

Keystart 9620 series Engine & Generator Controls Installation Instructions

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catalogue section 40 & 75



Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product. If in doubt, please contact your local Murphy representative.

GENERAL INFORMATION

BEFORE BEGINNING INSTALLATION OF THIS PRODUCT

- ✓ Disconnect all electrical power to the machine
- ✓ Make sure the machine cannot operate during installation
- ✓ Follow all safety warnings of the machine manufacturer
- ✓ Read and follow all installation instructions

General

The Keystart 9620 series provides manual start/stop and automatic fault shutdown protection for generators, pumps and other engine-driven applications.

Keystart features a 3 way keyswitch for operator control of the engine, with 6 LEDs for indication of status and faults - see 'front view' diagram for details. Electrical connection and configuration options are at the rear - see 'Rear view, connection and settings' diagram.

For each Keystart ordered, the following is supplied:

- 1 x Keystart module, fitted with 2 x panel mounting clips
- 2 x keys
- these instructions

Panel installation

Keystart is designed for front-of-panel mounting in a DIN standard 92 x 92 mm (3.6 x 3.6 in.) cut-out. Allow 75mm (3.0 in.) behind the panel for the case depth, keyswitch and cable connection.

Secure the case to the panel with the two ratcheted mounting clips:

1. Remove the plastic mounting clips from the Keystart case: release each clip's ratchet mechanism by pulling outwards (A), then slide the clip back and off the case (B).
2. At the front of the panel, insert the Keystart (without clips) into the panel cut-out (C).
3. At the rear of the panel, refit the two mounting clips into the slots on the Keystart case (D). Slide each clip forward until the arms (E) are secured behind the panel face. Ratchet mechanism (F) prevents the clip from moving backwards.



Product specifications

power supply:

operating voltage:	
steady state	7 – 30 VDC
brown out / cranking	5 VDC
current consumption	< 100mA

inputs:

fault switch inputs:	close to negative DC during fault
–ve input defined as:	–1V to +1V w.r.t. – ve DC supply
speed sensing input:	(model 9621 only)
generator AC (J2+J3 on)	70 – 270 VAC rms, <50 to >60 Hz. nominal
mag. pickup (J2+J3 off)	10 – 60 VAC peak, <2000 to >6500 Hz. nominal

outputs:

	<i>(all ratings non-reactive)</i>
run, preheat	positive DC, switched NO relay contact, 10 A max. @ 24VDC
start (crank)	positive DC via keyswitch contacts, 10 A max. @ 24V DC
alarm	negative DC (open collector NPN transistor), 250mA max.
calibration/tacho	to suit 0 – 1 mA, 75 Ohm meter output = 0.75mA at rated engine speed

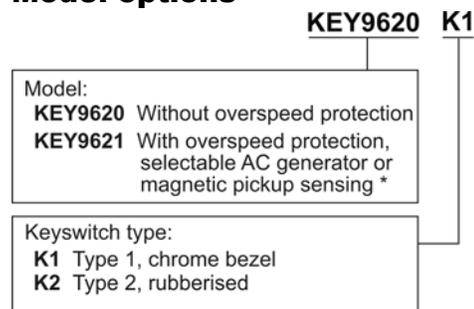
adjustable settings:

preheat timer	0 or 10 secs (link J1), default = 0 secs
fault override timer	2 to 20 secs (VR1), default = 10 secs
overspeed trip level	100 to 130 % (VR3) of nominal speed calibration (VR2), default = 110% (of 50 or 60 Hz)

general:

overall dimensions (w x h x d)	96 x 96 x 95 mm / 3.8 x 3.8 x 3.7 in.
panel cut-out size	DIN 92 x 92 mm / 3.6 x 3.6 in.
weight	approx. 300 g / 0.7 lb
operating temperature	–35°C to +55°C / –31°F to 131°F

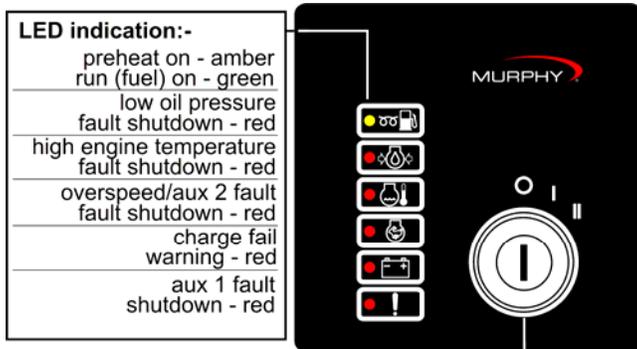
Model options



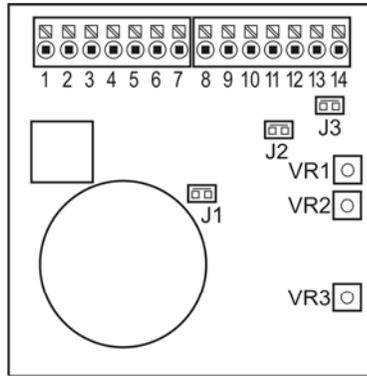
* standard stock modules are set for AC generator sensing, calibrated to either 50 or 60 Hz nominal. Non-standard (NS) settings/options are available to order.

GENERAL INFORMATION (cont.)

Front view and operation



Rear view, connections and settings



Connection:-

- 1 run (fuel) output: +DC, 10A
 - 2 preheat output: +DC, 10A
 - 3 start (crank) output: +DC, 10A
 - 4 + DC power supply
 - 5 charge fail (WL)
 - 6 oil pressure fault input
 - 7 aux. 1 fault input
 - 8 engine temp fault input
 - 9 aux. 2 fault input
 - 10 alarm output: - DC, 250mA
 - 11 tach/calibration output
 - 12 - DC power supply
- Speed input, model 9621 only, links J2 and J3 ON:-*
- 13 L } Generator AC, 50/60Hz
 - 14 N } 70-270 VAC, 50/60Hz
- links J2 and J3 OFF:-*
- 13 + } magnetic pickup,
 - 14 - } 10-60 VAC, 2000-6500Hz

Configuration:-

Use a 3 mm/0.1 in. flat head screwdriver for potentiometers VR1-VR3

All models:-

- J1:** preheat
 - link ON for no preheat
 - link OFF for 10 second preheat
- VR1:** Fault override, 2 - 20 secs, clockwise to increase.

Model 9621 only:-

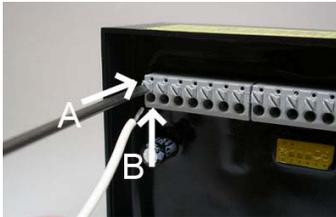
- J2 & J3:** speed sensing source (pins 13 and 14):-
 - both links ON for generator AC, 50/60Hz
 - both links OFF for magnetic pickup, 2000 - 6500 Hz.
- VR2:** Speed calibration. Set J2 and J3 correctly, run engine to nominal speed, adjust VR2 to give tach output of 0.75mA
- VR3:** Overspeed, 100 - 130% of VR2, clockwise to increase

ELECTRICAL CONNECTION



WARNING: DANGER OF INJURY OR DEATH. Keystart 9621 controllers allow connection of high voltage AC circuits. Before connection, disconnection or handling of these units, ensure that all AC and DC power supplies are isolated. Connection to or disconnection from live wiring may also cause damage to the Keystart's internal components.

Electrical connection to 0.5 to 1.5 mm² / 16 - 20 AWG panel wiring is by spring-clamp terminals at the rear.



- pre-strip 8 to 10 mm / 0.3 to 0.4 in. of insulation from each wire.
- Above each terminal is a square push-button with a diagonal slot. Insert a flat-head screwdriver into the slot (A), then push down to (towards the front of the Keystart) to open the terminal clamp.
- insert the wire into the terminal (B), checking that the insulation is clear of the clamp. Release the screwdriver/spring clamp pressure and check that the wire is secure.

General connection recommendations

Murphy make several recommendations for the electrical connection of engine and generator controllers.

- minimise controller output load current (i.e. wear/tear and potential damage) by using slave relays between the controller outputs and high power end-devices such as fuel and starter solenoids.
- Suppress (at source) electrical interference from panel relay and engine solenoid coils, using flywheel diode or proprietary snubber networks as appropriate.

- use separate routing for AC and DC wiring harnesses.
- use separate wiring for a) connection of battery charger to battery, and b) connection of battery to panel DC supply. Separate wiring will reduce high frequency battery charger output noise on the panel DC power supply.

Terminal functions

Pin	Function
1	Run (fuel) output
2	Preheat output
	These relay outputs provide control for a the engine's preheater and (energised to run) fuel / ignition circuits. When configuration link J3 is on (the default setting), the Preheat output (terminal 2) does not operate. If link J3 is removed, terminal 2 gives a positive DC output for 10 seconds, and the preheat LED lights, beginning from when the key is switched to the I (RUN) position.
	After any preheat time has expired, the Run output (pin 1) gives a positive DC output (operating engine fuel) and the green 'run' LED lights. The Run output and LED remain active until the operator switches the key to O (STOP) or until the Keystart initiates an automatic fault shutdown.
	Both Run and Preheat outputs are rated 10 Amp max. @ 24VDC. Murphy recommend the connection of slave relays with suppressed coils between these outputs and fuel solenoid coil and engine preheaters - see 'typical connection' diagram below.

ELECTRICAL CONNECTION (cont.)

Terminal functions (cont.)

Pin Function

3	Start (crank) output Pin 3 gives a positive DC, 16 Amp rated output when the key is switched to position II (start/crank). To prolong keyswitch contact life, connect a slave relay (with suppressed coil) between pin 3 and the engine starter solenoid coil - see 'typical connection' diagram below.
4	Power Supply, Positive DC
12	Power Supply, Negative DC The Keystart operates with any smooth DC / battery voltage in the range 7 – 30V. Supply brown-out protection is fitted as standard. Connect a 5 Amp anti-surge fuse in the positive DC line (pin 4).
5	Charge fail The charge fail LED lights, but there is no shutdown or alarm, when pin 5 is connected to battery negative. When using a charge alternator, connect pin 5 to the alternator warning lamp (WL) terminal. (Note: pin 5 supplies the alternator excitation current).
6	Low Oil Pressure (LOP) fault input
7	Auxiliary 1 fault input
8	High Engine Temperature (HET) fault input
9	Auxiliary 2 fault input Use remote switch/relay contacts that connect these inputs to battery negative during fault conditions. The Keystart shuts down the engine, lights the appropriate fault LED, and activates the alarm output. Note: activation of pin 9 (Aux 2 input) causes engine shutdown and illumination of the overspeed LED. For all the above inputs, shutdown is inhibited during engine cranking and until the end of the fault 'override' time (adjustable 2 – 20 secs using potentiometer VR1, clockwise to increase). To reset a shutdown fault condition, turn the key to O (Off) or remove the DC power supply.
10	Alarm output Pin 10 is a semiconductor-based (open collector NPN transistor) output that gives a negative DC output immediately after a fault shutdown. Output rating is 250mA max.: the output typically drives an audible/visible alarm circuit, using a slave relay with suppressed coil - see 'typical connection' opposite.
11	Tachometer (speed calibration) output This output is designed to work with a 0 - 1 mA DC ammeter, either a) during set-up to aid speed calibration, or b) in normal operation to indicate engine speed or generator Hz. For calibration, connect meter positive to pin 11 and meter negative to battery negative, e.g. at terminal 12. See 'speed sensing and calibration' below for setup procedure. For indication of engine RPM or generator Hz, the 0 – 1mA meter requires a custom scale: when correctly calibrated using VR2, Keystart gives 0 mA at 0 RPM/Hz. and 0.75mA (3/4 scale) at normal running RPM/Hz.

Pin Function

With links J2 & J3 ON:
13 **Generator AC Live**
14 **Generator AC Neutral**



When configuration links J2 and J3 are fitted (the default factory setting), terminals 13 and 14 are configured for overspeed sensing using a high voltage, generator AC 50/60Hz. signal.

The input accepts generator AC voltages between 70 and 270 VAC rms. A 1 Amp anti-surge fuse should be connected in series with AC live (pin 13). See 'speed sensing' below for correct calibration of this input using potentiometers VR2 and VR3.

To configure these terminals to magnetic pickup engine speed sensing, see section below.

With links J2 & J3 OFF:

13 **Magnetic pickup signal input**
14 **Magnetic pickup return**

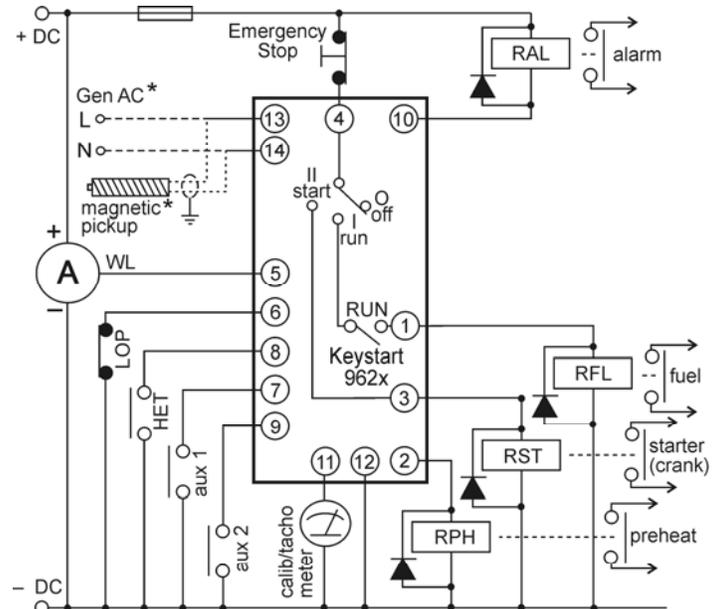
When configuration links J2 and J3 are removed, terminals 13 and 14 are configured for speed sensing by a magnetic pickup and flywheel/gearwheel combination.

Connect the magnetic pickup to the input using two-core and screen cable. To minimise electrical interference on the speed signal, connect the cable screen to earth at one end only.

Magnetic pickup signal requirements are 10 – 60 VAC peak, with frequency between 2000 and 6500 Hz. when the engine is running at nominal speed. See 'speed sensing' below for correct calibration of this input using potentiometers VR2 and VR3.

To configure these terminals for generator AC frequency sensing, see section above.

Typical connection



Notes:-

* Overspeed models 9621 only. Select generator AC or magnetic pickup speed sensing using links J2 & J3 (see rear facia diagram). Stock units are set for generator AC sensing.

SPEED SENSING AND CALIBRATION

Keystart model 9621 includes a speed sensing input and automatic shutdown protection for engine overspeed faults. Before use, model 9621's speed input must be correctly configured (using circuit-board links J2 and J3) and calibrated (using potentiometers VR2 and VR3).

Selection of speed signal source: links J2 and J3

Links J2 and J3 allow configuration of the speed sensing input (terminals 13 and 14) for either generator AC (the factory default setting) or magnetic pickup signals. Use small pliers to add or remove the links as required:

J2 and J3 links	Terminal 13 and 14 configuration
ON	Generator AC, 70 - 270 VAC rms, 50 or 60 Hz nominal.
OFF	Magnetic pickup, 10 – 60 VAC peak, 2000 to 6500 Hz nominal.

Speed calibration

Speed calibration is a two stage process:

1) Nominal speed calibration: potentiometer VR2

The factory default setting is for generator AC speed sensing, with standard models for 50 or 60Hz nominal calibration. To recalibrate for other systems:

- Select the speed sensing method (generator AC or magnetic pickup) using links J2 and J3 as detailed above.
- Turn VR2 fully clockwise (sets calibration for maximum nominal frequency).
- Connect a 0 – 1mA, 75 Ohm meter between pin 11 and battery negative, as detailed in 'electrical connection' above.
- Start and run the engine to nominal (normal running) speed.
- Turn VR2 anti-clockwise (decreasing the calibration frequency) until the ammeter rises to read 0.75mA.

2) Overspeed setting: potentiometer VR3

VR3 allows adjustment of the overspeed trip point, between approximately 100 and 130% of the nominal AC or magnetic pickup frequency (as set using VR2). The VR3 factory default setting is 110% (of either 50 or 60Hz). To adjust the overspeed trip level:

- Turn VR3 fully clockwise (to maximum, approx. 130% of nominal)
- Start and run the engine. Increase engine speed to the required overspeed/over-frequency trip level.
- Turn VR3 slowly anti-clockwise (decreasing the overspeed trip level) until the Keystart shuts down the engine and indicates 'overspeed'.

Where the engine speed cannot be adjusted, or if the speed signal cannot be simulated (e.g. with an adjustable signal generator), an approximate overspeed setting must be made (e.g. potentiometer mid-span = approximately 115% of VR2 nominal).

Maintenance and Warranty

The Keystart series contains no user-serviceable parts. Maintenance is therefore limited to the following preventative checks:

- Check that all electrical connections are secure.
- Check that the Keystart is securely clamped in the front of panel aperture, and kept free from ingress of water or build up of excessive dust/dirt. The front face label and casing may be wiped with a clean, damp cloth. Do not use cleaning solvents.

Each Keystart is supplied with a two year warranty on materials and workmanship. In the event of a fault or technical query, please contact your Murphy representative for technical support.

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FW MURPHY
P.O.Box 470248, Tulsa, Oklahoma 74147 USA
+1 918 317 4100 Fax: +1 918 317 4266
E-mail: sales@fwmurphy.com

INDUSTRIAL PANEL DIVISION
Fax: +1 918 317 4124
E-mail: ipdsales@fwmurphy.com

MURPHY POWER IGNITION
Website: www.murphy-pi.com

CONTROL SYSTEMS AND SERVICES DIVISION
P.O.Box 1819, Rosenberg, Texas 77471 USA
Phone: +1 281 633 4500 Fax: +1 281 633 4588
E-mail: sales@fwmurphy.com

FRANK W. MURPHY LTD.
Church Rd, Laverstock,
Salisbury, SP1 1QZ, United Kingdom
Tel: +44 1722 410055
Fax: +44 1722 410088
E-mail: sales@fwmurphy.co.uk
Web: www.fwmurphy.co.uk

COMPUTRONIC CONTROLS
41 - 43 Railway Terrace, Nechells,
Birmingham, B7 5NG, United Kingdom
Tel: +44 121 327 8500
Fax: +44 121 327 8501
E-mail: sales@computroniccontrols.com
Web: www.computroniccontrols.com

FW MURPHY INTERNATIONAL TRADING (SHANGHAI) CO. LTD.
Suite 1704, Tower B, City Center of Shanghai, 100 Zunyi Road,
Shanghai, 200051 China
Phone: +86 21 6237 2082 Fax: +86 21 6237 2083
E-mail: mhong@fwmurphy.com

FW MURPHY INSTRUMENTS (HANGZHOU) CO. LTD.
77 23rd Street, Hangzhou Economic & Technological Development Area
Hangzhou, Zhejiang 310018 China
Phone: +86 571 8788 6060 Fax: +86 571 8684 8878

