

I/P Converter

Digital Servo Pressure Control Valve

Installation & Operation Manual

Rev 1.6



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Digital Servo Pressure Control Valve

Model DSV-100

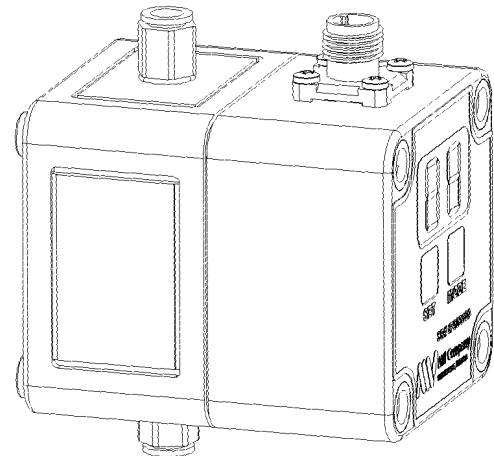
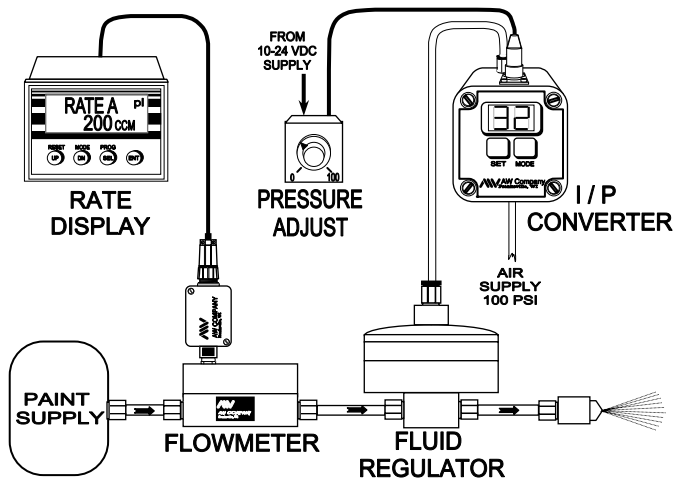
Installation and Operation Manual

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Introduction / Features

The DSV-100 I/P Converter from AW Gear Meters is a compact high performance digital servo pressure control valve. Accepting either current, voltage or touch-key input, the I/P Converter precisely regulates air pressure for directing process control valves and air or fluid regulators. This microprocessor-based converter delivers high accuracy pressure regulation with extremely low dynamic response times for improved process control and higher product quality. A highly visible integral LED display eliminates the need for additional display components providing a display of actual pressure, set point pressure or the actual pressure deviation from set point. Additional diagnostic test modes measure the system response time or check for line leaks providing actual real-time data invaluable in commissioning, monitoring or troubleshooting an installation. An analog output representing output pressure is provided. User set-up of output pressure range and input voltage or current span is accomplished quickly and easily via the two touch-keys and display. The lightweight and compact DIN rail mount package maximizes panel component density while the push-in type ¼” pneumatic hose connectors and threaded electrical connection minimize installation time and cost.

A Typical Spray Painting Application



Specifications

Power Requirements:

Supply Voltage	10 - 24 Vdc
Supply Current	85 mA. @ 15 Vdc

Signal Inputs:

Voltage Input (programmable)	0-5, 1-5, 0-10 Vdc
Voltage Input Impedance	10 KΩ
Current Input (programmable)	0-20 mA, 4-20 mA
Current Input Impedance	250Ω

Performance Specifications:

Max. Input Pressure	130 psig*
Output Psig (programmable)	3 to 15, 0 to 15,30,50, 100
Flow Rate, 100 psig @ Inlet	.6 SCFM max
Recommended Filtration	20 Micron
Min. Closed End Volume	2.13 cu. in. (35 ml)
Linearity (typical)	± 0.1% F.S.
Hysteresis (typical)	± 0.1% F.S.
Repeatability (typical)	± 0.2% F.S.
Accuracy (typical)	± 0.3% F.S.

Signal Output:

Pressure Signal	0-5 Vdc
(Actual pressure, 0 to 100% of programmed output range)	

Dynamic Response:

10 - 90% F.S. Rated Output	180 ms.
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Wetted Parts:

Elastomers	RTV, Glass
Manifold	Aluminum
Valves	Nickel Plated Brass
Press. Transducer	RTV, Aluminum, Plastic

Physical:

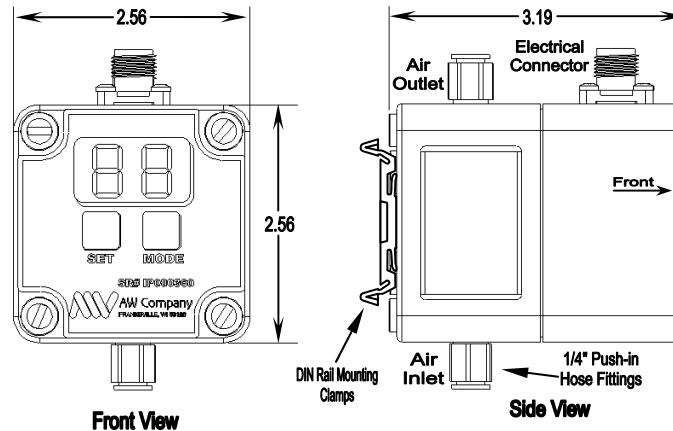
Operating Temp. Range	32-158°F (0-70°C)
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* Supply pressure should be 10% higher than max. required output pressure, not to exceed 130 psig.

Installation

The DSV-100 has DIN rail mounting provisions on the back of the unit. Units can be mounted directly beside each other for maximum panel component density. It is recommended to install the unit oriented horizontally as shown below or vertically on it's back. Air fittings are push-in type 1/4" O.D. pneumatic hose connectors.

Dimensions



Electrical Connections

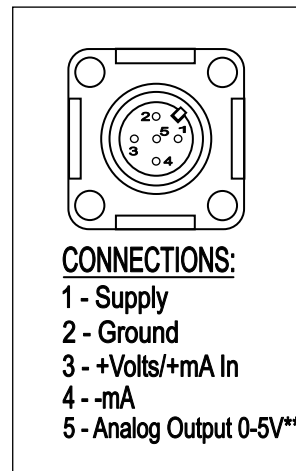
Power and signal connections to the DSV-100 are through a 5-pin threaded circular connector (4-pin connector on versions preceding 1.6). The use of shielded cable is recommended and the shield should be connected to earth ground at the source. The DSV-100 requires a 10-24 VDC @ 35-136 mA supply for operation. See specifications for complete voltage and current requirements. The DSV-100 will respond to either voltage or current control determined by electrical connection and input option selection. See Input/Output Options and Input/Output Options Programming on page 4 for input options. Voltage or current control is referenced to Supply Common or the DSV-100 will accept a fully isolated mA input when isolated mA input mode is selected in set-up. (On versions prior to 1.6 the -mA input must be connected to supply common for proper operation when a current control input is used).

Connection for Voltage Input

Electrical Connection	Connector Pin
10-24 VDC Supply	1
Supply/Signal Common	2
+ Volts Control Signal	3
No Connection	4
Analog Pressure Output**	5**

Connection for Current Input

Electrical Connection	Connector Pin
10-24 VDC Supply	1
Supply Common*	2*
+ mA Control Signal	3
- mA Control Signal*	4*
Analog Pressure Output**	5**



* -mA Control Signal must be connected to the Supply Common for proper operation on DSV-100 versions previous to 1.6. For version 1.6 and up isolated mA input operation is permitted when selected in set-up.

** Analog output available on version 1.6 and up only.

DSV-100 Start-Up

The DSV-100 has several options for control input as well as several output range options that require set-up before operation. To view and/or edit the input/output options see DSV-100 Input/Output Options on this page and Programming/Diagnostic Mode on page 5.

DSV-100 Display Modes

After briefly indicating the operating software version, the DSV will always display the **AP** (actual pressure) at power-up or after programming/diagnostics. The DSV-100 has three display modes:

AC - Actual Pressure – Displays the actual pressure in psi at the outlet port.

SE - Setpoint Pressure – Displays the set-point pressure in psi based on the analog input or manual set point.

di - Difference – Displays the difference in psi between the Actual Pressure and the Setpoint Pressure.

The MODE-key is used to change the display to another mode. When the MODE-key is touched the display will briefly flash **AC** for actual pressure, **SE** for setpoint, or **di** for difference to indicate which mode will be displayed. The DSV-100 will remain in the last selected display mode until the MODE-key is used or the power is removed.

DSV-100 Input/Output Options

Input Range Options - The DSV-100 has six possible input options supporting 0-5, 1-5, or 0-10 volt input, isolated or common grounded 0-20 or 4-20 mA input, or manual control of setpoint from the keypad. The input options are assigned a number for programming as follows:

(01) 0-20 mA/0-5 volt	(02) 4-20 mA/1-5 volt	(03) Manual (keypad) Operation*
(04) 0-10 volt	(05) 4-20 mA isolated input**	(06) 0-20 mA isolated input**

** Options (05) and (06) for isolated mA input are only available on DSV-100 version 1.6 or higher. For proper operation with DSV-100 versions previous to 1.6 the -mA Control Signal must be connected to the Supply Common. Version number is displayed at power-up or in set-up mode.

Output Range Options - Five output range options are offered. The output range options are assigned a number for programming as follows:

(01) 0-100 psi*	(02) 0-50 psi	(03) 0-30 psi
(04) 0-15 psi	(05) 3-15 psi	

*Manual operation will produce a 0-100 psi output range controlled directly from the front keypad. See Manual Operating Mode on page 6 for more information.

The selected output range will always linearly represent the selected voltage or current input range and pressure output is limited to maximum value of the selected range. The DSV-100 will respond to either voltage or current control as determined by electrical connection (see Electrical Connections on page 3) and input option setting. The DSV-100 default settings configure the unit for 0-20 mA/0-5 volt analog input range (option 01) with 0-100 PSI output (option 01).

Programming/Diagnostic Mode

To view or edit programmed input and output ranges and/or perform system diagnostic tests the programming/diagnostic mode is used. Programmed input and output options are retained by the DSV-100 indefinitely until edited. In the programming/diagnostic mode the input and output range options are first presented for viewing or editing after which the DSV-100 performs a system response and leak test.

WARNING!! The DSV-100 will pressurize the system and perform a response and leak test after the input and output range options are viewed or edited. This can cause unexpected motion, flow or other physical response. Always use caution when using the programming/diagnostic mode and be aware of the results it can produce.

To access programming/diagnostic mode, the SET-key must be pushed before and held in while power is applied to the DSV-100. With the SET-key held in, apply power to the panel and/or plug in the electrical connector to activate the converter. The DSV-100 will briefly show a software revision number before entering the programming/diagnostic mode.

View/Edit Input Option - The display will blink **ir** (input range) five times and then display the currently selected input option number for 2-3 seconds. If the desired option is displayed, do nothing and wait a few seconds for the display to blink **or** (output range). If the displayed number is not the desired input option, press the MODE-key immediately. The display will again blink **ir** (input range) five times and display the next input option number. If the displayed number is not the desired input option, press the MODE-key and repeat the procedure until the desired option number appears. When the desired option is displayed, do nothing and wait a few seconds. The DSV-100 will save the last displayed number as the input option and the display will then blink **or** (output range).

View/Edit Output Option - The same procedure is used to select one of five output range options. The display will blink **or** (output range) five times and then display the currently selected output option number for 2-3 seconds. If the desired option is displayed, do nothing and wait a few seconds for the display to blink **rP** (response test). If the displayed number is not the desired output option, press the MODE-key immediately. The display will again blink **or** (output range) five times and display the next input option number. If the displayed number is not the desired output option, press the MODE-key and repeat the procedure until the desired option number appears. When the desired option is displayed, do nothing and wait a few seconds. The DSV-100 will save the last displayed number as the output option and the display will then blink **rP** (response test).

Response Test - Once the input and output options have been viewed or edited the DSV-100 performs two diagnostic tests, a response test and a leak rate test. The first is a dynamic response test and the display will blink **rP** (for response test). The DSV-100 will first vent any pressure on the outlet then pressurize the output to the maximum pressure dictated by the programmed output range for 100 milliseconds, read the system response, and display the result. Results appear as a number from 0 to 100% with 100% indicating the best possible response. Responses will vary with length of hose and actuator volume. Responses above 80% can be considered very good, a response below 50% indicate a low response system. Lower responses can be due to long hoses, high volume components, excessive Cv requirement, or may indicate a leak or malfunction.

Leak Test - After a brief display of the response test result, the display will blink **Lr** (for leak rate) while the DSV-100 performs a leak test. The DSV-100 pressurizes the output to the maximum pressure dictated by the programmed output range and then reads the pressure for 2-3 seconds to determine if the system is holding pressure or at what rate it is depleted. The leak rate is displayed as a number from 0 to 100% with 0% indicating a completely open output and 100% indicating that there is no leakage. A result less than 100% indicates that pressure has diminished over time likely due to a leak in a hose, fitting, diaphragm or actuator. The leak rate result will be displayed for a few seconds and then the DSV-100 will then revert to the **AP** display (Actual Pressure) and begin operation according to the programmed options.

Manual Operating Mode

When the manual operating mode is selected the default setpoint is 4 psi and the output range is 0-100 psi. Whenever power is applied or after programming/diagnostics are completed the display will revert to the **AC** display (Actual Pressure). As with analog input modes, the MODE-key is used to view the **AC** (actual pressure), **SE** (set-point), or **di** (difference) displays. The two touch-keys are used to increment (MODE-key) or decrement (SET-key) the setpoint value. To adjust the setpoint, press the SET-key causing the display to blink **SE** (set) for 1-2 seconds. The DSV-100 looks for a key to be pressed before **SE** stops blinking so quickly press and hold the MODE-key to increment the setpoint, or press and hold in the SET-key to decrement the setpoint. Once either key is released, the SET-key must be pressed again change the setpoint. In manual mode the DSV-100 will not retain the setpoint if power is removed and the setpoint will always revert to four psi whenever power is applied or after programming/diagnostics are completed.