X87 SERIES

Process/Rotating Machinery Monitor System

RONAN

Description

The Ronan Series X87 Process Monitor System features continuous monitoring of temperature, vibration and engineering unit parameters, collected from processes and rotating machinery. The system consists of the master module and the required number of input modules. The master module provides digital readout of each input and its associated setpoints. The input signals from the sensors are conditioned and scaled in the input modules and continuously compared against single or dual setpoints. The individual front panel adjustable setpoints, if exceeded, provide transfer of relay contacts and visual alarms. The front panel alarm LEDs (light emitting diodes) operate in First Out or Manual Reset sequence.

The inputs and setpoints can be selectively displayed on the 3½-digit indicator located in the master module. The selections for readout are made by membrane touch switches on each input module or, optionally, from remotely located selector switches.

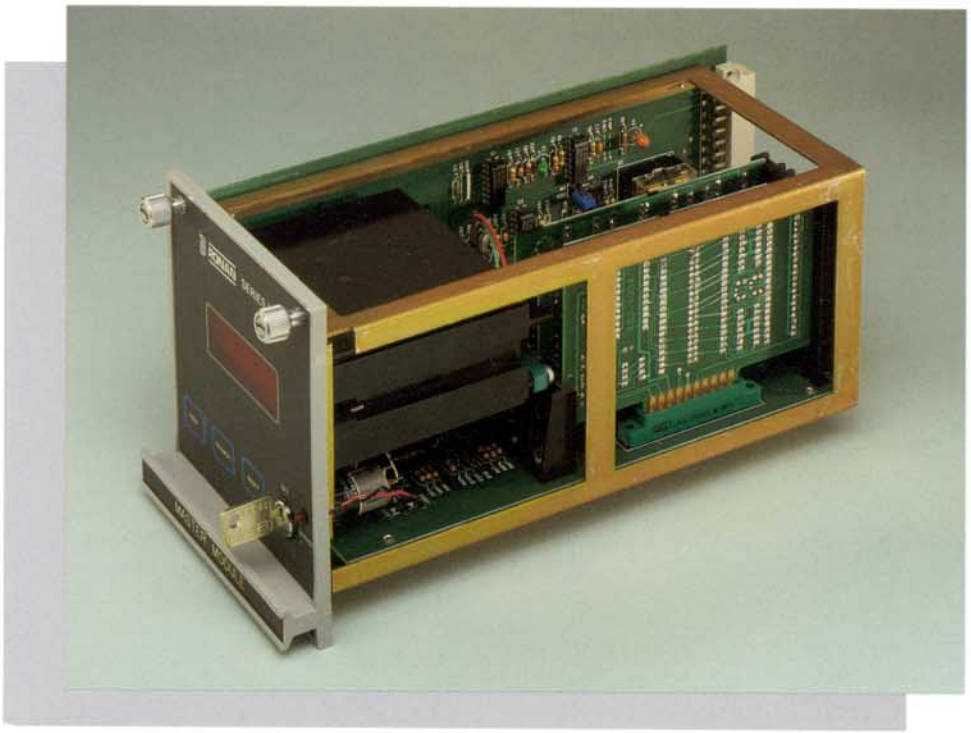
The master module features alarm sequence pushbutton functions which include TEST, SILENCE and RESET. A keylock BYPASS switch with LED indication can be used to inhibit shutdown relay operation during start-up or test operation.

Optionally, each input can be retransmitted via an on board, plug-in transmitter submodule, providing an isolated output in standard milliamp or voltage ranges. All input monitoring circuits are isolated from each other, the power supply and the transmitter output.

The input module features an independent, first out alarm sequence on either setpoint A or setpoint B, indicating the first point to exceed its limit in a selected group. Each setpoint not included in a first out group will operate as a manual reset alarm.

Process Monitor Features

- ☐ Inputs from Thermocouples, RTDs, mA and Voltage Sources.
- ☐ Inputs from Vibration Sensors including Displacement, Acceleration, Velocity and Position.
- ☐ Continuous monitoring of all inputs: No scanning used
- ☐ Two independent setpoints per input
- ☐ Relay outputs: double pole contact per setpoint
- ☐ Isolated current or voltage outputs for input signal retransmission via optional plug-in transmitter submodules.
- ☐ Plug-in input function submodules to facilitate change of range and sensor type, e.g. RTD, T/C etc.
- ☐ Plug-in submodule for setpoint range change
- ☐ Front panel LED alarm indicator
- ☐ Selectable First Out or Manual Reset alarm sequences
- ☐ Sensor failure indication with selectable alarm/shutdown relay output inhibit
- ☐ 3½-digit readout of selected input and setpoint in degrees Celsius or Fahrenheit, Engineering Units, Velocity (mm/sec), Acceleration (G's or m/sec^2), Displacement (P-P mils) etc.
- ☐ Keylock BYPASS switch to inhibit or override shutdown relays
- ☐ Relay outputs for audible alarm, common trouble alarm and reflash alarm



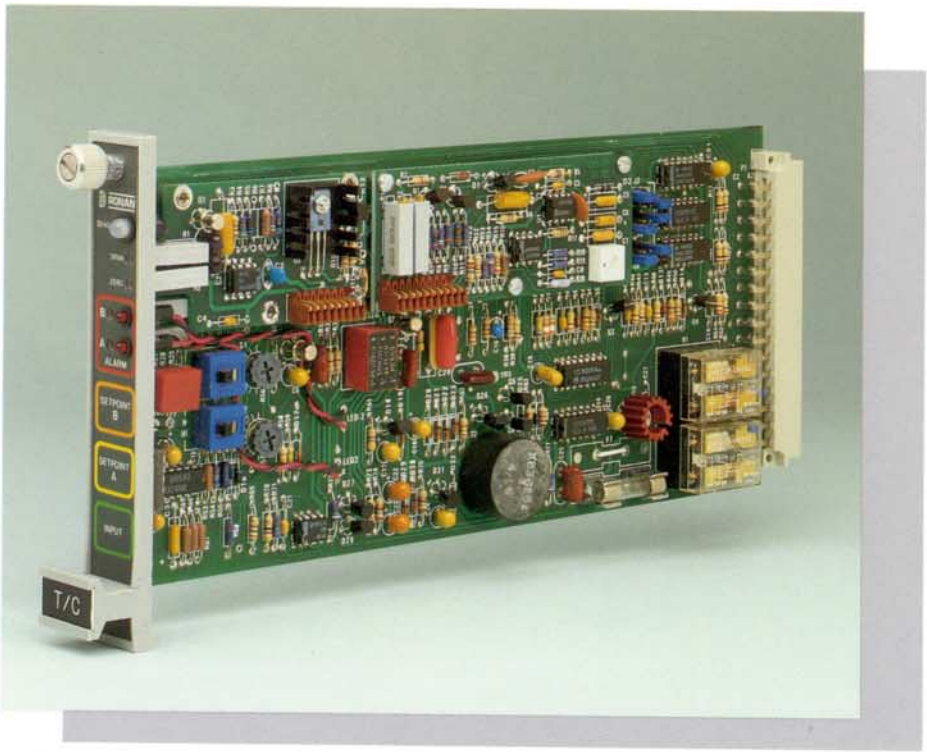
Master Module

The Model X87-100B Master Module features the 3½-digit panel meter, linearization submodules for three sensor types and auxiliary functions for audible alarm and reannunciation of system alarms. The reannunciation functions consist of a common trouble alarm (CTA) relay, indicating when any setpoint in the system is in an alarm state and the reflash relay which indicates an alarm condition and pulses once for each subsequent alarm. Both relays return to normal only when all points have returned to normal and the system's reset pushbutton has been pressed. The linearizer submodules, up to three, provide an accurate representation of the input signal on the digital display. X87 temperature inputs and setpoints are always displayed with 1° resolution. Additionally, engineering unit inputs and setpoints for devices such as remote transmitters or vibration sensors can be factory set to 1, 0.1, 0.01 or 0.001 resolution. Due to the fact that all Engineering Units Input Modules utilize the same Linearizing Submodule, one decimal point location can be selected for all engineering units inputs and setpoints in a system.

The signal conditioning and ranging is accomplished in the individual input modules. Three membrane touch switches, "Test, Silence and Reset", provide the system alarm function control. The test switch actuates all LEDs on the input modules and the master module, as well as the digital display. The silence switch deactivates the audible alarm, and the reset switch will return the alarm functions to normal if the inputs are normal when the switch is activated. A keylock switch, which is also provided, must be in "Bypass" position (indicated by flashing bypass LED) before the test switch will function. While in "Bypass" mode, the shutdown relays on each input module are maintained in normal state or returned to normal if in alarm state.

Transmitter Submodule

The optional plug-in transmitter submodule, Model X87-600, provides a totally isolated current or voltage output. The output follows the input with an accuracy of ±0.2% of span and is isolated from input, power and other outputs. The transmitter may be acquired as part of the initial system or may be added at any time in the field. Standard outputs are 1-5 mA, 4-20 mA, 10-50 mA; 1-5 VDC, 2-10 VDC; with additional special ranges available.



Temperature/ Engineering Units Input Modules

The Model X87-300/400 input modules feature signal conditioning, single or dual setpoints, alarm indication and optionally a transmitter output. The module accepts a wide variety of sensors such as RTDs, thermocouples, potentiometers and engineering unit signals. Its design allows field change of the sensor type by simple exchange of the input function submodule and the setpoint range selection submodule. Each setpoint level can be set by a front panel accessible potentiometer and provides two sets of relay contacts, which are available at the rear terminals of the system. The contacts may be used for realarming and/or shutdown of a process. The relays can be operated as normally energized (NE) or normally de-energized (NDE). They can also be non-latching (NL) following the input, or latching (L) following the alarm sequence. The contacts can be set for normally open (NO) or normally closed (NC). All relay functions are selectable by means of jumper plugs.

LEDs provided for each setpoint indicate an alarm in First Out or Manual Reset sequence when a setpoint is reached. Failure of a sensor or sensor wiring will change the front panel green "Sensor" LED to red and sound the system's horn. Jumper plugs provide the ability to inhibit setpoints A and/or B alarm/shutdown relay actuation during sensor failure. The setpoint and input parameter readings, selected by the front panel membrane switches or remote selector switches, are displayed on the digital LEDs, located in the master module or, optionally on a 3½-digit, remotely located panel meter.

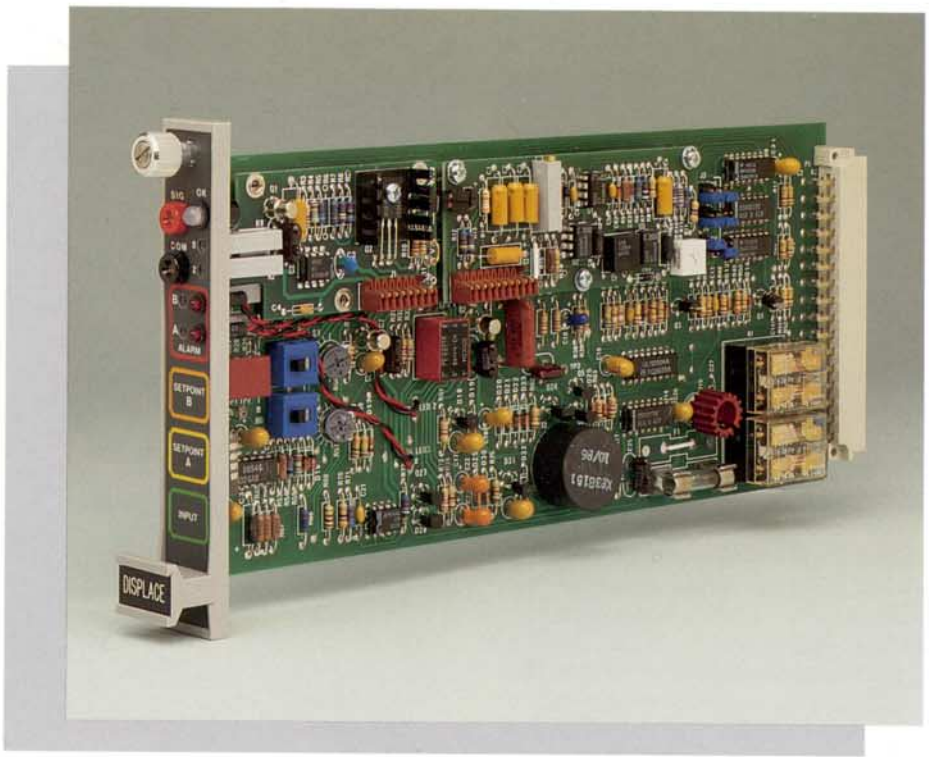
Input Function Submodule

The input function submodule conditions the signal of a specific sensor type to provide a standardized signal to the input modules. The plug-in function submodule can be field exchanged to adapt the input module to accept any of the different types of sensors normally supported by that particular input module.

Setpoint Range Selection Submodule

The setpoint range selection submodule (DIP header), supplied in conjunction with the input function submodule, provides setpoint adjustability over the whole sensor range and contains the linearizer submodule control code. For narrower setpoint range adjustments, where the process is operating over a smaller span than provided by the sensor, a special submodule is available to improve the resolution of the setpoint adjustment.

Vibration Input Modules (Displacement)



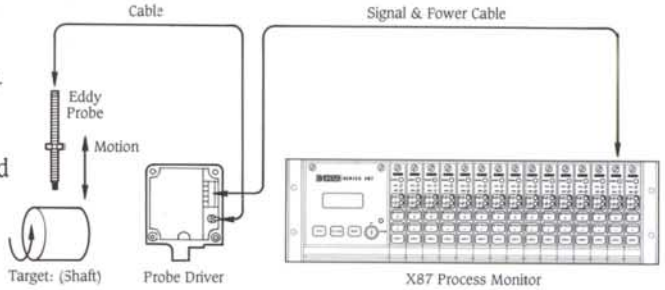
The Ronan Module X87-471 Vibration Input Module continuously monitors the output of a proximity type vibration sensor. The vibration, due to imbalance, misalignment or shaft/bearing wear is measured to provide alarms and to assist in scheduling preventative maintenance. The input derived from the machine mounted Eddy current type proximity sensor is continuously monitored and compared against preset limits. The alarm/shutdown relays transfer when their respective limits (setpoints) are exceeded. The system's horn relay transfers, and front panel LEDs illuminate, providing audible and visual indication of the alarms. The alarm sequence provided by the Model X87-471 Vibration Input Module is selectable as either First Out or Manual Reset. Front panel test jacks provide a means of easily monitoring the input voltage as it comes from the probe driver. This signal represents the probe gap plus peak to peak vibration and the scaling is typically 200 mV/mil.

The input signal and the two setpoint values can be displayed on the master module's digital display by pressing the corresponding front panel switch. The signal displayed indicates peak to peak vibration in mils. A transmitter is available to provide an isolated voltage or current output that may be used to drive a recorder. The transmitter output will normally represent the working range of the transducer.

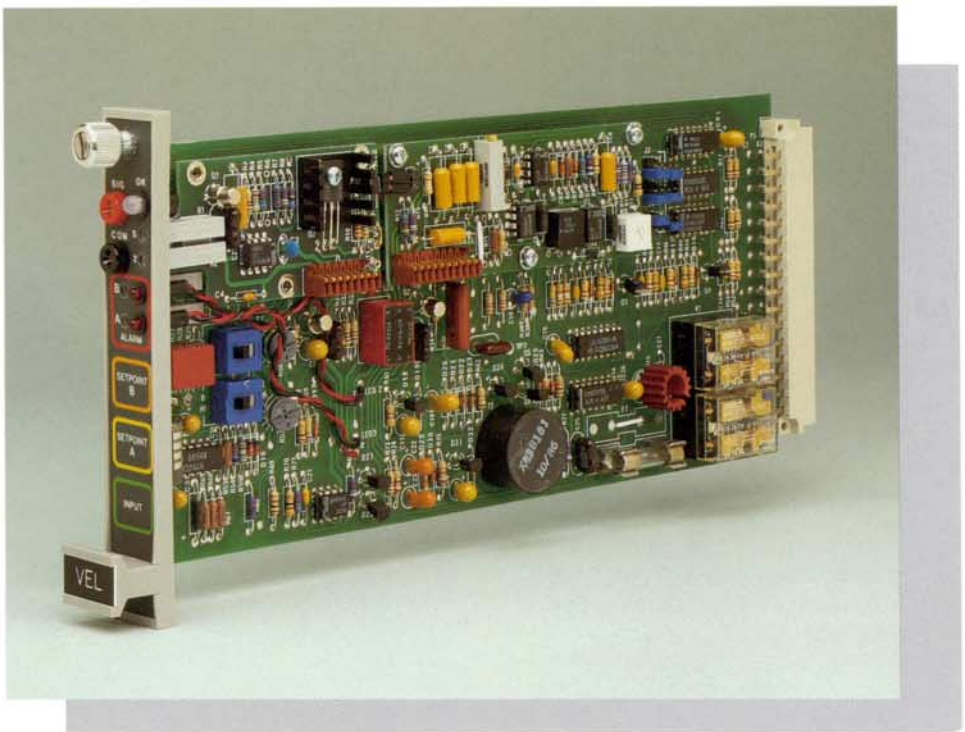
The module also features a circuit which monitors the sensor for failure or out of range condition. Normal conditions are indicated by a green "Sensor" LED which turns red for an abnormal condition and activates the system's horn. The alarm/shutdown relays can be inhibited on sensor abnormality with a plug-in jumper, leaving the audible alarm and "Sensor" LED active.

Vibration Sensor (Displacement)

This proximity type vibration sensor is the most widely used sensor to measure vibration and position movement of machine elements. This noncontacting sensor provides highly accurate measurement of vibration amplitude, eccentricity, static shaft position or dynamic motion. The sensor operates on the Eddy current principle. A radio frequency, generated by the driver, is radiated through the sensor tip to the observed surface, generating Eddy currents directly proportional to the distance between sensor tip and surface of a shaft or rotor. The signal is then conditioned in the driver, which outputs a DC voltage proportional to the gap and an AC voltage proportional to the peak to peak vibration which is fed to the Ronan X87-471 Vibration Input Module.



Velocity Input Modules



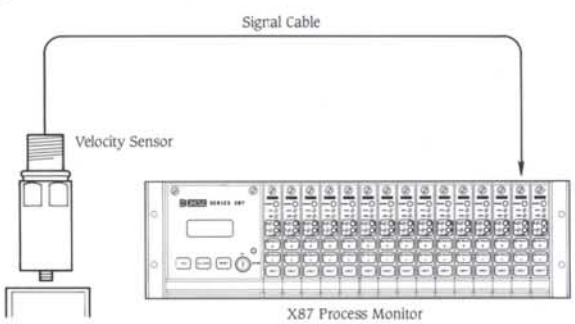
The Ronan Model X87-470 Velocity Input Module accepts the output of a velocity sensor. The velocity input module derives its input signal from a self-powered velocity sensor installed on a machine mounting base, or case. The output of the velocity sensor is continuously monitored and compared against pre-set limits. The alarm/shutdown relays transfer when their respective limits (setpoints) are exceeded. The system horn relay transfers, and front panel LEDs illuminate, providing audible and visual indication of the alarms. The alarm sequence provided by the Model X87-470 Velocity Input Module is selected as either First Out or Manual Reset. Front panel test jacks provide a means of easily monitoring the input signal as it comes from the sensor. This signal represents the velocity and the sensitivity is typically 100 mV/inch per second.

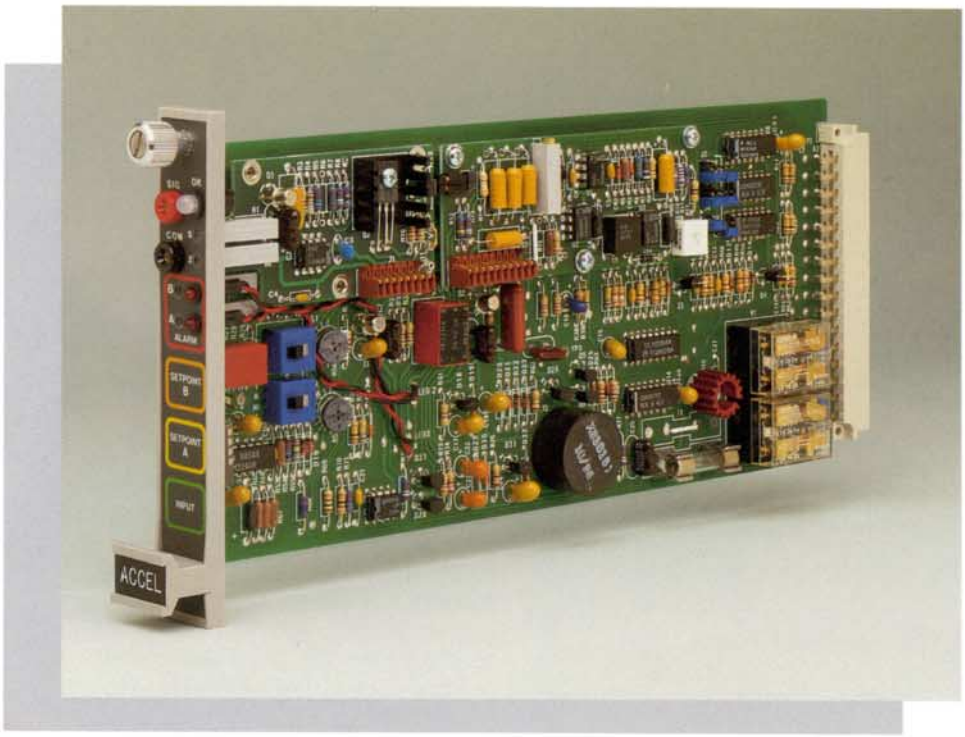
The input signal and the two setpoint values can be selected for display on the master module's digital display by pressing the corresponding front panel switch. The signal displayed indicates the velocity in inches per second. A transmitter is available to provide an isolated voltage or current output that may be used to drive a recorder. The transmitter output will normally represent the working range of the transducer.

The module also features a circuit which monitors the sensor for failure or out of range condition. Normal conditions are indicated by a green "Sensor" LED which turns red for an abnormal condition and activates the system's horn. The alarm/shutdown relays can be inhibited upon sensor abnormality with a plug-in jumper, leaving the audible alarm and "Sensor" LED active.

Velocity Sensor

The velocity measurement is utilized where a proximity sensor is not practical due to difficulties in installation or where a major amount of the shaft vibration is transmitted to the housing of the machine. The velocity measurement represents the time rate of change of the displacement which is directly proportional to vibration frequency. The velocity sensor attaches to the case of the machine and provides information on the overall mechanical condition. The velocity sensor uses an integral permanent magnet and coil assembly to generate an electrical voltage proportional to the machine case velocity. The output of the sensor is fed directly to the Ronan X87-470 Velocity Input Module. Three sensors are available to cover frequency ranges of 2.5 Hz to 3.5 KHz, 10 Hz to 1.5 KHz and 13 Hz to 1.0 KHz.





Acceleration Input Modules

The Ronan Model X87-472 Acceleration Input Module measures the absolute dynamic vibration level of a machine housing or other structure. This method of measurement is most useful to detect small vibrations at high frequencies. This superior high frequency performance makes this method ideal for monitoring vibration from turbine blade passage, gear mesh and ball or roller bearing defects where vibration is transmitted to the machine casing or bearing housing.

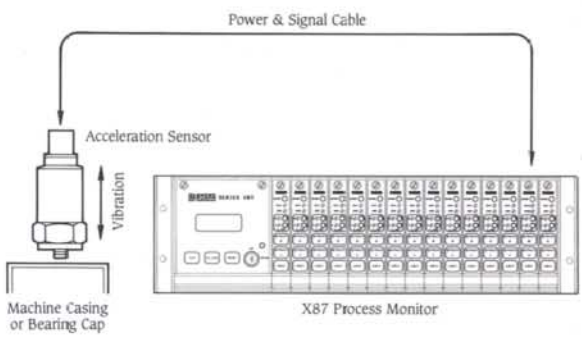
The output signal of an accelerometer is continuously monitored and compared against preset limits. The alarm/shutdown relays transfer when their respective limits (setpoints) are exceeded. The system's horn relay transfers, and front panel LEDs illuminate, providing audible and visual indication of the alarms. The alarm sequence provided by the Model X87-472 Acceleration Input Module is either First Out or Manual Reset. Front panel test jacks provide a means of easily monitoring the input signal as it comes from the accelerometer.

The input signal and the two setpoint values can be selected for display on the master module's digital display by pressing the corresponding front panel switch. The signal displayed indicates acceleration in peak G's or meter/sec^2. A transmitter is available to provide an isolated voltage or current output that may be used to drive a recorder. The transmitter output will normally represent the working range of the transducer.

The module also features a circuit which monitors the sensor for failure or out of range condition. Normal conditions are indicated by a green "Sensor" LED which turns red for abnormal conditions and activates the system's horn. The alarm/shutdown relays can be inhibited on sensor abnormality with a plug-in jumper, leaving the audible alarm and "Sensor" LED active.

Acceleration Sensor

The Acceleration Sensor (Accelerometer) is most suitable for measurements on bearing housings and machine cases exhibiting high frequency vibration caused by malfunctions such as imbalance, misalignment, etc. The acceleration measurement provides information about the mechanical condition of rotating machinery and is ideally suited for high frequency applications. The sensor is easy to install in a threaded hole in the machine case or bearing housing. An output signal, directly proportional to acceleration, is generated by a Piezoelectric crystal installed in the sensor base. An integral amplifier conditions this signal and transmits it directly, or via an interface module to the Ronan X87-472 acceleration input module. The acceleration sensor is available for general purpose or high frequency applications up to 10 KHz.



Position Input Modules

The Ronan Model X87-473 Position Module provides early warning of a pending failure by monitoring the position of a moving machine part. For example, the output from the Eddy current proximity sensor, situated to measure the axial position of the thrust collar in relation to the thrust bearing, is preconditioned in the driver module. The signal, resulting from movement in either direction, is continuously monitored and compared against adjustable preset limits. The alarm/shutdown relays transfer when their respective limits (setpoints) are exceeded.

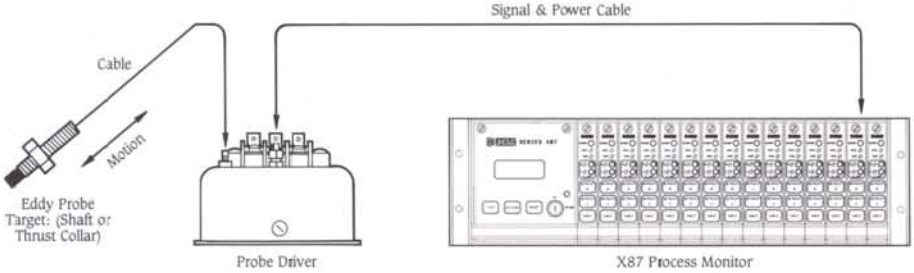
The system's horn relay transfers, and front panel LEDs illuminate, providing audible and visual indication of the alarms. The alarm sequence provided by the Model X87-473 Position Input Module is selectable as either First Out or Manual Reset. Front panel test jacks provide means of easily monitoring the input voltage as it comes from the probe driver. This signal represents the probe gap and the scaling is typically 200 mV/mil.

The input signal and the two setpoint values can be selected for display on the master module's digital display by pressing the corresponding front panel switch. The signal displayed indicates a ± change in position from its initial "Zero" position. A transmitter is available to provide an isolated voltage or current output that may be used to drive a recorder. The transmitter output will normally represent the working range of the transducer.

The module also features a circuit which monitors the sensor for failure or out of range condition. Normal conditions are indicated by a green "Sensor" LED which turns red for an abnormal condition and activates the system's horn. The alarm/shutdown relays can be inhibited on sensor abnormality with a plug-in jumper, leaving the audible alarm and "Sensor" LED active.

Position Sensor

The Position Sensor provides the input to the X87-473 Position Input Module by sensing changes in position due to failure or wear in bearings or rings, etc. The sensor operates on the Eddy current principle. A radio frequency, generated by the driver, is radiated through the probe tip to the observed surface, generating Eddy currents directly proportional to the distance between probe tip and the surface of a shaft or thrust collar. The signal, conditioned in the driver, provides a ± DC voltage proportional to the gap change from the intial zero position.



Specifications

INPUTS

RTD:

9 Ohm Copper: 0° to 300°F (−20° to 150°C)
10 Ohm Copper: 0° to 300°F (−20 to 150°C)
100 Ohm Platinum: −300° to 1000°F (−185° to 540°C)
120 Ohm Nickel: −50° to 550°F (−45° to 290°C)

Thermocouple:

Type E: −50° to 1800°F (−45° to 1000°C)
Type J: −50° to 1400°F (−45° to 760° C)
Type K: −50° to 1999°F (−45° to 1200°C)
Type R: 480° to 1999°F (250° to 1750°C)
Type S: 300° to 1999°F (150° to 1750°C)
Type T: −300° to 700°F (−200° to 370°C)

Engineering Units:

Voltage: 0-5 VDC, 1-5 VDC, 0-10 VDC, 2-10 VDC
Current: 1-5 mA, 4-20 mA, 10-50 mA
Potentiometer: 0-10 Ohms to 0-20 Kohms (Other ranges can be provided)

Vibration:

Displacement: 0.0 to 5.0 mils pk-pk
Velocity: 0.0 to 20.0 in./sec.
Acceleration: 0.0 to 5.0 g's peak

Position:

Distance: ±40.0 mils

INPUT IMPEDANCE

RTD: >100 Kohms
T/C: >10 Mohms
4-20 mA: 3.125 Ohms
10-50 mA: 1.25 Ohms
Voltage: >100 Kohms
Vibration: 10 Kohms
Position: 10 Kohms

OUTPUTS

Master Module:

A) 3½-digit (±1999) LED display (.39 in. high digits) with analog output of 1.0 mV/digit
B) Horn, Common Trouble Alarm and Reflash Relays rated at 3 amps at 240 VAC or 28 VDC. Hermetically sealed relays are optional and are rated 2 amps at 115 VAC or 28 VDC. (Form C=0.2 Amp at 115 VAC). Common Trouble Alarm Relays can be normally energized or de-energized.
C) LED indicator when in "Bypass" mode

Input Modules:

A) LED indicators for each setpoint alarm
B) LED indicators for sensor failure on RTD, T/C and vibration inputs
C) Alarm/shutdown relays-two Form A or Form B (or one Form C) contacts per setpoint. Coils can be normally energized or de-energized. Contacts are rated 3 Amps at 240 VAC or 28 VDC. Hermetically sealed relays are optional and are rated 2 Amps at 115 VAC or 28 VDC
D) Transmitter (isolated analog output) is available for each input in 1-5 mA, 4-20 mA, 10-50 mA, 0-5 VDC, 1-5 VDC, 0-10 VDC or 2-10 VDC format (not linearized)

Alarm Sequence: First Out or Manual Reset

Accuracy: (Not including sensors)

A) Digital Display:
Temperature: ±2°F or C to 1000°, ±3°F or C over 1000°
Vibration and Engineering Units: ±0.5% of reading, +1 digit
B) Transmitter Outputs: ±0.2% of span (not linearized)
C) Setpoint: ±0.1% of span

Resolution:

A) Digital Display:
Temperature: 1°F or C
Vibration and Engineering Units: Selectable Decimal Point
B) Setpoint: 0.1% of span

Setpoint Range: Same as sensor input (Range may be reduced on special order)

Hysteresis:

A) Temperature: 1-20°C
B) Vibration and Engineering Units: 1-30 digits

Ambient Temperature Effect: (75°F ±40°F)
Gain: ±0.02% of reading per degree C
Zero: ±0.05 degrees per degree, ±2 microvolts referred to the input

Isolation: Input to output to power

Common Mode Voltage: ±300 VDC or peak AC to 60 Hz without damage

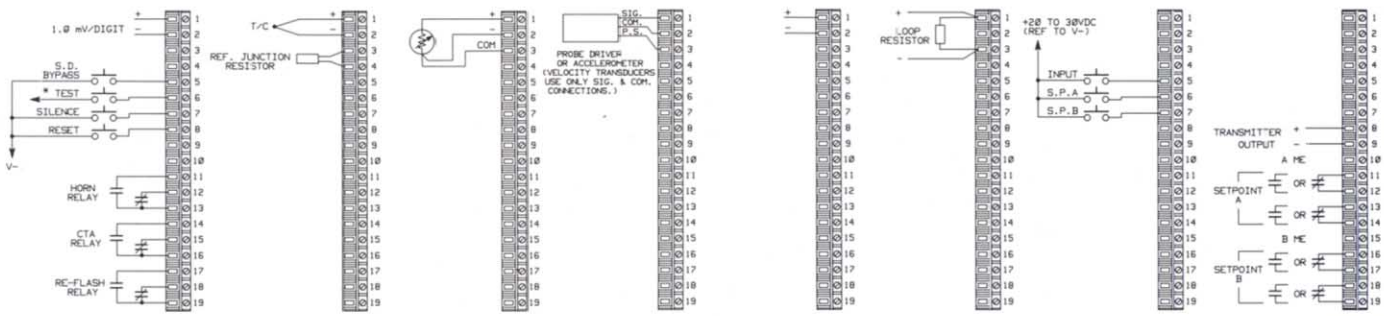
Power Requirements: 24 VDC ±10%
Master Module: 10 W
Input Modules: 3.5 W (Single setpoint)
Input Modules: 4.5 W (Dual setpoint)
Optional Transmitter Module: 0.8 W
(All modules feature individually fused power supply circuits)

Weight:
Master Module: 2.6 lbs. (1.2 kg)
Input Module: 0.7 lb. (0.32 kg)
Panel Mount Chassis (20 Points): 10.0 lbs. (4.6 kg)

WARRANTY

Ronan warrants equipment of its own manufacture to be free from defects in material and workmanship under normal conditions of use and service, and will repair or replace any component found to be defective, on its return, transportation charges prepaid, within one year of its original purchase. This warranty carries no liability, either expressed or implied, beyond our obligation to replace the unit which carries the warranty.

Wiring Information



MASTER MODULE
*To enable test function only when bypass is active. connect test switch to terminal 9. Otherwise connect to V−.

THERMOCOUPLE INPUT

RTD INPUT
(For 2-wire RTD jumper between terminals 2 and 3)

VIBRATION, POSITION INPUTS

mV, V INPUT

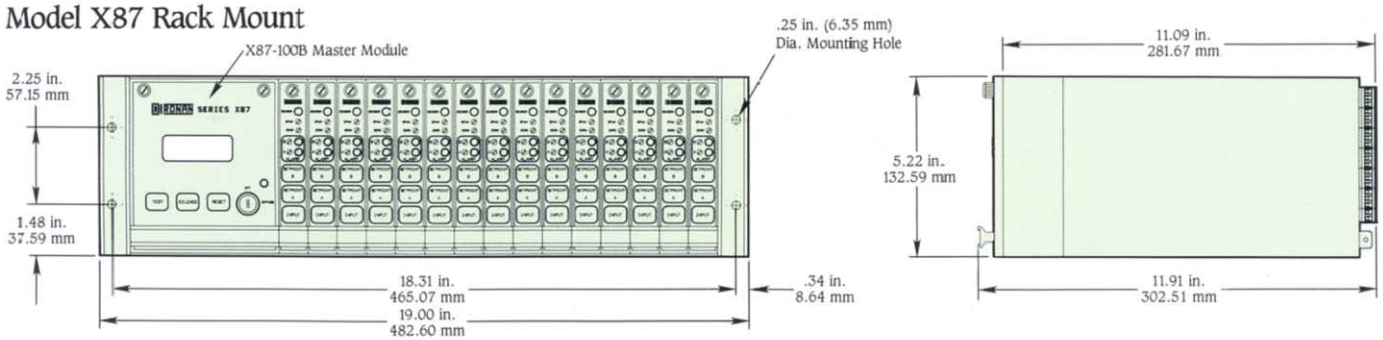
mA INPUT

REMOTE SELECT
Of display

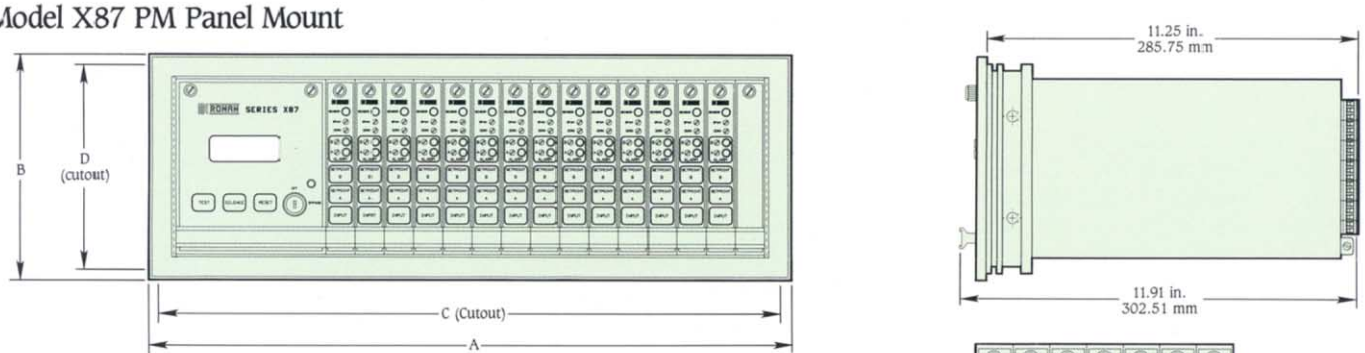
OUTPUT
(Typical to all input modules) Setpoint B is Optional

Mechanical Specifications

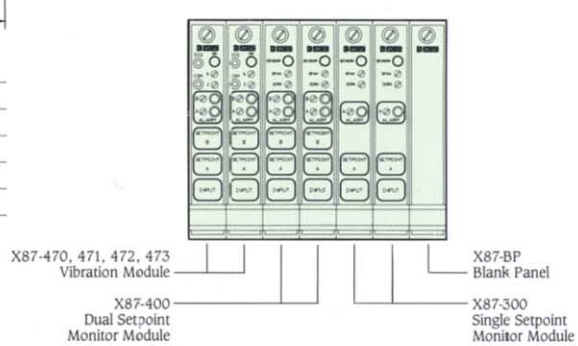
Model X87 Rack Mount



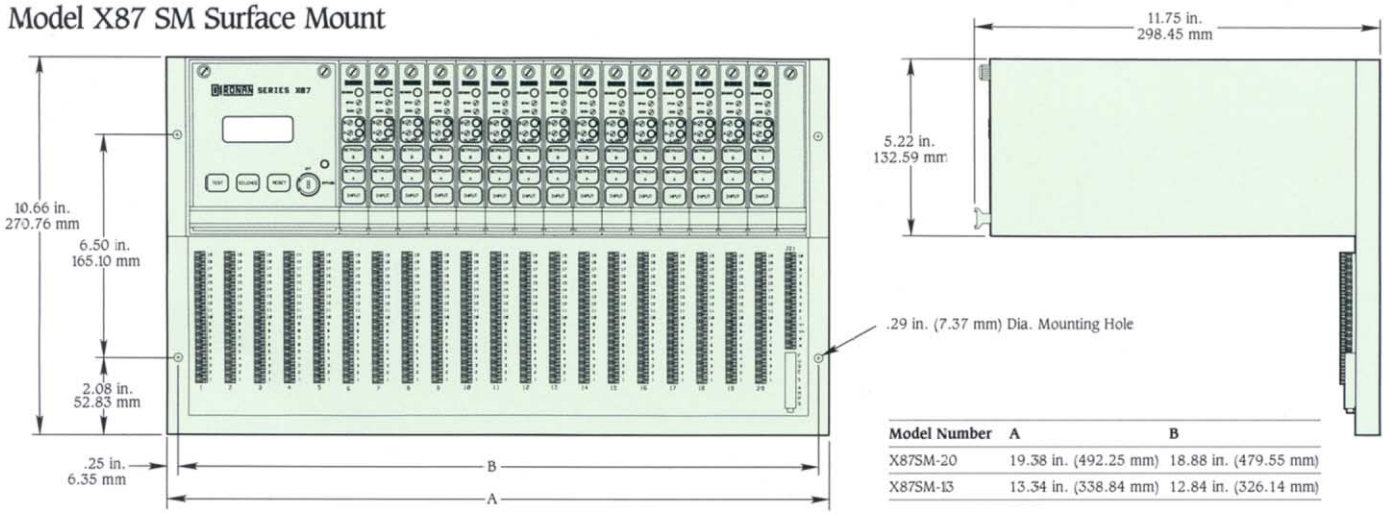
Model X87 PM Panel Mount



Model Number	A	B	C	D
X87PM-40	19.00 in. (482.60 mm)	11.94 in. (303.30 mm)	18.38 in. (466.85 mm)	11.31 in. (287.30 mm)
X87PM-20	19.00 in. (482.60 mm	6.72 in. (170.70 mm)	18.38 in. (466.85 mm)	6.09 in. (154.70 mm)
X87PM-26	12.95 in. (328.93 mm)	11.94 in. (303.30 mm)	12.32 in. (312.93 mm)	11.31 in. (287.30 mm)
X87PM-13	12.95 in. (328.93 mm)	6.72 in. (170.70 mm)	12.32 in. (312.93 mm)	6.09 in. (154.70 mm)



Model X87 SM Surface Mount



Model Number	A	B
X87SM-20	19.38 in. (492.25 mm)	18.88 in. (479.55 mm)
X87SM-13	13.34 in. (338.84 mm)	12.84 in. (326.14 mm)

Ordering Information

CHASSIS

X87-( )-( )

- 40=Positions (2 high by 20 wide)
- 26=Positions (2 high by 13 wide)
- 20=Positions (1 high by 20 wide)
- 13=Positions (1 high by 13 wide)

RR=Relay Rack Mount (20 positions only)
PM=Panel Mount (13, 20, 26 or 40 positions)
SM=Surface Mount (13, 20 positions only)

MASTER MODULE

X87-100B-( )-( )*

Digital Display Decimal Point Location Options
Not needed for Temperature only
E0=Engineering Units (0000E)
E1=Engineering Units (000.0E)
E2=Engineering Units (00.00E)
E3=Engineering Units (0.000E)
One decimal point location per system.

GP=General Purpose Relays
HS=Hermetically Sealed Relays

NOTE: Master Module occupies 5 chassis positions.

LINEARIZING SUBMODULES

X87-200-100	100 Ohm Platinum RTD
X87-200-120	120 Ohm Nickel RTD
X87-200-E	T/C Type E Chromel Constantan
X87-200-J	T/C Type J Iron Constantan
X87-200-K	T/C Type K Chromel/Alumel
X87-200-R	T/C Type R Platinum-13% Rhodium/Platinum
X87-200-S	T/C Type S Platinum-10% Rhodium/Platinum
X87-200-T	T/C Type T Copper Constantan
X87-200-EU	Engineering Units: All standard voltage, resistance and current inputs plus vibration (displacement, velocity, acceleration) and position. One per system for any combination of EU inputs.

NOTES: 1. Copper RTDs do not require linearizing submodules.
2. One to three linearizing submodules per Master Module.
3. Linearizing submodules are installed inside the Master Module.

INPUT MODULES

X87-300-( )-( )*	Universal Mother Board
X87-400-( )-( )**	Universal Mother Board
X87-470-( )-( )**	Vibration (Velocity), Mother Board
X87-471-( )-( )**	Vibration (Displacement) Mother Board
X87-472-( )-( )**	Vibration (Acceleration) Mother Board
X87-473-( )-( )**	Position (Displacement) Mother Board

RSO=Remote Selector Option
GP =General Purpose Relays
HS =Hermetically Sealed Relays

*Single setpoint
**Dual setpoint

NOTE: For a complete operating input module, add input function submodule, setpoint range selection submodule and optionally a transmitter submodule.

SETPOINT RANGE SELECTION SUBMODULES

X87-T00-( )-( )-( )

- 00=Standard Setpoint Range
- XX/XX=Special Setpoint Range
  e.g., 0-50°C=(0/50°C)

Input Type: See Input Function Submodule
Input Function

NOTE: One required per Input Module.

INPUT FUNCTION SUBMODULE

X87-( )-( )-( )

Display Range and Resolution
00=Standard or specify
e.g. (0.0/100.0)=0.0 to 100.0%
(0.00/10.00)=0.00 to 10.00 psi

Input Type
9=10 Ohms at 25°C RTD
10=10 Ohms at 0°C RTD
100=100 Ohms Platinum RTD
120=120 Ohms Nickel RTD
E=Type E T/C
J=Type J T/C
K=Type K T/C
T=Type T T/C
R=Type R T/C
S=Type S T/C
00=Standard (Vibration etc.) or specify e.g. (0/400 MVDC)

Specify for Engineering Units, e.g.
(1-5 mA)
(4-20 m)
(10-50 mA)
(0-10 VDC)
(1-5 VDC)
(0-10 VDC)
(2-10 VDC)

Input Function

S00=RTD	S74=Vibration (Velocity)
S10=T/C	S76=Vibration (Accelerometer)
S20=Engineering Units	S78=Position (Displacement)
S21=4-20 mA w/Loop Power	S81=Key Phaser
S30=Field Contact	
S70=Vibration (Displacement)	

NOTE: Only one decimal point location is allowed for all engineering unit inputs in a system.

ISOLATED TRANSMITTER SUBMODULE

X87-600-( )-( )-( )-( )

Input Range Transmitted (omit for full range)
e.g. (0/50°F)=0° to 50°

Output

A=1-5 mA	E=1-5 VDC
B=4-20 mA	F=0-10 VDC
C=10-50 mA	G=2-10 VDC
D=0-5 VDC	(Special outputs avail.)

Input Type: See Input Function Submodule
Input Function: See Input Function Submodule

INTEGRAL 24 VDC POWER SUPPLY MODULE

X87-( )-50DA

Output Power: Watts
115 or 230 VAC Input

NOTE: Occupies 2 chassis positions.

CHASSIS INTERCONNECT CABLE

X87-ICC-( )

Length: 12 in. standard or specify

EXTENDER BOARDS

X87-EXT/MM (For Master Module)
X87-EXT/IM (For Input Module)

VIBRATION AND POSITION SENSORS AND ACCESSORIES

DISPLACE/POSITION SENSORS

M65	5mm Eddy Current Sensor (Cable 40 in.) (90 mils usable range)
M665	Driver
M958	Extension Cable (140 in.)
M68	8mm Eddy Current Sensor (Cable 40 in.) (105 mils usable range)
M668	Driver
M958	Extension Cable (158 in.)

VELOCITY SENSORS

M86-1	Velocity Sensor, piezoelectric with Cable (15 ft.)
M86PM	Same as M86-1 but for permanent mount with conduit fittings

ACCELEROMETER SENSORS

M97-015-00	Low Frequency Accelerometer with Integral Cable (15 ft.)
M98/M628	Accelerometer with Remote Charge Amplifier
M99-1	Accelerometer with Integral Cable (15 ft.)
M99PM	Same as M99-1 but for permanent mount with conduit fittings
30765800-25	Cable M98 to M628 (25 ft.)

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