DEIF

-power in control

CE

INSTALLATION INSTRUCTIONS

Genset Controller, AGC 100

- Mounting
- Terminal overview
- Wiring
- Communication wiring
- Unit dimensions and cutout

DEIF A/S · Frisenborgvej 33 · DK-7800 Skive
Tel.: +45 9614 9614 · Fax: +45 9614 9615
info@deif.com · www.deif.com

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1. General information

2. Mounting

3. Terminals

4. Wiring

5. Communication

1. General information

1.1 Warnings, legal information and safety

1.1.1 Warnings and notes

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

Warnings

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

Notes

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

1.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

1.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply 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.

1.1.4 Electrostatic discharge awareness

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

1.1.5 Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

1.1.6 UL applications

These flat surface panel-mounted controllers are intended to be used in Listed Generator Assemblies, where the suitability of the combination has been determined by Underwriters Laboratories.

1.2 About the installation instructions

1.2.1 General purpose

These Installation Instructions mainly include general product and hardware information, mounting instructions, terminal strip descriptions, I/O lists and wiring descriptions.

The general purpose of this document is to give the user important information to be used in the installation of the unit.

Please make sure to read this document before starting to work with the Multi-line 2 unit and the genset to be controlled. Failure to do this could result in human injury or damage to the equipment.

1.2.2 Intended users

These Installation Instructions are mainly intended for the person responsible for the design and installation. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information in the document.

1.2.3 Contents and overall structure

This document is divided into chapters, and in order to make the structure simple and easy to use, each chapter will begin from the top of a new page.

2. Mounting

2.1 AGC 100 mounting

The unit is designed for flush mounting by means of eight fixing clamps (IP52), which are included at delivery. To have IP65, the unit must be ordered with option L (12 fixing clamps and a gasket).

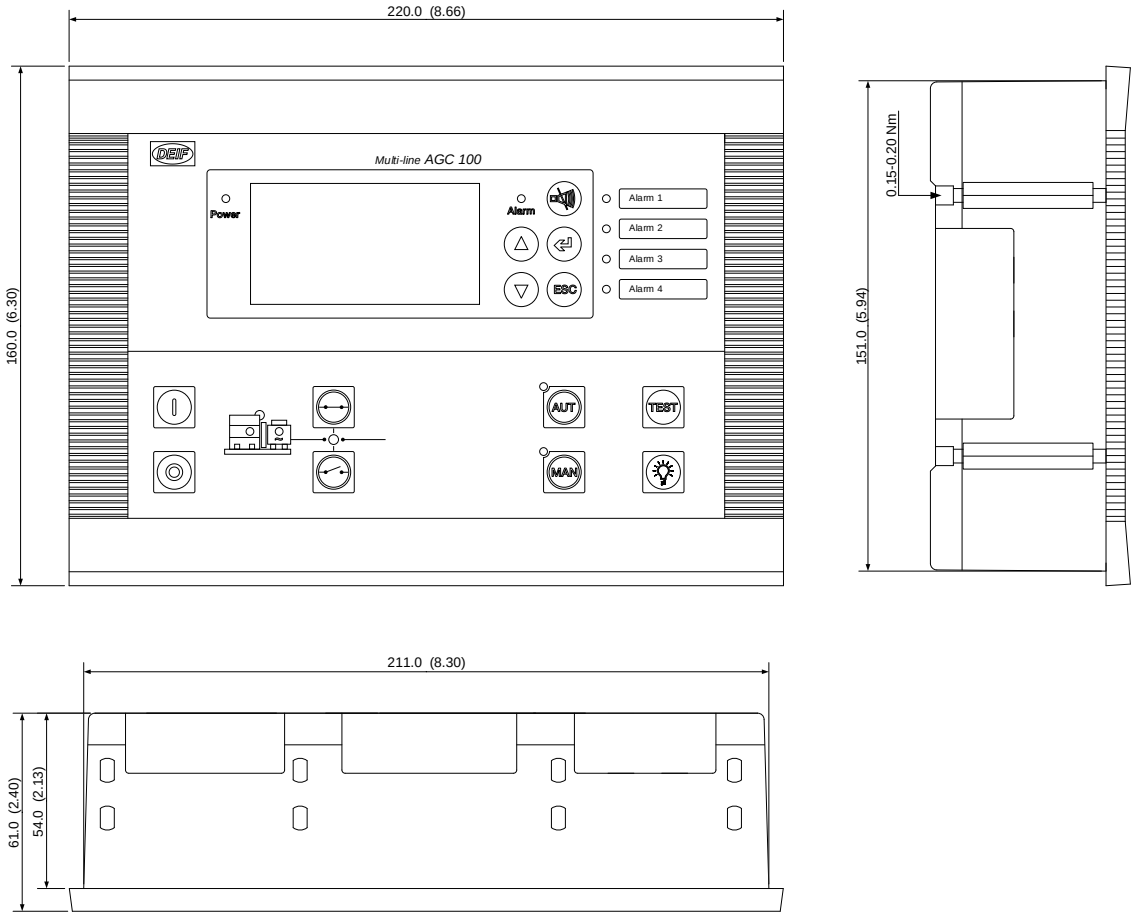
2.1.1 Unit dimensions and panel cutout

The unit is designed for mounting in the panel front.

In order to ensure optimum mounting, the panel door must be cut out according to the following measurements:

H × W = 151.00 × 211.00 + 1.00 mm

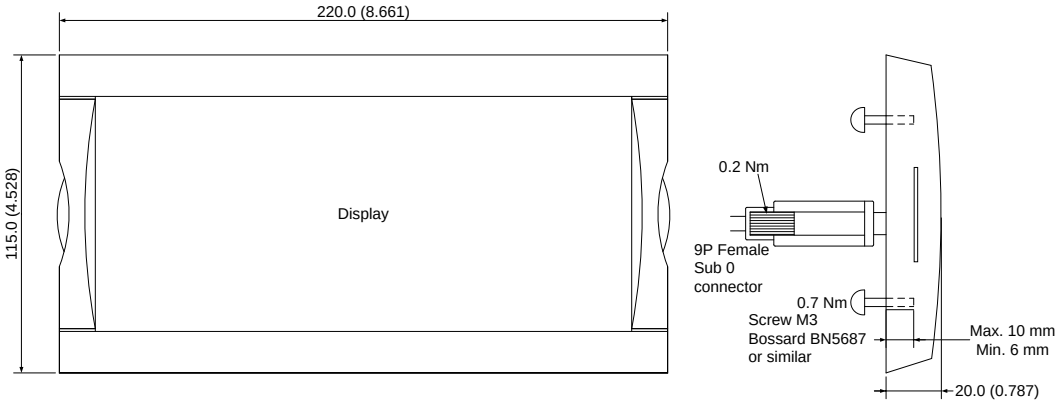
H × W = 5.94" × 8.31" + 0.04"



2.1.2 Tightening torques

Unit panel door mounting: 0.15-0.20 Nm, 1.4-1.8 lb-in (see diagram in "Unit dimensions and panel cut-out")
Plug connections (terminals): 0.5 Nm, 4.4 lb-in

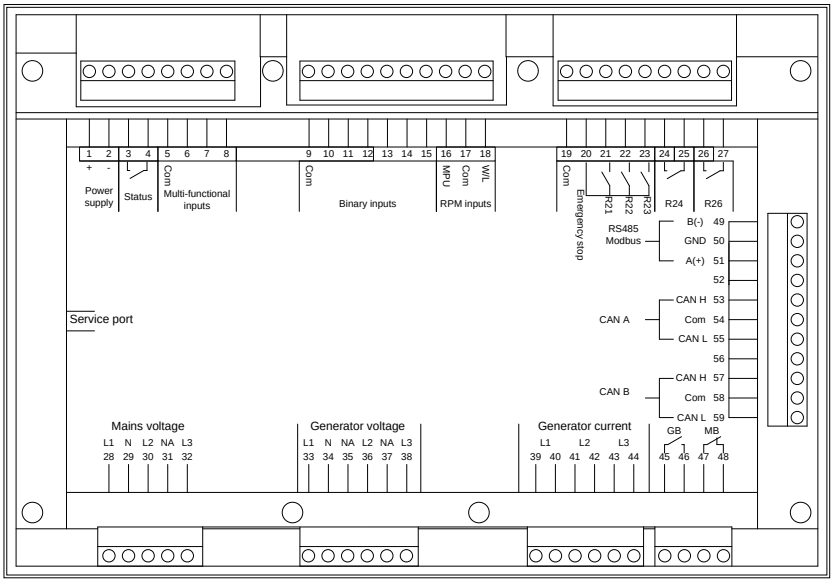
AOP-1 and AOP-2 (see diagram below)
Panel door mounting: 0.7 Nm, 6.2 lb-in
Sub-D screw: 0.2 Nm, 1.8 lb-in
DC-DC converter terminals: 0.5 Nm, 4.4 lb-in



3. Terminals

3.1 Terminal overview and description

Unit rear view



The RJ11 connector for the PC connection interface box is placed on the side of the unit.

3.1.1 Terminal description

For the relay outputs, the following terms will be used:
NO means Normally Open.
NC means Normally Closed.
Com. means common terminal for the individual relay.

Terminal	Technical data	Description
1	Power supply +	6 to 36 V DC (UL/cUL Listed: 7.5 to 32.7 V DC)
2	Power supply –	GND
3-4	Status out/configurable	See note*. Contact ratings 1 A 24 V DC/V AC Resistive
Multi-functional inputs		
5	Common	Common for terminal 6, 7 and 8
6	RMI/4 to 20 mA/digital input/ Pt1000	Configurable
7	RMI/4 to 20 mA/digital input/ Pt1000	
8	RMI/4 to 20 mA/digital input	
Digital inputs		
9	Common	Common for terminal 10 to 15
10	Digital input	Configurable
11	Digital input	
12	Digital input	
13	Digital input	
14	Digital input	
15	Digital input	
Tacho RPM input		
16	RPM input (MPU)	Magnetic pickup tacho generator (2-wire)
17	RPM-GND	Common for RPM input
18	RPM input (W/L)	Magnetic pickup. PNP, NPN or charge alternator W terminal
Relay outputs		
19	Common	Common for emergency stop terminal 20
20	Emergency stop and common for 21 to 23	Common for relay 21, 22 and 23 and input for emergency stop**
21	Relay output	Configurable. Function NO. Contact ratings 2 A 30 V DC/V AC
22	Relay output	
23	Relay output	
24-25	Relay output	Configurable. Function NO. Contact ratings 8 A 30 V DC/V AC
26-27	Relay output	
3-phase mains voltage input		
28	Mains voltage L1	Mains voltage and frequency
29	Mains neutral	
30	Mains voltage L2	
31	Not used, must not be connected	
32	Mains voltage L3	

Terminal	Technical data	Description
3-phase generator voltage input		
33	Gen. voltage, L1	Generator voltage and frequency
34	Gen. neutral	
35	Not used, must not be connected	
36	Gen. voltage, L2	
37	Not used, must not be connected	
38	Gen. voltage, L3	
3-phase generator current input		
39	Gen. current L1, s1	Generator current
40	Gen. current L1, s2	
41	Gen. current L2, s1	
42	Gen. current L2, s2	
43	Gen. current L3, s1	
44	Gen. current L3, s2	
Breaker relays		
45	Relay output	Generator circuit breaker/configurable, function NO (normally open) Contact ratings 2 A 30 V DC/250 V AC
46	Relay output	
47	Relay output	Mains circuit breaker/configurable, function NC (normally closed). With "Option M19" the relay is NO. Contact ratings 2 A 30 V DC/250 V AC
48	Relay output	
Modbus RS-485 interface		
49	B (-)	Modbus RS-485 RTU or ASCII
50	GND	
51	A (+)	
CAN bus port A: Engine interface		
53	CAN-H	CAN J1939 engine communication
54	Com	
55	CAN-L	
Optional CAN bus port B: AOP-2 interface		
57	CAN-H	CAN communication line to AOP-2
58	Com	
59	CAN-L	
Optional CAN bus port B: External I/O interface		
57	CAN-H	CAN communication port to external I/O
58	Com	
59	CAN-L	

* The status relay is the uP watchdog output. This relay is normally energised, and the switch is closed after power-up. If the uP fails or the power is lost, the relay will de-energise and the switch will open. If the unit fails to start up at power-up, the relay switch will remain open. The relay is configurable.

** If terminal 20 is used for emergency stop, see wiring diagram below.

The relay output functions are configurable via the PC utility software and can, among many other functions, be configured to cover the following in I/O settings:

- Status OK
- Run coil
- Stop coil
- Stop coil (not activated in start seq.)
- Prepare
- Starter (crank)
- Horn
- GB on
- GB off
- MB on
- MB off

It is possible to choose run coil on one relay and stop coil on another, thus supporting engines with double systems.

The multi-functional inputs can be configured to cover the following functions:

- RMI sensor input
- 4 to 20 mA input
- Binary input with wire break (switch function)
- Pt1000

Tacho RPM input (MPU) can be configured to cover the following functions:

- Magnetic pickup (2-wire)
- NPN or PNP pickup*

* These RPM inputs require external equipment.

Tacho RPM input with capacitor (W/L) can be configured to cover the following functions:

- Magnetic pickup (2-wire)
- W terminal on charger alternator
- NPN or PNP pickup*

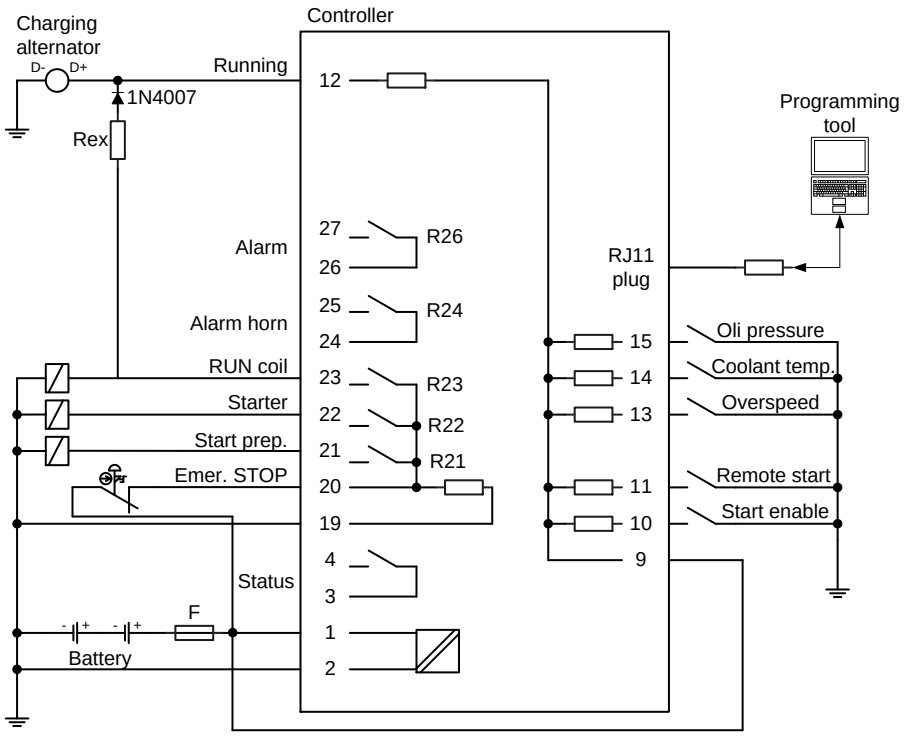
* These RPM inputs require external components.

The generator voltage and current input can be configured to the following:

- Voltage 100 to 25000 V primary
- Current 5 to 9000 A primary

4. Wiring

4.1 Wiring diagram



Term. 12 can be used as alarm input if not used for charger generator terminal D+

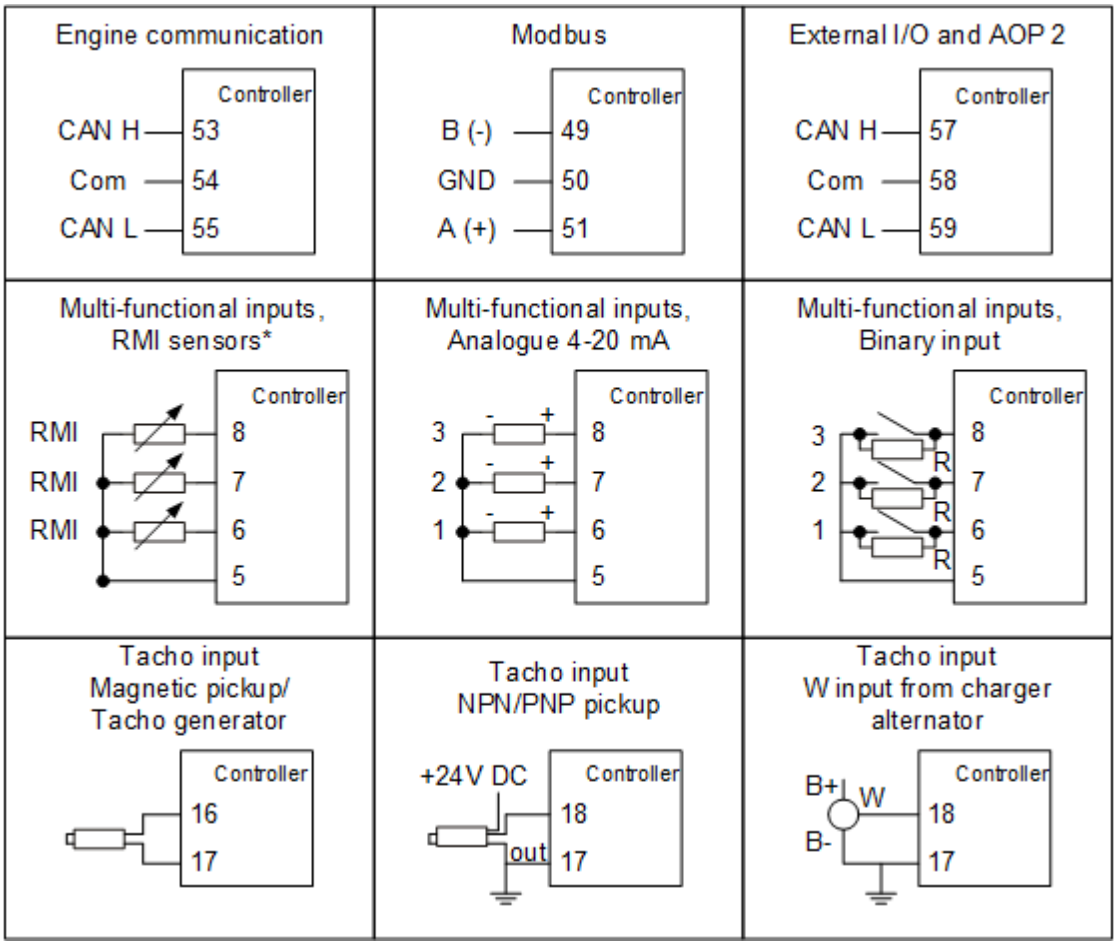
Rex: 12 V systems: 47 Ω 4 W
24 V systems: 100 Ω 6 W

If a stop coil is used, the REX resistor can be connected to the starter relay (crank).

The illustrated configuration is an example of settings. The use of the relays can be chosen freely.

It is important to protect the unit against damage caused by high voltages. Therefore, the fuse must not be more than 2 A slow-blow.

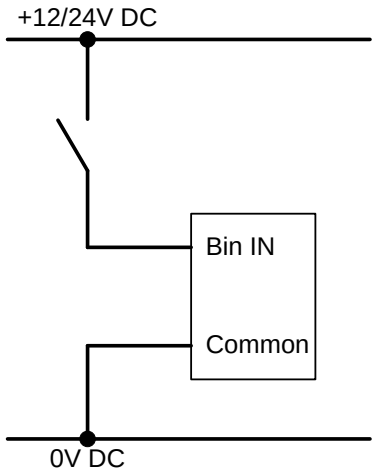
4.2 DC connections



* The illustration for the RMI sensors also apply to Pt1000 - but note that only multi-inputs 6 and 7 support Pt1000.

4.3 Digital inputs

All digital inputs are 12/24 V DC bi-directional optocoupler type. The typical wiring is illustrated below:



The digital inputs use fixed signals. Only the mode shift input and the test input (if the timer is used) use pulse signal.

4.4 Breaker selection

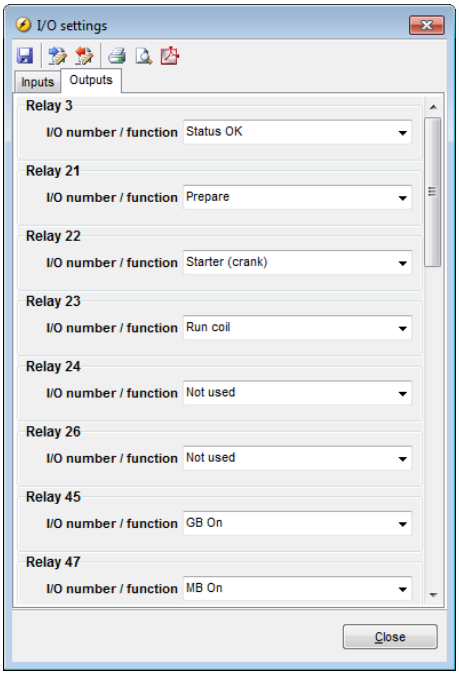
The controller can handle pulse, continuous and compact breakers. Selection of the breaker type is done in the application configuration with the PC utility software. Output for breaker handling is chosen in the I/O configuration of the PC utility software.

In the table below it is listed which outputs are needed for breaker handling, depending on the breaker type.

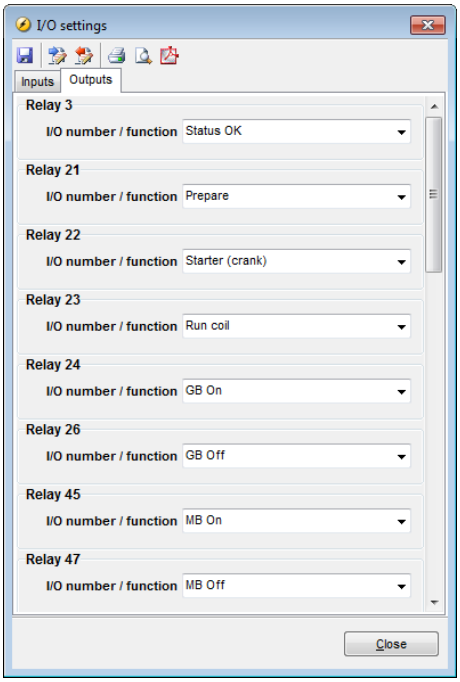
Breaker type	GB On/MB On/TB On	GB Off/MB Off/TB Off
Pulse breaker	X	X
Continuous breaker	X	
Compact breaker	X	X

The pictures below are examples of how to set up breakers.

Continuous breaker selection
With GB On and MB On configuration



Pulse breaker selection
With GB On, GB Off, MB On and MB Off selection



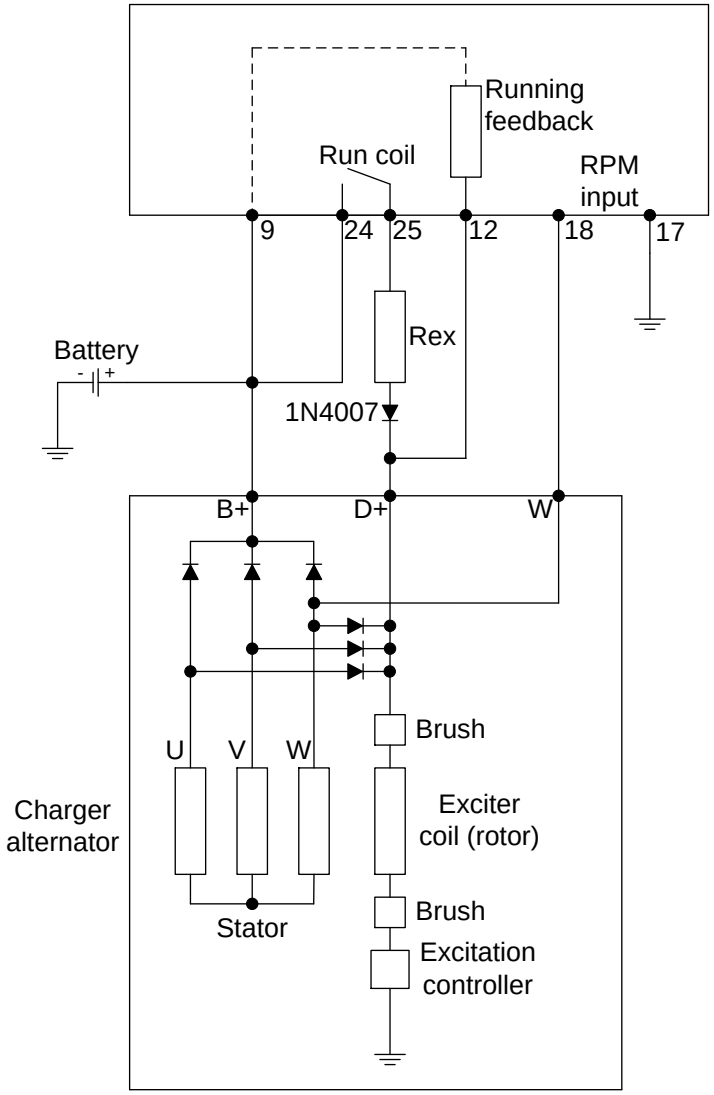
If the AGC 100 is ordered with option M19, relay 47 will have NO contact.

4.5 Charger alternator connections

The charger alternator can be used as running-feedback in two different ways:

1. Using the D+ terminal connected to terminal 12
2. Using the W terminal connected to the RPM input

Usually only one of these possibilities is used.



Rex: Excitation resistor	12 V systems: 47 Ω 4 W
	24 V systems: 100 Ω 6 W

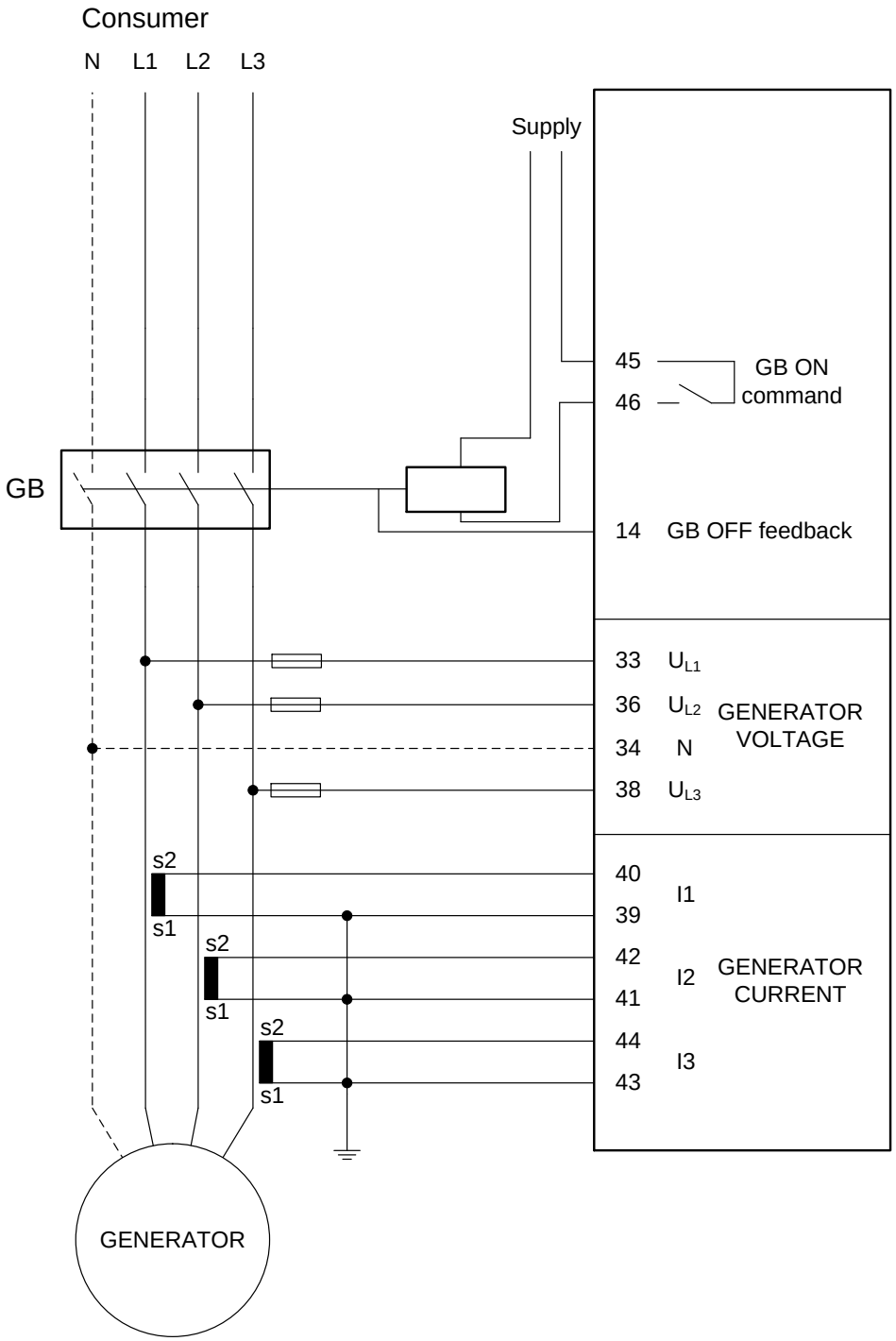
At standstill, the battery + is connected to terminal 9 (common), and a current flows to terminal 12 and via the D+ input on the alternator to ground (battery -). When the starter is engaged (cranking), the battery will supply the D+ through the REX resistor, helping the alternator to excite. When the alternator starts to produce voltage (excitation OK), the speed of the alternator will be above running speed, and the voltage on term. 12 will rise to a value higher than the battery voltage and then interrupt the current flow through REX and activate the running feedback input. Engine is running.

If a stop coil is used, the REX resistor can be connected to the starter relay (crank).

4.6 3-phase voltage and current wiring

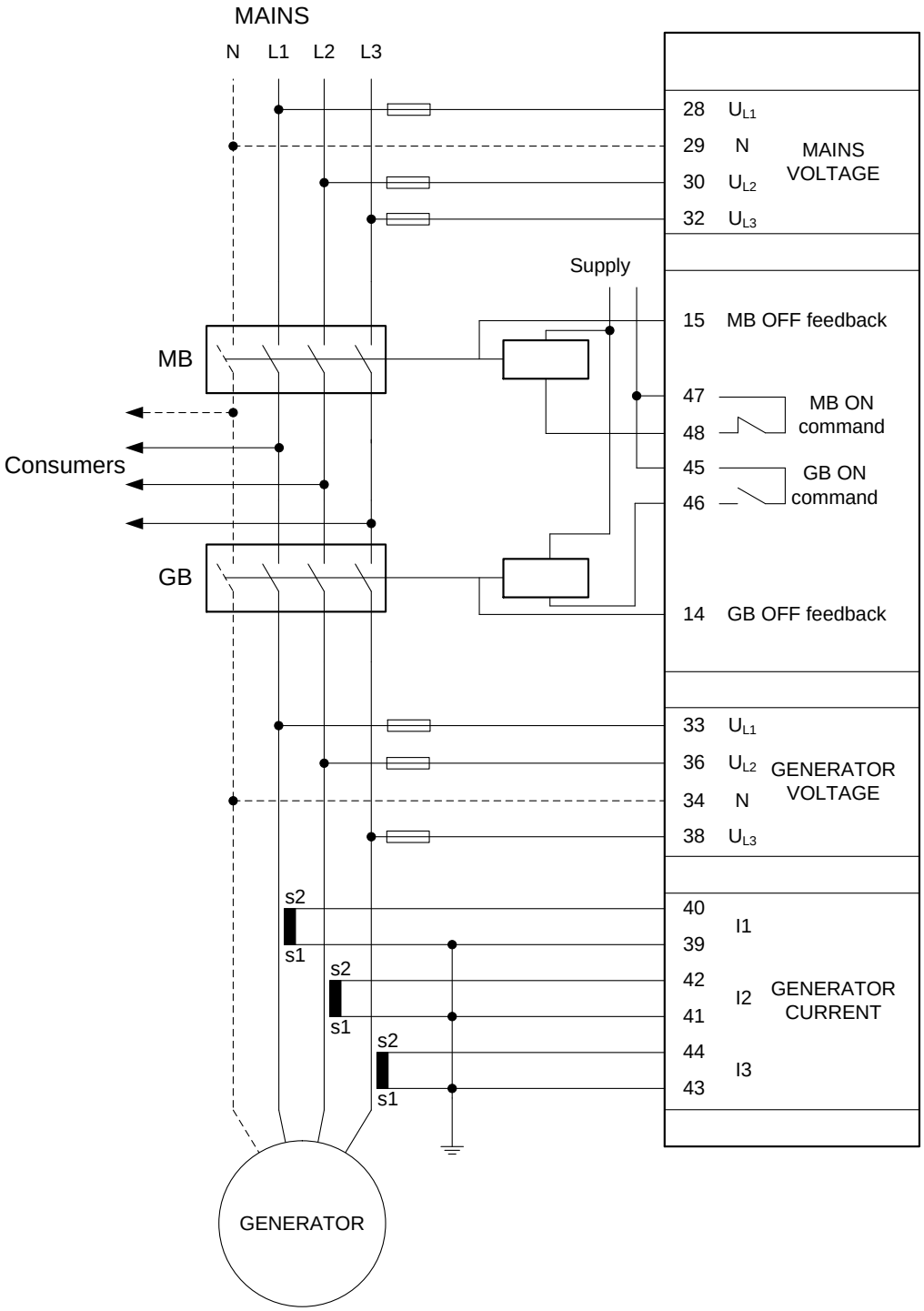
4.6.1 3-phase wiring, AGC 112

Island operation



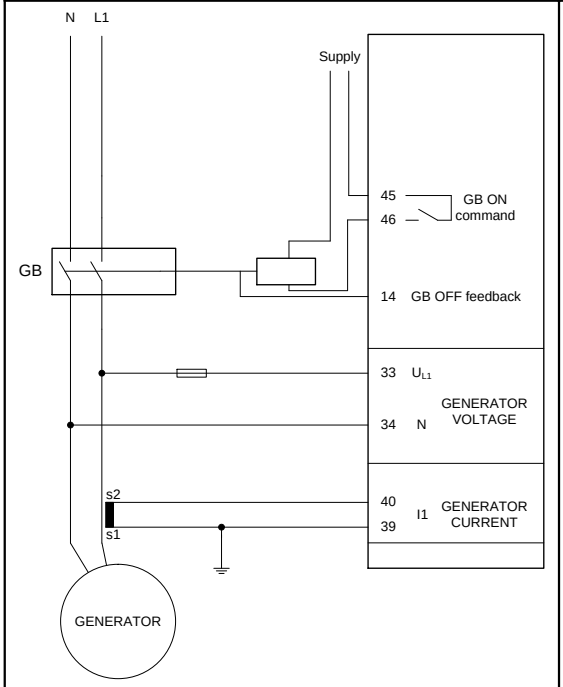
4.6.2 3-phase AMF wiring, AGC 113

3-phase AMF wiring

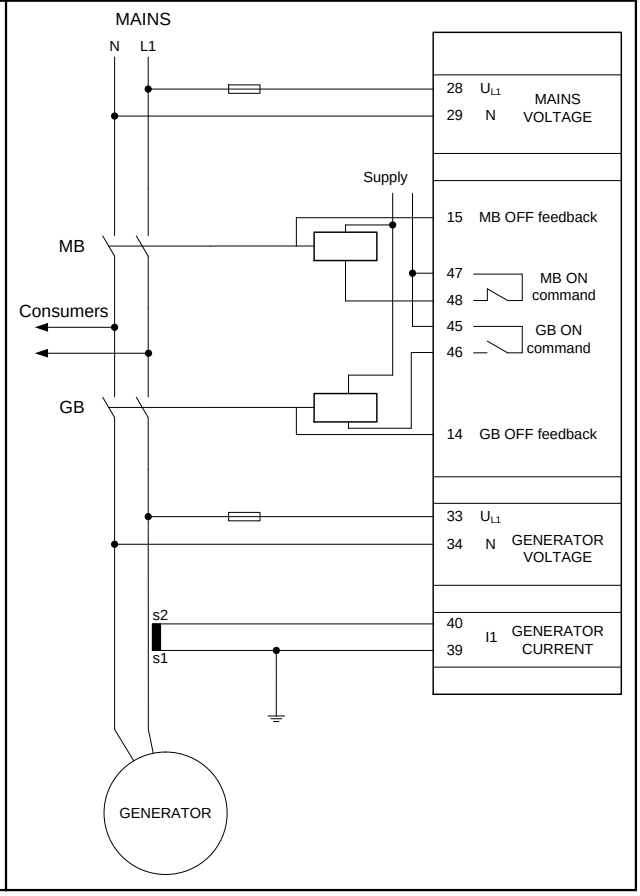


4.7 1-phase voltage and current wiring

Island, AGC 112

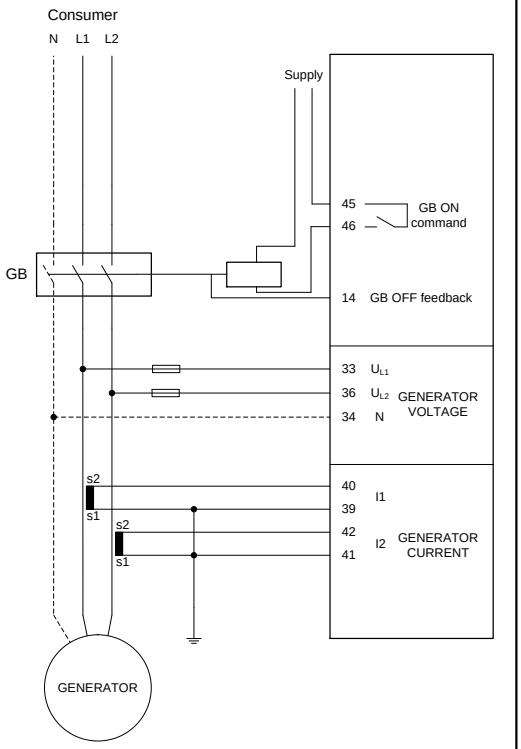


AMF and load takeover, AGC 113

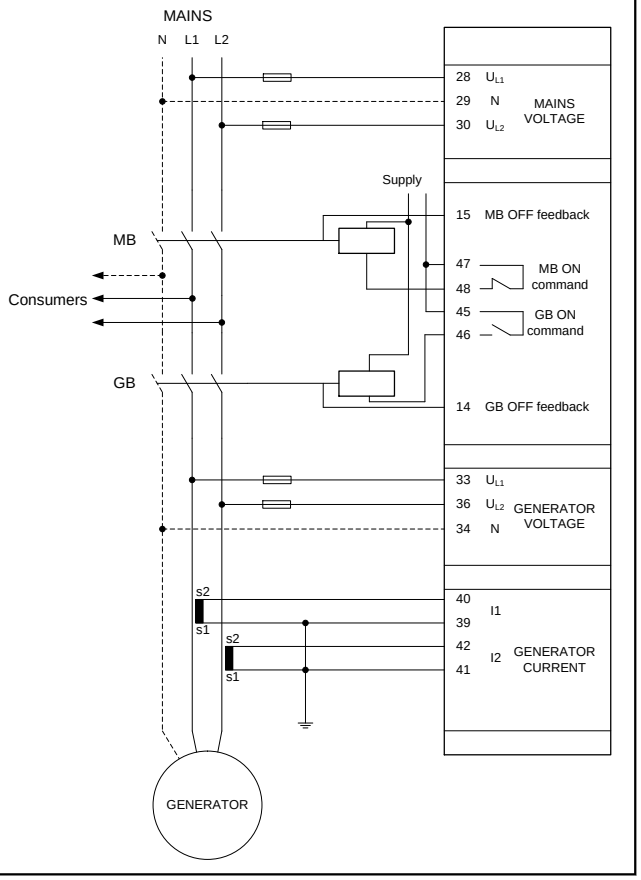


4.8 Split-phase voltage and current wiring

Island, AGC 112

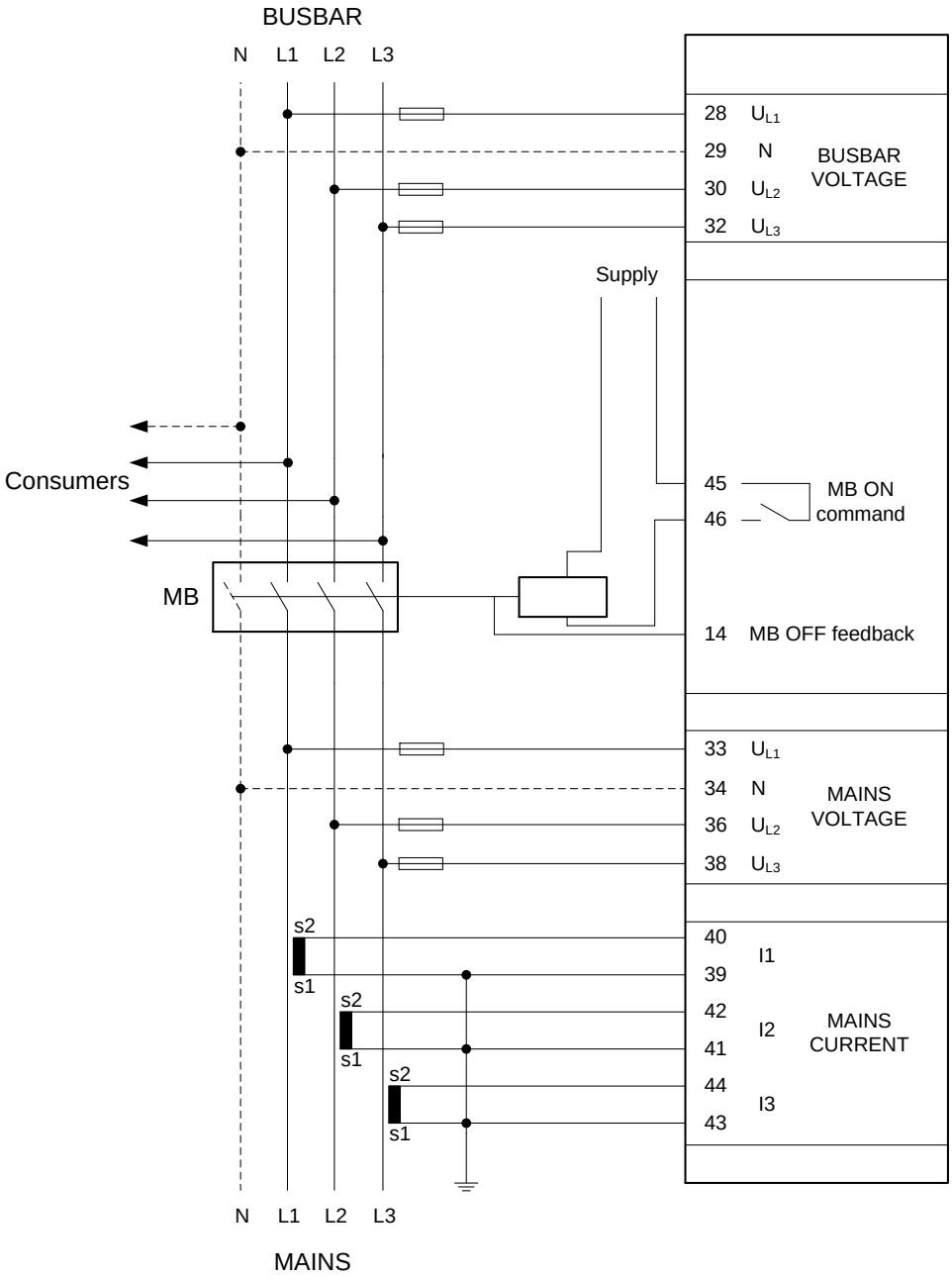


AMF and load takeover, AGC 113

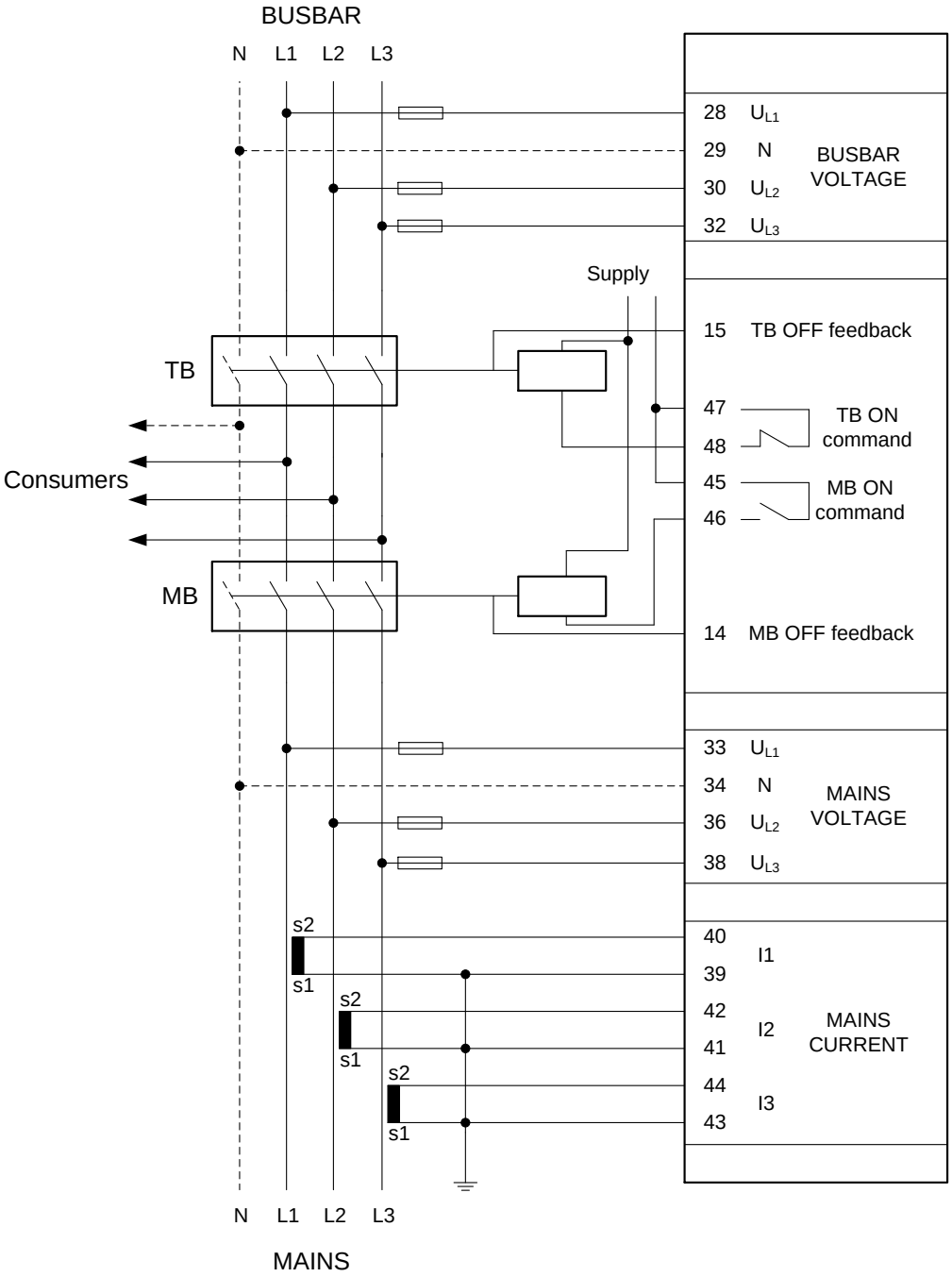


4.9 Power management 3-phase wiring (AGC 145/146)

4.9.1 Mains breaker, AGC 145



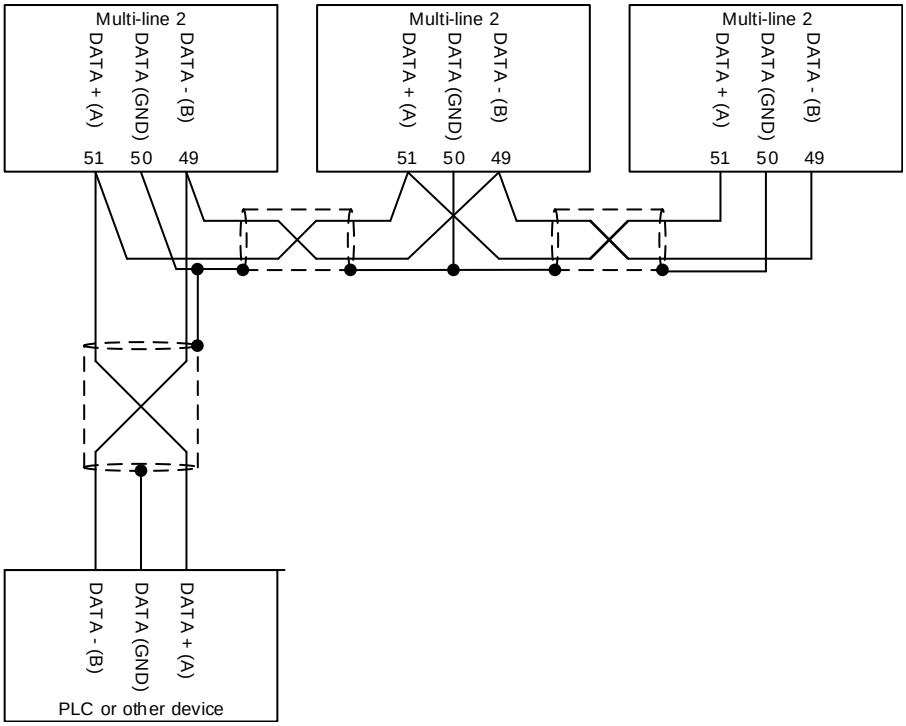
4.9.2 Mains and tie breaker, AGC 146



5. Communication

5.1 Modbus RTU

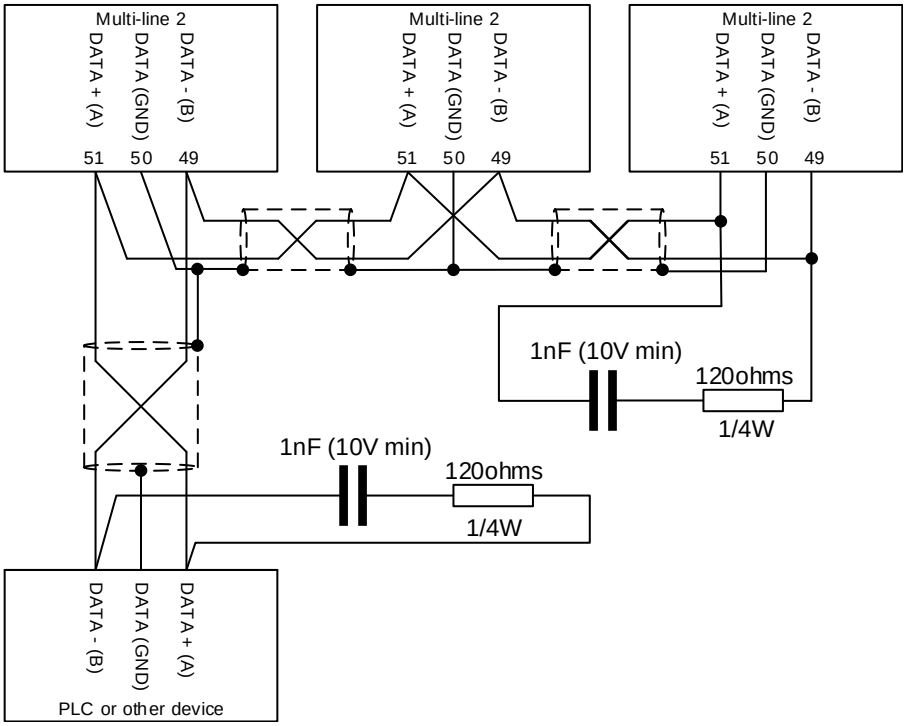
5.1.1 Connection with 2-wire shielded cable



Maximum length of the Modbus line is 300 m.

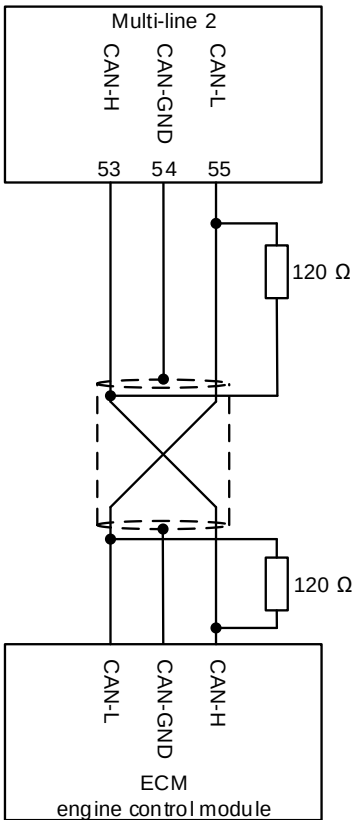
Cable: Belden 3106 A or equivalent. 22 AWG (0.324 mm^2) shielded twisted pair, min. 95 % shield coverage.

The RS-485 Modbus lines need end resistors (end terminators) when the bus length exceeds 30 m. If end resistors are needed, we recommend to install them like this:


Multi-line 2
DATA + (A)
DATA (GND)
DATA - (B)
51
50
49
Multi-line 2
DATA + (A)
DATA (GND)
DATA - (B)
51
50
49
Multi-line 2
DATA + (A)
DATA (GND)
DATA - (B)
51
50
49
1nF (10V min)
120ohms
1/4W
1nF (10V min)
120ohms
1/4W
DATA - (B)
DATA (GND)
DATA + (A)
PLC or other device

5.2 CAN bus engine communication

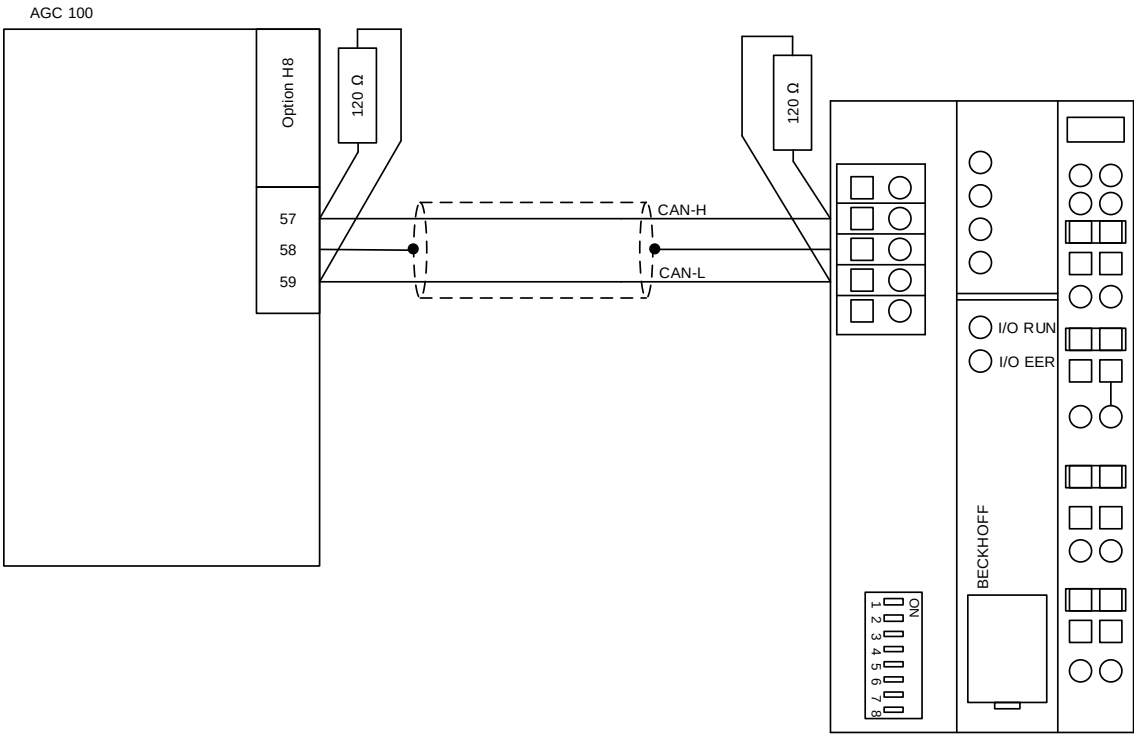
5.2.1 Connection with 2-wire shielded cable



Maximum length of the CAN bus line is 300 m.

Cable: Belden 3106 A or equivalent. 22 AWG (0.324 mm^2) shielded twisted pair, min. 95 % shield coverage.

5.3 External I/O modules

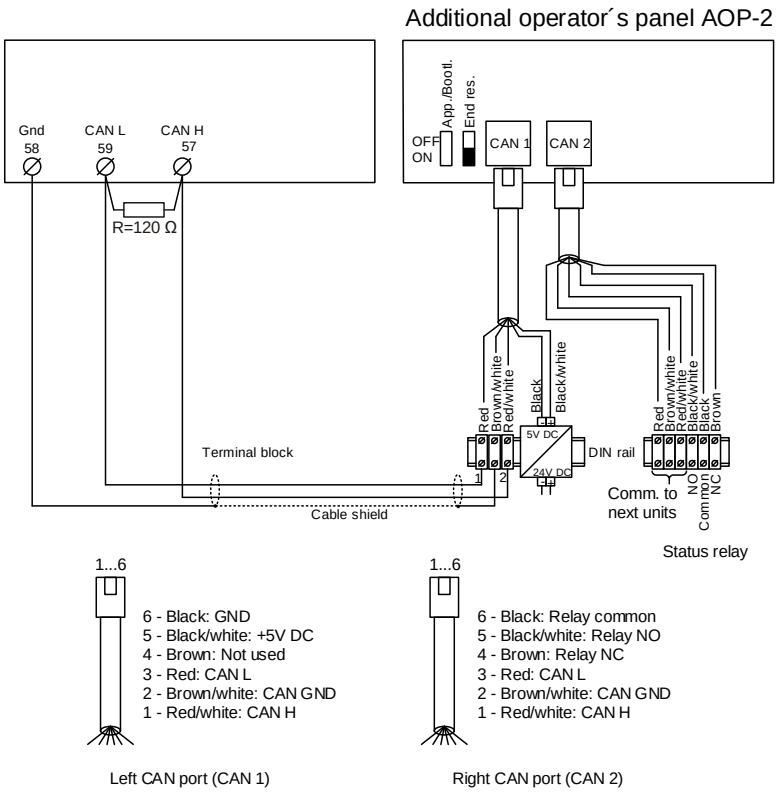


If external I/O modules "Option H8" are used together with AOP-2, the total terminal resistance of the AOP-2 and the external I/O controller must be 120 Ω.

Maximum length of the CAN bus line is 300 m.

Cable: Belden 3106 A or equivalent. 22 AWG (0.324 mm^2) shielded twisted pair, min. 95 % shield coverage.

5.4 Additional Operator Panel, AOP-2



If external I/O modules "Option H8" are used together with AOP-2, the total end resistance of the AOP-2 and the external I/O controller must be 120 Ω.

A DC/DC converter for the DC supply voltage and 2 × 1 m cable with an RJ12 plug in one end and stripped wires in the other end are included in the AOP-2 delivery.

Maximum length of the CAN bus line is 300 m.

Cable: Belden 3106 A or equivalent. 22 AWG (0.324 mm^2) shielded twisted pair, min. 95 % shield coverage.