

# FS1 Valves

## FK Electrical Installation Kits

*Wiring Schematics, installation guidelines and kit codes for the FS1 shutdown valve.*



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## Application

This handbook, the associated wiring schematic and installation kits are only for use with the M3 microswitch version of the FS1 valve as coded below. They are not applicable to the FS1-203 version of this valve.

### FS1- XXX - XX - M3

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 an LED status indicator when the valve is closed.

## DSE-103 Speedswitch Features

**Push Button Trip Speed Setting & 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 between 115% and 200% of the engine rpm by simply pressing the Set Trip button. The trip differential is adjusted between the 115% and 200% limits via a  $\frac{3}{4}$  turn potentiometer.

**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.

## FK Installation Kits

Three levels of installation kit are available for this valve **all of which include the speedswitch** fitted to a sheet metal mounting chassis and pre-wired to the Set & Test buttons. The main dimensions of the basic Speedswitch supplied with all kits is shown on page 5.

**Kit A:** Suitable for use in road vehicles or cabs where space is available to mount components and additional environmental protection is not required. The kit includes an E.Stop Button, LED indicator, Fuse Holder & Fuse as well as connection blocks, splicing blocks, crimps and wires to enable interconnection as shown in the related schematic diagram.

**Kit B:** Suitable for use where exposed on stationary or mobile equipment. The kit includes all Kit A parts plus an IP66 enclosure, cable glands and associated fasteners.

**Kit C:** To minimise installation time the kit includes the Kit B parts fully wired up in the IP66 enclosure and supplied with 3 meter leads to connect to the power, ground and alternator W terminal. The E Stop button and LED indicator are mounted in the lid of the enclosure. The enclosure will have a Wyndham Page label with part number, serial number and ratings.

The main dimensions of the IP66 enclosure supplied with Kits B & C is shown on page 5. Please note that the E.Stop Button, LED and Cable Glands are only supplied pre-fitted in Kit C.

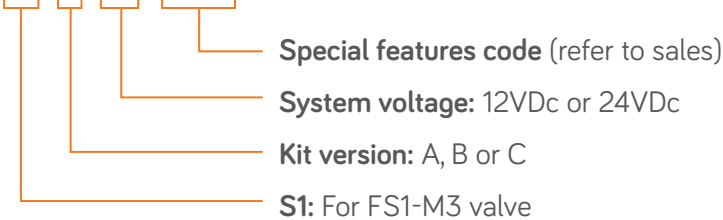
## FK Installation Kit Selection

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

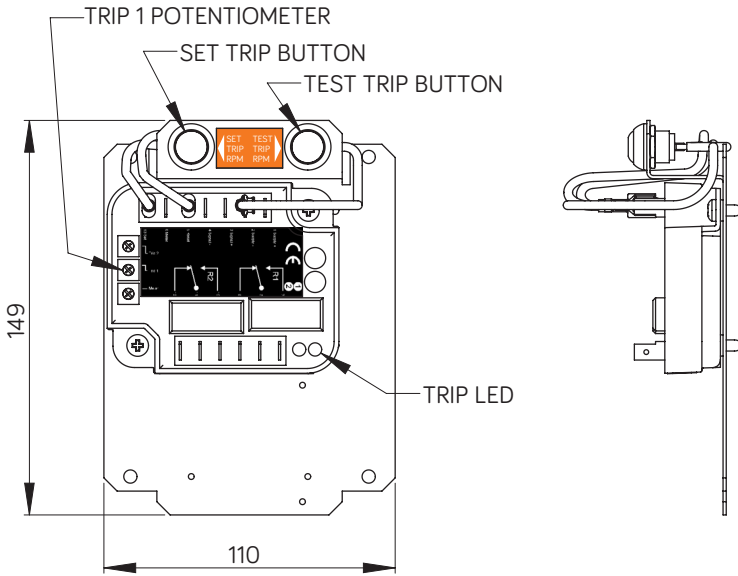
- [1]. System voltage: 12VDc or 24VDc
- [2]. Is an IP66 enclosure is required
- [3]. For ease of installation does the customer require the IP66 enclosure supplied fully assembled and wired.

## FK Installation Kit Order Codes

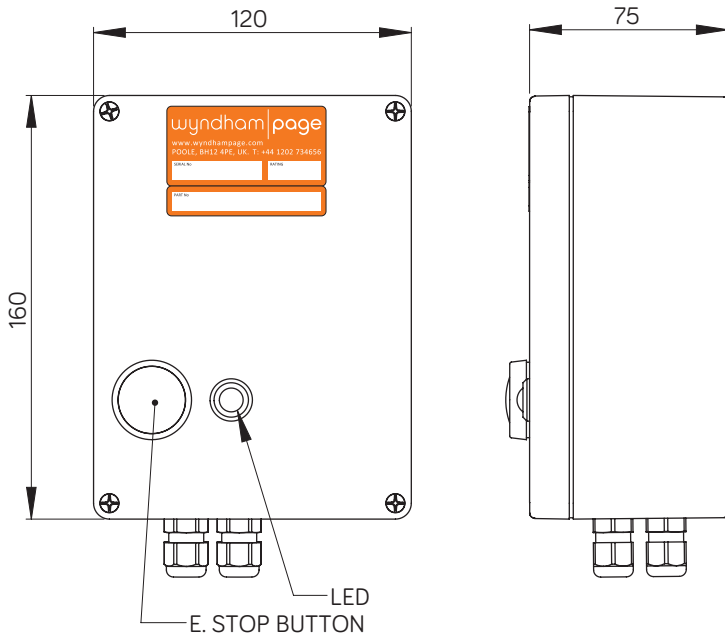
FK - S1 - X - XX - S000



**Special features:** Wyndham Page can supply the Speedswitch pre-programmed with a specific trip speed and test offset. Please contact sales for additional details.



**SPEEDSWITCH - KITS A, B & C**






**IP66 ENCLOSURE - KITS B & C**

## KIT A CONTENTS

ITEM	QTY	DESCRIPTION AND NOTES	
1	1	SPEEDSWITCH ASSEMBLY INC MOMENTARY SET AND TRIP BUTTONS S1 & S2	
2	1	FUSE HOLDER	
3	1	FUSE 12VDc SYSTEMS -10A 24VDc SYSTEMS - 5A	
4	1	MOMENTARY PUSH BUTTON SWITCH S3 <b>INSTALLATION NOTE:</b> ENSURE CONNECTION TO N.O TERMINALS	
5	1	LED 12VDc OR 24VDc <b>INSTALLATION NOTE:</b> ENSURE CORRECT POLARITY WHEN CONNECTING - GOLD TAB = +ANODE	
6	2	5 WAY SPLICING BLOCK	
7	1	3 WAY SPLICING BLOCK	
8	1	6 WAY TERMINAL BLOCK	
9	6	CRIMP RECEPTACLE 6.35 x 0.8	
10	2	CRIMP RECEPTACLE 2.8 x 0.8 (FOR LED)	
11	2	CRIMP RECEPTACLE 2.8 x 0.5 (FOR E.STOP)	
12	2	SELF TAP SCREW - SECURES ITEM 8 TO MOUNTING CHASSIS	
13	3M	BROWN WIRE - 2MM <sup>2</sup> - CONNECTION TO +VE	
14	3M	BLACK WIRE - 2MM <sup>2</sup> - CONNECTION TO -VE	
15	3M	WHITE WIRE - 2MM <sup>2</sup> - - CONNECTION TO SPEED SIGNAL	
16	3M	PURPLE WIRE - 1.3MM <sup>2</sup> - LOCAL SYSTEM WIRING	


**NOTES:** PARTS MAY VARY FROM THOSE SHOWN, CUSTOMERS MAY NEED TO PROVIDE ADDITIONAL PARTS FOR CONNECTION TO ELECTRICAL SYSTEM, ALTERNATOR ETC.

### KIT B ADDITIONAL CONTENTS

ITEM	QTY	DESCRIPTION AND NOTES	
1	1	IP66 ENCLOSURE	
2	4	CABLE GLAND - M12	
3	4	CABLE GLAND LOCK NUT -M12	

**NOTES:** PARTS MAY VARY FROM THOSE SHOWN, CUSTOMERS MAY NEED TO PROVIDE ADDITIONAL PARTS FOR CONNECTION TO ELECTRICAL SYSTEM, ALTERNATOR ETC.

### KIT C CONTENTS

ITEM	QTY	DESCRIPTION AND NOTES	
1	1	KIT PARTS FULLY ASSEMBLED AND WIRED INTO IP66 ENCLOSURE	

**NOTES:** PARTS MAY VARY FROM THOSE SHOWN, CUSTOMERS MAY NEED TO PROVIDE ADDITIONAL PARTS FOR CONNECTION TO ELECTRICAL SYSTEM, ALTERNATOR ETC.

# Installation Notes

**General Information:** The following instructions and T1057 Installation schematic 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.

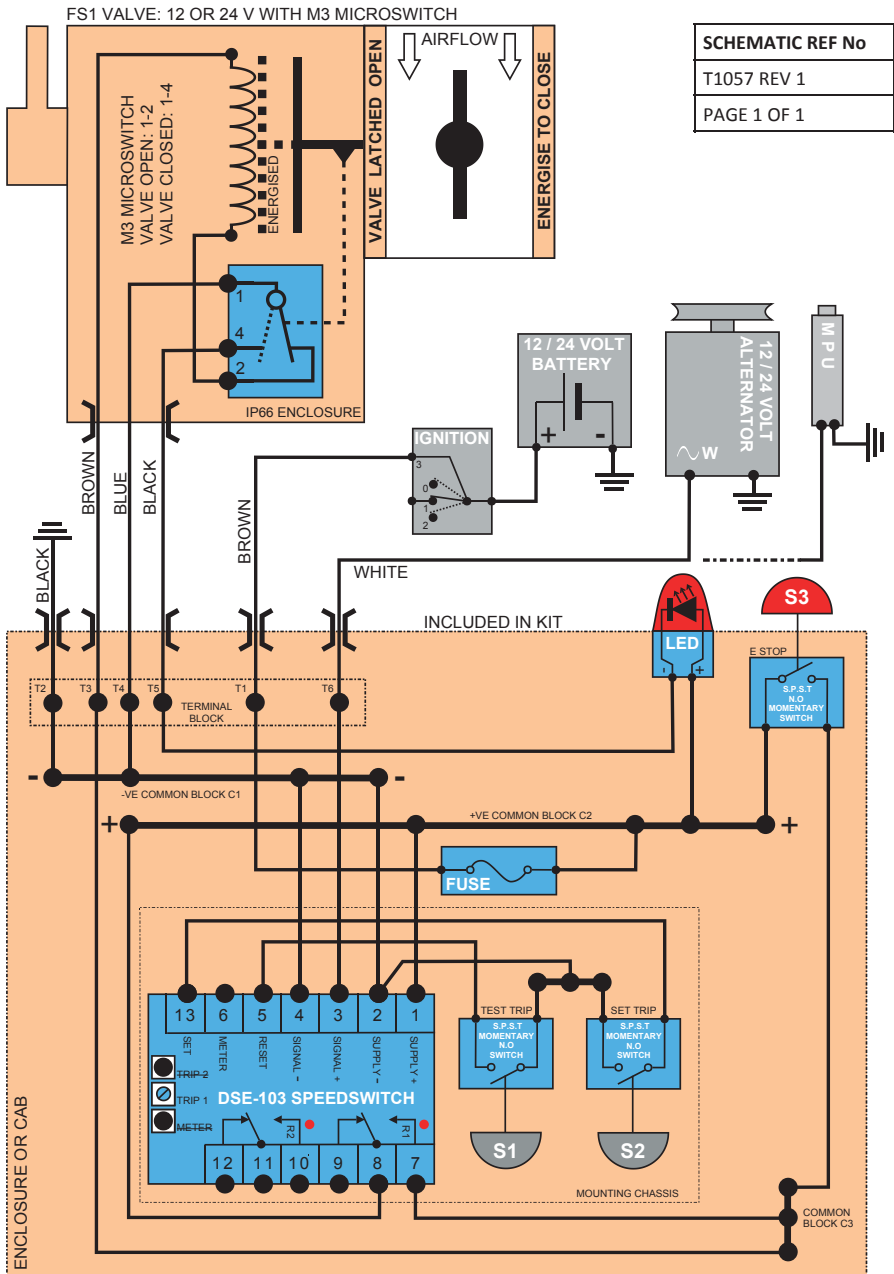
**Safety:** Installation, servicing and repair of this equipment should only be carried out by suitably qualified personnel. Do not carry out installation setup or maintenance until all instructions in this handbook have been fully reviewed and understood. For full FS1 Valve installation guidelines **always 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 directly to the battery, 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 from that shown in the schematic so that the Emergency Stop Button is connected directly to the battery.
3. The external LED indicator will light when the valve closes either through an overspeed trip or operation of the emergency stop. 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 energized, **do not** manually hold the Valve open with the solenoid energised. Ensure that the reset lever is unobstructed and that, if fitted, the Remote Reset Cable and T Handle are well maintained and return freely to the run position. Failure to ensure the above may result in damage to the valve solenoid.
6. The Speedswitch has a second R2 output which is not used with the FS1 valve, the LED trip indicator for this output will turn on when setting the trip speed but will not turn on when testing the trip setting as it has been configured to trip at 400% of the nominal speed.



**INSTALLATION WIRING SCHEMATIC: FS1 VALVE WITH DSE-103 SPEEDSWITCH**

## 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 Speedswitch 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 a common ground point.

Select mounting positions for the Speedswitch and E.Stop button 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 and to spray, immersion and other environmental contamination if not enclosed in a suitable IP rated enclosure.

## 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. Adjust the  $\frac{3}{4}$  turn Trip 1 potentiometer to the required TD setting as follows:  
Fully anticlockwise = 115%  
Fully clockwise = 200%  
The trip differential can be set at any value between 115% and 200% by adjusting the potentiometer between the 2 end stop positions. This adjustment is linear therefore a midpoint setting would give a TD of 157%.
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 **must be disconnected** from the terminal block at T3. 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 Trip 1 LED comes on release the button, the LED will go off indicating the new trip speed has been stored. If setting a trip speed value higher than that previously stored the LED 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, the LED will go off indicating the new higher trip speed has been stored.
7. Reconnect the FS1 valve to the terminal block.

## System Testing

1. E.Stop button. Operate the emergency stop button, the valve should close and the remote LED come on.
2. Overspeed function testing. Press and hold the “Test Trip” button. Slowly increase engine RPM, check that the system trips at the at the calculated “TT” speed and that the remote LED come on.

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 may be 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 remote 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 remote 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.

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	
R1 & R2	VOLT FREE RELAYS, BUILD IN LOAD DUMP, 15A DC MAX
FREQUENCY SENSING	
MIN FREQUENCY	3.5Hz
MAX FREQUENCY	10,000Hz
MIN VOLTAGE	0.6V RMS
ENVIRONMENTAL	
MIN AMBIENT	-30°C
MAX AMBIENT	70°C

## 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

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