• The "user level" user manual is designed for users who are qualified to set up an installation (generating set and environment). These users must be able to monitor that the generating set is operating correctly (start, stop, basic settings), to interpret any indications (mechanical, electrical) and may be required to check one or more parameters.

• The "operator level" user manual is designed for those who – in addition to the skills required for users – have the skills required to modify one or more parameters, to change the operation of an installation (generating set and environment). To do this, the operator will have completed training provided by the manufacturer beforehand.

• The "specialist level" user manual is designed for those who – in addition to the skills required for operators – have the skills required to make any special or complex modification to an installation (generating set and environment). To do this, the specialist will have completed training provided by the manufacturer beforehand.
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1 Preface

The APM303 is a instrumentation and control system for generating sets. It enables a generating set (whether or not it is connected to an automatic transfer switch) to be started and stopped, and manages the main safety devices for running a generating set. Easy navigation between the various screens enables rapid display of all the data recorded (mechanical and electrical values). There are only three buttons associated with the generating set's PLC, making it easier to operate the generating set.

1.1 Safety/Operating conditions/Powering on

- **Safety**
  The APM303 uses voltage sources of different origins, which are set to potentials dangerous to the human body. For this reason, only qualified personnel are authorised to start up and use the APM303.

  Before reading this document, we strongly recommended that you read the safety instructions relating to starting up a generating set (see General and Safety Instructions).

  SDMO Industries shall not be held responsible for failure to observe any of the instructions described in this manual.

- **Operating conditions**
  The conditions for use are given at the end of this manual (section 'Technical specifications'). If a component of the equipment must be replaced, it is necessary to pay attention to the effects of electrostatic discharges (consult the rules for handling given in section ‘Handling’).

- **Powering on**
  Powering on is specific to the electrical equipment within which the APM303 is integrated. It is therefore necessary to consult the wiring diagram for the equipment provided with this manual, before powering on.

1.2 Integrating the APM303 in its environment

The APM303 is integrated into central console equipment (type S1500, S2500, S3500, S4500), fitted on the base frame of the generating set, on versions II and IV (enclosure).

![Figure 1 - integration of the APM303](image)

1.3 Who is this manual intended for?

This manual is intended for users and operators.

- The user must be qualified to start the generating set. The user must be capable of monitoring the generator to ensure it is running correctly, and be able to interpret the electrical and mechanical indications provided in real time on the different screens. He or she may have to check one or more parameters.

- The operator - in addition to having the skills required for users - has the skills required to modify one or more parameters, to change the operation of an installation. To do this, the operator will have completed training provided by SDMO Industries beforehand.

*Note: for the APM303, no distinction is made between the user and the operator. This means that a user can modify all the internal parameters (no access code in the APM303). A self-study training aid is also available on our online Gaïa platform, however SDMO can provide any additional training required.*
2 Identification of the modules

2.1 APM303 module

- SMD part no.
- Manufacturer's serial no.
- Supplier code

Hardware and software identification label

<table>
<thead>
<tr>
<th>Hardware and software version no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/N 110400051b</td>
</tr>
</tbody>
</table>

2.2 CAN display module

For generating sets fitted with an ECU, a CAN bus display is used to show engine data.

- SDMO part no.
- Supplier code
- Manufacturer's serial no.

Identification labels (rear panel of module)

The CAN display module user manual is available on the online Gaïa platform.

3 Powering up the APM303 and associated configurations

Depending on the control option chosen, the APM303 is powered up:
- immediately, as soon as the generating set battery is connected (+ possible closing of battery isolator),
- following a change in the position of the 0/1 switch, located on the front of the central console.

On powering up, the APM303 automatically runs in the operating mode which was pre-set before it was switched on (see section 'Selecting the operating mode').

3.1 Single generator

- The installation comprises:
  - a generating set,
  - an APM303 and a CAN display (depending on the motor type),
  - a manually controlled circuit breaker.
- This installation supplies a LOAD either to:
  - an item of electrical equipment (engine/motor, etc.),
  - an entire building (industrial or service sector).

3.2 Generating set with Automatic Transfer Switch

- The installation comprises:
  - a generating set,
  - an electrical network,
  - an APM303 and a CAN display (depending on the motor type),
  - a manually controlled circuit breaker,
  - an automatically controlled Automatic Transfer Switch (*),
  - a 2-wire connection between the ATS and the generating set for the remote start order.

(*) automatically controlled: management of the mains power voltage and switching between sources

- This installation supplies a LOAD either to:
  - an item of electrical equipment (engine/motor, etc.),
  - an entire building (industrial or service sector).
4 **General description of the APM303 module**

The APM303 consists of a moulded unit measuring 118 x 108.

The technical specifications of the APM303 are given in section ‘Technical specifications’.

5 **Selecting the operating mode**

Two operating modes are available:
- Manual mode (MANU mode),
- Automatic mode (AUTO mode).

In all the explanations which follow, the terms MANU and AUTO will be used.

5.1 **MANU mode**

In this mode, the user has full control of generating set using the 2 START and STOP buttons.

⚠️ If a fault is detected (ALARM! LED flashing), it is not possible to start up the generating set in MANU mode.

⚠️ If there is an alarm (ALARM! LED flashing), it is still possible to start up the generating set in MANU mode. (see section ‘Anomalies’ for fault or alarm management)

**Running the generating set**
- Pressing the START button ( ) automatically launches the starting sequence (preheating ( ) + starter), the RUN LED flashes ( ).
- When the voltage and speed have stabilised (APM303 internal parameters), the RUN LED becomes fixed.
- ✅ Manually close the generating set's circuit breaker by switching the control lever on the genset.
- The generating set generates or is ready to generate during use ( ).
- Check the electrical and mechanical values on the various screens of the APM303 (see section ‘Display of data’).

(*) Preheating is not available for all engines.

(**) If the generating set fails to start after the starting sequence, the RUN LED goes off, the ALARM! LED flashes, and the "fail to start" fault is recorded in the anomalies stack (see section ‘Events and anomalies, screen 6’ and ‘Fault chart’).

(*** Users may have to manually close one or more auxiliary circuit breakers.

**Stopping the generating set**
- ⚠️ If possible, to avoid a sudden increase in frequency when manually tripping a circuit breaker, remove the load progressively, by breaking the terminal circuits one after another.
- ✅ Manually open the generating set's circuit breaker by switching the control lever on the genset. The load on the generating set is immediately cut off.
- ✅ Allow the engine to cool, allowing it to run off load for 3 minutes.
- ✅ Press the STOP button ( ), the generating set stops immediately, the RUN LED goes off.

**Special note on manual mode**
- When MANU mode is selected (AUTO LED off), if there is a remote start order (activation of the "remote start/stop" input, nothing happens, the APM303 remains in MANU mode, but the AUTO LED flashes to signal that there is a remote order. When the remote order disappears, the AUTO LED goes off.

This standard operation is called "priority MANU mode". It is possible to switch to "priority AUTO mode" (see section ‘“Basic settings” screen’, parameter B16).
5.2 AUTO mode

In this operating mode, the user does not control the operation of the generating set, the starting and stopping of the generating set are dependent on the APM303 receiving a remote order.

- If a fault is detected (ALARM! LED flashing), it is possible to select AUTO mode, but it is not possible to start up the generating set in manual mode.

- If there is an alarm (ALARM! LED flashing), it is possible to select AUTO mode and start up the generating set in manual mode.

(see section ‘Anomalies’ for fault or alarm management)

- Check that the generating set circuit breaker is closed. Alternatively, switch the circuit breaker control lever.
- Press the AUTO button ( ), the AUTO LED lights up, AUTO mode is selected. The generating set is on standby, ready to start.

Automatic start-up is dependent on activation of the “remote start/stop” input.

This input must be a potential-free contact ( ), this means that the user must not connect an external power supply to the terminals provide for this purpose. This will destroy the APM303.

( ) In general, the external input comes from an automatically controlled ATS.

An automatically controlled ATS independently controls the mains supply (power connection and disconnection), sends the start order to the generating set and ensures switching in both directions; Normal⇒Emergency and Emergency⇒Normal.

- When the "remote start/stop" input is activated, the RUN LED flashes, the generating set starts immediately (sequence launch). When the voltage and frequency have stabilised on the alternator terminals, the RUN LED becomes fixed and the generating set takes over.
- When the "remote start/stop" input is deactivated, the RUN LED flashes again, the generating set enters the cooling phase (3 minutes).

Where an ATS is fitted, cooling periods may accumulate. In fact, cooling can also be taken into account in the changeover switch.
- When cooling is complete, the RUN LED goes off and the generating sets stops.
- The AUTO LED remains on, the generating set is on standby, ready for another start.

Special note on AUTO mode

- When AUTO mode is selected and the generating set is on standby, pressing the START button ( ) immediately starts the generating set (AUTO mode is deactivated).
- When the generating set is already running, pressing the START button ( ) deactivates AUTO mode operation. The APM303 switches to MANU mode, the generating set continues to generate.
- When the "remote start/stop" input disappears, the generating sets continues to operate as the user has switched to MANU mode.
- When the generating set is operating, pressing the STOP button ( ) deactivates AUTO mode and immediately stops the generating set, without cooling.

This standard operation is called "priority MANU mode". It is possible to switch to "priority AUTO mode" (see section “Basic settings" screen', parameter B16).

In priority AUTO mode, pressing the START ( ) and STOP ( ) buttons does not change the status of the generating set.

5.3 During operation

- Monitor the electrical values on screens 4, 5 and 6 (see section ‘Display of data’), and particularly the current flow.

Never exceed a nominal power indicated on the alternator’s rating plate.

- Monitor the mechanical values on screens 7 and 8 (see section ‘Display of data’) and particularly the coolant temperature.

- When the generating set is operating (RUN LED lit), in AUTO mode (AUTO LED lit) or in MANU mode (AUTO LED off), the appearance of an alarm does not modify the operation of the generating set.

(see sections ‘Events and anomalies, screen 6’ and ‘Anomalies’ on alarm management)

- When the generating set is operating (RUN LED lit), in AUTO mode (AUTO LED lit) or in MANU mode (AUTO LED off), the appearance of a fault immediately stops the generating set.

(see sections ‘Events and anomalies, screen 6’ and ‘Anomalies’ on fault management)
6 Display of data

To view the data measured and recorded by the APM303, the user has 6 or 7 screens available:
- 7 screens are automatically displayed one after the other, with a delay of 7 seconds,
- 6 screens are displayed by successively pressing the  button (successively pressing the  button reverses the cycle shown in the diagram below).

![Diagram showing screen sequence]

(1) is only shown automatically if:
- an alarm is active,
- or a fault is active (cleared or not),
- or fault inactive and not cleared.

Automatic screen scrolling begins 2 minutes after the module is powered up.

Automatic screen scrolling is stopped by pressing  or . It restarts automatically 2 minutes after being pressed.

Figure 3 - viewing data

6.1 Main, screen 1

On powering up and after the initialisation period, this is the screen which is displayed by default. The following information is displayed on screen 1:
- power supplied in kW (e.g.: 100kW),
- the voltage between phases in Volts (e.g.: 400V),
- the voltage frequency in Hertz (e.g.: 50Hz),
- The generating set speed in rpm (e.g.: 1500rpm),
- the power factor (e.g.: 0.91).

![Figure 4 - main]

6.2 Electrical values, screens 2 and 3

The following information is displayed on screen 2:
- current in each phase in Amps (e.g.: 156, 154 and 159A),
  (the bar graph gives an indication of the percentage current supplied compared with nominal current)
- the 3 voltages between phase and neutral in Volts (e.g.: 231V),
- the 3 voltages between phases in Volts (e.g.: 400V).

The following information is displayed on screen 3:
- the power supplied to each phase in kW (e.g.: 33, 34 and 33kW),
- the power supplied to each phase in kVA (e.g.: 36, 37 and 37kVA),
- the power factor on each phase (e.g.: 0.92, 0.92 and 0.89),
- the sum of the 3 active power values in kW (e.g.: 100kW),
- the sum of the 3 apparent power values in kVA (e.g.: 110kVA),
- the average power factor (e.g.: 0.91).

![Figure 5 - current and voltage]

6.3 Mechanical values, screen 4

The following information is displayed on screen 4:
- the oil pressure in bar or in PSI (e.g.: 6.1bar),
- the coolant temperature in °C or °F (e.g.: 60°C),
- the percentage of fuel left in the tank (e.g.: 54%),
- the battery voltage in Volts (e.g.: 12.3V).

(∗) depending on settings

![Figure 6 - outputs]

![Figure 7 - mechanical values]
6.4 Metering, screen 5

The following information is displayed on screen 5:
- active energy in kWh (e.g.: 500 kWh).
- the number of operational hours of the generating set (e.g.: 50h).
- the number of generating set start-ups (e.g.: 10).

![Figure 8 - meters](image)

6.5 Events and anomalies, screen 6

Screen 6 shows the list of events and anomalies recorded by the APM303. A maximum of 12 events and anomalies can be recorded (the last 4 appear on screen). Consequently, when a new event or anomaly is recorded, the oldest event or anomaly is deleted from the stack.

When scrolling (manually or automatically), the symbol ▼ appears at the bottom of the screen (flashing) for 4 seconds.
- When the symbol is fixed, pressing button ▲ enables you to go down the stack of events and anomalies according to the following principle.
- When the ▲ button is first pressed, the ▼ symbol appears to show that there are more recent events or anomalies on this screen.

![Figure 9 - events and anomalies](image)

You can continue navigating in this way, until the screen for lines 9, 10, 11 & 12 is displayed.

**Information available on these screens:**

A the event or anomaly appears in numerical order (01 to 12)

B pictogram representing the event or anomaly (see lists in section ‘Events and anomalies’)

C anomaly status (4 different statuses) (see section ‘Clearing a fault’)

D number of hours generating set has been operating when event or anomaly appeared

![Figure 10 - navigating through the stack](image)

6.6 INIT, screen 0

Screen 0 displays the main identification parameters:
- the software number,
- the serial number of the APM303 module,
- the generating set serial number.

![Figure 12 - INIT](image)
7 Events and anomalies

7.1 Events

An event is either a change in APM303 status (powering up), or activation of one the 3 buttons, or any change in the PLC status (e.g. start-up).

The table below lists all the events which can be recorded in the stack.

<table>
<thead>
<tr>
<th>symbol</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![power-up symbol]</td>
<td>The APM303 is powered up: the unit is powered up either when the battery is connected, or when the switch on the front panel is set to position 1.</td>
</tr>
<tr>
<td>![manual-start symbol]</td>
<td>Starting up in MANUAL mode: the generating set has been started manually, after pressing button .</td>
</tr>
<tr>
<td>![auto-start symbol]</td>
<td>Starting up in AUTO mode: the APM303 is in AUTO mode and the generating set has been started up after activation of the external input, terminal T10 (I02 remote start/stop).</td>
</tr>
<tr>
<td>![stop-manual symbol]</td>
<td>Stopping in MANUAL mode: the generating set has been stopped manually, after pressing button .</td>
</tr>
<tr>
<td>![stop-auto symbol]</td>
<td>Stopping in AUTO mode: the APM303 is in AUTO mode and the generating set has been stop after deactivation of the external input, terminal T10 (I02 remote start/stop).</td>
</tr>
<tr>
<td>![auto-actuated symbol]</td>
<td>AUTO mode has been activated: the unit recognises that the button has been pressed, the AUTO LED light is fixed, the generating set can start up on activation of the &quot;remote start/stop&quot; input (terminal T10).</td>
</tr>
<tr>
<td>![auto-deactuated symbol]</td>
<td>AUTO mode has been deactivated: the unit recognises that the button has been pressed, the AUTO LED is off, the generating set cannot start up on activation of the &quot;remote start/stop&quot; input (terminal T10).</td>
</tr>
<tr>
<td>![stable-status symbol]</td>
<td>Generating set stabilised (ready to generate): This event is recorded if the minimum stabilisation time has elapsed and if electrical parameters U and F are within the setting range.</td>
</tr>
<tr>
<td>![auto-start battery symbol]</td>
<td>Automatic start-up when battery low: the APM303 is in AUTO mode, the generating set has been started up, as low battery voltage has been detected.</td>
</tr>
<tr>
<td>![auto-shutdown battery symbol]</td>
<td>Automatic shutdown after battery recharge: the APM303 is in AUTO mode, the generating set has been stopped, as the delay for battery charging has elapsed.</td>
</tr>
<tr>
<td>![modbus-connection symbol]</td>
<td>Modbus order received: a remote order has been received by the APM303 (see Modbus manual also).</td>
</tr>
</tbody>
</table>

7.2 Anomalies

An anomaly can be an alarm or a fault.

<table>
<thead>
<tr>
<th>anomaly</th>
<th>if generating set stopped</th>
<th>if generating set operating</th>
<th>status of ALARM! LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>alarm</td>
<td>generating set start-up possible</td>
<td>no generating set shutdown</td>
<td>ALARM! flashing</td>
</tr>
<tr>
<td>fault</td>
<td>generating set start-up not possible</td>
<td>immediate shutdown of generating set</td>
<td>ALARM! flashing</td>
</tr>
</tbody>
</table>

7.2.1 Appearance of an alarm

- If the ALARM! LED is flashing, the exclamation mark symbol opposite flashes in the top right of the screen "1-Main" (figure 13).

The alarm is recorded in the stack of events and anomalies (see section ‘Events and anomalies, screen 6’).

7.2.2 Clearing an alarm

- An alarm which is active (or present) cannot be cleared manually, it automatically becomes inactive when the problem which caused the alarm disappears (e.g.: the generating set overload disappears when there is a reduction in the load).
- When the alarm switches to inactive, the ALARM! LED goes off, the exclamation mark symbol disappears from the "1-main" screen, the alarm remains visible on the "6-events and anomalies" screen.

<table>
<thead>
<tr>
<th>description</th>
<th>status</th>
<th>screen shows &quot;6-faults and events&quot;</th>
<th>status of ALARM! LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>alarm</td>
<td>active</td>
<td>08 ![ALARM!] 19397.0</td>
<td>flashing</td>
</tr>
<tr>
<td>alarm</td>
<td>inactive</td>
<td>08 ![ALARM!] 19397.0</td>
<td>off</td>
</tr>
</tbody>
</table>
### 7.2.3 Alarm chart

The table below lists all the alarms which can be recorded in the stack.

<table>
<thead>
<tr>
<th>symbol</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="low battery voltage or charging alternator malfunction" /></td>
<td>Low battery voltage or charging alternator malfunction: appears when the battery voltage is below the set threshold after the fixed delay of 3 minutes. This symbol also appears if there is a charging alternator malfunction.</td>
</tr>
<tr>
<td><img src="image" alt="flat battery" /></td>
<td>Flat battery: if the APM303 cannot start up the generating set (because the battery voltage is too low), this alarm will be activated, but the starting sequence is not blocked.</td>
</tr>
<tr>
<td><img src="image" alt="low fuel level" /></td>
<td>Low fuel level: appears when the daily service tank reaches the low fuel level threshold E11 and if parameter E15 is set to 1 (alarm).</td>
</tr>
<tr>
<td><img src="image" alt="generating set overload" /></td>
<td>Generating set overload: appears when the output in kW supplied by the alternator exceeds the set threshold G07, after the delay G08.</td>
</tr>
<tr>
<td><img src="image" alt="rotation of alternator phases" /></td>
<td>Rotation of alternator phases: may appear on start-up, if an incorrect rotation of phases is detected as a result of the installation being incorrectly wired.</td>
</tr>
<tr>
<td><img src="image" alt="alarm input no. x (x=1,2 or 3)" /></td>
<td>Alarm input no. x (x=1, 2 or 3): appears when the input configured in &quot;alarm x&quot; is active (x takes values 1, 2 or 3).</td>
</tr>
<tr>
<td><img src="image" alt="generating set maintenance due (non-contractual)" /></td>
<td>Generating set maintenance due (non-contractual): appears when the value of parameter E07 has been reached, meaning that maintenance is due (*).</td>
</tr>
</tbody>
</table>

![example](image)

equation: E07 = 500 h ➞ generating set operation ➞ when E07 = 0 h appears ➞ E07 reprogramming ➞ disappears

### 7.2.4 Appearance of a fault

- If the ALARM! LED is flashing, the exclamation mark symbol opposite flashes in the top right of the screen "1-Main" (figure 14).

The fault is recorded in the stack of events and anomalies (see section 'Events and anomalies, screen 6').

### 7.2.5 Clearing a fault

- A fault which is active (or present) can be cleared manually by pressing the STOP button ( ). Clearing a fault means that the user acknowledges the fault. It does not change the fact that the fault remains active and it is not possible to restart the generating set.

- When the fault is cleared, the ALARM! LED lights up fixed, the exclamation mark symbol no longer flashes but remains on the "1-main" screen, the fault remains visible on the "6-events and anomalies" screen.

- To make a fault inactive, you must find the root cause behind the appearance of the fault (e.g.: emergency stop triggered).

- When the fault becomes inactive, the ALARM! LED goes off, the exclamation mark symbol disappears from the "1-main" screen, the fault remains visible on the "6-events and anomalies" screen.

<table>
<thead>
<tr>
<th>description</th>
<th>status</th>
<th>screen shows &quot;6-faults and events&quot;</th>
<th>status of ALARM! LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>fault</td>
<td>active, not cleared</td>
<td><img src="image" alt="image" /></td>
<td>flashing</td>
</tr>
<tr>
<td>fault</td>
<td>inactive not cleared</td>
<td><img src="image" alt="image" /></td>
<td>flashing</td>
</tr>
<tr>
<td>fault</td>
<td>active cleared</td>
<td><img src="image" alt="image" /></td>
<td>lit fixed</td>
</tr>
<tr>
<td>fault</td>
<td>inactive cleared</td>
<td><img src="image" alt="image" /></td>
<td>off</td>
</tr>
</tbody>
</table>

---

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7.2.6 Fault chart

The table below lists all the faults which can be recorded in the stack.

<table>
<thead>
<tr>
<th>symbol</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🚨</td>
<td>Emergency stop: appears when the user presses the emergency stop button, located on the central console on the enclosure, or at the entrance to the electrical room.</td>
</tr>
<tr>
<td>📉</td>
<td>Low fuel level: appears when the daily service tank reaches the low fuel level threshold E11 and if parameter E15 is set to 2 (fault).</td>
</tr>
<tr>
<td>🛑</td>
<td>Low oil pressure: appears if the engine oil pressure is too low (less than or equal to 1 Bar) or if the binary input is active.</td>
</tr>
<tr>
<td>🧢</td>
<td>High coolant temperature: appears if the engine coolant temperature is too high (above the activation threshold).</td>
</tr>
<tr>
<td>⏳</td>
<td>Overspeed: appears if the generating sets the exceeds 120% of nominal speed. The safety feature is set at 150% for 5 seconds on generating set start-up.</td>
</tr>
<tr>
<td>⏳</td>
<td>Under speed: appears when, after a full start-up, the generating set stops automatically after operating correctly for at least 5 seconds.</td>
</tr>
<tr>
<td>🇤</td>
<td>Max. alternator voltage (59): appears when the alternator voltage reaches or exceeds the set threshold (parameter G01), after a delay of 3 seconds.</td>
</tr>
<tr>
<td>🇦</td>
<td>Min. alternator voltage (27): appears when the alternator voltage reaches or dips below the set threshold (parameter G02), after a delay of 3 seconds.</td>
</tr>
<tr>
<td>🇦</td>
<td>Max. alternator frequency (81H): appears if the alternator’s frequency reaches or exceeds the set threshold (parameter G03), after a delay of 3 seconds.</td>
</tr>
<tr>
<td>🇦</td>
<td>Min. alternator frequency (81): appears when the alternator frequency reaches or dips below the set threshold (parameter G04), after a delay of 3 seconds.</td>
</tr>
<tr>
<td>📜</td>
<td>Alternator short-circuit (50/51): appears if the current consumed by the alternator reaches or exceeds the set threshold (parameter G05), after the delay G06 which can be adjusted.</td>
</tr>
<tr>
<td>🚨</td>
<td>Generating set start-up failure: appears if the generating set fails to start up after a full starting sequence.</td>
</tr>
<tr>
<td>🚨</td>
<td>Generating set shutdown failure: appears after a shutdown request in AUTO or MANUAL mode, if the speed exceeds 2 rpm, or if the voltage exceeds 10V, or if the oil pressure remains higher than 3Bar, or if the generating set is started up when no start demand has been given by the APM303. The safety feature is taken into account after fixed delay of 60 seconds.</td>
</tr>
<tr>
<td>📜</td>
<td>Fault input no. x (x=1, 2 or 3): appears when the input configured in “fault x” is active (x takes values 1, 2 or 3).</td>
</tr>
<tr>
<td>🚨</td>
<td>Circuit breaker position inconsistent: appears if there is an inconsistency between the motorised command from the circuit breaker and the position of the circuit breaker (open, closed), after a delay of 5 seconds.</td>
</tr>
</tbody>
</table>

Note: the figures between brackets (which may be accompanied by a letter) are the ANSI codes for the safety features (ANSI = American National Standards Institute).

7.2.7 Other anomaly displays

An anomaly referring to a mechanical or electrical value can be viewed on screens 1, 2, 3 or 4.

E.g.: "low battery voltage" alarm displayed on screen 4.

Parameter E06 (minimum battery voltage) is set at 20Volts.

The battery voltage value appears with inverted backlighting and is equal to 19.5Volts.

Figure 15 - an alarm displayed on the measurements screen
8 Settings

8.1 Home screen

The home screen is only displayed when the APM303 is powered up. This screen can only be customised using the configuration software (see user/operator level manual - configuration software).

8.2 Accessing settings (Main menu)

The settings can only be accessed if the APM303 is in Manual mode. Access to the settings varies according to whether or not the home screen is displayed.

<table>
<thead>
<tr>
<th>without home screen (standard application)</th>
<th>with home screen (customised application)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. press and hold</td>
<td>press and hold</td>
</tr>
<tr>
<td>2. press and hold + press once</td>
<td>press and hold + press once</td>
</tr>
<tr>
<td>3. press and hold + press once</td>
<td>press and hold + press once</td>
</tr>
</tbody>
</table>

The 3 “ALARM!”, “AUTO” and “RUN” LEDs light up fixed, the APM303 automatically switches to settings mode, and the "main menu" below is displayed (figure 16).

The 7 different screens can be accessed using 7 icons. The first icon flashes by default. To select an icon:
- Press one of the 2 buttons or , until the required icon flashes.
- Press the button to enter the selected screen.
- Press the button to exit the selected screen and return to the main menu.

Press the button again to exit the main menu. The "Miscellaneous information" screen is displayed and the 3 LEDs flash, the APM303 automatically resets. After 6 seconds, it automatically returns to the "1-main" screen.
- It is possible to bypass this 6 second delay by pressing the button again, when the "Miscellaneous information" screen is displayed. In this case, the "1-main" screen is automatically displayed.

8.3 Available screens

<table>
<thead>
<tr>
<th>icon</th>
<th>screen description</th>
<th>contents and details</th>
<th>how to modify a parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic settings</td>
<td>section “Basic settings screen”</td>
<td>section ‘Setting principle in other screens’</td>
</tr>
<tr>
<td></td>
<td>Motor protection and parameters</td>
<td>section “Engine safety features and parameters screen”</td>
<td>section ‘Setting principle in other screens’</td>
</tr>
<tr>
<td></td>
<td>Alternator protection</td>
<td>section “Alternator safety features screen”</td>
<td>section ‘Setting principle in other screens’</td>
</tr>
<tr>
<td></td>
<td>Modbus communication parameters</td>
<td>section “Modbus communication screen”</td>
<td>section ‘Setting principle in other screens’</td>
</tr>
<tr>
<td></td>
<td>Output settings</td>
<td>section “Output settings screen”</td>
<td>sections ‘Selecting an output’ to ‘Confirming the output’</td>
</tr>
<tr>
<td></td>
<td>Input settings</td>
<td>section “Input settings screen”</td>
<td>sections ‘Selecting an input’ to ‘Confirming the input’</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous information</td>
<td>section “Miscellaneous information screen”</td>
<td></td>
</tr>
</tbody>
</table>
8.4 Basic settings screen

The parameters available in the "Basic settings" screen are listed below.

<table>
<thead>
<tr>
<th>No.</th>
<th>description</th>
<th>setting</th>
<th>by default</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01</td>
<td>nominal voltage phase/neutral (†)</td>
<td>from 80V to 480V (in increments of 1V)</td>
<td>230</td>
</tr>
<tr>
<td>B02</td>
<td>nominal voltage phase/phase (‡)</td>
<td>from 80V to 600V (in increments of 1V)</td>
<td>400</td>
</tr>
<tr>
<td>B03</td>
<td>nominal frequency</td>
<td>1 = 50Hz, 2 = 60Hz</td>
<td>1</td>
</tr>
<tr>
<td>B04</td>
<td>connection type</td>
<td>1=1Ph+N, 2=2Ph+N, 3=3Ph, 4=3Ph+N</td>
<td>4</td>
</tr>
<tr>
<td>B05</td>
<td>unit format</td>
<td>1=Bar and °C, 2=PSI and °F</td>
<td>1</td>
</tr>
<tr>
<td>B07</td>
<td>zero consumption mode</td>
<td>from 0 to 360min (in increments of 1min)</td>
<td>0</td>
</tr>
<tr>
<td>B09</td>
<td>nominal current</td>
<td>from 1A to 5000A (in increments of 1A)</td>
<td>50</td>
</tr>
<tr>
<td>B10</td>
<td>primary CT</td>
<td>from 1A to 5000A</td>
<td>50</td>
</tr>
<tr>
<td>B11</td>
<td>nominal speed</td>
<td>from 100 to 4000rpm (in increments of 1rpm)</td>
<td>1500</td>
</tr>
<tr>
<td>B12</td>
<td>nominal power</td>
<td>from 1 to 3000kW (in increments of 1kW)</td>
<td>100</td>
</tr>
<tr>
<td>B13</td>
<td>automatic screen scrolling</td>
<td>1 = active, 2 = inactive</td>
<td>1</td>
</tr>
<tr>
<td>B14</td>
<td>automatic voltage and frequency detection</td>
<td>1= inactive, 2=active</td>
<td>1</td>
</tr>
<tr>
<td>B15</td>
<td>fuel solenoid valve type</td>
<td>1=diesel, 2=gas</td>
<td>1</td>
</tr>
<tr>
<td>B16</td>
<td>priority mode selection</td>
<td>1=MANUAL, 2=AUTO</td>
<td>1</td>
</tr>
</tbody>
</table>

(†) B01 only displays if B04 is set to 1

(‡) B02 only displays if B04 is set to 2, 3 or 4

8.5 Engine safety features and parameters screen

The parameters available in the "Engine safety features and parameters" screen are listed below.

<table>
<thead>
<tr>
<th>No.</th>
<th>description</th>
<th>setting</th>
<th>by default</th>
</tr>
</thead>
<tbody>
<tr>
<td>E01</td>
<td>preheating delay</td>
<td>from 0 to 600s (in increments of 1s)</td>
<td>10</td>
</tr>
<tr>
<td>E02</td>
<td>starter attempt delay</td>
<td>from 0 to 60s (in increments of 1s)</td>
<td>5</td>
</tr>
<tr>
<td>E03</td>
<td>cooling delay</td>
<td>from 0 to 3600s (in increments of 1s)</td>
<td>180</td>
</tr>
<tr>
<td>E04</td>
<td>oil pressure fault threshold</td>
<td>from 0 to 10Bar</td>
<td>1 (3s)</td>
</tr>
<tr>
<td>E05</td>
<td>coolant temperature fault threshold</td>
<td>0 to 150°C</td>
<td>90 (5s)</td>
</tr>
<tr>
<td>E06</td>
<td>min. battery voltage threshold</td>
<td>from 8 to 40V</td>
<td>11.5 (3min)</td>
</tr>
<tr>
<td>E07</td>
<td>maintenance alarm threshold</td>
<td>from 0 to 1000h</td>
<td>9999</td>
</tr>
<tr>
<td>E08</td>
<td>starter cut off due to oil pressure</td>
<td>1= inactive, 2=active</td>
<td>1</td>
</tr>
<tr>
<td>E10</td>
<td>stabilisation delay</td>
<td>from 1 to 300s</td>
<td>5</td>
</tr>
<tr>
<td>E11</td>
<td>low fuel level anomaly threshold</td>
<td>from 0 to 80%</td>
<td>20 (10s)</td>
</tr>
<tr>
<td>E12</td>
<td>preheating maintenance delay (†)</td>
<td>from 0 to 3600s</td>
<td>30</td>
</tr>
<tr>
<td>E13</td>
<td>automatic start when battery voltage at minimum</td>
<td>1 = active, 2 = inactive</td>
<td>1</td>
</tr>
<tr>
<td>E14</td>
<td>min. battery voltage recharge delay</td>
<td>1 to 240min</td>
<td>60</td>
</tr>
<tr>
<td>E15</td>
<td>low fuel level anomaly</td>
<td>1=alarm; 2=fault</td>
<td>1</td>
</tr>
</tbody>
</table>

(†) when the generating set is started up (used for cold countries)

Note: certain values are associated with a fixed delay, given in brackets.

8.6 Alternator safety features screen

The parameters available in the "Alternator safety features" screen are listed below.

<table>
<thead>
<tr>
<th>No.</th>
<th>description</th>
<th>setting</th>
<th>by default</th>
</tr>
</thead>
<tbody>
<tr>
<td>G01</td>
<td>max. voltage fault</td>
<td>from G02 to 200% (increments of 1%)</td>
<td>110 (3s)</td>
</tr>
<tr>
<td>G02</td>
<td>min. voltage fault</td>
<td>from 0 to G01% (increments of 1%)</td>
<td>70 (3s)</td>
</tr>
<tr>
<td>G03</td>
<td>maximum frequency fault</td>
<td>from G04 to 130% (increments of 1%)</td>
<td>110 (3s)</td>
</tr>
<tr>
<td>G04</td>
<td>min. frequency fault</td>
<td>from 0 to G03% (increments of 1%)</td>
<td>85 (3s)</td>
</tr>
<tr>
<td>G05</td>
<td>short circuit fault</td>
<td>from 100 to 500% (increments of 1%)</td>
<td>150 (G06)</td>
</tr>
<tr>
<td>G06</td>
<td>short circuit delay</td>
<td>from 0 to 10s (in increments of 1s)</td>
<td>0</td>
</tr>
<tr>
<td>G07</td>
<td>overload alarm</td>
<td>from 70 to 130% (increments of 1%)</td>
<td>110 (G08)</td>
</tr>
<tr>
<td>G08</td>
<td>overload delay</td>
<td>from 0 to 300s (increments of 1s)</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: certain values are associated with a fixed or variable delay, given in brackets.

(†) in percentage of nominal U (parameter B01 or B02)

(‡) in percentage of nominal F (parameter B03)

(§§) in percentage of nominal I (parameter B09)

(****) in percentage of nominal P (parameter B12)

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8.7 Modbus communication screen

The parameters available in the "Modbus communication" screen are listed below.

<table>
<thead>
<tr>
<th>No.</th>
<th>description</th>
<th>setting</th>
<th>by default</th>
</tr>
</thead>
<tbody>
<tr>
<td>M01</td>
<td>speed (in Bauds/s)</td>
<td>1=9600, 2=19200, 3=38400, 4=57600</td>
<td>1</td>
</tr>
<tr>
<td>M02</td>
<td>stop bit</td>
<td>1=1 stop bit, 2=2 stop bits</td>
<td>1</td>
</tr>
<tr>
<td>M03</td>
<td>parity</td>
<td>1=no, 2=even, 3=odd</td>
<td>1</td>
</tr>
<tr>
<td>M04</td>
<td>address</td>
<td>from 1 to 247</td>
<td>5</td>
</tr>
</tbody>
</table>

For more information on Modbus communication, see the Modbus operator manual.

8.8 Output settings screen

The configurable outputs are marked T07 to T09. Each output can be assigned an "output code". Each "output code" performs a specific function. The table below lists these functions.

<table>
<thead>
<tr>
<th>output code</th>
<th>function</th>
<th>output type</th>
<th>wiring to …</th>
</tr>
</thead>
<tbody>
<tr>
<td>O00</td>
<td>not used</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>O03</td>
<td>solenoid stop control</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O04</td>
<td>general fault &amp; alarm report</td>
<td>binary</td>
<td>terminal T09</td>
</tr>
<tr>
<td>O05</td>
<td>GCB opening and closing control</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O07</td>
<td>&quot;ready to generate&quot; report</td>
<td>binary</td>
<td>terminal T08</td>
</tr>
<tr>
<td>O08</td>
<td>air preheating control</td>
<td>binary</td>
<td>terminal T07</td>
</tr>
<tr>
<td>O10</td>
<td>starter command</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O11</td>
<td>glow plug preheating control</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O12</td>
<td>low fuel level alarm report</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O13</td>
<td>shut-off control valve</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O14</td>
<td>general alarm report</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>O15</td>
<td>general fault report</td>
<td>binary</td>
<td></td>
</tr>
</tbody>
</table>

GCB = Generator Circuit Breaker

8.8.1 Selecting an output

- In the row displaying T07 T08 T09, the T07 output flashes.
- Select the output to be programmed, by pressing the button.
- Confirm the selected output, by pressing the button.

8.8.2 Selecting the "output code"

- In the column displaying O04 O05 O07 O08, the "output code" programmed on the output selected previously (e.g. O08) flashes.
- Select the desired "output code", by pressing the or button (see section "Output settings screen" for possible output codes).
- Confirm the "output code" selected, by pressing the button.

8.8.3 Selecting the output action type

- Select the output action type by pressing the or button.

- Confirm the output action type, by pressing the button.
8.8.4 Confirming the output

- Confirm the entire function programmed (output number, function, action type), by pressing the button again.
- To make any changes to the programming (before confirming), press the button then the button to cancel the programming. Return to section ‘Selecting an output’ to select a new output.

8.9 Input settings screen

The configurable inputs are marked T10 to T15. Each input can be assigned an "input code". Each "input code" performs a specific function. The table below lists these functions.

<table>
<thead>
<tr>
<th>input code</th>
<th>function</th>
<th>input type</th>
<th>wiring to</th>
</tr>
</thead>
<tbody>
<tr>
<td>I00</td>
<td>not used</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>I02</td>
<td>remote start order</td>
<td>binary</td>
<td>terminal T10</td>
</tr>
<tr>
<td>I04</td>
<td>locking the APM303</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I07</td>
<td>return to generator breaker position</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I10</td>
<td>external alarm no. 1</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I11</td>
<td>external alarm no. 2</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I12</td>
<td>external alarm no. 3</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I13</td>
<td>external fault no. 1</td>
<td>binary</td>
<td>terminal T11</td>
</tr>
<tr>
<td>I14</td>
<td>external fault no. 2</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I15</td>
<td>external fault no. 3</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I20</td>
<td>low fuel level</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I21</td>
<td>fuel level</td>
<td>analog</td>
<td>terminal T13</td>
</tr>
<tr>
<td>I22</td>
<td>low oil pressure</td>
<td>binary</td>
<td></td>
</tr>
<tr>
<td>I23</td>
<td>oil pressure</td>
<td>analog</td>
<td>terminal T15</td>
</tr>
<tr>
<td>I24</td>
<td>high coolant temperature</td>
<td>binary</td>
<td>terminal T12</td>
</tr>
<tr>
<td>I25</td>
<td>coolant temperature</td>
<td>analog</td>
<td>terminal T14</td>
</tr>
</tbody>
</table>

8.9.1 Selecting an input

- In the row displaying T10 T11 T12 T13 T14, the T10 input flashes.
- Select the input to be programmed by pressing on the or button.
- Confirm the selected input, by pressing the button.

8.9.2 Selecting the “input code”

- In the column displaying I00 I02 I04 I07, the "input code" programmed on the input selected previously (e.g. I02) flashes.
- Select the desired "input code", by pressing the or button (see section “Input settings” screen for possible input codes).
- Confirm the "input code" selected, by pressing the button.

8.9.3 Selecting the input action type

- Select the input action type by pressing the or button.
- Confirm the input action type, by pressing the button.

the standard configuration "input codes" are greyed out.

REQUEST A QUOTE
parts@genpowerusa.com

SHOP ONLINE
www.genpowerusa.com
8.9.4 Confirming the input

- Confirm the entire function programmed (input number, function, action type), by pressing the button again.
- To make any changes to the programming (before confirming), press the button then the button to cancel the programming. Return to section ‘Selecting an input’ to select a new input.

8.10 Miscellaneous information screen

This screen displays general information about the generating set and the APM303 module. This screen corresponds to screen 0 described in section ‘INIT, screen 0’.

8.11 Setting principle in other screens

This section explains how to access and modify a parameter in the screens opposite.

The explanations below concern the “basic settings” screen, but they are also valid for the other 3 screens.

<table>
<thead>
<tr>
<th>icon</th>
<th>screen description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic settings</td>
</tr>
<tr>
<td></td>
<td>Motor protection and parameters</td>
</tr>
<tr>
<td></td>
<td>Alternator protection</td>
</tr>
<tr>
<td></td>
<td>Modbus communication parameters</td>
</tr>
</tbody>
</table>

A cursor is position on the first parameter (B01 or B02 depending on the setting of B04). A maximum of 6 parameters appear on screen.

- **to select** a parameter: press the ▼ or ▲ button (the cursor moves up or down)
  (pressing ▼ at the top of the screen does not work)
  (pressing ▲ at the bottom of the screen does not work)

- **to access** a parameter: press the button, the parameter value appears in a dark box (inverted backlighting)
  e.g.: with B02 selected, 400 is displayed

- **to modify** a parameter: press the ▼ or ▲ buttons to change the parameter value; press as many times as necessary, or press and hold the button until the desired setting is displayed
  e.g.: with B02 (400V) selected, press 10 times to obtain 410V

- **to confirm** the change: press the button to confirm the parameter change

- **to exit** the screen: press the button, to return to the “main menu” screen
9 Connections

9.1 Rear panel connections

Figure 18 - rear panel and connections

9.2 K6 connector/voltage measurement

Depending on the type of installation, the voltage measurement connection on the 7-pin connector will differ.

Figure 19 - three phase 3P+N (4 wires)

Figure 20 - three phase 3P (3 wires)

Figure 21 - two phase 2P+N (3 wires)

Figure 22 - single phase 1P+N (2 wires)
## Technical specifications

### Control unit
- **dimensions**: 118 x 108 x 40 (length x height x depth)
- **protection index**: IP54 on front panel, IP20 on rear, connectors side
- **weight without packaging**: 200g
- **cut-out for assembly**: 94 x 94 minimum (+/-1 mm)
- **tightening torque for assembly**: from 15 to 20cNm

### Environment
- **operating temperature**: -20°C to +70°C
- **storage temperature**: -30°C to +80°C
- **humidity**: 95% at 45°C, 70% at 50°C, 50% at 60°C

### Power supply
- **T01** terminals (0 V battery) and **T03** (+ battery) (on 3-pin connector)
  - **nominal voltage**: 12Vdc or 24Vdc
  - **voltage range**: from 8 to 36Vdc

### Binary inputs
- 6 binary inputs, terminals **T10**, **T11**, **T12**, **T13**, **T14** and **T15** (on 12-pin connector)
  - **not isolated**
  - **connected to 0Vdc**

### Emergency stop input
- **T04** (on 12-pin connector)
  - **not isolated**
  - **connected to + battery**

### Binary outputs
- 5 binary outputs, terminals **T05**, **T06**, **T07**, **T08**, **T09** (on 12-pin connector)
  - **not isolated**
  - **operating range**: from 8 to 36Vdc
  - **flyback diode required for inductive load**
  - **safety feature protecting against**: short-circuit, overload, overvoltage peaks
  - **not protected against polarity inversion**

### Analog inputs
- 3 analog inputs, terminals **T13**, **T14**, **T15** (on 12-pin connector)
  - **not isolated**
  - **measurement range**: from 0 to 2500Ω

### Voltage measurement
- **T20**, **T21**, **T22**, **T23** (on 7-pin connector)
  - **true RMS value**
  - **voltage range**: from 80 to 480Vac between phases
  - **from 50 to 277Vac between phase and neutral**
  - **not isolated**

### Frequency measurement
- **T21** (phase 1) (on 7-pin connector)
  - measurement on the fundamental

### Current measurement
- **T16**, **T17**, **T18**, **T19** (on 4-pin connector)
  - **true RMS value**
  - **measurement range**: from 100mA to 6A (secondary CT)
  - **not isolated**

### Charging alternator excitation
- **T02** (on 3-pin connector)
  - **excitation current**: 100mA

### Communication
- **USB** (on B type connector)
  - **device type**
  - **on the module**

### RS485 interface
- 1 input/output, 3 terminals (A, COM, B) (on 3-pin connector)
  - **RS485 type**
  - **on the module**
11 Packaging, storage and handling of the modules

11.1 Packaging
- Each module is supplied separately in a cardboard box.
- Each cardboard box has a glued identification label, which corresponds to the module reference.
- The modules must remain in their original packaging until they are integrated, i.e. "mechanically" and "electrically" installed, in the control/command equipment.

11.2 Storage
The storage conditions described below must be strictly adhered to, otherwise there is a risk that the product warranty will be completely voided by SDMO and/or by the manufacturer of the products.
- Store in a location free from dust.
- Temperature: -20°C to +70°C.
- Relative humidity: from 5% to 95% with no condensation.
- The modules may be stacked on top of each other, provided the following conditions are observed:
  - stored flat ⇒ recommended
  - stored at an angle ⇒ not recommended

11.3 Handling
11.3.1 Module packed in its box
- No particular conditions need to be observed; handle the products with care, avoiding any impacts.
- Bring the modules as close as possible to the workstation, before removing them from their original packaging.

11.3.2 Module not packed in its box
All electronic equipment is sensitive in varying degrees to static electricity. To protect the components against the effects of static electricity, it is necessary to follow the following special precautions to minimise or prevent any electrostatic discharges.
- Insofar as possible, avoid wearing synthetic clothing and wear cotton clothing whenever possible, as this does not generate static electricity.
- Before removing the module from its packaging, touch a metal earth with your hand to discharge the body of any static electricity, which could cause damage to the electronic components.
- When installing the module in its surroundings, or if you move outside the working area, it will be necessary to touch a metal earth again when re-entering the working area, as any movement along the ground can charge the body with static electricity.
- If a module needs replacing (for instance, for repair), place the replaced module in its original packaging or, if not possible, in an antistatic plastic bag of a suitable size for the module.

⚠️ It is formally prohibited to lift up the metal enclosure at the rear of the module; failure to observe this risks voiding the product warranty provided by SDMO and/or the product manufacturer completely.