P3 - POD™ WELD MONITOR

The P3 Pod™ Monitor is Livingston's full feature set POD™ weld monitor.

Monitored and Calculated Parameters

- *Current (secondary)* – RMS and Peak (1-100KA). Standard toroid measures (4 - 45KA), Higher currents supported with special-order toroids
- *Voltage* – RMS (+/-7V) and Peak (+/- 9.9V)
- *Force* – LBS, PSI, KPA, KG, or N (Differential Input +/-20mv)
- *Displacement* – IN or MM - *Initial thickness, Final thickness, Setdown* (Projection welds), *Expansion* (Spot welds); Typical resolution: 0.00002" or 0.0005mm with 100mm sensor
- *Conduction Angle-* Resolution 1.8 degrees
- *Resistance* – OHMs, mOHMs, or uOHMs
- *Energy -* KVA
- *Half Cycle Count* (AC, DC single-phase), *Millisecond Count* (MFDC)

Tolerancing

- Up to 31 different *"Master"* signatures allows tolerancing of multiple weld schedules
- Multiple user-defined adjustable weld segments for advanced tolerancing
- Advanced *"Relative"* and/or *"Absolute"* tolerancing of monitored and calculated parameters *per Half cycle, per Segment and per Weld*

Features

- Pre-weld "Window" bit for Force and Displacement.
- Supports AC and MFDC welding (spot, projection, and pulse welds)
- Compact, modular units mount directly at the weld head
- Simple and quick installation using DeviceNet™ network (only 5 wires)
- DeviceNet™ for easy integration with factory automation
- Up to 60 Pod™s on one network
- Does not require a dedicated Pod™ Server
- Easy firmware upgrade without disassembly or removal from system
- Interlocks with PLC (or welder) using optional DeviceNet™ scanner card or DeviceNet™ I/O blocks
- PLC can read calibrated sensor readings (Displacement and Force) via explicit messaging*
- Built-in 10VDC excitation voltage for load cells, pressure sensors and displacement sensors.
- Pentium-Class CPU with on-board Digital Signal Processor
- 4 simultaneous sampling 16-bit Analog-to-Digital converters at up to 100kHz sample rate.

NOTE: Requires PLC with DeviceNet™ explicit messaging capability

Features when used with a dedicated Pod™ Server (PC running WMS software)

- Low MTTR (Mean Time To Repair) since Pod™ Server initializes replacement Pod™ at power up using backed up Pod™ configuration (tolerances, settings, Calibration, Masters, etc.)
- Real-time ERP (Enterprise Resource Planning) integration.
- Real-time access to weld data and setup parameters. Data is accessible via Ethernet for statistical analysis and up-to-the-minute report generation. Databases compatible with Microsoft Office®, SQL Server and any ODBC compliant database.
- Remote user interface and control of Pod™ Server via Ethernet. Automated remote data backup capable.
- System logging: Explicit messaging* allows PLC to send and store time-stamped ASCII text messages to System Log for logging machine or process events. System Log is viewable on Pod™ Server screen.
- Real-time part and process "traceability": Explicit messaging* allows PLC to send and store process related time-stamped data (integer and floating point values) in the weld database.

NOTE: Requires PLC with DeviceNet™ explicit messaging capability

P1 - POD™ WELD MONITOR

The P1 Pod™ Monitor is Livingston's cost effective, basic feature set weld monitor used primarily to detect catastrophic weld process events.

Monitored and Calculated Parameters

- *Current (secondary)-* RMS average for weld (1-100KA). Standard toroid measures (4 - 45KA), Higher currents supported with special-order toroids
- *Voltage-* RMS average for the weld (+/-7V)
- *Force-* Average for the weld in LBS, PSI, KPA, KG, or N (Differential Input +/-20mv)
- *Displacement* – IN or MM - *Initial thickness, Setdown* (Projection welds); Typical resolution: 0.00002" or 0.0005mm with 100mm sensor
- *Half Cycle Count* (AC, DC single-phase), *Millisecond Count* (MFDC)

Tolerancing

- *"Absolute"* tolerancing of monitored and calculated parameters *per Weld*
- Up to 31 different sets of "Absolute" tolerances for use with multiple weld schedules
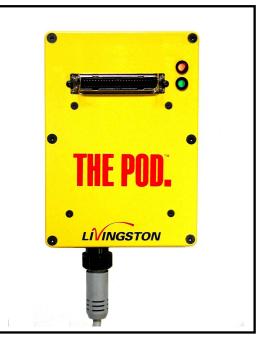
Features

- Pre-weld "Window" bit for Force and Displacement.
- Cost effective.
- Easy to understand, configure and operate.
- Supports AC and MFDC welding (spot, projection, and pulse welds)
- Compact, modular units mount directly at the weld head
- Simple and quick installation using DeviceNet™ network (only 5 wires)
- DeviceNet™ for easy integration with factory automation
- Up to 60 Pod™s on one network
- Does not require a dedicated Pod™ Server
- Easy firmware upgrade without disassembly or removal from system
- Interlocks with PLC (or welder) using optional DeviceNet™ scanner card or DeviceNet™ I/O blocks
- PLC can read calibrated sensor readings (Displacement and Force) via explicit messaging*
- Built-in 10VDC excitation voltage for load cells, pressure sensors and displacement sensors.
- Pentium-Class CPU with on-board Digital Signal Processor
- 4 simultaneous sampling 16-bit Analog-to-Digital converters at up to 100kHz sample rate.

NOTE: Requires PLC with DeviceNet™ explicit messaging capability

Features when used with dedicated Pod™ Server (PC running WMS software)

- Low MTTR (Mean Time To Repair) since Pod™ Server initializes replacement Pod™ at power up using backed up Pod™ configuration (tolerances, settings, Calibration, etc.)
- Real-time ERP (Enterprise Resource Planning) integration.
- Real-time access to weld data and setup parameters. Data is accessible via Ethernet for statistical analysis and up-to-the-minute report generation. Databases compatible with Microsoft Office®, SQL Server and any ODBC compliant database.
- Remote user interface and control of Pod™ Server. Remote data backup capable.
- System logging: Explicit messaging* allows PLC to send and store time-stamped ASCII text messages to System Log for logging machine or process events. System Log is viewable on Pod™ Server screen.
- Real-time part and process "traceability": Explicit messaging* allows PLC to send and store process related time-stamped data (integer and floating point values) in the weld database.

NOTE: Requires PLC with DeviceNet™ explicit messaging capability

N1 - POD™ MONITOR

The N1 Pod™ is intended for pre-weld process monitoring of displacement and force.

The N1 is ideal for checking part stack up and weld force prior to welding. This is useful for eliminating scrap welds that lead to costly rework due to missing parts, cold welds or expulsion. A DeviceNet output bit is used to indicate when both displacement and force are within acceptable limits. This output can be used with a stack light for visual indication or used with a PLC for pre-weld and post-weld conditions.

Monitored Parameters

- *Force-* LBS, PSI, KPA, KG, or N: Differential Input +/-20mv for use with tension and compression load cells, diaphragm type pressure transducers. Typical resolution: 0.01% of full scale.

- *Displacement* – IN or MM: For use with resistive voltage divider type potentiometers. Typical resolution: 0.00002" or 0.0005mm with 100mm sensor.

Tolerance Limits

- *"Absolute"* tolerance limits for a force and displacement window.
- Up to 31 different sets of "Absolute" limits for use with multiple weld schedules that have different weld forces or initial part stack-ups.

DeviceNet™ Inputs

- 5 Binary Select inputs for selecting up to 31 different sets of "Absolute" limits
- Zero Displacement – to reset the displacement sensor zero reference
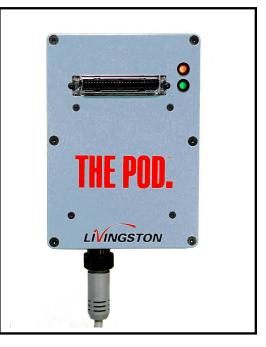- Reset – to clear latched outputs

DeviceNet™ Outputs

- Window bit – Real-time window status for Force and Displacement
- Hi/Lo bits – Real-time status for Force Hi, Force Lo, Displacement Hi, and Displacement Lo.
- Accept/Reject bits – Provide either pulsed or latched signals for changes in window status.
- Busy bit – Used to indicate when Pod is busy during configuration or setting displacement zero reference.

Features

- Cost effective
- Easy to understand, configure and operate.
- Compact, modular units can mount directly at the weld head
- Simple and quick installation using DeviceNet™ network for easy integration with factory automation
- Up to 60 Pod™s on one network
- Does not require a dedicated Pod™ Server
- Easy firmware upgrade without disassembly or removal from system
- Interlocks with PLC (or welder) using optional DeviceNet™ scanner card or DeviceNet™ I/O blocks
- PLC can read calibrated sensor readings (Displacement and Force) via explicit messaging*
- Built-in 10VDC excitation voltage for load cells, pressure sensors and displacement sensors.
- Pentium-Class CPU with on-board Digital Signal Processor

*NOTE: Requires PLC with DeviceNet™ explicit messaging capability

Livingston Product Feature Comparison Chart

	N1	P1	P3	2400
Weld Summary Parameter tolerancing	*1YES	YES	YES	NO
Current RMS		X	X	
Current Peak			X	
Voltage RMS		X	X	
Votlage Peak			X	
Force	X	X	X	
Initial Thickness	X	X	X	
Final Thickness			X	
Setdown		X	X	
Expansion			X	
Conduction Angle			X	
Resistance (Dynamic)			X	
Energy			X	
Half Cycle Count*2		X	X	
Segment and *2Half Cycle Parameter Tolerancing	NO	NO	YES	YES
Current RMS			X	X
Current Peak			X	X
Voltage RMS			X	X
Votlage Peak			X	X
Force			X	X
Initial Thickness			X	X
Final Thickness			X	X
Setdown			X	X
Expansion			X	X
Conduction Angle			X	X
Resistance (Dynamic)			X	X
Energy			X	X
Tolerancing	YES	YES	YES	YES
Absolute	X	X	X	X
Relative			X	X
Multiple Segments			X	X
Masters/Mastering			X	X
Adjustable Post Delay		X	X	X
Binary Selects	31	31	31	15
Weld Type				
AC	X	X	X	X
MFDC*2	X	X	X	
DC 1P (single phase)	X	X	X	

*1 - N1 parameter tolerancing is for Force and Initial thickness "window" bit control only.
*2 – MFDC monitored in milliseconds.