

Speedswitch Kits - FS1 Valves

Complete Installation Kits for the FS1 Valve

Kit codes, wiring schematics and installation guidelines for installing the FS1 shutdown valve with a Speedswitch

New FKII
Speed
switch



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About Wyndham Page Ltd

Based in the UK Wyndham Page specialise in the design and manufacture of safety equipment for diesel engines.

Our product range of Air Intake Shutdown Valves includes our E Series Automatic Valves and our F Series Butterfly Valves with solenoid, pneumatic or manual actuation options. We offer Speedswitch kits for the F Series valves, a range of G Series Mechanical Engine Safety Products and a range of Spark Arresters designed to prevent the emission of high energy sparks from diesel exhaust systems.

Wyndham Page is headed by Freddy Page-Roberts who brings over 20 years' experience in the diesel safety industry and was previously managing director of Chalwyn Ltd.

All members of the senior management team have considerable experience in organisations specialising in the design and manufacture of hazardous area equipment for diesel engines.

Quality Assurance

Wyndham Page Valves are manufactured and tested under our EN ISO 9001: 2015 quality management system.

Wyndham Page Ltd are certified to supply Ex equipment under Quality Assurance Notification CML ATEXQ11003 in the UK, CML ATEXQ13649 in the EU and IECEx Quality Assurance Report GB/CML/QAR17.0023/01.

- Ex Equipment supplied with an UK Declaration/Assertion of Conformity is CA marked and meets the provision of the UK directive SI 2016No. 1107
- Ex Equipment supplied with an EU Declaration/Assertion of Conformity is CE marked and meets the provision of the ATEX directive 2014/34/EU.
- Other Equipment supplied with an UK Declaration/Assertion of Conformity or an EU Declaration/Assertion of Conformity is CA / CE marked and meets the provision of the directives specified in the Declaration of conformity.

Speedswitch Kits: Application

This handbook, the associated wiring schematics and FKII-S1 installation kits are only applicable to the M3 microswitch version of the FS1 valve coded **FS1- XXX - XX - M3**. They are not applicable to the FS1-178 & 203 versions of this valve.

The solenoid used in the valve is not continuously rated and must be de-energised as soon as the valve is closed. To simplify installation of the valve the M3 microswitch is configured to cut-off the power to the solenoid and to switch on a valve status LED when the valve is closed.

To monitor the engine RPM a suitable speedsignal must be identified before installation. This may be taken from the Tacho (W) terminal of the alternator or from the crank sensor. If it is not possible to use these existing outputs the customer must fit a suitable magnetic pickup.

There are 2 types of kit available:

FKII-S1-01 Installation Kit

This compact kit is intended for mounting in the Cab or under the dash of Vans, Trucks and other vehicles. The kit includes the Speedswitch, Fuse Holder & Fuse mounted inside the enclosure which is fitted with 3 cable entries. An E.Stop Toggle Switch with Shroud and valve status LED indicator are supplied for fitting to the dash or suitable control panel. All components are fully wired up and ready for simple connection via the flying lead of the FS1 valve and to the power supply and speed signal using the 3 meter leads which are also supplied. The enclosure has a Wyndham Page label with part number, serial number and ratings. The main dimensions and features of the IP66 enclosure are shown on page 6.

Please note that the standard cable entries supplied with this kit are not IP66. If an IP66 rating is required for this enclosure please contact Wyndham Page sales for additional options.

FKII-S1-02 Installation Kit

This kit is intended for mounting on stationary or mobile equipment. The kit includes the Speedswitch, Fuse Holder & Fuse, Connection Block and an E.Stop Button and valve status LED indicator mounted in the lid of the IP66 enclosure which is fitted with four IP66 cable glands. All components are fully wired up and ready for simple connection via the Connection Block to the flying lead of the FS1 valve and to the power supply and speed signal using the 3 meter leads which are also supplied. The enclosure has a Wyndham Page label with part number, serial number and ratings. The main dimensions and features of the IP66 enclosure are shown on page 7.

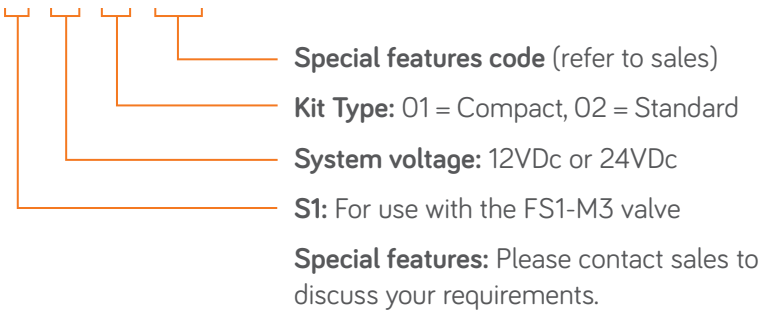
FKII Installation Kit Selection




To enable Wyndham Page to select the most suitable kit for a customers application the following data is required.


- 1. System voltage: 12VDc or 24VDc
- 2. Requirement for a compact or standard kit

FKII Installation Kit Order Codes

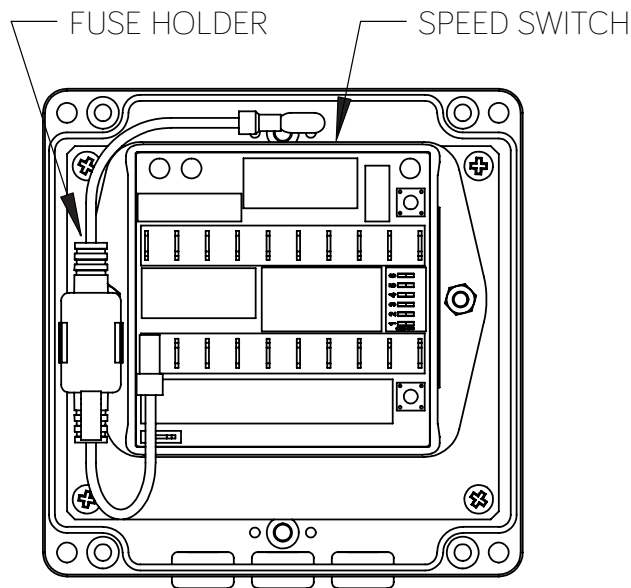
FKII - S1 - XX - XX - S00



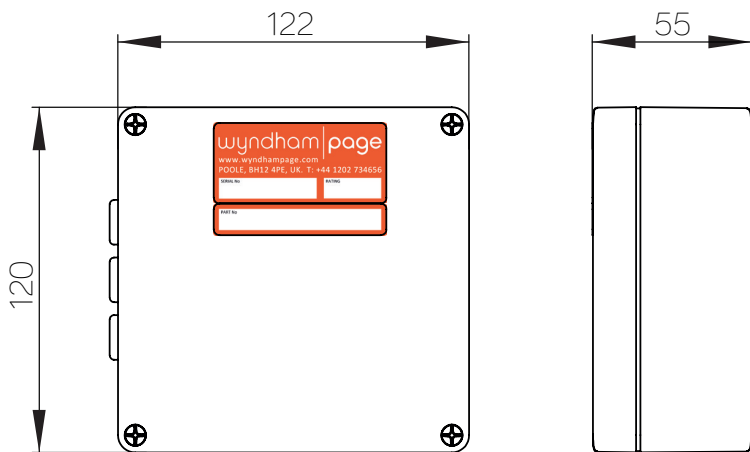
FKII-S1-01 KIT CONTENTS			
ITEM	QTY	DESCRIPTION AND NOTES	
1	1	KIT PARTS FULLY ASSEMBLED AND WIRED INTO ENCLOSURE. SUPPLIED WITH FLYING LEADS FITTED FOR CONNECTION OF POWER, SPEEDSIGNAL, E.STOP AND VALVE STATUS LED.	
2	1	E. STOP TOGGLE SWITCH AND GUARD	
3	1	VALVE STATUS LED	
NOTES: PARTS MAY VARY FROM THOSE SHOWN, CUSTOMERS MAY NEED TO PROVIDE ADDITIONAL PARTS FOR CONNECTION TO ELECTRICAL SYSTEM, ALTERNATOR ETC.			

FKII-S1-02 KIT CONTENTS			
ITEM	QTY	DESCRIPTION AND NOTES	
1	1	KIT PARTS FULLY ASSEMBLED AND WIRED INTO IP66 ENCLOSURE.	
2	3M	BROWN WIRE -2MM ² -CONNECTION TO +VE	
3	3M	BLACK WIRE -2MM ² -CONNECTION TO -VE	
4	3M	WHITE WIRE -2MM ² -CONNECTION TO SPEED SIGNAL	
NOTES: PARTS MAY VARY FROM THOSE SHOWN, CUSTOMERS MAY NEED TO PROVIDE ADDITIONAL PARTS FOR CONNECTION TO ELECTRICAL SYSTEM, ALTERNATOR ETC.			

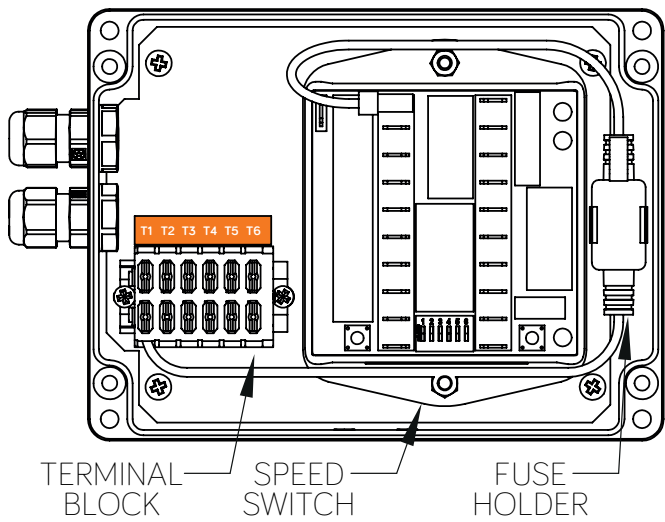
FKII-S1-01 Kit - Cover Removed - Main Internal Components



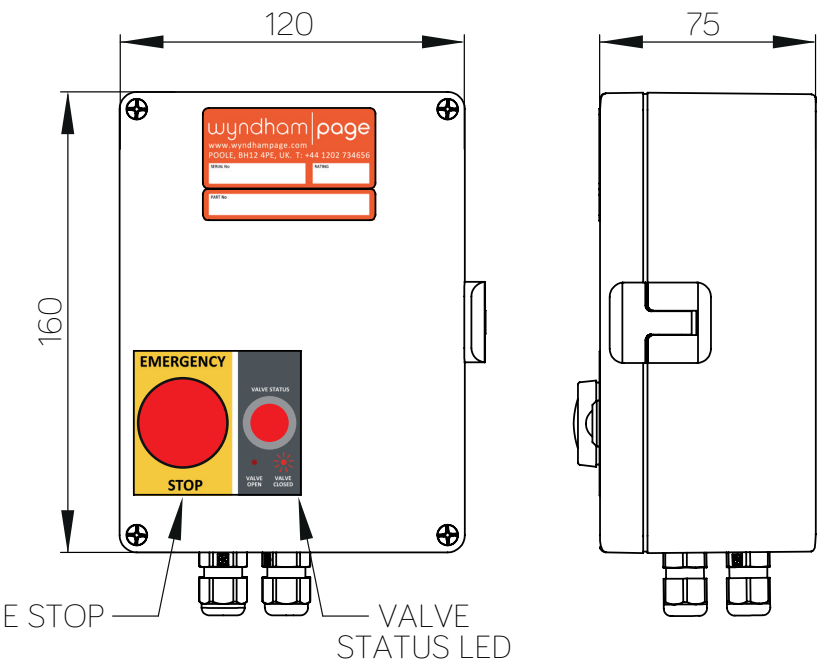
FKII-S1-01 Kit - External



FKII-S1-02 Kit - Cover Removed - Main Internal Components



FKII-S1-02 Kit - External



Speedswitch Features

Push Button Trip Speed Setting: The trip speed is set by simply pressing the SET TRIP button at the required engine speed.

Adjustable Overspeed Differential: To avoid the requirement to redline the engine or override the engine governor during setup the Speedswitch features an adjustable overspeed differential. This enables the trip speed to be set at fixed intervals between 100% and 200% of the engine rpm when the Set Trip button is pressed. The trip differential is adjusted via DIP switches 1, 2 & 3 (see diagram on page 9).

Startup Overspeed Delay: If set, a time delay is initiated when a speedsignal is first detected during engine startup. The overspeed signal is not monitored for the duration of the delay. This prevents signal fluctuation and noise during startup causing false overspeed trips. The time delay is initiated when the speedsignal is lost for 1.5 seconds or longer. If immediately restarting the engine the operator must wait 1.5 seconds before cranking in order to ensure the delay has initiated. A reboot (power off/on) is required for changes to the time delay setting to take effect. The overspeed delay is adjusted via DIP switches 4 & 5 (see diagram on page 9).

Push Button Overspeed Test function: Operation of the TEST TRIP button will test the overspeed shutdown function by tripping the system at a test offset of 75% of the trip speed. This again avoids the requirement to redline the engine or override the engine governor during setup and periodic testing.

LED A - Main Relay: When ON this indicates that the valve is energised.

LED B - Set Trip: This will indicate ON to confirm that a Trip Speed has been set when the SET TRIP button is pressed.

LED C - Speed Signal: When ON this indicates that a suitable speed signal is being received by the speedswitch.

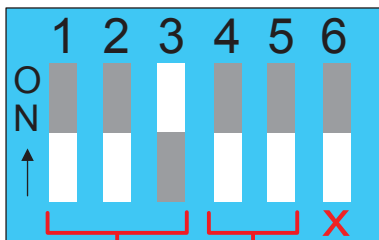
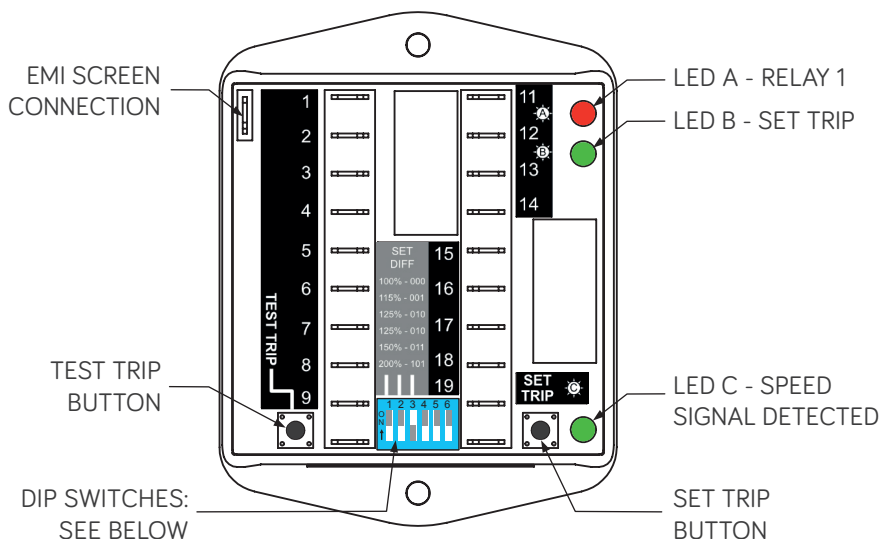
External LED Output: Terminals 18 & 19. This will show the FS1 valve status as indicated by the M3 microswitch in the valve.

ON = Valve closed after E.Stop or manual closure

ON (Flashing) = Valve closed after overspeed stop

Auxiliary Volts Free Relay: For optional connection by customer, this will show the FS1 valve status as indicated by the M3 microswitch in the valve:

T15 - N.O
T16 - COM
T17 - N.C



ADJUSTABLE TRIP
DIFFERENTIAL: DIPS 1, 2 & 3

100% - 000

115% - 001 (default)

125% - 010

150% - 011

175% - 100

200% - 101

STARTUP OVERSPEED
DELAY: DIPS 4 & 5

0 secs - 00 (default)

1.5 secs - 10

2.5 secs - 01

3.5 secs - 11

Note: DIP switch 6 must be set at 0

Installation Notes

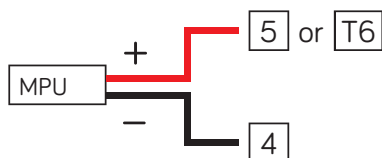
General Information: The following instructions are for guidance only, it is the responsibility of the installer or end user to ensure the FS1 valve is connected and operated as appropriate to the type of equipment being protected and to meet the safety requirements of the hazardous area in which the equipment will be operating.

Safety: Installation, servicing and repair of this equipment should only be carried out by suitably qualified personnel. Do not carry out installation, setup or maintenance until all instructions in this handbook have been fully reviewed and understood. For full FS1 Valve installation guidelines **always refer to the FS1 Valve Handbook** supplied with the valve and available for download from the Wyndham Page website.

Important Notes for installers and operators:

1. Always retain the standard fuel shutdown stop fitted to the engine. The Wyndham Page FS1 valve is designed for emergency stop only.
2. We recommend that the Speedswitch **is not** connected through the ignition, but is wired at the fuse box or other suitable point, to a permanent connection to the supply voltage. This avoids the risk that the system will not operate if the operator turns off the ignition before the engine has stopped in an emergency situation. If this arrangement is not possible we recommend that the wiring is modified so that the Emergency Stop Button is connected directly to the battery.
3. The external valve status LED will light when the valve closes either through an overspeed trip (flashing) or operation of the emergency stop (constant). Providing the system is energised the LED will remain on until the valve is manually reset to the open position. Do not attempt to start the engine with the LED on.
4. The Speedswitch output is non latching. In the event of an overspeed trip when the engine revs drop below the set trip speed the Speedswitch output will drop out. No electrical reset of the Speedswitch is required before manually resetting the valve.
5. The Valve must be free to close when the solenoid is energised, **do not** manually hold the Valve open with the solenoid energised.

6. The Speedswitch has a volts free output as detailed in the Speedswitch features section. Customers will require suitable wire and connectors to utilise this feature.
7. If the Set Trip button is accidentally pressed when the engine is off a trip speed of zero will be set, the valve will close as soon as the engine starts and the LED A on the Speedswitch will be permanently on. This is not a fault. Simply follow the instructions in step 5 of the System Setup section to set a higher trip speed. Do not hold the valve open when the LED A is on.
8. Speed signal connection:
 - a. The schematics on page 13 and on the inside of the enclosures show the default connection for a speedsignal from the alternator tacho output (W terminal).
 - b. Where a 2 wire magnetic pickup (MPU) is used the white lead should be removed and the MPU connected as shown below.



- c. For additional information on the connection of a speed signal from a 3 wire engine crank sensor or other type of active sensor please consult our technical department for assistance.
9. EMI screen connection: When installing the system in a vehicle or other environment with high level of background electronic noise the screen should be connected directly to a suitable chassis ground point using a low impedance earth lead (not supplied).

Installation

The FS1 Valve should be installed and tested in accordance with the guidelines in the separate FS1 valve handbook supplied with the valve.

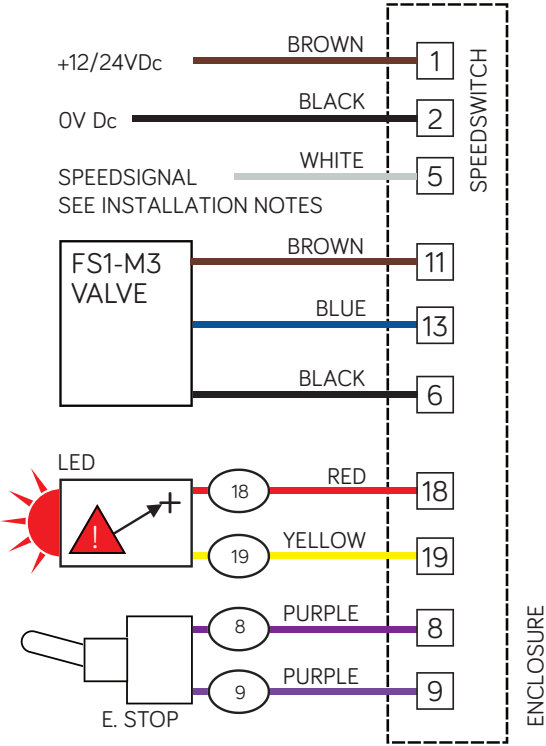
Before installing and wiring up the FKII-S1 kits ensure a suitable power supply is available and determine the approach to connecting the power supply to the system (see installation note 2). The Speedswitch will operate from any standard 12V or 24V DC battery system.

Ensure a suitable speed signal is available from the alternator or MPU and determine the best method of connecting this to the system. If an MPU is used the MPU earth must be connected to T4 of the speed switch as shown in the schematic on page 11.

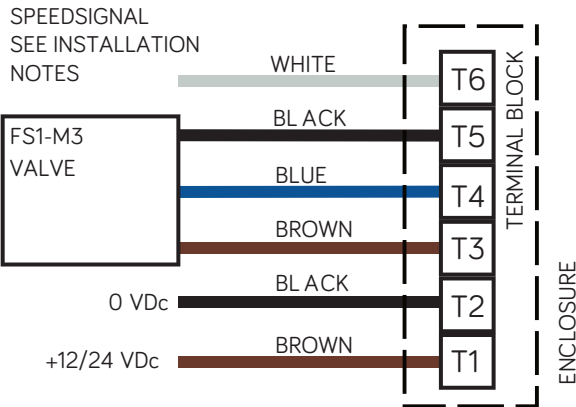
Select a mounting position for the Enclosure suitable for its IP rating which enables safe access for setup and operation and allows a suitably protected run for the cables. Ensure the selected location will not expose the parts to temperatures outside of those stated in the specification table at the end of this section.

In the case of the FKII-S1-01 kit determine a suitable location in the vehicle dash or equipment control panel and fit the E.Stop switch and valve status LED. The LED connection tabs must be connected to the flying lead of correct polarity as indicated in the wiring schematic.

FKII-S1-01 KIT - Connection Diagram



FKII-S1-02 KIT - Connection Diagram



Setup

1. Determine the required trip speed (TS) for the engine.
2. Determine the preferred trip differential (TD) i.e 115% or 200% then calculate the nominal engine speed (NS) at which to set the trip speed as follows;
 - $NS = TS / TD\%$
 - Eg. for a trip speed of 4500rpm using a trip differential of 115%the nominal speed will be $4500/115\% = 3913$ rpm or
 - For a trip speed of 4500rpm using a trip differential of 200% the nominal speed will be $4500/200\% = 2250$ rpm.
3. Set the DIP switches for the required TD as shown in the features section on page 8.
4. Calculate the Test Trip speed (TT)
 - $TT = TS \times 75\%$
 - Eg. For a TS of 4500rpm when tested using the Test Trip function the system will trip at $4500 \times 75\% = 3375$ rpm.
5. When setting a new trip speed, higher than one already stored, the Speedswitch will trip as the speed signal increases past the currently stored value. For this reason before setting a new trip speed the FS1 valve, brown wire, **must be disconnected** from the speed switch or from the terminal block. The FS1 valve must not be manually held open (see installation note 5).
6. With the valve disconnected run the engine up to the “NS” speed calculated in step 2 then press and hold “Set Trip” button for approximately 2 seconds, when the LED B comes on release the button. LED B will go off indicating the new trip speed has been stored. If setting a trip speed value higher than that previously stored, LED A will come on at the lower value, continue increasing the engine speed to the “NS” speed calculated then operate the “Set Trip” button as described above. LED A will go off when the engine speed reduces below the stored value.
7. Reconnect the FS1 valve to the terminal block.

System Testing

E.Stop button. Operate the emergency stop button, the valve should close and the valve status LED come on.

Overspeed function testing. Press and hold the “Test Trip” button. Slowly increase engine RPM, check that the system trips at the calculated “TT” speed and that the valve status LED comes on (flashing).

The complete FS1 Valve installation must also be tested in accordance with the guidelines in the separate FS1 valve handbook supplied with the valve.

Maintenance

The following maintenance schedule should be undertaken. Subject to experience of local operating conditions the frequency of the maintenance schedule maybe varied. Carry out the proposed maintenance work when the equipment is in a safe area and record details of the work carried out. Rectify any problems identified before returning the diesel powered equipment back into service. The points listed below should be carried out **in addition** to the regular inspection and maintenance schedule detailed in the main FS1 Valve handbook.

Following initial installation and thereafter:

At Weekly intervals;

Operate the E.Stop button and check that the FS1 Valve snaps shut and that the Valve status LED comes on.

Using the Test Trip button carry out a test of the engine overspeed shutdown and check the FS1 Valve snaps shut and that the valve status LED comes on.

At Monthly intervals;

Inspect wiring to ensure it is properly supported and free from damage. Inspect terminals on the Speedswitch and E.Stop button to ensure they are secure and free from corrosion.

Calculations

Trip Speed TS: rpm

Trip Differential TD: %

Nominal Speed NS: $TS / TD =$ rpm

Test Trip Speed TT: $TS \times 75\% =$ rpm

Commissioning Test

Measured Test Trip TT: rpm

By: Date:

Notes

SPEEDSWITCH SPECIFICATION	
SUPPLY	
DC SUPPLY	8 VOLTS TO 35 VOLTS CONTINUOUS 60 VOLT SURGE PROTECTION
REVERSE POLARITY PROTECTION	-35V CONTINUOUS
MAX OPERATING CURRENT	100mA at 24VDc 95mA at 12VDc
MAX STANDBY CURRENT	20mA at 24VDc 20mA at 12VDc
OUTPUTS	
AUX RELAY	VOLT FREE, BUILD IN LOAD DUMP,15A DC MAX
FREQUENCY SENSING	
MIN FREQUENCY	3.5Hz
MAX FREQUENCY	6500Hz
MIN VOLTAGE	0.6V RMS
ENVIRONMENTAL	
MIN AMBIENT	-30°C
MAX AMBIENT	70°C
HANDBOOK APPLICABLE ONLY TO FIRMWARE VERSION BELOW (SEE LABEL ON SIDE OF SPEEDSWITCH)	
FIRMWARE VERSION	Speedswitch Missing Tooth V3.0 - issued 2-10-23

Notes:

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