Atlas Copco Generators

QIX 190-540
QAS 80-325
QAC 500-1006

USER MANUAL FOR THE

Qc4001 GENERATOR CONTROLLER

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1 General

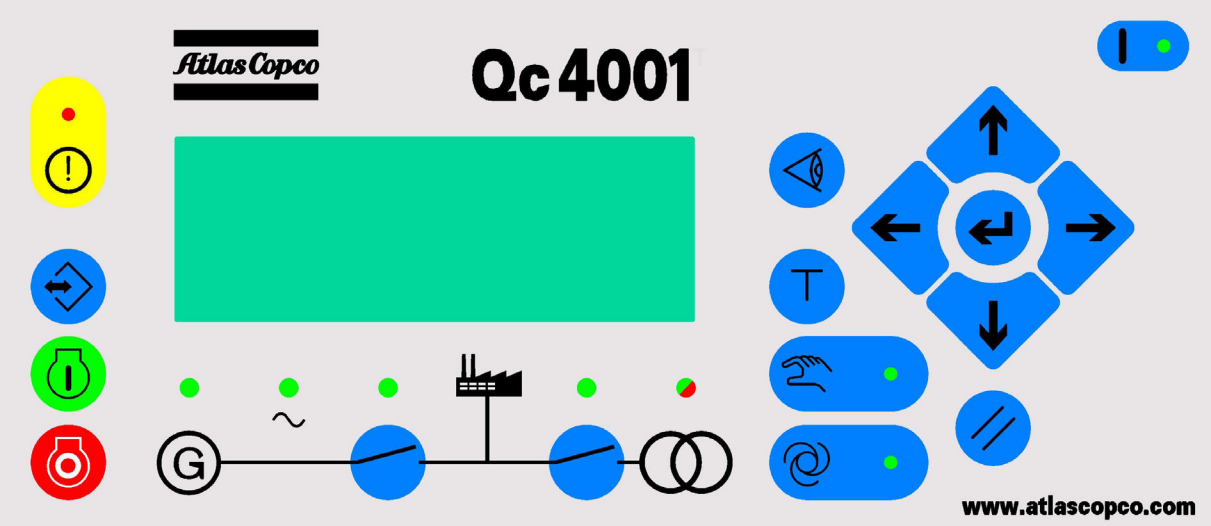
The Atlas Copco Qc4001 is a protection and control unit for a generator driven by a diesel engine. It will carry out all necessary tasks to control and protect a generator, regardless of the use of the generator. This means that the Atlas Copco Qc4001 can be used for several application types.

The Qc4001 measuring system is true RMS 3-phase measurement of generator voltage, generator current, generator frequency, mains voltage and mains frequency.

This User Manual is based on: Functional Specification 9822 1200 01.
The Functional Specification can be changed without prior notice.
The information contained in this User Manual is to assist you in the installation of your gen-set. If something is not clear, please do not hesitate to contact Atlas Copco for further help.

2 Display unit

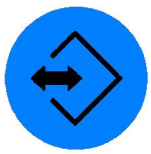
The display unit used in the Qc4001 communicates and receives power supply via a 9-pole Sub-D plug.
The plug fits directly onto the main unit, so the display can be mounted on the top of the main unit.
If the display is to be used as remote display, a standard computer extension cable with male/female plug can be used for the connection.



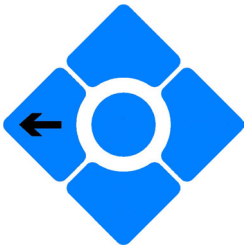
2.1 Pushbutton functions

There are 16 pushbuttons on the display unit with the following functions:

ALARM: Shifts the display 3 lower lines to show the alarm list (up to 30 alarms can be in the list).



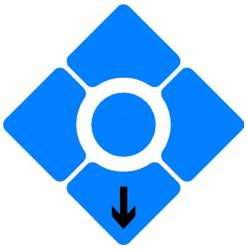
JUMP: This button enables the customer to enter a channel number selection. The module will jump directly to this channel. Using the JUMP button enables the user to select and display any setting without navigating all the way through the menus (see later).



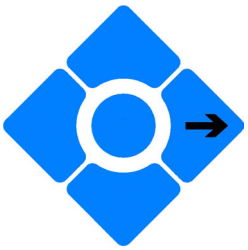
LEFT: Moves the cursor left for manoeuvring in the menus.

UP: Increases the value of the selected set-point (in the setting menus). In the daily use display it is used for scrolling the second line displaying of generator values.

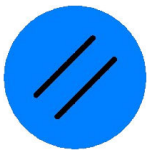
SELECT: Is used to select the chosen function (underscored selection in the lower line of the display).



DOWN: Decreases the value of the selected set-point (in the setting menus). In the daily use display it is used for scrolling the second line displaying of generator values



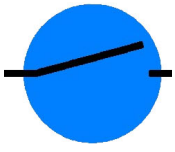
RIGHT: Moves the cursor right for manoeuvring in the menus.



BACK: Jumps one step backwards in the menu (to previous display or to the entry window).

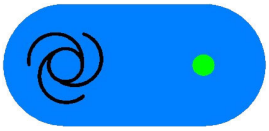
START: Start of the generator if “SEMI-AUTO” is selected.

STOP: Stop of the generator if “SEMI-AUTO” is selected.



GB ON: Manual activation of close contactor and open contactor sequence if “SEMI-AUTO” is selected.

MB ON: Manual activation of close contactor and open contactor sequence if “SEMI-AUTO” is selected.



AUTO: Puts the generator in AUTO mode.

SEMI-AUTO: Puts the generator in SEMI-AUTO (manual) mode.

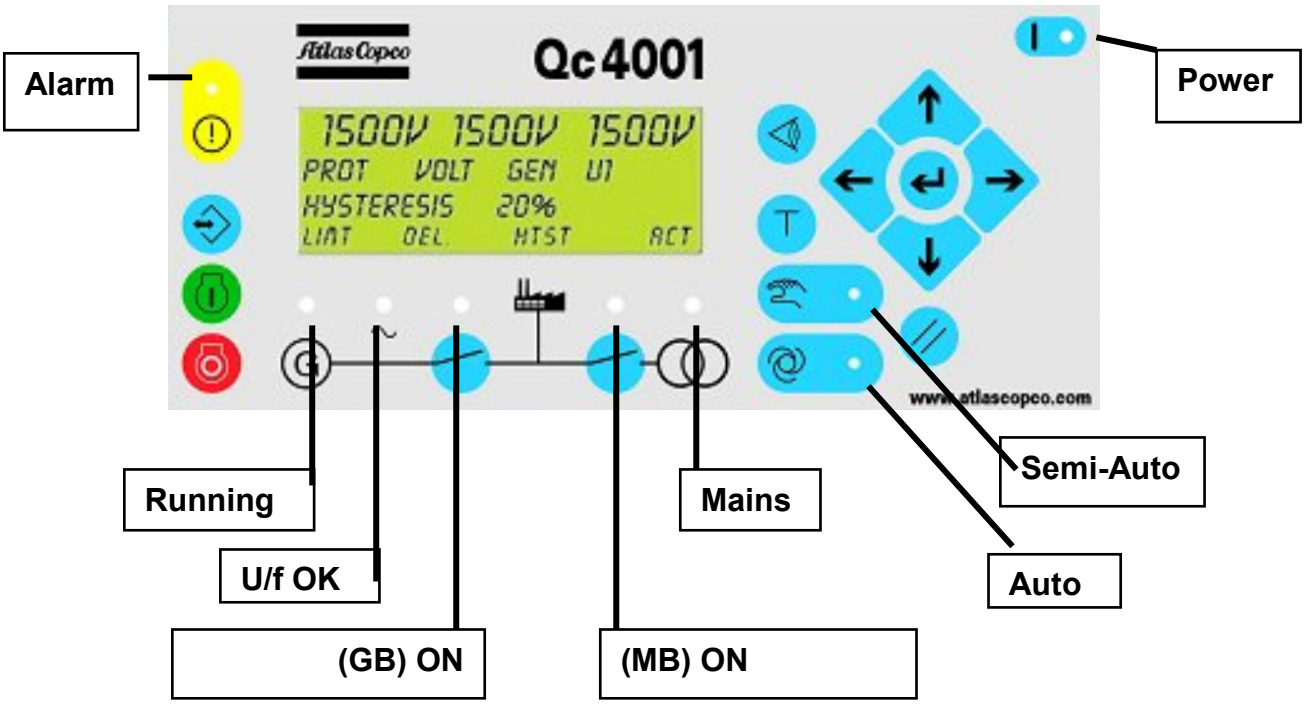
TEST: Puts the generator in TEST mode.

To enter the TEST mode, the lowest level password needs to be entered.

VIEW LOG: Shifts the display 3 lower lines to show the alarm list (up to 150 alarms can be listed). These alarms will be kept in memory when the unit is powered off.

2.2 LED functions

9 LEDs are used on the display unit.
The colour is green or red or a combination in different situations.



Alarm:	Red LED flashing indicates that unacknowledged alarms are present.
	LED fixed light indicates that ALL alarms are acknowledged.
Power:	Green LED indicates that the auxiliary supply is switched on.
Run:	Green LED indicates that the generator is running.
U/f OK:	Green LED light indicates that voltage/frequency is present and OK.
(GB) ON:	Green LED indicates that the plant contactor is closed.
(MB) ON:	Green LED indicates that the mains contactor is closed.
(MAINS) OK:	LED is green if the mains are present and OK.
	LED is red at a mains failure.
	LED is flashing green when the mains return during the “MAINS OK” delay time.
Auto:	Green LED indicates that AUTO mode is selected.
Semi-Auto:	Green LED indicates that SEMI-AUTO mode is selected.

The main Qc4001 control unit includes 3 LEDs:

Power:	Green LED indicates that the auxiliary supply is switched on.
Self check ok:	Green LED indicates that the unit is OK.
Alarm inhibit:	Green LED fixed light indicates that the inhibit input is ON.

3 Standard functions & protections

The Qc4001 measuring system is true RMS 3-phase measurement of generator voltage, generator current, generator frequency, mains voltage and mains frequency.

The Qc4001 module is built up with different extension cards that are mounted into one of the 9 different slots. Some of these cards are mounted as standard, and some as an option.
The Qc4001 has the following control and protection functions as standard:

3.1 Engine Protection

The engine alarm extension card has the following configurable inputs and outputs:
- 1 4…20 mA input for Mains Power Transducer
- 2 configurable 4…20mA inputs
- 3 resistive sensor inputs for Engine Oil Pressure/Coolant Level, Coolant Temperature/Alternator Temperature, Fuel Level
- 1 tacho input
- 9 binary inputs for Access Lock, Running Feedback, Engine Failure, Emergency Stop, 2n^{d} Parameter Set, W/L, Remote Start, disable analogue fuel input , Static Battery Charger.

3.2 Alternator Protection

- Over current protection, definite time characteristic
- Reverse power protection, definite time characteristic
- Over- and under voltage (generator and busbar)
- Over- and under frequency (generator and busbar)
- Vector jump
- Df/dt (ROCOF)
- Overload
- Current unbalance
- Voltage asymmetry
- Reactive power (import (excitation loss)/export)

3.3 Voltage/var/cos(phi) control

Selectable (via binary inputs or (optional) serial interface) functions:
- Constant voltage (stand-alone)
- Constant reactive power (parallel with mains)
- Constant power factor (parallel with mains)
- Reactive power sharing (parallel with other generators, island operation)

3.4 Analogue controller outputs

- +/-20mA for speed governor
- +/-20mA for voltage/var/cos control

3.5 Load sharing between gen-sets' analogue lines

3.6 Engine communication

Software selectable for:
- MTU MDEC communication
- Detroit Diesel DDEC communication
- Deutz EMR communication
- Volvo EDCIII
- John Deere JDEC communication
- Scania ScaniaDec communication

3.7 Configurable I/O extension card

- 13 binary inputs and 4 relay outputs

Note: It is possible to configure binary inputs, analogue inputs and binary outputs.

Binary Inputs
- *The text can be edited to a more saying name by using the USW*
- *Input 10 (terminal 118) can be configured as 'Sprinkler'. When 'Sprinkler' is selected, all alarms and fail classes are overruled. The only alarms the gen-set will react on are 'Emergency Stop' on terminal 117 or a 'Tacho Failure'. Also the gen-set has 7 start attempts before 'Start Failure'.*

Analogue Inputs
- *The text can be edited to a more saying name*

Binary Outputs
- *The output can be configured as 'Alarm' relay*
- *The output can be configured as 'Limit' relay*

4 Optional functions & protections

As standard 6 slots out of 9 slots contain a dedicated extension card. This means that 3 slots are still free for the optional extension cards. The following optional extension cards are available:

4.1 Power Management System (PMS)

4.2 Can-open Serial communication

4.3 Mod-bus Serial communication

4.4 Profi-bus Serial communication

Note that it is only possible to have one of the above options 4.1 –4.4 on one and the same unit.

4.5 Analogue Transducer Output of measured values (2x 4…20mA)

4.6 7 Binary Inputs

4.7 4 Relay Outputs

4.8 4 Analog Inputs (4…20mA)

Note that it is only possible to have one of the above options 4.5 - 4.8 on one and the same unit.

4.9 Ethernet – TCP/IP communication

Integrated Web Server with web pages for plant presentation.

5 Hardware

The Qc4001 housing is divided into board slot positions, some of which are standard (non-changeable) and some intended for options.

The unit is divided like this:

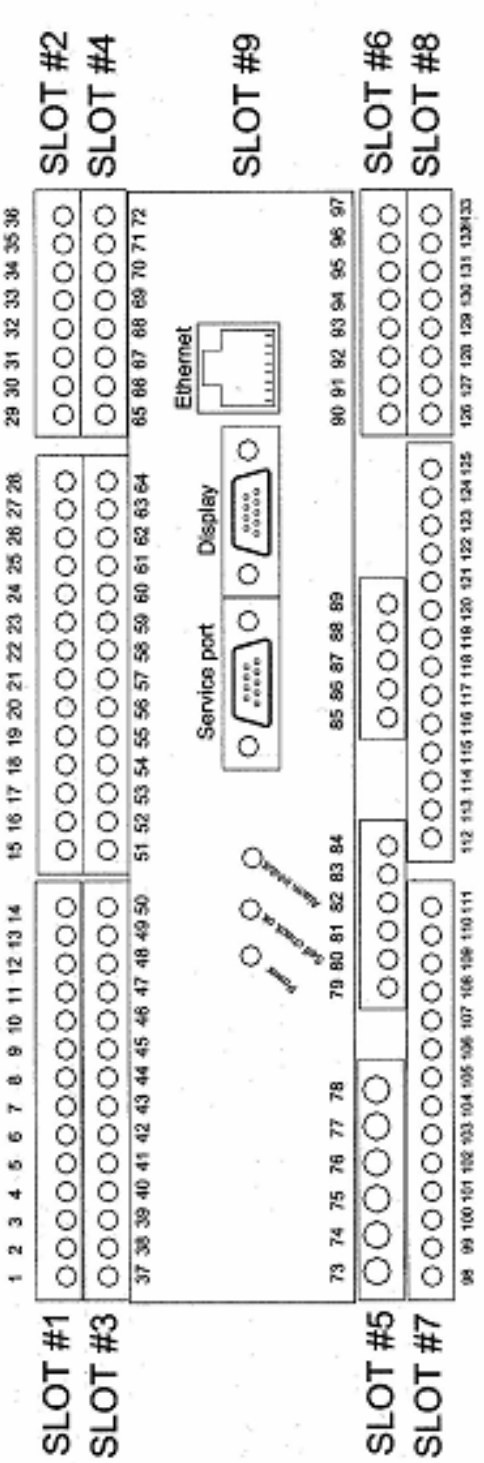
- Slot #1 Power supply and binary I/O 1-28	Standard
- Slot #2 Optional external communication 29-36	Option
- Slot #3 Load sharing control/I/O card 37-64	Standard
- Slot #4 Governor control analog outputs 65-72	Standard
- Slot #5 AC measuring 73-89	Standard
- Slot #6 Optional inputs/outputs 90-97	Option
- Slot #7 Engine interface card 98-125	Standard
- Slot #8 Engine communication 126-133	Standard
- Slot #9 Optional TCP/IP RJ45 conn.	Option

Besides the slots there is an additional board where the communication ports are placed.

- RS232 PC service port	Standard
- Display port	Standard

An overview of the terminals can be seen on the next page. The slots are positioned in the unit as follows (seen from the top of the unit):

Note:
The "Common terminal" is referring to the Power supply (+12/24VDC).



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

5.1 Slot #1, Power Supply and Binary I/O

Term.	*Function*	*Description*
1	+12/24 VDC	Power supply
2	0 VDC	
3	NC Status relay	Processor/power supply status supervision
4	Common terminal for terminal 3	
5	NO Relay	Central alarm HORN
6	Common terminal for terminals 5 and 7	
7	NC Relay	Central alarm HORN
8	NO Relay	Open mains breaker (open breaker)
9	Common terminal for terminals 8 and 10	
10	NC Relay	Open mains breaker (open breaker)
11	NO Relay	Close mains breaker (synchronising)
12	Common terminal for terminals 11 and 13	
13	NC Relay	Close mains breaker (synchronising)
14	NO Relay	Open generator breaker (deload)
15	Common terminal for terminals 14 and 16	
16	NC Relay	Open generator breaker (deload)
17	NO Relay	Close generator breaker (synchronising)
18	Common terminal for terminals 17 and 19	
19	NC Relay	Close generator breaker (synchronising)
20	Open collector 1	Transistor out Pulse output 1, kWh counter
21	Open collector 2	Transistor out Pulse output 2, kvarh counter
22	Common terminal for terminals 21 and 22	
23	Digital input 1	Optocoupler Alarm inhibit
24	Digital input 2	Optocoupler Mains breaker open
25	Digital input 3	Optocoupler Mains breaker closed
26	Digital input 4	Optocoupler Generator breaker open
27	Digital input 5	Optocoupler Generator breaker closed
28	Common terminal for terminals 23 to 27	

The functionality of the alarm inhibit input (terminal 23) is described in the table below:

Alarm inhibit input	*ON*	*OFF*
Generator low f	-	ACT
Generator low U	-	ACT
Generator high f	ACT	ACT
Generator high U	ACT	ACT
4…20 mA input	-	ACT
Binary input	-	ACT
VDO input	-	ACT
Tacho input	-	ACT

ACT = Alarm function is active
ON = Input is high

5.2 Slot #2, serial communication (optional)

Note: only 1 of the following options can be chosen: Can-open/Mod-bus/Profi-bus/Power Management

- Can-open:

Term.	*Function*	*Description*
29	Can-H	The can is based on can-open
30	GND	
31	Can-L	
32	Can-H	
33	GND	
34	Can-L	
35	Not used	
36	Not used	

- Mod-bus:

Term.	*Function*	*Description*
29	DATA + (A)	Mod-bus RTU, RS485
30	GND	
31	DATA - (B)	
32	DATA + (A)	
33	GND	
34	DATA - (B)	
35	Not used	
36	Not used	

- Profi-bus:

Term.	*Function*	*Description*
29	DATA + (B)	Pin 3 on 9 pole sub-D connector
30	GND	Pin 5 on 9 pole sub-D connector
31	DATA - (A)	Pin 8 on 9 pole sub-D connector
32	DATA + (B)	
33	GND	
34	DATA - (A)	
35	Not used	
36	Not used	

The serial communication line should be terminated between DATA + and DATA - with a resistor equal to the cable impedance. The terminals 29/32, 30/33 and 31/34 are internally connected on all communication PCBs.

Use shielded twisted pair cable.

- Power Management System

Term.	*Function*	*Description*
29	Can-H	Internal communication
30	GND	
31	Can-L	
32	Can-H	
33	GND	
34	Can-L	
35	Not used	
36	Not used	

The communication between Qc4001 units is used for power management purposes. With the Power Management System (PMS), the Can-bus is automatically integrated.

5.3 Slot #3, load sharing control, 13 binary inputs and 4 relay outputs

Term.	*Function*	*Description*
37	-5…0…5 VDC	Active load sharing line I/O
38	Common terminal for load sharing lines on terminals 37 and 39	
39	-5…0…5 VDC	Reactive load sharing I/O
40	-10…0…10 VDC	Frequency/active load set-point Input
41	Common terminal for terminals 40 and 42	
42	-10…0…10 VDC	Voltage/var/power factor/reactive load set point In.
43	Binary input 18	2nd Parameter set, not configurable
44	Binary input 19	3rd Parameter set, non configurable
45	Binary input 20	4th Parameter set, non configurable
46	Binary input 21	Configurable
47	Binary input 22	Configurable
48	Binary input 23	Configurable
49	Binary input 24	Configurable
50	Binary input 25	Configurable
51	Binary input 26	Configurable
52	Binary input 27	Configurable
53	Binary input 28	Configurable
54	Binary input 29	Configurable
55	Binary input 30	Configurable
56	Common terminal for terminals 43 to 55	
57	NO Relay 1	Configurable
58	Common terminal for terminal 57	
59	NO Relay 2	Configurable
60	Common terminal for terminal 59	
61	NO Relay 3	Configurable
62	Common terminal for terminal 61	
63	NO Relay 4	Configurable
64	Common terminal for terminal 63	

5.4 Slot #4, analogue outputs for governor and AVR control

Term.	*Function*	*Description*
65	Not used	
66	+/-20 mA out	Speed governor set-point output
67	0	
68	Not used	
69	Not used	
70	+/-20 mA out	AVR voltage set-point output
71	0	
72	Not used	

The analogue current outputs can, if needed, be converted to voltage using a resistor across the terminals (250 will convert the +/-20 mA into +/-5 VDC).

5.5 Slot #5, AC measuring

Term.	*Function*	*Description*
73	I L1 s1	Generator current L1 1/5A AC input
74	I L1 s2	
75	I L2 s1	Generator current L2 1/5A AC input
76	I L2 s2	
77	I L3 s1	Generator current L3 1/5A AC input
78	I L3 s2	
79	U L1	Generator voltage L1
80	Not used	
81	U L2	Generator voltage L2
82	Not used	
83	U L3	Generator voltage L3
84	U neutral	Generator voltage neutral
85	U L1	Mains/bus voltage L1
86	Not used	
87	U L2	Mains/bus voltage L2
88	Not used	
89	U L3	Mains/bus voltage L3

Note: Current inputs are galvanically separated. Max. 0.3 VA per phase.

Voltage measurements are for phase-to-phase voltages between 120VAC and 480VAC.

5.6 Slot #6, input/output cards (optional)

Note: only 1 of the following options can be chosen: 7 binary inputs /4 relay outputs/ 4 analogue inputs 4…20mA / Analogue transducer output.

- 7 binary inputs:

Term.	*Function*
90	Common for terminals 91 up to 97
91	Configurable Binary Input 17
92	Configurable Binary Input 16
93	Configurable Binary Input 15
94	Configurable Binary Input 14
95	Configurable Binary Input 13
96	Configurable Binary Input 12
97	Configurable Binary Input 11

- 4 relay outputs:

Term.	*Function*
90	NO Relay 1
91	Common for Terminal 90
92	NO Relay 2
93	Common for Terminal 92
94	NO Relay 3
95	Common for Terminal 94
96	NO Relay 4
97	Common for Terminal 96

- 4 analogue inputs 4…20mA:

Term.	*Function*
90	Common for Terminal 91
91	Analogue Input 5
92	Common for Terminal 93
93	Analogue Input 6
94	Common for Terminal 95
95	Analogue Input 7
96	Common for Terminal 97
97	Analogue Input 8

- Analogue transducer output:

These outputs are active outputs i.e. they use the internal power supply. The outputs are galvanically separated from each other and the rest of the Qc4001 unit. The individual output can be selected (in display or via Qc4001 Utility Software) to represent any AC measuring value or related values (e.g. power, power factor, frequency etc.).

For actual selection refer to the channel number 4500-4560.

Via software selection the outputs can be selected to be 0…20mA or 4…20mA.

Term.	*Function*
90	Not Used
91	Common for Terminal 92
92	Analogue Output 1
93	Not Used
94	Not Used
95	Common for Terminal 96
96	Analogue Output 2
97	Analogue Input 8

5.7 Slot #7, engine interface card

The engine interface board is installed in slot #7. It consists of configurable inputs and outputs. The configuration is done through the Qc4001 Utility Software and the default settings can be changed to the relevant settings. To configure the inputs, upload the parameter list from the Qc4001 and select the input to be configured. Then a configuration dialog box appears and the settings can be changed.
The standard title (e.g. 4...20 mA in no. 2) can be changed and the new title will also be shown in the display.

The minimum and maximum values of the 4...20 mA input can be adjusted:
- Value: Alarm value (e.g. 85°C)
- Min.: Value corresponding to 4 mA (e.g. 0°C)
- Max.: Value corresponding to 20 mA (e.g. 100°C)

The inverse proportional function is used when the input has inverse proportionality according to the measured value.
The inputs can be used for a high or low alarm. As a “high alarm” the alarm appears when the measured value is higher than the alarm limit, and as a “low alarm” the alarm appears when the measured values are lower than the alarm limit.

The relay outputs on slot #7 are used for engine control.
- Start
- Stop solenoid
- Start prepare

The binary inputs use 12/24 volt constant signal. They do not use pulse inputs.

Term.	*Function*	*Description/preconfiguration*
98	Analogue input	4…20 mA mains power input
99	Analogue input	GND for terminal 98
100	Analogue input 1	4…20 mA configurable input
101	Analogue input 1	GND for terminal 100
102	Analogue input 2	4…20 mA configurable input
103	Analogue input 2	GND for terminal 102
104	Resistive input 1	for VDO sensor
105	Resistive input 2	for VDO sensor
106	Resistive Input 3	for VDO sensor
107	Common ground for terminals 104-106	
108	Tacho Input	0.5…70VAC
109	Tacho Input	/10…10.000Hz
110	Binary Input 31	Remote Start/Stop
111	Binary input 32	W/L
112	Binary input 33	Disable Analogue Fuel Input
113	Binary Input 34	Static Battery Charger
114	Binary input 6	Access lock, not configurable
115	Binary input 7	Running feedback, not configurable
116	Binary input 8	External engine failure, configurable
117	Binary input 9	Emergency stop, not configurable
118	Binary input 10	Sprinkler, not configurable
119	Common terminal for terminals 110-118	
120	NO	Start relay
121	Common terminal for terminal 120	
122	NO	Run relay
123	Common terminal for terminal 122	
124	NO	Preheat relay
125	Common terminal for terminal 124	

The access lock input blocks the display functions, and the settings and parameters cannot be changed. The view windows are still accessible.

5.8 Slot #8, engine communication

Term.	*Function*	*Description*
126	Not used	
127	Not used	
128	Can-L	
129	GND	
130	Can-H	
131	Can-L	
132	GND	
133	Can-H	

Can-communication is possible with following engine electronics:

- MTU MDEC
- Detroit Diesel DDEC
- Deutz EMR
- Volvo EDCIII
- John Deere JDEC
- Scania ScaniaDec

The engine electronics' type is selectable through the Qc4001 Utility Software, so that the same hardware can be used for all.

6 Languages

The default language (= Master language) used in the Qc4001 is English.

Other available languages are:

- Danish
- Dutch
- Finnish
- French
- German
- Italian
- Norwegian
- Portuguese
- Spanish
- Swedish
- 1 extra language

It is possible for qualified Atlas Copco personnel to edit and/or add text and/or languages through the 'Qc4001 Utility Software'.
Only the Master language English text is non-editable.
For the other languages, empty 'textcells' will be foreseen where the translations can be filled in by qualified Atlas Copco personnel.

With the current type of LCDisplay, it is not possible to display other than Roman characters. For other languages please contact Atlas Copco.

7 Standard Modes

The Qc4001 is a protection and control unit for a generator driven by a diesel engine. It will carry out all necessary tasks to control and protect a gen-set, regardless of the use of the generator. This means that the Qc4001 can be used for several application types such as described in chapter 10.

It is possible to operate the Qc4001 in three modes. The required mode can be selected via a dedicated pushbutton.

7.1 AUTO mode

The Qc4001 controls the gen-set and the circuit breakers (generator breaker GB and mains breaker MB) automatically according to the operational state.

7.2 SEMI-AUTO mode

Manual control and activation of the sequences with the buttons on the LCDisplay.
The generator can be started/stopped manually.
The breakers can be closed/opened manually, but the module will check automatically synchronizing sequences.

7.3 Test mode

In this mode it is possible to enable/disable the synchronising feature.

When enabled:
- the gen-set will start-up
- the generator breaker will close after synchronizing
- the gen-set will take a defined load for a defined period
- the generator breaker will open
- the gen-set will cool down for a defined period
- the generator will stop.

When disabled:
- the gen-set will start-up
- the circuit breaker remains open
- the gen-set will run with no load for a defined period
- the gen-set stops.

The percentage of nominal load and running time can be programmed.
To go into the TEST mode, the lowest level password needs to be entered.

8 Standard Applications

It is possible to select 5 different applications (via display or configurator software).

8.1 AMF function

This application is only possible in combination with the AUTO mode.
If the SEMI-AUTO mode is selected, the AMF operation will NOT function !!

Installation with the Mains.
- Automatic starting of the gen-set
- Operation of the mains breaker MB and generator breaker GB
- Back synchronising of gen-set to mains when the mains returns
- Stopping of the gen-set

8.2 Peak Shaving

This application is possible in combination with the AUTO mode or SEMI-AUTO mode.
Installation with the Mains.

An optional Power Transducer is required.
- Automatic starting of the gen-set
- Operation of the mains breaker MB and generator breaker GB
- Load control
- Stopping of the gen-set

8.3 Island Mode

This application is possible in combination with SEMI-AUTO mode or AUTO mode with internal real time clock timer.

Installation is stand alone, never with the Mains.
- Operation of generator breaker GB.

8.4 Fixed Power

This application is possible in combination with SEMI-AUTO mode or AUTO mode with internal real time clock timer.

Installation is stand alone or with the Mains.
- Operation of generator breaker GB

8.5 Load Take Over

This application is possible in combination with SEMI-AUTO mode or AUTO mode with internal real time clock timer.

Installation is stand alone or with the Mains.
- Operation of the mains and generator breaker GB

8.6 Power Management System

This application is only possible in combination with the AUTO mode.
If the SEMI-AUTO mode is selected, the PMS operation will NOT function !!
An optional PMS circuit board inside the Qc4001 controller is required. This option cannot be added afterwards.

Installations are possible with stand alone generators or with the Mains (extra Qc4001 Mains is then needed):
- Operation of the generator breaker GB and Mains & Tie breaker
- Automatic start/stop function with multiple gensets depending on the load demand.

9 Single Genset use / Multi Genset use

Depending on the amount of generators in the installation, the customer can select between 5 or 6 applications:

9.1 Single Gen-set use

Only 1 generator in the installation.
Installation can be stand alone or with the Mains.

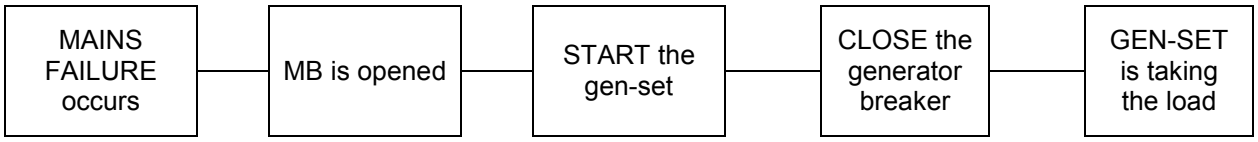
9.2 Multi gen-set use

More than 1 generator in the installation.
In practice up to 16 gen-sets can be installed in parallel.
Installation can be stand alone or with the Mains.

10 Application examples

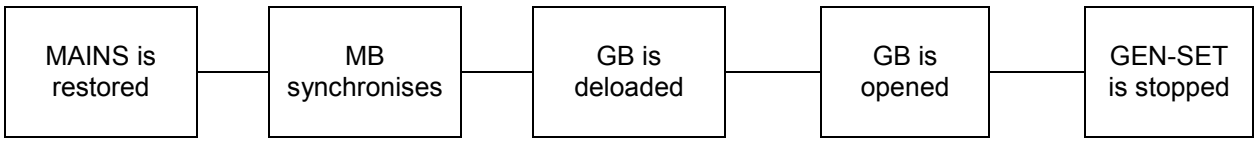
10.1 Automatic Mains Failure application with Single gen-set installation and with Back-syncronizing of the mains breaker MB

When the Qc4001 is operating in automatic mains failure operation, the following sequence will be run through in a mains failure situation:



The mains failure must be present in the period “FAIL DELAY” before the MB is opened. The timer “FAIL DELAY” will be reset each time when the mains is restored.

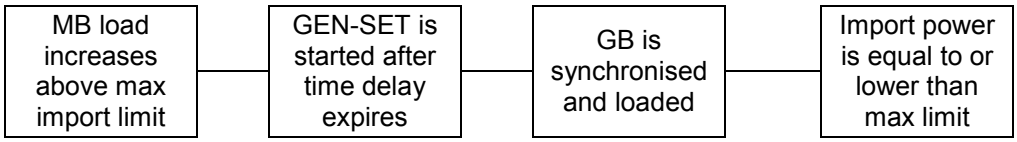
When the mains is restored the following sequence is run through:



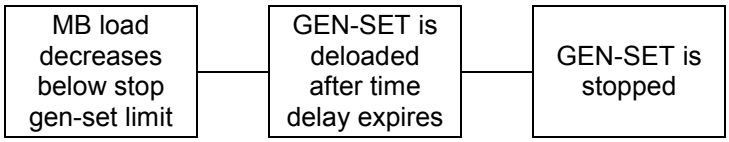
The mains must have been present in the period “MAINS OK DELAY” before the MB synchronises.
When the gen-set is running it will control the frequency and voltage to the nominal set point.

10.2 Peak Shaving operation with Single gen-set installation

When the Qc4001 is operating in peak shaving operation, the following sequence will be run through when the generator is in standby and the imported load increases above the configured limit:



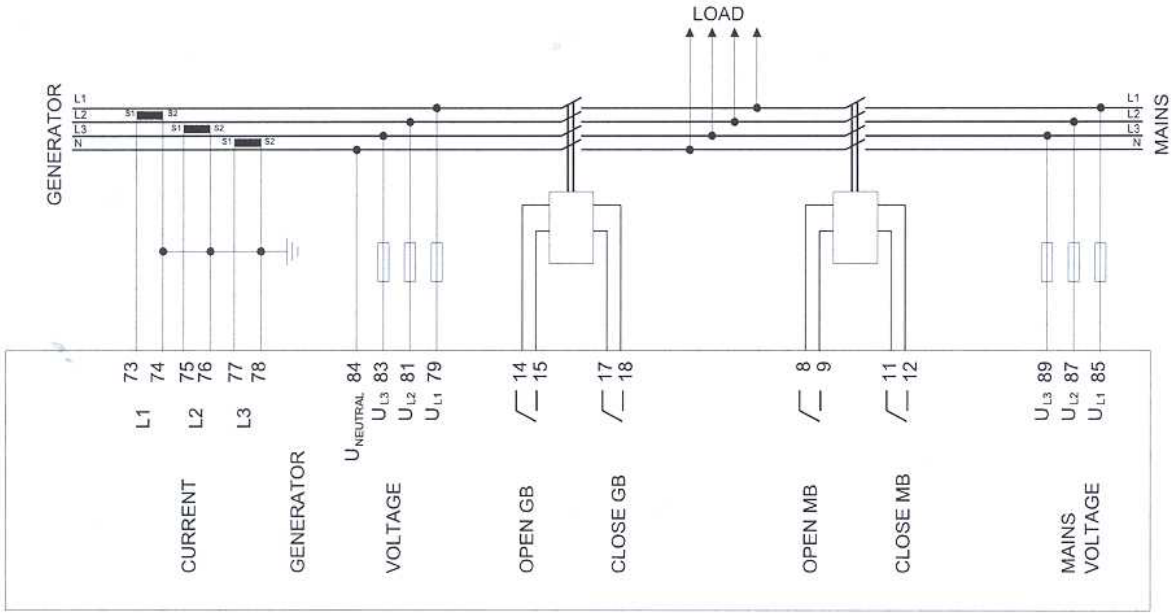
When the load decreases below the stop gen-set limit, the following sequence is run through:



When the gen-set is running it will be loaded between the minimum load limit (e.g. 5%) and the maximum nominal generator load.

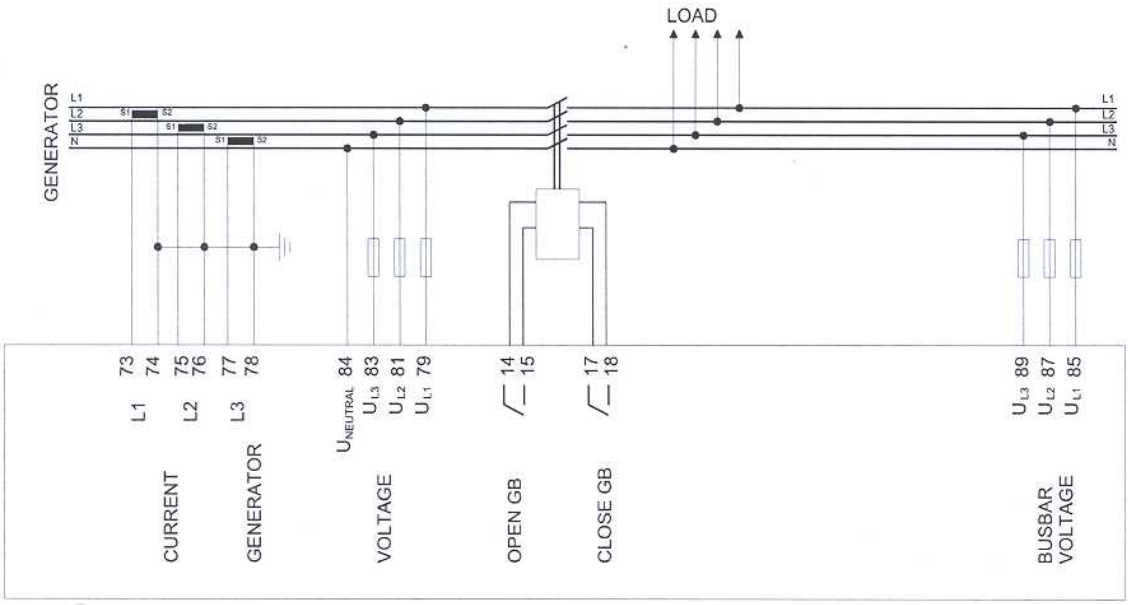
11 Wirings

11.1 Wiring for AMF, peak shaving, fixed power and load take over application



This drawing gives only a rough overview on the wiring. For details please see the correct circuit diagrams of the machine.

11.2 Wiring for Island and PMS mode application



This drawing gives only a rough overview on the wiring. For details please see the correct circuit diagrams of the machine.

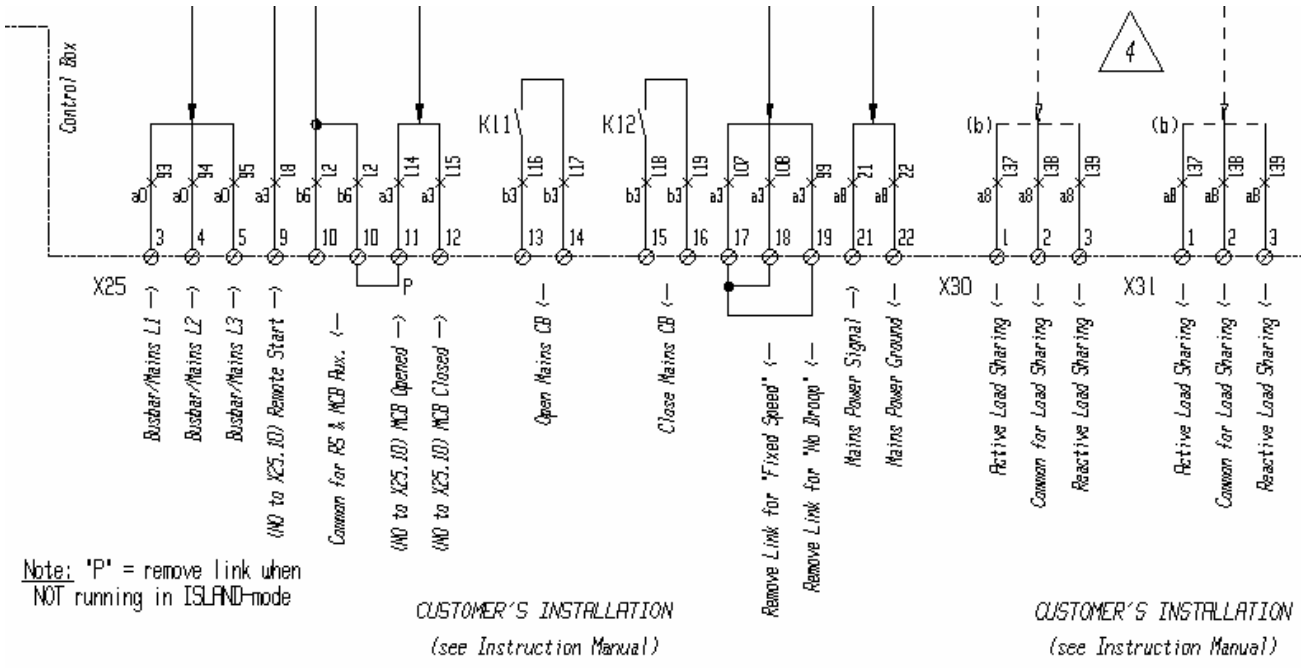
On the circuit diagrams you will find a terminal block (X25) where all the necessary connections have to be made.
The circuit diagram for QAC gen-sets is 9822 0952 54.

Below you see a detail of circuit diagram 9822 0990 52 for QIX gen-sets. Depending on the application the user has to connect the following wires:

- Mains sensing wires on X25.3 / X25.4 / X25.5
- Remote start signal on X25.9 / X25.10
- Mains breaker feedback wires on X25.11 / X25.12
- Mains breaker control wires on X25.13 / X25.14 / X25.15 / X25.16
- Mains power signal (from optional Power Transducer) on X25.21 / X25.22
- Active and reactive load sharing lines on X30.1 / X30.2 / X30.3 / X31.1 / X31.2 / X31.3

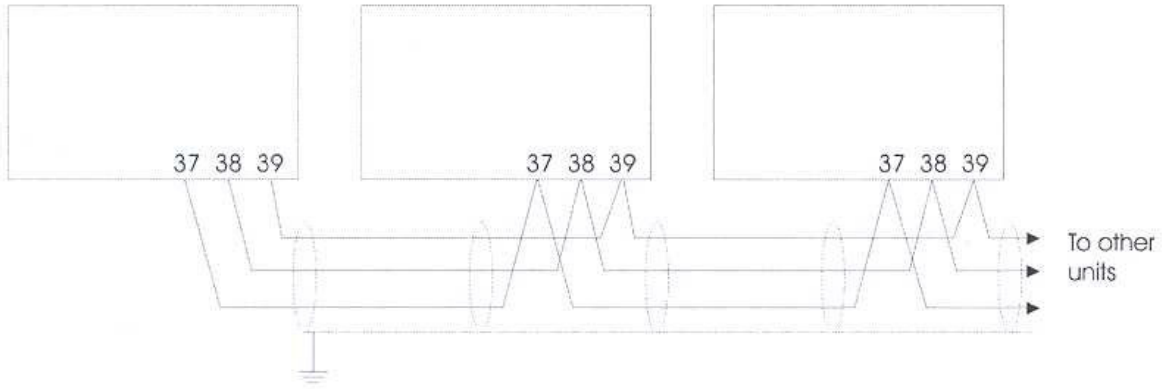
Important notes:

- Remove link between X25.10 / X25.11 when NOT running in Island Mode. The Qc4001 module always needs some feedback from the Mains Breaker MB. If you are in Island mode, then there is no mains breaker in the system. In this case we simulate the 'mains breaker open' signal with a bridge.
- Remove link between X25.17 / X25.19 for no droop operation. This is valid for the QIX gen-sets with EMR control. In parallel operation with other gen-sets or with mains, you need a frequency droop.



11.3 Load sharing lines

Even though screened cable is not needed, it is recommended if the cable run is longer than 5 m between units.



Remark :
*When the option PMS is installed these load sharing cables are **not** needed. The loads are shared through the PMS communication cable.*

11.4 Binary inputs

All binary inputs are 12/24 VDC bi-directional optocoupler.
The binary inputs use fixed signals. They do not use pulse signals.

11.5 Analogue inputs (external set-points)

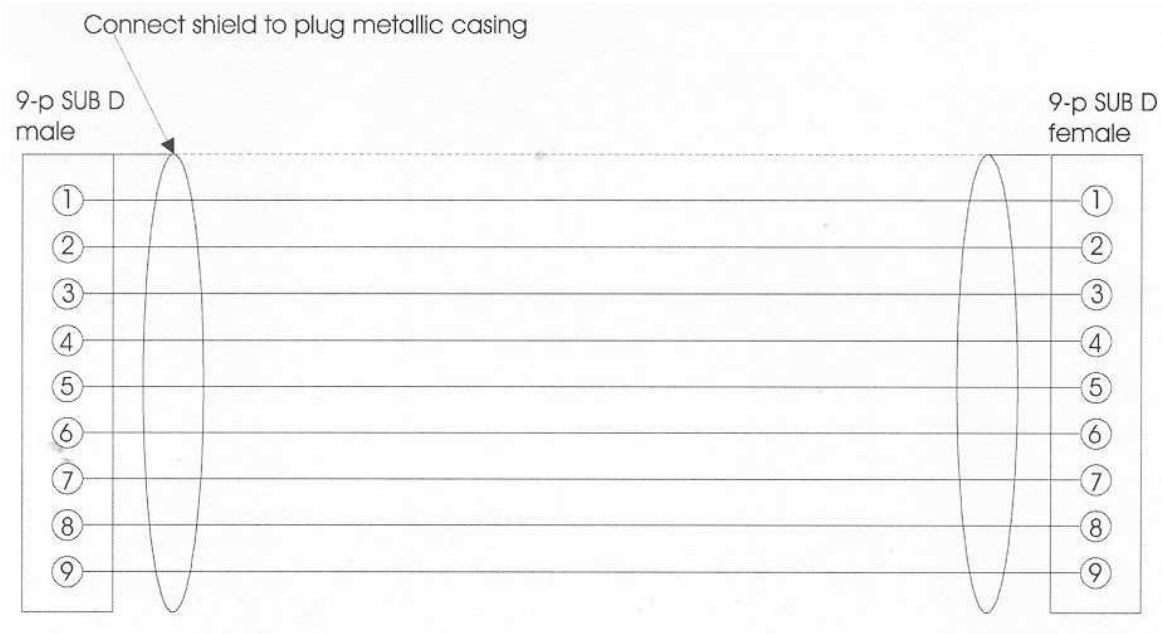
The set-point inputs are passive, i.e. an external power source is needed. This can be an active output from e.g. a PLC, or a potentiometer can be used.

11.6 Optocoupler outputs for external counter

The kWh counter (terminals 20-22) and kvarh counter (terminals 21-22) outputs are low-power outputs.

11.7 Display cable

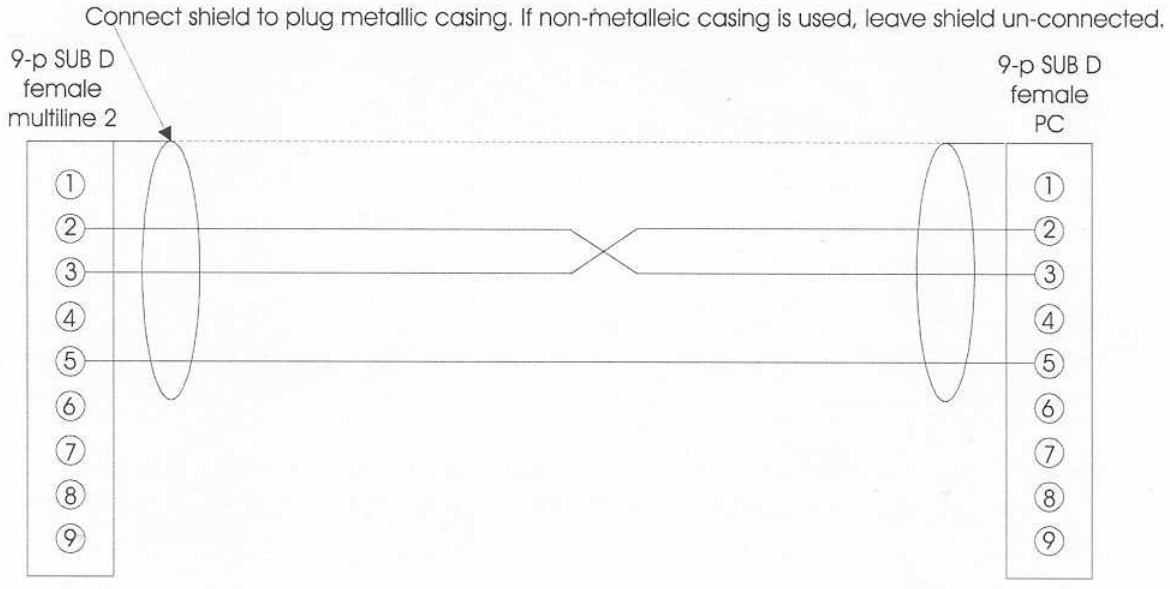
A standard computer extension cable can be used (9-pole SUB-D male/female plugs) or a cable can be tailored:
- Wires min. 0.22 mm²
- Max. cable length 6 m



Cable types: Belden 9540, BICC H8146, Brand Rex BE57540 or equivalent.

11.8 Serial cable for PC

A standard computer null-modem cable can be used (9-pole SUB-D female/female plugs) or a cable can be tailored.



12 Applications details for the Qc4001

This chapter shows the correct application configuration for the different use of the Qc4001. The following application configurations are possible:

Single gen-set	AMF operation	AUTO mode
		(SEMI-AUTO mode)*
	Island mode	AUTO mode
		SEMI-AUTO mode
	Peak shaving	AUTO mode
		SEMI-AUTO mode
	Fixed Power	AUTO mode
		SEMI-AUTO mode
	Load Take Over	AUTO mode
		SEMI-AUTO mode
Multi gen-sets	AMF operation	AUTO mode
		(SEMI-AUTO mode)*
	Island mode	AUTO mode
		SEMI-AUTO mode
	Peak shaving	AUTO mode
		SEMI-AUTO mode
	Fixed Power	AUTO mode
		SEMI-AUTO mode
	Load Take Over	AUTO mode
		SEMI-AUTO mode
	Power Management System	AUTO mode
		(SEMI-AUTO mode)*

( )* = the AMF and PMS operation will not function properly, when SEMI-AUTO mode is selected!

It is possible to use the Qc4001 for one of these purposes, or for peak shaving/fixed power/ load take over in combination with AMF.
The correct configuration can be set through the Qc4001 Utility Software or via the setup menu on the LCDisplay.

From each of the above applications the module can jump into the **Test mode**, by pushing the dedicated Test button on the LCDisplay. The gen-set will follow the defined Test sequences and afterwards the gen-set will return in its previous application, always in combination with the AUTO mode.

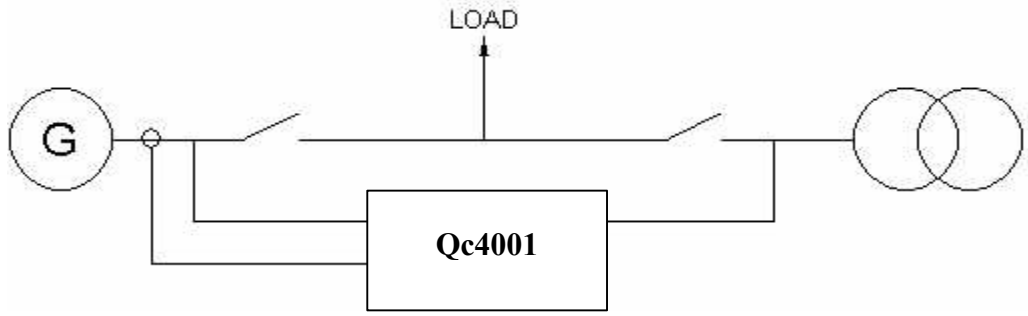
12.1 Single running gen-set

12.1.1 AMF operation

When the mains goes outside the user-defined voltage (over and under) or frequency (over and under) for a certain user-defined time, the mains will be disconnected and the gen-set will be started to take over the load.
When the mains is restored within the user-defined limits for a certain user-defined time, the gen-set will synchronise to the mains and deload the gen-set according a user defined ramp before disconnecting the gen-set (only if back-synchronisation feature is enabled)
The gen-set will then go into cool down and stop.

The generator is running in a system with only short simultaneous connection to other systems.

It is possible to enable/disable the back synchronisation feature.



Related customer settings:

- Check that the module is in AUTO mode — pushbutton on display
- Gen-set mode (=application) — channel 4320
- Cool down setting — channel 4400
- Mains V failure — channel 4420
- Mains Hz failure — channel 4430
- Back synchronisation setting of Mains breaker — channel 4440

Related customer wirings:

- Mains sensing lines L1 / L2 / L3.
- Wires for control and feedback of the Mains breaker.

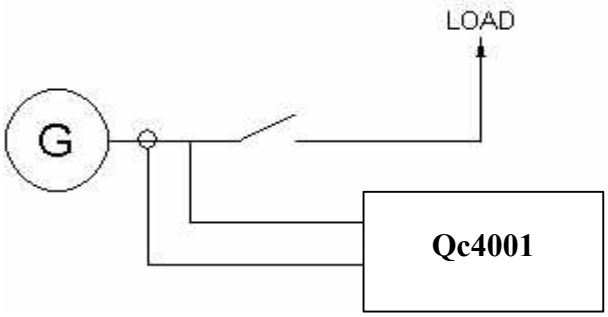
For details on all setpoints, see the setpoint list.
For details on the wirings, see the circuit diagram.

12.1.2 Island operation

In combination with SEMI-AUTO mode: The gen-set can be started/stopped wih a local start command. The breaker can be closed/opened with a local command (= LOCAL START).

In combination with AUTO mode: The gen-set can be started/stopped with a remote start command (= REMOTE START).
This can be a command through a signal from the internal real time clock.
This can be a command through a binary input. When an external hard-wired switch (connected to this dedicated input) is closed, the unit will start up and the generator breaker will be closed. When this external switch is opened again, the unit will open the generator circuit breaker and stop.

The generator is running in a system without simultaneous connection to other systems.



Related customer settings:

- Select the correct mode (Semi-auto/Auto) — pushbutton on display
- Gen-set mode (=application) — channel 4320
- Cool down setting — channel 4400
- Start command through internal real time clock — channel 4710 - 4780
- Stop command through internal real time clock — channel 4710 - 4780

Related customer wirings:

- Remote Start switch towards the dedicated binary input

For details on all setpoints, see the setpoint list.
For details on the wirings, see the circuit diagram.

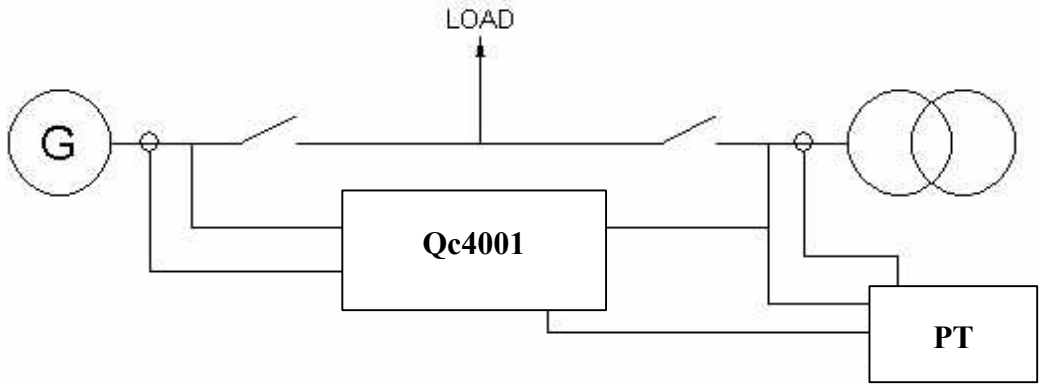
12.1.3 Peak Shaving application

In combination with AUTO mode:
The gen-set will start up when the mains imported power (measured through an optional Power Transducer PT) exceeds a user-defined level. The gen-set will synchronise with the bus, and will take load according a user-defined ramp until the user-defined allowable mains imported power level is reached.
When the mains imported power decreases below the user-defined mains imported power level for a user-definable time, the gen-set will deload according a user-defined ramp and disconnect from the bus. Then the gen-set will go into cooldown.
It is possible to define two levels of max. mains imported power: 'day' level and 'night' level.

In combination with SEMI-AUTO mode:
The gen-set starts up once a local start command is given. The gen-set breaker closes once the local command is given, and the synchronisation is done. The gen-set will take load only if the mains imported power exceeds a user-defined level.
The gen-set breaker can be opened and the gen-set stopped with a local command.

The generator is running in a system with long simultaneous connection to other systems.

It is possible to enable/disable AMF as a second application when the gen-set is in the peak shaving application. With AMF enabled, the gen-set will always guard the mains and will act as an AMF unit when not active as a peak shaving gen-set.
It is possible to enable/disable the back synchronisation feature.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Power ramp up / ramp down	channel 2110 - 2120
- Mains imported power level	channel 3010
- Daytime period	channel 3020
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Back synchronisation setting of Mains breaker	channel 4440
- Enable/disable AMF as 2nd application	channel 4440

Related customer wirings:
- Power Transducer lines
- Wires for control and feedback of the Mains breaker

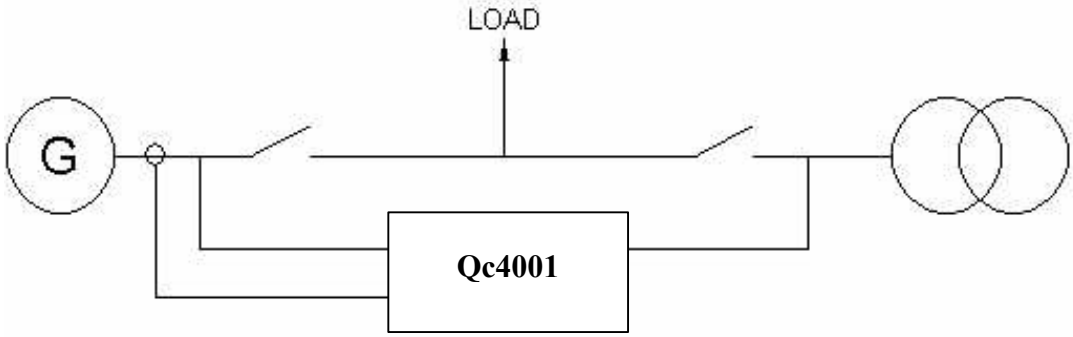
For details on all setpoints, see the setpoint list.
For details on the wirings, see the circuit diagram
For more information on the Power Transducer option, please contact Atlas Copco.

12.1.4 Fixed Power

In combination with SEMI-AUTO mode:
The gen-set will start up on a local command. The gen-set will synchronise with the mains, it will connect with the bus and it will take load according to a user-defined level and according a user-defined ramp.
Stopping on a local command will deload the gen-set according a user-defined ramp and disconnect the gen-set from the bus. Then the gen-set will go into cooldown and stop.

In combination with AUTO mode:
The gen-set will go through the same sequences once a remote command is given.
This can be a command through a signal from the internal real time clock.
Or this can be a command through a binary input. When an external hard-wired switch (connected to this dedicated input) is closed, the unit will start up and the generator breaker will be closed. When this external switch is opened again, the unit will open the generator circuit breaker and stop.

It is possible to enable/disable AMF as a second application when the gen-set is in fixe power application. With AMF enabled, the gen-set will always guard the mains and will act as an AMF unit when not active as a fixed power gen-set.
It is possible to enable/disable the back synchronisation feature.
The generator is running in a system with long simultaneous connection to other systems.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Power ramp up / ramp down	channel 2110 - 2120
- Fixed Power setpoint	channel 3080
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Back synchronisation setting of Mains breaker	channel 4440
- Enable/disable AMF as 2nd application	channel 4440
- Start command through internal real time clock	channel 4710 - 4780
- Stop command through internal real time clock	channel 4710 - 4780

Related customer wirings:

- Remote Start switch towards the dedicated binary input.
- Wires for control and feedback of the Mains breaker.

For details on all setpoints, see the setpoint list.
For details on the wirings, see the circuit diagram.

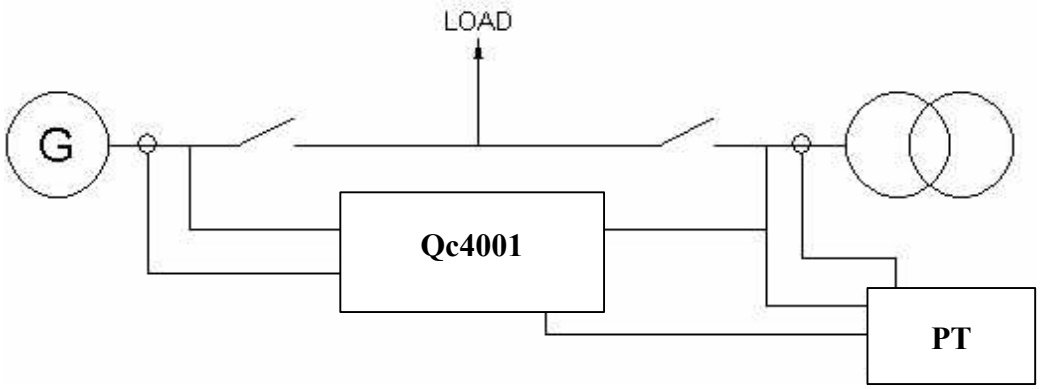
12.1.5 Load Take Over

In combination with SEMI-AUTO mode:
The gen-set will start up on a local command. The gen-set will synchronise with the mains, it will connect with the bus, and it will take over the load according a user-defined ramp and disconnect the mains. To know if the load is completely taken over from the mains, an optional Power Transducer (PT) is necessary.
After a local stop command, the gen-set will synchronise again to mains, connect the bus to mains, deload the gen-set according a user-defined ramp and disconnect the gen-set from the bus. Then the gen-set will go into cooldown and stop.

In combination with AUTO mode:
The gen-set will go through the same sequences once a remote command is given.
This can be a command through a signal from the internal real time clock.
Or this can be a command through a binary input.

It is possible to enable/disable AMF as a second application when the gen-set is in the Load Take Over application. With AMF enabled, the gen-set will always guard the mains and will act as an AMF unit when not active as a Load Take Over gen-set.
It is possible to enable/disable the back synchronisation feature.

The generator is running in a system with short simultaneous connection to other systems.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Power ramp up / ramp down	channel 2110 - 2120
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Back synchronisation setting of Mains breaker	channel 4440
- Enable/disable AMF as 2nd application	channel 4440
- Start command through internal real time clock	channel 4710 - 4780
- Stop command through internal real time clock	channel 4710 - 4780

Related customer wirings:

- Remote Start switch towards the dedicated binary input
- Wires for control and feedback of the Mains breaker
- Wires from the optional Power Transducer

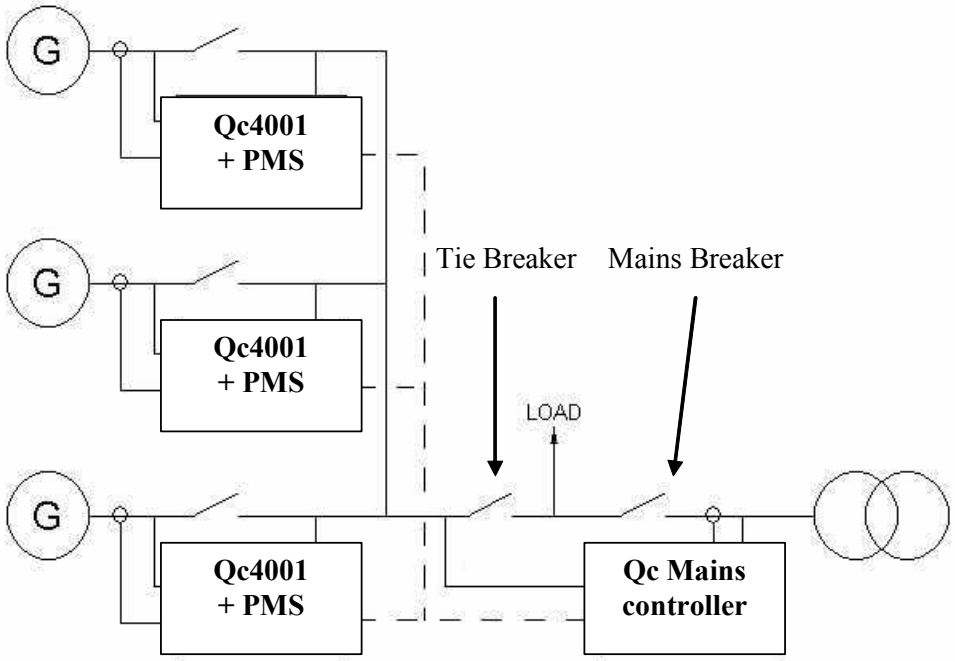
For details on all setpoints, see the setpoint list.
For details on the wirings, see the circuit diagram.
For more information on the Power Transducer option, please contact Atlas Copco.

12.2 Multi running gen-sets

12.2.1 AMF operation (optional)

It is possible to have an optional power management system (PMS) that allows communication between the Qc4001 modules over CAN-bus. It has fully intelligent system which will start up all gen-sets in case of a mains failure, and then stops and starts gen-sets according to the actual load and according to each gen-set's status.
It is possible to do this kind of intelligent load sharing between up to 16 Qc4001 controllers (all equipped with this PMS option). This PMS option needs to be installed from the factory and can not be added in the field !

The generators are running in a system with only short simultaneous connection to other systems. For the correct working all the generator Qc4001 controllers need to be programmed in AMF – AUTO mode and the Qc4001 mains controller has to put in AMF – AUTO mode. An complete overview on the parameters that needs to be programmed in both controllers you can find below.



Related customer settings Qc4001 controller genset :

- Check that the module is in AUTO mode	pushbutton on display
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Application	channel 5000
- Int. Communication ID	channel 3110
- PMS configuration	channel 3100
- Priority Select	channel 3120
- Stop Noncon. Gen-sets	channel 3240
- Running hours priority selection	channel 3220
- Manual priority selection	channel 3160 - 3180
- Number of ID’s	channel 3130 - 3150
- Load dependent start	channel 3050
- Load dedendent stop	channel 3060

Extra related customer settings Qc4001 Mains controller :

- Mains V failure channel 4420
- Mains Hz failure channel 4430
- Back synchronisation setting of Mains breaker channel 4440
- Power capacity set-point channel 3250
- Tie breaker channel 3260
- Application channel 5000

Remark :

The Qc4001 controller of the generators and the Qc4001 mains controller are **NOT** the same controllers. It is not possible to mutual exchange the 2 controllers !

Related customer wirings:

- Mains sensing lines L1 / L2 / L3.
- Wires for control and feedback of the Mains and Tie breaker.
- PMS communication lines.

For more details on related customer settings, see the setpoint list.
For more details on related customer wirings, see circuit diagram.
For more details on the PMS option, see 12.2.6.

12.2.2 Island operation

In combination with SEMI-AUTO mode:
Starting up and loading generators can be done through local commands on the LCDisplays of each unit. For each extra generator that is started, the breaker will close once the local command is given and the synchronisation is done.

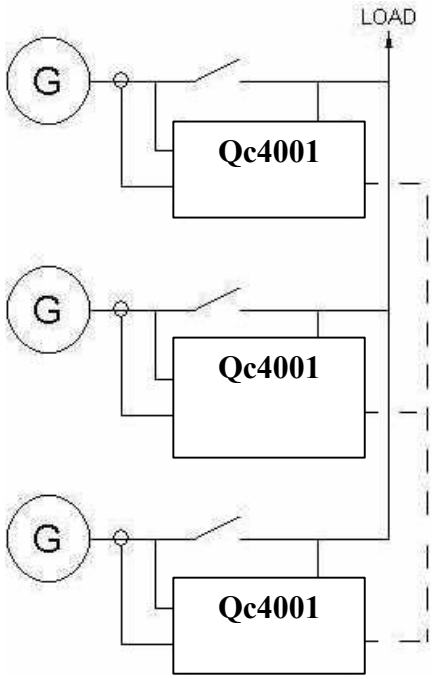
In combination with AUTO mode:
Starting up and loading generators can be done through a remote command. This can be a command through a signal from the internal real time clock. Or this can be a command through a binary input.

The load sharing will be done through the analogue load sharing lines.
It is possible to do load sharing between up to 8 gen-sets.
This 'analogue' load sharing is compatible with the Barber Colman Pow-R-Con. This means that old gen-sets can be parallelled with new gen-sets.

Optional it is possible to have a power management system (PMS) which allows communication between the Qc4001 modules over CAN-bus and to have a fully intelligent system which can determine which gen-sets to start and stop, according to the actual load and to each gen-set's status. It is possible to do this kind of intelligent load sharing between up to16 Qc4001 controllers (all equipped with this PMS option).

Remark :
When paralleling generators with PMS, it is no longer necessary to use the analogue load sharing lines. This will be done through the PMS communication lines.

The generators are running in a system without simultaneous connection to other systems.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Start command through internal real time clock	channel 4710 - 4780
- Stop command through internal real time clock	channel 4710 - 4780

Extra related settings if the PMS option is added :

- Application	channel 5000
- Int. Communication ID	channel 3110
- PMS configuration	channel 3100
- Priority Select	channel 3120
- Stop Noncon. Gen-sets	channel 3240
- Running hours priority selection	channel 3220
- Manual priority selection	channel 3160 - 3180
- Number of ID's	channel 3130 - 3150
- Load dependent start	channel 3050
- Load dedendent stop	channel 3060

Related customer wirings:

- Remote Start switch towards the dedicated binary input
- PMS communication lines

For more details on related customer settings, see the setpoint list.
For more details on related customer wirings, see circuit diagram.
For more details on the PMS option, see 12.2.6.

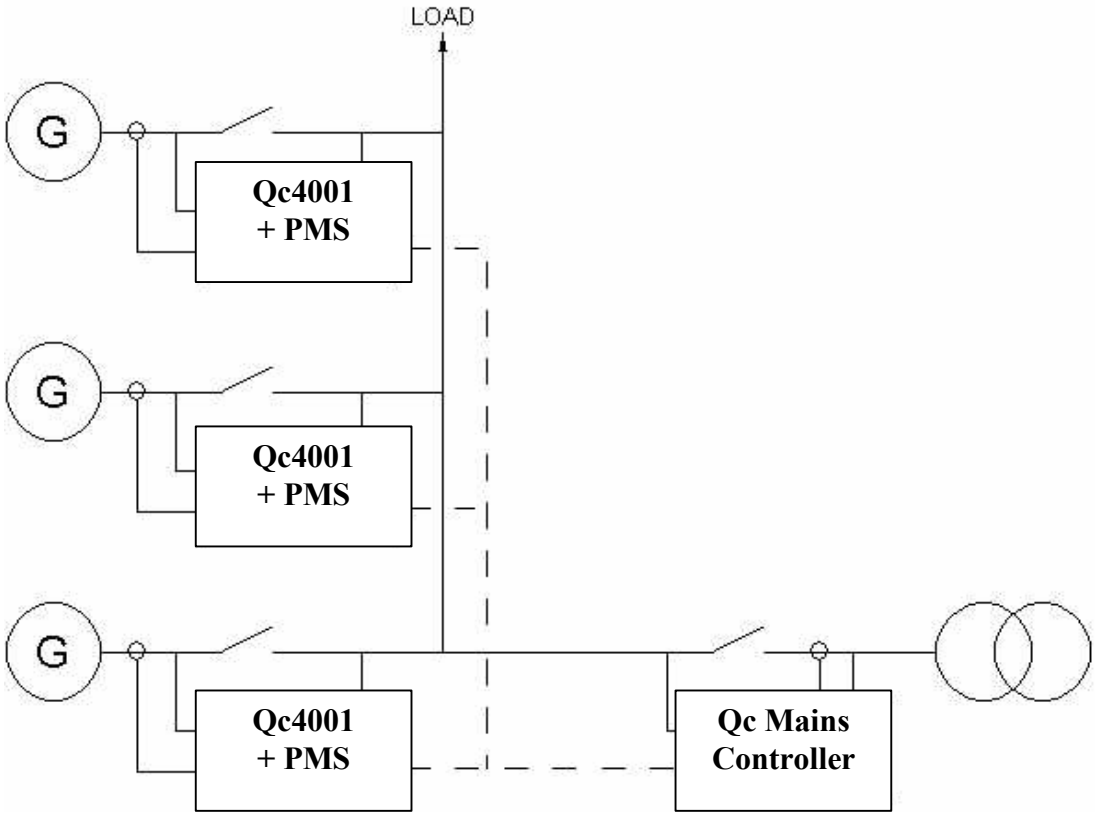
12.2.3 Peak Shaving (optional)

It is possible to have an optional power management system (PMS) which allows communication between the Qc4001 modules over CAN-bus and to have a fully intelligent system which will start and stop the necessary gen-set(s) to limit the imported mains power (measured through an optional Qc4001 Mains controller module) according the user-defined level.
It is possible to define 2 levels of max mains imported power: ‘day’ level and ‘night’ level.
It is possible to do this kind of intelligent peak shaving with up to 16 Qc4001 controllers (all equipped with this PMS option).

The generators are running in a system with long simultaneous connection to other systems.

It is possible to enable/disable AMF as a second application when the gen-sets are in this peak shaving application.
With AMF enabled, the gen-sets will always guard the mains and will act as AMF units when not active as peak shaving gen-sets (extra Tie breaker is needed; see 12.2.1).

It is possible to enable/disable the back synchronisation feature.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Power ramp up / ramp down	channel 2110 - 2120
- Mains imported power level	channel 3010
- Daytime period	channel 3020
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Back synchronisation setting of Mains breaker	channel 4440
- Enable/disable AMF as 2nd application	channel 4440
- Application	channel 5000
- Int. Communication ID	channel 3110
- PMS configuration	channel 3100
- Priority Select	channel 3120
- Stop Noncon. Gen-sets	channel 3240
- Running hours priority selection	channel 3220
- Manual priority selection	channel 3160 - 3180
- Number of ID's	channel 3130 - 3150
- Load dependent start	channel 3050
- Load dedendent stop	channel 3060

Related customer wirings:

- Mains sensing lines L1 / L2 / L3
- Wires for control and feedback of the Mains breaker
- PMS communication lines

For more details on related customer settings, see the setpoint list.
For more details on related customer wirings, see circuit diagram.
For more details on the PMS option, see 12.2.6.

12.2.4 Fixed Power (optional)

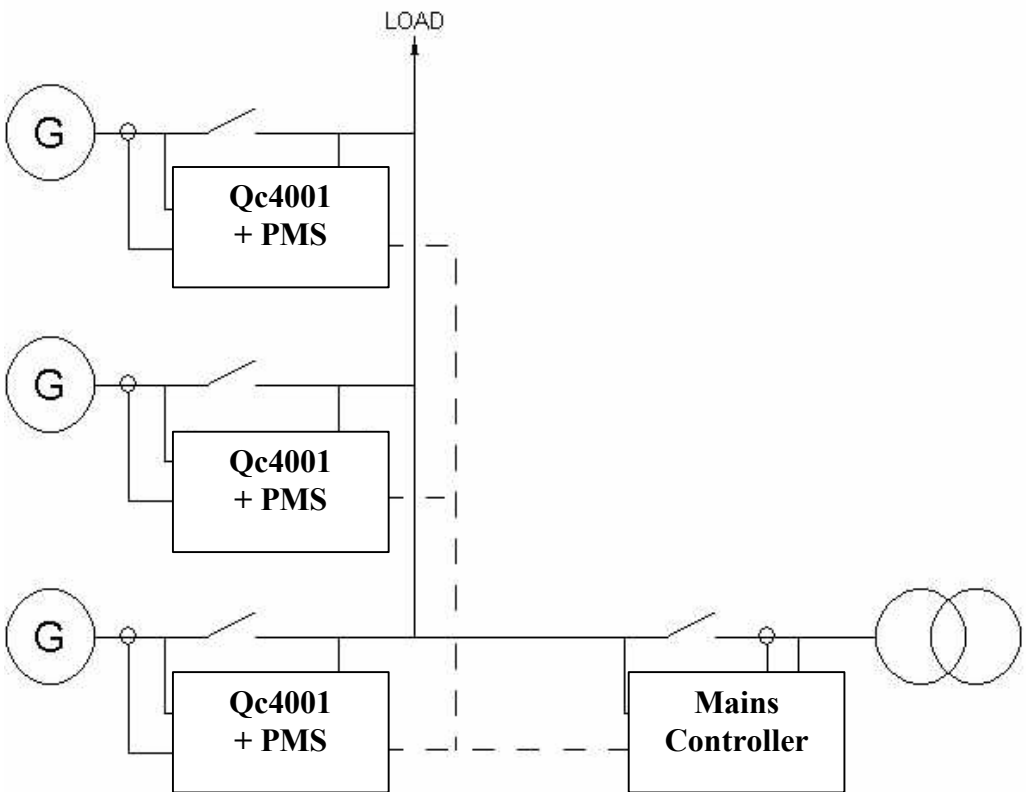
It is possible to have an optional power management system (PMS) which allows communication between the Qc4001 modules over CAN-bus and to have a fully intelligent system which will start up the necessary gen-set(s) when a start signal is given, synchronise the gen-set(s) with the mains, connect the gen-set(s) with the bus and load according a user-defined ramp to meet the user-defined fixed load.
When a stop signal is given, the gen-set(s) will be deloaded according a user-defined ramp and they will be disconnected from the bus. The gen-set(s) will go into cooldown and stop.

The start and stop signals can be local commands (in combination with SEMI-AUTO mode), or remote commands from the binary input or from the internal real time clock (in combination with AUTO mode).
It is possible to do this kind of intelligent fixed loading with up to 16 QC4001 controllers (all equipped with this PMS option).

The generators are running in a system with long simultaneous connection to other systems.

It is possible to enable/disable AMF as a second application when the gen-sets are in this fixed power application. With AMF enabled, the gen-sets will always guard the mains and will act as AMF units when not active as a fixed power gen-sets (extra Tie breaker is needed; see 12.2.1).

It is possible to enable/disable the back synchronisation feature.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Power ramp up / ramp down	channel 2110 - 2120
- Fixed Power setpoint	channel 3080
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Back synchronisation setting of Mains breaker	channel 4440
- Enable/disable AMF as 2nd application	channel 4440
- Start command through internal real time clock	channel 4710 - 4780
- Stop command through internal real time clock	channel 4710 - 4780
- Application	channel 5000
- Int. Communication ID	channel 3110
- PMS configuration	channel 3100
- Priority Select	channel 3120
- Stop Noncon. Gen-sets	channel 3240
- Running hours priority selection	channel 3220
- Manual priority selection	channel 3160 - 3180
- Number of ID's	channel 3130 - 3150
- Load dependent start	channel 3050
- Load dedendent stop	channel 3060

Related customer wirings:

- Mains sensing lines L1 / L2 / L3
- Remote Start switch towards the dedicated binary input
- Wires for control and feedback of the Mains breaker
- PMS communication lines

For more details on related customer settings, see the setpoint list.
For more details on related customer wirings, see circuit diagram.
For more details on the PMS option, see 12.2.6.

12.2.5 Load Take Over (optional)

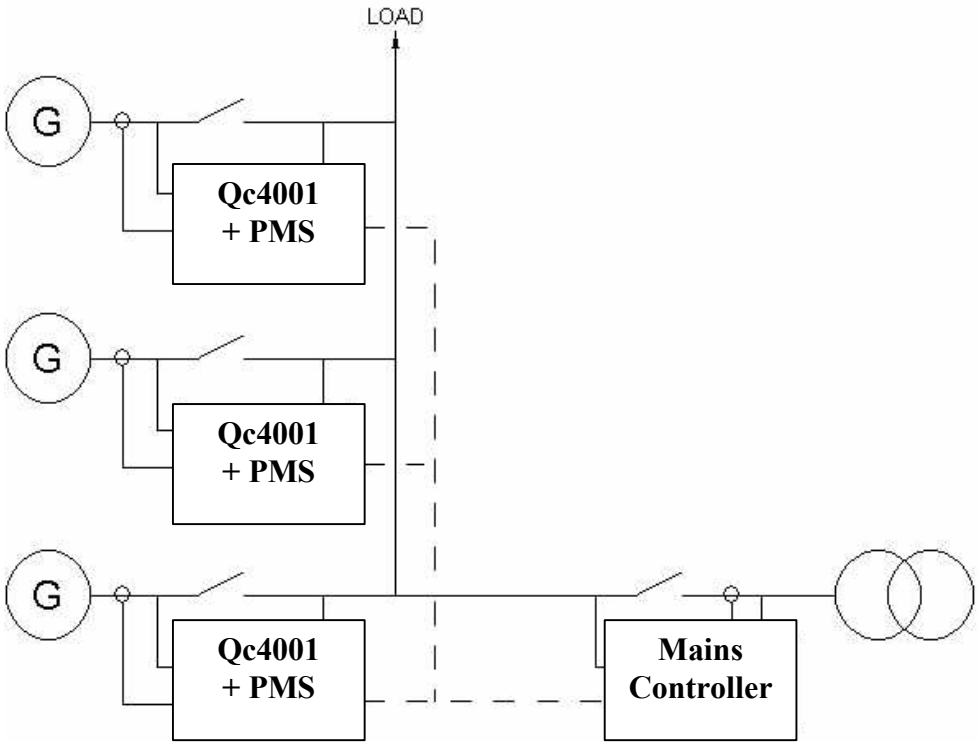
It is possible to have an optional power management system (PMS) which allows communication between the Qc4001 modules over CAN-bus and to have a fully intelligent system which will start the necessary gen-set(s) on a local command or remote command, synchronise the gen-set(s) to mains, connect to the bus, take over the load according a user defined ramp and disconnect mains.
This intelligent system will start and stop gen-sets to meet the actual load.
After a local command or remote stop command, the gen-set(s) will synchronise to mains, connect the bus to mains, deload the gen-set(s) according a user defined ramp and disconnect the gen-set from the bus. Then the gen-set(s) will go into cooldown and stop.
It is possible to do this kind of intelligent load take over with up to 16 Qc4001 controllers (all equipped with this PMS option).

The local commands can be given when the module is in SEMI-AUTO mode.
The remote commands can be given when the module is in AUTO mode. This can be through the binary input or through a signal from the internal real time clock.

The generator is running in a system with short simultaneous connection to other systems.

It is possible to enable/disable AMF as a second application when the gen-sets are in this Load Take Over application. With AMF enabled, the gen-sets will always guard the mains and will act as AMF units when not active as Load Take Over gen-sets (extra Tie breaker is needed; see 12.2.1).

It is possible to enable/disable the back synchronisation feature.



Related customer settings:

- Select the correct mode (Semi-auto/Auto)	pushbutton on display
- Power ramp up / ramp down	channel 2110 - 2120
- Gen-set mode (=application)	channel 4320
- Cool down setting	channel 4400
- Back synchronisation setting of Mains breaker	channel 4440
- Enable/disable AMF as 2nd application	channel 4440
- Start command through internal real time clock	channel 4710 - 4780
- Stop command through internal real time clock	channel 4710 - 4780
- Application	channel 5000
- Int. Communication ID	channel 3110
- PMS configuration	channel 3100
- Priority Select	channel 3120
- Stop Noncon. Gen-sets	channel 3240
- Running hours priority selection	channel 3220
- Manual priority selection	channel 3160 - 3180
- Number of ID's	channel 3130 - 3150
- Load dependent start	channel 3050
- Load dependent stop	channel 3060

Related customer wirings:

- Mains sensing lines L1 / L2 / L3
- Remote Start switch towards the dedicated binary input
- Wires for control and feedback of the Mains breaker
- PMS communication lines

For more details on related customer settings, see the setpoint list.
For more details on related customer wirings, see circuit diagram.
For more details on the PMS option, see 12.2.6.

12.2.6 Power Management System (optional)

PMS (= Power Management System) is a system that will automatically start & stop generators based on the actual load dependency. This will be done through a PMS communication between the different units connected.
PMS applications are always in combination with AUTO mode. The Qc4001 controllers from the gensets need to be programmed as PMS in AUTO mode. When a Qc Mains controller is installed this needs to be programmed in the application that is required (AMF, LTO, Fixed power) and AUTO mode.

Warning:
By programming the parameters in AUTO mode, the generator can start up immediately. It is recommended to place the generator in SEMI-AUTO mode while programming all the PMS parameters !

In an application with PMS it is important to program correctly the Start & Stop signals between the different generators because of the following reasons:

- The maximum load step needs to be programmed in the Qc4001 controllers. This never may exceeds the power reserve of the running generators. Otherwise the gensets will go in overload with a sudden max. load increase before the next generator is started up and connected to the busbar.
- To prevent the gensets to run in a start – stop loop.

The start signal is the value of the maximum required load step
The stop signal is the value when the generator should be stopped automatically.

Example :
Installation with 3 gensets : G1 = 300 kW; G2 = 200 kW; G3 = 200 kW

- Start signal is set at 90kW (Maximum load step < 90kW)
  Start signal if :

Total Power needed > (Total available power of running gensets –setpoint start signal)

Only G1 is running; at 210kW load (300kW – 90kW) => **G2 will be started**
G1 & G2 are running; at 410kW load (200kW + 300kW –90kW) => **G3 will be started**

- Stop signal is set at 100kW and priority is set as (high) G1 > G2 > G3 (low)
  Stop signal if :

> *Total Power needed < (Total available power of running gensets – Power of generator with lowest priority – setpoint stop signal)*

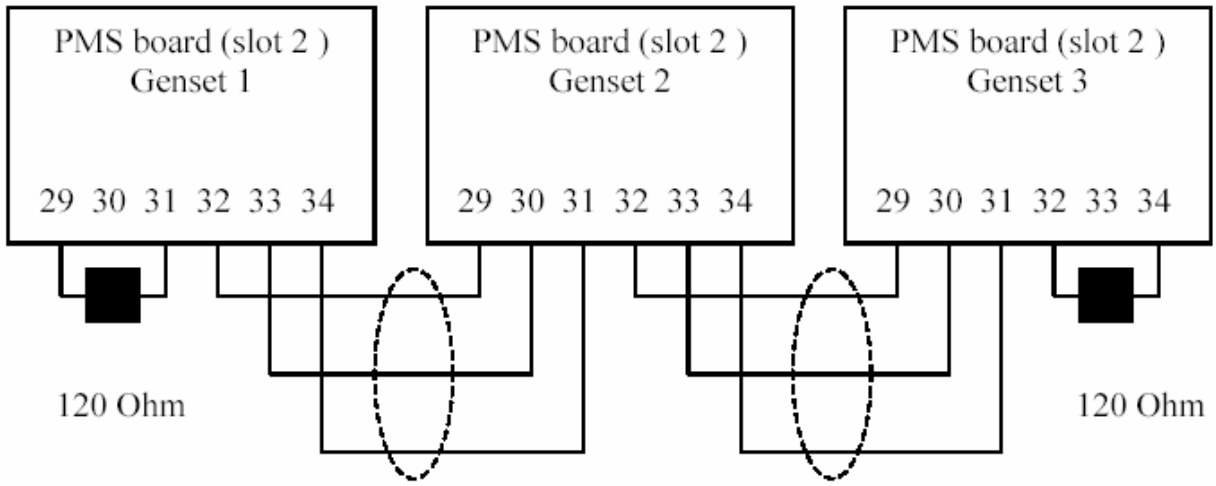
G1&G2&G3 are running; at 400kW (700kW – 200kW –100kW) => **G3 will be stopped**
G1&G3 are running; at 200kW (500kW – 200kW – 100kW) => **G2 will be stopped**

The priority on starting & stopping the generators can be chosen on priority settings or on the amount of running hours. In manual mode the start & stop sequence is determent by the chosen priority between the generators. The generator with the lowest priority will start as the latest genset and will stop as first. If running hours are chosen as priority the start & stop sequence will be defined based on the actual running hours of the different generators. The lowest running hours will get the highest priority.

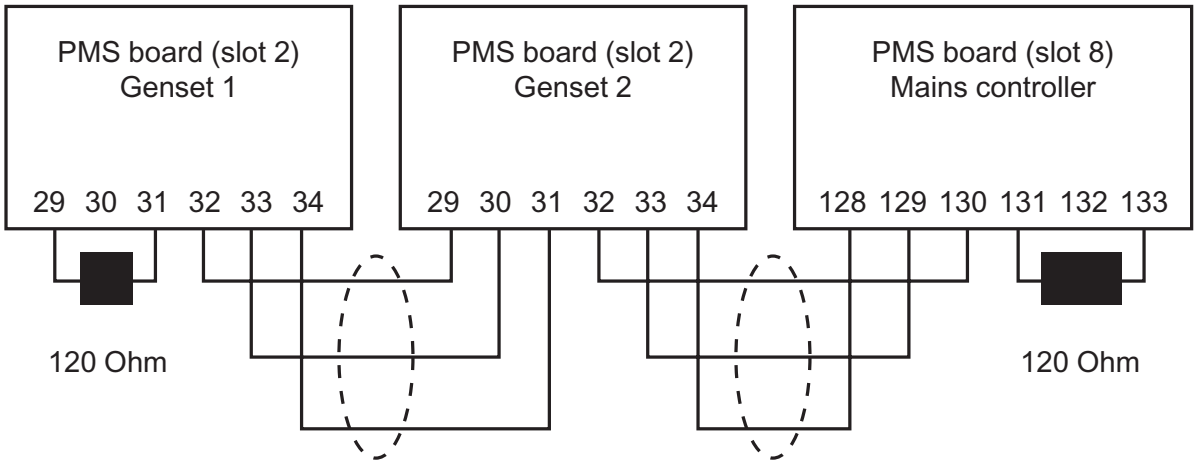
Remark :

When paralleling generators with PMS, it is no longer necessary to use the analogue load sharing lines. This will be done through the PMS communication lines. Use a screened CAN communication cable with a maximum total distance of 200 meters. Do not connect the cable screen to the ground ! Use a 120 Ohm resistor at both end controllers of the PMS as described in the drawings below.

The connections between the generators Qc4001 controllers (without the Qc mains controller) :



The connections for PMS between the generator and the Qc mains controller :



13 Remote control via www (optional)

It is possible to communicate with the Qc4001 through the world wide web or local intranet. To be able to use this feature, one Qc4001 must be installed with the optional TCP/IP hardware, and all Qc4001 modules must be installed with the optional Can-bus communication (standard when PMS option installed).
The communication with the world wide web is done through the TCP/IP unit.
This unit communicates through fieldbus with the other units in the system.
The web pages show the installation with the gen-sets, the breakers and the Qc4001 units.

Clicking on the icons on the screen gives access to the following:

- Status: Screen showing the alarms and the status of all control inputs.
- Messages: Creates and sends e-mail messages if alarms occur.
- Settings: Screen showing setup menus.
- Measurements: Relevant values can be chosen between all measured gen-set values.

For more information, please contact Atlas Copco.

14 Menu overview & changing parameters

14.1 Main View

The display has 4 different lines. The information on these lines can change, depending on which view is used. There are 4 different main views possible: SETUP / S1 / S2 / S3.

SETUP VIEW

QC4001		V. 1.02.1	
2003-11-21		16:08:11	
SETUP MENU			
SETUP	S3	S2	S1

S3 VIEW

	Phase missing		
G	0,00I	PF	0kW
G		0 kVA	0 kvar
SETUP	**S3**	S2	S1

S2 VIEW

G	0		0 0A
G	0,00I	PF	0kW
G		0 kVA	0 kvar
SETUP	S3	**S2**	S1

S1 VIEW

	Run Time		0Hour
Fuel level		100%	
2003-11-21		16:08:11	
SETUP	S3	S2	**S1**

The user can scroll through these views with the scroll buttons.

14.2 SETUP menu

The SETUP view shows the module name, the software version, the date and the time.
If you select SETUP then you get the following view :

G	0,00I	PF	0kW
I-L1			0A
PROTECTION SETUP			
PROT	CTRL	POWER	SYST

The fourth line is the entry selection for the Menu system. If the SELECT button is pressed, the selection of the menu indicated with an underscore will be entered.
Choices are:

“PROT”	protection setup
“CTRL”	controls setup
“POWER”	power control setup
“SYST”	system setup

The user can scroll to these choices with the scroll buttons.

14.2.1 If the PROTECTION SETUP is selected

The following view will appear (example of parameter) :

G		0,00I	PF		0kW
	1210 Gen high-volt 1				
		Set point			105,00%
LIM	DEL	OA	OB	ACT	FC

For a protective function the first entry shows the “gen high volt 1” setting. Scrolling down will give all the protection parameters.

The first line shows some generator data. There are 7 different information lines possible. The user can scroll through with the VIEW button.

G	0,00I	PF	0 kW
G	0 kVA		0 kvar
G-L1	0.0 Hz		0 V
B-L1	0.0 Hz		0 V
G	0	0	0 V
B	0	0	0 V
G	0	0	0 A

The second line shows the channel number and the name of the parameter.
The user can scroll through with the scroll buttons.

The third line shows the value of a setpoint of this parameter.

The fourth line shows the different possible setpoints. In this example:

“LIM”	= LIMIT, setting of switch point
“DEL”	= DELAY, setting of time delay
“OA”	OUTPUT A, selection of which relay the function must activate
“OB”	OUTPUT B, selection of which relay the function must activate
“ACT”	ACTION, activate/de-activate the function
“FC”	FAIL CLASS, fail class setting.

The user can scroll to these choices with the scroll button, and select one choice with the SELECT button. After selection of ‘LIM’ the following view will be visible:

G	0,00I	PF	0kW
ENTER PASSWORD			1999
ENTER			

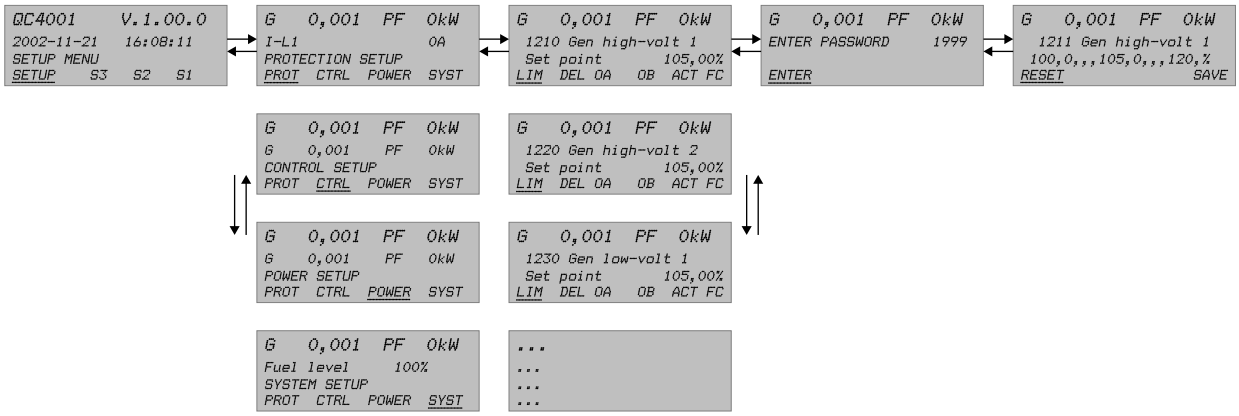
A password is needed in order to change the settings. There are 3 different password levels.

If the correct password is entered, the following view appears:

G	0,00I	PF	0kW
	1211 Gen high-volt 1		
	100,0,,,105,0,,,120,0%		
RESET			SAVE

Now the user can change the 'LIM' of parameter 'Gen high-volt 1'. This can be done with the scroll buttons.
Then the user has to select 'SAVE' to save the new settings.
To exit the user has to press the BACK button several time, till the main view appears.

This is the described menu flow:



14.2.2 If the CONTROL SETUP is selected

The following view will appear (example of parameter):

G	0,00I	PF	0kW
	2020Synchronisation		
	dfMax		0,3Hz
fMax	**fMin**	Umax	TGB

For control functions one entry shows the "Synchronisation" function. In this case the fourth line shows:

"fMax"	max allowed positive frequency deviation when synchronising.
"fMin"	min allowed negative frequency deviation when synchronising.
"Umax"	max allowed voltage deviation (positive/ negative) when synchronising.
"tCB"	closing time delay for generator circuit breaker.

Scrolling down gives all the other control parameters.
The setpoints can be changed as explained in the protection setup.

14.2.3 If POWER SETUP is selected

The following view will appear (example of parameter):

G	0,00I	PF	0kW
	3010Mains Power		
	Power		750 kW
DAY	**NIGHT**	TRANS	

For power setup the first entry shows the “Mains power” setting. In this case the fourth line shows:

“DAY”	setting of max allowed imported power during the daytime period.
“NIGHT”	setting of max allowed imported power during the daytime period.
“TRANS”	setting of transducer scale for transducer used in peak shaving system.

Scrolling down gives all the other power parameters.
The setpoints can be changed as explained in the protection setup.

14.2.4 If the SYSTEM SETUP is selected

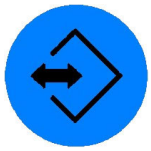
The following view will appear (example of parameter) :

G	0,00I	PF	0kW
	4010Nom. Settings		
	Frequency		50,0Hz
F	P	I	U

For system setup the first entry shows the “Nominal settings”. In this case the fourth line shows:

“f”	nominal frequency setting
“P”	nominal generator power setting
“I”	nominal generator current setting
“U”	nominal generator voltage setting

The above settings are used by the QC4001 to calculate the nominal apparent power and the power factor.
Scrolling down gives all the other system parameters.
The setpoints can be changed as explained in the protection setup.



14.3 The JUMP button

Instead of navigating through the entire menu, the user can jump directly to the required parameter, if he knows the channel number of that specific parameter.
For example, if the user wants to change 'language', he can jump directly to channel 4240.

If the JUMP button is pushed the password view will appear. Not all parameters can be changed by the end-user. The required password level for each parameter is given in the setpoint list.

14.4 S1 / S2 / S3 menu

The user can select 3 different views to read out information of gen-set, bus and mains.

S3 VIEW

	Phase missing		
G	0,00I	PF	0kW
G		0 kVA	0 kvar
SETUP	**S3**	S2	S1

The S3 view shows operational status and selectable measurements
During synchronisation the S3 view will show a synchronoscope in the first line.
This is useful during manual synchronising.

S2 VIEW

G		0	00A
G	0,00I	PF	0kW
G		0 kVA	0 kvar
SETUP	S3	**S2**	S1

The S2 view shows selectable measurements.

S1 VIEW

	Run Time		0Hour
Fuel level		100%	
2002-11-21		16:08:11	
SETUP	S3	S2	**S1**

In the S1 view the user can scroll up and down to 15 configurable screens showing different selectable measurements.
The configuration of the 15 different screens is done through the Qc4001 Utility Software. It is not possible to configure the windows through the display.
The screen shown when leaving "S1" will be the screen shown when returning to "S1".

If the text "No text" is selected in all three lines in a window it will not be displayed. This is to get a continuous displaying if a window is no longer to be shown.

The selectable values and measurements are shown in the table below:

I-L1	0 A	
I-L2	0 A	
I-L3	0 A	
Run time	0 Hour	
GB Operations	0	
0 822 0999 97-02		
MB Operations	0	
Mains P	156 kW	
Analog 1	5.5 mA	
Analog 2	5.5 mA	
Oil P	91 psi	6.3 bar
Cool. Temp.	77 F	25 °C
Fuel Level	100 %	
Analog 3	0.0 mA	
Analog 4	0.0 mA	
Analog 5	0.0 mA	
Analog 6	0.0 mA	
Tacho	0 rpm	
Serv. 1	0 d	49 h
Serv. 2	1809 d	49 h
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
Engine I.	value	N.A.
f-L1	0.00 Hz	
f-L2	0.00 Hz	
f-L3	0.00 Hz	
P	0 kW	
Q	0 kvar	
S	0 kVA	
P factor	0.00 Ind	
Angle L1L2	0 deg	
Angle L2L3	0 deg	
Angle L3L1	0 deg	
U-Bus L1	0 V	
U-Bus L2	0 V	
U-Bus L3	0 V	
U-Bus L1L2	0 V	
U-Bus L2L3	0 V	
U-Bus L3L1	0 V	
U-Bus Max	0 V	
U-Bus Min	0 V	
f Bus	0.00 Hz	
Ang BusL1L2	0 deg	
Ang Bus-Gen	0 deg	

U-Supply	24.6 V	
E	0 MWh	0 kWh
U-Gen L1N	0 V	
U-Gen L2N	0 V	
U-Gen L3N	0V	
U-Gen L1L2	0 V	
U-Gen L2L3	0 V	
U-Gen L3L1	0 V	
U-Gen Max	0 V	
U-Gen Min	0 V	

14.5 Alarm and event list menu

When selecting the alarm (and event) list, the second line will display the latest alarm/event. The user can scroll through the list with the scroll buttons.

15 Password levels

There are 4 different levels:

- No password level
- Customer password level
- Service password level
- Master password level

The user can scroll through the entire menu without any password.
From the moment that the user wants to change a setpoint, a password will be required. Changing different parameters requires different password levels. Some parameters cannot be changed by the end-customer because of safety reasons.

Once the password has be entered, the user can change all the accessible setpoints. Only if no actions have been taken within 3 minutes, the password entry will be deactivated, and a new password entry will be needed.

The user can change the Customer password in channel 4971.
Beware: Write down the new password. If you forget it, entering the menus will not be possible.

Service password and Master password can only be set through the Qc4001 Utility Software.

16 Fail classes

All the activated alarms of the Qc4001 must be configured with a fail class.
The fail classes define the category of the alarms and the subsequent action of the alarm.

4 different fail classes can be used:

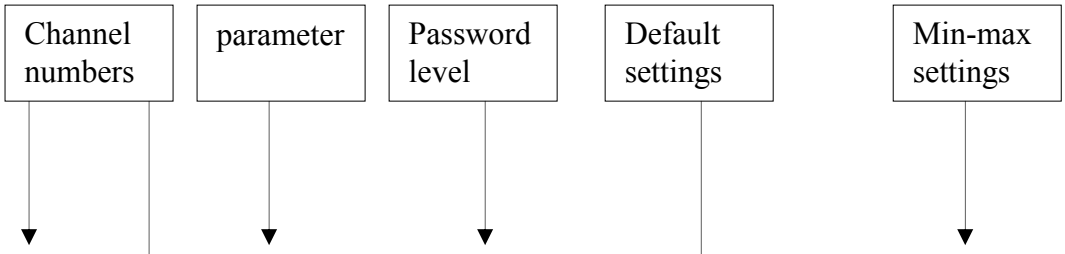
Fail Class	*Action*				
	Alarm Horn Relay	*Alarm Display*	*GB Trip*	*Gen-Set Stop*	*Shutdown*
1.Warning	X	X			
2.Trip of GB	X	X	X		
3.Trip & Stop	X	X	X	X	
4. Shutdown	X	X	X		X

All alarms can be disabled or enabled as following:

- OFF disabled alarm, inactive supervision.
- ON enabled alarm, supervision of alarm all the time.
- RUN gen-set running alarm, only supervision when the gen-set is running.

17 Menu set-points

Each parameter has its specific channel number.
Changing a parameter requires a password. The password level is indicated for each parameter.



1010	**Bus High Volt. 1**		***CUSTOMER LEVEL***	
1011	Setpoint		***103,0%***	*(100.0 ... 120.0)*
1012	Delay		***10.00s***	*(0.10 ... 99.99)*
1013	Output Relay A		***R0***	*(R0 ... R3)*
1014	Output Relay B		***R0***	*(R0 ... R3)*
1015	Enable		***OFF***	*(OFF / RUN / ON)*
1016	Fail Class		***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

The set points are listed below in numerical order of channel number.
The default values depend on the type of gen-set. Some values are different for QIX,QAS and for QAC gen-sets. In the parameter list below we have taken the default values for a QAC gen-set.

17.1 Protection setup

17.1.1 Bus voltage protection

1010	**Bus High Volt. 1**		***CUSTOMER LEVEL***	
1011	Setpoint		***103,0%***	*(100.0 ... 120.0)*
1012	Delay		***10.00s***	*(0.10 ... 99.99)*
1013	Output Relay A		***R0***	*(R0 ... R3)*
1014	Output Relay B		***R0***	*(R0 ... R3)*
1015	Enable		***OFF***	*(OFF / RUN / ON)*
1016	Fail Class		***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1020	**Bus High Volt. 2**		***SERVICE LEVEL***	
1021	Setpoint		***108,0%***	*(100.0 ... 150.0)*
1022	Delay		***5.00s***	*(0.10 ... 99.99)*
1023	Output Relay A		***R0***	*(R0 ... R3)*
1024	Output Relay B		***R0***	*(R0 ... R3)*
1025	Enable		***OFF***	*(OFF / RUN / ON)*
1026	Fail Class		***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

1030 Bus Low Volt. 1 ***CUSTOMER LEVEL***

1031	Setpoint	***97,0%***	*(80.0 ... 100.0)*
1032	Delay	***10.00s***	*(0.10 ... 99.99)*
1033	Output Relay A	***R0***	*(R0 ... R3)*
1034	Output Relay B	***R0***	*(R0 ... R3)*
1035	Enable	***OFF***	*(OFF / RUN / ON)*
1036	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1040 Bus Low Volt. 2 ***SERVICE LEVEL***

1041	Setpoint	***92,0%***	*(50.0 ... 100.0)*
1042	Delay	***5.00s***	*(0.10 ... 99.99)*
1043	Output Relay A	***R0***	*(R0 ... R3)*
1044	Output Relay B	***R0***	*(R0 ... R3)*
1045	Enable	***OFF***	*(OFF / RUN / ON)*
1046	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.2 Bus frequency protection

1050 Bus High Freq. 1 ***CUSTOMER LEVEL***

1051	Setpoint	***103,0%***	*(100.0 ... 120.0)*
1052	Delay	***10.00s***	*(0.10 ... 99.99)*
1053	Output Relay A	***R0***	*(R0 ... R3)*
1054	Output Relay B	***R0***	*(R0 ... R3)*
1055	Enable	***OFF***	*(OFF / RUN / ON)*
1056	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1060 Bus High Freq. 2 ***SERVICE LEVEL***

1061	Setpoint	***105,0%***	*(100.0 ... 120.0)*
1062	Delay	***5.00s***	*(0.10 ... 99.99)*
1063	Output Relay A	***R0***	*(R0 ... R3)*
1064	Output Relay B	***R0***	*(R0 ... R3)*
1065	Enable	***OFF***	*(OFF / RUN / ON)*
1066	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

1070 Bus Low Freq. 1 ***CUSTOMER LEVEL***

1071	Setpoint	***97,0%***	*(80.0 ... 100.0)*
1072	Delay	***10.00s***	*(0.10 ... 99.99)*
1073	Output Relay A	***R0***	*(R0 ... R3)*
1074	Output Relay B	***R0***	*(R0 ... R3)*
1075	Enable	***OFF***	*(OFF / RUN / ON)*
1076	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1080 Bus Low Freq. 2 ***SERVICE LEVEL***

1081	Setpoint	***95,0%***	*(80.0 ... 100.0)*
1082	Delay	***5.00s***	*(0.10 ... 99.99)*
1083	Output Relay A	***R0***	*(R0 ... R3)*
1084	Output Relay B	***R0***	*(R0 ... R3)*
1085	Enable	***OFF***	*(OFF / RUN / ON)*
1086	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.3 Generator Reverse Power

Reverse power settings relates to nominal power setting.

1090	**Reverse Power**	***SERVICE LEVEL***	
1091	Setpoint	***-20,0%***	*(-50.0 ... 0.0)*
1092	Delay	***5.00s***	*(0.1 ... 100.0)*
1093	Output Relay A	***R0***	*(R0 ... R3)*
1094	Output Relay B	***R0***	*(R0 ... R3)*
1095	Enable	***ON***	*(OFF / RUN / ON)*
1096	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.4 Generator Overcurrent Protection

Settings relates to nominal generator current setting.

1100	**Over Current 1**	***CUSTOMER LEVEL***	
1101	Setpoint	***110,0%***	*(50.0 ... 200.0)*
1102	Delay	***10.00s***	*(0.1 ... 100.0)*
1103	Output Relay A	***R0***	*(R0 ... R3)*
1104	Output Relay B	***R0***	*(R0 ... R3)*
1105	Enable	***ON***	*(OFF / RUN / ON)*
1106	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1110	**Over Current 2**	***SERVICE LEVEL***	
1111	Setpoint	***120,0%***	*(50.0 ... 200.0)*
1112	Delay	***5.00s***	*(0.1 ... 100.0)*
1113	Output Relay A	***R0***	*(R0 ... R3)*
1114	Output Relay B	***R0***	*(R0 ... R3)*
1115	Enable	***ON***	*(OFF / RUN / ON)*
1116	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.5 Generator Overload Protection

Settings relates to nominal generator power setting.

1120	**Over Load 1**		***CUSTOMER LEVEL***	
	1121	Setpoint	***110,0%***	*(1.0 ... 200.0)*
	1122	Delay	***10.00s***	*(0.1 ... 100.0)*
	1123	Output Relay A	***R0***	*(R0 ... R3)*
	1124	Output Relay B	***R0***	*(R0 ... R3)*
	1125	Enable	***ON***	*(OFF / RUN / ON)*
	1126	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1130	**Over Load 2**		***SERVICE LEVEL***	
	1131	Setpoint	***120,0%***	*(1.0 ... 200.0)*
	1132	Delay	***5.00s***	*(0.1 ... 100.0)*
	1133	Output Relay A	***R0***	*(R0 ... R3)*
	1134	Output Relay B	***R0***	*(R0 ... R3)*
	1135	Enable	***ON***	*(OFF / RUN / ON)*
	1136	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.6 Generator Current Unbalance Protection

Settings relates to nominal generator current.

1140	**Current Unbalance**		***SERVICE LEVEL***	
	1141	Setpoint	***30,0%***	*(0.0 ... 100.0)*
	1142	Delay	***10.00s***	*(0.1 ... 100.0)*
	1143	Output Relay A	***R0***	*(R0 ... R3)*
	1144	Output Relay B	***R0***	*(R0 ... R3)*
	1145	Enable	***OFF***	*(OFF / RUN / ON)*
	1146	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.7 Generator Voltage Unbalance Protection

Settings relates to nominal generator voltage.

1150	**Voltage Unbalance**		***SERVICE LEVEL***	
	1151	Setpoint	***10,0%***	*(0.0 ... 50.0)*
	1152	Delay	***10.00s***	*(0.1 ... 100.0)*
	1153	Output Relay A	***R0***	*(R0 ... R3)*
	1154	Output Relay B	***R0***	*(R0 ... R3)*
	1155	Enable	***OFF***	*(OFF / RUN / ON)*
	1156	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.8 Generator Reactive Power Import (loss of excitation) Protection

Settings relates to nominal generator power value (kW).

1160	**var Import**	***SERVICE LEVEL***	
1161	Setpoint	***50,0%***	*(0.0 ... 150.0)*
1162	Delay	***10.00s***	*(0.1 ... 100.0)*
1163	Output Relay A	***R0***	*(R0 ... R3)*
1164	Output Relay B	***R0***	*(R0 ... R3)*
1165	Enable	***ON***	*(OFF / RUN / ON)*
1166	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.9 Generator Reactive Power Export (overexcitation) Protection

Settings relates to nominal generator power value (kW).

1170	**var Export**	***SERVICE LEVEL***	
1171	Setpoint	***50,0%***	*(0.0 ... 100.0)*
1172	Delay	***10.00s***	*(0.1 ... 100.0)*
1173	Output Relay A	***R0***	*(R0 ... R3)*
1174	Output Relay B	***R0***	*(R0 ... R3)*
1175	Enable	***ON***	*(OFF / RUN / ON)*
1176	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.10 Loss of Mains Protection

The loss of mains protection includes df/dt (Rate Of Change Of Frequency) protection. The protection is used when the generator is paralleling with the mains. When the protections are activated there is a fixed time delay of 1 second after the mains breaker closes. The loss of mains function trips the generator breaker.

NOTE: Time delay is in periods (per).

1180	**Df/Dt (ROCOF)**	***SERVICE LEVEL***	
1181	Setpoint	***5.0Hz/s***	*(0.1 ... 10.0)*
1182	Delay	***6 periods***	*(1 ... 20)*
1183	Output Relay A	***R0***	*(R0 ... R3)*
1184	Output Relay B	***R0***	*(R0 ... R3)*
1185	Enable	***OFF***	*(OFF / RUN / ON)*

17.1.11 Vector jump

1190	**Vector Jump**	***SERVICE LEVEL***	
1191	Setpoint	***10.0 deg***	*(1.0 ... 90.0)*
1192	Output Relay A	***R0***	*(R0 ... R3)*
1193	Output Relay B	***R0***	*(R0 ... R3)*
1194	Enable	***OFF***	*(OFF / RUN / ON)*

17.1.12 Generator voltage protection

1210 Gen High Volt. 1 ***CUSTOMER LEVEL***

1211	Setpoint	***110,0%***	*(100.0 ... 120.0)*
1212	Delay	***5.0s***	*(0.1 ... 100.0)*
1213	Output Relay A	***R0***	*(R0 ... R3)*
1214	Output Relay B	***R0***	*(R0 ... R3)*
1215	Enable	***ON***	*(OFF / RUN / ON)*
1216	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1220 Gen High Volt. 2 ***MASTER LEVEL***

1221	Setpoint	***120,0%***	*(100.0 ... 150.0)*
1222	Delay	***1.0s***	*(0.1 ... 100.0)*
1223	Output Relay A	***R0***	*(R0 ... R3)*
1224	Output Relay B	***R0***	*(R0 ... R3)*
1225	Enable	***ON***	*(OFF / RUN / ON)*
1226	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

1230 Gen Low Volt. 1 ***CUSTOMER LEVEL***

1231	Setpoint	***90,0%***	*(80.0 ... 100.0)*
1232	Delay	***15.0s***	*(0.1 ... 100.0)*
1233	Output Relay A	***R0***	*(R0 ... R3)*
1234	Output Relay B	***R0***	*(R0 ... R3)*
1235	Enable	***RUN***	*(OFF / RUN / ON)*
1236	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1240 Gen Low Volt. 2 ***SERVICE LEVEL***

1241	Setpoint	***70,0%***	*(50.0 ... 100.0)*
1242	Delay	***10.0s***	*(0.1 ... 100.0)*
1243	Output Relay A	***R0***	*(R0 ... R3)*
1244	Output Relay B	***R0***	*(R0 ... R3)*
1245	Enable	***RUN***	*(OFF / RUN / ON)*
1246	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.13 Generator frequency protection

1250 Gen High Freq. 1 ***CUSTOMER LEVEL***

1251	Setpoint	***110,0%***	*(100.0 ... 120.0)*
1252	Delay	***5.0s***	*(0.2 ... 100.0)*
1253	Output Relay A	***R0***	*(R0 ... R3)*
1254	Output Relay B	***R0***	*(R0 ... R3)*
1255	Enable	***ON***	*(OFF / RUN / ON)*
1256	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1260 Gen High Freq. 2 ***MASTER LEVEL***

1261	Setpoint	***120,0%***	*(100.0 ... 120.0)*
1262	Delay	***1.0s***	*(0.2 ... 100.0)*
1263	Output Relay A	***R0***	*(R0 ... R3)*
1264	Output Relay B	***R0***	*(R0 ... R3)*
1265	Enable	***ON***	*(OFF / RUN / ON)*

1266	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

1270 Gen Low Freq. 1 ***CUSTOMER LEVEL***

1271	Setpoint	***90,0%***	*(80.0 ... 100.0)*
1272	Delay	***10.0s***	*(0.2 ... 100.0)*
1273	Output Relay A	***R0***	*(R0 ... R3)*
1274	Output Relay B	***R0***	*(R0 ... R3)*
1275	Enable	***RUN***	*(OFF / RUN / ON)*
1276	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1280 Gen Low Freq. 2 ***SERVICE LEVEL***

1281	Setpoint	***80,0%***	*(80.0 ... 100.0)*
1282	Delay	***5.0s***	*(0.2 ... 100.0)*
1283	Output Relay A	***R0***	*(R0 ... R3)*
1284	Output Relay B	***R0***	*(R0 ... R3)*
1285	Enable	***RUN***	*(OFF / RUN / ON)*
1286	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.14 Engine control

The configuration of the engine interface card is done in the next channel groups. Configuration of the inputs is done through the display and the Qc4001 Utility Software.

17.1.15 Mains Power 4…20 mA input

The input is not configurable because it is used as a mains power input in the peak shaving mode.

17.1.16 Configurable 4…20 mA input 1

1310 4...20mA Input 1.1 ***CUSTOMER LEVEL***

1311	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1312	Delay	***15.0s***	*(0.0 ... 600.0)*
1313	Output Relay A	***R0***	*(R0 ... R3)*
1314	Output Relay B	***R0***	*(R0 ... R3)*
1315	Enable	***OFF***	*(OFF / RUN / ON)*
1316	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***High***	*(Low / High)*

1320 4...20mA Input 1.2 ***CUSTOMER LEVEL***

1321	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1322	Delay	***15.0s***	*(0.0 ... 600.0)*
1323	Output Relay A	***R0***	*(R0 ... R3)*
1324	Output Relay B	***R0***	*(R0 ... R3)*
1325	Enable	***OFF***	*(OFF / RUN / ON)*
1326	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***High***	*(Low / High)*

High alarm = alarm when the actual value is higher than the setpoint.

17.1.17 Configurable 4…20 mA input 2

1330 4...20mA Input 2.1 *CUSTOMER LEVEL*

1331	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1332	Delay	***15.0s***	*(0.0 ... 600.0)*
1333	Output Relay A	***R0***	*(R0 ... R3)*
1334	Output Relay B	***R0***	*(R0 ... R3)*
1335	Enable	***OFF***	*(OFF / RUN / ON)*
1336	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***High***	*(Low / High)*

1340 4...20mA Input 2.2 *CUSTOMER LEVEL*

1341	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1342	Delay	***15.0s***	*(0.0 ... 600.0)*
1343	Output Relay A	***R0***	*(R0 ... R3)*
1344	Output Relay B	***R0***	*(R0 ... R3)*
1345	Enable	***OFF***	*(OFF / RUN / ON)*
1346	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***High***	*(Low / High)*

High alarm = alarm when the actual value is higher than the setpoint

17.1.18 Configurable VDO input 1

This input will be used for a resistive Engine Oil Pressure VDO sensor or for a 'fail-safe' VDO Coolant Level Switch.
A sensor type must be software selectable (2 pressure sensors, 1 level switch & 1 configurable curve (8 points to be defined)).
If a pressure sensor is selected, the displayed value will be in bar and psi.
If the level switch is selected, there's no value to be displayed.

1350 VDO 1.1 *SERVICE LEVEL*

1351	Setpoint	***N/A***	*(0.0 ... 10.0)*
1352	Delay	***5.0s***	*(0.0 ... 100.0)*
1353	Output Relay A	***R0***	*(R0 ... R3)*
1354	Output Relay B	***R0***	*(R0 ... R3)*
1355	Enable	***OFF***	*(OFF / RUN / ON)*
1356	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Sensor Type	***N/A***	*(0 / 1 / 2 / 3)*

1360 VDO 1.2 *MASTER LEVEL*

1361	Setpoint	***N/A***	*(0.0 ... 10.0)*
1362	Delay	***5.0s***	*(0.0 ... 100.0)*
1363	Output Relay A	***R0***	*(R0 ... R3)*
1364	Output Relay B	***R0***	*(R0 ... R3)*
1365	Enable	***OFF***	*(OFF / RUN / ON)*
1366	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

The 'Sensor Type' and 'Alarm Type' parameters will only be accessible through the Atlas Copco Qc4001 Utility Software, and not through the display menu.

Pressure	Sender 0 (ohm)	Sender 1 (ohm)
0 bar	10.0	10.0
0.5 bar	27.2	
1 bar	44.9	31.3
1.5 bar	62.9	
2 bar	81.0	51.5
2.5 bar	99.2	
3 bar	117.1	71.0
3.5 bar	134.7	
4 bar	151.9	89.6
4.5 bar	168.3	
5 bar	184.0	107.3
6 bar		124.3
7 bar		140.4
8 bar		155.7
9 bar		170.2
10 bar		184.0

Sender 2 : Coolant Level Switch: Normal situation: resistive value > 200 ohm ; Alarm situation: resistive value < 200 ohm.

Sender 3 : configurable 0 – 10 bar (parameter 5010 - 5020).

17.1.19 Configurable VDO input 2

This input will be used for a resistive Engine Coolant Temperature VDO sensor or for an Alternator Temperature PTC.
A sensor type must be software selectable (3 temperature sensors, 1 PTC & 1 configurable curve (8 points to be defined)).
If a temperature sensor is selected, the displayed value will be in °C and °F.
If the PTC is selected, there's no value to be displayed.

1370	**High alternator Temperature**	***SERVICE LEVEL***	
1371	Setpoint	***N/A***	*(40 ... 150)*
1372	Delay	***3.0s***	*(0.0 ... 100.0)*
1373	Output Relay A	***R0***	*(R0 ... R3)*
1374	Output Relay B	***R0***	*(R0 ... R3)*
1375	Enable	***OFF***	*(OFF / RUN / ON)*
1376	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Sensor Type	***3***	*(0 / 1 / 2 / 3 / 4)*

1380	**VDO 2.2**	***SERVICE LEVEL***	
1381	Setpoint	***N/A***	*(40 ... 150)*
1382	Delay	***5.0s***	*(0.0 ... 100.0)*
1383	Output Relay A	***R0***	*(R0 ... R3)*
1384	Output Relay B	***R0***	*(R0 ... R3)*
1385	Enable	***OFF***	*(OFF / RUN / ON)*
1386	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

The 'Sensor Type' and 'Alarm Type' parameters will only be accessible through the Atlas Copco Qc4001 Utility Software, and not through the display menu.

Temperature	Sender 0 (ohm)	Sender 1 (ohm)	Sender 2 (ohm)
40 °C	291.5	480.7	69.3
50 °C	197.3	323.6	
60 °C	134.0	222.5	36.0
70 °C	97.1	157.1	
80 °C	70.1	113.2	19.8
90 °C	51.2	83.2	
100 °C	38.5	62.4	11.7
110 °C	29.1	47.6	
120 °C	22.4	36.8	7.4
130 °C		28.9	
140 °C		22.8	
150 °C		18.2	

Sender 3 : Alternator Temperature PTC: Normal Situation: resistive value < 1k7 ; Alarm situation: resistive value > 1k7.

Sender 4 : Configurable 40 – 110 °C (parameter 5030 – 5040).

17.1.20 Configurable VDO input 3

This input will be used for a resistive Fuel Level VDO sensor.
A sensor type must be software selectable (2 level sensors & configurable curve (8 points to be defined)).
The displayed value will be in %.

1390	**Fuel Level 1**	***CUSTOMER LEVEL***	
1391	Setpoint 1	***10,0%***	*(0 ... 100)*
1392	Delay	***10.0s***	*(0.0 ... 100.0)*
1393	Output Relay A	***R0***	*(R0 ... R3)*
1394	Output Relay B	***R0***	*(R0 ... R3)*
1395	Enable	***ON***	*(OFF / RUN / ON)*
1396	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Sensor Type	***1***	*(0 / 1 / 2)*

Resistive Fuel Level Sender 0: Linear: 0 % = 78.8 ohm ; 100 % = 1.6 ohm.
Resistive Fuel Level Sender 1: Linear: 0 % = 3 ohm ; 100 % = 180 ohm.
Resistive Fuel Level Sender 2: Configurable 0 – 100 % (parameter 5050 - 5060).

The fuel pump logics will also use this input to start/stop the fuel pump when necessary.

1400	**Fuel Pump Logic**	***CUSTOMER LEVEL***	
1401	Setpoint 2	***20,0%***	*(0 ... 100)*
1402	Setpoint 3	***80.0%***	*(0 ... 100)*
1403	Relay Output Pump	***R4***	*(R0 ... R3)*
1404	Enable Pump Logics	***OFF***	*(OFF / RUN / ON)*
1405	Fill Check Delay	***60.0s***	*(0.1 ... 600.0)*

Fuel Pump Logics:
If the fuel level is below 'set-point 2', the 'relay output pump' will be energised.
This 'relay output pump' will stay energised until the fuel level reaches 'set-point 3', until a general failclass 3 or 4 occurs, until the controller is powered off.
When the 'relay output pump' is energised, and the fuel level hasn't risen during the fill chack delay, the 'relay output pump' will be de-energised and a failclass 1 alarm 'Fuel Fill Pump Error' will be displayed.
Set-point 4 will be an extra high alarm. This set-point can operate a relay output defined in 1467.

1410	**Fuel High level**	***CUSTOMER LEVEL***	
1411	Setpoint 4	***98,0%***	*(0 ... 100)*
1412	Delay	***5.0s***	*(0.1 ... 300.0)*
1413	Output Relay A	***R0***	*(R0 ... R3)*
1414	Output Relay B	***R0***	*(R0 ... R3)*

Set-point 4 will be an extra high alarm.

17.1.21 Overspeed (tacho input)

1420	**Overspeed**		***MASTER LEVEL***	
	1421	Setpoint	***1650rpm***	*(1 ... 2250)*
	1422	Delay	***3.0s***	*(0.2 ... 100.0)*
	1423	Output Relay A	***R1***	*(R0 ... R3)*
	1424	Output Relay B	***R0***	*(R0 ... R3)*
	1425	Enable	***ON***	*(OFF / RUN / ON)*
	1426	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

1430	**Overspeed**		***MASTER LEVEL***	
	1431	Overspeed S2	***1980rpm***	*(1 ... 2250)*
	1432	Overspeed S3	***1650rpm***	*(1 ... 2250)*
	1433	Overspeed S4	***1650rpm***	*(1 ... 2250)*

Overspeed S2 set-point is used when the 2nd set of parameters are active.
Overspeed S3 set-point is used when the 3rd set of parameters are active.
Overspeed S4 set-point is used when the 4th set of parameters are active.

17.1.22 Ext. Engine Failure (binary input 8)

1440	**Engine Failure**		***SERVICE LEVEL***	
	1441	Delay	***1.0s***	*(0.0 ... 180.0)*
	1442	Output Relay A	***R0***	*(R0 ... R3)*
	1443	Output Relay B	***R0***	*(R0 ... R3)*
	1444	Enable	***ON***	*(OFF / RUN / ON)*
	1445	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.23 Emergency Stop (binary input 9)

1450	**Emergency Stop**		***MASTER LEVEL***	
	1451	Delay	***0.0s***	*(0.0 ... 60.0)*
	1452	Output Relay A	***R0***	*(R0 ... R3)*
	1453	Output Relay B	***R0***	*(R0 ... R3)*
	1454	Enable	***ON***	*(OFF / RUN / ON)*
	1455	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.24 Non-configurable Sprinkler Input

Input 10 (terminal 118) can be configured as 'Sprinkler'. When 'Sprinkler' is selected, all alarms and fail classes are overruled. The only alarms the gen-set will react on are 'Emergency Stop' on terminal 117 or a 'Tacho Failure'. Also the gen-set has 7 start attempts before 'Start Failure'.

17.1.25 Coolant Temperature 1

A set-point can be configured for the coolant temperature value, that is read from the engine electronics over the CanBus.

1460	**Coolant Temperature 1**	***SERVICE LEVEL***	
1461	Setpoint	***100 deg***	*(0 ... 150.0)*
1462	Delay	***3.0s***	*(0.0 ... 600.0)*
1463	Output Relay A	***R0***	*(R0 ... R3)*
1464	Output Relay B	***R0***	*(R0 ... R3)*
1465	Enable	***ON***	*(OFF / RUN / ON)*
1466	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***High***	*(Low / High)*

High alarm = alarm when the actual value is higher than the setpoint.

17.1.26 Coolant Temperature 2

A set-point can be configured for the coolant temperature value, that is read from the engine electronics over the CanBus.

1470	**Coolant Temperature 2**	***SERVICE LEVEL***	
1471	Setpoint	***108 deg***	*(0 ... 150.0)*
1472	Delay	***3.0s***	*(0.0 ... 600.0)*
1473	Output Relay A	***R0***	*(R0 ... R3)*
1474	Output Relay B	***R0***	*(R0 ... R3)*
1475	Enable	***ON***	*(OFF / RUN / ON)*
1476	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***High***	*(Low / High)*

High alarm = alarm when the actual value is higher than the setpoint.

17.1.27 Oil Pressure

Here, a set-point can be configured for the oil pressure value, that is read from the engine electronics over the CanBus.

1480	**Oil Pressure**	***SERVICE LEVEL***	
1481	Setpoint	***3.0 bar***	*(0.0 ... 15.0)*
1482	Delay	***15.0s***	*(0.0 ... 600.0)*
1483	Output Relay A	***R0***	*(R0 ... R3)*
1484	Output Relay B	***R0***	*(R0 ... R3)*
1485	Enable	***RUN***	*(OFF / RUN / ON)*
1486	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm type	***Low***	*(Low / High)*

Low alarm = alarm when the actual value is lower than the setpoint.

17.1.28 Fuel Level 2

This input will be used for a resistive Fuel Level VDO sensor.
The displayed value will be in %.

1490	Fuel Level 2	*CUSTOMER LEVEL*	
1391	Setpoint 1	***5,0%***	*(0 ... 100)*
1392	Delay	***20.0s***	*(0.0 ... 100.0)*
1393	Output Relay A	***R0***	*(R0 ... R3)*
1394	Output Relay B	***R0***	*(R0 ... R3)*
1395	Enable	***ON***	*(OFF / RUN / ON)*
1396	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

17.1.29 Configurable binary input 11 – 17 (optional)

These settings will only be visible when the Qc4001 module contains the optional extension card with 7 binary inputs.
The reserved channels for these parameters are 1600 - 1666.

17.1.30 2nd Set of Parameters (binary input 18)

This input will be dedicated for a 2nd set of parameters input (see channel 4020: nominal settings 2).
When this input is made active, some of the settings will be re-set to another level.
No configuration of this input must be possible.

17.1.31 3rd Set of Parameters (binary input 19)

This input will be dedicated for a 3rd set of parameters input (see channel 4030: nominal settings 3).
When this input is made active, some of the settings will be re-set to another level.
No configuration of this input must be possible.

17.1.32 4th Set of Parameters (binary input 20)

This input will be dedicated for a 4th set of parameters input (see channel 4040: nominal settings 4).
When this input is made active, some of the settings will be re-set to another level.
No configuration of this input must be possible.

17.1.33 Configurable binary input 21

1700	Digital Input 21	*COSTUMER LEVEL*	
1701	Delay	***10.0s***	*(0.0 ... 100.0)*
1702	Output Relay A	***R0***	*(R0 ... R3)*
1703	Output Relay B	***R0***	*(R0 ... R3)*
1704	Enable	***OFF***	*(OFF / RUN / ON)*
1705	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1706	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.34 Configurable binary input 22

For the QAC gensets this input is dedicated to ‘Manual Fuel fill’.

1710	Man. Fuel Fill	*SERVICE LEVEL*	
1711	Delay	***0.0s***	*(0.0 ... 100.0)*
1712	Output Relay A	***R4***	*(R0 ... R3)*
1713	Output Relay B	***R0***	*(R0 ... R3)*
1714	Enable	***ON***	*(OFF / RUN / ON)*
1715	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1716	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.35 Configurable binary input 23

For the QAC gen-sets this input is dedicated to ‘Air Shut off’.

1720	Air Shut Off	*SERVICE LEVEL*	
1721	Delay	***0.2s***	*(0.0 ... 100.0)*
1722	Output Relay A	***R0***	*(R0 ... R3)*
1723	Output Relay B	***R0***	*(R0 ... R3)*
1724	Enable	***ON***	*(OFF / RUN / ON)*
1725	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
1726	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.36 Configurable binary input 24

For the QAC gen-sets this input is dedicated to ‘Fan Failure’.

1730	**Fan Failure**	***SERVICE LEVEL***	
1731	Delay	***60.0s***	*(0.0 ... 100.0)*
1732	Output Relay A	***R0***	*(R0 ... R3)*
1733	Output Relay B	***R0***	*(R0 ... R3)*
1734	Enable	***RUN***	*(OFF / RUN / ON)*
1735	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*
1736	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.37 Configurable binary input 25

For the QAC gen-sets this input is dedicated to ‘Low coolant Level’.

1740	**Low Coolant Level**	***SERVICE LEVEL***	
1741	Delay	***10.0s***	*(0.0 ... 100.0)*
1742	Output Relay A	***R0***	*(R0 ... R3)*
1743	Output Relay B	***R0***	*(R0 ... R3)*
1744	Enable	***ON***	*(OFF / RUN / ON)*
1745	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1746	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.38 Configurable binary input 26

For the QAC gensets this input is dedicated to ‘Tank leakage’.

1750	**Tank leakage**	***SERVICE LEVEL***	
1751	Delay	***10.0s***	*(0.0 ... 100.0)*
1752	Output Relay A	***R0***	*(R0 ... R3)*
1753	Output Relay B	***R0***	*(R0 ... R3)*
1754	Enable	***ON***	*(OFF / RUN / ON)*
1755	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1756	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.39 Configurable binary input 27

For the QAC gen-sets this input is dedicated to ‘DDEC check engine’.

1760	DDEC Check Engine	*SERVICE LEVEL*	
1761	Delay	***1.0s***	*(0.0 ... 100.0)*
1762	Output Relay A	***R0***	*(R0 ... R3)*
1763	Output Relay B	***R0***	*(R0 ... R3)*
1764	Enable	***RUN***	*(OFF / RUN / ON)*
1765	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1766	Type	***Low***	*(Low / High)*

Low alarm = Alarm when the input opens

17.1.40 Configurable binary input 28

For the QAC gen-sets this input is dedicated to ‘Terminal Board open’.

1770	T.B. Open	*SERVICE LEVEL*	
1771	Delay	***0.0s***	*(0.0 ... 100.0)*
1772	Output Relay A	***R0***	*(R0 ... R3)*
1773	Output Relay B	***R0***	*(R0 ... R3)*
1774	Enable	***ON***	*(OFF / RUN / ON)*
1775	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*
1706	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.41 Configurable binary input 29

This input can not only enable, but also disable a relay output.
For the QAC gen-sets this input is dedicated to ‘DDEC Stop Engine’

1780	DDEC Stop Engine	*SERVICE LEVEL*	
1781	Delay	***1.0s***	*(0.0 ... 100.0)*
1782	Enable Output Relay	***R0***	*(R0 ... R3)*
1783	Disable Output Relay	***R0***	*(R0 ... R3)*
1784	Enable	***RUN***	*(OFF / RUN / ON)*
1785	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
1786	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.42 Configurable (binary input 30)

This input can not only enable, but also disable a relay output.

1790	Digital Input 30	*CUSTOMER LEVEL*	
1791	Delay	***10.0s***	*(0.0 ... 100.0)*
1792	Enable Output Relay	***R0***	*(R0 ... R3)*
1793	Disable Output Relay	***R0***	*(R0 ... R3)*
1794	Enable	***OFF***	*(OFF / RUN / ON)*
1795	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1796	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.43 Configurable 4…20 mA input (optional)

These settings will only be visible when the Qc4001 module contains the optional extension card with 4 analogue inputs.
The reserved channels for these parameters are 1800 – 1856.

17.1.44 Run Status

All alarms can be:

- Disabled (OFF)
- Enabled all the time (ON)
- Enabled while the gen-set runs (RUN)

In case of 'enabled while gen-set runs' the alarms are monitored from when the generator is in running status.

1860	Run Status	*SERVICE LEVEL*	
1861	Delay	***5.0s***	*(0.0 ... 60.0)*
1862	Output Relay A	***R0***	*(R0 ... R3)*
1863	Output Relay B	***R0***	*(R0 ... R3)*
1864	Enable	***OFF***	*(OFF / ON)*

17.1.45 Remote Start/Stop (binary input 31)

This input will be dedicated for a remote start/stop command.
Closing a remote hard-wired switch, connected to this input, will start the gen-set and control its functions according the selected mode.
Opening of this switch will stop the gen-set according the selected mode.
This Remote Start/Stop can be used in Island Mode, in Fixed Power Mode and in Load Take Over Mode. It is active when the QC4001 is in "AUTO" mode and when all Real Time Clock Start/Stop Commands are disabled.

17.1.46 W/L (binary input 32)

This input will be dedicated for the charging feedback signal (W/L signal) of the charging alternator.

1870	W/L Input	SERVICE LEVEL	
1871	Delay	***3.0s***	*(0.0 ... 100.0)*
1872	Output Relay A	***R0***	*(R0 ... R3)*
1873	Enable	***RUN***	*(OFF / ON)*
1874	Type	***Low***	*(Low / High)*

Low alarm = Alarm when the input opens

17.1.47 Disable Analogue Fuel Input (binary input 33)

This input will be dedicated for following purpose:
If the input is made high, the controller disables the analogue VDO fuel input.
Then there will be no fuel level displayed, and all warnings, shutdowns or fuel pump actions will be disabled as well.

17.1.48 Static Charger (binary input 34)

This input will be dedicated for the static battery charger feedback signal.
This will only be monitored if the bus/mains voltage is present.

1880	Static Charger	SERVICE LEVEL	
1881	Delay	***10.0s***	*(0.0 ... 100.0)*
1882	Output Relay A	***R0***	*(R0 ... R3)*
1883	Enable	***ON***	*(OFF / ON)*
1884	Type	***High***	*(Low / High)*

High alarm = Alarm when the input closes

17.1.49 MDEC Run Signal

With a MDEC engine controller it is possible to connect an extra running signal from the engine controller to the Qc4001. This is default not connected and therefore disabled.

1890	MDEC Run Signal	SERVICE LEVEL	
1891	Delay	***10.0s***	*(0.0 ... 100.0)*
1892	Output Relay A	***R0***	*(R0 ... R3)*
1893	Output Relay B	***R0***	*(R0 ... R3)*
1894	Enable	***OFF***	*(OFF / ON)*

17.2 Control setup

17.2.1 Synchronisation type

2010	Sync. Type	*SERVICE LEVEL*	
2011	Sync. Type	***Dynamic Sync.***	*(Dynamic Sync. / Static Sync.)*

If dynamic synchronisation is chosen, the next menu will be 2020. If static synchronisation is chosen, the next menu will be 2030.

17.2.2 Dynamic synchronisation

The setting of df max. and df min. decides whether the generator synchronises when running faster or slower than nominal frequency.
The “dU max.” setting is related to nominal generator voltage. The “dU max.“ setting is +/- nominal generator voltage.
The Qc4001 module compensates for the breaker delay time when synchronising.

2020	Dynamic Sync.	*SERVICE LEVEL*	
2021	Df max.	***0.3Hz***	*(0.0 ... 0.5)*
2022	Df min.	***0.0Hz***	*(-0.5 ... 0.3)*
2023	DU max.	***5%***	*(2 ... 10)*
2024	Breaker Delay	***75ms***	*(40 ... 300)*

The synchronisation pulse is 400 ms.

17.2.3 Static synchronisation

The phase gain and frequency gain are the control parameters used during static synchronisation. They both control the governor output.
The phase controller will keep the angle between the generator voltage and the busbar voltage within the closing window. The frequency controller will keep the generator frequency and the busbar frequency at the same value.

2030	Static Sync.	*SERVICE LEVEL*	
2031	GB Close Time	***1.0s***	*(0.0 ... 100.0)*
2032	Closing Window	***10.0 deg***	*(0.1 ... 20.0)*
2033	Phase Gain	***40***	*(0 ... 100)*
2034	Frequency Gain	***40***	*(0 ... 100)*

The synchronisation pulse is 400 ms.

17.2.4 Blackout closing of breaker

Settings are accepted limits (generator voltage and frequency) for closing the generator breaker. The “dU max.” setting is related to nominal generator voltage.

2050	**Sync. Blackout**	***SERVICE LEVEL***	
2051	Df max.	***3.0Hz***	*(0.0 ... 5.0)*
2052	DU max.	***8%***	*(2 ... 10)*

If blackout closing of breaker is enabled on more units, external precautions must be taken to avoid two or more generators closing on a black busbar. In that case synchronism will not be present.

17.2.5 Generator and mains breaker, general failure alarm

- Synchronisation time — Adjustable time delay channel 2061/2071
- Breaker ON/OFF feedback fail — 1 second fixed time delay
- Phase sequence error — 1 second fixed time delay

2060	**GB Synchr. Fail**	***SERVICE LEVEL***	
2061	Delay	***60.0s***	*(30.0 ... 300.0)*
2062	Output Relay A	***R0***	*(R0 ... R3)*
2063	Output Relay B	***R0***	*(R0 ... R3)*

2070	**MB Synchr. Fail**	***SERVICE LEVEL***	
2071	Delay	***60.0s***	*(30.0 ... 300.0)*
2072	Output Relay A	***R0***	*(R0 ... R3)*
2073	Output Relay B	***R0***	*(R0 ... R3)*

The general failure alarms cannot be disabled.

17.2.6 Frequency Controller

The Frequency KP and KI parameter are used for the speed settings on the genset.
The proportional controller (Kp) will have the effect of reducing the rise time and will reduce ,but never eliminate the steady-state error. The integral control (Ki) will have the effect of eliminating the steady-state error. To have a quick and stable frequency both parameters needs to be adjusted and fine-tuned.

Frequency deadband % settings relate to nominal generator frequency.

2090	**Freq. Control**	***CUSTOMER LEVEL***	
2091	Deadband	***0.2%***	*(0.2 ... 10.0)*
2092	Frequency KP	***35***	*(0 ... 1000)*
2093	Frequency KI	***150***	*(0 ... 1000)*

17.2.7 Power Controller

The Power KP and KI parameter are used for the power settings on the genset. The proportional controller (Kp) will have the effect of reducing the rise time and will reduce ,but never eliminate the steady-state error. The integral control (Ki) will have the effect of eliminating the steady-state error. To have a quick and stable power output both parameters needs to be adjusted and fine-tuned.

Power deadband % settings relate to nominal generator power.

2100	**Power Control**	***CUSTOMER LEVEL***	
2101	Deadband	***0.2%***	*(0.2 ... 10.0)*
2102	Power KP	***15***	*(0 ... 1000)*
2103	Power KI	***100***	*(0 ... 1000)*

17.2.8 Power ramp up / Power ramp down

The delay point and time is the point where the generator stops ramping after closing of generator breaker to pre-heat the engine before commencing to take load. The time duration of the point is determined by the delay time setting. If the delay function is not needed, set the time to 0.

Power % settings relate to nominal generator power.

2110	**Power Ramp Up**	***CUSTOMER LEVEL***	
2111	Speed	***10%/s***	*(1.0 ... 20.0)*
2112	Delay Point	***10%***	*(1 ... 100)*
2113	Delay Time	***0.0s***	*(0.0 ... 180.0)*

17.2.9 Power ramp down

The breaker open point is where a relay output is activated to open the generator breaker before reaching 0 kW.

Power % settings relate to nominal generator power.

2120	**Power Ramp Down**	***CUSTOMER LEVEL***	
2121	Speed	***10%/s***	*(0.1 ... 20.0)*
2122	Breaker Open	***5%***	*(1 ... 20)*

17.2.10 Voltage controller

The Voltage KP and KI parameter are used for the voltage settings on the genset.
The proportional controller (Kp) will have the effect of reducing the rise time and will reduce ,but never eliminate the steady-state error. The integral control (Ki) will have the effect of eliminating the steady-state error. To have a quick and stable voltage parameters needs to be adjusted and fine-tuned.

The voltage controller is active when the generator is in island mode.
Voltage deadband % settings relate to nominal generator voltage.

2140	**Voltage Control**	***CUSTOMER LEVEL***	
2141	Deadband	***0.2%***	*(0.02 ... 10.0)*
2142	KP	***200***	*(0 ... 1000)*
2143	KI	***450***	*(0 ... 1000)*

17.2.11 Var controller

The Var KP and KI parameter are used for the reactive power settings on the genset.
The proportional controller (Kp) will have the effect of reducing the rise time and will reduce, but never eliminate., the steady-state error. The integral control (Ki) will have the effect of eliminating the steady-state error. To have a quick and stable reactive power both parameters needs to be adjusted and finetuned.

Frequency deadband % settings relate to nominal generator frequency.
Var deadband % settings relate to nominal generator power value, i.e. it is assumed that the generator var value is the same as the kW value. This is not correct, but the assumption is made for control purposes only.

The var controller is active when the generator is parallel to mains controlling the PF.

2150	**var Control**	***CUSTOMER LEVEL***	
2151	Deadband	***0.2%***	*(0.0 ... 10.0)*
2152	KP	***30***	*(0 ... 1000)*
2153	KI	***150***	*(0 ... 1000)*

17.2.12 PF Control

The Power Factor deadband is put in percentage of the nominal PF setpoint for fixed power applications (parameter 3080). For fixed power application it can be necessary to change this deadband.

2170	**PF Control**	***COSTUMER LEVEL***	
2171	Deadband	***5%***	*(0 ... 10)*

17.2.13 Governor regulation failure

The alarm is activated if the difference between the measured value and the set-point is outside the deadband for longer than the timer set-point.

2180	**Gov. Reg. Failure**	***SERVICE LEVEL***	
2181	Deadband	***30.0%***	*(1.0 ... 100.0)*
2182	Timer	***60.0s***	*(10 ... 300)*
2183	Output Relay A	***R0***	*(R0 ... R3)*
2184	Output Relay B	***R0***	*(R0 ... R3)*

17.2.14 AVR regulation failure

The alarm is activated if the difference between the measured value and the set-point is outside the deadband for longer than the timer set-point.

2190	**AVR Reg. Failure**	***SERVICE LEVEL***	
2191	Deadband	***30.0%***	*(1.0 ... 100.0)*
2192	Timer	***60.0s***	*(10 ... 300)*
2193	Output Relay A	***R0***	*(R0 ... R3)*
2194	Output Relay B	***R0***	*(R0 ... R3)*

17.2.15 Breaker type

2200	**Breaker Type**	***CUSTOMER LEVEL***	
2201	GB Type	***Pulse***	*(Pulse / Continuous)*
2202	MB Type	***Pulse***	*(Pulse / Continuous)*

If the selected type is ‘pulse’ then a closing pulse will be given for closing the breaker, and an opening pulse will be given to open the breaker.

When a contactor kit is used, then the selected type will be ‘continuous’. Then a continuous signal will be given to the contactor when it needs to be closed, and the opening pulse output won’t be used.

17.2.16 Static Synchronisation

With these parameters you can program the setpoint.

2210	**Static Sync.**	***SERVICE LEVEL***	
2211	Df max.	***0.1Hz***	*0.0 ... 0.25)*
2212	DU max.	***5%***	*(2 ... 10)*
2213	Close Window	***10.0 deg***	*(0.1 ...20.0)*
2214	KP	***80***	*(0 ... 1000)*
2215	KI	***80***	*(0 ... 1000)*
2216	Delay	***1.0s***	*(0.0 ... 5.0)*

17.3 Power setup. Peak shaving operation

17.3.1 Mains power (import power)

The mains power set point is the maximum imported power from the mains. If the load is higher than this set point, the mains will supply the load equal to the mains power set point and the gen-set will supply all additional loads.

It is possible to have two set points, daytime and nighttime set point. The purpose of this is to adapt the mains import to the different load conditions in different periods.

The Qc4001 needs a 4...20mA signal on terminal 98-99 from an optional Power Transducer, measuring the imported power from the mains. The calibration of the Power Transducer must be:

- 4 mA = 0.0 MW
- 20 mA = Transducer scale, set-point in channel 3013.

3010	**Mains Power**	***CUSTOMER LEVEL***	
3011	Day	***5000kW***	*(0 ... 20000)*
3012	Night	***5000kW***	*(0 ... 20000)*
3013	Transducer Scale	***5000kW***	*(0 ... 20000)*

17.3.2 Daytime period

The start / stop time of the daytime period are adjusted with hours and minutes. The period outside the daytime period is defined as the night time period.

3020	**Daytime Period**	***CUSTOMER LEVEL***	
3021	Start Hour	***8***	*(0 ... 23)*
3022	Start Minute	***0***	*(0 ... 59)*
3023	Stop Hour	***16***	*(0 ... 23)*
3024	Stop Minute	***0***	*(0 ... 59)*

17.3.3 Start gen-set

The set point is used to start the gen-set. When the imported mains power exceeds the set-point in channel 3031, the gen-set is started and synchronised to the busbar. The set-point in channel 3031 is referring to the mains power set-points in channel 3011 or 3012. The start generator minimum load point is the minimum loading of the gen-set. The mains will always supply the maximum possible power. The additional power will be supplied by the gen-set.

3030	**Start Generator**	***CUSTOMER LEVEL***	
3031	Setpoint	***80%***	*(5 ... 100)*
3032	Delay	***10.0s***	*(0.0 ... 990.0)*
3033	Minimum Load	***10***	*(0 ... 100)*

17.3.4 Stop gen-set

This set-point is used to stop the gen-set. When the imported mains power decreases below the set point the stop sequence of the genset is commenced. The set point in channel 3041 refers to the mains power set points in channel 3011 or 3012.

3040	**Stop Generator**		***CUSTOMER LEVEL***	
	3041	Setpoint	***60%***	*(0 ... 80)*
	3042	Delay	***600.0s***	*(0.0 ... 990.0)*

17.3.5 Load Dependent Start

With the option PMS this is the setpoint for setting the maximum load step needed in the application. The setpoint will tell you the minimal load step that always will be available by the gensets.
The delay is the time before the next unit will be started.
The minimum load is the setpoint on which the generator wants to run minimally in a peak shaving application.

3050	**Load Dependent Start**		***CUSTOMER LEVEL***	
	3051	Setpoint	***50kW***	*(0 ... 20000)*
	3052	Delay	***1.0s***	*(0.0 ... 990.0)*
	3053	Minimum Load	***20kW***	*(0 ... 20000)*

17.3.6 Load Dependent Stop

With the option PMS the setpoint will give you the maximum power reserve before stopping the gensets
The delay is the time before the last genset will be stopped.

3060	**Load Dependent Stop**		***CUSTOMER LEVEL***	
	3061	Setpoint	***100kW***	*(0 ... 20000)*
	3062	Delay	***30.0s***	*(5.0 ... 9900.0)*

17.3.7 Test running

3070	Test		*CUSTOMER LEVEL*	
	3071	Setpoint	***50%***	*(1 ... 100)*
	3072	Delay	***300.0s***	*(30.0 ... 990.0)*
	3073	Syncr.	***OFF***	*(ON / OFF)*

Test sequence:

When the TEST mode is selected, the gen-set is automatically started and synchronised with the mains. The sequence of the TEST is as follows:

- START sequence starts the gen-set
- Synchronise the generator breaker to the busbar (mains)
- Gen-set is loaded to the setting in channel 3071
- The parallel time expires and the generator is deloaded
- GB opens
- STOP sequence stops the gen-set

Pushing the TEST pushbutton on the display activates the test mode. The TEST mode can be used in peak shaving and AMF mode to check if the system is still functioning.
After the test run the Qc4001 returns to AUTO mode.

If the setting 3073 (Syncr.) is OFF, the sequence of the test is as follows:

- START sequence starts the gen-set
- The test time expires and the STOP sequence stops the gen-set

17.3.8 Fixed power set-point (for active generator power and power factor)

The fixed power set points are used when the Qc4001 is configured to fixed power operation. The PF (power factor) set point is used when the generator is running parallel to mains.

3080	Fixed Power Setpoint		*CUSTOMER LEVEL*	
	3081	P Setpoint	***80%***	*(0 ... 100)*
	3082	PF Setpoint	***0.95***	*(0.60 ... 1.00)*

17.3.9 PMS Configuration

These are parameters that needs to be programmed if the option PMS is installed.

- The amount of generators that are installed in the application
- Activate the Qc4001 Mains controller in the application if needed.
- Activate the PMS in this Qc4001 controller.

Warning:
By turning this parameter to ON in AUTO mode, the generator can start immediately. It is recommended to place the generator in SEMI-AUTO mode while programming the parameters !

- Program the Qc4001 command controller in the application. If one controller is set to ON the others will set automatically to OFF. Program the Qc4001 mains controller as command unit if possible. The command unit communicates the following parameters to the other connected units : start generator limit, start generator delay, stop generator limit, stop generator delay, command unit, start & stop command, timer values.
- Choose the way of starting up the application.

3100	**PMS Configuration**	***CUSTOMER LEVEL***	
3101	# Gen-sets available	***1***	*(1 ... 16)*
3102	Mains available	***OFF***	*(OFF / ON)*
3103	PMS active	***OFF***	*(OFF / ON)*
3104	Command Unit	***ON***	*(OFF / ON)*
3105	Enable Start/Stop	***Local***	*(Remote / Local / Timer)*

17.3.10 Internal Communication ID

Give every generator an individual ID. No duplicates are possible.
Used only with the PMS option.

3110	**Internal Communication ID**	***CUSTOMER LEVEL***	
3111	Intern. Comm. ID	***1***	*(1 ... 16)*

17.3.11 Priority Select

Choose the priority in starting up the gensets either manually by ID-numbers of by the actual running hours.
Used only with the PMS option.

3120	**Priority Select**	***CUSTOMER LEVEL***	
3121	Priority Select	***Manual***	*(Manual / Running Hours)*

Manual = 0 / Running Hours = 1

17.3.12 Number of ID's

Enable or disable every genset and mains controller in the PMS application. By disabling an ID, the generator won't be started but instead the next in the starting and stopping sequence.
Used only with the PMS option.

3130	Number of ID's	CUSTOMER LEVEL	
3131	Enable Mains	***OFF***	*(OFF / ON)*
3132	Enable ID1	***ON***	*(OFF / ON)*
3133	Enable ID2	***OFF***	*(OFF / ON)*
3134	Enable ID3	***OFF***	*(OFF / ON)*
3135	Enable ID4	***OFF***	*(OFF / ON)*
3136	Enable ID5	***OFF***	*(OFF / ON)*

3140	Number of ID's	CUSTOMER LEVEL	
3141	Enable ID6	***OFF***	*(OFF / ON)*
3142	Enable ID7	***OFF***	*(OFF / ON)*
3143	Enable ID8	***OFF***	*(OFF / ON)*
3144	Enable ID9	***OFF***	*(OFF / ON)*
3145	Enable ID10	***OFF***	*(OFF / ON)*
3146	Enable ID11	***OFF***	*(OFF / ON)*

3150	Number of ID's	CUSTOMER LEVEL	
3151	Enable ID12	***OFF***	*(OFF / ON)*
3152	Enable ID13	***OFF***	*(OFF / ON)*
3153	Enable ID14	***OFF***	*(OFF / ON)*
3154	Enable ID15	***OFF***	*(OFF / ON)*
3155	Enable ID16	***OFF***	*(OFF / ON)*

17.3.13 Priority of ID's

If manual priority (3120) is selected, the priority sequence needs to be programmed. Priority 1 means that the selected generator will be started first, then the generator with priority 2, etc.
Used only with the PMS option.

3160	Priority of ID's	CUSTOMER LEVEL	
3161	Priority ID1	***1***	*(1 … #Gen-sets Available)*
3162	Priority ID2	***2***	*(1 … #Gen-sets Available)*
3163	Priority ID3	***3***	*(1 … #Gen-sets Available)*
3164	Priority ID4	***4***	*(1 … #Gen-sets Available)*
3165	Priority ID5	***5***	*(1 … #Gen-sets Available)*
3166	Transmit	***OFF***	*(OFF / ON)*

3170	Priority of ID's		CUSTOMER LEVEL	
	3171	Priority ID6	***6***	*(1 … #Gen-sets Available)*
	3172	Priority ID7	***7***	*(1 … #Gen-sets Available)*
	3173	Priority ID8	***8***	*(1 … #Gen-sets Available)*
	3174	Priority ID9	***9***	*(1 … #Gen-sets Available)*
	3175	Priority ID10	***10***	*(1 … #Gen-sets Available)*
	3176	Priority ID11	***11***	*(1 … #Gen-sets Available)*

3180	Priority of ID's		CUSTOMER LEVEL	
	3181	Priority ID12	***12***	*(1 … #Gen-sets Available)*
	3182	Priority ID13	***13***	*(1 … #Gen-sets Available)*
	3183	Priority ID14	***14***	*(1 … #Gen-sets Available)*
	3184	Priority ID15	***15***	*(1 … #Gen-sets Available)*
	3185	Priority ID16	***16***	*(1 … #Gen-sets Available)*

17.3.14 Running hours

If running hours priority (3120) is selected, this parameter will become available. The costumer can set the delay before running hours between the generators will be checked on which the priority is based on.
Used only with the PMS option.

3220	Running hours		COSTUMER LEVEL	
	3221	Hours	***175***	*(1 ...20000)*

17.3.15 Ground Relay

In some special multi-genset PMS applications it is necessary to connect only 1 Neutral at a time to the load. These relay outputs can be connected to the separate Neutral breaker for getting only 1 Neutral closed. This will be based on the priorities between the genset, the open&close signal of the GB and the running feedback of the gensets.

3230	Ground Relay		COSTUMER LEVEL	
	3231	Output Relay A	***R0***	*(R0 ... R3)*
	3232	Output Relay B	***R0***	*(R0 ... R3)*
	3233	Enable	***OFF***	*(OFF / ON)*

17.3.16 Stop Noncon. Gen-sets

Extra safety delay time to stop the generator when through PMS a stop command is given but after a certain amount of time the genset does not stop.
Used only with the PMS option.

3240	Stop Noncon. Gen-sets		COSTUMER LEVEL	
	3241	Delay	***60.0s***	*(10.0 ... 600.0)*

17.3.17 Power Capacity

This parameter will only be available on the Qc4001 mains control unit and is used for programming the power capacity that is needed on the generator side before switching over. With a setpoint that is higher than the total available power capacity by the gensets, the Mains controller will not close the tie-breaker.
Used only with the PMS option.

3250	**Power Capacity**	***COSTUMER LEVEL***	
3251	Power Capacity	***50kW***	*(0 ...20000)*

17.3.18 Tie breaker

This parameter will only be available on the Qc4001 mains control unit and is used for enabling the tie breaker.
Used only with the PMS option.

3260	**Tie breaker**	***COSTUMER LEVEL***	
3261	Tie breaker	***OFF***	*(OFF / ON)*

17.4 System setup

In the system setup it is possible to set up the Qc4001 with the specific parameters for application, engine and generator.

17.4.1 Nominal settings (1st / 2nd / 3th / 4th Parameter Set)

The 1st parameter set is used as standard.
Depending on the input that is activated the other parameter sets will be used.
On the QAC genn-sets 2 parameter sets will be used: the 1th set for 50Hz operation and the 2th set for 60Hz operation. The input is activated by the 50/60Hz switch on the cubicle.

4010	**Nominal Settings**	***SERVICE LEVEL***	
4011	Frequency	***50Hz***	*(48.0 ... 62.0)*
4012	Generator Power	***720kW***	*(10 ... 20000)*
4013	Generator Current	***1300A***	*(0 ... 9000)*
4014	Generator Voltage	***400V***	*(100 ... 25000)*

4020	**Nominal Settings 2**	***SERVICE LEVEL***	
4021	Frequency	***60Hz***	*(48.0 ... 62.0)*
4022	Generator Power	***810kW***	*(10 ... 20000)*
4023	Generator Current	***1217A***	*(0 ... 9000)*
4024	Generator Voltage	***480V***	*(100 ... 25000)*

4030	Nominal Settings 3	SERVICE LEVEL	
4031	Frequency	***50Hz***	*(48.0 ... 62.0)*
4032	Generator Power	***720kW***	*(10 ... 20000)*
4033	Generator Current	***1300A***	*(0 ... 9000)*
4034	Generator Voltage	***400V***	*(100 ... 25000)*

4040	Nominal Settings 4	SERVICE LEVEL	
4041	Frequency	***50Hz***	*(48.0 ... 62.0)*
4042	Generator Power	***720kW***	*(10 ... 20000)*
4043	Generator Current	***1300A***	*(0 ... 9000)*
4044	Generator Voltage	***400V***	*(100 ... 25000)*

17.4.2 Transformer generator (for generator voltage measuring)

Voltage transformer: If no voltage transformer is present, the primary and secondary side values are set to generator nominal value.

4050	Transformer Gen.	SERVICE LEVEL	
4051	Volt. Prim.	***440V***	*(100 ... 25000)*
4052	Volt. Sec.	***440V***	*(100 ... 690)*
4053	Current Prim.	***1600A***	*(5 ... 9000)*
4054	Current Sec.	***5A***	*(1 / 5)*

17.4.3 Transformer busbar (for busbar voltage measuring)

Voltage transformer: If no voltage transformer is present, the primary and secondary side values are set to generator nominal value.

4060	Transformer Bus	SERVICE LEVEL	
4061	Volt. Prim.	***440V***	*(100 ... 25000)*
4062	Volt. Sec.	***440V***	*(100 ... 690)*

17.4.4 External communication control (optional)

These setpoints will only be visible when an optional external communication extension card is mounted. The channels 4070-4094 are foreseen.
The Baud rate can only be changed with Modbus communication.

17.4.5 Engine communication

4100	Engine Comms.	SERVICE LEVEL	
4101	Type	***DDEC***	*(OFF / MDEC / DDEC / EMR / JDEC)*

0 = OFF / 1 = MDEC / 2 = DDEC / 3 = EMR / 5 = JDEC

NOTE: Selecting communication control ON will overrule external and internal settings.

17.4.6 Date and time (internal clock) setting

4110 Date and Time (internal clock) ***CUSTOMER LEVEL***

4110	Date	***dd/mm/yyyy***	*(…)*
4110	Time	***Hh:mm***	*(…)*

17.4.7 Measuring of generator running time and circuit breaker operations

The function 'running time' counts the hours the generator has been running (voltage on generator present).
The function 'GB operations' counts how many times the generator breaker has been closed.
The function 'MB operations' counts how many times the mains breaker has been closed.

The counters can be reset/set.

4120 Counters ***MASTER LEVEL***

4121	Running Time	***0***	*(0 ... 20000)*
4122	GB Operations	***0***	*(0 ... 20000)*
4123	MB Operations	***0***	*(0 ... 20000)*
4124	Reset kWh	***OFF***	

17.4.8 Battery undervoltage / overvoltage alarm

4220 Battery Low ***SERVICE LEVEL***

4221	Setpoint	***18.0V***	*(6.0 ... 36.0)*
4222	Delay	***3.0s***	*(0.0 ... 999.0)*
4223	Output Relay A	***R0***	*(R0 ... R3)*
4224	Output Relay B	***R0***	*(R0 ... R3)*
4225	Enable	***ON***	*(ON / OFF)*

4230 Battery High ***SERVICE LEVEL***

4231	Setpoint	***30.0V***	*(12.0 ... 36.0)*
4232	Delay	***0.5s***	*(0.0 ... 999.0)*
4233	Output Relay A	***R0***	*(R0 ... R3)*
4234	Output Relay B	***R0***	*(R0 ... R3)*
4235	Enable	***ON***	*(ON / OFF)*

17.4.9 Language

4240 Language ***CUSTOMER LEVEL***

4241	Language	***English***	*(GB / NL / F / D / E / I / DK / S / N / SF / P)*

0 = Master / 1 = English / 2 = Danish / 3 = Dutch / 4 = Finnish / 5 = French / 6 = German / 7 = Italian / 8 = Norwegian / 9 = Portuguese / 10 = Spanish / 11 = Swedish

17.4.10 Loadshare output

This function enables the user to set the voltage level of the active power loadshare line. This is only possible if the loadshare type Pow-R-Con is chosen (channel 4250).

4250	**Loadshare Out**	***CUSTOMER LEVEL***	
4251	Loadshare Out	***5.0V***	*(1.0 ... 5.0)*

17.4.11 Loadshare type

This function enables the user to set the type of active power loadshare.

4260	**Loadshare Type**	***CUSTOMER LEVEL***	
4261	Loadshare Type	***Qc4001***	*(Qc4001 / Selco / Pow-R-Con)*

0 = Qc4001 / 1 = Selco T4800 / 2 = Pow-R-Con

17.4.12 Battery undervoltag / overvoltage alarm 2

4270	**Battery Low 2**	***COSTUMER LEVEL***	
4271	Setpoint	***N/A***	*(6.0 ... 36.0)*
4272	Delay	***10.0s***	*(0.0 ... 999.0)*
4273	Output Relay A	***R0***	*(R0 ... R3)*
4274	Output Relay B	***R0***	*(R0 ... R3)*
4275	Enable	***OFF***	*(ON / OFF)*

4270	**Battery High 2**	***COSTUMER LEVEL***	
4281	Setpoint	***N/A***	*(6.0 ... 36.0)*
4282	Delay	***0.5s***	*(0.0 ... 999.0)*
4283	Output Relay A	***R0***	*(R0 ... R3)*
4284	Output Relay B	***R0***	*(R0 ... R3)*
4285	Enable	***OFF***	*(ON / OFF)*

17.4.13 Mode Relay

This function can be used to activate a relay in different modes.

4280	**Mode Relay**	***COSTUMER LEVEL***	
4291	Test	***R0***	*(R0 ... R3)*
4292	Auto	***R0***	*(R0 ... R3)*
4293	Semi	***R0***	*(R0 ... R3)*

17.4.14 Engine type

4300	**Engine Type**	***MASTER LEVEL***	
	4301 Engine Type	***Diesel***	*(Diesel / Gas)*

0 = Diesel / 1 = Gas

17.4.15 Gen-set modes

4320	**Gen-Set Mode**	***CUSTOMER LEVEL***	
	4321 Gen-Set Mode	***Island***	*(Island / AMF / PS / FP / LTO / PMS)*

0 = Island / 1 = AMF / 2 = Peak Shaving / 3 = Fixed Power / 4 = Load Take Over /
5 = Power Management System

17.4.16 CAN Unit

This parameter can be used to change the read-outs on the display.

4320	**CAN Unit**	***CUSTOMER LEVEL***	
	4331 CAN Unit	***bar-celsius***	*(bar-celsius / psi-farenheit)*

0 = bar-celsius / 1 = psi-farenheit

17.4.17 Tacho configuration

4350	**Tacho Config.**	***SERVICE LEVEL***	
	4351 Setpoint	***500rpm***	*(1 ... 2000)*
	4352 Teeth	***0***	*(0 ... 500)*

The tacho input (=magnetic speed pick-up) must be configured to 0 teeth when not in use.

17.4.18 Start sequency of the engine

4360	**Starter**	***COSTUMER LEVEL***	
	4361 Start Prepare	***1.0s***	*(0.0 ... 600.0)*
	4362 Start ON Time	***12.0s***	*(1.0 ... 30.0)*
	4363 Start OFF Time	***12.0s***	*(1.0 ... 99.0)*
	4364 Prepare	***Normal***	*(Normal/ Extended)*
4370	**Start Attempts**	***SERVICE LEVEL***	
	4371 Attempts	***3***	*(1 ... 10)*
	4372 Output Relay A	***R0***	*(R0 ... R3)*
	4373 Output Relay B	***R0***	*(R0 ... R3)*

The settings “start prepare”, “start ON time” and “start OFF time” are the periods that the relays on the engine interface card slot #7 are activated.
The start prepare output can for example be used for prelubricating or preheating. The start relay output is for activating the starter of the engine and the stop relay output is for activating the stop coil of the engine.
The amount of start attempts can be defined.

The start sequence is interrupted in the following situations:

- Running feedback from the engine
- Voltage is present at the generator
- STOP signal, e.g. by STOP pushbutton in SEMI-AUTO
- Shutdown alarm

The interruption deactivates the start relay, and a start failure alarm is displayed.

17.4.19 GB ON / GB OFF sequence

The GB ON sequence will synchronise and/or close the generator breaker. The breaker is closed directly without synchronising if the mains breaker is open or if no mains breaker is present (island mode), this means if the voltage on the busbar/mains is not present.
The GB ON sequence is automatically initiated (except in SEMI-AUTO mode) when the automatic start sequence has been completed and the engine is running.
In SEMI-AUTO mode the operator may initiate the GB ON sequence by pressing the "GB" pushbutton on the display.

Conditions, which must be fulfilled before a GB ON signal is activated:

- Running feedback from the engine (channel 4351, tacho configuration set-point or running feedback input).
- The frequency and voltage has been present in the time “f/U OK” (channel 4381).

This will initiate synchronising and/or closing of the generator breaker.

4380	**f/U OK**		***SERVICE LEVEL***	
	4381	Delay	***3.0s***	*(1.0 ... 99.0)*

4390	**f/U failure**		***SERVICE LEVEL***	
	4391	Delay	***30.0s***	*(1.0 ... 99.0)*
	4392	Output Relay A	***R0***	*(R0 ... R3)*
	4393	Output Relay B	***R0***	*(R0 ... R3)*

The GB ON sequence is interrupted when:

- Synchronisation alarm
- GB ON alarm
- GB pushbutton pressed in SEMI-AUTO mode
- f/U failure

The GB OFF sequence is automatically initiated (except in SEMI-AUTO mode) when the generator has to be stopped. In AMF operation this is when the mains returns and the mains breaker is synchronised, and in PEAK SHAVING and LOAD TAKE OVER operation this is when the load is to be supplied by the mains only.
In SEMI-AUTO mode the operator may initiate the GB OFF sequence by pressing the "GB" pushbutton on the display.

Sequence (if parallel with mains):

- De-load the generator
- Open the breaker at a configurable setpoint (channel 2122)

Sequence (if island mode):

- Open the breaker immediately

The GB OFF sequence is interrupted when:

- A DELOAD alarm
- A GB OFFalarm
- GB pushbutton is pressed in SEMI-AUTO mode

17.4.20 MB ON / MB OFF sequence

The MB ON sequence will synchronise and/or close the mains breaker.
In AUTO mode the MB ON sequence is automatically initiated if the Qc4001 is in AMF operation and the mains returns after a mains failure. In peak shaving mode the MB ON sequence is automatically initiated when the mains is OK.
If the generator breaker is open and the mains is present, the MB will be closed immediately in AUTO mode.
In SEMI-AUTO mode the operator may initiate the MB ON sequence by pressing the "MB" pushbutton on the display. Pressing the MB pushbutton in SEMI-AUTO will close the MB immediately, if the GB is open and the mains is present.

Conditions that must be fulfilled before a MB ON signal is activated:
- No active MB alarms
- Mains OK

This will initiate synchronising and/or closing of the mains breaker.

Interruption of the MB ON sequence:
- Mains failure alarm
- MB ON alarm
- MB OFF pushbutton in SEMI-AUTO.

The MB OFF sequence is automatically initiated (except in SEMI-AUTO mode). In SEMI-AUTO mode the operator may initiate the MB OFF sequence by pressing the "MB" pushbutton on the display.

Sequence: AUTO (mains failure)
- Mains not present
- Open the mains breaker

Sequence: SEMI-AUTO (gen-set parallel with mains)
- MB pushbutton is pressed
- Open the mains breaker

Sequence: SEMI-AUTO (gen-set stopped, the mains supplies the load)
- MB OFF pushbutton pressed
- Open the mains breaker

Interruption of the MB OFF sequence:
- MB OFF alarm
- Pressing the MB pushbutton in SEMI-AUTO operation

17.4.21 Stop sequence

Stop sequence:
- Programmable cooling down time
- "STOP" output with programmable extended stop time

The stop sequence is carried out when the Qc4001 has completed the GB OFF sequence and the generator breaker is open.
In AUTO mode the stop sequence is initiated automatically. In SEMI-AUTO mode a stop command with the "STOP" pushbutton will stop the engine without cooling down. If the generator is running with the generator breaker closed and the “STOP” pushbutton is pressed, the generator is opened without deloading, and the engine is stopped without cooling down.

A start command will interrupt an ongoing cool down period and leave the engine in idle speed. A GB ON signal will synchronise and close the breaker.

A stop failure is displayed if the running feedback signal or the generator voltage and frequency are still present.

If the coil type is configured as ‘running coil’, the stop coil will be energized during starting and running and de-energized during stopping.

STOP parameters

4400	**Stop**	***SERVICE LEVEL***	
	4401 Cool Down Time	***60.0s***	*(0.0 ... 990.0)*
	4402 Extended Stop	***15.0s***	*(1.0 ... 99.0)*
	4403 Coil Type	***RUN***	*(RUN / STOP)*

0 = Run Coil / 1 = Stop Coil

4410	**Stop Failure**	***SERVICE LEVEL***	
	4411 Delay	***20.0s***	*(10.0 ... 120.0)*
	4412 Output Relay A	***R0***	*(R0 ... R3)*
	4413 Output Relay B	***R0***	*(R0 ... R3)*

Mains failure:

Automatic mains failure is detected when the Qc4001 is in AUTO mode and configured as an AMF unit. When the timer “FAIL DELAY” expires the following sequence is carried out:
- MB is opened
- Start sequence is initiated
- GB is closed

In case of MB open fail the sequence is stopped and an “MB OPEN FAILURE” alarm is displayed.

When the mains returns the change-over sequence is started. The sequence is started when the timer “MAINS OK DELAY” expires:
- MB is synchronised
- GB is de-loaded (if parallel running is allowed)
- GB is opened
- Stop sequence is initiated

In case of a sequence alarm the sequence will be stopped. If GB OFF fail and parallel running is not allowed, then the MB is opened.

4420	**Mains V Failure**	***CUSTOMER LEVEL***	
	4421 Fail Delay	***1.0s***	*(1.0 ... 990.0)*
	4422 Mains OK Delay	***60.0s***	*(10.0 ... 990.0)*
	4423 Low Voltage	***75%***	*(50 ... 100)*
	4424 High Voltage	***120%***	*(100 ... 150)*
	4425 Mains Fail Control	***Start+Open MB***	*(Start / Start+Open MB)*

0 = Start+Open MB / 1 = Start

4430	**Mains Hz Failure**	***CUSTOMER LEVEL***	
	4431 Fail Delay	***1.0s***	*(1.0 ... 990.0)*
	4432 Mains OK Delay	***60.0s***	*(10.0 ... 990.0)*
	4433 Low Frequency	***95%***	*(80 ... 100)*
	4434 High Frequency	***105%***	*(100 ... 120)*

17.4.22 MB Control

4440	**MB Control**	***SERVICE LEVEL***	
4441	Function	***Mode Shift OFF***	*(MS OFF / PS-AMF-PS / LTO-AMF-LTO)*
4442	Timer	***0.5s***	*(0.0 ... 30.0)*
4443	Back Sync.	***OFF***	*(ON / OFF)*
4444	Synchr. Timer	***75ms***	*(40 … 3000)*

Description of Mode Shift:
In case of Peak Shaving, Fixed Power and Load Take Over mode, it is possible to enable the AMF function as a second application, next to the chosen mode.
If then a mains failure occurs, the unit changes to AMF operation and finally it returns to the chosen mode when the mains supply is restored.

17.4.23 Horn timeout

4450	**Alarm Horn**		***CUSTOMER LEVEL***	
	4451	Delay	***20.0s***	*(0.0 ... 990.0)*

The setting is the maximum time the horn is sounding at an alarm. If the setting is adjusted to 0 s, the horn will sound continuously until the alarm is acknowledged.

17.4.24 GB Control

4460	**GB Control**		***CUSTOMER LEVEL***	
	4461	GB Close Delay	***1.0s***	*(0.0 ... 30.0)*

17.4.25 Analogue output configuration (optional)

The analogue output option consists of two independent 0/4…20mA outputs.
The related setpoints will only be shown when this analogue output extension card is mounted.

17.4.26 Relay Setup

The relays can be configured in the 2 different ways described below.

Alarm Relay Function:	When an alarm activates the relay, it is activated as long as the alarm is present and unacknowledged.
Limit Function:	When an alarm activates the relay, no alarm message is displayed. After that the condition which activates this relay has returned to normal, the relay will deactivate after the 'Off Delay' has expired.

4610	**Relay 1**		***SERVICE LEVEL***	
	4611	Function	***Alarm***	*(Limit / Alarm)*
	4612	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4620	**Relay 2**		***SERVICE LEVEL***	
	4621	Function	***Alarm***	*(Limit / Alarm)*
	4622	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4630	**Relay 3**		***SERVICE LEVEL***	
	4631	Function	***Alarm***	*(Limit / Alarm)*
	4632	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4640	**Relay 4**		***SERVICE LEVEL***	
	4641	Function	***Alarm***	*(Limit / Alarm)*
	4642	Off Delay	***0.0s***	*(0.0 ... 999.9)*

17.4.27 Relay Setup (optional)

These setpoints will only be shown when the optional output relay extension card is mounted in the Qc4001. The channels 4650-4682 are foreseen.

17.4.28 Real Time Clock Start & Stop commands

Up to 8 start/stop commands can be programmed on a weekly base.
These commands, if enabled, can be used when the Qc4001 is in AUTO-mode in following applications:
- Island Mode
- Fixed Power Mode
- Load Take Over Mode

If a Start command is enabled, then a Stop command should be enabled as well. Else the genset will keep on running.
For example: in channel 4710 a Start command can be defined on Monday 10h00, and in channel 4720 a Stop command can be defined on Tuesday 14h00.

Following days or groups of days can be selected:

Setting	
MO	0
TU	1
WE	2
TH	3
FR	4
SA	5
SU	6
MO-TU-WE-TH	7
MO-TU-WE-TH-FR	8
SA-SU	9
MO-TU-WE-TH-FR -SA-SU	10

4710 Start/Stop Cmd. 1 ***CUSTOMER LEVEL***

4711	Enable	***OFF***	*(ON / OFF)*
4712	START/STOP	***STOP***	*(START / STOP)*
4713	Day(s)	***10***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4714	Hour	***10***	*(0 ... 23)*
4715	Minute	***0***	*(0 ... 59)*

4720 Start/Stop Cmd. 2 ***CUSTOMER LEVEL***

4721	Enable	***OFF***	*(ON / OFF)*
4722	START/STOP	***STOP***	*(START / STOP)*
4723	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4724	Hour	***10***	*(0 ... 23)*
4725	Minute	***0***	*(0 ... 59)*

4730 Start/Stop Cmd. 3 ***CUSTOMER LEVEL***

4731	Enable	***OFF***	*(ON / OFF)*
4732	START/STOP	***STOP***	*(START / STOP)*
4733	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4734	Hour	***10***	*(0 ... 23)*
4735	Minute	***0***	*(0 ... 59)*

4740 Start/Stop Cmd. 4 ***CUSTOMER LEVEL***

4741	Enable	***OFF***	*(ON / OFF)*
4742	START/STOP	***STOP***	*(START / STOP)*
4743	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4744	Hour	***10***	*(0 ... 23)*
4745	Minute	***0***	*(0 ... 59)*

4750 Start/Stop Cmd. 5 ***CUSTOMER LEVEL***

4751	Enable	***OFF***	*(ON / OFF)*
4752	START/STOP	***STOP***	*(START / STOP)*
4753	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4754	Hour	***10***	*(0 ... 23)*
4755	Minute	***0***	*(0 ... 59)*

4760 Start/Stop Cmd. 6 ***CUSTOMER LEVEL***

4761	Enable	***OFF***	*(ON / OFF)*
4762	START/STOP	***STOP***	*(START / STOP)*
4763	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4764	Hour	***10***	*(0 ... 23)*
4765	Minute	***0***	*(0 ... 59)*

4770 Start/Stop Cmd. 7 ***CUSTOMER LEVEL***

4771	Enable	***OFF***	*(ON / OFF)*
4772	START/STOP	***STOP***	*(START / STOP)*
4773	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4774	Hour	***10***	*(0 ... 23)*
4775	Minute	***0***	*(0 ... 59)*

4780 Start/Stop Cmd. 8 ***CUSTOMER LEVEL***

4781	Enable	***OFF***	*(ON / OFF)*
4782	START/STOP	***STOP***	*(START / STOP)*
4783	Day(s)	***11***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4784	Hour	***10***	*(0 ... 23)*
4785	Minute	***0***	*(0 ... 59)*

0 = Start / 1 = Stop

17.4.29 GSM Pin Code

4790 GSM Pin Code ***COSTUMER LEVEL***

4791	Pin code	***0000***	*(0 … 9999)*

17.4.30 Service Time

Two maintenance intervals can be monitored.
Both monitor the running hours (with a counter) and the elapsed time (with a timer) since the last service. The first parameter (counter or timer) that reaches its defined limit, will give a maintenance warning to the user.
For example on a QIX gen-set the maintenance interval is 500 running hours or 1 year, whichever comes first.
For each of the two intervals, if either the setted running hours or the setted elapsed time is reached, an alarm will be given.
Each interval can be reset by enabling the reset function. Then the respectively counter and timer will be put to 0.

The Service Timer menus can only be entered using the “JUMP” pushbutton.

4910	**Service Timer 1**		***SERVICE LEVEL***	
	4911	Enable	***ON***	*(ON / OFF)*
	4912	Run Hours	***500h***	*(10 ... 10000)*
	4913	Elapsed Time	***365 days***	*(1 ... 1000)*
	4914	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
	4915	Output Relay A	***R0***	*(R0 ... R3)*
	4916	Reset		

4920	**Service Timer 2**		***SERVICE LEVEL***	
	4921	Enable	***ON***	*(ON / OFF)*
	4922	Run Hours	***1000h***	*(10 ... 10000)*
	4923	Elapsed Time	***365 days***	*(1 ... 1000)*
	4924	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
	4925	Output Relay A	***R0***	*(R0 ... R3)*
	4926	Reset		

17.4.31 Diagnostic Mode

4930	**Diagnostics Mode**		***CUSTOMER LEVEL***	
	4930	Diagnostics	***Normal***	*(Normal / Diagnostics)*

0 = Normal / 1 = Diagnostics

17.4.32 User passwords

4940	**Reset Eventlog**		***MASTER LEVEL***	
	4940	Reset	***OFF***	*(ON / OFF)*

17.4.33 User passwords

Only the level 1 (customer level) password can be changed through the display menu. Higher levels of passwords can only be changed through theQc4001 Utility Software.

The level 1 password menu can only be entered using the “JUMP” pushbutton.

4971 **Level 1 Password** ***CUSTOMER LEVEL***

4971	Setting	***2003***

(0 ... 32000)

4972 **Level 2 Password** ***SERVICE LEVEL***

4972	Setting	****

(0 ... 32000)

4973 **Level 3 Password** ***MASTER LEVEL***

4973	Setting	****

(0 ... 32000)

17.4.34 Service menu

The service menu can only be entered using the “JUMP” pushbutton. This menu is used in service situations.

In the alarm selection you can see all the alarm timers and their remaining time if they are counting.

The input and output selections show the present status of the inputs and outputs. E.g. mode inputs, relay outputs and load sharing lines.

No.	Setting		Description
4980	Service Menu	Selection Display	
4981	Service Menu	Alarm	Shows remaining alarm delay time
4982	Service Menu	Digital Inputs	Shows digital input status
4983	Service Menu	Digital Outputs	Shows digital output status

17.4.35 Diagnostics menu

This diagnostics menu can only be entered using the "JUMP" pushbutton. This menu is used in (mainly EMR) diagnostics situations.
If diagnostics is selected in this menu, the fuel solenoid relay output will be de-energized for 30 seconds (to make sure that the unit is completely stopped), and then gets energized again. Then EMR diagnostics can take place.
To leave this status, normal operation has to be selected again in this menu.

4930	**Diagnostics Mode**	***CUSTOMER LEVEL***	
4930	Diagnostics	***Normal***	*(Normal / Diagnostics)*

It's only possible to start the gen-set when this parameter is at 'Normal'.

17.4.36 Clear Log Menu

This menu can only be entered by using the “JUMP” pushbutton. This menu will be used when the gen-sets leave the Atlas Copco test area, to clear the log memory in the Qc4001.

4940	**Reset Eventlog**	***MASTER***	
4940	Reset	***OFF***	*(ON / OFF)*

17.4.37 Parameter Set ID

This is a text field which is saved and loaded together with the parameter set.
The text is editable and contain a maximum of 15 characters (can be a combination of all kind of characters, eg. '9822 0999 97_02').
This text is listed in the 'parameters shown on the display 'list.
This text can only be entered or edited through the Utility Software in the parameter file

17.4.38 Application

This parameter is default set on 0; only in a PMS application the Qc4001 mains controller needs to be set at 1.
Used only with the PMS option.

Warning : If a genset Qc4001 controller is set at 1; all the settings will be lost !

5000	**Application**	***MASTER***	
5000	Application	***0***	*(0 / 1)*

17.4.39 VDO 1

Parameters to be programmed when a configurable oil pressure sensor is used.

5010	**VDO 1**	***SERVICE LEVEL***	
5011	VDO 1 @ 0,0 bar	***10***	*(0 … 240)*
5012	VDO 1 @ 2,5 bar	***44,9***	*(0 … 240)*
5013	VDO 1 @ 5,0 bar	***81***	*(0 … 240)*
5014	VDO 1 @ 6,0 bar	***134,7***	*(0 … 240)*

5020	**VDO 1**	***SERVICE LEVEL***	
5021	VDO 1 @ 7,0 bar	***184***	*(0 … 240)*
5022	VDO 1 @ 8,0 bar	***200***	*(0 … 240)*
5023	VDO 1 @ 9,0 bar	***210***	*(0 … 240)*
5024	VDO 1 @ 10,0 bar	***220***	*(0 … 240)*

17.4.40 VDO 2

Parameters to be programmed when a configurable coolant temperature sensor is used.

5030	**VDO 2**	***SERVICE LEVEL***	
5031	VDO 2 @ 40 °C	***292***	*(0 … 480)*
5032	VDO 2 @ 50 °C	***197***	*(0 … 480)*
5033	VDO 2 @ 60 °C	***134***	*(0 … 480)*
5034	VDO 2 @ 70 °C	***97***	*(0 … 480)*

5040	**VDO 2**	***SERVICE LEVEL***	
5041	VDO 2 @ 80 °C	***70***	*(0 … 480)*
5042	VDO 2 @ 90 °C	***51***	*(0 … 480)*
5043	VDO 2 @ 100 °C	***39***	*(0 … 480)*
5044	VDO 2 @ 110 °C	***29***	*(0 … 480)*

17.4.41 VDO 3

Parameters to be programmed when a configurable fuel level sensor is used.

5050	**VDO 3**	***SERVICE LEVEL***	
5051	VDO 3 @ 0%	***78,8***	*(0 … 180)*
5052	VDO 3 @ 40%	***47,9***	*(0 … 180)*
5053	VDO 3 @ 50%	***40,2***	*(0 … 180)*
5054	VDO 3 @ 60%	***32,5***	*(0 … 180)*

5060	**VDO 3**	***SERVICE LEVEL***	
5061	VDO 3 @ 70%	***24,8***	*(0 … 180)*
5062	VDO 3 @ 80%	***17***	*(0 … 180)*
5063	VDO 3 @ 90%	***9,3***	*(0 … 180)*
5064	VDO 3 @ 100%	***1,6***	*(0 … 180)*

18 Technical specifications

Accuracy: Class 1.0 according to IEC 688.

Operating temperature: -25…70 °C.

Aux. supply: 12/24 VDC -25/+30 %.
Guaranteed performance @ dips down to 6V (for max. 1s.) during starting.

Measuring voltage: 100…690 VAC. Consumption max. 0.15 VA per phase.

Frequency: 30…70 Hz.

Measuring current: From current transformers …/1 A or …/5 A. Consumption max. 0.3 VA per phase.

Binary inputs: Input voltage 6…32 VDC. Impedance 2.4 k ., bi-directional.

Open collector outputs: Supply voltage 6…32 VDC. Load max. 10 mA.

Load sharing lines: +/-5 VDC.

Analogue inputs: +/-10 VDC, impedance 100 k .(not galvanically separated).

Relay outputs: 250 V/8 A or 24 VDC/1 A. Refer to actual description of I/O's.

Safety: To EN 61010-1 installation category (overvoltage category) III, 600 V, pollution degree 2.

CE and C-UL approved.

Galvanic separation: Between AC voltage, AC current and other I/O's: 3250 VAC – 50 Hz – 1 min. Between analogue outputs: 500 VDC – 1 min.

EMC/CE: According to EN-50081-1/2, EN-50082-1/2, SS4361503 (PL4) and IEC 255-3.

Material: All plastic parts are self-extinguishing to UL94 (V1).

Climate: HSE, to DIN 40040.

Connections: 4 mm² multi stranded for AC currents, all others 2.5 mm² multi stranded.

Response times: From the set-point is reached till the output is activated and the delay set to 0.

Generator: Over/under voltage 70-200 ms.
Over/under frequency 70-200 ms.

Current: 100-200 ms.
Fast overcurrent: <42 ms.

High overcurrent: 100-200 ms.

Rocof: 100 ms (4 periods).

Vector jump: 30 ms.

Protection: Case: IP40.

Terminals: IP20.

Operator panel: IP52.

To IEC 529 and EN 60529.

Mounting: Base mounted with six screws or DIN-rail mounted.

Protection of PCB's: all PCB's shall be sprayed to guarantee good functioning of the controller in humid environments.

Cold Tested according to IEC 68-2-1.

Dry Heat Tested according to IEC 68-2-2.

Damp Heat Dynamic Tested according IEC 68-2-30.

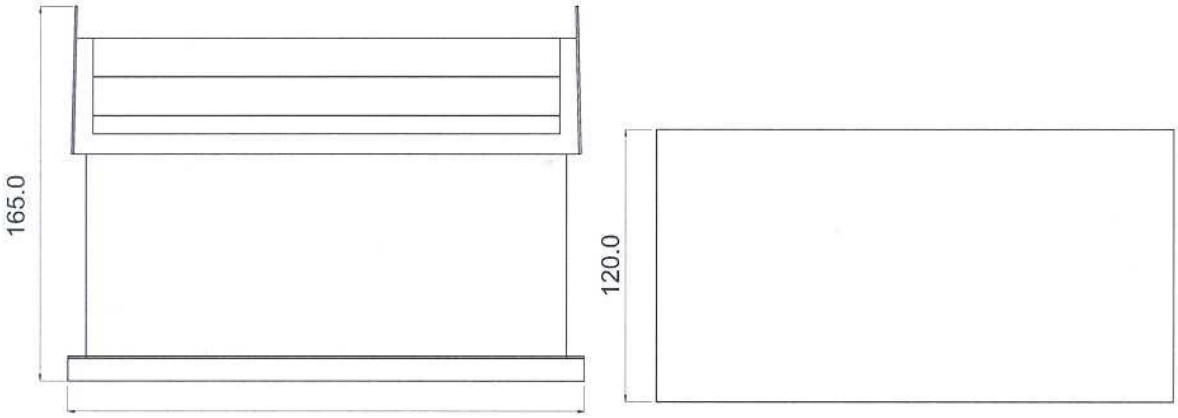
Vibration Tested according IEC 60068-2-6.

Shock Tested according IEC 68-2-27.

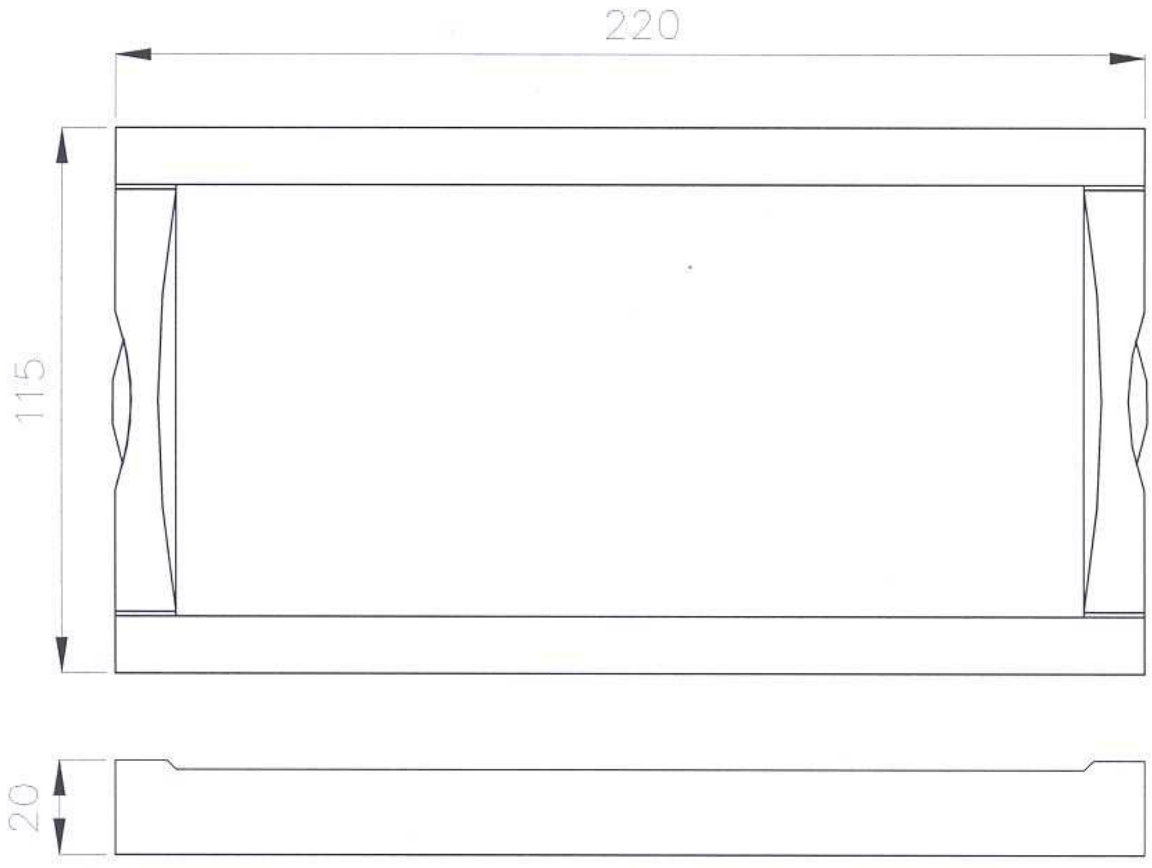
Flammability Test according to IEC 695-2-2.

19 Dimensions

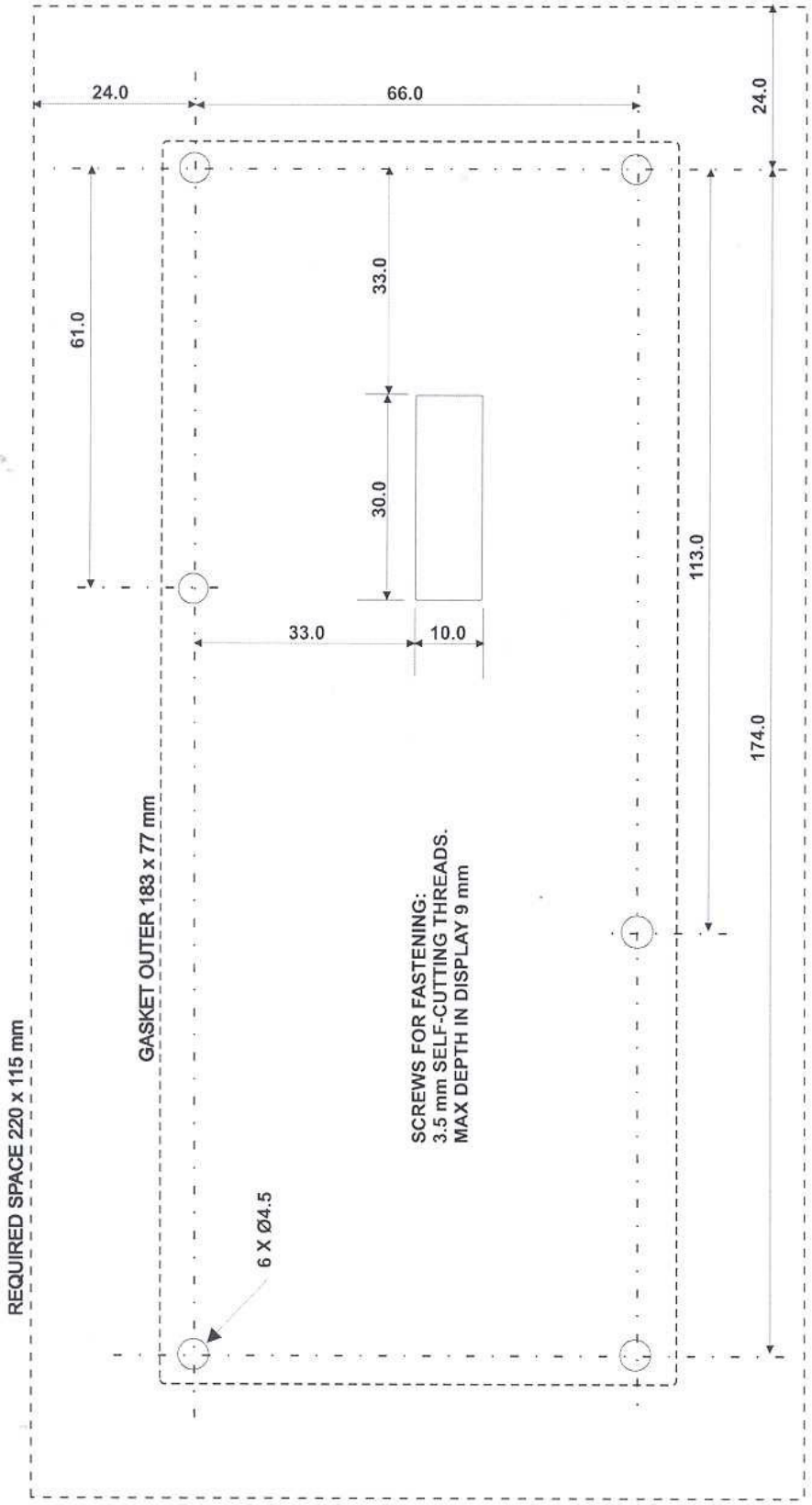
19.1 Unit dimensions



19.2 Display Dimensions



19.3 Panel cutout for display



20 Engine Communication CAN-bus

20.1 MTU MDEC

Specifications: All necessary information and specifications about the MDEC CAN-bus can be found in following MTU manuals:

- 'Connecting third-party devices to the MCS-5 FIELD BUS 1 / Documentation for design engineers / Structure and function of the field bus 1 communication protocol'
  E 531 827 / 00 E

- 'CAN bus interface / MTU-MDEC to third-party systems / DDC-MTU Series 2000 / Stationary applications / Documentation Part 1'
  E 531 966 / 00 E

MDEC Messages displayed on the Qc4001:

Object	*Type*
Engine Speed	Value
Overspeed Shutdown	Shutdown
MDEC Yellow Alarm	Warning
MDEC Red Alarm	Shutdown
Oil Pressure	Value
Low Oil Pressure Warning	Warning
Low Oil Pressure Shutdown	Shutdown
Charge Air Pressure	Value
Low Coolant Level Warning	Warning
Actual MDEC Failures	Digits
MDEC ECU Failure	Shutdown
Coolant Temperature	Value
High Coolant Temp. Warning	Warning
High Coolant Temp. Shutdown	Shutdown
Charge Air Temperature	Value
High Intercooler Temp.	Warning
Oil Temperature	Value
High Oil Temp. Shutdown	Shutdown
Fuel Temperature	Value
High Charge Air Temp. Shutdown	Shutdown
Defect Coolant Level Switch	Warning
Intercooler Temperature	Value

20.2 Deutz EMR

Specifications: All necessary information and specification about the EMR CAN-bus can be found in following Deutz manual:

- 'EMR CAN Messages Documentation V1'

EMR Messages displayed on the Qc4001

Object	*Type*
High Coolant Temp. Shutdown	Shutdown
Low Oil Pressure Shutdown	Shutdown
Overspeed Shutdown	Shutdown
EMR Warning	Warning
EMR Shutdown	Shutdown
Actual EMR Faults	Digits
Coolant Temperature	Value
Oil Pressure	Value
Engine Speed	Value

20.3 Detroit Diesel DDEC IV

Specifications: All necessary information and specification about the DDEC IV CAN-bus can be found in the following Detroit Diesel manual:

- 'Detroit Diesel DDEC IV Application and Installation Manual' in Chapter 5 'Communication Protocols'.

DDEC IV Messages displayed on the Qc4001:

Object	*Type*
Engine Speed	Value
Coolant Temperature	Value
Engine Oil Temperature	Value
Fuel Temperature	Value
Engine Oil Pressure	Value
Coolant Level	Value
Fuel Rate	Value
Air Inlet Temperature	Value
Boost Pressure	Value