

Keystart 7210/7211/9610/9611 Engine & generator control modules

00-02-0678
2nd July 2009
catalogue section 40 & 75



Installation Instructions

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

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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

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 inputs:-	
generator AC	70 – 270 VAC rms, <50 to >60 Hz., default setting: 50 or 60 Hz.
mag pickup/transducer	3.5 – 21 VAC rms, <2000 to >6500 Hz.

outputs:

(all ratings non-reactive)

fuel (run), preheat	positive DC, switched NO relay contact, 7210 series: 1 A max. @ 24V DC 9610 series: 16 A max. @ 24VDC
start (crank)	positive DC via keyswitch contacts, 16 A max. @ 24V DC
alarm (fault)	negative DC (open collector NPN transistor), 100mA max.
speed calibration	to suit 0 – 1 mA, 75 Ohm meter output = 0.75mA at rated engine speed

adjustable settings:

preheat timer	0 to 20 secs, default setting 0 secs
fault override timer	2 to 20 secs, default setting 10 secs
overspeed trip level	100 to 130 % of calibrated speed, default setting 110%

general:

overall dimensions,	<i>(w x h x d)</i>
721x:	72 x 72 x 100 mm (2.83 x 2.83 x 3.94 in.)
961x:	96 x 96 x 131 mm (3.78 x 3.78 x 5.16 in.)
panel cut-out size, 721x:	DIN 68 x 68 mm (2.68 x 2.68 in.)
961x:	DIN 92 x 92 mm (3.62 x 3.62 in.)
weight	approx 300 g / 0.7 lb
operating ambient temperature	–10 to +55°C / 14 to 131°F

General

Keystart 7210, 7211, 9610 and 9611 modules provide manual start/stop control and automatic fault shutdown protection for generators, pumps and other engine-driven applications. Models 9610 and 9611 were superseded in 2009 by the Keystart 9620 and 9621 – see separate literature for details.

Operator control of the engine is through a 3 way keyswitch, with 6 LEDs and icons for indication of status and faults (see 'front view' overleaf). Electrical connection and potentiometer adjustments are at the rear (see 'rear view' overleaf).

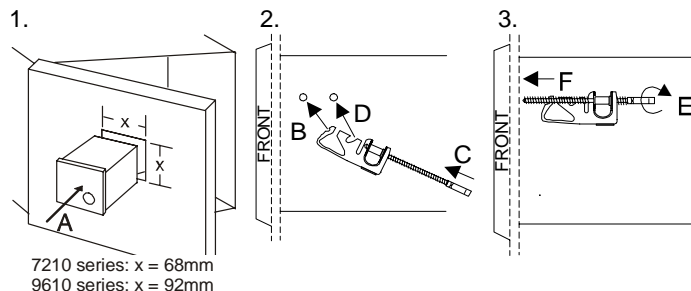
For each Keystart ordered, the following is supplied:-

- 1 x Keystart module
- 2 x keys
- 2 x case clamps
- these instructions

Panel installation

The Keystart is designed for front-of-panel mounting in a DIN standard cut-out: the 7210 and 7211 have cases for use in 68 x 68mm (2.68 x 2.68 in.) panel cut-outs; the 9610 and 9611 use cases for 92 x 92mm (3.62 x 3.62 in.) cut-outs.

For 7210 and 7211 modules, allow a minimum of 120mm (4.7 in) behind the panel front for case depth and wiring connection; for 9610 and 9611 units, allow 150mm (5.9 in.).



Standard models

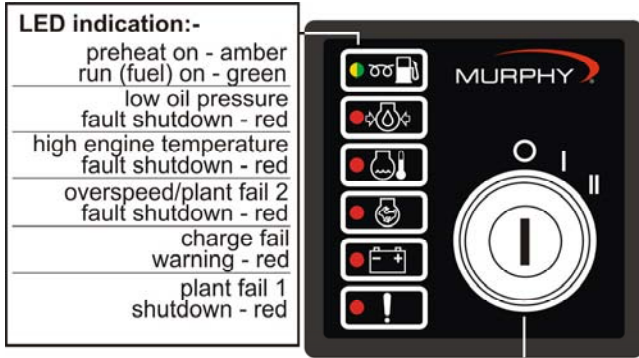
stock code model / description

76.70.1166	KEY7210, 72mm Keystart, no overspeed
76.70.1167	KEY7211, 72mm Keystart, AC/pickup overspeed*
76.70.1168	KEY9610, 96mm Keystart, no overspeed <i>(production discontinued 2009)</i>
76.70.1169	KEY9611, 96mm Keystart, AC/pickup overspeed* <i>(production discontinued 2009)</i>

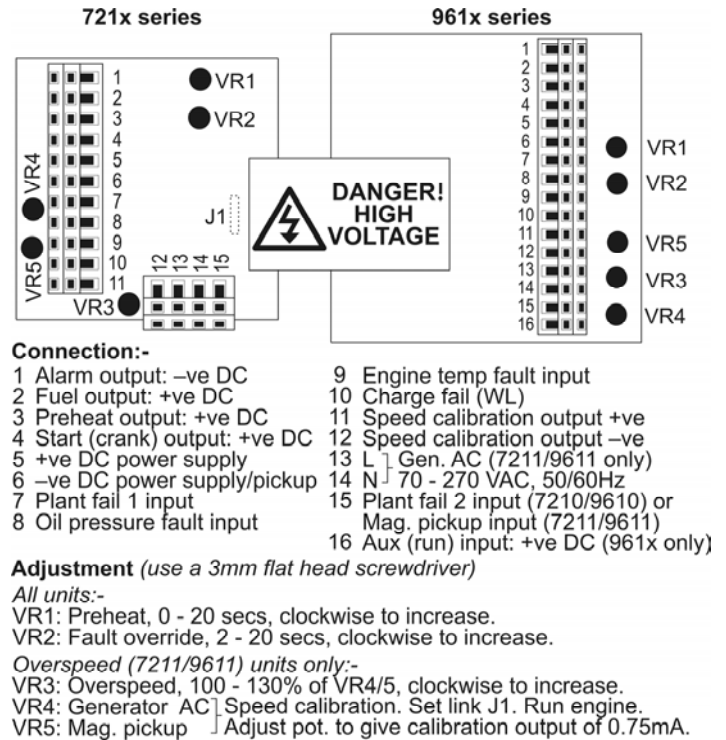
* Note: stock units are set to AC sensing, nominal 50Hz. To select magnetic pickup sensing, adjust internal circuit board link J1 (see Speed Sensing and Calibration section).

GENERAL INFORMATION (cont.)

Front view and operation



Rear view, connections and settings

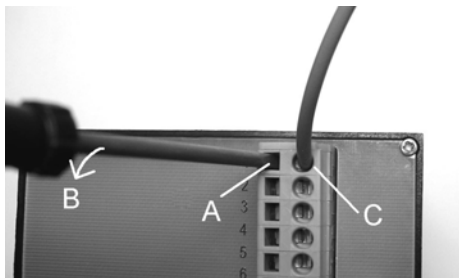


ELECTRICAL CONNECTION



WARNING: DANGER OF INJURY OR DEATH. Keystart 7210/9610 controllers may be connected to 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 is by spring-clamp terminals at the rear:-



- pre-strip approx. 6 to 8 mm (1/4 in.) of insulation from each wire.
- insert a 3mm (1/8 in.) flat-head screwdriver into the spring receptacle (A), then lever the screwdriver towards the unit (B) until the wiring terminal (C) opens.
- insert the wire into the terminal, checking that the insulation is just clear of the clamp, then release the spring pressure. Check that the wire is secure.

General connection recommendations

Murphy make several general recommendations for the electrical connection of engine and genset 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 to the battery will minimise high frequency battery charger output noise on the panel DC power supply.

For further details about these recommendations, please refer to Murphy document yi6398.

Terminal functions

Pin Function

1 Alarm output

Pin 1 is a semiconductor-based (open collector NPN transistor) output. It gives a negative DC 100mA max. rated output immediately after a fault shutdown. The output is typically used to drive an audible/visible alarm circuit, using a slave relay with suppressed coil - see 'typical connection' opposite.

2 Fuel (run) output

3 Preheat output

These outputs provide control for engine preheater and (energized to run) fuel / ignition circuits.

If any preheat time is set (0.25 – 20 secs using VR1, anti-clockwise to increase), pin 3 gives a positive DC output (and the preheat LED lights) as soon as the key is switched to the I (RUN) position.

ELECTRICAL CONNECTION (cont.)

After any preheat time, pin 3 de-activates, pin 2 gives a positive DC output (operating engine fuel) and the green 'run' LED lights. The fuel output and LED remain active until the operator switches the key to **O** (STOP) or until the Keystart initiates an automatic fault shutdown.

Fuel and preheat relay contacts are rated to maximum 1 Amp (7210/7211) or 16 Amp (9610/9611). Slave relays with suppressed relay coils **MUST** be connected between these outputs and engine preheaters and fuel solenoid - see 'typical connection' diagram below.

4 Start (crank) output

Pin 4 gives a positive DC, 16 Amp rated output when the key is switched to position **II** (START). To prolong keyswitch contact life, connect a slave relay (with suppressed coil) between pin 4 and the engine starter solenoid coil - see 'typical connection' diagram below.

5 Positive DC power supply

6 Negative DC power supply

The Keystart operates with any smooth DC / battery voltage in the range 7 – 30V. Supply crank-dip voltage protection is fitted as standard. Connect a 5 Amp anti-surge fuse in the positive DC line (pin 5).

7 Plant fail 1 input

8 Low Oil Pressure (LOP) fault input

9 High Engine Temperature (HET) fault input

Use remote fault contacts to connect these inputs to battery negative during fault. The Keystart shuts down the engine, lights the appropriate LED, and activates the alarm output. Shutdown is inhibited during engine cranking and until the end of the fault 'override' time (adjustable 2 – 20 secs using VR2, clockwise to increase). To reset a shutdown fault condition, turn the key to **O** (Off) or remove the DC power supply.

10 Charge fail

The charge fail LED lights, but there is no shutdown or alarm, when pin 10 is connected to battery negative. When using a charge alternator, connect pin 10 to the alternator WL terminal. (Note: pin 10 supplies the alternator excitation current).

To disable the charge fail LED, connect pin 10 to battery positive DC.

11 Speed calibration output positive

12 Speed calibration output negative

This output is designed to work with a 0 - 1 mA DC scale ammeter, either a) during set-up to aid speed calibration, or b) in normal operation to indicate engine speed or generator Hz. Connect meter positive to pin 11 and meter negative to pin 12. See also 'speed sensing and calibration' below.

13 Generator (alt) AC Live

14 Generator (alt) AC Neutral



For overspeed sensing by generator AC frequency, ensure that circuit board link J1 is in the 'ALT' position – for details see 'speed sensing and calibration' below. The AC input voltage range is 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 setup of this input.

15 Plant fail 2 input (non-overspeed models 7210 and 9610) Magnetic pickup input (overspeed models 7211 and 9611)

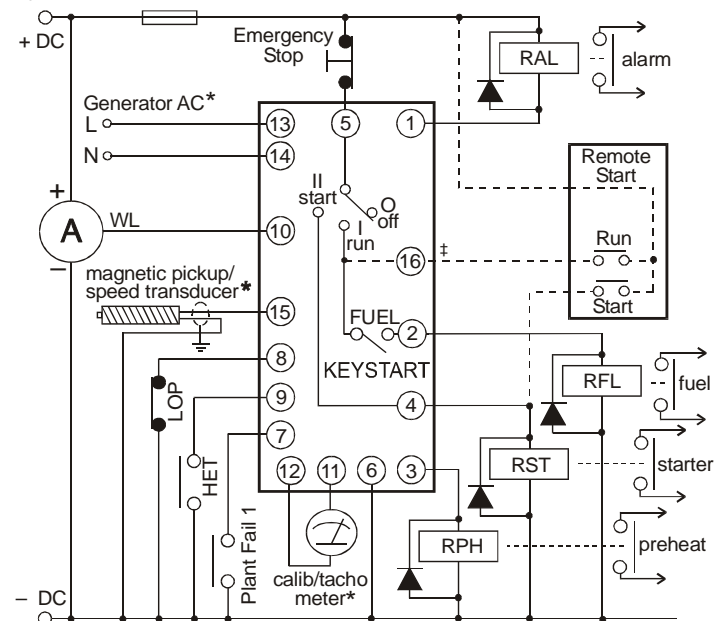
On non-overspeed models 7210 and 9610, pin 15 is an auxiliary shutdown input with operation as pins 7, 8 and 9.

On overspeed models 7211 and 9611, pin 15 allows speed sensing by a magnetic pickup and engine flywheel combination. Ensure circuit link J1 is set to the position marked "TRANS" or "MPU" (see 'speed sensing' below for details). Connect pin 15 to the pickup signal output, and the pickup return connection to pin 6 or panel negative DC. Two-core shielded cable should be used for the inter-connection, with the shield earthed at one end only. See 'speed sensing' below for correct setup of this input.

16 Auxiliary (Remote Run) input (9610/9611 models only)

This input provides a direct internal connection to the keyswitch Run terminal. To bypass the keyswitch operation and power the Keystart into Run mode (e.g. as part of a remote, automatic start system), connect pin 16 to battery positive DC.

Typical connection



Notes:-

* Overspeed models 7211/9611 only. Selection of generator AC or magnetic pickup speed sensing is by internal circuit board link J1. Stock units are set for generator AC sensing, 50Hz nominal. On non-overspeed models, pin 15 is 'plant fail 2' switch input, with connection as pin 7.

‡ Pin 16 (remote run input) available only on models 9610/9611.

SPEED SENSING AND CALIBRATION

Models 7211 and 9611 feature an engine speed and generator frequency measurement circuit. Before the Keystart is used, potentiometers VR3, VR4 and VR5 must be set to correctly calibrate the speed sensing circuits and overspeed/frequency shutdown trip level.

Selection of speed sensing source: link J1

Internal circuit board link J1 allows selection of speed sensing from either generator AC (the factory default setting) or magnetic pickup.



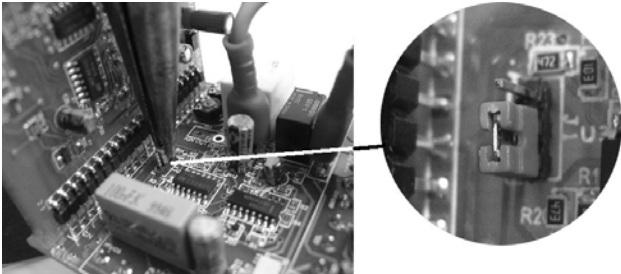
WARNING: the setting of link J1 requires access to internal circuit boards and sensitive electronic components. Anti-static precautions should be observed :-

- Use earthed wrist straps and anti-static mats.
- Handle circuit boards at the edges, avoiding physical contact with circuits and components.

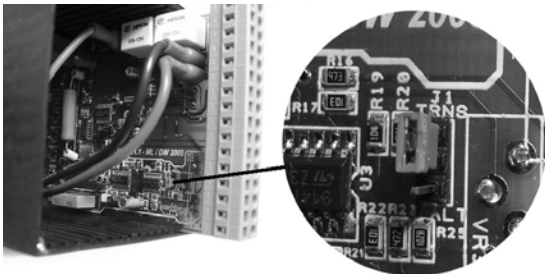
J1 has 3 pins, fitted with a circuit jumper that links the centre terminal to one of the outside positions. A pair of small, long-nosed pliers may assist in changing the link position. To access J1:-

- remove the 4 screws at each corner of the Keystart rear.
On models 9610 and 9611, remove the plastic rear cover plate.
- Slide the circuit board assembly rearwards until the circuits are exposed. The circuit board is connected by wires to the keyswitch, but can be moved rearwards enough to allow access to link J1.

On model 7211, J1 is located on the inside of the rear circuit board, close to the connection with the main circuit board:-



On model 9611, link J1 is located on the main circuit board, close to terminal 13:-



Move jumper J1 to the required position:-

- "ALT", "AC" or "GEN" for generator AC sensing, or
- "MPU" or "TRNS" for magnetic pickup speed transducer.

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USA-ISO 9001:2000 FM 28221
UK-ISO 9001:2000 FM 29422
Registered Facilities



Speed calibration

Calibration is a two stage process:-

1) Nominal speed calibration

For generator AC (alternator) speed sensing, standard factory calibration may be 50Hz or 60Hz. For magnetic pickup (transducer) sensing, standard calibration is 3000Hz (equivalent to 120 flywheel teeth @ 1500 RPM).

To recalibrate for other systems:-

- Connect a 0 – 1mA, 75 Ohm meter to speed calibration output pins 11 and 12, as detailed in 'electrical connection' above.

For generator AC sensing, use potentiometer VR4:-

- Turn VR4 fully anti-clockwise (to maximum nominal frequency)
- Start and run the generator to normal speed
- Turn VR4 clockwise until the meter rises to read 0.75mA.

For magnetic pickup sensing, use potentiometer VR5:-

- Turn VR5 fully anti-clockwise (to maximum nominal frequency)
- Start and run the engine to normal speed
- Turn VR5 clockwise until the calibration meter rises to 0.75mA.

2) Overspeed setting

The overspeed setting potentiometer VR3 is adjustable between approximately 100 and 130% (of the VR4 or VR5 nominal calibration). VR3 is factory set to 110% of calibrated speed/frequency. 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 until the Keystart shuts down the engine.

Where engine speed cannot be adjusted, an approximate overspeed setting must be made.

Maintenance and Warranty

The Keystart range 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 parts and workmanship. In the event of a fault or technical query, please contact your Murphy representative for technical support.