37391C

easYgen-1000
Genset Control

Configuration
Software Version 2.1xxx

EASY GEN 1000

Manual 37391C

WARNING

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

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

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

CAUTION

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

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

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

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Important definitions

WARNING

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

CAUTION

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

NOTE

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

Revision History

Rev.	Date	Editor	Changes
NEW	07-02-02	TP	Release based on manual 37321B
A	08-05-20	TP	Update information added; minor corrections
B	08-07-01	TP	Parameter descriptions from Interface Manual added
C	11-06-16	TE	Minor corrections

Content

Illustrations And Tables

Illustrations

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Chapter 1.
General Information

Related Documents

Type		English	German
easYgen-1000 Series			
easYgen-1000 - Installation		37390	GR37390
easYgen-1000 - Configuration	this manual ⇨	37391	GR37391
easYgen-1000 - Operation		37392	GR37392
easYgen-1000 - Interfaces		37393	GR37393
easYgen-1000 - Application		37394	GR37394
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
20-channel 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.			
LeoPC1 - User Manual		37146	GR37146
PC program for visualization, configuration, remote control, data logging, language upload, alarm and user management, and management of the event recorder. This manual describes the set up of the program and interfacing with the control unit.			
LeoPC1 - Engineering Manual		37164	GR37164
PC program for visualization, configuration, remote control, data logging, language upload, alarm and user management, and management of the event recorder. This manual describes the configuration and customization 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 is 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 at the rear of this manual.

Update Information

This manual refers to the easYgen-1000 with software version 2.1xxx. The following list shows the most important differences compared with software version 2.0xxx without a claim to completeness:

- Display
  - Dynamic Display – freely configurable main display screen (refer to Application: Dynamical Display on page 28)
  - No mains current, power, and power factor display if mains current measuring is disabled
  - Calculated average current display available

- Analog Inputs
  - New temperature sensor "SMP 2125" is available for 25 to 150 °C (refer to Analog Inputs: Type on page 109)
  - Bar/psi and °C/°F selectable for J1939 engine data

- J1939
  - Remote start / stop / speed set point for various ECUs (mtu ADEC, Volvo EMS2, Deutz EMR2) (refer to Interface Manual 37393)
  - SISU EEM2/3 ECU support added with SW version 2.1004

- Counter
  - Freely adjustable hours counter for adding up the duration of certain events (refer to Counters: Free Adjustable Hours Counter on page 121)
  - Operating hours counter resolution of 0.01 hours

- Magnetic Pickup Unit
  - "Number of gear teeth" or "Pulses per revolution 0.00" configurable for applications with a charge alternator connected with a belt (refer to Engine: Pickup on page 39)
  - Adjustable filter for displayed RPMs (refer to Engine: Pickup on page 39)

- Firmware update using Woodward ToolKit (former Flashtool)

- Updated interface telegrams for LeoPC1 and easYlite to reflect the changes (operating hours resolution etc.) (refer to Interface Manual 37393)

Chapter 2.
Configuration

Configuration Via The Front Panel

How to operate the unit via the front panel is explained in manual "37392". Please familiarize yourself with the unit, the buttons and their meaning/operation and the display monitoring using this manual. The display of parameters via the front panel will differ from the display of the parameters via the LeoPC1 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 LeoPC1 software with the following software version:

LeoPC1 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 installation manual.
- 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. This setting will not change the language of the control unit being configured.
- After the installation of the PC program 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 installation manual).
- You may 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 subdirectory "/LeoPC".
- After the PC program was started, establish the communication by pressing the "F2" button. This will establish a data link between the unit and the laptop/PC.
- Start the sub program "Device Parameterization" and adjust the parameter of the unit to your application using this manual.

NOTE

The connection cables delivered with the DPC must be used to connect to the easYgen to ensure that the controller functions properly. An extension or utilization of different cable types for the connection between easYgen and DPC may result a malfunction of the easYgen. This may possibly result in damage to components of the system. If an extension of the data connection line is required, only the serial cable between DPC and laptop/PC may be extended.

NOTE

If the laptop/PC fails to communicate with the control unit being configured, refer to LeoPC1 manual 37146.

NOTE

Depending on the used computer and the installed operation system, problems with the communication via an infrared connection may occur.

NOTE

If you want to read or write parameters using a [LeoPC1 Gateway-RS-232 via GW4] connection, you must configure the parameter "Visualization" to "not active" in LeoPC1. The parameter "Visualization" may be configured back to "active" after reading and/or writing.

Function Of The Inputs And Outputs

Discrete inputs

The discrete inputs may be grouped into two categories:

- ***programmable***
  The programmable discrete input has been programmed with a factory default function using the *LogicsManager*. The following text describes how these functions may be changed using the *LogicsManager*.

- ***fixed***
  The discrete input has a specific function that cannot be changed. The discrete input cannot be used in the *LogicsManager*.

NOTE

Depending on the configured application mode (Parameter 20), the discrete inputs can be "*programmable*" or "*fixed*". Please refer to the table on page 104.

Emergency stop ***programmable*** to discrete input [D1], terminal 51/50

This discrete input is configured as alarm class F and it is not delayed by the engine.

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

Activated in the operation mode AUTOMATIC

logic "1" ..... 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.

logic "0" ..... The engine will be stopped.

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

⇨ Note: Only if parameter Enable MCB via DI6 is enabled (refer to page 48)!

logic "1" ..... The MCB is enabled.

logic "0" ..... The MCB is not enabled and switching back to mains supply following an emergency power operation will be blocked.

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

⇨ Note: Negative logic function!

This discrete input indicates to the control that the MCB is open if it is energized (logic "1"). This operating status will be displayed in the LCD.

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.

Alarm inputs {all}

All discrete inputs which are not assigned a function can be used as alarm inputs. The alarm or control inputs can be configured freely. Please refer to Discrete Inputs on page 104.

Relay outputs

The discrete outputs can be grouped into two categories:

- ***programmable***
  The relay output has been pre-defined (programmed) with this function using the *LogicsManager* (which are described in the following text). The function may be changed by using the *LogicsManager*.

- ***fixed***
  The relay output has a specific function that cannot be changed. The relay output is not visible at the unit in the *LogicsManager*.

NOTE

The relay outputs can be "*programmable*" or "*fixed*" depending on the application mode (refer to Parameter 20). Also refer to Table 3-22: Relay outputs - assignment on page 107.

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

By energizing this relay a centralized alarm is issued. A horn or a buzzer can be activated. By pressing the button next to the symbol "✓", the relay can be reset. It will be energized again if a new fault condition occurs. The centralized alarm is activated by alarms class B or higher.

Stopping alarm {all} ***programmable*** to relay [R2], terminals 31/35

By energizing this relay a stopping alarm (alarms of alarm classes C and higher) is issued. It will be reset if all stopping alarms have been acknowledged.

Starter {all} ***fixed*** to relay [R3], terminals 32/35

By energizing this relay the starter motor is engaged. When reaching ignition speed (Parameter 57) or the maximum starter time (Parameter 52), this relay will be de-energized again.

Fuel solenoid / gas valve (Diesel / gas engine) **{all}** ***fixed*** to relay [R4], terminals 33/35

Fuel solenoid: By energizing this relay the fuel solenoid for the diesel engine is energized. If the engine should be shut down or engine-firing speed drops below the set speed, this relay de-energizes immediately.
Gas valve: By energizing this relay the gas valve for the engine is enabled. If the engine should be shut down or the engine speed drops below the set ignition speed, this relay de-energizes immediately.

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

By energizing this relay preheating of the diesel engine is carried out. Refer to parameter "Preglow mode" in section "Engine".

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

By energizing this relay the ignition of the gas engine is enabled.

Auxiliary services *programmable* to relay [R6], terminals 36/37

Prior to engine start (pre-run):
Before each starting sequence this relay may be energized for an adjustable time (i.e. opening louvers). By energizing the relay output the message "Aux.serv.prerun" is displayed in the control screen. This relay is always energized if speed is detected. In the "MANUAL" operating mode this relay output is always energized. The signal remains ON until the operating mode is changed.

During engine run:
The relay remains energized while the engine is running or as long as speed is detected.

Following an engine stop (post-operation):
After each engine stop (speed is no longer detected) this relay may remain energized for an adjustable time (i.e. operate a cooling pump). If the operating mode is changed from MANUAL to STOP or AUTOMATIC without a start command the relay remains energized for this period of time. The message "Aux. services" will be displayed on the control unit screen. In the "MANUAL" operating mode this relay output is always energized. The signal remains ON until the operating mode is changed.

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

{1o}: This relay remains de-energized until the GCB is manually closed. The relay will de-energize when a fault condition or an engine shut down occurs.
{1oc}or{2oc): This relay will be energized by the control unit to perform the GCB switching operation. If "Reply: GCB is open" occurs, the relay will de-energize.

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

By energizing this relay the MCB will be closed. This output is always a closing pulse. This requires the MCB have a holding coil and sealing contacts, which are external to the control unit.

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

By energizing this relay the MCB will be opened. If "Reply MCB is open" occurs the relay output will be terminated.

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

Configured maintaining output: Energizing this relay will close the GCB. If the GCB is configured as a maintaining output the relay will remain energized as long as the discrete input "Reply: GCB is open" is not active. If an alarm class C or higher occurs or the GCB is opened, this relay de-energizes.
Configured momentary output: If the relay is configured in this manner a holding coil and sealing contacts must be installed externally to the control unit.

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

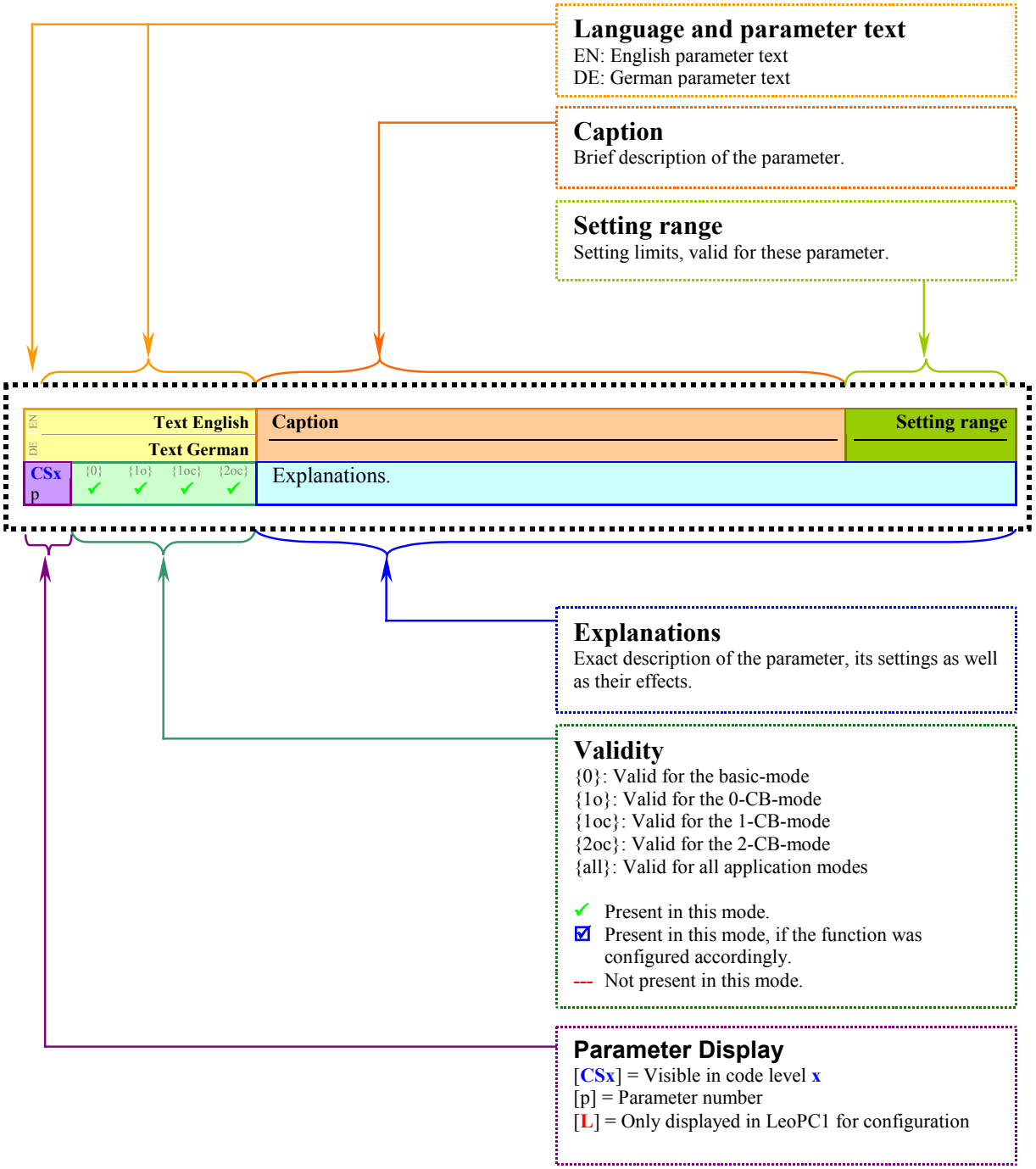
This relay energizes when the control unit is powered up and the control unit does not detect any internal fault conditions within the CPU. If the relay de-energizes safe operation of the control unit cannot be ensured. This is a watchdog relay for the control unit CPU. It is recommended this relay should be wired to an emergency stop function(i.e. open GCB and stop engine). Additionally, it is possible to configure further events, which cause the relay to de-energize, using the *LogicsManager*.

***LogicsManager* Relay {all}**

All relays not assigned a defined function, may 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 = none
This code level permits for monitoring of the system but does not permit access to the parameters. Configuration is blocked. Only the time may be adjusted. The unit powers up in this code level.

Code level CS1 ***(Service Level)*** Standard password = "**0 0 0 1**"
This code level entitles the user to change selected non-critical parameters, such as setting Bar/PSI, °C/°F, and horn reset time. Changing a password is not permitted at this level. Access granted by this password expires two hours after the password has been entered and the user is returned to the CL0 level.

Code level CL2 ***(Temporary Commission Level)*** No standard password available
Permits temporary access to most of the parameters (displaying and changing). It is calculated out of the random number and a formula. It is designed to grant an user one-time access to a parameter without having to give him a reusable password. Access granted by this password expires two hours after the password has been entered and the user is returned to the CL0 level.

Code level CS3 ***(Commission Level)*** Standard password = "**0 0 0 3**"
Permits complete direct access to all parameters (displaying and changing). In addition, the user may also change the passwords for levels CL1 and CL2. Access granted by this password expires two hours after the password has been entered and the user is returned to the CL0 level.

NOTE

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

It is possible to disable expiration of the password by entering "0000" after the CL1 or CL3 password has been entered. Access to the entered code level will remain enabled until another password is entered. Otherwise, the code level would expire when loading the standard values (default 0000) via LeoPC1.

EN	Password				**Password: Entry via front panel**	**0000 to 9999**
DE	Passwort					
CS0	{0} ✓	{1o} ✓	{1oc} ✓	{2oc} ✓	To configure the control via the front panel bus enter the password.	

EN	Password CAN				**Password: Entry via CAN bus**	**0000 to 9999**
DE	Passwort CAN					
L1	{0} ✓	{1o} ✓	{1oc} ✓	{2oc} ✓	To configure the control via CAN bus enter "password CAN".	

EN	Password DPC				**Password: Entry via DPC**	**0000 to 9999**
DE	Passwort RS232 / DPC					
L2	{0} ✓	{1o} ✓	{1oc} ✓	{2oc} ✓	To configure the control via DPC please enter "password DPC".	

Event History

The event history is a FIFO (First In/First Out) memory for logging alarm events and operation states of the unit. The capacity of the event history is 300 entries. As new event messages are entered into the history, the oldest messages are deleted once 300 events have occurred.
The individual events, which are stored in the event history, are listed in Table 3-28 on page 176.

The event history display is password-protected and may only be viewed if the password for code level 2 or higher is entered. If the password for code level 2, 3, or 4 is entered (depending on the setting of the parameter "Code level for reset event log"), it is also possible to delete single entries from the event history with the ✓ button when they are highlighted.

Refer to Appendix D: GetEventLog starting at page 173 for a description about reading out the event history using a software tool.

Figure 3-1: Event history- display

NOTE

The ✓ button deletes the highlighted entry if the appropriate password is entered!

A date/time stamp is added to each entry. Additional characters (+ and -) indicate the state of the alarm. The "+" character indicates an alarm condition that is still active. If the alarm conditions are no longer present anymore, the "+" character will be changed to "-".

EN Event history display
DE Ereignisspeicher anzeigen

	{0}	{1o}	{1oc}	{2oc}
CS2	✓	✓	✓	✓

Event history: Display event history — **Info**

Individual entries can be selected with the ↑ or ↓ keys and deleted from the event history with the ✓ key.

EN Clear event log
DE Ereignisspeicher löschen

	{0}	{1o}	{1oc}	{2oc}
CS2	✓	✓	✓	✓

Event history: Clear event history — **YES / NO**

YES .....The complete event history will be deleted. After the event history has been deleted, this parameter changes back to "NO" automatically.
NO .....The event history will not be deleted.

NOTE: The accessibility of this parameter depends on the setting of the parameter "Code level for reset event log".

NOTE

The code level for the parameter "Clear event log" may be changed to prevent unwanted deletion of code level entries. In this case, it is required to enter the password for the appropriate code level to access this parameter.

EN Code level for reset event log
DE Codestufe f. Speich. löschen

	{0}	{1o}	{1oc}	{2oc}
CS4	✓	✓	✓	✓

Event history: Set code level for resetting the event log — **2 to 4**

The code level, which is required to display the parameter "Clear event log" and delete entries from the event history may be configured here.

Measuring

NOTE

This controller is available in two different hardware version with either 1A [../1] or 5A [../5] current transformer inputs. Both versions are discussed in this manual. The set points for specific parameters will differ depending upon the hardware version.

NOTE

It is absolutely essential that correct rated values to be entered when configuring the controller, as many measurement and monitoring functions refer to these values.

Measuring: Rated Values

EN Rated system frequency
DE Nennfrequenz im System
CS0 {0} {1o} {1oc} {2oc}
3 ✓ ✓ ✓ ✓

Rated system frequency **50/60 Hz**

The rated frequency of the system is used as a reference figure for all frequency related functions, which use a percentage value, like frequency monitoring or breaker operation windows.

EN Rated voltage generator
DE Nennspannung Generator
CS0 {0} {1o} {1oc} {2oc}
4 ✓ ✓ ✓ ✓

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

ⓘ This value refers to the rated voltage of the generator (generator voltage on data plate) and is the voltage measured on the potential transformer primary.

The generator potential transformer primary voltage is entered in this parameter. The generator rated voltage is used as a reference figure for all generator voltage related functions, which use a percentage value, like generator voltage monitoring or breaker operation windows.

EN Rated voltage mains
DE Nennspannung Netz
CS0 {0} {1o} {1oc} {2oc}
5 --- --- --- ✓

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

ⓘ This value refers to the rated voltage of the mains and is the voltage measured on the potential transformer primary.

The mains potential transformer primary voltage is entered in this parameter. The mains rated voltage is used as a reference figure for all mains voltage related functions, which use a percentage value, like mains voltage monitoring or breaker operation windows.

EN Generator voltage measuring
DE Gen.Spannungsmessung

	{0}	{1o}	{1oc}	{2oc}
CS0 6	✓	✓	✓	✓

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

ⓘ Please refer to the comments on measuring principles in the installation manual (37390).

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 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 Line-Neutral (WYE connected system). 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 Generator current measuring
DE Gen.Strommessung

	{0}	{1o}	{1oc}	{2oc}
CS0 7	✓	✓	✓	✓

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

ⓘ Please refer to the comments on measuring principles in the installation manual (37390).

L1 L2 L3 .....All three phases are monitored. 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{1/2/3} Only one phase is monitored. The measurement, display and protection are adjusted according to the rules for single-phase measurement. Monitoring refers to the selected phase.

EN Mains voltage measuring
DE Netz.Spannungsmessung
CS0 {0} {1o} {1oc} {2oc}
8 --- --- --- ✓

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

ⓘ Please refer to the comments on measuring principles in the installation manual (37390).

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 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 Line-Neutral (WYE connected system). 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
CS0 {0} {1o} {1oc} {2oc}
9 --- --- --- ✓

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

ⓘ Please refer to the comments on measuring principles in the installation manual (37390).

Phase L{1/2/3} Measurement is performed for the selected phase only. The measurement and display refer to the selected phase. The configured phase CT must be connected to perform current measurement.

NOTE

It is absolutely essential that correct rated values to be entered when configuring the controller, as many measurement and monitoring functions refer to these values.

EN Rated active power[kW]
DE Nennwirkleistung[kW]
CS0 {0} {1o} {1oc} {2oc}
10 ✓ ✓ ✓ ✓

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

This value specifies the generator real power rating, which is used as a reference figure for related functions. The generator rated active power is the generator apparent power multiplied by the generator power factor (typically ~0.8). These values are indicated in the generator data plate.

EN Rated current
DE Nennstrom Generator
CS0 {0} {1o} {1oc} {2oc}
11 ✓ ✓ ✓ ✓

Rated current **5 to 32.000 A**

This value specifies the generator rated current, which is used as a reference figure for related functions.

Measuring: Transformers

Voltage Transformer

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

	{0}	{1o}	{1oc}	{2oc}
CS0 12	✓	✓	✓	✓

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

Some generator applications may require the use of potential transformers to facilitate measuring the voltages produced by the generator. The rating of the primary side of the potential transformer must be entered into this parameter.

If the generator application does not require potential transformers (i.e. the generated voltage is 480 V or less), then the generated voltage will be entered into this parameter.

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

	{0}	{1o}	{1oc}	{2oc}
CS0 13	✓	✓	✓	✓

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

ⓘ The control is equipped with dual voltage measuring inputs. The voltage range of these measurement inputs is dependent upon input terminals are used (see below). This value refers to the secondary voltages of the potential transformers, which are directly connected to the control.

Some generator applications may require the use of potential transformers to facilitate measuring the voltages produced by the generator. The rating of the secondary side of the potential transformer must be entered into this parameter.

If the generator application does not require potential transformers (i.e. the generated voltage is 480 V or less), then the generated voltage will be entered into this parameter.

- Rated voltage: 100 V (this parameter configured between 50 and 130 V)
  - Generator voltage: Terminals 22/24/26/28
- Rated voltage: 400 V (this parameter configured between 131 and 480 V)
  - Generator voltage: Terminals 23/25/27/29

! **WARNING:**
Only connect the measured voltage to either the 100 V or the 400 V inputs. Do not connect both sets of inputs to the measured system.

EN Mains.volt. transf. primary
DE Netz.Spg.Wandler primär
CS0 {0} {1o} {1oc} {2oc}
14 --- --- --- ✓

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

Some applications may require the use of potential transformers to facilitate measuring the voltages to be monitored. The rating of the primary side of the potential transformer must be entered into this parameter.

If the application does not require potential transformers (i.e. the measured voltage is 480 V or less), then the measured voltage will be entered into this parameter.

EN Mains.volt. transf. secondary
DE Netz.Spg.Wandler sekundär
CS0 {0} {1o} {1oc} {2oc}
15 --- --- --- ✓

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

ⓘ The control is equipped with dual voltage measuring inputs. The voltage range of these measurement inputs is dependent upon input terminals are used (see below). This value refers to the secondary voltages of the potential transformers, which are directly connected to the control.

Some applications may require the use of potential transformers to facilitate measuring the mains voltages. The rating of the secondary side of the potential transformer must be entered into this parameter.

If the application does not require potential transformers (i.e. the measured voltage is 480 V or less), then the measured voltage will be entered into this parameter.

- Rated voltage: 100 V (this parameter configured between 50 and 130 V)
  - Mains voltage: Terminals 14/16/18/20
- Rated voltage: 400 V (this parameter configured between 131 and 480 V)
  - Mains Voltage: Terminals 15/17/19/21

! **WARNING:**
Only connect the measured voltage to either the 100 V or the 400 V inputs. Do not connect both sets of inputs to the measured system.

Current Transformer

EN Generator current transformer
DE Generator Stromwandler
CS0 {0} {1o} {1oc} {2oc}
16 ✓ ✓ ✓ ✓

Current transformer, generator **1 to 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, which control the same memory location. You can find this value at the unit either on the data plate or via the software.
The input of the current transformer ratio is necessary for the indication and control of the actual monitored value. The current transformers ratio should be selected so that at least 60% of the secondary current rating can be measured when the monitored system is at 100% of operating capacity (i.e. at 100% of system capacity a 5 A CT should output 3 A). If the current transformers are sized so that the percentage of the output is lower, the loss of resolution may cause inaccuracies in the monitoring and control functions and affect the functionality of the control.

{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 Input mains current
DE Eingang Netzstrom

	{0}	{1o}	{1oc}	{2oc}
CS3 17	✓	✓	✓	☑

Current transformer, input **Mains / Ground / Off**

Mains .....Mains current input is used for measuring the mains current. The ground current is only provided as calculated ground current.

ⓘ The ground current monitoring refers to the rated generator current!

Ground.....Mains current input is used for the directly measured ground current. The calculated ground current is not evaluated anymore.

ⓘ The ground current monitoring refers to the rated transformer current configured at the unit!

Off .....No measuring is performed at the mains current input and the following mains values are not displayed:
power factor, current, real power, and reactive power

NOTE

It depends on the setting of the above parameter, whether one of the following screens is displayed.

EN Mains curent transformer
DE Netz Stromwandler

	{0}	{1o}	{1oc}	{2oc}
CS0 18	---	---	---	☑

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

ⓘ Current transformer ratio for the mains.

The control can be optionally equipped with ../1 A or with ../5 A current transformer inputs. Depending on the version there are two different specifications of the parameter, which control the same memory location. You can find this value at the unit either on the data plate or via the software.
The input of the current transformer ratio is necessary for the indication and control of the actual monitored value. The current transformers ratio should be selected so that at least 60% of the secondary current rating can be measured when the monitored system is at 100% of operating capacity (i.e. at 100% of system capacity a 5 A CT should output 3 A). If the current transformers are sized so that the percentage of the output is lower, the loss of resolution may cause inaccuracies in the monitoring and control functions and affect the functionality of the control.

{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 Ground current transformer
DE Erd-Stromwandler

	{0}	{1o}	{1oc}	{2oc}
CS0 19	✓	✓	✓	☑

Current transformer, ground **1 to 32,000/{x} A**

ⓘ Ground current transformer ratio.

The control can be optionally equipped with ../1 A or with ../5 A current transformer inputs. Depending on the version there are two different specifications of the parameter, which control the same memory location. You can find this value either on the data plate or via the software.
The input of the current transformer ratio is necessary for the indication and control of the actual monitored value. The current transformers ratio should be selected so that at least 60% of the secondary current rating can be measured when the monitored system is at 100% of operating capacity (i.e. at 100% of system capacity a 5 A CT should output 3 A). If the current transformers are sized so that the percentage of the output is lower, the loss of resolution may cause inaccuracies in the monitoring and control functions and affect the functionality of the control.

{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.

Application

Application: Application Mode

NOTE

All functions which are described in the following text may be assigned by the *LogicsManager* to any relay which is available via the *LogicsManager* and not assigned to another function. The assignment of the defined relays to defined functions occurs by selection of the application mode (i.e. function "Command: Close GCB" on relay [R10], this relay can no longer be operated via the *LogicsManager*). The same way some relays are designated to specific functions, others may be assigned to different functions. These are listed as "programmed" relays. If a relay is "programmable" the function may be assigned to other relays via the *LogicsManager* by configuration.

NOTE

Changing the application mode will not change other configured values in the parameters. The application mode parameter is the only mode that will be affected.

EN	Application mode				
DE	Betriebsmodus				
CS0	{0}	{1o}	{1oc}	{2oc}	
20	✓	✓	✓	✓	

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

The unit may be configured for four different application modes. The discrete inputs and relay outputs are pre-defined dependent upon the selected application mode. Only the screens and functions that pertain to the application mode selected are displayed. Refer to the "Operation manual" (37392) for additional information.

None..... Application mode **{0}** "Engine Control" [BM]
The control unit will function as an engine control. All necessary inputs and outputs are assigned and pre-defined.

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

GCB..... Application mode **{1oc}** "1-CB control" [open/close GCB]
The control unit will function as a 1 CB unit. The control unit can open and close the GCB. All necessary inputs and outputs are assigned and pre-defined.

GCB/MCB... Application mode **{2oc}** "2 CB control" [open/close GCB/MCB]
The control unit will function as a 2 CB unit. The control unit can open and close the GCB and the MCB. All necessary inputs and outputs are assigned and pre-defined.

Application: Start In AUTOMATIC Operating Mode (*LogicsManager*)

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

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

If this logical output becomes TRUE in AUTOMATIC operating mode, the generator starts and the GCB will be closed. The simultaneous activation of other *LogicsManager* outputs (e.g. Stop req. in Auto, Start w/o load) may affect this function.
Only {1oc}, {2oc}: If this logical output becomes FALSE again, the GCB will be opened again and the generator will be stopped after the cool-down phase.

EN					**Start req. in Auto**
DE					**Startanf. in Auto**
CS0	{0}	{1o}	{1oc}	{2oc}	
21	✓	✓	✓	✓	

Start request in operation mode AUTOMATIC ***LogicsManager***

The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

Application: Stop In AUTOMATIC Operating Mode (*LogicsManager*)

If this logical output becomes TRUE, it inhibits all other start processes (e.g. Start req. in Auto, emergency power, etc.). Stopping of the engine can be initiated externally via a discrete input or any logical combination.

EN					**Stop req. in Auto**
DE					**Stopanf. in Auto**
CS0	{0}	{1o}	{1oc}	{2oc}	
22	✓	✓	✓	✓	

Stop request in operation mode AUTOMATIC ***LogicsManager***

The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

Application: Operating Mode

EN					**Start w/o load**
DE					**Start ohne Übernahme**
CS0	{0}	{1o}	{1oc}	{2oc}	
23	---	---	✓	✓	

Start without assuming load ***LogicsManager***

If this *LogicsManager* condition is TRUE switching from mains to generator supply following an engine start is prevented (the GCB operation is blocked). This function may be used to perform a test operation. If an emergency power case occurs meanwhile, it is still possible to change to generator operation. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN					**Startup in mode**
DE					**Einschalten in Betriebsart**
CS0	{0}	{1o}	{1oc}	{2oc}	
24	---	---	✓	✓	

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

If the controller is powered down, the unit will start in the following configured mode when it is powered up again.

Stop .....The unit starts in the STOP operating mode.
Auto.....The unit starts in the AUTOMATIC operating mode.
Manual.....The unit starts in the MANUAL operating mode.
last.....The unit starts in the last operating mode the control was in prior to being de-energized.

NOTE

For the selection of the operating mode via the *LogicsManager* (if two different operating modes have been selected simultaneously) the control unit will prioritize the modes as follows:

1. **STOP,**
2. **MANUAL**
3. **AUTOMATIC**

EN Operation mode AUTO
DE Betriebsart AUTO

	{0}	{1o}	{1oc}	{2oc}
CS0 25	✓	✓	✓	✓

Activate operating mode AUTOMATIC *LogicsManager*

Once the conditions of the *LogicsManager* have been fulfilled the unit will change into operating mode AUTOMATIC. If AUTOMATIC mode is selected via the *LogicsManager* it is not possible to change operating modes via the front panel. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN Operation mode MAN
DE Betriebsart MAN

	{0}	{1o}	{1oc}	{2oc}
CS0 26	✓	✓	✓	✓

Activate operating mode MANUAL *LogicsManager*

Once the conditions of the *LogicsManager* have been fulfilled the unit will change into operating mode MANUAL. If MANUAL mode is selected via the *LogicsManager* it is not possible to change operating modes via the front panel. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN Operation mode STOP
DE Betriebsart STOP

	{0}	{1o}	{1oc}	{2oc}
CS0 27	✓	✓	✓	✓

Activate operating mode STOP *LogicsManager*

Once the conditions of the *LogicsManager* have been fulfilled the unit will change into operating mode STOP. If STOP mode is selected via the *LogicsManager* it is not possible to change operating modes via the front panel. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

NOTE

If a stopping alarm (alarm class C, D, E, or F; refer to Alarm on page 138) occurs in AUTOMATIC operating mode, the alarm may only be acknowledged via external acknowledgement (refer to Protection: Alarm Acknowledgement on page 51) or after selecting STOP operating mode.

Application: Liquid Crystal Display (LC Display)

EN Alternative screen
DE Alternative Anzeigemasken

	{0}	{1o}	{1oc}	{2oc}
CS0 28	✓	✓	✓	✓

Show alternative screens **YES / NO**

YES..... The alternative screens are shown in the LC display. Refer to manual 37392.
NO..... The standard screens are shown in the LC display. Refer to manual 37392.

EN Show mains data
DE Netzdaten anzeigen

	{0}	{1o}	{1oc}	{2oc}
CS0 29	---	---	---	✓

Show mains data **YES / NO**

YES..... The alternative screens are shown in the LC display. Refer to manual 37392.
NO..... The standard screens are shown in the LC display. Refer to manual 37392.

Application: Dynamical Display

The easYgen primary measurement display screen "Generator values - overview" provides five configurable display fields. The measurement value and the unit may be configured freely for each of these fields. The figure below shows these five fields with the default settings.

The different fields have different value length restrictions. If a measurement value is assigned to a field with insufficient length, the value will not be displayed correctly.

Field	maximum length
Field 1	31 px (pixels)
Field 2	35 px (pixels)
Field 3	28 px (pixels)
Field 4	28 px (pixels)
Field 5	35 px (pixels)

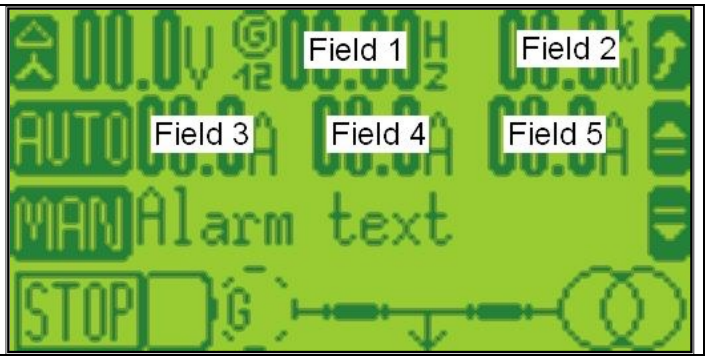


Figure 3-2: Dynamical display - fields

Two parameters are available for each field to configure the measurement value and unit to be displayed in the respective field.

EN Value display field x
DE Inhalt Anzeige Feld x

	{0}	{1o}	{1oc}	{2oc}
CS3 30	✓	✓	✓	✓

Value display field {x} [x = 1 to 5] **refer to selection below**

This parameter configures the displayed measurement value for the respective display field. Consider the value length restrictions for the different fields.

Off	No measurement value is displayed	
Gen. frq.	The generator frequency is displayed in [Hz]	31 px
Gen. Pwr.	The generator power is displayed in [kW]	30 px
Gen. PF	The generator power factor is displayed	27 px
Gen Cur A	The generator current of phase L1 is displayed in [A]	25 px
Gen Cur B	The generator current of phase L2 is displayed in [A]	25 px
Gen Cur C	The generator current of phase L3 is displayed in [A]	25 px
GenCurAvg	The average generator current of all three phases is displayed in [A]	25 px

Note: Refer to Appendix E: Average Generator Current Calculation on page 177 for detailed information about the calculation of the average generator current depending on the parameters "Generator voltage measuring" (Parameter 6) and "Generator current measuring" (Parameter 7).

Batt. Vol	The battery voltage is displayed in [V]	24 px
An. Inp.1	The value of the analog input 1 is displayed	35 px
An. Inp.2	The value of the analog input 2 is displayed	35 px
Eng. Spd.	The engine speed is displayed in [rpm]	28 px

Note: The following J1939 engine status messages may be displayed if an ECU is connected and configured accordingly. If the J1939 values are not received correctly (due to a wire break or sensor defect), "----" is displayed in front of the engineering unit.

ECUSPN100	The engine oil pressure is displayed in [bar] or [psi]	35 px
ECUSPN110	The engine coolant temperature is displayed in [°C] or [°F]	28 px
ECUSPN175	The engine oil temperature is displayed in [°C] or [°F]	28 px
ECUSPN190	The engine speed is displayed in [rpm]	28 px

NOTE

The J1939 values from the ECU have the following display range:

- **ECUSPN100 (engine oil pressure) 0 to 10.00 bar / 0 to 145 psi**
- **ECUSPN110 (engine coolant temperature) -40 to 210 °C / -39 to 410 °F**
- **ECUSPN175 (engine oil temperature) -273 to 1735 °C / -459 to 3155 °F**
- **ECUSPN190 (engine speed) 0 to 8031 rpm**

EN	Unit display field x			
DE	Einheit Anzeige Feld x			
CS3	{0}	{1o}	{1oc}	{2oc}
31	✓	✓	✓	✓

Unit display field {x} [x = 1 to 5] **refer to selection below**

This parameter configures the unit, which is displayed next to the measurement value as a bitmap, for the respective display field.

Off.....No engineering unit is displayed following the measured value
psi......"psi" is displayed following the measured value
bar....."bar" is displayed following the measured value
°C ....."°C" is displayed following the measured value
°F....."°F" is displayed following the measured value
rpm ....."rpm" is displayed following the measured value
ohm ....."ohm" is displayed following the measured value

Note: Configuring a unit is **only** required if an analog input is selected in Parameter "Value display field {x}" **and** the analog input type (Parameter 247) is configured as "linear", "Table A", or "Table B".
As an example, if the power, frequency or a J1939 value is configured to a display field, the measured values are automatically provided with the appropriate engineering unit. It is possible to add a display field unit bitmap to the displayed value. This may result in the engineering units overlapping and causing the display to appear corrupted or displaying an incorrect engineering unit.

Display of the Units Depending on the Analog Input Type

The display of the analog input values on the screen depends on the configured analog input type (Parameter 247).

The following table indicates, which analog input types are already assigned an engineering unit:

Analog input type	Screen display
Off	empty display
VDO 5 bar	"xx.xx" + "bar" or "psi" bitmap *
VDO 10 bar	"xx.xx" + "bar" or "psi" bitmap *
VDO 150°C	temp. value + "°C" or "°F" bitmap **
VDO 120°C	temp. value + "°C" or "°F" bitmap **
Pt 100	temp. value + "°C" or "°F" bitmap **
SMP 2125	temp. value + "°C" or "°F" bitmap **
linear	Depending on the formatting of the analog value. The formatting may be configured with the parameter "Value format" (Parameter 253), which may only be accessed via LeoPC1.
Table A	Depending on the formatting of the analog value. The formatting may be configured with the parameter "Value format" (Parameter 253), which may only be accessed via LeoPC1.
Table B	Depending on the formatting of the analog value. The formatting may be configured with the parameter "Value format" (Parameter 253), which may only be accessed via LeoPC1.

* It depends on the setting of "Display pressure in" (Parameter 246) whether "bar" or "psi" is displayed here; the value is converted automatically
** It depends on the setting of "Display temperature in" (Parameter 245) whether "°C" or "°F" is displayed here; the value is converted automatically

Table 3-1: Dynamical display fields - units

NOTE

The freely configurable inputs do not require that the display format consist of numbers. It is also possible to mix text with digits.

Example: A customer configures a format for an analog input in LeoPC1 as: "000lbs"

The screen will display the measurement value followed by the text "lbs". The zeros are only used as placeholder for the measurement value.

Maximum Length of the Measurement Values

The maximum length of the measurement values in the individual fields is:

Field 1 = 5 digits
Field 2 = 6 digits
Field 3 = 5 digits
Field 4 = 5 digits
Field 5 = 6 digits

Woodward recommends using fields 2 and 5 for analog input values because these fields display 6 digits permitting a higher resolution.

Application: Critical Mode (Sprinkler Operation, *LogicsManager*)

The critical mode may be externally initiated via a discrete input. The *LogicsManager* is used to define the conditions that will enable the critical mode (for conditions and explanation of programming refer to *LogicsManager* on page 122).

Alarm Classes

When critical mode is enabled the alarm classes are reclassified 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 critical mode operation *LogicsManager* output becomes TRUE (logic "1"). The "**Critical mode**" message is displayed on the LC screen. If the engine is not already running, the controller will attempt to start the engine up to 10 times (unless configured for less). All shutdown alarms become warning messages (see above).

Critical mode "OFF"

A critical mode will be interrupted/stopped once critical mode operation *LogicsManager* output becomes FALSE (logic "0"). The critical mode operation is continued for the configured critical mode postrun time. If the operation mode changes to STOP, this time will be considered as expired. With termination of the critical mode, a normal cool down is performed.

Critical mode and emergency power {2oc}

The emergency power operation has priority. If there is a mains failure during the critical mode, the generator will supply the busbar. The MCB will be opened and the GCB will be closed. The "**Emerg/Critical**" message is displayed on the LC screen and all shutdown alarms become warning alarms.

- ⇨ Critical mode ends before mains recovery: The emergency power operation will be continued and all shutdown alarms become active again. If the mains return, the unit transfers the load from generator supply to mains supply after the mains settling delay expires.
- ⇨ Emergency power operation ends before the end of the critical mode: The critical mode is maintained and the load is transferred from generator supply to mains supply after the mains settling delay expires. 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 while 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). The "**Critical mode**" message is displayed on the LC screen and all shutdown alarms become warning alarms.

- ⇨ Critical mode ends before the start request is terminated: The engine continues running (in application mode {2oc} there will be a change from mains supply to generator supply of the busbar). All shutdown 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 no longer fulfilled.

Parameters

If this logical output becomes TRUE in AUTOMATIC operating mode, it starts the critical mode.

EN	Critical mode				**Critical mode request** — *LogicsManager*
DE	Sprinklerbetrieb				
	{0}	{1o}	{1oc}	{2oc}	
32	✓	✓	✓	✓	

The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN	Critical mode postrun				**Critical mode postrun time** — **0 to 6000 s**
DE	Sprinkler Nachlaufzeit				
	{0}	{1o}	{1oc}	{2oc}	
33	✓	✓	✓	✓	

The critical mode operation is continued for the time configured here after the critical mode request has been terminated.

EN	Close GCB in override				**Close GCB in critical mode** — **YES / NO**
DE	GLS schließen bei Sprinkler				
	{0}	{1o}	{1oc}	{2oc}	
34	---	---	✓	✓	

YES ..... If a critical mode operation is detected the GCB will close.
NO ..... The GCB cannot be closed during a critical mode operation.

EN	Override alarm cl. also in MAN				**Critical mode alarm classes active in MANUAL operating mode** — **YES / NO**
DE	Sprinkler Alarmkl. in MAN				
	{0}	{1o}	{1oc}	{2oc}	
35	✓	✓	✓	✓	

YES ..... The critical mode alarm classes will override the normal operation alarm classes when in MANUAL operation mode if enable via the *LogicsManager*.
NO ..... The alarm classes will not be changed in the MANUAL operating mode.

EN	Break emergency in override				**Critical mode override emergency operations …** — **0 to 999 s**
DE	Pause Notstrom bei Sprinkler				
	{0}	{1o}	{1oc}	{2oc}	
36	---	---	---	✓	

The emergency power operations are overridden for the configured time when the critical mode starts to supply the complete generator power to the sprinkler pump.

Engine

Engine: Start /Stop Sequence

NOTE

All functions which are described in the following text, may be assigned by the *LogicsManager* to any relay that is available via the *LogicsManager* and not assigned another function.

EN					Start/Stop mode
DE					Start/Stop Modus
	{0}	{1o}	{1oc}	{2oc}	
37	✓	✓	✓	✓	

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

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

Engine: Diesel Engine

Start sequence

The relay "Pre-glow" will be energized for the preheating time period ("**Preglow**" display). Following preheating, the fuel solenoid is first energized and then the starter is engaged ("**Start**" display). When the configured firing speed is exceeded, the starter is disengaged and the fuel solenoid remains energized via the firing speed. If the engine fails to start, the starting sequence is blocked ("**Stop engine**" display) for a configurable time period ("Time for engine stop"), and the message "Crank protect" is displayed if starting of the engine is attempted. If the number of unsuccessful start attempts reaches the configured value, an alarm message will be issued ("**Start fail**" display).

Stop sequence

After opening the GCB, the coasting time starts and the engine runs without load ("**Cool down**" display). On termination of the coasting time, the fuel solenoid is de-energized, and the engine is stopped ("**Stop engine**" display). If starting of the engine is attempted. If the engine cannot be stopped via the fuel solenoid, the alarm message "**Shutdown malfct.**" 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]

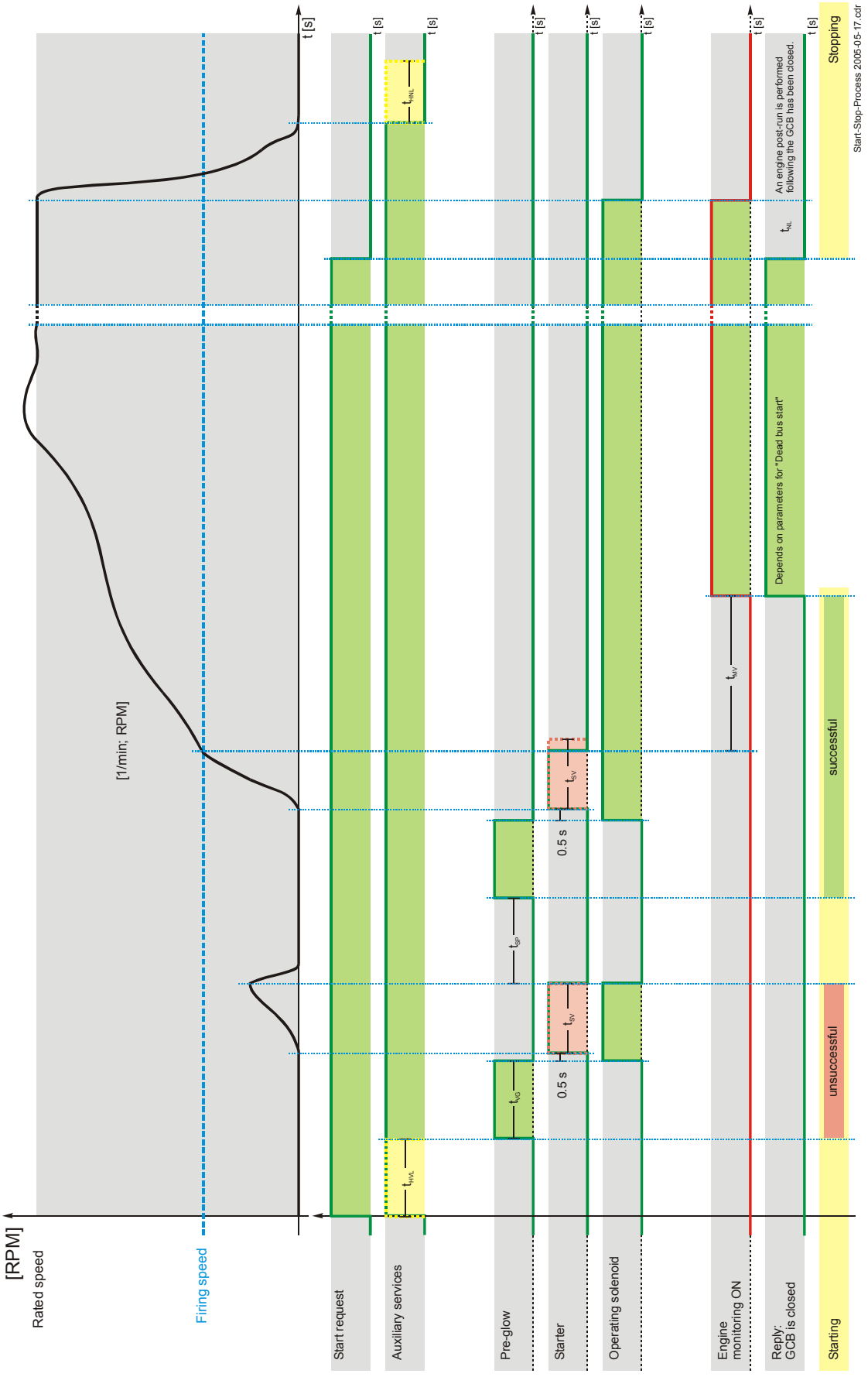


Figure 3-3: Start /stop sequence - diesel engine

Parameter

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

	{0}	{1o}	{1oc}	{2oc}
38	✓	✓	✓	✓

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

YES..... **Stop solenoid**
To stop the engine the stop solenoid is energized. The stop solenoid remains energized for and additional 30 s after speed is no longer detected from the engine.

NO..... **Operating solenoid**
Before each starting sequence the operating solenoid is energized. To stop the engine the operating solenoid is de-energized.

EN Preglow time
DE Vorglühzeit

	{0}	{1o}	{1oc}	{2oc}
39	✓	✓	✓	✓

Diesel engine: Preglow time [t_{VG}] **0 to 300 s**

Before each starting the diesel engine is preheated for this time (if a "0" has been configured here the engine will be started without preglow). The display indicates "**`Preglow`**".

EN Preglow mode
DE Vorglühmodus

	{0}	{1o}	{1oc}	{2oc}
40	✓	✓	✓	✓

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

This parameter dictates if and under what conditions a diesel engine is preheated.

NO..... The diesel engine is never preheated before a start attempt.

Always ..... Before a start attempt the "Preheating" relay is always energized for the pre-glow time (previous screen). After that a start attempt is initiated.

An.in.{x} ..... Preheating of the engine is initiated by a temperature transducer through 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 screen.

EN Preglow temp. threshold
DE Vorglühen wenn T<

	{0}	{1o}	{1oc}	{2oc}
41	✓	✓	✓	✓

Diesel engine: Preheating temperature set point value **-10 to 60 °C**

If the transducer temperature falls below the value entered here and the previous parameter ("temp 1" or "temp 2") is enabled and the diesel engine will be preheated.

Engine: Gas Engine

Start sequence

Function: The starter is engaged ("**Turning**" display). Following the expiration of the firing delay time and if the engine is rotating with at least the configured "minimum start speed", the ignition is switched on ("**Ignition**" display). Following the expiration of the gas valve delay, the gas valve is then enabled ("**Start**" display). If the starting attempt is successful (i.e. the configured firing speed is exceeded) the starter is disengaged. The gas valve and the ignition remain enabled via the firing speed. If the engine fails to start, the starting sequence is blocked for a configurable time period ("Time for engine stop"), and the message "Crank protect" is displayed if starting of the engine is attempted.

Stop sequence

Function: After opening the GCB, the coasting time starts and the engine runs without load ("**Cool down**" display). On termination of the coasting time, the gas valve is closed or de-energized, and the engine is stopped ("**Stop engine**" display). If the engine cannot be stopped, the alarm message "**Shutdown malfct.**" appears. If no speed is detected anymore, the ignition remains active for 5 seconds so that the remaining gas is able to combust.

CAUTION

It is imperative to connect an emergency stop circuit to discrete input DI 1 to be able to perform an emergency stop by disabling the ignition in case the gas valve fails to close.

Start/stop diagram

The formula signs and indices mean:

t_{HVL} ..... Lead time auxiliary operation.....[s]
t_{SV} ..... Starter time .....[s]
t_{SP} ..... Start pause .....[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]

Parameter

EN Ignition delay
DE Zündverzögerung
{0} {1o} {1oc} {2oc}
42 ✓ ✓ ✓ ✓

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

With gas engines often a purging operation is desired before starting. With the engaging of the starter the ignition delay is started. The display indicates "**Turning**". If the "Minimum speed for ignition" is reached after the expiration of this time, the ignition is energized.

EN Gas valve delay
DE Gasverzögerung
{0} {1o} {1oc} {2oc}
43 ✓ ✓ ✓ ✓

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

By energizing the ignition relay the gas valve delay is started ("**Ignition**" display). After the time set here has expired, and as long as the speed is higher than the minimum speed for ignition, the gas valve is enabled for the time configured in Parameter 52 "Starter time" ("**Start**" display). Once the ignition speed has been reached, the gas valve remains opened. If the speed falls below ignition speed, the gas valve will be closed and the "Ignition" relay is de-energized 5 seconds later.

EN Min.speed for ignition
DE Mindestdrehz. für Zündung
{0} {1o} {1oc} {2oc}
44 ✓ ✓ ✓ ✓

Gas engine: Minimum speed for ignition **10 to 1.800 RPM**

After expiration of the ignition delay the number of revolutions set here must be reached, so the "Ignition" relay will be energized.

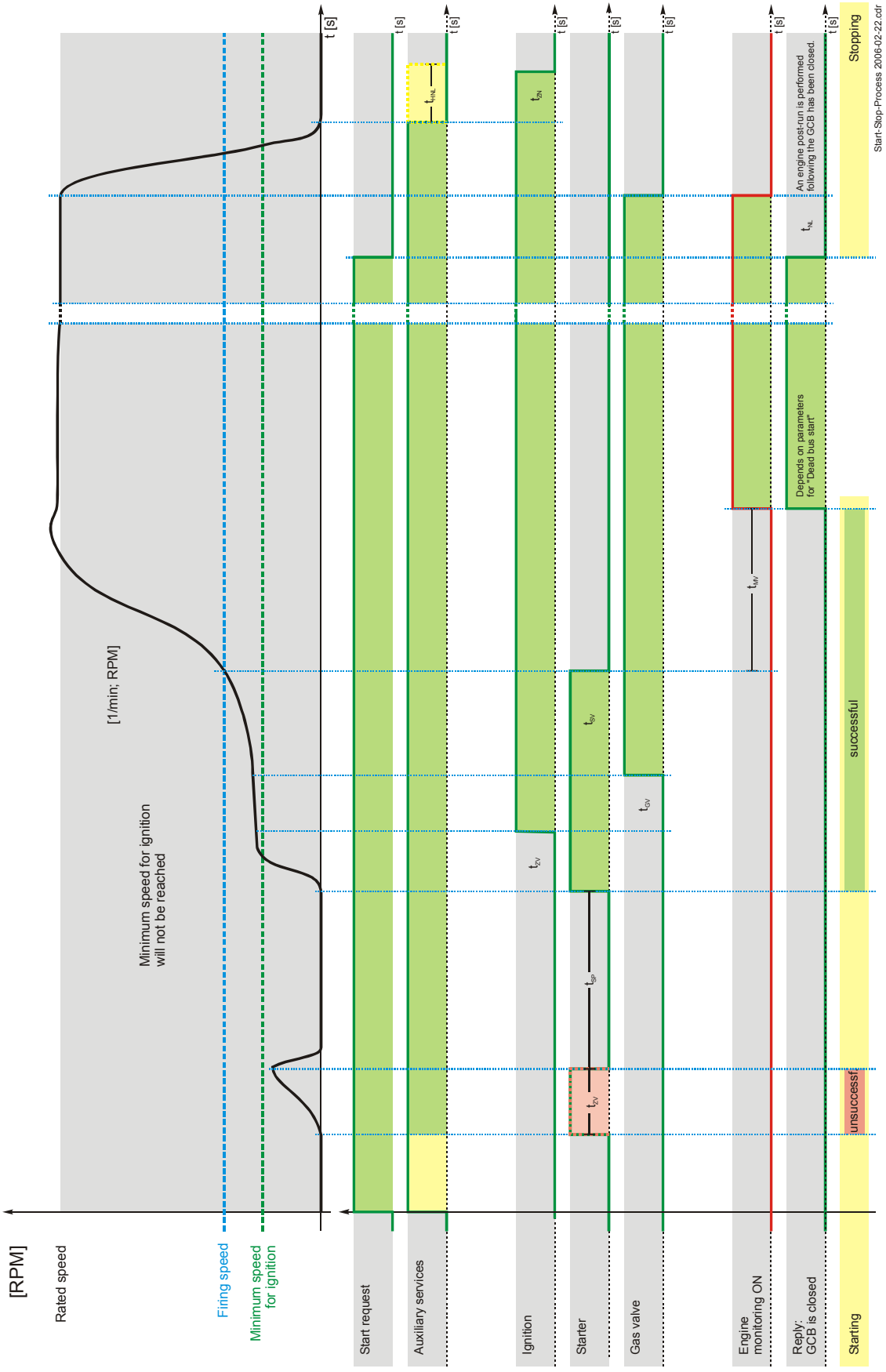


Figure 3-4: Start /stop sequence - gas engine - successful

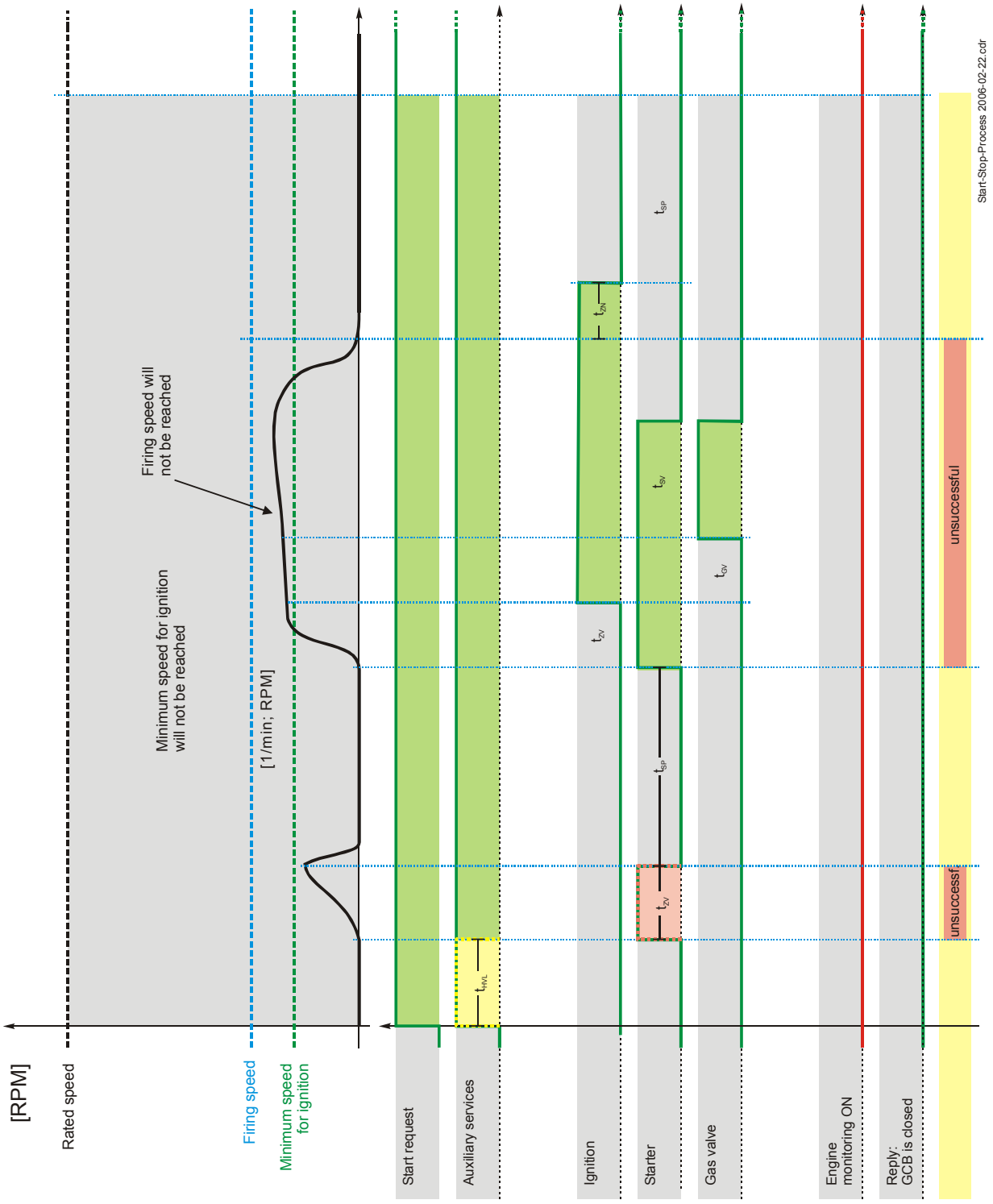


Figure 3-5: Start /stop sequence - gas engine - unsuccessful

Engine: Pickup

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

- Nominal speed (RPM)
- The speed measurement method – via pickup (MPU) or an output at the alternator
- Number of teeth on the flywheel detected by the magnetic pick up (MPU) or the number of pulses per revolution of the engine.

EN Speed Pickup
DE Pickup
45 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Pickup **ON / OFF**

ON..... Speed monitoring of the engine is carried out using an MPU or speed output.
OFF..... Speed/frequency monitoring of the generator set (the engine) is performed by measuring the frequency of the generator. There is no MPU or sensor wired to this unit.

EN Nominal speed
DE Nenndrehzahl
46 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

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

Number of revolutions per minute of the engine at rated engine speed.

EN Pickup measurement from:
DE Pickup Messung über:
47 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Pickup measurement from **Pickup / Sensor**

Pickup..... Speed monitoring of the engine is carried out using an MPU.
Sensor..... Speed monitoring of the engine is carried out using the speed output at the alternator (terminal W).

EN Fly wheel teeth
DE Anzahl Pickup-Zähne
48 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Number of flywheel teeth **2 to 260**

ⓘ This parameter is only visible, if Parameter 47 is configured to Pickup.

The number of pulse per revolution/teeth on the flywheel is configured here.

EN Pulses per revolution
DE Pulse pro Umdrehung
49 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Pulses per revolution **2.00 to 260.00**

ⓘ This parameter is only visible, if Parameter 47 is configured to Sensor.

The number of pulse per revolution is configured here if a speed output at the alternator is used. Since the alternator is usually driven by a V-belt by the engine, the transmission ratio of the belt must be considered here. This parameter provides two decimal digits to be able to adjust any transmission ratio.

EN Filter time constant
DE Filter
50 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Filter time constant **0 to 8**

The filter enables to filter heavily varying speed signals. This may be useful if the speed is measured using an output at the alternator (parameter 47 configured to "Sensor") because engine ignition timing and the elasticity of the V-belt may cause a heavily varying speed display.
The speed display may be filtered with 8 stages. If "0" is configured here, no filter is applied.

Note: If the filter is enabled, only the speed display is filtered. Speed monitoring and the speed value transmitted on the bus systems are not affected by the filter and use the measured speed data.

Engine: Start/Stop Automatic

EN Aux. services prerun
DE Hilfsbetriebe Vorlauf
{0} {1o} {1oc} {2oc}
51 ✓ ✓ ✓ ✓

Engine: Pre-run auxiliary operation (start preparation) [t_{HVL}] **0 to 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 this relay may be energized for an adjustable time (i.e. opening louvers). By energizing the relay output the message "**`Aux.serv.prerun`**" is displayed in the control screen. This relay is always energized if speed is detected. In the "MANUAL" operating mode this relay output is always energized. The signal remains ON until the operating mode is changed.

EN Starter time
DE Einrückzeit Anlasser
{0} {1o} {1oc} {2oc}
52 ✓ ✓ ✓ ✓

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

This is the maximum time that the starter relay will remain energized ("**`Start`**" display). If the discrete input for the *LogicsManager* function "Ignition speed reached" = TRUE, the speed/frequency have reached firing speed, or the time has expired the relay is then de-energized.

EN Start pause time
DE Startpausenzeit
{0} {1o} {1oc} {2oc}
53 ✓ ✓ ✓ ✓

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

This is the delay time between the individual starting attempts. This time also is used to protect the starter relay. The message "**`Start - Pause`**" is displayed.

EN Cool down time
DE Motor Nachlaufzeit
{0} {1o} {1oc} {2oc}
54 ✓ ✓ ✓ ✓

Engine: Cool down time [t_{NL}] **1 to 999 s**

Regular stop: If the engine performs a normal stop (start request is disabled or change into STOP operating mode) or a stop caused by an alarm of alarm class C/D, a cool down with an opened GCB is carried out. This time is programmable. The message "**`Cool down`**" is displayed.

Stop by a class 'C' or 'D' alarm: If the engine is stopped by an alarm of this alarm class, a cool down is carried out with an opened GCB. This time is programmable.

Stop by a class 'E' or 'F' alarm: If the engine is stopped by an alarm of this alarm class, the engine is shutdown without a cool down immediately.

EN Auxiliary services postrun
DE Hilfsbetriebe Nachlauf
{0} {1o} {1oc} {2oc}
55 ✓ ✓ ✓ ✓

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

After each engine stop (speed is no longer detected) this relay may remain energized for an adjustable time (i.e. operate a cooling pump). If the operating mode is changed from MANUAL to STOP or AUTOMATIC without a start command the relay remains energized for this period of time. The message "**`Aux. services`**" will be displayed on the control unit screen. In the "MANUAL" operating mode this relay output is always energized. The signal remains ON until the operating mode is changed.

EN Time of motor stop
DE Zeit für Motorstop
{0} {1o} {1oc} {2oc}
56 ✓ ✓ ✓ ✓

Engine: Engine blocking **0 to 99 s**

During this time a restart of the engine is blocked. This time should be configured so that the engine is total shutdown to protect the starting circuit. Once speed from the engine is no longer detected the time configured in this parameter is initiated. ("**`Stop engine`**" display)

Engine: Firing Speed And Engine Delayed Monitoring

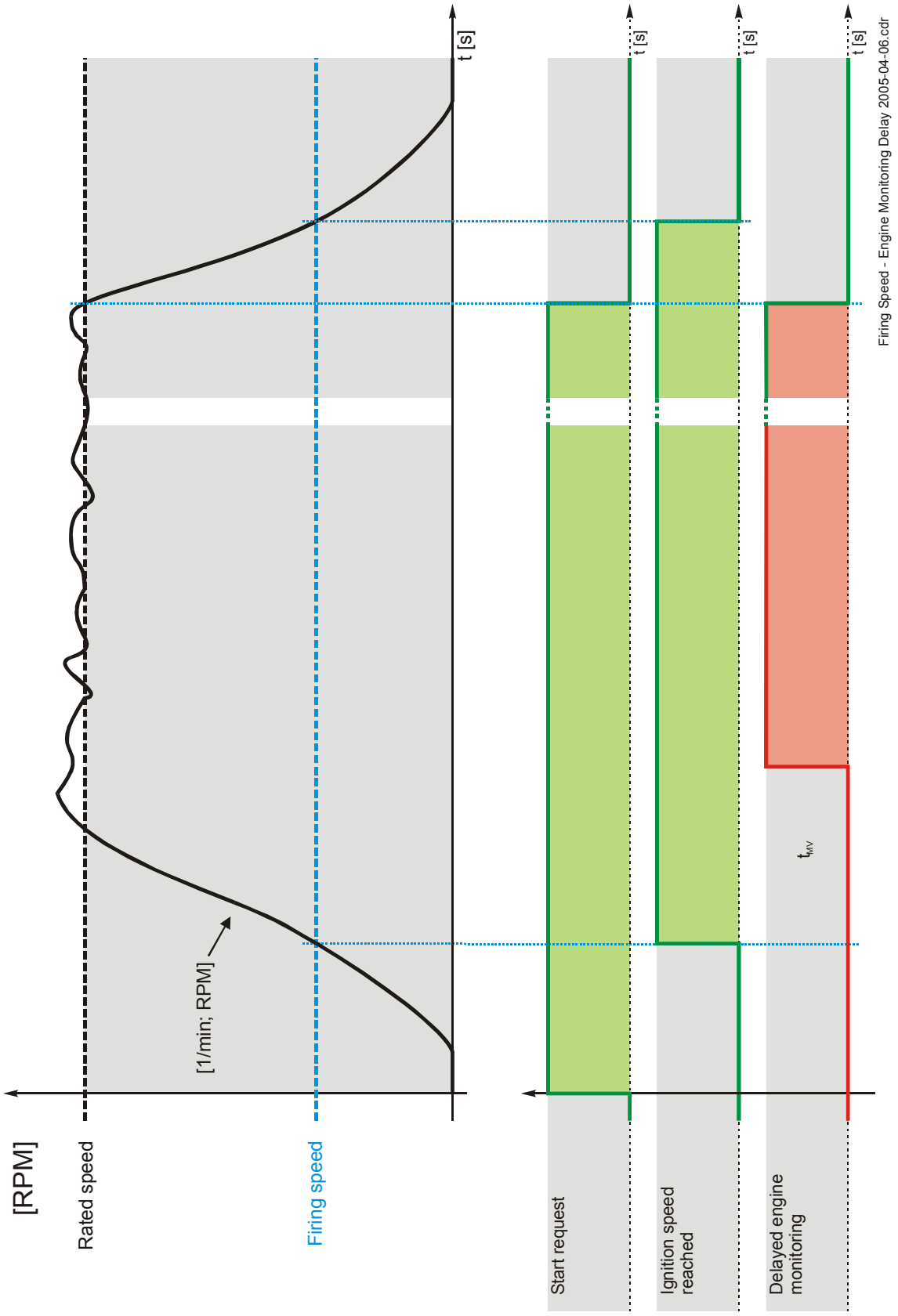


Figure 3-6: Engine - firing speed and engine delayed monitoring

NOTE

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

- **The measurement via MPU is enabled (ON):**
  ⇨ Ignition speed is detected
  ⇨ Ignition speed (measured via the generator voltage) is detected
  ⇨ Conditions for discrete input "Ignition speed" (see *LogicsManager*) equal true.
- **The measurement via MPU is disabled (OFF):**
  ⇨ Ignition speed (measured via the generator voltage) is detected
  ⇨ Conditions for discrete input "Ignition speed" (see *LogicsManager*) equal true.

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}
57 ✓ ✓ ✓ ✓

Engine: Firing speed **5 to 60 Hz**

After firing speed has been reached, the starter is disengaged and the time counter for the engine delayed monitoring is activated. The firing speed is to be configured low enough that it is always exceeded during regular generator operation.

Note: Frequency measurement via the generator voltage input is possible beginning with 15 Hz or higher. If the MPU measurement is enabled, values down to 5 Hz can be measured.

EN Logicm. for firing speed
DE Logikm. für Zünddrehzahl
{0} {1o} {1oc} {2oc}
58 ✓ ✓ ✓ ✓

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

YES.....The engine firing speed is monitored by the *LogicsManager* instead of the MPU.
NO .....The firing speed is measured by the speed/frequency input (MPU), not via the *LogicsManager*.

EN Ignition speed
DE Zünddrehz. erreicht
{0} {1o} {1oc} {2oc}
59 ✓ ✓ ✓ ✓

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

Once the conditions of the *LogicsManager* have been fulfilled the ignition speed will be recognized as above minimum limit (e.g. via an oil pressure switch). The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

Engine: Engine Delayed Monitoring

After reaching the minimum ignition speed a timer is started. Upon expiration of this timer all "engine delayed monitoring" configured alarms and discrete inputs will be enabled. This timer should be configured in such a manner that it corresponds to the starting time of the engine plus any possible startup transients. A GCB closure may take place after the expiration of this timer. Note: The GCB closure can be initiated prior to engine delayed monitoring by configuring the *LogicsManager*; see "Breaker" starting page 43).

EN Engine monit. delay time
DE Verzög. Motorüberwach.
{0} {1o} {1oc} {2oc}
60 ✓ ✓ ✓ ✓

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

Delay between reaching the firing speed and activation of the monitoring of engine speed delayed alarms (i.e. underspeed).

Engine: Idle Mode

When the engine is operated at idle speed, undervoltage, underframequency, and underspeed monitoring are not performed. The analog input monitoring uses the alternative limits, which may be configured for the idle mode (Parameter 260). The GCB cannot be closed in idle mode. This function allows for a controlled operation of an engine without alarm messages at a lower speed (lower than the configured monitoring values e.g. warm-up of an engine). Note: The idle mode is blocked when the GCB is closed. A message may be output to a relay here using the *LogicsManager* (Idle mode is active, command variable 4.15), e.g. as a signal for s speed controller. The display indicates "**`Idle run active`**" during idle mode.

EN Constant idle run
DE Dauernd Idle Modus

	{0}	{1o}	{1oc}	{2oc}
61	✓	✓	✓	✓

Engine: *LogicsManager* continuous idle mode ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled the engine will be continuously operated in idle mode. Undervoltage, underfrequency, and underspeed monitoring are not performed. A key switch via a DI may be configured here for example. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN Idle mode automatic
DE Automatic Idle Modus

	{0}	{1o}	{1oc}	{2oc}
62	✓	✓	✓	✓

Engine: *LogicsManager* automatic idle mode ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled the engine will be operated in idle mode automatically for the configured time during start-up. Undervoltage, underfrequency, and underspeed monitoring are not performed. This function may always be configured to "1" for example. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN Time for automatic idle run
DE Zeit für Automatic Idle Modus

	{0}	{1o}	{1oc}	{2oc}
63	✓	✓	✓	✓

Engine: Time for automatic idle mode **1 to 9999 s**

The automatic idle mode is active for the time configured here. Undervoltage, underfrequency, and underspeed monitoring are not performed during this time.

EN During emerg/critical
DE Während Notstrom/Sprinkler

	{0}	{1o}	{1oc}	{2oc}
64	✓	✓	✓	✓

Engine: Idle mode possible during AMF / critical operation **YES / NON**

YES .....If an AMF or sprinkler operation is enabled, the engine will go to rated speed only after completing the configured idle mode.
NO .....If an AMF or critical operation is enabled, the idle mode will be overridden and the engine will go directly to rated speed.

NOTE

The idle mode will be deactivated and normal operation monitoring limits (Parameter 259) will be enabled again, if one of the following conditions is fulfilled:

- **Generator frequency and voltage are within the dead bus start limits (Parameter 70 and 71).**
- **Engine delayed monitoring (Parameter 60) has expired after the idle mode has ended.**

NOTE

The analog inputs alternate limit of the analog inputs for the idle mode is configured with Parameter 260.

Breaker

Breaker: Operation Of The Circuit Breakers

Switching the pulses takes place in the following screen and has the described effect on the signal sequence (the MCB cannot be controlled by the continuous pulse for security reasons, because otherwise, the MCB would be opened in case of a failure/exchange of the easYgen). If the parameter "Auto unlock" is configured to YES, an open pulse will be issued prior to each close pulse. The parameter "Enable MCB" prevents the closing of the MCB. A closed MCB will not be opened.

Dead bus start GCB {1oc} or {2oc}

The GCB is closed, if the following conditions are met simultaneously. The display indicates "**GCB dead bus cls**".

Automatic operation

- The operating mode AUTOMATIC has been selected
- No class C alarm or higher is present
- The engine is running
- The engine delayed monitoring (Parameter 60) as well as the GCB breaker delay (Parameter 72) have been expired or the *LogicsManager* function "Undelayed close of GCB" (Parameter 69) is enabled
- The generator voltage and frequency are within the configured limits (Parameters 70 and 71)
- The MCB has been opened for at least the time configured in "Transfer time GCB↔MCB" (Parameter 77) ({2oc} only)
- The function "Start without load" (Parameter 23) has been disabled through the *LogicsManager*
- Only in critical mode: the parameter "Close GCB in override" (Parameter 34) is configured to YES

Manual operation

- The operating mode MANUAL has been selected.
- No class C alarm or higher is present
- The engine is running
- The engine delayed monitoring (Parameter 60) as well as the GCB breaker delay (Parameter 72) have been expired
- The generator voltage and frequency are within the configured limits (Parameters 70 and 71)
- The MCB has been open for at least the time configured in "Transfer time GCB↔MCB" (Parameter 77) ({2oc} only)
- The button "Close GCB" has been pressed

Dead bus start MCB {2oc}

The MCB is closed, if the following conditions are met simultaneously. The display indicates "**MCB dead bus cls**".

Automatic operation

- The operating mode AUTOMATIC has been selected
- The mains voltage is available and within the configured limits (Parameters 70 and 71)
- The GCB is open or has been opened for at least the "Transfer time GCB←→MCB" (Parameter 77)
- "Enable MCB" (Parameter 76) is configured as ALWAYS or discrete input 6 is energized if configured as DI 6

Manual operation

- Operating mode MANUAL has been selected
- The mains voltage is available and within the configured limits (Parameters 70 and 71)
- The GCB is open or has been opened for at least the "Transfer time GCB←→MCB" (Parameter 77)
- "Enable MCB" (Parameter 76) is configured as ALWAYS or discrete input 6 is energized if configured as DI 6
- The button "Close MCB" has been pressed

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

The GCB is opened when the relay "Command: GCB close" de-energizes (only if Parameter **67** "GCB close pulse" is configured as NO) and when the relay "Command GCB open" energizes. The GCB will be opened under the following circumstances.

- In STOP operating mode
- In case of a class C alarm or higher
- 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 an automatic stopping in the AUTOMATIC operating mode (the start request has been terminated or a stop request has been initiated)
- Prior to the MCB closing onto the dead busbar
- In critical mode (Sprinkler operation), provided that an emergency power operation is not active, and "Close GCB in override" (Parameter 34) has been configured to NO
- If "Start without load" has been enabled through the *LogicsManager*

Open MCB {2oc}

The MCB is opened when the relay "Command: MCB open" is energized. The MCB will be opened under the following circumstances.

- If an emergency power operation is initiated (mains failure) once the generator voltage is within the permissible limits
- Prior to the closure of the GCB
- Upon pressing the "MCB OPEN" or "GCB CLOSE" push-button (dependent upon the configured CB logic) in MANUAL operating mode

Breaker: GCB Settings

NOTE

Operating current (NO): The relay is enabled (i.e. in the operating state) when current flows through the coil. If a loss of the supply voltage occurs, the relay contacts will not transfer and a fault condition will not be monitored. In this mode of operation the state of the system should be monitored through other means than the state of the relay.

Closed circuit current (NC): The relay is disabled (i.e. in idle state) when current flows through the coil. The relay is energized in idle state. If a loss of the supply voltage occurs, the relay contacts will transfer and a fault condition will be monitored.

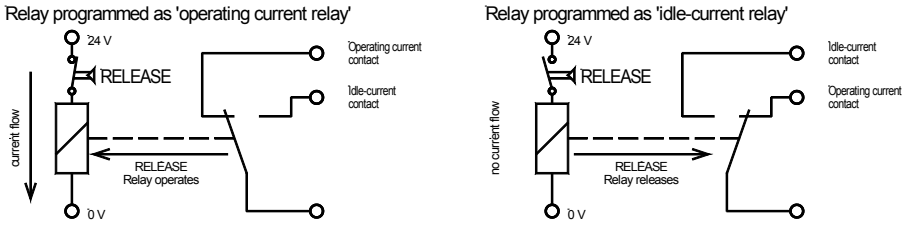


Figure 3-7: Operating / closed circuit current

EN GCB open relay
DE GLS Öffnen-Kontakt

	{0}	{1o}	{1oc}	{2oc}
65	---	✓	✓	✓

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" is energized. When the control receives the message "Reply GCB is open", the relay is de-energized.

N.C. (normally closed) If the GCB is to be opened, the relay "command: GCB open" de-energizes. When the control receives the message "Reply: GCB is open", the relay is energized again.

EN GCB time pulse
DE GLS Impulsdauer

	{0}	{1o}	{1oc}	{2oc}
66	---	✓	✓	✓

Breaker: Pulse duration to close the GCB **0.04 to 10.00 s**

The time of the pulse output may be adjusted to the breaker being utilized.

EN GCB close pulse
DE GLS Schließen Impuls

	{0}	{1o}	{1oc}	{2oc}
67	---	---	✓	✓

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

YES .....Configured momentary output: The relay "Command: GCB close" issues an add-on pulse. If the relay is configured in this manner a holding coil and sealing contacts must be installed externally to the control unit. The DI "Reply: GCB closed" is used to identify closed contacts.

NO .....Configured maintaining output: The relay "Command: close GCB" may be wired directly into the holding circuit for the power circuit breaker. If this method is utilized it is recommended that isolation relays be used. After the connect pulse has been issued and the reply of the power circuit breaker has been received, the relay "Command: close GCB" remains energized. If a class C alarm or higher occurs or the GCB is opened, this relay de-energizes.

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

EN GCB auto unlock
DE GLS auto entriegeln

	{0}	{1o}	{1oc}	{2oc}
68	---	---	✓	✓

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

This is used for special circuit breakers to put the breaker into a defined initial state or to enable closing at all.

YES..... Before every close-pulse, an open-pulse is issued for 1 second. A CB close pulse is enabled only after the open pulse is issued.

NO..... The CB close pulse is enabled without being preceded by a CB open pulse.

EN Undelayed close GCB
DE GLS unverzögert

	{0}	{1o}	{1oc}	{2oc}
69	---	---	✓	✓

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 the delayed by engine speed timer to expire). When using the standard setting, the GCB will be closed without delay in AMF operation. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

EN GCB frequency window
DE GLS Frequenzabweichung

	{0}	{1o}	{1oc}	{2oc}
70	---	---	✓	✓

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

ⓘ This value refers to the Rated system frequency (Parameter 3, see page 19).

This is the maximum amount that the frequency will be allowed to deviate from the rated frequency and the "Command: GCB close" may be issued. This is to prevent the prime mover from going into an underfrequency condition due to overloading.

EN GCB voltage window
DE GLS Spannungsabweichung

	{0}	{1o}	{1oc}	{2oc}
71	---	---	✓	✓

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

ⓘ This value refers to the Rated generator voltage (Parameter 4, see page 19).

This is the maximum amount that the voltage will be allowed to deviate from the rated voltage and the "Command: GCB close" may be issued.

EN Gen. settling time
DE GLS Schalterverzögerung

	{0}	{1o}	{1oc}	{2oc}
72	---	---	✓	✓

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

The time configured here begins to count down once the engine monitoring delay timer has expired. This permits for an additional delay time before the breaker is closed in order to ensure that none of the engine delayed watchdogs trips. It is possible to bypass this delay time through the *LogicsManager* (see Parameter 69) in the event an emergency operation condition (mains failure) occurs.

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. This condition occurs during switching operations from the mains to the generator. Every time a switching operation occurs the bus is without voltage for a short time. The consumers can be supplied once the "GCB settling time" has been expired. If the GCB would be closed prior to expiration of the delayed engine monitoring (by enabling this via the *LogicsManager*) and an alarm would become active after expiration of the delayed engine monitoring, the GCB would have to be opened and the consumers would be without voltage again. Unnecessary CB switching operations and voltage interruptions should be avoided by utilizing this parameter.

Breaker: MCB Settings {2oc}

EN MCB auto unlock
DE NLS auto entriegeln

	{0}	{1o}	{1oc}	{2oc}
73	---	---	---	✓

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

This is used for special circuit breakers to put the breaker into a defined initial state or to enable closing at all.

YES .....Before every close-pulse, an open-pulse is issued for 1 second. A CB close pulse is enabled only after the open pulse is issued.

NO .....The CB close pulse is enabled without being preceded by a CB open pulse.

EN Close MCB in stop mode
DE NLS schließen im Stopmodus

	{0}	{1o}	{1oc}	{2oc}
74	---	---	---	✓

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

YES .....The MCB may be closed in the STOP operation mode as long as the closing conditions are fulfilled.

NO .....The MCB cannot be closed in the STOP operation mode.

EN MCB time impulse
DE NLS Impulsdauer

	{0}	{1o}	{1oc}	{2oc}
75	---	✓	✓	✓

Breaker: Impulse duration to close the MCB **0.04 to 10.00 s**

The time of the pulse output may be adjusted to the breaker being utilized.

EN Enable MCB
DE Freigabe NLS

	{0}	{1o}	{1oc}	{2oc}
76	---	---	---	✓

Breaker: Enable MCB **ALWAYS / DI6**

ALWAYS.....The MCB is always enabled and the discrete input 6 may be configured freely.

DI6.....Enabling the MCB is performed by energizing discrete input 6 (Enable MCB).

Breaker: GCB/MCB Settings {2oc}

EN Transfer time GCB↔MCB
DE Pausenzeit GLS↔NLS

	{0}	{1o}	{1oc}	{2oc}
77	---	---	---	✓

Breaker: Transfer time GCB ↔ MCB **0.10 to 99.99 s**

Switching from generator supply to mains supply or from mains supply to generator supply occurs automatically if the operating conditions have been met. 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 consumers are de-energized.

Emergency Power (AMF)

NOTE

The emergency power operation is possible only in application mode {2oc} (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 may be prevented or interrupted from an external source.

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*).

The display indicates "**`Emergency run`**" during emergency power operation.

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

Permissible predetermined limits		
Mains		
	Voltage	Parameter values (refer to "Protection/Mains failure detection "; page 82)
	Frequency	Parameter values (refer to "Protection/Mains failure detection"; page 82)
	Rotation	Parameter values (refer to "Protection/Mains phase rotation"; page 81)

Table 3-2:Permissible limits

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

- If an emergency power operation is initiated, the engine is started under all circumstances, unless the start sequence is interrupted via an alarm or prevented via the *LogicsManager* or the operating mode is changed.
- The GCB can be closed regardless of the engine delay time after the dead bus starting limits have been reached if the parameter 69 has be set accordingly.
- If the mains return during an emergency power operation (GCB is closed), the mains settling time must expire before the load is transferred from the generator to mains operation.

MCB malfunction: The following is the protocol the unit follows when the control unit is in the AUTOMATIC operating mode, there has not been a start request, and the control unit is configured as emergency power standby. If the MCB opens, the control system attempts to reclose the breaker. If this is not possible (due to an MCB alarm), the engine is started due to 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 GCB opened and the MCB closed and the engine shuts off again. Emergency power is also triggered via the detection of a switch fault when the MCB is switched on regularly. In order to achieve this, the "Emergency start with MCB failure" (Parameter 81) and "MCB monitoring" (Parameter 172) must be configured as "ON" .

Mains rotation field alarm: If the mains returns after a mains failure with a reversed rotation direction the generator remains in emergency power operation until the mains rotation matches the rotation of the generator set.

EN On/Off
DE Ein/Aus

	{0}	{1o}	{1oc}	{2oc}
78	---	---	---	✓

Emergency power: Monitoring **ON / OFF**

ON ..... If the unit is in the AUTOMATIC operating mode and a mains fault occurs according to the following parameters, 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}
79	---	---	---	✓

Emergency power: Mains failure: Start delay **0.20 to 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. This delay time starts only if the easYgen is in AUTOMATIC operating mode and emergency power is activated.

EN Mains settling time
DE Netzberuhigungszeit

	{0}	{1o}	{1oc}	{2oc}
80	---	---	---	✓

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

To end the emergency operation, the monitored mains must be within the configured operating parameters without interruption for the minimum period of time set with this parameter without interruption. This parameter permits delaying the switching of the load from the generator to the mains. The display indicates "**`Mains settling`**" during this time.

NOTE

The reduced mains settling time is always active in MANUAL operating mode regardless of the breaker feedback and the setting of parameter 78 (Emergency power). The reduced mains settling time is fixed to 2 seconds.

The reduced mains settling time is always active in STOP operating mode. The reduced mains settling time is fixed to 2 seconds.

EN Emerg. start with MCB failure
DE Bei NLS-Fehler aktivieren

	{0}	{1o}	{1oc}	{2oc}
81	---	---	---	✓

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

Emergency power operations may be configured with the failure of the MCB in addition to a loss of power on the main supply. An MCB breaker alarm is indicated if Parameter 172 "Monitoring MCB" is configured "ON".

EN Inhibit Emergency run
DE Kein Notstrombetrieb

	{0}	{1o}	{1oc}	{2oc}
82	---	---	---	✓

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 140 in Appendix B: "*LogicsManager*".

Protection

Protection: Alarm Acknowledgement

		{0}	{1o}	{1oc}	{2oc}
EN	Time until horn reset				
DE	Zeit Hupenreset				
83		✓	✓	✓	✓

Time until horn reset — **Self acknowledgment of the centralized alarm (horn)** — **0 to 1,000 s**

Alarm class A - Alarm class A messages are acknowledged using the "✓" button on the front panel.
Alarm class B to F - After each alarm of this alarm class occurs, the alarm LED flashes and the command variable 03.05 (horn) is issued. After the delay time 'time until horn reset' has expired, the flashing LED changes into a steady light and the command variable 03.05 (horn) is reset. The alarm LED flashes until the alarm has been acknowledged either via the push button, the *LogicsManager*, or the interface.
Note: If this parameter is configured to 0, the horn will remain active until it will be acknowledged.

		{0}	{1o}	{1oc}	{2oc}
EN	External acknowledge				
DE	Ext. Quittierung				
84		✓	✓	✓	✓

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

It is possible to acknowledge all alarms simultaneously from remote, e.g. with a discrete input. The command variables of the *LogicsManager* have to become TRUE twice. The first time is for acknowledging the horn, the second for all alarm messages. The On-delay time is the minimum time the input signals have to be "1". The OFF-delay time is the time how long the input conditions have to be "0" before the next high signal is accepted. Once the conditions of the *LogicsManager* have been fulfilled the alarms will be acknowledged.

ⓘ The first high signal into the discrete input acknowledges the command variable 03.05 (horn). The second high signal acknowledges all inactive alarm messages.

The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

Protection: Generator Protection

		{0}	{1o}	{1oc}	{2oc}
EN	Voltage monitoring generator				
DE	Spg.Überwachung Generator				
85		---	✓	✓	✓

Voltage monitoring generator — **Generator protection: Type of monitoring** — **3 phase / 4 phase**

The unit can either monitor the wye voltages (phase-neutral: 3ph-4w, 1ph-3w and 1ph-2w) or the delta voltages (phase-phase: 3ph-3w and 3ph-4w). Usually, for the low-voltage system the phase voltages are monitored, while for the medium to high voltage systems the delta voltages are monitored. The monitoring of the wye voltage is above all necessary to avoid earth-faults in a compensated or isolated network resulting in 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) ANSI# 81O

There are two overfrequency alarm levels available in the control. Both alarms are definite time alarms and are illustrated in the figure below. 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. 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.
If this protective function is triggered, the display indicates "**Gen.overfreq. 1**" or "**Gen.overfreq. 2**".

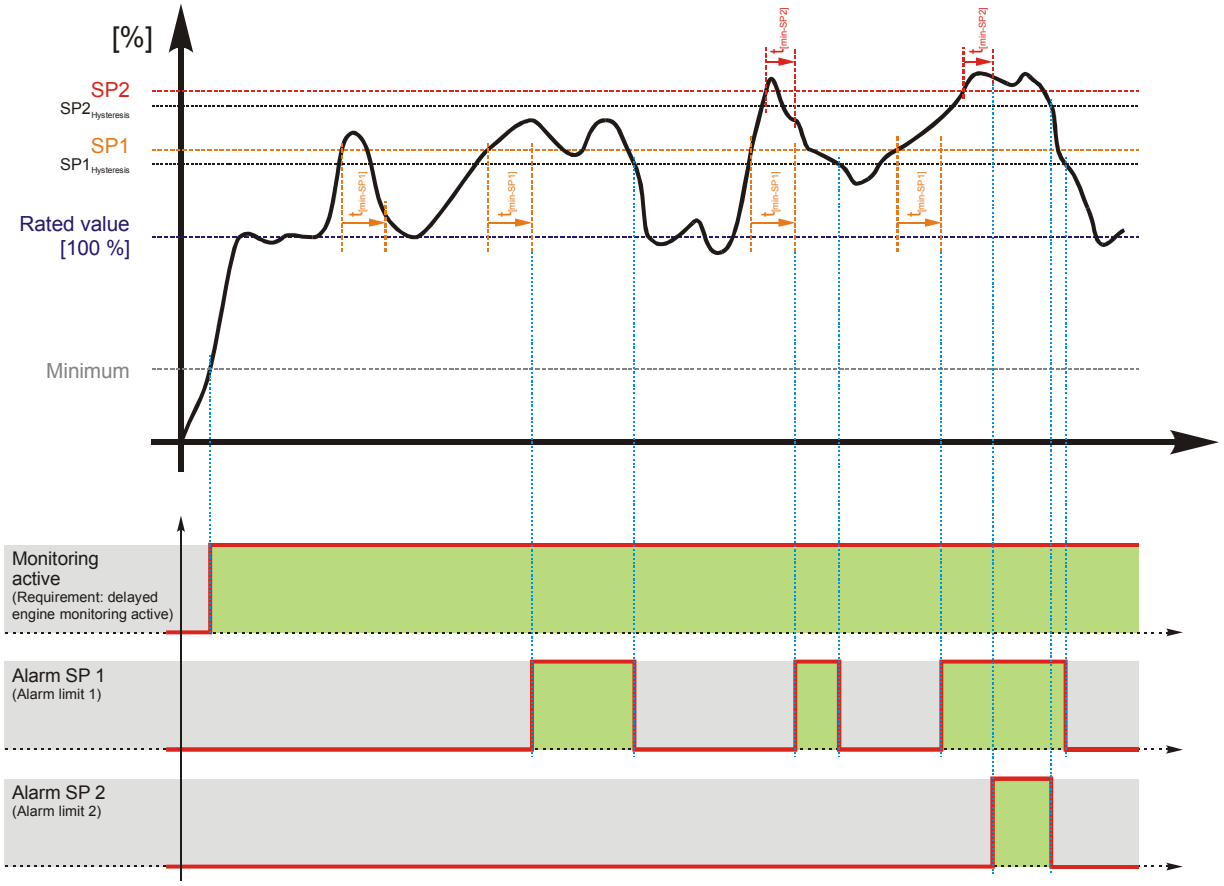


Figure 3-8: Monitoring - generator overfrequency

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 130.0 %	110.0 %
	Delay	0.02 to 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 to 130.0 %	115.0 %
	Delay	0.02 to 99.99 s	0.30 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO

Table 3-3: Monitoring - standard values - generator overfrequency

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
86 --- ✓ ✓ ✓

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

ON..... Overfrequency monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may be configured independent from each other (prerequisite: limit 1 < limit 2).
OFF..... Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
87 --- ✓ ✓ ✓

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

ⓘ This value refers to the Rated system frequency (Parameter 3, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or exceeded for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
88 --- ✓ ✓ ✓

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

If the monitored generator frequency value exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator frequency falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
89 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
90 --- ✓ ✓ ✓

Gen. overfrequency: Self acknowledgment (limit 1/limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Protection: Generator, Underfrequency (Limits 1 & 2) ANSI# 81U

There are two underfrequency alarm levels available in the control. Both alarms are definite time alarms and are illustrated in the figure below. 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 performed in two steps. Measuring of the frequency occurs three-phase, if all voltages are larger than 15 % of the rated frequency. This permits quick and exact frequency measuring. The frequency however will be measured correctly even if voltage is applied only to one phase.
If this protective function is triggered, the display indicates "**Gen.underfreq. 1**" or "**Gen.underfreq. 2**".

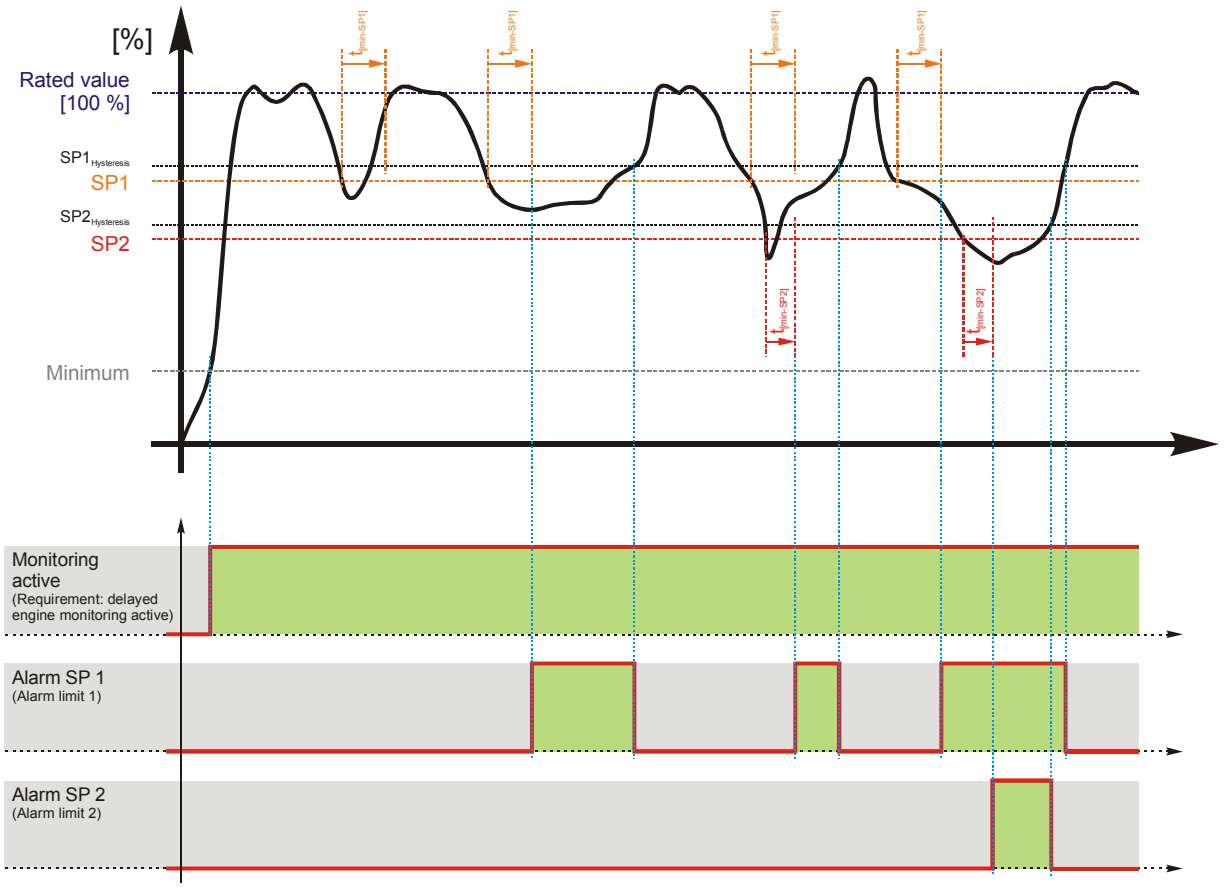


Figure 3-9: Monitoring - generator underfrequency

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 130.0 %	90.0 %
	Delay	0.02 to 99.99 s	5.00 s
	Alarm class	A/B/C/D/E/F	B
	Self-acknowledgment	YES / NO	NO
	Delayed by engine speed	YES / NO	NO
Limit 2	Monitoring	ON / OFF	ON
	Limit	50.0 to 130.0 %	84.0 %
	Delay	0.02 to 99.99 s	0.30 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
	Delayed by engine speed	YES / NO	NO

Table 3-4: Monitoring - Standard values - generator underfrequency

EN Monitoring
DE Überwachung

	{0}	{1o}	{1oc}	{2oc}
91	---	✓	✓	✓

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

ON..... Underfrequency monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may be configured independent from each other (prerequisite: Limit 1 > Limit 2).
OFF..... Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
92	---	✓	✓	✓

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

ⓘ This value refers to the Rated system frequency (Parameter 3, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or fallen below for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung

	{0}	{1o}	{1oc}	{2oc}
93	---	✓	✓	✓

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

If the monitored generator frequency value falls below the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator frequency exceeds the threshold (plus the hysteresis) again before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
94	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
95	---	✓	✓	✓

Gen. underfrequency: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
96	---	✓	✓	✓

Gen. underfrequency Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

This monitoring function is disabled in idle mode (see page 43).

Protection: Generator, Overvoltage (Limits 1 & 2) ANSI# 59

Voltage is monitored depending on Parameter 6 "Gen.voltage measuring". There are two overvoltage alarm levels 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.
If this protective function is triggered, the display indicates "**Gen.overvolt. 1**" or "**Gen.overvolt. 2**".

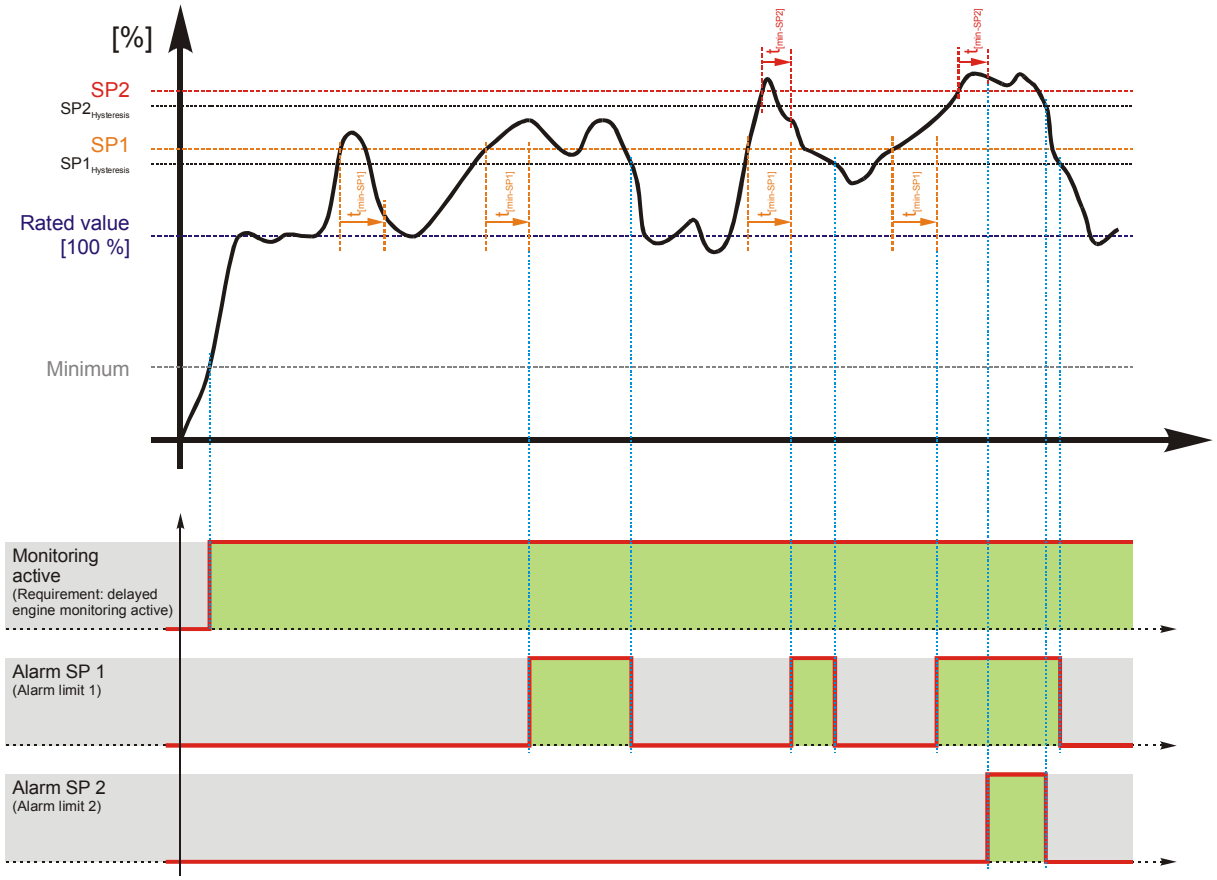


Figure 3-10: Monitoring - generator overvoltage

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 125.0 %	108.0 %
	Delay	0.02 to 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 to 125.0 %	112.0 %
	Delay	0.02 to 99.99 s	0.30 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	NO

Table 3-5: Monitoring - standard values - generator overvoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
97 --- ✓ ✓ ✓

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

ON..... Overvoltage monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may be configured independent from each other (prerequisite: limit 1 < limit 2).
OFF..... Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
98 --- ✓ ✓ ✓

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

ⓘ This value refers to the Rated generator voltage (Parameter 4, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or exceeded for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
99 --- ✓ ✓ ✓

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

If the monitored generator voltage exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator voltage falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
100 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
101 --- ✓ ✓ ✓

Gen. overvoltage: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
102 --- ✓ ✓ ✓

Gen. overvoltage: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Generator, Undervoltage (Limits 1 & 2) ANSI# 27

Voltage is monitored depending on Parameter 6 "Gen.voltage measuring". There are two undervoltage alarm levels 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.
If this protective function is triggered, the display indicates "**Gen.undervolt. 1**" or "**Gen.undervolt. 2**".

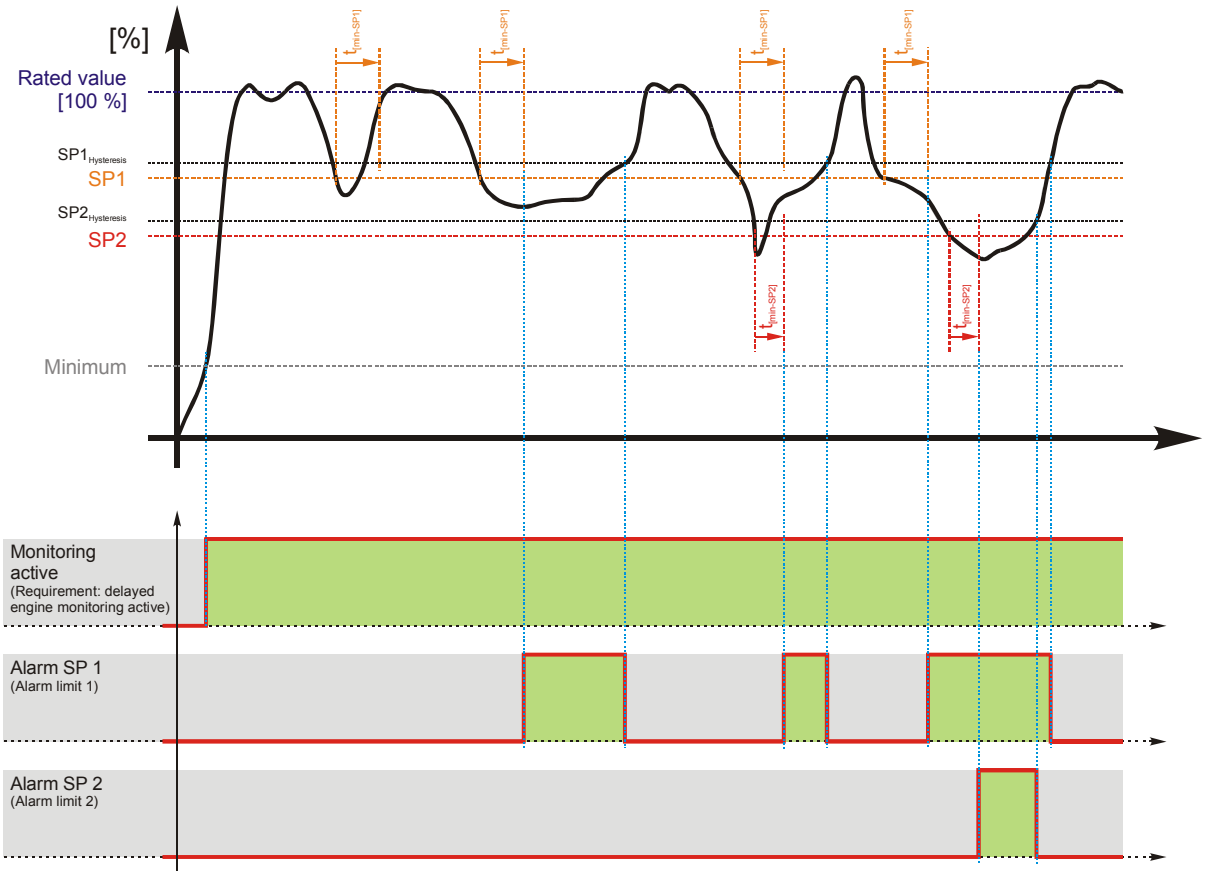


Figure 3-11: Monitoring - generator undervoltage

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 125.0 %	92.0 %
	Delay	0.02 to 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 to 125.0 %	88.0 %
	Delay	0.02 to 99.99 s	3.00 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
	Engine delayed monitoring	YES / NO	YES

Table 3-6: Monitoring - standard values - generator undervoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
103 --- ✓ ✓ ✓

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

ON..... Undervoltage monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may be configured independent from each other (prerequisite: limit 1 < limit 2).
OFF..... Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
104 --- ✓ ✓ ✓

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

ⓘ This value refers to the Rated generator voltage (Parameter 4, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or fallen below for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
105 --- ✓ ✓ ✓

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

If the monitored generator voltage falls below the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator voltage exceeds the threshold (plus the hysteresis) again before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
106 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
107 --- ✓ ✓ ✓

Gen. undervoltage: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
108 --- ✓ ✓ ✓

Gen. undervoltage: Delayed engine speed (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

This monitoring function is disabled in idle mode (see page 43).

Protection: Generator, Time-Overcurrent Monit. (Limits 1, 2 & 3) ANSI# 50/51

Current is monitored depending on Parameter 7 "Gen.current measuring". The generator overcurrent alarm contains three limits and can be setup as a step definite time overcurrent alarm as illustrated in the figure below. 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.
If this protective function is triggered, the display indicates "**Gen. overcurr. 1**", "**Gen.overcurr. 2**", or "**Gen.overcurr. 3**".

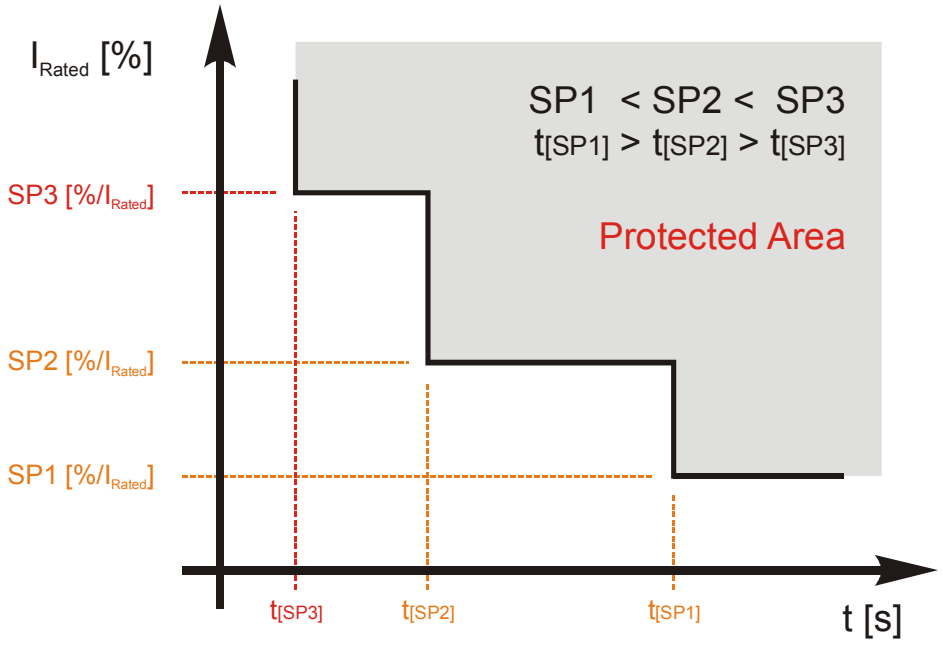


Figure 3-12: Monitoring - generator time-overcurrent

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 300.0 %	110.0 %
	Delay	0.02 to 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 to 300.0 %	150.0 %
	Delay	0.02 to 99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO
Limit 3	Monitoring	ON / OFF	ON
	Limit	50.0 to 300.0 %	250.0 %
	Delay	0.02 to 99.99 s	0.40 s
	Alarm class	A/B/C/D/E/F	F
	Self-acknowledgment	YES / NO	NO

Table 3-7: Monitoring - standard values - generator time-overcurrent

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
109 --- ✓ ✓ ✓

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 performed at three levels. All three values may be configured independent from each other (prerequisite: Limit 1 < Limit 2 < Limit 3).
OFF..... Monitoring is disabled for limit 1, limit 2, and/or limit 3.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
110 --- ✓ ✓ ✓

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

ⓘ This value refers to the Rated current (Parameter 11, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or exceeded for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
111 --- ✓ ✓ ✓

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

If the monitored generator current exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator current falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
112 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
113 --- ✓ ✓ ✓

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

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Protection: Generator, Reverse/Reduced Power (Limits 1 & 2) ANSI# 32R/F

Power is monitored depending on Parameter 6 "Gen.voltage measuring" and Parameter 7 "Gen.current measuring". The generator power limits may be setup as reduced power and/or reverse power depending on the threshold value configured in the control. The note below explains how a reduced or reverse power limit is configured. If the single- 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.
If this protective function is triggered, the display indicates "**Gen. Rv/rd pow.1**" or "**Gen. Rv/rd pow.2**".

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

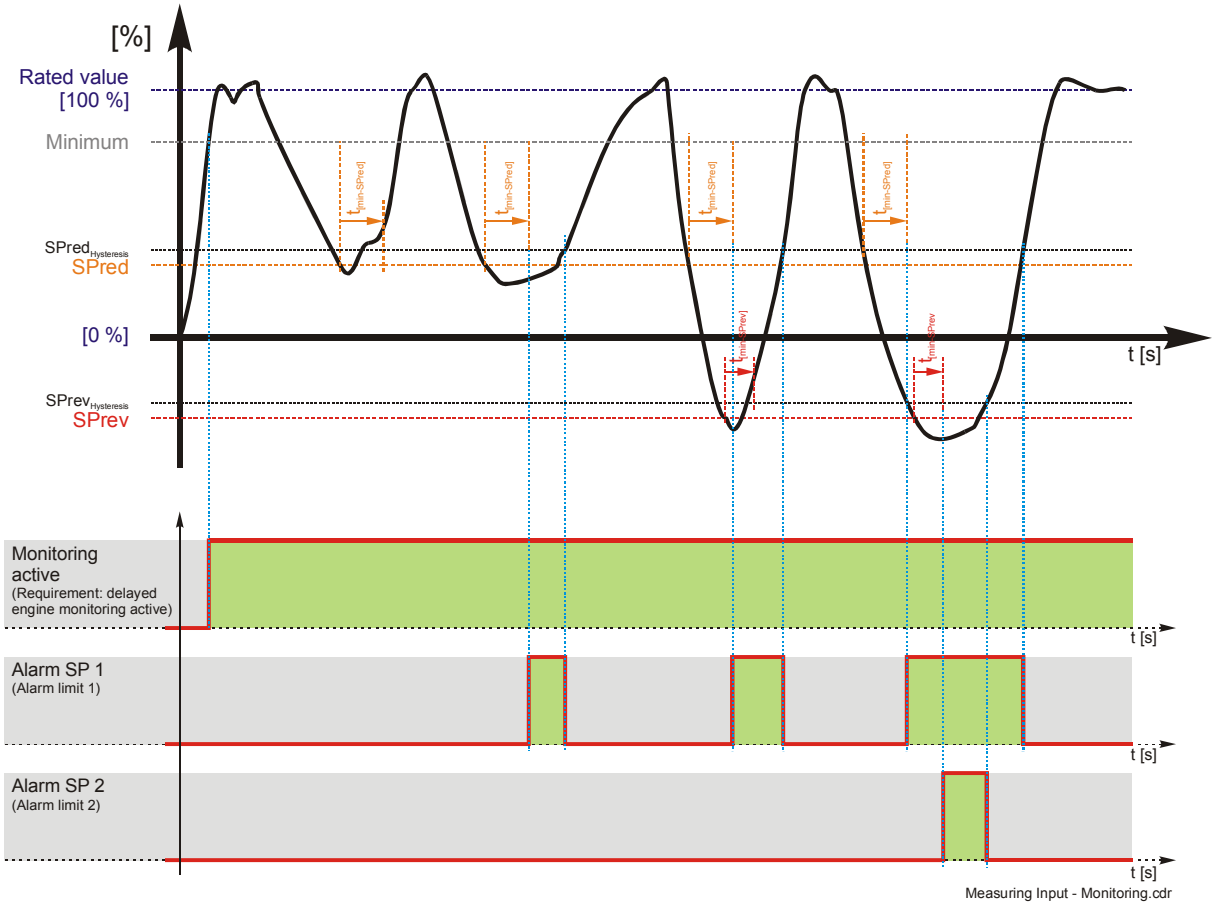


Figure 3-13: Monitoring - generator reverse / reduced power

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 99.0 %	-3.0 %
Limit 1 > 0 %	Delay	0.02 to 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	-99.9 to 99.0 %	-5.0 %
Limit 2 > 0 %	Delay	0.02 to 99.99 s	3.00 s
Red. power	Alarm class	A/B/C/D/E/F	E
Limit 2 < 0 %	Self-acknowledgment	YES / NO	NO
Rev. power	Engine delayed monitoring	YES / NO	NO

Table 3-8: Monitoring - standard values - generator reverse / reduced power

EN Monitoring
DE Überwachung

	{0}	{1o}	{1oc}	{2oc}
114	---	✓	✓	✓

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 may be configured independent from each other (prerequisite for {1oc}, {2oc}: GCB must be closed).
OFF .....Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
115	---	✓	✓	✓

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

ⓘ This value refers to the Rated active power (Parameter 10, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or fallen below for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung

	{0}	{1o}	{1oc}	{2oc}
116	---	✓	✓	✓

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

If the monitored generator power falls below the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator power exceeds or falls below the threshold (plus/minus the hysteresis) again before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
117	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
118	---	✓	✓	✓

Gen. reverse/reduced power: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
119	---	✓	✓	✓

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

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Engine/Generator, Overload (Limits 1 & 2) ANSI# 32

Power is monitored depending on Parameter 6 "Gen.voltage measuring" and Parameter 7 "Gen.current measuring". If the real power is above the configured limit an alarm will be issued.
If this protective function is triggered, the display indicates "**Gen. Overload 1**" or "**Gen. Overload 2**".

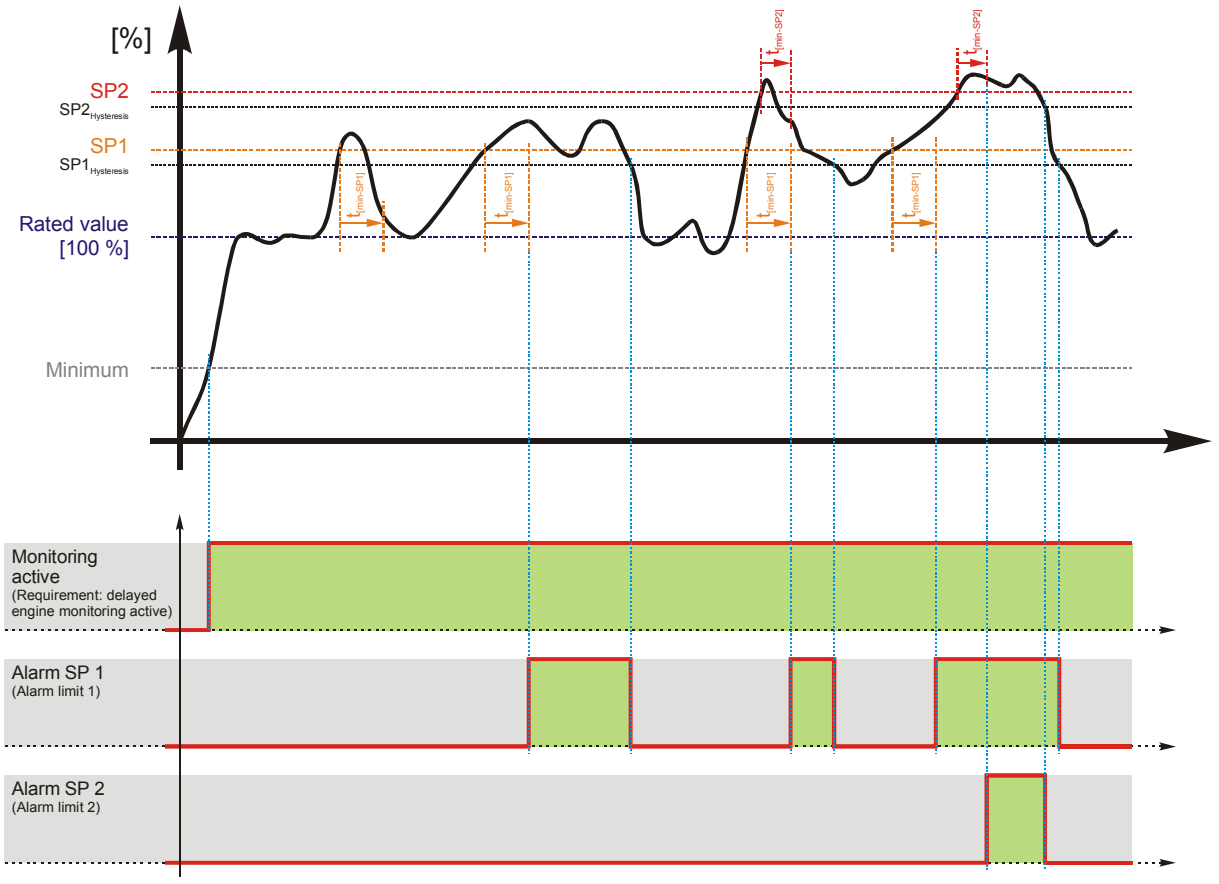


Figure 3-14: Monitoring - generator overload

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 300.0 %	110.0 %
	Delay	0.02 to 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 to 300.0 %	120.0 %
	Delay	0.02 to 99.99 s	0.10 s
	Alarm class	A/B/C/D/E/F	E
	Self-acknowledgment	YES / NO	NO

Table 3-9: Monitoring - standard values - generator overload

EN Monitoring
DE Überwachung

	{0}	{1o}	{1oc}	{2oc}
120	---	✓	✓	✓

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

ON .....Overload monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may be configured independent from each other (prerequisite: limit 1 < limit 2).
OFF .....Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
121	---	✓	✓	✓

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

ⓘ This value refers to the Rated active power (Parameter 10, see page 19).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or exceeded for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung

	{0}	{1o}	{1oc}	{2oc}
122	---	✓	✓	✓

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

If the monitored generator load exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator load falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
123	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.-

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
124	--- ---	✓ ✓	✓ ✓	✓ ✓

Gen. overload: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Protection: Generator, Unbalanced Load (Limits 1 & 2) ANSI# 46

Power is monitored depending on Parameter 6 "Gen.voltage measuring" and Parameter 7 "Gen.current measuring". The generator unbalanced load alarm is a phase imbalance alarm. The percentage threshold value indicates the permissible variation of phase current from the arithmetic mean value of all three-phase currents. If this protective function is triggered, the display indicates "**`Unbal. load 1`**" or "**`Unbal. load 2`**".

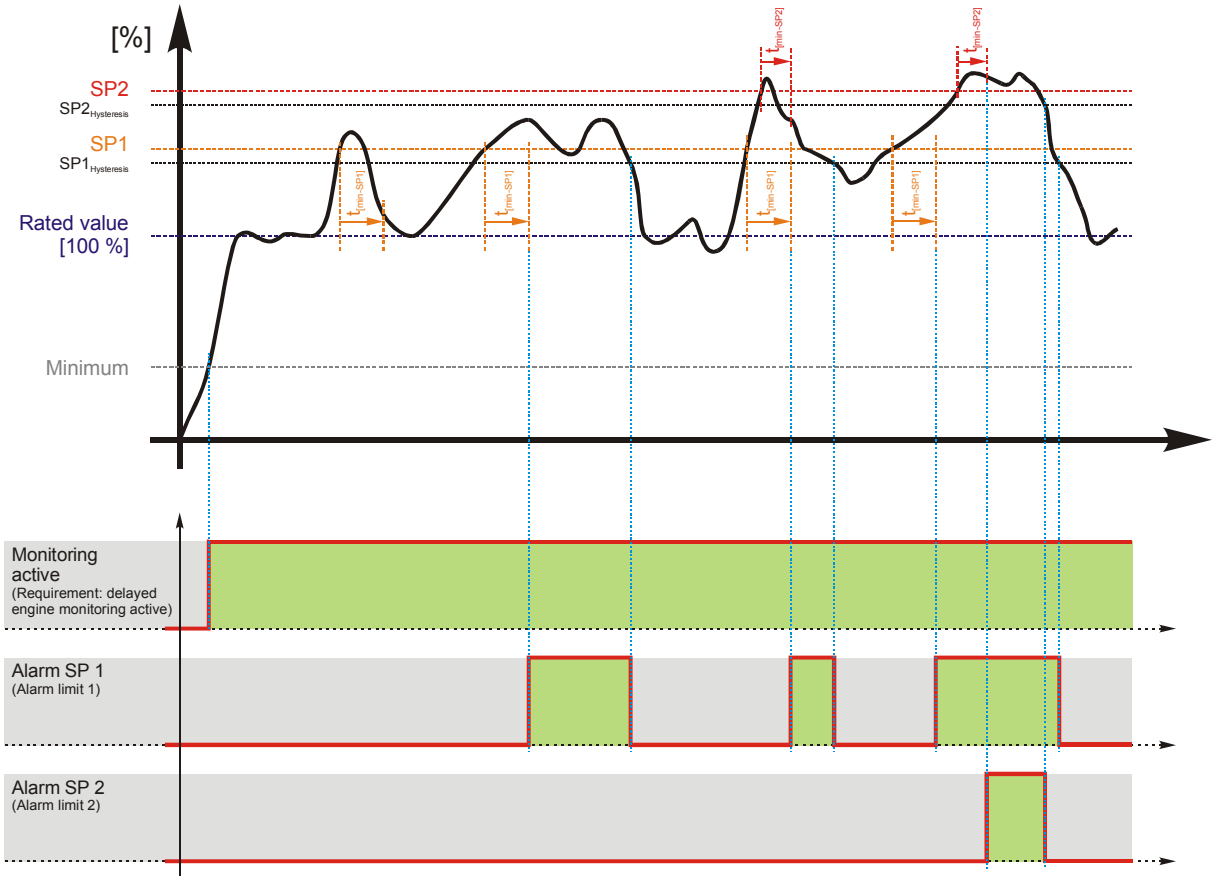


Figure 3-15: Monitoring - generator unbalanced load

Parameter table

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

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

Table 3-10: Monitoring - standard values - generator unbalanced load

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 undershot

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}
125 --- ✓ ✓ ✓

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

ON..... Unbalanced load monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may 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}
126 --- ✓ ✓ ✓

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

ⓘ This value refers to the Rated current (Parameter 11, see page 21).

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or exceeded for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
127 --- ✓ ✓ ✓

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

If the monitored load exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored load exceeds or falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
128 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
129 --- ✓ ✓ ✓

Gen. unbalanced load: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
130 --- ✓ ✓ ✓

Gen. unbalanced load: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

An alarm will only be issued for 3Ph-3W or 3Ph-4W applications and monitored 3-phase generator current.

Protection: Generator, Voltage Asymmetry

The voltage asymmetry alarm monitors the individual three-phase voltages of the generator. Voltage asymmetry monitoring is always performed phase-phase (delta). The percentage threshold value is the permissible variation from the average measured voltage of all three phases. If a measured voltage exceeds a configured permissible asymmetrical voltage deviation from the average voltage value, an alarm is issued.
If this protective function is triggered, the display indicates "**`Gen. asymmetry`**".

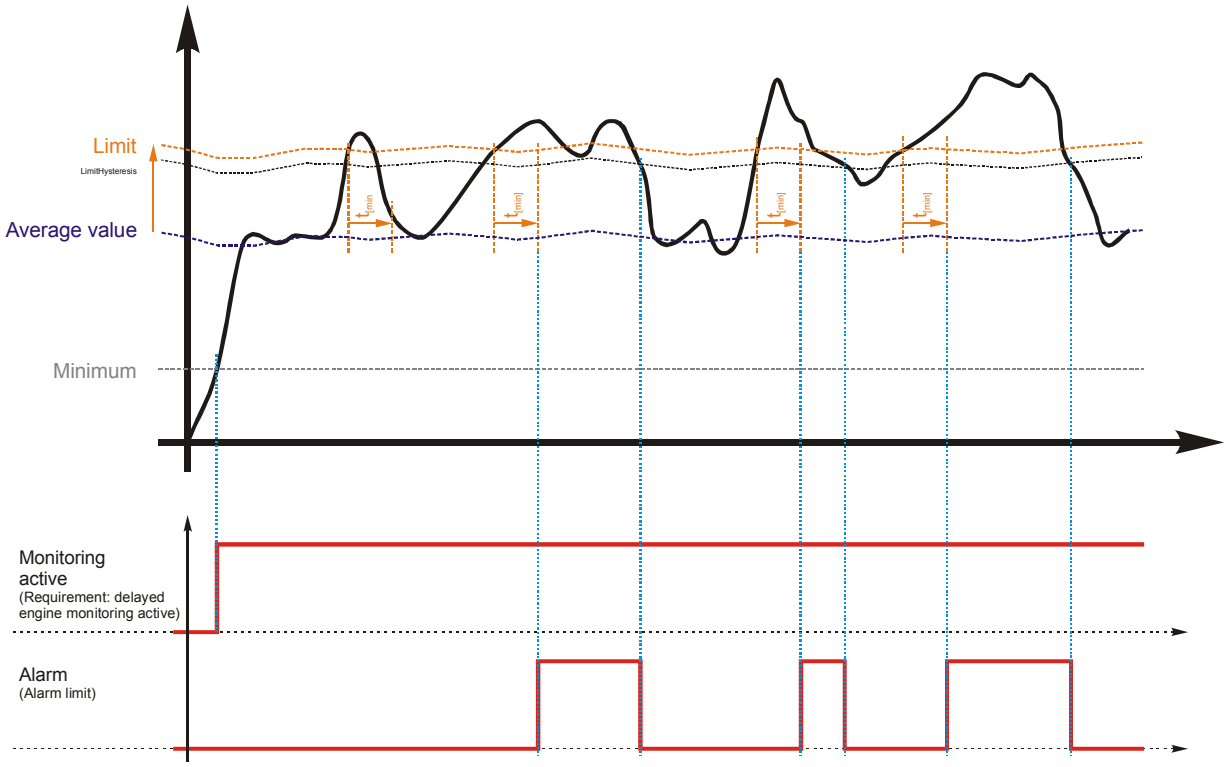


Figure 3-16: Monitoring - generator voltage asymmetry

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 99.9 %	10.0 %
	Delay	0.02 to 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 3-11: Monitoring - standard values - generator voltage asymmetry

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
131 --- ✓ ✓ ✓

Gen. voltage asymmetry: Monitoring **ON / OFF**

ON..... Voltage asymmetry monitoring is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
132 --- ✓ ✓ ✓

Gen. voltage asymmetry: Threshold value **0.5 to 99.9 %**

ⓘ This value refers to Rated generator voltage (Parameter 4, see page 19).

The percentage value that is to be monitored is defined here. If the voltage in one phase differs from the average value of all three phases by more than this value for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
133 --- ✓ ✓ ✓

Gen. voltage asymmetry: Delay **0.02 to 99.99 s**

If the monitored generator voltage asymmetry exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored generator voltage asymmetry falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
134 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
135 --- ✓ ✓ ✓

Gen. voltage asymmetry: Self acknowledgment **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
136 --- ✓ ✓ ✓

Gen. voltage asymmetry: Engine delayed monitoring **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

An alarm will only be issued for 3Ph-3W applications and monitored 3Ph-4W voltage systems.

Protection: Generator, Ground Fault (Limits 1 & 2)

Mains current transformer is configured to mains current (calculated ground current)

(Please refer to Current Transformer on page 23)

Current is monitored depending on Parameter 7 "Gen.current measuring". The configured three conductor currents I_{Gen-L1}, I_{Gen-L2} and I_{Gen-L3} are vectorially summated ($I_S = I_{Gen-L1} + I_{Gen-L2} + I_{Gen-L3}$) and compared with the response value. The calculated actual value is indicated in the display, if the monitoring is enabled. If the actual value rises over the response value, a ground fault is present, and an alarm is issued.
If this protective function is triggered, the display indicates "**`Ground fault 1`**" or "**`Ground fault 2`**".

NOTE

Please consider that the installation location of the generator current transformers determines the protection area of the ground fault monitoring.

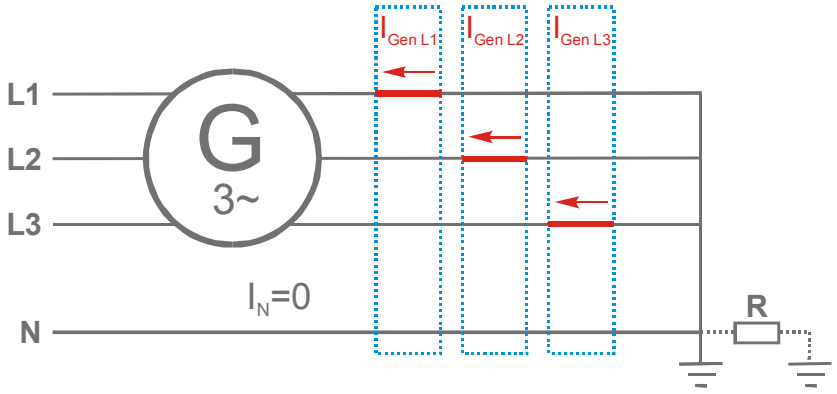
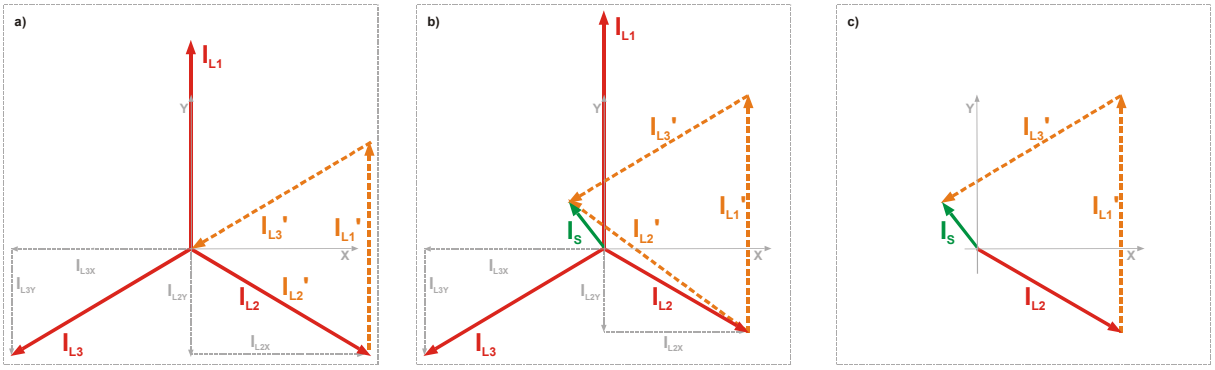


Figure 3-17: Monitoring - calculated generator ground fault

Test: If one of the current transformers is short-circuited while the others have rated current the actual value amounts to 100 %.
The ground current calculation does not consider the current in a possibly existing neutral conductor. In order to be able to consider the calculation result as ground current, the neutral conductor must not conduct an appreciable operating current.

The threshold value is indicated as a percentage. It refers likewise to the generator rated current and should be adjusted in practice because of asymmetries, which cannot be avoided, to at least 10 %.

Calculation



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

Figure 3-18: Monitoring - calculated generator ground current - vector diagram

The **sum current I_S** is calculated e.g. (after previous complex dismantling) geometrically/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) $I_S = 0.866$A.

Mains current transformer is configured to ground current (measured ground current)

(Please refer to Current Transformer on page 23)

In this case, the value measured at the mains/ground current input is monitored. The configured percentage refers to the ground current transformer. The measured actual value is indicated on the display, if the monitoring is enabled. If the actual value rises over the response value, a ground fault is present, and an alarm is issued.
If this protective function is triggered, the display indicates "**`Ground fault 1`**" or "**`Ground fault 2`**".

NOTE

The ground fault protection zone is determined by the physical installation location of the generator current transformer.

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 300 %	10 %
	Delay	0.02 to 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 to 300 %	30 %
	Delay	0.02 to 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 3-12: Monitoring - standard values - generator ground fault

Parameter

EN Monitoring
DE Überwachung

	{0}	{1o}	{1oc}	{2oc}
137	---	✓	✓	☑

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

ON .....Ground current monitoring is carried out according to the following parameters. Monitoring is performed at two levels. Both values may be configured independent from each other (prerequisite: Limit 1 < Limit 2).
OFF .....Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
138	---	✓	✓	☑

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

ⓘ This value refers to the Rated current of the generator (Parameter 11, see page 21), if the ground current is calculated from the generator current values. It refers to the transformer rated current (Parameter 19, see page 24), if the ground current is measured directly.

The percentage values that are to be monitored for each threshold limit are defined here. If this value is reached or exceeded for at least the delay time without interruption, the action specified by the alarm class is initiated.

NOTE

The ground fault threshold shall not exceed the ground current measuring range (approx. 1.5 × I_{rated}; refer to the Technical Data section of the Installation Manual 37390).

EN Delay
DE Verzögerung

	{0}	{1o}	{1oc}	{2oc}
139	---	✓	✓	☑

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

If the monitored ground fault exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored ground fault falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
140	---	✓	✓	☑

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
141	---	✓	✓	☑

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

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
142	---	✓	✓	☑

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

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Generator, Voltage Phase Rotation

CAUTION

Please ensure during installation that all voltages applied to this unit are wired correctly to both sides

of the circuit breaker. Failure to do so may result in damage to the control unit and/or generation equipment due to closing the breaker asynchronous or with mismatched phase rotations and phase rotation monitoring enabled at all connected components (engine, generator, breakers, cable, busbars, etc.).

This function may block a connection of systems with mismatched phases systems only under the following conditions:

- **The voltages being measured are wired correctly with respect to the phase rotation at the measuring points (i.e. the voltage transformer in front and behind the circuit breaker)**
- **The measuring voltages are wired without angular phase shift or interruption from the measuring point to the control unit**
- **The measuring voltages are wired to the correct terminals of the control unit (i.e. L1 of the generator is connected with the terminal of the control unit which is intended for the L1 of the generator)**

Correct phase rotation of the phase voltages ensures that damage will not occur during an open transition breaker closure to either the mains or the generator. The voltage phase rotation alarm checks the phase rotation of the voltages and the configured phase rotation to ensure they are identical. The directions of rotation are differentiated as "clockwise" and "counter clockwise". With a clockwise field the direction of rotation is "L1-L2-L3"; with a counter clockwise field the direction of rotation is "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 direction of configured rotation being monitored by the control unit is displayed in the LCD.
If this protective function is triggered, the display indicates "**`Gen. phase rot. misw.`**".

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 3-13: Monitoring - standard values - generator voltage phase rotation

EN Generator phase rotation
DE Generatordrehfeld

	{0}	{1o}	{1oc}	{2oc}
143	---	✓	✓	✓

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}
144	---	✓	✓	✓

Gen.voltage phase rotation: Monitoring **ON / OFF**

ON .....Phase rotation monitoring is carried out according to the following parameters.
OFF .....Monitoring is disabled.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
145	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
146	---	✓	✓	✓

Gen.voltage phase rotation: Self-acknowledgment **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
147	---	✓	✓	✓

Gen.voltage phase rotation: Engine delayed monitoring **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Generator, Inverse Time-Overcurrent Monitoring ANSI# IEC 255

Current is monitored depending on Parameter 7 "Gen.current measuring". The tripping time depends on the measured current. The higher the current is the faster the tripping time according to a defined curve. According to IEC 255 three different characteristics are available.
If this protective function is triggered, the display indicates "**`Inv.time ov.curr.`**".

"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

NOTE

The maximum tripping time is 327s. If a higher tripping time is configured, no tripping will be performed.

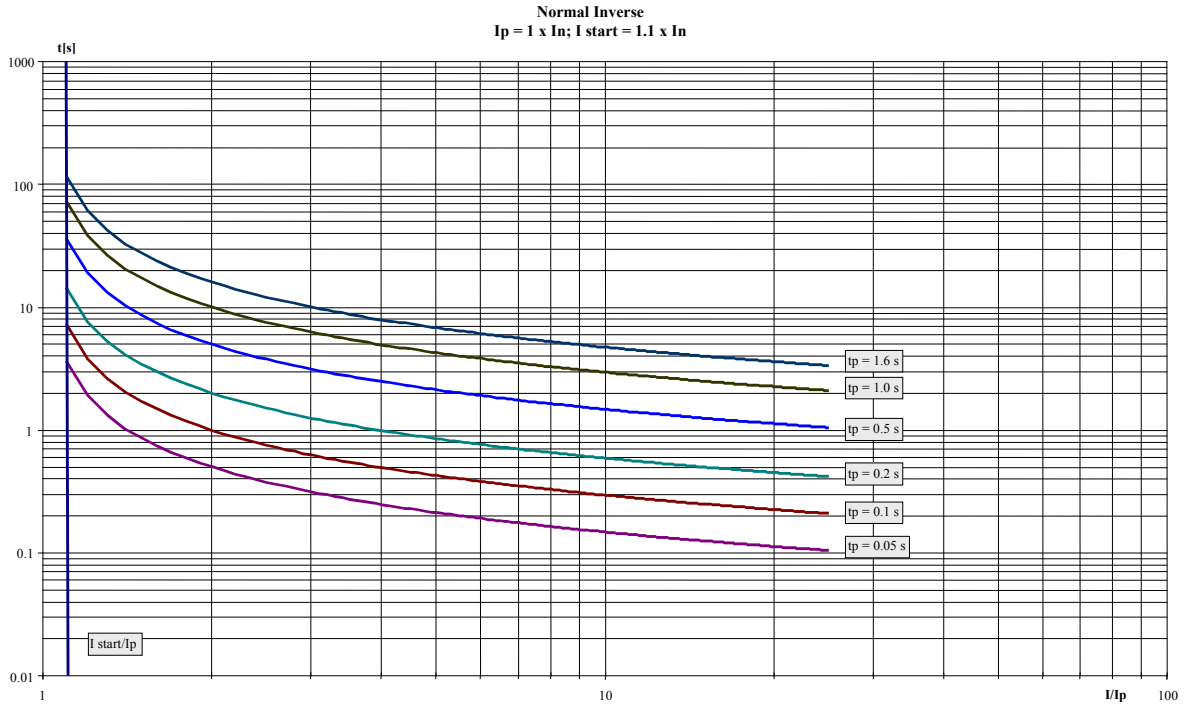


Figure 3-19: Monitoring - generator inverse time-overcurrent - characteristic "Normal"

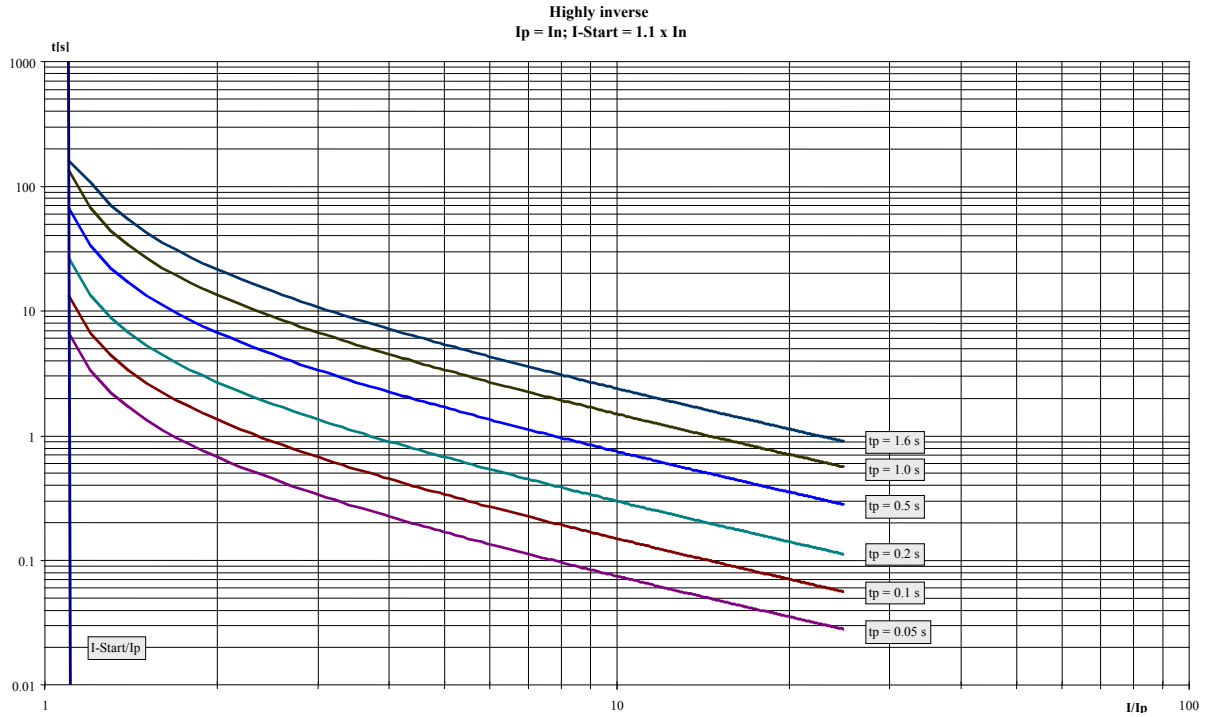


Figure 3-20: Monitoring - generator inverse time-overcurrent - characteristic "High"

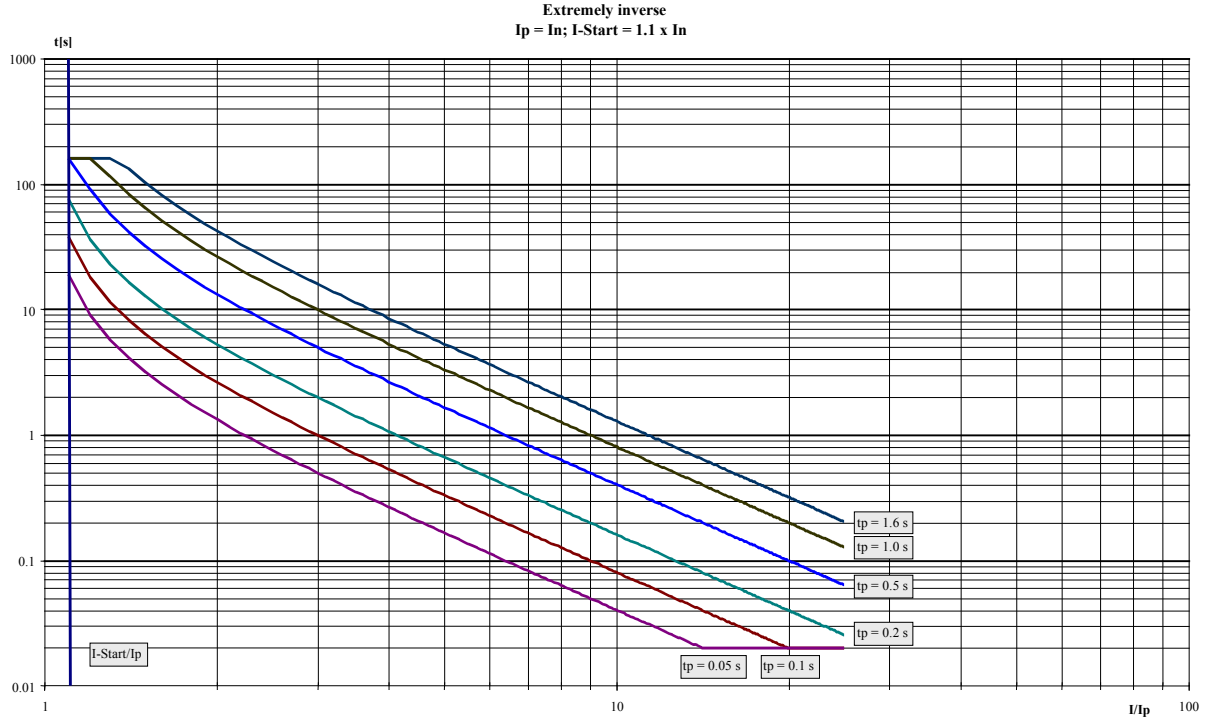


Figure 3-21: Monitoring - generator inverse time-overcurrent - characteristic "Extreme"

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 1.99 s	0.06 s
	Inv. time overcurrent Ip	10.0 to 300.0 %	100.0 %
	Inv. time overcurrent I start	100.0 to 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 3-14: Monitoring - standard values - generator inverse time-overcurrent

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
148 --- ✓ ✓ ✓

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

ON..... Overcurrent monitoring is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Inverse time characteristic
DE Überstrom Charakteristik
{0} {1o} {1oc} {2oc}
149 --- ✓ ✓ ✓

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 "highly inverse" will be used
Extreme ..... The characteristic "extremely inverse" will be used.

EN Inv. time overcurrent
DE Überstrom (AMZ) Tp=
{0} {1o} {1oc} {2oc}
150 --- ✓ ✓ ✓

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

Time constant Tp to calculate the characteristics.

EN Inv. time overcurr. Ip=
DE Überstrom (AMZ) Ip=
{0} {1o} {1oc} {2oc}
151 --- ✓ ✓ ✓

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

Current constant Ip to calculate the characteristics.

EN Inv. time overcurr. I start=
DE Überstrom (AMZ) I-Start=
{0} {1o} {1oc} {2oc}
152 --- ✓ ✓ ✓

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

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

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
153	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
154	---	✓	✓	✓

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

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
155	---	✓	✓	✓

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

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Mains Protection {2oc}

EN Voltage monitoring mains
DE Spg.-Überwachung Netz

	{0}	{1o}	{1oc}	{2oc}
156	---	✓	✓	✓

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

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

WARNING:
This parameter influences the protective functions.

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

Protection: Mains, Voltage Phase Rotation - {2oc}

CAUTION

Please ensure during installation that all voltages applied to this unit are wired correctly to both sides of the circuit breaker. Failure to do so may result in damage to the control unit and/or generation equipment due to closing the breaker asynchronous or with mismatched phase rotations and phase rotation monitoring enabled at all connected components (engine, generator, breakers, cable, busbars, etc.).

This function may block a connection of systems with mismatched phases systems only under the following conditions:

- **The voltages being measured are wired correctly with respect to the phase rotation at the measuring points (i.e. the voltage transformer in front and behind the circuit breaker)**
- **The measuring voltages are wired without angular phase shift or interruption from the measuring point to the control unit**
- **The measuring voltages are wired to the correct terminals of the control unit (i.e. L1 of the generator is connected with the terminal of the control unit which is intended for the L1 of the generator)**

Correct phase rotation of the phase voltages ensures that damage will not occur during an open transition breaker closure to either the mains or the generator. The voltage phase rotation alarm checks the phase rotation of the voltages and the configured phase rotation to ensure they are identical. The directions of rotation are differentiated as "clockwise" and "counter clockwise". With a clockwise field the direction of rotation is "L1-L2-L3"; with a counter clockwise field the direction of rotation is "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 direction of configured rotation being monitored by the control unit is displayed in the LCD.
If this protective function is triggered, the display indicates "**`Mains phase rot. misw.`**".

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 3-15: Monitoring - standard values - mains voltage phase rotation

EN Mains phase rotation
DE Netzdrehfeld

	{0}	{1o}	{1oc}	{2oc}
157	---	---	---	✓

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

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
158 --- --- --- ✓

Mains voltage phase rotation: Monitoring **ON / OFF**

ON .....Phase rotation monitoring is carried out according to the following parameters
OFF .....Monitoring is disabled.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
159 --- --- --- ✓

Mains voltage phase rotation: Alarm class **Class A/B/C/D/E/F**

➔ **CAUTION:**
If an alarm class that leads to an engine shutdown (alarm class C or higher) is configured into this parameter, a main phase rotation alarm may lead to an interruption of power.

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
160 --- --- --- ✓

Mains voltage phase rotation: Self-acknowledgment **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
161 --- --- --- ✓

Mains voltage phase rotation: Engine delayed monitoring **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Mains, Mains Failure Detection {2oc}

Voltage is monitored depending on Parameter 8 "Mains voltage measuring".

EN High voltage threshold
DE Obere Grenzspannung
{0} {1o} {1oc} {2oc}
162 --- --- --- ✓

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

ⓘ This value refers to the Rated mains voltage (Parameter 5, see page 19).

This is the percentage of the rated voltage that determines if there has been a mains failure. If the value exceeds the configured limit, a mains failure is detected and an emergency power operation is initiated.

EN Low voltage threshold
DE Untere Grenzspannung
{0} {1o} {1oc} {2oc}
163 --- --- --- ✓

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

ⓘ This value refers to the Rated mains voltage (Parameter 5, see page 19).

The percentage threshold value that is to be monitored. If this value is reached or fallen below for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Voltage hysteresis
DE Spannungshysterese
{0} {1o} {1oc} {2oc}
164 --- --- --- ✓

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

ⓘ This value refers to the Rated mains voltage (Parameter 5, see page 19).

The percentage value configured in this parameter defines the upper and lower limits that permit for an assessment of the mains and if a failure has occurred. If the monitored value exceeds the configured limit, a mains failure has occurred and the emergency power operation is initiated. If the measured value is close to the configured limits (positive or negative deviation) the hysteresis value must be exceeded on negative deviations or fallen below on positive deviations for a mains failure to be assessed as having ended. This operation must occur for the configured mains settling time (Parameter 80). If the measured values fall below or exceed the limits before the failure delay time has expired, the failure delay timer is reset.

EN High frequency threshold
DE Obere Grenzfrequenz
{0} {1o} {1oc} {2oc}
165 --- --- --- ✓

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

ⓘ This value refers to the Rated system frequency (Parameter 3, see page 19).

The percentage value configured in this parameter defines the upper limit threshold for the controller to monitor the mains and determine if a failure has occurred. If the monitored value exceeds the configured limit, a mains failure has occurred and an emergency power operation is initiated.

EN Low frequency threshold
DE Untere Grenzfrequenz
{0} {1o} {1oc} {2oc}
166 --- --- --- ✓

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

ⓘ This value refers to the Rated system frequency (Parameter 3, see page 19).

The percentage value configured in this parameter defines the lower limit threshold for the controller to monitor the mains and determine if a failure has occurred. If the monitored value falls below the configured limit, a mains failure has occurred and an emergency power operation is initiated.

EN Frequency hyteresis
DE Frequenzhysterese
{0} {1o} {1oc} {2oc}
167 --- --- --- ✓

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

ⓘ This value refers to the Rated system frequency (Parameter 3, see page 19).

The percentage value configured in this parameter defines the upper and lower limits that permit for an assessment of the mains and if a failure has occurred. If the monitored value exceeds the configured limit, a mains failure has occurred and the emergency power operation is initiated. If the measured value is close to the configured limits (positive or negative deviation) the hysteresis value must be exceeded on negative deviations or fallen below on positive deviations for a mains failure to be assessed as having ended. This operation must occur for the configured mains settling time (Parameter 80). If the measured values fall below or exceed the limits before the failure delay time has expired, the failure delay timer is reset.

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 the configured number of attempts the monitoring CB alarm will be initiated.
(See parameter Breaker monitoring GCB: Max. "GCB close" attempts).
If this protective function is triggered, the display indicates "**`GCB fail to close`**".

Breaker Open Alarm: If the control is attempting to open the circuit breaker and it fails to see that the CB is open within the configured time in seconds after issuing the breaker open command then the monitoring CB alarm will be initiated.
(See parameter Breaker monitoring GCB: Max. time until reply "GCB has been opened").
If this protective function is triggered, the display indicates "**`GCB fail to open`**".

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
  - 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 can not be closed, the engine is stopped and the unit switches to mains operation if:
  - The mains voltage is within the configured limits
  - The mains settling time has expired
  - The "Enable MCB" is set
  - If it is not possible to switch to mains operation the busbar remains de-energized (dead) until the GCB fault is 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}
168 --- ✓ ✓ ✓

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

ON..... Monitoring of the GCB is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN GCB alarm class
DE GLS Alarmklasse
{0} {1o} {1oc} {2oc}
169 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN GCB max. closing attempts
DE GLS ZU max. Schaltversuche
{0} {1o} {1oc} {2oc}
170 --- --- ✓ ✓

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

The number of breaker closing attempts is configured in this parameter (relay output "Command: close GCB"). When the breaker reaches the configured number of attempts, a GCB failure alarm is issued if the breaker is still open and the GCB open monitoring timer (Parameter 171) has expired.

EN GCB open monitoring
DE GLS AUF Überwachung
{0} {1o} {1oc} {2oc}
171 --- ✓ ✓ ✓

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

If the "Reply: GCB is open" is not detected as energized once this timer expires, a GCB failure alarm is issued. This timer initiates as soon as the "open breaker" sequence begins. The alarm configured in Parameter 169 is issued.

Monitoring of the MCB {2oc}

NOTE

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

If an alarm class higher than 'B' class has been selected it will not be possible to start the engine with the setting "Emergency power with MCB failure" (Parameter 81) = configured as 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 the configured number of attempts the monitoring CB alarm will be initiated.
(See Parameter 170 Breaker monitoring MCB: Max. "MCB close" attempts).
If this protective function is triggered, the display indicates "**`MCB fail to close`**".

Breaker Open Alarm: If the control is attempting to open the circuit breaker and it fails to see that the CB is open within the configured time in seconds after issuing the breaker open command then the monitoring CB alarm will be initiated.
(See Parameter 171 Breaker monitoring MCB: Max. time until reply "MCB has been opened").
If this protective function is triggered, the display indicates "**`MCB fail to open`**".

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 78 "Emergency power" = OFF
  If the MCB cannot be closed, the busbar remains without voltage, until the MCB breaker fault is acknowledged. The control continues attempting to close the MCB.
- Alarm class B
  Parameter 78 "Emergency power" = ON, Parameter 81 "Emergency operation by MCB failure" = OFF
  If the MCB cannot be closed, the busbar remains without voltage, until the MCB breaker fault is acknowledged. The control continues attempting to close the MCB.
- Alarm class B
  Parameter 78 "Emergency power" = ON, Parameter 81 "Emergency operation by MCB failure" = 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, the load is switched to mains supply and the emergency power operation terminates. Attempts to close the MCB are still performed until the generator has reached the dead bus start limits.

Fault at 'opening the MCB'

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

EN MCB monitoring
DE NLS Überwachung

	{0}	{1o}	{1oc}	{2oc}
172	---	---	---	✓

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

ON .....Monitoring of the MCB is carried out according to the following parameters.
OFF .....Monitoring is disabled.

EN MCB alarm class
DE NLS Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
173	---	---	---	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN MCB max. closing attempts
DE NLS ZU max. Schaltversuche

	{0}	{1o}	{1oc}	{2oc}
174	---	---	---	✓

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

The number of breaker closing attempts is configured in this parameter (relay output "Command: close MCB"). When the breaker reaches the configured number of attempts, a MCB failure alarm is issued if the breaker is still open and the MCB open monitoring timer (Parameter **175**) has expired.

EN MCB open monitoring
DE NLS AUF Überwachung

	{0}	{1o}	{1oc}	{2oc}
175	---	---	---	✓

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

If the "Reply: MCB is open" is not detected as energized once this timer expires, a MCB failure alarm is issued. This timer initiates as soon as the "open breaker" sequence begins. The alarm configured in Parameter **173** is issued.

Protection: Engine, Overspeed (Limits 1 & 2) ANSI# 12

The speed measured by the magnetic pickup unit (MPU) is monitored for overspeed. If the MPU is disabled, the speed may only be monitored using the generator overfrequency monitoring. If the MPU speed exceeds the overspeed limits the configured alarms will be initiated.
If this protective function is triggered, the display indicates "**Overspeed 1**" or "**Overspeed 2**".

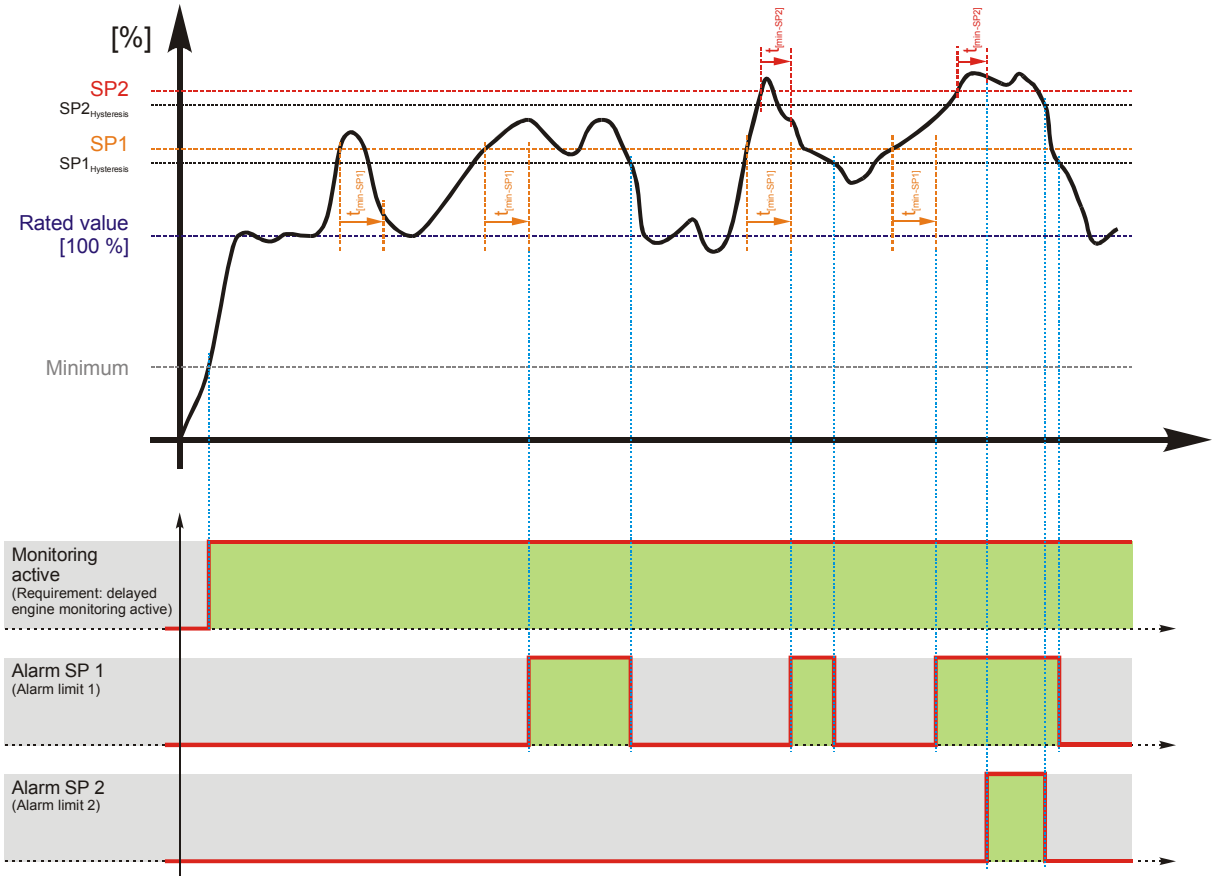


Figure 3-22: Monitoring - engine overspeed

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 9,999 RPM	1,850 RPM
	Delay	0.02 to 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 to 9,999 RPM	1,900 RPM
	Delay	0.02 to 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 3-16: Monitoring - standard values - engine overspeed

EN Monitoring
DE Überwachung

	{0}	{1o}	{1oc}	{2oc}
176	---	✓	✓	✓

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 .....Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
177	---	✓	✓	✓

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

The threshold values that are to be monitored are defined here. If the monitored engine speed reaches or exceeds this value for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung

	{0}	{1o}	{1oc}	{2oc}
178	---	✓	✓	✓

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

If the monitored engine speed exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored engine speed falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
179	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
180	---	✓	✓	✓

Engine overspeed: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
181	---	✓	✓	✓

Engine overspeed: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Engine, Underspeed (Limits 1 & 2)

The speed measured by the magnetic pickup unit (MPU) is monitored for underspeed. If the MPU is disabled, the speed may only be monitored using the generator underfrequency monitoring. If the MPU speed falls below the underspeed limits the configured alarms will be initiated.
If this protective function is triggered, the display indicates "**Underspeed 1**" or "**Underspeed 2**".

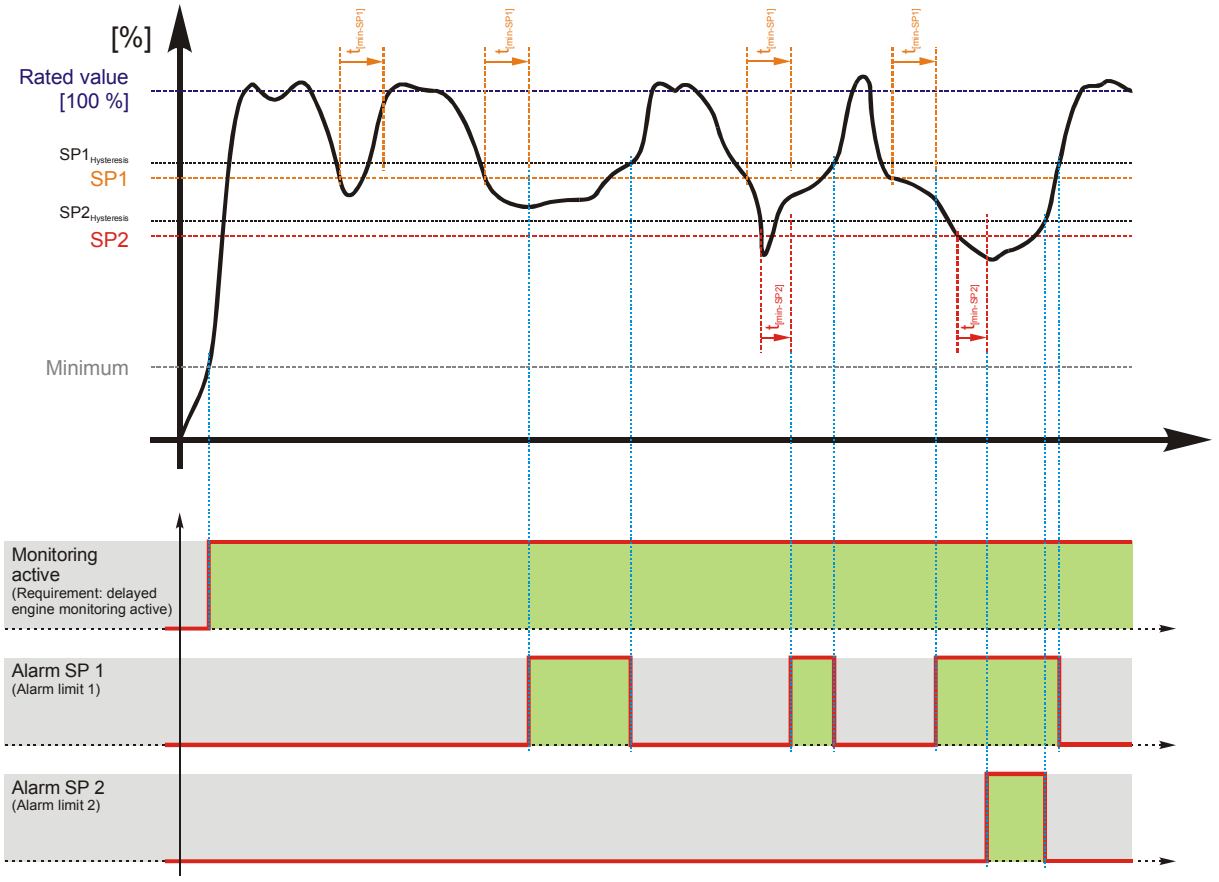


Figure 3-23: Monitoring - engine underspeed

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 9,999 RPM	1,300 RPM
	Delay	0.02 to 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 to 9,999 RPM	1,250 RPM
	Delay	0.02 to 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	YES

Table 3-17: Monitoring - standard values - engine underspeed

EN Monitoring
DE Überwachung

	{0}	{1o}	{1oc}	{2oc}
182	---	✓	✓	✓

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 .....Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
183	---	✓	✓	✓

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

The threshold values that are to be monitored are defined here. If the monitored engine speed reaches or falls below this value for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung

	{0}	{1o}	{1oc}	{2oc}
184	---	✓	✓	✓

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

If the monitored engine speed falls below the threshold value for the delay time configured here, an alarm will be issued. If the monitored engine speed exceeds the threshold (plus the hysteresis) again before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
185	---	✓	✓	✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend

	{0}	{1o}	{1oc}	{2oc}
186	---	✓	✓	✓

Engine underspeed: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.

	{0}	{1o}	{1oc}	{2oc}
187	---	✓	✓	✓

Engine underspeed: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Engine/Generator, Speed/Frequency Mismatch (Speed Detection)

Speed/frequency mismatch (n/f mismatch) checks if the generator voltage frequency f (determined from the measured generator voltage) differs from the measured 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 *LogicsManager* output "Firing speed" is checked upon its logical status with respect to the measuring values "generator frequency" and "Pickup speed".
If this protective function is triggered, the display indicates "**`Speed det. alarm`**".

NOTE

Speed/frequency mismatch (n/f mismatch) is carried out only if an MPU is connected to the control and Parameter 45, "Pickup", is configured ON. The following is valid:

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

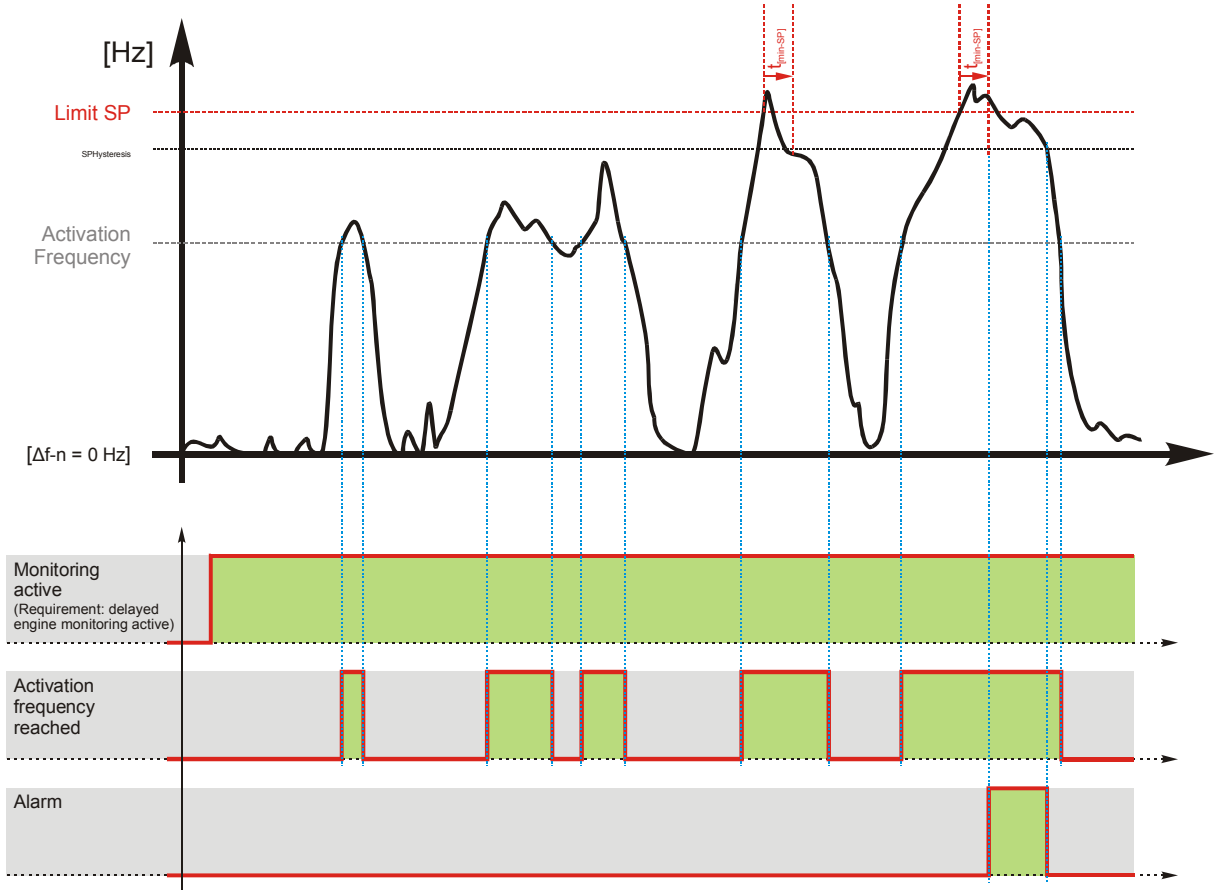


Figure 3-24: Monitoring - plausibility check n/f

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 8.5 Hz	5.0 Hz
	Delay	0.02 to 99.99 s	2.00 s
	Monitoring frequency	15 to 85 Hz	20 Hz
	Alarm class	A/B/C/D/E/F	E
	Self-acknowledgment	YES/NO	NO

Table 3-18: Monitoring - standard values - plausibility control n/f

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
188 --- ✓ ✓ ✓

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

ON .....Monitoring of the speed/frequency/*LogicsManager* mismatch (n/f/*LM* mismatch) is carried out according to the following parameters.
OFF .....Monitoring is disabled.

EN Mismatch limit
DE Zulässige Differenz
{0} {1o} {1oc} {2oc}
189 --- ✓ ✓ ✓

n/f/*LogicsManager* mismatch: Threshold value **1.5 to 8.5 Hz**

The frequency mismatch that is to be monitored is defined here. If the monitored frequency mismatch reaches or exceeds this value for at least the delay time without interruption, the action specified by the alarm class is initiated.

The *LogicsManager* is monitored with respect to his status.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
190 --- ✓ ✓ ✓

n/f/*LogicsManager* mismatch: Delay **0.02 to 99.99 s**

If the monitored frequency mismatch exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored frequency mismatch falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Activation frequency
DE Überwachung ab
{0} {1o} {1oc} {2oc}
191 --- ✓ ✓ ✓

n/f/*LogicsManager* mismatch: Start-up frequency **15 to 85 Hz**

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

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
192 --- ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
193 --- ✓ ✓ ✓

n/f/*LogicsManager* mismatch: Self acknowledgment **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Protection: Engine, Start Failure

A configured number of start attempts will be performed. If it is not possible to start the engine within this number of start attempts, an alarm will be initiated.
If this protective function is triggered, the display indicates "**Start fail**".

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
194 ✓ ✓ ✓ ✓

Start alarm: Monitoring **ON / OFF**

ON..... Monitoring of the start sequence is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Start attempts
DE Anzahl Startversuche
{0} {1o} {1oc} {2oc}
195 ✓ ✓ ✓ ✓

Start alarm: Number of starting attempts **1 to 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, an alarm will be initiated. An engine has been successfully started if the ignition speed reaches the configured firing speed within the start delay time.

EN Start attempts override
DE Anzahl Startvers. Sprinkler
{0} {1o} {1oc} {2oc}
196 ✓ ✓ ✓ ✓

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

If a critical operation mode is initiated, the engine will continue to attempt to start as an override function. The engine will continue to attempt to start for the additional number of starts configured here. An engine has been successfully started if the ignition speed reaches the configured firing speed within the start delay time.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
197 ✓ ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
198 ✓ ✓ ✓ ✓

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

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Protection: Engine, Shutdown Malfunction

If it is not possible to stop the engine within a configured time, an alarm will be initiated.
If this protective function is triggered, the display indicates "**Shutdown malfct.**".

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
199 ✓ ✓ ✓ ✓

Stop failure: Monitoring **ON / OFF**

ON .....Monitoring of the stop sequence is carried out according to the following parameters.
OFF .....Monitoring is disabled.

EN Max. stop delay
DE Verzögerung Abstellstörung
{0} {1o} {1oc} {2oc}
200 ✓ ✓ ✓ ✓

Stop failure: Delay **3 to 999 s**

The maximum permissible time between the output of a stop command and the reply that the engine is stopped successfully is defined here. If the engine cannot be stopped within this time (this means speed via the Pickup, frequency via the generator voltage, or the *LogicsManager* is detected) the action specified by the alarm class is initiated.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
201 ✓ ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
202 ✓ ✓ ✓ ✓

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

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

NOTE

We recommend to assign this monitoring function to a discrete output to be able to shutdown the engine with an external device to provide a shutdown redundancy.

Protection: Engine, Unintended Stop

If an engine stop has been detected without a stop command being issued, an alarm will be initiated.
If this protective function is triggered, the display indicates "**Unintended stop**".

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
203 ✓ ✓ ✓ ✓

Unintended stop: Monitoring **ON / OFF**

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

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
204 ✓ ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

Protection: Engine, Dead Bus Operation

The dead bus operation monitoring issues an alarm if ignition speed is exceeded and the limits for closing the GCB (Parameters 70 and 71) are not exceeded within the configured delay. No alarm will be issued in idle mode. If this protective function is triggered, the display indicates "**`Timeout dead bus op.`**".

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
205 ✓ ✓ ✓ ✓

Dead bus operation: Monitoring **ON / OFF**

ON..... Monitoring of the dead bus operation is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
206 ✓ ✓ ✓ ✓

Dead bus operation: Delay **1 to 999 s**

If the frequency deviation (Parameter 70) and/or the voltage deviation (Parameter 71) exceed the configured limits for the time defined here, an alarm will be issued. If both deviations return within the limits before the delay time expires, the delay time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
207 ✓ ✓ ✓ ✓

Dead bus operation:Alarm class **Class A/B/C/D/E/F**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
208 ✓ ✓ ✓ ✓

Dead bus operation: Self acknowledge **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Protection: Battery, Overvoltage (Limits 1 & 2)

There are two battery overvoltage alarm levels 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.
If this protective function is triggered, the display indicates "**`Batt.overvolt.1`**" or "**`Batt.overvolt.2`**".

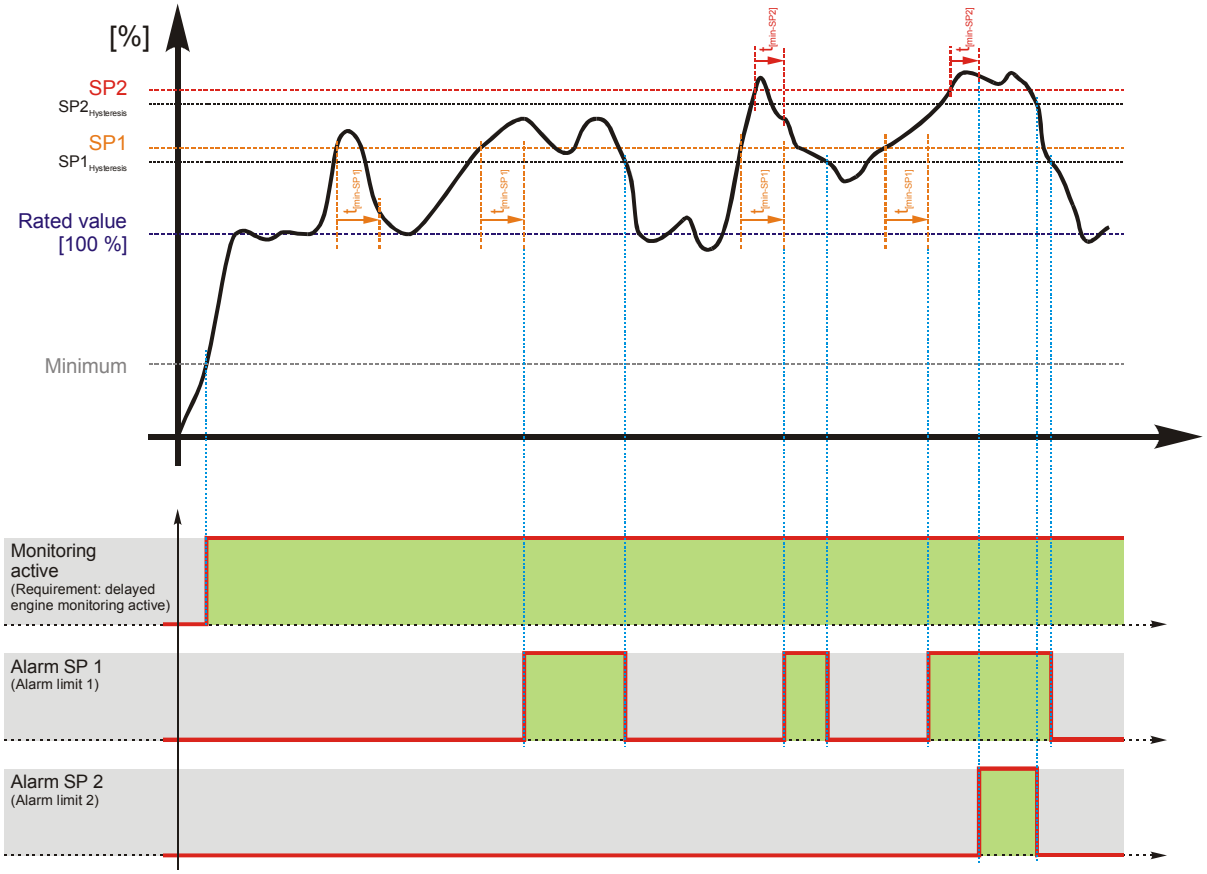


Figure 3-25: Monitoring - battery overvoltage

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 42.0 V	32.0 V
	Delay	0.02 to 99.99 s	5.00 s
	Alarm class	A/B/C/D/E/F/Control	B
	Self-acknowledgment	YES/NO	NO
	Engine delayed monitoring	YES/NO	NO
Limit2	Monitoring	ON/OFF	OFF
	Limit	8.0 to 42.0 V	35.0 V
	Delay	0.02 to 99.99 s	1.00 s
	Alarm class	A/B/C/D/E/F/Control	B
	Self-acknowledgment	YES/NO	NO
	Engine delayed monitoring	YES/NO	NO

Table 3-19: Monitoring - standard values - battery overvoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
209 ✓ ✓ ✓ ✓

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

ON..... Overvoltage monitoring of the battery voltage is carried out according to the following parameters.
OFF..... Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
210 ✓ ✓ ✓ ✓

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

The threshold values that are to be monitored are defined here. If the monitored battery voltage reaches or exceeds this value for at least the delay time without interruption, the action specified by the alarm class is initiated.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
211 ✓ ✓ ✓ ✓

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

If the monitored battery voltage exceeds the threshold value for the delay time configured here, an alarm will be issued. If the monitored battery voltage falls below the threshold (minus the hysteresis) before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
212 ✓ ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
213 ✓ ✓ ✓ ✓

Battery overvoltage: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
214 ✓ ✓ ✓ ✓

Battery overvoltage: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: Battery, Undervoltage (Limits 1 & 2)

There are two battery undervoltage alarm levels 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.
If this protective function is triggered, the display indicates "**`Batt.undervolt.1`**" or "**`Batt.undervolt.2`**".

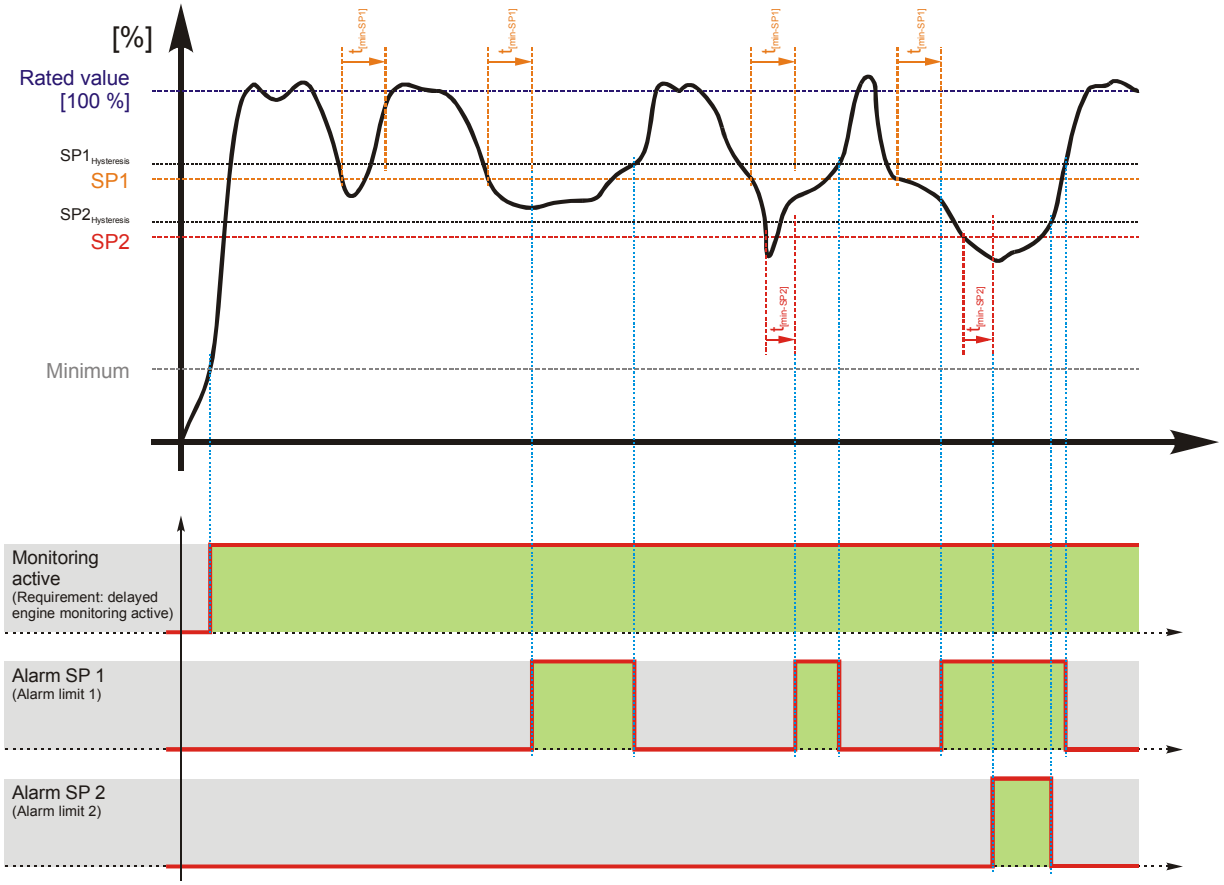


Figure 3-26: Monitoring - battery undervoltage

Parameter table

The parameters represented in this table are specified in the following, whereas the description is identical for all limits; the limits may 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 to 42.0 V	24.0 V
	Delay	0.02 to 99.99 s	60.00 s
	Alarm class	A/B/C/D/E/F/Control	B
	Self-acknowledgment	YES/NO	NO
	Engine delayed monitoring	YES/NO	NO
Limit2	Monitoring	ON/OFF	ON
	Limit	8.0 to 42.0 V	20.0 V
	Delay	0.02 to 99.99 s	10.00 s
	Alarm class	A/B/C/D/E/F/Control	B
	Self-acknowledgment	YES/NO	NO
	Engine delayed monitoring	YES/NO	NO

Table 3-20: Monitoring - standard values - battery undervoltage

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
215 ✓ ✓ ✓ ✓

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

ON..... Undervoltage monitoring of the battery voltage is carried out according to the following parameters.
OFF..... Monitoring is disabled for limit 1 and/or limit 2.

EN Limit
DE Limit
{0} {1o} {1oc} {2oc}
216 ✓ ✓ ✓ ✓

Battery undervoltage: Threshold value (Limit 1/Limit 2) **8.0 to 42.0 V**

The threshold values that are to be monitored are defined here. If the monitored battery voltage reaches or falls below this value for at least the delay time without interruption, the action specified by the alarm class is initiated.

Note
The default monitoring limit for battery undervoltage is 24 Vdc after 60 seconds. This is because in normal operation the terminal voltage is approximately 26 Vdc (alternator charged battery).

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
217 ✓ ✓ ✓ ✓

Battery undervoltage: Delay time (Limit 1/Limit 2) **0.02 to 99.99 s**

If the battery voltage falls below the threshold value for the delay time configured here, an alarm will be issued. If the battery voltage exceeds the threshold (plus the hysteresis) again before the delay expires the time will be reset.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
218 ✓ ✓ ✓ ✓

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

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
219 ✓ ✓ ✓ ✓

Battery undervoltage: Self acknowledgment (Limit 1/Limit 2) **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
220 ✓ ✓ ✓ ✓

Battery undervoltage: Engine delayed monitoring (Limit 1/Limit 2) **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Protection: CANopen Interface, Monitoring

The CANopen interface is monitored. If the interface does not receive a CANopen protocol message before the delay expires, an alarm will be initiated.
If this protective function is triggered, the display indicates "**CAN Open Fault**".

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
221 ✓ ✓ ✓ ✓

CANopen Interface: Monitoring **ON / OFF**

ON .....Monitoring of the CANopen interface is carried out according to the following parameters.
OFF .....Monitoring is disabled.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
222 ✓ ✓ ✓ ✓

CANopen Interface: Delay **0.1 to 650.0 s**

The delay is configured with this parameter. If the interface does not receive a CANopen protocol message before the delay expires, the action specified by the alarm class is initiated. The delay timer is re-initialized after every message is received.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
223 ✓ ✓ ✓ ✓

CANopen Interface: Alarm class **Class A/B/C/D/E/F**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
224 ✓ ✓ ✓ ✓

CANopen Interface: Self acknowledgment **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
225 ✓ ✓ ✓ ✓

CANopen Interface: Engine delayed **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

This protection is only available if an external digital I/O board (e.g. IKD 1) is connected.

Protection: J1939 Interface, Monitoring

This watchdog triggers if the easYgen is configured to receive J1939 data from an ECU (Parameter 339) connected to the CAN bus to evaluate these data, and no data is received from the ECU.
If this protective function is triggered, the display indicates "**CAN-Fault J1939**".

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
226 ✓ ✓ ✓ ✓

J1939 Interface: Monitoring **ON / OFF**

ON..... Monitoring of the J1939 interface is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
227 ✓ ✓ ✓ ✓

J1939 Interface: Delay **0.1 to 650.0 s**

The delay is configured with this parameter. If the interface does not receive a CAN SAE J1939 protocol message before the delay expires, the action specified by the alarm class is initiated. The delay timer is re-initialized after every message is received.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
228 ✓ ✓ ✓ ✓

J1939 Interface: Alarm class **Class A/B/C/D/E/F**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
229 ✓ ✓ ✓ ✓

J1939 Interface: Self acknowledgment **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
230 ✓ ✓ ✓ ✓

J1939 Interface: Engine delayed **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

This protection is only available if an engine control is connected which communicates with the easYgen using the J1939 protocol.

Protection: J1939 Interface, Amber Warning Lamp DM1

This watchdogs monitors, whether a specific alarm bit is received from the CAN J1939 interface. This enables to configure the easYgen in a way that a reaction is caused by this bit (e.g. warning, shutdown).
If this protective function is triggered, the display indicates "**`Amber warning lamp`**".

EN Monitoring
DE Überwachung
231 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Amber warning lamp DM1: Monitoring **ON / OFF**

ON .....Monitoring of the Amber Warning Lamp message from the ECU is carried out according to the following parameters.
OFF .....Monitoring is disabled.

EN Delay
DE Verzögerung
232 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Amber warning lamp DM1: Delay **0.1 to 650.0 s**

The amber warning lamp delay is configured with this parameter. If the ECU sends the Amber Warning Lamp ON message, the action specified by the alarm class is initiated after the delay configured here expires.

EN Alarm class
DE Alarmklasse
233 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Amber warning lamp DM1: Alarm class **Class A/B/C/D/E/F/Control**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
234 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Amber warning lamp DM1: Self acknowledgment **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
235 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Amber warning lamp DM1: Engine delayed **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

This protection is only available if an engine control is connected which communicates with the easYgen using the J1939 protocol.

Protection: J1939 Interface, Red Stop Lamp DM1

This watchdogs monitors, whether a specific alarm bit is received from the CAN J1939 interface. This enables to configure the easYgen in a way that a reaction is caused by this bit (e.g. warning, shutdown).
If this protective function is triggered, the display indicates "**Red stop lamp**".

EN Monitoring
DE Überwachung
236 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Red stop lamp DM1: Monitoring **ON / OFF**

ON..... Monitoring of the Red Stop Lamp message from the ECU is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Delay
DE Verzögerung
237 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Red stop lamp DM1: Delay **0.1 to 650.0 s**

The red stop lamp delay is configured with this parameter. If the ECU sends the Red Stop Lamp ON message, the action specified by the alarm class is initiated after the delay configured here expires.

EN Alarm class
DE Alarmklasse
238 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Red stop lamp DM1: Alarm class **Class A/B/C/D/E/F/Control**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
239 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Red stop lamp DM1: Self acknowledgment **YES / NO**

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
240 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

J1939 Interface: Red stop lamp DM1: Engine delayed **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

This protection is only available if an engine control is connected which communicates with the easYgen using the J1939 protocol.

Discrete Inputs

Number	Terminal	Application mode			
		{0}	{1o}	{1oc}	{2oc}
Internal discrete inputs					
[D1]	51	Alarm input (*LogicsManager*), pre-assigned with EMERGENCY OFF			
[D2]	52	Alarm input (*LogicsManager*), pre-assigned with Start in AUTO			
[D3]	53	Alarm input (*LogicsManager*)			
[D4]	54	Alarm input (*LogicsManager*)			
[D5]	55	Alarm input (*LogicsManager*)			
[D6]	56	Alarm input (*LogicsManager*)			Enable MCB #1
[D7]	57	Alarm input (*LogicsManager*)			Reply: MCB is open
[D8]	58	Alarm input (*LogicsManager*)		Reply: GCB is open	Reply: GCB is open
External discrete inputs (via CANopen; not included in easYgen delivery; can be e.g. IKD1, etc.)					
[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*)			

#1..If the parameter Enable MCB is configured to ALWAYS, this DI may be used as alarm input (*LogicsManager*)

Table 3-21: Discrete inputs - assignment

NOTE

Alarm inputs may also be configured as control inputs and then be used as command variables in the *LogicsManager*.

NOTE

Operating current (NO): The relay is enabled (i.e. in the operating state) when current flows through the coil. If a loss of the supply voltage occurs, the relay contacts will not transfer and a fault condition will not be monitored. In this mode of operation the state of the system should be monitored through other means than the state of the relay.

Closed circuit current (NC): The relay is disabled (i.e. in idle state) when current flows through the coil. The relay is energized in idle state. If a loss of the supply voltage occurs, the relay contacts will transfer and a fault condition will be monitored.

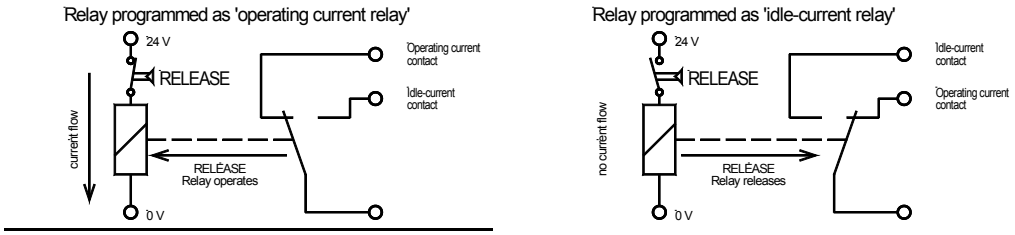


Figure 3-27: N.O./N.C.

NOTE

If the discrete input is used as a reply message for the breaker position, the discrete input must be configured as N.C. All reply messages from breakers are evaluated as N.C.

EN DI {x} operation
DE DI {x} Funktion
{0} {1o} {1oc} {2oc}
241 ✓ ✓ ✓ ✓

Discrete input: Operation **N.O. / N.C.**

The discrete inputs may be operated by an operating current contact or an idle circuit current contact. The idle circuit current input can be used to monitor for a wirebreak. A positive or negative voltage polarity referred to the reference point of the DI may be applied.

N.O...... The discrete input is analyzed as "enabled" by energizing the input (N.O. / operating current).

N.C...... The discrete input is analyzed as "enabled" by de-energizing the input (N.C. / idle current).

EN DI {x} delay
DE DI {x} Verzögerung
{0} {1o} {1oc} {2oc}
242 ✓ ✓ ✓ ✓

Discrete input: Delay **0.08 to 650.00 s**

A delay time in seconds can be assigned to each alarm input. The discrete input must be enabled without interruption for the delay time before a fault is recognized. If the discrete input is used within the *LogicsManager* this delay is taken into account as well.

EN DI {x} alarm class
DE DI {x} Alarmklasse
{0} {1o} {1oc} {2oc}
243 ✓ ✓ ✓ ✓

Discrete input: Alarm class **Class A/B/C/D/E/F/Control**

ⓘ see chapter "Alarm Classes" on page 138.

An alarm class may be assigned to the discrete input. The alarm class is executed when the discrete input is enabled.

If "control" has been configured as alarm class a function out of the *LogicsManager* (description at page 139) can be assigned to the discrete inputs.
There will be no entry in the event history in case of an alarm.

EN DI {x} delayed by eng.speed
DE DI {x} verzög. d. Motordrehz.
{0} {1o} {1oc} {2oc}
244 ✓ ✓ ✓ ✓

Discrete input: Engine delayed monitoring **YES / NO**

YES .....The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO .....The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

NOTE

If a discrete input has been configured with a shut-down alarm that has been enabled to self-acknowledge, and has been configured as engine delayed the following scenario may happen:

- **The discrete input shuts down the engine because of its alarm class.**
- **Due to the engine stopping, all engine delayed alarms are ignored.**
- **The alarm class is acknowledged automatically.**
- **The alarm will self-acknowledge and clear the fault message that shut the engine down. This prevents the fault from being analyzed. After a short delay, the engine will restart.**
- **After the engine monitoring delay expires, the fault that originally shut down the engine will do so again. This cycle will continue to repeat until corrected.**

EN DI {x} self acknowledge
DE DI {x} Selbstquittierend
{0} {1o} {1oc} {2oc}
245 ✓ ✓ ✓ ✓

Discrete input: Self acknowledgment **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

If the DI is configured with the alarm class "Control", self acknowledgement is always active.

EN DI {x} text
DE DI {x} Text
L {0} {1o} {1oc} {2oc}
246 ✓ ✓ ✓ ✓

Discrete input: Message text **user-defined**

If the discrete input is enabled, this text is displayed on the control unit screen. The event log will store this text message as well.

Note: This parameter may only be configured using LeoPC1.

Note: If the DI is used as control input with the alarm class "Control", you may enter here its function (e.g. external acknowledgement) for a better overview within the configuration.

Discrete Outputs (*LogicsManager*)

The discrete outputs are controlled via the *LogicsManager*.

⇨ **Please note the description of the *LogicsManager* starting on page 140.**

Some outputs are assigned 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 'Diesel: Pre-glow, Gas: Ignition'			
[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	*Ready* [for] operation / *LogicsManager*			
External relay output (via CANopen; not included in easYgen delivery; can be an expansion card like IKD1)					
[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*			

#1..The relay has superimposed the "Ready for operation" information and operates as idle current relay (N.C.)

Table 3-22: Relay outputs - assignment

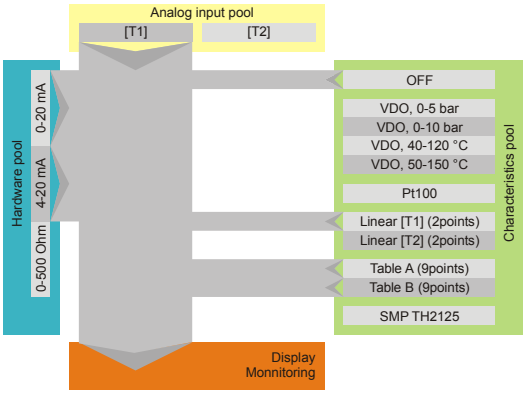
Analog Inputs (*FlexIn*)

The table of analog inputs lists the various types of inputs that may be utilized with this control unit. The inputs to be used on the control unit are [T1] and [T2]. The free definable characteristic curves located in tables A and B may be assigned as user defined to each analog input. The linear characteristic curves of [T1] and [T2] may only be assigned to the current analog inputs. The following assignment configurations are possible:

Table of analog inputs	**Table of characteristic curves (type)**										
	OFF	VDO, Pressure 0 to 5 bar (0 to 72 psi)	VDO, Pressure 0 to 10 bar (0 to 145 psi)	VDO, Temperature 40 to 120 °C (104 to 248 °F)	VDO, Temperature 50 to 150 °C (122 to 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	SMP TH2125, Temperature 25 to 150 °C (77 to 302 °F)
Analog input [T1]											
0 to 20 mA	✓	---	---	---	---	---	✓	---	✓	✓	---
4 to 20 mA	✓	---	---	---	---	---	✓	---	✓	✓	---
0 to 500 Ohm	✓	✓	✓	✓	✓	✓	✓	---	✓	✓	✓
Analog input [T2]											
0 to 20 mA	✓	---	---	---	---	---	---	✓	✓	✓	---
4 to 20 mA	✓	---	---	---	---	---	---	✓	✓	✓	---
0 to 500 Ohm	✓	✓	✓	✓	✓	✓	---	✓	✓	✓	✓

Table 3-23: Analog inputs - possibilities of configuration (*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

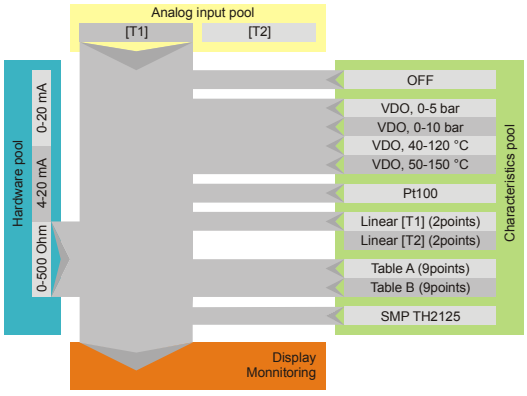


Figure 3-28: Analog inputs - possibilities of combinations (*FlexIn*)

Analog Inputs: Display

EN Display temperature in
DE Temperaturanzeige in
{0} {1o} {1oc} {2oc}
247 ✓ ✓ ✓ ✓

Temperature display in **°C / °F**

°C .....The temperature is displayed in °C (Celsius).
°F.....The temperature is displayed in °F (Fahrenheit).

EN Display pressure in
DE Druckanzeige in
{0} {1o} {1oc} {2oc}
248 ✓ ✓ ✓ ✓

Pressure display in **bar / psi**

bar.....The pressure is displayed in Bar.
psi.....The pressure is displayed in psi.

NOTE

These parameters define only the display. Monitoring of the limits is always performed with the engineering units °C or bar.

Analog Inputs: Type

EN Type
DE Typ
{0} {1o} {1oc} {2oc}
249 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Type **OFF / VDO 5bar / VDO 10bar / VDO 120°C / VDO 150°C / Pt100 / linear / Table A / Table B**

ⓘ The characteristic curves of the inputs can be found in Appendix C (page 168).

According to the following parameters different measuring ranges are possible at the analog inputs. The selectable ranges are:

OFF.....The analog input is switched off.
VDO 5bar.....The value of the analog input is interpreted with the VDO characteristics 0 to 5 bar.
VDO 10bar.....The value of the analog input is interpreted with the VDO characteristics 0 to 10 bar.
VDO 120°C .....The value of the analog input is interpreted with the VDO characteristics 40 to 120 °C.
VDO 150°C .....The value of the analog input is interpreted with the VDO characteristics 50 to 150 °C.
Pt100.....The value of the analog input is interpreted with a Pt100 characteristic.
linear.....Each analog input may be assigned to a linear characteristic curve, which can be only used for the respective defined input [T{x}] (x = 1 to 2). The minimum (0 %) and maximum (100 %) value refers to the total measuring range of the analog input (i.e. 0 to 500 Ohm, 0 to 20 mA or 4 to 20 mA). Both benchmark limits of the linear characteristic curves must be defined only in case they are used.
Table A / B .....The analog input is assigned to a characteristic curve which is defined over 9 points (stored in a table). Two independent tables (table A and table B) may be allocated to the analog inputs. Note that if these tables are to be used with the analog inputs, the defined points of these tables must be programmed into the control unit.
SMP 2125 .....The value of the analog input is interpreted with a SMP TH2125 characteristic.

EN Select hardware
DE Auswahl Hardware
{0} {1o} {1oc} {2oc}
250 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Hardware **0 to 500 Ohm / 0 to 20 mA / 4 to 20 mA**

The software in the control unit may be configured for various types of sensors. The configurable ranges apply to the linear analog input. Configurable ranges are:
0 to **500 Ohm** The measuring range of the analog input is 0- to 500 Ohm.
0 Ohm = 0 %, 500 Ohm = 100 %.
0 to **20 mA**....The measuring range of the analog input is 0 to 20 mA.
0 mA = 0 %, 20 mA = 100 %.
4 to **20 mA**....The measuring range of the analog input is 4 to 20 mA.
4 mA = 0 %, 20 mA = 100 %.

EN Offset
DE Offset
{0} {1o} {1oc} {2oc}
251 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Offset **-20.0 to 20.0 Ohm**

The resistive input (the "0-500Ohm" analog input) may be calculated with a permanent offset to adjust for inaccuracies. If the offset feature is utilized, the value configured in this parameter will be added to/subtracted from the measured resistive value. This has the following effect to the measured values (please note tables starting on page 168):
-20.0 to **0.1 Ohm**
VDO temperature: The displayed value will decrease.
VDO pressure: The displayed value will increase.
+0.1 to **20.0 Ohm**
VDO temperature: The displayed value will increase.
VDO pressure: The displayed value will decrease.

EN Bargraph minimum
DE Bargraph Minimum
{0} {1o} {1oc} {2oc}
252 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Bar graph minimum value **-9999 to 9999**

The start value for the bar graph display of the analog input is defined here. The value must be entered according to the display format, which refers to the analog input type (Parameter 249).

Note: This parameter is only effective if Parameter 249 is configured to Linear or Table A/B.

EN Bargraph maximum
DE Bargraph Maximum
{0} {1o} {1oc} {2oc}
253 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Bar graph maximum value **-9999 to 9999**

The end value for the bar graph display of the analog input is defined here. The value must be entered according to the display format, which refers to the analog input type (Parameter 249).

Note: This parameter is only effective if Parameter 249 is configured to Linear or Table A/B.

EN Description
DE Beschreibung
L {0} {1o} {1oc} {2oc}
254 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 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 control unit screen. The event log will store this text message and it is also used for the visualization screen.

Note: This parameter may only be configured using LeoPC1.

EN	Value format				
DE	Zahlenformat				
L	{0}	{1o}	{1oc}	{2oc}	
255	✓	✓	✓	✓	

Analog input {x} [x = 1 or 2]: Value format **user-defined**

ⓘ If a sign to denote a negative measured value (i.e. –10) is required, then the first "0" of the numeric display is utilized for this symbol.

To display the measuring value of the analog input for the analog input types linear as well as Table A and Table B (Parameter 249) correctly this parameter is to be used to define the format. The zeros in the numeric display are used for the measuring values and are configurable. The placeholders for the digits may have symbols (i.e. commas).

Note

- This parameter may only be configured using LeoPC1.
- This parameter only applies to the linear and the user defined Table A and Table B (Parameter 249) analog input types.
- The displayed value should be configured with the same number of digits as the desired value to be measured.
- The measured value will be displayed from right to left. If the measured value is larger than the number of digits in the display, only a portion of the measured value will be shown. An example of this would be a display of three digits is configured when four digits will be needed. Instead of the number "1234" being displayed only "234" will be shown.
- If the parameter being displayed has a numeral "0" in the name, the letter "O" must be used instead. If a numeral is used, a numeric value will display in its place.

Examples

Fuel level
- value at 0 %.....0
- value at 100 %.....1000
- desired display .....up to 1,000mm
- this parameter.....`0,000mm`

Angle
- value at 0 %.....-1799
- value at 100 %.....1800
- desired display .....-179.9° to 180.0°
- this parameter.....`0000.0°`

Pressure
- value at 0 %.....0
- value at 100 %.....100
- desired display .....up to 10.0bar
- this parameter.....`00.0bar`

EN Filter time constant
DE Filter
256 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Analog input {x} [x = 1 or 2]: Filter time constant **OFF / 1 / 2 / 3 / 4 / 5**

A filter time constant may be used to reduce the fluctuation of an analog input reading. This filter time constant assesses the average of the signal according to the following formula:

$$Cut-off-frequency = \frac{1}{20ms \times 2 \times \pi \times 2^{N-1}}$$, whereby "N" is the parameter.

OFF .....The analog input is displayed without filtering.
1 .....Cut-off-frequency = 7.96 Hz (filter time constant = 0.02 s)
2 .....Cut-off-frequency = 3.98 Hz (filter time constant = 0.04 s)
3 .....Cut-off-frequency = 1.99 Hz (filter time constant = 0.08 s)
4 .....Cut-off-frequency = 0.99 Hz (filter time constant = 0.16 s)
5 .....Cut-off-frequency = 0.50 Hz (filter time constant = 0.32 s)

EN Hysteresis
DE Hysterese
257 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Scaling linear {x} [x = A/B]: Hysteresis **0 to 999**

If the analog input is used for monitoring/protection the actual value must exceed or fall below one of the limits defined in Parameter 259 and/or 260 to be recognized as out of parameters. For a value to register as having returned to be within parameters, the monitored value must rise above or fall below this value for the hysteresis.

NOTE

The setting of the hysteresis is only valid for the fixed assigned thresholds.

When using flexible thresholds, an own hysteresis (Parameter 279) must be defined. The setting of this parameter has no effect with flexible thresholds.

Analog Inputs: Monitoring Limits

Monitoring of the respective analog input is performed according to the configuration.
If this protective function is triggered, the display indicates "**`Lv1: {Text of Parameter 254}`**" or "**`Lv2: {Text of Parameter 254}`**".

EN Monitoring level {y}
DE Überwachung Stufe{y}
258 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Analog input {x} [x = 1 or 2]: Monitoring threshold value {y} [y = 1/2] **ON / OFF**

ON .....Limit(s) 1 and/or 2 are enabled and monitoring of following parameter is limits carried out. Both limits can be enabled independent of each other.
OFF .....Monitoring is disabled.

EN Limit level {y}
DE Limit Stufe{y}
259 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Analog input {x} [x = 1 or 2]: Threshold value {y} [y = 1/2] **-9,999 to 9,999**

The limit of the value to be monitored is defined by this parameter. If this value is reached or exceeded / fallen below (dependent on Parameter 262) for at least the delay time configured in Parameter 261 the action ispecified by the alarm class is initiated after the configured delay expires. Entering the limits may only be performed in the engineering units °C or bar, not in °F or psi.

EN Limit level {y} Idle Run
DE Limit Stufe{y} Idle Modus
260 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Analog input {x} [x = 1 or 2]: Idle mode threshold value {y} [y = 1/2] **-9,999 to 9,999**

ⓘ See Engine: Idle Mode on page 43.

If the engine idle mode is enabled, an alternative threshold value is configured here. This threshold is used instead of the threshold defined in Parameter 259 while the idle mode is active.

EN Delay level{y}
DE Verzögerung Stufe {y}
{0} {1o} {1oc} {2oc}
261 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Delay time threshold value {y} [y = 1/2] 0.02 to 99.99 s

If the monitored analog input value exceeds or falls below the threshold value for the delay time configured here, an alarm will be issued. If the monitored analog input value falls below or exceeds (dependent on Parameter 262) the threshold (plus/minus the hysteresis) before the delay expires the time will be reset.

EN Monitoring level {y} at
DE Überwachung Stufe{y} auf
{0} {1o} {1oc} {2oc}
262 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 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}
263 ✓ ✓ ✓ ✓

Analog in.{x} [x = 1 or 2]: Alarm cl.. limit {y} [y = 1/2] Class A/B/C/D/E/F

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge level {y}
DE Selbstquittierend Stufe {y}
{0} {1o} {1oc} {2oc}
264 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Self acknowledged limit {y} [y = 1/2] YES / NO

YES..... The control automatically clears the alarm if it is no longer valid.
NO..... An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

EN Delayed by engine level {y}
DE Verzögert d. Motordr. St. {y}
{0} {1o} {1oc} {2oc}
265 ✓ ✓ ✓ ✓

Analog input {x} [x = 1 or 2]: Engine delayed monitoring {y} [y = 1/2] YES / NO

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

Analog Inputs: Wire Break Monitoring

The respective analog input is monitored for wire break.
If this protective function is triggered, the display indicates "**`Wb: {Text of Parameter 254}`**".

EN Monitoring wire break
DE Drahtbruchüberw.

	{0}	{1o}	{1oc}	{2oc}
266	✓	✓	✓	✓

Analog input {x} [x = 1 or 2]: Wire break monitoring — **Off / High / Low / high/low**

The analog input can be monitored for a wire break. The following configurations are used to monitor for a wire break:
Off .....No wire break monitoring is performed.
High.....If the actual value rises over the maximum value (overshoot), this is identified as a wire break.
Low.....If the actual value falls below the minimum value (undershoot), this is identified as a wire break.
high/low .....If the actual value rises over the maximum value (overshoot) or falls below the minimum value (undershoot), this is identified as a wire break.

NOTE

If the control unit detects that the measuring range for an analog input has been exceeded and an alarm is issued, the limit value monitoring of this analog input is disabled.

The measuring range is recognized as being exceeded and an alarm is issued:

- **4 to 20 mA**
  Minimum value ..... **2 mA** ..... **Undershooting**
  Maximum value ..... **20.5 mA** ..... **Overshooting**
- **0 to 500 Ohm**
  Minimum value ..... **5 Ohm** ..... **Undershooting (Offset = 0 Ohm)**
  Maximum value ..... **515 Ohm** ..... **Overshooting (Offset = 0 Ohm)**

  Note: Depending on what was configured for the offset value (Parameter 251) the displayed value may be shifted. This may result in a broken wire being recognized early or later than the actual value being measured. (An offset of +20ohms will recognize a wire break at 25ohms instead of 5ohms.)

EN Wire break alarm class
DE Drahtbruch Alarmklasse

	{0}	{1o}	{1oc}	{2oc}
267	✓	✓	✓	✓

Analog in. {x} [x = 1 or 2]: Alarm cl. wire break monit. — **Class A/B/C/D/E/F/Control**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge wire break
DE Drahtbruch selbstquitt.

	{0}	{1o}	{1oc}	{2oc}
268	✓	✓	✓	✓

Analog input {x} [x = 1 or 2]: Self acknowledged — **YES / NO**

YES .....The control automatically clears the alarm if it is no longer valid.
NO .....An automatic reset of the alarm does not occur. The reset occurs manually by pressing the appropriate buttons, by activating the *LogicsManager* output "External acknowledgement" via an discrete input, or via an interface.

Analog Inputs: Characteristics "Linear" (2 Point Scaling)

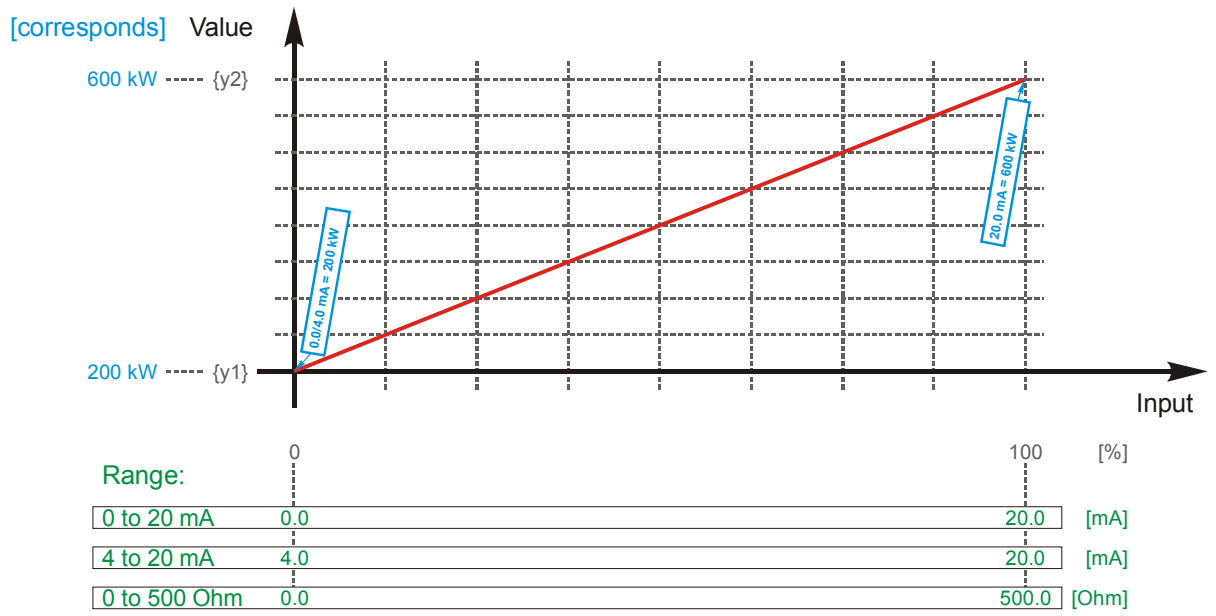


Figure 3-29: Analog input scaling - linear characteristics

EN Value at 0%
DE Wert bei 0%
{0} {1o} {1oc} {2oc}
269 ✓ ✓ ✓ ✓

Scaling linear {x} [x = A/B]: Value at 0 % **-9,999 to 9,999**

The analog input is assigned to a straight line. This parameter defines the actual value at 0 % of the total range of the analog input. For example, the input is configured as a 0 to 20 mA input, 0 % equals 0 mA. If 4 to 20 mA is selected, 0 % equals 4 mA.

EN Value at 100%
DE Wert bei 100%
{0} {1o} {1oc} {2oc}
270 ✓ ✓ ✓ ✓

Scaling linear {x} [x = A/B]: Value at 100 % **-9,999 to 9,999**

The analog input is assigned to a straight line. This parameter defines the actual value at 100 % of the range of the analog input. For example, the input is configured as a 0 to 20 mA input, 100 % equals 20 mA.

Analog Inputs: Configure Flexible Thresholds

Monitoring of the respective limit is performed according to the configuration.
If this protective function is triggered, the display indicates "**`Flexible Limit {x}`**", where {x} indicates the flexible limits 1 to 4, or the display indicates the text configured in Parameter 280.

EN Monitoring
DE Überwachung
{0} {1o} {1oc} {2oc}
271 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Monitoring **ON / OFF**

ON..... Monitoring of the flexible limit {x} is carried out according to the following parameters.
OFF..... Monitoring is disabled.

EN Monitored analog input
DE Überwachter Analogeingang

	{0}	{1o}	{1oc}	{2oc}
272	✓	✓	✓	✓

Flexible limit {x} [x = 1 to 4]: Monitored analog input **see selection below**

Battery .....The battery voltage is monitored with the flexible limit {x}.
AnalogIn1 ....The analog input 1 is monitored with the flexible limit {x}.
AnalogIn2 ....The analog input 2 is monitored with the flexible limit {x}.
ECUSPN110 The coolant temperature from an ECU via the CAN bus is monitored with the flexible limit {x} (J1939 SPN 110).
ECUSPN100 The oil pressure from an ECU via the CAN bus is monitored with the flexible limit {x} (J1939 SPN 100).
ECUSPN190 The engine speed from an ECU via the CAN bus is monitored with the flexible limit {x} (J1939 SPN 190).

EN Limit
DE Limit

	{0}	{1o}	{1oc}	{2oc}
273	✓	✓	✓	✓

Flexible limit {x} [x = 1 to 4]: Threshold **-32000 to +32000**

The threshold limit of the value to be monitored is defined by this parameter. If this value is reached or exceeded / fallen below (dependent on Parameter 275) for at least the delay time configured in Parameter 274 the action specified by the alarm class is initiated after the configured delay expires. The format for entering the threshold value depends on the monitored analog input:
Battery .....Input in 0.1 V – example: 23.5 V > input: 00235
ECUSPN110 Direct input in °C – example: 156°C > input: 00156
ECUSPN100 Direct input in kPa – example: 600 kPa > input: 00600
ECUSPN190 Direct input in rpm – example: 1500 rpm > input: 01500
AnalogIn1/2 .Input depends on the configured format of the respective analog input:
VDO 5 bar ...Input in 0.01 bar/psi – example: 5.0 bar > input: 00500 *
VDO 10 bar .Input in 0.01 bar/psi – example: 73.6 psi > input: 07360 *
VDO 150°C..Direct input in °C/F – example: 69°C > input: 00069 **
VDO 120°C..Direct input in °C/F – example: 156°F > input: 00156 **
Pt100 .....Direct input in °C/F – example: 69°C > input: 00069 **
Linear.....Input according to the configured format (Parameter 255)
Tab. A/B.....Input according to the configured format (Parameter 255)
SMP 2125.....Direct input in °C/F – example: 73°C > input: 00073 **
* depending on the setting of Parameter 248
** depending on the setting of Parameter 247

Examples

Fuel level
- value at 0 % 0
- value at 100 % 1000
- desired display ..... up to 1,000mm
- this parameter ..... `0,000mm`

Angle
- value at 0 % ..... -1799
- value at 100 % 1800
- desired display ..... -179.9° to 180.0°
- this parameter ..... `0000.0°`

Pressure
- value at 0 % 0
- value at 100 % 100
- desired display ..... up to 10.0bar
- this parameter ..... `00.0bar`

EN Delay
DE Verzögerung
{0} {1o} {1oc} {2oc}
274 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Delay **00,02 to 99,99 s**

If the monitored value exceeds or falls below the threshold value for the delay time configured here, an alarm will be issued. If the monitored value falls below the threshold (plus/minus the hysteresis, dependent on Parameter 275) before the delay expires the time will be reset.

EN Monitoring at
DE Überwachung auf
{0} {1o} {1oc} {2oc}
275 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Monitoring for **Overrun / Underrun**

Overrun..... The monitored value must exceed the threshold limit for a fault to be recognized.
Underrun..... The monitored value must fall below the threshold limit for a fault to be recognized.

EN Alarm class
DE Alarmklasse
{0} {1o} {1oc} {2oc}
276 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Alarm class **Class A/B/C/D/E/F/Control**

ⓘ See chapter "Alarm" on page 138.

The alarm class assigned to each limit alarm.

EN Self acknowledge
DE Selbstquittierend
{0} {1o} {1oc} {2oc}
277 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Self acknowledge **YES / NO**

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

EN Delayed by engine speed
DE Verzögert durch Motordrehz.
{0} {1o} {1oc} {2oc}
278 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Engine speed delay **YES / NO**

YES..... The alarm is delayed until engine monitoring is enabled. Therefore the conditions of Parameter 60 "Engine delayed monitoring" must be fulfilled.
NO..... The alarm is not delayed until engine monitoring is enabled. Fault conditions are immediately analyzed.

EN Hysteresis
DE Hysterese
{0} {1o} {1oc} {2oc}
279 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Hysteresis **0 to 999**

During monitoring, the actual value must exceed or fall below one of the limits defined in parameter 273 to be recognized as out of permissible limits. For a value to register as having returned to the permissible limits, the monitored value must rise above or fall below this value for the hysteresis. The format for entering the hysteresis depends on the monitored analog input and corresponds with the one of the threshold listed in Parameter 273.

Note: When using the flexible thresholds, the setting of Parameter 257 has no effect.

EN Description
DE Beschreibung
L
{0} {1o} {1oc} {2oc}
280 ✓ ✓ ✓ ✓

Flexible limit {x} [x = 1 to 4]: Message text **user-defined**

If the configured threshold of the flexible analog input has been reached or exceeded the text configured here is displayed in the control unit screen (the default text is: Flexible Limit). The event log will store this text message and it is also used for the visualization screen.

Note: This parameter may only be configured using LeoPC1.

Analog Inputs: Characteristics "Table A" And "Table B" (9 Point Scaling)

The characteristic curves of "Table A" and "Table B" (freely configurable over 9 defined percentage points) are independently configurable for all analog inputs. Each percentage point may be scaled to related values measured from the analog input (0 to 500 Ohm, 0 to 20 mA or 4 to 20 mA), so that the actual display reflects the measured values (i.e. -100 to 100 kW). The so developed characteristic curve can be used for visualization and monitoring via the configuration to "Table A" (for Table A) as well as "Table B" (for Table B)

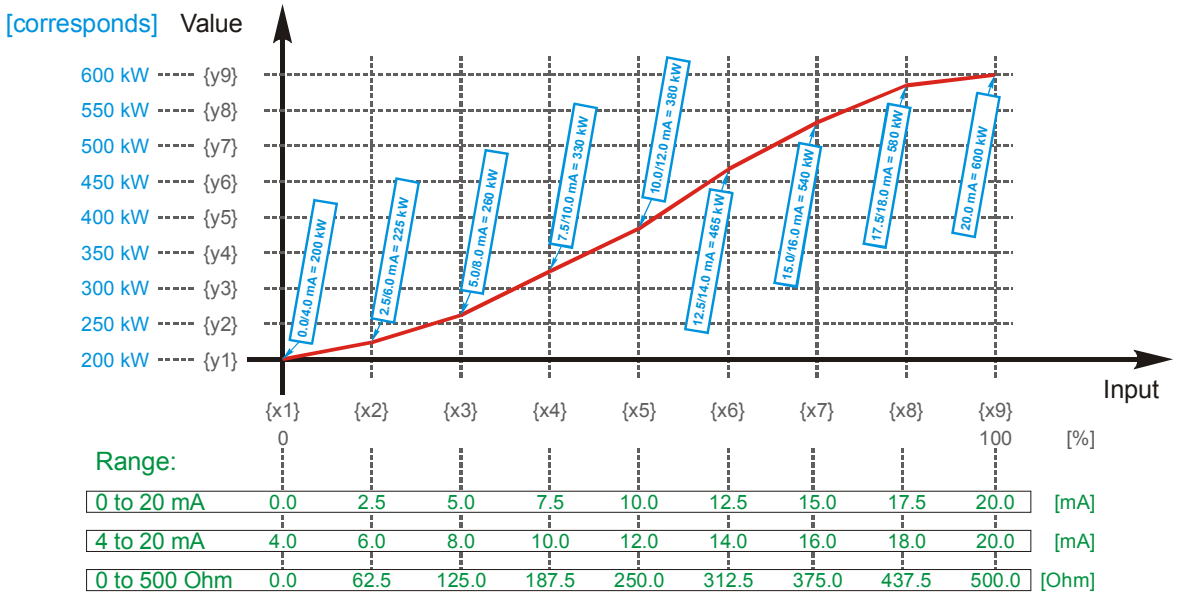


Figure 3-30: Analog input scaling - table (example)

NOTE

The X and Y junction may be moved within the range of values (the junctions don't have to be equidistant).

When configuring the X coordinates, ensure the coordinates always increase in scale continuously. In the following example the first set of x/y coordinates are correct and the second set of x/y coordinates are wrong:

- **correct** X-coord. 0 % 10 % 20 % 40 % 50 % 60 % 80 % 90 % 100 %
  Y-coordinate -100 -95 -500 -10 +3 +17 +18 +100 +2000
- **wrong** X-coord. 0 % 10 % 20 % 60 % 20 % 30 % 80 % 40 % 100 %
  Y-coordinate -100 -50 -95 +18 +17 +3 -10 +2000 +100

If the first X coordinate is >0%, all values smaller than the first X value will be output with the first Y value. If the last Y value is <100%, all higher values will be output with the value of Y9.

EN X-value {a}
DE X-Wert {a}
{0} {1o} {1oc} {2oc}
281 ✓ ✓ ✓ ✓

Table {x} [x = A/B]: X-coordinate {a} [a = 1 to 9] **0 to 100 %**

The analog input is assigned to a curve. This parameter defines the actual percentage assigned to each of the nine points along the X-axis of the total range of the selected hardware for analog input. For example: If a 0 to 20mA input is configured and the X1-coordinate=0%, then the Y1-coordinate=0mA. If a 4 to 20mA input is configured and the X1-coordinate=0%, then the Y1-coordinate=4mA

EN Y-value {b}
DE Y-Wert {b}
{0} {1o} {1oc} {2oc}
282 ✓ ✓ ✓ ✓

Table {x} [x = A/B]: Y-coordinate {b} [b = 1 to 9] **-9999 to 9999**

This parameter defines the Y-coordinate (the displayed and monitored value) at the corresponding X-coordinate. For example: If a 0 to 20mA input is configured and the X2-coordinate=10%, then the Y2-coordinate=2mA. If a 4 to 20mA input is configured and the X2-coordinate=10%, then the Y2-coordinate=5.6mA.

Counters

Counters: Maintenance Call

A maintenance call will be issued if the configured number of operating hours has expired or the configured number of days has expired since the last maintenance.
In case of a maintenance call, the display indicates "**Mainten. days exceeded**" or "**Mainten. hours exceeded**".

EN Maintenance hours
DE Wartungsintervall Stunden
{0} {1o} {1oc} {2oc}
283 ✓ ✓ ✓ ✓

Counter. Maintenance interval 'Hours' **0 to 9,999 h**

ⓘ To disable the maintenance "hours" counter configure "0" for this entry.

This parameter defines the remaining hours until the next maintenance call occurs. Once the generator has been operated for the number of hours configured here, a maintenance message is displayed.

If the maintenance counter is reset either by the push-buttons at the front panel (see manual 37392), or by configuring the parameter "Reset maintenance call" to "YES" (see Parameter 285), the maintenance counter is reset to the configured value.

EN Maintenance days
DE Wartungsintervall Tage
{0} {1o} {1oc} {2oc}
284 ✓ ✓ ✓ ✓

Counter. Maintenance interval 'Days' **0 to 999 days**

ⓘ To disable the maintenance "days" counter configure "0" for this entry.

This parameter defines the remaining days until the next maintenance call occurs. Once the configured number of days has expired since the last maintenance, a maintenance message is displayed.
If the maintenance counter is reset either by the push-buttons at the front panel (see manual 37392), or by configuring the parameter "Reset maintenance call" to "YES" (see Parameter 286), the maintenance counter is reset to the configured value.

EN Reset maintenance period h
DE Wartungsstunden rücksetzen
{0} {1o} {1oc} {2oc}
285 ✓ ✓ ✓ ✓

Counter: Reset maintenance call counter 'Hours' **YES / NO**

If this parameter is configured to "YES" the maintenance "hours" counter is reset to the configured value. Once the counter has been reset, the control unit changes this parameter to "NO".

EN Reset maintenance period days
DE Wartungstage rücksetzen
{0} {1o} {1oc} {2oc}
286 ✓ ✓ ✓ ✓

Counter: Reset maintenance call counter 'Days' **YES / NO**

If this parameter is configured to "YES" the maintenance "days" counter is reset to the configured value. Once the counter has been reset, the control unit changes this parameter to "NO".

EN Code level for reset maintenance
DE Codeebene für Wrtg. rücksetzen
{0} {1o} {1oc} {2oc}
287 ✓ ✓ ✓ ✓

Counter: Code level for resetting the maintenance call **0 to 3**

This parameter determines the required code level for resetting the visualization screen "Maintenance call in...". User with a lower code level may not access this function.
The following code levels exist:
3 = Commissioner
2 = Temporary commissioner
1 = Service level
0 = Operator

Counters: Running Hours, kWh And kvarh

EN Counter value preset
DE Zähler-Setzwert

	{0}	{1o}	{1oc}	{2oc}
288	✓	✓	✓	✓

Counter: Set point value for counters **0 to 99,999,999**

This value is utilized to set the hours in the following parameters:
- running hours
- kWh counter
- kvarh counter

The number entered into this parameter is the number that will be set to the parameters listed above when they are enabled.

EN Set operation hours in 0.00h
DE Betriebsstd. setzen in 0,00h

	{0}	{1o}	{1oc}	{2oc}
289	✓	✓	✓	✓

Counter: Set running hours counter **YES / NO**

YES..... The current value of this counter is overwritten with the value configured in "Counter value preset". After the counter has been (re)set, this parameter changes back to "NO" automatically.
NO ..... The value of this counter is not changed.

EN Set counter free adj in 0.00h
DE Frei konf. h setzen in 0,00h

	{0}	{1o}	{1oc}	{2oc}
290	✓	✓	✓	✓

Counter: Set free adjustable hours counter **YES / NO**

YES..... The current value of this counter is overwritten with the value configured in "Counter value preset". After the counter has been (re)set, this parameter changes back to "NO" automatically.
NO ..... The value of this counter is not changed.

EN Set active energy in 0.00MWh
DE Wirkarbeitsz. setzen in 0,00MWh

	{0}	{1o}	{1oc}	{2oc}
291	✓	✓	✓	✓

Counter: Set kWh counter **YES / NO**

YES..... The current value of this counter is overwritten with the value configured in "Counter value preset". After the counter has been (re)set, this parameter changes back to "NO" automatically.
NO..... The value of this counter is not changed.

EN Set reactive energy 0.00Mvarh
DE Blindarbeitsz. set. 0,00Mvarh

	{0}	{1o}	{1oc}	{2oc}
292	✓	✓	✓	✓

Counter: Set kvarh counter **YES / NO**

YES..... The current value of this counter is overwritten with the value configured in "Counter value preset". After the counter has been (re)set, this parameter changes back to "NO" automatically.
NO..... The value of this counter is not changed.

NOTE

Example: The counter value preset (Parameter 288) is configured to "3456".
If Parameter 289 will be configured to YES, the operation hour counter will be set to 34.56h.
If Parameter 291 will be configured to YES, the active energy counter will be set to 34.56MWh.

Counters: Start Counter

EN Counter value preset
DE Zähler-Setzwert

	{0}	{1o}	{1oc}	{2oc}
293	✓	✓	✓	✓

Counter: Set point value for start counter **0 to 65535**

This parameter defines the number of times the control unit registers a start of the generator set. The number entered here will overwrite the current displayed value after confirming with Parameter 294.

EN Set number of starts
DE Anzahl Starts setzen

	{0}	{1o}	{1oc}	{2oc}
294	✓	✓	✓	✓

Counter: Set start counter **YES / NO**

YES..... The current value of the start counter is overwritten with the value configured in "Set point value for start counter". After the counter has been (re)set, this parameter changes back to "NO" automatically.
NO ..... The value of this counter is not changed..

Counters: Free Adjustable Hours Counter

The freely adjustable hours counter may be used to add up the duration of certain events. It is possible to record how long the system has been in emergency power operation or how long the system has been connected to the mains by configuring the respective command variable for the related *LogicsManager* output for example.
This counter will be enabled if the related *LogicsManager* output becomes TRUE.
This counter will be disabled if the related *LogicsManager* output becomes FALSE.
This counter may be set using Parameter 290.

EN Hours counter free adjustable
DE Frei konf. h-Zähler

	{0}	{1o}	{1oc}	{2oc}
295	✓	✓	✓	✓

Counter: Enable free adjustable hours counter ***LogicsManager***

Once the conditions of the *LogicsManager* have been fulfilled, the free adjustable hours counter begins to count. The *LogicsManager* and its default settings are explained on page 140 in Appendix B: "*LogicsManager*".

LogicsManager

LogicsManager: Limit Switch (Load)

LogicsManager: Limit switch 'generator power'

It is possible configure multiple power limit set points that will energize a discrete output when a specific limit has been reached. By utilizing the *LogicsManager*, it is possible to use the monitored values of various parameters to evaluate the condition of the generator and power being monitored as command variable. This makes it possible to disconnect the load via an external circuit.

NOTE

This function is not designed to be a generator protection function. An external circuit may be combined with the functions performed here to create additional generator protective functions. The additional protective functions will not result in the issuing of a centralized alarm or a fault condition message being displayed in the LC Display of the control unit.

EN Gen. load limit 1
DE Generatorlast St.1
296 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Limit monitoring: Generator power: Limit (Limit 1) **0.0 to 200.0 %**

ⓘ This value refers to the Rated active power (Parameter 10, see page 19).

The percentage value, which is to be monitored, is configured with this parameter. If this value is reached or exceeded, the command variable is set to "TRUE".

EN Gen. load limit 2
DE Generatorlast St.2
297 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Limit monitoring: Generator power: Limit (Limit 2) **0.0 to 200.0 %**

ⓘ This value refers to the Rated active power (Parameter 10, see page 19).

The percentage value, which is to be monitored, is configured with this parameter. If this value is reached or exceeded, the command variable is set to "TRUE".

EN Gen. load hysteresis
DE Generatorlast Hysterese
298 {0} ✓ {1o} ✓ {1oc} ✓ {2oc} ✓

Limit monitoring: Generator power: hysteresis (Limit 1/Limit 2) **0.0 to 100.0 %**

ⓘ This value refers to the Rated active power (Parameter 10, see page 19).

If the monitored value has exceeded the configured set point, the monitored value must fall below the limit set point and the value configured here for the hysteresis (this value applies to both limit values). When the monitored value falls below the hysteresis, the internal flag is set to "FALSE".

LogicsManager: Limit switch 'mains power' {2oc} (Load)

It is possible to configure multiple power limit set points that will energize a discrete output when that limit has been reached. By utilizing the *LogicsManager*, it is possible to use the monitored values of various parameters to evaluate the condition of the mains and power being monitored as command variable. This makes it possible to disconnect the load via an external circuit.

NOTE

This function is not designed to be a mains protection function. An external circuit may be combined with the functions performed here to create additional mains protective functions. The additional protective functions will not result in the issuing of a centralized alarm or a fault condition message being displayed in the LC Display of the control unit.

EN	Mains load limit 1	**Limit monitoring: Mains power: limit value (Limit 1)**				**-999.9 to 999.9 %**
DE	Netzlast St.1					
	{0}	{1o}	{1oc}	{2oc}		
299	---	---	---	✓		

ⓘ This value refers to the rated values of the mains current and voltage transformer (Parameters 14 or 15 and 19).

The percentage value, which is to be monitored, is configured with this parameter. If this value is reached or exceeded, the command variable is set to "TRUE".

EN	Mains load limit 2	**Limit monitoring: Mains power: limit value (Limit 2)**				**-999.9 to 999.9 %**
DE	Netzlast St.2					
	{0}	{1o}	{1oc}	{2oc}		
300	---	---	---	✓		

ⓘ This value refers to the rated values of the mains current and voltage transformer (Parameters 14 or 15 and 19).

The percentage value, which is to be monitored, is configured with this parameter. If this value is reached or exceeded, the command variable is set to "TRUE".

EN	Mains load hysteresis	**Limit monitoring: Mains power: hysteresis (Limit 1/Limit 2)**				**0.0 to 100.0 %**
DE	Netzlast Hysterese					
	{0}	{1o}	{1oc}	{2oc}		
301	---	---	---	✓		

ⓘ This value refers to the rated values of the mains current and voltage transformer (Parameters 14 or 15 and 19).

If the monitored value has exceeded the configured set point, the monitored value must fall below the limit set point and the value configured here for the hysteresis (this value applies to both limit values). When the monitored value falls below the hysteresis, the internal flag is set to "FALSE".

LogicsManager: Internal Flags

Internal flags within the *LogicsManager* logical outputs may be programmed and used for multiple functions. For conditions and explanation of programming please refer to page 140 in chapter "*LogicsManager*").

EN	Flag {x}	**Internal flags: Flag {x} [x = 1 to 8]**				***LogicsManager***
DE	Merker {x}					
	{0}	{1o}	{1oc}	{2oc}		
302	✓	✓	✓	✓		

The flags may be used as auxiliary flags for complex combinations by using the logical output of these flags as command variable for other logical outputs.

NOTE

Flag 1 is also used as placeholder in other logical combinations. Flag 8 is preset with a timer start.

LogicsManager: Timer

LogicsManager: Daily Time Set Point

Utilizing the *LogicsManager* it is possible to establish specific times of the day that functions (i.e. generator exerciser) can be enabled. The two daily time set points are activated each day at the configured time. Using the *LogicsManager* these set points may be configured individually or combined to create a time range.

EN Setpoint {x}: Hour
DE Setpoint {x}: Stunde

	{0}	{1o}	{1oc}	{2oc}
303	✓	✓	✓	✓

Timer: Daily time set point {x} [x = 1/2]: hour **0 to 23 h**

Enter the hour of the daily time set point here. Example:
0 .....0th hour of the day (midnight).
23 .....23rd hour of the day (11pm).

EN Setpoint {x}: Minute
DE Setpoint {x}: Minute

	{0}	{1o}	{1oc}	{2oc}
304	✓	✓	✓	✓

Timer: Daily time set point {x} [x = 1/2]: minute **0 to 59 min**

Enter the minute of the daily time set 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}
305	✓	✓	✓	✓

Timer: Daily time set point {x} [x = 1/2]: second **0 to 59 s**

Enter the second of the daily time set point here. Example
0 .....0th second of the minute.
59 .....59th second of the minute.

LogicsManager: Active Time Set Point

Utilizing the *LogicsManager* it is possible to establish specific days (or hours, minutes, seconds) that functions (i.e. generator exerciser) can be enabled. The active switching point is activated only on a specified day (or hour, minute, second). The set points may be configured individually or combined via the *LogicsManager*. You may configure monthly, daily, hourly, minutely, or even secondly time set points depending on how you combine the set points in the *LogicsManager*.

EN Active day
DE Aktiver Tag

	{0}	{1o}	{1oc}	{2oc}
306	✓	✓	✓	✓

Timer: Active time set point: day **1 to 31**

Enter the day of the active switch point here. Example:
01 .....1st day of the month.
31 .....31st day of the month.
The active time set point is enabled during the indicated day from 0:00:00 hours to 23:59:59 hours.

EN Active hour
DE Aktive Stunde

	{0}	{1o}	{1oc}	{2oc}
307	✓	✓	✓	✓

Timer: Active time set point: hour **0 to 23 h**

Enter the hour of the active switch point here. Example:
0 .....0th hour of the day.
23 .....23rd hour if the day.
The active time set point is enabled every day during the indicated hour from minute 0 to minute 59.

EN Active minute
DE Aktive Minute

	{0}	{1o}	{1oc}	{2oc}
308	✓	✓	✓	✓

Timer: Active time set point: minute **0 to 59 min**

Enter the minute of the active switch point here. Example:
0 .....0th minute of the hour.
59 .....59th minute of the hour.
The active time set point is enabled every hour during the indicated minute from second 0 to second 59.

EN	Active second				
DE	Aktive Sekunde				
	{0}	{1o}	{1oc}	{2oc}	
309	✓	✓	✓	✓	

Timer: Active time set point: second **0 to 59 s**

Enter the second of the active switch point here. Example:
0..... 0th second of the minute.
59..... 59th second the minute.
The active time set point is enabled every minute during the indicated second.

LogicsManager: Weekly Time Set Point

Utilizing the *LogicsManager* it is possible to establish specific days of the week that functions (i.e. generator exerciser) can be enabled. The weekly time set point is enabled during the indicated day from 0:00:00 hours to 23:59:59 hours.

EN	{x} active				
DE	{x} aktiv				
	{0}	{1o}	{1oc}	{2oc}	
310	✓	✓	✓	✓	

Timer: Weekly time set points {x} [x = Mo-Su]: days **YES / NO**

Please enter the days of the weekly workdays. Example:

Monday ..... ***YES*** - The switch point is enabled every Monday
NO - The switch point is disabled every Monday

Tuesday ..... ***YES*** - The switch point is enabled every Tuesday
NO - The switch point is disabled every Tuesday

Wednesday ..... ***YES*** - The switch point is enabled every Wednesday
NO - The switch point is disabled every Wednesday

Thursday ..... ***YES*** - The switch point is enabled every Thursday
NO - The switch point is disabled every Thursday

Friday ..... ***YES*** - The switch point is enabled every Friday
NO - The switch point is disabled every Friday

Saturday ..... ***YES*** - The switch point is enabled every Saturday
NO - The switch point is disabled every Saturday

Sunday ..... ***YES*** - The switch point is enabled every Sunday
NO - The switch point is disabled every Sunday

Interfaces

EN / DE		{0}	{1o}	{1oc}	{2oc}
EN	Device number				
DE	Gerätenummer				
311		✓	✓	✓	✓

Interfaces: Device address **1 to 127**

So that this control unit may be positively identified on the CAN bus, the unit address must be set in this parameter. The address may only be represented once on the CAN bus. All other addresses on the CAN bus are calculated on the basis of the address entered in this parameter.

Interfaces: CAN Bus (*FlexCAN*)

NOTE

Refer to the Interface Manual 37393 for detailed information about the CAN bus.

EN / DE		{0}	{1o}	{1oc}	{2oc}
EN	Protocol				
DE	Protokoll				
312		✓	✓	✓	✓

CAN bus: Protocol **OFF / CANopen / LeoPC**

The CAN bus of this unit may be operated with different protocols and Baud rates. This parameter defines the protocol to be utilized. Please note, that all participants on the CAN bus must use the same protocol.

OFF .....The CAN bus is disconnected. Values are not sent or received.
CANopen .....The CANopen protocol is used. More information may be found in the interface manual 37393 under CANopen.
LeoPC .....The CAN CAL protocol is used. More information may be found in the interface manual 37393 under CAN (CAL).

EN / DE		{0}	{1o}	{1oc}	{2oc}
EN	Baudrate				
DE	Baudrate				
313		✓	✓	✓	✓

CAN bus: Baud rate **20 / 50 / 100 / 125 / 250 / 500 / 800 / 1,000 kBaud**

The CAN bus of this unit may be operated 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: CANopen

EN CAN-open Master
DE CAN-open Master
{0} {1o} {1oc} {2oc}
314 ✓ ✓ ✓ ✓

CANopen Master **YES / NO**

YES..... The easYgen is the CANopen Master.
The easYgen automatically changes into operational mode and sends broadcast messages (Start_Remote_Node), which cause all other units to change into operational mode as well.
Attached external devices were configured from the easYgen with SDO messages. The easYgen sends a SYNC message all 20ms on COB ID 80 Hex.
NO..... The easYgen is a CANopen Slave.

EN Producer heartbeat time
DE Producer heartbeat time
{0} {1o} {1oc} {2oc}
315 ✓ ✓ ✓ ✓

CAN bus: Producer heartbeat time **20 to 65,530 ms**

The object producer heartbeat time defines the heartbeat cycle time. If the producer heartbeat time is equal 0, the heartbeat will only be sent as response to a remote frame request.

EN COB-ID SYNC Message
DE COB-ID SYNC Message
{0} {1o} {1oc} {2oc}
316 ✓ ✓ ✓ ✓

COB-ID SYNC Message **1 to 4294967295**

This corresponds to object 1005h (refer to the Interface Manual 37393).

EN Max. answer time ext. devices
DE Max. Antwortzeit ext. Geräte
{0} {1o} {1oc} {2oc}
317 ✓ ✓ ✓ ✓

Max response time ext. devices **0.1 to 9.9 s**

The maximum time that an attached external device has to answer an SDO message. If the external device fails to answer before this time expires, an abort message is sent and the SDO message will be sent again. This is only effective, if easYgen CANopen master is enabled.

EN Time re-init. ext. devices
DE Zeit Re-init. ext- Geräte
{0} {1o} {1oc} {2oc}
318 ✓ ✓ ✓ ✓

Time re-init (re-initialization) ext. devices **0 to 9,999 s**

An external device will be configured again with SDO messages after the time set for this parameter.
If 0 is input in this parameter, the external device will not be configured again with SDO messages
This only functions if easYgen CANopen master is enabled.

Interfaces: CANopen: Additional Server SDOs

EN 2nd Client->Server COB-ID (rx)
DE 2. Client->Server COB-ID (rx)
{0} {1o} {1oc} {2oc}
319 ✓ ✓ ✓ ✓

CAN bus: Client->Server COB-ID (rx) **1 to 4294967295**

This is the CAN ID, on which SDO requests are received.

EN 2nd Server->Client COB-ID (tx)
DE 2. Server->Client COB-ID (tx)
{0} {1o} {1oc} {2oc}
320 ✓ ✓ ✓ ✓

CAN bus: Server-> Client COB-ID (tx) **1 to 4294967295**

This is the CAN ID, on which SDO replies are sent.

EN 3rd Client->Server COB-ID (rx)
DE 3. Client->Server COB-ID (rx)
{0} {1o} {1oc} {2oc}
321 ✓ ✓ ✓ ✓

CAN bus: Client->Server COB-ID (rx) **1 to 4294967295**

This is the CAN ID, on which SDO requests are received.

EN 3rd Server->Client COB-ID (tx)
DE 3. Server->Client COB-ID (tx)
{0} {1o} {1oc} {2oc}
322 ✓ ✓ ✓ ✓

CAN bus: Server-> Client COB-ID (tx) **1 to 4294967295**

This is the CAN ID, on which SDO replies are sent.

EN 4th Client->Server COB-ID (rx)
DE 4. Client->Server COB-ID (rx)
{0} {1o} {1oc} {2oc}
323 ✓ ✓ ✓ ✓

CAN bus: Client->Server COB-ID (rx) **1 to 4294967295**

This is the CAN ID, on which SDO requests are received.

EN 4th Server->Client COB-ID (tx)
DE 4. Server->Client COB-ID (tx)
{0} {1o} {1oc} {2oc}
324 ✓ ✓ ✓ ✓

CAN bus: Server-> Client COB-ID (tx) **1 to 4294967295**

This is the CAN ID, on which SDO replies are sent.

EN 5th Client->Server COB-ID (rx)
DE 5. Client->Server COB-ID (rx)
{0} {1o} {1oc} {2oc}
325 ✓ ✓ ✓ ✓

CAN bus: Client->Server COB-ID (rx) **1 to 4294967295**

This is the CAN ID, on which SDO requests are received.

EN 5th Server->Client COB-ID (tx)
DE 5. Server->Client COB-ID (tx)
{0} {1o} {1oc} {2oc}
326 ✓ ✓ ✓ ✓

CAN bus: Server-> Client COB-ID (tx) **1 to 4294967295**

This is the CAN ID, on which SDO replies are sent.

NOTE

The COB IDs must be entered in decimal numbers in LeoPC1. Here are some important conversions:

Hexadecimal value	Decimal value
80h	128
181h	385
201h	513
281h	641
301h	769
381h	897
401h	1025
481h	1153
501h	1281
581h	1409
601h	1537
80000000h	2147483648

Interfaces: CANopen: Receive PDO (RPDO) {x} ({x} = 1/2)

Two RPDOs are available.

EN COB-ID
DE COB-ID

	{0}	{1o}	{1oc}	{2oc}
327	✓	✓	✓	✓

COB-ID **1 to 4294967295**

This corresponds to object 1400h sub index 1h (refer to the Interface Manual 37393).

CAUTION

The COB-IDs must be configured different, even if one RPDO is configured to OFF.

EN Function
DE Funktion

	{0}	{1o}	{1oc}	{2oc}
328	✓	✓	✓	✓

Function **OFF / 1. IKD /2. IKD / Bk 16DIDO / Co 16DIDO**

Function for the external device is selected:
OFF..... no function
1. IKD ..... IKD for the discrete inputs 1 to 8
2. IKD ..... IKD for the discrete inputs 9 to 16
Bk 16DIDO . Phoenix terminal with 16 DIs and DOs (only for RPDO1)
IL CAN BK (Phoenix order no.: 271801)
Co 16DIDO . Phoenix terminal with 16 DIs and DOs (only for RPDO1)
ILB CO 24 16DI 16DO (Phoenix order no.: 2862592)

Combine Functions with Each Other

PDO1	PDO2		
	1. IKD	2. IKD	OFF
1. IKD	NO	YES	YES
2. IKD	YES	NO	YES
Bk 16DIDO	NO	NO	YES
Co 16DIDO	NO	NO	YES
OFF	YES	YES	YES

Read: If PDO1 is configured as 1. IKD, then PDO2 can only be configured as either 2. IKD or OFF.

EN Node-ID of the device
DE Node-ID des Gerätes

	{0}	{1o}	{1oc}	{2oc}
329	✓	✓	✓	✓

Node-ID of the device **1 to 127**

Node-ID of the attached device. The SDO messages were sent on the standard SDO-IDs or the answers were expected.

EN RPDO-COP-ID ext. device {x}
DE RPDO-COP-ID ext. Gerät {x}

	{0}	{1o}	{1oc}	{2oc}
330	✓	✓	✓	✓

RPDO-COB-ID ext. device {x} **1 to 4294967295**

Value to be written in the object 1800h sub index 1h of the external device.

CAUTION

COB-IDs, which are already used, should not be used.

COB-IDs in a CANopen device after loading the standard values:
280h + Node-ID = 640 + Node-ID Object 1801h Subindex 1
380h + Node-ID = 896 + Node-ID Object 1802h Subindex 1
480h + Node-ID = 1152 + Node-ID Object 1803h Subindex 1

The receiving COB-IDs are preallocated:
300h + Node-ID = 768 + Node-ID Object 1401h Subindex 1
400h + Node-ID = 1024 + Node-ID Object 1402h Subindex 1
500h + Node-ID = 1280 + Node-ID Object 1403h Subindex 1.

Problems may be encountered if a COB-ID is assigned multiple times.

Interfaces: CANopen: Transmit PDO (TPDO) {x} ({x} = 1 to 4)

4 TPDOs are available.

EN	COB-ID	**COB-ID**				**1 to 4294967295**
DE	COB-ID					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1800h sub index 1h.	
331	✓	✓	✓	✓		
EN	Transmission type	**Transmission type**				**0 to 255**
DE	Transmission type					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1800h sub index 2h.	
332	✓	✓	✓	✓		
EN	Event-timer	**Event-timer**				**20 to 65.000 ms**
DE	Event-timer					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1800h sub index 5h.	
333	✓	✓	✓	✓		
EN	Number of Mapped Objects	**CAN bus: Number of mapped objects**				**0 to 4**
DE	Anzahl der Mapped Objects					
	{0}	{1o}	{1oc}	{2oc}	Number of the mapped objects in the PDO.	
334	✓	✓	✓	✓		
EN	1. Mapped Object	**1. Mapped Object**				**0 to 65535**
DE	1. Mapped Object					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1A00h sub index 1h. It may always be changed.	
335	✓	✓	✓	✓		
EN	2. Mapped Object	**2. Mapped Object**				**0 to 65535**
DE	2. Mapped Object					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1A00h sub index 2h. It may always be changed.	
336	✓	✓	✓	✓		
EN	3. Mapped Object	**3. Mapped Object**				**0 to 65535**
DE	3. Mapped Object					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1A00h sub index 3h. It may always be changed.	
337	✓	✓	✓	✓		
EN	4. Mapped Object	**4. Mapped Object**				**0 to 65535**
DE	4. Mapped Object					
	{0}	{1o}	{1oc}	{2oc}	This corresponds to object 1A00h sub index 4h. It may always be changed.	
338	✓	✓	✓	✓		

NOTE

Examples may be found in the Interface Manual 37393 under "Setting the Transmit PDO (Examples)".

Interfaces: J1939

NOTE

If a Volvo EDC4 ECU is utilized, all settings are to be configured as described for the Deutz EMR ECU in this manual.

If a Volvo EMS1 or EDC3 ECU is utilized, all settings are to be configured as described for the EMS2 Volvo ECU in this manual. The rated speed cannot be switched via CAN in this case.

EN Device type
DE Betriebsmodus

	{0}	{1o}	{1oc}	{2oc}
339	✓	✓	✓	✓

J1939 Interf.: Dev. type Off / Standard / S6 Scania / EMR / EMS2 / ADEC / SISU EEM

The J1939 interface of this device may be operated with different engine control units. This parameter determines the operating mode of the used ECU.

Off..... The J1939 interface is disabled. No messages will be received.
Standard..... Standard J1939 messages will be received.
S6 Scania ..... Standard J1939 messages plus special S6 Scania messages will be received.
EMR ..... Standard J1939 messages plus special EMR messages will be received.
EMS2..... Standard J1939 messages plus special Volvo EMS2 messages will be received.
ADEC ..... Standard J1939 messages plus special MTU ADEC messages will be received.
SISU EEM... Standard J1939 messages plus special Sisu EEM2/3 messages will be received.

Refer to manual 37393, chapter CAN SAE J1939, for more information.

EN Request send address
DE Request Sendeadressse

	{0}	{1o}	{1oc}	{2oc}
340	✓	✓	✓	✓

J1939 Interface: Request send address **0 to 255**

The J1939 protocol device number is necessary to request special parameter groups, which are only sent on request.
With this participant address also the acknowledge command for passive alarms is sent (Diagnostic Data Clear/Reset of Previously Active DTCs -DM3).
Details may be found in the manual of the genset control.

EN Receive device number
DE Empf. Geräte Nummer

	{0}	{1o}	{1oc}	{2oc}
341	✓	✓	✓	✓

J1939 Interface: Receive device number **0 to 255**

The unit sends J1939 request and control messages with this ID. It must be changed for different ECU types according to the following table. The ECU listens only to control messages, if they are sent to the correct address.

Scania S6	EMR2 Deutz	EMS2 Volvo	MTU ADEC	SISU EEM2/EEM3
39	3	17	128	0

Details may be found in the manual of the ECU because above addresses indicates only the default values for the ECUs.

EN Reset prev.active DTCs - DM3
DE Quittieren passiver Fehler DM3

	{0}	{1o}	{1oc}	{2oc}
342	✓	✓	✓	✓

J1939 Interface: Reset previously active DTCs - DM3 **YES / NO**

If this parameter is set YES, a DM3 message "Acknowledge passive faults" is sent. After that this parameter is reset automatically to NO.
As a result alarms (DM2) which no longer apply are cleared.

EN SPN version
DE SPN Version
{0} {1o} {1oc} {2oc}
343 ✓ ✓ ✓ ✓

J1939 Interface: SPN version **Version 1 / Version 2 / Version 3**

The J1939 protocol provides 4 different versions for formatting Suspect Parameter Number. This is important for a correct display of the alarm messages.
With this parameter it is defined if formatting occurs according to Version 1, Version 2, or Version 3. Formatting according to Version 4 is identified automatically.
Details may be found in the engine control J1939 manual.

EN ECU remote controlled
DE Fernsteuern der ECU über J1939
{0} {1o} {1oc} {2oc}
344 ✓ ✓ ✓ ✓

J1939 Interface: ECU remote control via J1939 **ON / OFF**

ON .....The ECU remote control via the J1939 protocol will be activated.
OFF .....The ECU remote control via the J1939 protocol will be deactivated. The blink codes can neither be read nor reset. The following two parameters will not be displayed.

EN ECU set droop mode
DE ECU Statik-Modus
{0} {1o} {1oc} {2oc}
345 ✓ ✓ ✓ ✓

J1939 Interface: ECU set droop mode **ON / OFF**

ON .....The droop mode of the ECU will be enabled via the J1939 interface.
OFF .....The droop mode of the ECU will be disabled via the J1939 interface.

Note: If the Device type (parameter 339) is configured to "SISU EEM", this parameter is enabled, and Frequency Offset ECU (parameter 346) is configured to "AnalogIn1" or "AnalogIn2", the behavior as described under Frequency Offset ECU applies. If Device type is configured to "SISU EEM", this parameter is enabled, and Frequency Offset ECU is disabled, the value configured as "Nominal speed" (parameter 46) **plus 4% droop** will be transmitted. The 4% relate always to the configured Nominal speed.

Example: If the Nominal speed is configured to 1500 rpm, the transmitted value is 1500 rpm/100)*104 = 1560 rpm.
The engine adjusts to this speed in idle operation.

EN Frequency Offset ECU
DE Frequenz Offset ECU
{0} {1o} {1oc} {2oc}
346 ✓ ✓ ✓ ✓

J1939 Interface: Frequency Offset ECU **OFF / AnalaogIn1 / AnalogIn2**

The functionality of this parameter depends on the setting of the Device type (parameter 339).

Device type configured to "Scania S6" or "EMS2":
This parameter is used to configure a variable offset via an analog input of the easYgen. The analog input must be configured with a scaling from -125 to +125. If it is configured otherwise, it will be limited to the sizes -125 to 125. -125 corresponds to the maximum negative offset of the Scania S6 or Volvo EMS2 by default 120 rpm. 125 corresponds with the maximum positive offset of the Scania S6 or Volvo EMS2 by default 120 rpm.

Device type configured to "Standard", "EMR", "ADEC", or "SISU EEM":
This parameter is used to configure the rated speed of an externally connected ECU via an analog input of the easYgen. We recommend to configure the analog input to the desires speed range, like 1440 to 1560 rpm. In this case, 1440 rpm corresponds to the minimum rated speed and 1560 rpm corresponds to the maximum speed. The maximum range is 0 to 8031 rpm; if the easYgen is configured to a wider range, the range will be limited to the maximum range.

Device type configured to "Off":
The internal rated speed value of the easYgen is sent to a connected ECU.

Interfaces: Serial Interface

EN Baudrate
DE Baudrate
{0} {1o} {1oc} {2oc}
347 ✓ ✓ ✓ ✓

Serial interface: Baud rate **2.4 / 4.8 / 9.6 / 14.4 / 19.2 / 38.4 / 65 / 115 kBaud**

ⓘ A DPC (P/N 5417-557) must be used for connecting the control unit from the service interface to a PC or to another participant.

The serial interface of this unit connects to an RJ45-plug on the side of the housing. This parameter defines the baud rate that communications will be performed. Please note, that all participants on the service interface must use the same Baud rate.

EN Parity
DE Parity
{0} {1o} {1oc} {2oc}
348 ✓ ✓ ✓ ✓

Serial interface: Parity **no / even / odd**

The used parity of the service interface is set here.

EN Stop bits
DE Stop Bits
{0} {1o} {1oc} {2oc}
349 ✓ ✓ ✓ ✓

Serial interface: Stop bits **one / two**

The number of stop bits is set here.

EN ModBus Slave ID
DE ModBus Slave ID
{0} {1o} {1oc} {2oc}
350 ✓ ✓ ✓ ✓

Serial interface: Modbus Slave ID **0 to 255**

Here, the Modbus device address is entered, which is used to identify the device via Modbus.

NOTE

The Modbus Slave module is disabled by default. It may be enabled by configuring a Modbus Slave ID!

EN Modbus Reply delay time
DE Modbus Zeitverzöger. der Antwort
{0} {1o} {1oc} {2oc}
351 ✓ ✓ ✓ ✓

Serial interface: Reply delay time **0.00 to 0.20 s**

This is the minimum delay time between a request from the Modbus master and the sent response of the slave. This time is also required if an external interface converter to RS-485 is used for example. Please note that you also need the DPC (see page 12) in this case.

NOTE

The service interface may be used for the following connections:

- **LeoPC1 via direct driver**
- **LeoPC1 via a modem**
- **Requests via Modbus protocol**

System

System: Password System

EN	Code level CAN port	**Password system: Code level via CAN-Bus**			**Info**
DE	Codeebene CAN Schnittstelle				
	{0} {1o} {1oc} {2oc}	This value displays the code level which is currently selected for the access via the CAN bus.			
352	✓ ✓ ✓ ✓				

EN	Code level serial port/DPC	**Password system: Code level via serial RS-232 (DPC) interface**			**Info**
DE	Codeebene RS232/DPC				
	{0} {1o} {1oc} {2oc}	This value displays the code level that is currently selected for the access via the serial RS-232 (DPC) interface. The following code levels exist: 3 = Commissioner 2 = Temporary commissioner 1 = Service level 0 = Operator			
353	✓ ✓ ✓ ✓				

NOTE

The following passwords permit different levels of access to the parameters. Each individual password can be used to access the appropriate configuration level through the different methods of access (via the front panel, via serial RS-232 (DPC) interface, and via CAN bus).

EN	Commissioning level code	**Password system: Password "Commissioner"**			**0000 to 9999**
DE	Code Inbetriebnahme Ebene				
	{0} {1o} {1oc} {2oc}	Configuration of the password for the code level "Commissioner". See chapter Password on page 17 for default values.			
354	✓ ✓ ✓ ✓				

EN	Temp. commissioning level code	**Password system: Password "Temporary Commissioner"**			**0000 to 9999**
DE	Code temp. Inbetriebn. Ebene				
	{0} {1o} {1oc} {2oc}	Configuration of the password for the code level "Temporary Commissioner". See chapter Password on page 17 for default values.			
355	✓ ✓ ✓ ✓				

EN	Basic level code	**Password system: Password "Service Level"**			**0000 to 9999**
DE	Code Serviceebene				
	{0} {1o} {1oc} {2oc}	Configuration of the password for the code level "Service". See chapter Password on page 17 for default values.			
356	✓ ✓ ✓ ✓				

System: Factory Settings

EN Ereignisspeicher löschen
DE Clear event log

	{0}	{1o}	{1oc}	{2oc}
357	✓	✓	✓	✓

Factory settings: Clear event log **YES / NO**

YES..... The event log will be cleared.
NO..... The event log will not be cleared.

EN Werkseinstellung DPC/RS232
DE Factory Settings DPC/RS232

	{0}	{1o}	{1oc}	{2oc}
358	✓	✓	✓	✓

Factory settings: Factory settings DPC/RS-232 **YES / NO**

YES..... The resetting of the factory settings via DPC/RS-232 will be enabled.
NO..... The resetting of the factory settings via DPC/RS-232 will not be enabled.

EN Werkseinstellung CAN
DE Factory Settings CAN

	{0}	{1o}	{1oc}	{2oc}
359	✓	✓	✓	✓

Factory settings: Factory settings CAN **YES / NO**

YES..... The resetting of the factory settings via CAN bus will be enabled.
NO..... The resetting of the factory settings via CAN bus will not be enabled.

EN Standardwerte
DE Set default values

	{0}	{1o}	{1oc}	{2oc}
360	✓	✓	✓	✓

Factory settings: Set default values **YES / NO**

YES..... The factory settings, which have been enabled with Parameter 359 or Parameter 360, will be transferred to the unit.
NO..... The factory settings will not be transferred to the unit.

EN Bootloader starten
DE Start Bootloader

	{0}	{1o}	{1oc}	{2oc}
361	✓	✓	✓	✓

Factory settings: Start Bootloader **00000**

This function may be used to start the Bootloader. In order to do this, the correct code must be entered here while the unit is in the code level required for this.

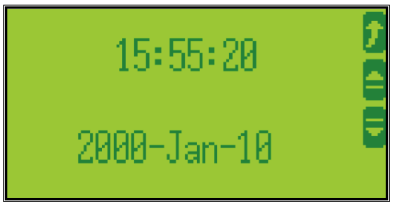
Attention: This function is used to flash the software and may only be used by authorized Woodward technicians!

NOTE

If the easYgen parameters are read out via CAN / DPC and stored as standard values, all parameters behind Parameter 360 (Set default values) will not be overwritten when writing back the standard value file via CAN / DPC.

This prevents an unintentional start of the Bootloader or an overwriting of the time or date in the unit with a wrong (old) value. The following version information is only for info anyway and cannot be overwritten.

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}
362	✓	✓	✓	✓

Adjust clock: hour **0 to 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}
363	✓	✓	✓	✓

Adjust clock: minute **0 to 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}
364	✓	✓	✓	✓

Adjust clock: second **0 to 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}
365	✓	✓	✓	✓

Adjust clock: day **1 to 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}
366	✓	✓	✓	✓

Adjust clock: month **1 to 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}
367	✓	✓	✓	✓

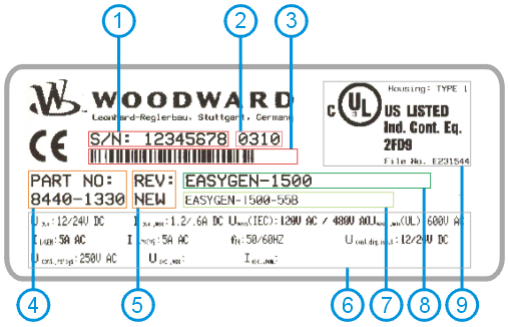
Adjust clock: year **0 to 99**

The current year of the date is set here. Example:
0 .....Year 2000.
99 .....Year 2099.

System: Versions

The parameters in this section are informational only and cannot be modified.

The control unit may be identified from the numbers located on the unit and in the software. The most important technical information is located on the unit data plate. Technical data can be located in manual 37390.



1	S/N	serial number (numeric)
2	S/N	manufactured date (YYMM)
3	S/N	serial number (as Barcode)
4	P/N	part number
5	REV	part 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}
368	✓	✓	✓	✓

Version: Serial number (S/N) **info**

The serial number (S/N) is utilized to identify individual control units. The number can also be found on the data plate (items #**1** & #**3**).

EN **Boot item number**
DE **Boot Artikelnummer**

	{0}	{1o}	{1oc}	{2oc}
369	✓	✓	✓	✓

Version: Part number of the firmware (P/N) **info**

The part number (P/N) is the firmware in the control unit.

EN **Boot revision**
DE **Boot Revision**

	{0}	{1o}	{1oc}	{2oc}
370	✓	✓	✓	✓

Version: Revision of the item number of the firmware (REV) **info**

The revision number (REV) is the revision of the control unit firmware.

EN **Boot version**
DE **Boot Version**

	{0}	{1o}	{1oc}	{2oc}
371	✓	✓	✓	✓

Version: Version of the firmware **info**

This number (Vx.xxxx) represents the version of the control unit firmware.

EN **Program item number**
DE **Programm Artikelnummer**

	{0}	{1o}	{1oc}	{2oc}
372	✓	✓	✓	✓

Version: Item number of the application software (P/N) **info**

The part number (P/N) is the application software running the control unit.

EN **Program revision**
DE **Programm Revision**

	{0}	{1o}	{1oc}	{2oc}
373	✓	✓	✓	✓

Version: Revision of the item number of the software (REV) **info**

The revision number (REV) is the revision of the application software running the control unit.

EN **Program version**
DE **Programm Version**

	{0}	{1o}	{1oc}	{2oc}
374	✓	✓	✓	✓

Version: Version of the application software **info**

This number (Vx.xxxx) represents the version of the application software running the control 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 performed
A	**yes** **Warning Alarm** This alarm does not interrupt the unit operation. A message output without a centralized alarm occurs: ⇨ Alarm text.	**no**	**no**	**no**	**no**
B	**yes** **Warning Alarm** This alarm does not interrupt the unit operation. An output of the centralized alarm occurs and the command variable 3.05 (horn) is issued. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn).	**yes**	**no**	**no**	**no**
C	**yes** **Shutdown Alarm** With this alarm the GCB is opened and the engine is stopped. Coasting occurs. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn) + GCB open + Coasting + Engine stop.	**yes**	**yes**	**cool down time**	**yes**
D	**yes** **Shutdown Alarm** With this alarm the GCB is opened and the engine is stopped. Coasting occurs. ⇨ Alarm text + flashing LED "Alarm" + Relay centralized alarm (horn) + GCB open + Coasting + Engine stop.	**yes**	**yes**	**cool down time**	**yes**
E	**yes** **Shutdown 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.	**yes**	**yes**	**immediately**	**yes**
F	**yes** **Shutdown 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.	**yes**	**yes**	**immediately**	**yes**
Control	**no** **Control Signal** This signal issues a control command only. It may be assigned to a digital input for example to get a control signal, which may be used in the *LogicsManager*. No alarm message and no entry in the alarm list or the event history will be issued. This signal is always self-acknowledging, but considers a delay time and may also be configured with an engine delay.	**no**	**no**	**no**	**no**

NOTE

If an alarm has been configured with a shutdown alarm that has been enabled to self-acknowledge, and has been configured as engine delayed the following scenario may happen:

- **The alarm shuts down the engine because of its alarm class.**
- **Due to the engine stopping, all engine delayed alarms are ignored.**
- **The alarm class is acknowledged automatically.**
- **The alarm will self-acknowledge and clear the fault message that shut the engine down. This prevents the fault from being analyzed. After a short delay, the engine will restart.**
- **After the engine monitoring delay expires, the fault that originally shut down the engine will do so again. This cycle will continue to repeat until corrected.**

Conversion Factors

Temperature

°C ⇨ °F	°F ⇨ °C
T [°F] = (T [°C] x 1.8) + 32	T [°C] = (T [°F] – 32) / 1.8

Pressure

bar ⇨ psi	psi ⇨ bar
P [psi] = P [bar] x 14.503	P [bar] = P [psi] / 14.503

Appendix B.
LogicsManager

The *LogicsManager* is used to customize the sequence of events in the control **unit** such as the start command of the engine or the operation of control unit relay outputs. For example, the start routine may be programmed so that it requires 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 may be programmed with the *LogicsManager* will vary. Two independent time delays are provided for the configured 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 'Diesel: Pre-glow, Gas: Ignition'			
[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	Ready for operation / *LogicsManager*			
External relay output (via CANopen; not included in easYgen delivery; can be an expansion card like IKD1)					
[RExx01]	---	*LogicsManager*			
[RExx02]	---	*LogicsManager*			
[RExx03]	---	*LogicsManager*			
[RExx04]	---	*LogicsManager*			
[RExx05]	---	*LogicsManager*			
[RExx06]	---	*LogicsManager*			
[RExx07]	---	*LogicsManager*			
[RExx08]	---	*LogicsManager*			
[RExx09]	---	*LogicsManager*			
[RExx10]	---	*LogicsManager*			
[RExx11]	---	*LogicsManager*			
[RExx12]	---	*LogicsManager*			
[RExx13]	---	*LogicsManager*			
[RExx14]	---	*LogicsManager*			
[RExx15]	---	*LogicsManager*			
[RExx16]	---	*LogicsManager*			

Table 3-24: Relay outputs - Assignment

Structure and description of the *LogicsManager*

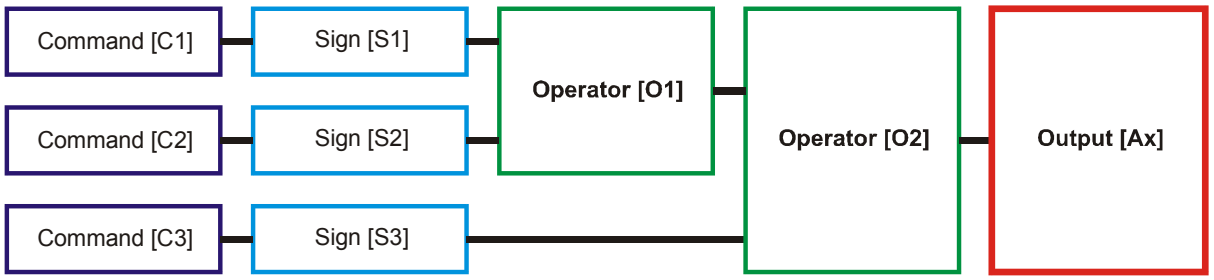


Figure 3-31: *LogicsManager* - function overview

- **Command (variable)** - A list of over 100 parameters and functions is provided for the command inputs. Examples of the parameters that may be configured into these commands are Generator undervoltage set points 1 and 2, Start fail, and Cool down. These command variables are used to control the output function or relay. Refer to Logical Command Variables starting on page 145 for a complete list of all command variables.
- **Sign** - The sign field can be used to invert the state of the command or to fix its output to a logical true or false if the command is not needed. Setting the sign to the NOT state changes the output of the command variable from true to false or vise versa.
- **Operator** - A logical device such as AND or OR.
- **(Logical) output** - The action or control sequence that occurs when all parameters set into the *LogicsManager* are met.

[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 140.	**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** Logical AND **NAND** Logical negated AND **OR** Logical OR **NOR** Logical negated OR **XOR** Exclusive OR **NXOR** Exclusive negated OR (See Table 3-26 for symbols)	The description and the tables of all logical outputs, flags, and functions that are able to combine via the *LogicsManager* can be found on page 140.

Table 3-25: *LogicsManager* - command overview

NOTE

A logical output may either be delayed when switching on or switching off. The time starts when all logical functions of the operation have been met.

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 energize, whenever "Discrete input [D2]" is energized "AND" the control does "NOT" have a fault that is "Alarm class C" "AND" does "NOT" have a fault that is "Alarm class D" ⇨

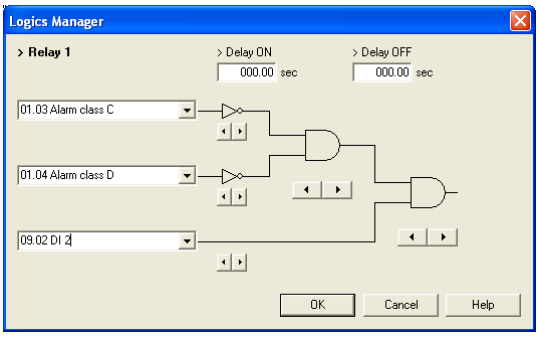


Figure 3-32: *LogicsManager* - display in LeoPC

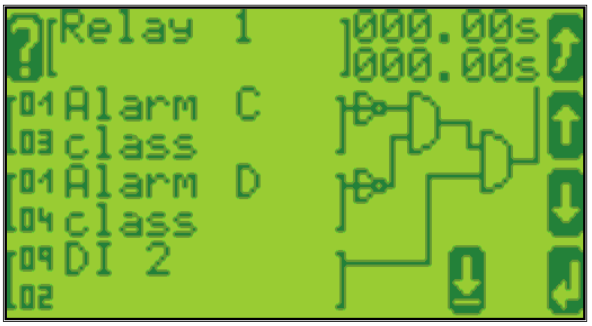
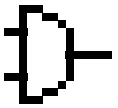
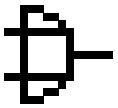
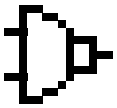
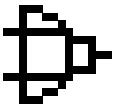
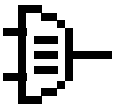
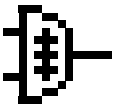
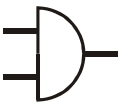
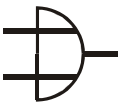
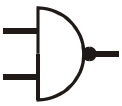
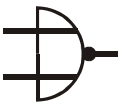
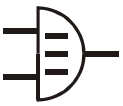
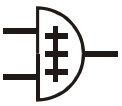
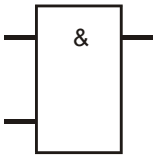
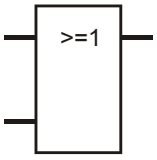
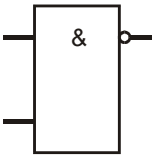
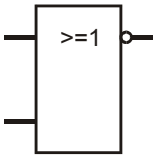
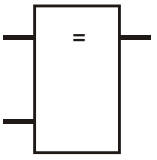
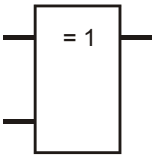


Figure 3-33: *LogicsManager* - display in LCD

Logical Symbols

The following symbols are used for the graphical programming of the *LogicsManager*.

	AND	OR	NAND	NOR	NXOR	XOR
easYgen						
DIN 40 700						
LeoPC1 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

Table 3-26: *LogicsManager* - logical symbols

Logical Outputs

The logical outputs or combinations may be grouped into three categories:

- internal logical flags
- Internal functions
- relay outputs

NOTE

The numbers of the logical outputs in the third column may again be used as input variable for other outputs in the *LogicsManager*.

Logical Outputs: Internal Flags

8 internal logical flags may be programmed to activate/deactivate functions. This permits more than 3 commands to be included in a logical function. They may be used like "auxiliary flags".

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 Outputs: Internal functions

The following logical functions may be used to activate/deactivate functions.

Name	Function	Number
Start request in AUTO	Start in AUTOMATIC operating mode (from page 26)	00.09
Stop request in AUTO	Stop in AUTOMATIC operating mode (from page 26)	00.10
Inhibit emergency run	Blocking or interruption of an emergency power operating in AUTOMATIC operating mode (from page 49)	00.11
Undelayed close GCB	Immediately closing of the GCB after engine start without waiting for the engine delayed monitoring and generator stable timers to expire (from page 46)	00.12
Critical mode	Activation of a Critical operation mode where most alarms are downgraded to warnings (functional description from page 31)	00.13
Constant idle run	Enables idle/rated speed modes (from page 43).	00.14
External acknowledge	The alarm acknowledgement is performed from an external source (from page 51)	00.15
Operation mode AUTO	Activation of the AUTOMATIC operating mode (from page 26)	00.16
Operation mode MAN	Activation of the MANUAL operating mode (from page 26)	00.17
Operation mode STOP	Activation of the STOP operating mode (from page 26)	00.18
Start without load request	Starting the engine without closing the GCB (from page 26)	00.19
Idle mode automatic	Automatic idle mode (blocks the undervoltage, underfrequency, and underspeed monitoring for a configured time automatically, from page 43)	00.20

Logical Outputs: Relay Outputs

All relays may be controlled directly by the *LogicsManager* depending on the respective application mode.

Name	Function	Number
Relay 1	If this logical output becomes true, the relay output 1 will be activated	13.01
Relay 2	If this logical output becomes true, the relay output 2 will be activated	13.02
Relay 3	If this logical output becomes true, the relay output 3 will be activated	13.03
Relay 4	If this logical output becomes true, the relay output 4 will be activated	13.04
Relay 5	If this logical output becomes true, the relay output 5 will be activated	13.05
Relay 6	If this logical output becomes true, the relay output 6 will be activated	13.06
Relay 7	If this logical output becomes true, the relay output 7 will be activated	13.07
Relay 8	If this logical output becomes true, the relay output 8 will be activated	13.08
Relay 9	If this logical output becomes true, the relay output 9 will be activated	13.09
Relay 10	If this logical output becomes true, the relay output 10 will be activated	13.10
Relay 11	If this logical output becomes true, the relay output 11 will be activated	13.11
External DO 1	If this logical output becomes true, the external relay output 1 will be activated	14.01
External DO 2	If this logical output becomes true, the external relay output 2 will be activated	14.02
External DO 3	If this logical output becomes true, the external relay output 3 will be activated	14.03
External DO 4	If this logical output becomes true, the external relay output 4 will be activated	14.04
External DO 5	If this logical output becomes true, the external relay output 5 will be activated	14.05
External DO 6	If this logical output becomes true, the external relay output 6 will be activated	14.06
External DO 7	If this logical output becomes true, the external relay output 7 will be activated	14.07
External DO 8	If this logical output becomes true, the external relay output 8 will be activated	14.08
External DO 9	If this logical output becomes true, the external relay output 9 will be activated	14.09
External DO 10	If this logical output becomes true, the external relay output 10 will be activated	14.10
External DO 11	If this logical output becomes true, the external relay output 11 will be activated	14.11
External DO 12	If this logical output becomes true, the external relay output 12 will be activated	14.12
External DO 13	If this logical output becomes true, the external relay output 13 will be activated	14.13
External DO 14	If this logical output becomes true, the external relay output 14 will be activated	14.14
External DO 15	If this logical output becomes true, the external relay output 15 will be activated	14.15
External DO 16	If this logical output becomes true, the external relay output 16 will be activated	14.16

Logical Command Variables

The logical command variables are grouped into 14 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
- [11.00] Time functions
- [12.00] External discrete inputs
- [13.00] Status of the internal relay outputs
- [14.00] Status of the external relay outputs

Logical Command Variables: [00.00] - Internal Flags

Internal flag, Logic command variables 00.01-00.20
Internal Flags are the result of the output of the logic ladders from Flag 1 to 8. Flags are internal logic that can be sent to other flags or Command variables.

No.	Name	Function	Note
00.01	Flag 1	Internal flag 1	Internal calculation; descr. page 143
00.02	Flag 2	Internal flag 2	Internal calculation; descr. page 143
00.03	Flag 3	Internal flag 3	Internal calculation; descr. page 143
00.04	Flag 4	Internal flag 4	Internal calculation; descr. page 143
00.05	Flag 5	Internal flag 5	Internal calculation; descr. page 143
00.06	Flag 6	Internal flag 6	Internal calculation; descr. page 143
00.07	Flag 7	Internal flag 7	Internal calculation; descr. page 143
00.08	Flag 8	Internal flag 8	Internal calculation; descr. page 143
00.09	Start request in AUTO	Start in AUTOMATIC operating mode	Internal calculation; descr. page 26
00.10	Stop request in AUTO	Stop in AUTOMATIC operating mode	Internal calculation; descr. page 26
00.11	Inhibit emergency run	Blocking or interruption of an emergency power operation in AUTOMATIC operating mode	Internal calculation; descr. page 49
00.12	Undelayed close GCB	Immediately closing of the GCB without waiting for the engine delayed monitoring timers to expire	Internal calculation; descr. page 46
00.13	Critical mode	Activation of the Critical operation	Internal calculation; descr. page 31
00.14	Constant idle run	Constant idle speed mode enabled (blocks alarm for undervoltage, underfrequency, and underspeed constantly)	Internal calculation; descr. page 43
00.15	External acknowledge	The alarm acknowledgement is performed from an external source	Internal calculation; descr. page 51
00.16	Operation mode AUTO	Activation of the AUTOMATIC operating mode	Internal calculation; descr. page 26
00.17	Operation mode MAN	Activation of the MANUAL operating mode	Internal calculation; descr. page 26
00.18	Operation mode STOP	Activation of the STOP operating mode	Internal calculation; descr. page 26
00.19	Start without load request	Starting the engine without closing the GCB	Internal calculation; descr. page 26
00.20	Idle mode automatic	Automatic idle speed mode (blocks alarm for undervoltage, underfrequency, and underspeed automatically for a set time)	Internal calculation; descr. page 43

Logical Command Variables: [01.00] - Alarm Classes

Alarm class commands, Logic command variables 01.01-01.10
Alarm classes may be configured as command variables for all logical outputs in the *LogicsManager*.

Number	Name / Function	Note
01.01	Alarm class A	Description see page 138 TRUE as long as this alarm class is active
01.02	Alarm class B	Description see page 138 TRUE as long as this alarm class is active
01.03	Alarm class C	Description see page 138 TRUE as long as this alarm class is active
01.04	Alarm class D	Description see page 138 TRUE as long as this alarm class is active
01.05	Alarm class E	Description see page 138 TRUE as long as this alarm class is active
01.06	Alarm class F	Description see page 138 TRUE as long as this alarm class is active
01.07	All alarm classes	Description see page 138 TRUE as long as at least one of the alarm classes A/B/C/D/E/F is active
01.08	Warning alarm	Description see page 138 TRUE as long as at least one of the alarm classes A/B is active
01.09	Stopping alarm	TRUE as long as one of alarm classes C / D / E / F is active
01.10	Centralized alarm	Description see page 138 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

System status commands, Logic command variables 02.01-02.15

The status of the system may be used as command variable in a logical output to set parameters for customized operations.

No.	Name	Function	Note
02.01	Firing speed	Ignition speed reached (via MPU/gen.frequency / *LogicsManager*)	TRUE as long as the ignition speed has been reached (either via the MPU, the generator frequency, or the *LogicsManager* output "ignition speed reached")
02.02	Speed	Speed recognized (via MPU/gen.frequency / *LogicsManager*)	TRUE as long as a speed is measured (this can be lower that the ignition speed; either via the MPU, the generator frequency, or the *LogicsManager* output "ignition speed reached")
02.03	Generator voltage ok	Generator voltage within default range	TRUE as long as the generator voltage is within the limits for dead bus start
02.04	Generator frequency ok	Generator frequency within default range	TRUE as long as the generator frequency is within the limits for dead bus start
02.05	Generator ok	Generator voltage/frequency within default range	TRUE as long as the generator voltage and frequency are within the limits for dead bus start
02.06		-Internal-	
02.07		-Internal-	
02.08		-Internal-	
02.09	Mains voltage ok	Mains voltage within default range	TRUE as long as the mains voltage is not within the limits for an emergency power operation
02.10	Mnains frequency ok	Mains frequency within default range	TRUE as long as the mains frequency is not within the limits for an emergency power operation
02.11	Mains ok	Mains voltage/frequency within default range	TRUE as long as the mains voltage and frequency are not within the limits for an emergency power operation
02.12	Generator rotation CCW	Generator voltage: rotating direction CW	only possible for three-phase generator voltage measurement
02.13	Generator rotation CW	Generator voltage: rotating direction CCW	
02.14	Mains rotation CCW	Mains voltage: rotating direction CW	only possible for three-phase mains voltage measurement
02.15	Mains rotation CW	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

Engine control commands, Logic command variables 03.01-03.14
These variables may be used as command variable in a logical output to set parameters for customized operations.

Number	Name / Function	Note
03.01	Auxiliary services	
03.02	Starter	
03.03	Start/stop (Diesel) Gas (valve) (Gas)	
03.04	Preglow (Diesel) Ignition (Gas)	
03.05	Horn (active)	TRUE if alarm class B to F is activated until the time until horn reset is expired or it is acknowledged for the first time.
03.06	Engine released	TRUE if the engine is requested and the start is released
03.07	Engine delay over (engine delayed monitoring expired)	TRUE after expiration of the "delayed engine monitoring" timer until the fuel relay is de-energized
03.08	Breaker delay over (engine delayed monitoring expired)	TRUE after expiration of the "breaker delay" timer until the fuel relay is de-energized (= CB may be closed)
03.09	Generator load limit 1 (reached)	TRUE = limit value exceeded
03.10	Generator load limit 2 (reached)	TRUE = limit value exceeded
03.11	Mains load limit 1(reached)	TRUE = limit value exceeded
03.12	Mains load limit 2 (reached)	TRUE = limit value exceeded
03.13	Blinking lamp ECU	TRUE as soon as the ECU activates the diagnosis light (only for EMS Scania ECU). This command variable is only active if remote control of the ECU via easYgen is activated.
03.14	ECU special ignition	TRUE as long as a reset or read-out of the Scania S6 ECU blink code is requested (only for EMS Scania ECU). This command variable is only active if remote control of the ECU via easYgen is activated.
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

Operating status commands, 4.01-04.15

These operating statuses may be used as command variable in a logical output to set parameters for customized operations.

No.	Name	Function	Note
04.01	Auto mode	AUTOMATIC operating mode active	
04.02	Stop mode	STOP operating mode active	
04.03	Manual mode	MANUAL operating mode active	
04.04	Lamp test	A lamp test is being performed	TRUE if the lamp test is active
04.05	Acknowledge	"Acknowledge" push button has been pressed or an external acknowledgment via *LogicsManager*	Note: this condition is TRUE for approx. 40 ms and must be extended utilizing a delay time
04.06	GCB closed	GCB is closed ("Reply: GCB is closed" = 0)	{1oc} / {2oc}
04.07	MCB closed	MCB is closed ("Reply: MCB is closed" = 0)	{2oc}
04.08	MCB released	Enable MCB	only {2oc}
04.09	Emergency mode	Emergency power operation active	TRUE with the expiration of the emergency power delay; FALSE with the expiration of the mains setting time
04.10	Cool down	Engine cool-down cycle active	
04.11	Mains settling	Mains setting time active	
04.12	Start without load	Start without closing GCB is active	
04.13	Remote request	Request over remote control to activate a function	TRUE if the start bit is set via DPC (LeoPC1, Modbus) or CAN bus (LeoPC1, CANopen)
04.14	Remote acknowledge	Request over remote control to acknowledge	TRUE if the acknowledgement bit is set
04.15	Idle run active	Idle mode is active	TRUE if the idle mode is active. This may be used to issue an "Idle" command to a speed controller.
04.16		-free-	
04.17		-free-	
04.18		-free-	
04.19		-free-	
04.20		-free-	

Logical Command Variables: [05.00] - Alarms of the Engine

Engine alarm status commands, 05.01-05.14
These engine alarms may be used as command variable in a logical output to set parameters for customized operations.

Number	Name / Function	Note
05.01	Overspeed (limit) 1	TRUE = limit value reached FALSE = alarm acknowledged
05.02	Overspeed (limit) 2	
05.03	Underspeed (limit) 1	
05.04	Underspeed (limit) 2	
05.05	Unintended stop	
05.06	Shutdown malfunction	
05.07	Speed detection alarm	
05.08	Start fail	
05.09	Maintenance days exceeded	
05.10	Maintenance hours exceeded	
05.11	-internal-	
05.12	Timeout dead bus operation (time for dead bus monitoring expired)	
05.13	Red stop lamp	
05.14	Amber warning lamp	
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

Generator alarm status commands, 06.01-06.22

These generator alarms may be used as command variable in a logical output to set parameters for customized operations.

Number	Name / 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 (definite time) overcurrent (limit)1	
06.10	Generator (definite time) overcurrent (limit) 2	
06.11	Generator (definite 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) unbalanced load (limit)1	
06.17	(Generator) unbalanced load (limit) 2	
06.18	Generator (voltage) asymmetry	
06.19	Ground fault (limit) 1	
06.20	Ground fault (limit) 2	
06.21	Generator mismatched phase rotation (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

Alarms of the mains commands, 07.01-07.05
These mains alarms may be used as command variable in a logical output to set parameters for customized operations.

Number	Function	Note
07.01	Mains overfrequency emergency (power recognition)	TRUE = limit value reached FALSE = alarm acknowledged
07.02	Mains underfrequency emergency (power recognition)	
07.03	Mains overvoltage emergency (power recognition)	
07.04	Mains undervoltage emergency (power recognition)	
07.05	Mains mismatched phase rotation (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

Alarms of the system commands, 08.01-08.10
These system alarms may be used as command variable in a logical output n to set parameters for customized operations.

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 fail to close	
08.06	GCB fail to open	
08.07	MCB fail to close	
08.08	MCB fail to open	
08.09	CANopen fault	
08.10	CAN-Fault J1939	
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] - Discrete Inputs

Control discrete input commands, 09.01-09.08
The discrete inputs may be used as command variable in a logical output to set parameters for customized operations.

Number	Function	Note
09.01	DI 1 (Discrete input [D1])	TRUE = logical "1" (delay times and NO/NC parameters are ignored) FALSE = logical "0" (alarm has been acknowledged or immediately after TRUE condition is not present anymore, if Control is configured as alarm class)
09.02	DI 2 (Discrete input [D2])	
09.03	DI 3 (Discrete input [D3])	
09.04	DI 4 (Discrete input [D4])	
09.05	DI 5 (Discrete input [D5])	
09.06	DI 6 (Discrete input [D6])	
09.07	DI 7 (Discrete input [D7])	
09.08	DI 8 (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

Control analog input commands, 10.01-10.10
The analog inputs may be used as command variable in a logical output.

Number	Name / Function	Note
10.01	Analog input 1 threshold 1	TRUE = limit value reached FALSE = logical "0" (alarm has been acknowledged, or immediately after TRUE condition is not present anymore, if Control is configured as alarm class)
10.02	Analog input 1 threshold 2	
10.03	Analog input 1 wirebreak	
10.04	Analog input 2 threshold 1	
10.05	Analog input 2 threshold 2	
10.06	Analog input 2 wirebreak	
10.07	(Flexible) threshold 1 analog input	
10.08	(Flexible) threshold 2 analog input	
10.09	(Flexible) threshold 3 analog input	
10.10	(Flexible) threshold 4 analog input	
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

Time function commands, 11.01-11.10
Time functions may be used as command variable in a logical output.

Number	Name / Function	Note
11.01	Set point 1 (exceeded)	see page 124
11.02	Set point 2 (exceeded)	see page 124
11.03	Active weekday (equal to setting)	see page 124
11.04	Active day (equal to setting)	see page 124
11.05	Active hour (equal to setting)	see page 124
11.06	Active minute (equal to setting)	see page 124
11.07	Active setting (equal to setting)	see page 124
11.08	Engine (running hours exceeded by) 1 hour	Status changes every operating hour
11.09	Engine (running hours exceeded by) 10 hour	Status changes every 10 operating hours
11.10	Engine (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 (Expansion Board)

External discrete input commands, 12.01-12.16
Additional discrete inputs from an expansion board (i.e. IKD 1 extension board) may be used as command variable in a logical output.

Number	Name / Function	Note
12.01	External discrete input 1 [D.E01]	TRUE = logical "1" (delay times and NO/NC parameters are ignored) FALSE = logical "0" (alarm has been acknowledged, or immediately after TRUE condition is not present anymore, if Control is configured as alarm class)
12.02	External discrete input 2 [D.E02]	
12.03	External discrete input 3 [D.E03]	
12.04	External discrete input 4 [D.E04]	
12.05	External discrete input 5 [D.E05]	
12.06	External discrete input 6 [D.E06]	
12.07	External discrete input 7 [D.E07]	
12.08	External discrete input 8 [D.E08]	
12.09	External discrete input 9 [D.E09]	
12.10	External discrete input 10 [D.E10]	
12.11	External discrete input 11 [D.E11]	
12.12	External discrete input 12 [D.E12]	
12.13	External discrete input 13 [D.E13]	
12.14	External discrete input 14 [D.E14]	
12.15	External discrete input 15 [D.E15]	
12.16	External discrete input 16 [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

Discrete output commands, 13.01-13.08
The discrete outputs may be used as command variable in a logical output.

Number	Name / Function	Note
13.01	Digital output DO1 [R01]	TRUE = logical "1" (this condition indicates the logical status of the internal relays) FALSE = logical "0" (this condition indicates the logical status of the internal relays)
13.02	Digital output DO2 [R02]	
13.03	Digital output DO3 [R03]	
13.04	Digital output DO4 [R04]	
13.05	Digital output DO5 [R05]	
13.06	Digital output DO6 [R06]	
13.07	Digital output DO7 [R07]	
13.08	Digital output DO8 [R08]	
13.09	Digital output DO9 [R09]	
13.10	Digital output DO10 [R10]	
13.11	Digital output DO11 [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-	

Logical Command Variables: [14.00] - Status Of The External Relay Outputs

Discrete output commands, 14.01-14.16
The external discrete outputs may be used as command variable in a logical output.

Number	Name / Function	Note
14.01	External digital output DO1 [R01]	TRUE = logical "1" (this condition indicates the logical status of the relays, which are connected via external expansion boards) FALSE = logical "0" (this condition indicates the logical status of the relays, which are connected via external expansion boards)
14.02	External digital output DO2 [R02]	
14.03	External digital output DO3 [R03]	
14.04	External digital output DO4 [R04]	
14.05	External digital output DO5 [R05]	
14.06	External digital output DO6 [R06]	
14.07	External digital output DO7 [R07]	
14.08	External digital output DO8 [R08]	
14.09	External digital output DO9 [R09]	
14.10	External digital output DO10 [R10]	
14.11	External digital output DO11 [R11]	
14.12	External digital output DO12 [R12]	
14.13	External digital output DO13 [R13]	
14.14	External digital output DO14 [R14]	
14.15	External digital output DO15 [R15]	
14.16	External digital output DO16 [R16]	
14.17	-free-	
14.18	-free-	
14.19	-free-	
14.20	-free-	

Factory Setting

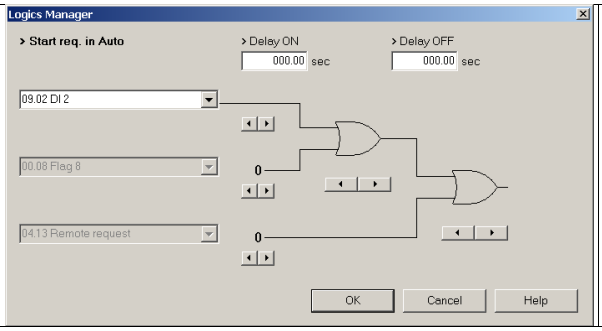
The inputs, outputs, and internal flags, which may be programmed via the *LogicsManager* have the following factory default settings when delivered:

simple (function)	extended (configuration)	result

Factory Setting: Functions

Start request in Auto

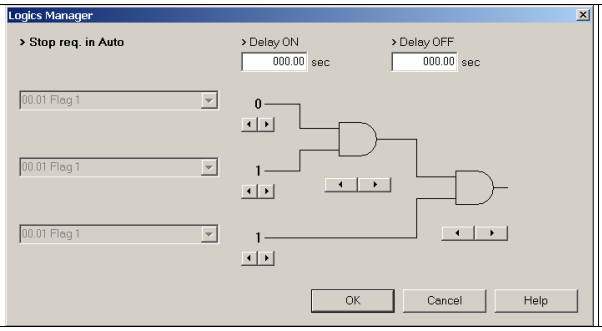
{0}	✓	If TRUE the engine is started in AUTOMATIC operating mode. Prepared for start via clock (Flag 8) and remote start.
{1o}	✓	
{1oc}	✓	
{2oc}	✓	
STOP	---	
AUTO	✓	
MAN	---	



dependent on discrete input [D2]

Stop request in Auto

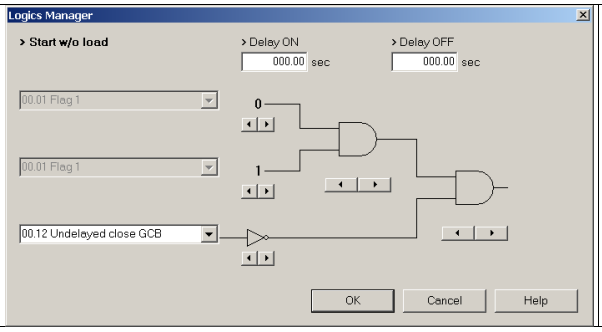
{0}	✓	If TRUE the engine is either stopped in AUTOMATIC operating mode or a start of the engine is suppressed (also an emergency operation). Prepared for: Deactivated by default
{1o}	✓	
{1oc}	✓	
{2oc}	✓	
STOP	---	
AUTO	✓	
MAN	---	



FALSE

Start without load transfer

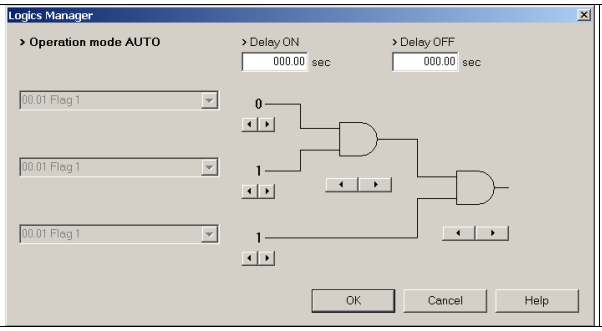
{0}	✓	Engine start without load transfer to the generator (closing of the GCB is blocked). Prepared for: Deactivated by default Observe critical mode when activating
{1o}	✓	
{1oc}	✓	
{2oc}	✓	
STOP	✓	
AUTO	✓	
MAN	✓	



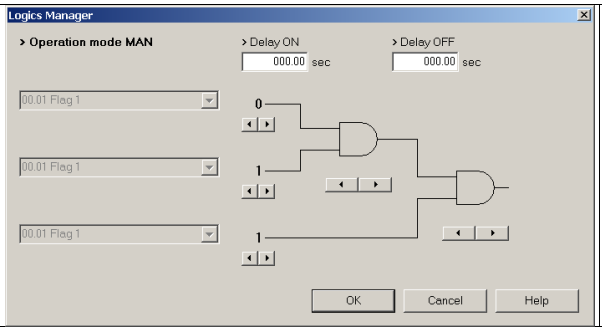
FALSE

simple (function)		extended (configuration)	result

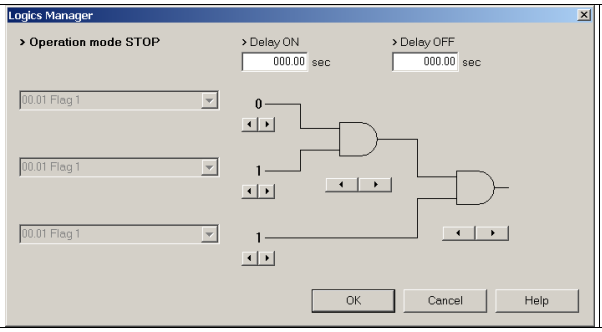
Operation mode AUTOMATIC

{0}	✓	If TRUE the unit changes into AUTOMATIC operating mode. Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Operation mode MANUAL

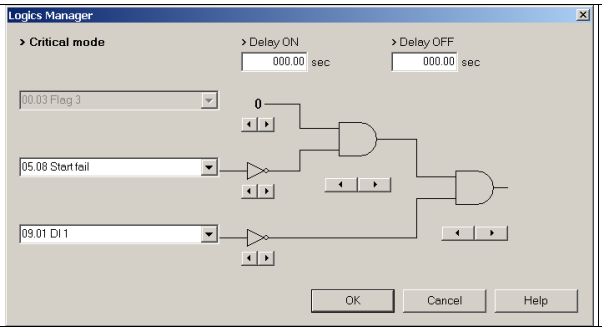
{0}	✓	If TRUE the unit changes into MANUAL operating mode. Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Operation mode STOP

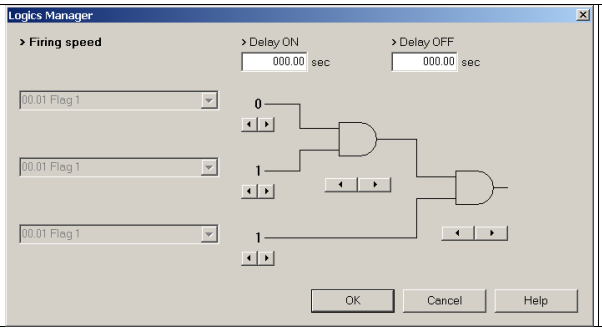
{0}	✓	If TRUE the unit changes into STOP operating mode. Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

	simple (function)	extended (configuration)	result

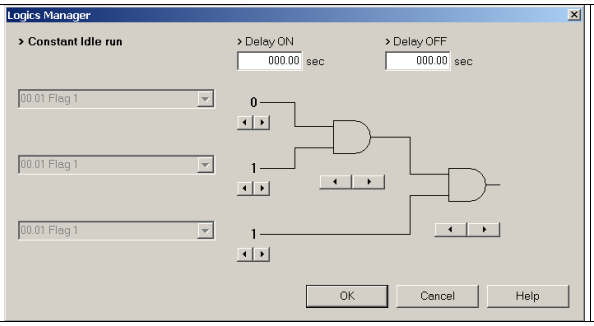
Critical mode

{0}	✓	If TRUE, critical mode operation is initiated (see page 26). Prepared for: Observe start fail + DI1 (emergency stop) when activating		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

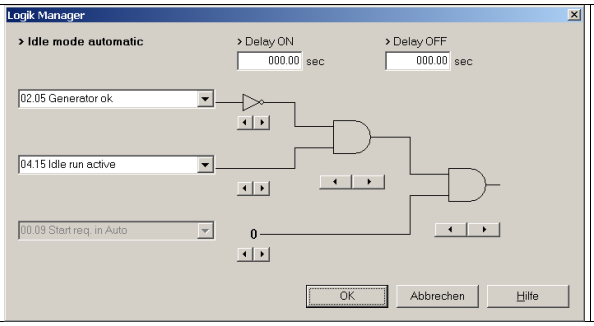
Firing speed reached

{0}	✓	If TRUE, the unit recognizes that the ignition speed has been reached. Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Constant Idle run

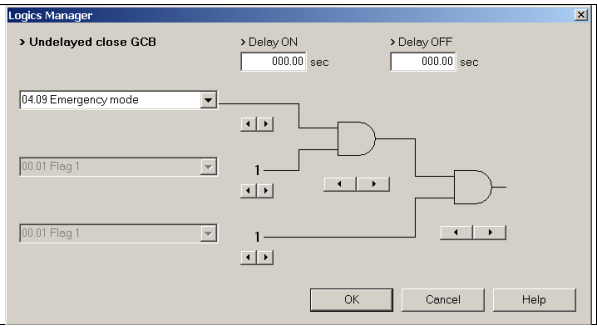
{0}	✓	If TRUE, the control outputs an "Constant idle run" if a start request for the generator is present Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Automatic Idle run

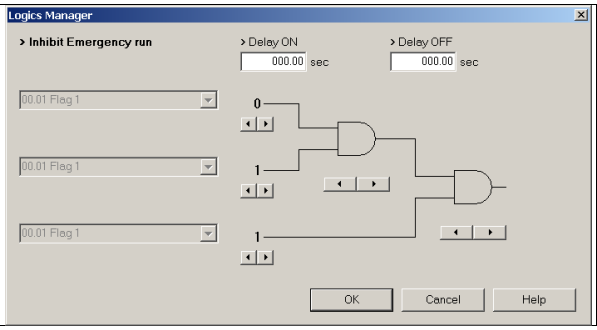
{0}	✓	If this condition is fulfilled, the control performs an idle run for a configured time at start-up . Prepared for: Deactivated by defaul **Note:** This function is pre-configured and may be activated by passing through the command variable 00.09 Start req. in Auto ('—' instead of '0').		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

	simple (function)	extended (configuration)	result

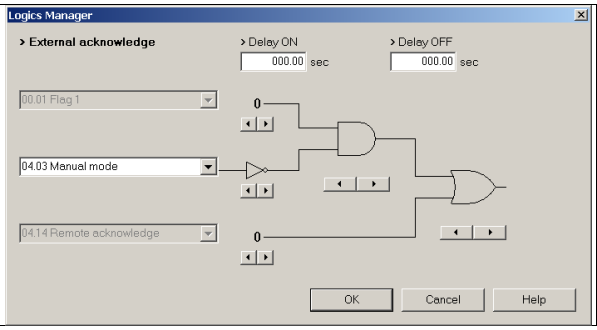
Undelayed close GCB

{0}	---	If TRUE, the GCB will be closed in an emergency operation without waiting for expiration of the delayed engine monitoring.		dependent on emergency operation
{1o}	---			
{1oc}	---			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	✓			

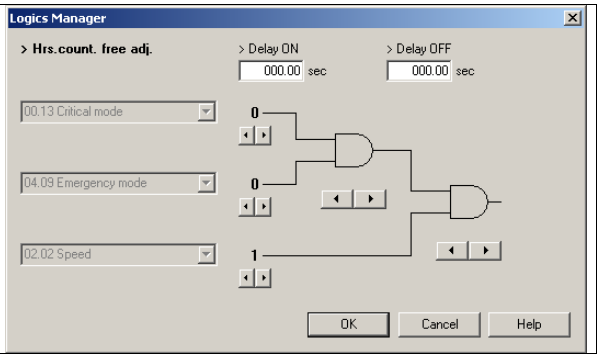
Inhibit emergency run

{0}	---	If TRUE, an emergency operation is inhibited or interrupted. Prepared for: Deactivated by default		FALSE
{1o}	---			
{1oc}	---			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

External acknowledgment

{0}	✓	If TRUE, alarms are acknowledged from an external source. Prepared for: External acknowledgement required? Remote acknowledgement prepared		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

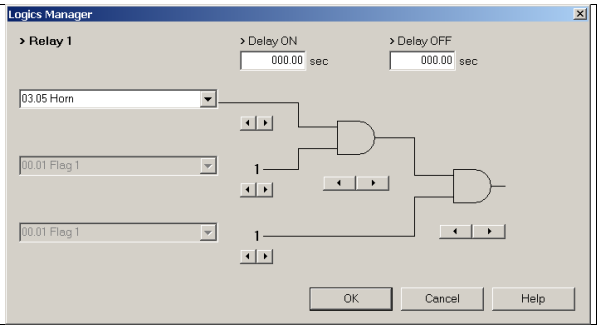
Hours counter free adjustable

{0}	✓	If TRUE, the freely adjustable hours counter will be enabled. Prepared for: Critical mode enabled? Emergency mode enabled? Speed detected?		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

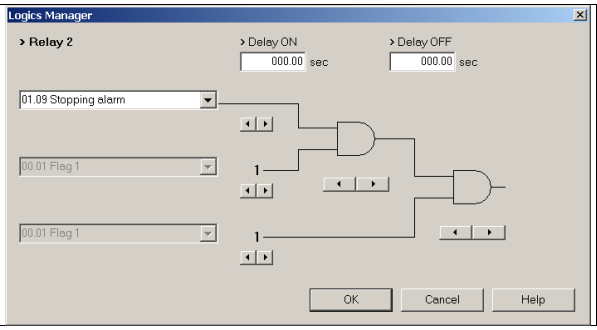
simple (function)	extended (configuration)	result

Factory Setting: Relay Outputs

Relay 1 [R01] - centralized alarm (horn) / freely configurable

{0}	✓	Relay energizes if the internal condition "Horn" is TRUE		dependent on Logics Command Variable [03.05]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay 2 [R02] - shut-down alarm class active / freely configurable

{0}	✓	Relay energizes if one of the alarm classes C, D, E or F is active		dependent on Logics Command Variable [01.09]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay 3 [R03] - Crank

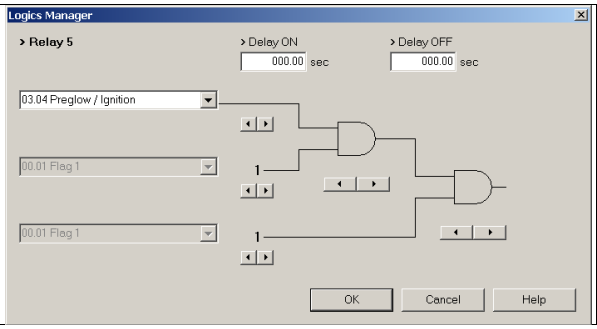
{0}	---	Fixed to "Crank"	**N/A**	---
{1o}	---			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay 4 [R04] – Fuel solenoid

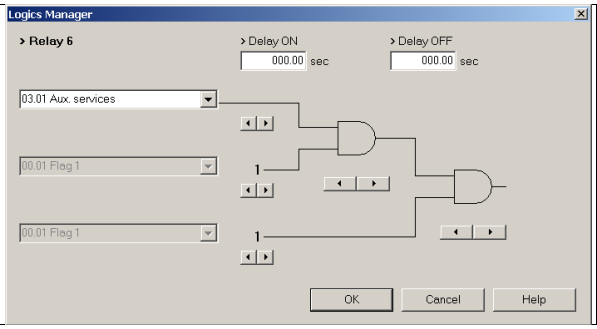
{0}	---	Fixed to "Fuel solenoid"	**N/A**	---
{1o}	---			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

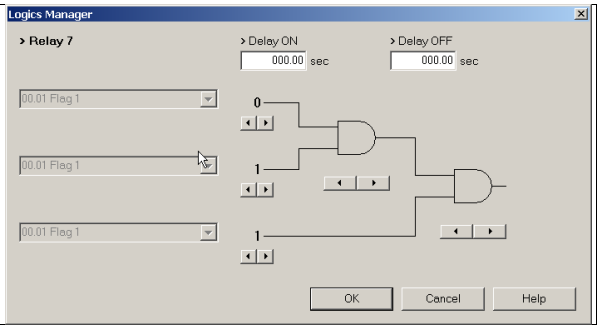
Relay 5 [R05] - preglow / ignition ON / freely configurable

{0}	✓	Relay energizes to preglow the Diesel engine or enables the ignition of the gas engine		dpenendent on Logics Command Variable [03.04]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay 6 [R06] - auxiliary services

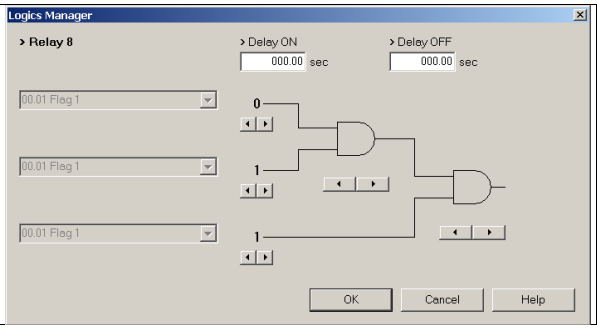
{0}	✓	Relay energizes to activate the auxiliary services (it energizes prior to an engine start and de-energizes with the engine stop)		dependent on Logics Command Variable [03.01]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Relay 7 [R07] - free / Command: open GCB

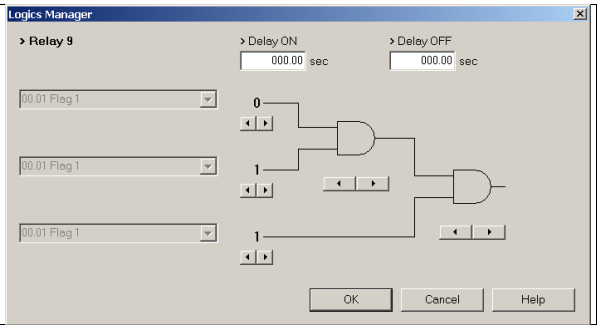
{0}	✓	In application mode {0} = freely configurable relay (unassigned) In application mode {1o}, {1oc}, and {2oc} "Command: open GCB" Prepared for: Deactivated by default		**FALSE**
{1o}	---			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

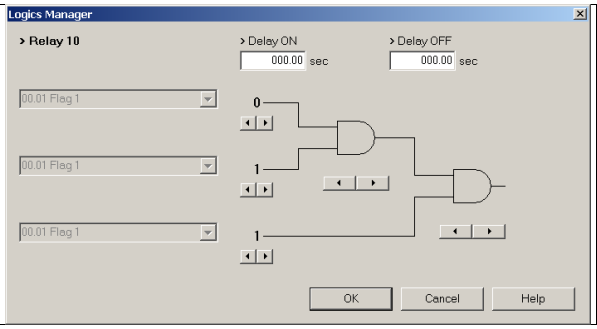
Relay 8 [R08] - free / Command: close MCB

{0}	✓	In application mode {0}, {1o} and {1oc} = freely configurable relay (unassigned) In application mode {2oc} "Command: close MCB" Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

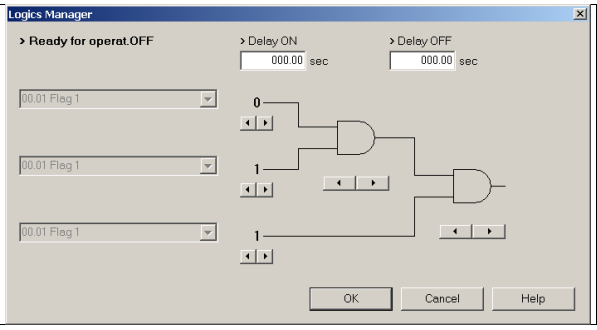
Relay 9 [R09] - free / Command: open MCB

{0}	✓	In application mode {0}, {1o} and {1oc} = freely configurable relay (unassigned) In application mode {2oc} "Command: open MCB" Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

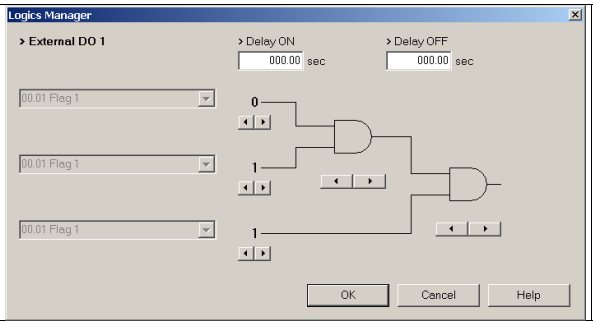
Relay 10 [R10] - free / Command: close GCB

{0}	✓	In application mode {0} and {1o} = freely configurable relay (unassigned) In application mode {1oc} and {2oc} "Command: close GCB" Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	---			
{2oc}	---			
STOP	✓			
AUTO	✓			
MAN	✓			

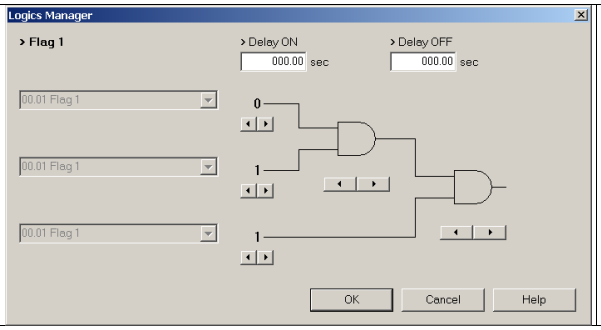
Relay 11 [R11] – Ready for operation OFF

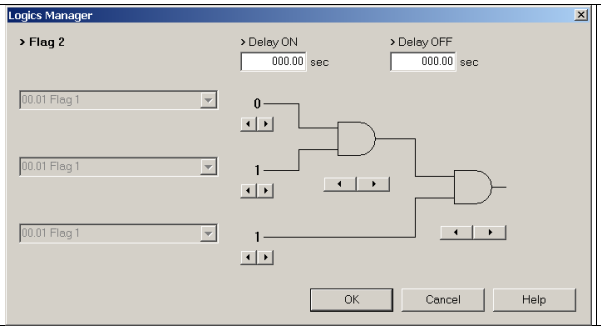
{0}	✓	Relay will be de-energized if unit is not ready for operation or the logics manager output is TRUE. **Note:** The unit is only ready for operation after an start-up delay following the power supply connection.		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)	extended (configuration)	result

External digital output {x} [REx{x}] - free (external expansion card, if connected; {x} = 1-16)				
{0} {1o} {1oc} {2oc} STOP AUTO MAN	✓ ✓ ✓ ✓ ✓ ✓ ✓	Control of the external relay {x}, if this is connected Prepared for: Deactivated by default		**FALSE**

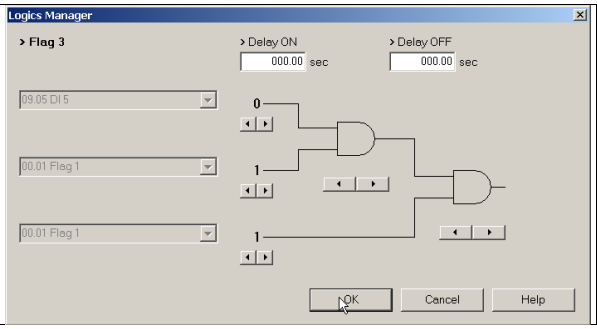
Factory Setting: Internal Flags

Internal flag 1 - free				
{0} {1o} {1oc} {2oc} STOP AUTO MAN	✓ ✓ ✓ ✓ ✓ ✓ ✓	freely configurable relay (unassigned) **Note:** This flag is used in all logical outputs as default setting.		**FALSE**

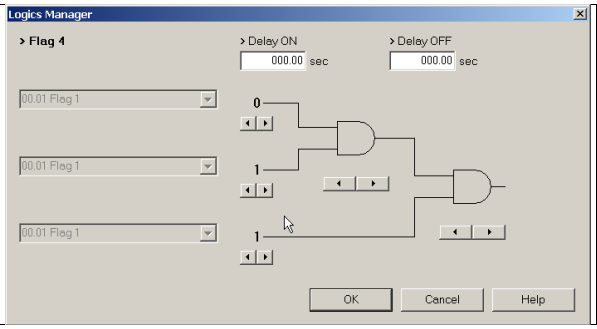
Internal flag 2 - free				
{0} {1o} {1oc} {2oc} STOP AUTO MAN	✓ ✓ ✓ ✓ ✓ ✓ ✓	freely configurable flag Prepared for: Deactivated by default		**FALSE**

	simple (function)	extended (configuration)	result

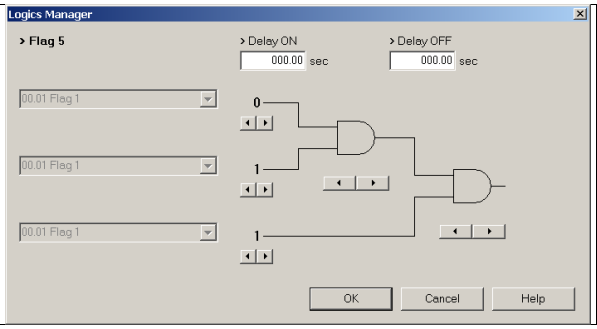
Internal flag 3 - free

{0}	✓	freely configurable flag		FALSE
{1o}	✓			
{1oc}	✓	Prepared for:		
{2oc}	✓	Deactivated by default		
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 4 - free

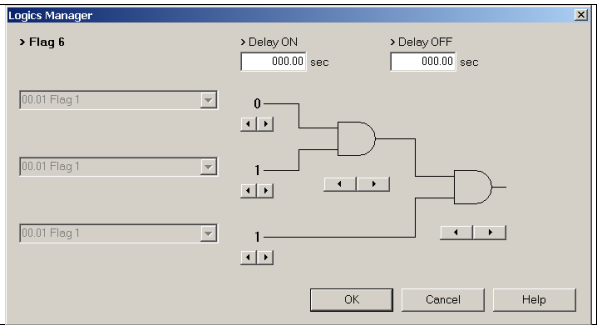
{0}	✓	freely configurable flag		FALSE
{1o}	✓			
{1oc}	✓	Prepared for:		
{2oc}	✓	Deactivated by default		
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 5 - free

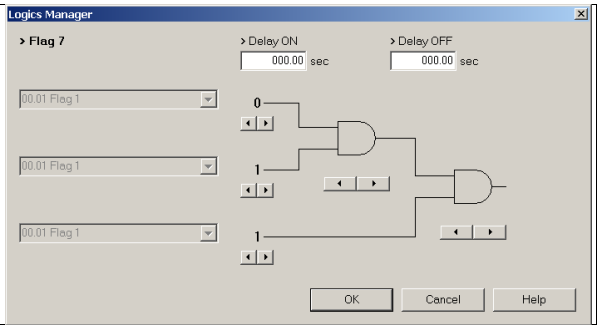
{0}	✓	freely configurable flag		FALSE
{1o}	✓			
{1oc}	✓	Prepared for:		
{2oc}	✓	Deactivated by default		
STOP	✓			
AUTO	✓			
MAN	✓			

simple (function)		extended (configuration)	result

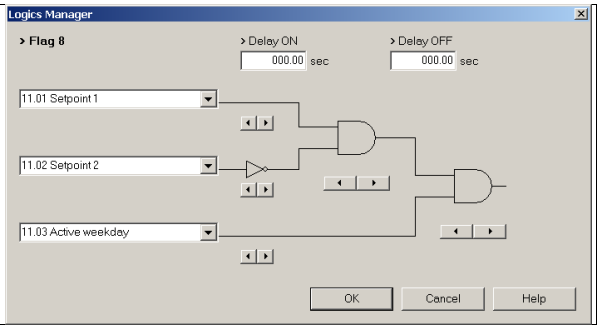
Internal flag 6 - free

{0}	✓	freely configurable flag Prepared for: Deactivated by default		FALSE
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 7 - extend emergency power operation

{0}	✓	freely configurable flag Prepared for: Deactivated by default		dependent on Logics Command Variables [04.08] and [04.07] and [02.11]
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	✓			
AUTO	✓			
MAN	✓			

Internal flag 8 - engine start via timer

{0}	✓	Prepared for: 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 124 "LogicsManager: Timer")		dependent on timer
{1o}	✓			
{1oc}	✓			
{2oc}	✓			
STOP	---			
AUTO	✓			
MAN	---			

Discrete Inputs

[D1]	{0} {1o} {1oc} {2oc}	freely configurable EMERGENCY OFF alarm class F

[D2]	{0} {1o} {1oc} {2oc}	freely configurable Remote start / start request alarm class Control

[D3]	{0} {1o} {1oc} {2oc}	freely configurable discrete input (unassigned) alarm class B

[D4]	{0} {1o} {1oc} {2oc}	freely configurable discrete input (unassigned) alarm class B

[D5]	{0} {1o} {1oc} {2oc}	freely configurable discrete input (unassigned) alarm class B

[D6]	{0} {1o} {1oc}	freely configurable discrete input (unassigned) alarm class B
	{2oc}	Enable MCB (not available in the *LogicsManager*) If the parameter Enable MCB is configured to ALWAYS, this DI may be used as alarm input (*LogicsManager*)

[D7]	{0} {1o} {1oc}	freely configurable discrete input (unassigned) alarm class Control
	{2oc}	Reply: MCB is opened (not available in the *LogicsManager*)

[D8]	{0}	freely configurable discrete input (unassigned) alarm class Control
	{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 to 5 bar / 0 to 72 psi) - Index "III"

Since VDO sensors are available in various different types, the Index Numbers of the characteristic curve tables are listed. The customer must observe to order a sensor with the correct characteristic curve when selecting a VDO sensor. Manufacturers of VDO sensors usually list these tables in their catalogs.

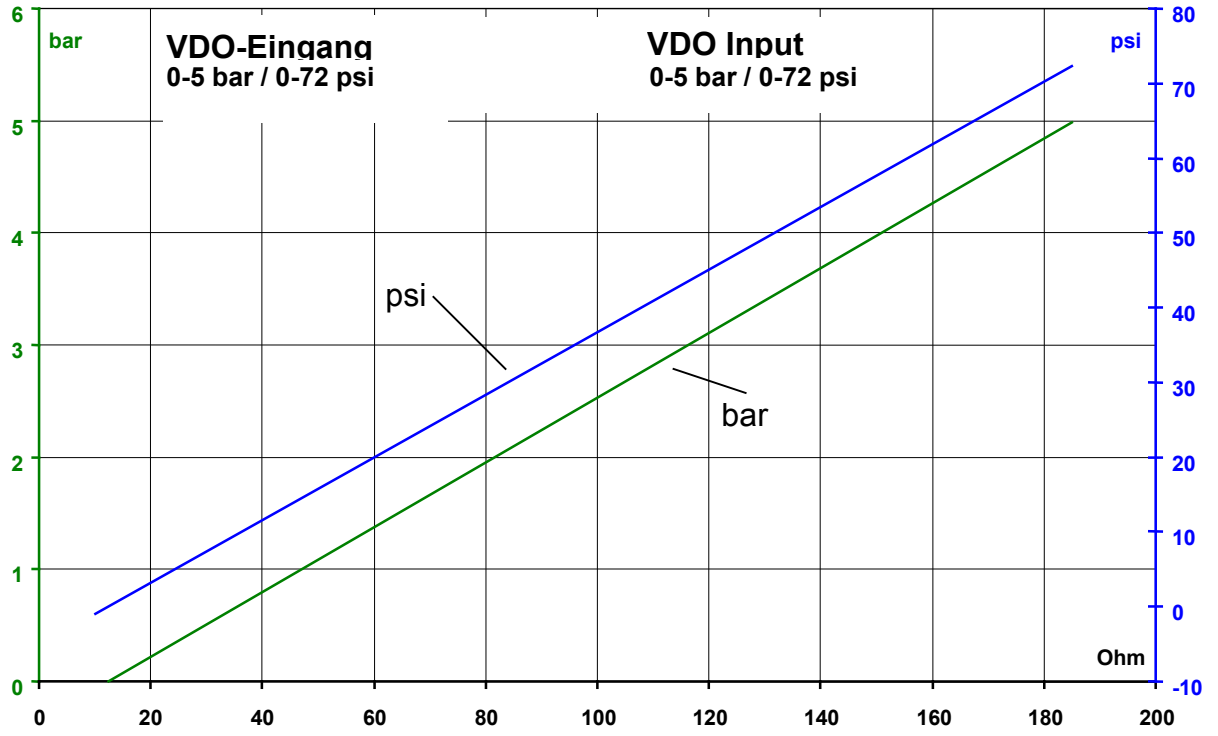


Figure 3-34: Analog inputs - characteristics diagram VDO 0 to 5 bar, Index "III"

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

Ohm	bar	psi
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

Ohm	bar	psi
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 to 10 bar / 0 to 145 psi) - Index "IV"

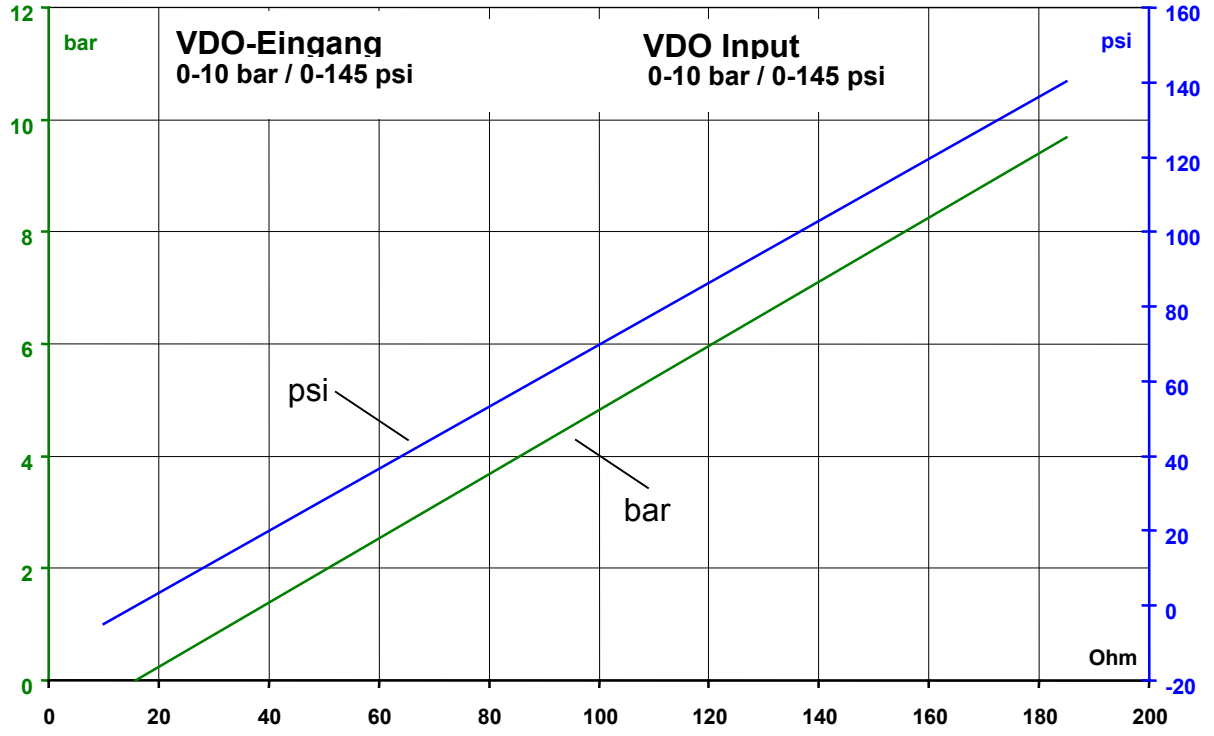


Figure 3-35: Analog inputs - characteristics diagram VDO 0 to 10 bar, Index "IV"

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 to 120 °C / 104 to 248 °F) - Index "92-027-004"

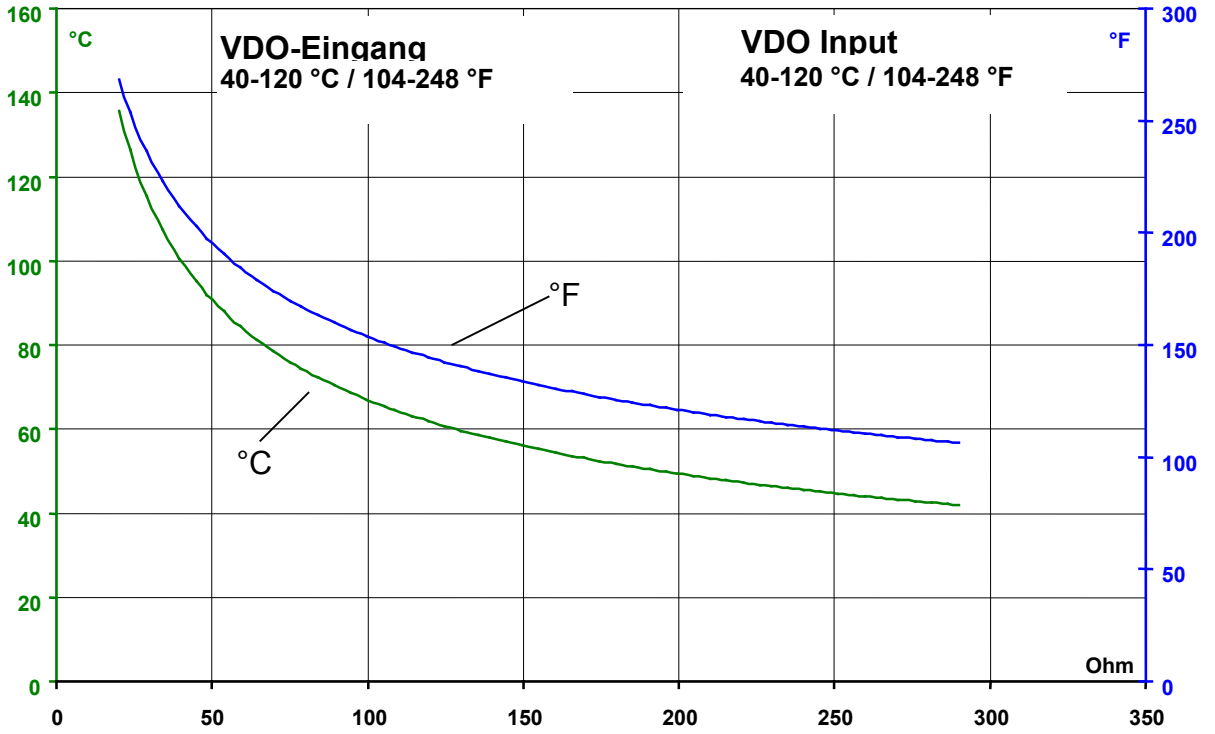


Figure 3-36: Analog inputs - characteristics diagram VDO 40 to 120 °C, Index "92-027-004"

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
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
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 to 150 °C / 122 to 302 °F) - Index "92-027-006"

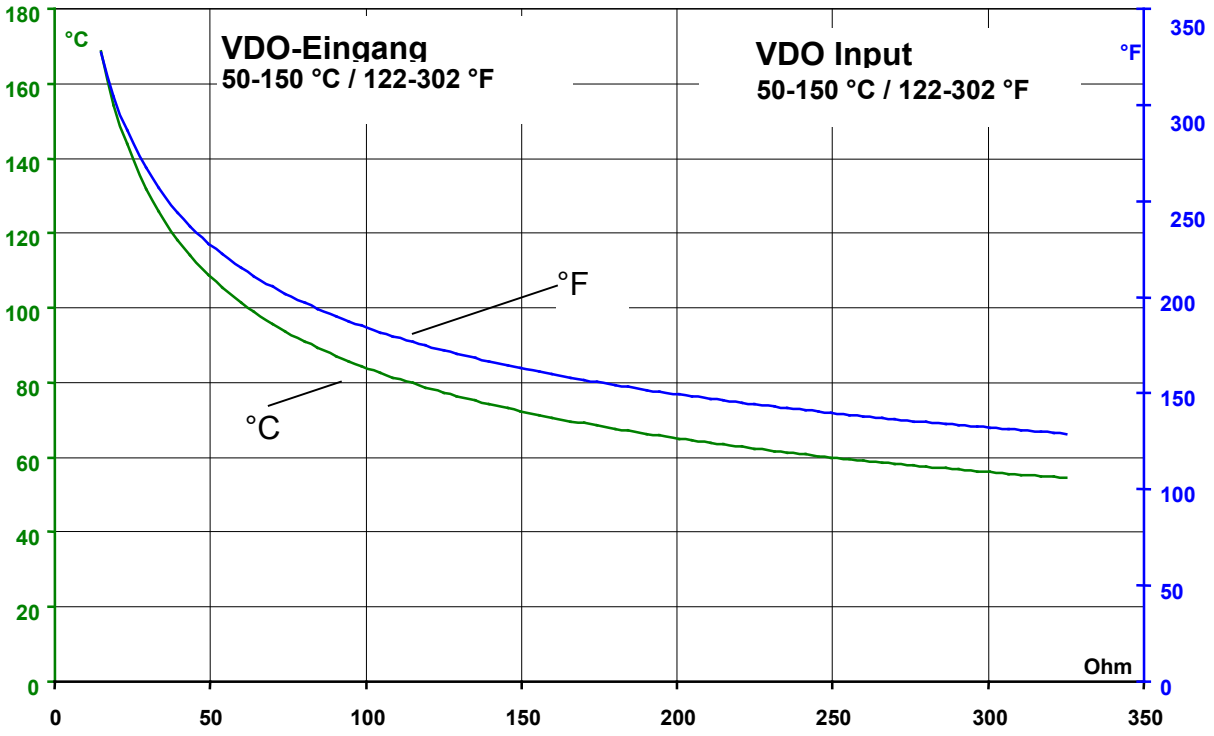


Figure 3-37: Analog inputs - characteristics diagram VDO 50 to 150 °C, Index "92-027-006"

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

SMP Input "Temperature" (25 to 150 °C / 77 to 302 °F)

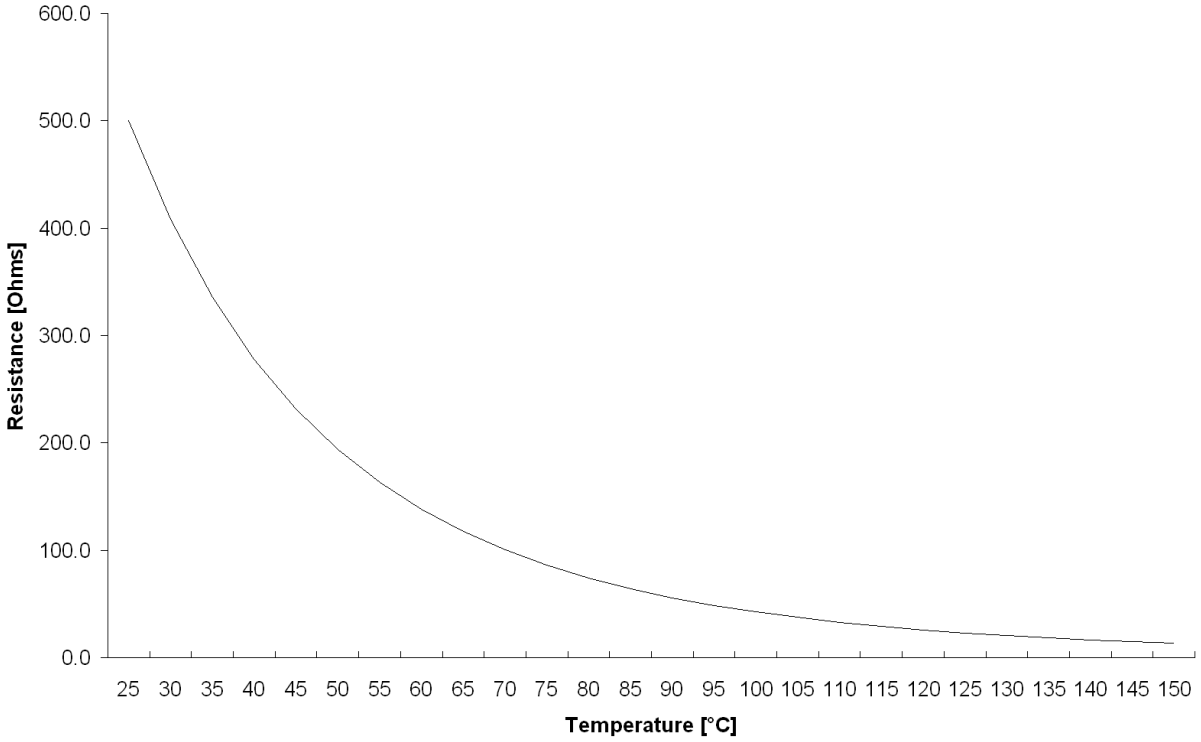


Figure 3-38: Analog inputs - characteristics diagram SMP TH2125

Temp. [°C]	25	30	35	40	45	50	55	60	65	70	75	80	85
Temp. [°F}	77	86	95	104	113	122	131	140	149	158	167	176	185
R [Ohm]	500.0	408.5	335.9	278.0	231.4	193.8	163.1	138.0	117.3	100.3	86.0	74.2	64.2
Temp. [°C]	90	95	100	105	110	115	120	125	130	135	140	145	150
Temp. [°F}	194	203	212	221	257	239	248	257	266	275	284	293	302
R [Ohm]	55.8	48.7	42.6	37.4	33.0	29.2	25.9	23.0	20.6	18.4	16.5	14.9	13.4

Table 3-27: Analog inputs - characteristics diagram SMP TH2125

Appendix D. GetEventLog

The event history is a 300-entry FIFO (First In/First Out) memory for logging alarm events and operation states of the unit. Refer to the Event History section on page 18 for more info about the event history.

It is possible to read out the event history using the direct configuration cable DPC and the GetEventLog software tool.

GetEventLog Software

Installing GetEventLog

GetEventLog can either be used as a stand alone or within LeoPC1. In order to call it up from LeoPC1, it must be installed into the LeoPC1 installation path.

To install GetEventLog, start GetEventLog_vxxxxx.exe from the GetEventLog directory on the CD delivered with the unit.
If you want to use GetEventLog from inside LeoPC1, it must be installed into the LeoPC1 installation directory.

Starting GetEventLog

Connect the easYgen to a free COM port on your computer using the DPC as described under Configuration Using The PC on page 12.
Start GetEventLog directly or call it up by selecting GetEventLog from the menu Tools in LeoPC1.
After starting GetEventLog for the first time, you must configure the communication settings. To do this, select the Interface tab, configure the COM port according to the port, to which you have connected the DPC, and enter the other settings as represented in figure Figure 3-39 since these are the default settings of the easYgen-1000.

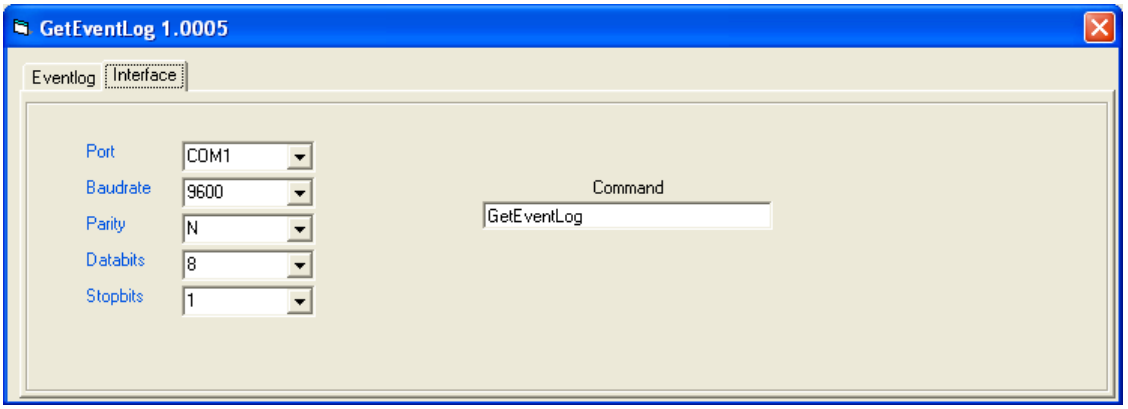


Figure 3-39: GetEventLog - interface configuration

Reading Out GetEventLog

On the Eventlog tab of GetEventLog, click the Request Eventlog button to read out the content of the event history memory. The content of the event history is displayed as shown in Figure 3-40.

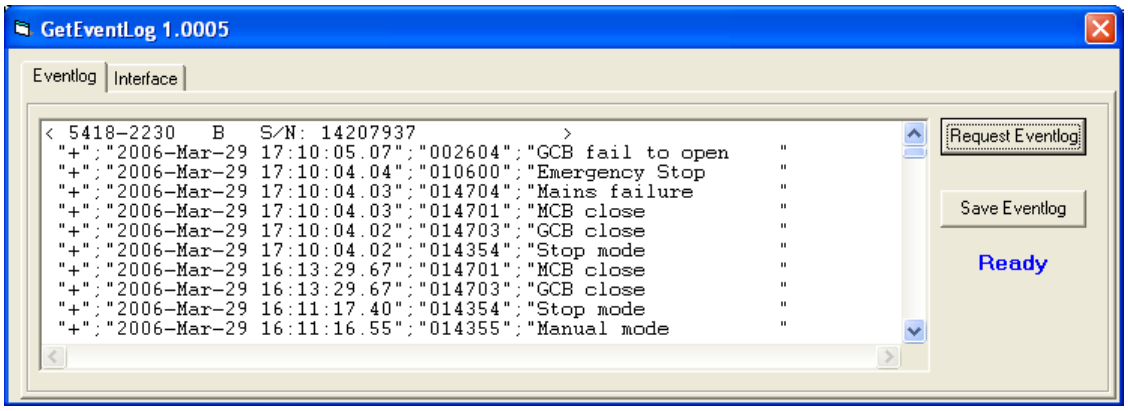


Figure 3-40: GetEventLog - event history content

The 300 latest events are displayed in chronological order and each entry is composed like this:

"sign";"event date and time";"event no.";"event text"

whereas the **"sign"** **"+"** indicates the occurrence and **"-"** indicates the disappearance or acknowledgement of the alarm or state

"event date and time" serves as a timestamp and indicates the date and time of the event occurred

"event no." indicates the event ID number that occurred

"event text" indicates the event that occurred in clear text

The event text is read out in the language, which is selected in the easYgen, like English or French. Some languages may not be supported by GetEventLog, like Japanese or Chinese. Then you may change the language in the unit.
The event numbers are indicated in Table 3-28 at the end of this section. Please note that some event texts may be configured freely (like analog inputs, etc.) and may not correspond with the original text. The event numbers are unambiguous.

Example: The entry **"+";"2005-June-15 13:23:05.69";"014705";"Emergency run"** means that an emergency run operation **"014705"** occurred **"+"** at June 15, 2005 at 23 minutes, 5 seconds and 69 hundredths of a second after 1 o'clock in the afternoon **"2005-June-15 13:23:05.69"**.

Storing Event History Data

Using the Save Eventlog button on the Eventlog tab, you are able to save the content of the event history in CSV format (comma separated values). You may open the saved file within Excel for example.

	A	B	C	D
1	< 5418-2230 B S/N: 14207937			>
2	"+"	2006-Mar-29 09:37:25.07	2604	GCB fail to open
3	"+"	2006-Mar-29 09:37:24.04	10600	Emergency Stop
4	"+"	2006-Mar-29 09:37:24.03	14704	Mains failure
5	"+"	2006-Mar-29 09:37:24.03	14701	MCB close
6	"+"	2006-Mar-29 09:37:24.02	14703	GCB close
7	"+"	2006-Mar-29 09:37:24.02	14354	Stop mode
8	"+"	2006-Mar-29 09:31:16.03	14704	Mains failure
9	"+"	2006-Mar-29 09:31:16.03	14700	MCB open
10	"+"	2006-Mar-29 09:31:16.02	14702	GCB open
11	"+"	2006-Mar-29 09:31:16.02	14354	Stop mode
12	"+"	2006-Mar-27 10:13:18.07	2604	GCB fail to open
13	"+"	2006-Mar-27 10:13:17.03	10600	Emergency Stop

Figure 3-41: GetEventLog - event history content in Excel

Resetting the Event History

NOTE

Be sure to be in the appropriate code level to reset the event history. If you have not entered the correct password for the required code level, the parameters for resetting the event history are not available (refer to the Event History section on page 18 for more information).

The event history can be reset using the parameter "Clear event log" via the front panel or LeoPC1 (deleted events or empty entries are represented with a series of dashes in the event history). To do this, perform the following steps:

Resetting the Event History Using the Front Panel

Make sure that you are in code level CS3 (refer to the Password section on page 17).
Set the parameter "Clear event log" to YES (refer to the Event History section on page 18).
The complete event history is now being cleared (single events may be cleared by pressing the button).

Resetting the Event History Using LeoPC1

Connect the easYgen with your PC and start LeoPC1 as described in Configuration Using The PC on page 12.
Set the parameter "Clear event log" to YES (refer to the Event History section on page 18).
The complete event history is now being cleared.

Event Texts and Numbers

Event no.	Event text	Description
001912	Gen.overfreq. 1	Generator frequency has exceeded threshold 1
001913	Gen.overfreq. 2	Generator frequency has exceeded threshold 2
001962	Gen.underfreq. 1	Generator frequency has fallen below threshold 1
001963	Gen.Unterfreq. 2	Generator frequency has fallen below threshold 2
002012	Gen.overvolt. 1	Generator voltage has exceeded threshold 1
002013	Gen.overvolt. 2	Generator voltage has exceeded threshold 2
002062	Gen.undervolt. 1	Generator voltage has fallen below threshold 1
002063	Gen.undervolt. 2	Generator voltage has fallen below threshold 2
002112	Overspeed 1	Engine speed has exceeded threshold 1
002113	Overspeed 2	Engine speed has exceeded threshold 2
002162	Underspeed 1	Engine speed has fallen below threshold 1
002163	Underspeed 2	Engine speed has fallen below threshold 2
002218	Gen. overcurr. 1	Generator current has exceeded threshold 1
002219	Gen. overcurr. 2	Generator current has exceeded threshold 2
002220	Gen. overcurr. 3	Generator current has exceeded threshold 3
002262	Gen. Rv/Rd pow.1	Generator reverse/reduced power has exceeded threshold 1
002263	Gen. Rv/Rd pow.2	Generator reverse/reduced power has exceeded threshold 2
002312	Gen. Overload 1	Generator overload has exceeded threshold 1
002313	Gen. Overload 2	Generator overload has exceeded threshold 2
002412	Unbal. load 1	Generator load imbalance has exceeded threshold 1
002413	Unbal. load 2	Generator load imbalance has exceeded threshold 2
002457	Speed det. alarm	Engine speed and generator frequency difference is exceeded
002504	Shutdwn malfunct.	Engine could not be stopped within the configured time
002560	Mainten. days exceeded	Maintenance days counter has expired
002561	Mainten. hours exceeded	Maintenance hours counter has expired
002603	GCB fail to close	GCB could not be closed within the configured attempts
002604	GCB fail to open	GCB could not be opened within the configured time
002623	MCB fail to close	MCB could not be closed within the configured attempts
002624	MCB fail to open	MCB could not be opened within the configured time
002644	Timeout dead bus op.	Dead bus operation has exceeded the delay
002652	Unintended stop	Engine has stopped without intention
003263	Ground fault 1	Generator ground fault current has exceeded threshold 1
003264	Ground fault 2	Generator ground fault current has exceeded threshold 2
003325	Start fail	Engine could not be started within the configured attempts
003907	Gen. asymmetry	Generator voltage asymmetry has exceeded threshold
003955	Gen. phase rot. misw.	Generator voltage phase rotation is not as configured
003975	Mains phase rot. misw.	Mains voltage phase rotation is not as configured
004038	Inv.time ov.curr.	Generator current has exceeded threshold
010005	Batt.undervolt.1	Battery voltage has fallen below threshold 1
010006	Batt.undervolt.2	Battery voltage has fallen below threshold 2
010007	Batt.overvolt.1	Battery voltage has exceeded threshold 1

Event no.	Event text	Description
010008	Batt.overvolt.2	Battery voltage has exceeded threshold 2
010010	Lv1: Analog inp.1 *	Analog input 1 level 1 is exceeded/fallen below
010011	Lv2: Analog inp.1 *	Analog input 1 level 2 is exceeded/fallen below
010012	Lv1: Analog inp.2 *	Analog input 2 level 1 is exceeded/fallen below
010013	Lv2: Analog inp.2 *	Analog input 2 level 2 is exceeded/fallen below
010014	Wb: Analog inp.1 *	Wire break at analog input 1
010015	Wb: Analog inp.2 *	Wire break at analog input 2
010016	CAN Open Fault	No CANopen protocol message is received
010017	CAN-Fault J1939	No J1939 data is received from an ECU
010018	Flexible Limit 1 *	Flexible limit 1 exceeded/fallen below
010019	Flexible Limit 2 *	Flexible limit 2 exceeded/fallen below
010020	Flexible Limit 3 *	Flexible limit 3 exceeded/fallen below
010021	Flexible Limit 4 *	Flexible limit 4 exceeded/fallen below
010600	DI 1 Text *	Discrete input 1 is enabled
010601	DI 2 Text *	Discrete input 2 is enabled
010602	DI 3 Text *	Discrete input 3 is enabled
010603	DI 4 Text *	Discrete input 4 is enabled
010604	DI 5 Text *	Discrete input 5 is enabled
010605	DI 6 Text *	Discrete input 6 is enabled
010607	DI 7 Text *	Discrete input 7 is enabled
010608	DI 8 Text *	Discrete input 8 is enabled
010802	Red stop lamp	ECU has sent a red stop lamp signal to the control
010803	Amber warning lamp	ECU has sent an amber warning lamp signal to the control
014353	Auto mode	Automatic mode is active
014354	Stop mode	Stop mode is active
014355	Manual mode	Manual mode is active
014700	MCB open	Status: MCB is open
014701	MCB close	Status: MCB is closed
014702	GCB open	Status: GCB is open
014703	GCB close	Status: GCB is closed
014704	Mains failure	Mains failure has been detected
014705	Emergency run	Emergency power operation is active
014706	Engine is running	Engine is running
014707	Critical mode	Critical mode operation is active
016360	Ext. DI 1 text *	External discrete input 1 is enabled
016361	Ext. DI 2 text *	External discrete input 2 is enabled
016362	Ext. DI 3 text *	External discrete input 3 is enabled
016364	Ext. DI 4 text *	External discrete input 4 is enabled
016365	Ext. DI 5 text *	External discrete input 5 is enabled
016366	Ext. DI 6 text *	External discrete input 6 is enabled
016367	Ext. DI 7 text *	External discrete input 7 is enabled
016368	Ext. DI 8 text *	External discrete input 8 is enabled
016369	Ext. DI 9 text *	External discrete input 9 is enabled
016370	Ext. DI 10 text *	External discrete input 10 is enabled
016371	Ext. DI 11 text *	External discrete input 11 is enabled
016372	Ext. DI 12 text *	External discrete input 12 is enabled
016373	Ext. DI 13 text *	External discrete input 13 is enabled
016374	Ext. DI 14 text *	External discrete input 14 is enabled
016375	Ext. DI 15 text *	External discrete input 15 is enabled
016376	Ext. DI 16 text *	External discrete input 16 is enabled

* This is the default text, but may be configured freely

Table 3-28: Event history - event texts and numbers

Appendix E.
Average Generator Current Calculation

Calculating Principle

The calculating principle of the average generator current depends on the setting of the parameter "Generator voltage measuring" (Parameter 6).

Generator Voltage Measuring Configured to "1Ph 2W"

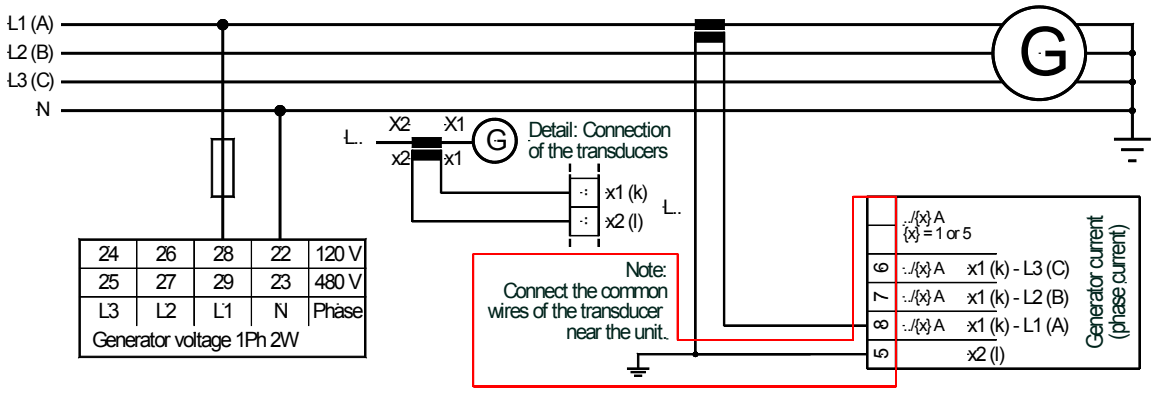


Figure 3-42: Average generator current calculating principle - 1Ph 2W

The calculated average generator current is the current of phase L1.

Formula: $I_{GenAvg} = I_{L1}$

Generator Voltage Measuring Configured to "1Ph 3W"

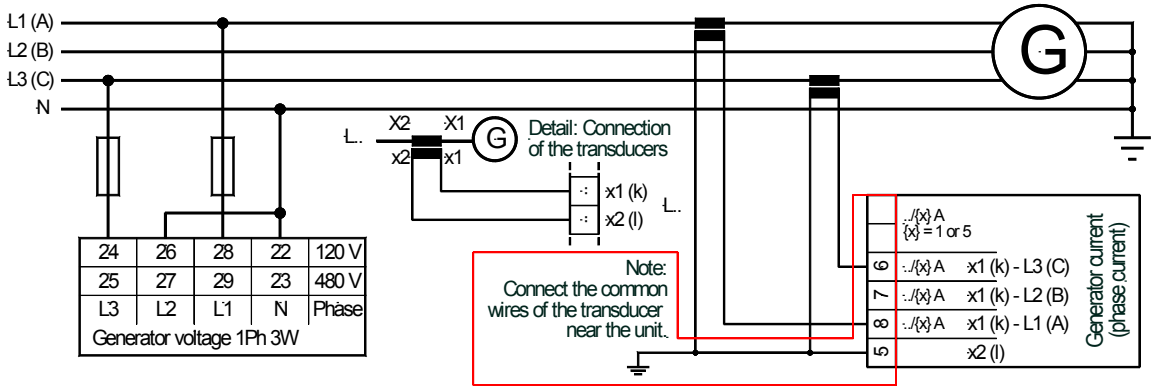


Figure 3-43: Average generator current calculating principle - 1Ph 3W

The calculated average generator current is the average of the currents of phase L1 and L3.

Formula: $I_{GenAvg} = (I_{L1} + I_{L3}) / 2$

Generator Voltage Measuring Configured to "3Ph 3W" or "3Ph 4W"

If "3Ph3W" or "3Ph4W" are configured for generator voltage measuring (Parameter 6), the calculating principle of the average generator current is dependent on the setting of the parameter "Generator current measuring" (Parameter 7).

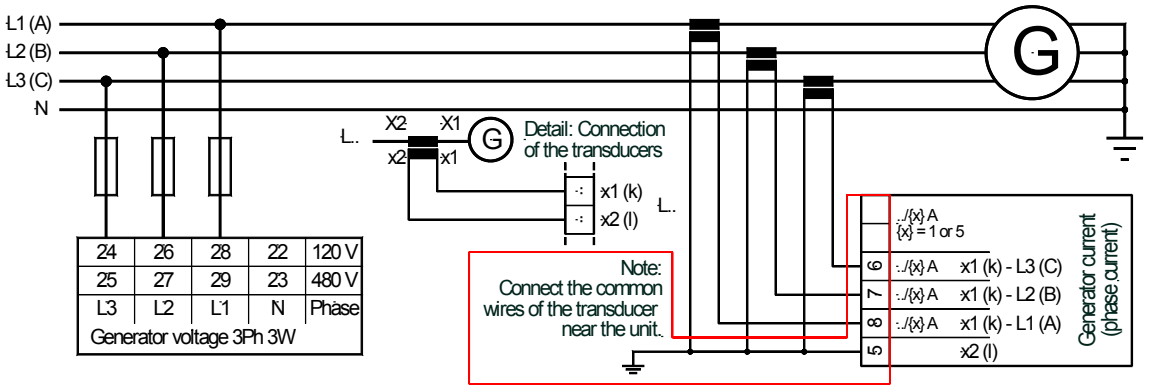


Figure 3-44: Average generator current calculating principle - 3Ph 3W

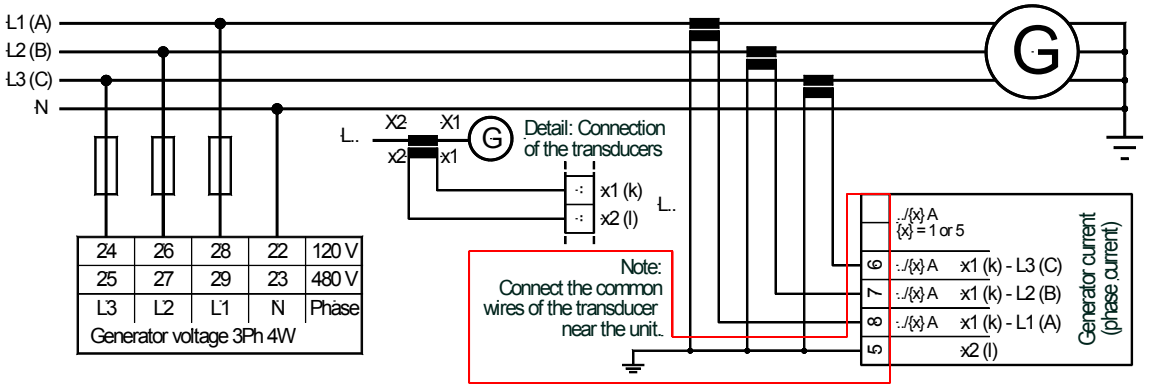


Figure 3-45: Average generator current calculating principle - 3Ph 4W

Generator Current Measuring Configured to "L1 L2 L3"

The calculated average generator current is calculated from the currents of all three available phases.

Formula: $I_{GenAvg} = (I_{L1} + I_{L2} + I_{L3}) / 3$

Generator Current Measuring Configured to "L1"

The calculated average generator current is the current of phase L1.

Formula: $I_{GenAvg} = I_{L1}$

Generator Current Measuring Configured to "L2"

The calculated average generator current is the current of phase L2.

Formula: $I_{GenAvg} = I_{L2}$

Generator Current Measuring Configured to "L3"

The calculated average generator current is the current of phase L3.

Formula: $I_{GenAvg} = I_{L3}$

Appendix F.
List Of Parameters

Unit number P/N _____ Rev _____

Version easYgen-_____

Project _____

Serial number S/N _____ Date _____

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
PASSWORD							
1	Password CAN	10402	UNSIGNED 16	0000 to 9999	0003		
2	Password DPC	10401	UNSIGNED 16	0000 to 9999	0003		
1 MEASURING							
3	Rated system frequency	01750	UNSIGNED 16	50/60 Hz	50 Hz		
4	Rated voltage generator	01766	UNSIGNED 32	50 to 650000 V	400 V		
5	Rated voltage mains	01768	UNSIGNED 32	50 to 650000 V	400 V		
6	Generator voltage measuring	01851	UNSIGNED 16	3Ph 4W 3Ph 3W 1Ph 2W 1Ph 3W	3Ph 4W	☐ 3Ph4W ☐ 3Ph3W ☐ 1Ph2W ☐ 1Ph3W	☐ 3Ph4W ☐ 3Ph3W ☐ 1Ph2W ☐ 1Ph3W
7	Generator current measuring	01850	UNSIGNED 16	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
8	Mains voltage measuring	01853	UNSIGNED 16	3Ph 4W 3Ph 3W 1Ph 2W 1Ph 3W	3Ph 4W	☐ 3Ph4W ☐ 3Ph3W ☐ 1Ph2W ☐ 1Ph3W	☐ 3Ph4W ☐ 3Ph3W ☐ 1Ph2W ☐ 1Ph3W
9	Mains current measuring	01852	UNSIGNED 16	Phase L1 Phase L2 Phase L3	Phase L1	☐ Ph.L1 ☐ Ph.L2 ☐ Ph.L3	☐ Ph.L1 ☐ Ph.L2 ☐ Ph.L3
10	Rated active power [kW]	01752	UNSIGNED 32	0.5 to 99999.9 kW	200.0 kW		
11	Rated current	01754	UNSIGNED 16	5 to 32000 A	300 A		
	1.1 Transformer						
12	Gen. voltage transf. primary	01801	UNSIGNED 32	50 to 650000 V	400 V		
13	Gen. voltage transf. secondary	01800	UNSIGNED 16	50 to 480 V	400 V		
14	Mains voltage transf. primary	01804	UNSIGNED 32	50 to 650000 V	400 V		
15	Mains voltage transf. secondary	01803	UNSIGNED 16	50 to 480 V	400 V		
16	Generator current transformer	01806	UNSIGNED 16	1 to 32000/5 A	500/5 A		
		01808	UNSIGNED 16	1 to 32000/1 A	500/1 A		
17	Input mains current	01854	UNSIGNED 16	Mains / Ground / Off	Mains	☐ Mains ☐ Ground ☐ Off	☐ Mains ☐ Ground ☐ Off
18	Mains current transformer	01807	UNSIGNED 16	1 to 32000/5 A	500/5 A		
		01809	UNSIGNED 16	1 to 32000/1 A	500/1 A		
19	Ground current transformer	01810	UNSIGNED 16	1 to 32000/5 A	500/5 A		
		01811	UNSIGNED 16	1 to 32000/1 A	500/1 A		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
2 APPLICATION							
20	Application mode	3401	UNSIGNED 16	None {0} GCB open {1o} GCB {1oc} GCB/MCB {2oc}	GCB/MCB {2oc}	☐ {0} ☐ {1o} ☐ {1oc} ☐ {2oc}	☐ {0} ☐ {1o} ☐ {1oc} ☐ {2oc}
21	Start req. in Auto	12120	Logman	refer to *LogicsManager* chapter on page 157; default: (09.02. + 0) + 0			
22	Stop req. in Auto	12190	Logman	refer to *LogicsManager* chapter on page 157; default: (0 & 1) & 1			
23	Start w/o load	10718	Logman	refer to *LogicsManager* chapter on page 157; default: (0 & 1) & !00.13			
24	Startup in mode	1795	UNSIGNED 16	Stop Auto Manual last	Stop	☐ STOP ☐ AUTO ☐ MAN ☐ last	☐ STOP ☐ AUTO ☐ MAN ☐ last
25	Operation mode AUTO	12510	Logman	refer to *LogicsManager* chapter on page 157; default: (0 & 1) & 1			
26	Operation mode MAN	12520	Logman	refer to *LogicsManager* chapter on page 157; default: (0 & 1) & 1			
27	Operation mode STOP	12530	Logman	refer to *LogicsManager* chapter on page 157; default: (0 & 1) & 1			
28	Alternative screen	4104	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
29	Show mains data	4106	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
30	Value display field 1	4300	UNSIGNED 16	refer to Parameter 30	Gen. frq		
31	Unit display field 1	4305	UNSIGNED 16	refer to Parameter 31	OFF		
30	Value display field 2	4301	UNSIGNED 16	refer to Parameter 30	Gen. Pwr.		
31	Unit display field 2	4306	UNSIGNED 16	refer to Parameter 31	OFF		
30	Value display field 3	4302	UNSIGNED 16	refer to Parameter 30	Gen Cur A		
31	Unit display field 3	4307	UNSIGNED 16	refer to Parameter 31	OFF		
30	Value display field 4	4303	UNSIGNED 16	refer to Parameter 30	Gen Cur B		
31	Unit display field 4	4308	UNSIGNED 16	refer to Parameter 31	OFF		
30	Value display field 5	4304	UNSIGNED 16	refer to Parameter 30	Gen Cur C		
31	Unit display field 5	4309	UNSIGNED 16	refer to Parameter 31	OFF		
	2.1 Critical Mode						
32	Critical mode	12220	Logman	refer to *LogicsManager* chap. on page 157; default: (0 & !05.08) & !09.01			
33	Critical mode postrun	4109	UNSIGNED 16	0 to 6000 s	600 s		
34	close GCB in override	4100	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
35	Override alarmcl. also in MAN	4105	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
36	Break emergency in override	4101	UNSIGNED 16	0 to 999 s	5 s		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
3 CONFIGURE ENGINE							
37	Start/stop mode	3321	UNSIGNED 16	Diesel Gas External	Diesel	☐ Diesel ☐ Gas ☐ External	☐ Diesel ☐ Gas ☐ External
	3.1 Engine type: Diesel						
38	Fuel relay: close to stop	3320	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
39	Preglow time	3308	UNSIGNED 16	0 to 300 s	3 s		
40	Preglow mode	3317	UNSIGNED 16	NO Always Analog input [T1] Analog input [T2]	NO	☐ No ☐ Always ☐ [T1] ☐ [T2]	☐ No ☐ Always ☐ [T1] ☐ [T2]
41	Preglow temp. threshold	3309	SIGNED 16	-10 to 140 °C	0 °C		
	3.2 Engine type: Gas						
42	Ignition delay	3310	UNSIGNED 16	0 to 999 s	3 s		
43	Gas valve delay	3311	UNSIGNED 16	0 to 999 s	3 s		
44	Min. speed for ignition	3312	UNSIGNED 16	10 to 1800 RPM	100 RPM		
	3.3 Pickup						
45	Speed Pickup	1600	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
46	Nominal speed	1601	UNSIGNED 16	500 to 4000 RPM	1500 RPM		
47	Pickup measurement from:	1604	UNSIGNED 16	Pickup / Sensor	Pickup	☐ P ☐ S	☐ P ☐ S
48	Fly wheel teeth	1602	UNSIGNED 16	2 to 260	118		
49	Pulses per revolution	1603	UNSIGNED 16	2.00 to 260.00	118.00		
50	Filter time constant	10102	UNSIGNED 16	0 to 8	0		
	3.4 Start/stop automatic						
51	Auxiliary services prerun	3300	UNSIGNED 16	0 to 999 s	0 s		
52	Starter time	3306	UNSIGNED 16	1 to 99 s	5 s		
53	Start pause time	3307	UNSIGNED 16	1 to 99 s	7 s		
54	Cool down time	3316	UNSIGNED 16	1 to 999 s	20 s		
55	Auxiliary services postrun	3301	UNSIGNED 16	0 to 999 s	0 s		
56	Time of engine stop	3326	UNSIGNED 16	0 to 99 s	10 s		
57	Firing speed	3313	UNSIGNED 16	5 to 60 Hz	15 Hz		
58	Logicm. for firing speed	3324	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
59	Ignition speed	12500	Logman	refer to *LogicsManager* chapter starting page 157; default: (0 & 1) & 1			
60	Engine monit. delay time	3315	UNSIGNED 16	0 to 99 s	8 s		
	3.5 Idle Mode						
61	Constant idle run	12550	Logman	refer to *LogicsManager* chapter starting page 157; default: (0 & 1) & 1			
62	Idle mode automatic	12570	Logman	refer to *LogicsManager* chapter starting page 157; default: (0 & 1) & 1			
63	Time for automatic idle run	3328	UNSIGNED 16	1 to 9999 s	10 s		
64	During emerg/critical	3329	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
4 BREAKER							
65	GCB open relay	3403	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
66	GCB time pulse	3416	UNSIGNED 16	0.04 to 10.00 s	0.24 s		
67	GCB close pulse	3409	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
68	GCB auto unblock	3405	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
69	Undelayed close GCB	12210	Logman	refer to *LogicsManager* chapter starting page 157; default: (04.09 & 1) & 1			
70	GCB frequency window	3350	UNSIGNED 16	0.2 to 10.0 %	2.0 %		
71	GCB voltage window	3351	UNSIGNED 16	1 to 100 %	10 %		
72	CB settling time	3415	UNSIGNED 16	0 to 99 s	2 s		
73	MCB auto unlock	3407	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
74	Close MCB in STOP mode	3410	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
75	MCB time pulse	3417	UNSIGNED 16	0.04 to 10.00 s	0.24 s		
76	Enable MCB	3423	UNSIGNED 16	ALWAYS / via DI6	ALWAYS	☐ A ☐ DI6	☐ A ☐ DI6
77	Transfer time GCB/MCB	3400	UNSIGNED 16	0.10 to 99.99 s	1.00 s		
5 EMERGENCY POWER (AMF)							
78	On/Off	2802	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
79	Mains fail delay time	2800	UNSIGNED 16	0.20 to 99.99 s	3.00 s		
80	Mains settling time	2801	UNSIGNED 16	1 to 9,999 s	20 s		
81	Emerg. start with MCB failure	3408	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
82	Inhibit emergency run	12200	Logman	refer to *LogicsManager* chapter starting page 157; default: (0 & 1) & 1			

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
6 MONITORING							
83	Time until horn reset	1756	UNSIGNED 16	0 to 1,000 s	180 s		
84	External acknowledge	12490	Logman	refer to *LogicsManager* chapter starting page 157; default: (0 & !04.03) + 0			
	6.1 Monitoring Generator						
85	Voltage monitoring generator	1770	UNSIGNED 16	3 phase/4 phase	3 phase	☐ 3 ☐ 4	☐ 3 ☐ 4
	6.1.1 Generator: overfrequency level 1						
86	Monitoring level 1	1900	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
87	Limit level 1	1904	UNSIGNED 16	50.0 to 130.0 %	110.0 %		
88	Delay level 1	1905	UNSIGNED 16	0.02 to 99.99 s	1.50 s		
89	Alarm class level 1	1901	UNSIGNED 16	A/B/C/D/E/F	B		
90	Self acknowledge level 1	1902	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.2 Generator: overfrequency level 2						
86	Monitoring level 2	1906	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
87	Limit level 2	1910	UNSIGNED 16	50.0 to 130.0 %	115.0 %		
88	Delay level 2	1911	UNSIGNED 16	0.02 to 99.99 s	0.30 s		
89	Alarm class level 2	1907	UNSIGNED 16	A/B/C/D/E/F	F		
90	Self acknowledge level 2	1908	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.3 Generator: underfrequency level 1						
91	Monitoring level 1	1950	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
92	Limit level 1	1954	UNSIGNED 16	50.0 to 130.0 %	90.0 %		
93	Delay level 1	1955	UNSIGNED 16	0.02 to 99.99 s	5.00 s		
94	Alarm class level 1	1951	UNSIGNED 16	A/B/C/D/E/F	B		
95	Self acknowledge level 1	1952	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
96	Delayed by engine speed level 1	1953	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.4 Generator: underfrequency level 2						
91	Monitoring level 2	1956	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
92	Limit level 2	1960	UNSIGNED 16	50.0 to 130.0 %	84.0 %		
93	Delay level 2	1961	UNSIGNED 16	0.02 to 99.99 s	0.30 s		
94	Alarm class level 2	1957	UNSIGNED 16	A/B/C/D/E/F	F		
95	Self acknowledge level 2	1958	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
96	Delayed by engine speed level 2	1959	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
6 MONITORING							
	6.1.5 Generator: overvoltage level 1						
97	Monitoring level 1	2000	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
98	Limit level 1	2004	UNSIGNED 16	50.0 to 125.0 %	108.0 %		
99	Delay level 1	2005	UNSIGNED 16	0.02 to 99.99 s	5.00 s		
100	Alarm class level 1	2001	UNSIGNED 16	A/B/C/D/E/F	B		
101	Self acknowledge level 1	2002	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
102	Delayed by engine speed level 1	2003	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.6 Generator: overvoltage level 2						
97	Monitoring level 2	2006	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
98	Limit level 2	2010	UNSIGNED 16	50.0 to 125.0 %	112.0 %		
99	Delay level 2	2011	UNSIGNED 16	0.02 to 99.99 s	0.30 s		
100	Alarm class level 2	2007	UNSIGNED 16	A/B/C/D/E/F	F		
101	Self acknowledge level 2	2008	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
102	Delayed by engine speed level 2	2009	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.7 Generator: undervoltage level 1						
103	Monitoring level 1	2050	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
104	Limit level 1	2054	UNSIGNED 16	50.0 to 125.0 %	92.0 %		
105	Delay level 1	2055	UNSIGNED 16	0.02 to 99.99 s	5.00 s		
106	Alarm class level 1	2051	UNSIGNED 16	A/B/C/D/E/F	B		
107	Self acknowledge level 1	2052	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
108	Delayed by engine speed level 1	2053	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	6.1.8 Generator: undervoltage level 2						
103	Monitoring level 2	2056	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
104	Limit level 2	2060	UNSIGNED 16	50.0 to 125.0 %	88.0 %		
105	Delay level 2	2061	UNSIGNED 16	0.02 to 99.99 s	0.30 s		
106	Alarm class level 2	2057	UNSIGNED 16	A/B/C/D/E/F	F		
107	Self acknowledge level 2	2058	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
108	Delayed by engine speed level 2	2059	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	6.1.9 Generator: overcurrent level 1						
109	Monitoring level 1	2200	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
110	Limit level 1	2204	UNSIGNED 16	50.0 to 300.0 %	110.0 %		
111	Delay level 1	2205	UNSIGNED 16	0.02 to 99.99 s	30.00 s		
112	Alarm class level 1	2201	UNSIGNED 16	A/B/C/D/E/F	E		
113	Self acknowledge level 1	2202	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.10 Generator: overcurrent level 2						
109	Monitoring level 2	2206	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
110	Limit level 2	2210	UNSIGNED 16	50.0 to 300.0 %	150.0 %		
111	Delay level 2	2211	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
112	Alarm class level 2	2207	UNSIGNED 16	A/B/C/D/E/F	F		
113	Self acknowledge level 2	2208	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.11 Generator: overcurrent level 3						
109	Monitoring level 3	2212	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
110	Limit level 3	2216	UNSIGNED 16	50.0 to 300.0 %	250.0 %		
111	Delay level 3	2217	UNSIGNED 16	0.02 to 99.99 s	0.40 s		
112	Alarm class level 3	2213	UNSIGNED 16	A/B/C/D/E/F	F		
113	Self acknowledge level 3	2214	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.12 Gen.: reverse/reduced pow. level 1						
114	Monitoring level 1	2250	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
115	Limit level 1	2254	INTEGER 16	-99.9 to 99.9 %	-3.0 %		
116	Delay level 1	2255	UNSIGNED 16	0.02 to 99.99 s	5.00 s		
117	Alarm class level 1	2251	UNSIGNED 16	A/B/C/D/E/F	B		
118	Self acknowledge level 1	2252	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
119	Delayed by engine speed level 1	2253	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.13 Gen.: reverse/reduced pow. level 2						
114	Monitoring level 2	2256	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
115	Limit level 2	2260	U INTEGER 16	-99.9 to 99.9 %	-5.0 %		
116	Delay level 2	2261	UNSIGNED 16	0.02 to 99.99 s	3.00 s		
117	Alarm class level 2	2257	UNSIGNED 16	A/B/C/D/E/F	E		
118	Self acknowledge level 2	2258	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
119	Delayed by engine speed level 2	2259	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
6 MONITORING							
	6.1.14 Generator: overload level 1						
120	Monitoring level 1	2300	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
121	Limit level 1	2304	UNSIGNED 16	50.0 to 300.0 %	110.0 %		
122	Delay level 1	2305	UNSIGNED 16	0.02 to 99.99 s	11.00 s		
123	Alarm class level 1	2301	UNSIGNED 16	A/B/C/D/E/F	B		
124	Self acknowledge level 1	2302	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.15 Generator: overload level 2						
120	Monitoring level 2	2306	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
121	Limit level 2	2310	UNSIGNED 16	50.0 to 300.0 %	120.0 %		
122	Delay level 2	2311	UNSIGNED 16	0.02 to 99.99 s	0.10 s		
123	Alarm class level 2	2307	UNSIGNED 16	A/B/C/D/E/F	E		
124	Self acknowledge level 2	2308	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.16 Generator: unbalanced load level 1						
125	Monitoring level 1	2400	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
126	Limit level 1	2404	UNSIGNED 16	0.0 to 100.0 %	10.0 %		
127	Delay level 1	2405	UNSIGNED 16	0.02 to 99.99 s	10.00 s		
128	Alarm class level 1	2401	UNSIGNED 16	A/B/C/D/E/F	B		
129	Self acknowledge level 1	2402	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
130	Delayed by engine speed level 1	2403	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.17 Generator: unbalanced load level 2						
125	Monitoring level 2	2406	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
126	Limit level 2	2410	UNSIGNED 16	0.0 to 100.0 %	15.0 %		
127	Delay level 2	2411	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
128	Alarm class level 2	2407	UNSIGNED 16	A/B/C/D/E/F	E		
129	Self acknowledge level 2	2408	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
130	Delayed by engine speed level 2	2409	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.18 Generator: voltage asymmetry						
131	Monitoring	3900	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
132	Limit	3903	UNSIGNED 16	0.5 to 99.9 %	10.0 %		
133	Delay	3904	UNSIGNED 16	0.02 to 99.99 s	5.00 s		
134	Alarm class	3901	UNSIGNED 16	A/B/C/D/E/F	F		
135	Self acknowledge	3902	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
136	Delayed by engine speed	3905	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	6.1.19 Generator: ground fault level 1						
137	Monitoring level 1	3250	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
138	Limit level 1	3254	UNSIGNED 16	0 to 300 %	10 %		
139	Delay level 1	3255	UNSIGNED 16	0.02 to 99.99 s	0.20 s		
140	Alarm class level 1	3251	UNSIGNED 16	A/B/C/D/E/F	B		
141	Self acknowledge level 1	3252	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
142	Delayed by engine speed level 1	3253	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.20 Generator: ground fault level 2						
137	Monitoring level 2	3256	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
138	Limit level 2	3260	UNSIGNED 16	0 to 300 %	30 %		
139	Delay level 2	3261	UNSIGNED 16	0.02 to 99.99 s	0.10 s		
140	Alarm class level 2	3257	UNSIGNED 16	A/B/C/D/E/F	F		
141	Self acknowledge level 2	3258	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
142	Delayed by engine speed level. 2	3258	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.1.21 Generator: phase rotation						
143	Generator phase rotation	3950	UNSIGNED 16	CW (+)/CCW (-)	CW	☐ + ☐ -	☐ + ☐ -
144	Monitoring	3954	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
145	Alarm class	3951	UNSIGNED 16	A/B/C/D/E/F	F		
146	Self acknowledge	3952	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
147	Delayed by engine speed	3953	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	6.1.22 Gen.: inverse-time overcurrent						
148	Monitoring	4030	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
149	Inverse time characteristic	4034	UNSIGNED 16	Normal/High/Extreme	Normal	☐n ☐h ☐e	☐n ☐h ☐e
150	Inv. time overcurrent Tp=	4035	UNSIGNED 16	0.01 to 1.99 s	0.06 s		
151	Inv. time overcurrent Ip=	4036	UNSIGNED 16	10.0 to 300.0 %	100.0 %		
152	Inv. time overcurrent I-start=	4037	UNSIGNED 16	100.0 to 300.0 %	115.0 %		
153	Alarm class	4031	UNSIGNED 16	A/B/C/D/E/F	F		
154	Self acknowledge	4032	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
155	Delayed by engine speed	4033	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
6 MONITORING							
	6.2 Monitoring Mains						
156	Voltage monitoring mains	1771	UNSIGNED 16	3 phase/4 phase	3 phase	☐ 3 ☐ 4	☐ 3 ☐ 4
	6.2.1 Mains phase rotation						
157	Mains phase rotation	3970	UNSIGNED 16	CW (+)/CCW (-)	CW	☐ + ☐ -	☐ + ☐ -
158	Monitoring	3974	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
159	Alarm class	3971	UNSIGNED 16	A/B/C/D/E/F	B		
160	Self acknowledge	3972	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
161	Delayed by engine speed	3973	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.2.2 Mains failure						
162	High voltage threshold	2704	UNSIGNED 16	50.0 to 130.0 %	110.0 %		
163	Low voltage threshold	2709	UNSIGNED 16	50.0 to 130.0 %	90.0 %		
164	Voltage hysteresis	2710	UNSIGNED 16	0.0 to 50.0 %	2.0 %		
165	High frequency threshold	2754	UNSIGNED 16	70.0 to 160.0 %	110.0 %		
166	Low frequency threshold	2759	UNSIGNED 16	70.0 to 160.0 %	90.0 %		
167	Frequency hysteresis	2760	UNSIGNED 16	0.0 to 50.0 %	2.0 %		
	6.3 Monitoring Breakers						
168	GCB monitoring	2600	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
169	GCB alarm class	2601	UNSIGNED 16	A/B/C/D/E/F	B		
170	GCB max. closing attempts	3418	UNSIGNED 16	1 to 10	5		
171	GCB open monitoring	3420	UNSIGNED 16	0.10 to 5.00 s	2.00 s		
172	MCB monitoring	2620	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
173	MCB alarm class	2621	UNSIGNED 16	A/B	B		
174	MCB max. closing attempts	3419	UNSIGNED 16	1 to 10	5		
175	MCB open monitoring	3421	UNSIGNED 16	0.10 to 5.00 s	2.00 s		
	6.4 Monitoring Engine						
	6.4.1 Engine: overspeed level 1						
176	Monitoring level 1	2100	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
177	Limit level 1	2104	UNSIGNED 16	0 to 9999 RPM	1850 RPM		
178	Delay level 1	2105	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
179	Alarm class level 1	2101	UNSIGNED 16	A/B/C/D/E/F	B		
180	Self acknowledge level 1	2102	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
181	Delayed by engine speed level 1	2103	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.4.2 Engine: overspeed level 2						
176	Monitoring level 2	2106	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
177	Limit level 2	2110	UNSIGNED 16	0 to 9999 RPM	1900 RPM		
178	Delay level 2	2111	UNSIGNED 16	0.02 to 99.99 s	0.10 s		
179	Alarm class level 2	2107	UNSIGNED 16	A/B/C/D/E/F	F		
180	Self acknowledge level 2	2108	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
181	Delayed by engine speed level 2	2109	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.4.3 Engine: underspeed level 1						
182	Monitoring level 1	2150	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
183	Limit level 1	2154	UNSIGNED 16	0 to 9999 RPM	1300 RPM		
184	Delay level 1	2155	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
185	Alarm class level 1	2151	UNSIGNED 16	A/B/C/D/E/F	B		
186	Self acknowledge level 1	2152	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
187	Delayed by engine speed level 1	2153	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	6.4.4 Engine: underspeed level 2						
182	Monitoring level 2	2156	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
183	Limit level 2	2160	UNSIGNED 16	0 to 9999 RPM	1250 RPM		
184	Delay level 2	2161	UNSIGNED 16	0.02 to 99.99 s	0.10 s		
185	Alarm class level 2	2157	UNSIGNED 16	A/B/C/D/E/F	F		
186	Self acknowledge level 2	2158	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
187	Delayed by engine speed level 2	2159	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	6.4.5 Speed detection						
188	Monitoring	2450	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
189	Mismatch limit	2454	UNSIGNED 16	1.5 to 8.5 Hz	5.0 Hz		
190	Delay	2455	UNSIGNED 16	0.02 to 99.99 s	2.00 s		
191	Activation frequency	2453	UNSIGNED 16	15 to 85 Hz	20 Hz		
192	Alarm class	2451	UNSIGNED 16	A/B/C/D/E/F	E		
193	Self acknowledge	2452	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
6 MONITORING							
	6.4.6 Start failure						
194	Monitoring	3303	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
195	Start attempts	3302	UNSIGNED 16	1 to 20	3		
196	Start attempts override	4102	UNSIGNED 16	1 to 20	10		
197	Alarm class	3304	UNSIGNED 16	A/B/C/D/E/F	F		
198	Self acknowledge	3305	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.4.7 Shutdown malfunction						
199	Monitoring	2500	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
200	Max. stop delay	2503	UNSIGNED 16	3 to 999 s	30 s		
201	Alarm class	2501	UNSIGNED 16	A/B/C/D/E/F	F		
202	Self acknowledge	2502	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.4.8 Unintended stop						
203	Monitoring	2650	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
204	Alarm class	2651	UNSIGNED 16	A/B/C/D/E/F	F		
	6.4.9 Dead bus operation						
205	Monitoring	2640	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
206	Delay	2643	UNSIGNED 16	1 to 999 s	30 s		
207	Alarm class	2641	UNSIGNED 16	A/B/C/D/E/F	B		
208	Self acknowledge	2642	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.5 Monitoring Battery						
	6.5.1 Battery: overvoltage level 1						
209	Monitoring level 1	3450	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
210	Limit level 1	3454	UNSIGNED 16	8.0 to 42.0 V	32.0 V		
211	Delay level 1	3455	UNSIGNED 16	0.02 to 99.99 s	5.00 s		
212	Alarm class level 1	3451	UNSIGNED 16	A/B/C/D/E/F/Control	B		
213	Self acknowledge level 1	3452	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
214	Delayed by engine speed level 1	3453	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.5.2 Battery: overvoltage level 2						
209	Monitoring level 2	3456	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
210	Limit level 2	3460	UNSIGNED 16	8.0 to 42.0 V	35.0 V		
211	Delay level 2	3461	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
212	Alarm class level 2	3457	UNSIGNED 16	A/B/C/D/E/F/Control	B		
213	Self acknowledge level 2	3458	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
214	Delayed by engine speed level 2	3459	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.5.3 Battery: undervoltage level 1						
215	Monitoring level 1	3500	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
216	Limit level 1	3504	UNSIGNED 16	8.0 to 42.0 V	24.0 V		
217	Delay level 1	3505	UNSIGNED 16	0.02 to 99.99 s	60.00 s		
218	Alarm class level 1	3501	UNSIGNED 16	A/B/C/D/E/F/Control	B		
219	Self acknowledge level 1	3502	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
220	Delayed by engine speed level 1	3503	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.5.4 Battery: undervoltage level 2						
215	Monitoring level 2	3506	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
216	Limit level 2	3510	UNSIGNED 16	8.0 to 42.0 V	20.0 V		
217	Delay level 2	3511	UNSIGNED 16	0.02 to 99.99 s	10.00 s		
218	Alarm class level 2	3507	UNSIGNED 16	A/B/C/D/E/F/Control	B		
219	Self acknowledge level 2	3508	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
220	Delayed by engine speed level 2	3509	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
6 MONITORING							
	6.6 Monitoring Interface						
	6.6.1 Monitoring CAN Open interface						
221	Monitoring	3150	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
222	Timeout	3154	UNSIGNED 16	0.1 to 650.0 s	2.0 s		
223	Alarm class	3151	UNSIGNED 16	A/B/C/D/E/F	B		
224	Self acknowledge	3152	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
225	Delayed by engine speed	3153	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.6.2 J1939 Interface						
	6.6.2.1 Monitoring J1939 Interface						
226	Monitoring	15110	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
227	Timeout	15114	UNSIGNED 16	0.0 to 650.0 s	20.0 s		
228	Alarm class	15111	UNSIGNED 16	A/B/C/D/E/F	B		
229	Self acknowledge	15112	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
230	Delayed by engine speed	15113	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.6.2.2 Amber warning lamp DM1						
231	Monitoring	15120	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
232	Timeout	15124	UNSIGNED 16	0.0 to 650.0 s	2.0 s		
233	Alarm class	15121	UNSIGNED 16	A/B/C/D/E/F/Control	A		
234	Self acknowledge	15122	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
235	Delayed by engine speed	15123	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	6.6.2.3 Red stop lamp DM1						
236	Monitoring	15110	UNSIGNED 16	ON/OFF	OFF	☐ 1 ☐ 0	☐ 1 ☐ 0
237	Timeout	15114	UNSIGNED 16	0.0 to 650.0 s	2.0 s		
238	Alarm class	15111	UNSIGNED 16	A/B/C/D/E/F/Control	A		
239	Self acknowledge	15112	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
240	Delayed by engine speed	15113	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
7 DISCRETE INPUTS							
	7.1 Discrete input [D1]						
241	DI 1 operation	1201	UNSIGNED 16	N.O. N.C.	N.C.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 1 delay	1220	UNSIGNED 16	0.08 to 650.00 s	0.20 s		
243	DI 1 alarm class	1222	UNSIGNED 16	A/B/C/D/E/F/Control	F		
244	DI 1 delayed by eng. speed	1223	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 1 self acknowledge	1224	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	DI 1 text	1400	Text/16	user-defined	Emerg. Stop		
	7.2Discrete input [D2]						
241	DI 2 operation	1221	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 2 delay	1220	UNSIGNED 16	0.08 to 650.00 s	0.50 s		
243	DI 2 alarm class	1222	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	DI 2 delayed by eng. speed	1223	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 2 self acknowledge	1224	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	DI 2 text	1410	Text/16	user-defined	Startr. in AUTO		
	7.3 Discrete input [D3]						
241	DI 3 operation	1241	UNSIGNED 16	N.O. N.C.	N.O.	☐ NO ☐ NC	☐ N.O. ☐ N.C.
242	DI 3 delay	1240	UNSIGNED 16	0.08 to 650.00 s	0.50 s		
243	DI 3 alarm class	1242	UNSIGNED 16	A/B/C/D/E/F/Control	B		
244	DI 3 delayed by eng. speed	1243	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 3 self acknowledge	1244	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	DI 3 text	1420	Text/16	user-defined	Digital Inp. 3		
	7.4 Discrete input [D4]						
241	DI 4 operation	1261	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 4 delay	1260	UNSIGNED 16	0.08 to 650.00 s	0.50 s		
243	DI 4 alarm class	1262	UNSIGNED 16	A/B/C/D/E/F/Control	B		
244	DI 4 delayed by eng. speed	1263	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 4 self acknowledge	1264	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	DI 4 text	1430	Text/16	user-defined	Digital Inp. 4		
	7.5 Discrete input [D5]						
241	DI 5 operation	1281	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 5 delay	1280	UNSIGNED 16	0.08 to 650.00 s	0.50 s		
243	DI 5 alarm class	1282	UNSIGNED 16	A/B/C/D/E/F/Control	B		
244	DI 5 delayed by eng. speed	1283	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 5 self acknowledge	1284	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	DI 5 text	1440	Text/16	user-defined	Digital Inp. 5		
	7.6 Discrete input [D6]						
241	DI 6 operation	1301	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 6 delay	1300	UNSIGNED 16	0.08 to 650.00 s	0.50 s		
243	DI 6 alarm class	1302	UNSIGNED 16	A/B/C/D/E/F/Control	B		
244	DI 6 delayed by eng. speed	1303	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 6 self acknowledge	1304	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	DI 6 text	1450	Text/16	user-defined	Digital Inp. 6		
	7.7 Discrete input [D7]						
241	DI 7 operation	1321	UNSIGNED 16	N.O. N.C.	N.C.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 7 delay	1323	UNSIGNED 16	0.08 to 650.00 s	0.00 s		
243	DI 7 alarm class	1322	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	DI 7 delayed by eng. speed	1323	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 7 self acknowledge	1324	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
246	DI 7 text	1460	Text/16	user-defined	Digital Inp. 7		
	7.8 Discrete input [D8]						
241	DI 8 operation	1341	UNSIGNED 16	N.O. N.C.	N.C.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	DI 8 delay	1340	UNSIGNED 16	0.08 to 650.00 s	0.00 s		
243	DI 8 alarm class	1342	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	DI 8 delayed by eng. speed	1343	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	DI 8 self acknowledge	1344	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
246	DI 8 text	1470	Text/16	user-defined	Digital Inp. 8		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
7 DISCRETE INPUTS							
	7.9 Discrete input [DEx01]						
241	Operation	16001	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16000	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16002	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16003	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16004	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 1 Text	16200	Text/16	user-defined	Ext. DI 1		
	7.10 Discrete input [DEx02]						
241	Operation	16011	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16010	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16012	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16013	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16014	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 2 Text	16210	Text/16	user-defined	Ext. DI 2		
	7.11 Discrete input [DEx03]						
241	Operation	16021	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16020	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16022	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16023	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16024	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 3 Text	16220	Text/16	user-defined	Ext. DI 3		
	7.12 Discrete input [DEx04]						
241	Operation	16031	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16030	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16032	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16033	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16034	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 4 Text	16230	Text/16	user-defined	Ext. DI 4		
	7.13 Discrete input [DEx05]						
241	Operation	16041	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16040	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16042	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16043	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16044	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 5 Text	16240	Text/16	user-defined	Ext. DI 5		
	7.14 Discrete input [DEx06]						
241	Operation	16051	UNSIGNED 16	N.O. N.C.	N.O.	☐ NO ☐ NC	☐ N.O. ☐ N.C.
242	Delay	16050	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16052	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16053	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16054	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 6 Text	16250	Text/16	user-defined	Ext. DI 6		
	7.15 Discrete input [DEx07]						
241	Operation	16061	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16060	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16062	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16063	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16064	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 7 Text	16260	Text/16	user-defined	Ext. DI 7		
	7.16 Discrete input [DEx08]						
241	Operation	16071	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16070	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16072	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16073	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16074	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 8 Text	16270	Text/16	user-defined	Ext. DI 8		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
7 DISCRETE INPUTS							
	7.17 Discrete input [DEx09]						
241	Operation	16081	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16080	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16082	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16083	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16084	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 9 Text	16280	Text/16	user-defined	Ext. DI 9		
	7.18 Discrete input [DEx10]						
241	Operation	16091	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16090	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16092	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16093	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16094	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 10 Text	16290	Text/16	user-defined	Ext. DI 10		
	7.19 Discrete input [DEx11]						
241	Operation	16101	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16100	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16102	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16103	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16104	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 11 Text	16300	Text/16	user-defined	Ext. DI 11		
	7.20 Discrete input [DEx12]						
241	Operation	16111	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16110	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16112	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16113	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16114	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 16 Text	16310	Text/16	user-defined	Ext. DI 12		
	7.21 Discrete input [DEx13]						
241	Operation	16121	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16120	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16122	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16123	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16124	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 13 Text	16320	Text/16	user-defined	Ext. DI 13		
	7.22 Discrete input [DEx14]						
241	Operation	16131	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16130	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16132	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16133	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16134	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 14 Text	16330	Text/16	user-defined	Ext. DI 14		
	7.23 Discrete input [DEx15]						
241	Operation	16141	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16140	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16142	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16143	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16144	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 15 Text	16340	Text/16	user-defined	Ext. DI 15		
	7.24 Discrete input [DEx16]						
241	Operation	16151	UNSIGNED 16	N.O. N.C.	N.O.	☐ N.O. ☐ N.C.	☐ N.O. ☐ N.C.
242	Delay	16150	UNSIGNED 16	0.05 to 650.00 s	0.20 s		
243	Alarm class	16152	UNSIGNED 16	A/B/C/D/E/F/Control	Control		
244	Delayed by eng. speed	16153	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
245	Self acknowledge	16154	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
246	Ext. DI 16 Text	16350	Text/16	user-defined	Ext. DI 16		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting
8 RELAY OUTPUTS (*LogicsManager*)						
	Relay 1	12100	Logman	refer to *LogicsManager* chapter starting page 161; default: (03.05 & 1) & 1		
	Relay 2	12110	Logman	refer to *LogicsManager* chapter starting page 161; default: (01.09 & 1) & 1		
	Relay 5	12130	Logman	refer to *LogicsManager* chapter starting page 161; default: (03.04 & 1) & 1		
	Relay 6	12140	Logman	refer to *LogicsManager* chapter starting page 161; default: (03.01 & 1) & 1		
	Relay 7	12150	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	Relay 8	12160	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	Relay 9	12170	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	Relay10	12180	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	Ready for operat.OFF	12580	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 1	12330	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 2	12340	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 3	12350	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 4	12360	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 5	12370	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 6	12380	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 7	12390	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 8	12400	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 9	12410	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 10	12420	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 11	12430	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 12	12440	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 13	12450	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 14	12460	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 15	12470	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		
	External DO 16	12480	Logman	refer to *LogicsManager* chapter starting page 161; default: (0 & 1) & 1		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
9 ANALOG INPUTS (*FlexIn*)							
247	Display temperature in	3631	UNSIGNED 16	°C / °F	°C	☐ °C ☐ °F	☐ °C ☐ °F
248	Display pressure in	3630	UNSIGNED 16	bar / psi	bar	☐ bar ☐ psi	☐ bar ☐ psi
	9.1 Analog input [T1]						
249	Type	1000	UNSIGNED 16	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
250	Select hardware	1020	UNSIGNED 16	0 to 500 Ohm 0 to 20 mA 4 to 20 mA	0 to 500 Ohm	☐ 500Ohm ☐ 0-20mA ☐ 4-20mA	☐ 500Ohm ☐ 0-20mA ☐ 4-20mA
251	Offset	1046	INTEGER 16	-20.0 to 20.0 Ohm	0.0 Ohm		
252	Bargraph minimum	3632	INTEGER 16	-9999 to 9999	00000		
253	Bargraph maximum	3633	INTEGER 16	-9999 to 9999	01000		
254	Description	1025	Text/16	user-defined	Analog inp. 1		
255	Value format	1035	Text/8	user-defined	0000		
256	Filter time constant	10113	UNSIGNED 16	OFF/1/2/3/4/5	3		
257	Hysteresis	1045	UNSIGNED 16	0 to 999	1		
	9.1.1 Limit 1 AI 1						
258	Monitoring level 1	1006	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
259	Limit level 1	1011	INTEGER 16	-9999 to 9999	200		
260	Limit level 1 idle run	1047	INTEGER 16	-9999 to 9999	200		
261	Delay level 1	1012	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
262	Monitoring level 1 at	1010	UNSIGNED 16	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
263	Alarm class level 1	1007	UNSIGNED 16	A/B/C/D/E/F/Control	B		
264	Self acknowledge level 1	1008	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
265	Delayed by engine level 1	1009	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	9.1.2 Limit 2 AI 1						
258	Monitoring level 2	1013	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
259	Limit level 2	1018	INTEGER 16	-9999 to 9999	100		
260	Limit level 2 idle run	1048	INTEGER 16	-9999 to 9999	100		
261	Delay level 2	1019	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
262	Monitoring level 2 at	1017	UNSIGNED 16	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
263	Alarm class level 2	1014	UNSIGNED 16	A/B/C/D/E/F/Control	F		
264	Self acknowledge level 2	1015	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
265	Delayed by engine level 2	1016	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	9.1.3 Wire Break AI 1						
266	Monit. wire break	1003	UNSIGNED 16	OFF High Low high/low	OFF	☐ OFF ☐ high ☐ low ☐ h/l	☐ OFF ☐ high ☐ low ☐ h/l
267	Wire break alarm class	1004	UNSIGNED 16	A/B/C/D/E/F/Control	B		
268	Self acknowledge wire break	1005	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	9.1.4 Linear Scale AI 1						
269	Value at 0 %	1001	INTEGER 16	-9999 to 9999	0		
270	Value at 100 %	1002	INTEGER 16	-9999 to 9999	1000		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
9 ANALOG INPUTS (*FlexIn*)							
	9.2 Analog input [T2]						
249	Type	1050	UNSIGNED 16	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
250	Select hardware	1070	UNSIGNED 16	0 to 500 Ohm 0 to 20 mA 4 to 20 mA	0-500 Ohm	☐ 500Ohm ☐ 0-20mA ☐ 4-20mA	☐ 500Ohm ☐ 0-20mA ☐ 4-20mA
251	Offset	1096	INTEGER 16	-20.0 to 20.0 Ohm	0.0 Ohm		
252	Bargraph minimum	3634	INTEGER 16	-9999 to 9999	00000		
253	Bargraph maximum	3635	INTEGER 16	-9999 to 9999	01000		
254	Description	1075	Text/16	user-defined	Analog inp. 2		
255	Value format	1085	Text/8	user-defined	0000		
256	Filter time constant	10114	UNSIGNED 16	OFF/1/2/3/4/5	3		
257	Hysteresis	1095	UNSIGNED 16	0 to 999	1		
	9.2.1 Limit 1 AI 2						
258	Monitoring level 1	1056	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
259	Limit level 1	1061	INTEGER 16	-9999 to 9999	95		
260	Limit level 1 idle run	1097	INTEGER 16	-9999 to 9999	95		
261	Delay level 1	1062	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
262	Monitoring level 1 at	1060	UNSIGNED 16	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
263	Alarm class level 1	1057	UNSIGNED 16	A/B/C/D/E/F/Control	B		
264	Self acknowledge level 1	1058	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
265	Delayed by engine level 1	1059	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	9.2.2 Limit 2 AI 2						
258	Monitoring level 2	1063	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
259	Limit level 2	1068	INTEGER 16	-9999 to 9999	100		
260	Limit level 2 idle run	1098	INTEGER 16	-9999 to 9999	100		
261	Delay level 2	1069	UNSIGNED 16	0.02 to 99.99 s	1.00 s		
262	Monitoring level 2 at	1067	UNSIGNED 16	Overrun Underrun	Overrun	☐ over ☐ under	☐ over ☐ under
263	Alarm class level 2	1064	UNSIGNED 16	A/B/C/D/E/F/Control	F		
264	Self acknowledge level 2	1065	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
265	Delayed by engine level 2	1066	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	9.2.3 Wire Break AI 2						
266	Monit. wire break	1053	UNSIGNED 16	OFF High Low high/low	OFF	☐ OFF ☐ high ☐ low ☐ h/l	☐ OFF ☐ high ☐ low ☐ h/l
267	Wire break alarm class	1054	UNSIGNED 16	A/B/C/D/E/F/Control	B		
268	Self acknowledge wire break	1055	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	9.2.4 Linear Scale AI 2						
269	Value at 0 %	1051	INTEGER 16	-9999 to 9999	0		
270	Value at 100 %	1052	INTEGER 16	-9999 to 9999	1000		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
9 ANALOG INPUTS (*FlexIn*)							
	9.3 Flexible Thresholds						
	9.3.1 Configure limit 1						
271	Monitoring	4200	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
272	Monitored analog input	4206	UNSIGNED 16	Battery voltage AnalogIn1 AnalogIn2 ECUSPN110 ECUSPN100 ECUSPN190	AnalogIn1	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190
273	Limit	4205	INTEGER 16	-32000 to +32000	+00100		
274	Delay	4207	UNSIGNED 16	00.02 to 99.99 s	01.00 s		
275	Monitoring at	4204	UNSIGNED 16	Overrun / Underrun	Underrun	☐ O / ☐ U	☐ O / ☐ U
276	Alarm class	4201	UNSIGNED 16	A/B/C/D/E/F/Control	B		
277	Self acknowledge	4202	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
278	Delayed by engine speed	4203	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
279	Hysteresis	4216	UNSIGNED 16	000	001		
280	Description	4208	Text/16	user-defined	Flexible Limit 1		
	9.3.2 Configure limit 2						
271	Monitoring	4217	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
272	Monitored analog input	4223	UNSIGNED 16	Battery voltage AnalogIn1 AnalogIn2 ECUSPN110 ECUSPN100 ECUSPN190	AnalogIn1	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190
273	Limit	4222	INTEGER 16	-32000 to +32000	+00100		
274	Delay	4224	UNSIGNED 16	00.02 to 99.99 s	01.00 s		
275	Monitoring at	4221	UNSIGNED 16	Overrun / Underrun	Underrun	☐ O / ☐ U	☐ O / ☐ U
276	Alarm class	4218	UNSIGNED 16	A/B/C/D/E/F/Control	B		
277	Self acknowledge	4219	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
278	Delayed by engine speed	4220	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
279	Hysteresis	4233	UNSIGNED 16	000	001		
280	Description	4225	Text/16	user-defined	Flexible Limit 2		
	9.3.3 Configure limit 3						
271	Monitoring	4234	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
272	Monitored analog input	4240	UNSIGNED 16	Battery voltage AnalogIn1 AnalogIn2 ECUSPN110 ECUSPN100 ECUSPN190	AnalogIn2	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190
273	Limit	4239	INTEGER 16	-32000 to +32000	+00100		
274	Delay	4241	UNSIGNED 16	00.02 to 99.99 s	01.00 s		
275	Monitoring at	4238	UNSIGNED 16	Overrun / Underrun	Underrun	☐ O / ☐ U	☐ O / ☐ U
276	Alarm class	4235	UNSIGNED 16	A/B/C/D/E/F/Control	B		
277	Self acknowledge	4236	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
278	Delayed by engine speed	4237	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
279	Hysteresis	4250	UNSIGNED 16	000	001		
280	Description	4242	Text/16	user-defined	Flexible Limit 3		
	9.3.4 Configure limit 4						
271	Monitoring	4251	UNSIGNED 16	ON/OFF	ON	☐ 1 ☐ 0	☐ 1 ☐ 0
272	Monitored analog input	4257	UNSIGNED 16	Battery voltage AnalogIn1 AnalogIn2 ECUSPN110 ECUSPN100 ECUSPN190	AnalogIn2	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190	☐ Battery ☐ AnIn1 ☐ AnIn2 ☐ SPN110 ☐ SPN100 ☐ SPN190
273	Limit	4256	INTEGER 16	-32000 to +32000	+00100		
274	Delay	4258	UNSIGNED 16	00.02 to 99.99 s	01.00 s		
275	Monitoring at	4255	UNSIGNED 16	Overrun / Underrun	Underrun	☐ O / ☐ U	☐ O / ☐ U
276	Alarm class	4252	UNSIGNED 16	A/B/C/D/E/F/Control	B		
277	Self acknowledge	4253	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
278	Delayed by engine speed	4254	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
279	Hysteresis	4267	UNSIGNED 16	000	001		
280	Description	4259	Text/16	user-defined	Flexible Limit 4		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
9 ANALOG INPUTS (*FlexIn*)							
	9.4 Define Table A						
281	X-value 1	3560	UNSIGNED 16	0 to 100 %	2 %		
282	Y-value 1	3550	INTEGER 16	-9999 to 9999	0		
281	X-value 2	3561	UNSIGNED 16	0 to 100 %	8 %		
282	Y-value 2	3551	INTEGER 16	-9999 to 9999	207		
281	X-value 3	3562	UNSIGNED 16	0 to 100 %	16 %		
282	Y-value 3	3552	INTEGER 16	-9999 to 9999	512		
281	X-value 4	3563	UNSIGNED 16	0 to 100 %	24 %		
282	Y-value 4	3553	INTEGER 16	-9999 to 9999	838		
281	X-value 5	3564	UNSIGNED 16	0 to 100 %	27 %		
282	Y-value 5	3554	INTEGER 16	-9999 to 9999	970		
281	X-value 6	3565	UNSIGNED 16	0 to 100 %	31 %		
282	Y-value 6	3555	INTEGER 16	-9999 to 9999	1160		
281	X-value 7	3566	UNSIGNED 16	0 to 100 %	36 %		
282	Y-value 7	3556	INTEGER 16	-9999 to 9999	1409		
281	X-value 8	3567	UNSIGNED 16	0 to 100 %	37 %		
282	Y-value 8	3557	INTEGER 16	-9999 to 9999	1461		
281	X-value 9	3568	UNSIGNED 16	0 to 100 %	41 %		
282	Y-value 9	3558	INTEGER 16	-9999 to 9999	1600		
	9.5 Define Table B						
281	X-value 1	3610	UNSIGNED 16	0 to 100 %	4 %		
282	Y-value 1	3600	INTEGER 16	-9999 to 9999	2553		
281	X-value 2	3611	UNSIGNED 16	0 to 100 %	6 %		
282	Y-value 2	3601	INTEGER 16	-9999 to 9999	2288		
281	X-value 3	3612	UNSIGNED 16	0 to 100 %	8 %		
282	Y-value 3	3602	INTEGER 16	-9999 to 9999	2100		
281	X-value 4	3613	UNSIGNED 16	0 to 100 %	13 %		
282	Y-value 4	3603	INTEGER 16	-9999 to 9999	1802		
281	X-value 5	3614	UNSIGNED 16	0 to 100 %	16 %		
282	Y-value 5	3604	INTEGER 16	-9999 to 9999	1685		
281	X-value 6	3615	UNSIGNED 16	0 to 100 %	23 %		
282	Y-value 6	3605	INTEGER 16	-9999 to 9999	1488		
281	X-value 7	3616	UNSIGNED 16	0 to 100 %	28 %		
282	Y-value 7	3606	INTEGER 16	-9999 to 9999	1382		
281	X-value 8	3617	UNSIGNED 16	0 to 100 %	42 %		
282	Y-value 8	3607	INTEGER 16	-9999 to 9999	1188		
281	X-value 9	3618	UNSIGNED 16	0 to 100 %	58 %		
282	Y-value 9	3608	INTEGER 16	-9999 to 9999	1035		

10 CONFIGURE COUNTERS							
283	Maintenance hours	2550	UNSIGNED 16	0 to 9999 h	300 h		
284	Maintenance days	2551	UNSIGNED 16	0 to 999 days	365 days		
285	Reset maintenance period h	2562	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
286	Reset maintenance period days	2563	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
287	Code level for reset maintenance	2567	UNSIGNED 16	0 to 3	3		
288	Counter value preset	2515	UNSIGNED 16	0 to 99999999	00000000		
289	Set operation hours in 0.00h	2554	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
290	Set counter free adj in 0.00h	2572	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
291	Set active energy in 0.00MWh	2510	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
292	Set reactive energy in 0.00Mvarh	2511	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
293	Counter value preset	2541	UNSIGNED 16	0 to 65535	00000		
294	Set number of starts	2542	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
297	Hours counter free adjustable	2570	UNSIGNED 16	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
11	***LogicsManager***						
	11.1 Limit switch						
296	Gen. load limit 1	4001	UNSIGNED 16	0.0 to 200.0 %	80.0 %		
297	Gen. load limit 2	4002	UNSIGNED 16	0.0 to 200.0 %	90.0 %		
298	Gen. load hysteresis	4000	UNSIGNED 16	0.0 to 100.0 %	5.0 %		
299	Mains load limit 1	4011	INTEGER 16	-999.9 to 999.9 %	80.0 %		
300	Mains load limit 2	4012	INTEGER 16	-999.9 to 999.9 %	90.0 %		
301	Mains load hysteresis	4010	UNSIGNED 16	0.0 to 100.0 %	5.0 %		
	11.2 Internal Flags						
302	Flag 1	12230	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 2	12240	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 3	12250	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 4	12260	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 5	12270	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 6	12280	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 7	12290	Logman	refer to *LogicsManager* chapter starting page 164; default: (0 & 1) & 1			
302	Flag 8	12300	Logman	refer to *LogicsManager* chap. start. p. 164; def.: (11.01 & !11.02) & 11.03			
	11.3 Set Timers						
303	Setpoint 1: Hour	1652	UNSIGNED 8	0 to 23 h	8 h		
304	Setpoint 1: Minute	1651	UNSIGNED 8	0 to 59 min	0 min		
305	Setpoint 1: Second	1650	UNSIGNED 8	0 to 59 s	0 s		
303	Setpoint 2: Hour	1657	UNSIGNED 8	0 to 23 h	17 h		
304	Setpoint 2: Minute	1656	UNSIGNED 8	0 to 59 min	0 min		
305	Setpoint 2: Second	1655	UNSIGNED 8	0 to 59 s	0 s		
306	Active day	1663	UNSIGNED 8	1 to 31	1		
307	Active hour	1662	UNSIGNED 8	0 to 23 h	12 h		
308	Active minute	1661	UNSIGNED 8	0 to 59 min	0 min		
309	Active second	1660	UNSIGNED 8	0 to 59 s	0 s		
310	Monday active	1670	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
310	Tuesday active	1671	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
310	Wednesday active	1672	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
310	Thursday active	1673	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
310	Friday active	1674	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
310	Saturday active	1675	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
310	Sunday active	1676	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N

12	**COMMUNICATION INTERFACES**						
311	Device number	1702	UNSIGNED 16	1 to 127	1		
	12.1 CAN Interfaces						
312	Protocol	3155	UNSIGNED 16	OFF CANopen LeoPC	CANopen	☐ OFF ☐ CANop. ☐ LeoPC	☐ OFF ☐ CANop. ☐ LeoPC
313	Baudrate	3156	UNSIGNED 16	20/50/100/125/250/500/ 800/1000 kBd	125 kBd		

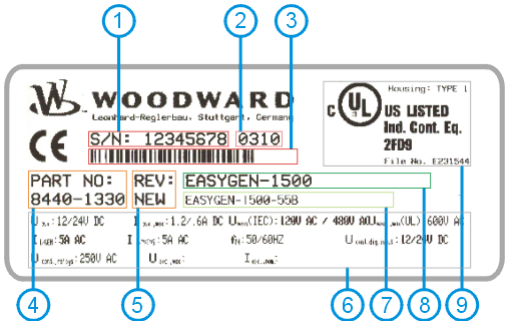
No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
12 COMMUNICATION INTERFACES							
	12.1.1 CANopen			Refer to manual 37393 for 'CAN bus' parameter settings			
	CAN-Open Master	8993	UNSIGNED 16	YES/NO	YES	☐ Y ☐ N	☐ Y ☐ N
	Producer Heartbeat Time	9120	UNSIGNED 16	20 to 65530 ms	2000 ms		
	COB-ID SYNC Message	9100	UNSIGNED 32	1 to 4294967295	128		
	Max. answer time ext. devices	9010	UNSIGNED 16	0,1 to 9,9 s	3,0 s		
	Time re-init. ext. devices	9009	UNSIGNED 16	0 to 9999 s	10 s		
	12.1.1.1 Additional S-SDO						
	2nd Client->Server COB-ID (rx)	9020	UNSIGNED 32	1 to 4294967295	0x80000601		
	2nd Server->Client COB-ID (tx)	9022	UNSIGNED 32	1 to 4294967295	0x80000581		
	3rd Client->Server COB-ID (rx)	9024	UNSIGNED 32	1 to 4294967295	0x80000602		
	3rd Server->Client COB-ID (tx)	9026	UNSIGNED 32	1 to 4294967295	0x80000582		
	4th Client->Server COB-ID (rx)	9028	UNSIGNED 32	1 to 4294967295	0x80000603		
	4th Server->Client COB-ID (tx)	9030	UNSIGNED 32	1 to 4294967295	0x80000583		
	5th Client->Server COB-ID (rx)	9032	UNSIGNED 32	1 to 4294967295	0x80000604		
	5th Server->Client COB-ID (tx)	9034	UNSIGNED 32	1 to 4294967295	0x80000584		
	12.1.1.2 CAN OPEN RPDO 1						
	COB-ID	9300	UNSIGNED 32	1 to 4294967295	513		
	Function	9050	UNSIGNED 16	no func. 1st IKD / 2nd IKD BK 16DIDO/Co 16DIDO	no func.		
	Node-ID of the device	9060	UNSIGNED 16	1 to 127	2		
	RPDO-COB-ID ext. device 1	9070	UNSIGNED 32	1 to 4294967295	385		
	12.1.1.3 CAN OPEN RPDO 2						
	COB-ID	9310	UNSIGNED 32	1 to 4294967295	514		
	Function	9051	UNSIGNED 16	no func. 1st IKD / 2nd IKD	no func.		
	Node-ID of the device	9061	UNSIGNED 16	1 to 127	3		
	RPDO-COB-ID ext. device 2	9072	UNSIGNED 32	1 to 4294967295	386		
	12.1.1.5 CAN OPEN TPDO 1						
	COB-ID	9600	UNSIGNED 32	1 to 4294967295	385		
	Transmission type	9602	UNSIGNED 16	0 to 255	255		
	Event-timer	9604	UNSIGNED 16	20 to 65000 ms	20 ms		
	Number of mapped objects	9609	UNSIGNED 8	0 to 4	4		
	1.Mapped Object	9605	UNSIGNED 16	0 to 65535	8001		
	2.Mapped Object	9606	UNSIGNED 16	0 to 65535	8000		
	3.Mapped Object	9607	UNSIGNED 16	0 to 65535	8000		
	4.Mapped Object	9608	UNSIGNED 16	0 to 65535	8000		
	12.1.1.6 CAN OPEN TPDO 2						
	COB-ID	9610	UNSIGNED 32	1 to 4294967295	386		
	Transmission type	9612	UNSIGNED 16	0 to 255	255		
	Event-timer	9614	UNSIGNED 16	20 to 65000 ms	20 ms		
	Number of mapped objects	9619	UNSIGNED 8	0 to 4	4		
	1.Mapped Object	9615	UNSIGNED 16	0 to 65535	8002		
	2.Mapped Object	9616	UNSIGNED 16	0 to 65535	8000		
	3.Mapped Object	9617	UNSIGNED 16	0 to 65535	8000		
	4.Mapped Object	9618	UNSIGNED 16	0 to 65535	8000		
	12.1.1.7 CAN OPEN TPDO 3						
	COB-ID	9620	UNSIGNED 32	1 to 4294967295	897		
	Transmission type	9622	UNSIGNED 16	0 to 255	255		
	Event-timer	9624	UNSIGNED 16	20 to 65000 ms	20 ms		
	Number of mapped objects	9629	UNSIGNED 8	0 to 4	1		
	1.Mapped Object	9625	UNSIGNED 16	0 to 65535	15601		
	2.Mapped Object	9626	UNSIGNED 16	0 to 65535	0		
	3.Mapped Object	9627	UNSIGNED 16	0 to 65535	0		
	4.Mapped Object	9628	UNSIGNED 16	0 to 65535	0		
	12.1.1.8 CAN OPEN TPDO 4						
	COB-ID	9630	UNSIGNED 32	1 to 4294967295	1153		
	Transmission type	9632	UNSIGNED 16	0 to 255	255		
	Event-timer	9634	UNSIGNED 16	20 to 65000 ms	20 ms		
	Number of mapped objects	9639	UNSIGNED 8	0 to 4	1		
	1.Mapped Object	9635	UNSIGNED 16	0 to 65535	3190		
	2.Mapped Object	9636	UNSIGNED 16	0 to 65535	0		
	3.Mapped Object	9637	UNSIGNED 16	0 to 65535	0		
	4.Mapped Object	9638	UNSIGNED 16	0 to 65535	0		

No.	Parameter	Index	Data type	Setting range	Default value	Customer setting	
12 COMMUNICATION INTERFACES							
	12.1.2 J1939						
339	Device type	15102	UNSIGNED 16	Off Standard S6 Scania EMR EMS2 ADEC SISU EEM	Off	☐ Off ☐ Standard ☐ S6Scania ☐ EMR ☐ EMS2 ☐ ADEC ☐ SISU	☐ Off ☐ Standard ☐ S6Scania ☐ EMR ☐ EMS2 ☐ ADEC ☐ SISU
340	Request send address	15101	UNSIGNED 16	0 to 255	3		
341	Receive device number	15100	UNSIGNED 16	0 to 255	0		
342	Reset prev. active DTCs DM3	15104	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
343	SPN version	15103	UNSIGNED 16	Version 1/2/3	Version 1	☐ V1 ☐ V2 ☐ V3	☐ V1 ☐ V2 ☐ V3
344	ECU remote controlled	15127	UNSIGNED 16	ON/OFF	OFF	☐ ON ☐ OFF	☐ ON ☐ OFF
345	ECU set droop mode	15128	UNSIGNED 16	ON/OFF	OFF	☐ ON ☐ OFF	☐ ON ☐ OFF
346	Frequency offset ECU	15131	UNSIGNED 16	OFF / AnalogIn1 / AanalogIn2	OFF	☐ OFF ☐ AI1 ☐ AI2	☐ OFF ☐ AI1 ☐ AI2
	12.2 Serial Interfaces						
347	Baudrate	3163	UNSIGNED 16	2400/4800/9600 Bd / 14.4/19.2/38.4/56/115 kBd	9,600 Bd		
348	Parity	3161	UNSIGNED 16	None/even/odd	None		
349	Stop Bits	3162	UNSIGNED 16	one/two	one		
350	ModBus Slave ID	3185	UNSIGNED 16	0 to 255	0		
351	Modbus Reply delay time	3186	UNSIGNED 16	0.00 to 0.20 s	0.00 s		

13 SYSTEM							
	13.1 Codes						
352	Code level CAN port	10407	UNSIGNED 16	Info	---		
353	Code level serial port / DPC	10406	UNSIGNED 16	Info	---		
354	Commissioning level code	10413	UNSIGNED 16	0000 to 9999	---		
355	Temp. commissioning level code	10414	UNSIGNED 16	0000 to 9999	---		
356	Basic level code	10415	UNSIGNED 16	0000 to 9999	---		
357	Clear event log	1706	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
358	Factory settings DPC/RS232	1704	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
359	Factory settings CAN	1705	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
360	Set default values	1701	UNSIGNED 16	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
361	Start Bootloader	10500	UNSIGNED 16	00000 to 99999			
	13.2 Clock Set						
362	Hours	1710	UNSIGNED 8	0 to 23 h	---		
363	Minutes	1709	UNSIGNED 8	0 to 59 min	---		
364	Seconds	1708	UNSIGNED 8	0 to 59 s	---		
365	Day	1711	UNSIGNED 8	1 to 31	---		
366	Month	1712	UNSIGNED 8	1 to 12	---		
367	Year	1713	UNSIGNED 8	0 to 99	---		
	13.3 Versions						
368	Serial number	910	Text/20	Info	---		
369	Boot item number	950	Text/12	Info	---		
370	Boot revision	960	Text/4	Info	---		
371	Boot version	965	Text/8	Info	---		
372	Program item number	930	Text/12	Info	---		
373	Program revision	940	Text/4	Info	---		
374	Program version	945	Text/4	Info	---		

Appendix G.
Technical Data

Nameplate



1	S/N	Serial number (numerical)
2	S/N	Date of production (YYMM)
3	S/N	Serial number (Barcode)
4	P/N	Part number
5	REV	Part revision number
6	Details	Technical data
7	Type	Description (short)
8	Type	Description (long)
9	UL	UL sign

Measuring values, voltages ---------- ⅄/Δ

- Measuring voltages

100 V

Rated value (V_{rated}) ..... 69/120 Vac
Maximum value (V_{max}) ..... max. 86/150 Vac
Rated voltage phase – ground ..... 150 Vac
Rated surge voltage ..... 2.5 kV

400 V

Rated value (V_{rated}) ..... 277/480 Vac
Maximum value (V_{max}) ..... max. 346/600 Vac
Rated voltage phase – ground ..... 300 Vac
Rated surge voltage ..... 4.0 kV

- Linear measuring range: 1.25 × V_{rated}
- Measuring frequency: 50/60 Hz (40.0 to 70.0 Hz)
- Accuracy: Class 1
- Input resistance per path: **100 V** ..... 0.498 MΩ; **400 V** ..... 2.0 MΩ
- Maximum power consumption per path ..... < 0.15 W

Measuring values, currents ---------- isolated

- Measuring current: **[1]** Rated value (I_{rated}) ..../1 A; **[5]** Rated value (I_{rated}) ..../5 A
- Accuracy ..... Class 1
- Linear measuring range: Generator (terminals 5-8) ..... 3.0 × I_{rated}; Mains/ground current (terminals 1/2) approx. 1.5 × I_{rated}
- Maximum power consumption per path ..... < 0.15 VA
- Rated short-time current (1 s): **[1]** ..... 50.0 × I_{rated}; **[5]** ..... 10.0 × I_{rated}

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

- Power supply ..... 12/24 Vdc (6.5 to 40.0 Vdc)
  Battery ground (terminal 48) must be grounded to the chassis
- Intrinsic consumption ..... max. 15 W
- Degree of pollution 2

Discrete inputs ---------- isolated

- Input range (VCont, digital input).....Rated voltage 12/24 Vdc (6.5 to 40.0 Vdc)
- Input resistance .....approx. 6.7 kΩ

Relay outputs ---------- potential free

- Contact material ..... AgCdO
- General purpose (GP) (VCont, relay output)

  AC..... 2.00 Aac@250 Vac
  DC.....2.00 Adc@24 Vdc
  0.36 Adc@125 Vdc
  0.18 Adc@250 Vdc

- Pilot duty (PD) ($V_{Cont, relay output}$)

  AC.....B300
  DC.....1.00 Adc@24 Vdc
  0.22 Adc@125 Vdc
  0.10 Adc@250 Vdc

Analog inputs ---------- freely scaleable

- Resolution .....10 Bit
- 0/4 to 20 mA input .....internal load 50 Ω
- 0 to 180/380 Ω input ..... load current ≤ 2.3 mA
- Accuracy solely two-pole sensors..... ≤ 1%
  single-pole sensors..... ≤ 2.5%

Magnetic Pickup Input ---------- capacitive decoupled

- Input impedance..... min. approx. 17 kΩ
- Input voltage ..... refer to manual 37390, section Pickup

Interface ----------

Service interface
- Version RS-232
- Signal level 5V
  Level conversion and insulation by using DPC (P/N 5417-557)

CAN bus interface isolated
- Insulation voltage ..... 1,500 Vdc
- Version ..... CAN bus
- Internal line termination ..... Not available

Battery ----------
- Type ..... NiCd
- Durability (at operation without power supply) ..... approx. 5 years
- Battery field replacement ..... not possible

Housing ----------
- Type ..... APRANORM DIN 43 700
- Dimensions (W × H × D) ..... 192 × 144 × 64 mm
- Front cutout (W × H) ..... 186 [+1.1] × 138 [+1.0] mm
- Wiring ..... screw-plug-terminals 2.5 mm²
- Recommended locked torque ..... 4 inch pounds / 0.5 Nm
  use 60/75 °C copper wire only
  use class 1 wire only or equivalent
- Weight ..... approx. 800 g

Protection ----------
- Protection system ..... IP42 from front with proper installation
  IP54 from front with gasket (gasket: P/N 8923-1043)
  IP20 from back
- Front folio ..... insulating surface
- EMC test (CE) ..... tested according to applicable EN guidelines
- Listings ..... CE marking; UL listing for ordinary locations
- Type approval ..... UL/cUL listed, Ordinary Locations, File No.: 231544

Appendix H.
Environmental Data

Dynamics ----------

- Frequency Range – Sine Sweep ..... 5Hz to 150Hz
  - Acceleration 4G
- Frequency Range - Random ..... 10Hz to 500Hz
  - Power Intensity 0,015G²/Hz
  - RMS Value ..... 1,04 Grms
- Standards .....

EN 60255-21-1 (EN 60068-2-6, Fc)
EN 60255-21-3
Lloyd's Register, Vibration Test2
SAEJ1455 Chasis Data
MIL-STD 810F, M514.5A, Cat.4,
Truck/Trailer tracked-restrained
cargo, Fig. 514.5-C1

Shock ----------

- Shock ..... 40G, saw tooth pulse, 11ms
- Standards .....

EN 60255-21-2
MIL-STD 810F, M516.5, Procedure 1

Temperature ----------

- Cold, Dry Heat (storage) ..... -30°C (-22°F) / 80°C (176°F)
- Cold, Dry Heat (operating) ..... -20°C (-4°F) / 70 °C (158°F)
- Standards .....

IEC 60068-2-2, Test Bb and Bd
IEC 60068-2-1, Test Ab and Ad

Humidity----------

- Humidity ..... 60°C, 95% RH, 5 days
- Standards .....

IEC 60068-2-30, Test Db

Marine Environmental Categories ----------

- Bureau Veritas (BV) 33
- Det Norske Veritas (DNV) .....

Temperature Class: ..... B
Vibration Class: ..... B
Humidity Class: ..... B

- Germanischer Lloyd (GL) ..... Environmental Class D
- Lloyd's Register of Shipping (LRS) ..... ENV1, ENV2, ENV3 und ENV4

Appendix I.
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 (0) 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 (0) 711 789 54-0 for instructions and for a Return Authorization Number.

Replacement Parts

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

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

How To Contact Woodward

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

Woodward GmbH
Handwerkstrasse 29
70565 Stuttgart - Germany

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

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

Facility	Phone number
USA	+1 (970) 482 5811
India	+91 (129) 4097100
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: stgt-documentation@woodward.com

Please include the manual number from the front cover of this publication.

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Homepage

http://www.woodward.com/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).

2011/06/Stuttgart