



RAYAN

Overspeed Protection datasheet



Introduction

The RAYAN-P10 Overspeed Protection Device is a product developed by HANI Energy Co. It is intended to be used for the over speed protection of rotating machines.

The system reads the frequency of input sensors by 3 independent Monitoring modules and trip two 2oo3 voters if at least two sensors detect over frequency from user setpoint.

Each monitoring module reads two other sensors for comparison and sensor fault detection. In addition the monitoring modules support an isolated power supply for sensors that need to be powered. In this case a current monitoring of sensor is done to detect faults of sensor.

For safety path, measuring, comparison and deenergizing the shutdown relays, is tested by a self-test process in each Monitoring module. If any fault detected the module would be forced to trip mode.

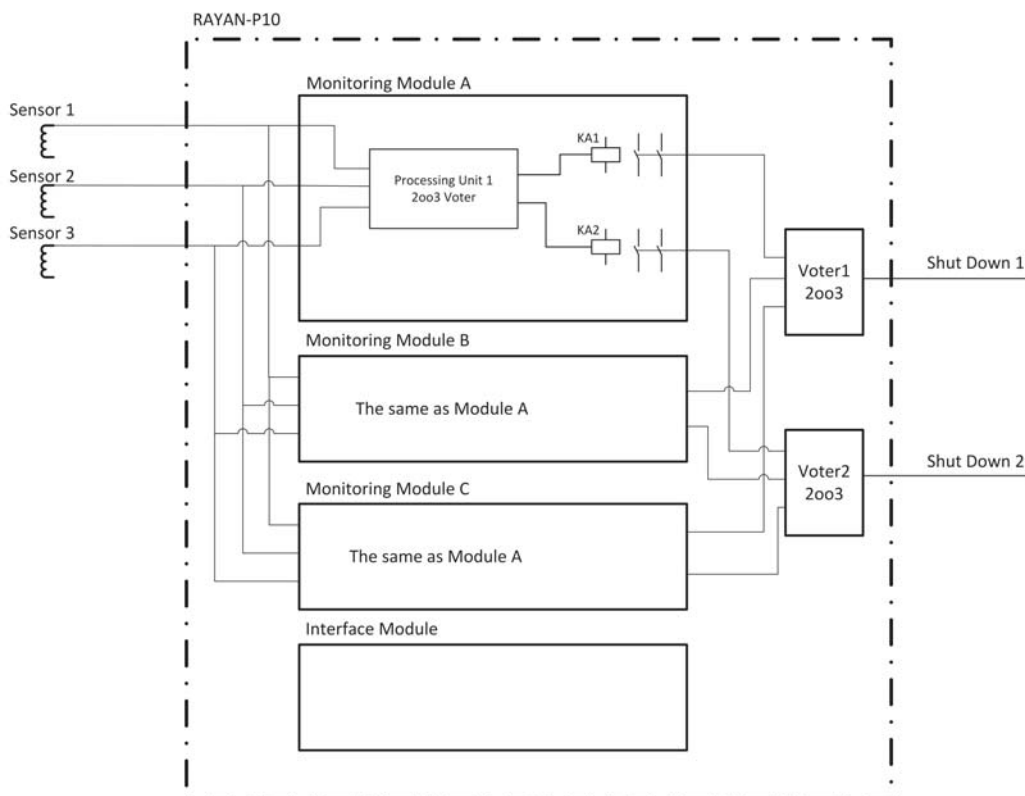
The system can monitor up to two shaft speeds in the same rack (2 set of 2oo3 overspeed protection can be assembled on one rack). Each set of overspeed can be set by unique overspeed setpoints. The Monitoring modules and voters of two sets are independent.

There is a TFT LCD and keypad Module (IM) for displaying the status of monitoring modules, alarms and events, and also setting the user configurations. This display part is out of safety path and only used for monitoring.

A profibus communication port exists for sending data of IM to user system. All the displayed data on IM module can be read in profibus, but user settings can't be set by this port.

In addition to IM module, a powerful PC software connects to system, by USB port to program the user settings or read the settings recently set on system. This user friendly software enable the user to fast configuration.

The following block diagram is suggested for using RAYAN-P10 in a system to reach SIL3 safety level.



Product Features

- Fast reaction time to over speed (15msec)
- Two Internal 2oo3 voting relays
- Isolated analogue outputs with scalable ranges for each monitoring module
- Peak speed detection and display
- Front panel TFT display
- One External-trip input
- Two alarm output
- A buffered output pulse
- Independent power input (18–30 V DC) for each Module
- The input can read magnetic pickup, proximity and hall effect sensors
- Hot pluggable modules
- Up to two shaft monitoring and trip on one rack
- Alarm management and event logger consist of:
 - Speed deviation between input sensors
 - Check for communication loss
 - Out of range Setting Input
 - Speed measurement processor failure
 - Routine test performance
 - Power Monitoring
- Configuration via PC and front panel LCD and keypad

Product Description

The RAYAN-P10 is an electronic over speed trip device designed, to provide reliable over speed trip protection for rotating equipment using magnetic speed sensors to determine rotational speed.

The RAYAN-P10 is designed fully modular and is configured in a 19" rack, consists of 3 independent Monitoring Modules for each shaft and one Interface Module.

Monitoring Modules

Each monitoring module accepts one magnetic speed sensor and in addition to that, it measures other two modules' sensors with its CPLD unit. Each module would trip two Shut down (Trip) relays if at least two of the sensors simultaneously detect an over speed condition. (Relays are de-energized to trip)

The safety path is independent of processing unit and frequency measurement and comparison is performed in a CPLD.

The processing unit is responsible for user configurations and diagnostic purposes. It performs the self-test of safety path periodically. The time interval of self-tests is defined by user.

Also the communication with IM module is established in processing unit for sending monitoring data to IM.

Over speed Set point and hysteresis is configurable in whole measuring range. The whole system response time is less than 15ms.

Sensor input is isolated from main power. Input impedance is 33 kOhms for each sensor, suitable for passive or active sensors.

In the case of Hall Effect or proximity sensors, a 24VDC power supply, with 120 mA current supports. This power is short circuit proof on more than 200 mA.

A frequency repeater output is considered for user. It is an isolated source, square wave.

The amplitude in high level is min 16 Vpp and it is open for low level. This output is short circuit proof and it can support up to 100mA current.

One common reset input for resetting latched trip or latched alarms exist. If the trip source is exist, the reset input won't change shut down relays trip state.

Another common input is External trip contact input for emergency stopping of all monitoring relays. If this input opens, all monitoring modules will trip instantaneously.

There is an internal testing feature in each monitoring module that, with the internal generators and at the specified range of times, the test procedure initiates and test the whole calculation and trip path.

The feedback is read and if there is any incompatibility the module force to trip its output.

And if one module initiates a trip other two modules won't initiate test procedure.

Sensor Input	
No.of Inputs per Module	1 Proximity or magnetic pick up Sensor
AC Range	Max 75 VRMS, Min 1VRMS
Frequency Band	0.1 Hz to 20KHz
Accuracy	1 Hz
Isolation from MPU	Yes, 500 VDC
Isolation From Current Output	Yes

Input Power Supply

Power input Range	24± 5 Vdc
Power dissipation (each power)	3W without IM
Isolation of input and output	Yes. 500Vdc
Short circuit Protection	Yes

Analog Output

Output Range	4 to 20 mA
Output Overrange	2 to 22mA
Accuracy	±48µA
Resolution	12bit
Power	Independent power from main power 24± 5 Vdc

Repeater

Number per Channel	1
Nominal Voltage Amplitude	0-24 VDC
High Level	Min. 16 V
Low Level	Max. 1 V
Frequency Range	DC to 20 KHz
Max current @ high level	100mA, Short circuit Proof
Low level	Open

Shutdown Output

Output Type	Dry Contact
Number per Channel	1 NO
Max Output Response Time	10mS
Contact Allowable Current	4A @ 30VDC

Interface Modules

The role of the Interface Module is to display data of Monitoring Modules and also getting the user settings and sends them to Monitoring Modules.

With use of keypads and user friendly GUI it conveys user configurations and commands to monitoring modules.

When not configuring, it displays each module speed, status (trip, alarm, no module, testing and)

If a cost-effective system needed, the IM module can be replaced by a programmer module which don't have display LCD and keypad. In this case the user configuration mean is the PC software and USB port.

Voting Output

The overspeed protection system has two voting outputs, each is the result of 2oo3 voting of monitoring modules. The relays in monitoring modules are force guide relays and their feedbacks are read by self-test process.

The two voter outputs are independent and can be externally connected to form a 1oo2 output.

Allowable contact current is 4A @ 30VDC.


Environmental condition

Temperature 0 to 50 °C

Humidity Up to 70% noncondensing

Standards and Norms

IEC61000-6-2	Electromagnetic compatibility (EMC) – Immunity for industrial environments
IEC60068	Environmental testing
IEC61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
API670	Machinery Protection Systems

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