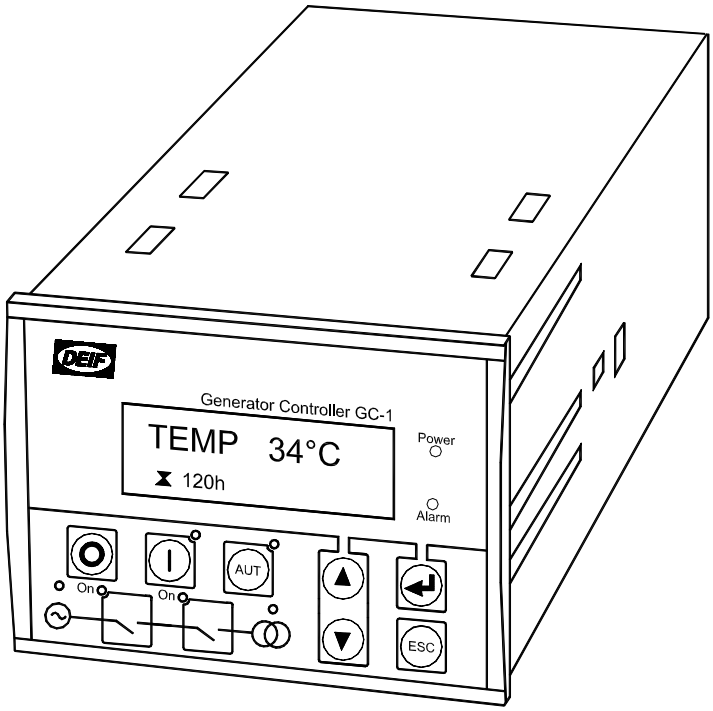
DEIF A/S

Description of options

Option B3, Automatic Mains Failure Generator Controller GC-1

4189340406C
SW 1.4X.X



- *Description of option*
- *Functional descriptions*

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1. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the engine set. If there is any doubt about how to install or operate the engine/generator controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Factory settings

The unit is delivered with certain factory settings. Given the fact that these settings are based on average values, they are not necessarily the correct settings for matching the individual engine/generator. Thus precautions must be taken to check the settings before running the engine.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

The notes provide general information, which will be helpful for the reader to bear in mind.

Warnings

The warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

2. Description of option

This document describes the functionality of AC voltage measurement and function contained in option B3.

ANSI numbers

Function	ANSI no.
3-phase AC voltage measurement, 50-480V AC, 50/60Hz	-
3-phase over- and undervoltage failure	27/59
3-phase over- and underfrequency failure	81

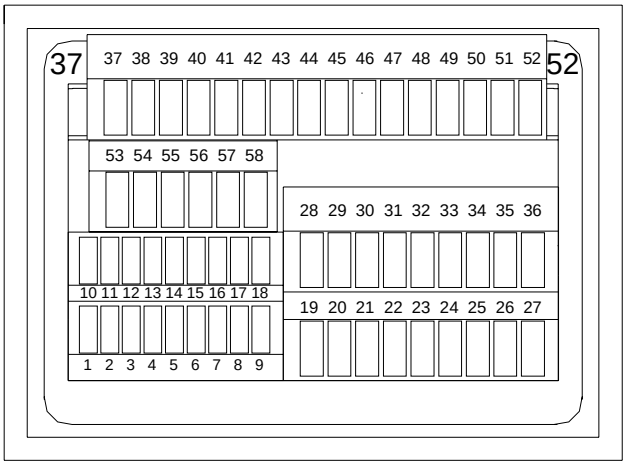
Option B3

Option B3 is a software and hardware option, which means that the front foil will have to be changed. The basic GC-1 generator controller unit can be equipped with option B3. With option B3 the GC-1 will function as a real emergency power system controller. The mains (busbar) is supervised, and if a fault (voltage/frequency) is detected, then a disconnection signal will be sent to the mains breaker. At the same time the start sequence for the generator is initiated. When the generator voltage is within the limits, a signal will be transmitted to close the generator breaker. When the mains returns and the mains OK timer is expired, then the generator breaker will open and the mains breaker is closed.

3. Hardware

Terminals

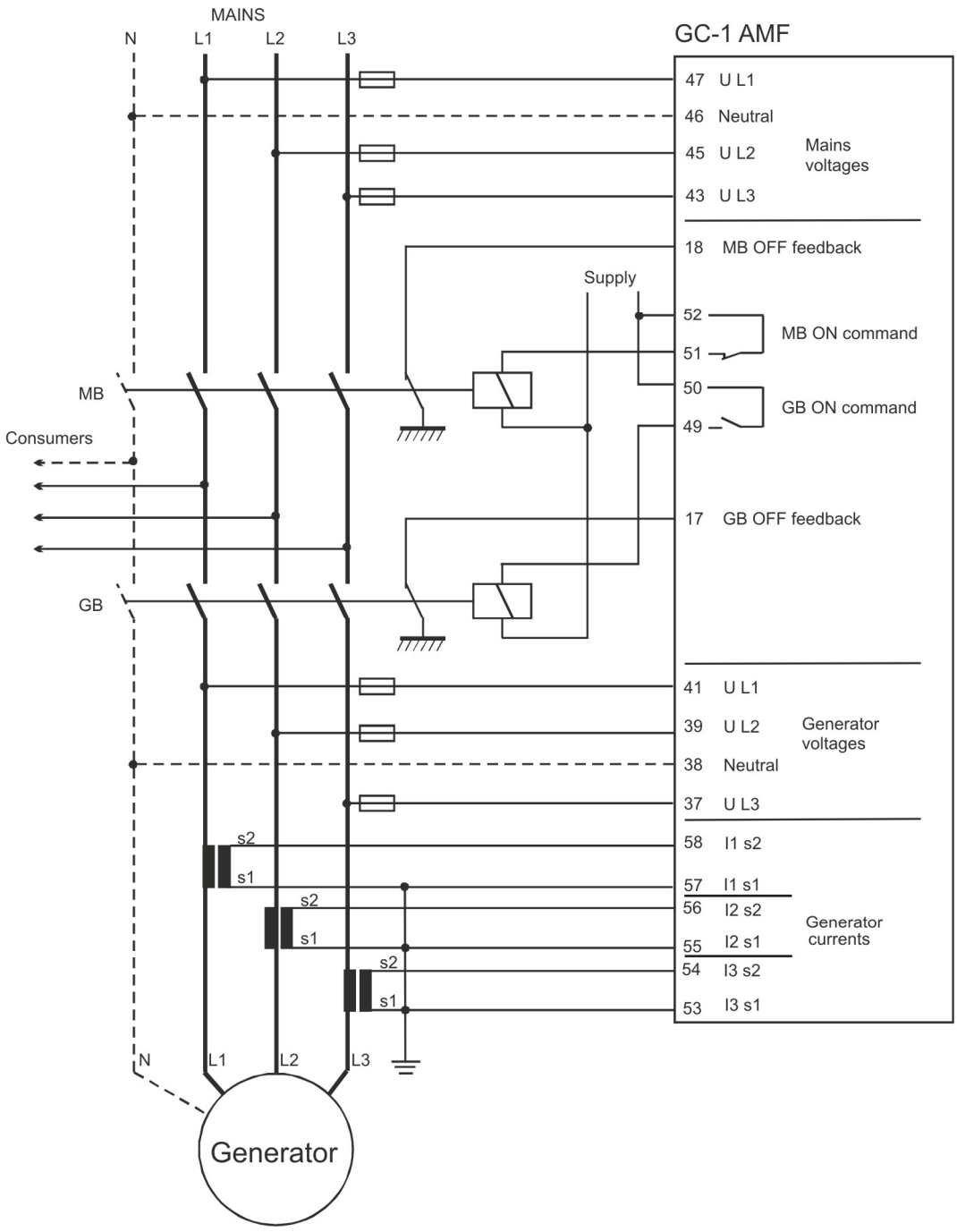
The AC voltage inputs are placed on terminals 43-47. Mains breaker control relay output is placed on terminals 51 and 52.



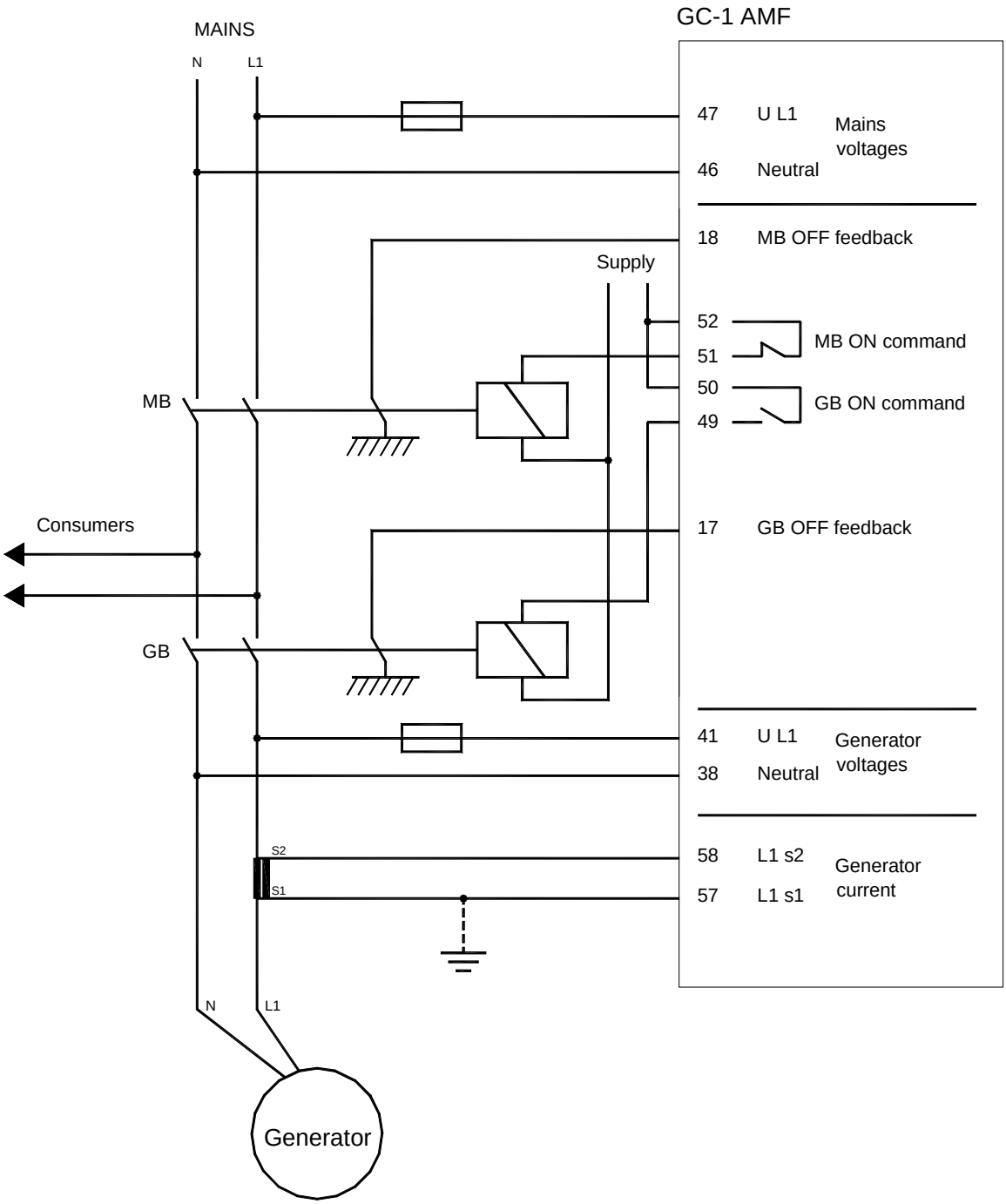
Unit rear view

AMF control		
43	Mains L3 voltage	Voltage range 50-480V AC Ph-Ph value
45	Mains L2 voltage	
46	Mains neutral voltage	
47	Mains L1 voltage	
51-52	Mains breaker control relay, 2A 30V DC/V AC	Function NC (normally closed). Not configurable

Wiring 3-phased

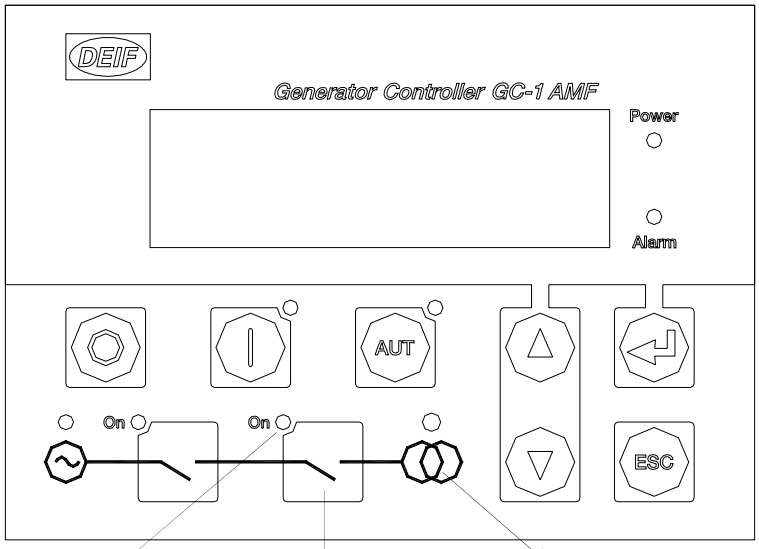


Wiring 1-phased



Push-buttons and LEDs

The display for option B3 includes 1 extra push-button and 2 LEDs.



ON: LED is on (green), if MB is closed.
LED is off, if MB is open.

MAINS PRESENT: LED is on (green), if mains is present and within limits.
MAINS FAILURE: LED is on (red), when the mains failure occurs.
Starts flashing (green), when mains restores. LED keeps flashing (green), until "Mains OK delay" time runs out.

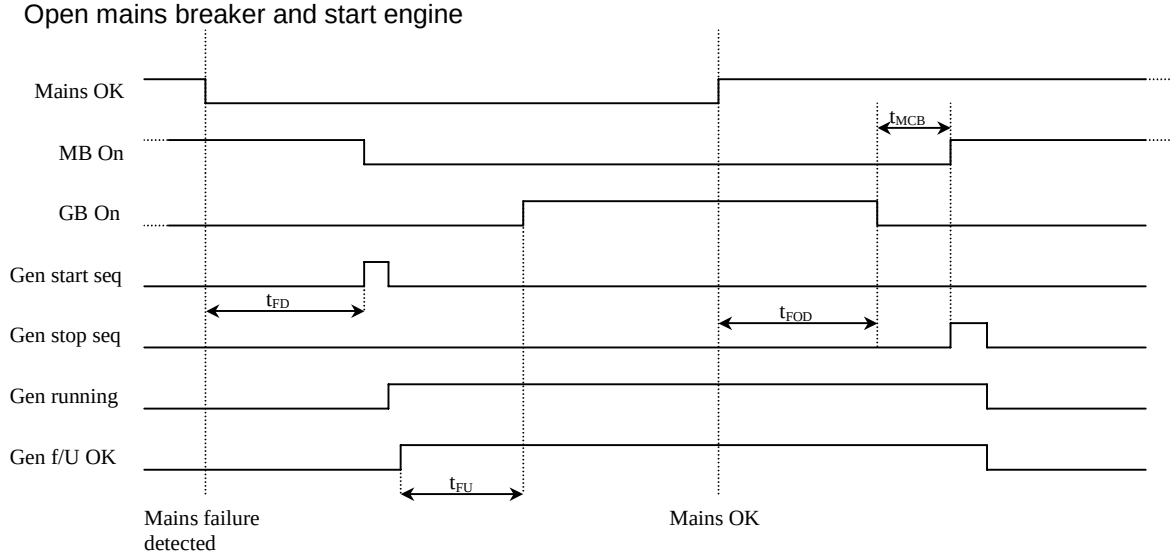
Manual open/close of the mains breaker.
Only possible if MANUAL is selected.

For general information about the display push-buttons and LEDs, please see the Installation Instructions and Reference Handbook.

4. Functional descriptions

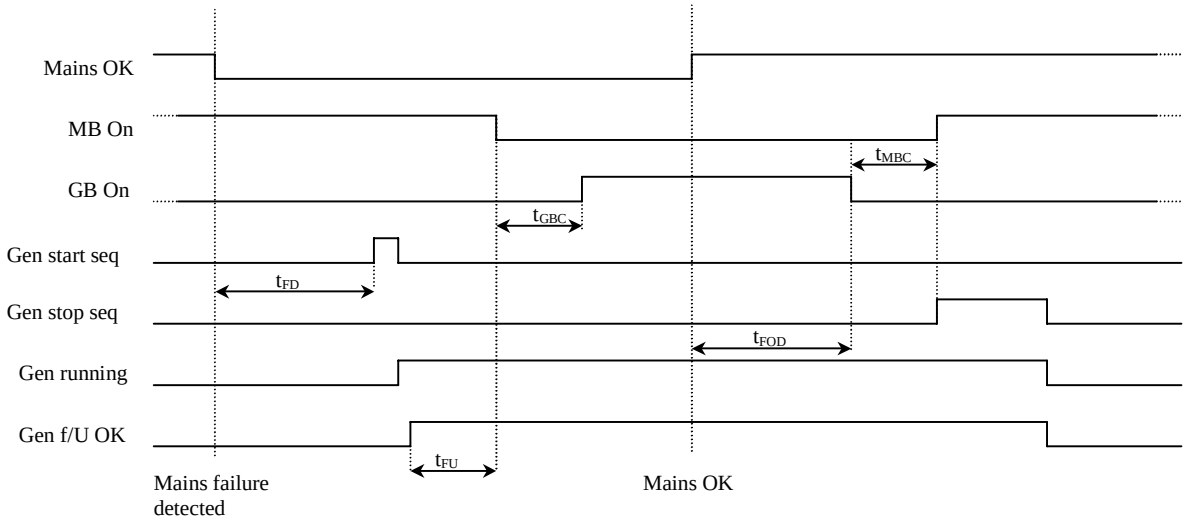
Mains fail timing sequence

Open mains breaker and start engine



Mains fail timing sequence

Start engine and open mains breaker



Timer explanation

Timer	Description
t_{FD}	Mains failure delay See 4423 and 4433
t_{FU}	Frequency/voltage OK See 4380
t_{FOD}	Mains failure OK delay See 4422 and 4432
t_{GBC}	GB ON delay See 4451
t_{MBC}	MB ON delay See 4442

ON and OFF sequences

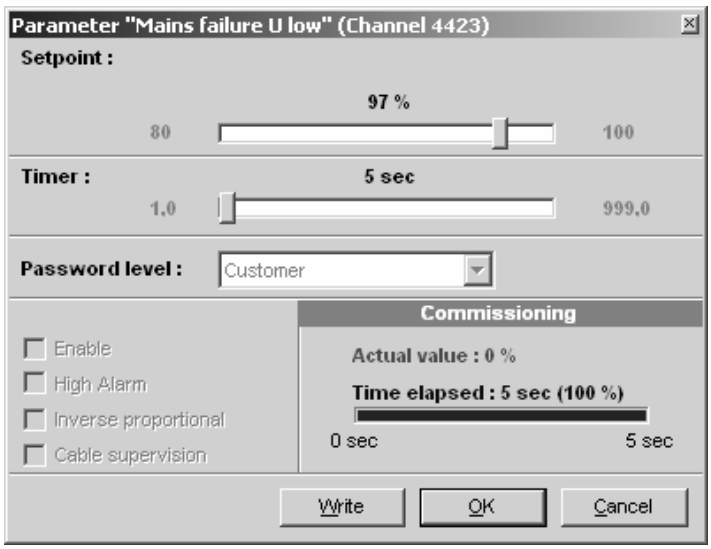
Conditions for breaker operations	
Sequence	**Condition**
GB ON, direct closing	Running feedback Generator frequency/voltage OK MB open
MB ON, direct closing	Mains frequency/voltage OK GB open
GB OFF, direct opening	Shutdown Trip GB alarms
MB OFF, direct opening	Mains failure

Mains failure control set Start engine + open MB
If the generator fails to start or the generator breaker fails to close and the mains is OK, the mains "ok u" and mains "ok f" timer must expire, before the mains breaker is closed.

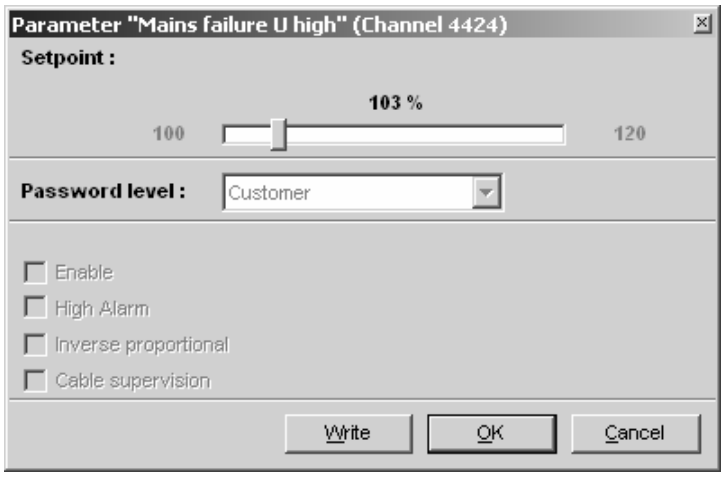
Mains failure control set Start engine
If the generator fails to start or the generator breaker fails to close, the mains breaker is closed.

Configuration

The example below shows the menu for setting the mains failure low voltage:

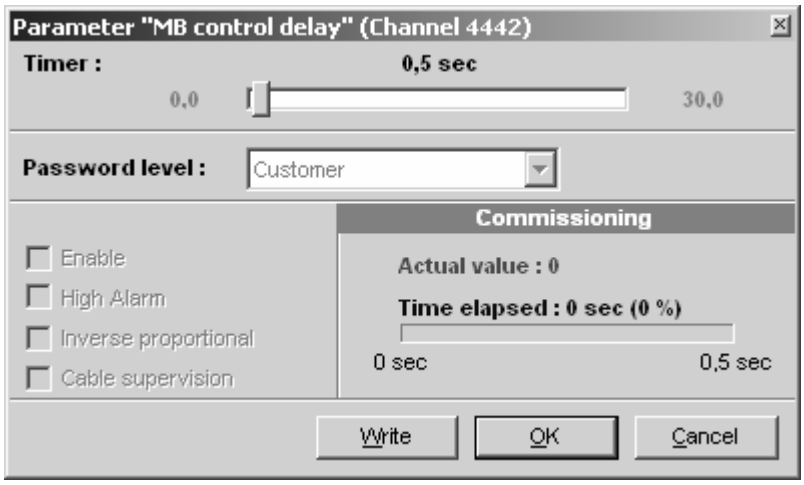


The example below shows the menu for setting the mains failure high voltage:



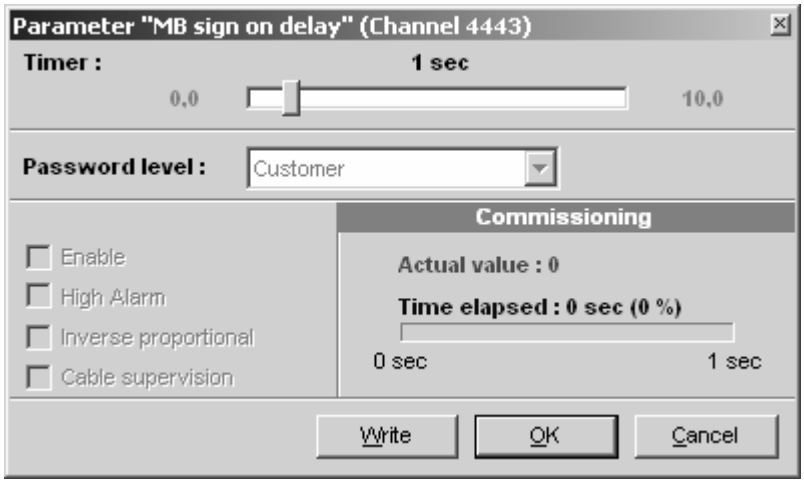
The timer for both low and high voltage set point is set in the menu for low voltage. The same principle is used for the setting of low and high frequency.

The example below shows the MB control delay timer. The delay set is the time between the transmitting of the GB open signal to the transmitting of the MB close signal.


Parameter "MB control delay" (Channel 4442)
Timer :
0,5 sec
0,0
30,0
Password level :
Customer
Commissioning
Enable
High Alarm
Inverse proportional
Cable supervision
Actual value : 0
Time elapsed : 0 sec (0 %)
0 sec
0,5 sec
Write
OK
Cancel

The example below shows the MB sign on delay timer. If the timer expires before the MB is closed, then the alarm will be activated. If no sign signals are used, then the GC-1 will automatically assume that the breaker is closing.

The same principle is used for the GB.



5. Parameter list

The setup of parameters is done via the PC utility software (USW). In the following the settings are presented in tables. Default settings can be changed to the relevant settings.

Settings marked with a * can also be changed using the display.

Parameter table description

The table consists of the following possible adjustments:

Set point: The alarm set point is adjusted in the set point menu. The setting is a percentage of the nominal values.

Timer: The timer setting is the time that must expire from the alarm level is reached until the alarm occurs.

Relay output A: A relay can be activated by output A.

Relay output B: A relay can be activated by output B.

Enable: The alarm can be activated or deactivated. ON means always activated, RUN means that the alarm has run status. This means it is activated, when the running signal is present.

Fail class: When the alarm occurs, the unit will react depending on the selected fail class.

Small differences due to the character of the parameters may exist between the individual tables.

Overview table

1000 Gen-set mode	**4425 Mains failure control**
4060 Transformer mains	**4432 Mains OK frequency**
4120 Counter	**4433 Mains failure frequency**
4422 Mains OK voltage	**4442 Mains breaker control**
4423 Mains failure voltage	**4452 Generator breaker control**

Parameter tables

1000 Gen-set mode

No.	Setting		Min. setting	Max. setting	Factory setting
1000	Gen-set mode		Island	AMF	Island

4060 Transformer mains

No.	Setting		Min. setting	Max. setting	Factory setting
4061	Transformer mains	Primary	50V	25000V	440V
4062	Transformer mains	Secondary	50V	480V	440V

If no voltage transformer is used, the setting 440/440V can be maintained.

4120 Counter

No.	Setting		Min. setting	Max. setting	Factory setting
4123*	Counter	No. of MB operations	0	20000	0

4422 Mains OK voltage

No.	Setting		Min. setting	Max. setting	Factory setting
4422*	Mains OK U	Timer	1.0 s	9900.0 s	60.0 s

4423 Mains failure voltage

No.	Setting		Min. setting	Max. setting	Factory setting
4423*	Mains failure U low	Set point	80%	100%	92%
4423*	Mains failure	Timer	1.0 s	990.0 s	5.0 s
4424*	Mains failure U high	Set point	100%	120%	103%

4425 Mains failure control

No.	Setting		Min. setting	Max. setting	Factory setting
4425	Mains failure control		Start eng. + open MB	Start eng.	Start eng. + open MB

4432 Mains OK frequency

No.	Setting		Min. setting	Max. setting	Factory setting
4432	Mains OK f *	Timer	1.0 s	9900.0 s	60.0 s

4433 Mains failure frequency

No.	Setting		Min. setting	Max. setting	Factory setting
4433	Mains failure f low*	Set point	80%	100%	97%
4433	Mains failure*	Timer	1.0 s	990.0 s	5.0 s
4434	Mains failure f high*	Set point	100%	120%	103%
4435	Mains failure f ON/OFF	Enable	OFF	ON	ON

Parameter 4435 – please see the Designer's Reference Handbook, chapter 'The GC-1 in IT networks' for further information.

4442 Mains breaker control

No.	Setting		Min. setting	Max. setting	Factory setting
4442	MB control delay	Timer	0.0 s	30.0 s	0.5 s
4443	MB sign on delay	Timer	0.0 s	10.0 s	1.0 s
4444	MB sign off delay	Timer	0.0 s	10.0 s	1.0 s

4452 Generator breaker control

No.	Setting		Min. setting	Max. setting	Factory setting
4451	GB control delay	Timer	0.0 s	30.0 s	0.5 s
4452	GB sign on delay	Timer	0.0 s	10.0 s	1.0 s
4453	GB sign off delay	Timer	0.0 s	10.0 s	1.0 s