



# FREQUENCY DETECTION MODULE (FDM)

## GENERAL DESCRIPTION

The Frequency Detection Module (FDM) is an electronic accessory for use with Stamford generators using Permanent Magnet Generator (PMG) excitation system.

Its main uses are in engine control circuits requiring starter motor release and overspeed shutdown. Alternatively, the unit can be used for over/under frequency detection.

The FDM is powered from the engine battery system and derives a speed signal from the generator PMG. Voltage free relay contacts are provided for the starter motor release and overspeed functions.

## TECHNICAL SPECIFICATION

### SUPPLY VOLTAGE

12 volt version	10-16 V dc
24 volt version	20-32 V dc

### SUPPLY CURRENT

12 volt version	200 m A max
24 volt version	100 m A max

### Hz SENSE INPUT All models

Volts 20-300 V ac  
Hz 100 @ 1500 rpm  
Isolation Optical 2 kV

### OUTPUT

Voltage free contacts	Isolation 2 kV Rating 5 A @ 30 V dc / 240 dc
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### SETTING RANGE

Low relay	300-1800 RPM
High relay	1500-2500 RPM

### THERMAL STABILITY

0.025% / °C

### SWITCH OPTIONS

Mode 0	Low relay ON below set point and OFF above High relay OFF below set point and ON above
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Mode 1	Low relay OFF below set point and ON above High relay OFF below set point and ON above
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### UNIT POWER DISSIPATION

5 Watts max

### PHYSICAL SIZE

100 x 75 x 50mm high

### WEIGHT

200 gms max

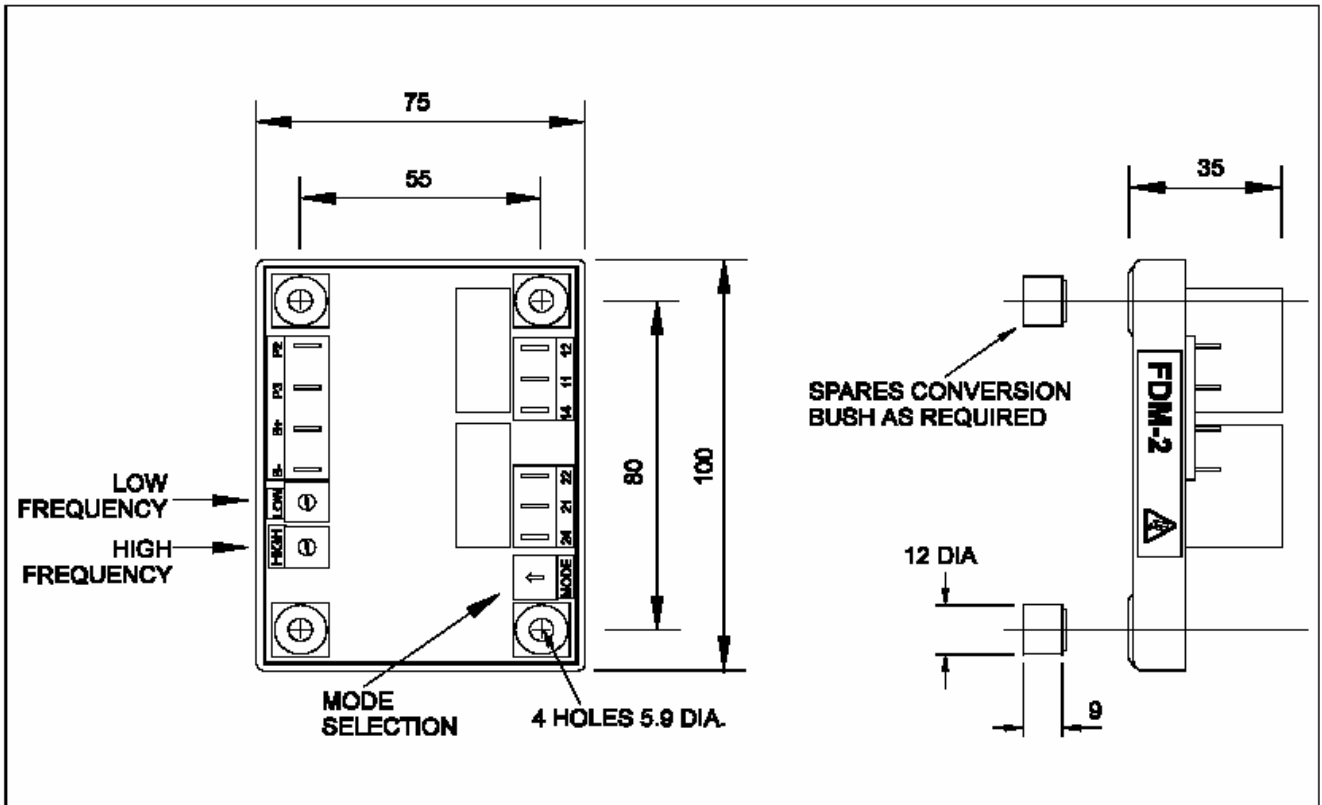
### ENVIRONMENTAL

Vibration	20-100 Hz 30mm/s 100 Hz-2 kHz 2.0g
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### HUMIDITY

	0-60°C95% RH
Operating Temperature	-40 to +70°C
Storage Temperature	-55 to +80°C

## FITTING AND OPERATING



SUMMARY OF AVR CONTROLS		
CONTROL	FUNCTION	DIRECTION
MODE SELECTION	ADJUSTS OPERATING MODE OF UNDER SPEED (OR CRANKING RELEASE) RELAY	0 = RELAY ENERGISED AT STAND STILL 1 = RELAY DE-ENERGISED AT STAND STILL
LOW FREQUENCY	ADJUSTS FREQUENCY DETECTION POINT OF UNDER SPEED (OR CRANKING RELEASE) RELAY	CLOCKWISE INCREASES FREQUENCY DETECTION POINT
HIGH FREQUENCY	ADJUSTS FREQUENCY DETECTION POINT OF OVER SPEED RELAY	CLOCKWISE INCREASES FREQUENCY DETECTION POINT

### ADJUSTMENT OF CONTROLS

#### 'HIGH' POTENTIOMETER

The HIGH potentiometer's range is 1500-2500 rpm, it adjusts the frequency detection point of the overspeed relay (terminals 24, 21, 22). Clockwise increases the frequency detection point.

#### 'LOW' POTENTIOMETER

The LOW potentiometer's range is 300-1800rpm it adjusts the frequency detection point of the underspeed (or cranking release) relay, (terminals 14,11 12). Clockwise increases the frequency detection point.

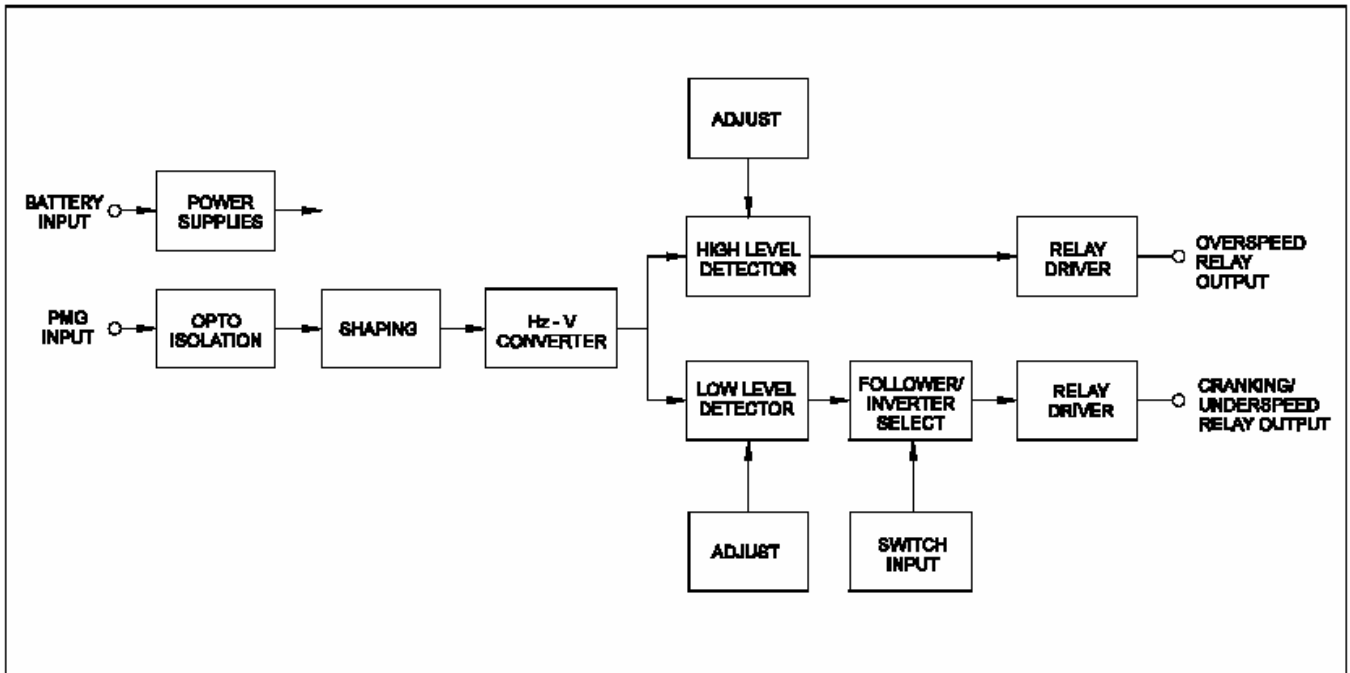
#### MODE SWITCH

The mode switch has two active positions which affect the operation of the low speed (or cranking) relay. Position 0 causes the low speed relay to be energised at standstill. The relay then de-energises when the frequency reaches the set point.

Position 1 causes the low speed relay to be de-energised at standstill. The relay then energises when the frequency reaches the set point.

The overspeed relay energises when the speed exceeds the set point and is unaffected by the position of the mode switch.

## BASIC OPERATON



The internal block diagram of the FDM is shown above. The main functions of the FDM are as follows:-

### OPTO ISOLATION

Provides isolation between the engine battery system and the generator PMG, using opto-electronic technology.

### SHAPING

Converts the speed signal from the PMG into a narrow pulse suitable for triggering the F - V converter circuit.

### F-V CONVERTER

Converts the narrow pulse from the shaping circuit into a constant width pulse which is then filtered to produce an average DC voltage proportional to speed.

### LOW LEVEL DETECTOR

Compares the output from the F-V converter with an adjustable reference voltage, and produces an output whenever the F-V converter signal is less than the reference.

### HIGH LEVEL DETECTOR

Compares the output from the F-V converter with an adjustable reference voltage, and produces an output whenever the F-V converter signal is greater than the reference.

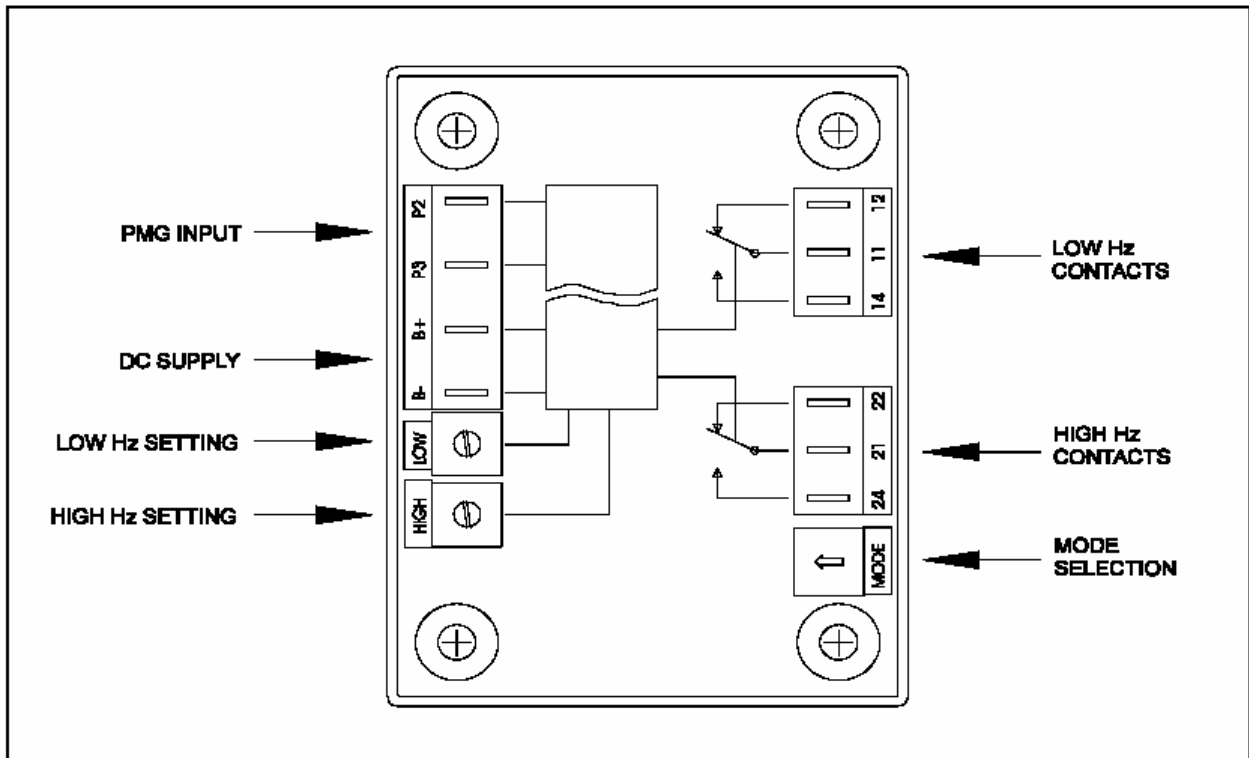
### FOLLOWER/INVERTER

Depending on the setting of the mode switch (0 or 1), this circuit either inverts the output of the LOW LEVEL DETECTOR or follows it.

### RELAY DRIVERS

Provide the current drive for the relay coils.

## PIN OUT INFORMATION



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