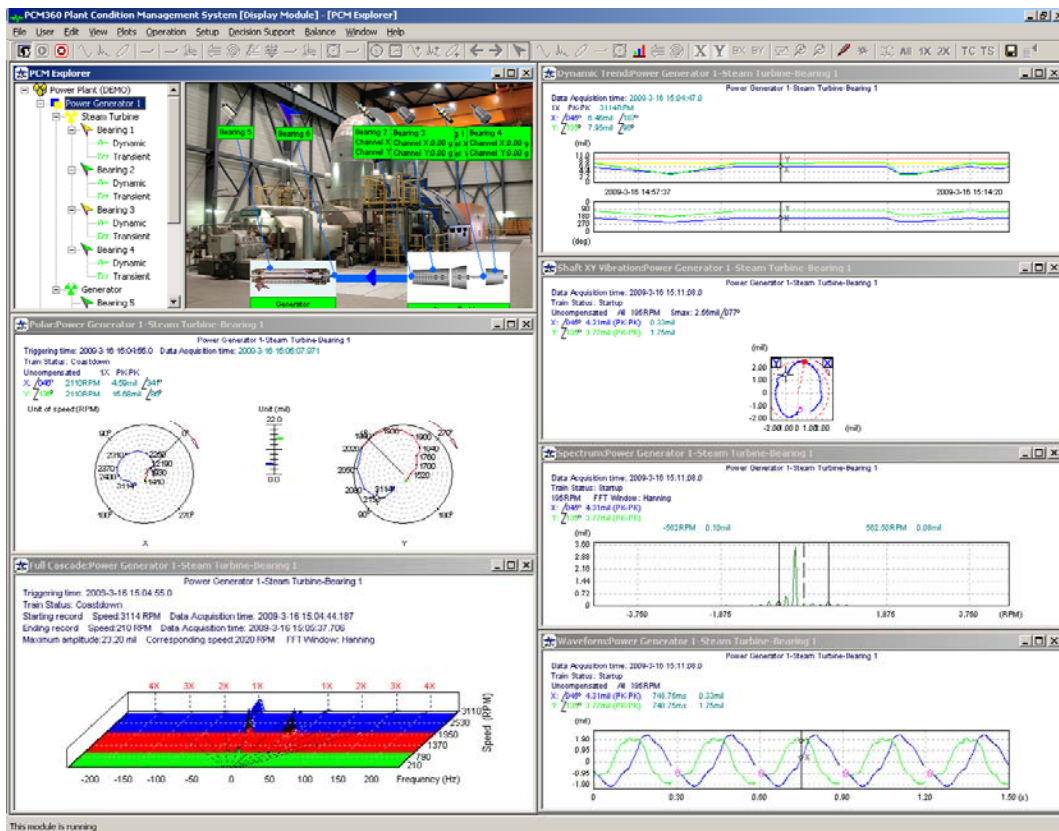




ProvibTech

Innovative Machine Monitoring

Condition Monitoring



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PCM360 Condition Management System

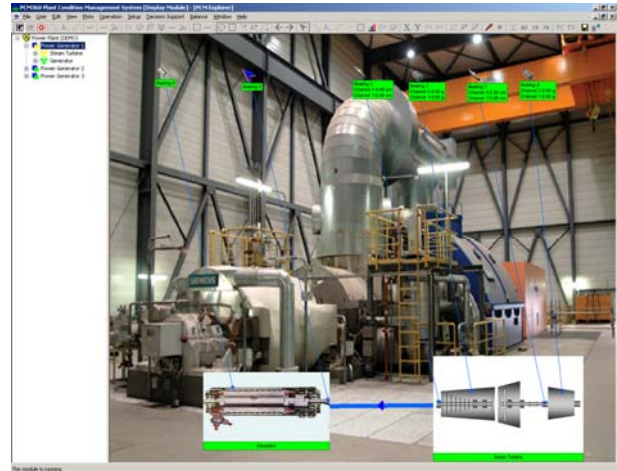
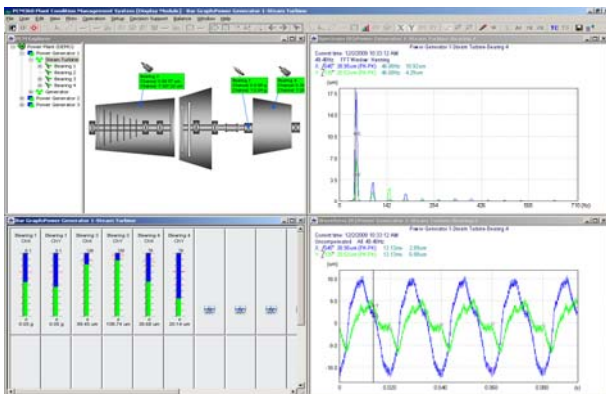
Introduction

ProvibTech's PCM360 is a machine condition management system that collects, stores, analyzes and distributes machine status monitoring information to LAN or internet. The PCM360 provides static, dynamic and transient data collection and analysis, such as graphical indication of vibration level, trend, waveform, spectrum, bode plots, cascade plots and much more.

All ProvibTech's monitors and transmitters can quickly and easily be integrated to upload static and dynamic data to the PCM360. The PCM360 can obtain both critical machinery running status and balance of plant running status. The PCM360 is also capable of collecting process data with 4-20mA, Modbus, etc. The PCM360 provides an integrated system solution for asset management supplying a total solution for machine maintenance and protection.

Leading Features of PCM360

- ✓ Integrate plant condition monitoring and process data into one database.
- ✓ User-friendly interface for instant data analysis with minimum training.
- ✓ Maximum flexibility and expandability of the software system with object oriented modular design.
- ✓ Transient data collection, dynamic data collection and process data collection.
- ✓ Build on Microsoft® SQL Server database to assure better data management and reliable networking.
- ✓ Client/Server architecture let Display terminal has access to database to display historical data.
- ✓ Browser/Server architecture enables user to access PCM360 system via IE terminal.



- ✓ Rich hardware input modules ready to integrate with any third-party vibration monitors and process monitors.
- ✓ Multiple digital input modules, such as Modbus, and OPC.
- ✓ Multiple hardware output modules ready for further data transfer and annunciation in relays and current transmission.
- ✓ 24 hour notification through on site alarms, operator interface and even SMS messaging on GPRS mobile.
- ✓ Advanced post-processing of transient data minimizes data loss, maximizing analysis capability.
- ✓ Display the specific status data on Display Terminal.
- ✓ Attach notes to dynamic and transient samples.
- ✓ Multiple trigger modes: alarm trigger, band alarm trigger, time trigger, speed trigger, and manually trigger.
- ✓ Multiple real-time plots: waveform, waveform with DC Coupling, spectrum, shaft XY vibration, shaft XY vibration with DC Coupling, trend, shaft centerline, bode, polar, bar graph, etc.

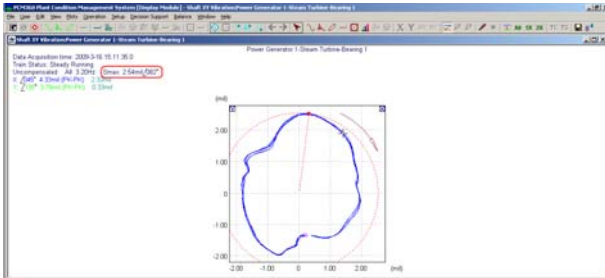
PCM360 Advantage

- ✓ Maximize productivity by minimizing machine down time.
- ✓ Machine management with automatically status and process data collection into a centralized database.
- ✓ Sharing machine condition management information among various departments and managers.
- ✓ Integrates and collects machine running data via third-party monitors.
- ✓ Around the clock machine condition monitoring, alarming operator of the machine problems instantly.



Portable and Online Condition Monitoring System

- ✓ Flexible software module and hardware module enables the system grows with the plant expansion.
- ✓ Ideal for working with turbines, pumps, blowers, motors, and compressors. Can be utilized on refinery, petroleum, steel, fossil power, hydro power, cement, transportation, etc.
- ✓ Assist plant managers to take maintenance decision.
- ✓ Simultaneous high speed data acquisition on all channels.



PCM360 Unique Features

User-friendly system with integrated layout

- ✓ Software modules works in one unified user interface.
- ✓ Designed for customer easy installation, configuration, and data analysis.
- ✓ Significantly decreases the learning and training time and cost with the user-friendly interface.

Universal vibration interface module that works with vibration monitors

- ✓ Works with all ProvibTech's hardware monitors.
- ✓ Works with any other third-party monitors.

Universal process interface module that works with any third-party process monitors

- ✓ Isolated voltage input.
- ✓ 4-20mA input.

Advanced post-processing algorithm

- ✓ The algorithm allows customer to save the raw data into temporary file.
- ✓ Customer is capable of processing the collected transient data till satisfactory result. And then save to the database.
- ✓ Critical transient data will be saved and never get lost during the wrong configuration of the system.

Baseline reference

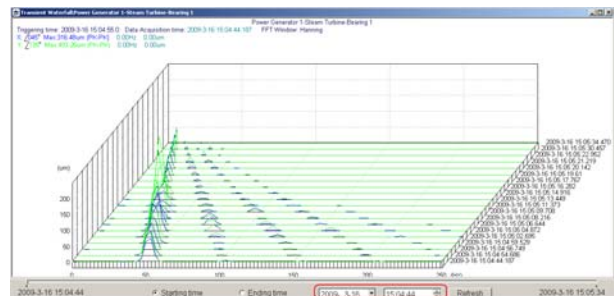
- ✓ A unique feature with PCM360. Standard baseline data can be collected when machine is running in good condition.
- ✓ This baseline data can always be integrated into plots for comparison with the newly collected data.
- ✓ Difference will be noted for machine condition change.

More information on dynamic plots

- ✓ In addition to just one channel data analysis, each of the PCM360 dynamic plot contains both X and Y data, and phase information.
- ✓ Baseline data can also be included in the plot.
- ✓ All the above can be put into one standard plot. This will make analysis much easier.

More information on transient plots

- ✓ In addition to just one channel data analysis, each of the PCM360 transient plot contains both X and Y data, and phase information.
- ✓ PCM360 has one group of unique plot, the trend plot, waterfall plot and the shaft XY vibration plot with transient data.



Unique transient data acquisition setup

- ✓ Customer definition of amount data collected before transient data triggering.
- ✓ Transient data collected on both speed and on time.
- ✓ Much higher sampling frequency with PT360-DAQ hardware system than the built-in data-acquisition in some monitors.

Alarms output with programmable relays, and overall output with 4-20mA

- ✓ The processed alarms from PCM360 can be programmed to drive relays. Programming is similar with ladder logic to allow our customer to program multiple alarms in logical combination. Each PCM360 system can drive up to 1,024 relays.



Portable and Online Condition Monitoring System

- ✓ The overall of each channel can be programmed for 4-20mA output.

Remote notification to operator's mobile phone

- ✓ Timed status and overall notification with pre-defined machines, and measurement points.
- ✓ Notification triggered by alarms with machine running status and overall vibration values.

Static, dynamic and transient data collection and analysis

Static:

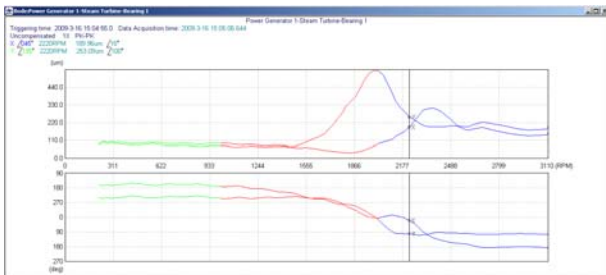
- ✓ PCM Explorer for Hierarchy structural machine view
- ✓ Machine mimic photo image status view
- ✓ Trend plot with historical and real-time
- ✓ Alarm list
- ✓ Status list
- ✓ Bar graph
- ✓ Process data view
- ✓ Print the plot as you seen
- ✓ Save plot as .bmp format

Dynamic:

- ✓ Waveform XY with optional baseline plot
- ✓ Spectrum XY with optional baseline plot
- ✓ Full spectrum plot
- ✓ Shaft XY vibration plot
- ✓ Waterfall XY plot
- ✓ Shaft average centerline plot
- ✓ 3-D shaft XY mode shape plot with multi-planes
- ✓ Band Alarm
- ✓ Attach notes
- ✓ Status definition

Transient:

- ✓ Bode plot



- ✓ Polar plot
- ✓ Cascade plot
- ✓ Full Cascade plot
- ✓ Trend on Transient
- ✓ Waterfall on Transient
- ✓ Attach notes
- ✓ Status definition

Analysis:

- ✓ X, Y with their baselines and phase reference on one plot
- ✓ Zoom in, zoom out
- ✓ Harmonics
- ✓ Sideband
- ✓ Overall, 1X, 2X, NX, NOT1X
- ✓ FFT Windows
- ✓ Plot group on measurement point
- ✓ Plot group on waveform
- ✓ Plot group on spectrum
- ✓ Plot group on shaft XY vibration
- ✓ Baseline contrast
- ✓ Slow roll compensation
- ✓ Auto full-scale
- ✓ Synchronized marker on multi-plots
- ✓ Smax on most of the plots
- ✓ Revealing waveform and spectrum by double clicking the measurement point on the machine photo
- ✓ Waveform and spectrum visible with double clicking the point on dynamic waterfall plot
- ✓ Real-time waveform and spectrum visible with double clicking on the related channel's bar graph
- ✓ Waveform and spectrum visible with double clicking the point on dynamic trend plot
- ✓ Display the specific status data on Display Terminal



Portable and Online Condition Monitoring System

Network Ready: Multiple User Access

Microsoft® SQL Server software:

- ✓ PCM360 adopts the MS SQL Server for data storage and management.
- ✓ Database can be attached, maintained, backed up and restored.

Three levels of user access:

- ✓ Administrator: has un-limited access right.
- ✓ Super user: capable of configuring the data acquisition units and output units.
- ✓ User: analysis and report.

PCM360 Data Acquisition Input

Pro vibTech supplies various data acquisition input modules in digital and analog format. These input modules enable our customer to put all the possible plant machine running status information and plant machine process information into one integral system. This makes the PCM360 a significant better system than others. The rich inputs modules insure the future expansion of the system.

Direct interface with the following data acquisition hardware unit:

- ✓ PT360-DAQ

Monitors link with PCM360 via PT360-DAQ:

- ✓ PT2060/80-BK
- ✓ TM

Direct interface with the monitors via digital Modbus link:

- ✓ DTM
- ✓ DM200
- ✓ PT580

Direct interface with PVT sensors via PT360-DAQ and PT360-SC:

- ✓ TM0782A or any accelerometers
- ✓ TM0793V or any velocity sensors
- ✓ TM079VD Low frequency velocity sensors
- ✓ 5mm, 8mm, 11mm and 25mm proximity sensors

Monitors link with PCM360 via PT371:

- ✓ TR
- ✓ VS102

Third-party vibration monitors link via PT360-DAQ:

- ✓ Most Rack based monitoring system
- ✓ Any monitors with buffer output

Third-party process variable monitors link via PT371:

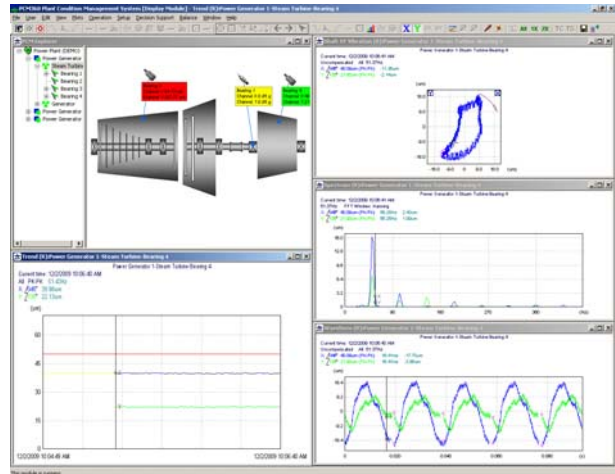
- ✓ Any transmission monitors with 4-20mA output
- ✓ Any monitors with voltage output

Third-party process variable monitors link via Modbus:

- ✓ Any monitors with Modbus RTU/Modbus TCP

Additional digital link via OPC:

- ✓ Any OPC output from monitors.



PCM360 Data Acquisition Output

Pro vibTech supplies various data acquisition output modules in digital and analog format. These output modules could offer other plant management systems the information from the PCM360.

Digital Modbus output:

- ✓ Modbus TCP

Programmable relays output:

- ✓ Program various channel alarms into one logic combination to drive relays (PT373)
- ✓ Relays are dry contact for ideal contact and isolation

Programmable current output:

- ✓ 4-20mA output corresponding with any channels overall

Digital OPC server:

- ✓ More information than analog output with OPC connection.

Remote notification on group of cellular phone:

- ✓ Notification on any alarm events
- ✓ Notification on pre-selected channel status
- ✓ Notification on pre-selected channel overall

Generic Microsoft® SQL Server:

- ✓ Ready for data transfer via MS SQL Server software



PCM360 Specifications

Frequency Response (+/- 3db)

- 0.1 - 100 Hz
- 0.5 - 100 Hz
- 2 - 4,000 Hz
- 10 - 20,000 Hz

Measurement Range

- Acceleration (PK or RMS): 0 - 20g
- Velocity (PK or RMS): 0 - 100 mm/sec
(0 - 4 in/sec)
- Displacement (PK-PK): 0 - 20 mm (0 - 800 mil)

Unit of Measurement

- Peak
- Peak-peak
- RMS
- AVER

Waveform and Spectrum

- Resolution depends on customer configuration.
- Maximum spectrum resolution is 12,800 lines.

Storage and Network Database

- MS SQL Server 2000 Personal Edition or MS SQL Server 2008 WorkGroup Edition.

Operating System

- Windows XP SP2 or later version of Windows.

Data Storage Capacity

- Unlimited by software.
- Limited by hardware storage capacity only.

Routing Capacity

- Unlimited in plant, machine train, machine, and measurement point.

System Processing Capability

- Limit of data acquisition units per system: 240.
- Limit of Modbus devices per system: 240.

Computer Specifications

- Please consult ProvibTech for details.

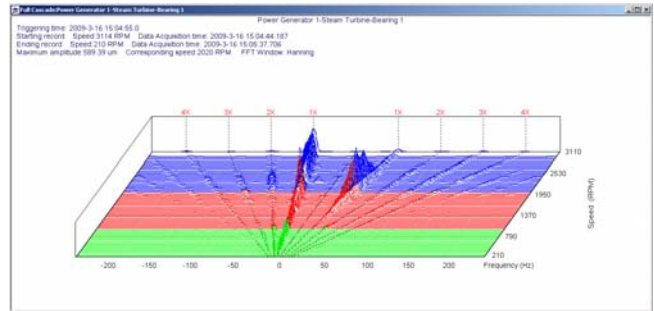
Data Acquisition Format

- Synchronous sampling:
 - 32 to 1,024 points per waveform time period.
- Asynchronous sampling:
 - Based on frequency response.

PCM360 Technical Support

PCM360 comes standard with one year technical support. Additional support may be purchased.

- ✓ Free software updates for one year.
- ✓ Enable technical support with the software.



PT360-DAQ Data Acquisition Hardware

PT360-DAQ is an industrial computer with data acquisition modules and accessories. It can work as a data acquisition system and a client work station.

Sampling Frequency

- Up to 15 KHz per channel with standard data acquisition module.
- Up to 62 KHz per channel with high-speed data acquisition module.

Number of Channels per Module

16

Maximum Dynamic Channels per PT360-DAQ

64

A/D Resolution

16 bit

Input Voltage Range

-20VDC to +20VDC

Modbus Input

- Modbus RTU is available with RS485 converter and optional interface software.
- Modbus TCP is available with standard Ethernet connection.

PT360-SC Signal Conditioning Unit

PT360-SC is a signal conditioning unit. It can directly power any current mode accelerometer and velocity sensor. It can also power proximity probes with its' built in -24VDC power supply. Additionally, a +24VDC is available to power the process sensors directly.

Each PT360-SC can power up to 32 sensors. The PT360-SC power supply is isolated from the AC power supply.

Power Input:

- 110VAC +/- 10% with maximum current of 1.0A.
- 230VAC +/- 10% with maximum current of 1.0A.



Constant Current Sources:

16 channels or 32 channels.

Nominal current: 4mA, constant.

-24VDC Sensor Power: -24VDC +/- 5% @ 200mA

+24VDC Sensor Power: +24VDC +/- 5% @ 200mA

PT371 Universal Input Module

The PT371 is a 16 channel input module.



Signal Inputs:

Voltage input: 0 - 10V; -5 to +5V.

Current input: 4 - 20mA (with the shunt resistor).

Thermocouple or thermo resistors:

Discrete input: any 0-24V; 0-12V; 0-5V.

TC: K, E, S, T, N, J, B, R, EU-2.

Compensation mode: Inner (Specify) and Exterior.

RTD: Pt100, Cu50, Cu100, BA1, BA2, G.

Wire Unit: 2-wires, 3-wires.

Data acquisition rate:

1.0 sec

Amplitude A/D resolution:

PT371 module: 12 bit.

0.2% FS.

Power supply:

24VDC +/- 10% @ 150mA

PT372 4-20mA Output Module

The PT372 is a 4 channel 4-20mA output module.



Amplitude A/D resolution:

PT372 module: 12bit

Power supply:

24VDC +/- 10% @ 100mA

Maximum load:

750 ohms

PT373 Relay Module

The PT373 is a 16 channel relay module. The PT373 can be configured for any logic combination of alarms or status of each channel.

The relays are selectable as: energized/de-energized, latching/non-latching and bypass.



Power supply:

24VDC +/- 10% @ 150mA

Relays:

Seal: epoxy

Capacity: 0.5A/230VAC/30VDC, resistive load

Relay type: SPTD

Isolation: 1000VDC

PCM-SMS Cellular Phone GSM/GPRS Notifier Module

PCM-SMS is a quad-band universal transmission and receiving module that will transmit machine running status and overall about predefined measurement points into any GSM cellular phone. This is useful while operator and service personnel are off site, and there is an alarm due to machine running status change. The module can also be programmed to regularly transmit the status and overall data into a cellular phone. The operator or service personnel can obtain machine condition when off site.



Power supply:

6 - 40 VDC @ 500mA or 90 - 250 VAC @ 100mA, from 47 - 65 Hz.

Transmit format: GSM; GPRS

Transmission frequency band:

850MHz

900MHz

1800MHz

1900MHz



Order Information

PCM360 on-line condition monitoring system consists of the PCM360 software and PT360-DAQ data acquisition unit.

PCM360 Online System Software

PCM360-COM-AX

PCM360-COM is a software module that interfaces with communication and data acquisition hardware.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-DISP-AX

PCM360-DISP is a display and analysis software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-MODBUS-AX

PCM360-MODBUS is a Modbus RTU and Modbus TCP software module. This module is for both input and output.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-DBM-AX

PCM360-DBM is the database management software module (only needs to be installed on DB server).

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-OPC-AX

PCM360-OPC is an OPC software module. This module is for both server and client.

AX: Software option

A0*: OPC Original version (Contains both server and client)

OPC-Server: Offering the PCM360 data for the third-party's OPC software.

OPC-Client: Collecting the data from the third-party's OPC devices.

A1: Software updates CD

PCM360-SMS-AX

PCM360-SMS is a SMS software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-TextOutput-AX

PCM360-TextOutput is a Text Output software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-Web Server-AX

PCM360-Web Server is a web service software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-LIS-AXX-BXX-CX-DX-EX-FX-GX-HX

PCM360-LIS is a software module that controls user options and licenses.

AXX: Communication and data acquisition module user licenses

XX: Number of interface modules

BXX: Display module user licenses

XX: Number of simultaneous user displays

CX: Analysis options

C0: Process, dynamic and transient

C1: Process and dynamic

C2: Process

DX: Remote cellular phone notification (software module only)

D0: With remote notification

D1: No remote notification

EX: Text Output Option

E0: With Text Output

E1: Without Text Output

FX: Digital Communication

F0: No digital communication

F1: With Modbus

F2: With Modbus and digital condition monitoring

GX: OPC Option

G0: With OPC

G1: Without OPC

HX: Web Server Option

H0: With Web service

H1: Without Web service



PCM360 Online Data Acquisition System

Hardware

The PT360-DAQ on-line data acquisition unit is fully configured with the industrial computer or work station, 19" LCD display unit, and signal process modules.

PT360-DAQ-AX-BX-CX-DX

AX: Number of dynamic channels (includes phase reference)

- A0*: 16 (14** for PT2060)
- A1: 32 (28** for PT2060)
- A2: 48 (42** for PT2060)
- A3: 64 (56** for PT2060)
- A10*: 16 high frequency (14** for PT2060)
- A11: 32 high frequency (28** for PT2060)
- A12: 48 high frequency (42** for PT2060)
- A13: 64 high frequency (56** for PT2060)

BX: Interface kit

- B0*: General purpose
- B1: PT2060 (standard 1.5 meters)

CX: SQL

- C0*: Included
- C1: Not included

DX: Configuration

- D0*: As both data acquisition and display system (industrial computer)
- D1: As a data acquisition system only (industrial computer; monitor display is not available)
- D2: As both data acquisition and display system (work station)
- D3: As a data acquisition system only (work station; monitor display is not available)

* Note: Default configuration

** Note: Each 14 channels include 12 dynamic channels and 2 phase reference channels.

Accessories

PCM360-SUP-AX-BXX

Extended technical support agreement

AX: Additional years

X = Number of additional years with the agreement

BXX: Machines

XX = Number of machines

PT360-SC-AX-BX

Signal condition module that directly interfaces and powers with accelerometers, velocity sensors or proximity probes. No monitor is required.

AX: Number of dynamic channels

A0: 16

A1: 32

BX: Power supply

B0: 230VAC

B1: 110VAC

PCM-SERV

Pre-configured server which is configured with PCM360 software and Microsoft® SQL Server database (software is purchased separately).

PCM-DPC

Pre-configured work station computer with PCM360 software (software is purchased separately).

PCM-LPC

Pre-configured laptop/notebook computer with PCM360 software (software is purchased separately).

PCM-485

RS485 module on PCI slot

PCM-SQL

Microsoft® SQL Server 2008 server database

PCM-GP

General purpose interface kit that includes PT360-DAQ cable, converter box.

PCM-SMS

SMS cellular phone message transmission and receiving hardware module. This module works with any GSM system.

PCM-PT2060-XXX

PT2060 and PT360-DAQ interconnection cable.

XXX: Cable length in meters

PT2060/80-BK

Back panel of the data acquisition module on PT2060 monitor. Specially designed to directly interface with PT360-DAQ.



Portable and Online Condition Monitoring System

PT371

16 channels universal input module

PT372

4-20mA, 4 channels output module

PT373

16 channels relay alarm module

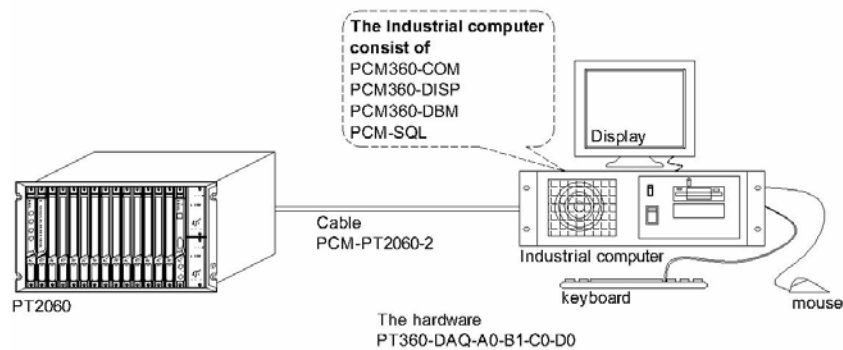


PCM360 Application Notes

I. PCM360 Minimum System Configuration

For example, the PCM360 minimum system is configured to interface with the PT2060 monitor. The system consists of:

- ✓ PCM360-COM-A0 communication and data acquisition module
- ✓ PCM360-DISP-A0 display and analysis module. Computers are equipped with Microsoft Windows XP professional or higher operational system
- ✓ PCM360-DBM-A0 database management
- ✓ PCM360-LIS-A01-B01-C1-D1-E1-F0-G1-H1 user options and licenses module
- ✓ PT360-DAQ-A0-B1-C0-D0 data acquisition system (hardware)



The minimum system

It is a 12 channel system. The entire system, with hardware and software, has been put into an industrial computer. This system will perform data acquisition with process data and dynamic data. The system is ideal for plant operators, maintenance engineers, and managers that perform general data analysis and maintenance.

The features of the system include:

- ✓ Integral system with one industrial computer
- ✓ Single user
- ✓ 12 dynamic channels, 2 phase reference channels
- ✓ Directly interfaces with PT2060 monitor
- ✓ Microsoft® SQL Server 2008 WorkGroup Edition software
- ✓ Capable of collecting, analyzing and storing dynamic data

Since PCM360 is a modular system, the system can easily expand into a standard plant-wide condition management system; additional features can be realized by adding more modules.

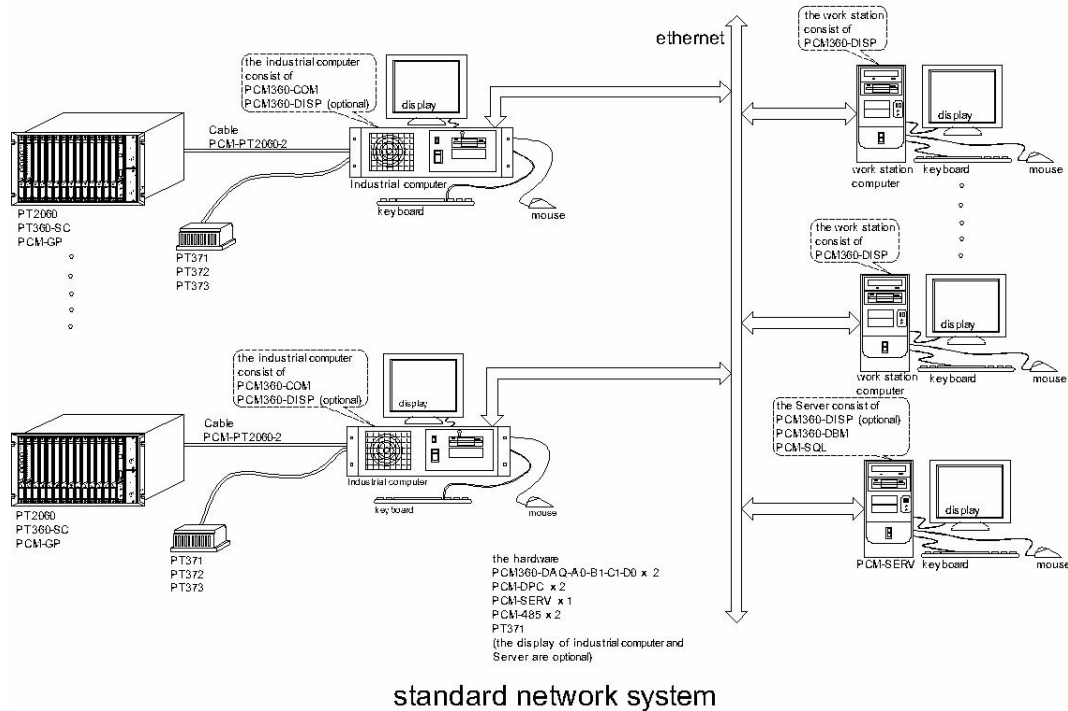
- ✓ Transient data collection and analysis
- ✓ Multiple users access
- ✓ Up to 240 PT360-DAQ
- ✓ Up to 240 Modbus RTU devices
- ✓ Dedicated server computer
- ✓ High frequency data acquisition
- ✓ Hardware output of programmed alarms and 4-20mA
- ✓ Remote access to the system with Citrix™ server
- ✓ Logon the system via IE terminal
- ✓ Interface with any third company process data and dynamic data
- ✓ On-site technical service and training
- ✓



Application Notes Continued

II. PCM360 Standard Network System Configuration

Example: A plant has 10 machine trains. Each machine train includes a compressor and an electrical motor. The compressor has four proximity probes to measure shaft X, Y vibration; one proximity probe to measure thrust position and one proximity probe to measure phase reference. The motor has four channels of case mounted accelerometers to measure case vibration. Five PT2060 monitors are mounted in the control room. Each PT2060 can monitor two machine trains with 18 dynamic channels and 2 phase reference channels.



There will be five data acquisition units; assume the plant has 10 users.

Recommendation: the standard PCM360 system with the following modules:

- ✓ PCM360-COM-A0 x 1 communication and data acquisition module
- ✓ PCM360-DISP-A0 x 1 display and analysis module
- ✓ PCM360-DBM-A0 x 1 database management
- ✓ PCM360-MODBUS-A0 x 1 Modbus RTU communication module
- ✓ PCM360-LIS-A05-B10-C0-D1-E1-F1-G1-H1 x 1 x 1 user option and license module
- ✓ PT360-DAQ-A1-B1-C1-D1 x 5 Five data acquisition systems (hardware)
- ✓ PCM-SERV x 1 Server computer. Equipped with Windows 2003 server operation system
- ✓ PCM-SQL x 1 Microsoft® SQL Server 2008 WorkGroup Edition software
- ✓ PCM-DPC x 10 Work stations running DISP software module
- ✓ PCM360-SUP-A5-B10 x 1 Five year technical support plan for 10 machines



Application Notes Continued

III. PCM360 Connection to PT2060 Monitor

The PCM360 directly interfaces with the PT2060 monitor. Each PT2060 can hold a maximum of 48 channels (with condition monitoring modules).

The 4th slot from the right output dynamic signal of channel 1 to 24. The 3rd output channel 25 to 48. On each of the PT2060/80-BK modules, there are two multi-pin connectors, the top connector output data of channel 1 to 12 (25 to 36) with dual phase references. The bottom connector output data of channel 13 to 24 (37 to 48) with dual phase references.

PCM360 and PT2060 monitor could be integrated into a complete system to provide a better protection and data acquisition features.

IV. PCM360 Connection with Modbus Devices or Any Process Data Monitors

Modbus RTU communication is available with PCM360. Each system can hold a maximum of 240 Modbus devices.

For a large system, we recommend obtaining process data through Modbus communication. This will save many dynamic data acquisition channels on both hardware and software.

PT371 can be used to collect process data from any third-party monitors, and then it converts the process data into digital data and finally transfers the data to PCM360 DAQ software. A PCM-485 is required for this configuration.

V. PCM360 Connection Direct To Sensors

Optional rack mount hardware PT360-SC is required to connect sensors directly without monitors. Each PT360-SC can hold 16 or 32 channels (including phase reference channels). This signal conditioner can directly drive current mode accelerometers and velocity sensors.

VI. PCM360 Hardware Output of Programmed Relay Alarms and 4-20mA

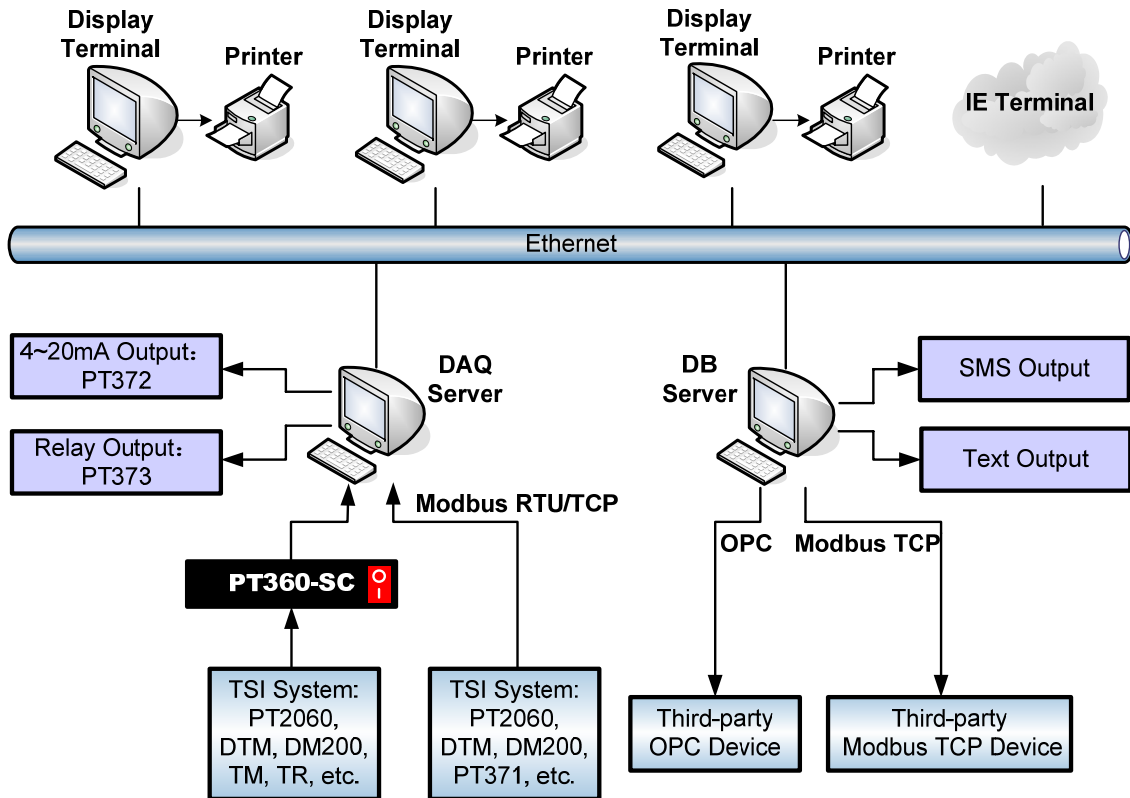
This is a unique feature of PCM360. With PLC similar logic, user could program alarms of various channels to drive the PT373 dry contact relays. PT372 will output up to four channels of 4-20mA signals.



Application Notes Continued

VII. PCM360 System Layout

System Layout





PCM360DW Condition Management System

Introduction

ProvibTech's Predictive Plant Condition Management System PCM360DW which consists of PCM360 Condition Management Software and Digital Monitors is capable of performing condition monitoring with digitally captured and transferred waveform, spectrum, and shaft XY vibration measurements. The digital monitors include DTMs and DMs.

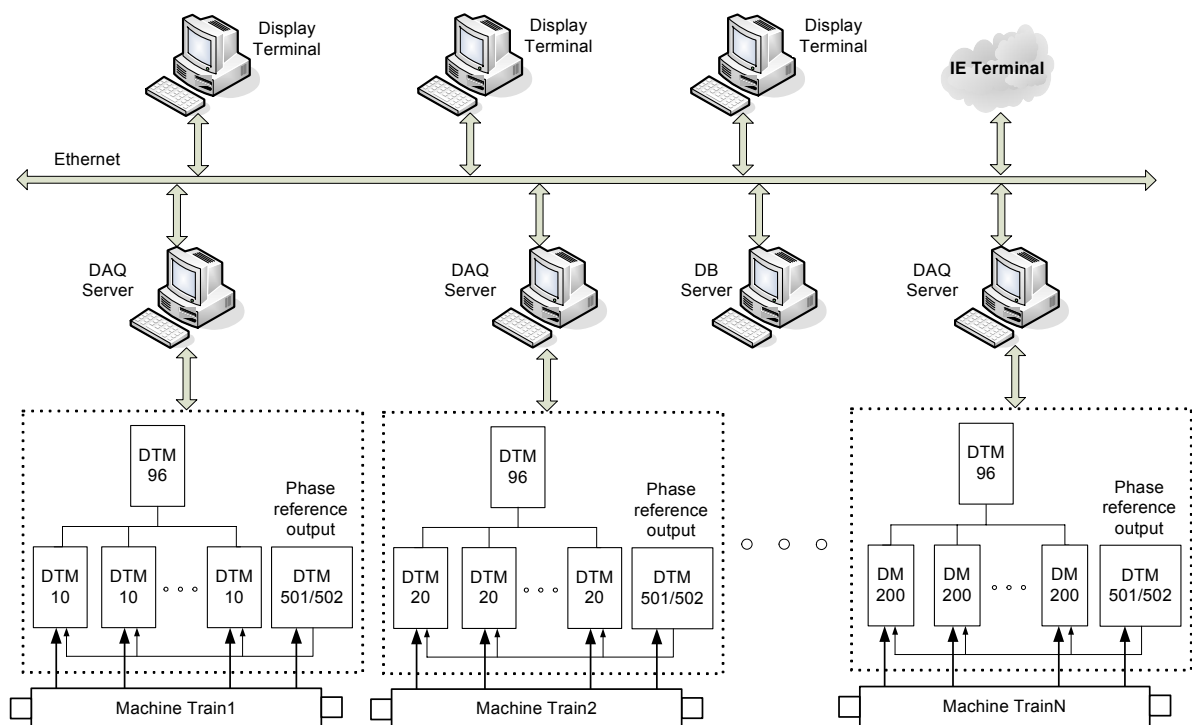
As a Plant Condition Management System, the PCM360DW can collect, store, and analyze machine health condition based on vibration, position, and other process parameters and is capable of transmitting the information over LAN or internet.

The PCM360DW system focuses on dynamic and static data collection. Data is processed digitally and transmitted to the PCM360DW software via the same digital port that transmits Modbus data. Both dynamic and static data can be transmitted together via RS485 or Ethernet.

With the PCM360DW system information concerning the machine status and measured value can be easily and quickly integrated into one system, which making the configuration process simple and intuitive.

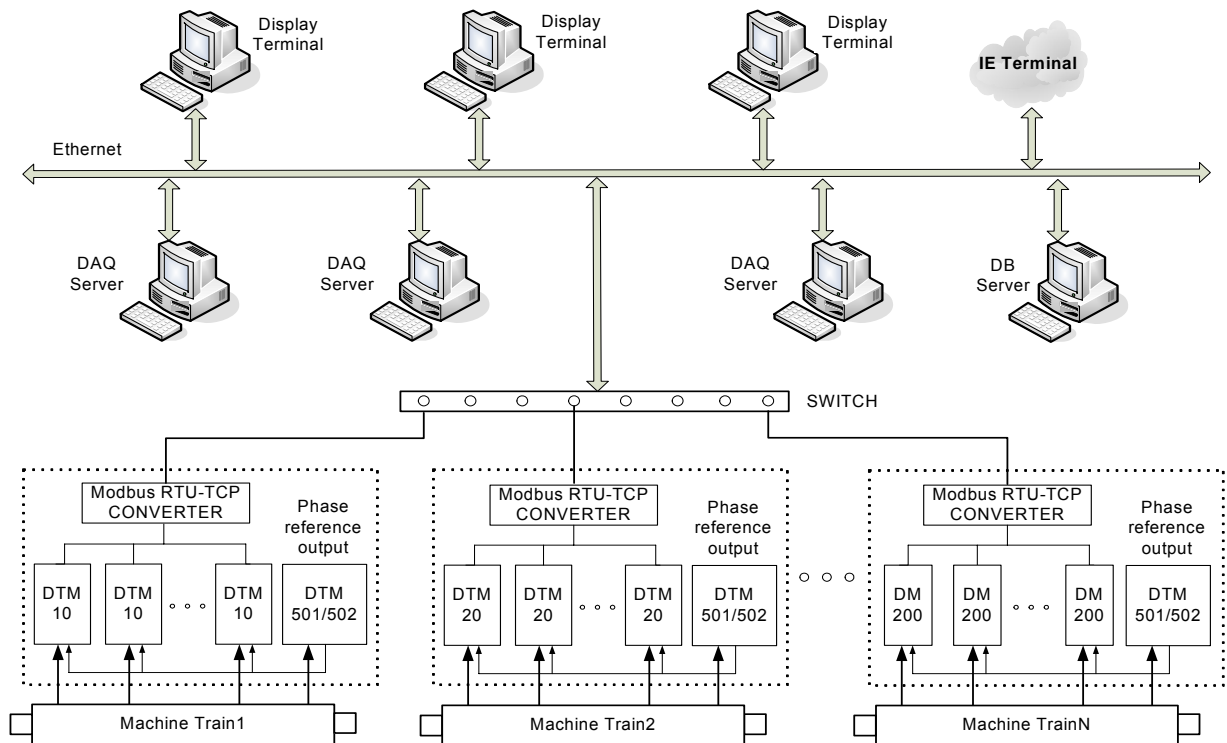
PCM360DW Advantage

- ✓ **MAXIMIZE PRODUCTIVITY** by minimizing machine down time. Predictive maintenance enables plant operators to diagnose early warning signs of machine running problems.
- ✓ **CENTRALIZED DATABASE.** All data flows into a centralized database thus enabling users to manage machine data automatically.
- ✓ **SHARE** machine condition management information among various departments and managers by moving data and not men.
- ✓ **BROWSER/SERVER ARCHITECTURE** enables user to log on the PCM360DW system via any IE terminal.
- ✓ **MODBUS INTERFACE.** Static and Dynamic data can be obtained via standard Modbus RTU or Modbus TCP protocol. The figures below show a typical network system layout with multiple DTMs and/or DMs digital meters. One figure shows RTU network integration and another shows TCP network integration.





Portable and Online Condition Monitoring System



- ✓ **SINGLE DIGITAL PORT FOR BOTH DYNAMIC AND STATIC DATA.** Overalls values, alarms, and system status can be accessed via the standard Modbus protocol. Waveform, spectrum, and shaft XY vibration signals can also be accessed with the same digital port. Our DTM's and DM's capture the raw signal and transmit it digitally to the PCM360DW analysis system. A significant cost saving is realized by eliminating additional cabling, signal conditioning modules, and interface hardware normally needed to acquire vibration signals.
- ✓ **STANDARD ETHERNET NETWORKING.** Data is exchanged via a single digital port. This can be RS485 or Ethernet. Existing standard Ethernet networks in your plant will make the machine status data available plant-wide.
- ✓ **SIMPLIFIED FIELD WIRING.** Field wiring has never been easier with the integrated port for all digital data communications.
- ✓ **PLOTS AND ANALYSIS TOOLS.** Waveform plots, spectrum plots, waterfall plots, shaft XY vibration plots (DM200 only), trend plots, alarm lists, bar graphs, machine mimics and more. 1X, 2X, NOT1X amplitude and phase are available along with NX amplitude and phase information.
- ✓ **FULLY DIGITAL, PROGRAMMABLE AND RELIABLE TRANSMITTER-MONITORS.** The DTM and DM series digital transmitter-monitors are designed based on advanced microprocessing technique and could be used for critical machine as well as balance of plant applications. They are easily configured by the related configuration software which developed on Windows platform and is easy to operate. In addition, the built-in system diagnosis and redundancy such as power redundancy, output redundancy and channel redundancy provide a more reliable protection system.
- ✓ **NEVER MISS AN ALARM.** When an alarm occurs, the waveform and spectrum information, together with sensor OK status, alarm status, overall vibration level, gap voltage, and other channels status information, will be automatically stored for further analysis.



Portable and Online Condition Monitoring System

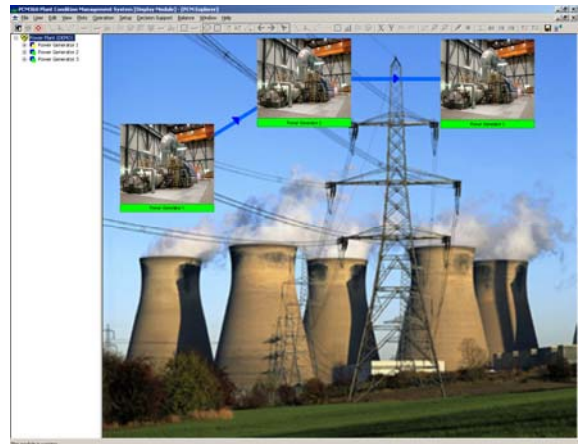
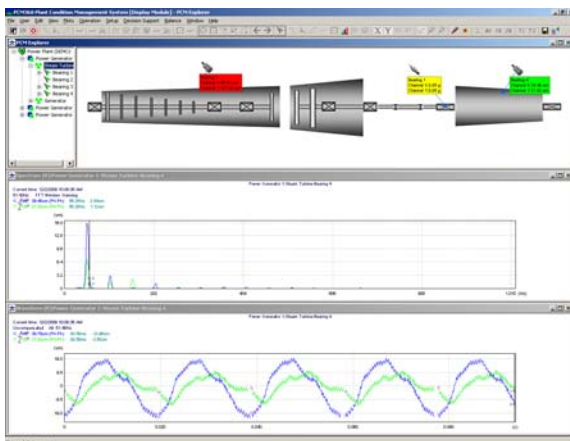
PCM360DW Features

- ✓ User-friendly interface for instant data analysis with minimal training required for field staff.
- ✓ Build on Microsoft® SQL Server software to assure better data management and reliable networking.
- ✓ Dynamic data and static data collection. And the data could be displayed by collected time order.
- ✓ Data from DTM and DM200 channels under the same machine train will be collected synchronously.
- ✓ Up to 800 lines of spectrum resolution with DTM and DM200. The available channel's sampling frequencies are 500Hz, 4 KHz, and 25 KHz.
- ✓ Client/Server architecture let Display terminal has access to database to display historical data.
- ✓ Display the specific status data on Display Terminal.
- ✓ Save plot as .bmp format.
- ✓ Readily integrates with third-party vibration monitors and process monitors with minimum hardware requirements.
- ✓ Transfers data based on OPC technology.
- ✓ Multiple hardware output modules ready for further data transfer and annunciation in relays and current transmission.
- ✓ 24 hour notification through on site alarms, operator interface, and even SMS messaging on GPRS mobile.
- ✓ Flexibility of software and hardware modules allows future modifications at the time of plant expansion.
- ✓ Assist plant managers to take intelligent maintenance decisions based on acquired data.

PCM360DW Additional Information

User-friendly system with integrated layout

- ✓ Software modules work in one unified user interface.



- ✓ Designed for easy installation, configuration, and data analysis.
- ✓ Significantly decreases the learning/training time and cost with user-friendly interface.

Universal vibration interface module

- ✓ Works with ProviTech's DTM and DM200 that transfer dynamic waveform data via Modbus RTU or Modbus TCP protocols.
- ✓ Works with other third-party digital meters that transfer overall data via Modbus RTU or Modbus TCP protocols.

Universal process interface module

- ✓ Isolated voltage input
- ✓ 4-20mA input
- ✓ Thermocouple or thermo resistor

Baseline reference

- ✓ Standard baseline data can be collected when machine is running in good condition.
- ✓ Baseline data can be integrated into plots for comparison with newly collected data.
- ✓ Differences will indicate changes in machine condition, providing important information for analysis.

Dynamic plots

- ✓ In addition to just one channel data analysis, each dynamic plot is capable of containing channel X and channel Y data, as well as phase information.
- ✓ Baseline data can also be included in the plot.
- ✓ All the above can be put into one standard plot making comparative analysis much easier.
- ✓ Phase reference information will be displayed on waveform plot and shaft XY vibration plot.



Portable and Online Condition Monitoring System

- ✓ FFT analysis for spectrum plot to improve accuracy of the produced spectrum.
- ✓ Time sensitive dynamic and waterfall trends.

Alarms output and overall output

- ✓ The processed alarms can be programmed to drive relays. Programmable alarm is similar to ladder logic in PLC allowing one to program multiple alarms in logic combination. Each PCM360DW system can drive up to 1,024 relays.
- ✓ The overall measured value of each channel can be programmed to drive a 4-20mA output.

Remote notification to operator's mobile phone

- ✓ Timed status and overall notification with predefined machines and measurement points.
- ✓ Notifications containing machine running status and overall vibration values sent when triggered by alarms.

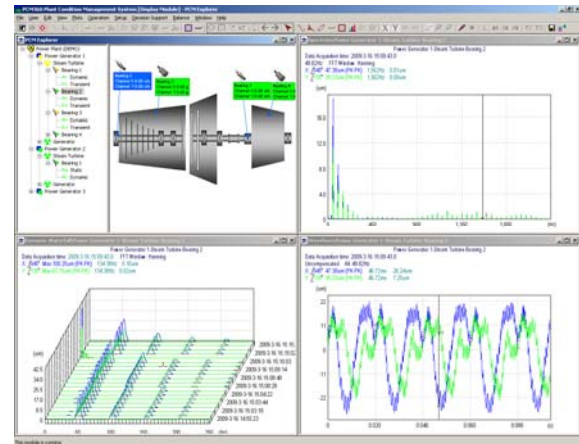
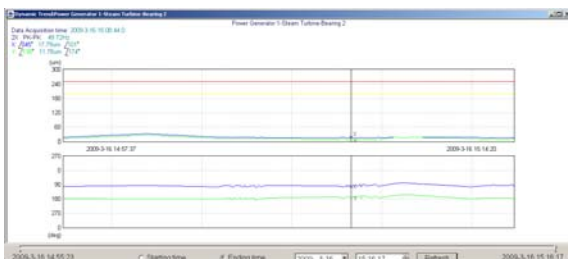
Dynamic and static data collection and analysis

Plots and functions supported by dynamic data

- ✓ Waveform XY with optional baseline plot
- ✓ Spectrum XY with optional baseline plot
- ✓ Full spectrum plot (DM200 only)
- ✓ Shaft XY vibration plot (DM200 only)
- ✓ Bar graph
- ✓ Trend plot
- ✓ Waterfall plot
- ✓ Attach notes
- ✓ Status definition

Plots and functions supported by static data

- ✓ Navigate the static data by time. Each page can display up to 2000 static samples.
- ✓ Bar graph
- ✓ Trend plot



Analysis

- ✓ Machine mimic photo image status view
- ✓ X, Y with baselines and phase reference on one plot
- ✓ Plots with historical and real-time values
- ✓ Alarm lists
- ✓ Overall vibration real-time status lists
- ✓ Bar graphs
- ✓ Printable Plots
- ✓ Save plots as .bmp format
- ✓ Zoom in & Zoom out
- ✓ Auto full-scale
- ✓ Harmonics
- ✓ Sideband
- ✓ FFT Windows
- ✓ Overall, 1X, 2X, NX, NOT1X
- ✓ Baseline contrast
- ✓ SMax on shaft XY vibration plot
- ✓ Synchronized marker on multi-plots
- ✓ Waveform and spectrum visible by double clicking any point on dynamic trend or waterfall plot.
- ✓ Real-time waveform and spectrum plots visible by double clicking the bar graph of any channel.
- ✓ Plot group analysis on measurement points.
- ✓ Plot group analysis on waveforms.
- ✓ Plot group analysis on spectrums.
- ✓ Plot group analysis on shaft XY vibrations.

Network Ready: Multiple User Access

Microsoft® SQL Server Software

- ✓ PCM360DW adopts the MS SQL Server Software for data storage and management.
- ✓ Database can be attached, backed up, restored, deleted, and detached with a single



mouse-click.

Three levels of User Access

- ✓ Administrator: has un-limited access right.
- ✓ Super user: capable of configuring the data acquisition input units and output units.
- ✓ User: analysis and report only.

PCM360DW Data Acquisition Input

PCM360DW data acquisition input module could put all possible plant machine running status information and plant machine process information into the integral system.

Directly interface with the monitors via digital link:

- ✓ DTM
- ✓ DM200

Process/Static data via PT371 universal input module (optional):

- ✓ Any process monitor with analog output
- ✓ Any process sensor with analog output

Additional process data via Modbus or OPC module (optional):

- ✓ Any monitor with Modbus output
- ✓ Any monitor with OPC interface

PCM360DW Data Acquisition Output

ProvibTech supplies various data output modules with digital and analog interface. The output modules offer other plant management systems the information from the PCM360DW system.

Digital Modbus output:

- ✓ Modbus TCP

Programmable relay outputs (optional):

- ✓ Using ladder logic to program relays (PT373) output.
- ✓ Relays are dry contact for ideal contact ratings and isolation.

Programmable current output (optional):

- ✓ 4-20mA output corresponding with any channels overall value.

Remote notification via cellular phone (optional):

- ✓ Notification on any alarm events.
- ✓ Notification on pre-selected channel status.
- ✓ Notification on overall pre-selected channel.

Data sharing on the generic Microsoft® SQL Server:

- ✓ Ready for data transfer via MS SQL Server Software.

PCM360DW Specifications

Frequency Response ($\pm 3\text{dB}$):

DTM10

Normal frequency: 4 - 3.0 KHz
 Low frequency: 0.5 - 100Hz



DTM20

Normal Frequency:
 Acceleration: 4 - 3.0 KHz
 Velocity: 4 - 3.0 KHz
 Displacement: 4 - 3.0 KHz
 Low Frequency:
 Acceleration: 0.5 - 100Hz
 Velocity: 0.5 - 100Hz (TM079VD)
 Displacement: 0.5 - 100Hz (TM079VD)
 High Frequency:
 Acceleration: 10 - 20 KHz (PK)



DM200

Standard: 4 - 3.0 KHz
 Low frequency: 0.5 - 100Hz



Measurement Range:

Acceleration (PK or RMS): 0 - 20g
 Velocity (PK or RMS): 0 - 100 mm/sec
 (0 - 4 in/sec)
 Displacement (PK-PK): 0 - 20 mm (0 - 800 mil)

Unit of Measurement

PK
 PK-PK
 RMS
 AVER



Portable and Online Condition Monitoring System

Waveform and Spectrum

Spectrum resolution is 400 lines or 800 lines with DMs or DTMs.

Software is capable of up to 12,800 lines of resolution using additional hardware.

Storage and Network Database

Microsoft® SQL Server 2008 WorkGroup Edition.

Operating System

Windows XP SP2 or later version of Windows.

Data Storage Capacity

Unlimited by software.

Limited by hardware storage capacity only.

Routing Capacity

Unlimited in plant, machine train, machine, and measurement point.

System Processing Capability

Limit of data acquisition units per system: 240

Limit of Modbus devices per system: 240

Computer Specifications

Please consult ProvibTech for details.

PCM360DW Technical Support

PCM360DW comes standard with one year technical support. Additional support may be purchased.

- ✓ Free software updates for one year
- ✓ Enable technical support with the software

Order Information

PCM360DW Software

The PCM360DW On-Line Condition Monitoring System consists of the PCM360DW software package, the digital monitors with vibration sensors, and the network accessories.

PCM360-COM-AX

PCM360-COM is a software module that interfaces with communication and data acquisition hardware.

AX: Software option

A0*: Basic Communication software for DMs and DTMs

A1: Software updates CD

PCM360-DISP-AX

PCM360-DISP is a display and analysis software module.

AX: Software option

A0*: Basic Display Software

A1: Software updates CD

PCM360DW-MODBUS-AX

PCM360DW-MODBUS is a Modbus RTU and Modbus TCP software module. This module is for both input and output.

AX: Software option

A0*: Digital communication software

A1: Software updates CD

PCM360-DBM-AX

PCM360-DBM is the database management software module.

AX: Software option

A0*: SQL Database Software

A1: Software updates CD

PCM360DW-LIS-AXX-BXX-CX-DX-EX-FX-GX-HX

PCM360DW-LIS is a software module that controls user options and licenses.

AXX: Communication and data acquisition module user licenses

XX: Number of interface modules

BXX: Display module user licenses

XX: Number of simultaneous user displays

CX: Analysis options

C1: Static and dynamic

DX: Remote cellular phone notification (software module only)

D0: With remote notification

D1: No remote notification

EX: Text Output Option

E0: With Text Output

E1: Without Text Output

FX: Digital Communication

F2: With Modbus and digital condition monitoring

GX: OPC Option

G0: With OPC

G1: Without OPC

HX: Web Server Option

H0: With Web service

H1: Without Web service



PCM-SQL

Microsoft® SQL Server 2008 WorkGroup Edition. Can also be supplied by customer.

Microsoft® Windows Server

Supplied by customer.

PCM360DW Hardware

The PT360-DAQ On-line Data Acquisition Unit is a fully configured industrial computer or work station, optional 19" LCD display, and signal process modules.

PT360-DAQ-CX-DX-EX

CX: SQL

C0*: Included

C1: Not included

DX: Configuration

D0: As both data acquisition and display system (Industrial computer)

D1*: As a data acquisition system only (industrial Computer; monitor display is not available)

D2: As both data acquisition and display system (Work station)

D3: As a data acquisition system only (work station; monitor display is not available)

EX: Communication kit

E0*: Modbus TCP

E1: Modbus RTU (one PCM-485 included)

* Note: Default configuration

PCM-SERV

PCM-SERV is a pre-configured server computer loaded and initialized with Microsoft® Windows server, Microsoft® SQL Server software (software is purchased separately), and PCM360DW Software package (sold separately). Please consult with ProvibTech for computer and Microsoft® Windows server specification and price.

PCM360DW Monitors

DTM10-201-AX-CX-GX-IX-MX-SX

Factory pre-configured for radial vibration (probe driver required)

AX: Full Scale

A0*: 0 - 200um PK-PK

A1: 0 - 1,000um PK-PK

A2: 0 - 100um PK-PK

A3: 0 - 10mil PK-PK

A4: 0 - 50mil PK-PK

A5: 0 - 5.0mil PK-PK

A6: 0 - 200um PK-PK (0.5 - 100Hz)

A7: 0 - 1,000um PK-PK (0.5 - 100Hz)

A8: 0 - 100um PK-PK (0.5 - 100Hz)

CX: Alarms

C0*: Dual alarms with epoxy sealed relays

C1: No alarm

GX: Mounting

G0*: DIN rail mount

G1: Plate mount

IX: Frequency Response

I0*: Normal frequency

I1: Low frequency (0.5 - 100Hz)

MX: Digital Communication

M1*: With Modbus

M2: With Modbus and digital condition monitoring

SX: Approvals

S0*: CE

S1: CE

CSA: Class I, Div.2, GrpsABCDT4

ATEX: II3G, Ex nA II T4

GOST R: 2Ex nA II T4X

DTM10-202-AX-CX-GX-SX

Factory pre-configured for axial (thrust) position (probe driver required)

AX: Full Scale

A0*: 1.0 - 0 - 1.0mm (40 - 0 - 40mil)

(Requires TM0180 or other 8mm proximity probe transducer; TM0105 or other 5mm proximity probe transducer.)

A1: 2.0 - 0 - 2.0mm (80 - 0 - 80mil)

(Requires TM0110 or other 11mm proximity probe transducer)

A2: 5.0 - 0 - 5.0mm (0.2 - 0 - 0.2inch)

(Requires TM0120 or other 25mm, 35mm proximity probe transducer)

A3: 12.0 - 0 - 12.0mm (0.5 - 0 - 0.5inch)

(Requires TM0150 or other 50mm proximity probe transducer)

CX: Alarms

C0*: Dual alarms with epoxy sealed relays

C1: No alarm

GX: Mount

G0*: DIN rail mount

G1: Plate mount

SX: Approvals

S0*: CE

S1: CE



CSA: Class I, Div.2, GrpsABCDT4
ATEX: II3G Ex nA II T4
GOST R: 2Ex nA II T4X

DTM10-501-AX-CX-FXX-GX-SX

Factory pre-configured for speed/phase Reference (Probe Driver required)

AX: Full Scale

- A0: 0 - 1,000 RPM
- A1*: 0 - 3,600 RPM
- A2: 0 - 6,000 RPM
- A3: 0 - 10,000 RPM
- A4: 0 - 30,000 RPM
- A5: 0 - 50,000 RPM
- A6: phase reference output

CX: Alarms

- C0*: Dual alarms with epoxy sealed relays
- C1: No alarm

FXX: Teeth per Revolution

F01*: 1

FXX: Customer specifies, number of teeth =XX

GX: Mounting

- G0*: DIN rail mount
- G1: Plate mount

SX: Approvals

- S0*: CE
- S1: CE

CSA: Class I, Div.2, GrpsABCDT4
ATEX: II3G Ex nA II T4
GOST R: 2Ex nA II T4X

E00*: TM0180, 5m Cable

E01: TM0180, 9m Cable

E02: 8mm Probe, 3300, 5m Cable

E03: 8mm Probe, 3300, 9m Cable

E04: 8mm Probe, 7200, 5m Cable

E05: 8mm Probe, 7200, 9m Cable

E06: TM0105, 5m Cable

E07: TM0105, 9m Cable

E08: TM0110, 5m Cable

E09: TM0110, 9m Cable

E10: 11mm Probe, 3300, 5m Cable

E11: 11mm Probe, 3300, 9m Cable

E12: 11mm Probe, 7200, 5m Cable

E13: 11mm Probe, 7200, 9m Cable

GX: Mount

G0*: DIN rail mount

G1: Plate mount

IX: Frequency Response

I0*: Normal frequency

I1: Low frequency (0.5-100Hz)

MX: Digital Communication

M1*: With Modbus

M2: With Modbus and Digital Condition Monitoring

SX: Approvals

S0*: CE

S1: CE

CSA: Class I, Div.2, GrpsABCDT4
ATEX: II3G Ex nA II T4
GOST R: 2Ex nA II T4X

DTM10-302-AX-CX-EXX-GX-SX

Factory configured for Axial (Thrust) Position (Built-in Probe Driver)

AX: Full Scale

A0*: 1.0 - 0 - 1.0mm (40 - 0 - 40mil)
(Requires TM0180 or other 8mm proximity probe)

A1: 2.0 - 0 - 2.0mm (80 - 0 - 80mil)
(Requires TM0110 or other 11mm proximity probe)

CX: Alarms

C0*: Dual alarms with epoxy sealed relays

C1: No alarm

EXX: Probe and Cable (not included)

E00*: TM0180, 5m Cable

E01: TM0180, 9m Cable

E02: 8mm Probe, 3300, 5m Cable

E03: 8mm Probe, 3300, 9m Cable

E04: 8mm Probe, 7200, 5m Cable

E05: 8mm Probe, 7200, 9m Cable

EXX: Probe and Cable (not included)



Portable and Online Condition Monitoring System

- E06: TM0105, 5m Cable
- E07: TM0105, 9m Cable
- E08: TM0110, 5m Cable
- E09: TM0110, 9m Cable
- E10: 11mm Probe, 3300, 5m Cable
- E11: 11mm Probe, 3300, 9m Cable
- E12: 11mm Probe, 7200, 5m Cable
- E13: 11mm Probe, 7200, 9m Cable

GX: Mount

- G0*: DIN rail mount
- G1: Plate mount

SX: Approvals

- S0*: CE
- S1: CE
- CSA: Class I, Div.2, GrpsABCDT4
- ATEX: II3G Ex nA II T4
- GOST R: 2Ex nA II T4X

DTM10-502-AX-CX-EXX-FXX-GX-SX

Factory pre-configured for speed/phase reference (Built-In Probe Driver)

AX: Full Scale

- A0: 0 - 1,000 RPM
- A1*: 0 - 3,600 RPM
- A2: 0 - 6,000 RPM
- A3: 0 - 10,000 RPM
- A4: 0 - 30,000 RPM
- A5: 0 - 50,000 RPM
- A6: phase reference output

CX: Alarms

- C0*: Dual alarms with epoxy sealed relays
- C1: No alarm

EXX: Probe and Cable (not included)

- E00*: TM0180, 5m Cable
- E01: TM0180, 9m Cable
- E02: 8mm Probe, 3300, 5m Cable
- E03: 8mm Probe, 3300, 9m Cable
- E04: 8mm Probe, 7200, 5m Cable
- E05: 8mm Probe, 7200, 9m Cable
- E06: TM0105, 5m Cable
- E07: TM0105, 9m Cable
- E08: TM0110, 5m Cable
- E09: TM0110, 9m Cable
- E10: 11mm Probe, 3300, 5m Cable
- E11: 11mm Probe, 3300, 9m Cable
- E12: 11mm Probe, 7200, 5m Cable
- E13: 11mm Probe, 7200, 9m Cable

FXX: Teeth per Revolution

F01*: 1

FXX: Customer specifies number, number of teeth =XX

GX: Mount

- G0*: DIN rail mount
- G1: Plate mount

SX: Approvals

- S0*: CE
- S1: CE
- CSA: Class I, Div.2, GrpsABCDT4
- ATEX: II3G Ex nA II T4
- GOST R: 2Ex nA II T4X

DTM20-101-AXX-CX-GX-HX-IX-MX-SX

Factory pre-configured Seismic Vibration DTM

AXX: Full Scale

- A00: 0 - 200um (8mil) PK-PK
- A01: 0 - 500um (20mil) PK-PK
- A02: 0 - 100um (4mil) PK-PK
- A03: 0 - 250um (10mil) PK-PK
- A05: 0 - 125um (5mil) PK-PK
- A06*: 0 - 50mm/s (2.0 ips) PK
- A07: 0 - 100mm/s (4.0 ips) PK
- A08: 0 - 20mm/s (0.8 ips) PK
- A11: 0 - 25mm/s (1.0 ips) PK
- A12: 0 - 5.0g PK
- A13: 0 - 10g PK
- A26: 0 - 50mm/s (2.0 ips) RMS
- A27: 0 - 100mm/s (4.0 ips) RMS
- A28: 0 - 20mm/s (0.8 ips) RMS
- A31: 0 - 25 mm/s (1.0 ips) RMS

CX: Alarms

- C0*: Dual alarms with epoxy sealed relays
- C1: No Alarm

GX: Mounting

- G0*: DIN rail mount
- G1: Plate mount

HX: Sensors (not included)

- H0*: TM0782A or any current mode accelerometer with 100mV/g (A00-A05 not available)
- H1: TM0793V or any current mode velocity sensor with 4mV/mm/s (A12, 13 not applicable)
- H2: TM079VD (A12, 13 not available)

HXXX: Seismic velocity sensor,

Sensitivity = XXXmV/in/sec (A12, 13 not available)

IX: Frequency Response

- I0*: Normal frequency (H2 not available)
- I1: Low frequency (0.5-100Hz)
- I2: High frequency (A12, A13 only with accelerometer)

MX: Digital Communication



Portable and Online Condition Monitoring System

M1*: With Modbus
M2: With Modbus and Digital Condition Monitoring

SX: Approvals

S0*: CE

S1: CE

CSA: Class I, Div.2, GrpsABCDT4

ATEX: II3G Ex nA II T4

GOST R: 2Ex nA II T4X

*Please refer to DTM catalog for details.

DX: Environmental Rating (front panel)

D0*: No rating

D1: IP65 or NEMA 4X (buffered output and settings not Available on front panel)

EX: Digital Communication

E0*: No digital communication

E1: With Modbus

E2: With Modbus and digital condition monitoring

*Please refer to DM200 catalog for details.

DM200-AXX-BX-CX-DX-EX

Dual channel A/V/D vibration monitor

AXX: Full Scale

A12: 0 ~ 5.0g PK

A13: 0 ~ 10g PK

A40*: 0 ~ 20mm/s RMS

A41: 0 ~ 25 mm/s RMS

A42: 0 ~ 50mm/s RMS

A43: 0 ~ 100mm/s RMS

A46: 0 ~ 1.0 ips RMS

A47: 0 ~ 2.0 ips RMS

A48: 0 ~ 4.0 ips RMS

A50: 0 ~ 20mm/s PK

A51: 0 ~ 25 mm/s PK

A52: 0 ~ 50mm/s PK

A53: 0 ~ 100mm/s PK

A56: 0 ~ 1.0 ips PK

A57: 0 ~ 2.0 ips PK

A58: 0 ~ 4.0 ips PK

A60: 0 ~ 100um PK-PK

A61: 0 ~ 125um PK-PK

A62: 0 ~ 200um PK-PK

A63: 0 ~ 250um PK-PK

A64: 0 ~ 500um PK-PK

A66: 0 ~ 5mil PK-PK

A67: 0 ~ 10mil PK-PK

A68: 0 ~ 20mil PK-PK

BX: Sensor (not include)

B0*: TM0782A, TM0783A, TM0785A or any ICP accelerometer with 100mV/g (A60-A68 not applicable)

B1: TM0793V or any ICP velocity sensor with 4mV/mm/s (A12, 13 not applicable)

B2: TM079VD (A12, 13 not available)

BXXX: Seismic sensor, Sensitivity = XXX

CX: Frequency Response

C0*: Normal Frequency (B2 not applicable)

C1: Low Frequency (B2 only)

RS485 Networking Order Information

DTM96-AX-BX-SX

DTM96 acts as the interface between DTM (or DM) and the PCM360DW software. Each DTM96 enables up to 32 DTM (or DM) modules to be networked together.

AX: Output

A0*: Modbus RS485, RS422, RS232

BX: Mounting

B0*: DIN rail mount

B1: Plate mount

SX: Approvals

S0*: CE

S1: CE

CSA: Class I, Div.2, GrpsABCDT4

ATEX: II3G Ex nA II T4

GOST R: 2Ex nA II T4X

PCM-485

RS485 module on PCI slot. Each module has two RS485 ports.



Ethernet Order Information

PCM-TCP

Modbus RTU-TCP Converter, which interface DTMs or DMs to an Ethernet network.





Order Information (Optional)

PCM360 Software

PCM360-SMS-AX

PCM360-SMS is a SMS software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-TextOutput-AX

PCM360-TextOutput is a Text Output software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-OPC-AX

PCM360-OPC is an OPC software module. This module is for both server and client.

AX: Software option

A0*: OPC communication software (Contains both server and client).

OPC-Server: Offering the PCM360 data for the third party's OPC software.

OPC-Client: Collecting the data from the third party's OPC devices.

A1: Software updates CD.

PCM360-Web Server-AX

PCM360-Web Server is a web service software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360-SUP-AX-BXX

Extended technical support agreement

AX: Additional years

X = Number of additional years

BXX: Machines

XX = Number of machines

* Note: Default configuration

Accessories (Optional)

TM900

Power Converter that converts 110VAC/220VAC to 24VDC. Each TM900 can power up to six DTMs.

Sensor

Vibration sensors or proximity sensors are required for DTMs and DMs.

PCM-SMS

SMS cellular phone message transmission and receiving hardware module. This module works with any GSM system.

PT371

Universal input module, 16 channels (requires PCM360DW-MODBUS-AX).

PT372

4-20mA output module, 4 channels (requires PCM360DW-MODBUS-AX).

PT373

Relay alarm module, 16 channels (requires PCM360DW-MODBUS-AX).



PCM360DW Application Notes

I. PCM360DW Basic System Configuration

A PCM360DW basic system is configured to interface with one package of DTMs.

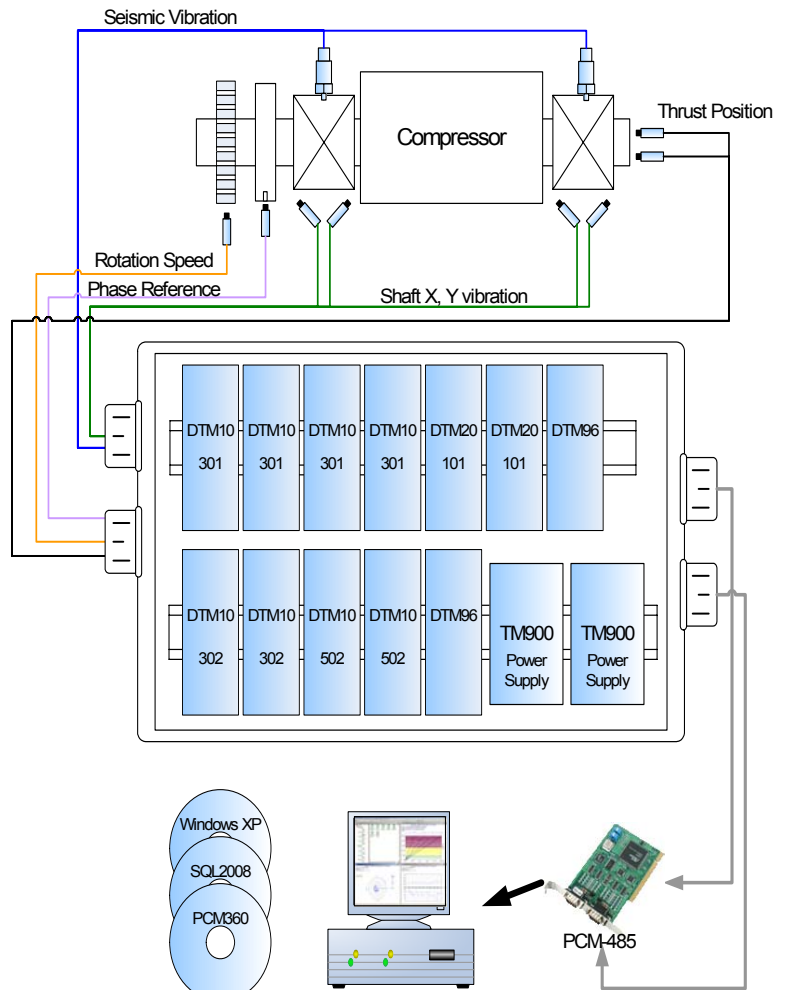
For example: A plant has one compressor to be monitored. The compressor has four proximity probes to measure shaft X and Y vibration; two velocity sensors to measure seismic vibration; two proximity probes to measure thrust position; one proximity probe to measure rotation speed; and one proximity probe to measure phase reference.

Software Required:

- PCM360-COM-A0
- PCM360-DISP-A0
- PCM360-DBM-A0
- PCM360DW-MODBUS-A0
- PCM-SQL
- PCM360DW-LIS-A01-B01-C1-D1-E1-F2-G1-H1

Hardware Required:

- Qty. 1 PT360-DAQ-C1-D0-E1
- Qty. 4 DTM10-301-A0-C0-E00-G0-I0-M2-S1
- Qty. 2 DTM10-302-A0-C0-E00-G0-S1
- Qty. 2 DTM20-101-A06-C0-G0-H1-I0-M2-S1
- Qty. 1 DTM10-502-A1-C0-E00-F60-G0-S1
(rotation speed)
- Qty. 1 DTM10-502-A7-C0-E00-F01-G0-S1
(phase reference)
- Qty. 2 TM900-A0 (power supply)
- Qty. 2 DTM96



This is a 10 channel system. The entire system, with hardware and software, has been put into an industrial computer. This system will perform data acquisition with process data and dynamic data via Modbus. The system is ideal for plant operators, maintenance engineers, and managers that perform general data analysis and maintenance.

The features of the system include:

- ✓ Integral system with one industrial computer.
- ✓ Single user.
- ✓ 6 dynamic channels; 1 phase reference channel, 3 process channels.
- ✓ Interfaces with Industrial Computer through PCM-485.
- ✓ Microsoft® SQL Server 2008 WorkGroup Edition Software.
- ✓ Capable of collecting, analyzing and storing dynamic data.



Portable and Online Condition Monitoring System

Since PCM360DW is a modular system, the system can easily expand into a standard plant-wide condition management system; additional features can be realized by adding more modules.

- ✓ Multiple users access
- ✓ Up to 240 PT360-DAQ
- ✓ Up to 240 Modbus RTU devices
- ✓ Dedicated server computer
- ✓ High frequency data acquisition
- ✓ Hardware output of programmed alarms and 4-20mA
- ✓ Remote access to the system with Citrix™ server
- ✓ Logon the system via IE terminal
- ✓ Interface with any third-party's process data and dynamic data
- ✓ On-site technical service and training

II. PCM360DW Standard Network System Configuration

Example: A plant has 4 compressors like the one in above minimum system. Each compressor has four proximity probes to measure shaft X, Y vibration and two velocity sensors to measure seismic vibration; two proximity probes to measure thrust position; one proximity probe to measure rotation speed and one proximity probe to measure phase reference.

There will be one data acquisition unit, one server; and we assume that the plant has 3 users.

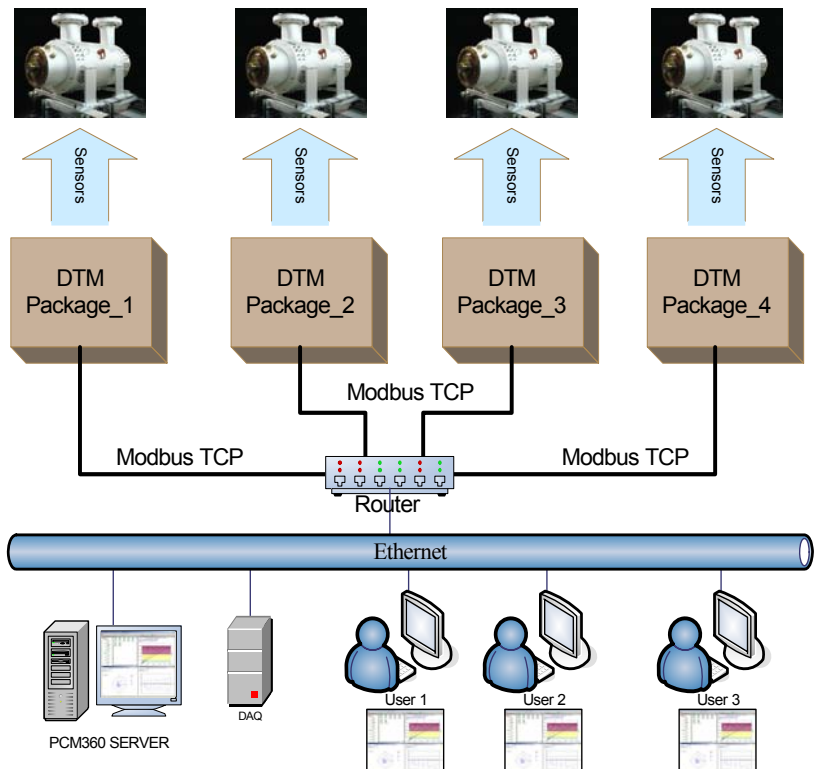
Recommendation: The standard PCM360DW system uses the following modules:

Software Required:

- PCM360-COM-A0
- PCM360-DISP-A0
- PCM360-DBM-A0
- PCM360DW-MODBUS-A0
- PCM360DW-LIS-A01-B03-C1-D1-E1-F2-G1-H1
- PCM-SQL

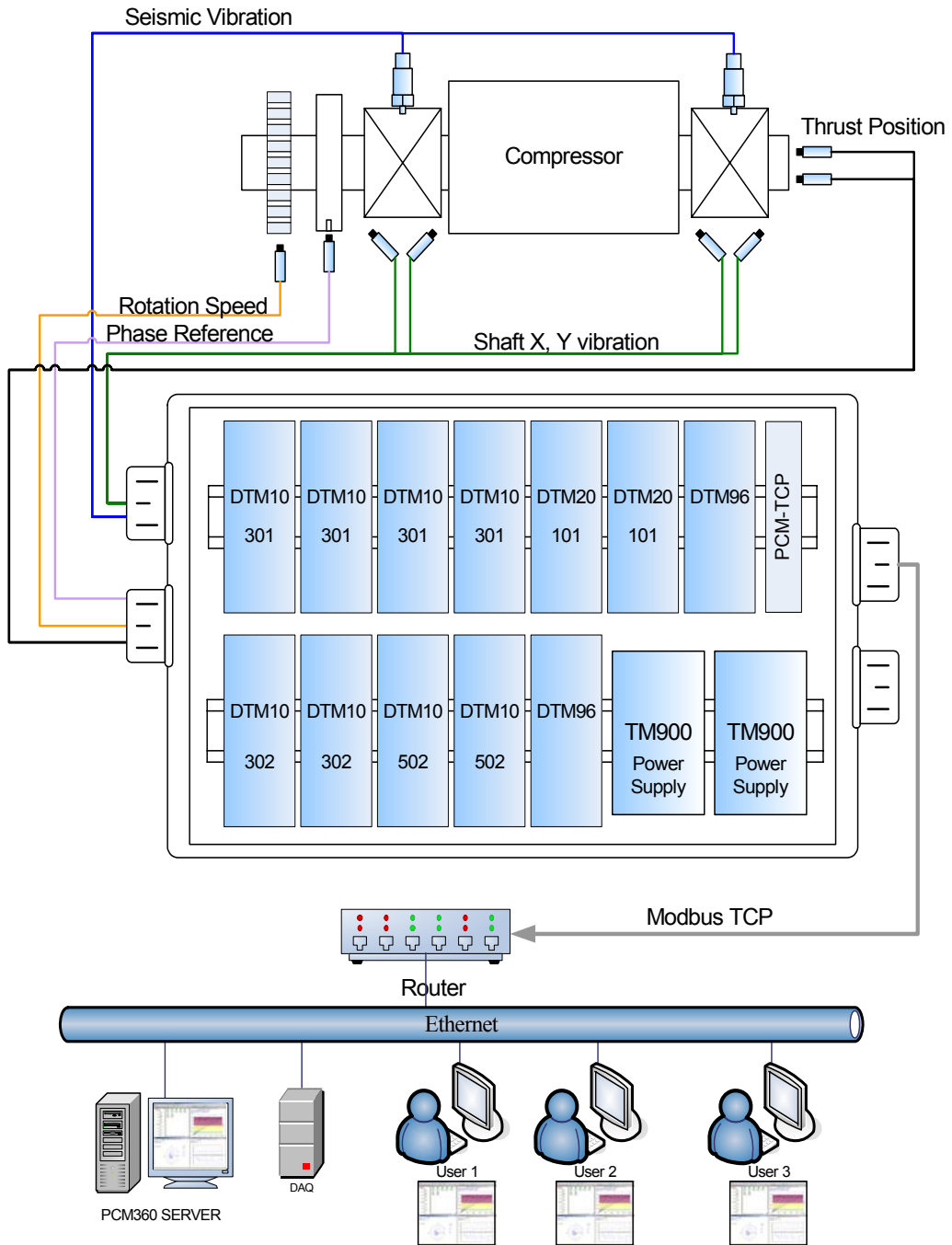
Hardware Required:

- Qty. 1 PT360-DAQ-C1-D1-E0
- Qty. 1 PCM-SERV
- Qty. 3 PCM-DPC
- Qty. 4 PCM-TCP
- Qty. 1 Router
- Qty. 16 DTM10-301-A0-C0-E00-G0-I0-M2-S1
- Qty. 8 DTM10-302-A0-C0-E00-G0-S1
- Qty. 8 DTM20-101-A06-C0-G0-H1-I0-M2-S1
- Qty. 4 DTM10-502-A1-C0-E00-F60-G0-S1
(rotation speed)
- Qty. 4 DTM10-502-A7-C0-E00-F01-G0-S1
(phase reference)
- Qty. 8 TM900-A0 (power supply)
- Qty. 8 DTM96





Portable and Online Condition Monitoring System





Appendix. Optional Accessories

PT371 Universal Input Module

The PT371 is a 16 channel input module.



Signal Inputs:

- Voltage input: 0 - 10V; -5 to +5V.
- Current input: 4 - 20mA (with the shunt resistor).
- Thermocouple or thermo resistors:
- Discrete input: any 0-24V; 0-12V; 0-5V.
- TC: K, E, S, T, N, J, B, R, EU-2.
- Compensation mode: Inner (Specify) and Exterior.
- RTD: Pt100, Cu50, Cu100, BA1, BA2, G.
- Wire Unit: 2-wires, 3-wires.

Data acquisition rate:

1.0 sec

Amplitude A/D resolution:

- PT371 module: 12 bit.
- 0.2% FS.

Power supply:

24VDC +/- 10% @ 150mA

PT372 4-20mA Output Module

The PT372 is a 4 channel 4-20mA output module.



Amplitude A/D resolution:

PT372 module: 12bit

Power supply:

24VDC +/- 10% @ 100mA

Maximum load:

750 ohms

PT373 Relay Module

The PT373 is a 16 channel relay module. The PT373 can be configured for any logic combination of alarms or status of each channel.

The relays are selectable as: energized/de-energized, latching/non-latching and bypass.



Power supply:

24VDC +/- 10% @ 150mA

Relays:

- Seal: epoxy
- Capacity: 0.5A/230VAC/30VDC, resistive load
- Relay type: SPDT
- Isolation: 1000VDC

PCM-SMS Cellular Phone GSM/GPRS Notifier Module

PCM-SMS is a quad-band universal transmission and receiving module that will transmit machine running status and overall about predefined measurement points into any GSM cellular phone.



Power supply:

6 - 40 VDC @ 500mA or 90 - 250 VAC @ 100mA, from 47 - 65 Hz.

Transmit format:

GSM; GPRS

Transmission frequency band:

- 850MHz
- 900MHz
- 1800MHz
- 1900MHz



PCM360-M Plant Condition Management System

Introduction

ProviTech's PCM360-M is a mobile plant condition management system that integrates data collecting, processing and analyzing into one system. It is mainly used to provide a short-term fault diagnosis and analysis for experts. The system is able to work with any ProviTech and third-party transducers to collect static, dynamic and transient data. Based on its multi-plant management mode, technicians can perform data management on various plants independently.

PCM360-M is developed based on the principle "user oriented". With its single user management and user-friendly interface, user could master the main functions of the software with less training. And with multiple analysis tools of the system, technicians and engineers can analyze the critical machinery running status and make an effective total solution for machine maintenance and protection.



Leading Features of PCM360-M

- ✓ Support two signal interfaces: continuous vibration signal from transducers and buffer output from our or third-party monitors.
- ✓ Up to 12,800 lines of spectrum resolution.
- ✓ Up to 32 plants and 3200 measurement points could be monitored in one PCM360-M system.
- ✓ Build on Microsoft® SQL Server database to assure better data management.
- ✓ Maintain and manage plants independently. And perform plants management just by one-key clicking.
- ✓ Display the specific status data on Display module.
- ✓ Attach notes to dynamic and transient samples.
- ✓ Set status for machine train and sample.
- ✓ Multiple trigger modes: alarm trigger, band alarm trigger, time trigger, speed trigger, and manually trigger.
- ✓ Multiple real-time plots: waveform, waveform with DC Coupling, spectrum, shaft XY vibration, shaft XY vibration with DC Coupling, trend, shaft centerline, bode, polar, bar graph, shaft mode shape, etc.
- ✓ Event list: Record alarm events of the plant.
- ✓ Status list: Display real-time value and alarm set-points in list format.
- ✓ Magnify, restore, auto full scale...and keyboard navigation functions make plots analysis more flexible.

PCM360-M Advantage

- ✓ The mobile and intelligent computer makes work easier and more convenient.
- ✓ Integrate plant condition monitoring and process data into one database.
- ✓ Automatically build integrative database of machine train's status by creating records about trend of machine trains running status during long-term running time.
- ✓ User-friendly system with integrated layout: Software modules works in one unified user interface; designed for customer easy configuration, and data analysis; significantly decreases the learning and training time and cost with the user-friendly interface.
- ✓ Advanced post-processing of transient data minimizes data loss and maximizes analysis capability.
- ✓ Simultaneous high speed data acquisition on all channels.
- ✓ Support two classes of sampling frequency: 250 KHz and 1 MHz, which makes system accurately collect high frequency signal in the field.
- ✓ Ideal for working with turbines, pumps, blowers, motors, and compressors. Can be utilized on refinery, petroleum, steel, fossil power, hydro power, cement, transportation, etc.
- ✓ Assist plant managers to take maintenance decision.



PCM360-M System Components

PCM360-M system consists of data acquisition hardware (a mobile computer with DAQ Card) and PCM360-M software (contains Plant Manager, DAQ&COM, and Display software).

PT360M-DAQ Data Acquisition Hardware

PT360M-DAQ is a portable military computer with DAQ Card and accessories.

Number of Channels

- ✓ 16 (with one DAQ Card)
- ✓ 32 (with two DAQ Cards)

Sampling Frequency

- ✓ Up to 15 KHz per channel with standard DAQ Card
- ✓ Up to 62 KHz per channel with high-speed DAQ Card

A/D Resolution

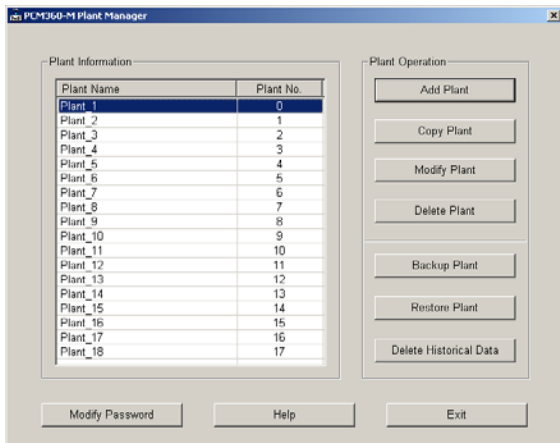
16 bit

Input Voltage Range

-20VDC to +20VDC

PCM360-M Plant Manager Software

A plant-management software, which is used to set up and maintain plants independently, such as backup and restore plant, copy the configuration information from one to another, etc.



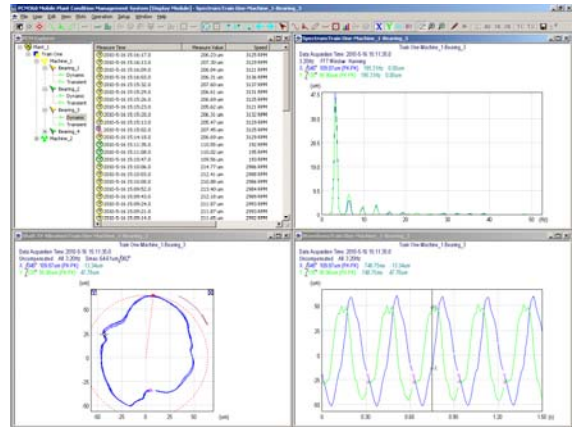
PCM360-M DAQ&COM Software

A data acquisition software, which is used to configure the plant and collect data. It supports two signal interfaces: continuous vibration signal from transducers, and buffer output from our or the third-party monitors.



PCM360-M Display Software

A data display and analysis software, which provides not only historical and real-time plots, but also multiple analysis tools.



PCM360-M Data Acquisition Input

PCM360-M system supports two signal interfaces to let our customer collect data from various plants and put all possible running status information of plant into one integral system. This feature makes the PCM360-M a significant better system than other similar systems available commercially in market today.

Direct interface with the following data acquisition hardware unit:

- ✓ PT360M-DAQ

Direct interface with PVT sensors via PT360M-DAQ and PCM-GP-M:

- ✓ TM0782A or any accelerometers
- ✓ TM0793V or any velocity sensors
- ✓ TM079VD Low frequency velocity sensors
- ✓ 5mm, 8mm, 11mm and 25mm proximity sensors



Monitors Link with PCM360-M via PT360M-DAQ

- ✓ PT2060/80-BK

Direct interface with the monitors via Buffer output:

- ✓ PT2060 Rack
- ✓ DTM
- ✓ DM

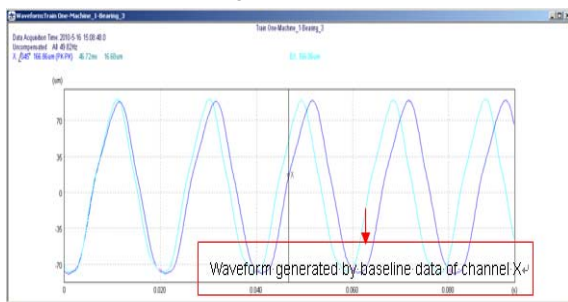
Third party vibration monitors link via PT360M-DAQ:

- ✓ Any monitors with buffer output

PCM360-M Data Analysis

Baseline reference

- ✓ A unique feature with PCM360-M. Standard baseline data can be collected when machine is running in good condition.
- ✓ This baseline data can always be integrated into plots for comparison with the newly collected data. Difference will be noted for machine condition change.



Trend change of running status

- ✓ Analyze variation trend of any one or more parameters compared with others.
- ✓ Static, dynamic, and transient trend plot
- ✓ Historical and real-time trend plot



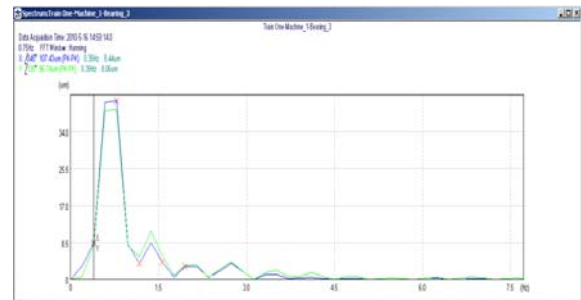
Compensation arithmetic

- ✓ To subtract the defined slow-roll from sample. (Slow-roll is collected at the low rotative speed of a rotor, at which dynamic motion effects from forces are negligible.)

- ✓ Four types of plot support the function: Waveform, shaft XY vibration, bode, and polar.

Harmonics and sideband

- ✓ Point of which frequency has some relationship with the specified sample's frequency.
- ✓ Help user find out the malfunction location on shaft according to the change of amplitude and phase angle.

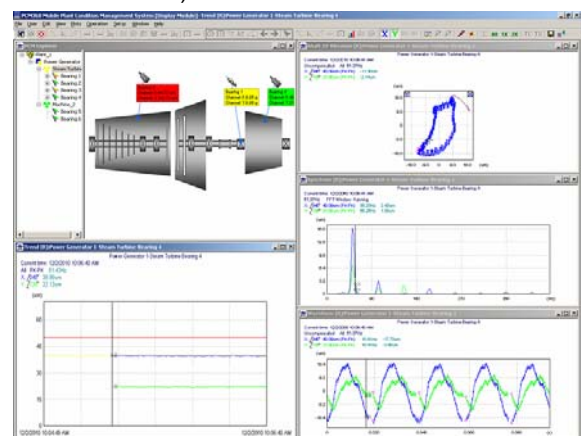


NX plot analysis

- ✓ Analyze user concerned frequency components by calculating amplitude and phase angle of 1X, 2X, NX, and NOT1X frequency components.
- ✓ Five types of plot support the function: Waveform, shaft XY vibration, trend, bode, and polar.

Group of plots contrast

- ✓ Group of sample
- ✓ Group of transient sample
- ✓ Group of measurement point
- ✓ Group of waveforms (historical and real-time)
- ✓ Group of spectrums (historical and real-time)
- ✓ Group of shaft XY vibration (historical and real-time)



Main functions supported by static, dynamic and transient sample



Static sample

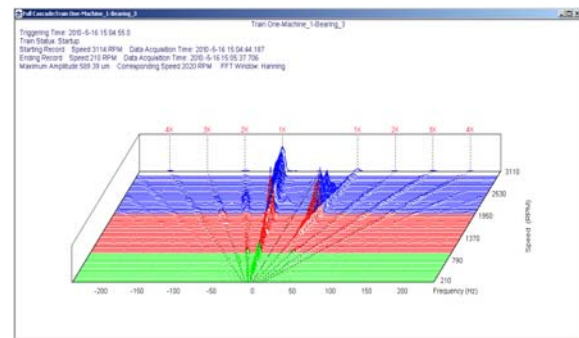
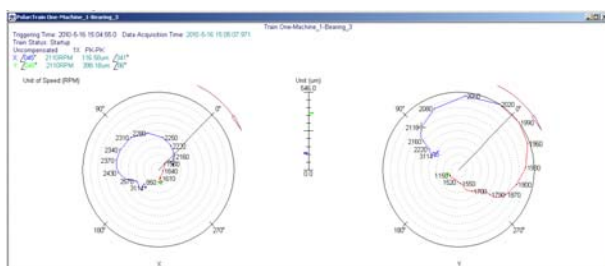
- ✓ PCM Explorer for Hierarchy structural machine view
- ✓ Machine mimic photo image status view
- ✓ Trend plot with historical and real-time
- ✓ Alarm list
- ✓ Status list
- ✓ Bar graph
- ✓ Process data view
- ✓ Print the plot as you seen
- ✓ Save plot as .bmp format
- ✓ Auto full-scale the plot
- ✓ Zoom in or zoom out the plot

Dynamic sample

- ✓ Waveform XY with optional baseline plot
- ✓ Waveform with DC Coupling plot
- ✓ Spectrum XY with optional baseline plot
- ✓ Spectrum with DC Coupling plot
- ✓ Full spectrum plot
- ✓ Shaft XY vibration plot
- ✓ Waterfall XY plot
- ✓ Shaft centerline plot
- ✓ 3-D shaft XY mode shape plot with multi-planes
- ✓ Band Alarm
- ✓ Bar graph
- ✓ Attach notes
- ✓ Status definition
- ✓ Auto full-scale the plot
- ✓ Zoom in or zoom out the plot

Transient sample

- ✓ Bode plot
- ✓ Polar plot
- ✓ Cascade plot
- ✓ Full Cascade plot
- ✓ Trend on Transient
- ✓ Waterfall on Transient
- ✓ Attach notes
- ✓ Status definition



- ✓ Auto full-scale the plot
- ✓ Zoom in or zoom out the plot

Other analysis:

- ✓ FFT Windows
- ✓ Synchronized marker on multi-plots
- ✓ Smax on most of the plots
- ✓ Revealing waveform and spectrum by double clicking the measurement point on the machine photo
- ✓ Waveform and spectrum visible with double clicking the point on dynamic waterfall plot
- ✓ Real-time waveform and spectrum visible with double clicking on the related channel's bar graph
- ✓ Waveform and spectrum visible with double clicking the point on dynamic trend plot
- ✓ Display the specific status data on Display Terminal

More information on dynamic plots

- ✓ In addition to just one channel data analysis, each of the PCM360-M dynamic plot contains both X and Y data, and phase information.
- ✓ Baseline data can also be included in the plot.
- ✓ All the above can be put into one standard plot. This will make analysis much easier.

More information on transient plots

- ✓ In addition to just one channel data analysis, each of the PCM360-M transient plot contains both X and Y data, and phase information.
- ✓ PCM360-M has one group of unique plot, the trend plot, waterfall plot and the shaft XY vibration plot with transient data.



PCM360-M Specifications

Frequency Response (+/- 3db)

- 0.5 - 100 Hz
- 0.5 - 1000 Hz
- 2 - 4,000 Hz
- 10 - 20,000 Hz

Measurement Range

- Acceleration (PK or RMS):
 - 0 - 20g
- Velocity (PK or RMS):
 - 0 - 100 mm/sec (0 - 4 in/sec)
- Displacement (PK-PK):
 - 0 - 20 mm (0 - 800 mil)

Unit of Measurement

- Peak
- Peak-peak
- RMS
- AVER

Waveform and Spectrum

- Resolution depends on customer configuration.
- Maximum spectrum resolution is 12,800 lines.

Storage Database

MS SQL Server 2008 WorkGroup Edition

Data Storage Capacity

- Unlimited by software.
- Limited by hardware storage capacity only.

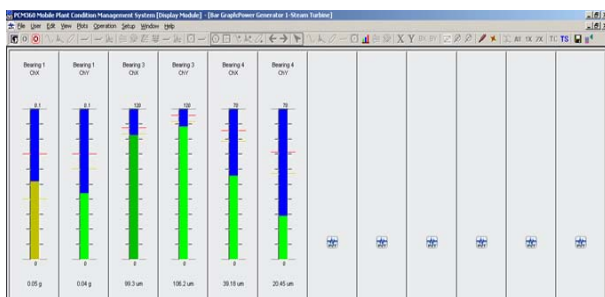
Data Acquisition Format

- Synchronous sampling:
 - 32 to 1,024 points per waveform time period.
- Asynchronous sampling:
 - Based on frequency response.

PCM360-M Technical Support

PCM360-M comes standard with one year technical support. Additional support may be purchased.

- ✓ Free software updates for one year.
- ✓ Enable technical support with the software.



PCM-MPC-3

Standard portable military computer with small size and strong anti-vibration can be applicable to lots of field.



- ✓ Operating System: Microsoft Windows XP/Vista
- ✓ Processor: INTEL C2D E7500 2.93GHz
- ✓ Memory: Super Talent DDR2-800 2GB/128*8 Micron
- ✓ Hard Disk: WD3200BEVT 2.5" 320GB SATA 5400RPM
- ✓ Drive: DVD Drive
- ✓ Screen Resolution: 15" TFT 1024*768
- ✓ Dimensions:
 - 15.7"W x 11.5"H x 8.25"D
 - 399mm W x 292mm H x 210mm D
- ✓ PCI Expansion Slots: 4
- ✓ Power Supply: SEASONIC SS-500ES 500WATT PS/2 PS
- ✓ Enclosure:
 - Sturdy aircraft aluminum alloy inner frame
 - Rugged ABS plastic outer shell

PCM-GP-M

General purpose interface kit that used to connect PT360M-DAQ and transducers, monitors, or other transmitters. It includes:

- Qty. 1 PCM-GP-BOX converter box
- Qty. 1 PCM-PT2060-002 DAQ cable 2m
- Qty. 16 PCM360-M-CB1 BNC cables 2m
- Qty. 16 PCM360-M-CB2 1m BNC cables with alligator clip





Order Information

PCM360-M Software

PCM360-M software consists of PCM360-M Plant Manager software, PCM360-M DAQ&COM software, and PCM360-M Display software.

PCM360M-Plant Manager-AX

PCM360M-Plant Manager is a plant management and maintenance software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360M-DAQ-AX

PCM360M-DAQ is a software module that interfaces with data acquisition hardware.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360M-DISP-AX

PCM360M-DISP is a plot display and analysis software module.

AX: Software option

A0*: Original version

A1: Software updates CD

PCM360M-LIS-AX-BX

PCM360M-LIS is a software module that controls system license information.

AX: DAQ Card Type Option

A0: Standard DAQ Card

A1: High-speed DAQ Card

BX: Number of DAQ Card

B0: One DAQ Card

B1: Two DAQ Card

PT360M-DAQ

The PT360M-DAQ off-line data acquisition unit is fully configured with signal process modules, which consists of the mobile computer with 15" LCD and DAQ Card.

PT360M-DAQ-AX-BX

AX: Number of dynamic channels (includes phase reference)

A0: 16

A1: 32

A10: 16 high frequency

A11: 32 high frequency

BX: Military PC type

B2*: PCM-MPC-3

* Note: Default configuration

Standard PCM360-M system includes:

Qty. 1 PCM360-M Plant Manager software

Qty. 1 PCM360-M DAQ software

Qty. 1 PCM360-M Display software

Qty. 1 PCM360-M License software

Qty. 1 PCM-SQL MS SQL Server 2008

Qty. 1 PT360M-DAQ data acquisition hardware

(includes one PCM-MPC-3 portable military

computer with carrying case, one PCI 6220

standard DAQ Card, and one PCM-GP-M General

purpose interface kit with cables)

Accessories

PCM360M-SUP-AX-BXX

Extended technical support agreement

AX: Additional years

X = Number of additional years with the agreement

BXX: Machines

XX = Number of machines

PCM-SQL

Microsoft® SQL Server 2008 Workgroup (32-bit) Edition

DAQ Card

- **PCI-6220**

Standard data acquisition card, sampling frequency 250 KHz

- **PCI-6250**

High frequency data acquisition card, sampling frequency 1MHz



PCM-GP-BOX

Signal interface box



PCM360-M-CB1

At both ends as a standard BNC connector, length 2m



PCM-PT2060-XXX

PCM-GP-BOX and PCM360-M interconnection cable

XXX: Cable length in meters



PCM360-M-CB2

One end as a standard BNC connect, the other side as two alligator clips, length 1m

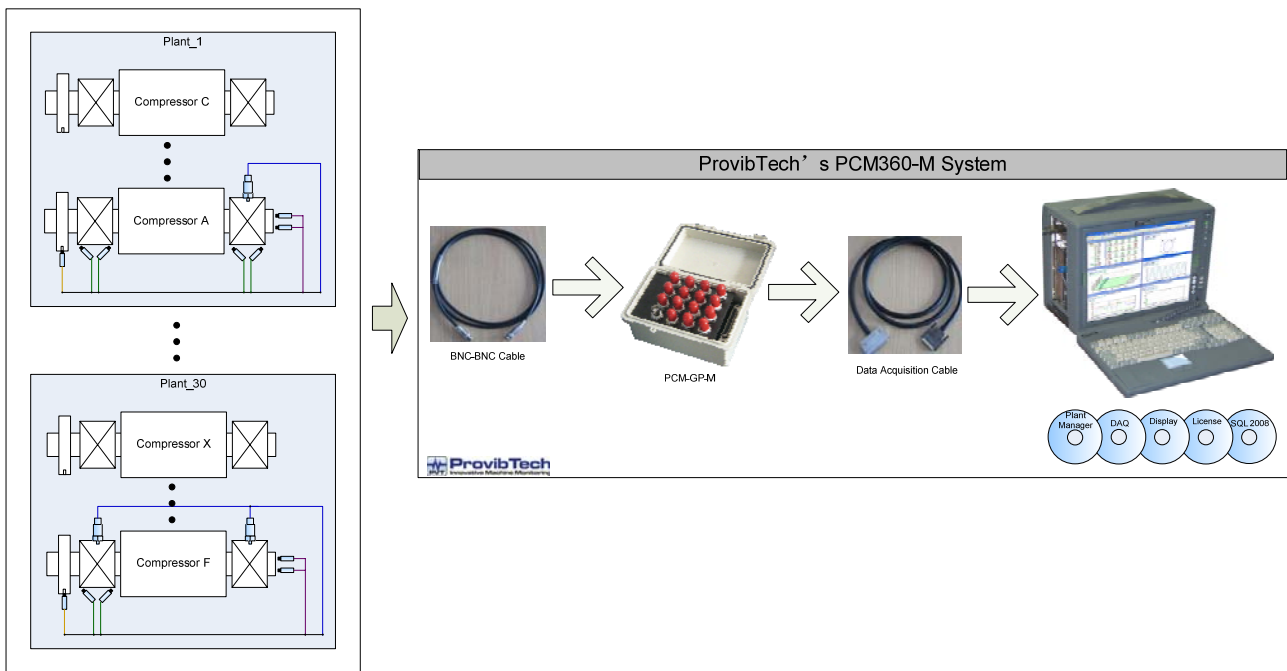




PCM360-M Application Notes

I. Typical Application

For example, there are 30 plants that have several machines such as compressor to be monitored. Some compressors have four measurement points and some have five or more, which depends on user and the field requirements. Figure below shows the process of the system data acquisition: Supposing Compressor A in plant_1 has four proximity probes to measure shaft X and Y vibration; one accelerometer to measure seismic vibration; two proximity probes to measure thrust position; and one proximity probe to measure phase reference. Compressor F in plant_30 has two proximity probes to measure shaft X and Y vibration; two accelerometers to measure seismic vibration; two proximity probes to measure thrust position; and one proximity probe to measure phase reference. Users could also measure other machines similarly.

**Software Required:**

- Qty. 1 PCM360M-Plant Manager-A0
- Qty. 1 PCM360M-DAQ-A0
- Qty. 1 PCM360M-DISP-A0
- Qty. 1 PCM360M-LIS-A1-B0
- Qty. 1 PCM-SQL

Hardware Required:

- Qty. 1 PT360M-DAQ-A10-B2
- Qty. 1 PCM-GP-M

In this example, the system contains one high-speed DAQ Card. User could order two DAQ Cards if the measurement work is complicated. Each PCM360-M system is capable of monitoring up to 32 plants and supports up to 3200 measurement points. User can collect data among various plants and perform the management on plants independently.

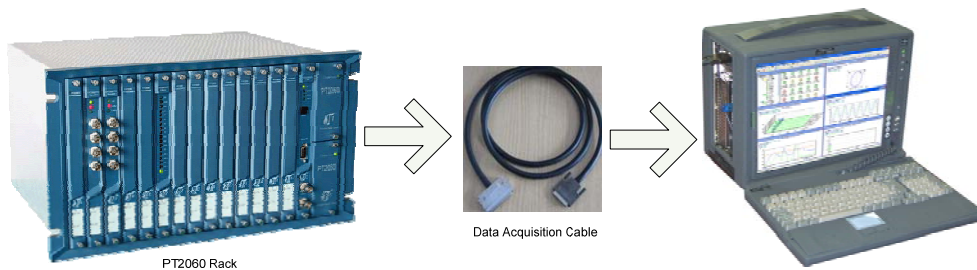


II. Connection Direct To Sensors

Directly connect to sensors to obtain continuous analog signal without any monitors.
In this case, PCM-GP-M is required, and each PCM-GP-M can hold 16 channels (including phase reference channels).

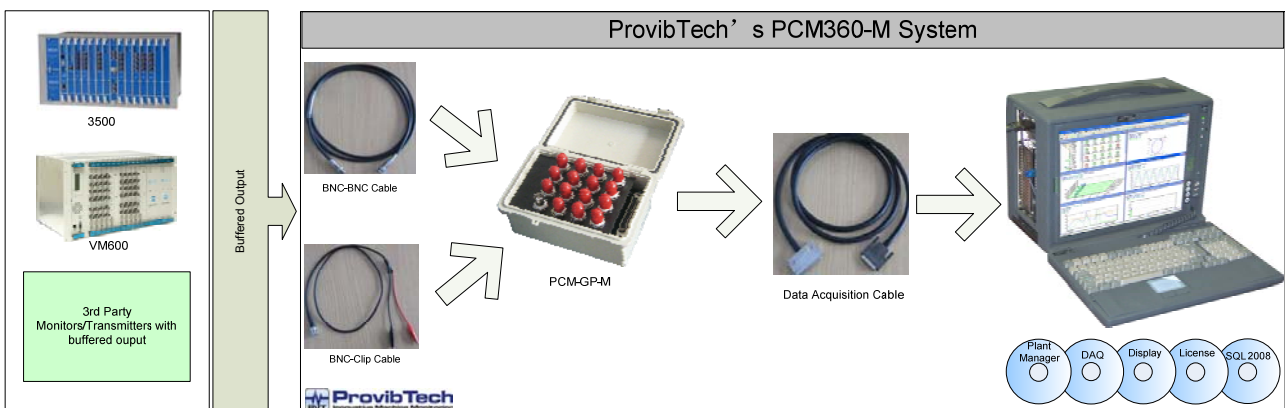
III. Connection to PT2060 Rack

The PCM360-M directly interfaces with the PT2060 Rack via PT2060/80 signal IO module. Each PT2060 can hold a maximum of 48 channels (with condition monitoring modules).
The 4th slot from the right output dynamic signal of channel 1 to 24. The 3rd output channel 25 to 48. On each of the PT2060/80-BK modules, there are two multi-pin connectors, the top connector output data of channel 1 to 12 (25 to 36) with dual phase references. The bottom connector output data of channel 13 to 24 (37 to 48) with dual phase references.
PCM360-M and PT2060 Rack could be integrated into a complete system to provide a better protection and data acquisition features.



IV. Connection to Buffer Output

Support Buffer interface: to obtain continuous analog signal from Buffer output of monitors.
In this case, PCM-GP-M is required. System with one DAQ Card provides 16 Buffer inputs (require one PCM-GP-M); while system with two DAQ Cards provides 32 Buffer inputs (require two PCM-GP-Ms).

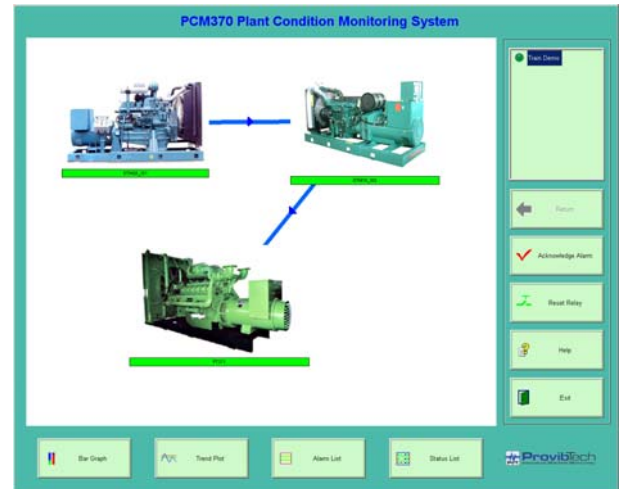




PCM370 Plant Condition Management System

Introduction

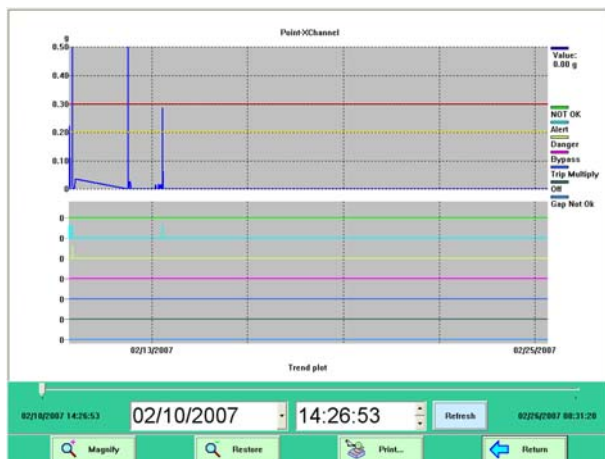
The PCM370 plant condition management system collects, stores, analyzes and distributes machinery status monitoring information to a local network or wide area network (over the Internet). The PCM370 obtains status data of critical machinery as well as balance of plant equipment. All of ProvibTech's digital monitoring systems are quickly and easily integrated into the PCM370 system, as well as devices from other manufacturers which communicate via Modbus. Besides the vibration monitoring data, the PCM370 is also capable of collecting numerous process variables such as voltage inputs, current inputs, RTDs, thermocouples, discrete inputs and Modbus.



PCM370 Features

- ✓ **Integrates all of machine running monitoring data into one system**
- ✓ **Measures static variables and process variables**
- ✓ **Integrates process inputs**
- ✓ **User-friendly system with touch panel**
- ✓ **ProvibTech's database**
- ✓ **Software alarms used for indication of machine status**
- ✓ **Data collection done automatically or with alarm**
- ✓ **Modbus data collection and storage**

Waveform and spectrum information are not available.



PCM370-CFG System Configuration Software

Automatic configuration:

All ProvibTech's digital monitors can be automatically configured by the PCM370. Only a couple clicks of the mouse to setup.

- ✓ DTM
- ✓ PT2060
- ✓ PT580
- ✓ DM200
- ✓ PT371

Ability to interface with other devices which have Modbus interface:

Any other manufacturers' Modbus (Modbus RTU/TCP) device can integrate with the PCM370. Status and running data are configured according to user requirements.

Machine graphical interface:

The PCM370 provides a library of machine photos or user may import images which can be used for the machine status display.

The following are configurable:

- Data mapping by machines.
- Trend – history (chart list recorder)
- Trend – real-time
- Alarms with PT373 mapping
- 4-20mA with PT372 mapping
- Software program runs on PCM-TOUCH or any standard computer.



Portable and Online Condition Monitoring Products

PCM370 Software

The user interface that displays the machine condition graphs is included in the PCM370 Software. Data is obtained from ProvibTech's database.

Hardware interface:

- ✓ ProvibTech's digital monitors (Modbus RTU/TCP)
- ✓ Other manufacturers' equipment (Modbus RTU/TCP capable devices)
- ✓ RTU, thermocouple inputs
- ✓ Current and voltage inputs
- ✓ Discrete inputs/relays

Standard condition monitoring plot:

- ✓ Machine-train graphical interface with real-time status
- ✓ Machine graphical interface with real-time measurement point overall and status
- ✓ Trend plot of historical data with single or multiple points
- ✓ Real-time alarms, alarm list
- ✓ Real-time overall vibration and status table view
- ✓ Bar graph of 12 and 24 channels
- ✓ Real-time trend plot, simulate recorder
- ✓ Print any viewing window

Measurement range:

- Acceleration (PK or RMS): 0 - 20g
- Velocity (PK or RMS): 0 - 200 mm/sec (0 - 8 in/sec)
- Displacement (PK-PK): 0 - 100 mm (0 - 4 in)

Units of measurement:

- Peak
- Peak to peak
- RMS
- Average



Route can be configured to three hierarchy layers:

Machine-Train

Alarm Time	Channel Name	Alarm Status	Measurers Value	Alert Low	Danger Low	Alert High	Danger High
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	273.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	279.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	274.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	214.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	234.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	240.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	234.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	227.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	234.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	240.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	235.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	241.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	235.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	227.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	236.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	241.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	236.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	236.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	217.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	237.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	244.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	241.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	245.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	244.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	245.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	243.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	219.00g	-300.00g	50.00g	--	--
2007-01-31 23:40:00	Train 1 Mch 1_1	Alert	238.00g	-300.00g	50.00g	--	--

Machine
Measurement- Point

Storage databases:

ProvibTech's database

Data storage capacity:

Limited by hardware storage capacity
Unlimited by software

Routing capacity:

Unlimited in machine train, machine and measurement point

Modbus interface:

- ✓ Works with all ProvibTech's digital monitors
 - PT2060
 - DTM
 - DM200
 - PT580
 - PT371, PT372, PT373

✓ Works with any other vendors' Modbus RTU/TCP

Bar graph:

Each channel accepts up to 16 status parameters; such as OK, Alert, Danger, Trip-multiply, etc. This information is user-configurable.

For displays greater than 12 channels in the bar graph, the status output will not show.

Printer support:

Each graph can be printed.

PT371 Universal Input Module

The PT371 is a 16 channel input module.



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Signal Inputs:

Voltage input: 0 - 10V; -5 to +5V
 Current input: 4 - 20mA (with the shunt resistor)
 Thermocouple or thermo resistors:
 Discrete input: any 0-24V; 0-12V; 0-5V
 TC: K, E, S, T, N, J, B, R, EU-2
 Compensation mode: Inner, Specify and Exterior
 RTD: Pt100, Cu50, Cu100, BA1, BA2, G
 Wire Unit: 2-wires, 3-wires

Data acquisition rate:

1.0 sec

Amplitude resolution:

PT371 module: 12 bit
 0.2% FS

Power supply:

24VDC +/- 10% @ 150mA

Power supply:

24VDC +/- 10% @ 150mA

Relays:

Seal: epoxy
 Capacity: 0.5A/230VAC/30VDC, resistive load
 Relay type: SPTD
 Isolation: 1000VDC

PT372 4-20mA Output Module

The PT372 is a 4 channel 4-20mA output module used with the PCM370.



Amplitude resolution:

PT372 module: 12bit

Power supply:

24VDC +/- 10% @ 100mA

Maximum load:

750 ohms

PT373 Relay Module

The PT373 is a 16 channel relay module. The PT373 can be configured for any logic combination of alarms or status of each channel from the PCM370.

The relays are selectable as: energized/de-energized, latching/non-latching and bypass.

PCM-TOUCH

The PCM-TOUCH is a touch panel computer.



Electrical

Touch Screen power supply:
 100 - 240 VAC @ 50 ~ 60 Hz, 4 - 2 A

Environmental

Temperature:
 Operation: 0°C to +50°C
 Storage: -20°C to +60°C
 Humidity:
 10 ~ 90% @ 40 °C (non-condensing)

Physical

Touch panel, color 15" computer
 Dimensions (W x H x D):
 Front Panel: 450 x 315.6 x 6 mm
 Control Box: 422.4 x 219.4 x 97/112.2 mm
 Cut out Dimensions: 428 x 297 mm

System Specifications

Intel® Celeron® M 1GHz CPU
 1GB RAM, 80G HD
 15"LCD, 1024*768 screen resolution
 Support USB 2.0 high performance peripherals
 Optical Driver: 1 x Slim Type DVD



Portable and Online Condition Monitoring Products

Order Information

PCM370-AX-BX-CX-DX

PCM370 plant condition management system software:

AX: Condition monitoring module selection

A0: Standard condition monitoring

BX: Database selection

B0: ProvibTech's single license database

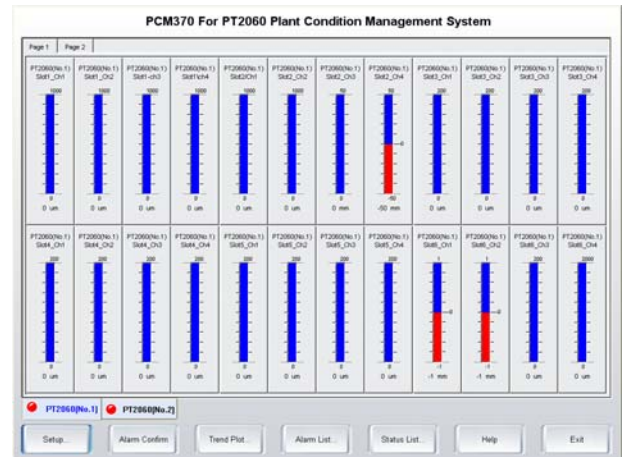
CX: User license

C0: Single user license

DX: Hardware interface

D0: All available hardware

D1: PT2060



Train 1-Status List						
Name	Measure Value	Alert High	Danger High	Alert Low	Danger Low	Digital Status
1 Mch_1_3 MchP1113 VCbaa	228.88 g	200.00 g	50.00 g	-	-	True
1 Mch_1_3 MchP1113 VCbaa	-242.88 g	1000.00 g	1200.00 g	-	-	False
1 Mch_1_3 MchP1113 VCbaa	-	-	-	-	-	-
1 Mch_1_3 MchP1112 VCbaa	1858.88 EU	1000.00 EU	1200.00 EU	-	-	-
1 Mch_1_3 MchP1112 VCbaa	1858.88 EU	1000.00 EU	1200.00 EU	-	-	-
1 Mch_1_3 MchP1121 VCbaa	1858.88 EU	1000.00 EU	1200.00 EU	-	-	-
1 Mch_1_3 MchP1121 VCbaa	1858.88 EU	1000.00 EU	1200.00 EU	-	-	-
1 Mch_1_3 MchP1122 VCbaa	1858.88 EU	1000.00 EU	1200.00 EU	-	-	-
1 Mch_1_3 MchP1122 VCbaa	1858.88 EU	1000.00 EU	1200.00 EU	-	-	-
1 Mch_1_3 MchP1131 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_3 MchP1131 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_3 MchP1132 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_3 MchP1132 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_3 MchP1141 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_3 MchP1141 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_4 MchP141 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-
1 Mch_1_4 MchP141 VCbaa	1858.88 EU	8.00 EU	10.00 EU	-	-	-

Accessories

PT371

16 channels universal input module

PT372

4-20mA, 4 channels output module

PT373

Relay alarm module, 16 channels

DTM96

RS485 to RS232/RS485/RS422 converter with signal isolation for Modbus connection

RS232-USB

RS232 to USB converter for Modbus connection

RS485-USB

RS485 to USB converter for Modbus connection with isolation

PCM-TOUCH

Touch panel computer that works with PCM370 software



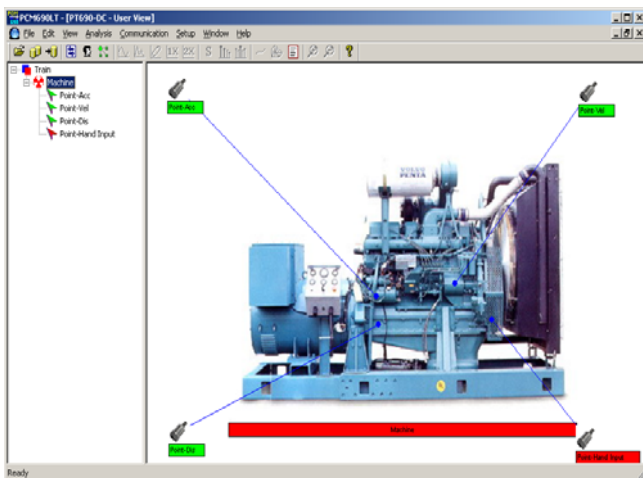
PT690 Vibration Data Collector

Features

- ✓ Simultaneously measures acceleration, velocity and displacement
- ✓ Route is programmable up to 500 points
- ✓ User friendly interface
- ✓ Powerful analysis software with spectrum, waveform, waterfall, trend and machine image
- ✓ 4 lines display with back light
- ✓ Auto power off
- ✓ Hand input process data
- ✓ Machine image with condition status and overall level
- ✓ Software supports multiple data collectors
- ✓ Cost effective solution for in-depth condition monitoring
- ✓ Simple upgrade from vibration meter

Cost Effective Solution with Programmable Route and Alarms

The PT690 system consists of the PT690-DC data collector and PCM690 analysis software. ProvibTech provides a cost effective, yet feature rich solution in machine condition monitoring. The PT690 is ideal for large plants which require several vibration data collectors and/or for plants with a limited budget in condition monitoring.



The PT690-DC collects and stores waveform, spectrum, overall vibration and alarm status of each point in a route. It also processes the information and displays the measurement point ID, last measurement data, overall vibration, and the alarm status. With the PT690 a user has the ability to manually enter process variables which are then recorded by the PT690.

Display: Acceleration, Velocity and Displacement

With advanced digital processing, this “smart measurement” is available to display acceleration, velocity and displacement simultaneously. It is simple to use; any field service personnel can use the PT690-DC with little or no training.

Powerful Analysis Software with Spectrum and Waveform

Once the collected data from the PT690 is up-loaded to the PCM690 analysis software, one may analyze the machine condition with: alarm list, spectrum, trend, or with a visual inspection of a machine image to obtain an understanding of the machine condition.

For the vibration expert who requires additional information for analysis, the PCM690 offers waveform, spectrum, and waterfall for each measurement point. With further analysis of



Portable and Online Condition Monitoring Products

each plot with harmonics, sideband, zoom, mark, etc. One can also compare the collected spectrum with standard spectrum to locate deviations.

Electrical

Frequency Response (+/- 3db):

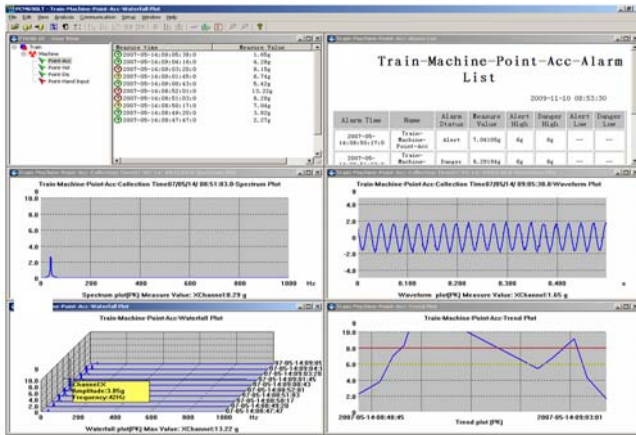
Acceleration: 2 - 1,000 Hz
Velocity: 5 - 1,000 Hz
Displacement: 5 - 1,000 Hz

Measurement Range:

Acceleration (PK or RMS):
0 - 20g
Velocity (PK or RMS):
0 - 100 mm/sec (0 - 4 in/sec)
Displacement (PK-PK):
0 - 2,000 um (0 - 80 mil)
Process Variable:
Hand input
Peak and PK-PK are RMS converted

Waveform and Spectrum:

Collect and store 1,000 data variables for each measurement point.
400 lines of resolution in spectrum



Route:

Maximum 500 measurement points.
Route can be configured for three hierarchy layers: Machine-Train, Machine, and Measurement-Point.
Each measurement point can be configured to measure acceleration, velocity, and displacement or have a manual input. Manual hand input can be any number, such as, thrust position or process variable.
Each measurement point has its own point ID with up to 12 letters or numbers.

Alarms:

Dual alarms for each measurement point.

Display:

LCD 128 x 64 with blue backlight, 4 lines, 18 letter PT690-DC will display point ID, last measurement data, current measurement data, unit, alarm status, and battery status.

Power Converter:

90 - 250 VAC, 5W

Battery:

Li-H rechargeable battery 1100mAh

Measurement Error:

+/- 5%

Data Transfer:

Once the data collector receives the machine route and point configuration information, it uploads the last measured data to the host computer for in-depth analysis and data storage.

Memory:

RAM: 10Mb
ROM: Flash, 10Mb

Approval:

CE
Hazardous area PCEC approval: iaIICT4

Physical

Temperature:

Operation: -20°C to + 65°C (-4°F to +140°F)
Storage: -40°C to + 85°C (-40°F to +185°F)

Dimensions:

180mm x 82mm x 53mm (7in x 3.2in x 2in)

Weight:

240g (0.5lb)

PCM690 Analysis Software

Basic Analysis:

- Route
- Running status on machine image
- Trend plot
- Alarm list
- Overall vibration list

Advanced Analysis:

- Waveform plot
- Spectrum plot
- Spectrum with standard waveform
- Waterfall plot



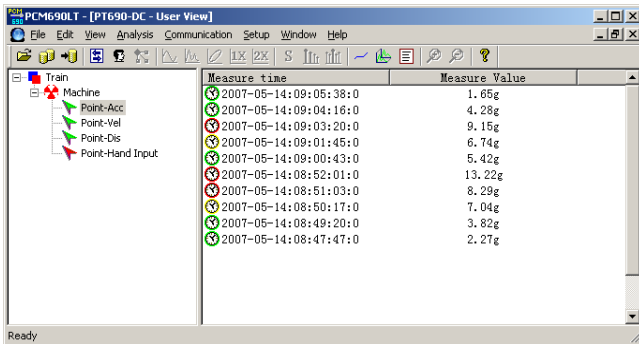
Portable and Online Condition Monitoring Products

Functions:

- Marker
- Zoom
- Harmonics
- Sideband
- Works with multiple data collectors
- Print
- System configuration
- English or metric unit

Operation System:

Windows 2000 or Windows XP SP2



Order Information

PT690-LT-K

The PT690 System with Data Collector and Analysis Software Includes:

- PT690-DC data collector
- PCM690-LT windows analysis software
- TM0782A accelerometer
- PT690-CASE carrying case
- PT600-TP accelerometer tip, 50mm
- PT600-MG magnet for accelerometer
- PT690-CB1 cable for data collector and computer
- PT690-CB2 cable for accelerometer and data collector
- PT690-CB3 cable for accelerometer and BNC port
- PT690-USR user manual

PT690-DC-K

The PT690 Data Collector Kit Includes:

- PT690-DC data collector
- TM0782A accelerometer
- PT690-CASE carrying case
- PT600-TP accelerometer tip, 50mm
- PT600-MG magnet for accelerometer
- PT690-CB1 cable for data collector and computer
- PT690-CB2 cable for accelerometer and data collector
- PT690-CB3 cable for accelerometer and BNC port
- PT690-USR user manual

PT690-DC

PT690 Data Collector Includes:

- PT690-DC data collector
- PT690-BAT rechargeable battery
- PT690-PWR power converter
- PT690-DC-CASE PT690-DC case

PCM690-LT

PT690 windows analysis software

Accessories

TM0782A: Accelerometer

PT690-CASE: PT690 system carrying case

PT600-TP: Accelerometer tip, 50mm

PT600-MG: Magnet for accelerometer

PT690-CB1 cable for data collector and computer

PT690-CB2 cable for accelerometer and data collector

PT690-CB3 cable for accelerometer and BNC port

PT690-BATT: Rechargeable battery

PT690-PWR: Power converter

PT690-DC-CASE: PT690-DC case

PT690-USR: User manual

PT690-PC: Laptop computer configured for PT690



PT908 Vibration and Bearing/Gearbox Meter

ProvibTech's PT908 is ideal for overall vibration and bearing/gearbox measurement. The PT908 can measure acceleration, velocity, displacement or bearing/gearbox condition.

A unique feature of the PT908 is its ability to pick-up the high frequency signal from a bearing or gearbox. The vibration trend is a good indication of bearing or gearbox running condition.



Features

- ✓ Measuring acceleration, velocity, and displacement in Metric or English units
- ✓ Detecting bearing or gearbox defect
- ✓ Built-in accelerometer, for easy handling in the field
- ✓ External accelerometer with magnet holder for more accurate measurement
- ✓ Large LCD display, easy to read in the field
- ✓ Leather carrying case
- ✓ Automatic power-off
- ✓ Automatic freeze of display for easy data recording
- ✓ Dual size probe tips
- ✓ Low battery warning



Electrical

Frequency Response (+/- 3dB):

Acceleration:	10 - 1000Hz
Velocity:	10 - 1000Hz
Displacement:	10 - 500Hz
HFD:	about 5000 - 10,000 Hz

Maximum Measurable Range:

Acceleration (PK):	0.02 - 19.9g
Velocity (PK, English unit):	0.008 - 8 in/sec
Velocity (RMS, Metric unit):	0.2 - 199.9mm/s
Displacement (PK-PK):	1 - 1999um (0.04 - 80mil)
HFD:	0.02 - 19.9 g (equivalent)

Power: 9V battery pack, 6F22

Display: LCD: 3 1/2 digits

Overall Vibration Accuracy: 5%

Temperature Range: 0 – 50°C

Approval: CE

PCEC: Ex iaIICT4

Physical

Size: 130mm × 60mm × 22mm
(5.1" × 2.4" × 0.9")

Weight: 260g (0.5lb)



Order Information

PT908-M-I

PT908 Vibration Meter in metric unit with internal sensor:

- PT908 Vibration Meter
- Internal accelerometer
- Leather case for PT908
- 30mm and 10mm probe tips

PT908-E-I

PT908 Vibration Meter in English unit with internal sensor:

- PT908 Vibration Meter
- Internal accelerometer
- Leather case for PT908
- 1 1/2" and 1/2" probe tips

PT908-M-O

PT908 Vibration Meter in metric unit with external sensor:

- PT908 Vibration Meter
- Leather case for PT908
- 50mm probe tip
- External accelerometer
- 0.5 m extension cable
- Magnetic holder

PT908-E-O

PT908 Vibration Meter in English unit with external sensor:

- PT908 Vibration Meter
- Leather case for PT908
- 1 1/2" probe tip
- External accelerometer with 20" cable
- Magnetic holder

PT908-M-I-S

PT908-E-I-S

PT908-M-O-S

PT908-E-O-S

PT908 Vibration Meter with PCEC hazardous area certification: Ex ia II CT4

Accessories

TM0784A

Accelerometer

PT908-CB

The connection cable between the TM0784A and PT908 meter

PT600-TP1

Accelerometer stinger 10mm (4.0 in)