

VOP 03

DATA SHEET

Description

The VOP 03 Triple Voting Overspeed Protection Unit is a two out of three voting system to protect turbo machinery from overspeed.

The design provides protection from nuisance trips. If there is a glitch on one of the three channels only that individual channel will trip. At least two of the channels have to agree an over frequency and trip simultaneously for the overall voting contact to trip the turbine.

The system monitors three individual magnetic pickups in three independent modules whose voted output appears on a high integrity dry contact output which may be connected into a safety trip circuit of a machine control system to shut the machine down in the event of overspeed

The unit is easy to calibrate using a maintenance program with a laptop to set the trip frequency.

The product is easily tested whilst operating using an onboard frequency generator housed on board each of the three modules. Hermetically sealed relays and fully isolated frequency inputs guarantee quality and longevity and accuracy of speed measurement. Accuracy and repeatability are at the heart of this system. The isolated digital modules sense, and then calculate measured speed to within 0.1 %, an accuracy cannot be rivalled by mechanical overspeed devices.

The two out of three voting system protects against spurious trips. VOP 03 voting system ensures transient conditions only seen by one channel will not shut down the turbine. Each of the three units are fully isolated and is only connected to the other channels via volt free voting relay contacts.

The motherboard PCB is tracked in a voting system so two or more of the individual channel relays must sense overspeed before the common fault contact opens. The chance of a false trip is also reduced by each of the three modules having its own isolated power supply.

Each channel should be tested individually on a regular basis to ensure correct function. The built-in test mode and signal generators allow the channel to be tested and tripped. The overall trip will not trip. Before testing a channel they should not be indicating a fault condition. If a channel fails it can be replaced without causing an overall trip.



Features

Wide speed range
50 Hz - 25 KHz

Two out of three voting provides protection from nuisance trips

Uses three separate speed pickups

Easy to use maintenance software

Hermetically sealed relays for longer life

Built in frequency generator for self-test routines

Each module key locked to prevent unauthorised testing

Individual displays for each module showing current engine speed, peak speed and trip set point

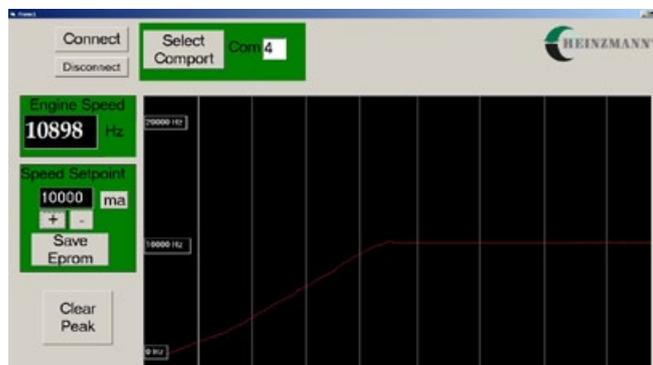
Safety integrity rating SIL 2



The VOP 03 set point is not influenced by temperature and friction like older mechanical devices. It will provide a very repeatable trip set point for long periods with no adjustments giving trouble free reliable overspeed protection.

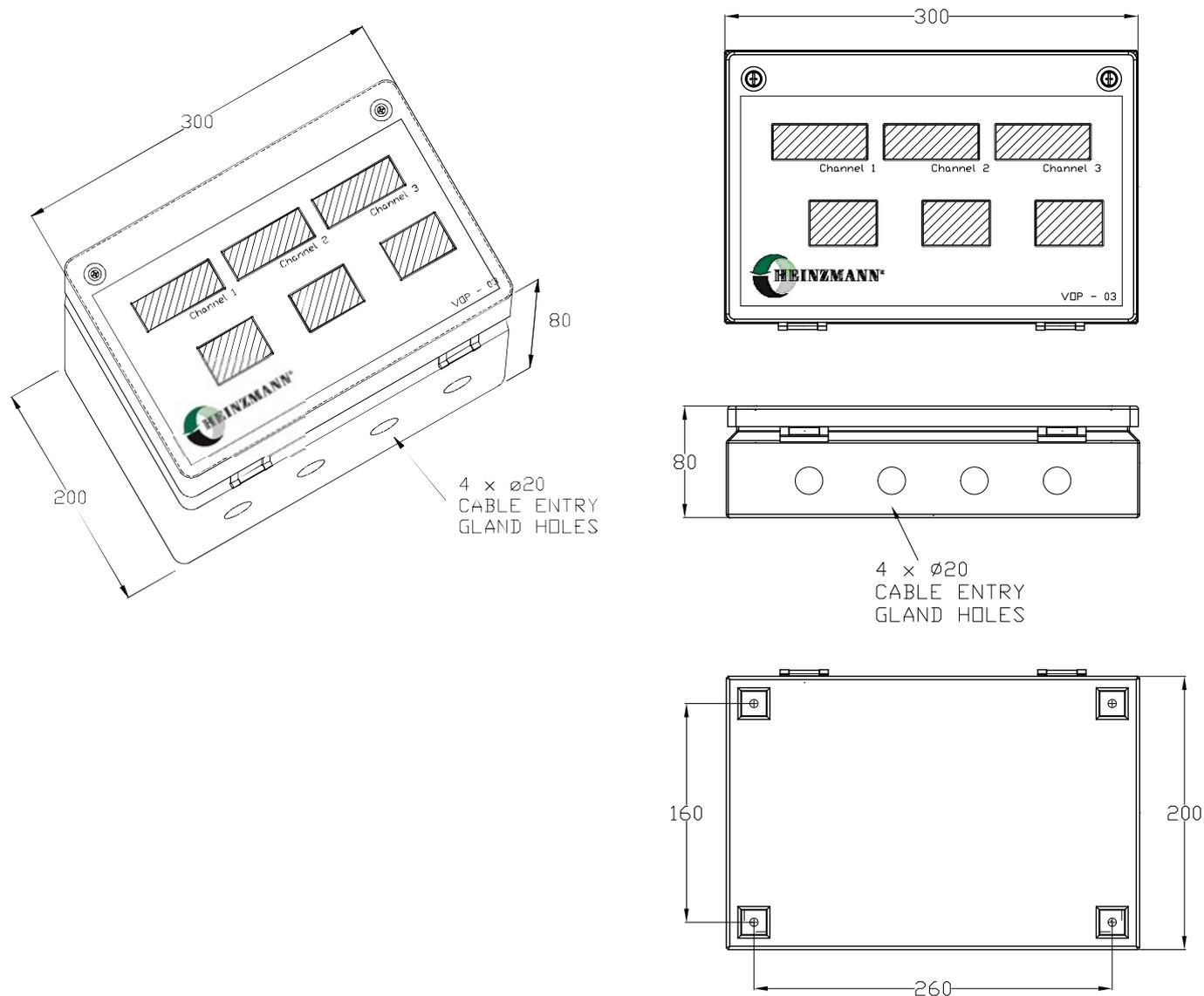
Operation

If the module detects a speed above the trip set point the modules trips and latches. To unlatch the trip relay measured speed must fall back below to 20 % of the trip set point. The relay can also trip if frequency is lost or not detected after 30 second timer elapses from a remote start signal.



Overspeed Terminal

Dimensions



Technical data

Specifications performance	
Trip methods	De-energise relay for trip (fail-safe)
Local reset	Push button clears flashing overspeed frequency recorded display.
Remote start	Volt free contact starts a timer when pulsed for 1 second. If timer > 30 seconds with no frequency measured trips on lost pickup. If contact is linked out lost frequency trips relay is ignored.
Onboard test	Each module has its own built-in frequency generator for self-test. Test is initiated by turning a key to test position. Key held by engineer. Once key turned to test mode 10 turn pot generates 50 Hz to 25 kHz. Each channel can be tested separately while running engine.
Key lock	Prevents unauthorised persons from testing. Key stays with engineer.
Hot swap	Each module can be changed while engine is running.
Outputs	A separate volt-free alarm contact is available for each module's relay. Overall two of three overspeed voting contact is on the motherboard.
MPU	Failure each module has an LED indication for MPU failure. Independent watchdog circuit trips relay if MPU fails as channel failed.
Display	2x 16 alpha numeric backlit display shows current engine speed. Peak speed and trip set point. <i>Over_speed</i> or <i>Under_speed</i> is displayed If the unit has tripped or not tripped respectively. After trip the peak speed flashes until a local reset button is pressed. When overspeed is detected the relay trips and latches. Trip relay unlatched by speed dropping to 20 % of the trip set point.
LED	Annunciating LED CPU OK Green On = Healthy TEST MODE = AMBER when key is turned into self-test mode OK = GREEN when unit has not sensed overspeed FAIL = RED when unit has sensed overspeed or frequency lost
Speed range	50 Hz to 25 kHz
Trip point range	200 to 20 kHz
Input amplitude	1 Vrms @ 50 Hz to 25 kHz
Power supply	Each module has a separate isolated power for redundancy. 18-32 VDC @ 0.6 A
Field wiring	Normally open two out of three overspeed voting contact. Overspeed on two or more channels open circuits above contact. Individual alarm contacts on each overspeed modules relay.
MPU	Circuit input impedance 2 K. Accuracy +/- 2 Hz over temp range. Sample time 5 ms. Total response time 40 ms.
General	
Enclosure	IIP54 (IP66 available on request)
Weight	5 kg
Environmental	
Operating temperature	-20 to 70 °C
Humidity	20-80 % RH

Certificates

Safety integrity rating SIL 2

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