

# Generator Set Control

## PowerStart

### 0600/0601/0602



#### Description

The PowerStart control is a microprocessor-based generator set monitoring and control system. The control provides a simple operator interface to the generator set, manual and remote start/stop control and shutdown fault indication. The integration of all control functions into a single control provides enhanced reliability and performance compared to conventional generator set control systems. This control has been designed and tested to meet the harsh environment in which gensets are typically applied.

The PowerStart generator set control is suitable for use on a wide range of Generator sets & Fire Pumps. It is suitable for use with reconnectable or non-reconnectable generators, can be configured for either 50 Hz or 60 Hz and voltage and power connection from 190-600 VAC line-to-line.

This control includes an intuitive operator interface that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes 12 generator set status LED lamps with both internationally accepted symbols and English text to comply with customer needs. The interface also includes an LED backlit LCD display with tactile-feel soft-switches for easy operation and screen navigation. The *manual/auto/stop* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the 10 previous faults.

Power for this control is derived from the generator set starting batteries and functions over a voltage range from 8 VDC to 32 VDC.

#### Features

- Generator set monitoring and protection.
- Integrated 128x64 Pixel monochrome graphic LCD Display.
- 12/24 VDC battery operation.
- Engine starting - Includes solid state output to operate external relays start the engine, fuel shut off (FSO), and glow plugs. Start Disconnect is achieved by monitoring main alternator frequency.
- Remote start capability – Interface to transfer switch or AMF Panel
- Certification - Suitable for use on generator sets that are designed, manufactured, tested, and certified to relevant ISO, IEC Mil Std. and CE standards.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- BMS – Compatible for Building Management Systems over Modbus communication protocol
- Built-in ATS Controls feature supports Contactor pair (conventional AMF control) Auto Transfer Switch Mechanism (TS1311)
- Governor & Speed Bias – PS0601 has inbuild Governor along with 0-5v DC speed bias input as Sync ready feature
- CAN / J1939: PS0602 has inbuilt CAN communication chip along with additional Analogue & Digital I/O's
- 4-20mA: New 4-20mA Sensor inputs available on PS0601 & PS0602 for Oil Pressure measurement

## Base control functions

### LCD capability

LED indicating lamps - For genset running, remote start, shutdown, warning, manual, auto and stop.

LCD display – Integrated 128x64 Pixel monochrome graphic LCD Display

Operation interface - Six tactile-feel membrane switches for LCD navigation, genset operation and control setup. These switches are indicated by internationally accepted symbols and English text.

Operator adjustments - The LCD includes provisions for necessary set up and adjustment functions.

Control data - Access to the control software part number and software version are provided from the LCD or InPower™.

Data logs - Includes engine run time and controller on time.

Fault history - Provides a record of the most recent fault conditions with control hours time stamp. Up to 5 events are stored in the control non-volatile memory.

### Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kVA & kW (three phase and total)
- Frequency, Power Factor & Energy Metering

### Engine data

- Starting battery voltage
- Engine running hours
- Engine temperature
- Engine oil pressure

Service adjustments - The control includes provisions for adjustment and calibration of generator set control functions. Functions include:

- Voltage selection
- Frequency selection
- Configurable input set up
- Configurable output set up
- Meter calibration
- Units of measurement

Symbol & Text Mode: - User can switch between English Language (default) or Symbols in Display

### Engine control

Battery operation - PowerStart will operate on 12 VDC batteries.

Auto start mode - Accepts a ground signal from remote devices to automatically start the generator set and immediately accelerate to rated speed and voltage. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

Emergency stop - The control annunciates when an emergency stop signal is received and the generator set immediately shuts down. The generator set is prevented from running or cranking with the switch engaged.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating.

Engine starting - The control supports automatic engine starting. Primary and backup start disconnects are achieved by battery charging alternator feedback or main alternator output frequency. The control also supports configurable glow plug control when applicable.

Cycle cranking - Configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shutdown after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Governing with Speed Bias – PS0601/602 supports isochronous / droop mode Governing with speed bias input to facilitate paralleling with external Genset Controllers

## Protective functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower Service Tool provide service keys and procedures based on the service codes provided. InPower is used to configure settings.

### Protective Functions include:

Configurable alarm input - The control accepts up to one alarm input (contact closed to ground) to cause a shutdown or warning response from the control.

Emergency stop - Annunciate whenever an emergency stop signal is received from external switch.

### Engine Protection

Low lube oil pressure warning/shutdown - Level is preset to match the capabilities of the engine used. Control includes time delays to prevent nuisance shutdown signals.

High engine temperature warning/shutdown - Level is preset to match the capabilities of the engine used. Control includes time delays to prevent nuisance shutdown signals.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

Sensor failure indication - Logic is provided on the base control to detect analogue sensor or interconnecting wiring failures.

## General Engine Protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control will test the battery each time the generator set is signalled to start and indicate a warning if the battery indicates impending failure.

Fail to start shutdown - The control will indicate a fault if the generator set fails to start by the completion of the engine crack sequence.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is running.

## Alternator Protection

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 1-10 seconds. Default value is 110% for 5 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of voltage, time delay 2-20 seconds. Default value is 90% for 5 seconds.

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below nominal governor set point, for a 500-2000 half cycles delay. Default: 5 Hz, 1000 half cycles.

Over frequency shutdown/warning (81 o) - Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for 100-2000 half cycles delay. Default: 5 Hz, 1000 half cycles.

Loss of sensing voltage shutdown - Shutdown of generator set will occur on loss of voltage sensing inputs to the control.

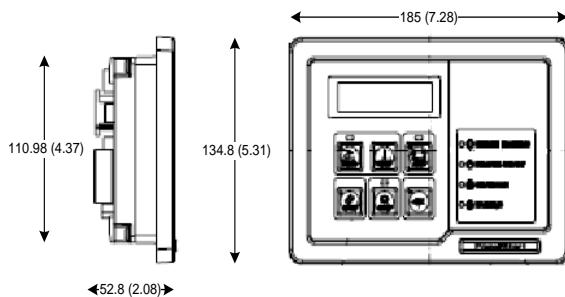
## Software

InPower (beyond 12.0 version) is a PC-based software service tool that is designed to directly communicate to PowerStart generator sets and transfer switches, to facilitate service and monitoring of these products.

## Product Feature Comparison

Features	PS0600	PS0601	PS0602
4 – 20mA Input	1	1	2
0 – 5 V Input	NA	1	2
Discrete Inputs	3	3	6
Discrete Outputs	6	6	9
Speed Bias Input	NA	Yes	Yes
Governor	NA	Yes	Yes
Regulator	NA	NA	NA
CAN / J1939	NA	NA	Yes
Part No	A054G527	A063J660	A064A614

## Mechanical drawing



## Warranty

All components and subsystems are covered by an express limited one year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

## Certifications

PowerStart meets or exceeds the requirements of the following codes and standards:

- CE marking: The control is suitable for use on generator sets to be CE-marked.
- EN61000 series – EMI, EMC compliment
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- PowerStart control and generator sets are designed and manufactured in ISO 9001 certified facilities.
- CES10903 (ROHS - Restriction of Hazardous substance / REACH) compliant

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