

DIESEL GENERATOR CONTROLS

MICROSTART

MICROPROCESSOR GENERATOR CONTROLLER

Microprocessor technology has been used to produce Modex's most comprehensive and flexible generator controller to date. Key features include:-

- Automatic or manual operation, keyswitch selectable.
- 40 character, back-lit liquid crystal display (LCD).
- 8 user configurable 'event fault' inputs.
- 3 phase mains voltage and frequency monitoring.
- 3 phase generator voltage and frequency monitoring.
- Full programmability of alarms, timers and trip limits.
- Upgradable with RS232 communications and individual fault output options.

Programmability...

Microstart has been designed to meet with a wide range of generator control specifications: functions such as delay times, trip levels, fault messages and alarm configurations may be changed quickly and easily by use of the display and front facia cursor keys.

Entry to 'program mode' is restricted by the use of a PIN number, preventing any unauthorised end-user tampering of the control settings. The programmable functions include:

- Alarm events:** (For each of the 8 fault channels:)
- a fault message (of up to 20 characters).
 - a 'status' (engine shutdown or warning only).
 - configuration (sensors open/close, to +ve/-ve).
- Timers:** Time settings for: mains fail latency; start delay; preheat, crank and crank cool times; alarm override and engine warm-up times; contactor (de-synch) delay; mains restoration and engine cool times.
- System values:** Trip levels for: generator over and under voltage, frequency and speed; mains failed and healthy levels.
- 'Switches':** Miscellaneous selectable functions:
- enable/disable generator load in 'System Test'.
 - enable/disable load transfers in manual mode.
 - mains fail override (or not) of manual mode.
 - shutdown/dump load on under volts/freq.
 - program mode and system test PIN numbers.

Display

As well as being used for programming, the 40 character display is used during the normal operation of the generator to give information about:

- System status:** Operating mode (auto or manual), mains failure, system test, generator running, generator on load, etc.
- Fault status:** Fault messages and warning information, e.g. 'engine halted: low oil pressure', 'mag. pickup failure'.
- Voltage:** 3 phase, L-N voltage for both generator and mains.
- Frequency:** Single phase, generator and mains.
- Engine speed:** expressed in RPM (when using a magnetic pickup speed sensor).

Much of this information is automatically displayed according to priority; other information is available to the operator by use of the front facia cursor keys.



Product Specification

Supply:

Operating voltage range	9 - 40 V DC continuous, Ni-Cd backup allows voltage dips to 5 V DC for 1 second without erroneous operation
Typical current consumption	500mA at 12 V DC, 300mA at 24 V DC

Inputs:

DC inputs (events, remote start)	
Positive input range	80% to 100% of battery +ve
Negative input range	-1V to +2V w.r.t. GND terminal
Mains and generator AC:	
Voltage: measurement range	0 - 300 V AC (L-N)
accuracy	<= 1.5% of full scale
display resolution	1 V
maximum input	300 V AC rms or 425 V peak
input isolation	1kV DC
Frequency: operating range	20 - 99 Hz.
accuracy	<= 1.2% of full scale
display resolution	0.1 Hz.
Magnetic pickup (speed measurement):	
operating voltage range	10 - 80 V AC rms
frequency range	625 to 21000 Hz.
	(suitable for nominal engine speeds of 750 to 3600 RPM, with 50 to 350 flywheel teeth).
Battery voltage:	
measurement range	0 - 40 V DC
accuracy	<= 0.5% of full scale
display resolution	0.1 V

Outputs:

	(all ratings for resistive load)
Start, preheat and alarm relays	SPNO, 16A @ 24V DC
Fuel relay	SPCO, 16A @ 24V DC
Mains and generator contactor control	
AC version (solid state relays)	rated 3A @ 240V AC
DC version (electro-mech. relays)	SPNC (mains) and SPNO (gen.) contacts, rated 16A @ 24V DC
Klaxon, off/reset, alert and charge control	open collector, active low, 250mA max. @ 33 V DC

Physical:

Ambient temperature: operating	0 to +50 °C
storage	-20 to +70 °C
Vibration	5 G, 10 Hz to 150 Hz. (BS2011, pt. 2.1)
Overall dimensions (W x H x D)	192 x 144 x 225 mm
Panel cut-out size	DIN standard 186 x 138 mm
Weight	approx. 2.7 Kg

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Alarm System

Microstart has a comprehensive system for the monitoring and warning of generator faults, and taking automatic action as necessary (e.g. shutting down the generator). The alarm system includes:

- 8 'event' inputs for the connection of remote sensors or relay contacts (e.g. oil pressure, low fuel, overload).
- on-board monitoring of generator voltage, frequency and speed - all trip levels are programmable
- two inputs for the monitoring of mains battery charger and charge alternator faults.
- Emergency stop, for use with remote, daisy-chained, push-to-break switches. This function operates independently of Microstart's processor circuit.
- 'Intelligent' alarms: generator failed to start, contactor failed to engage, magnetic pickup failure, generator stopped - cause unknown.
- Self diagnostic alarms: Microstart is able to diagnose faults within its own operating system and signal an appropriate fault message (e.g. 'memory failure').

Each Microstart has three 'common alarm' outputs:

- Klaxon:** An open collector, active low output. The output is active during all faults and for the last few seconds of preheating. The operator may acknowledge a fault and turn off the klaxon output by pressing the front facia klaxon mute button.
- Alarm:** Normally open relay contacts, activated after a generator shutdown (alarm) fault.
- Alert:** An open collector output, activated during a 'warning only' (alert) fault.

Individual outputs for each fault type are also available as an option.

Additional Inputs

Microstart is also fitted with inputs for the following features:

- manual mode starting and stopping through remote switches
- a 'remote start' function (close input to -ve to initiate start)
- monitoring of contactor state (through auxiliary contacts)
- measurement and display of battery voltage.

Outputs

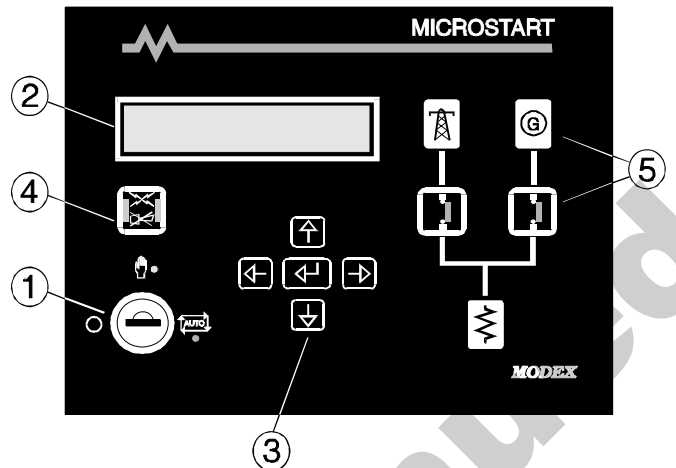
Engine fuel, starter and pre-heater circuits are controlled through diode suppressed relay outputs. Two further outputs are provided: 'off/reset' enables remote equipment to be reset from Microstart's keyswitch; 'charge control' enables a mains battery charger to be isolated during generator cranking and running.

Generator and mains contactors are controlled by one of two methods (please specify which at order): where the application uses AC coiled contactors, Microstart uses solid state relay outputs for superior operating life and reduced interference; for DC coil applications, diode suppressed electro-mechanical contacts are used.

Other features:

- Universal 12/24V DC switched mode power supply.
- System test function: automatic simulation of a mains failure start/stop cycle, with or without load transfer.
- Automatic lamp test on power-up.
- Hours run recorder: 0 - 99,999 hours, non-volatile.
- Automatic excitation of charge alternator at engine start.
- Alarm events status screen, allowing the condition of all 8 inputs to be displayed at any time.

Front Facia Controls



- ① **Keyswitch:** used to select Microstart's operating mode:

- **Off/reset:** All functions (bar the mains contactor control) are reset and disabled.
- ☞ **Manual:** generator and contactors are put under the control of the operator, with optional, programmable override on mains failure. On turning to this key position, the operator is given the option of entering 'program mode'.
- Ⓜ **Auto:** puts the generator on standby, ready to automatically respond to a mains failure or 'remote start' condition. The 'system test' feature may also be initiated in this mode (by pressing).

- ② **Display:** Liquid crystal, 40 character, back-lit.

- ③ **Cursor keys:** these are used when programming Microstart, to display additional system information on the display, and to activate the system test function. Each press of the key is acknowledged by an audible 'beep' from within Microstart.

- ④ **Klaxon mute button:** may be used by the operator to acknowledge a fault condition and turn off the klaxon output.

The button contains two red LEDs: these flash repeatedly when a fault occurs, light continuously after the button is pressed, and only extinguish once the fault is rectified or the unit is reset.

- ⑤ **Contactor controls:**

The two lamps - and - respectively indicate the state of the mains and generator supplies, i.e. whether they are within the programmed trip limits and available for use.

Below each of these lamps is a push button with an integral green LED. In auto mode, pressing these buttons has no effect; in manual mode, the buttons may be optionally enabled, allowing the operator to carry out load transfers between mains and generator.

The integral LEDs operate in both auto and manual modes, lighting to indicate when the mains or generator contactor is engaged.

Options:

- 'R' - Individual outputs for each generator fault
- 'C' - Remote communications via RS232 and modem

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