

3ST

Three point speed relay

ms5885
 (supersedes ms5884 / M040301)
 revision D, 20th March 2003
 catalogue section 20



- **Three speed relays in one compact unit**
- **Wide operating frequency**
- **Engine RPM meter output**

Description

The 3ST provides three independent speed relays in one compact unit. It is designed to work with an engine mounted speed transducer, typically a magnetic pickup. The 3ST measures the transducer signal frequency (which is proportional to engine speed) and compares this with three user-set trip levels. The three non-latching relays then activate or deactivate as appropriate.

Each relay circuit has a front facia LED that lights when the relay is energised. On standard units, the relay functions are designated S1 (crank), S2 (underspeed) and S3 (overspeed): all three relays are energised, and all LEDs lit, when the engine is running at normal speed - see diagram overleaf for relay/LED operation.

Nominal speed calibration and relay trip levels are set via four multi-turn potentiometers - see 'calibration' overleaf. The 3ST also features a 'meter' output, which may be used for calibration and/or engine speed indication.

The 3ST has a robust, polycarbonate case, designed for DIN rail or surface mounting. Electrical connection is by 12 screw terminals, suitable for stripped panel wires or narrow blade crimps.

Application

The 3ST is designed for use with engines, generators, pumps or any moving machinery where speed related control that requires accurate and repeatable.

Warranty

A two year limited warranty on materials and workmanship is given with this Murphy product. Details are available on request and at www.fwmurphy.co.uk/warranty.

Specification

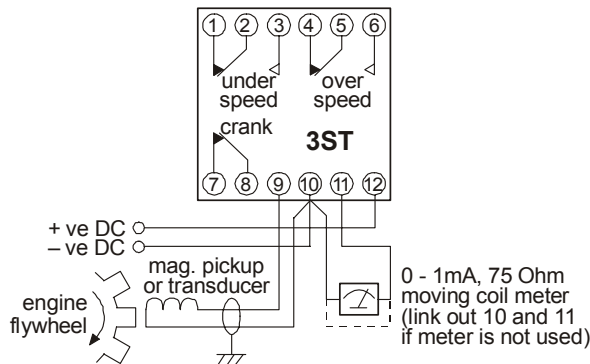
Power supply:	
voltage range, 12 V units	8 – 16 V DC
24 V units	16 – 32 V DC
power consumption	4 W typ.
Input:	
voltage range	0.5 – 80 V AC rms
nominal frequency range (f_0)	1 – 8 kHz. Special 'L' (10 – 200 Hz) and 'M' (200 – 1500 Hz) variants available for volume orders
Trip settings:	
S1 (crank) range	10 – 45 % of f_0
S2 (underspeed) range	50 – 95 % of f_0
S3 (overspeed) range	100 – 130% of f_0
trip point hysteresis	2.5% of setting (typ.)
Outputs:	
relays	SPNC (S1) and SPDT (S2 & S3) volt free contacts, 5A max. @ 24V DC (resistive load), 2 x 10 ⁵ operations
tacho/calibration	0 – 1 mA into a 75 Ohm moving coil meter. Output at normal engine speed = 0.75 mA
General:	
operating temperature	–10 to +55 °C
dimensions (W x H x D)	50 x 75 x 110 mm
weight	approx. 190 g

MURPHY®

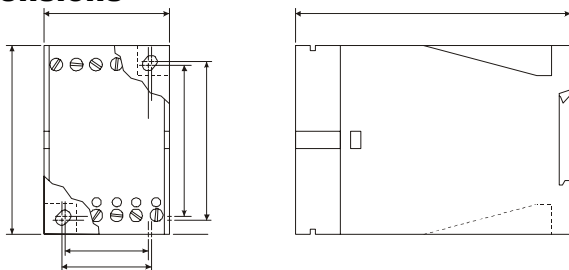
Relay operation/LED indication

S1	○	○	☀	☀	☀	CRANK
S2	○	○	○	☀	☀	UNDERSPEED
S3	○	☀	☀	☀	○	OVERSPEED
	power off		power on, engine stationary/cranking	engine running below crank but below settings	normal running	overspeed or open circuit input

Electrical connection



Dimensions



How to order

Stock Units

These are supplied with blank calibration labels and set to a nominal frequency (f_0) of 3000Hz (equivalent to 120 flywheel teeth at 1500 RPM). These units will usually therefore require customer calibration:-

Stock code Model / description

76.70.0039 3ST/1SET4 speed trip, 24V, std. settings
76.70.0068 3ST/2SET4 speed trip, 12V, std. settings

Special Calibration

We can also supply the 3ST calibrated to your requirements. Please specify:-

- Model type:** 3ST/1 (24V) or 3ST/2 (12V)
- Nominal transducer frequency (f_0)**
- Trip levels for S1, S2 and S3**, expressed as either:
 - an absolute (transducer) trip frequency (in Hz), or
 - a percentage of f_0

Calibration

For the 3ST to correctly measure engine speed, it must be calibrated for each particular engine and transducer type.

Calibration may be carried out during engine commissioning, or 'on the bench' using a signal generator to simulate the engine speed transducer. This is a two stage process:-

a) Nominal calibration

Use the **METER ADJUST** potentiometer to calibrate the 3ST to the 'nominal' transducer frequency (or f_0 , the transducer output frequency when the engine is running at normal speed). Standard units allow adjustment of f_0 between 1 and 8 kHz.

When calibrating with a signal generator, f_0 must be known, either a) by prior measurement of the pickup when the engine is running, or b) by calculation - e.g. for a pickup and flywheel:-

$$f_0 \text{ (Hz)} = \frac{\text{normal engine speed} \times \text{number of flywheel teeth}}{60}$$

To set the nominal calibration:-

- Connect the pickup, transducer or signal generator input: signal positive to pin 9, signal negative to pin 10
- Connect a 0 – 1mA meter (ideally with a 75 ohm moving coil action): meter positive to pin 11, meter negative to pin 10.
- Connect the DC power supply: positive DC to pin 12, negative DC to pin 10. Switch on the supply.
- Start the engine manually (not under the control of the 3ST relays) and run to normal speed, or adjust the signal generator to simulate the transducer signal.
- Turn the **METER ADJUST** potentiometer until the meter reads 0.75mA. Turn the pot. clockwise to increase the meter reading (i.e. to lower the nominal calibration frequency). All LEDs should now be lit.

The nominal calibration is now complete. The meter may be left connected to the 3ST or replaced with a wire link.

b) S1, S2 and S3 relay settings

Once the nominal calibration (f_0) has been set, use potentiometers **S1**, **S2** and **S3** to set the trip frequency of each relay. The adjustment range of each pot. is fixed in percentage terms to f_0 (see specification for ranges); the absolute frequency range and setting of each relay will therefore change if f_0 is changed.

For each of the 3 relay settings:-

- Adjust the engine speed to the required trip level, or adjust the signal generator to simulate the transducer frequency at the required engine speed.
- Adjust the potentiometer (S1, S2 or S3) until the relay just changes over (the LED will light then extinguish). Turn each pot clockwise to increase the trip frequency.

The 3ST is now calibrated. For full details of 3ST calibration, please see our separate installation instructions

MURPHY

FW Murphy
PO Box 470248
Tulsa, Oklahoma 74147, USA
tel: +1 918 317 4100
fax: +1 918 317 4266
email: sales@fwmurphy.com
web: www.fwmurphy.com

CONTROL SYSTEMS AND SERVICES DIVISION
PO Box 1819, Rosenberg, Texas 77471, USA
tel: +1 281 633 4500
fax: +1 281 633 4588
email: sales@fwmurphy.com

MURPHY DE MEXICO S.A. DE C.V.
Blvd. Antonio Rocha Cordero 300, Fracción del Aguaje
San Luis Potosí, S.L.P. México 78384
tel: +52 444 8206264
fax: +52 444 8206336
Villahermosa office tel: +52 993 3162117
email: ventasmex@murphymex.com.mx
web: www.murphymex.com.mx

FRANK W. MURPHY LTD.
Church Rd, Laverstock, Salisbury, SP1 1QZ, UK
tel: +44 1722 410055
fax: +44 1722 410088
email: sales@fwmurphy.co.uk
web: www.fwmurphy.co.uk

MURPHY SWITCH OF CALIFORNIA
41343 12th Street West,
Palmdale, CA 93551-1442, USA
tel: +1 661 272 4700
fax: +1 661 947 7570
email: sales@murphyswitch.com
web: www.murphyswitch.com

MACQUARRIE CORPORATION
1620 Hume Highway,
Campbellfield, Victoria 3061, Australia
tel: +61 3 9358 5555
fax: +61 3 9358 5558
email: murphy@macquarrie.com.au



USA - ISO9001:2000 FM 28221
UK - ISO9001:2000 FM 29422