

Installation and Operation Instructions for Dual Set Point Speed Switch HD9063 Series



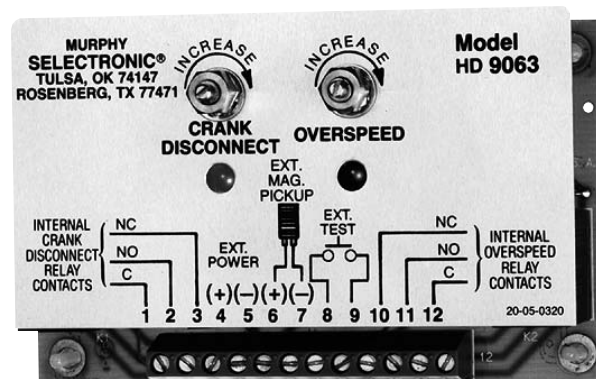
Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install this unit and make sure it conforms to NEC and local codes.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS MURPHY 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.



Description

The HD9063 Series is a unitized two set point speed switch with SPDT relay outputs. HD9063 is a PC-board configuration with standoffs for mounting in a control panel or cabinet.

Models are available for crank disconnect/overspeed and for underspeed/overspeed applications. Trip points can be field adjusted on all models. LED's next to the set point potentiometers indicate that the trip point has been reached and the relay(s) have operated. An overspeed test circuit is built-in; it will actuate the output relay at a point below actual overspeed set point.

The **HD9063** can disconnect the starter on automatic start engine applications and shutdown the engine if an overspeed situation occurs. Re-engagement of the starter is inhibited until RPM returns virtually to zero.

HD9063-USOS models allow operation of control circuits according to the speed of the driver or as a pre-alarm. Two separate adjustable speed switches are included on one common board.

Specifications

Power Supply:

Voltage: 8-30 VDC
 Maximum Current: 150 mA

Frequency Signal:

Voltage, Magnetic Pickup Signal Models

- Minimum: 0.35 Vrms
- Maximum: 60 Vrms

Maximum Current, Magnetic Pickup Signal Models: 4.8 μ A.

Adjustment Range, Magnetic Pickup Signal Models

- HD9063 Model
 - Crank Disconnect: 250-6,000 Hz
 - Overspeed: 1,100-10,000 Hz
- HD9063-USOS Model
 - Underspeed: 200-5,800 Hz
 - Overspeed: 1,100-10,000 Hz

Reset Differential, Magnetic Pickup Signal Models

- HD9063 Model
 - Crank Disconnect: Dropout 160 Hz \pm 5%
 - Overspeed: 200 Hz Differential
- HD9063-USOS Model
 - Underspeed: +5% of Set point Differential
 - Overspeed: 155 Hz \pm 10% Differential

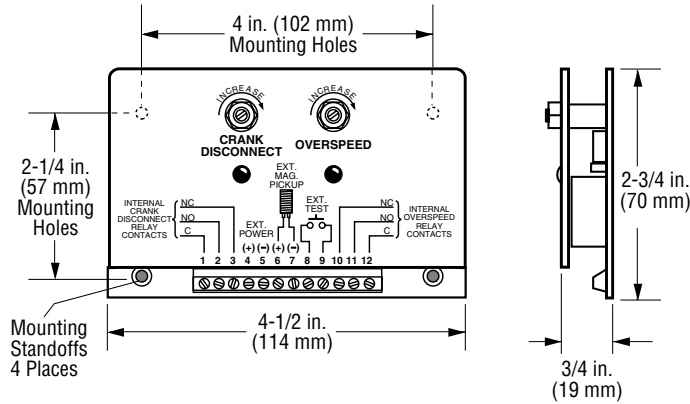
Output: Relay Contact, SPDT, Resistive Load: (2) 5 A, 30 VDC

Adjustment: (2) 270°-turn potentiometer

Temperature Range: 14 to 158°F (-10 to 70°C)

MOUNTING DIMENSIONS

HD9063 and HD9063-USOS



Mounting

1. Drill four 3/16 in. (5 mm) diameter mounting holes (refer to mounting hole dimensions above).
2. Align the plastic standoffs on the HD9063 with the 4 mounting holes and push gently until standoffs snap into place.
CAUTION: Pushing too hard could damage board.

Mounting

1. Drill four 1/4 in. (6 mm) diameter mounting holes (refer to mounting hole dimensions above).
2. Secure with four 10-32 screws.

RELAY FUNCTIONS

Crank Disconnect Relay

An understanding of the crank disconnect function for your particular system is critical to speed switch installation. It is also important to consider the 5 A current limitation of K1 relay contacts. **Figure 1** illustrates the use of a low-current pilot relay to operate the high-current starter solenoid. In operation, battery voltage is supplied through the normally closed contacts of the speed switch crank disconnect relay K1. When the engine starts, K1 energizes and its normally closed contacts open. This action de-energizes the pilot relay and inhibits the starter from operating until the engine nearly stops. The normally open contacts may be used if a contact closure is required to disable the cranking function for your system.

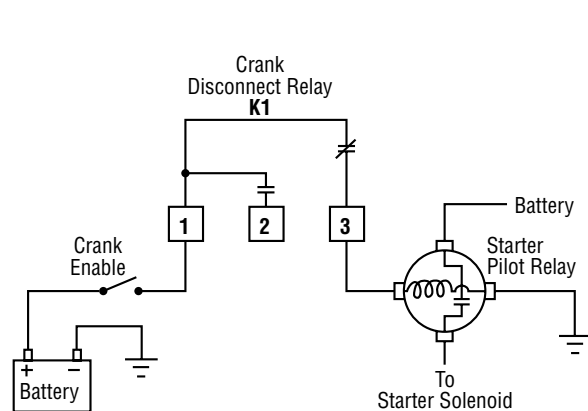


Figure 1

Overspeed and Underspeed Relay

NOTE: Underspeed relay available on HD9063-USOS only.

The overspeed and underspeed functions of the speed switch may be used in various systems to effect engine shutdown or actuate an alarm in the event of engine overspeed or underspeed. **Figure 2** illustrates the overspeed/underspeed function being used to control a fuel rack solenoid. In this application, battery voltage is available to the solenoid through normally open contacts of the relay (K2 overspeed) (K1 underspeed). If the engine speed exceeds the normal overspeed or underspeed set point, relay K1 or K2 energizes and this voltage energizes the solenoid, shutting down the engine. Similarly, the normally closed contacts may be used if engine shutdown is to be initiated by removal of battery voltage.

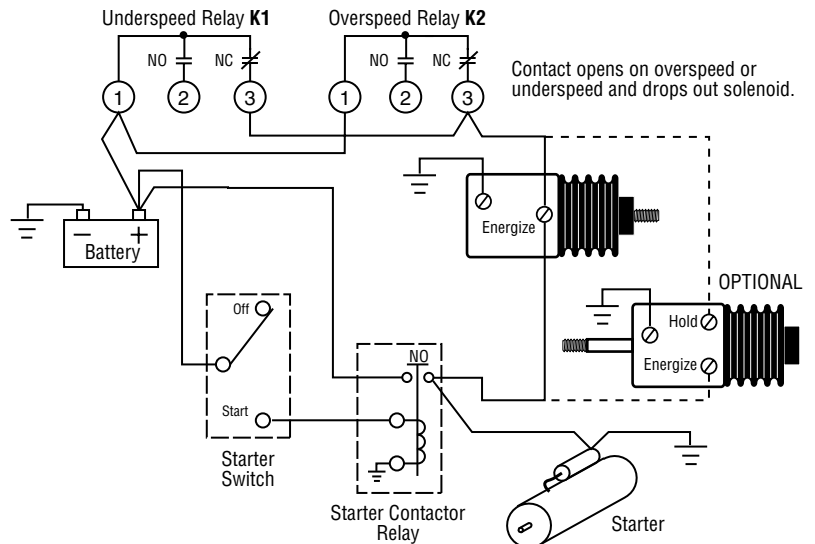


Figure 2

WIRING



CAUTION: PERFORM THE WIRING OPERATION WITH THE POWER SOURCE "OFF"

1. Connect terminal 5 on the HD9063 to engine ground and connect terminal 4 to battery positive (see Figure 3).
2. Connect the magnetic pickup cable conductors to terminals 6 and 7.
3. If cable is shielded, connect shield to engine chassis ground.
4. If desired, connect a normally open test push button switch between terminals 8 and 9.
5. Connect crank disconnect circuit to crank disconnect terminals 1 thru 3 as discussed in *Crank Disconnect Relay Function*, page 2. On **HD9063-USOS** models connect the overspeed circuits 1 thru 3 as discussed in *Overspeed Relay and Underspeed Relay Function*, page 2.
6. Connect the overspeed circuits to overspeed terminals 10 thru 12 as discussed in *Overspeed Relay and Underspeed Relay Function*, page 2.

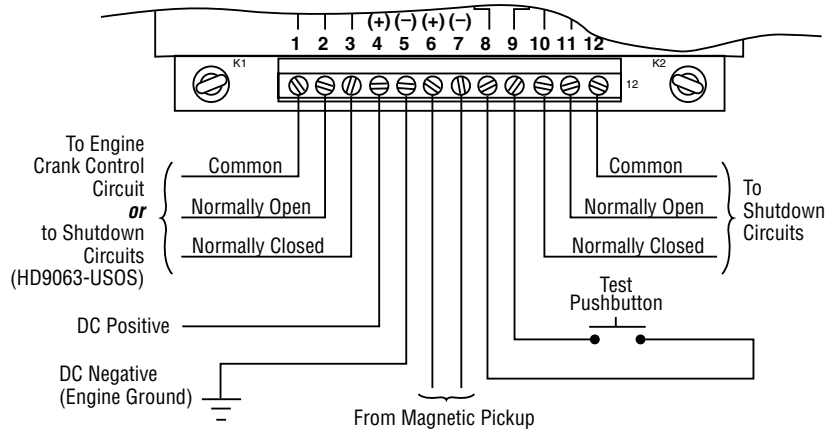


Figure 3

MAGNETIC PICKUP INSTALLATION

A magnetic pickup is an AC generator. It is normally installed into the flywheel housing of an internal combustion engine, so that the starter ring gear acts upon it to generate a voltage pulse each time a gear tooth passes the end of the sensor.

Magnetic Pickup Installation (see Figure 5)

Drill and tap a hole in the flywheel housing (See *Specifications Chart* below for model and thread size). **IMPORTANT: Drilling too deep may damage ring gear teeth. Blow chips with air hose when drilling and tapping hole.**

Gap Adjustment

Insert magnetic pickup and turn until it stops at the face of the gear. Back-off the gear by turning the pickup counterclockwise 1/4, 1/2, or 3/4 turn (**Figure 4**).

See *Gap Chart* (above, right) to determine gap distance based on the turn. Check gap clearance by rotating the gear completely around.

NOTE: Magnetic pickup gap should be adjusted so that the minimum voltage required is attained at the engine's lowest RPM. The voltage will increase as the speed increases.

If erratic readings occur, remove magnetic pickup and check the magnetic tip for metal chips.

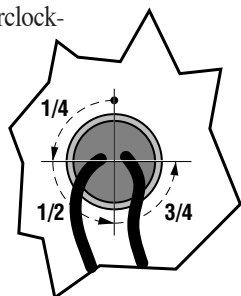


Figure 4

Gap Chart

THREAD SIZE	TURN				GAP
	1/4	1/2	3/4	1	
5/8-18 UNF	.013 in. (0.33 mm)	.028 in. (0.71 mm)	.035 in. (0.88 mm)	.055 in. (1.39 mm)	GAP
3/4-16 UNF	.015 in. (0.38 mm)	.030 in. (0.76 mm)	.045 in. (1.14 mm)	.062 in. (1.57 mm)	

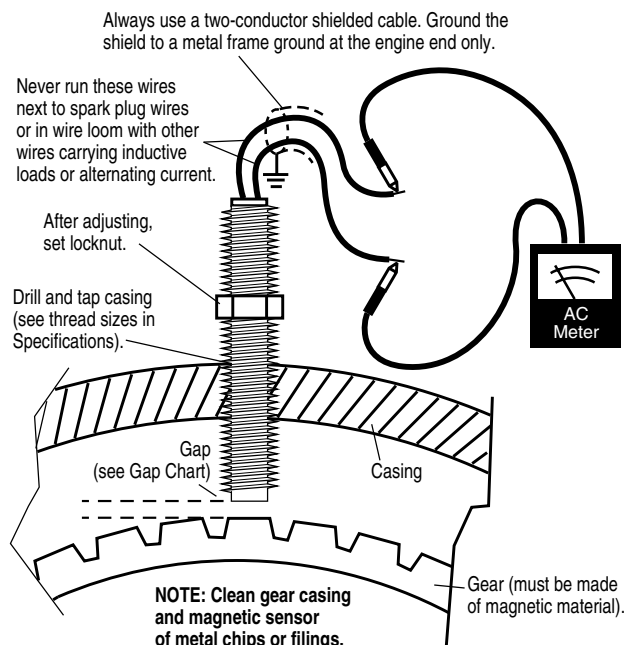


Figure 5

Murphy Magnetic Pickup Specifications Chart

Pickup Model	Total Length	Threaded Length	Thread Size
MP3298*	3 in. (76 mm)	3 in. (76 mm)	5/8-18 UNF
MP7906†	3 in. (76 mm)	3 in. (76 mm)	3/4-16 UNF
MP7905††	4-1/2 in. (114 mm)	4-1/2 in. (114 mm)	3/4-16 UNF

*Replaces 20-01-0080 and MP100. Lead wire hookup (12 in. [305 mm]).

†Replaces 20-01-0081. Lead wire hookup (12 in. [305 mm]).

††Replaces 20-01-0082. Lead wire hookup (12 in. [305 mm]).

Adjustment of the Dual Set point Speed Switch is performed when the system is otherwise operational in all respects. See **Figure 6** for location of Crank Disconnect, Underspeed and Overspeed potentiometers.

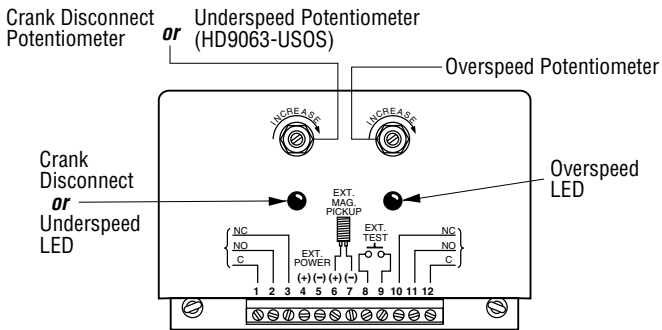


Figure 6

Crank Disconnect Set Point Adjustment

1. If engine serves as a backup for an electric pump or other motor driven device, turn off the associated electric motor.
2. Reset any associated switches.
3. Ground engine ignition system or shut off fuel to engine to disable engine from starting.
4. Loosen locknut on Crank Disconnect set point potentiometer and turn potentiometer fully clockwise.
5. Operate electrical switch(es) as appropriate so that engine will begin to crank.
6. While engine is cranking, slowly turn Crank Disconnect Set point potentiometer counterclockwise until Crank Disconnect LED lights (**Figure 6**). Engine should stop cranking.
7. Now turn the potentiometer clockwise 1/16 turn.
8. Enable engine and allow it to start, verifying that starter disengages. If starter motor stays engaged too long, lower set point slightly by turning potentiometer counterclockwise in increments of no more than 1/16 turn. Re-test after each adjustment by starting engine, and continue adjustment until starter disconnects as soon as engine starts. If starter motor does not stay engaged long enough, raise set point slightly by turning potentiometer clockwise in increments of 1/16 turn. Re-test after each adjustment.
9. Tighten locknut on Crank Disconnect set point potentiometer.

NOTE: A starter protection feature prevents starter from being engaged until engine almost completely stops after running.

Overspeed and Underspeed Set Point Adjustment

OVERSPEED

1. Loosen locknut on Overspeed set point potentiometer and turn potentiometer fully clockwise.
2. Start engine and run at **highest** normal operating RPM.
3. Slowly turn Overspeed adjustment potentiometer counterclockwise until overspeed switch trips or engine shuts down. The LED light should flash.
4. Turn potentiometer approximately 2° clockwise, then tighten locknut.
5. Reset switches as applicable and restart engine.

NOTE: An overspeed test switch connected as shown in **Figure 3** provides a means for decreasing set point for test purposes.

6. If a test push button is installed, press push button and verify that overspeed LED (**Figure 6**) flashes and engine shuts down or switch trips.

UNDERSPEED

NOTE: Underspeed is available on HD9063-USOS models only.

1. Loosen locknut on Underspeed set point potentiometer and turn potentiometer fully counterclockwise.
2. Start engine and run at **lowest** normal operating RPM.
3. Slowly turn Underspeed adjustment potentiometer clockwise until underspeed switch trips or engine shuts down. The LED light should flash.
4. Turn potentiometer approximately 2° counterclockwise, then tighten locknut.
5. Reset switches as applicable and restart engine.

NOTE: An overspeed test switch connected as shown in **Figure 3** provides a means for decreasing set point for test purposes.

6. If overspeed test push button is installed, press push button and verify that overspeed LED (**Figure 6**) flashes and engine shuts down or switch trips.

Warranty

A limited warranty on materials and workmanship is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to www.fwmurphy.com/support/warranty.htm



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