

Autostart AS731/AS732 Generator Controller

Operating Instructions

mi6130
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catalogue section 75



Please read the following information before operating. Before using this product, it is your responsibility to ensure that it has been correctly installed by qualified mechanical and electrical technicians.

1. Introduction

The Autostart AS731 and AS732 are full-function, programmable controllers for automatic or manual running of a standby generator. The modules include comprehensive measurement and display of engine and generator parameters, with automatic plant protection and operator warning in the event of faults. All units are fitted with an RS232 communication link that allows remote configuration, monitoring and control using Murphy PC software. AS732 units additionally have RS485 MODBUS facility, allowing communications with other AS732 units, or PLC, SCADA and building management systems.

This document details the user operation of the AS731 and AS732. Further information on the specification, electrical connection and set up may be found in the following documents:-

Doc. ref. Title

ms6127	AS731 bulletin and technical spec.
ms6343	AS732 sales bulletin and technical spec.
mi6128	AS731/732 installation A: electrical connection
mi6129	AS731/732 installation B: programming
mi6131	AS731/732 and AS7CN PC comms software

2. Front facia and controls

As shown in the diagram right, the front facia contains a liquid crystal display (LCD), two mode indicating LEDs and 5 operator control keys.

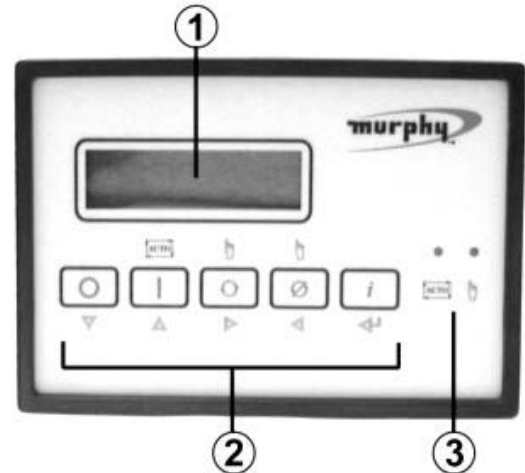
2.1 Display

The 2 line by 16 character, backlit LCD provides continuous information about the system status.

Automatically scrolled messages indicate operating mode, engine status, generator parameters (e.g. VAC, Hz, Amps), timer progress and fault conditions. Press the **i** key to manually scroll to additional system information (see 2.3.4 below).

Examples of LCD messages are given in section 3.

Front facia



- 2 line x 16 character backlit liquid crystal display
- Operator control keys:
 - Off/reset
 - On/Auto mode
 - Manual mode start
 - Manual mode stop
 - Info (scroll display)
- Auto/manual mode LED indication

2.2 Mode Indicators

Two LEDs at the right of the front facia provide 'at-a-glance' indication of operating mode:-

This green LED lights when the Autostart is in Auto mode and flashes when RS232 communication is in progress, e.g. during remote control via a modem link.

This amber LED lights when the Autostart is in manual mode. When the operator selects manual mode from the front facia, the RS232 communication link can be used to monitor, but not control) the Autostart.



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2.3 Operator Controls

The AS731/732 has five front control keys. The symbols within and above each key indicate its control function during normal operation. The arrow symbols below each key relate to the programming of the unit. For full details about programming, please refer to document mi6129.

2.3.1 Off/reset

Press this key at any time, and hold for around 2 seconds, to power down the Autostart. This will stop the engine (if running) and reset a latched shutdown fault.


2.3.2 On/Auto

Press this key to power up the unit into Auto mode, or to switch to Auto mode control after manual mode operation.

In Auto mode, the Autostart automatically starts, runs and stops the engine in response to the 'remote start' contact. Full details are given in section 3.1 below.

2.3.3 Manual Start

Manual Stop

Use these keys to manually control the generator. Press either key momentarily to select manual mode: note that the top left of the LCD changes from **AUTO** to **MAN** and that the amber  LED lights.

If the engine is stationary, selection of manual mode can be used to start the engine. If the engine is already running in Auto mode, selection of manual mode can be used to maintain running indefinitely. For full details, refer to section 3.2 below.

2.3.4 Information

In normal operation, the LCD automatically scrolls a series of predefined status messages. Press the **i** key to manually scroll through additional information screens such as:-

- DC/Battery voltage
- Engine hours run
- Engine RPM (where a magnetic pickup is fitted)
- Engine oil pressure (where a sender is fitted)
- Engine temperature (where a sender is fitted)
- Generator frequency, in Hz
- Generator 3 phase voltage, V AC
- Generator 3 phase current, A AC

3. Operation

3.1 Operation in Auto mode

In Auto mode, the AS731/732 controls engine starting, load transfer and engine stopping in response to the 'remote start' input.

An automatic start, run and stop (return to standby) cycle is typically displayed on the LCD as follows:-

LCD message

```
AUTO:standby
Battery 27.0V
```

Status

The engine is stationary and the AS731 is on 'standby'. LCD displays battery voltage and any fault conditions.

```
AUTO:Remote strt
Start delay 0:03
```

Remote start input is active. The Autostart will begin its start sequence as soon as the start delay expires.

```
Start no 1 of 3
Cranking 10 sec
```

The Autostart is cranking the engine, and will release the starter motor as soon as engine speed is detected. If engine speed is not detected, the unit will go through a crank cool period, then further attempts to (preheat and) start engine.

```
AUTO:eng running
Warmup 05s
```

With the engine running, the Autostart waits for the warmup delay to expire before loading generator.

```
AUTO:gen on load
50Hz 230V 150A
```

The remote start input is still active, all parameters are in limits and the 'gen contactor' output has activated (running the generator on load).

```
AUTO:gen on load
restore: 0:04:59
```

The remote start input has de-activated, but the Autostart keeps the generator on load until the restore timer has expired. The restore timer will reset if the remote start input re-activates.








```
AUTO:eng running
Cooling 0:02:59
```

The Autostart is running the generator off load, cooling down. The AS731 returns the system to standby at the end of the cool time, but will reload the generator (and reset restore and cool times) if the remote start input re-activates.

3.2 Operation in Manual mode

3.2.1 Manual engine start


With the AS731/732 in Auto mode and the engine stationary (on standby), use the manual mode keys to give an immediate engine start:-

- Press and immediately release the  or  key. The Autostart adopts manual mode, the amber  LED lights, and the top left of the LCD changes from **AUTO** to **MAN**. Note: *provided the  or  key is immediately released, the Autostart assumes manual mode but does not crank the engine – the unit does not then respond to the (automatic) remote start input.*
- To initiate an engine start sequence, press and hold the  key for at least 1 second. If a timed preheat output option has been set, it will activate. At the end of the preheat time, or if a preheat option has not been set, the Autostart will crank the engine. The  key may be released as soon as the preheat/crank sequence has begun: the start sequence then continues automatically, as for auto mode.

Once the engine has started, the AS731/732 runs the generator indefinitely if required. While Autostart is running the engine in manual mode, activation of the 'remote start' or 'mains fail' input may or may not cause an attempt to load the generator: please refer to the 'load in MAN' section of 'programming' document mi6129.

3.2.2 Maintaining engine running




If the Autostart is running the engine in Auto mode, selection of manual mode allows the engine to be run indefinitely:-

- Press and release the  key. The manual mode LED lights and the top left of the LCD changes from **AUTO** to **MAN**.

Note: the above operation does not affect the generator load status.

3.2.3 Stopping the engine

With the engine running in manual mode, there are several options for stopping the engine:-

- Press the  key and release after about 1 second. The Autostart immediately stops the engine and remains in manual mode.
- Press the  (off/reset) key. The Autostart immediately stops the engine and powers down.
- Press the  key. Engine stopping (and re-starting) then reverts to automatic, i.e.-
 - If the remote start input is active (e.g. if the mains supply has failed), the Autostart maintains or reloads the generator until the remote start input clears.
 - If the remote start input is inactive (e.g. if mains is healthy) and the generator is running on load, the Autostart maintains load and begins a 'return to standby' sequence, starting with a 'restore' time.
 - If the remote start input is inactive and the generator is running *off* load, a return to standby sequence begins, starting with an 'engine cool' time.

3.3 Responding to faults

In Auto and manual modes, the Autostart continuously monitors for a range of engine and plant faults. The unit is typically set up to operate an external, audible alarm during a fault conditions; the LCD backlight will also flash on and off.

The operator, once alerted, can check the system and fault status by use of the LCD messages, and/or panel indicators driven from programmable outputs. The AS731/732 has three main fault response types - shutdown, warning and load release.

3.3.1 Shutdown faults


A shutdown response is given to those faults which require an automatic and immediate engine shutdown and lock-out. These are serious faults that might otherwise cause personal injury, or damage to the generator and other equipment, e.g. 'emergency stop', engine 'low oil pressure', 'high engine temperature', 'overspeed', AC 'overvolts', 'no speed signal' and

'failed to start' (overcrank). A shutdown response may also be set for other inputs or parameters, e.g. AC over current, AC undervolts, earth fault, coolant leak, etc.

After a shutdown fault, the front facia LCD flashes and displays a relevant fault message, e.g.:-

ENGINE SHUTDOWN
LOW OIL PRESSURE

If the Autostart has been set up for use with a 'klaxon mute' panel button, press this button to silence the audible alarm and leave the fault message displayed.

To clear the fault condition, press and hold the  key for 1 second, or isolate the DC supply (either of which causes a power down and 'hard' reset).

Once reset, the Autostart should only be powered up again once the reason for the shutdown has been investigated and corrected.

3.3.2 Warning faults

These faults are less serious in nature, requiring operator warning or intervention but not an automatic engine shutdown. Warning faults include 'charge fail', 'low/high battery volts', 'low fuel', etc.

Faults are indicated on the LCD with a flashing backlight. Typically, the LCD top line continues to display operating mode and system status, while the bottom line displays a fault message, e.g.

AUTO:gen on load
CHARGE FAIL

The operator response depends on the nature of the fault. Some faults can be rectified while the engine is running, others may require that the engine is stopped before further investigation. Warning faults are self-resetting: the displayed fault message and any alarm outputs will clear as soon as the problem is rectified.

3.3.3 Load release faults

This type of fault is similar to the warning fault above, but the Autostart will also 'release' the generator load, allow the engine to run on (off load). The Autostart may be set to give a 'load release' response to faults such as 'generator under voltage' or 'generator over current'.

Fault indication is similar to warning faults: the LCD flashes, the top line displays operating mode and system status, while the bottom line displays a fault message, e.g.


AUTO:eng running
GEN UNDERVOLTS

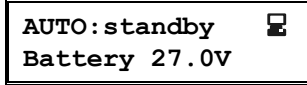
Once alerted, the operator should investigate the cause of the fault.

If a 'load release' fault clears, the response depends on the generator manufacturer's programming. If one of the inputs has been configured for 'load reset', the Autostart only attempts to reload the generator if both the fault has cleared and the input is activated (typically by the user pressing a panel push button). Without a 'load reset' input, Autostart automatically reloads the generator and clears its fault message immediately that the fault clears.

3.4 RS485 communication (AS732 only)

AS732 units feature an RS485 MODBUS communication network through which AS732s can communicate with each other or other equipment such as PLC, SCADA or building management systems.

Active communication over the RS485 network is indicated by a  symbol in the LCD, e.g.



This symbol remains displayed for 30 seconds after the last RS485 communication activity.



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