



-power in control

GC-1F Gen-set Controller DESCRIPTION OF OPTIONS



Option B3 Automatic Mains Failure

- Description of option
- Functional description
- Parameter list



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1. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the gen-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
3-phase voltage unbalance	60

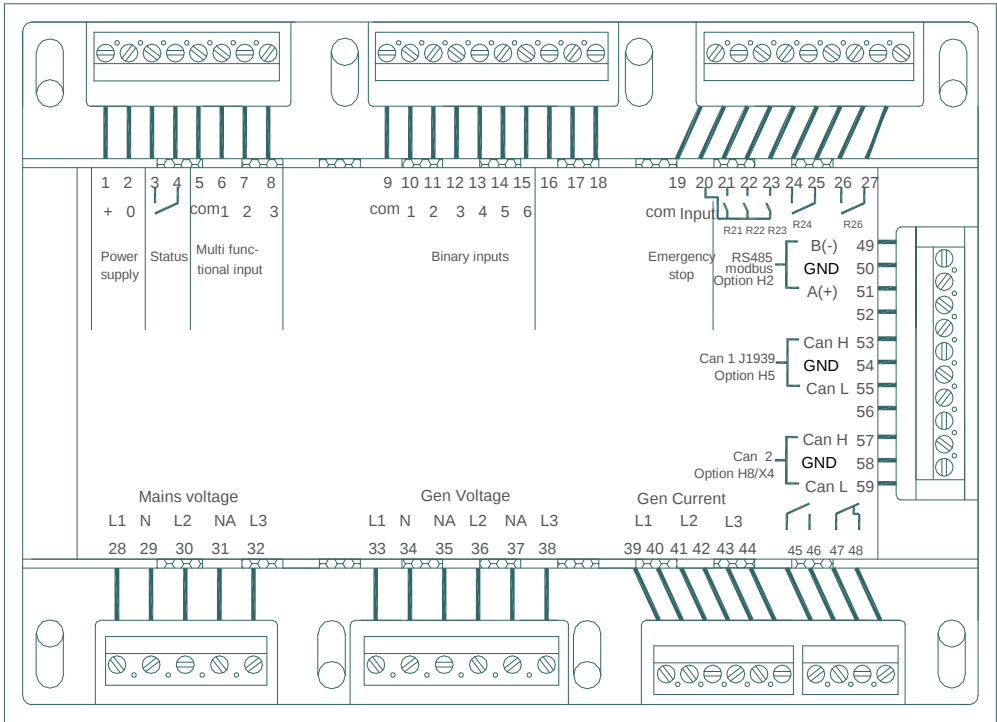
Option B3

Option B3 is a software and hardware option, which means that the front foil will have to be changed. The basic GC-1F gen-set controller unit can be equipped with option B3. With option B3 the GC-1F will function as a real emergency power system controller. The mains (busbar) is supervised, and if a fault (voltage/frequency/unbalanced) 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

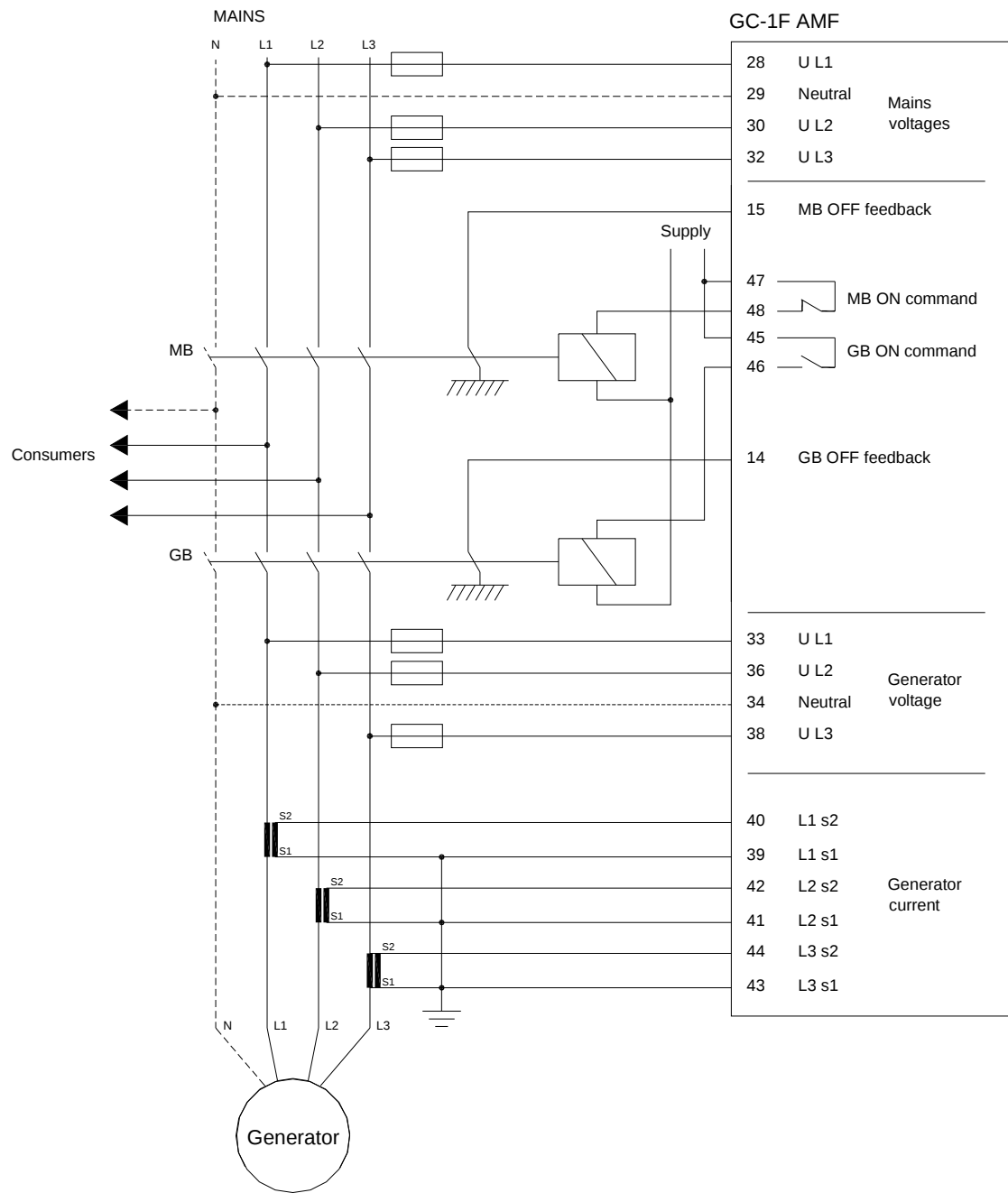
The AC voltage inputs are placed on terminals 28-32. Mains breaker control relay output is placed on terminals 47 and 48.



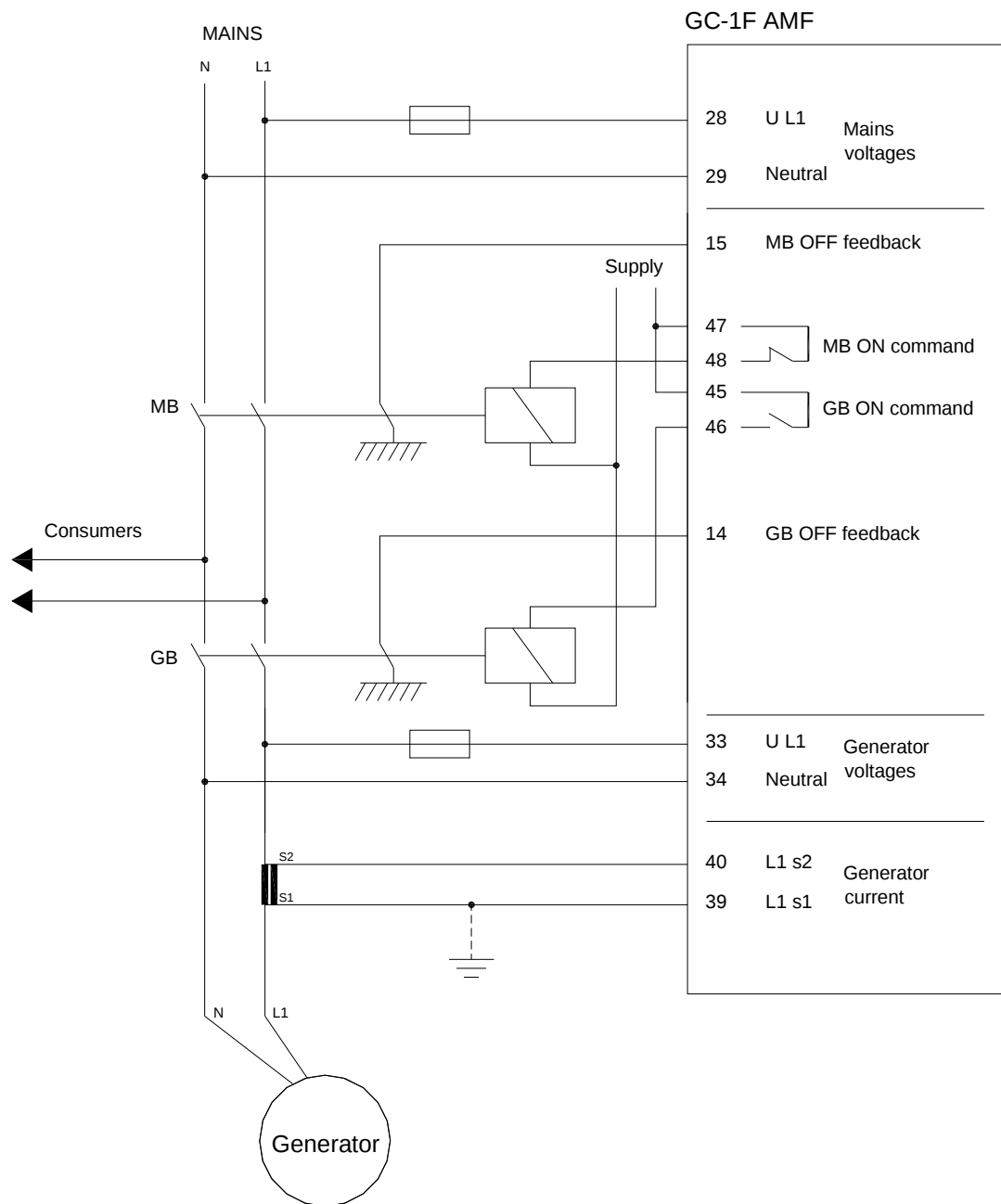
Unit rear view

AMF control		
28	Mains L1 voltage	Voltage range 50-480V AC Ph-Ph value
29	Mains neutral voltage	
30	Mains L2 voltage	
31	Do not connect	
32	Mains L3 voltage	Function NC (normally closed). Configurable
47-48	Mains breaker control relay	

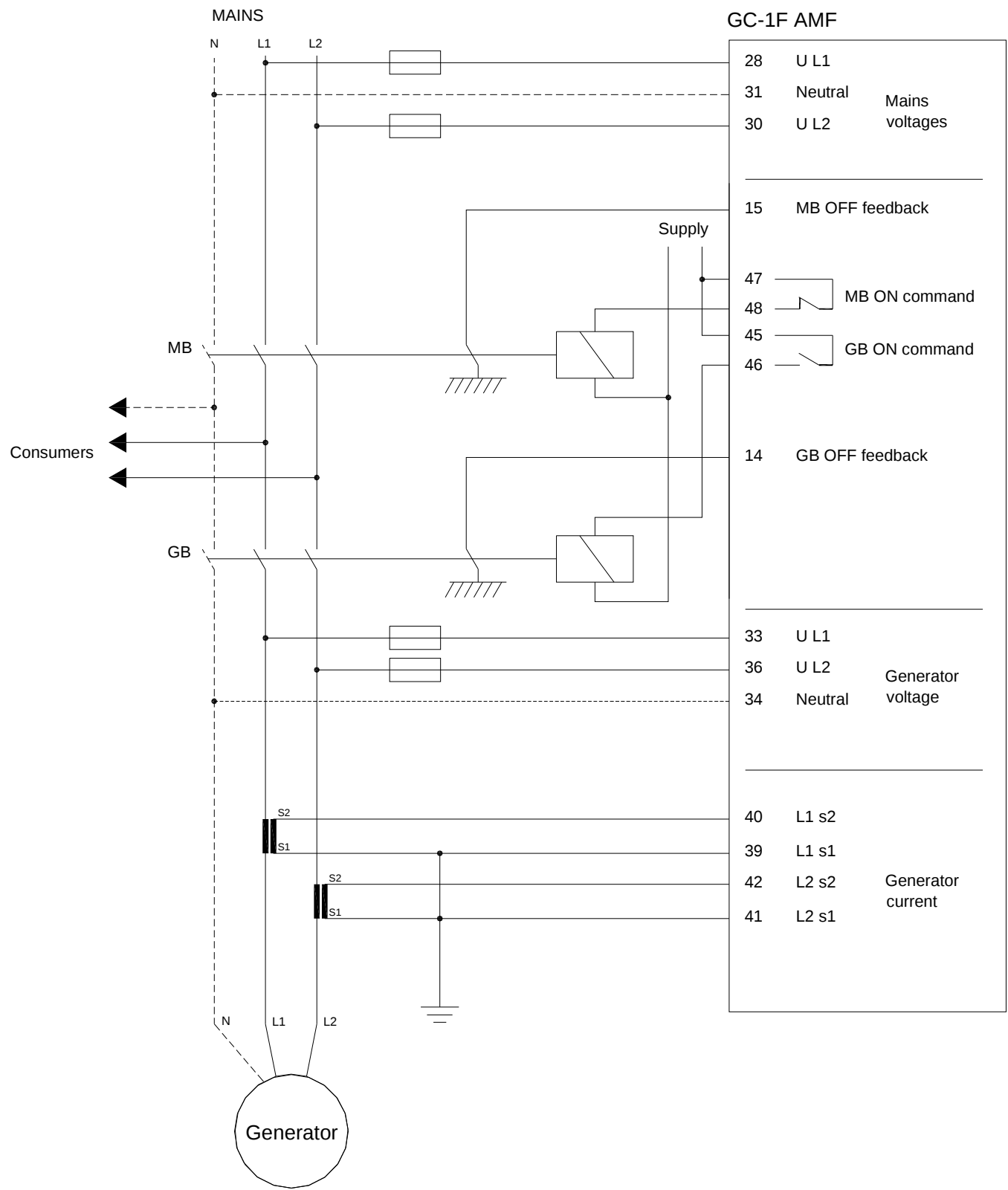
Wiring 3-phased



Wiring 1-phased

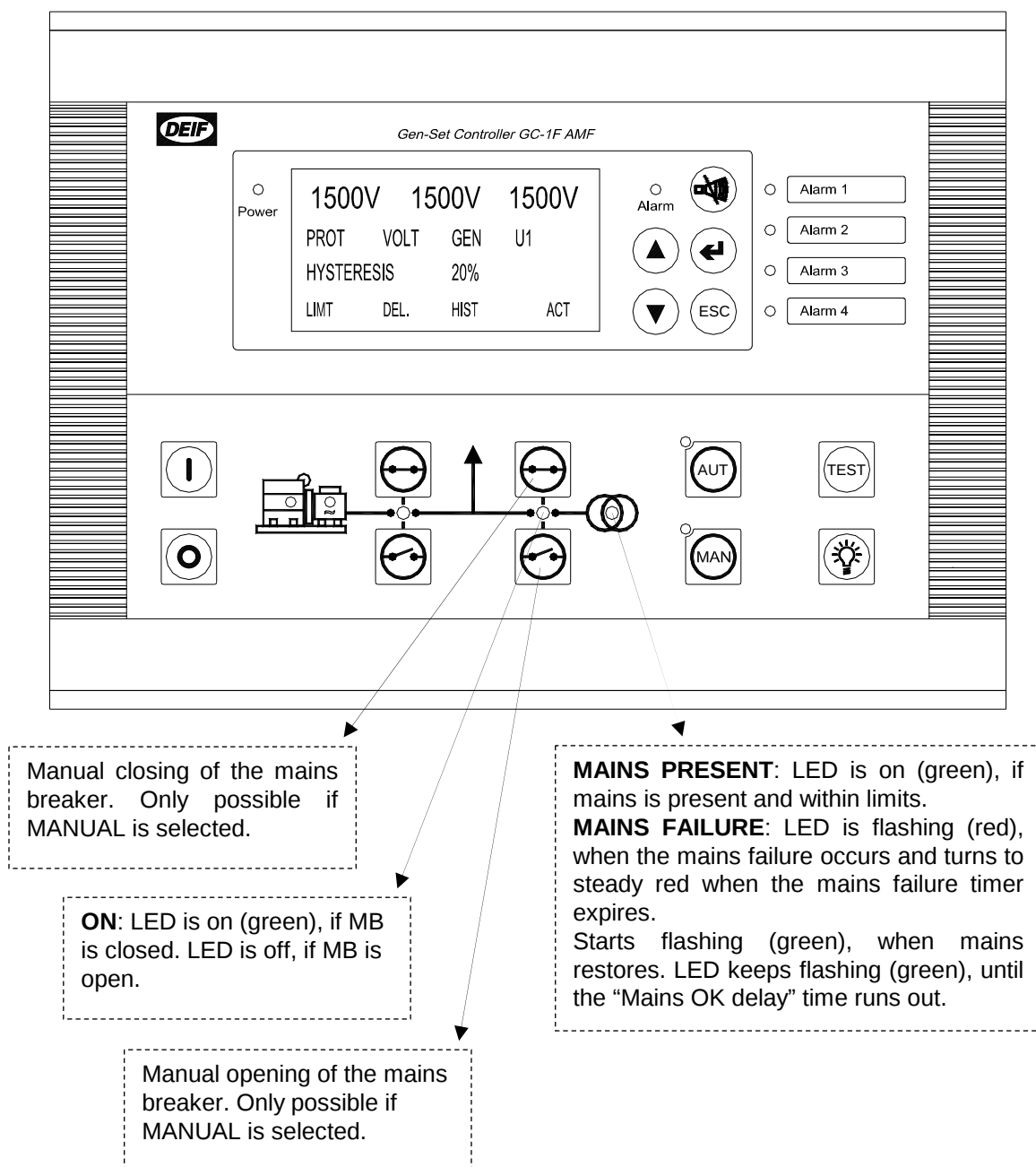


Wiring split-phased



Push-buttons and LEDs

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

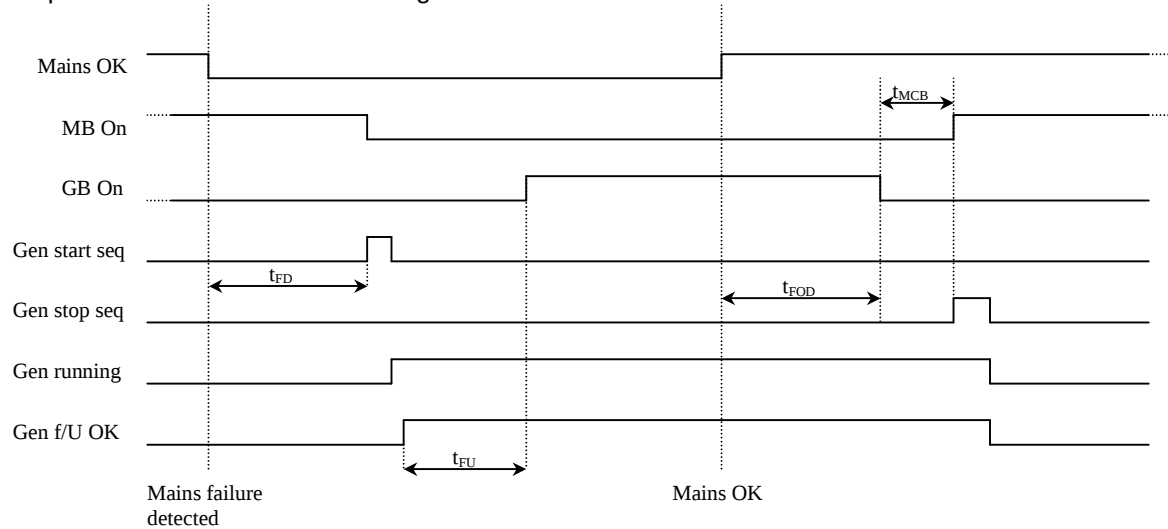


For general information about the display push-buttons and LEDs, please see the Installation Instructions and Reference Handbook.

4. Functional descriptions

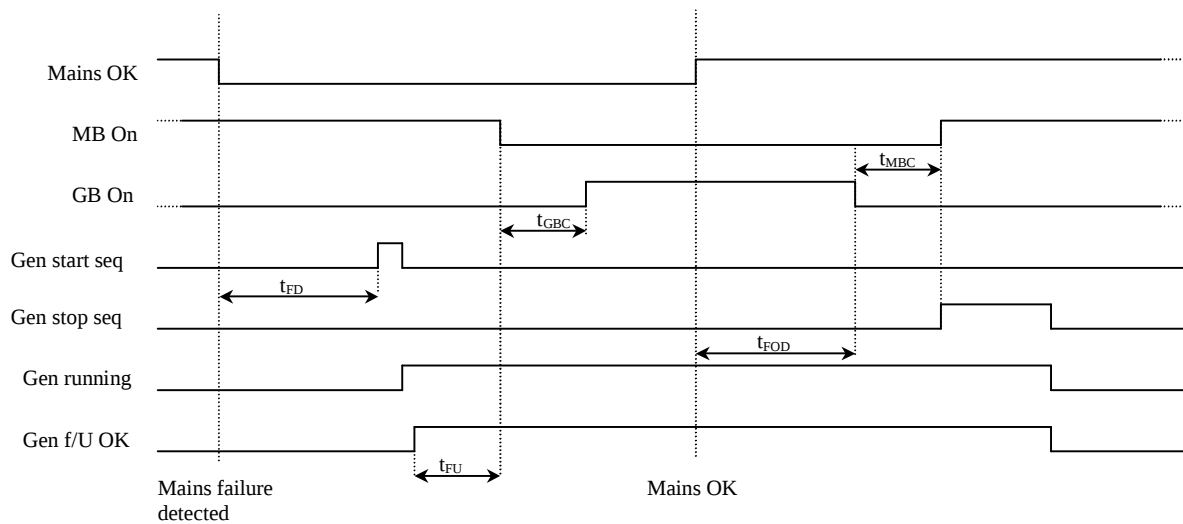
Mains fail timing sequence

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 7063 and 7073
t_{FU}	Frequency/voltage OK See 6220
t_{FOD}	Mains failure OK delay See 7062 and 7072
t_{GBC}	GB ON delay See 6231
t_{MBC}	MB ON delay See 7082

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:

Parameter "Mains failure U low" (Channel 7063)

Setpoint :

80 92 % 100

Timer :

1.0 5 sec 990.0

Password level : Customer

☐ Enable
☐ High Alarm
☐ Inverse proportional
☐ Auto acknowledge
Inhibits...

Commissioning

Actual value : 0 %
Time elapsed : 5 sec (100 %)
0 sec 5 sec

Write OK Cancel

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

Parameter "Mains failure U high" (Channel 7064)

Setpoint :

100 108 % 120

Password level : Customer

☐ Enable
☐ High Alarm
☐ Inverse proportional
☐ Auto acknowledge
Inhibits...

Write OK Cancel



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 close delay timer. The delay set is the time between the transmission of the GB open signal to the transmission of the MB close signal.

Parameter "MB close delay" (Channel 7082)

Timer : 0,0 **0,5 sec** 30,0

Password level : Customer

☐ Enable
☐ High Alarm
☐ Inverse proportional
☐ Auto acknowledge
Inhibits...

Commissioning

Actual value : 0
Time elapsed : 0 sec (0 %)
0 sec 0,5 sec

Write OK Cancel

The example below shows the MB close failure 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-1F will automatically assume that the breaker is closing.

The same principle is used for the GB.

Parameter "MB close failure" (Channel 2210)

Timer : 0,0 **1 sec** 10,0

Password level : Customer

☐ Enable
☐ High Alarm
☐ Inverse proportional
☐ Auto acknowledge
Inhibits...

Commissioning

Actual value : 0
Time elapsed : 0 sec (0 %)
0 sec 1 sec

Write OK Cancel

Load Take Over

The purpose of the LTO mode is to transfer the load, imported from the mains, to the Gen-set. The generator will then supply only. This could be used with command timer functions. There are two LTO modes, normal LTO and LTO with AMF.

Parameter "LTO Mode shift" (Channel 7081)

Setpoint :

Mode shift OFF (normal LTO)

Mode shift OFF (normal LTO)

Mode shift ON (LTO with AMF mode)

Password level: Customer

☐ Enable

☐ High Alarm

☐ Inverse proportional

☐ Auto acknowledge

Inhibits...

Write OK Cancel

Normal LTO: Makes it possible to take over the load when starting the gen-set in auto independently of the mains status. If an AMF situation occurs when a Stop gen-set command timer is active, the gen-set will stop and open GB. The MB will also remain open until the mains voltage is normal again and then it will close MB. If an AMF situation occurs while the gen-set is stopped (not running), the gen-set will not react to the mains failure.

LTO with AMF-mode: If an AMF situation occurs when a Stop gen-set command timer is active, the gen-set will remain running and GB closed until the mains voltage is normal again. If an AMF situation occurs while the gen-set is stopped (not running), the gen-set will react to the mains failure and start up like in a normal AMF situation. The gen-set will stop again, when the mains has been restored.

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.

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

1620 Mains voltage unbalance	7060 Mains failure voltage
2160 GB open failure	7062 Mains OK voltage
2170 GB close failure	7065 Mains failure control
2200 MB open failure	7070 Mains failure frequency
2210 MB close failure	7072 Mains OK frequency
6050 Transformer mains	7080 MB close delay
6070 Gen-set mode	7081 LTO mode shift
6104 No. of MB operations	7082 MB close delay
6230 GB close delay	7110 Mains failure unbalance

Parameter tables

1620 Mains voltage unbalance

No.	Setting		Min. setting	Max. setting	Factory setting
1621	Voltage unbalance	Set point	0%	50%	10%
1622	Voltage unbalance	Timer	0.0 s	10.0 s	1.0 s
1623	Voltage unbalance	Relay output A	R0 (none)	R26 (relay 26)	R0 (none)
1624	Voltage unbalance	Relay output B	R0 (none)	R26 (relay 26)	R0 (none)
1625	Voltage unbalance	Enable	OFF	ON	OFF
1626	Voltage unbalance	Fail class	Warning	Shutdown	Warning

2160 GB open failure

No.	Setting		Min. setting	Max. setting	Factory setting
2161	GB open failure	Timer	0.0 s	60.0 s	1.0 s

2170 GB close failure

No.	Setting		Min. setting	Max. setting	Factory setting
2171	GB close failure	Timer	0.0 s	60.0 s	1.0 s

2200 MB open failure

No.	Setting		Min. setting	Max. setting	Factory setting
2201	MB open failure	Timer	0.0 s	60.0 s	1.0 s

2210 MB close failure

No.	Setting		Min. setting	Max. setting	Factory setting
2211	MB close failure	Timer	0.0 s	60.0 s	1.0 s

6050 Transformer mains

No.	Setting		Min. setting	Max. setting	Factory setting
6051	Transformer mains	Primary	50V	25000V	440V
6052	Transformer mains	Secondary	50V	480V	440V



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

6070 Gen-set mode

No.	Setting		Min. setting	Max. setting	Factory setting
6071	Gen-set mode		Island	AMF	Island

6104 No. MB operations

No.	Setting		Min. setting	Max. setting	Factory setting
6104*	Counter	No. of MB operations	0	20000	0

6230 GB close delay

No.	Setting		Min. setting	Max. setting	Factory setting
6231	GB close delay	Timer	0.0 s	30.0 s	0.5 s

7040 AMF test function

No.	Setting		Min. setting	Second setting	Max. setting	Factory setting
7042	Activation	Set point	Digital input	Button	Digital input or button	Button
7041	Timer	Timer	0.0 s	-	990.0 s	5.0 s
7043	Enable	Enable	OFF	-	ON	ON

7060 Mains failure voltage

No.	Setting		Min. setting	Max. setting	Factory setting
7063*	Mains failure U low	Set point	80%	100%	92%
7061*	Mains failure	Timer	1.0 s	990.0 s	5.0 s
7064*	Mains failure U high	Set point	100%	120%	103%

7062 Mains OK voltage

No.	Setting		Min. setting	Max. setting	Factory setting
7062*	Mains OK U	Timer	1.0 s	9900.0 s	60.0 s

7065 Mains failure control

No.	Setting		Min. setting	Max. setting	Factory setting
7065	Mains failure control		Start eng. + open MB	Start eng.	Start eng. + open MB

7070 Mains failure frequency

No.	Setting		Min. setting	Max. setting	Factory setting
7073	Mains failure f low*	Set point	80%	100%	97%
7071	Mains failure*	Timer	1.0 s	990.0 s	5.0 s
7074	Mains failure f high*	Set point	100%	120%	103%

7072 Mains OK frequency

No.	Setting		Min. setting	Max. setting	Factory setting
7072	Mains OK f *	Timer	1.0 s	9900.0 s	60.0 s

7080 MB close delay

No.	Setting		Min. setting	Max. setting	Factory setting
7082	MB close delay	Timer	0.0 s	30.0 s	0.5 s

7110 Mains failure voltage unbalance

No.	Setting		Min. setting	Max. setting	Factory setting
7110	Mains failure unbalance	Enable	OFF	ON	OFF
7111	Mains unbalance failure	Timer	1.0 s	990.0 s	5.0 s
7112	Mains unbalance OK	Timer	10.0 s	990.0 s	60.0 s
7114	Mains unbalance volt	Set point	0%	50%	5%

DEIF A/S reserves the right to change any of the above