sigPOD PSV

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PROCESS SIGNATURE VERIFICATION FOR PRODUCTION MONITORING

BENEFITS

- Out-of-the-box solution for monitoring test and assembly processes.
- Flexible system can be configured to qualify virtually any manufacturing process.
- Powerful data acquisition hardware allows sampling up to 24 analog and 6 quadrature encoder channels.
- Large, user friendly 10.4" touch interface provides detailed results of the manufacturing process.
- Wide library of processing and analysis toolsets available.
- Communication via discrete I/O, or optionally through industry standard hardware (RS232, RS485, 10/100 BaseT) and protocols (Devicenet[1], Profibus[1], Interbus[1], Ethernet I/P, Modbus TCP).

FEATURES

Packaging
- Compact industrial hardware can be installed in a panel cutout, DIN rail mounted, or machine/wall/desktop mounted
- NEMA 12 (IP 67) models also available
- Modular terminal connector plugs for Analog and digital I/O connections simplify installation and wiring complexity

Unmatched Data Collection
- Up to 24 analog channels, 16 bit A/D, up to 1 MHz sampling
- Up to 6 encoder input channels
- Built in precision sensor excitation for each analog channel
- Internal instrumentation amplifier for mV and bridge sensors
- Available ICP and charge amplifier conditioners

Flexible Test Setup
- 16 model types
- 10 operations, each can have a unique test setup

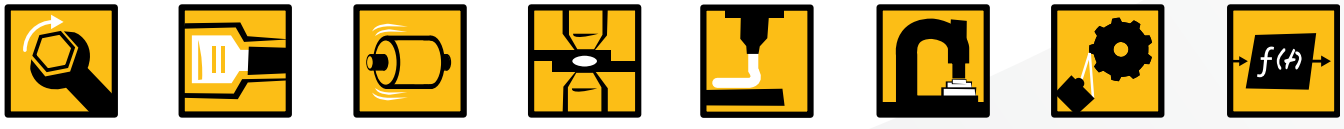
Intuitive Operator Interface
- Touch-screen friendly navigation
- Detailed process graphs at your fingertips
- Backup and restore in seconds

Powerful Processing
- Time and frequency spectrum analysis
- 18 processes available

Thorough Analysis
- 27 analysis features available
- Statistically generated envelopes

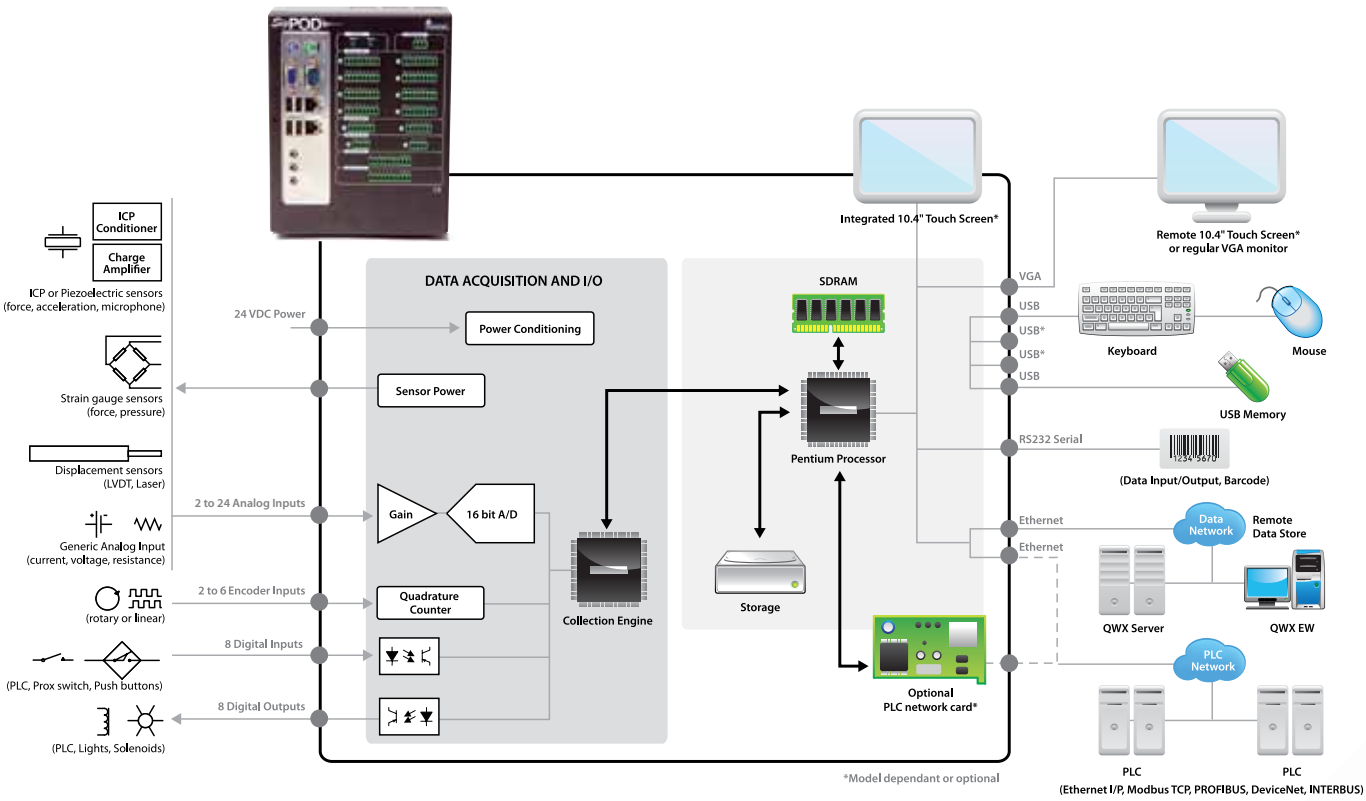
Detailed Data Management and Reporting
- Local / remote storage of test results
- SPC reporting
- Statistically learned test limits

Connectivity
- Communication with station controller via discrete I/O
- Optional fieldbus support for communication through industry standard hardware (RS232, RS485, 10/100 BaseT) and protocols (Devicenet[1], Profibus[1], Interbus[1], Ethernet I/P, Modbus TCP)



OVERVIEW

sigPOD PSV is an off-the-shelf solution for virtually any type of in process verification or monitoring for manufacturing operations. The operator interface is fully menu driven and easy to setup through a simple set of menus; just decide what sensors need to be measured and sigPOD can be configured to collect the analog data, perform a signature analysis algorithm, make a pass/fail decision, save the data and report on the results.



In a typical application, sigPOD PSV is configured to perform the following tasks in an assembly or manufacturing station:

1. **Wait for a trigger (the start of the manufacturing process to monitor)**
2. **Collect data for all required sensors including full signatures and waveforms**
3. **Analyze the waveforms and make pass/fail decisions about the process or test**

sigPOD PSV can act alone to monitor the manufacturing process, or can be interfaced with the station controller for fully automatic operation.

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UNMATCHED DATA COLLECTION

At the heart of sigPOD PSV is a powerful data collection engine which samples analog and digital signals from sensors equipped to monitor the manufacturing process. The data collection engine has many features which allow it to be tailored for most monitoring processes.

All measurements are made with 16 bits of analog to digital resolution, while most competitors provide only 12 bits of resolution. This translates to the granularity of each analog measurement being 16 times finer than a 12 bit measurement.

Measurement speed is another major feature, measurements can be made as slow as required, or at a rate up to 1 Mhz, depending on the hardware model. Measurement speed is critical for certain applications such as welding and sound/ vibration testing.

ANALOG INPUTS

Up to 24 analog inputs are supported and the sigPOD is available in a 2, 4, and 8 channel configuration; additional channels are made available by using the 1608 expansion module. Each input accepts a differential input signal, and can be a milli-volt, voltage or 4-20 mA signal. The flexibility starts with each channel having its own measurement range setting with the built in instrumentation amplifier. To maximize the resolution of each measuring channel, the range of each channel can be set to 100mV, 200 mV, 500 mV, 1V, 2V, 5V or 10V, depending on the hardware model. This allows a standard bridge device or sensor to be measured along with a 4-20 mA signal without additional hardware conditioning.

Each analog input channel also has an integrated precision 10 volt excitation source to power bridge or other analog sensors, and has input overload protection to safeguard from wiring faults or sensor failures.

Optional signal conditioners are available to support ICP or charge amplifier sensor types, such as for acceleration, pressure or load.

ENCODER INPUTS

Up to two encoder inputs can be measured. Each channel can be configured to monitor a single phase pulse (counter mode), or a two phase A-B pulse to track direction (quadrature mode). Each encoder channel provides a 5 volt source to power the sensor, and has input overload protection to protect the channel from wiring faults or other failures.

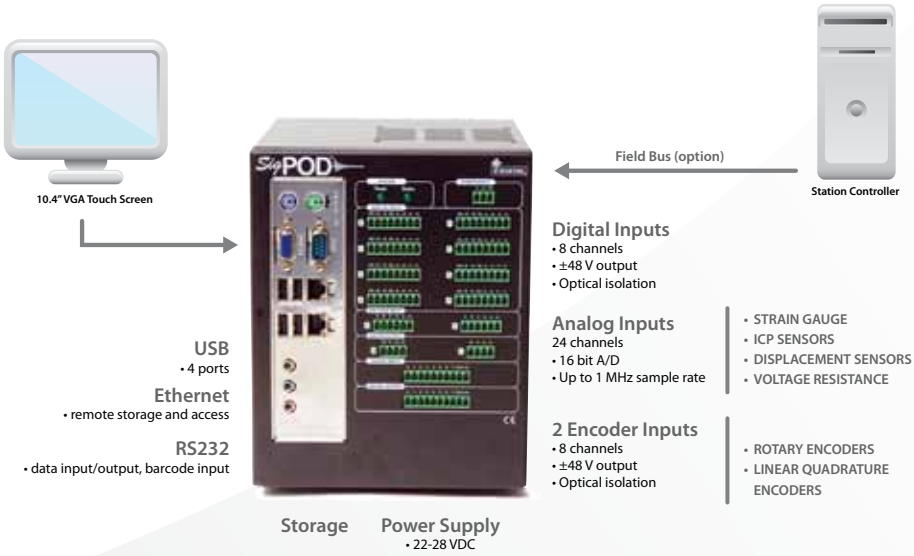
The encoder inputs can be used to measure rotary position such as a crankshaft or torque spindle, or for linear displacement data such as with a SONY DL probe.

DIGITAL INPUTS

sigPOD PSV has eight digital inputs available for multiple functions. While a number of the channels are reserved for external triggering, model selection, and resetting the system, some of the digital inputs can be sampled along with the other input sensors, and can be evaluated to determine the quality of the manufacturing process. The digital inputs typically use 24 VDC, and are bi-directional, so polarity is not a concern.

DIGITAL OUTPUTS

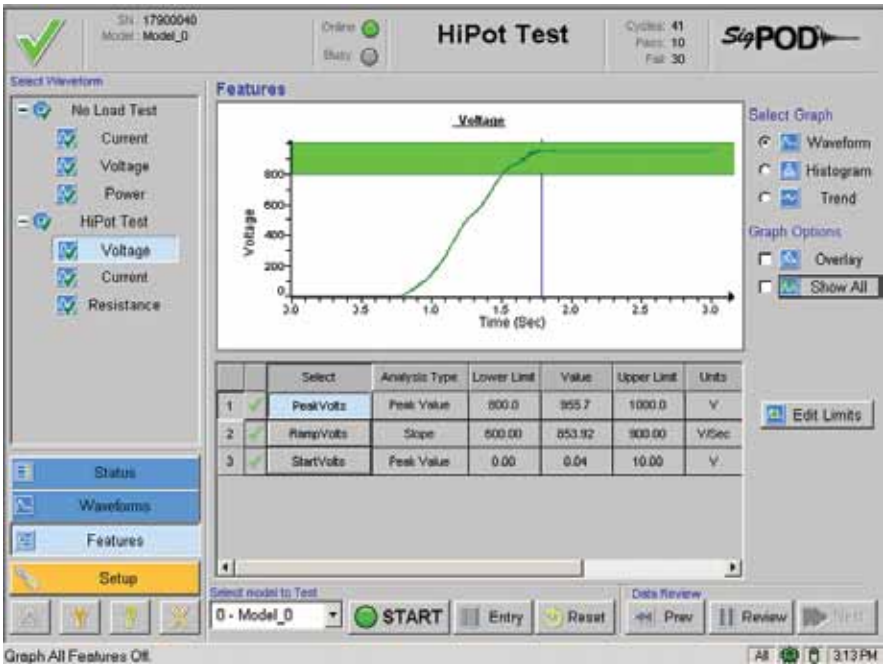
Eight digital outputs are available on the system. These outputs are used to communicate or handshake with the process or station controller, often a PLC. The digital outputs are typically used with 24 VDC control systems, and have bi-directional polarity. Each output is capable of switching up to 1 Amp of current.



FLEXIBLE TEST SETUP

sigPOD PSV allows up to 16 model types to be programmed. Each model type can have a programmable description to identify it from the others, and has a unique set of data collection and analysis parameters. Within each model type, up to four operations can be programmed. Each operation can be used to monitor a specific function of the manufacturing process. In many cases, only one operation is required to monitor the process, but some more complicated processes require multiple operations to be monitored during the process. For example, a press system may require that the parts to be pressed are measured before and after the press insertion. Multiple units would likely be required if using a simpler monitoring device, however sigPOD PSV can accomplish this task by using three different operations – the first operation would perform the part pre-measurements, the second operation would monitor the press insertion process and the third operation would perform the post press depth measurements.

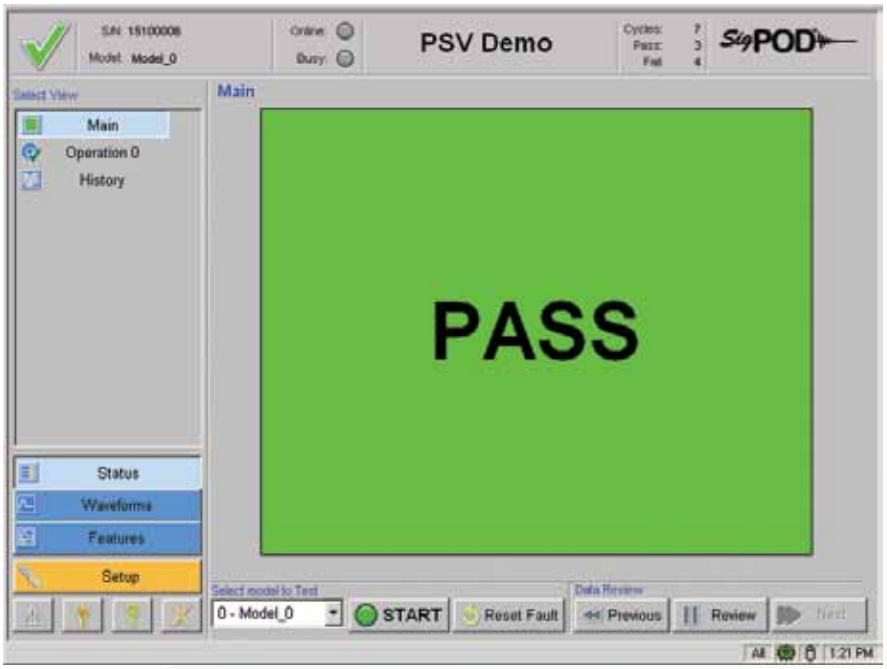
For even more flexibility, up to 10 waveforms can be programmed for use within each operation. This enables sigPOD PSV to handle more complex applications that traditionally would be performed by larger, more expensive data acquisition solutions.



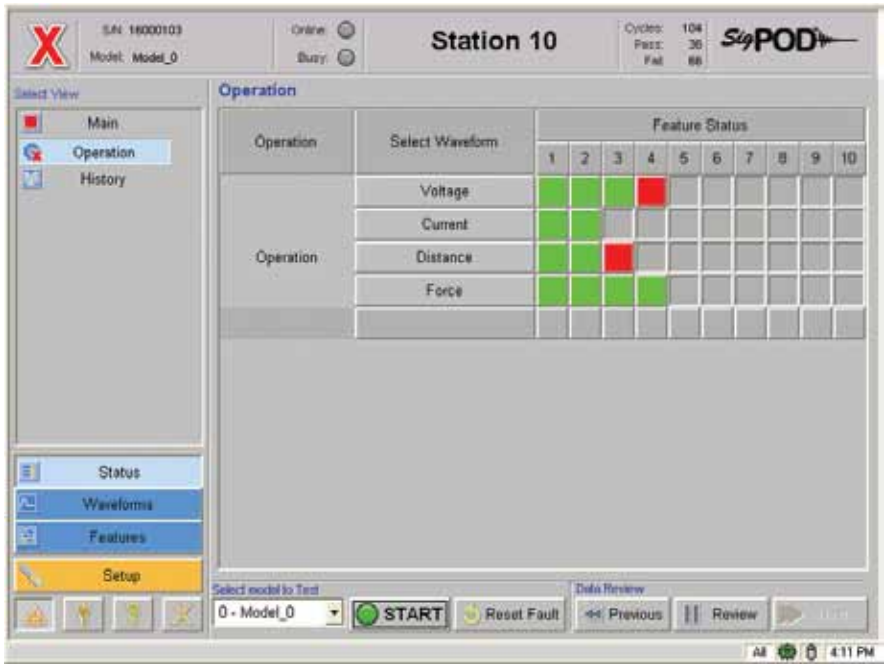
Features view displaying multiple operations

INTUITIVE OPERATOR INTERFACE

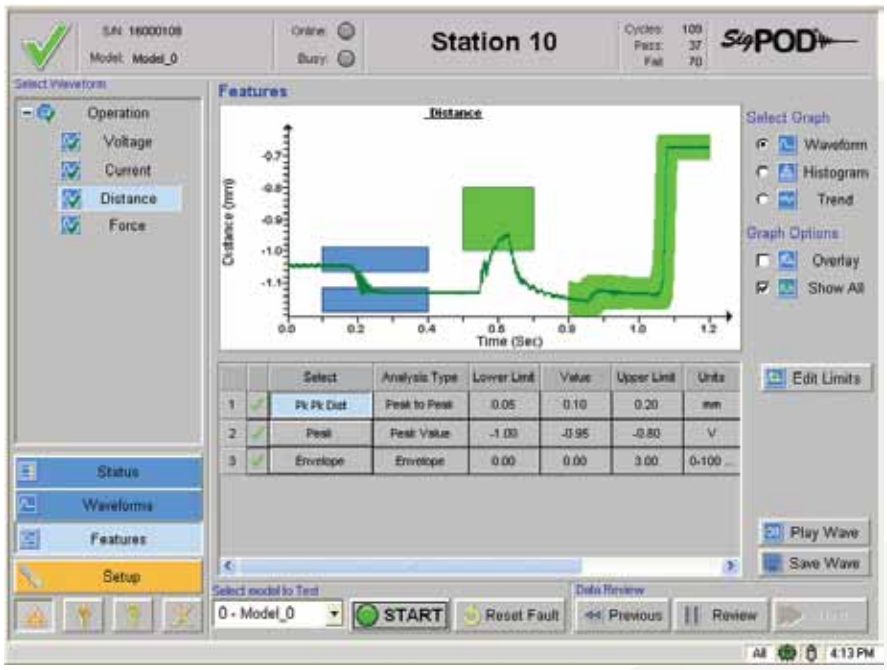
Backed by an industry leading 10.4" touch display, sigPOD PSV offers intuitive, one button menu choices to allow the user to navigate and view test information. High level operator status screens allow operators to quickly assess the status of the manufacturing process, while more detailed results and graphs are available to 'drill down' right at the test station. Graphs can be made full



Status View – Main



Status View – Operation Details



Features view with multiple features displayed

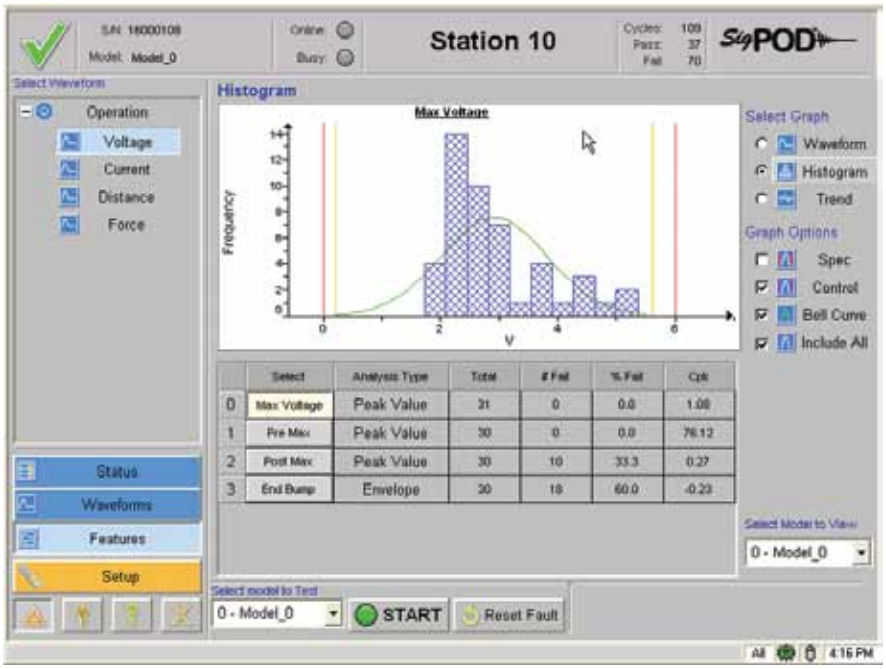
screen, panned and zoomed for more thorough analysis of the results. A simple backup and restore interface also allows users to create system or data backups in seconds.

POWERFUL PROCESSING

Once sensor data has been sampled, it can be evaluated against time, a position sensor or any other sensor that was part of the same data collection (eg. displacement versus temperature). Collected sensor data can undergo processing to improve signal to noise ratios, exploit a specific feature or anomaly within the sensor data or convert the data from the time to frequency spectrum. In all, there are 18 processes available to apply to collected data - FFT, running RMS, clipper, derivative, extract, high, low, and band pass filters, integral, linear, min and max track, notch filter, pop noise filter, remove DC, waveform math, remove reversed data, and remove idle data. Up to 10 processes can be cascaded and applied to each sensor (eg. perform waveform math to multiply two sensors together, then perform low pass filter and then apply FFT). Also, a unique feature allows the user to automatically view the results of processing and feature changes using previously saved data. This streamlines the setup process and eliminates the need to re-test production parts to evaluate the outcome of process or limit changes.

THOROUGH ANALYSIS

Specific features can be extracted from the processed sensor data for evaluation. These features are used to verify the quality of the manufacturing process. Twenty seven powerful feature checks are available to evaluate the process data - area, knee value / location, envelope, number of points, mean, rise / fall time,



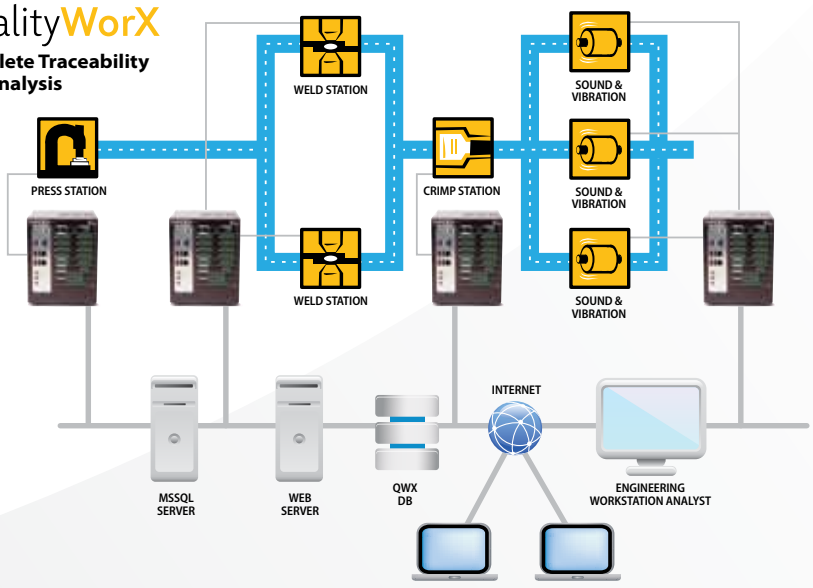
Features view – SPC Histogram

median, standard deviation, peak to peak, threshold count or crossing, waveform length, power sum, get Y at X, slope, minimum value and location, peak RMS, peak value / location, total harmonic distortion, cusp value / location. Envelopes can be generated from production data curves to create a statistical template. This powerful feature enables a complex sensor waveform or signature to be evaluated with a simple template analysis.

DATA MANAGEMENT AND REPORTING

Comprehensive SPC reporting allows a user to track test results and make informed decisions on their process. A unique feature allows test limits to be applied from the statistically derived control limits, allowing test limits to be 'learned' statistically. Local data storage for thousands of production cycles allows for traceability of recent production directly at the test station. Data can be reviewed at the station while the system is still monitoring production. Several options are available for remote data storing- Sciemetric's QualityWorX traceability solution stores all remote data and adds the additional functionality of complete part traceability and robust reporting. Optional email notification is available to warn of consecutive part failures or other system faults.

QualityWorX
Complete Traceability and Analysis



CONNECTIVITY

sigPOD PSV is equipped to communicate over simple discrete I/O, or as an option, with one of today's most common industry standard protocols. Multiple communication hardware options include RS232 serial and 10/100 Base T Ethernet, depending on the hardware model.

Supported communication protocols include:

- Devicenet[1]
- Profibus[1]
- Interbus[1]
- Ethernet I/P
- Modbus TCP

Serial numbers can be received via these interfaces so the test results can be made traceable. Numeric test results can also be transmitted via Ethernet I/P or serial output in simple ASCII format, allowing data integration with the most MES or ERP systems.

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TECHNICAL SPECIFICATIONS

Power
- **Supply Voltage:** 24 VDC (22 to 28 VDC)
- **Power Consumption:** 75 W maximum, 40 W typical

Processor
- **System Memory:** 1 GB RAM
- **Data Memory:** 60 GB HD minimum
- **Ethernet:** 1 or 2 (see chart)
- **USB:** 2 or 4 (see chart)
- **RS232:** 1
- **Monitor:** SVGA Connector
- **Keyboard/Mouse:** PS2

General
- **Operating Temperature:** 5 to 45 ˚C
- **Environment:** NEMA 12 (IP 52) Model 12xx only
- **Paint Finish:** Black backed powder

Digital Inputs
- **Number of Channels:** 8 with common return line
- **Polarity:** Bidirectional
- **Isolation Voltage:** ±120 V (Optically isolated)
- **Input current:** Less than 2.3 mA
- **Input for low state:** 8 VDC maximum
- **Input for high state:** 16 VDC minimum
- **Maximum input Voltage:** ±48 V
- **Switching speed:** 2 msec

Digital Outputs
- **Number of Channels:** 8 with common return line
- **Polarity:** Bidirectional
- **Isolation Voltage:** 120 V (optically isolated)
- **Switching Capability:** ±1 A @ ±48 VDC or VAC peak
- **Contact Resistance:**
  > 100 M ohms off
  <0.5 ohms on
- **Power on State:** All off
- **Switching Speed:** 8 msec

Analog Excitation
- **Excitation Voltage:** +10 VDC
- **Maximum Current:**100 mA per channel
- **Accuracy:** ±0.1 %
- **Maximum Noise:** 100 µV
- **Short Circuit Protection:** Continuous

Encoder Input
- **Number of Channels:** See model chart
- **Sensors:** Rotary encoders and linear scales
- **Input Voltage:** 5 V TTL or OC (Open Collector)
- **Signal Type:** Quadrature or single phase
- **Max Input Frequency:** 10 MHz TTL, 50 kHz Open Collector
- **Counter:** 32 bit (±2 x 10^9 counts)
- **Input Protection:** +24 V or -18 V without damage
- **Sensor Power:** +5 VDC @ 150 mA, current limited

Analog Input
- **Number of Channels:** 2, 4 and 8(16 and 24 channels available with 1608 expansion module)
- **Input Ranges:** See model chart
- **Input Accuracy:**
  ±0.02% for ±1 V range and greater;
  ±0.05% for ranges less than 1 V
- **Resolution:** 16 bit A/D, ±32,768 counts
- **Maximum Sample Rate:** 250 kHz (1 MHz Model 15xx)
- **Input Impedance:** 10 Gohms in parallel with 100 pF (820 ohms no power)
- **Small Signal Bandwidth:**
  1.7 MHz (Model 15xx)
  700 kHz (Model 14xx)
  20 kHz (Model 12xx)
- **Cross Talk:** 75 dB adjacent channels, 90 dB non-adjacent channels
- **CMRR:** (DC to 60 Hz)
  75 dB (Model 12xx)
  92 dB (Model 14xx)
  100 dB (Model 15xx)
- **Overload Protection:** ±25 V for up to 2 channels powered and ±15 V when off.

Test
- **Models / Recipes:** 16
- **Operations per model:** 10
- **Waveforms per operation:** 10
- **Features per waveform:** 10
- **Typical analysis time:** <400ms (dependant on complexity of analysis)
- **Response to trigger :** < 50ms

SIGPOD MODELS

1202/04

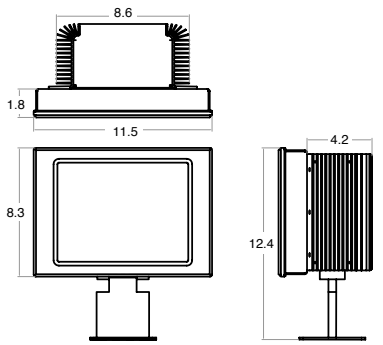
1402/04/08

1508

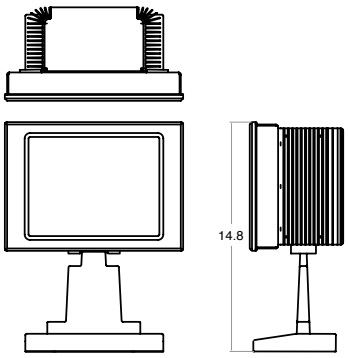
1608

	1202/04	1402/04/08	1508	1608
Analog In	2 / 4	2/4/8	8	8
Analog Range	±10, 2, 0.1, 0.033 V	±10, 5, 1, 0.2 V	±10, 5, 2, 1, 0.5, 0.2, 0.1 V	±10, 5, 1, 0.2V
Encoder In	2/4	2	2	2
Max Sample Rate	250 KHz	250 KHz	1 MHz	250 KHz
Digital I/O	8 In / 8 Out	8 In / 8 Out	8 In / 8 Out	8 In/8 Out
Processor	650 MHz	1.5 GHz	1.5 GHz	-
Memory	512 MB	1 GB	1 GB	-
HD	60 GB	120 GB	120 GB	-
USB	2 V1.0	4 V2.0	4 V2.0	-
Ethernet	1	2	2	-
Industrial Networks (optional)	Ethernet I/P Modbus TCP Profibus DeviceNet Interbus	Ethernet I/P Modbus TCP	Ethernet I/P Modbus TCP	-
Operating System	XP Embedded	XP Embedded	XP Embedded	-
Size Inch (mm)	7.5 x 9.66 x 4.2 (199 x 241 x 107)	8 x 6.5 x 8 (203 x 165 x 203)	8 x 6.5 x 8 (203 x 165 x 203)	8 x 4.5 x 8 (203 x 115 x 203
NEMA 12 (IP 52)	✓	-	-	-

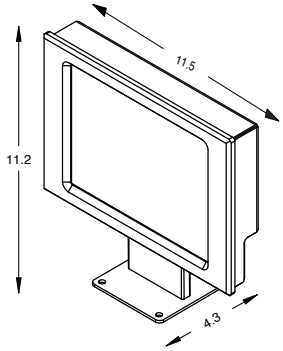
MOUNTING OPTIONS



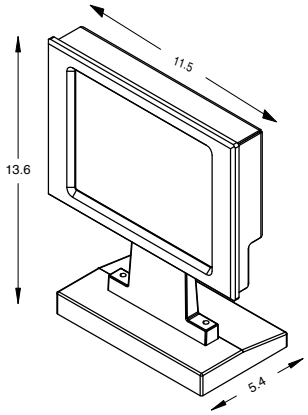
1200 series
MACHINE MOUNT



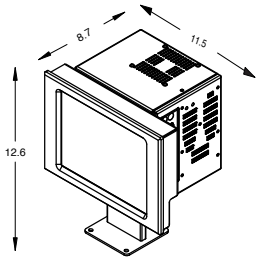
1200 series
DESK MOUNT



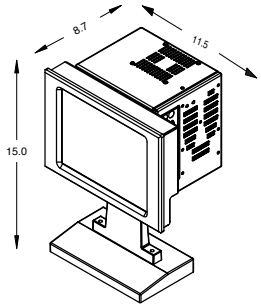
1490 TFT
MACHINE MOUNT



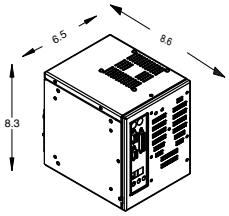
1490 TFT
DESK MOUNT



SIGPOD II WITH LCD
MACHINE MOUNT



SIGPOD II WITH LCD
DESK MOUNT



SIGPOD II
DIN RAIL MOUNT

ABOUT SCIEMETRIC

Since 1981, Sciemetric technology and products have enabled the automotive, medical, industrial and manufacturing sectors to gain full visibility and control over their manufacturing processes. Sciemetric's process signature verification technology enables understanding of the physical behavior of machines and assembly systems; thereby, detecting defects previously thought to be undetectable. Sciemetric solutions help companies reduce costs, improve quality, maximize yield and increase traceability.

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1 Selected fieldbus available on sigPOD 12xx systems only.

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