

Masoneilan FVP[®] 110

FOUNDATION Fieldbus[™]

Valve Positioner and Controller, Interoperable and
Integrated, Single & Double-Acting



Masoneilan's FVP® positioner, certified and approved by Fieldbus™ Foundation, can be used in conjunction with all certified Foundation Fieldbus™ Host systems. Within the FF host system, certified device descriptors (DD) enable seamless integration *and* interoperability of the Masoneilan FVP positioner. The Masoneilan FVP positioner has unequalled “on-board” data gathering capabilities, alarms, and diagnostics as well as standard positioner functionality. The Masoneilan FVP as advanced diagnostics integration and automated valve data analysis available with leading asset management software. Further enhanced capabilities of graphical data manipulation and valve signature acquisition are accomplished with Masoneilan's ValVue® FF software program, which may be used either as a standalone program or integrated with major FF host systems.

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Precise Digital Positioning & Diagnostics

The Masoneilan FVP is an intelligent digital valve positioner and PID process controller that communicates using the FOUNDATION Fieldbus protocol. The Masoneilan FVP offers advanced control technology for pneumatically actuated valves; provides higher precision, greater flexibility and ease of use. The major advantages of the Masoneilan FVP are:

- High Performance: Can respond to Step Changes of (0.05%)
- Low Power Consumption: (16mA) – Ideal for Intrinsically Safe applications
- Fast Commissioning: User friendly ValVue FF Set-up Wizard and Methods
- Low Life Cycle Cost: Low Air Consumption (< 10 scfh @ 20 psi)
- Self-initiated Valve Alarms
- Diagnostics and software integration possible with virtually all control systems
- On Board Valve Signature & Diagnostics Storage: Easily retrieved diagnostic information
- One Model Fits All: The same unit can be mounted on any manufacturer's rotary or linear actuator
- Manual Pneumatic Override Switch: Bypass electronics for valve installation, commissioning, and diagnosing
- Standard or Advanced Diagnostics: Scalable valve diagnostics to match process application
- Online Firmware Flash: Update Firmware without Process Interruption
- Built in Positioning Autotune: Patented for optimal response regardless of actuator size, can be launched from the control system or any FF configurator
- Frictionless Position Sensor: High resolution and maintenance free
- Modular Design: Makes for a compact and easily maintained and installed positioner
- Single- and Double-Acting models available



Masoneilan FVP Overview

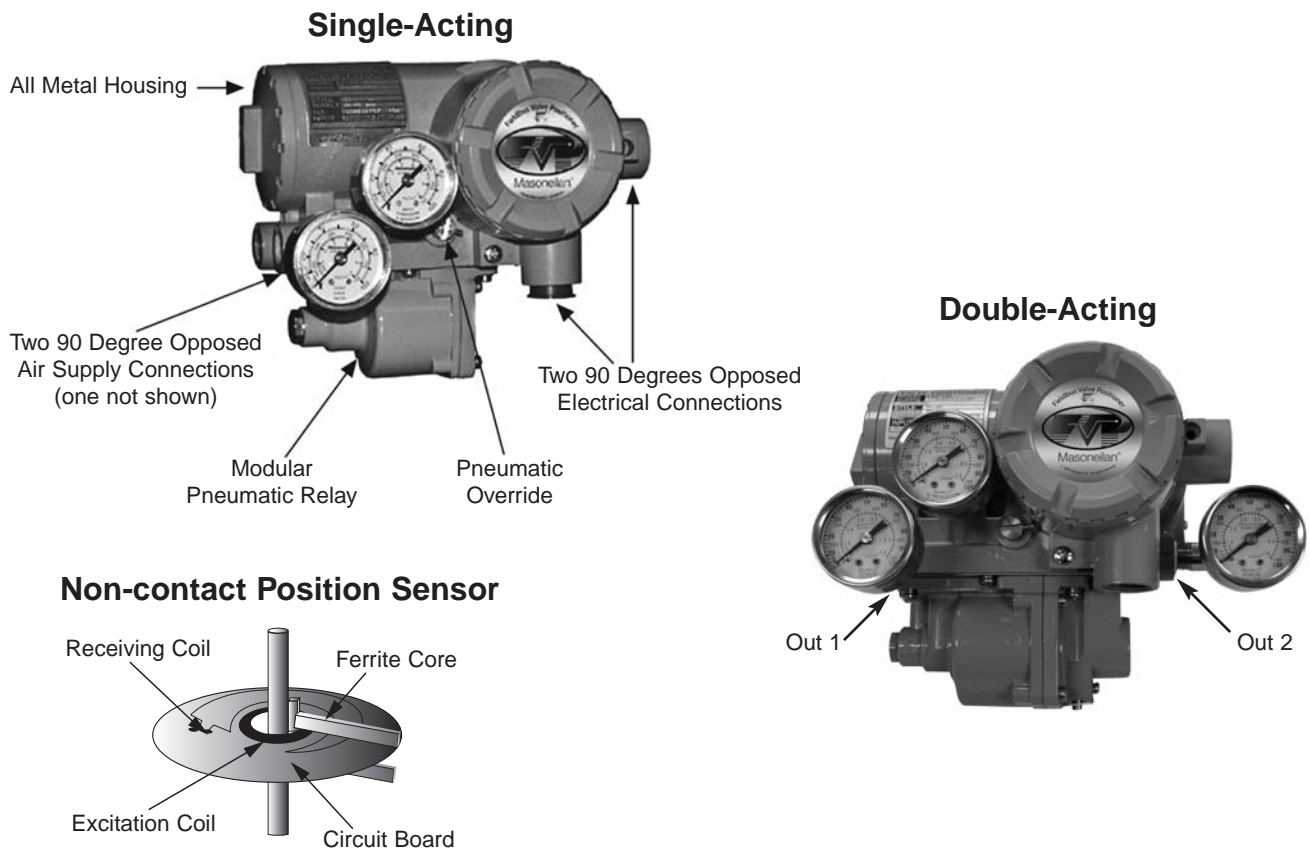


Figure 1: Masoneilan FVP Components

Multi-Function Blocks = Control Flexibility

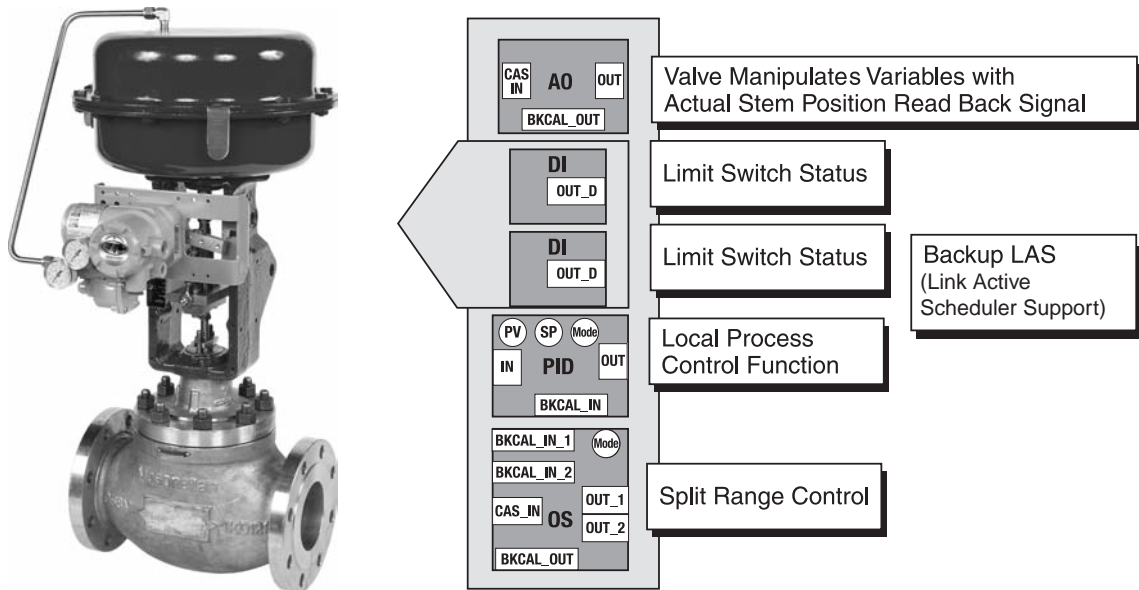


Figure 2: Masoneilan FVP Functional Overview

Physical and Operational Specifications

Item	Specification
Communication Protocol	FOUNDATION Fieldbus™
Voltage/Capacitance	9 - 32 Vdc / 1.76 nF
Housing Materials	Case: Aluminum die-cast / Paint: Polyurethane resin-baked finish
Weight	Single-Acting = 5.1 lbs (2.3 Kg)
	Double-Acting = 6.2 lbs (2.8 Kg)
Supply Current (Standard)	17mA max (16mA standard)
Supply Current (on-line download version)	17mA (approximately 41mA when flashing firmware)
Action	Single-Acting / Double-Acting
Connections	Pneumatic 1/4 NPT Female
	Electrical 1/2 NPT Female (other options available)
	Gauges 1/8 NPT
External Pneumatic Auto/Manual Switch	Included
Position Sensor Span	Rotary Travel 20 - 90° Linear Travel 0.4 - 6 inches (10 - 152mm) ⁽¹⁾
Operating Temperature Limits	Single-Acting = -40°F to 185°F (-40°C to 85°C) Double-Acting = -40°F to 140°F (-40°C to 60°C) Option available for higher temperature.
Enclosure Rating	IP65, NEMA4X
Linearity	+/-0.5%
Hysteresis	0.3%
Dead Band	0.1%
Supply Pressure	Single-Acting = 20 - 100 PSI (1.4-6.9 bar) Double-Acting = 30 - 105 PSI (2 - 7 bar)
Air Consumption	Single-Acting = 0.32 m ₃ /h at 20 PSI (1.4 bar) Double-Acting = 0.508 SCFM (0.915 Nm ₃ /h)
Air Delivery	Single-Acting = 6.6 m ₃ /h at 20 PSI (1.4 bar) Double-Acting = 11.7 SCFM (18.85 Nm ₃ /h)
Temperature Effect	+/- 0.04% of F.S./°F (+/-0.08% of F.S./°C)
Lightning Protection (Optional)	Max current 6000 A (rise 1 micro second, fall 40 micro seconds) Repeating current 1000 A (rise 1 micro second, fall 40 micro seconds) 100 times
Ambient Humidity Limits	5 to 95% RH at 104°F (40°C)
Vibration Limit	4 mm at 5 to 15 Hz / 2G at 15 to 2000 Hz
Shock Limit	10G
Flow Characterization	Linear, Equal Percentage (50:1 and 30:1), Quick Opening, Camflex Eq% User Defined, Tight Shut-off and Full Open
Valve Position Auto Tune	Masoneilan FVP performs an automatic determination of the optimal valve position control parameters (during setup).
On-line Firmware Download	Optional
Backup Link Active Scheduler	Standard

1. Above 6 inches can be achieved with custom mounting. Consult factory for mounting details.

Table 1: Masoneilan FVP Specifications

Physical and Operational Specifications

Item	Specification
Function Blocks Included	PID, AO, DI X 2: and OS (splitter block)
Positioner Alarms	Block Alarm, Process Alarm, and Event Update Each alarm provides detailed information
Fail Safe Action	Internal diagnostics and configurable deviation alarm can set output pressure to zero
Diagnostics	Standard or Advanced (see pages 8 & 9)
ITK (consult www.fieldbus.org for latest updates)	4.61

Table 1: FVP110 Specifications (cont.)

Item	Specification	Code	
ATEX	Flame Proof Per EN 50014 (1997) and EN 50018 (2000) Group: II Category: 2G EEx d IIC T6, ambient Temp.: -40 to 167°F (-40 to 75°C) EEx d IIC T5, ambient Temp.: -40 to 176°F (-40 to 80°C)	KF2	
ATEX	Intrinsically Safe Per EN 50014 (1997), EN 50020 (2002), EN 50284 (1999), EN60529 (1991), and EN50281-1-1 (1998) Group: II Category : 1GD, 1G or 1D Maximum Surface Temp for dust proof: 212°F (100°C) Ambient Temp for 1G: -40 to 140°F (-40 to 60°C) Ambient Temp for 1D: -40 to 176°F (-40 to 80°C) Ambient Temp for 1GD: -40 to 140°F (-40 to 60°C)	KS25	
	Gas Proof/Dust Proof		EEx ia IIC T4 EEx ia IIB T4
ATEX	Type n Group: II, Category: 3G	Consult Factory	
Factory Mutual Approvals	Explosion Proof	Class I, Division 1, Groups B, C and D	FF1
	Intrinsically Safe	Class I, II, III Division 1, Groups A, B, C D, E, F and G	FSI5
	Non-incendive	Class 1, Division 2, Groups A, B, C and D Suitable for Class II, Division 2, Groups F and G and Class III with Non-incendive Field Wiring applications Hazardous (Classified)	FN15
CSA Approvals	Explosion Proof	Class I, Division 1, Groups B, C and D	CF1
	Intrinsically Safe	Ex ia IIB/IIC T4; Tamb = -58 - 140°F (-50 to 60°C); CSA Enel Type 4X; IP66	CS15
JIS Approvals	Explosion Proof	Class I, Division 1, Groups B, C and D	JF3
	Intrinsically Safe		JS3
CE Conformity	Yes per EN61326		

Note: Intrinsically safe approvals per FISCO.

Table 2: Agency Approvals

Model Numbering System

Table 3 (below) describes the Masoneilan FVP model numbering system and features. For example, Masoneilan FVP model number *FVP110-F1A1/LC1/BP/FF1* indicates: Foundation Fieldbus input signal, is intended for a Single-Acting Actuator, has a PID Function Block, Pressure Sensor and Diagnostics and meets FM Explosion Proof Agency Certification.

Model	Suffix Codes	Description
FVP110		
Input Signal	-F	Foundation Fieldbus
Applicable Actuator	1	Single-Acting Actuator
	2	Double-Acting Actuator. See price sheet for an example.
-	A	Always A
Connection	3	Electrical Connection: 1/2NPT, Pneumatic Connection: 1/4NPT
	6	Electrical Connection: M20, Pneumatic Connection: Rc 1/4"
	N	
Option Codes	/	Optional Specifications (see table below for codes and descriptions)

Note: 0-100 psi (0-7 bar) pressure gauges for OUTPUT and SUPPLY are provided as standard.

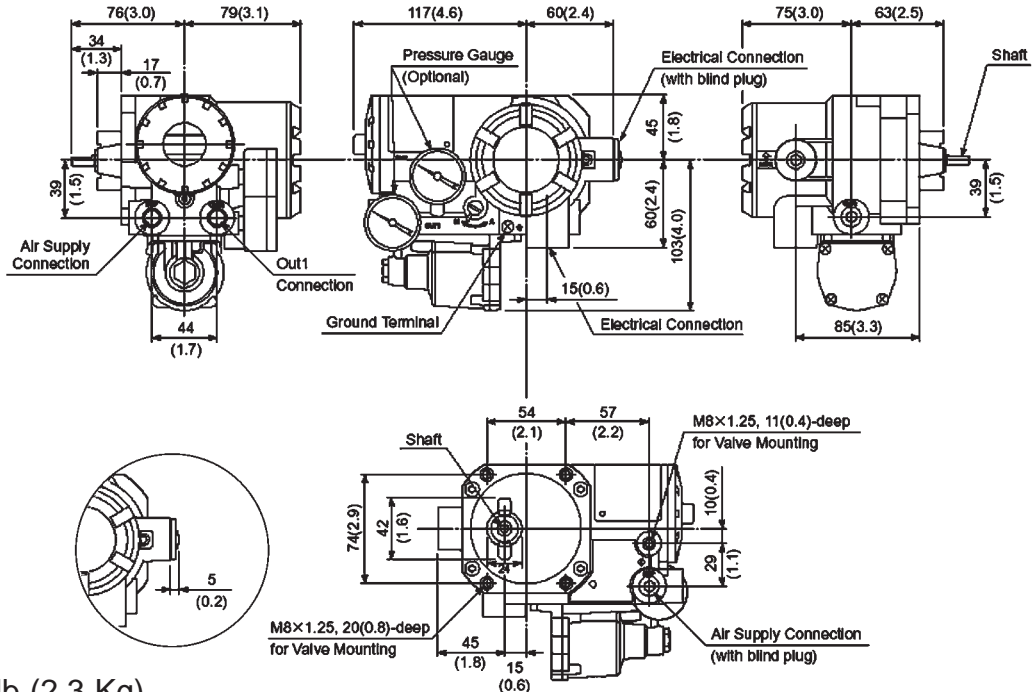
Optional Specifications

Item	Description	Code
Lightning protection	Power supply 10.5 to 32 V DC Allowable current Max.6000A(1*40μS), repeating 1000A(1*40μS) 100 times	A
Coating Change	Epoxy resin coating	X1
PID Function Block, Link master function	Process control function block with backup link master function	LC1
Output pressure detecting function, Signature function	Advanced Diagnostics	BP
High Temperature (for Double-Acting Only)	+14°F to +180°F (-10°C to +85°C) ambient temperature	HT
FF Firmware Download Function (Not available for Intrinsic Safety)	Online Firmware Upgrade	EE
FM Explosion proof	See Table 2	FF1
FM Intrinsic Safety	See Table 2	FS15
FM Non incendive	See Table 2	FN15
CSA Explosion proof	See Table 2	CF1
CSA Intrinsic Safety	See Table 2	CS15
ATEX Type N Consult Factory	See Table 2	KN25
ATEX (KEMA) Flame Proof Approval	See Table 2	KF2
ATEX (KEMA) Intrinsic Safety Approval	See Table 2	KS25

Table 3: Masoneilan FVP Model Nomenclature

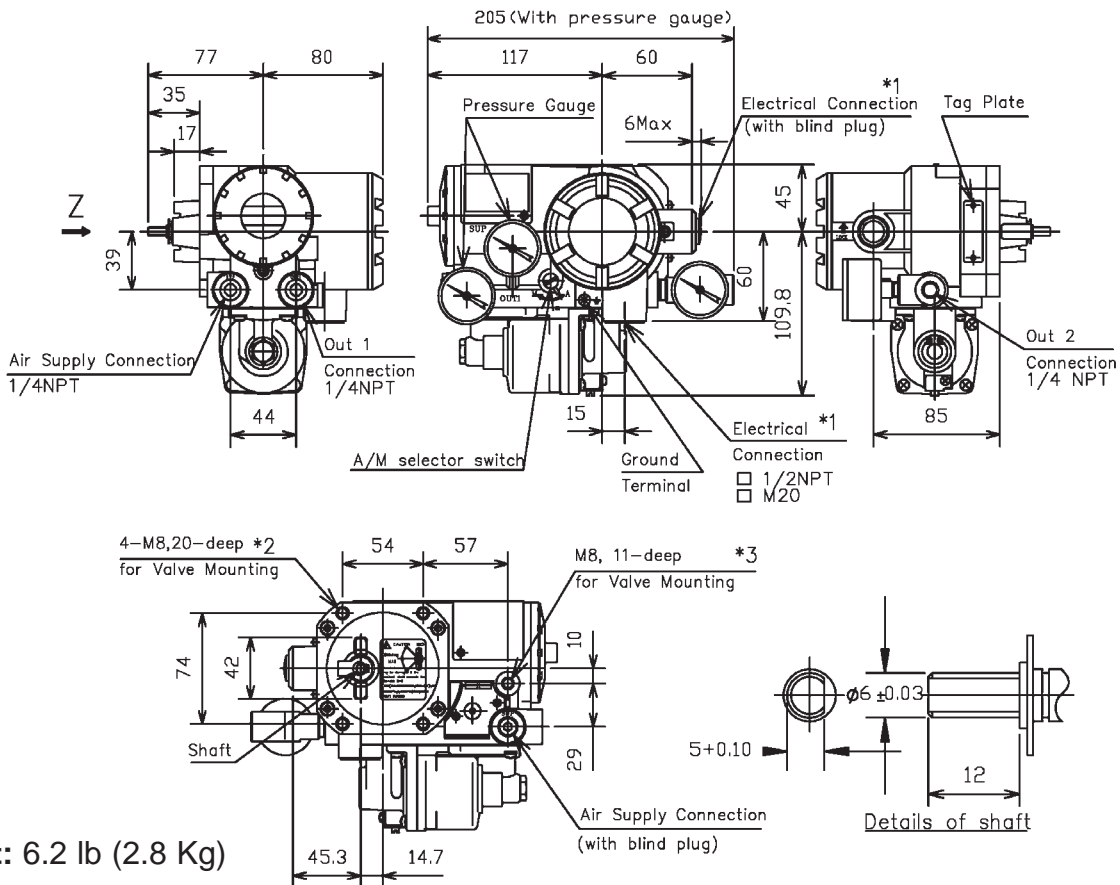
Dimensions and Weights

Unit: mm(approx. inch)



Weight: 5.1 lb (2.3 Kg)

Figure 3: Masoneilan FVP Dimensions (Single-Acting)



Weight: 6.2 lb (2.8 Kg)

Figure 3: Masoneilan FVP Dimensions (Double-Acting)

Alarms

Control Valve Related Runtime Alarms	Diagnostics Option	
	Standard	Advanced / BP
Temperature Sensor Failure	X	X
Pressure Sensor Failure		X
Position Sensor Failure	X	X
A/D Converter Failure (Position Sensor)	X	X
EEPROM Failure	X	X
Amplifier Failure	X	X
Failsafe	X	X
Temperature Measurement Out of Range	X	X
Pressure Measurement Out of Range		X
Position Sensor Out of Range	X	X
Adjustable Hi-Lo Servo Drift Warning	X	X
Cycle Count Limit Exceeded	X	X
Travel Limit Exceeded	X	X
Total Time Open Limit Exceeded	X	X
Total Time Closed Limit Exceeded	X	X
Total Time Near Closed Limit Exceeded	X	X
Deviation Warning	X	X
Deviation Error	X	X
Calibration Related Feedback / Alarms		
Auto Tune / Travel Calibration Error	X	X
Exhaust Air Press Warning		X
Small Air Supply Warning		X
Large Air Supply Warning		X
Offset Drift Warning	X	X
Large Response Speed Warning	X	X
Large Hysteresis Warning	X	X
Large Slip Width Warning	X	X
Small Angle Span Warning	X	X
Large Angle Span Warning	X	X
50% Angle Warning	X	X
Small Angle Span Error	X	X
Large Angle Span Error	X	X
50% Angle Error	X	X
Linear Adjustment Error	X	X
Offset Measurement Failed	X	X
Gain Measurement Failed	X	X
Response Speed Measurement Failed	X	X
Hysteresis Measurement Failed	X	X

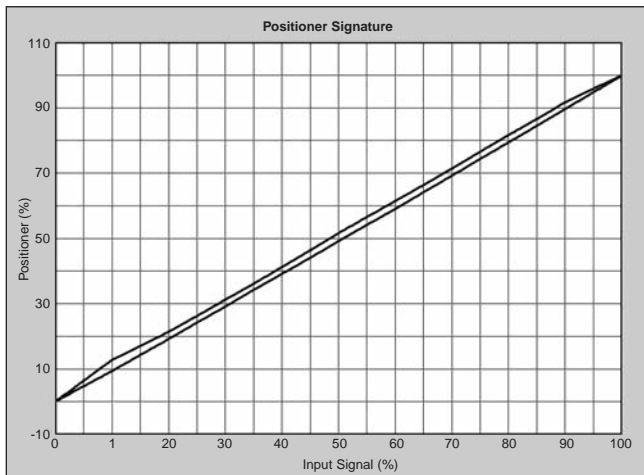
Masoneilan FVP Diagnostics

The Masoneilan FVP has two levels of diagnostics: **Standard** or **Advanced**. The **standard diagnostics version** provides Fieldbus Alarms (see page 8).

The **advanced diagnostics version** provides more in depth calculations (friction, spring range, etc) using a built in pressure sensor (see examples below). This version also provides a means of measuring online friction as well as the dynamic performance of the valve without disturbing the process (consult Masoneilan for details).

Positioner Signature (Stored on PC)

Travel vs Setpoint

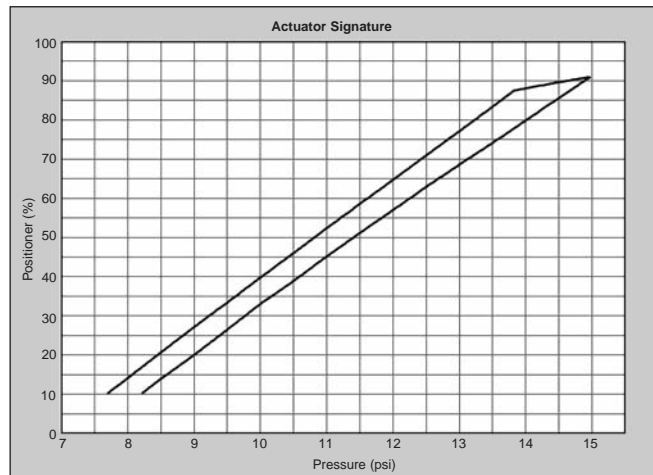


Analysis

- Hysteresis
- Accuracy
- Overall "Picture"
- Deadband
- Linearity

Standard Actuator Signature* (Stored in the Masoneilan FVP or PC)

Travel vs Actuator Pressure

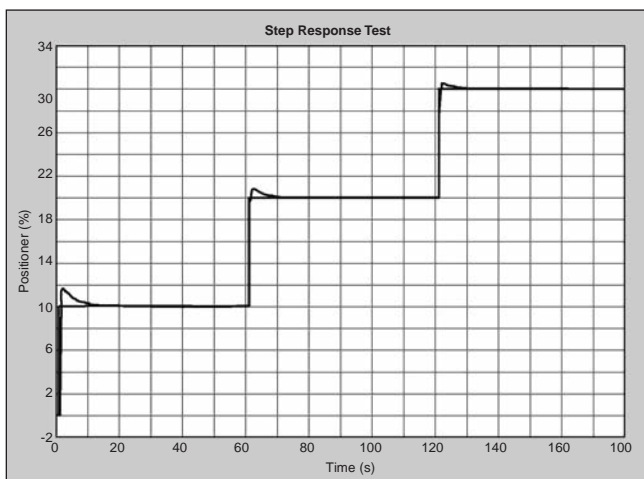


Analysis

- Friction
- Stick-Slip Width
- Spring Range
- Actuator Pressure

Step Signature (Stored on PC)

Travel & Setpoint vs Time

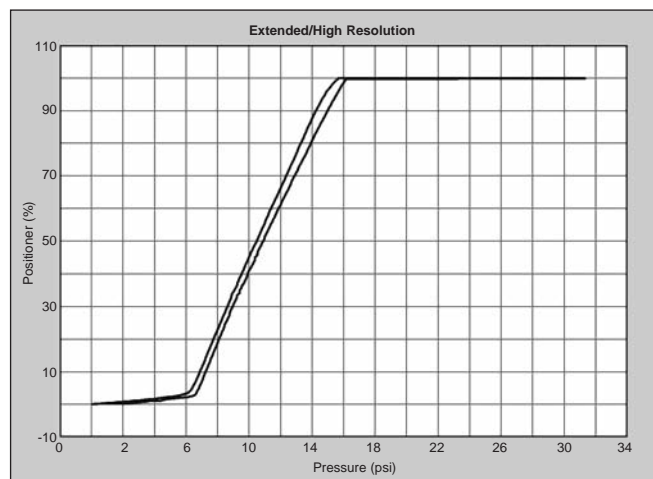


Analysis

- T86
- Resolution
- Overshoot
- Dead Time

Extended Actuator Signature* (Stored on PC)

Travel vs Actuator Pressure



Analysis




- Friction
- Stick-Slip Width
- Seating Analysis
- Spring Range
- Actuator Pressure

**Available with Single-Acting version only.*

Figure 4: Masoneilan FVP Diagnostics, Graphs

Masoneilan FVP Integration With Host Systems

Table 4 below provides a summary of the possible Masoneilan FVP and Host System integration configurations.

	Certified & Approved FF Host System With Advanced Diagnostics Integration ⁽³⁾			All Certified & Approved Foundation Fieldbus Host Systems
	Honeywell	Emerson	Yokogawa	
	Experion™ PKS	Emerson DeltaV™	Yokogawa CS 1000 CS 3000 STARDOM™	
Configuration – Calibration – Diagnostics				
Diagnostics Integration	Yes ⁽¹⁾	Yes ⁽²⁾ AMS™	Yes ⁽⁴⁾ PRM	Consult Masoneilan
Configuration / Calibration Using Menus, Methods & Setup Wizards	Yes ⁽⁴⁾	Yes ⁽⁴⁾	Yes ⁽⁴⁾	Yes
Configuration / Calibration via Host	Yes	Yes	Yes	Yes
Asset Management Support	Yes ⁽¹⁾ FVP Scout	Yes ⁽²⁾ AMS	Yes ⁽⁴⁾ PRM	Consult Masoneilan
Configuration / Calibration via Host	Yes	Yes	Yes	Yes
Configuration / Calibration / Diagnostics via ValVue FF Standalone connected to H1 Segment	 ValVue	Yes	Yes	Yes
Configuration / Calibration / Diagnostics via Integrated Package				
 ValVue	Yes ⁽¹⁾	Yes ⁽²⁾	Yes	Consult Factory
Name of Add-On Package	Pending	AMS ValVue FF SNAP-ON™	ValVue FF PRM Plug-In	N/A

1. Asset Manager Fault Models for FVP.


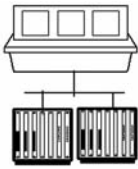



2. Emerson Delta V AMS SNAP-ON for ValVue FF.

3. At Time of Print. For other systems contact Masoneilan.

4. Device Type 1, Rev 3 or Type 7 only

Table 4: Masoneilan FVP - Host Integration

Table of Contents

Diagnostic Item	Diagnostics Version		Accessibility Read and Write (if applicable)			Device Initiated
	Standard	Advanced /BP Option	Host System (TB Block and menus-and-methods)	FF Handheld (TB Block and menus-and-methods)	ValVueFF	
						Minimal or No Highway Loading ⁽²⁾
						
Diagnostics Tests						
Self check including auto-analysis of spring range, low and high air supply, valve hysteresis, time constant, and stick-slip	✓*	✓	✓	✓	✓	✓
Standard Actuator Signature test with automatic friction, and spring range analysis ⁽⁴⁾		✓	✓	✓	✓	✓
On board non-volatile memory storage for two actuator signatures with analysis ⁽⁴⁾		✓	✓	✓	✓	✓
Extended actuator test with automatic friction, spring, and seating analysis ⁽⁴⁾		✓			✓	✓
High resolution extended actuator test with automatic friction, spring, and seating analysis ⁽⁴⁾		✓			✓	N/A
Positioner performance signature (positioner signature)		✓			✓	✓
Valve/Actuator/Positioner performance signature (step test)		✓			✓	✓
Online performance analysis including friction	✓ ⁽³⁾	✓			Consult Factory	
Signature Handling						
Comparative signature overlay and analysis of 8 tests	N/A	N/A	✓ ⁽¹⁾		✓	N/A
Trending window of diagnostic test progress can be saved	N/A	N/A	✓ ⁽¹⁾		✓	N/A
Batch operation for diagnostic tests	N/A	N/A	✓ ⁽¹⁾		✓	N/A
HTML report	N/A	N/A	✓ ⁽¹⁾		✓	N/A

1. This feature is host system dependent. See table “Integration with control systems” for more details, page 10.

2. Diagnostic tests or calibration routines, which are “device initiated” and running within the micro-processor of the Masoneilan FVP. Therefore, minimal or no communication bandwidth is affected, which allows for successful completion of these tasks without sacrificing the H1 segment throughput.


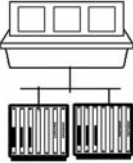


3. Friction related information not available.

4. Not available with Double-Acting.

* Spring Range, Air Supply Not Available

Table 5: Diagnostics Summary

Diagnostics Summary

Diagnostics Item	Diagnostics Version		Accessibility Read and Write (if applicable)			Device Initiated
	Standard	Advanced /BP Option	Host System (TB Block and menus-and-methods)	FF Handheld (TB Block and menus-and-methods)	ValVueFF	
	Standard	Advanced /BP Option				Minimal or No Highway Loading ⁽²⁾
Valve Historian						
32 bit cycle counter with adjustable alarm threshold	✓	✓	✓	✓	✓	✓
32 bit Travel accumulator with adjustable alarm threshold	✓	✓	✓	✓	✓	✓
Accumulating timer of valve position “closed” with adjustable alarm threshold	✓	✓	✓	✓	✓	✓
Accumulating timer of valve position “near closed” with adjustable alarm threshold	✓	✓	✓	✓	✓	✓
Accumulating timer of valve position “open” with adjustable alarm threshold	✓	✓	✓	✓	✓	✓
FVP Self Initiated Diagnostics						
Impending positioner or control valve problem (servo alarm)	✓	✓	✓	✓	✓	✓
Control valve position deviation from commanded setpoint	✓	✓	✓	✓	✓	✓
Sensor failures (position, temperature, A/D converter, etc)	✓	✓	✓	✓	✓	✓
CPU tasks, memory integrity, communication integrity	✓	✓	✓	✓	✓	✓
Setup and Calibration Diagnostics						
Auto-Calibration with 9 pass-fail criteria	✓	✓	✓	✓	✓	✓
Positioning AutoTune with 11 pass-fail criteria	✓	✓	✓	✓	✓	✓

1. This feature is host system dependent. See table “Integration with control systems” for more details, page 10.
2. Diagnostic tests or calibration routines, which are “device initiated” and running within the micro-processor of the Masoneilan FVP. Therefore, minimal or no communication bandwidth is affected, which allows for successful completion of these tasks without sacrificing the H1 segment throughput.
3. Friction related information not available.

Table 5: Diagnostics Summary (cont.)

Fieldbus Specification Data Summary

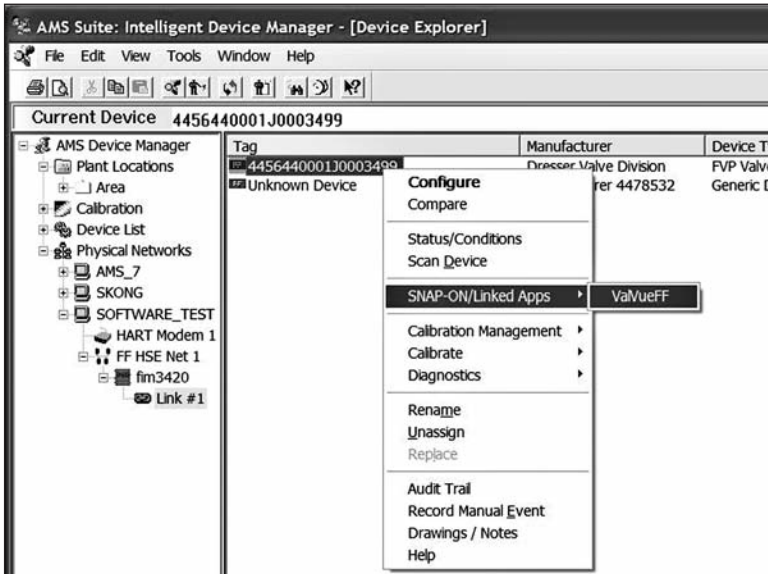
1. General		
	Is the device registered at the Fieldbus Foundation (Y/N)	Yes
	Manufacturer Name	Dresser Masoneilan
	Manufacturer ID	445644
	Model	FVP110
	Device Type/Rev	1/4
		7/2
	ITK (See www.fieldbus.org for latest updates)	4.61
2. DD and CFF		
	Device Description File Name (.ffo and .sym)	Type 1: 0401.FFO, 0401.SYM Type 7: 0202.FFO, 0202.SYM
	Capabilities File Name	Type 1: 040101.CFF Type 7: 040101.CFF
	List of Methods	Setup Wizard
		Auto Tuning
		Travel Calibration
		Operational Configuration
		Search Stop Points
		Control Parameter Tuning
		Self Check Execution
		Release Fail Safe
		Signature Execution
		Upload Signature Data
	Upload Signature Header Data	
	Instant Troubleshooting	
3. Physical		
3.1	Polarity Sensitive (Y/N)	Yes
3.2	Quiescent Current Draw (mA)	16
3.3	Startup Current Draw (ma)	17
3.4	Capacitance	176nF
3.5	4-wire Device	No
4. Communication		
4.1	Stack Manufacturer	Yokogawa/Softing
4.2	Does the Device support Backup LAS functionality?	Yes
	Total Number of VCRs	29
4.3	Number of Fixed VCRs for user configuration (Publisher, Subscriber, Alarming, and Trending)	QUB/Server-3
		QUU/Source(Alert)-1
		QUU/Source(Trend)-1
		BNU/Publisher - 11
		BNU/Subscriber - 12

Fieldbus Specification Data Summary (cont'd)

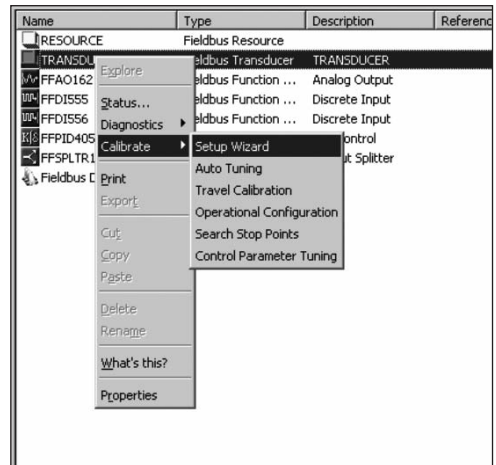
5. User Layer General		
5.1	Function Block Application Manufacturer	Yokogawa
5.2	Function Blocks (list all type, but not including transducer)	AO, PID, DI, OS
5.3	Device Support Block Instantiation (Y/N)	No
5.4	Number of Link Objects	25
5.5	Device Support firmware upgrade over fieldbus segment? (Y/N)	Yes (optional)
6. Resource Block		
6.1	Block Class (Standard, Enhanced, Custom)	Standard
6.2	Special Features	No
7. Transducer Blocks		
7.1	Block Class (Standard, Enhanced, Custom)	Custom
7.2	Does the device support methods in the Resource and Transducer Blocks?	Yes
7.3	Special Features besides Methods (multiple views, etc.)	Yes
7.4	Transducer Block Special Features (supports Methods, multiple VIEWS, etc.)	Multiple VIEWS
8. Function Blocks		
8.1	Does the Device support Custom Function Blocks?	No
8.2	Block Type	DI1, DI2, OS, PID, AO
8.3	Number Available	5 (RB and TB not included)
8.4	Execution Time (ms)	AO: 95 ms, PID: 120 ms, OS: 95 ms, DI1 & DI2: 40 ms
8.5	Block Class (Standard, Enhanced, Custom)	Standard
8.6	Is the AO block of the device able to operate in Cascade mode?	Yes
9. Channels		
	XD_SCALE and CHANNEL value	Listed by Channel, Unit Code, Enumerated Description, and Function Block Type
9.1	Channel 0	PID Controlled Value Input
9.2	Channel 1	Analog
		Input/Output
		Set point and readback signals
9.3	Channel 2	Discrete output High limit switch status
9.4	Channel 3	Discrete output Low limit switch status

Ease of Setup

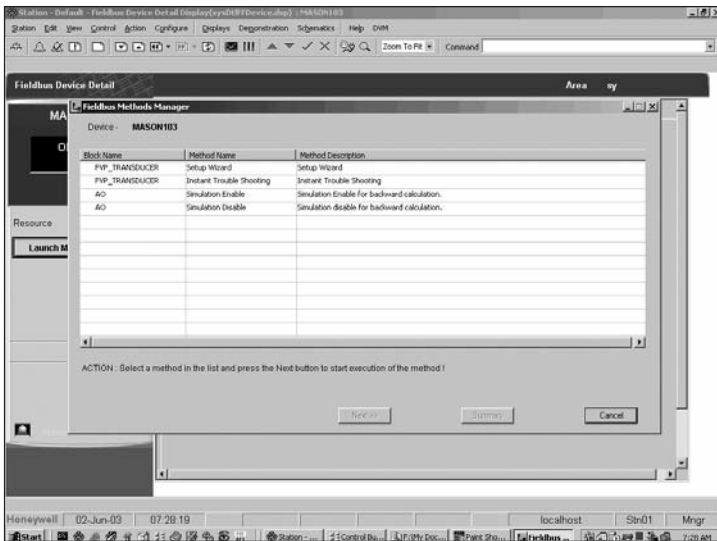
The Masoneilan FVP is very easy to setup, configure and commission from any FF host, because the (DDs) that reside in the host system contain “menu and methods” to guide the user through the Masoneilan FVP setup. Below are a few examples of the Setup Wizard executed from some commonly used host systems and Masoneilan FVP.



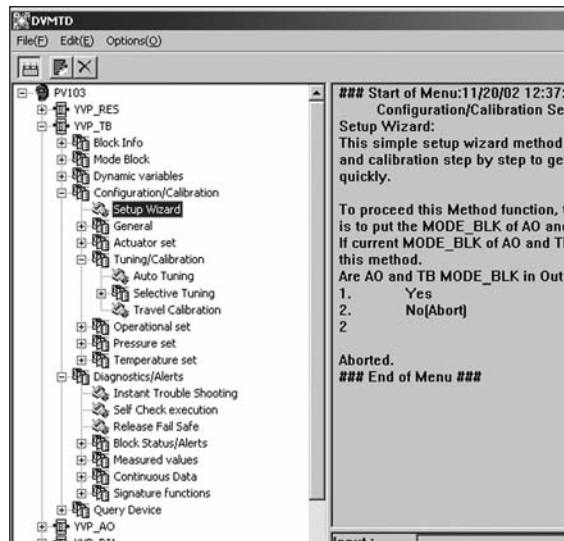
Emerson Process Management integration - ValVueFF Snap-On for AMS 7.0, DeltaV 7.2 or later edition



Launching the Setup Wizard by Right-clicking on the TB Block from the DeltaV Explorer



Honeywell ExperionPKS – How to Launch the Setup Wizard from the “Fieldbus Methods Manager”



Yokogawa Centum system – How to Launch the Setup Wizard from the “Method Invoker”

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About Dresser, Inc.

Dresser, Inc. is a leader in providing highly engineered infrastructure products for the global energy industry. The company has leading positions in a broad portfolio of products including valves, actuators, meters, switches, regulators, piping products, natural gas-fueled engines, retail fuel dispensers and associated retail point of sale systems and air and gas handling equipment.

Leading brand names within the Dresser portfolio include Dresser Wayne® retail fueling systems, Waukesha® natural gas-fired engines, Masoneilan® control valves, Mooney® regulators, Consolidated® pressure relief valves, and Roots® blowers and rotary gas meters. It has manufacturing and customer service facilities located strategically worldwide and a sales presence in more than 100 countries. The company's website can be accessed at www.dresser.com.

About Dresser Masoneilan

Headquartered in Houston, Dresser Masoneilan is a leading brand in the Dresser, Inc. portfolio. With a history of innovation and technological leadership that goes back more than 125 years, Dresser Masoneilan delivers flexible, best-fit process control valve solutions with interoperable instrumentation and smart technologies for a wide range of applications and industries. An "open architecture" technology platform offers more product application and operational flexibility. With strategically located manufacturing operations and a worldwide network of service and support facilities, Dresser Masoneilan delivers comprehensive process control solutions and services to a global market.

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