause Notstrom bei Sprinkler

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Interrupt emergency operation at critical mode for ... **2..999 s**

The emergency power operating remains interrupted for this time starting with the critical mode.

Engine

Engine: Start /stop sequence

NOTE

All functions which are described in the following can be assigned by the *LogicsManager* to each relay which is available via the *LogicsManager* and not used for another function. By selection of the application mode the assignment of the defined relays to defined functions occurs at the same time (e.g. function "Command: Close GCB" on relay [R10], afterwards this relay can be operated no longer via the *LogicsManager*). In the same way other relays are assigned to other functions. These are marked by the text "Pre-allocated". If a relay was "pre-allocated" this function can be assigned to each other relay via the *LogicsManager* by configuration.

All

EN Start/Stop mode
DE Start/Stop Modus

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Engine: Type of engine **Diesel / Gas / External**

Diesel or gas engine can be selected. The starting sequences are described in the following chapters. If this parameter is configured to "External" the start/stop sequence has to be done externally.

Engine: Diesel engine

Start sequence

The relay "Preheating" will be set for the period of the preheating time. Following preheating, the operating magnet is first set, and then the starter. When the adjustable firing speed [ZD]is exceeded, the starter is disengaged again, and the operating magnet is held via the firing speed. Is the number of start attempts reached or exceeded and it was not able to start the engine an alarm message will be issued.

Stop sequence

After opening the generator power circuit breaker, the coasting time is started, and the engine rotates without load. On termination of the coasting time, the operating magnet is reset. The engine is stopped. If the firing speed [ZD] is not reached, engine starting is prevented for a adjustable time ("Time for engine stop"). If the engine cannot be stopped via the operating magnet, an alarm message appears.

Start/stop diagram

The formula signs and indices mean:

t_{HVL} ..... Lead time auxiliary operation .....[s]
t_{VG} ..... Preheating time .....[s]
t_{SV} ..... Engagement time .....[s]
t_{SP} ..... Interval between 2 start attempts .....[s]
t_{MV} ..... Engine delayed monitoring.....[s]
t_{HNL} ..... Coasting time auxiliary operation.....[s]
t_{NL} ..... Coasting time .....[s]

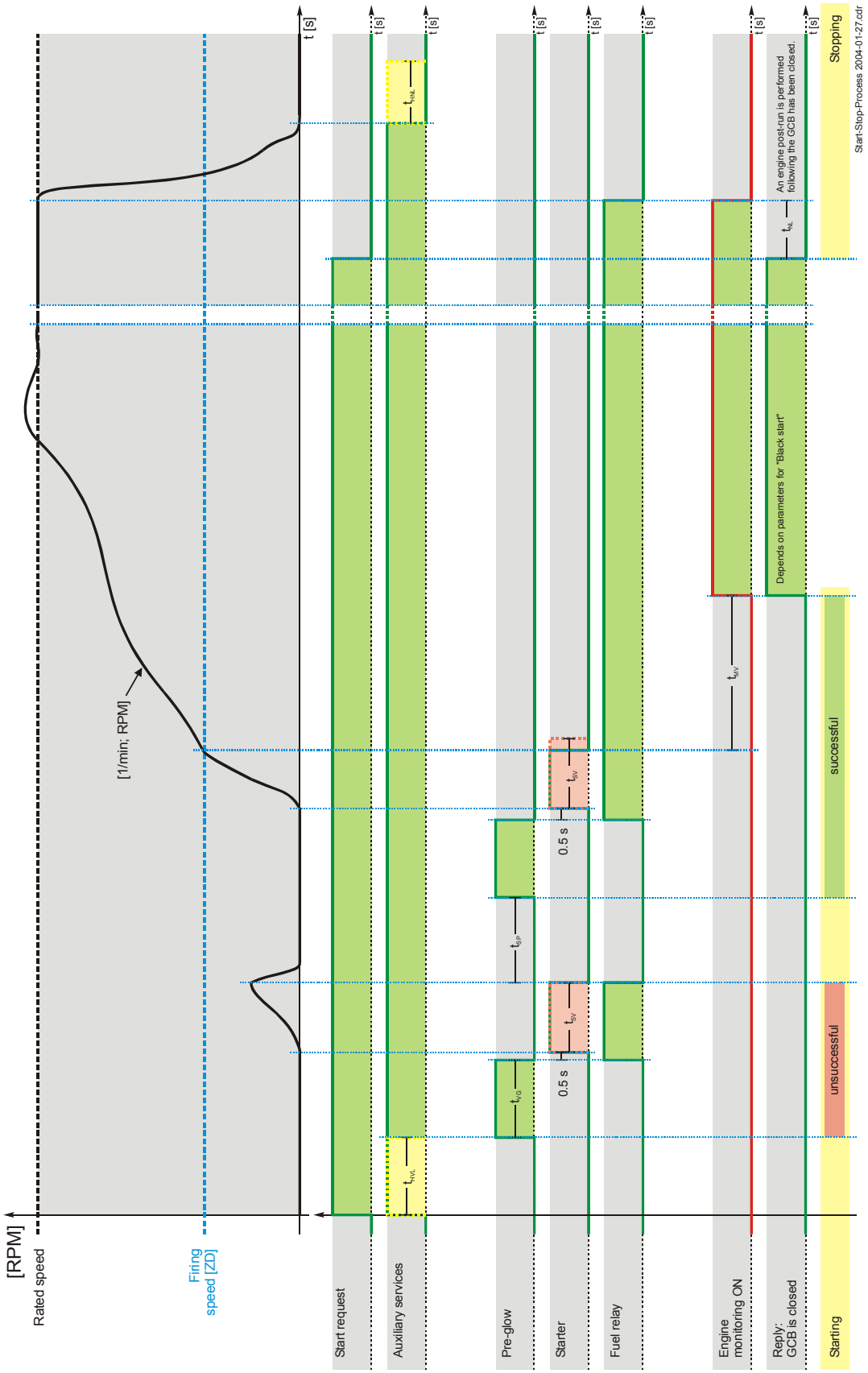


Figure 3-1: Start /stop sequence – Diesel engine

Parameter

EN Fuel relay: close to stop
DE Kraftstoffmagnet: Stopmag.

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Diesel engine: Fuel relay for close to stop **YES / NO**

YES..... **Stop magnet**
To stop the engine the stop magnet is set. Once no speed is detected anymore the stop magnet remains closed for another 30 s.

NO..... **Operating magnet**
Before each starting sequence the operating magnet is set. To stop the engine the operating magnet is taken back.

EN Preglow time
DE Vorglühzeit

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Diesel engine: Preglow time [t_{VG}] **0..999 s**

Before each starting the diesel engine is preglowed for this time (if a "0" has been configured here the engine will be started without preglow).

EN Preglow mode
DE Vorglühmodus

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Diesel engine: Preglow mode **NO / Always / An.input [Tx]**

With this parameter it is decided if and by reason of which argument a diesel engine is preheated.

NO..... The diesel engine is never preheated, e.g. the relay "Preheating" will not pick up before a start attempt.

Always ..... Before a start attempt the relay "Preheating" is always picked up for the pre-glow time (previous mask). After that a start attempt is carried out.

An.in.{x} ..... Preheating the engine occurs due to a temperature which is measured over the analog input [T1] = "Temp.1" or the analog input [T2] = "Temp.2". A requirement here is that the selected analog input is configured as a temperature measuring input. The limit of the temperature is set in the following mask.

EN Preglow temp. threshold
DE Vorglühen wenn T<

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Diesel engine: Preheating temperature setpoint value **-10..0..+60 °C**

If this limit is fallen below and the previous parameter is set "temp 1" or "temp 2" the diesel engine will be preheated.

Engine: Gas engine

Start sequence

Function: The starter is set. Following the expiration of the firing delay time and if the engine is rotating with at least the set "minimum speed start" [ZDmin], the ignition is switched on. Following the expiry of the gas delay, the gas valve is then switched on. If the starting attempt is successful, i.e., the firing speed [ZD]was exceeded, the starter is disengaged again. The gas valve and the ignition are held via the firing speed [ZD].

Stop sequence

Function: After opening the generator power circuit breaker, the coasting time is started, and the engine rotates without load. On termination of the coasting time, the gas valve is opened or turned off. The engine is stopped. If the firing speed [ZD] is not reached, engine starting is prevented for a adjustable time ("Time for engine stop"). If the engine cannot be stopped, an alarm message appears. Following negative deviation from the firing speed [ZD], the ignition remains set for 5 seconds so that the remaining gas is able to combust.

Start/stop diagram

The formula signs and indices mean:
t_{HVL}.....Lead time auxiliary operation .....[s]
t_{SV}.....Start delay .....[s]
t_{SP}.....Interval between 2 start attempts....[s]
t_{ZV}.....Ignition delay .....[s]
t_{GV}.....Gas delay.....[s]
t_{MV}.....Engine delayed monitoring .....[s]
t_{HNL}.....Coasting time auxiliary operation ..[s]
t_{NL}.....Coasting time .....[s]
t_{ZN}.....Ignition coasting ("post burning")..[s]

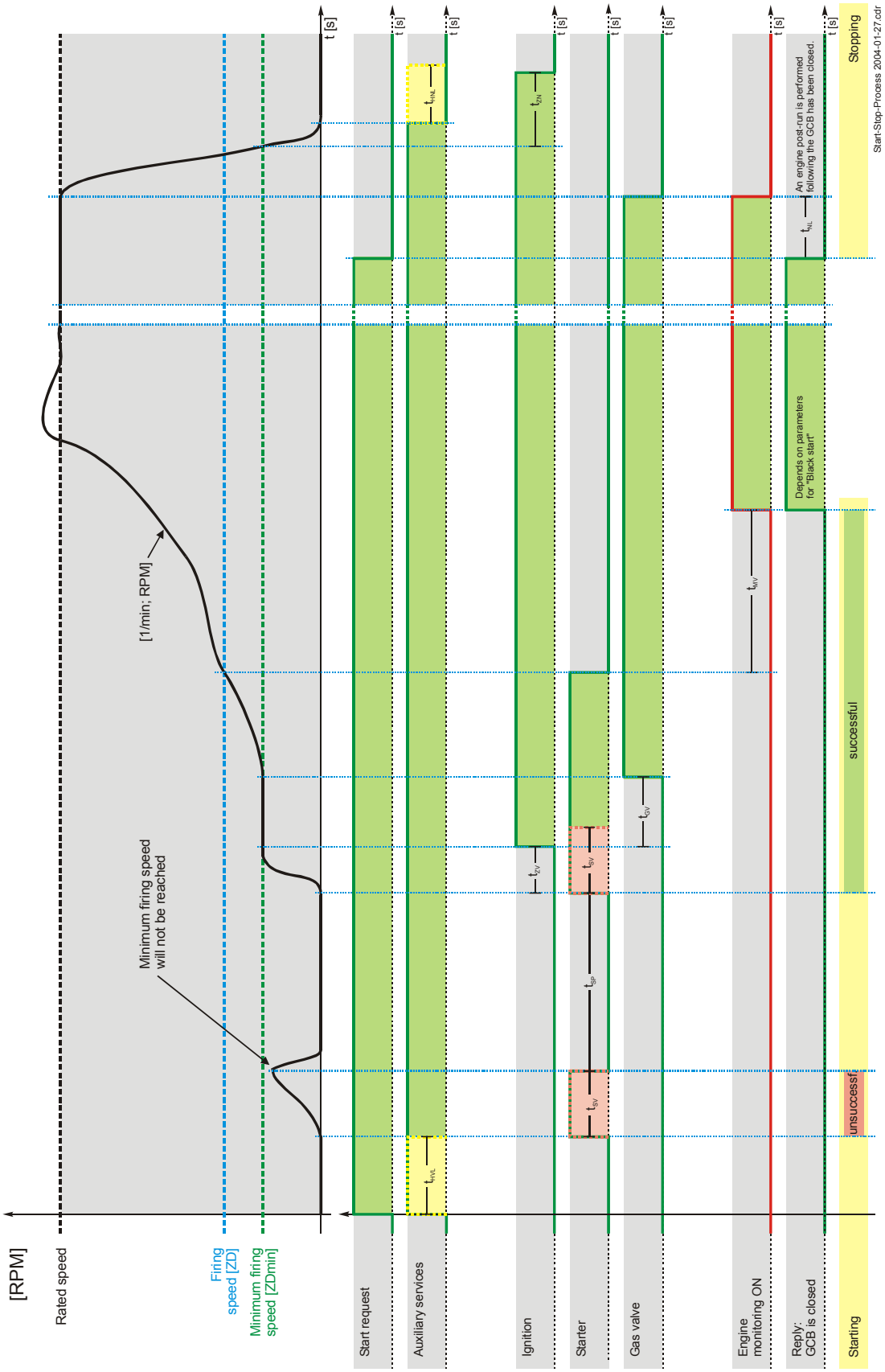


Figure 3-2: Start /stop sequence – Gas engine

Parameter

EN Ignition delay
DE Zündverzögerung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Gas engine: Ignition delay [t_{ZV}] **0..999 s**

With gas engines often a purging operation is desired before starting. With the engaging of the starter the ignition delay is started. If the "Minimum speed starter" [ZDmin] is reached after the expiry of this time, the ignition is set.

EN Gas valve delay
DE Gasverzögerung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Gas engine: Gas valve delay [t_{GV}] **0..999 s**

By setting the ignition relay the gas valve delay is started. After the expiry of the here set time as long as the number of revolutions is higher than the minimum ignition speed [ZDmin], the gas valve is set. With the reaching of the ignition speed [ZD] the relay "Ignition" is sealing until shut down of the engine.

EN Min.speed for ignition
DE Mindestdrehz. für Zündung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Gas engine: Minimum ignition speed [ZDmin] **10..1.800 RPM**

After expiry of the ignition delay the number of revolutions set here must be reached at least, so that the relay "Ignition" will be set.

Engine: Pickup

To configure the pickup input, the following values must be configured:

- Nominal speed (RPM)
- Number of cogs of the Pickup speed sensor per revolution of the engine respectively number of pickup pulses per revolution of the engine.

EN Speed Pickup
DE Pickup
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Pickup **ON / OFF**

ON .....Speed monitoring of the engine is carried out by pickup.
OFF .....Speed/frequency monitoring of the generator (of the engine) is carried out by measuring the frequency of the generator. There is no Pickup wired to this unit.

EN Nominal speed
DE Nenndrehzahl
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Nominal speed **500..4,000 RPM**

Number of revolutions of the engine at rated engine speed.

EN Number of gear teeth
DE Anzahl Pickup-Zähne
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Number of pickup teeth **2..260**

Number of pulse per revolution.

Engine: Start/stop automatic

EN Aux. services prerun
DE Hilfsbetriebe Vorlauf
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Pre-run auxiliary operation (start preparation) [t_{HVL}] **0..999 s**

➡ **CAUTION:**
During an emergency start this delay time "auxiliary pre-run" is not initialized. The engine will be started immediately.

ⓘ In the MANUAL operation mode the relay "auxiliary pre-run" is permanently ON.

Before each starting sequence a relay output can be set for an adjustable time (example: opening a sun-blind). By setting the relay output an additional message is monitored in the display. In operating mode "MAN" this relay output is always set. The signal remains ON until the operating mode is changed.

EN Starter time
DE Einrückzeit Anlasser
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Maximum starter delay [t_{SV}] **1..99 s**

The maximum time during which the starter relais remains closed (not a speed/frequency nor the discrete input "Ignition speed reached" has been set to logical "1"). With reaching the ignition speed [ZD] or with the *LogicsManager* "Ignition speed reached" = TRUE the starter relay drops out.

EN Start pause time
DE Startpausenzeit
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Start pause time [t_{SP}] **1..99 s**

Time between the individual starting attempts. (This time also is used to protect the starter relay.)

EN Cool down time
DE Motor Nachlaufzeit
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Cooldown time [t_{NL}] **0..999 s**

Regular stop: If the engine performs a normal stop, changed into operation mode STOP or stopped by an alarm of alarm class C/D, a cooldown with an opened GCB is carried out. This time is adjustable.

Stop by an alarm (alarm class 'C' and 'D'): If the engine is stopped by an alarm of this alarm class, a cooldown will be carried out with an opened GCB. This time is adjustable.

Stop by an alarm (alarm class 'E' and 'F'): If the engine is stopped by an alarm of this alarm class, the engine will be shut-down immediately and without a cooldown.

EN Aux. services postrun
DE Hilfsbetriebe Nachlauf
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Coasting auxiliary operation (post processing) [t_{HNL}] **0..999 s**

After each engine stop (after speed is no longer detected) a relay output can be set for an adjustable time (example: to operate a cooling pump). If the operating mode is changed from MANUAL to STOP or to AUTOMATIC without start command the relay keeps set for this time. A message is monitored in the display.

EN Time of motor stop
DE Zeit für Motorstop
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Engine blocking **0..99 s**

During this time a engine restart is blocked. This time is to be selected in that way that an engine can be shutdown totally and is used amongst others to protect the starter. A message is displayed in the LCD with initializing the stopping process until no speed can be recognized plus this time.

Engine: Firing speed and engine delayed monitoring

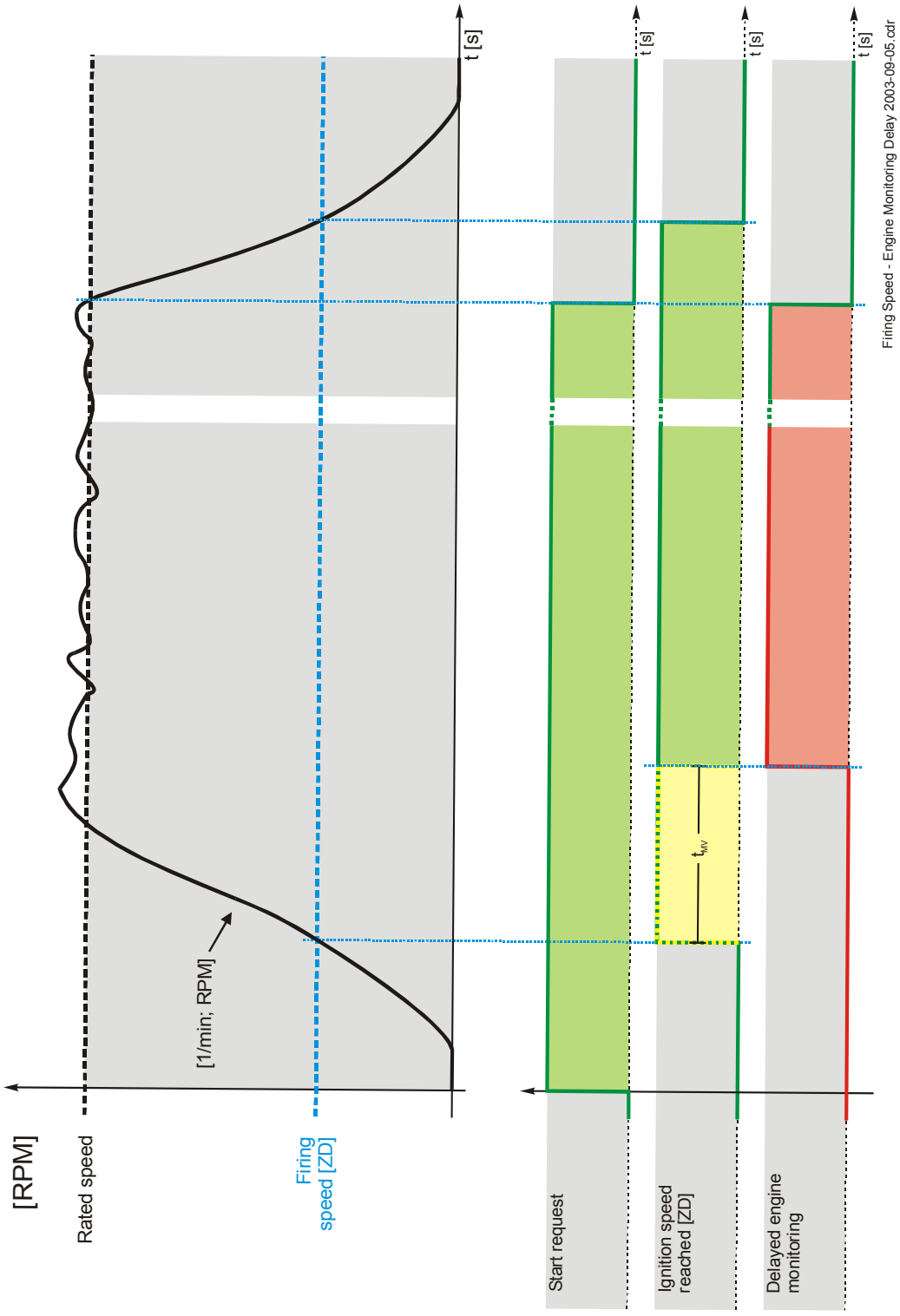


Figure 3-3: Engine – Firing speed and engine delayed monitoring

NOTE

When the ignition speed is reached, the starter is switched off under one of the following conditions:

- **The measurement via Pickup is enabled (ON):**
  ⇨ Whether due to the engine speed
  ⇨ or due to the generator frequency (which is measured via the generator voltage)
  ⇨ or due to the discrete input "Ignition speed" (see *LogicsManager*).
- **The measurement via Pickup is disabled (OFF):**
  ⇨ Whether due to the generator frequency (which is measured via the generator voltage)
  ⇨ or due to the discrete input "Ignition speed" (see *LogicsManager*).

Pickup	Generator frequency	Engine speed	*LogicsManager*
OFF	YES	NO	YES (if programmed)
ON	YES	YES	YES (if programmed)

Engine: Firing/ignition speed

EN Firing speed
DE Zünddrehzahl
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Firing speed [ZD] **5..60 Hz**

After firing speed has been reached, the starter is switched off and the time counter for the engine delayed monitoring is activated.

Note: Frequency measurement via the generator voltage input is possible beginning with 15 Hz or higher (also if 5 Hz will be displayed). Is the Pickup measurement enabled values down to 5 Hz can be measured.

EN Logicm. for firing speed
DE Logikm. für Zünddrehzahl
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Firing speed via *LogicsManager* **YES / NO**

YES ..... Instead of measuring the firing speed [ZD] by a Pickup via the current engine speed, this can alternatively be done via the *LogicsManager* (following parameter).
NO ..... The firing speed [ZD] is evaluated via the speed/frequency but not via a discrete input.

EN Ignition speed
DE Zünddrehz. erreicht
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Firing speed reached via *LogicsManager* ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled the ignition speed will be recognized as reached. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

Engine: Engine delayed monitoring

After reaching the ignition speed [ZD] a timer is started. Upon expiration of this timer all "engine delayed monitoring" configured alarms and discrete inputs will be initialized. This timer should be selected in such a way that it corresponds to the typical starting time of the engine plus any possible startup transients. A GCB closure can take place after the expiration of this timer. Note: The GCB closure can be initiated prior to engine delayed monitoring by setting a discrete input; see "Breaker" starting page 34).

EN Engine mon. delay time
DE Verzög. Motorüberwach.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Engine: Engine delayed monitoring [t_{MV}] **0..99 s**

Delay between reaching the firing speed and the activation of the monitoring of engine speed delayed alarms.

Breaker

Breaker: Operation of the circuit breakers

The change-over of the impulses occurs in the screen displayed below and has the indicated effect on the signal sequence (the control of the MCB cannot occur by a continuous impulse). If the parameter "Automatic breaker unblocking" is set ON, an open impulse is output before each close impulse. The "Release MCB" prevents switching on the MCB. A closed MCB will not be opened.

Black start GCB {1oc}+{2oc}

The GCB is closed, if the following conditions are met simultaneously:

Automatic operation

- The operating mode AUTOMATIC has been selected.
- No alarm of alarm class C..F is present.
- The engine is running.
- The engine delayed monitoring has been expired.
- The generator voltage and frequency are within the permissible limits.
- The MCB has been opened for at least the "Transfer time GCB↔MCB" ({2oc} only).
- The parameter 'Close GCB in override' has to be configured to YES.
- The function "Start without load" has to be disabled.

Manual operation

- The operating mode MANUAL has been selected.
- No alarm of alarm class C..F is present.
- The engine is running.
- The engine delayed monitoring has been expired.
- The generator voltage and frequency are within the permissible limits.
- The MCB has been opened for at least the "Transfer time GCB↔MCB" ({2oc} only).
- The button "Close GCB" has been pressed.

Black start MCB {2oc}

The MCB is closed, if the following conditions are met simultaneously:

Automatic operation

- The operating mode AUTOMATIC has been selected.
- The mains voltage is available and within the limits.
- The GCB is open or has been opened for at least the "Transfer time GCBMCB".
- The discrete input "Release MCB" is set.

Manual operation

- Operating mode MANUAL has been selected.
- The mains voltage is available and within the limits.
- The GCB is open or has been opened for at least the "Transfer time GCBMCB".
- The discrete input "Release MCB" is set.
- The button "Close MCB" has been pressed.

Open GCB {1o}+{1oc}+{2oc}

The GCB is opened both when the relay "Command: GCB close" drops out (only if the parameter "GCB close impulse" is set to NO) and via the closure of the relay "Command GCB open". The GCB will be opened under the following circumstances.

- In the operating mode STOP.
- In case of alarm class C..F.
- By pressing the button "GCB open" or "MCB close" (depending on the CB logic which has been set) in MANUAL operating mode.
- By pressing the button "stop engine" in MANUAL operating mode.
- In the event of automatic stopping in AUTOMATIC operating mode (start request has been deleted or stop request has been initiated).
- Before the MCB is switched to the black busbar.
- In critical mode (Sprinkler operation), provided that no case of emergency power is present, and the parameter "Close GCB in override" has been configured to NO.
- If "Start without load" has been enabled.

Open MCB {2oc}

The MCB is opened via the closure of the relay "Command: MCB open". The MCB will be opened under the following circumstances.

- If emergency power is triggered (mains failure) once the generator voltage is within the limits.
- Prior to the closure of the GCB.
- Upon pressing the "MCB OFF" or "GCB ON" push-button (depending on the CB logic which has been set) in MANUAL operating mode.

Breaker: GCB settings

NOTE

Operating current (NO): The relay picks up when triggering, i. e. in the operating state current flows through the coil. In case of a loss of the supply voltage no change in state of the relay will be effected, no triggering will occur. In this case readiness for operation should be monitored by all means.

Closed circuit current (NC): The relay drops out when triggering, i. e. in idle state current flows through the coil. The relay is picked up in idle state (= no triggering). In case of a loss of the supply voltage change in state of the relay will be effected, triggering occurs.

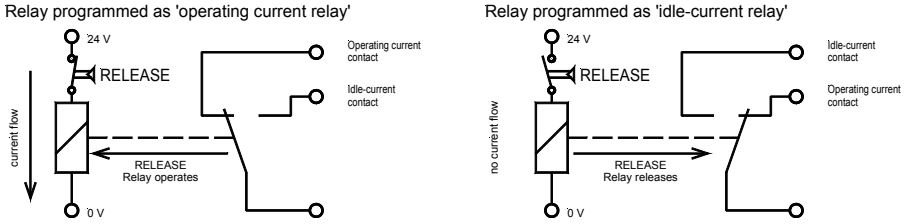


Figure 3-4: Operating / closed circuit current

EN GCB open relay
DE GLS Öffnen-Kontakt

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Breaker: "Command: GCB open" relay **N.O. / N.C.**

N.O. (normally open) If the GCB is to be opened, the relay "command: GCB open" picks up. With effected "Reply GCB is open" the relay drops out.

N.C. (normally closed) If the GCB is to be opened, the relay "command: GCB open" drops out. With effected "Reply: GCB is open" the relay picks up again.

EN GCB time impulse
DE GLS Impulsdauer

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Breaker: Impulse duration to close the GCB **0.04..1.00 s**

The time of the pulse output can be adjusted to the used breaker.

EN GCB close pulse
DE GLS Schließen Impuls

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Breaker: "Command: GCB close" issue as pulse **YES / NO**

YES .....The relay "Command: GCB close" issues an add-on pulse. Locking the GCB must occur by an external self locking circuit. The "Reply: GCB closed" of the GCB is used to identify closed contacts.

NO .....The relay "Command: close GCB" can be looped directly into the self-holding circuit of the power circuit breaker (recommendation: use coupling relays). After the connect pulse has been output and the reply of the power circuit breaker has been received, the relay "Command: close GCB" remains picked up. If the power circuit breaker has to be opened, the relay drops out.

In both cases the relay "Command: GCB open" picks up to open the GCB.

EN GCB auto unlock
DE GLS auto entriegeln

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Breaker: Breaker unblocking GCB **YES / NO**

YES..... Before every close-pulse for 1 second an open-pulse is issued. After that until closing the breaker a switch on impulse is set.
NO..... The switch activation for closing occurs only by the switch on impulse. Before the close-pulse no open-pulse is issued.

EN Undelayed close GCB
DE GLS unverzögert

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Breaker: Undelayed closing of the GCB ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled the GCB will be closed immediately (without waiting for expiring the engine delay). The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

EN GCB frequency window
DE GLS Frequenzabweichung

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Breaker: "Command: GCB close": maximum frequency deviation **0.2..10.0 %**

ⓘ This value refers to the Rated system frequency (see page 15).

In order that the "Command: GCB close" is issued, the generator frequency may deviate maximum by the here indicated amount of the rated frequency. Thus is to prevent that by locking the load onto the generator, the generator frequency will climb down and the engine will thereby run out.

EN GCB voltage window
DE GLS Spannungsabweichung

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Breaker: "Command: GCB close": maximum voltage deviation **1..100 %**

ⓘ This value refers to the Rated generator voltage (see page 15).

In order that the "Command: GCB close" is issued, the generator voltage may deviate maximum by the here indicated amount of the rated voltage.

EN Gen. settling time
DE GLS Schalterverzögerung

{0}	{1o}	{1oc}	{2oc}
---	---	✓	✓

Breaker: "Command: GCB close": Breaker delay **0..99 s**

Once the engine monitoring delay has been expired this counter starts running. A breaker operation can be additionally delayed with this time. During an emergency operation (mains failure) this delay is ignored if this has been programmed via the *LogicsManager* (see above).

Background: This additional delay time, which starts upon expiration of the "delayed engine monitoring" is used to prevent unnecessary interruptions of the voltage supply of the consumers. Since e.g. switching of from mains to generator supply makes a previous opening of the MCB necessary, the consumers become voltage free for a short time. The consumers can be supplied once the "Gen.settling time" has been expired. If the GCB is closed prior to expiration of the delayed engine monitoring (by enabling this via the *LogicsManager*) and an alarm becomes active after expiration of the delayed engine monitoring, the GCB has to be opened. The consumers are without voltage again. After the MCB has been closed again, the consumers can be supplied. With this parameter the described doubled and unnecessary interruption of the voltage supply of the consumers should be prevented.

Breaker: MCB settings {2oc}

EN MCB auto unlock
DE NLS auto entriegeln

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Breaker: Switch unblocking MCB **YES / NO**

YES .....Before every close-pulse for 1 second an open-pulse is issued. After that until closing the breaker a switch on impulse is set.
NO .....The switch activation for closing occurs only by the switch on impulse. Before the close-pulse no open-pulse is issued.

EN Close MCB in stop mode
DE NLS schließen im Stopmodus

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Breaker: Close MCB in STOP mode **YES / NO**

YES .....The MCB can be closed in operating mode STOP as long as the closing conditions are fulfilled.
NO .....The MCB would not be closeds in operating mode STOP.

EN MCB time impulse
DE NLS Impulsdauer

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Breaker: Impulse duration to close the MCB **0.04..1.00 s**

The time of the pulse output can be adjusted to the used breaker.

Breaker: GCB/MCB settings {2oc}

EN Transfer time GCB↔MCB
DE Pausenzeit GLS↔NLS

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Breaker: Transfer time GLS ⇔ NLS **0.10..99.99 s**

Switching from generator supply to mains supply or from mains supply to generator supply occurs automatically dependent of the operating conditions. The time between the reply "power circuit breaker is open" and a close-pulse is set by this parameter. This time applies for both directions. During this time the busbar is black.

Emergency Power (AMF)

NOTE

The emergency power operation is possible only in application mode {2oc} (thus in installations with 2 power circuit breakers). If the function 'Stop in AUTO' or 'inhibit emergency power' has been assigned to a discrete input, an emergency power operation can be prevented or interrupted from external.

Prerequisite: The emergency power function can only be activated in the case of synchronous generators by the configuration screen "Emergency power ON". Emergency power is carried out in operating mode AUTOMATIC regardless of the status of the discrete input 'Start in AUTO' (*LogicsManager*).

Activation of emergency power: If the mains power reveals an alarm on at least one of terminals 14-21 for the duration of the time set in the "Emergency power delay time ON" screen, emergency power is activated. A mains voltage fault is defined using the following limits:

Permissible predetermined limits		
Mains		
	Voltage	Parameter values (see chapter "Protection/Mains failure detection "; page 73)
	Frequency	Parameter values (see chapter "Protection/Mains failure detection"; page 73)
	Rotation	Parameter values (see chapter "Protection/Mains phase rotation"; page 72)

Table 3-5:Permissible limits

The following principles are observed in the case of emergency power:

- If emergency power is triggered, the engine is started under all circumstances, unless the sequence is interrupted via an alarm or a change in operating mode or prevented via the *LogicsManager*.
- The GCB can be closed regardless of the engine delay time after the black starting limits have been reached if the parameter has be set accordingly.
- If the mains returns during emergency power (GCB is closed), the mains settling time must pass before reverse of generator to mains operation.

MCB malfunction: In the AUTOMATIC operating mode without a starting request, the control system is set to emergency power standby. If the MCB is tripped, the control system attempts to reactivate this. If this is not possible (due to an MCB alarm), the engine is started following the "MCB malfunction", if the parameter "Emergency power" is configured to "ON". Emergency power subsequently supplies the busbar. Only following the successful acknowledgment of the "MCB malfunction" alarm, is the MCB synchronized and the engine shut off again. Emergency power is also triggered via the detection of a switch fault when the MCB is switched on. In order to achieve this, the "Emergency power with MCB alarms" and "MCB monitoring" screens must be set to "ON" .

Mains rotation field alarm: If the mains returns after a mains failure with a false rotation direction the generator remains in emergency power operation until the mains rotation is correct.

EN On/Off
DE Ein/Aus
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Emergency power: Monitoring **ON / OFF**

ON .....If the unit stands in operating mode AUTOMATIC and a mains fault according to the following parameters occurs, the engine is started and an automatic emergency operation is carried out.
OFF .....No emergency operation is carried out.

EN Mains fail delay time
DE Startverzögerung
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Emergency power: Mains failure: Start delay **0.20..99.99 s**

To start the engine and to carry out an emergency operation the monitored mains must be failed continuously for the minimum period of time set with this parameter.

EN Mains settling time
DE Netzberuhigungszeit
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Emergency power: Mains failure: Mains settling time **0..9,999 s**

To stop the emergency operation the monitored mains must be continuously present for the minimum period of time set with this parameter. With this parameter the back spacing of generator to mains supply can be delayed.

EN Emerg. start w. MCB fail.
DE Bei NLS-Fehler aktivieren
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Emergency power: Emergency operation by MCB failure **YES / NO**

Additional to the mains failure recognition also an alarm when closing the MCB can be consulted for estimation of an emergency power operation. The breaker alarm is indicated, if the parameter "Monitoring MCB" is set "ON".

EN Inhibit Emergency run
DE Kein Notstrombetrieb
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Emergency power: Inhibit emergency power ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled the emergency power operation will be terminated or blocked. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

Protection

Protection: Alarm acknowledgement

EN Time until horn reset
DE Zeit Hupenreset

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Self acknowledgment of the centralized alarm (horn) **0..1,000 s**

Alarm class A - Alarm message of the alarm class A are acknowledged using the softkey in the display. **Alarm class B to F** - After a new alarm of this alarm class occurs, the alarm LED flashes and the centralized alarm (horn) is issued. After the delay time 'time until horn reset' has expired, the flashing LED changes into a steady light and the centralized alarm (horn) is reset. The alarm LED flashes until the alarm has been acknowledged either via the push button, the discrete input or the interface.

EN External acknowledge
DE Ext. Quittierung

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Protection: External acknowledgment of alarms ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled the alarms will be acknowledged.

ⓘ The first setting of the discrete input acknowledges the centralized alarm (horn), the second setting acknowledges the alarm message.

The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

Protection: Idle mode

EN Idle mode
DE Idle Modus

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Protection: Enable idle modus ***LogicsManager***

If the discrete input 'Idle mode' is set, the following watchdogs will be blocked: Generator undervoltage, generator underfrequency, and engine underspeed. Using this function it is possible to e. g. extend the delayed engine monitoring, or an engine can be controlled with a lower speed (lower than the configured watchdog levels) without alarm messages. The *LogicsManager* and its default settings are explained on page 116 in chapter "LogicsManager".

Protection: Generator protection

EN	Voltage monitoring generator			
DE	Spg.Überwachung Generator			
	{0}	{1o}	{1oc}	{2oc}
	---	✓	✓	✓

Generator protection: Type of monitoring **3 phase / 4 phase**

The unit can either monitor the phase voltages (phase-neutral; 3ph-4w, 1ph-3w and 1ph-2w) or the wye voltages (phase-phase; 3ph-3w and 3ph-3w). Usually, for the low-voltage system the phase voltages are monitored, while for the medium-high-voltage system the wye voltages are monitored. The monitoring of the wye voltage is above all necessary to avoid that a line-to-earth-fault in a compensated or isolated network causes the tripping of the voltage protection.

➔ **WARNING:**
This parameter influences the protective functions.

3 phase .....The phase-phase voltage will be measured and all subsequent parameters concerning voltage monitoring "generator" are referred to this value (V_{L-L}).

4 phase .....The phase-neutral voltage will be measured and all subsequent parameters concerning voltage monitoring "generator" are referred to this value (V_{L-N}).

Protection: Generator, overfrequency (limits 1 & 2)

There are two overfrequency alarms available in the control. Both alarms are definite time alarms and are illustrated in the below figure. The figure diagrams a frequency trend and the associated pickup times and length of the alarms. It should be noted that this figure illustrates a limit 1 alarm that is self acknowledged. Limit 2 alarms cannot be self acknowledged. Monitoring of the frequency is accomplished in two steps. Three-phase measurement of the frequency is carried out, if all voltages are greater then 15 % of the rated value (120 V or 480 V). This permits a very rapid and accurate frequency measurement. The frequency however will be measured properly even if voltage is applied to one phase only.

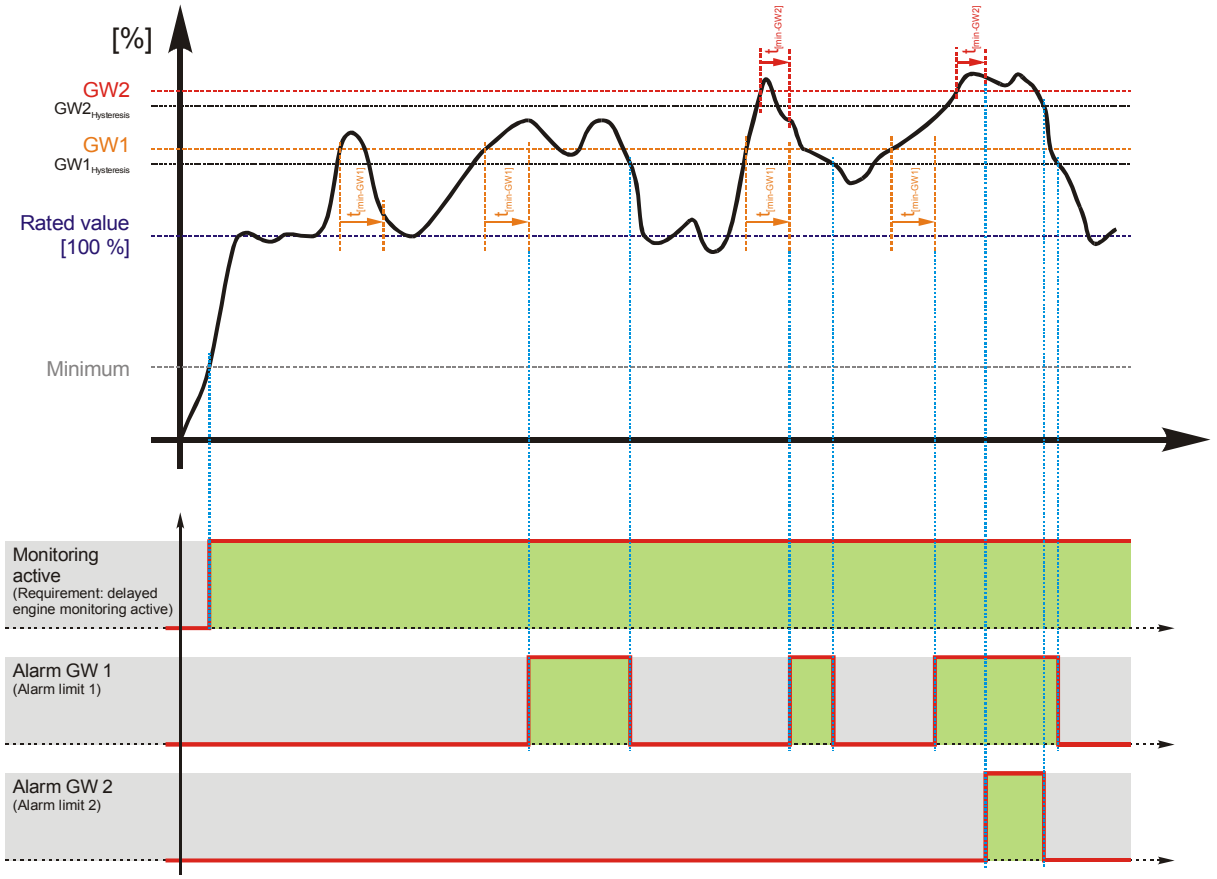


Figure 3-6: Monitoring – Generator overfrequency

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Default value
Overfrequency (The hysteresis is 0.05 Hz.)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	50.0..130.0 %	110.0 %
	Delay	0.02..99.99 s	1.50 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0..130.0 %	115.0 %
	Delay	0.02..99.99 s	0.30 s
	Alarm class	A/B/C/D/E/F	F

Table 3-7: Monitoring – Standard values – Generator overfrequency

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen.Overfrequency: Monitoring (limit 1/limit 2) **ON / OFF**

ON .....Overfrequency monitoring is carried out according to the following parameters. Monitoring is done in two steps; both values can be configured independent from each other (prerequisite: limit 1 < limit 2).
OFF .....No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen.Overfrequency: Threshold value (limit 1/limit 2) **50.0..130.0 %**

ⓘ This value refers to the Rated system frequency (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen.Overfrequency: Delay (limit 1/limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen.Overfrequency: Alarm class (limit 1/limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overfrequency: Self acknowledgment (Limit 1) **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Generator, underfrequency (limits 1 & 2)

There are two underfrequency alarms available in the control. Both alarms are definite time alarms and are illustrated in the below figure. The figure diagrams a frequency trend and the associated pickup times and length of the alarms. It should be noted that this figure illustrates a limit 1 alarm that is self acknowledged. Limit 2 alarms cannot be self acknowledged. Monitoring of the frequency is done out in two steps. Measuring of the frequency occurs three phase, if all voltages are larger than 15 % of the rated frequency (120 V or 480 V). This permits a very quick and exact frequency measuring. The frequency however will be measured correctly even if voltage is applied only to one phase.

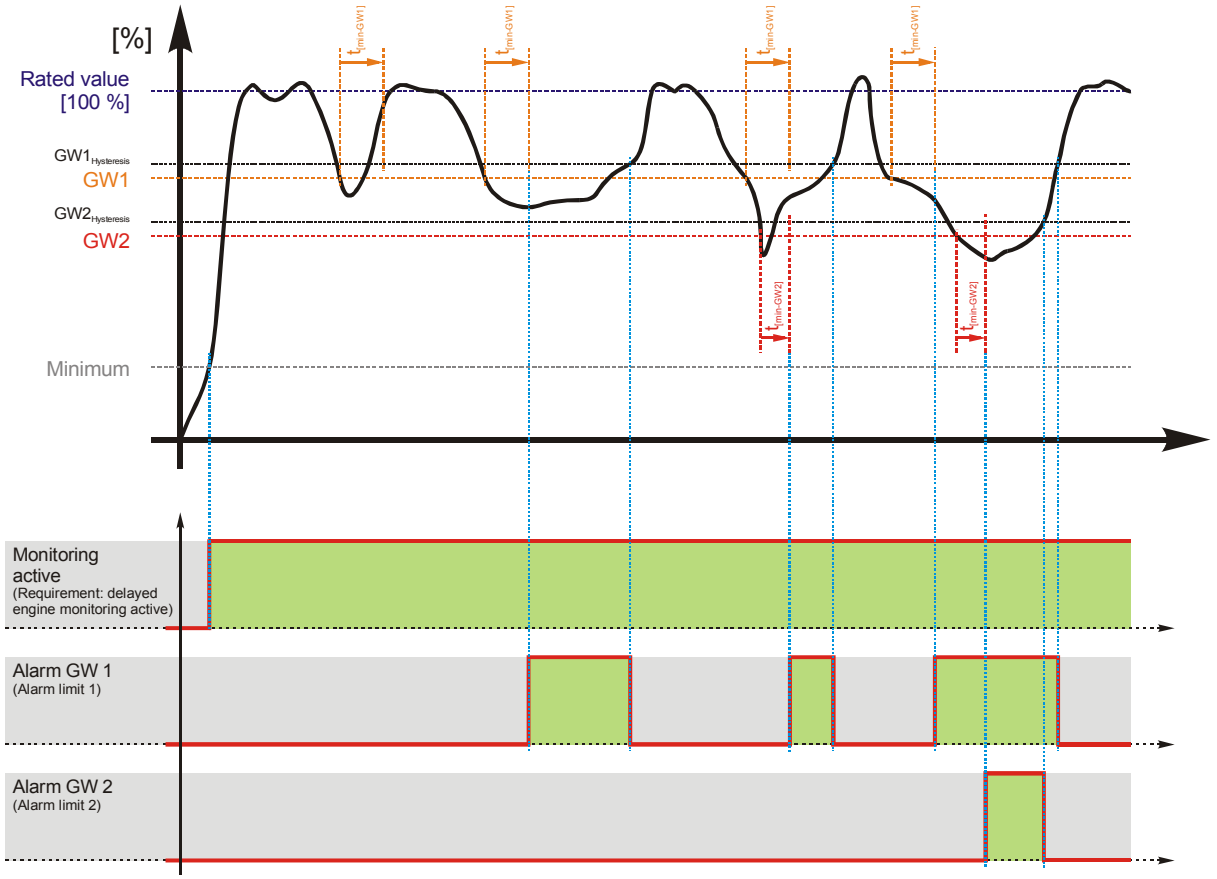


Figure 3-8: Monitoring – Generator underfrequency

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Underfrequency (The hysteresis is 0.05 Hz.)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	50.0..130.0 %	90.0 %
	Delay	0.02..99.99 s	5.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0..130.0 %	84.0 %
	Delay	0.02..99.99 s	0.30 s
	Alarm class	A/B/C/D/E/F	F

Table 3-9: Monitoring – Standard values – Generator underfrequency

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. underfrequency: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON .....Underfrequency monitoring is carried out according to the following parameters. Monitoring is done in two steps, both values can be configured independent from each other (condition: Limit 1 > Limit 2).
OFF .....No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. underfrequency: Threshold value (Limit 1/Limit 2) **50.0..130.0 %**

ⓘ This value refers to the Rated system frequency (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or fallen below for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. underfrequency: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. underfrequency: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. underfrequency: Self acknowledgment (Limit 1) **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Generator, overvoltage (Limits 1 & 2)

Power is monitored depending on the parameter 'Gen.voltage measuring' and 'Gen.current measuring' 'Voltage monitoring generator' There are two overvoltage alarms available in the control. Both alarms are definite time alarms and are illustrated in the below figure. The figure diagrams a frequency trend and the associated pickup times and length of the alarms. It should be noted that this figure illustrates a limit 1 alarm that is self acknowledged. Limit 2 alarms cannot be self acknowledged. Monitoring of the voltage is done in two steps. Measuring of the voltage occurs three phase. Respectively the interlinked voltage is monitored.

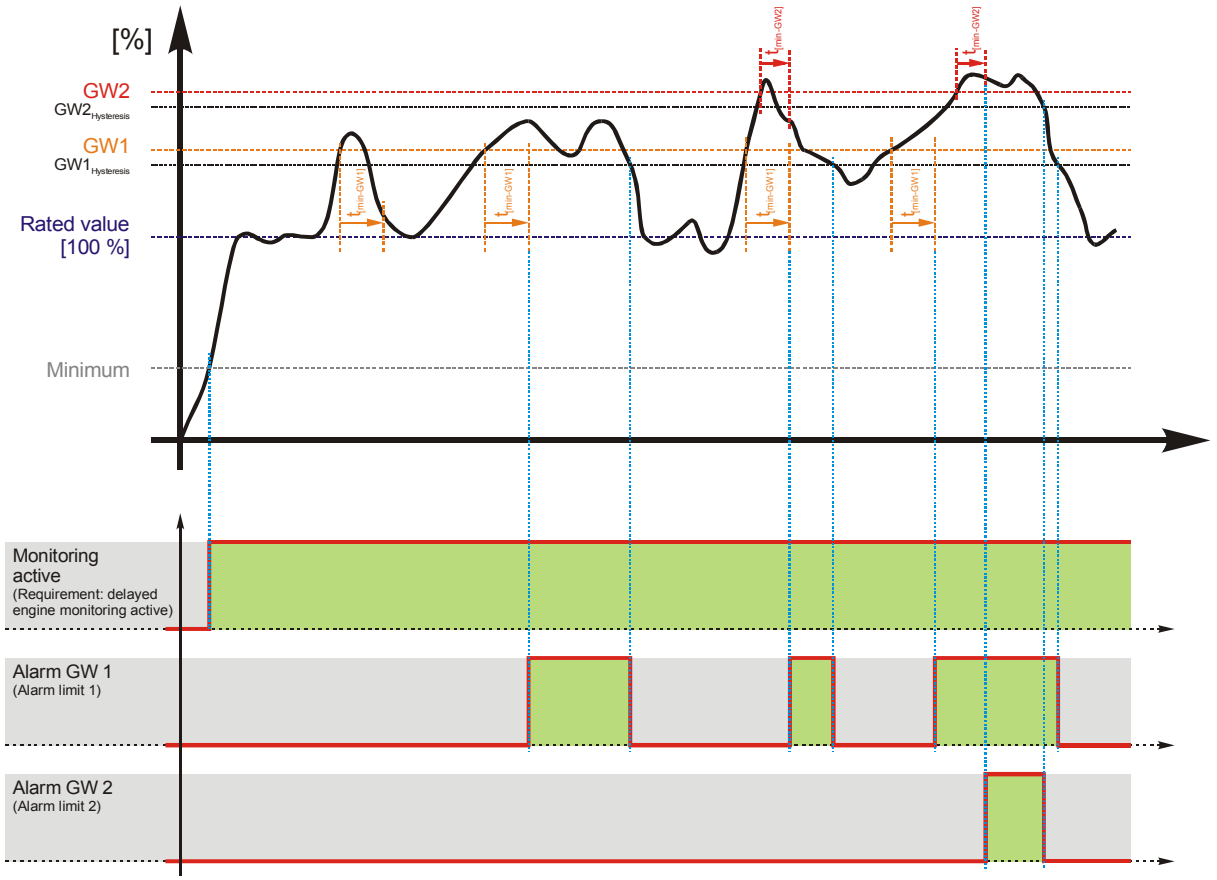


Figure 3-10: Monitoring – Generator overvoltage

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Overvoltage (The hysteresis is 0.7 % of the rated value)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	50.0..125.0 %	108.0 %
	Delay	0.02..99.99 s	5.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0..125.0 %	112.0 %
	Delay	0.02..99.99 s	0.30 s
	Alarm class	A/B/C/D/E/F	F

Table 3-11: Monitoring – Standard values – Generator overvoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overvoltage: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON .....Overvoltage monitoring is carried out according to the following parameters. Monitoring is done in two steps, both values can be configured independent from each other (condition: Limit 1 < Limit 2).
OFF .....No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overvoltage: Threshold value (Limit 1/Limit 2) **50.0..125.0 %**

ⓘ This value refers to the Rated generator voltage (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overvoltage: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overvoltage: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overvoltage: Self acknowledgment (Limit 1) **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overvoltage: Engine delayed monitoring (Limit 1) **YES / NO**

YES .....The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO .....The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Generator, undervoltage (Limits 1 & 2)

Voltage is monitored depending on the parameter 'Gen.voltage measuring' and 'Voltage monitoring generator'. There are two undervoltage alarms available in the control. Both alarms are definite time alarms and are illustrated in the below figure. The figure diagrams a frequency trend and the associated pickup times and length of the alarms. It should be noted that this figure illustrates a limit 1 alarm that is self acknowledged. Limit 2 alarms cannot be self acknowledged. Monitoring of the voltage is done in two steps. Measuring of the voltage occurs three phase. Respectively the interlinked voltage is monitored.

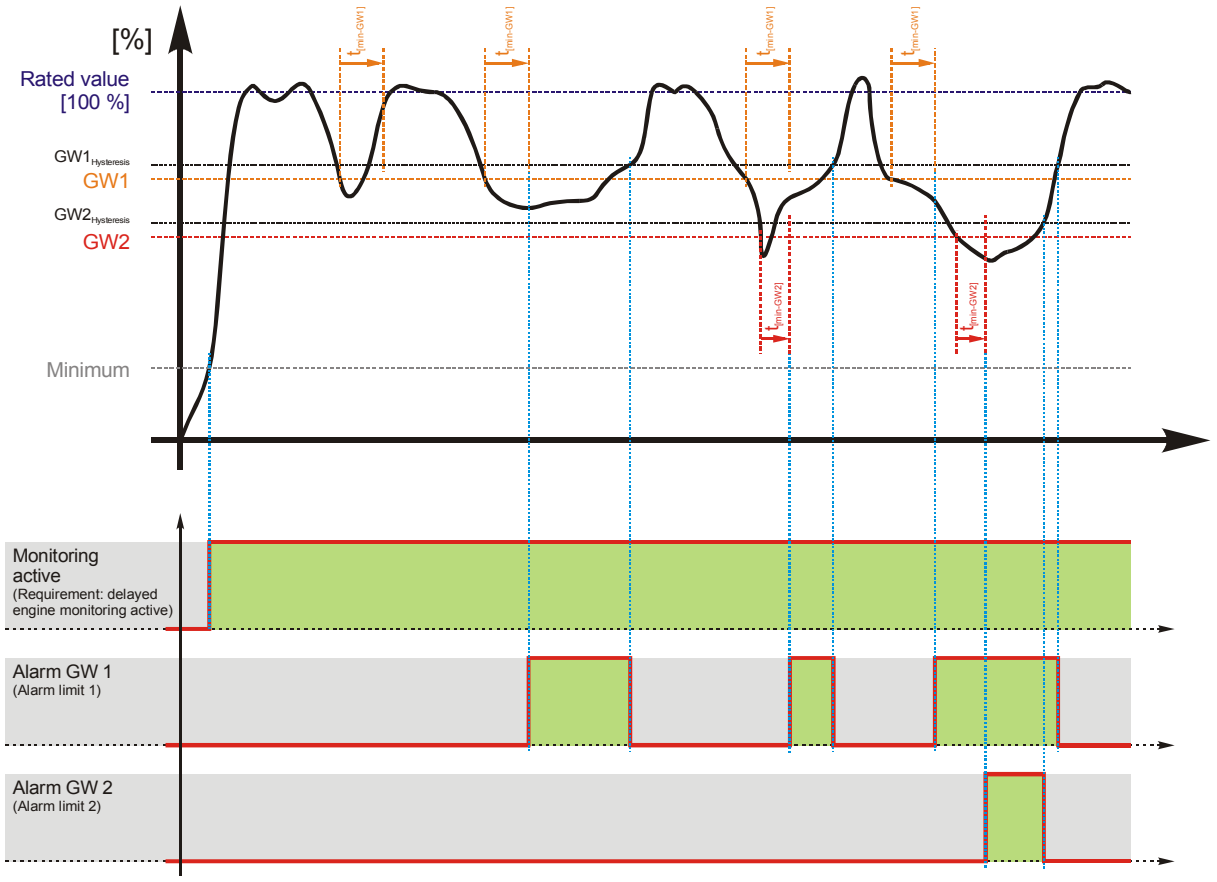


Figure 3-12: Monitoring – Generator undervoltage

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Undervoltage (The hysteresis is 0.7 % of the rated value)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	50.0..125.0 %	92.0 %
	Delay	0.02..99.99 s	5.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	YES
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0..125.0 %	88.0 %
	Delay	0.02..99.99 s	3.00 s
	Alarm class	A/B/C/D/E/F	F

Table 3-13: Monitoring – Standard values – Generator undervoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. undervoltage: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON .....Undervoltage monitoring is carried out according to the following parameters. Monitoring is done in two steps, both values can be configured independent from each other (condition: Limit 1 > Limit 2).
OFF .....No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. undervoltage: Threshold value (Limit 1/Limit 2) **50.0..125.0 %**

ⓘ This value refers to the Rated generator voltage (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or fallen below for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. undervoltage: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. undervoltage: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. undervoltage: Self acknowledgment (Limit 1) **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. undervoltage: Delayed engine speed (Limit 1) **YES / NO**

YES .....The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO .....The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Generator, time-overcurrent monitoring (Limits 1, 2 & 3)

Current is monitored depending on the parameter 'Gen.current measuring'. The generator overcurrent alarm contains three limits and can be setup as a step-wise inverse time alarm as illustrated in the below figure. Monitoring of the maximum phase current is performed in three steps. Every step can be provided with a delay time independent of the other steps.

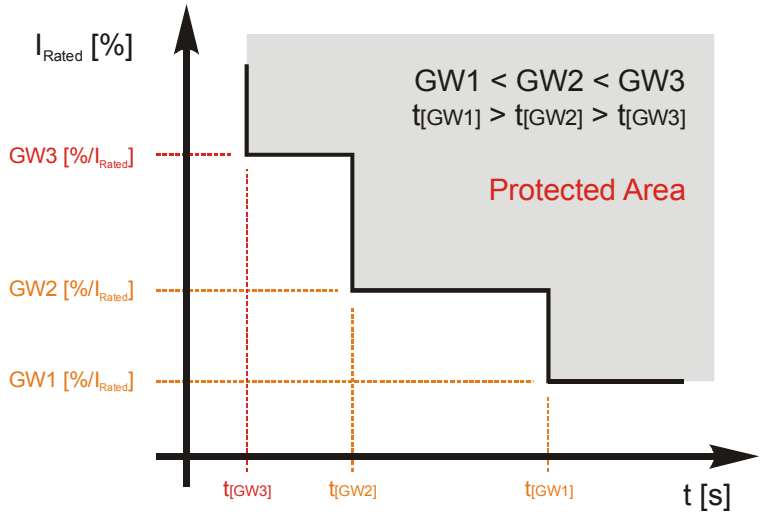


Figure 3-14: Monitoring – Generator time-overcurrent

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Overcurrent (The hysteresis is 1 % of the rated value)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	50.0..300.0 %	110.0 %
	Delay	0.02..99.99 s	30.00 s
	Alarm class	A/B/C/D/E/F	E
	Self-acknowledgment	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0..300.0 %	150.0 %
	Delay	0.02..99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F	F
Limit 3	Monitoring	ON / OFF	ON
	Limit	50.0..300.0 %	250.0 %
	Delay	0.02..99.99 s	0.40 s
	Alarm class	A/B/C/D/E/F	F

Table 3-15: Monitoring – Standard values – Generator time-overcurrent

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, TOC: Monitoring (Limit 1/Limit 2/Limit 3) **ON / OFF**

ON .....Overcurrent monitoring is carried out according to the following parameters. Monitoring is done in three steps, all three values can be configured independent from each other (condition: Limit 1 < Limit 2 < Limit 3).
OFF .....No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, TOC: Threshold value (Limit 1/Limit 2/Limit 3) **50.0..300.0 %**

ⓘ This value refers to the Rated current (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, TOC: Delay (Limit 1/Limit 2/Limit 3) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, TOC: Alarm class (Lim.1/Lim.2/Lim.3) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, TOC: Self acknowledgment (Limit 1) **ON / OFF**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Generator, reverse/reduced power (Limits 1 & 2)

Power is monitored depending on the parameter 'Gen.voltage measuring' and 'Gen.current measuring'. The generator power limits can be setup as reduced power and/or reverse power limits depending on the threshold value configured in the control. The note below details how a reduced or reverse power limit is configured. If the one or three phase measured real power is below the adjusted limit of the reduced load or below the adjusted value of the reverse power the alarm will be issued.

NOTE

Definition

- **Reduced power**
  Tripping if the real power has fallen below the (positive) limit..
- **Reverse power**
  Tripping if the direction of the real power reverses and the (negative) limit is exceeded.

The values for reverse /reduced power monitoring can be configured as follows:

- **Limit 1 (Limit 1) = Positive and**
  Limit 2 (Limit 2) = Positive (whereas Limit 2 > Limit 1 > 0 %):
  ⇨ Both limits are reduced power monitoring.
- **Limit 1 (Limit 1) = Negative and**
  Limit 2 (Limit 2) = Negative (whereas 0 % < Limit 1 < Limit 2):
  ⇨ Both limits are reverse power monitoring.
- **Limit 1 (Limit 1) = Positive and**
  Limit 2 (Limit 2) = Negative (whereas Limit 1 > 0 %; Limit 2 < 0 %):
  ⇨ One limit is reduced power monitoring and
  ⇨ One limit is reverse power monitoring.

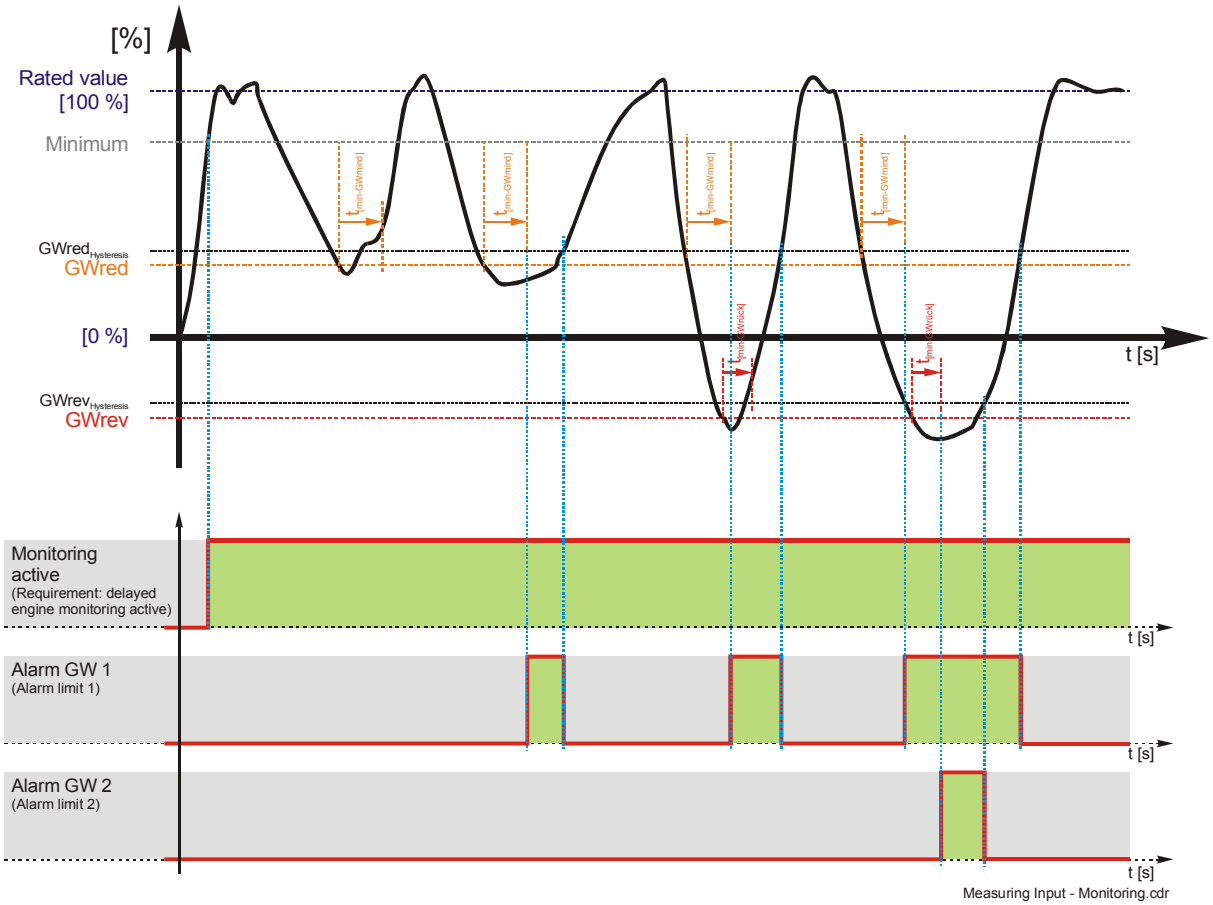


Figure 3-16: Monitoring – Generator reverse / reduced power

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Reverse / reduced power (The hysteresis is 1 % of the rated value)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	-99.9..0.0..+99.0 %	-3.0 %
Limit 1* > *0 %	Delay	0.02..99.99 s	5.00 s
Red. power	Alarm class	A/B/C/D/E/F	B
Limit 1* < *0 %	Self-acknowledgment	YES / NO	NO
Rev. power	Engine delayed monitoring	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
Limit 2* > *0 %	Limit	-99.9..0.0..+99.0 %	-5.0 %
Red. power	Delay	0.02..99.99 s	3.00 s
Limit 2* < *0 %	Alarm class	A/B/C/D/E/F	E
Rev. power	Engine delayed monitoring	YES / NO	NO

Table 3-17: Monitoring – Standard values – Generator reverse / reduced power

EN Monitoring
DE Überwachung

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. reverse/reduced power: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Reverse/reduced power monitoring is carried out according to the following parameters. Both values can be configured independent from each other (condition: *limit* Reverse power < *limit* Reduced load).
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. reverse/reduced power: Threshold value (Limit 1/Limit 2) **-99.9..0.0..99.0 %**

ⓘ This value refers to the Rated active power (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. reverse/reduced power: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. reverse/reduced power: Alarm cl.(Lim.1/Lim.2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. reverse/reduced power: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. reverse/reduced power: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Generator, overload (Limits 1 & 2)

Power is monitored depending on the parameter 'Gen.voltage measuring' and 'Gen.current measuring'. If the real power is above the configured limit an alarm will be issued.

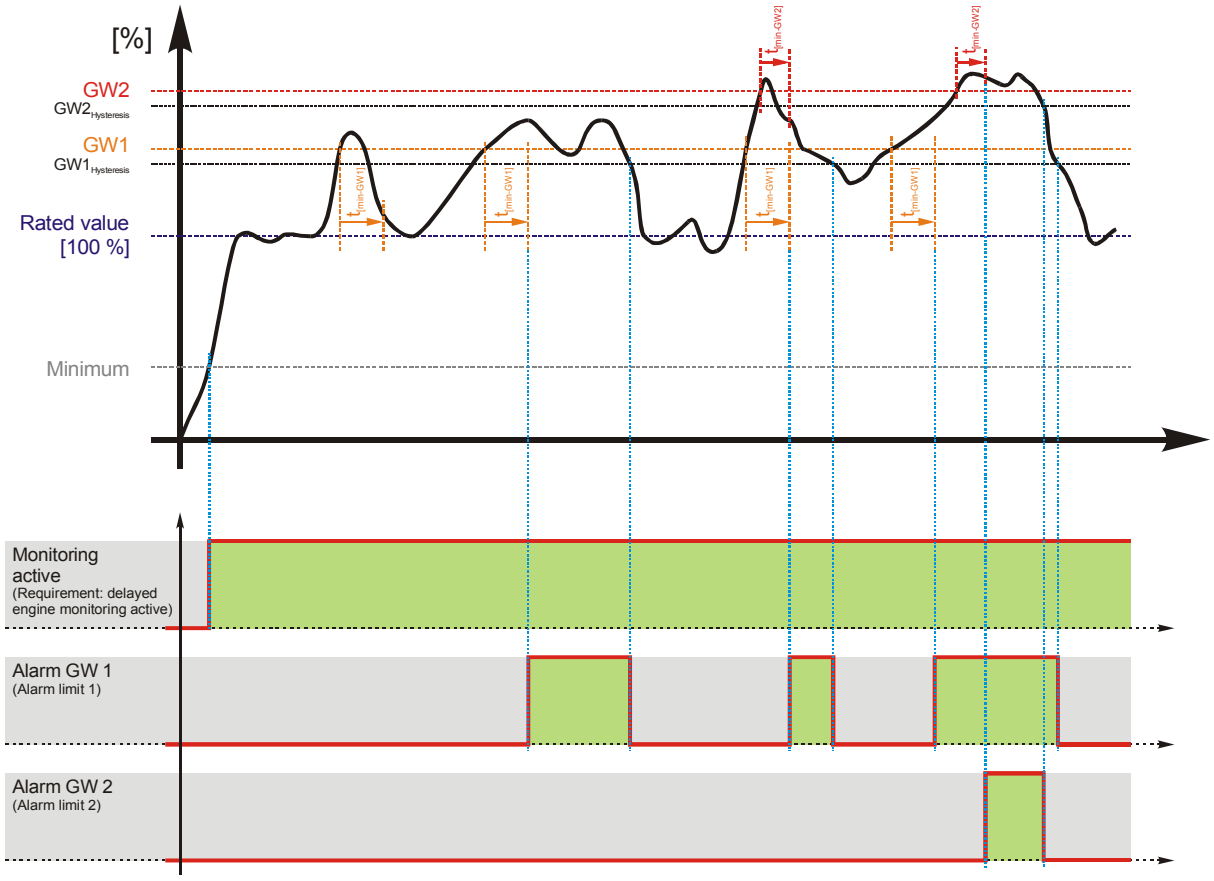


Figure 3-18: Monitoring – Generator overload

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Overload (The hysteresis is 1 % of the rated value)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	50.0..300.0 %	110.0 %
	Delay	0.02..99.99 s	11.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0..300.0 %	120.0 %
	Delay	0.02..99.99 s	0.10 s
	Alarm class	A/B/C/D/E/F	E

Table 3-19: Monitoring – Standard values – Generator overload

EN Monitoring
DE Überwachung

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overload: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Overload monitoring is carried out according to the following parameters. Monitoring is done in two steps, both values can be configured independent from each other (condition: Limit 1 < Limit 2).
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overload: Threshold value (Limit 1/Limit 2) **50.0..300.00 %**

ⓘ This value refers to the Rated active power (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overload: Delayed (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overload: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Self acknowledge
DE Selbstquittierend

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓
---	✓	✓	✓

Gen. overload: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Generator, load unbalanced (Limits 1 & 2)

Power is monitored depending on the parameter 'Gen.voltage measuring' and 'Gen.current measuring'. The generator load unbalance alarm is a phase imbalance alarm. The percentage threshold value indicates the allowed variation of phase current from the arithmetic mean value of all three phase currents.

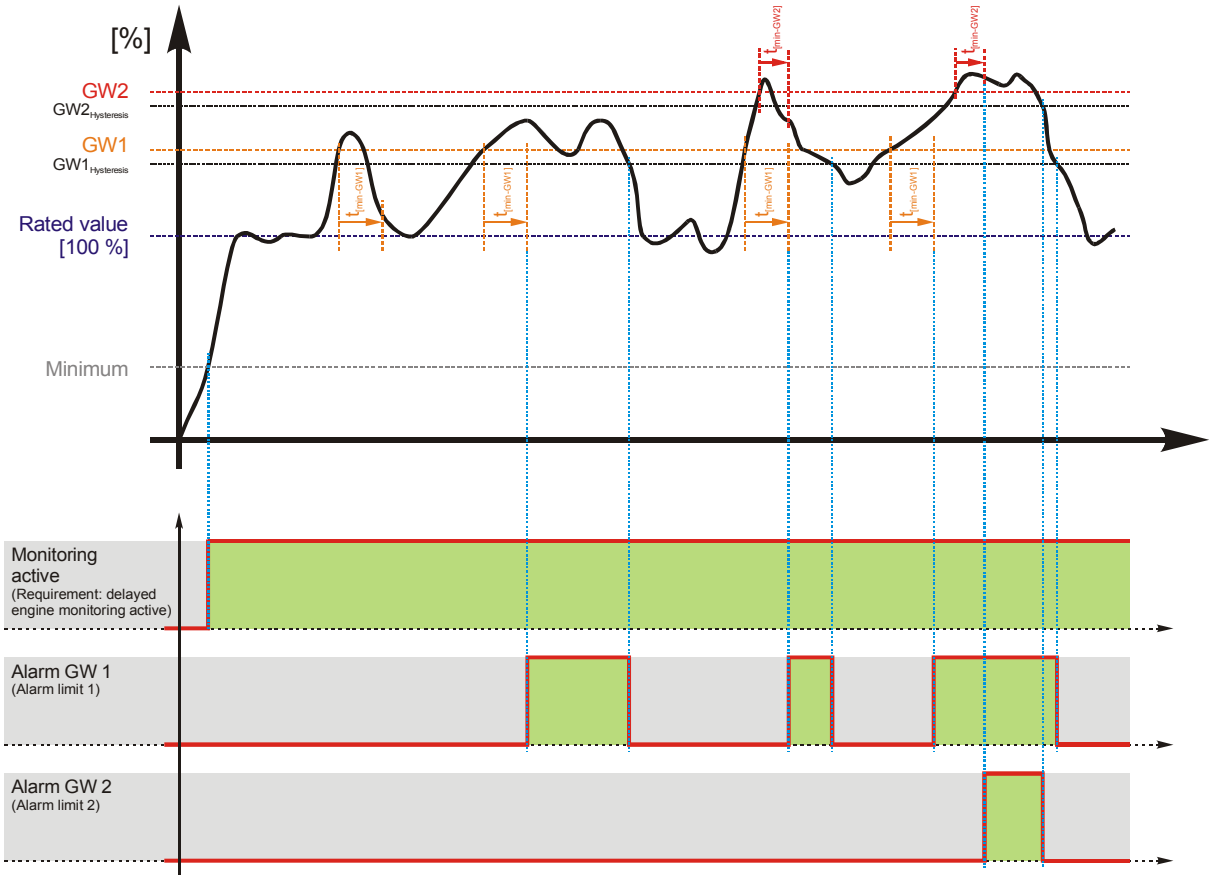


Figure 3-20: Monitoring – Generator load unbalance

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Load unbalance (The hysteresis is 1 % of the rated value)			
Limit 1	Monitoring	ON / OFF	ON
	Limit	0.0..100.0 %	10.0 %
	Delay	0.02..99.99 s	10.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	0.0..100.0 %	15.0 %
	Delay	0.02..99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F	E

Table 3-21: Monitoring – Standard values – Generator load unbalance

Formulas for calculation

	Phase L1	Phase L2	Phase L3
Exceeding	$I_{L1} \geq \frac{3 \times I_N \times P_A + I_{L2} + I_{L3}}{2}$	$I_{L2} \geq \frac{3 \times I_N \times P_A + I_{L1} + I_{L3}}{2}$	$I_{L3} \geq \frac{3 \times I_N \times P_A + I_{L1} + I_{L2}}{2}$
Undershooting	$I_{L1} \leq \frac{I_{L2} + I_{L3} - 3 \times I_N \times P_A}{2}$	$I_{L2} \leq \frac{I_{L1} + I_{L3} - 3 \times I_N \times P_A}{2}$	$I_{L3} \leq \frac{I_{L1} + I_{L2} - 3 \times I_N \times P_A}{2}$

Example 1 - exceeding of a limit value

Current in phase L1 = current in phase L3
Current in phase L2 has been exceeded

P_A ..... percentage tripping value (here 10 %)
I_N ..... rated current (here 300 A)

Tripping value for phase L2:

$$I_{L2} \geq \frac{3 \times I_N \times P_A + I_{L1} + I_{L3}}{2} = \frac{3 \times 300\text{A} \times 10\% + 300\text{A} + 300\text{A}}{2} = \frac{\frac{3 \times 300\text{A} \times 10}{100} + 300\text{A} + 300\text{A}}{2} = 345\text{A}$$

Example 2 - undershooting of a limit value

Current in phase L2 = current in phase L3
Current in phase L1 has been undershoot

P_A ..... percentage tripping value (here 10 %)
I_N ..... rated current (here 300 A)

Tripping value for phase L1:

$$I_{L1} \geq \frac{I_{L2} + I_{L3} - 3 \times I_N \times P_A}{2} = \frac{300\text{A} + 300\text{A} - 3 \times 300\text{A} \times 10\%}{2} = \frac{300\text{A} + 300\text{A} - \frac{3 \times 300\text{A} \times 10}{100}}{2} = 255\text{A}$$

Parameters

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. load imbalance: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON .....Load imbalance monitoring is carried out according to the following parameters. Monitoring is done in two steps, both values can be configured independent from each other (condition: Limit 1 < Limit 2).
OFF .....No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. load unbalance: Threshold value (Limit 1/Limit 2) **0.0..100.0 %**

ⓘ This value refers to the Rated current (see page 17).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. load unbalance: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. load unbalance: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. load unbalance: Self acknowledgment (Limit 1) **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Generator, voltage asymmetry (Limit 1)

The generator voltage asymmetry alarm measures voltage differences between the phases of the generator. The voltage is measured three-phase. If the phase-to-phase voltage difference between the three phases exceeds the configured asymmetry limit the alarm will be issued.

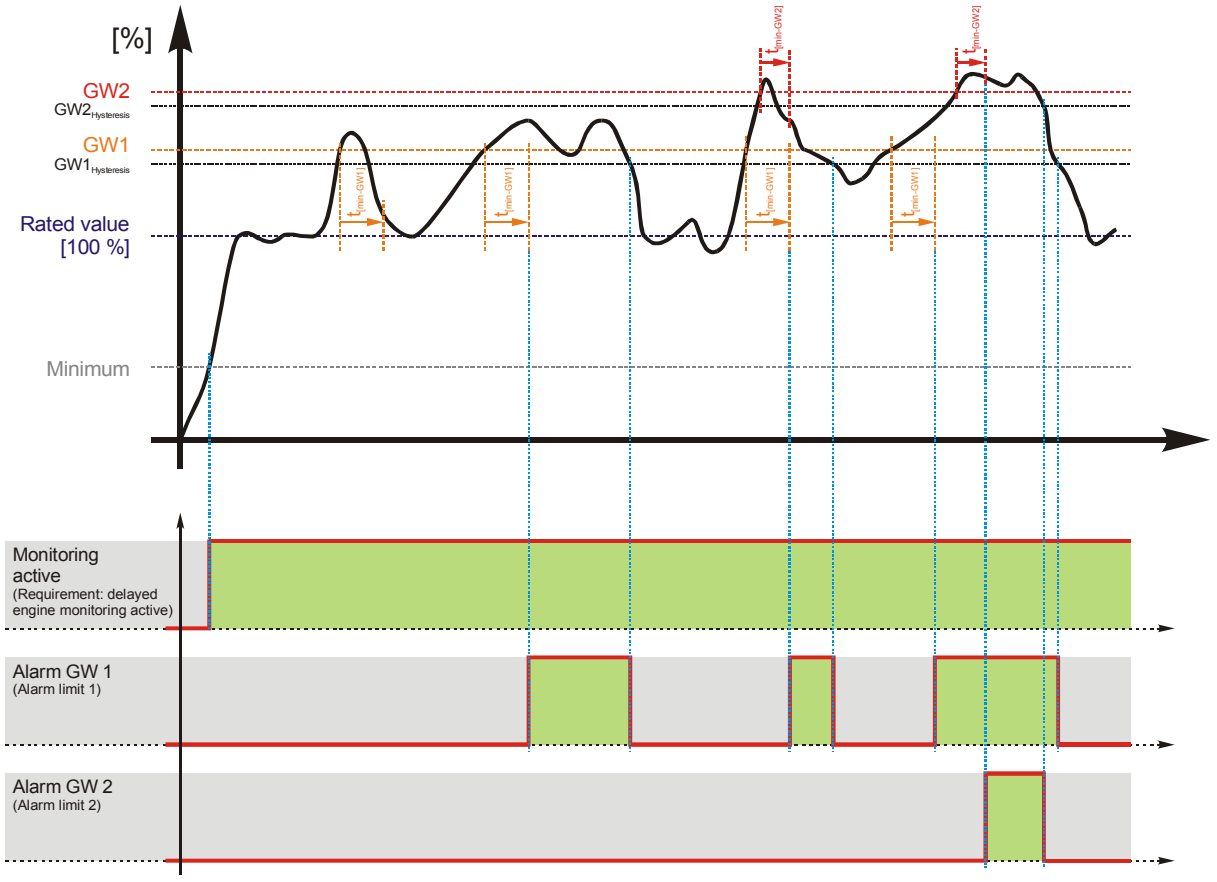


Figure 3-22: Monitoring – Generator voltage asymmetry

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Generator voltage asymmetry (The hysteresis is 0.7 % of the rated value).			
	Monitoring	ON / OFF	ON
	Limit	0,5..99.9 %	10.0 %
	Delay	0.02..99.99 s	5,00 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	YES

Table 3-23: Monitoring – Standard values – Generator voltage asymmetry

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. voltage asymmetry: Monitoring (Limit 1) **ON / OFF**

ON .....Voltage asymmetry monitoring is carried out according to the following parameters.
OFF .....No monitoring is carried out.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. voltage asymmetry: Threshold value (Limit 1) **0.5..99.9 %**

ⓘ This value refers to the Measuring: Rated values (see page 15).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. voltage asymmetry: Delay (Limit 1) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. voltage asymmetry: Alarm class (Limit 1) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. voltage asymmetry: Self acknowledgment (Limit 1) **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. voltage asymmetry: Engine delayed monitoring (Limit 1) **YES / NO**

YES .....The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO .....The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Generator, calculated ground fault (Limits 1 & 2)

Current is monitored depending on the parameter 'Gen.current measuring'. The three conductor currents I_{Gen-L1}, I_{Gen-L2} and I_{Gen-L3} are vectorially summated ($I_{ground\ current} = I_{Gen-L1} + I_{Gen-L2} + I_{Gen-L3}$) and compared with the response value (the calculated actual value is indicated in the display). If the actual value rises over the response value, a ground fault is present, and an alarm is issued.

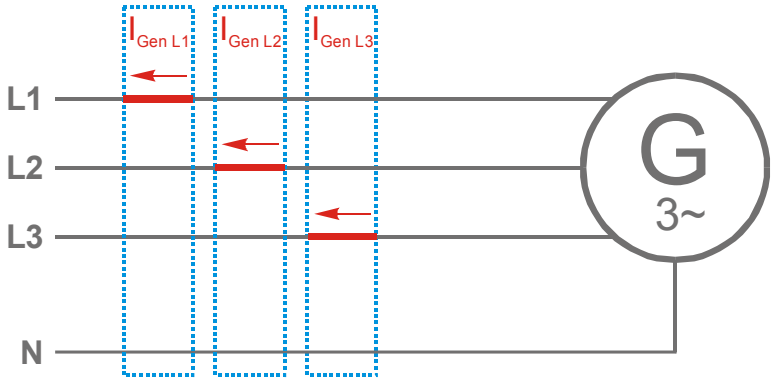


Figure 3-24: Monitoring - calculated generator ground fault

Test: If one of the current transformers is short circuit during the others have rated current the actual value amounts to 100 %.

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

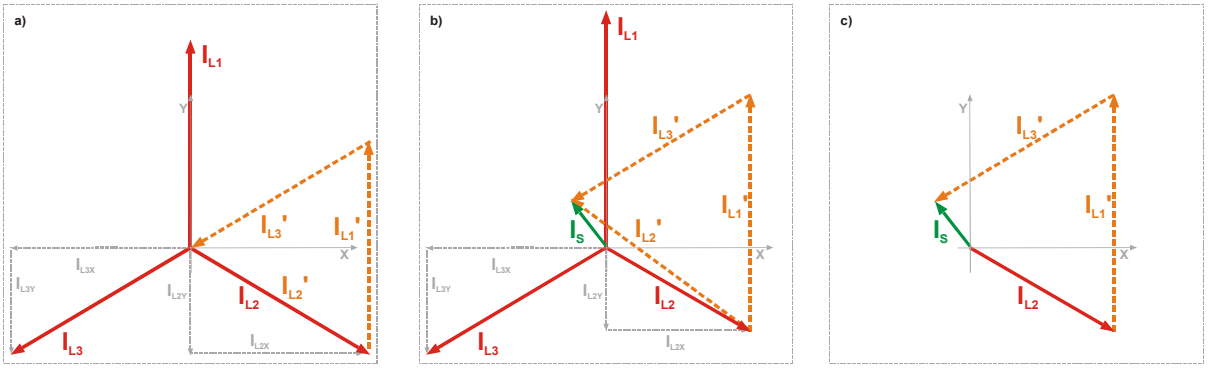
Limit	Text	Setting range	Standard value
Generator ground fault (The hysteresis is 0.7 % of the rated value)			
Limit 1	Monitoring	ON / OFF	OFF
	Limit	0..300 %	10 %
	Delay	0.02..99.99 s	0.20 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	NO
Limit 2	Monitoring	ON / OFF	OFF
	Limit	0..300 %	30 %
	Delay	0.02..99.99 s	0.10 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	NO

Table 3-25: Monitoring – Standard values – Generator ground fault

Calculation

At the calculated ground fault it must be assumed that all three phases of the generator are equally loaded, since the three currents of the generator are vectorially added and the resulting sum current is interpreted as ground current.

The displayed value in the control is a percentage, which results from the relationship calculated sum current to configured rated current. The threshold value is likewise indicated in percent. This percentage figure refers likewise to the adjusted rated current and should be adjusted in practice (due to always existing asymmetries in the phase currents) to at least 10 %.



a) No ground fault b) Ground fault (with vectorial calculation) c) Ground fault (I_S = ground fault current)

Figure 3-26: Monitoring - calculated generator ground current - vector diagram

The **sum current I_S** is determined e.g. (after previous complex dismantling) geometrical/vectorially, as the pointers of the **phase currents I_{L1}** and **I_{L2}** are parallel shifted and lined up. The pointer, that between the neutral point and the point of the shifted **pointer I_{L2}'** results is the **sum current I_S**. In order to be able to add the pointers vectorially, these must be divided into their X- and Y-coordinates (I_{L2X}, I_{L2Y}, I_{L3X} and I_{L3Y}). Afterwards all X- and all Y-coordinates can be added by an addition and a subtraction.

Results of a calculation example:

Phase current $I_{L1} = I_{Rated} = 7$ A
Phase current $I_{L2} = 6.5$ A
Phase current $I_{L3} = 6$ A
Sum current (ground fault current) $I_S = 12.37$ %.

Parameter

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ☑

Gen. ground fault: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Ground current monitoring is carried out according to the following parameters. Monitoring is done in two steps, both values can be configured independent from each other (condition: Limit 1 < Limit 2).
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ☑

Gen. ground fault: Threshold value (Limit 1/Limit 2) **0..300 %**

ⓘ This value refers to the Rated current (see page 17).

The percentage threshold value that is to be monitored. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ☑

Gen. ground fault: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ☑

Gen. ground fault: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ☑

Gen. ground fault: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ☑

Gen. ground fault: Engine delayed monitoring (Limit 1) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Generator, voltage phase rotation (limit 1)

CAUTION

Please guarantee during installation that the voltages applied to this unit are wired correctly to both sides of the circuit breaker. Miss caution can cause damages because of closing the breaker asynchronous or with wrong rotating voltage with enabled voltage rotation monitoring at all connected components (engine, generator, breakers, cable, busbars, etc.).

This function can block a connection of rotation-different voltage systems only at the following conditions:

- **The measuring voltages are at the measuring points (e. g. at the voltage transformer before and behind the circuit-breaker) wired correctly with respect to the phase-rotation;**
- **the measuring voltages are wired without angular phase shift or interruption from the measuring point to this unit;**
- **the measuring voltages are wired to the correct terminals of this unit (e. g. L1 of the generator with**

the terminal of this equipment, which is intended for the L1 of the generator).

Correct phase rotation of the phase voltages insures that damage will not occur during an open transition breaker closure to either the mains or the generator. The voltage phase rotation alarm checks that the phase rotation of the voltages and the configured phase rotation are alike. The direction of rotation is differentiated thereby with respect to "clockwise" and "counter clockwise". With a clockwise field the direction of rotation is in the three phases "L1-L2-L3"; with a counter clockwise field the direction of rotation is in the three phases "L1-L3-L2". If the control is configured for a clockwise rotation and the voltages into the unit are calculated as counterclockwise the alarm will be initiated. The currently measured direction of rotation is displayed in the LCD.

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Generator voltage phase direction fault (The hysteresis is 0.7 % of the rated value)			
	Direction	CW / CCW	CW
	Monitoring	ON / OFF	ON
	Alarm class	A/B/C/D/E/F	F
	Self acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	YES

Table 3-27: Monitoring - standard values - generator voltage phase rotation

EN Generator phase rotation
DE Generatordrehfeld

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen.voltage phase rotation: Direction **CW / CCW**

CW..... The three-phase measured generator voltage is rotating CW (clock-wise; that means the voltage rotates in direction L1-L2-L3; standard setting).
CCW..... The three-phase measured generator voltage is rotating CCW (counter clock-wise; that means the voltage rotates in direction L1-L3-L2).

EN Monitoring
DE Überwachung

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen.voltage phase rotation: Monitoring (limit 1) **ON / OFF**

ON..... Phase rotation monitoring is carried out according to the following parameters.
OFF..... No monitoring is carried out.

EN Alarm class
DE Alarmklasse

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen.voltage phase rotation: Alarm class (limit 1) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen.voltage phase rotation: Self-acknowledgment (limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen.voltage phase rotation: Engine delayed monitoring (limit 1) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Generator, inverse time-overcurrent monitoring

Current is monitored depending on the parameter 'Gen.current measuring'. Monitoring of time-overcurrent including inverse time tripping characteristic. The tripping time depends on the measured current. The higher the current is the tripping time will be decreased according to a defined curve. According to IEC 255 three different characteristics are available.

"Normal inverse" characteristic: $$t = \frac{0{,}14}{(I/I_P)^{0{,}02} - 1} * t_p[s]$$

"Highly inverse" characteristic: $$t = \frac{13{,}5}{(I/I_P) - 1} * t_p[s]$$

"Extremely inverse" characteristic: $$t = \frac{80}{(I/I_P)^2 - 1} * t_p[s]$$

Data meaning:

	t:	tripping time
	t_p	setting value time
	I	fault current; here measured current
	I_p	setting value current

Please take into account during configuration:

for I start: I start > In and I start > Ip
for Ip the smaller I_p is, the steeper is the slope of the tripping curve

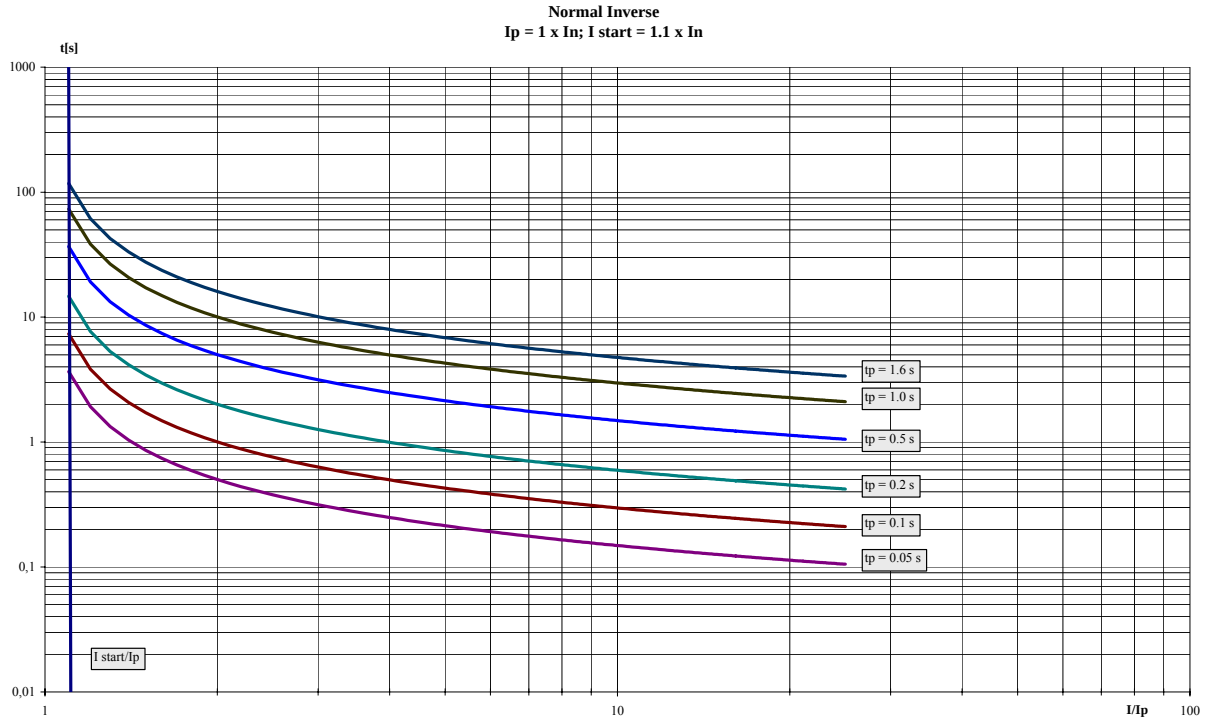


Figure 3-28: Monitoring – Generator inverse time-overcurrent - characteristic "Normal"

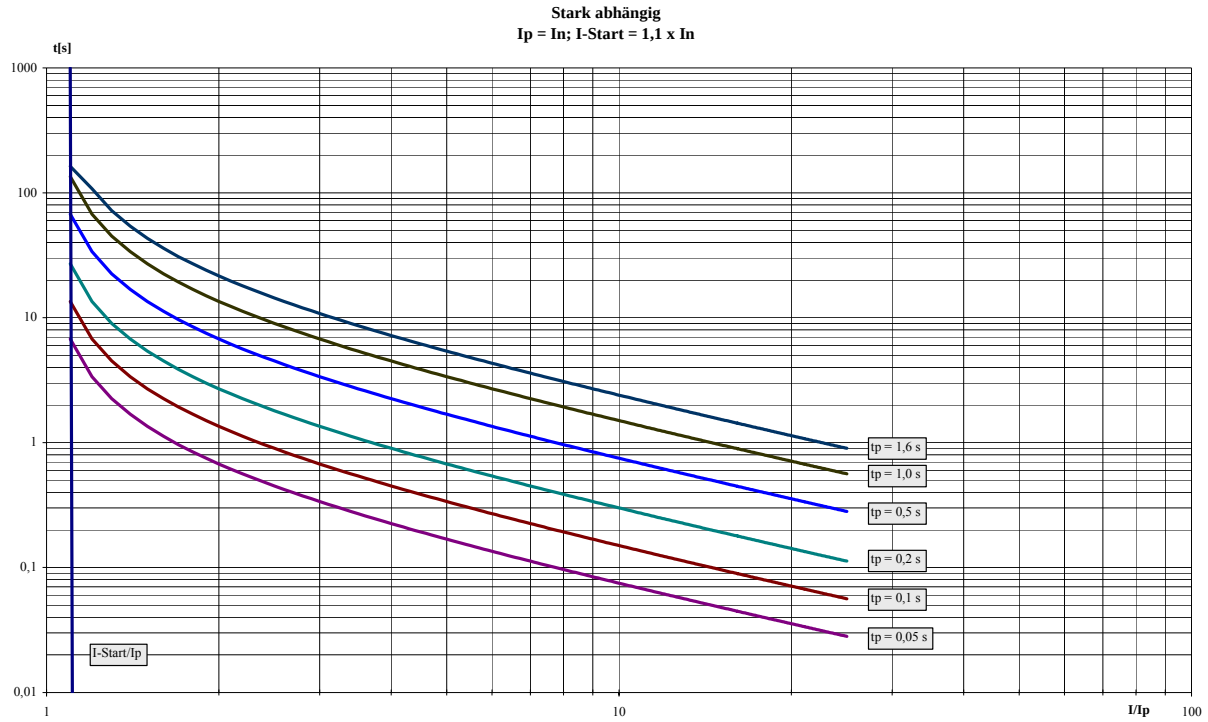


Figure 3-29: Monitoring – Generator inverse time-overcurrent - characteristic "High"

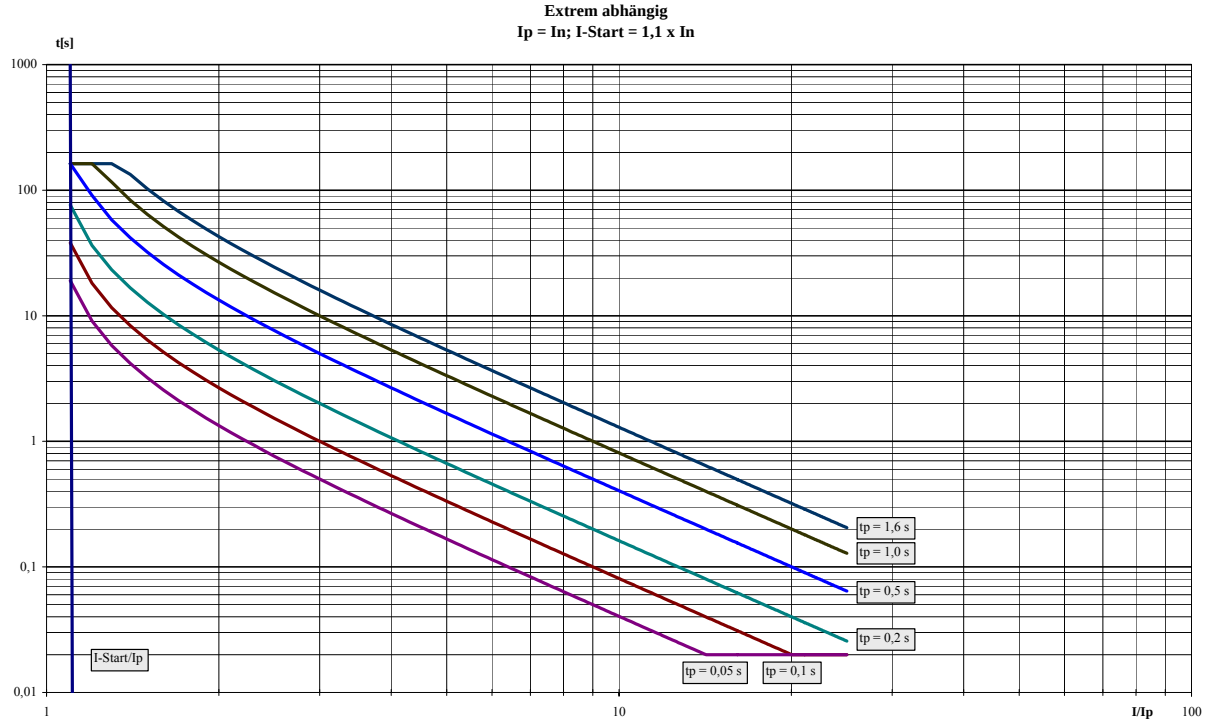


Figure 3-30: Monitoring – Generator inverse time-overcurrent - characteristic "Extreme"

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Inverse time-overcurrent (The hysteresis is 1 % of the rated value)			
	Monitoring	ON / OFF	ON
	Overcurrent characteristic	Normal / High / Extreme	Normal
	Inv. time overcurrent Tp	0.01..1.99 s	0.06 s
	Inv. time overcurrent Ip	10.0..300.0 %	100.0 %
	Inv. time overcurrent I start	100.0..300.0 %	115.0 %
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	NO

Table 3-31: Monitoring – Standard values – Generator inverse time-overcurrent

EN **Monitoring**
DE **Überwachung**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overcurrent, inverse: Monitoring **ON / OFF**

ON .....Overcurrent monitoring is carried out according to the following parameters.
OFF .....No monitoring is carried out.

EN **Inverse time characteristic**
DE **Überstrom Charakteristik**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overcurrent, inverse: Tripping characteristic **Normal / High / Extreme**

Selection of the used overcurrent characteristic.

Normal.....The characteristic "normal inverse" will be used
High.....The characteristic "high inverse" will be used
Extreme .....The characteristic "extreme inverse" will be used.

EN **Inv. time overcurrent Tp=**
DE **Überstrom (AMZ) Tp=**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overcurrent, inverse: Time constant Tp **0.01..1.99 s**

Time constant Tp to calculate the characteristics.

EN **Inv. time overcurrent Ip=**
DE **Überstrom (AMZ) Ip=**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overcurrent, inverse: Current constant Ip **10.0..300.0 %**

Current constant Ip to calculate the characteristics.

EN **Inv. time overcurrent I start=**
DE **Überstrom (AMZ) I-Start=**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

Gen. overcurrent, inverse: I start **100.0..300.0 %**

Lower tripping value for inverse time-overcurrent protection. If current I is below I start, the inverse time-overcurrent protection does not trip. If I start is <Ip , Ip is used as the lower tripping value.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, inverse: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, inverse: Self acknowledgment **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Gen. overcurrent, inverse: Engine delayed monitoring **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Mains protection {2oc}

EN Voltage monitoring mains
DE Spg.-Überwachung Netz
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Mains protection: Type of monitoring **3 phase / 4 phase**

The unit can either monitor the phase voltages (phase-neutral; 3ph-4w, 1ph-3w and 1ph-2w) or the wye voltages (phase-phase; 3ph-3w and 3ph-3w). Usually, for the low-voltage system the phase voltages are monitored, while for the medium-high-voltage system the wye voltages are monitored. The monitoring of the wye voltage is above all necessary to avoid that a line-to-earth-fault in a compensated or isolated network causes the tripping of the voltage protection.

➡ **WARNING:**
This parameter influences the protective functions.

3 phase..... The phase-phase voltage will be measured and all subsequent parameters concerning voltage monitoring "generator" are referred to this value (VL-L).
4 phase..... The phase-neutral voltage will be measured and all subsequent parameters concerning voltage monitoring "generator" are referred to this value (VL-N).

Protection: Mains, voltage phase rotation (limit 1) - {2oc}

CAUTION

Please guarantee during installation that the voltages applied to this unit are wired correctly to both sides of the circuit breaker. Miss caution can cause damages because of closing the breaker asynchronous or with wrong rotating voltage with enabled voltage rotation monitoring at all connected components (engine, generator, breakers, cable, busbars, etc.).

This function can block a connection of rotation-different voltage systems only at the following conditions:

- **The measuring voltages are at the measuring points (e. g. at the voltage transformer before and behind the circuit-breaker) wired correctly with respect to the phase-rotation;**
- **the measuring voltages are wired without angular phase shift or interruption from the measuring point to this unit;**
- **the measuring voltages are wired to the correct terminals of this unit (e. g. L1 of the generator with the terminal of this equipment, which is intended for the L1 of the generator).**

Correct phase rotation of the phase voltages insures that damage will not occur during an open transition breaker closure to either the mains or the generator. The voltage phase rotation alarm checks that the phase rotation of the voltages and the configured phase rotation are alike. The direction of rotation is differentiated thereby with respect to "clockwise" and "counter clockwise". With a clockwise field the direction of rotation is in the three phases "L1-L2-L3"; with a counter clockwise field the direction of rotation is in the three phases "L1-L3-L2". If the control is configured for a clockwise rotation and the voltages into the unit are calculated as counterclockwise the alarm will be initiated. The currently measured direction of rotation is displayed in the LCD.

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Mains voltage phase direction fault (The hysteresis is 0.7 % of the rated value)			
	Direction	CW / CCW	CW
	Monitoring	ON / OFF	ON
	Alarm class	A/B	B
	Self-acknowledgment	YES / NO	YES
	Engine delayed monitoring	YES / NO	NO

Table 3-32: Monitoring - standard values - mains voltage phase rotation

EN Mains phase rotation
DE Netzdrehfeld

{0}	{1o}	{1oc}	{2oc}
---	---	---	✓

Mains voltage phase rotation: Direction **CW / CCW**

CW .....The three-phase measured mains voltage is rotating CW (clock-wise; that means the voltage rotates in direction L1-L2-L3; standard setting).

CCW .....The three-phase measured mains voltage is rotating CCW (counter clock-wise; that means the voltage rotates in direction L1-L3-L2).

NOTE

A mains voltage rotation fault is carried out as mains failure (if the monitoring "mains voltage rotation fault" is enabled). One of the following actions is carried out:

- **Emergency power operation is enabled (ON):**
  ⇨ **The MCB will not be closed and a emergency power operation is carried out.**
- **Emergency power operation is disabled (OFF):**
  ⇨ **The MCB will not be closed and a emergency power operation is NOT carried out.**

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains voltage phase rotation: Monitoring (limit 1) **ON / OFF**

ON..... Phase rotation monitoring is carried out according to the following parameters
OFF..... No monitoring is carried out.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains voltage phase rotation: Alarm class (limit 1) **Class A/..B/..C/..D/..E/..F**

➔ **CAUTION:**
If you configure an alarm class that leads to an engine stop (alarm classes beginning with C) it may happen that a mains rotation field alarm leads to an dead and voltage free busbar, and to an interruption of supply.

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains voltage phase rotation: Self-acknowledgment (limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains voltage phase rotation: Engine delayed monitoring (limit 1) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Mains, mains failure detection {2oc}

Voltage is monitored depending on the parameter 'Mains voltage measuring' 'Voltage monitoring mains'.

EN High voltage threshold
DE Obere Grenzspannung
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains failure detection: Threshold value overvoltage **50.0..130.0 %**

ⓘ This value refers to the Rated mains voltage (see page 15).

For mains failure recognition and mains estimation this value is consulted. If the actual value rises over the adjusted limit, this is estimated as mains failure and emergency power is started.

EN Low voltage threshold
DE Untere Grenzspannung
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains failure detection: Threshold value undervoltage **50.0..130.0 %**

ⓘ This value refers to the Rated mains voltage (see page 15).

For mains failure recognition and mains estimation this value is consulted. If the actual value falls below the adjusted limit, this is estimated as mains failure and emergency power is started.

EN Voltage hyteresis
DE Spannungshysterese
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains failure detection: Hysteresis: Voltage **0.0..50.0 %**

ⓘ This value refers to the Rated mains voltage (see page 15).

For mains failure recognition and estimation this value is consulted. If the actual value exceeds the above adjusted limit, this is assessed as mains failure and the emergency power operation is initiated. If the actual value is close to the limit (exceeding or negative deviation) the hysteresis must be at least exceeded (on negative deviation monitoring) or fallen below (on exceeding monitoring) so that mains failure can be assessed as ended. This must occur for the mains settling time (see parameter below). Rises or falls the actual value within this time over or under the limit, the delay time is started again.

EN High frequency threshold
DE Obere Grenzfrequenz
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains failure detection: Threshold value overfrequency **70.0..160.0 %**

ⓘ This value refers to the Rated system frequency (see page 15).

For mains failure recognition and mains estimation this value is consulted. If the actual value rises over the adjusted limit this is estimated as mains failure and emergency power is started.

EN Low frequency threshold
DE Untere Grenzfrequenz
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains failure detection: Threshold value underfrequency **70.0..160.0 %**

ⓘ This value refers to the Rated system frequency (see page 15).

For mains failure recognition and mains estimation this value is consulted. If the actual value falls below the adjusted limit this is estimated as mains failure and emergency power is started.

EN Frequency hyteresis
DE Frequenzhysterese
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Mains failure detection: Hysteresis: Frequency **0.0..50.0 %**

ⓘ This value refers to the Rated system frequency (see page 15).

For mains failure recognition and estimation this value is consulted. If the actual value exceeds the above adjusted limit, this is assessed as mains failure and the emergency power operation is initiated. If the actual value is close to the limit (exceeding or negative deviation) the hysteresis must be at least exceeded (on negative deviation monitoring) or fallen below (on exceeding monitoring) so that mains failure can be assessed as ended. This must occur for the mains settling time (see parameter below). Rises or falls the actual value within this time over or under the limit, the delay time is started again.

Protection: Breaker, circuit breaker monitoring

Monitoring of the GCB

Circuit breaker monitoring contains two alarms: A breaker reclose alarm and a breaker open alarm.

Reclose Alarm: If the control initiates a close of the breaker and the breaker fails to close after five attempts the monitoring CB alarm will be initiated (exception: The power circuit breaker logics is configured to "EXTERNAL").

Breaker Open Alarm: If the control is attempting to open the circuit breaker and it fails to see that the CB is open 2 seconds after issuing the breaker open command then the monitoring CB alarm will be initiated.

Application mode {2oc}: The alarm classes have the following influence to the function of the unit.

Fault at 'closing the GCB'

- Alarm class A = no consequence
- Alarm class B: If the GCB can not be closed the control is switched to mains operation if
  - the mains voltage is within the necessary limits,
  - the mains settling time has expired, and
  - the "Enable MCB" is set.
  - If it is not possible to switch to mains operation the GCB attempts to continuously close.
- Alarm class C-F: If the GCB could not be closed the engine is stopped and it is switched to mains operation, if
  - the mains voltage is within the necessary limits,
  - the mains settling time has expired, and
  - the "Enable MCB" is set.
  - If it is not possible to switch to mains operation the busbar remains de-energized (black) until the GCB fault can be acknowledged.

Fault at 'opening the GCB'

This alarm is operated according to the description of the alarm classes. During the reply that the GCB is still closed the MCB cannot be closed.

EN GCB monitoring
DE GLS Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Circuit breaker monitoring GCB: Monitoring **ON / OFF**

ON .....Monitoring of the GCB is carried out according to the following parameters.
OFF .....No monitoring is carried out.

EN GCB alarm class
DE GLS Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Circuit breaker monitoring GCB: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN GCB max. closing attempts
DE GLS ZU max. Schaltversuche
{0} {1o} {1oc} {2oc}
--- --- ✓ ✓

Breaker monitoring GCB: Max. "GCB close" attempts **1..10**

Up to this number of "close breaker" attempts (relay output "Command: close CB") the unit tries to close the breaker. Is this number reached the above configured alarm class is issued.

EN GCB open monitoring
DE GLS AUF Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Breaker monitoring GCB: Max. time until reply "GCB has been opened" **0.10..5.00 s**

Is the "Reply: CB has been opened" not present once this timer has been finished (measured from starting the "open breaker" sequence) the above configured alarm class is issued.

Monitoring of the MCB {2oc}

NOTE

If an alarm is detected when attempting to close the MCB emergency power operation will be carried out if the "Emergency power with MCB alarm" is ON.

If an alarm class higher than alarm class 'B' has been selected it will not be possible to start the engine with the setting "Emergency power with MCB fault" = ON in an emergency power condition.

Circuit breaker monitoring contains two alarms: A breaker reclose alarm and a breaker open alarm.

Reclose Alarm: If the control initiates a close of the breaker and the breaker fails to close after five attempts the monitoring CB alarm will be initiated (exception: The power circuit breaker logics is configured to "EXTERNAL").

Breaker Open Alarm: If the control is attempting to open the circuit breaker and it fails to see that the CB is open 2 seconds after issuing the breaker open command then the monitoring CB alarm will be initiated.

The alarm classes have the following influence to the function of the unit.

Fault at 'closing the MCB'

- Alarm class A = no consequence
- Alarm class B
  Parameter "Emergency power" = OFF
  If the MCB cannot be closed, the busbar remains without voltage, until the MCB breaker fault can be acknowledged. The control continues to attempt to close the MCB.
- Alarm class B
  Parameter "Emergency power" = ON, Parameter "at MCB fault activate" = OFF
  If the MCB cannot be closed, the busbar remains without voltage, until the MCB breaker fault can be acknowledged. The control continues to attempt to close the MCB.
- Alarm class B
  Parameter "Emergency power" = ON, Parameter "at MCB fault activate" = ON
  If the MCB cannot be closed, an emergency power operation is initiated after the emergency power delay time has expired (the engine is started and the GCB is closed; the busbar is supplied by the generator). If the alarm is acknowledged and if the MCB can be closed, it is switched to mains supply and the emergency power operation terminates.

Fault at 'opening the MCB'

This fault is processed according to the action described with the alarm classes. As long as the reply is present that the MCB is still closed, the GCB cannot be closed.

N
DE **MCB monitoring**
NLS Überwachung
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Circuit breaker monitoring MCB: Monitoring **ON / OFF**

ON..... Monitoring of the MCB is carried out according to the following parameters.
OFF..... No monitoring is carried out.

EN
DE **MCB alarm class**
NLS Alarmklasse
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Circuit breaker monitoring MCB: Alarm class **Class A/..B**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN
DE **MCB max. closing attempts**
NLS ZU max. Schaltversuche
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Breaker monitoring MCB: Max. "GCB close" attempts **1..10**

Is the "Reply: CB has been opened" not present once this timer has been finished (measured from starting the "open breaker" sequence) the above configured alarm class is issued.

EN
DE **MCB open monitoring**
NLS AUF Überwachung
{0} {1o} {1oc} {2oc}
--- --- --- ✓

Breaker monitoring MCB: Max. time until reply "GCB has been opened" **0.10..5.00 s**

Up to this number of "close breaker" attempts (relay output "Command: close CB") the unit tries to close the breaker. Is this number reached the above configured alarm class is issued.

Protection: Engine, overspeed (Limits 1 & 2)

The engine speed measured by a magnetic or switching Pickup is monitored for overspeed. If the speed exceeds the overspeed limits the alarms will be initiated.

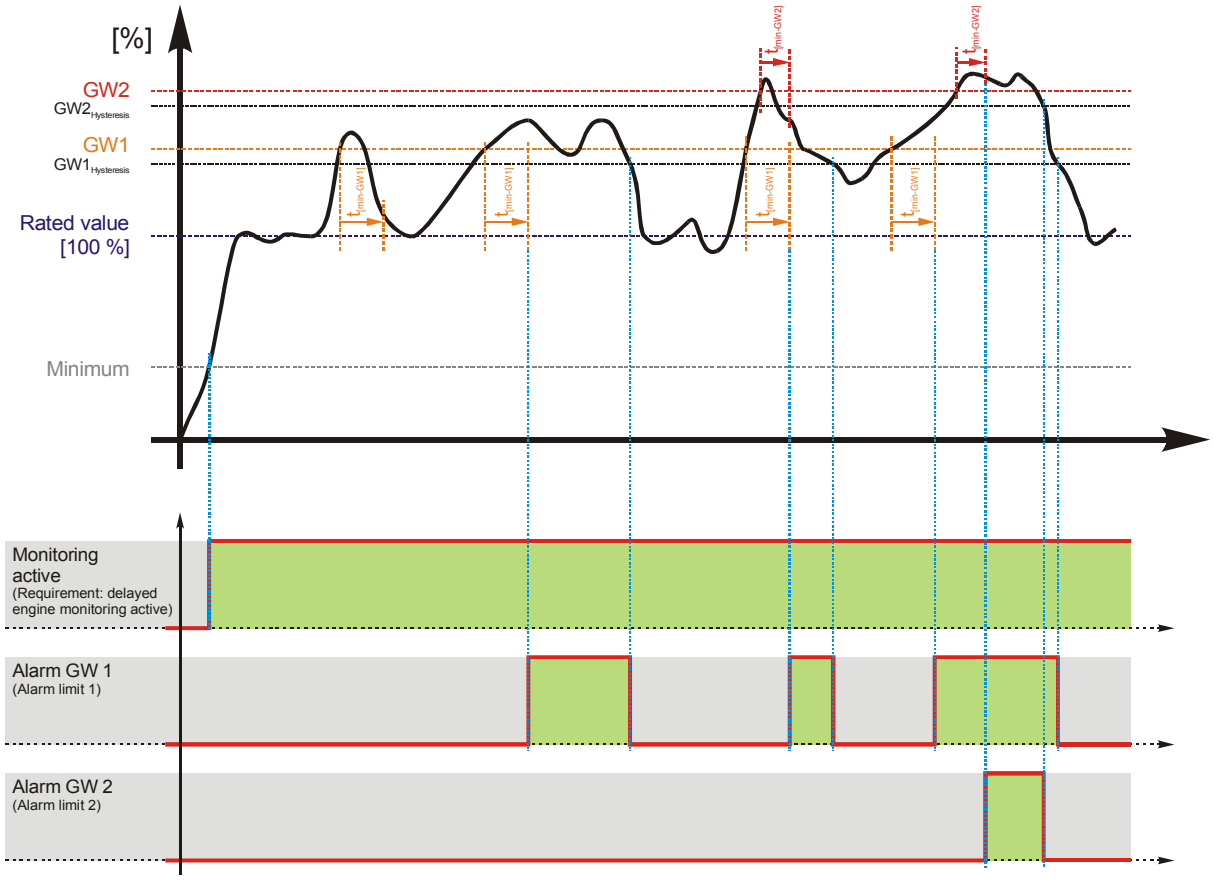


Figure 3-33: Monitoring – Engine overspeed

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Engine overspeed (The hysteresis is 50 min^{-1}).			
Limit 1	Monitoring	ON / OFF	ON
	Limit	0..9,999 RPM	1,850 RPM
	Delay	0.02..99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	0..9,999 RPM	1,900 RPM
	Delay	0.02..99.99 s	0.10 s
	Alarm class	A/B/C/D/E/F	F

Table 3-34: Monitoring – Standard values – Engine overspeed

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine overspeed: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Overspeed monitoring of the engine speed is carried out according to the following parameters.
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine overspeed: Threshold value (Limit 1/Limit 2) **0..9,999 RPM**

The threshold value is set by this parameter. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine overspeed: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine overspeed: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine overspeed: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine overspeed: Engine delayed monitoring (Limit 1) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Engine, underspeed (Limits 1 & 2)

The engine speed measured by a magnetic or switching Pickup is monitored for underspeed. If the speed exceeds the underspeed limits the alarms will be initiated.

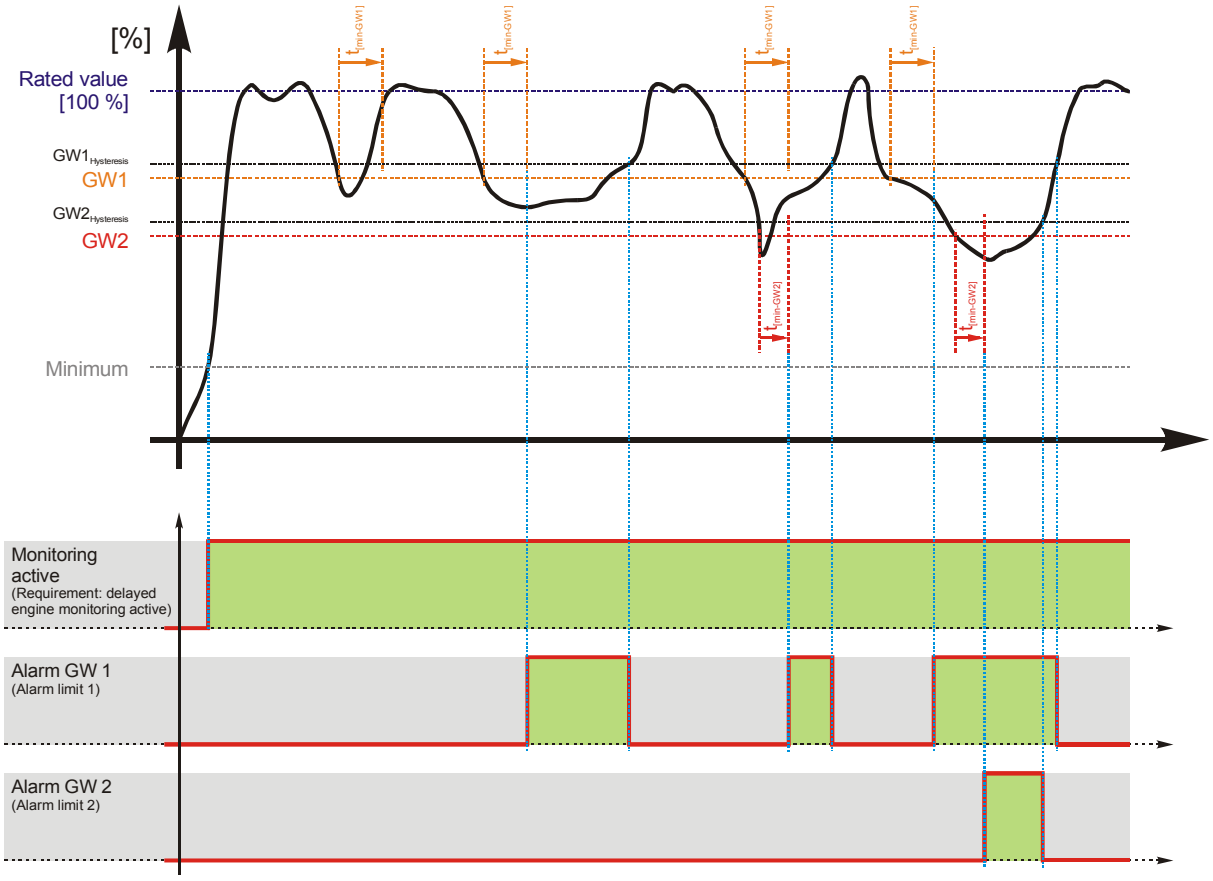


Figure 3-35: Monitoring – Engine underspeed

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Engine underspeed (The hysteresis is 50 min^{-1})			
Limit 1	Monitoring	ON / OFF	ON
	Limit	0..9,999 RPM	1,300 RPM
	Delay	0.02..99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	YES
Limit 2	Monitoring	ON / OFF	ON
	Limit	0..9,999 RPM	1,250 RPM
	Delay	0.02..99.99 s	0.10 s
	Alarm class	A/B/C/D/E/F	F

Table 3-36: Monitoring – Standard values – Engine underspeed

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine underspeed: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Underspeed monitoring of the engine speed is carried out according to the following parameters.
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine underspeed: Threshold value (Limit 1/Limit 2) **0..9,999 RPM**

The threshold value is set by this parameter. If this value is reached or fallen below for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine underspeed: Delay (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine underspeed: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine underspeed: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
--- ✓ ✓ ✓

Engine underspeed: Engine delayed monitoring (Limit 1) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Engine/generator, speed/frequency mismatch (speed detection)

Speed/frequency mismatch (n/f mismatch) checks if the "electrical" generator frequency f (determined from the measured generator voltage) differs from the measured "mechanical" engine speed n (determined from the Pickup signal) (Δf-n). If the two frequencies are not identical (Δf-n ≠ 0), an alarm is output. Additionally the discrete input "Ignition speed" is checked upon his logical status with respect to the measuring values "generator frequency" and "Pickup speed".

NOTE

Speed/frequency mismatch (n/f mismatch) is carried out only if a (magnetic/switching) Pickup is supplied to the control. The parameter "Pickup" is ON. The following is valid:

- **The measurement via Pickup is enabled (ON):**
  - ⇨ **Mismatch monitoring is carried out using the engine speed from the Pickup, the generator frequency, and the discrete input. If the speed/frequency mismatch or the discrete input is set and the frequency is outside of the limit the alarm will be issued.**
- **The measurement via Pickup is disabled (OFF):**
  - ⇨ **Mismatch monitoring is carried out using the generator frequency and the discrete input. If the discrete input is set and the frequency is outside of the limit the alarm will be issued.**

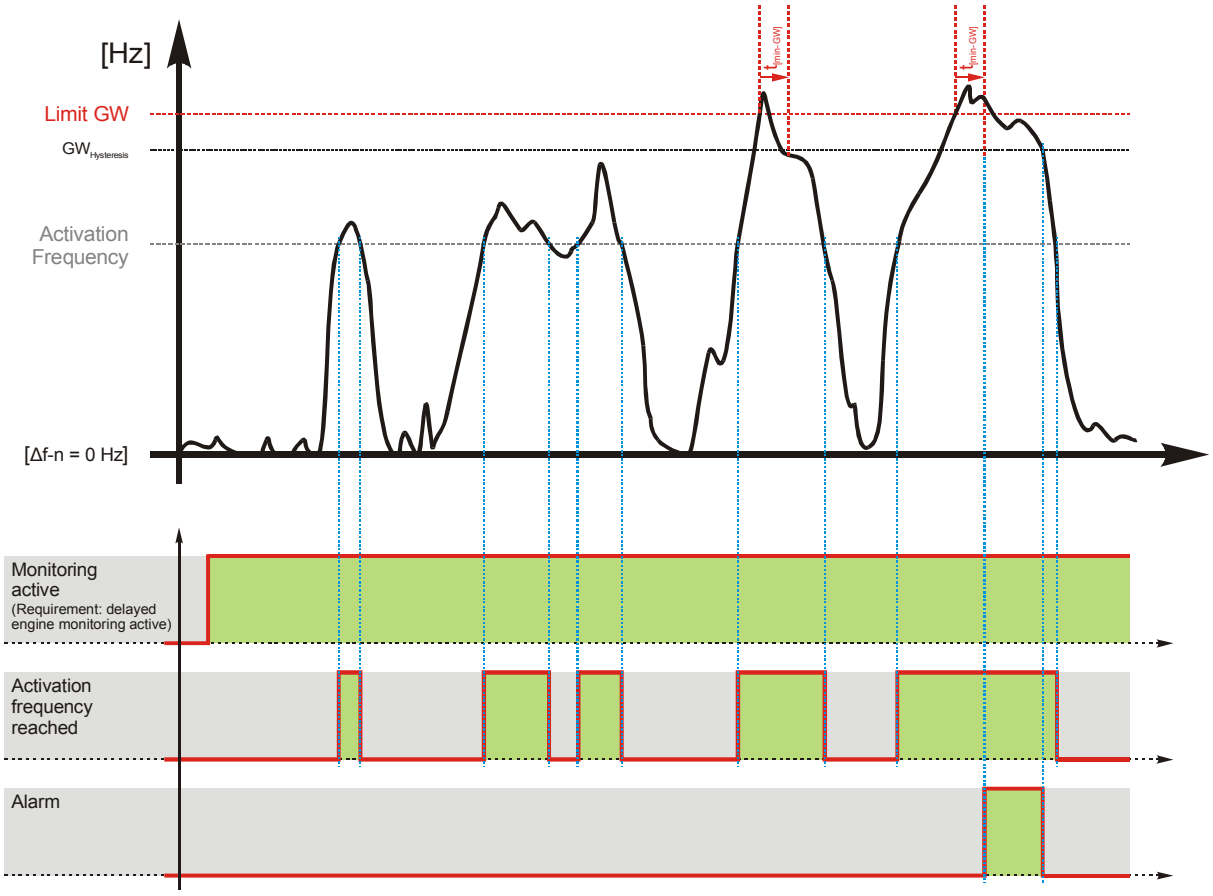


Figure 3-37: Monitoring – Plausibility check n/f

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Speed/frequency mismatch (n/f mismatch) (The hysteresis is 50 RPM).			
	Monitoring	ON/OFF	ON
	Limit	1.5..8.5 Hz	5.0 Hz
	Delay	0.02..99.99 s	2.00 s
	Monitoring frequency	15..85 Hz	20 Hz
	Alarm class	A/B/C/D/E/F	E
	Self-acknowledgment	YES/NO	NO

Table 3-38: Monitoring – Standard values – Plausibility control n/f

EN **Monitoring**
DE **Überwachung**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

n/f/DI mismatch: Monitoring **ON / OFF**

ON..... Monitoring of the speed/frequency mismatch (n/f mismatch) is carried out according to the following parameters.
OFF..... No monitoring is carried out.

EN **Mismatch limit**
DE **Zulässige Differenz**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

n/f/DI mismatch: Threshold value **1.5..8.5 Hz**

The threshold value is set by this parameter. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

The discrete input is monitored with respect to his status.

EN **Delay**
DE **Verzögerung**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

n/f/DI mismatch: Delay **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN **Activation frequency**
DE **Überwachung ab**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

n/f/DI mismatch: Start-up frequency **15..85 Hz**

The speed/frequency mismatch monitoring is enabled at this generator frequency.

EN **Alarm class**
DE **Alarmklasse**

{0}	{1o}	{1oc}	{2oc}
---	✓	✓	✓

n/f/DI mismatch: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

Protection: Engine, start failure

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Start alarm: Monitoring **ON / OFF**

ON .....Monitoring of the start sequence is carried out according to the following parameters.
OFF .....No monitoring is carried out.

EN Start attempts
DE Anzahl Startversuche
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Start alarm: Number of starting attempts **1..20**

The control will attempt to start the engine with this number of start attempts. If the engine fails to start after the configured number of attempts the alarm will be initiated. An engine has been successfully started if the ignition speed [ZD] has been reached a certain level within the start delay time.

EN Start attempts override
DE Anzahl Startvers. Sprinkler
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Start alarm: Number of starting attempts for override **1..20**

The engine is started for the override function with up to this number of start attempts. An engine has been successfully started if the ignition speed [ZD] has been reached a certain level within the start delay time.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Start alarm: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Start alarm: Self acknowledgment **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Engine, stop failure

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Stop alarm: Monitoring **ON / OFF**

ON..... Monitoring of the stop sequence is carried out according to the following parameters.
OFF..... No monitoring is carried out.

EN Max. stop delay
DE Verzögerung Abstellstörung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Stop alarm: Threshold value **3..999 s**

The time between the output of a stop command and the reply that the engine was stopped successfully. If the engine cannot be stopped within this time (this means speed via the Pickup, frequency via the generator voltage or the discrete input is recognized) , the action specified in the alarm class, is initiated.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Stop alarm: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Stop alarm: Self acknowledgment **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Protection: Engine, unintended stop

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Unintended stop: Monitoring **ON / OFF**

ON..... If the engine stops without a stop command the action specified in the alarm class is initiated. This monitoring will be enabled with expiration of the engine delayed monitoring.
OFF..... Stop alarm will not be evaluated.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Unintended stop: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

Protection: Battery, overvoltage (Limits 1 & 2)

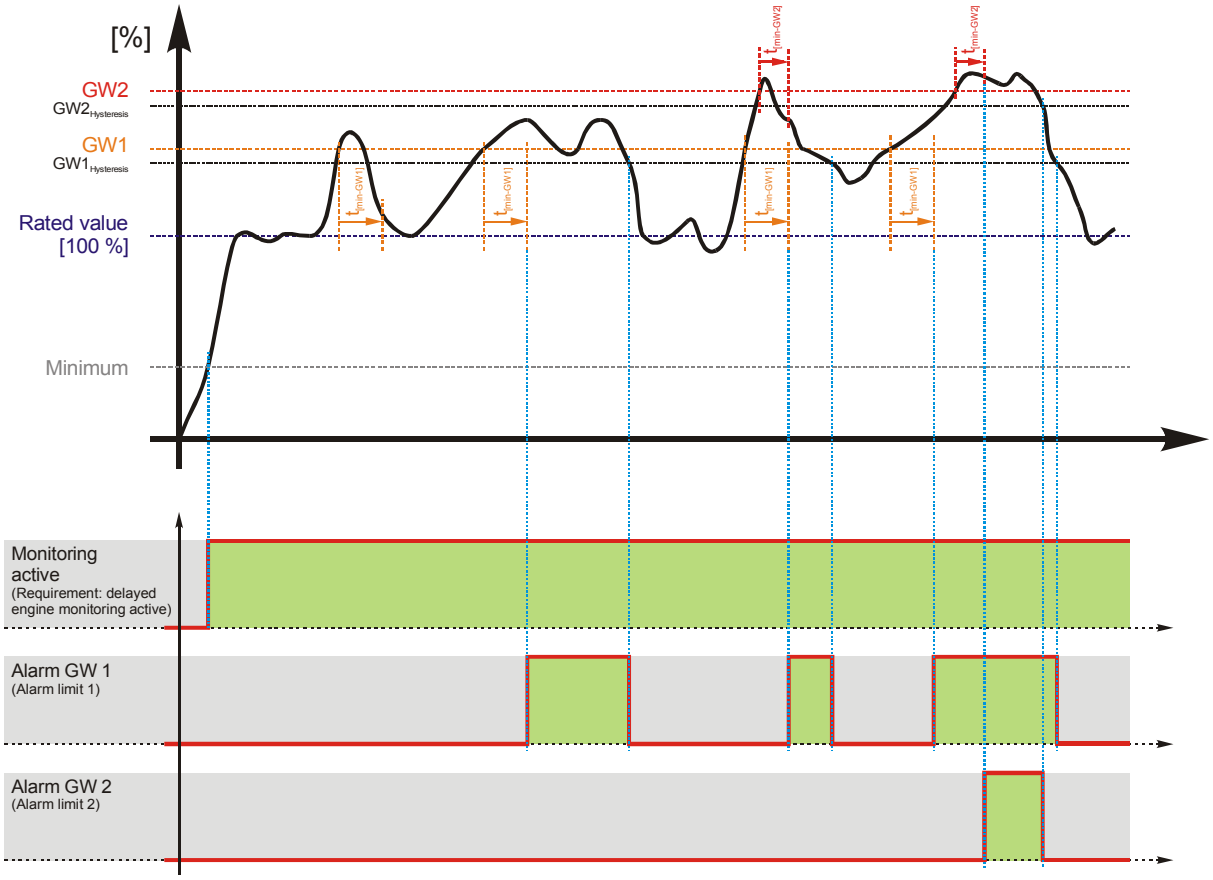


Figure 3-39: Monitoring – Battery overvoltage

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Battery overvoltage (The hysteresis is 0,7 % of the rated value.)			
Limit 1	Monitoring	ON/OFF	ON
	Limit	8.0..42.0 V	32.0 V
	Delay	0.02..99.99 s	5.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES/NO	NO
	Engine delayed monitoring	YES/NO	NO
Limit2	Monitoring	ON/OFF	OFF
	Limit	8.0..42.0 V	35.0 V
	Delay	0.02..99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F	B

Table 3-40: Monitoring - Standard values – Battery overvoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery overvoltage: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Battery overvoltage monitoring of the battery voltage is carried out according to the following parameters.
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery overvoltage: Threshold value (Limit 1/Limit 2) **8.0..42.0 V**

The threshold value is set by this parameter. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery overvoltage: Delay time (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery overvoltage: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery overvoltage: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery overvoltage: Engine delayed monitoring (Limit 2) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Battery, undervoltage (Limits 1 & 2)

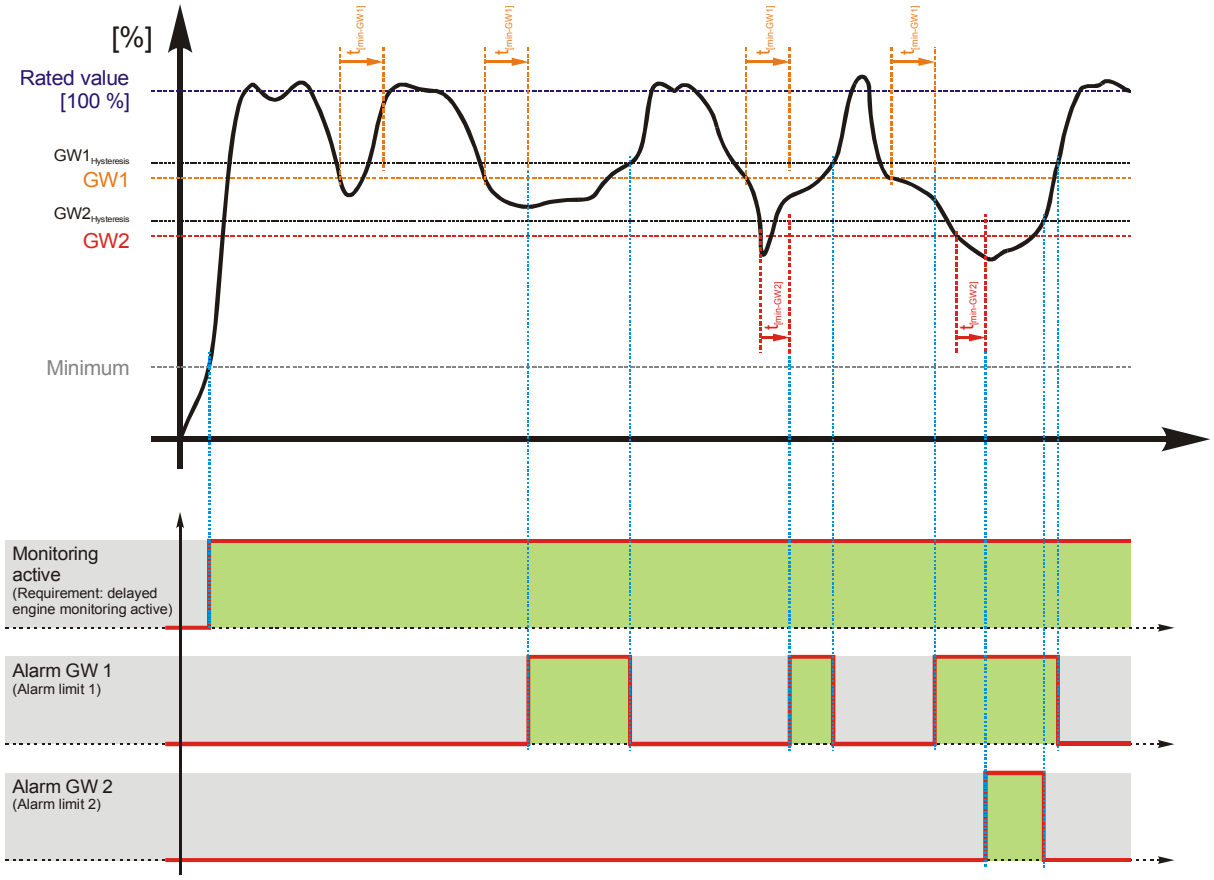


Figure 3-41: Monitoring – Battery undervoltage

Parameter table

The parameters represented right hand are specified in the following, whereas the description is identical for all limits; the limits only differ in their setting ranges.

Limit	Text	Setting range	Standard value
Battery undervoltage (The hysteresis is 0,7 % of the rated value).			
Limit 1	Monitoring	ON/OFF	ON
	Limit	8.0..42.0 V	24.0 V
	Delay	0.02..99.99 s	60.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES/NO	NO
	Engine delayed monitoring	YES/NO	NO
Limit2	Monitoring	ON/OFF	ON
	Limit	8.0..42.0 V	20.0 V
	Delay	0.02..99.99 s	10.00 s
	Alarm class	A/B/C/D/E/F	B

Table 3-42: Monitoring – Standard values – Battery undervoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery undervoltage: Monitoring (Limit 1/Limit 2) **ON / OFF**

ON..... Battery undervoltage monitoring of the battery voltage is carried out according to the following parameters.
OFF..... No monitoring is carried out for either limit 1 or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery undervoltage: Threshold value (Limit 1/Limit 2) **8.0..42.0 V**

The threshold value is set by this parameter. If this value is reached or fallen below for at least the delay time, the action, specified in the alarm class, is initiated.

Note
The default monitoring limit for battery undervoltage is the rated value of 24 Vdc after 60 seconds. This is because in normal operation the terminal voltage is approximately 26 Vdc (dynamo charges battery).

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery undervoltage: Delay time (Limit 1/Limit 2) **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery undervoltage: Alarm class (Limit 1/Limit 2) **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery undervoltage: Self acknowledgment (Limit 1) **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Battery undervoltage: Engine delayed monitoring (Limit 1) **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Protection: Interface, monitoring

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Interface: Monitoring **ON / OFF**

ON .....Monitoring of the interface is carried out according to the following parameters.
OFF .....No monitoring is carried out.

EN Timeout
DE Zeitüberschreitung
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Interface: Threshold value **0.1..999.9 s**

The threshold value is set by this parameter. If this value is reached or exceeded for at least the delay time, the action, specified in the alarm class, is initiated.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Interface: Alarm class **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Interface: Self acknowledgment **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Interface: Engine delayed **YES / NO**

YES .....The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO .....The alarm is not engine delayed monitored. Alarms are directly analyzed.

Discrete Inputs

Number	Terminal	Application mode			
		{0}	{1o}	{1oc}	{2oc}
Internal discrete inputs					
[D1]	51	Alarm input (*LogicsManager*), pre-specified with EMERGENCY OFF			
[D2]	52	Alarm input (*LogicsManager*)			
[D3]	53	Alarm input (*LogicsManager*)			
[D4]	54	Alarm input (*LogicsManager*)			
[D5]	55	Alarm input (*LogicsManager*)			
[D6]	56	Alarm input (*LogicsManager*)			Release NLS
[D7]	57	Alarm input (*LogicsManager*)			RM: MCB is open
[D8]	58	Alarm input (*LogicsManager*)		RM: GCB is open	RM: GCB is open
External discrete inputs (via CANopen; not included in easYgen delivery; can be e.g. IKD1, Phoenix)					
[DEx01]	---	Alarm input (*LogicsManager*)			
[DEx02]	---	Alarm input (*LogicsManager*)			
[DEx03]	---	Alarm input (*LogicsManager*)			
[DEx04]	---	Alarm input (*LogicsManager*)			
[DEx05]	---	Alarm input (*LogicsManager*)			
[DEx06]	---	Alarm input (*LogicsManager*)			
[DEx07]	---	Alarm input (*LogicsManager*)			
[DEx08]	---	Alarm input (*LogicsManager*)			
[DEx09]	---	Alarm input (*LogicsManager*)			
[DEx10]	---	Alarm input (*LogicsManager*)			
[DEx11]	---	Alarm input (*LogicsManager*)			
[DEx12]	---	Alarm input (*LogicsManager*)			
[DEx13]	---	Alarm input (*LogicsManager*)			
[DEx14]	---	Alarm input (*LogicsManager*)			
[DEx15]	---	Alarm input (*LogicsManager*)			
[DEx16]	---	Alarm input (*LogicsManager*)			

RM..Reply

Table 3-43: Discrete inputs - Assignment

NOTE

Operating current (NO): The relay picks up when triggering, i. e. in the operating state current flows through the coil. In case of a loss of the supply voltage no change in state of the relay will be effected, no triggering will occur. In this case readiness for operation should be monitored by all means.

Closed circuit current (NC): The relay drops out when triggering, i. e. in idle state current flows through the coil. The relay is picked up in idle state (= no triggering). In case of a loss of the supply voltage change in state of the relay will be effected, triggering occurs.

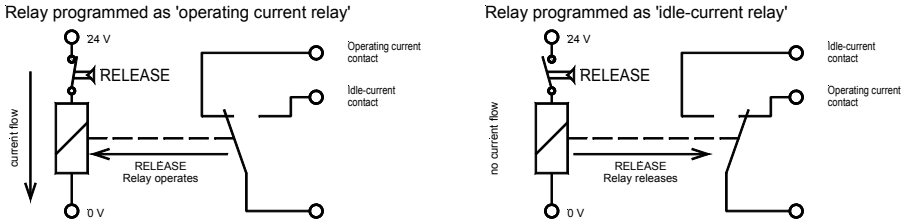


Figure 3-44: NO/NC

NOTE

The settings NO/NC is invalid if the discrete input is used as reply message for the breaker position. The reply messages of the breakers are always evaluated as NO.

EN **DI {x} operation**
DE **DI {x} Funktion**

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Discrete input: Operation **N.O. / N.C.**

The discrete inputs can be operated by an operating current contact or a closed circuit current contact. The closed circuit current input can be used to monitor a wire-break. A positive or negative voltage difference can apply.

N.O. .....The discrete input is analyzed as "present" by applying of a voltage difference (N.O. / operating current).

N.C. .....The discrete input is analyzed as "present" by falling off of a voltage difference (N.C. / idle current).

EN **DI {x} delay**
DE **DI {x} Verzögerung**

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Discrete input: Delay **0.02..650.00 s**

A delay time in seconds can be assigned to each alarm input. The set delay time must be present continuously at the input before tripping occurs. If the discrete input is used within the *LogicsManager* this delay is taken into account, too.

EN DI {x} alarm class
DE DI {x} Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Discrete input: Alarm class **Class A/..B/..C/..D/..E/..F/Control**

ⓘ see chapter "Alarm Classes" on page 114.

An alarm class can be a assigned to the discrete input. The alarm class is executed with applying a voltage to the discrete input according to the fixed sequence.

If "control" has been configured as alarm class the following functions can be assigned to the discrete inputs:
- a function out of the *LogicsManager* (description at page 116),
- external acknowledgment or
- ignition speed via discrete input (description at page 33).

EN DI {x} delayed by eng.speed
DE DI {x} verzög. d. Motordrehz.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Discrete input: Engine delayed monitoring **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

NOTE

If a discrete input has been configured with a shut-down alarm as well as self-acknowledgeable and engine delayed the following scenario can happen:

- **The discrete input shuts the engine because of its alarm class down.**
- **With stopping the engine all engine delayed alarms are ignored.**
- **The alarm class is acknowledged automatically.**
- **Because if the self-acknowledgeability of the alarm input the reason of the engine shut-down can not be evaluated any more. The engine will be re-started after the start pause time is over.**
- **After the time of the engine delayed monitoring is reached the alarm - who has shut-down the engine before - is still present and will shut-down the engine again, etc.**

EN DI {x} self acknowledge
DE DI {x} Selbstquittierend
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Discrete input: Self acknowledgment **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN DI {x} text
DE DI {x} Text
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Discrete input: Message text **user-defined**

If the discrete input is logically "1" this text is displayed in the display. The storage in the event recorder is done using this text, too.

Discrete Outputs (*LogicsManager*)

The discrete outputs are controlled via the *LogicsManager*.

⇨ **Please note the description of the *LogicsManager* starting on page 116.**

Some outputs are fixed to a function according to the application mode (see following table).

Relay Number	Term.	Application mode: Basic {0}	GCB open {1o}	GCB open/close {1oc}	GCB/MCB open/close {2oc}
Internal relay outputs					
[R1]	30/35	*LogicsManager*			
[R2]	31/35	*LogicsManager*			
[R3]	32/35	Crank			
[R4]	33/35	Diesel: Fuel solenoid Gas: Gas valve			
[R5]	34/35	*LogicsManager;* pre-assigned with 'Pre-glow'			
[R6]	36/37	*LogicsManager;* pre-assigned with 'Auxiliary services'			
[R7]	38/39	*LogicsManager*	Command: open GCB		
[R8]	40/41	*LogicsManager*			Command: close MCB
[R9]	42/43	*LogicsManager*			Command: open MCB
[R10]	44/45	*LogicsManager*		Command: close GCB	
[R11]	46/47	Readiness for operation			
External relay output (via CANopen; not included in easYgen delivery; can be e.g. IKD1, Phoenix ??????????????)					
[REx01]	---	*LogicsManager*			
[REx02]	---	*LogicsManager*			
[REx03]	---	*LogicsManager*			
[REx04]	---	*LogicsManager*			
[REx05]	---	*LogicsManager*			
[REx06]	---	*LogicsManager*			
[REx07]	---	*LogicsManager*			
[REx08]	---	*LogicsManager*			
[REx09]	---	*LogicsManager*			
[REx10]	---	*LogicsManager*			
[REx11]	---	*LogicsManager*			
[REx12]	---	*LogicsManager*			
[REx13]	---	*LogicsManager*			
[REx14]	---	*LogicsManager*			
[REx15]	---	*LogicsManager*			
[REx16]	---	*LogicsManager*			

Table 3-45: Relay outputs - Assignment

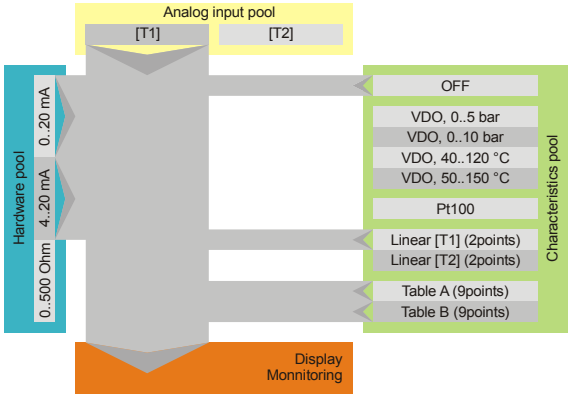
Analog Inputs (*FlexIn*)

Out of the pool of hardware a characteristic out of the pool of characteristics can be lodged to each analog input [T1]..[T2]. The free definable characteristics of table A and B can be assigned user defined and to each analog input, the linear characteristics [T1]..[T2] can only be assigned to the current analog inputs. The following assignment possibilities are valid:

Pool of the Hardware	**Pool of the characteristics**									
	OFF	VDO, Pressure 0..5 bar (0..72 psi)	VDO, Pressure 0..10 bar (0..145 psi)	VDO, Temperature 40..120 °C (104..248 °F)	VDO, Temperature 50..150 °C (122..302 °F)	Pt100	Linear, 2-Points Characteristics for [T1]	Linear, 2-Points Characteristics for [T2]	Table, 9-Points Characteristics A	Table, 9-Points Characteristics B
Analog input [T1]										
0..20 mA	✓	---	---	---	---	---	✓	---	✓	✓
4..20 mA	✓	---	---	---	---	---	✓	---	✓	✓
0..500 Ohm	✓	✓	✓	✓	✓	✓	✓	---	✓	✓
Analog input [T2]										
0..20 mA	✓	---	---	---	---	---	---	✓	✓	✓
4..20 mA	✓	---	---	---	---	---	---	✓	✓	✓
0..500 Ohm	✓	✓	✓	✓	✓	✓	---	✓	✓	✓

Table 3-46: Analog inputs – Possibilities of combinations (*FlexIn*)

Example for the possibilities of combinations for the Analog input [T1] with 20 mA hardware



Example for the possibilities of combinations for the Analog input [T1] with resistance hardware

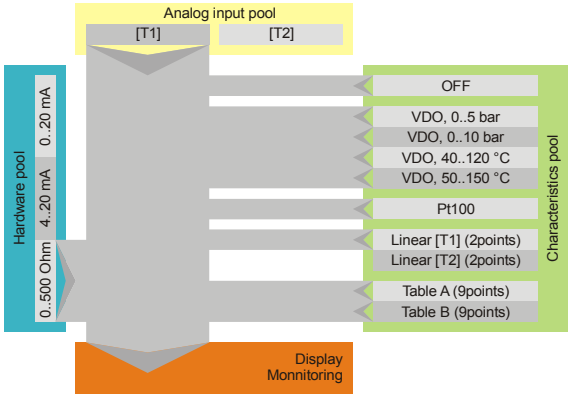


Figure 3-47: Analog inputs - Possibilities of combinations (*FlexIn*)

Analog inputs: Type

EN Type
DE Typ

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Analog input {x} [x = 1..2]: Type **OFF / VDO 5bar / VDO 10bar / VDO 120°C / VDO 150°C / Pt100 / linear / Table A / Table B**

ⓘ The characteristics of the inputs can be found in the appendix (page 141).

According to the following parameters different measuring ranges are possible at the analog inputs. Thereby it differs between:

OFF ..... The analog input is switched off.
VDO 5bar ..... The value of the analog input is interpreted with the VDO characteristics 0..5 bar.
VDO 10bar ..... The value of the analog input is interpreted with the VDO characteristics 0..10 bar.
VDO 120°C..... The value of the analog input is interpreted with the VDO characteristics 40..120 °C.
VDO 150°C..... The value of the analog input is interpreted with the VDO characteristics 50..150 °C.
Pt100 ..... The value of the analog input is interpreted with a Pt100 characteristic.
linear ..... Each analog input can be lodged to a linear characteristic, which can be only used for the respective defined input [T{x}] (x = 1..2). The minimum (0 %) and maximum (100 %) value refers to the total measuring range of the analog input (e.g. 0..500 Ohm, 0..20 mA oder 4..20 mA). Both benchmark limits of the linear characteristics must be defined only in chase they are used.
Table A / .. B..... The analog input is lodged to a characteristics which is defined over 9 points (defined in a table). Two independent tables (table A and table B) can be defined which can be allocated to the analog inputs. Please attend that the definition of the tables for all inputs in which a called up occurs, must be adjusted once.

EN Select hardware
DE Auswahl Hardware

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Analog input {x} [x = 1..2]: Hardware **0..500 Ohm / 0..20 mA / 4..20 mA**

The analog input can be configured by the software for different sensors. The specification of the rage occurs already by the previous parameter. The following selections are possible:
0..500 Ohm The measuring range of the analog input is 0..500 Ohm.
0 Ohm = 0 %, 500 Ohm = 100 %.
0..20 mA.....The measuring range of the analog input is 0..20 mA.
0 mA = 0 %, 20 mA = 100 %.
4..20 mA.....The measuring range of the analog input is 4..20 mA.
4 mA = 0 %, 20 mA = 100 %.

EN Offset
DE Offset

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Analog input {x} [x = 1..2]: Offset **-20,0..0,0..+20,0 Ohm**

The resistive input (parameter setting of parameter "Select hardware" to "0..500Ohm") can be calculated with a permanent offset to adjust inaccuracies. The following principle is valid: The configured value in Ohm will be added/subtract to/from the measured resistive value. This has the following effect to the measured values (please note tables starting on page 141):

-20,0..-0,1 Ohm

VDO temperature: The displayed value will decrease.
VDO pressure: The displayed value will increase.

+0,1..+20,0 Ohm

VDO temperature: The displayed value will increase.
VDO pressure: The displayed value will decrease.

EN Description
DE Beschreibung

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Analog input {x} [x = 1..2]: Message text **user-defined**

If the programmed limit value of the analog input has been reached or exceeded this text is displayed in the display. The storage in the event recorder is done using this text, too.

EN Value format
DE Zahlenformat

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Analog input {x} [x = 1..2]: Value format **user-defined**

ⓘ If a signed is to be used (e. g. " - ") the first " 0 " is used therefore.

To display the measuring value of the analog input correctly this parameter is to be used to define the format. The zeros are therefore used as a wildcard for the measuring values. The wildcards can be interrupted with any sign (e. g. commas).

Note

- The displayed value should be configured with the same number of digits as the further below defined value.
- The measured value will be displayed from right to left into the wildcards. If there are too less digits available the measuring value will be cut of in the front.
- If the numeral "0" has to be displayed as figure "0" the letter "O" has to be used. If the numeral "0" is used a value will be displayed.

Examples

Fuel level
- value at 0 %.....0 mm
- value at 100 %.....1,000 mm
- desired display 0,000mm
- this parameter.....**0,000mm**

Angle
- value at 0 %.....-179.9 °
- value at 100 %.....180.0 °
- desired display .....-179.9° to 180.0°
- this parameter.....**0000.0°**

Pressure
- value at 0 %.....0.0 bar
- value at 100 %.....10.0 bar
- desired display 00.0bar
- this parameter.....**00.0bar**

EN Filter time constant
DE Filter

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Analog input {x} [x = 1..2]: Filter time constant **OFF / 1 / 2 / 3 / 4 / 5**

To absorb variations of the analog inputs at each input a filter time constant can be entered which assess/takes the mean of the signal according to the following formula:

$$\text{Cut} - \text{off} - \text{frequency} = \frac{100\text{ms}}{2 \times \pi \times 2^{N}}$$, whereby "N" is this parameter.

OFF .....The value is evaluated without smoothing.
1 .....Cut-off-frequency = 7.96 mHz (delay = 0.13 s)
2 .....Cut-off-frequency = 3.98 mHz (delay = 0.25 s)
3 .....Cut-off-frequency = 1.99 mHz (delay = 0.50 s)
4 .....Cut-off-frequency = 0.99 mHz (delay = 1.01 s)
5 .....Cut-off-frequency = 0.50 mHz (delay = 2.00 s)

EN Hysteresis
DE Hysterese

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Scaling linear {x} [x = A/B]: Hysteresis **0..999**

If the analog input is used for monitoring/protection the actual value must exceed or fall below one of the following limits to be recognized as "triggered". To recognize the value as "not triggered" the current value must be higher or fall below for this hysteresis over or under the limit value.

Analog inputs: Monitoring limits

EN Monitoring level {y}
DE Überwachung Stufe{y}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Monitoring threshold value {y} [y = 1/2] **ON / OFF**

ON..... Monitoring according to the following parameters is carried out. Both values can be configured independent from each other.
OFF..... Monitoring is disabled.

EN Limit level {y}
DE Limit Stufe{y}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Threshold value {y} [y = 1/2] **-9,999..0..9,999**

The value which has to be monitored, is set by this parameter. If this value is reached, exceeded or fallen below for at least the delay time configured in this mask (dependent of the parameter "Monitoring on …"), the action is started which you gave by means of the alarm class.

EN Delay level{y}
DE Verzögerung Stufe {y}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Delay time threshold value {y} [y = 1/2] **0.02..99.99 s**

If the current value exceeds the threshold value for the delay time the alarm will be issued. If the current value falls below the threshold (minus the hysteresis) before the delay expires the delay will be restart.

EN Monitoring level {y} at
DE Überwachung Stufe{y} auf
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Monitoring limit {y} [y = 1/2] on **Overrun / Underrun**

Overrun..... So that the actual value is identified as reached it must have rised over the limit.
Underrun .... So that the actual value is identified as reached it must have fallen below the limit.

EN Alarm class level {y}
DE Alarmklasse Stufe {y}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog in.{x} [x = 1..2]: Alarm cl.. limit {y} [y = 1/2] **Class A/..B/..C/..D/..E/..F**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge level {y}
DE Selbstquittierend Stufe {y}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Self acknowledged limit {y} [y = 1/2] **YES / NO**

YES..... The control will automatically clear the alarm if it is no longer valid.
NO..... An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

EN Delayed by engine level {y}
DE Verzögert d. Motordr. St. {y}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Engine delayed monitoring {y} [y = 1/2] **YES / NO**

YES..... The alarm is engine delayed monitored. Therefore the conditions of the parameter "Engine delayed monitoring" on page 32 must be fulfilled.
NO..... The alarm is not engine delayed monitored. Alarms are directly analyzed.

Analog inputs: Wire break monitoring

EN Monit. wire break
DE Drahtbruchüberw.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Wire break monitoring **Off / High / Low / high/low**

The analog input can be monitored on wire break. For estimation the following arguments are used:

Off .....No wire break monitoring occurs.
High.....If the actual value rises over the maximum value, this is identified as wire break.
Low.....If the actual value falls below the minimum value, this is identified as wire break.
high/low .....If the actual value rises over the maximum value or falls below the minimum value, this is identified as wire break.

NOTE

If a measuring range overstepping (wire break) has been detected and if a tripping occurs the limit value monitoring of this analog input will be disabled.

Measuring range overstepping, tripping at:

- **4..20 mA**
  Minimum value ..... **2 mA** ..... **Undershooting**
  Maximum value ..... **20,5 mA** ..... **Overstepping**
- **0..500 Ohm**
  Minimum value ..... **5 Ohm** ..... **Undershooting (Offset = 0 Ohm)**
  Maximum value ..... **515 Ohm** ..... **Overstepping (Offset = 0 Ohm)**

Note: Depending on the parameter setting of the offset value the displayed value can be shifted. That means, that wire break can be recognized earlier or later than the effective value. (At a offset of +20 Ohm a wire break would not be recognized starting with 25 Ohm.)

EN Wire break alarm class
DE Drahtbruch Alarmklasse
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog in. {x} [x = 1..2]: Alarm cl. wire break monit. **Class A/..B/..C/..D/..E/..F/Control**

ⓘ See chapter "Alarm" on page 114.

The alarm class assigned to each limit alarm.

EN Self acknowledge wire break
DE Drahtbruch selbstquitt.
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Analog input {x} [x = 1..2]: Self acknowledged **YES / NO**

YES .....The control will automatically clear the alarm if it is no longer valid.
NO .....An automatically reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by setting the appropriate discrete input or via interface.

Analog inputs: Characteristics "Linear" (2 point scaling)

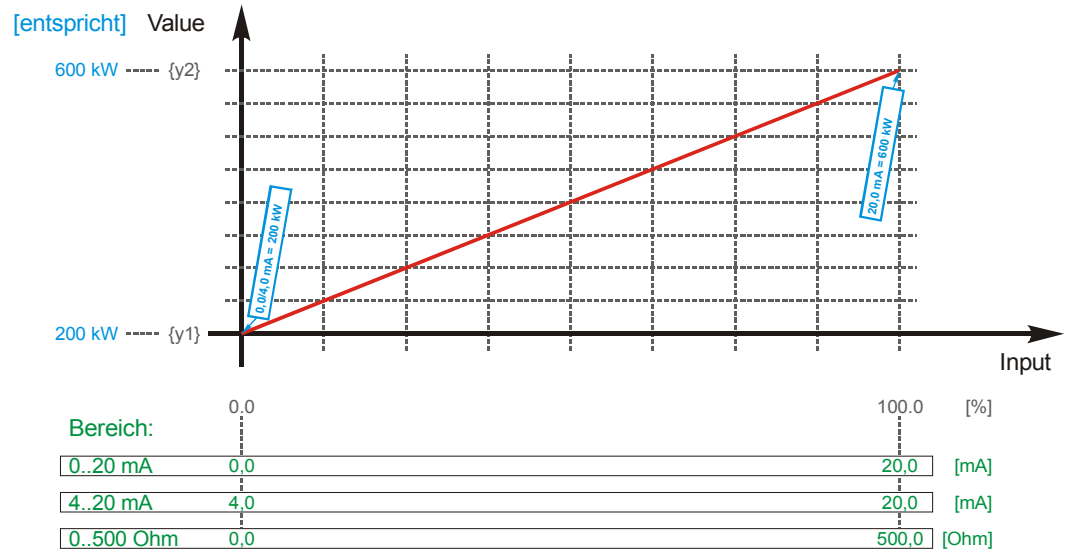


Figure 3-48: Analog input scaling – linear characteristics

EN Value at 0%
DE Wert bei 0%
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Scaling linear {x} [x = A/B]: Value at 0 % **-9,999..0..9,999**

The analog input is assigned to a curve. This parameter defines the actual value at 0 % of the total range of the analog input. For example, the input is set 0..20 mA, so 0 % = 0 mA. If 4..20 mA is selected, it applies 0 % = 4 mA.

EN Value at 100%
DE Wert bei 100%
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Scaling linear {x} [x = A/B]: Value at 100 % **-9,999..0..9,999**

The analog input is assigned to a curve. This parameter defines the actual value at 100 % of the total range of the analog input. For example, the input is set 0..20 mA, it applies 100 % = 20 mA.

Analog inputs: Characteristics "Table A" and "Table B" (9 point scaling)

The characteristics "Table A" and "Table B" (configurable free over 9 defined percentage points) are here once and independent from each other for all analog inputs, in which both tables are used, configured. Every one of the 9 percentual to the actual hardware value scaled and related values (0..500 %, 0..20 mA or 4..20 mA) is displayed with an independent actual display value (e. g. -100..0..+100 kW). The so developed characteristic can be used for visualization and monitoring via the configuration to "Table A" (for Table A) as well as "Table B" (for Table B)

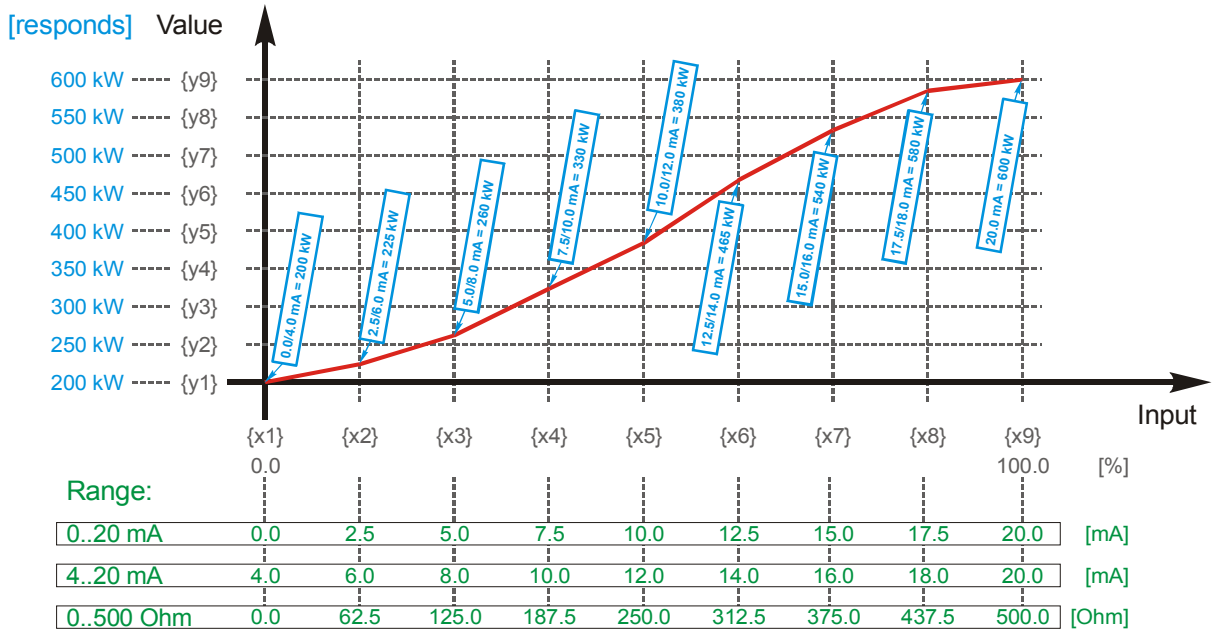


Figure 3-49: Analog input scaling – Table (Example)

NOTE

The X and Y coordinates of the dot pairs can be moved within the range of values (the dot pairs must not be equidistant).

It is to be made certain however that both the values of the X-coordinates, and the values of the Y-coordinates become, in itself constantly either more largely or smaller. In the following example a correct and wrong row is represented:

- **correct** X-coord. 0 % 10 % 20 % 40 % 50 % 60 % 80 % 90 % 100 %
  Y-coordinate -100 -95 -50 -10 +3 +17 +18 +100 +2.000
- **wrong** X-coord. 0 % 10 % 20 % 40 % 50 % 60 % 80 % 90 % 100 %
  Y-coordinate -100 -50 -95 +18 +17 +3 -10 +2.000 +100

EN X-value {a}
DE X-Wert {a}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Table {x} [x = A/B]: X-coordinate dot pair {a} [a = 1..9] **0..100 %**

The analog input is assigned to a curve. This parameter defines the actual value at {a} % of the total range of the analog input of the selected hardware. For example the input is set 0..20 mA, so 10 % = 2.0 mA. If 4..20 mA is selected, it applies 10 % = 5.6 mA.

EN Y-value {b}
DE Y-Wert {b}
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Table {x} [x = A/B]: Y-coordinate dot pair {b} [b = 1..9] **-9,999..0..9,999**

This parameter defines the Y-coordinate (the displayed and monitored value) at the defined X-coordinate.

Counters

Counters: Maintenance call

NOTE

The total time until the next maintenance is calculated out of days + hours from the next parameters when resetting the maintenance counter.

EN Maintenance hours
DE Wartungsintervall Stunden
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Counter. Maintenance interval 'Hours' **0..9,999 h**

ⓘ To switch-off the maintenance counter "hours" please configure "0".

This parameter defines the remaining hours until the next maintenance call occurs. Once the configured total time (calculated from days and hours) has been exceeded a message is displayed.

If the parameter "Reset maintenance call" is configured to "YES" (see below) the maintenance counter is reset to the configured value.

EN Maintenance days
DE Wartungsintervall Tage
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Counter. Maintenance interval 'Days' **0..999 days**

ⓘ To switch-off the maintenance counter "days" please configure "0".

This parameter defines the remaining days until the next maintenance call occurs. Once the configured total time (calculated from days and hours) has been exceeded a message is displayed.

If the parameter "Reset maintenance call" is configured to "YES" (see below) the maintenance counter is reset to the configured value.

EN Reset maintenance period h
DE Wartungsstunden rücksetzen
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Counter: Reset maintenance call counter 'Hours' **YES / NO**

If this parameter is configured to "YES" the maintenance counter 'Hours' is (re)set to the configured value. Once the counter has been (re)set this parameter will automatically be set to "NO".

EN Reset maint. period days
DE Wartungstage rücksetzen
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Counter: Reset maintenance call counter 'Days' **YES / NO**

If this parameter is configured to "YES" the maintenance counter 'Days' is (re)set to the configured value. Once the counter has been (re)set this parameter will automatically be set to "NO".

Counters: Running hours, kWh and kvarh

EN Counter value preset
DE Zähler-Setzwert

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Counter. Setpoint value for counters **0..99,999,999**

This value is taken into account to set the following counters
- running hours,
- kWh counter and
- kvarh counter.

If at the corresponding counter the value is configured to "YES" the current value of the counter is overwritten with this value.

EN Set operation hours
DE Betriebsstunden setzen

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Counter: Set running hours counter **YES / NO**

YES .....The current value of this counter is overwritten with the above specified "setpoint value for counters".
NO .....The value of this counter is not changed.

EN Set kWh
DE kWh setzen

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Counter: Set kWh counter **YES / NO**

YES .....The current value of this counter is overwritten with the above specified "setpoint value for counters".
NO .....The value of this counter is not changed.

EN Set kvarh
DE kvarh setzen

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Counter: Set kvarh counter **YES / NO**

YES .....The current value of this counter is overwritten with the above specified "setpoint value for counters".
NO .....The value of this counter is not changed.

Counters: Start counter

EN Number of starts
DE Anzahl Starts

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Counter. Start counter **0..65,535**

The start counter is set to this value (the current value is overwritten).

LogicsManager

LogicsManager: Limit switch

LogicsManager: Limit switch 'generator power'

It is possible to supervise the generator power on excess of two configurable values. Via the *LogicsManager* it is possible to evaluate the result of the limit value monitoring. It is thus possible with an external circuit to make a load disconnection.

NOTE

This function does not represent a generator protection. Nevertheless if a generator protection is to be accomplished, this is to be realized via an external circuit. With this function no output of a centralized alarm and also no message on the display take place.

EN Gen. load limit 1
DE Generatorlast St.1

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Limit monitoring: Generator power: Limit (Limit 1) **0.0..200.0 %**

ⓘ This value refers to the Rated active power (see page 15).

The percentage value, which is to be monitored, is set by this parameter. If this value is reached or exceeded, the internal flag is set to "TRUE".

EN Gen. load limit 2
DE Generatorlast St.2

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Limit monitoring: Generator power: Limit (Limit 2) **0.0..200.0 %**

ⓘ This value refers to the Rated active power (see page 15).

The percentage value, which is to be monitored, is set by this parameter. If this value is reached or exceeded, the internal flag is set to "TRUE".

EN Gen. load hysteresis
DE Generatorlast Hysterese

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Limit monitoring: Generator power: hysteresis (Limit 1/Limit 2) **0.0..100.0 %**

ⓘ This value refers to the Rated active power (see page 15).

If the response value is fallen below for the value of this hysteresis (this value applies to both limit values), the internal flag is set on "FALSE".

LogicsManager: Limit switch 'mains power' {2oc}

It is possible to supervise the mains power on excess of two configurable values. Via the *LogicsManager* it is possible to evaluate the result of the limit value monitoring. It is thus possible with an external circuit to make a load disconnection.

NOTE

This function does not represent a generator protection. Nevertheless if a generator protection is to be accomplished, this is to be realized via an external circuit. With this function no output of a centralized alarm and also no message on the display take place.

EN DE **Mains load limit 1** / **Netzlast St.1**

{0} {1o} {1oc} {2oc}
--- --- --- ✓

Limit monitoring: Mains power: limit value (Limit 1) **-999.9..0..+999.9 %**

ⓘ This value refers to the Rated active power (see page 15).

The percentage value, which is to be monitored, is set by this parameter. If this value is reached or exceeded, the internal flag is set to "TRUE".

EN DE **Mains load limit 2** / **Netzlast St.2**

{0} {1o} {1oc} {2oc}
--- --- --- ✓

Limit monitoring: Mains power: limit value (Limit 2) **-999.9..0..+999.9 %**

ⓘ This value refers to the Rated active power (see page 15).

The percentage value, which is to be monitored, is set by this parameter. If this value is reached or exceeded, the internal flag is set to "TRUE".

EN DE **Mains load hysteresis** / **Netzlast Hysterese**

{0} {1o} {1oc} {2oc}
--- --- --- ✓

Limit monitoring: Mains power: hysteresis (Limit 1/Limit 2) **0.0..100.0 %**

ⓘ This value refers to the Rated active power (see page 15).

If the response value is fallen below for the value of this hysteresis (this value applies to both limit values), the internal flag is set on "FALSE".

LogicsManager: Flags

Within the *LogicsManager* flags can be programmed and used (for conditions and explanation of programming please note page 21 in chapter "Application: Start in operating mode AUTOMATIC (LogicsManager)").

LogicsManager: Timer

LogicsManager: Daily switch point

The two daily switching points are activated each day to the indicated time. Using the *LogicsManager* the two points can be combined to a range.

EN Setpoint {x}: Hour
DE Setpoint {x}: Stunde

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Daily switch point {x} [x = 1/2]: hour **0..23 h**

Enter the hour of the daily switch point here. Example:
0..... 0th hour of the day.
23..... 23rd hour of the day.

EN Setpoint {x}: Minute
DE Setpoint {x}: Minute

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Daily switch point {x} [x = 1/2]: minute **0..59 min**

Enter the minute of the daily switch point here. Example:
0..... 0th minute of the hour.
59..... 59th minute of the hour.

EN Setpoint {x}: Second
DE Setpoint {x}: Sekunde

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Daily switch point {x} [x = 1/2]: second **0..59 s**

Enter the second of the daily switch point here. Example
0..... 0th second of the minute.
59..... 59th second of the minute.

LogicsManager: Monthly switch point

The monthly switching point is activated only to a completely determined (indicated) day to a completely determined time. This can be evaluated via the *LogicsManager*.

EN Active day
DE Aktiver Tag

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Monthly switch point: day **1..31**

Enter the day of the monthly switch point here. Example:
01..... 1st day of the month.
31..... 31st day of the month.

EN Active hour
DE Aktive Stunde

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Monthly switch point: hour **0..23 h**

Enter the hour of the monthly switch point here. Example:
0..... 0th hour of the day.
23..... 23rd hour if the day.

EN Active minute
DE Aktive Minute

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Monthly switch point: minute **0..59 min**

Enter the minute of the monthly switch point here. Example:
0..... 0th minute of the hour.
59..... 59th minute of the hour.

EN Active second
DE Aktive Sekunde

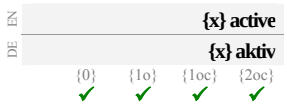
{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Timer: Monthly switch point: second **0..59 s**

Enter the second of the monthly switch point here. Example:
0..... 0th second of the minute.
59..... 59th second the minute.

LogicsManager: Weekly switch point

The weekly switching points are only on completely determined (indicated) days activated. These can be evaluated via the *LogicsManager*. The switching point is active during the indicated day from 0:00:00 o'clock to 23:59:59 o'clock.



Timer: Weekly switch points {x} [x = Mo..Su]: days **YES / NO**

Please enter the days of the weekly workdays. Example:

Monday..... ***YES*** - The switch point is every Monday enabled.
NO - The switch point is Mondays disabled

Tuesday..... ***YES*** - The switch point is every Tuesday enabled.
NO - The switch point is Tuesdays disabled

Wednesday ..... ***YES*** - The switch point is every Wednesday enabled.
NO - The switch point is Wednesdays disabled

Thursday ..... ***YES*** - The switch point is every Thursday enabled.
NO - The switch point is Thursdays disabled

Friday..... ***YES*** - The switch point is every Friday enabled.
NO - The switch point is Fridays disabled

Saturday ..... ***YES*** - The switch point is every Saturday enabled.
NO - The switch point is Saturdays disabled

Sunday ..... ***YES*** - The switch point is every Sunday enabled.
NO - The switch point is Sundays disabled.

Interfaces

EN Device number
DE Gerätenummer

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Interfaces: Serial number **1..32**

So that this control unit can be definitely identified on the CAN bus, the serial number must be set in this parameter. It may be present only once in the whole bus system. On basis of this serial number all further addresses are calculated.

Interfaces: CAN bus (*FlexCAN*)

NOTE

For the description of the CANopen parameters please refer to Manual 37262.

EN Protocol
DE Protokoll

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

CAN bus: Protocol **OFF / CANopen / LeoPC**

The CAN bus of this unit can be operated optionally with different protocols and Baud rates. This parameter defines the used protocol. Please note, that all participants on the CAN bus must use the same protocol.

OFF..... The CAN bus is disconnected. Values are neither received nor send.
CANopen..... The CANopen protocol is used. More information can be found on page **Fehler! Textmarke nicht definiert.**.
LeoPC..... The CAN CAL protocol is used. More information can be found on page **Fehler! Textmarke nicht definiert.**.

EN Baudrate
DE Baudrate

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

CAN bus: Baud rate **20 / 50 / 100 / 125 / 250 / 500 / 800 / 1,000 kBaud**

The CAN bus of this unit can be operated optionally with different protocols and Baud rates. This parameter defines the used Baud rate. Please note, that all participants on the CAN bus must use the same Baud rate.

Interfaces: Service interface

EN Baudrate
DE Baudrate

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Service interf.: Baud rate **9,600 Baud / 14.4 / 19.2 / 38.4 / 65 / 150 kBaud**

ⓘ Please use always the DPC for connecting of the unit from the service interface to a PC or to another participant.

The service interface of this unit is led out over a RJ45-plug at the side of the housing. This parameter defines the used Baud rate. Please note, that all participants on the service interface must use the same Baud rate.

EN Parity
DE Parity

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Service interf.: Parity **no / even / odd**

The used parity of the service interface is set here.

EN Stop bits
DE Stop Bits

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Service interf.: Stop bits **one / two**

The number of stop bits is set here.

EN File over DirPara
DE Datei über DirPara

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Service interf.: Upload file for configuration via DPC **YES / NO**

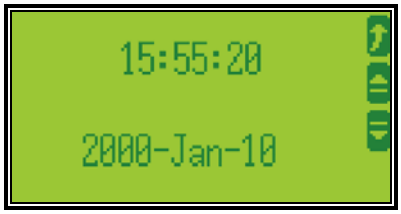
To configure the unit via a PC the configuration cable (DPC), which has to be connected to the service interface, the PC program LeoPC as well as the corresponding files for the PC program have to be used. These files can be downloaded from the homepage (http://www.woodward.com) using the item number (P/N), the revision as well as the serial number (S/N) of the unit. It is also possible to directly download the files from the unit. If you want to download the files directly from the unit, a connection is to be established between the PC program and the unit via the DPC. This parameter has thereby the following meaning:

ON .....The configuration file (.asm) is downloaded from the unit to the PC.
OFF .....A download does not occur.

Description:
Upload = actions from the PC to the unit.
Download = actions from the unit to the PC.

System

System: Real-time clock



This screen shows the current date and time. The clock is implemented as real time clock. In case of a voltage supply failure an internal battery guarantees that the information is not lost. The data stand for:

XX:YY:ZZ..... hour:minute:second.
AAAA-BBB-CC..... Year-month-day.

System: Adjust clock

EN Hour
DE Stunden

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Adjust clock: hour **0..23 h**

The current hour of the clock time is set here. Example:
0..... 0th hour of the day.
23..... 23th hour of the day.

EN Minute
DE Minuten

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Adjust clock: minute **0..59 min**

The current minute of the clock time is set here. Example:
0..... 0th minute of the hour.
59..... 59th minute of the hour.

EN Second
DE Sekunden

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Adjust clock: second **0..59 s**

The current second of the clock time is set here. Example:
0..... 0th second of the minute.
59..... 59th second of the minute.

System: Adjust date

EN Day
DE Tag

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Adjust clock: day **1..31**

The current day of the date is set here. Example:
1..... 1st day of the month.
31..... 31st day of the month.

EN Month
DE Monat

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Adjust clock: month **1..12**

The current month of the date is set here. Example:
1..... 1st month of the year.
12..... 12th month of the year.

EN Year
DE Jahr

{0}	{1o}	{1oc}	{2oc}
✓	✓	✓	✓

Adjust clock: year **0..99**

The current year of the date is set here. Example:
0..... Year 2000.
99..... Year 2099.

System: Password system

EN Code leve CAN port
DE Codeebene CAN Schnittstelle
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Password system: Code level via CAN-Bus **Info**

This value displays the code level which is currently selected for the access via the CAN bus.

EN Code level serial port/DPC
DE Codeebene RS232/DPC
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Password system: Code level via serial RS232 (DPC) interface **Info**

This value displays the code level which is currently selected for the access via the serial RS232 (DPC) interface.

NOTE

The following passwords are valid simultaneously for all access possibilities (via the LCD, via the serial SR232 (DPC) interface and via the CAN bus). Every access possibility has its own bolt for which the different passwords are to be used.

EN Commissioning level code
DE Code Inbetriebnahme Ebene
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Password system: Password "Commissioner" **0..9.999**

Configuration of the password for the code level "Commissioner".

EN Temp. commis. level code
DE Code temp. Inbetriebn. Ebene
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Password system: Password "Temporary Commissioner" **0..9.999**

Configuration of the password for the code level "Temporary Commissioner".

EN Basic level code
DE Code Serviceebene
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

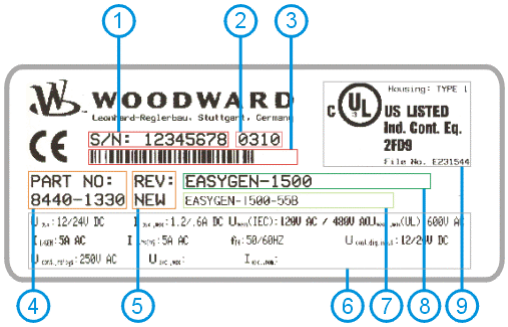
Password system: Password "Service Level" **0..9.999**

Configuration of the password for the code level "Service".

System: Versions

The values of this chapter are read-only.

The available equipment can be identified on the basis its numbers, which are deposited partly in the software. In addition a name/type plate on the equipment, which contains additionally the most important (technical) data (technical data can be found in the manual 37203).



1	S/N	serial number (numeric)
2	S/N	manufactured date (YYMM)
3	S/N	serial number (as Barcode)
4	P/N	item number
5	REV	item number revision
6	Details	technical data
7	Type	description (long)
8	Type	Description (short)
9	UL	UL sign

EN **Serial number**
DE **Seriennummer**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Serial number (S/N) **info**

The serial number (S/N) is used to identify a control clearly. The number can be found on the name plate (#**1** & #**3**).

EN **Boot item number**
DE **Boot Artikelnummer**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Item number of the firmware (P/N) **info**

This number (P/N) represents the firmware software of the unit.

EN **Boot revision**
DE **Boot Revision**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Revision of the item number of the firmware (REV) **info**

This number (REV) represents the revision of the firmware software of the unit.

EN **Boot version**
DE **Boot Version**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Version of the firmware **info**

This number (Vx.xxxx) represents the software version oft the firmware software of the unit.

EN **Program item number**
DE **Programm Artikelnummer**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Item number of the application software (P/N) **info**

This number (P/N) represents the application software of the unit.

EN **Program revision**
DE **Programm Revision**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Revision of the item number of the software (REV) **info**

This number (REV) represents the revision of the application software of the unit.

EN **Program version**
DE **Programm Version**
{0} {1o} {1oc} {2oc}
✓ ✓ ✓ ✓

Version: Version of the application software **info**

This number (Vx.xxxx) represents the software version of the application software of this unit.

Appendix A.
Common

Alarm Classes

The control functions are structured in the following alarm classes:

Alarm class	Visible in the display	LED "Alarm" & horn	Relay "Command: open GCB"	Shut-down engine	Engine blocked until ack. sequence has been passed
A	**yes**	---	---	---	---
	Warning Alarm This alarm does not interrupt the operation. An output without centralized alarm occurs: ⇨ Alarm text.				
B	**yes**	**yes**	---	---	---
	Warning Alarm This alarm does not interrupt the operation. An output of the centralized alarm occurs: ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn).				
C	**yes**	**yes**	**following power reduction** not available in the easYgen-1000	**after cooling phase**	**yes**
	Responding Alarm With this alarm the GCB is opened and the engine is stopped. Coasting occurs. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn) + Coasting + GCB open + Engine stop.				
D	**yes**	**yes**	**immediately**	**after cooling phase**	**yes**
	Responding Alarm With this alarm the GCB is opened and the engine is stopped. Coasting occurs. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn) + Coasting + GCB open + Engine stop.				
E	**yes**	**yes**	**following power reduction** not available in the easYgen-1000	**immediately**	**yes**
	Responding Alarm With this alarm the GCB is opened immediately and the engine is stopped. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn)+ GCB open + Engine stop.				
F	**yes**	**yes**	**immediately**	**immediately**	**yes**
	Responding Alarm With this alarm the GCB is opened immediately and the engine is stopped. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn)+ GCB open + Engine stop.				

Conversion Factors

Conversion factors: Temperature

°C ⇨ °F	°F ⇨ °C
$1\ °F = \left([\text{Value}\ °C \times 1.8\ °F/°C\right) + 32\ °F$	$1\ °C = \frac{\left([\text{Value}]\ °F - 32\ °F\right)}{1.8\ °F/°C}$

Conversion factors: Pressure

bar ⇨ psi	psi ⇨ bar
$1\ \text{psi} = [\text{Value}]\ \text{bar} \times 14.501$	$1\ \text{bar} = \frac{[\text{Value}]\ \text{psi}}{14.501}$

Appendix B.
LogicsManager

The *LogicsManager* is used to customize the sequence of events in the control such as the start command of the engine or to open and close the relay outputs of the control. For example, the start routine can be programmed so that it would require the closing of a discrete input or a preset time of day. Depending on the application mode of the unit, the number of available relays that can be programmed with the *LogicsManager* will vary. Two independent time delays are provided for this action to take place and be reset. The following table shows the function of each relay in each of the application modes.

Starting the engine can be carried out externally via a discrete input. With it the *LogicsManager* is used whose conditions and programming is defined as follows:

Relay Number	Term.	Application mode: Basic {0}	GCB open {1o}	GCB open/close {1oc}	GCB/MCB open/close {2oc}
Internal relay outputs					
[R1]	30/35	*LogicsManager*			
[R2]	31/35	*LogicsManager*			
[R3]	32/35	Crank			
[R4]	33/35	Diesel: Fuel solenoid Gas: Gas valve			
[R5]	34/35	*LogicsManager*; pre-assigned with 'Pre-glow'			
[R6]	36/37	*LogicsManager*; pre-assigned with 'Auxiliary services'			
[R7]	38/39	*LogicsManager*	Command: open GCB		
[R8]	40/41	*LogicsManager*			Command: close MCB
[R9]	42/43	*LogicsManager*			Command: open MCB
[R10]	44/45	*LogicsManager*		Command: close GCB	
[R11]	46/47	Readiness for operation			
External relay output (via CANopen; not included in easYgen delivery; can be e.g. IKD1, Phoenix ???????????????)					
[RExt01]	---	*LogicsManager*			
[RExt02]	---	*LogicsManager*			
[RExt03]	---	*LogicsManager*			
[RExt04]	---	*LogicsManager*			
[RExt05]	---	*LogicsManager*			
[RExt06]	---	*LogicsManager*			
[RExt07]	---	*LogicsManager*			
[RExt08]	---	*LogicsManager*			
[RExt09]	---	*LogicsManager*			
[RExt10]	---	*LogicsManager*			
[RExt11]	---	*LogicsManager*			
[RExt12]	---	*LogicsManager*			
[RExt13]	---	*LogicsManager*			
[RExt14]	---	*LogicsManager*			
[RExt15]	---	*LogicsManager*			
[RExt16]	---	*LogicsManager*			

Table 3-50: Relay outputs - Assignment

Structure and description of the *LogicsManager*

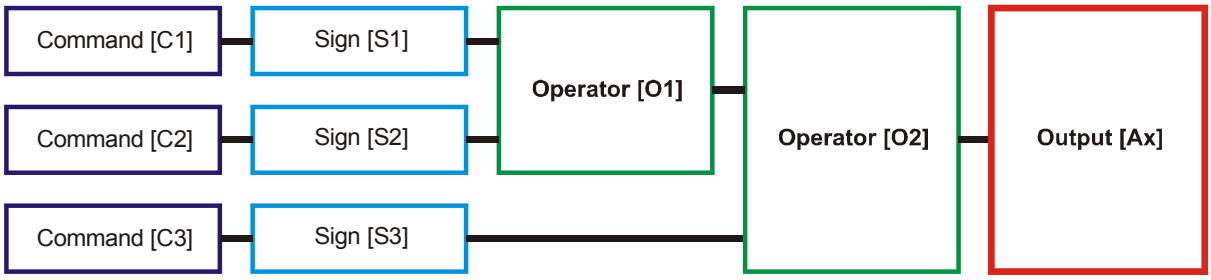


Figure 3-51: *LogicsManager* – Function overview

- **Command** - A list of over 100 parameters is provided for the command inputs. For example, engine running, control in AUTOMATIC mode, and overfrequency alarm. These are the variables that will be used to control the output function or relay.
- **Sign** - The sign field can be used to invert the state of the command or to fix its output if the command is not needed. So setting the sign to the NOT state would be the opposite of the command variable.
- **Operator** - A logical device such as AND or OR.
- **Output** - A control sequence such as engine start or a relay output.

[Cx] – Command {x}	[Sx] - Sign {x}	[Ox] - Operator {x}	[Ax] - Output {x}
The description and the tables of all values, flags, and internal functions that are able to combine via the *LogicsManager* can be found on page 116.	**Value {[Cx]}** The value [Cx] is passed 1:1. **NOT VALUE {[Cx]}** The opposite of the value [Cx] is passed. **0 [always "0"]** The value [Cx] is ignored and this logic path will always be FALSE. **1 [always "1"]** The value [Cx] is ignored and this logic path will always be TRUE.	**AND** Logic AND **NAND** Logic negated AND **OR** Logic OR **NOR** Logic negated OR **XOR** Exclusive OR **NXOR** Exclusive negated OR	The description and the tables of all outputs, flags, and functions that are able to combine via the *LogicsManager* can be found on page 116.

Table 3-52: *LogicsManager* – Command overview

Configuration of the chain of commands

Using the values specified in the above table the chain of commands of the *LogicsManager* (for example: operating the relays, setting the flags, specification of the automatic functions) is configured as follows:

[Ax] = (([C1] & [S1]) & [O1] & ([C2] & [S2])) & [O2] & ([C3] & [S3])

Programming example for the *LogicsManager*:
Relay [R1] shall pick up, whenever "Discrete input [D2]" is closed "AND" the control does "NOT" have a fault that is "Alarm class C" "OR" "Alarm class D" ⇨

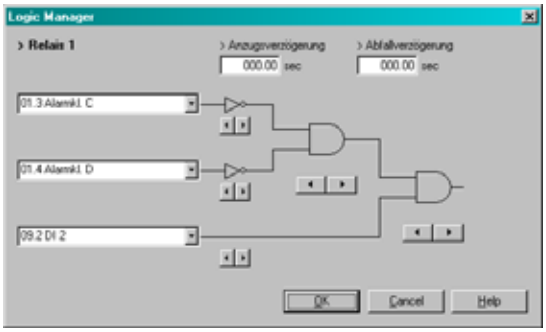


Figure 3-53: *LogicsManager* – display in LeoPC

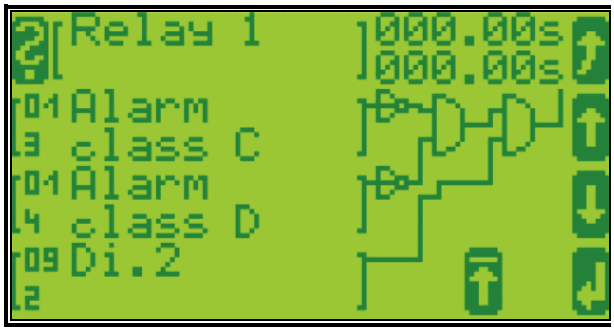
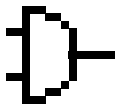
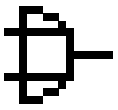
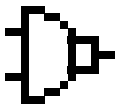
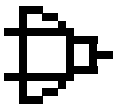
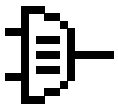
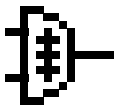
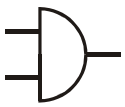
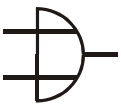
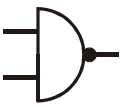
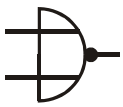
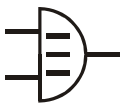
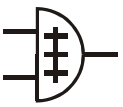
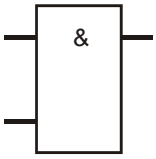
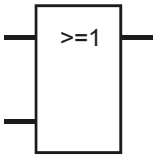
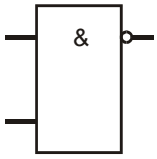
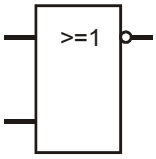
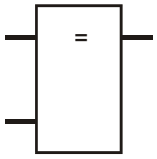
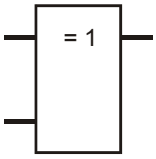


Figure 3-54: *LogicsManager* – display in LCD

Logical Symbols

The following symbols are used for the graphical programming of the *LogicsManager*.

	AND			OR			NAND			NOR			NXOR			XOR		
easYgen																		
DIN 40 700																		
ASA US MIL																		
IEC617-12																		
Truth table	x1	x2	y	x1	x2	y	x1	x2	y	x1	x2	y	x1	x2	y	x1	x2	y
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
	0	1	0	0	1	1	0	1	1	0	1	0	0	1	0	0	1	1
	1	0	0	1	0	1	1	0	1	1	0	0	1	0	0	1	0	1
	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0

Logical Combinations

The combinations or outputs can be grouped into three categories:

- Internal functions,
- internal logical flags and
- relay outputs.

Logical combinations: Internal functions

The following logical functions can be used to activate/deactivate a functions.

Name	Function	Number
Remote start	Start in operating mode AUTOMATIC	00.09
Remote stop	Stop in operating mode AUTOMATIC	00.10
Block emergency power	Blocking or interruption of an emergency power operating in operating mode AUTOMATIC	00.11
Close GCB immediately	Immediately closing of the GCB after engine start without waiting for the engine delayed monitoring and generator stable timers	00.12
Critical operation	Activation of a Critical operation mode where most alarms are overwritten (functional description on page 10)	00.13
Idle mode	Activation of an idle mode (see page 41).	00.14

Logical combinations: Internal flags

8 internal logical flags can be programmed to activate/deactivate functions. In this way more than 3 commands can be included for the logical operation.

Name	Function	Number
Flag 1	Internal flag 1	00.01
Flag 2	Internal flag 2	00.02
Flag 3	Internal flag 3	00.03
Flag 4	Internal flag 4	00.04
Flag 5	Internal flag 5	00.05
Flag 6	Internal flag 6	00.06
Flag 7	Internal flag 7	00.07
Flag 8	Internal flag 8	00.08

Logical combinations: Relay outputs

All relays can be controlled directly depending on the respective application mode with the *LogicsManager*.

Logical Command Variables

The logical command variables are grouped into twelve categories:

- [00.00] Internal flags,
- [01.00] Alarm classes,
- [02.00] System status,
- [03.00] Engine control,
- [04.00] Operating status,
- [05.00] Alarms of the engine,
- [06.00] Alarms of the generator,
- [07.00] Alarms of the mains,
- [08.00] Alarms of the system,
- [09.00] Discrete inputs,
- [10.00] Analog inputs and
- [11.00] Time functions.

Logical command variables: [00.00] - internal flags

Number	Function	Note
00.01	Internal flag 1	Internal calculation; description page 119
00.02	Internal flag 2	Internal calculation; description page 119
00.03	Internal flag 3	Internal calculation; description page 119
00.04	Internal flag 4	Internal calculation; description page 119
00.05	Internal flag 5	Internal calculation; description page 119
00.06	Internal flag 6	Internal calculation; description page 119
00.07	Internal flag 7	Internal calculation; description page 119
00.08	Internal flag 8	Internal calculation; description page 119
00.09	Start in operating mode AUTOMATIC	Internal calculation; description page 119
00.10	Stop in operating mode AUTOMATIC	Internal calculation; description page 119
00.11	Blocking or interruption of an emergency power operating in operating mode AUTOMATIC	Internal calculation; description page 119
00.12	Immediately closing of the GCB without waiting for the engine delayed monitoring	Internal calculation; description page 119
00.13	Activation of the Critical operation	Internal calculation; description page 21
00.14	Idle mode (blocks alarm for undervoltage, underfrequency, and underspeed)	
00.15	-free-	
00.16	-free-	
00.17	-free-	
00.18	-free-	
00.19	-free-	
00.20	-free-	

Logical command variables: [01.00] - alarm classes

Number	Function	Note
01.01	Alarm class A	Description see page 114 TRUE as long as this alarm class is active
01.02	Alarm class B	Description see page 114 TRUE as long as this alarm class is active
01.03	Alarm class C	Description see page 114 TRUE as long as this alarm class is active
01.04	Alarm class D	Description see page 114 TRUE as long as this alarm class is active
01.05	Alarm class E	Description see page 114 TRUE as long as this alarm class is active
01.06	Alarm class F	Description see page 114 TRUE as long as this alarm class is active
01.07	All alarm classes	Description see page 114 TRUE as long as at least one of the alarm classes A/B/C/D/E/F is active
01.08	Warning alarms	Description see page 114 TRUE as long as at least one of the alarm classes A/B is active
01.09	Engine stop failure active	TRUE as long as one of alarm classes C / D / E / F is active
01.10	Horn continuously	Description see page 114 TRUE as long as at least one of the alarm classes B/C/D/E/F is active

Logical command variables: [02.00] - system status

Number	Function	Note
02.01	Ignition speed reached (via Pickup/gen.frequency/DI)	TRUE as long as the ignition speed [ZD] has been reached (either via the generator frequency, via the engine speed (pickup) or via the discrete input "ignition speed reached")
02.02	Speed recognized (via Pickup/gen.frequency/DI)	TRUE as long as a speed is measured (this can be lower that the ignition speed [ZD])
02.03	Generator voltage within default range	TRUE as long as the generator voltage is within the limits for black start
02.04	Generator frequency within default range	TRUE as long as the generator frequency is within the limits for black start
02.05	Generator voltage/frequency within default range	TRUE as long as the generator voltage and frequency are within the limits for black start
02.06	-Internal-	
02.07	-Internal-	
02.08	-Internal-	
02.09	Mains voltage within default range	TRUE as long as the mains voltage is not within the limits for an emergency power
02.10	Mains frequency within default range	TRUE as long as the mains frequency is not within the limits for an emergency power
02.11	Mains voltage/frequency within default range	TRUE as long as the mains voltage and frequency are not within the limits for an emergency power
02.12	Generator voltage: rotating direction CW	
02.13	Generator voltage: rotating direction CCW	
02.14	Mains voltage: rotating direction CW	
02.15	Mains voltage: rotating direction CCW	
02.16	-free-	
02.17	-free-	
02.18	-free-	
02.19	-free-	
02.20	-free-	

Logical command variables: [03.00] - engine control

Number	Function	Note
03.01	Readiness for operation	
03.02	Starter	
03.03	Start/stop (Diesel) Gas valve (Gas)	
03.04	Pre-glow (Diesel) Ignition ON (Gas)	
03.05	Horn active	
03.06	Enable engine	TRUE from "aux. operations" = ON" FALSE if fuel relay drops out
03.07	Engine monitoring active (engine delayed monitoring expired)	TRUE from expire of the time "delayed engine monitoring" until the fuel relay drops out
03.08	Breaker delay expired (engine delayed monitoring expired)	TRUE from expire of the time breaker delay" until the fuel relay drops out
03.09	Generator power limit 1 reached	TRUE = limit value exceeded
03.10	Generator power limit 2 reached	TRUE = limit value exceeded
03.11	Mains power limit 1 reached	TRUE = limit value exceeded
03.12	Mains power limit 2 reached	TRUE = limit value exceeded
03.13	-free-	
03.14	-free-	
03.15	-free-	
03.16	-free-	
03.17	-free-	
03.18	-free-	
03.19	-free-	
03.20	-free-	

Logical command variables: [04.00] - operating status

Number	Function	Note
04.01	Operating mode AUTOMATIC active	
04.02	Operating mode STOP active	
04.03	Operating mode MANUAL active	
04.04	-Internal-	
04.05	Push button "Acknowledge" has been pressed or external acknowledgment via *LogicsManager*	Note: this condition is for approx. 40 ms TRUE and has to be extended using a delay time
04.06	GCB is closed ("Reply: GCB is closed" = 0)	
04.07	MCB is closed ("Reply: MCB is closed" = 0)	
04.08	Enable MCB	
04.09	Emergency power operation active	TRUE with expire of the emergency power delay; FALSE with expire of the mains setting time
04.10	Engine cool-down cycle active	
04.11	Mains setting time active	
04.12	-free-	
04.13	-free-	
04.14	-free-	
04.15	-free-	
04.16	-free-	
04.17	-free-	
04.18	-free-	
04.19	-free-	
04.20	-free-	

Logical command variables: [05.00] - alarms of the engine

Number	Function	Note
05.01	Engine overspeed limit 1	TRUE = limit value reached FALSE = alarm acknowledged
05.02	Engine overspeed limit 2	
05.03	Engine underspeed limit 1	
05.04	Engine underspeed limit 2	
05.05	Unintended stop	
05.06	Shut-down failure	
05.07	Speed/Frequency mismatch (speed detection)	
05.08	Start failure	
05.09	Maintenance call "days" expired	
05.10	Maintenance call "hours" expired	
05.11	-free-	
05.12	-free-	
05.13	-free-	
05.14	-free-	
05.15	-free-	
05.16	-free-	
05.17	-free-	
05.18	-free-	
05.19	-free-	
05.20	-free-	

Logical command variables: [06.00] - alarms of the generator

Number	Function	Note
06.01	Generator overfrequency limit 1	TRUE = limit value reached FALSE = alarm acknowledged
06.02	Generator overfrequency limit 2	
06.03	Generator underfrequency limit 1	
06.04	Generator underfrequency limit 2	
06.05	Generator overvoltage limit 1	
06.06	Generator overvoltage limit 2	
06.07	Generator undervoltage limit 1	
06.08	Generator undervoltage limit 2	
06.09	Generator dependent time-overcurrent limit 1	
06.10	Generator dependent time-overcurrent limit 2	
06.11	Generator dependent time-overcurrent limit 3	
06.12	Generator reverse/reduced power limit 1	
06.13	Generator reverse/reduced power limit 2	
06.14	Generator overload limit 1	
06.15	Generator overload limit 2	
06.16	Generator load imbalance limit 1	
06.17	Generator load imbalance limit 2	
06.18	Generator voltage asymmetry	
06.19	Ground current limit 1	
06.20	Ground current limit 2	
06.21	Generator phase incorrectly wired (rotation field alarm)	
06.22	Generator inverse time-overcurrent	
06.23	-free-	
06.24	-free-	
06.25	-free-	
06.26	-free-	
06.27	-free-	
06.28	-free-	
06.29	-free-	
06.30	-free-	
06.31	-free-	
06.32	-free-	
06.33	-free-	
06.34	-free-	
06.35	-free-	
06.36	-free-	
06.37	-free-	
06.38	-free-	
06.39	-free-	
06.40	-free-	

Logical command variables: [07.00] - alarms of the mains

Number	Function	Note
07.01	Mains overfrequency (for emergency power recognition)	TRUE = limit value reached FALSE = alarm acknowledged
07.02	Mains underfrequency (for emergency power recognition)	
07.03	Mains overvoltage (for emergency power recognition)	
07.04	Mains undervoltage (for emergency power recognition)	
07.05	Mains phase incorrectly wired (rotation field alarm)	
07.06	-free-	
07.07	-free-	
07.08	-free-	
07.09	-free-	
07.10	-free-	
07.11	-free-	
07.12	-free-	
07.13	-free-	
07.14	-free-	
07.15	-free-	
07.16	-free-	
07.17	-free-	
07.18	-free-	
07.19	-free-	
07.20	-free-	
07.21	-free-	
07.22	-free-	
07.23	-free-	
07.24	-free-	
07.25	-free-	
07.26	-free-	
07.27	-free-	
07.28	-free-	
07.29	-free-	
07.30	-free-	

Logical command variables: [08.00] - alarms of the system

Number	Function	Note
08.01	Battery overvoltage limit 1	TRUE = limit value reached FALSE = alarm acknowledged
08.02	Battery overvoltage limit 2	
08.03	Battery undervoltage limit 1	
08.04	Battery undervoltage limit 2	
08.05	GCB not successfully closed	
08.06	GCB not successfully opened	
08.07	MCB not successfully closed	
08.08	MCB not successfully opened	
08.09	-free-	
08.10	-free-	
08.11	-free-	
08.12	-free-	
08.13	-free-	
08.14	-free-	
08.15	-free-	
08.16	-free-	
08.17	-free-	
08.18	-free-	
08.19	-free-	
08.20	-free-	

Logical command variables: [09.00] - internal discrete inputs

Number	Function	Note
09.01	Discrete input [D1]	TRUE = logical "1" (delay times and NO/NC parameters are ignored)
09.02	Discrete input [D2]	
09.03	Discrete input [D3]	
09.04	Discrete input [D4]	
09.05	Discrete input [D5]	
09.06	Discrete input [D6]	
09.07	Discrete input [D7]	
09.08	Discrete input [D8]	
09.09	-free-	
09.10	-free-	
09.11	-free-	
09.12	-free-	
09.13	-free-	
09.14	-free-	
09.15	-free-	
09.16	-free-	
09.17	-free-	
09.18	-free-	
09.19	-free-	
09.20	-free-	

Logical command variables: [10.00] - analog inputs

Number	Function	Note
10.01	Analog input [A1] limit 1	TRUE = limit value reached
10.02	Analog input [A1] limit 2	
10.03	Analog input [A1] out of range	
10.04	Analog input [A2] limit 1	
10.05	Analog input [A2] limit 2	
10.06	Analog input [A2] out of range	
10.07	-free-	
10.08	-free-	
10.09	-free-	
10.10	-free-	
10.11	-free-	
10.12	-free-	
10.13	-free-	
10.14	-free-	
10.15	-free-	
10.16	-free-	
10.17	-free-	
10.18	-free-	
10.19	-free-	
10.20	-free-	

Logical command variables: [11.00] - time functions

Number	Function	Note
11.01	Time [Z1] exceeded	
11.02	Time [Z2] exceeded	
11.03	Weekday equal to setting	
11.04	Day of the month equal to setting	
11.05	Hour equal to setting	
11.06	Minute equal to setting	
11.07	Second equal to setting	
11.08	Running hours exceeded by 1 hour	Status changes every operating hour
11.09	Running hours exceeded by 10 hour	Status changes every 10 operating hours
11.10	Running hours exceeded by 100 hour	Status changes every 100 operating hours
11.11	-free-	
11.12	-free-	
11.13	-free-	
11.14	-free-	
11.15	-free-	
11.16	-free-	
11.17	-free-	
11.18	-free-	
11.19	-free-	
11.20	-free-	

Logical command variables: [12.00] - external discrete inputs

Number	Function	Note
12.01	Discrete input [D.E01]	TRUE = logical "1" (delay times and NO/NC parameters are ignored)
12.02	Discrete input [D.E02]	
12.03	Discrete input [D.E03]	
12.04	Discrete input [D.E04]	
12.05	Discrete input [D.E05]	
12.06	Discrete input [D.E06]	
12.07	Discrete input [D.E07]	
12.08	Discrete input [D.E08]	
12.09	Discrete input [D.E09]	
12.10	Discrete input [D.E10]	
12.11	Discrete input [D.E11]	
12.12	Discrete input [D.E12]	
12.13	Discrete input [D.E13]	
12.14	Discrete input [D.E14]	
12.15	Discrete input [D.E15]	
12.16	Discrete input [D.E16]	
12.17	-free-	
12.18	-free-	
12.19	-free-	
12.20	-free-	

Logical command variables: [13.00] - status of the internal relay outputs

Number	Function	Note
13.01	Relay output [R01]	TRUE = logical "1" (this condition replys the logical status of the internal relays)
13.02	Relay output [R02]	
13.03	Relay output [R03]	
13.04	Relay output [R04]	
13.05	Relay output [R05]	
13.06	Relay output [R06]	
13.07	Relay output [R07]	
13.08	Relay output [R08]	
13.09	Relay output [R09]	
13.10	Relay output [R10]	
13.11	Relay output [R11]	
13.12	-free-	
13.13	-free-	
13.14	-free-	
13.15	-free-	
13.16	-free-	
13.17	-free-	
13.18	-free-	
13.19	-free-	
13.20	-free-	

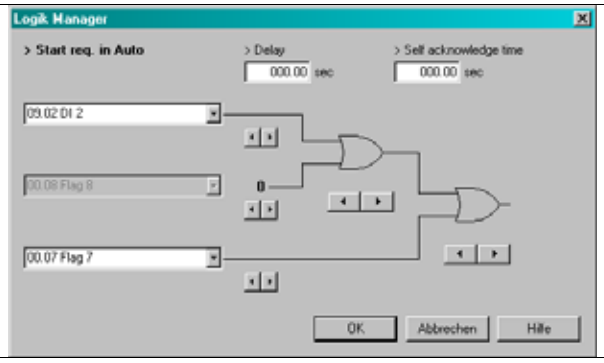
Factory Setting

The inputs, outputs and internal flags, which can be programmed via the *LogicsManager* have the following factory settings when delivered:

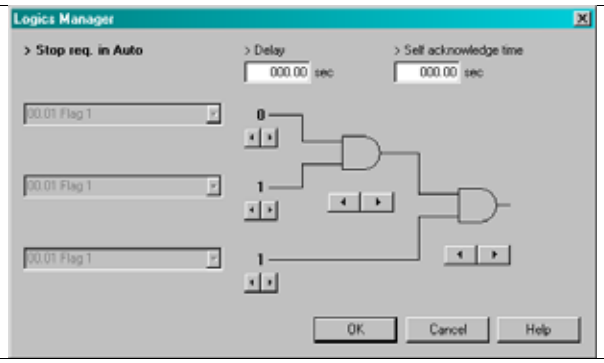
simple (function)	extended (configuration)	result

Factory setting: Functions

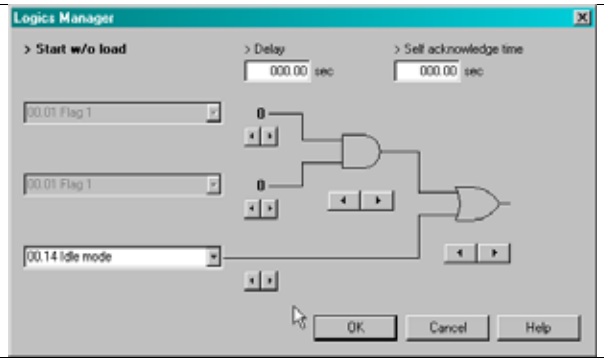
Start request

{0}	✓	If TRUE the engine is started in operating mode AUTOMATIC		dependent on discrete input [D2] and flag [00.07]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

Stop request

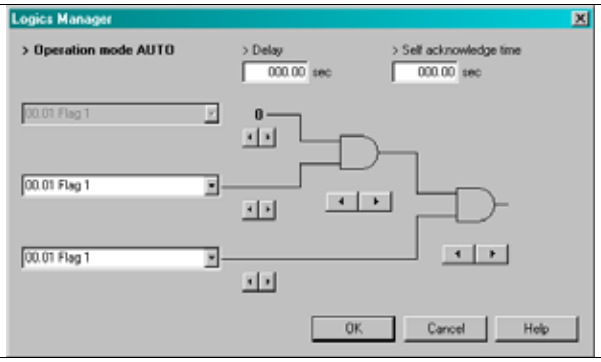
{0}	✓	Prepared for: If TRUE the engine is either stopped in operating mode AUTOMATIC or a start of the engine is suppressed (also an emergency operation).		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

Start without load transfer

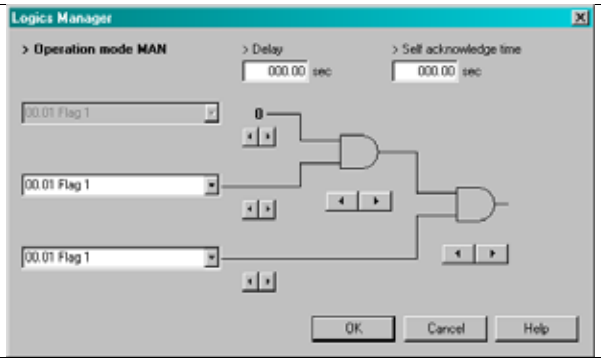
{0}	✓	Prepared for: Engine start without load transfer to the generator (closing of the GCB is blokked)		dependent on internal function "Idle mode"
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

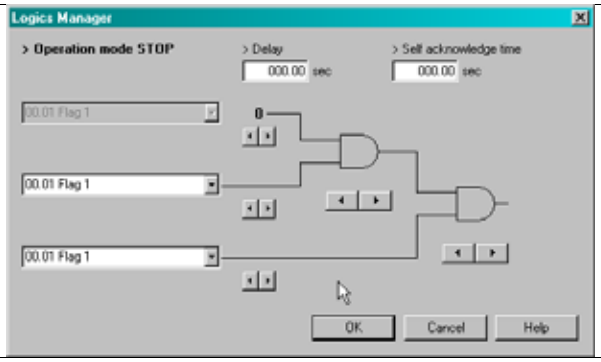
Operating mode AUTOMATIC

{0}	✓	Prepared for: If TRUE the unit changes into operating mode AUTOMATIC.		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Operating mode MANUAL

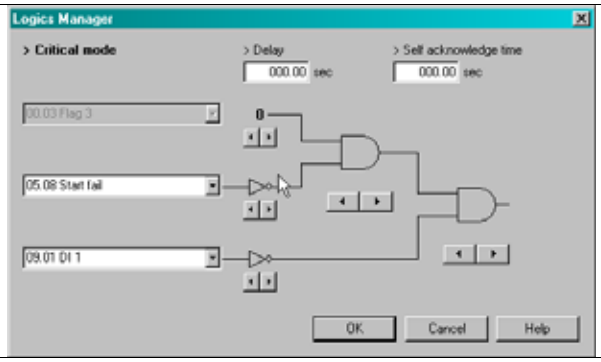
{0}	✓	Prepared for: If TRUE the unit changes into operating mode MANUAL.		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Operating mode STOP

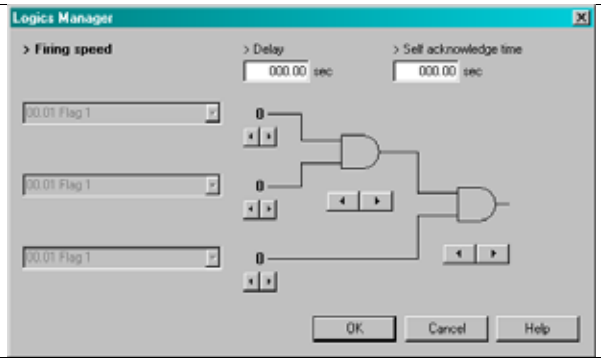
{0}	✓	Prepared for: If TRUE the unit changes into operating mode STOP.		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

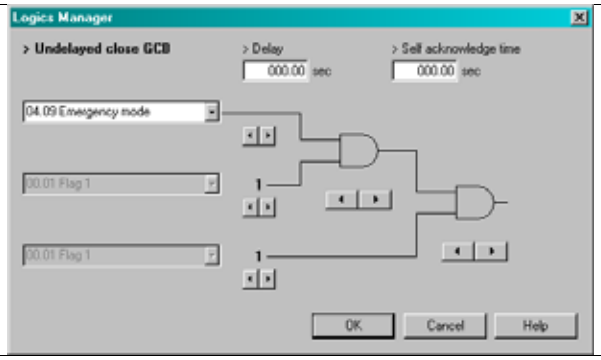
Critical mode

{0}	✓	Prepared for: If TRUE a critical mode operation is initiated (see page 21).		dependent on "NO start failure" and "NO discrete input [D1]"
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

Firing speed reached

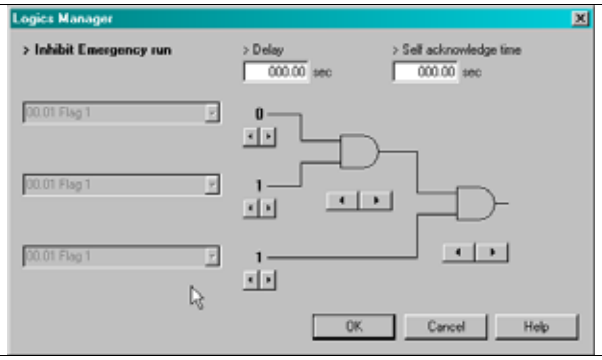
{0}	✓	Prepared for: If TRUE the unit recognizes that the ignition speed has been reached.		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Close GCB without delay

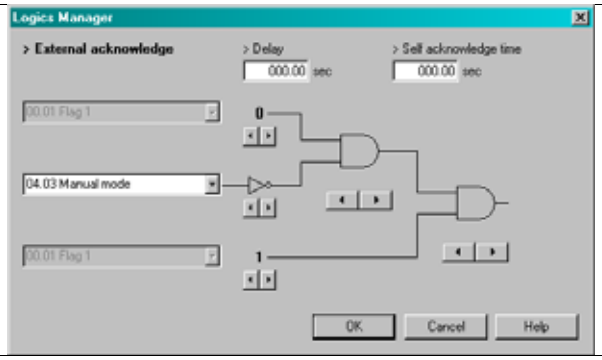
{0}	---	If TRUE the GCB will be closed in an emergency operation without waiting for the expire of the delayed engine monitoring		dependent on emergency operation
{1o}	---			
{1oc}	---			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

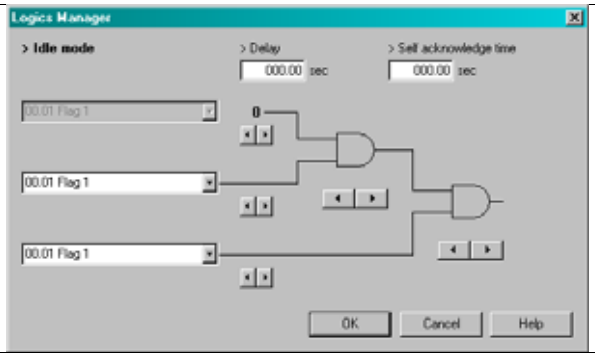
Inhibit/interrupt emergency power operation

{0}	---	Prepared for: If TRUE an emergency operation is inhibited or interrupted		**FALSE**
{1o}	---			
{1oc}	---			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

External acknowledgment

{0}	✓	Prepared for: If TRUE alarms are acknowledged.		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

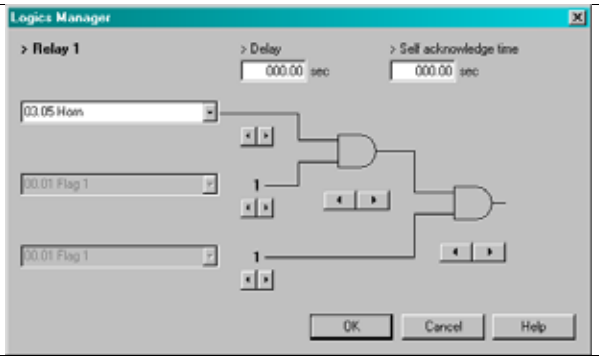
Idle mode

{0}	✓	Prepared for: If TRUE the control outputs "idle mode"		**FALSCH**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

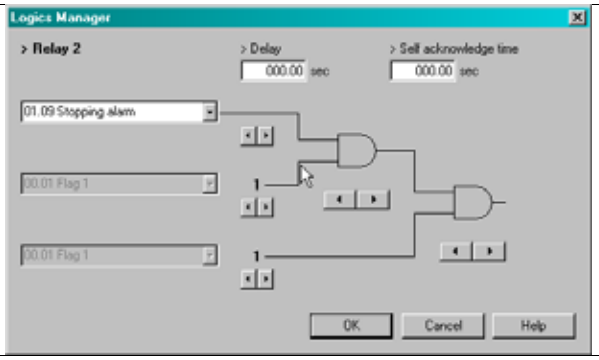
simple (function)	extended (configuration)	result

Factory setting: Relay ouputs

Relay [R01] - centralized alarm (horn)

{0}	✓	Relay pulls up if the internal condition "Centralized alarm" is TRUE		dependent on [03.05]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay [R02] - shut-down alarm class active

{0}	✓	Relay pulls up if one of the alarm classes C, D, E or F is active		dependent on [01.09]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay [R03] - Crank

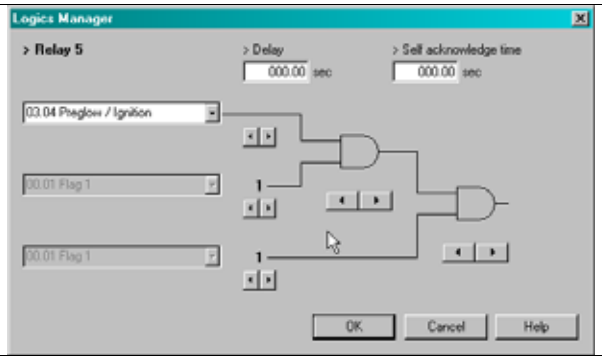
{0}	---	Fixed to "Crank"	---	---
{1o}	---			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay [R04] - Operating magnet

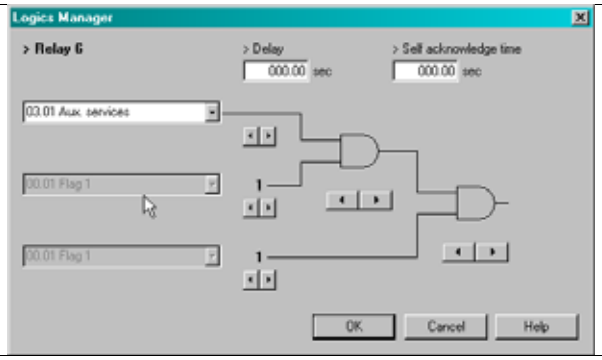
{0}	---	Fixed to "Operating magnet"	---	---
{1o}	---			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

	simple (function)	extended (configuration)	result

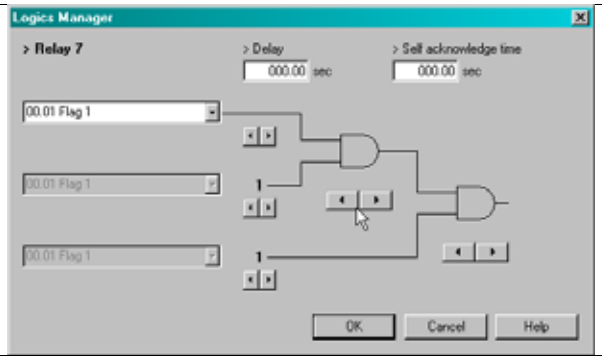
Relay [R05] - preglow / ignition ON

{0}	✓	Relay pulls up to preglow the Diesel engine or the switch-on the ignition of the gas engine		dpenendent on [03.04]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay [R06] - auxiliary services

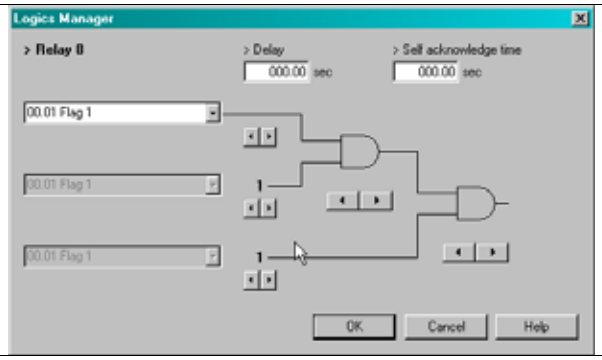
{0}	✓	Relay pulls up to activate the auxiliary services (it pulls up prior to an engine start drops out with the engine stop)		dependent on [03.01]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay [R07] - free / Command: open GCB

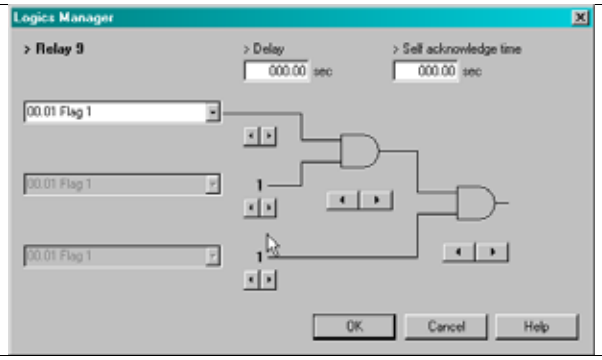
{0}	✓	In application mode {0} = free Otherwise "Command: open GCB"		dependent on [00.01]
{1o}	---			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)		extended (configuration)	result

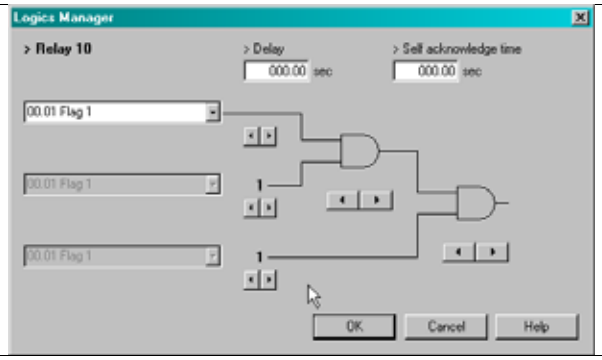
Relay [R08] - free / Command: close MCB

{0}	✓	In application mode {0}, {1o} and {1oc} = free Otherwise "Command: close MCB"		dependent on [00.01]
{1o}	✓			
{1oc}	✓			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

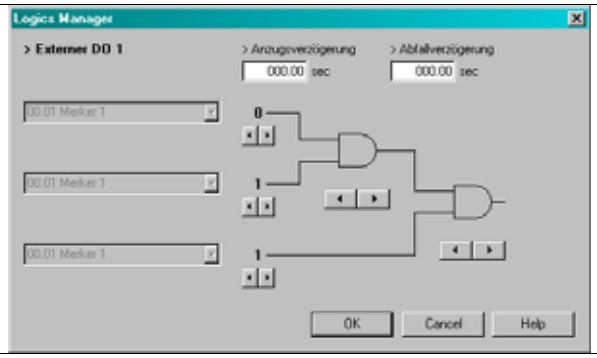
Relay [R09] - free / Command: open MCB

{0}	✓	In application mode {0}, {1o} and {1oc} = free Otherwise "Command: open MCB"		dependent on [00.01]
{1o}	✓			
{1oc}	✓			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

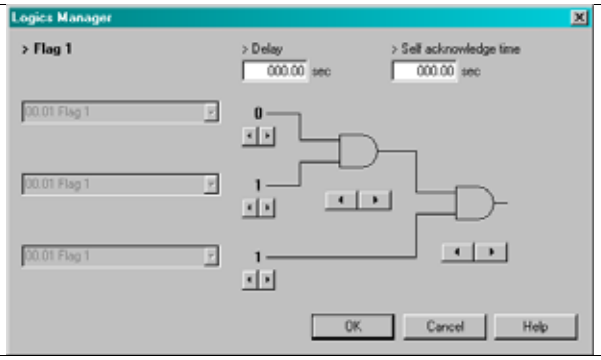
Relay [R10] - free / Command: close GCB

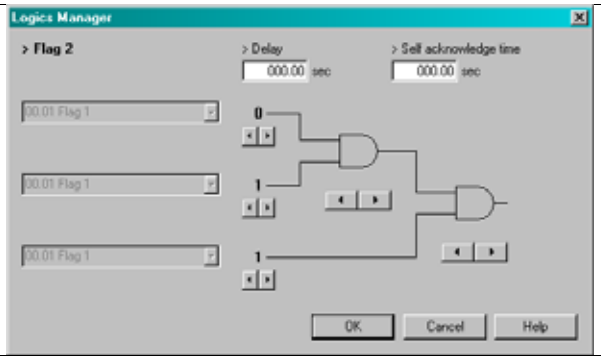
{0}	✓	In application mode {0} and {1o} = free Otherwise "Command: close GCB"		dependent on [00.01]
{1o}	✓			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

	simple (function)	extended (configuration)	result

Relay [REx{x}] - free (external expansion card, if connected; {x} = 1..16)				
{0}	✓	Control of the external relay {x}, if this is connected		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

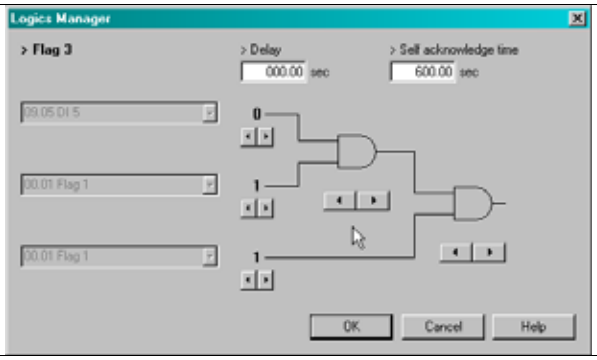
Factory setting: Internal flags

Internal flag 1 - free				
{0}	✓	free		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

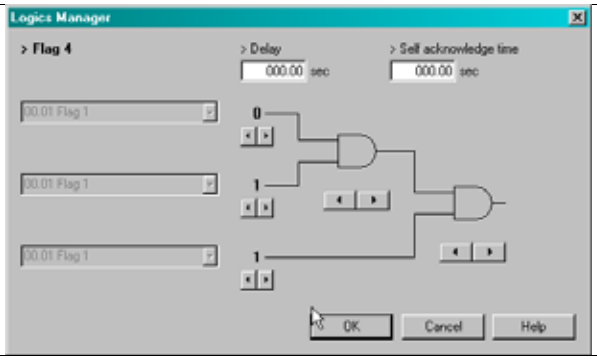
Internal flag 2 - free				
{0}	✓	free		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

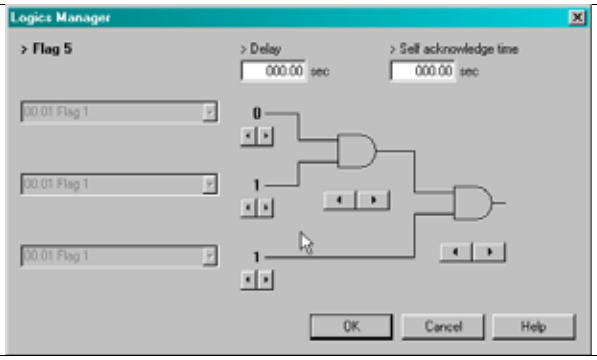
Internal flag 3 - free

{0}	✓	Prepared for: TRUE as long as the critical post-run is activated (10 minutes)		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 4 - free

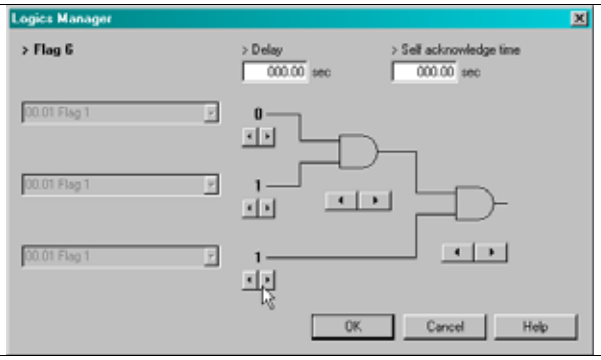
{0}	✓	free		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 5 - free

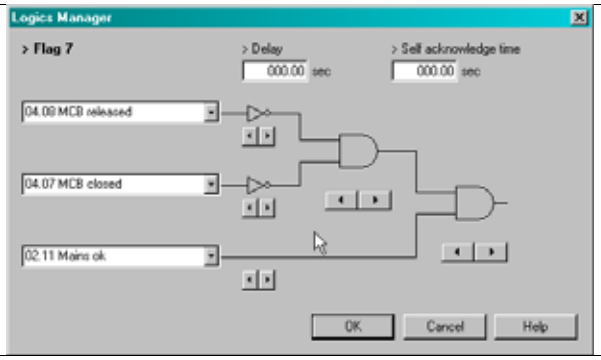
{0}	✓	free		**FALSE**
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

	simple (function)	extended (configuration)	result

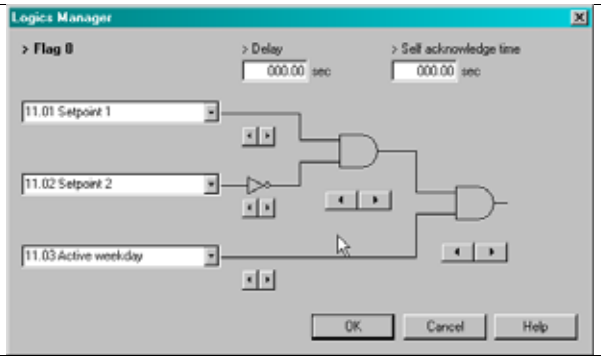
Internal flag 6 - free

{0}	✓	free		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 7 - extend emergency power operation

{0}	✓	free		dependent on [04.08] and [04.07] and [02.11]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 8 - engine start via timer

{0}	✓	TRUE once the configured time 1 has been reached [11.01], and the configured time 2 [11.02] has not been reached as well if the current day is the configured day [11.03] (see page 107 "LogicsManager: Timer")		dependent on timer
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

Discrete inputs

[D1]	{0}	EMERGENCY OFF
	{1o}	
	{1oc}	
	{2oc}	

[D2]	{0}	Remote start / start request
	{1o}	
	{1oc}	
	{2oc}	

[D3]	{0}	free
	{1o}	
	{1oc}	
	{2oc}	

[D4]	{0}	free
	{1o}	
	{1oc}	
	{2oc}	

[D5]	{0}	free
	{1o}	
	{1oc}	
	{2oc}	

[D6]	{0}	free
	{1o}	
	{1oc}	
	{2oc}	Enable MCB (not available in the *LogicsManager*)

[D7]	{0}	free
	{1o}	
	{1oc}	
	{2oc}	Reply: MCB is opened (not available in the *LogicsManager*)

[D8]	{0}	free
	{1o}	
	{1oc}	Reply: GCB is opened (not available in the *LogicsManager*)
	{2oc}	Reply: GCB is opened (not available in the *LogicsManager*)

Appendix C.
Characteristics of the VDO Inputs

VDO input "Pressure" (0-5 bar / 0-72 psi)

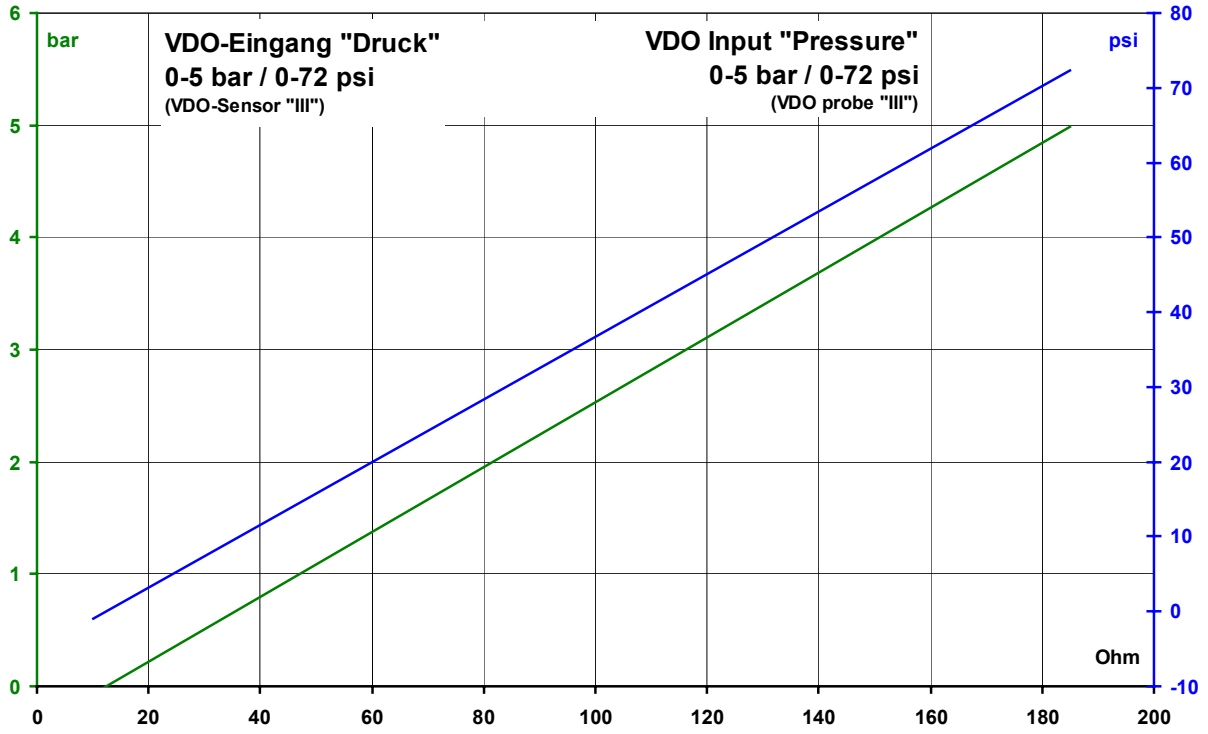


Figure 3-55: Analog inputs - characteristics diagram VDO 0-5 bar

Ohm	bar	psi
10	0,00	0,00
15	0,13	1,81
20	0,25	3,63
25	0,38	5,44
30	0,50	7,25
35	0,64	9,27
40	0,78	11,28
45	0,92	13,30
50	1,06	15,36
55	1,21	17,49
60	1,35	19,62
65	1,50	21,76
70	1,65	23,89
75	1,79	26,02
80	1,94	28,15
85	2,09	30,29
90	2,24	32,42
95	2,38	34,55
100	2,53	36,69
105	2,68	38,82
110	2,82	40,95
115	2,97	43,09
120	3,11	45,12
125	3,25	47,14
130	3,39	49,15
135	3,53	51,19
140	3,68	53,32
145	3,82	55,46
150	3,97	57,59
155	4,12	59,72
160	4,26	61,86
165	4,41	63,99
170	4,56	66,17
175	4,72	68,44
180	4,88	70,71
185	5,03	72,97

VDO input "Pressure" (0-10 bar / 0-145 psi)

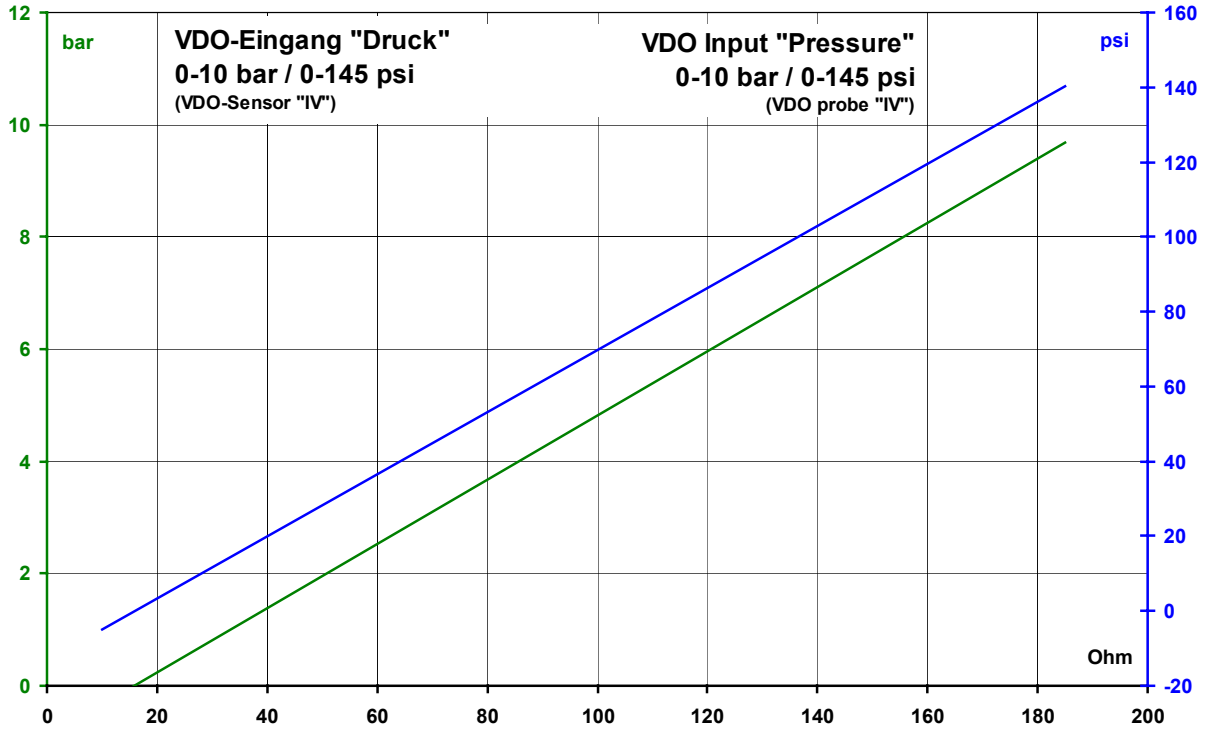


Figure 3-56: Analog inputs - characteristics diagram VDO 0-10 bar

Ohm	bar	psi
10	0,00	0,00
15	0,24	3,45
20	0,48	6,91
25	0,71	10,36
30	0,95	13,81
35	1,19	17,27
40	1,43	20,72
45	1,67	24,17
50	1,90	27,63
55	2,16	31,30
60	2,42	35,11
65	2,68	38,93
70	2,95	42,75
75	3,24	46,92
80	3,53	51,19
85	3,82	55,46
90	4,11	59,63
95	4,39	63,66
100	4,67	67,69
105	4,94	71,71
110	5,22	75,74
115	5,50	79,77
120	5,78	83,80
125	6,06	87,93
130	6,38	92,46
135	6,69	97,00
140	7,00	101,53
145	7,33	106,36
150	7,67	111,20
155	8,00	116,03
160	8,33	120,87
165	8,67	125,70
170	9,00	130,54
175	9,36	135,72
180	9,71	140,90
185	10,07	146,08

VDO input "Temperature" (40-120 °C / 104-248 °F)

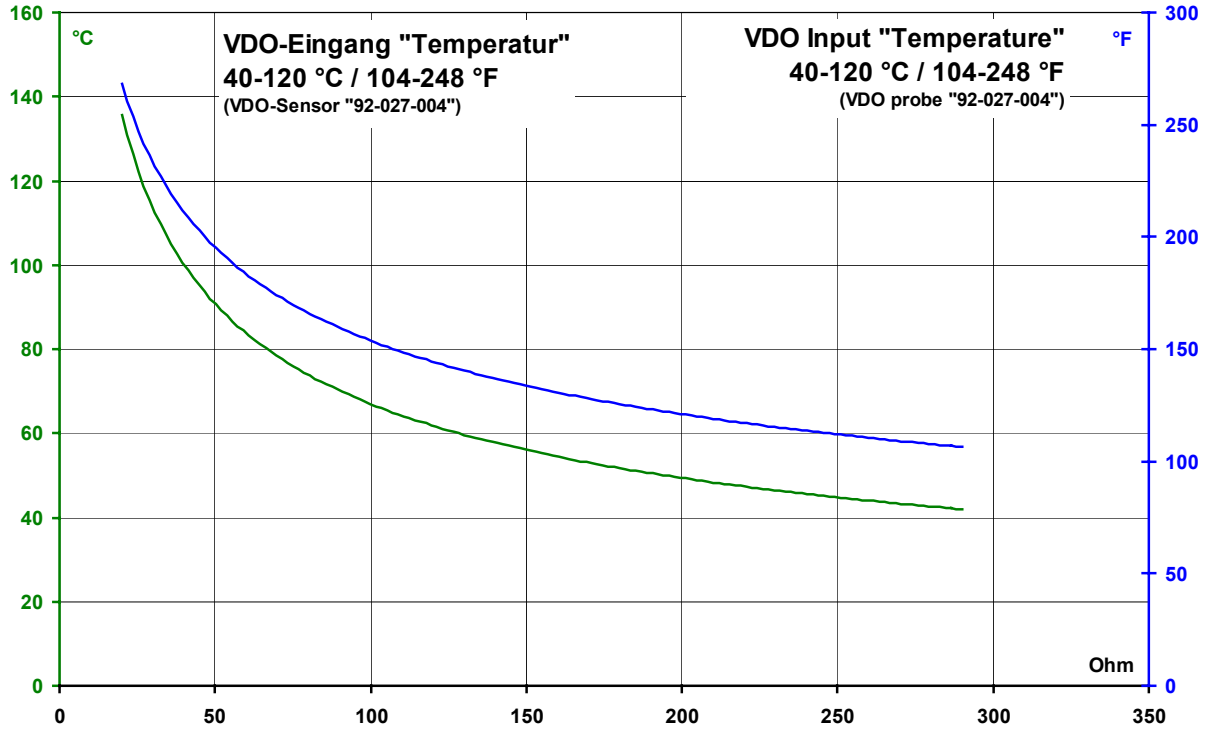


Figure 3-57: Analog inputs - characteristics diagram VDO 40-120 °C

Ohm	°C	°F
20	124	255
30	109	229
40	99	210
50	91	196
60	85	185
70	80	175
80	76	168
90	72	162
100	69	156

Ohm	°C	°F
110	66	151
120	64	146
130	61	142
140	59	138
150	57	135
160	56	132
170	54	129
180	52	126
190	51	123
200	50	121

Ohm	°C	°F
210	48	119
220	47	117
230	46	115
240	45	113
250	44	111
260	43	109
270	42	107

VDO input "Temperature" (50-150 °C / 122-302 °F)

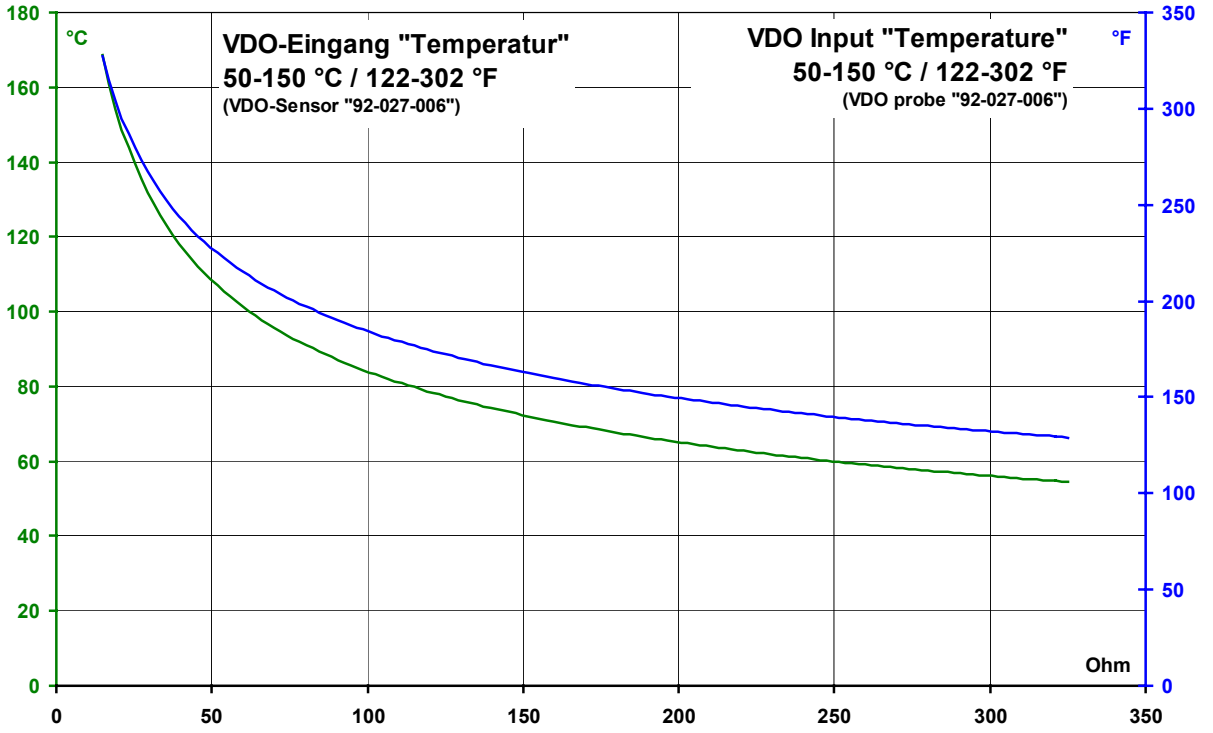


Figure 3-58: Analog inputs - characteristics diagram VDO 50-150 °C

Ohm	°C	°F
20	147	296
30	129	263
40	117	242
50	108	227
60	102	215
70	96	205
80	91	197
90	88	190
100	84	184
110	81	178
120	79	174
130	78	172
140	76	169
150	75	166
160	73	164
170	72	161
180	70	159
190	69	156
200	68	154
210	66	151
220	65	148
230	63	146
240	62	143
250	60	141
260	59	138
270	58	136
280	56	133
290	55	130
300	53	128
310	52	125
320	50	123

Appendix D.
List of Parameters

Unit number P/N _____ Rev _____

Version easYgen-_____

Project _____

Serial number S/N _____ Date _____

	Parameter	Setting range	Default value	Customer setting	
PASSWORD					
	Password CAN	0000..9999	0003		
	Password DPC	0000..9999	0003		
MEASURING					
	Rated system frequency	50/60 Hz	50 Hz		
	Rated voltage generator	50..650,000 V	400 V		
	Rated voltage mains	50..650,000 V	400 V		
	Generator voltage measuring	3Ph 4W 3Ph 3W 1Ph 2W 1Ph 3W	3PH 4W	☐ 3ph4w ☐ 3ph3w ☐ 1ph2w ☐ 1ph3w	☐ 3ph4w ☐ 3ph3w ☐ 1ph2w ☐ 1ph3w
	Generator current measuring	L1 L2 L3 Phase L1 Phase L2 Phase L3	L1 L2 L3	☐ L123 ☐ Ph.L1 ☐ Ph.L2 ☐ Ph.L3	☐ L123 ☐ Ph.L1 ☐ Ph.L2 ☐ Ph.L3
	Mains voltage measuring	3Ph 4W 3Ph 3W 1Ph 2W 1Ph 3W	3PH 4W	☐ 3ph4w ☐ 3ph3w ☐ 1ph2w ☐ 1ph3w	☐ 3ph4w ☐ 3ph3w ☐ 1ph2w ☐ 1ph3w
	Mains current measuring	Phase L1 Phase L2 Phase L3	Phase L1	☐ Ph.L1 ☐ Ph.L2 ☐ Ph.L3	☐ Ph.L1 ☐ Ph.L2 ☐ Ph.L3
	Rated active power [kW]	0.5..99,999.9 kW	200.0 kW		
	Rated current	5..32,000 A	300 A		
	Gen. voltage transf. primary	50..650,000 V	400 V		
	Gen. voltage transf. secondary	50..480 V	400 V		
	Mains voltage transf. primary	50..650,000 V	400 V		
	Mains voltage transf. secondary	50..480 V	400 V		
	Generator current transformer	1..32,000/{x} A	500/{x} A		
	Mains current transformer	1..32,000/{x} A	500/{x} A		

	Parameter	Setting range	Default value	Customer setting	
APPLICATION					
	Application mode	None {0} GCB open {1o} GCB {1oc} GCB/MCB {2oc}	GCB/MCB {2oc}	☐ {0} ☐ {1o} ☐ {1oc} ☐ {2oc}	☐ {0} ☐ {1o} ☐ {1oc} ☐ {2oc}
	Start req. in Auto	see description in chapter *LogicsManager*			
	Stop req. in Auto	see description in chapter *LogicsManager*			
	Start w/o load	see description in chapter *LogicsManager*			
	Startup in mode	Stop Auto Manual last	Stop	☐ STOP ☐ AUTO ☐ MAN ☐ last	☐ STOP ☐ AUTO ☐ MAN ☐ last
	Operation mode AUTO	see description in chapter *LogicsManager*			
	Operation mode MAN	see description in chapter *LogicsManager*			
	Operation mode STOP	see description in chapter *LogicsManager*			
	Alternative screen	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Show mains data	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Critical mode	see description in chapter *LogicsManager*			
	close GCB in override	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Override alarmcl. also in MAN	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Break emergency in override	2..999 s	5 s		
ENGINE					
	Start/stop mode	Diesel Gas External	Diesel	☐ Diesel ☐ Gas ☐ External	☐ Diesel ☐ Gas ☐ External
	Engine type: Diesel				
	Fuel relay: close to stop	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Preglow time	0..999 s	3 s		
	Preglow mode	NO always Analog input [T1] Analog input [T2]	NO	☐ no ☐ always ☐ [T1] ☐ [T2]	☐ no ☐ always ☐ [T1] ☐ [T2]
	Preglow temp. threshold	-10..0..+60 °C	0 °C		
	Engine type: Gas				
	Ignition delay	0..999 s	3 s		
	Gas valve delay	0..999 s	3 s		
	Min. speed for ignition	10..1,800 UPM	100 UPM		
	Pickup				
	Speed Pickup	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Nominal speed	500..4.000 UPM	1.500 UPM		
	Number of gear teeth	2..260	118		
	Start/stop automatic				
	Auxiliary services prerun	0..999 s	5 s		
	Starter time	1..99 s	5 s		
	Start pause time	1..99 s	7 s		
	Cool down time	0..999 s	20 s		
	Auxiliary services postrun	0..999 s	30 s		
	Time of engine stop	0..99 s	10 s		
	Engine: Ignition speed & delayed engine monitoring				
	Firing speed	5..60 Hz	15 Hz		
	Logicm. for firing speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Firing speed	see description in chapter *LogicsManager*			
	Engine monit. delay time	0..99 s	8 s		

	Parameter	Setting range	Default value	Customer setting	
BREAKER					
	Breaker: GCB settings				
	GCB open relay	N.O. N.C.	N.O.	☐ NO ☐ NC	☐ NO ☐ NC
	GCB time pulse	0.04..1.00 s	0.24 s		
	GCB close pulse	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	GCB auto unblock	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Undelayed close GCB	see description in chapter *LogicsManager*			
	GCB frequency window	0.2..10.0 %	2.0 %		
	GCB voltage window	1..100 %	10 %		
	CB settling time	0..99 s	2 s		
	MCB auto unlock	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Close MCB in STOP mode	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	MCB time pulse	0.04..1.00 s	0.24 s		
	Transfer time GCBMCB	0.10..99.99 s	1.00 s		
EMERGENCY POWER (AMF)					
	On/Off	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Mains fail delay time	0.20..99.99 s	3.00 s		
	Mains settling time	0..9,999 s	20 s		
	Emerg. start with MCB failure	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Inhibit emergency run	see description in chapter *LogicsManager*			
PROTECTION					
	Time until horn reset	0..1,000 s	180 s		
	External acknowledge	see description in chapter *LogicsManager*			
	Idle mode	see description in chapter *LogicsManager*			
	Generator protection				
	Voltage monitoring generator	3 phase/4 phase	3 phase	☐ 3 ☐ 4	☐ 3 ☐ 4
	Generator: Over frequency				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..130.0 %	110.0 %		
..	Delay	0.02..99.99 s	1.50 s		
..	Alarm class	A/B/C/D/E/F	B		
lim.1	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
GW2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..130.0 %	115.0 %		
..	Delay	0.02..99.99 s	0.30 s		
GW2	Alarm class	A/B/C/D/E/F	F		
	Generator: Under frequency				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..130.0 %	90.0 %		
..	Delay	0.02..99.99 s	5.00 s		
..	Alarm class	A/B/C/D/E/F	B		
lim.1	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
GW2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..130.0 %	84.0 %		
..	Delay	0.02..99.99 s	0.30 s		
GW2	Alarm class	A/B/C/D/E/F	F		

	Parameter	Setting range	Default value	Customer setting	
PROTECTION					
	Generator: Over voltage				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..125.0 %	108.0 %		
..	Delay	0.02..99.99 s	5.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..125.0 %	112.0 %		
..	Delay	0.02..99.99 s	0.30 s		
lim.2	Alarm class	A/B/C/D/E/F	F		
	Generator: Under voltage				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..125.0 %	92.0 %		
..	Delay	0.02..99.99 s	5.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..125.0 %	88.0 %		
..	Delay	0.02..99.99 s	0.30 s		
lim.2	Alarm class	A/B/C/D/E/F	F		
	Generator: Time-overcurrent				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..300.0 %	110.0 %		
..	Delay	0.02..99.99 s	30.00 s		
..	Alarm class	A/B/C/D/E/F	E		
lim.1	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..300.0 %	150.0 %		
..	Delay	0.02..99.99 s	1.00 s		
lim.2	Alarm class	A/B/C/D/E/F	F		
lim.3	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..300.0 %	250.0 %		
..	Delay	0.02..99.99 s	0.40 s		
lim.3	Alarm class	A/B/C/D/E/F	F		
	Generator: Reverse/reduced power				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	-99.9..0.0..+99.9 %	-3.0 %		
..	Delay	0.02..99.99 s	5.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	-99.9..0.0..+99.9 %	-5.0 %		
..	Delay	0.02..99.99 s	3.00 s		
..	Alarm class	A/B/C/D/E/F	E		
lim.2	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Generator: Overload				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..300.0 %	110.0 %		
..	Delay	0.02..99.99 s	11.00 s		
..	Alarm class	A/B/C/D/E/F	B		
lim.1	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	50.0..300.0 %	120.0 %		
..	Delay	0.02..99.99 s	0.10 s		
lim.2	Alarm class	A/B/C/D/E/F	E		

	Parameter	Setting range	Default value	Customer setting	
PROTECTION					
	Generator: Load imbalance				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0.0..100.0 %	10.0 %		
..	Delay	0.02..99.99 s	10.00 s		
..	Alarm class	A/B/C/D/E/F	B		
lim.1	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0.0..100.0 %	15.0 %		
..	Delay	0.02..99.99 s	1.00 s		
lim.2	Alarm class	A/B/C/D/E/F	E		
	Generator: Voltage asymmetry				
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Limit	0.5..99.9 %	10.0 %		
	Delay	0.02..99.99 s	5.00 s		
	Alarm class	A/B/C/D/E/F	F		
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Delayed by engine speed	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Generator: Ground current, calculated				
lim.1	Monitoring	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0..300 %	10 %		
..	Delay	0.02..99.99 s	0.20 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0..300 %	30 %		
..	Delay	0.02..99.99 s	0.10 s		
..	Alarm class	A/B/C/D/E/F	F		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Generator: Phase rotation				
	Generator phase rotation	CW (+)/CCW (-)	CW	☐ + ☐ -	☐ + ☐ -
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Alarm class	A/B/C/D/E/F	F		
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Delayed by engine speed	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Generator: Inverse-time overcurrent				
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Inverse time characteristic	Normal/High/Extreme	Normal	☐n ☐h ☐e	☐n ☐h ☐e
	Inv. time overcurrent Tp=	0.01..1.99 s	0.06 s		
	Inv. time overcurrent Ip=	10.0..300.0 %	100.0 %		
	Inv. time overcurrent I-start=	100.0..300.0 %	115.0 %		
	Alarm class	A/B/C/D/E/F	F		
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Mains protection				
	Voltage monitoring mains	3 phase/4 phase	3 phase	☐ 3 ☐ 4	☐ 3 ☐ 4
	Mains: Phase rotation				
	Mains phase rotation	CW (+)/CCW (-)	CW	☐ + ☐ -	☐ + ☐ -
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Alarm class	A/B/C/D/E/F	B		
	Self acknowledge	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

	Parameter	Setting range	Default value	Customer setting	
PROTECTION					
	Emergency power: Limits				
	High voltage threshold	50.0..130.0 %	110.0 %		
	Low voltage threshold	50.0..130.0 %	90.0 %		
	Voltage hysteresis	0.0..50.0 %	2.0 %		
	High frequency threshold	70.0..160.0 %	110.0 %		
	Low frequency threshold	70.0..160.0 %	90.0 %		
	Frequency hysteresis	0.0..50.0 %	2.0 %		
	System: Breaker monitoring				
	GCB monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	GCB alarm class	A/B/C/D/E/F	B		
	GCB max. closing attempts	1..10	5		
	GCB open monitoring	0.10..5.00 s	2.00 s		
	MCB monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	MCB alarm class	A/B	B		
	MCB max. closing attempts	1..10	5		
	MCB open monitoring	0.10..5.00 s	2.00 s		
	Engine: Overspeed				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0..9,999 UPM	1,850 UPM		
..	Delay	0.02..99.99 s	1.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0..9,999 UPM	1,900 UPM		
..	Delay	0.02..99.99 s	0.10 s		
lim.2	Alarm class	A/B/C/D/E/F	F		
	Engine: Underspeed				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0..9,999 UPM	1,300 UPM		
..	Delay	0.02..99.99 s	1.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	0..9,999 UPM	1,250 UPM		
..	Delay	0.02..99.99 s	0.10 s		
lim.2	Alarm class	A/B/C/D/E/F	F		
	Motor: Speed/frequency mismatch (speed detection)				
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Mismatch limit	1.5..8.5 Hz	5.0 Hz		
	Delay	0.02..99.99 s	2.00 s		
	Activation frequency	15..85 Hz	20 Hz		
	Alarm class	A/B/C/D/E/F	E		
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Engine: Start failure				
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Start attempts	1..20	3		
	Start attempts override	1..20	10		
	Alarm class	A/B/C/D/E/F	F		
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Engine: Stop failure				
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Max. stop delay	3..999 s	30 s		
	Alarm class	A/B/C/D/E/F	F		
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Engine: Unintended stop				
	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
	Alarm class	A/B/C/D/E/F	F		

	Parameter	Setting range	Default value	Customer setting	
PROTECTION					
	Battery Overvoltage				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	8.0..42.0 V	32.0 V		
..	Delay	0.02..99.99 s	5.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	8.0..42.0 V	35.0 V		
..	Delay	0.02..99.99 s	1.00 s		
lim.2	Alarm class	A/B/C/D/E/F	B		
	Battery: Undervoltage				
lim.1	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	8.0..42.0 V	24.0 V		
..	Delay	0.02..99.99 s	60.00 s		
..	Alarm class	A/B/C/D/E/F	B		
..	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit	8.0..42.0 V	20.0 V		
..	Delay	0.02..99.99 s	10.00 s		
lim.2	Alarm class	A/B/C/D/E/F	B		
	Interface				
	Monitoring	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
	Timeout	0.1..999.9 s	2.0 s		
	Alarm class	A/B/C/D/E/F	B		
	Self acknowledge	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Delayed by engine speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
DISCRETE INPUTS					
	Discrete input [D1]				
	DI 1 operation	N.O. N.C.	NC	☐ NO ☐ NC	☐ NO ☐ NC
	DI 1 delay	0.02..650.00 s	0.20 s		
	DI 1 alarm class	A/B/C/D/E/F/Control	F		
	DI 1 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 1 self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 1 text	user-defined	Emergency Stop		
	Discrete input [D2]				
	DI 2 operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	DI 2 delay	0.02..650.00 s	0.50 s		
	DI 2 alarm class	A/B/C/D/E/F/Control	Control		
	DI 2 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 2 self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 2 text	user-defined	Digital Inp. 2		
	Discrete input [D3]				
	DI 3 operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	DI 3 delay	0.02..650.00 s	0.50 s		
	DI 3 alarm class	A/B/C/D/E/F/Control	B		
	DI 3 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 3 self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 3 text	user-defined	Digital Inp. 3		

	Parameter	Setting range	Default value	Customer setting	
DISCRETE INPUTS					
	Discrete input [D4]				
	DI 4 operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	DI 4 delay	0.02..650.00 s	0.50 s		
	DI 4 alarm class	A/B/C/D/E/F/Control	B		
	DI 4 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 4 self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 4 text	user-defined	Digital Inp. 4		
	Discrete input [D5]				
	DI 5 operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	DI 5 delay	0.02..650.00 s	0.50 s		
	DI 5 alarm class	A/B/C/D/E/F/Control	B		
	DI 5 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 5 self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 5 text	user-defined	Digital Inp. 5		
	Discrete input [D6]				
	DI 6 operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	DI 6 delay	0.02..650.00 s	0.00 s		
	DI 6 alarm class	A/B/C/D/E/F/Control	Control		
	DI 6 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 6 self acknowledge	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	DI 6 text	user-defined	Digital Inp. 6		
	Discrete input [D7]				
	DI 7 operation	N.O. N.C.	NC	☐ NO ☐ NC	☐ NO ☐ NC
	DI 7 delay	0.02..650.00 s	0.00 s		
	DI 7 alarm class	A/B/C/D/E/F/Control	Control		
	DI 7 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 7 self acknowledge	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	DI 7 text	user-defined	Digital Inp. 7		
	Discrete input [D8]				
	DI 8 operation	N.O. N.C.	NC	☐ NO ☐ NC	☐ NO ☐ NC
	DI 8 delay	0.02..650.00 s	0.00 s		
	DI 8 alarm class	A/B/C/D/E/F/Control	Control		
	DI 8 delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	DI 8 self acknowledge	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	DI 8 text	user-defined	Digital Inp. 8		
	Discrete input [DEx01]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 1 Text	user-defined	Ext. DI 1		
	Discrete input [DEx02]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 2 Text	user-defined	Ext. DI 2		

	Parameter	Setting range	Default value	Customer setting	
DISCRETE INPUTS					
	Discrete input [DEx03]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 3 Text	user-defined	Ext. DI 3		
	Discrete input [DEx04]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 4 Text	user-defined	Ext. DI 4		
	Discrete input [DEx05]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 5 Text	user-defined	Ext. DI 5		
	Discrete input [DEx06]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 6 Text	user-defined	Ext. DI 6		
	Discrete input [DEx07]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 7 Text	user-defined	Ext. DI 7		
	Discrete input [DEx08]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 8 Text	user-defined	Ext. DI 8		
	Discrete input [DEx09]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 9 Text	user-defined	Ext. DI 9		

	Parameter	Setting range	Default value	Customer setting	
DISCRETE INPUTS					
	Discrete input [DEx10]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 10 Text	user-defined	Ext. DI 10		
	Discrete input [DEx11]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 11 Text	user-defined	Ext. DI 11		
	Discrete input [DEx12]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 16 Text	user-defined	Ext. DI 12		
	Discrete input [DEx13]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 13 Text	user-defined	Ext. DI 13		
	Discrete input [DEx14]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 14 Text	user-defined	Ext. DI 14		
	Discrete input [DEx15]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 15 Text	user-defined	Ext. DI 15		
	Discrete input [DEx16]				
	Operation	N.O. N.C.	NO	☐ NO ☐ NC	☐ NO ☐ NC
	Delay	0.02..650.00 s	0.20 s		
	Alarm class	A/B/C/D/E/F/Control	Control		
	Delayed by eng. speed	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Self acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Ext. DI 16 Text	user-defined	Ext. DI 16		

	Parameter	Setting range	Default value	Customer setting	
RELAY OUTPUTS (*LogicsManager*)					
	Relay 1	see description in chapter *LogicsManager*			
	Relay 2	see description in chapter *LogicsManager*			
	Relay3	see description in chapter *LogicsManager*			
	Relay 4	see description in chapter *LogicsManager*			
	Relay 5	see description in chapter *LogicsManager*			
	Relay 6	see description in chapter *LogicsManager*			
	Relay 7	see description in chapter *LogicsManager*			
	Relay 8	see description in chapter *LogicsManager*			
	Relay 9	see description in chapter *LogicsManager*			
	Relay10	see description in chapter *LogicsManager*			
	External DO 1	see description in chapter *LogicsManager*			
	External DO 2	see description in chapter *LogicsManager*			
	External DO 3	see description in chapter *LogicsManager*			
	External DO 4	see description in chapter *LogicsManager*			
	External DO 5	see description in chapter *LogicsManager*			
	External DO 6	see description in chapter *LogicsManager*			
	External DO 7	see description in chapter *LogicsManager*			
	External DO 8	see description in chapter *LogicsManager*			
	External DO 9	see description in chapter *LogicsManager*			
	External DO 10	see description in chapter *LogicsManager*			
	External DO 11	see description in chapter *LogicsManager*			
	External DO 12	see description in chapter *LogicsManager*			
	External DO 13	see description in chapter *LogicsManager*			
	External DO 14	see description in chapter *LogicsManager*			
	External DO 15	see description in chapter *LogicsManager*			
	External DO 16	see description in chapter *LogicsManager*			
ANALOG INPUTS (*FlexIn*)					
	Analog input [T1]				
	Type	OFF VDO 5bar VDO 10bar VDO 120°C VDO 150°C Pt100 Linear Table A Table B	AUS	☐ OFF ☐ 5bar ☐ 10bar ☐ 120°C ☐ 150°C ☐ Pt100 ☐ linear ☐ Tab.A ☐ Tab.B	☐ OFF ☐ 5bar ☐ 10bar ☐ 120°C ☐ 150°C ☐ Pt100 ☐ linear ☐ Tab.A ☐ Tab.B
	Select hardware	0..500 Ohm 0..20 mA 4..20 mA	0..500 Ohm	☐ 500Ohm ☐ 0..20mA ☐ 4..20mA	☐ 500Ohm ☐ 0..20mA ☐ 4..20mA
	Offset	-20.0..0.0..+20.0 Ohm	0.0 Ohm		
	Description	user-defined	Analog inp. 1		
	Value format	user-defined	0000		
	Filter time constant	OFF/1/2/3/4/5	3		
	Hysteresis	0..999	1		
lim.1	Monitoring level 1	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit level 1	-9,999..0..+9,999	200		
..	Delay level 1	0.02..99.99 s	1.00 s		
.. ..	Monitoring level 1 at	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
..	Alarm class level 1	A/B/C/D/E/F/Control	B		
..	Self acknowledge level 1	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine level 1	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring level 2	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit level 2	-9,999..0..+9,999	100		
..	Delay level 2	0.02..99.99 s	1.00 s		
.. ..	Monitoring level 2 at	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
..	Alarm class level 2	A/B/C/D/E/F/Control	F		
..	Self acknowledge level 2	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Delayed by engine level 2	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

	Parameter	Setting range	Default value	Customer setting	
ANALOG INPUTS (*FlexIn*)					
	Analog input [T1]				
	Monit. wire break	OFF High Low high/low	OFF	☐ OFF ☐ high ☐ low ☐ h/l	☐ OFF ☐ high ☐ low ☐ h/l
	Wire break alarm class	A/B/C/D/E/F/Control	B		
	Self acknowledge wire break	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Value at 0 %	-9,999..0..+9,999	0		
	Value at 100 %	-9,999..0..+9,999	1,000		
	Analog input [T2]				
	Type	OFF VDO 5bar VDO 10bar VDO 120°C VDO 150°C Pt100 Linear Table A Table B	OFF	☐ OFF ☐ 5bar ☐ 10bar ☐ 120°C ☐ 150°C ☐ Pt100 ☐ linear ☐ Tab.A ☐ Tab.B	☐ OFF ☐ 5bar ☐ 10bar ☐ 120°C ☐ 150°C ☐ Pt100 ☐ linear ☐ Tab.A ☐ Tab.B
	Select hardware	0..500 Ohm 0..20 mA 4..20 mA	0..500 Ohm	☐ 500Ohm ☐ 0..20mA ☐ 4..20mA	☐ 500Ohm ☐ 0..20mA ☐ 4..20mA
	Offset	-20.0..0.0..+20.0 Ohm	0.0 Ohm		
	Description	user-defined	Analog inp. 2		
	Value format	user-defined	0000		
	Filter time constant	OFF/1/2/3/4/5	3		
	Hysteresis	0..999	1		
lim.1	Monitoring level 1	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit level 1	-9,999..0..+9,999	95		
..	Delay level 1	0.02..99.99 s	1.00 s		
.. ..	Monitoring level 1 at	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
..	Alarm class level 1	A/B/C/D/E/F/Control	B		
..	Self acknowledge level 1	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.1	Delayed by engine level 1	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Monitoring level 2	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
..	Limit level 2	-9,999..0..+9,999	100		
..	Delay level 2	0.02..99.99 s	1.00 s		
.. ..	Monitoring level 2 at	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
..	Alarm class level 2	A/B/C/D/E/F/Control	F		
..	Self acknowledge level 2	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
lim.2	Delayed by engine level 2	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Monit. wire break	OFF High Low high/low	OFF	☐ OFF ☐ high ☐ low ☐ h/l	☐ OFF ☐ high ☐ low ☐ h/l
	Wire break alarm class	A/B/C/D/E/F/Control	B		
	Self acknowledge wire break	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Value at 0 %	-9,999..0..+9,999	0		
	Value at 100 %	-9,999..0..+9,999	1,000		

	Parameter	Setting range	Default value	Customer setting	
ANALOG INPUTS (*FlexIn*)					
	Table A				
	X-value 1	0..100 %	2 %		
	Y-value 1	-9,999..0..+9,999	0		
	X-value 2	0..100 %	8 %		
	Y-value 2	-9,999..0..+9,999	207		
	X-value 3	0..100 %	16 %		
	Y-value 3	-9,999..0..+9,999	512		
	X-value 4	0..100 %	24 %		
	Y-value 4	-9,999..0..+9,999	838		
	X-value 5	0..100 %	27 %		
	Y-value 5	-9,999..0..+9,999	970		
	X-value 6	0..100 %	31 %		
	Y-value 6	-9,999..0..+9,999	1,160		
	X-value 7	0..100 %	36 %		
	Y-value 7	-9,999..0..+9,999	1,409		
	X-value 8	0..100 %	37 %		
	Y-value 8	-9,999..0..+9,999	1,461		
	X-value 9	0..100 %	41 %		
	Y-value 9	-9,999..0..+9,999	1,600		
	Table B				
	X-value 1	0..100 %	4 %		
	Y-value 1	-9,999..0..+9,999	2,553		
	X-value 2	0..100 %	6 %		
	Y-value 2	-9,999..0..+9,999	2,288		
	X-value 3	0..100 %	8 %		
	Y-value 3	-9,999..0..+9,999	2,100		
	X-value 4	0..100 %	13 %		
	Y-value 4	-9,999..0..+9,999	1,802		
	X-value 5	0..100 %	16 %		
	Y-value 5	-9,999..0..+9,999	1,685		
	X-value 6	0..100 %	23 %		
	Y-value 6	-9,999..0..+9,999	1,488		
	X-value 7	0..100 %	28 %		
	Y-value 7	-9,999..0..+9,999	1,382		
	X-value 8	0..100 %	42 %		
	Y-value 8	-9,999..0..+9,999	1,188		
	X-value 9	0..100 %	58 %		
	Y-value 9	-9,999..0..+9,999	1,035		
COUNTER					
	Maintenance, running hours, kWh, kvarh				
	Maintenance hours	0..9.999 h	300 h		
	Maintenance days	0..999 days	365 days		
	Reset maintenance period h	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Reset maintenance period days	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Counter value preset	0..99,999,999	0		
	Set operation hours	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	set kWh	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	set kvarh	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Number of starts	0..65,535	0		

	Parameter	Setting range	Default value	Customer setting	
LogicsManager					
	Limit: Generator power				
	Gen. load limit 1	0.0..200.0 %	80.0 %		
	Gen. load limit 2	0.0..200.0 %	90.0 %		
	Gen. load hysteresis	0.0..100.0 %	5.0 %		
	Limit: Mains power				
	Mains load limit 1	-999.9..0.0..+999.9 %	80.0 %		
	Mains load limit 2	-999.9..0.0..+999.9 %	90.0 %		
	Mains load hysteresis	0.0..100.0 %	5.0 %		
	Flags				
	Flag 1	see description in chapter *LogicsManager*			
	Flag 2	see description in chapter *LogicsManager*			
	Flag 3	see description in chapter *LogicsManager*			
	Flag 4	see description in chapter *LogicsManager*			
	Flag 5	see description in chapter *LogicsManager*			
	Flag 6	see description in chapter *LogicsManager*			
	Flag 7	see description in chapter *LogicsManager*			
	Flag 8	see description in chapter *LogicsManager*			
	Daily timer setpoints				
	Setpoint 1: Hour	0..23 h	8 h		
	Setpoint 1: Minute	0..59 min	0 min		
	Setpoint 1: Second	0..59 s	0 s		
	Setpoint 2: Hour	0..23 h	17 h		
	Setpoint 2: Minute	0..59 min	0 min		
	Setpoint 2: Second	0..59 s	0 s		
	Monthly timer setpoints				
	Active day	1..31	1		
	Active hour	0..23 h	12 h		
	Active minute	0..59 min	0 min		
	Active second	0..59 s	0 s		
	Weekly timer setpoint				
	Monday active	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Tuesday active	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Wednesday active	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Thursday active	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Friday active	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Saturday active	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Sunday active	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
SCHNITTSTELLEN					
	Device number	1..32	1		
	CAN bus				
	Protocol	OPFF CANopen LeoPC	CANopen	☐ OFF ☐ CNopen ☐ LeoPC	☐ OFF ☐ CNopen ☐ LeoPC
	Baudrate	20/50/100/125/250/500/ 800/1,000 kBaud	15 kBaud		
	CANopen parameter	Parameter settings 'CAN bus': see manual 37262			
	Service interface				
	Baudrate	9,600 Baud / 14.4/19.2/38.4/65/150 kBaud	9,600 Baud		
	Parity	None/even/odd	None		
	Stop Bit	one/two	one		
	File over DirPara	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0

	Parameter	Setting range	Default value	Customer setting	
SYSTEM					
	Real-time clock: Time				
	Hours	0..23 h	---		
	Minutes	0..59 min	---		
	Seconds	0..59 s	---		
	Real-time clock: Date				
	Day	1..31	---		
	Month	1..12	---		
	Year	0..99	---		
	Passwords				
	Code level CAN port	Info	---		
	Code level serial port / DPC	Info	---		
	Commissioning level code	0..9,999	---		
	Temp. commissioning level code	0..9,999	---		
	Basic level code	0..9,999	---		
	Versions				
	Serial number	Info	---		
	Boot item number	Info	---		
	Boot revision	Info	---		
	Boot version	Info	---		
	Program item number	Info	---		
	Program revision	Info	---		
	Program version	Info	---		

Appendix E.
Service Options

Product Service Options

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

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

Returning Equipment For Repair

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

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

CAUTION

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

Packing a control

Use the following materials when returning a complete control:

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

Return Authorization Number RAN

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

NOTE

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

Replacement Parts

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

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

How To Contact Woodward

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

Woodward Governor Company
Leonhard-Reglerbau GmbH
Handwerkstrasse 29
70565 Stuttgart - Germany

Phone: +49 (711) 789 54-0 (8.00 - 16.30 o'clock)
Fax: +49 (711) 789 54-100
eMail: sales-stuttgart@woodward.com

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

Facility	Phone number
USA	+1 (970) 482 5811
India	+91 (129) 230 7111
Brazil	+55 (19) 3708 4800
Japan	+81 (476) 93 4661
The Netherlands	+31 (23) 566 1111

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

Engineering Services

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

- Technical support
- Product training
- Field service during commissioning

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

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

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

Technical Assistance

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

Contact

Your company_____

Your name_____

Phone number _____

Fax number _____

Control (see name plate)

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

Unit type easYgen-_____

Serial number S/N _____

Description of your problem

_____

_____

_____

_____

_____

_____

Please be sure you have a list of all parameters available. You can print this using LeoPC. Additionally you can save the complete set of parameters (standard values) and send them to our Service department via e-mail.

We appreciate your comments about the content of our publications.

Please send comments to: icinfo@woodward.com

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

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Homepage

http://www.woodward.com/smart-power

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address/phone/fax/e-mail information for all locations is available on our website (www.woodward.com).

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