PCM360-M Plant Condition Management System

Introduction

ProvibTech'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 ProvibTech 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
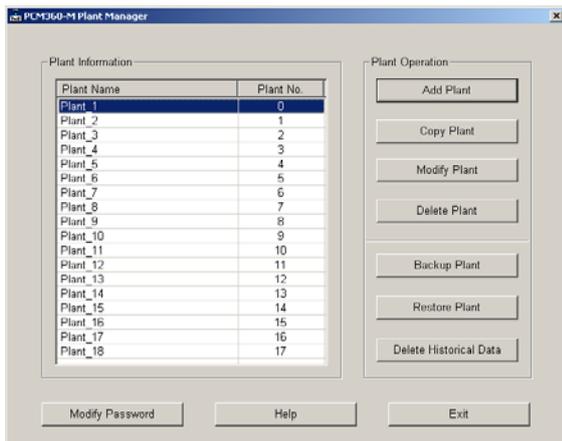
A/D Resolution

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.
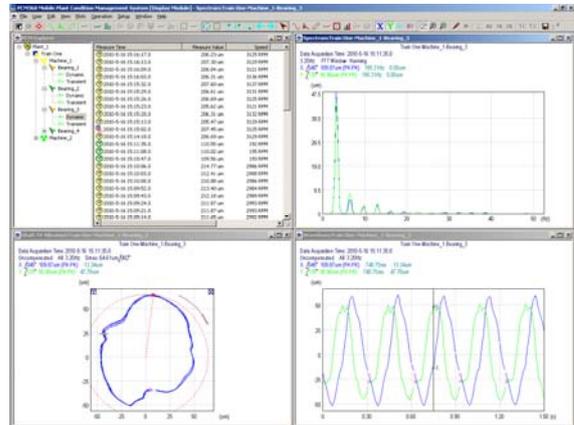
PCM360-M Data Acquisition Input

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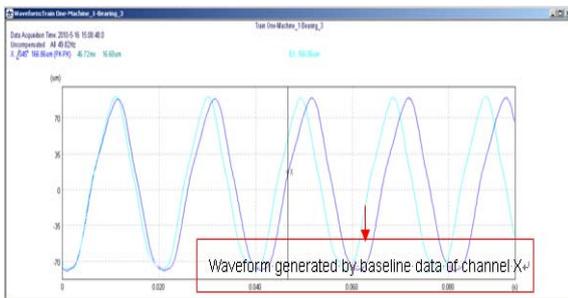
Trend Change of Running Status
- ✓ Analyze variation trend of any one or more parameters compared with others.
- ✓ Static, dynamic, and transient trend plot
- ✓ Historical and real-time trend plot

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.
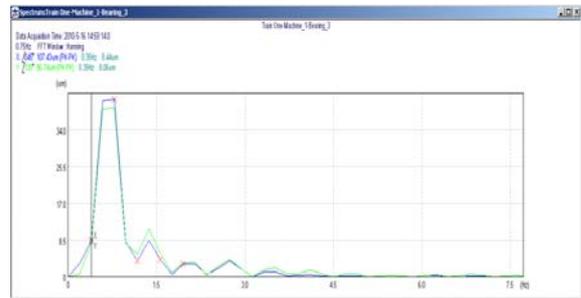

NX Plot Analysis
- ✓ Analyze user concerned frequency components by calculating amplitude and phase angle of 1X, 2X, NX, and NOT1X frequency components.
- ✓ Five types of plot support the function: Waveform, shaft XY vibration, trend, bode, and polar.

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)
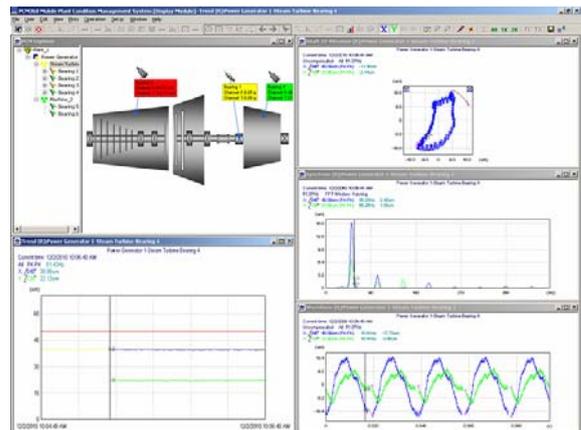
Main Functions Supported by Static, Dynamic and Transient Sample

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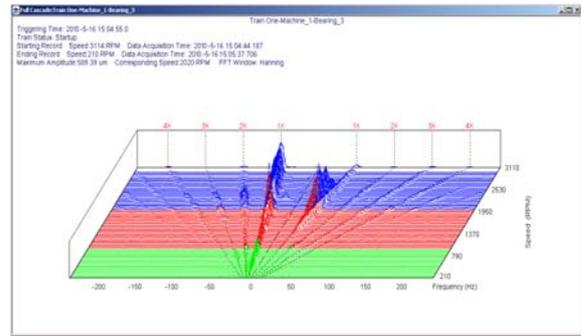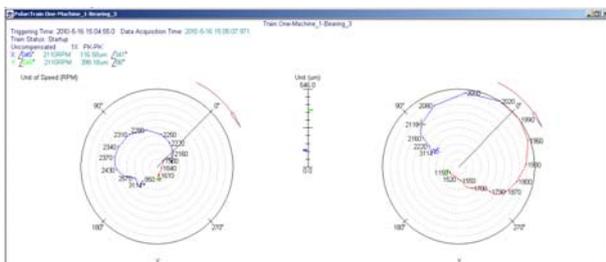
- ✓ Auto full-scale the plot
- ✓ Zoom in or zoom out the plot

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.

✓ 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

PCM360-M Technical Support

PCM360-M comes standard with one year technical support. Additional support may be purchased.
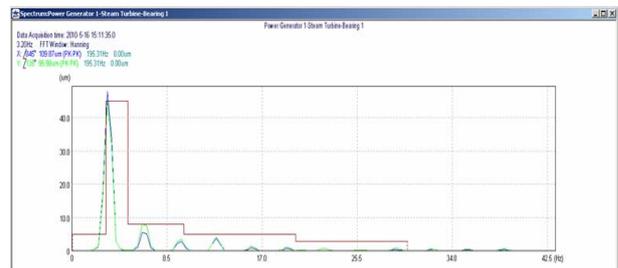
✓ Free software updates for one year.

✓ Enable technical support with the software.
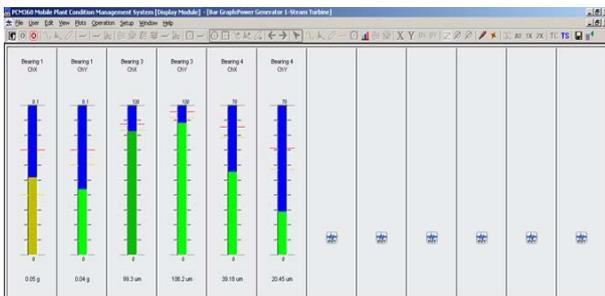
PCM-GP-M

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

PCM-MPC-3

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

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

BNC connector, length 2m

PCM-PT2060-XXX

PCM-GP-BOX and PCM360-M interconnection cable

　　XXX: Cable length in meters

At　　　　　　　both ends as a standard

PCM360-M-CB1

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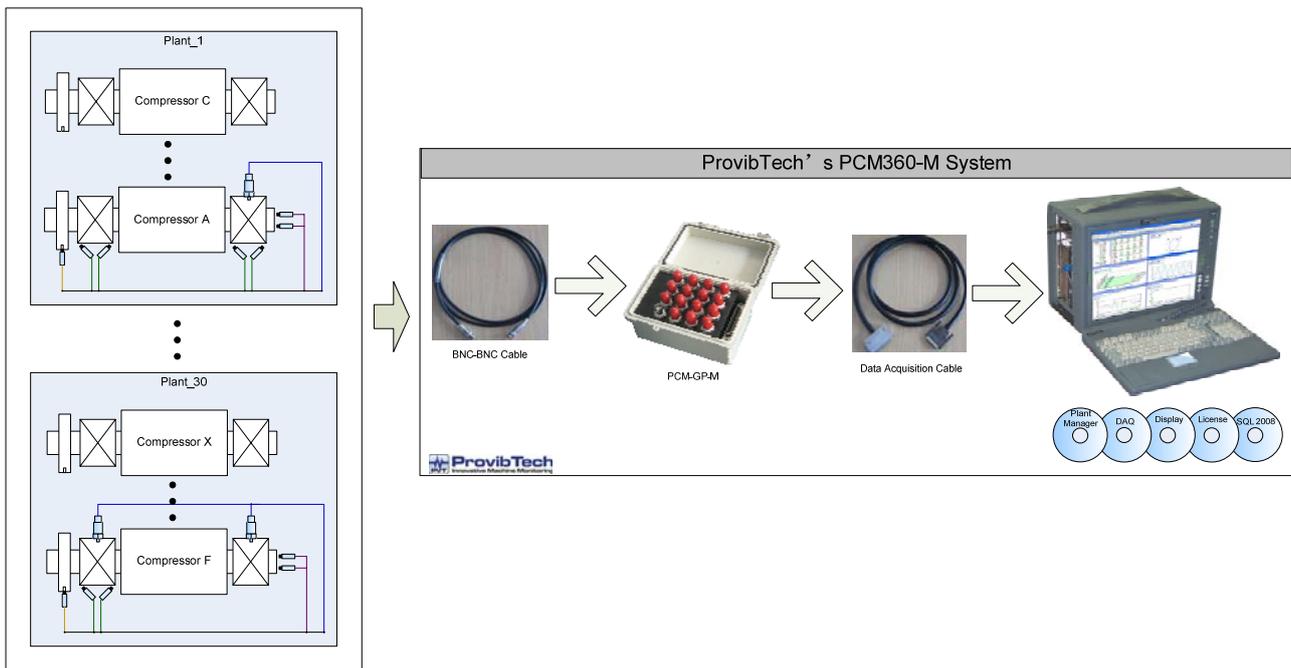
Software Required:
Qty. 1 PCM360M-Plant Manager-A0
Qty. 1 PCM360M-DAQ-A0
Qty. 1 PCM360M-DISP-A0
Qty. 1 PCM360M-LIS-A1-B0
Qty. 1 PCM-SQL

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.
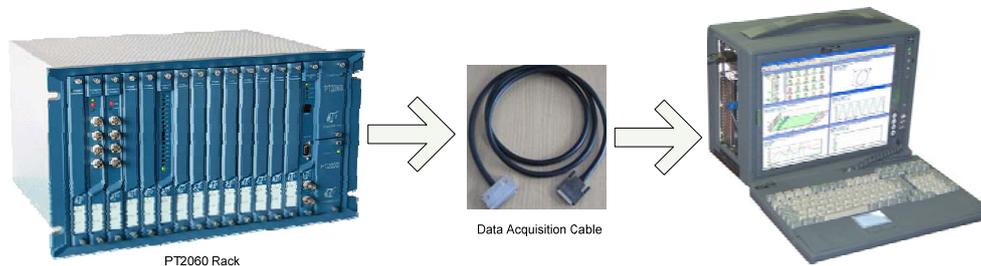In this case, PCM-GP-M is required, and each PCM-GP-M can hold 16 channels (including phase reference channels).

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.

PT2060 Rack

Data Acquisition Cable

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).

ProvibTech's PCM360-M System

3500

VM600

3rd Party Monitors/Transmitters with buffered ouput

Buffered Output

BNC-BNC Cable

BNC-Clip Cable

PCM-GP-M

Data Acquisition Cable

Plant Manager   DAQ   Display   License   SQL 2008