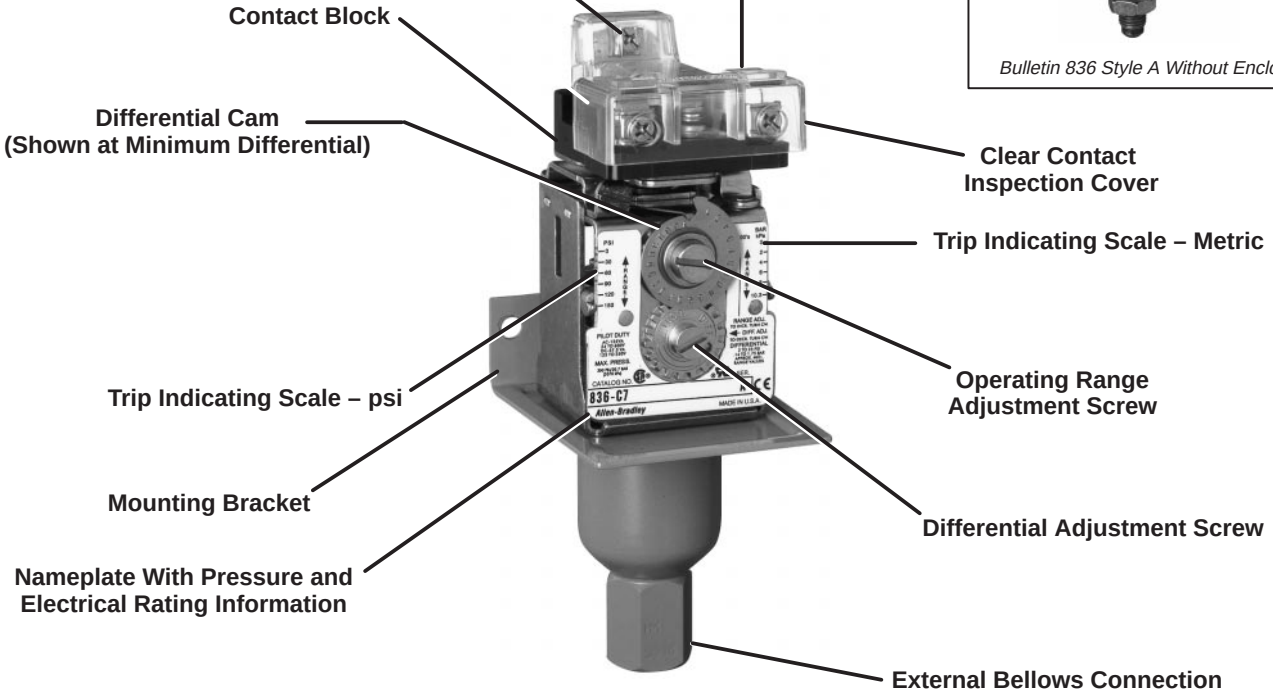
Bulletin 836 Style A Without Enclosure



Bulletin 836 Style C Without Enclosure

TABLE OF CONTENTS

Reference Information

UL and CSA Numbers page 15-15.

Conversion Factors Catalog page Important-2. Enclosure information Catalog page Important-8.

Description

Bulletin 836 Pressure Controls are designed for general industrial use to control and detect pressure. Allen-Bradley Bulletin 836 Pressure Controls can be used in pneumatic and hydraulic systems. Pressure controls use copper alloy or stainless steel bellows. The design and high quality components provide long life operation with air, water, oil, non-corrosive liquids, vapors, gases, and some corrosive liquids or gases. Pressure controls feature snap action precision switches equipped with silver contacts. The straight in-line and relatively friction-free construction provides accurate and consistent operation regardless of the angle at which the controls are mounted. Pressure controls are designed for easy adjustment of both trip and reset pressures.

Allen–Bradley Bulletin 836 Pressure Controls are used in many types of industries and applications. They can be used to control pneumatic systems, maintaining preset pressures between two values. Pressure controls can be used to detect over-pressures of gases or liquids to protect machines, processes, and personnel. They can also be used to detect low pressures to protect equipment from loss of coolants and lubrication.

Bulletin 836 Pressure Controls are offered in a variety of styles to meet a wide range of applications. The devices are available in Type 1, 4 & 13, 4X, 7 & 9 and 4 & 13 combined and Open Type without enclosure for panel mounting. Pressure controls have a wide variety of contact modifications to meet most control circuit requirements. The controls have adjustable pressure ranges from 30” mercury vacuum to 900 psi with corresponding differentials. Accessories and modifications are available to tailor the device to meet most application requirements.

Applications

- **Air Compressors**
- **Compressed Air Monitor Systems**
- **Liquid Level Control**
- **Vacuum Transfer Systems**
- **High Pressure Alert**
- **Low Pressure Alert**
- **Monitor Low and High Pressure**

Style A — Small Size, Internal Copper Alloy Bellows

Style A

- Independently adjustable range and differential
- 7/16” - 20 SAE flare for 1/4” copper connection tubing
- Adjustable Operating Range – 30” mercury vacuum to 375 psi
- Maximum Line Pressure – 750 psi
- Occasional Surge Pressure – 850 psi

Style C — Wider Ranges, External Bellows

Style C

- Independently adjustable range and differential
- 1/4” N.P.T.F. female pipe connection
- 3/8” N.P.S.F. female pipe connection (**836-C1** and **836-C1A** only)

Copper Alloy Bellows

- Adjustable Operating Range – 30” mercury vacuum to 900 psi
- Maximum Line Pressure – 1300 psi
- Occasional Surge Pressure – 1600 psi

Type 316 Stainless Steel Bellows

- Adjustable Operating Range – 30” mercury vacuum to 375 psi
- Maximum Line Pressure – 650 psi
- Occasional Surge Pressure – 650 psi

Refrigeration Controls – See page 15-16

Style H

- High Pressure Refrigeration Controls

Style L

- Low Pressure Refrigeration Controls

Style P

- High Pressure Definite Purpose Controls

Note: psi= pounds per square inch gauge pressure.

Technical Terms

Adjustable Operating Range – total span within which the contacts can be adjusted to trip and reset.

Trip Setting – higher pressure setting at which value the contacts transfer from their normal state to a changed state.

Reset Setting – lower pressure setting at which value the contacts return to their normal state.

Adjustable Differential – difference between the trip and reset values.

Minimum Differential – when the differential is set to the lowest pressure difference between trip and reset.

Maximum Differential – when the differential is set to the widest pressure difference between trip and reset.

Max. Occasional Surge Pressure – maximum surge pressure that can be applied to the actuator. Surges or transients can occur during start-up and shut-down of a machine or system. Expressed in milliseconds, complex electronic instrumentation is required to measure the varying amplitude, frequency, and duration of this wave form. Extreme surges that occur approximately 8 times in a 24 hour period are negligible.

Maximum Line Pressure – maximum sustained pressure that can be applied to the bellows without permanent damage. The control should not be cycled at this pressure.

Positive Pressure – any pressure more than zero pounds per square inch (psi). See Figure 2.

- **Trip Setting –** increasing pressure setting when contacts change state.
- **Reset Setting –** decreasing pressure setting when contacts return to their normal state.

Vacuum (Negative) Pressure – any pressure less than zero psi, inches of mercury vacuum. See Figure 3.

- **Trip Setting –** increasing vacuum setting when contacts change state.
- **Reset Setting –** decreasing vacuum setting when contacts return to their normal state.

psi – Devices listed are in gauge pressure units which use atmospheric pressure as a reference. Atmospheric pressure at sea level is approximately 14.7 psi or 30 inches of mercury.

Operating Range Adjustment Screw – this screw is used to adjust the trip setting by varying the force of the main spring.

Differential Adjustment Screw – this screw is used to adjust reset setting by varying the force of the differential blade spring.

Pressure Media – there are many types of pressure media that are controlled. Examples include, air, water, hydraulic fluids and other types of gases and liquids. The type of media and maximum system pressure will determine the type of actuator used for the pressure control application. See page 15-6.

Pressure Connection – common types of pressure connections used in control systems are 1/4" and 3/8" female pipe threads, and 7/16" – 20 SAE copper tubing.

Contact Configuration – there are many types of contact configurations available. Bulletin 836 Style A and C pressure controls offer a wide variety of contact configurations for both automatic operation and manual reset. See page 15-11.

Figure 1
Graphics to Illustrate Technical Terms

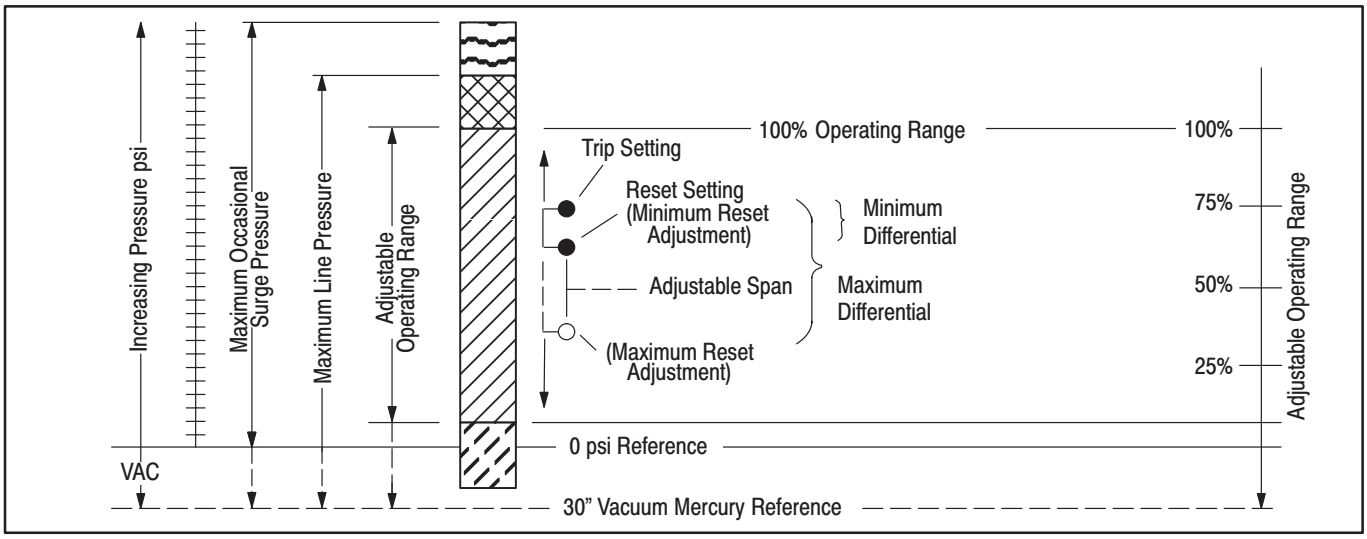


Figure 2
Positive Pressure

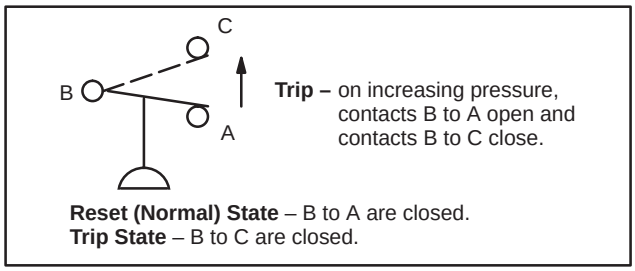
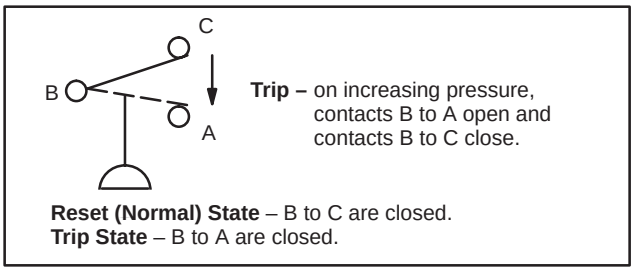


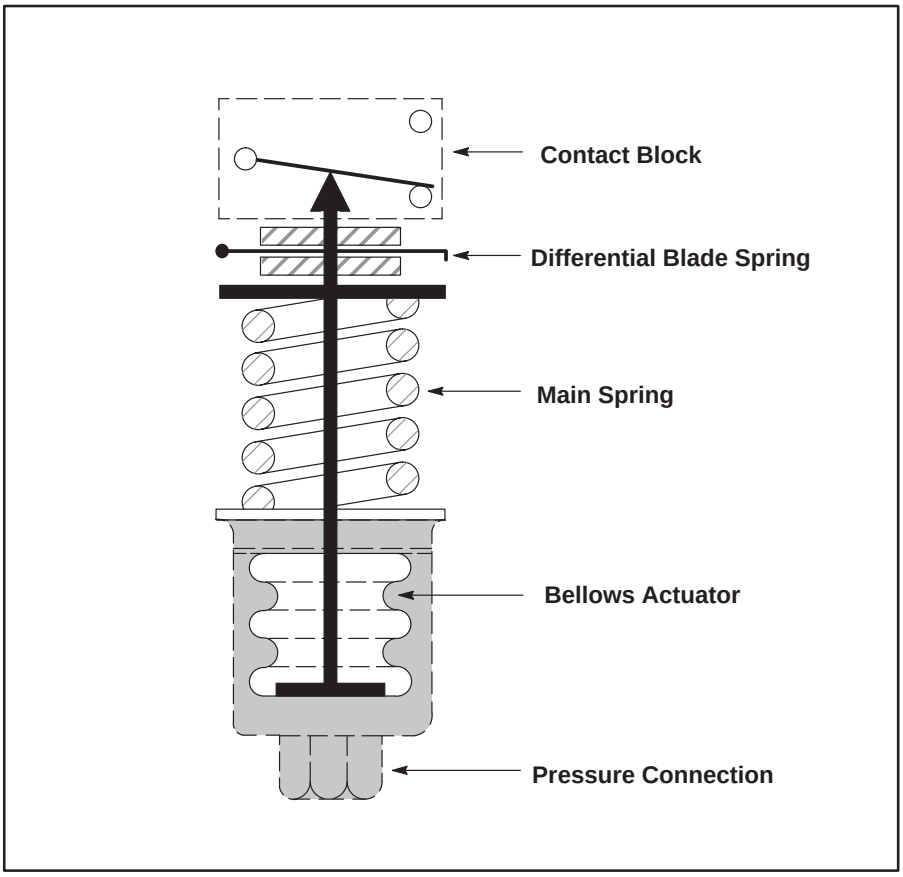
Figure 3
Vacuum Pressure



Theory of Operation

Bulletin 836 Pressure Controls are designed to open or close electrical circuits in response to changes in pneumatic (air or gas) or hydraulic (water or oil) pressure. Figure 4 is a simplified drawing of a pressure control. The system pressure is connected to the control at the pressure connection. The system pressure is applied directly into the bellows. As pressure rises, the bellows exerts force on the main spring. When the threshold force of the main spring is overcome, it transfers the motion to the contact block causing the contacts to actuate – this is referred to as the TRIP SETTING. As pressure decreases, the main spring will retract, causing the secondary differential blade spring to activate and return the contacts to their normal state – this is referred to as RESET SETTING. Varying the force of the main spring (by turning the operating range adjustment screw) determines where the contacts will trip. Varying the force of the secondary differential blade spring (by turning the differential adjustment screw) determines where the contacts will reset.

Figure 4
Basic Mechanical Structure



Applications for Control

Pressure controls can be used to either control or monitor a machine or process. Figure 5 shows a typical control application. Here, pressure is controlled within predetermined high and low values. Figure 6 shows a typical monitoring application. Here, pressure is monitored between a high and low value, signaling when a preset limit has been exceeded.

Figure 5
Typical Control Application

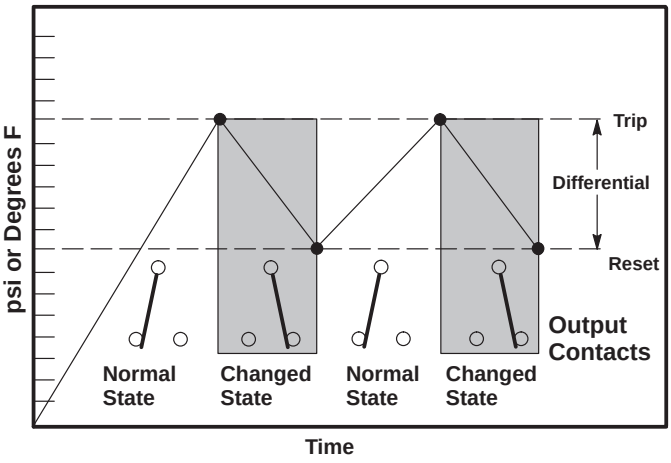
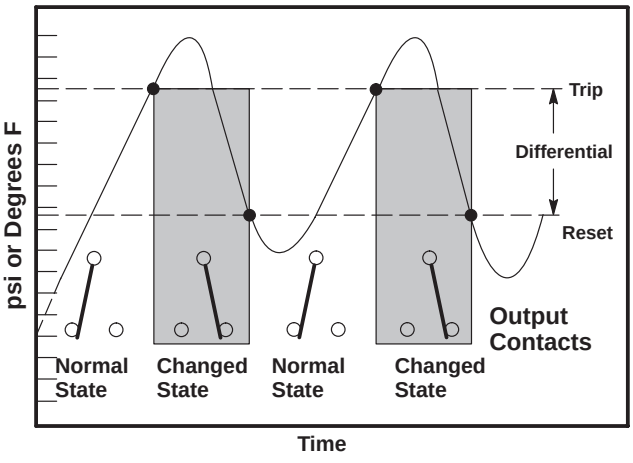


Figure 6
Typical Monitoring Application



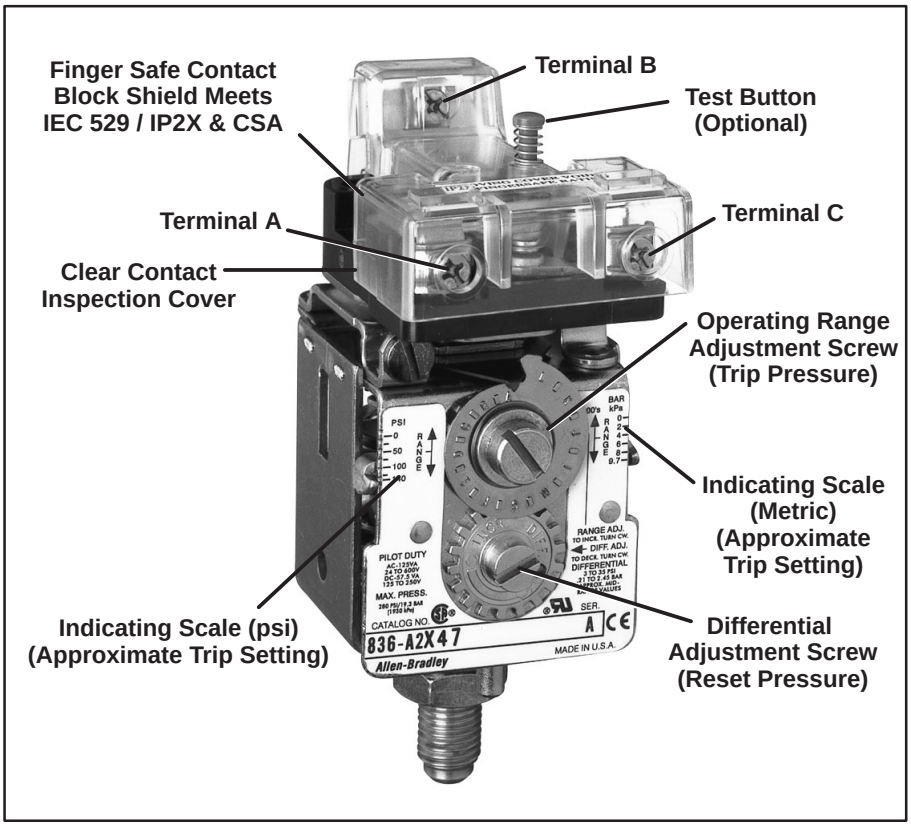
Control Settings

Allen-Bradley controls are designed for ease of setting to help minimize installation time. Standard controls shipped from the factory are set at the maximum operating range and minimum differential. By following this simple two step process, the control can be set to the specific requirements for each application. See Figure 7.

STEP 1 – Adjust Trip Setting
The trip setting is set by turning the operating range adjustment screw. Turn screw counterclockwise to lower the trip setting, or clockwise to raise the trip setting. The approximate trip setting is shown on the indicating scale.
Note: Turning the operating range adjustment screw will change both the trip and reset settings in equal increments.

STEP 2 – Adjust Reset Setting
The reset setting is set by turning the differential adjustment screw counterclockwise to increase the differential, or clockwise to decrease the differential.
Note: Adjusting the differential does not affect the trip setting.

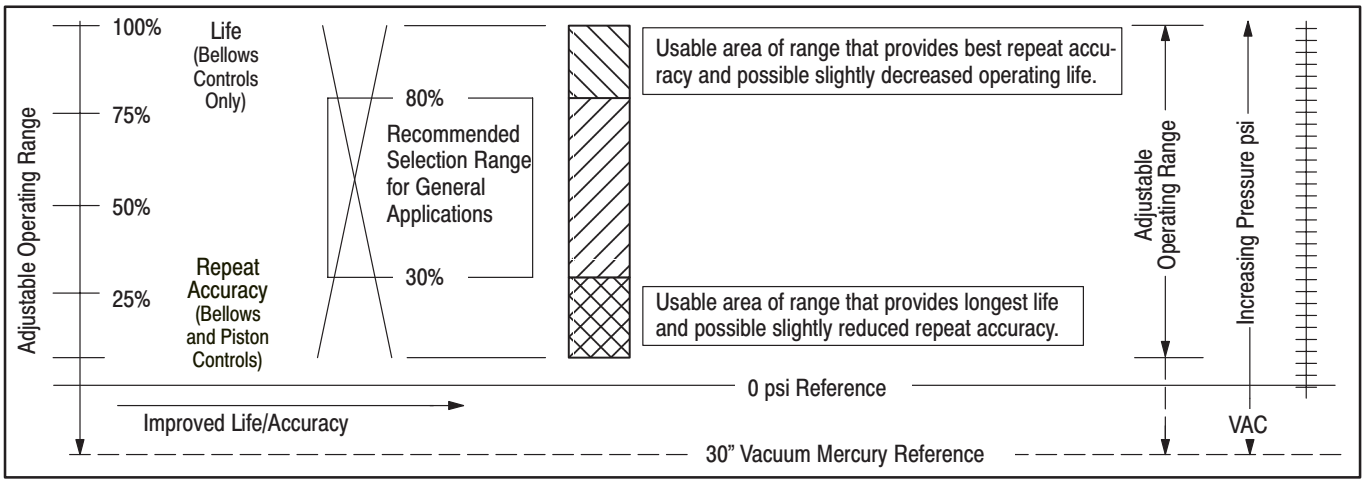
Figure 7
Trip and Reset Adjustment



Repeat Accuracy and Mechanical Life

The design and construction of Bulletin 836 Styles A and C controls provide a typical repeat accuracy of **± 0.5%** or better. Repeat accuracy is based on percent of maximum range, evaluated from test data and calculated using the formula per ICS 2-225 standards. Repeat accuracy and mechanical life of bellows type controls is graphically illustrated in Figure 8. For general applications, controls selected where the contacts operate between 30% and 80% of the operating range and where the maximum line and surge pressures do not exceed the specified values will provide excellent life and repeat accuracy. For more specific applications, it is important to note that the controls are designed to operate **below** or **above** these values. However, there may be a small trade-off between the factors of repeat accuracy and mechanical life.

Figure 8
Repeat Accuracy Versus Mechanical Life Graph



Standard Contacts

Contact Operation

Contact blocks are single pole, double throw and can be wired to open or close on increasing or decreasing pressures.

Non-Inductive Ratings

5 Amperes, 240 Volts
3 Amperes, 600 Volts

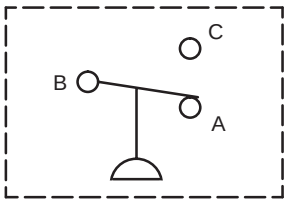
Control Circuit Ratings

AC – 125VA, 24 to 600 Volts
DC – 57.5VA, 115 to 230 Volts

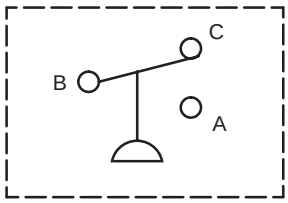
Standard Contact Wiring Configurations

Single Pole Double Throw

Positive Pressure



Vacuum Pressure



Note: NEMA does not rate contacts to switch low voltage and current.
Bulletin 836 Styles A and C Pressure Controls are supplied with silver contacts. The devices are designed to deliver high force snap action to the contacts. This provides exceptional contact fidelity at 24V DC I/O card current level entry when the control is protected in a suitable enclosure for the surrounding environment.

Special Controls

A large number of unlisted catalog modifications and complete devices are available for specific and OEM applications.

Special controls and modification service is available to meet many applications unique to the OEM market.

Consult your nearest Allen-Bradley Sales Office for assistance with specific modified controls and accessories.

Temperature Range

Temperature range at +32° F (0° C) or below is based on the absence of freezing moisture, water, or other fluids that may solidify and impede operation of the control. Temperature ratings are as follows:

Operating: –22°F to +150°F
(–30°C to +66°C)
Storage: –22°F to +200°F
(–30°C to +93°C)

Factory Set Pressure Controls

Allen-Bradley will factory set pressure controls to customer-specified values. See Factory Options, page 15-15.

Pressure Control Selection

The selection table below is an overview of the three types of Bulletin 836 Pressure Controls Allen-Bradley offers. Each type of control is suitable for use on many types of applications. Pressure ranges, pressure connections, enclosure types and the compatibility of the actuator with different types of pressure media are given to assist in the selection of which type of control to use.

Bulletin Number	836 Style A	836 Style C	836 Style C
Actuator Type	Internal Bellows, Copper Alloy	External Bellows, Copper Alloy	External Bellows, Stainless Steel Type 316
Adjustable Operating Ranges	30” Hg Vac. to 375 psi	30” Hg Vac. to 900 psi	30” Hg Vac. to 375 psi
Adjustable Differentials	2 to 95 psi	0.2 to 125 psi	0.4 to 80 psi
Maximum Line Pressures	750 psi	1300 psi	650 psi
Occasional Surge Pressures	850 psi	1600 psi	650 psi
Pressure Media			
Air	●	●	●
Water	●	●	●
Hydraulic Fluids	●	●	●
Liquids: Corrosive ❶			●
Non-Corrosive	●	●	●
Gases: Corrosive ❶			●
Non-Corrosive	●	●	●
Enclosures			
Open Type	●	●	●
Type 1	●	●	●
Type 4 & 13	●	●	●
Type 4X		●	●
Type 7 & 9 and 4 & 13	●	●	●
Pipe Connections			
Pressure Connection	7/16”-20 SAE Flare for 1/4” Copper Tubing	1/4” N.P.T.F. Female Pipe Thread or 3/8” N.P.S.F. Female Pipe connection (**836-C1** and **836-C1A** only)	1/4” N.P.T.F. Female Pipe Thread

❶ Corrosive liquids and gases compatible with Type 316 Stainless Steel.

Ordering Bulletin 836 Pressure Controls

When ordering Bulletin 836 Pressure Controls, consider the following:

- Device Style
- Adjustable Operating Range
- Adjustable Differential
- Maximum Line Pressure
- Occasional Surge Pressure
- Pressure Media
- Enclosure Type
- Pressure Connection

How to Order

Step 1: Basic Device —
Select a catalog number for the basic device. . . . . **See pages 15-8 thru 15-10.**

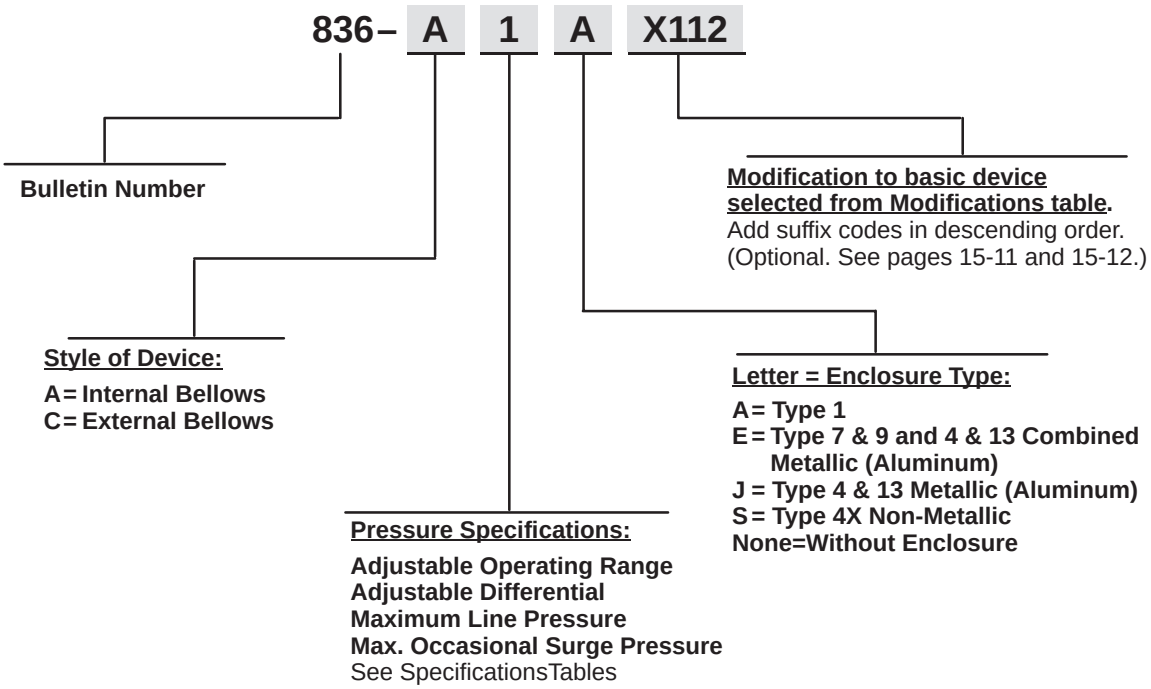
Step 2: Modifications —
If required, add the appropriate modification suffix code(s) to the catalog number of the basic device. . . . . **See pages 15-11 and 15-12.**

Step 3: Accessories —
If required, select appropriate accessories. . . . . **See pages 15-13 and 15-14.**

Step 4: Factory Options —
Factory Set Pressure Controls. . . . . **See page 15-15.**

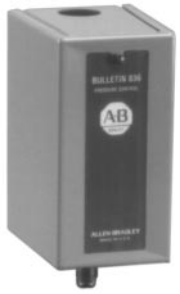
Catalog Number Explanation

Note: Catalog numbers must not include blank spaces.



Conversion Factors

Conversion Factors (Rounded)
psi x 703.1 = mm/H_2O psi x 27.68 = in. H_2O psi x 51.71 = mm/H_2O psi x 2.036 = in. Hg psi x .0703 = kg/cm^2 psi x .0689 = bar psi x 68.95 = mbar psi x 6895 = Pa psi x 6.895 = kPa
Note: psi – pounds per square inch (gauge). H_2O at 39.2° F./ Hg at 32° F.



Style A Internal Bellows — Copper Alloy, Type 1

Style A Internal Bellows — Copper Alloy, Type 4 & 13

Style A Internal Bellows — Copper Alloy Bellows❶ With 7/16" – 20 SAE Flare for 1/4" Copper Tubing Connection

Pressure Specifications				Enclosure Type			
Adjustable Operating Range Hg Vac. to psi ❷	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum psi		Open Type Without Enclosure		Type 1	
		Line Pressure	Occasional Surge Pressure ❸	Catalog Number	✻	Catalog Number	✻
30" Vac. to 75	2 to 20 ❹	160	160	836-A1		836-A1A	
6 to140	3 to 35	280	340	836-A2		836-A2A	
12 to 250	6 to 65	500	600	836-A3		836-A3A	
16 to 375	8 to 95	750	850	836-A4		836-A4A	

Style A Internal Bellows — Copper Alloy Bellows❶ With 7/16" – 20 SAE Flare for 1/4" Copper Tubing Connection

Pressure Specifications				Enclosure Type			
Adjustable Operating Range Hg Vac. to psi ❷	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum psi		Type 4 & 13		Type 7 & 9 and 4 & 13 ❺	
		Line Pressure	Occasional Surge Pressure ❸	Catalog Number	✻	Catalog Number	✻
30" Vac. to 75	2 to 20	160	160	836-A1J		836-A1E	
6 to140	3 to 35	280	340	836-A2J		836-A2E	
12 to 250	6 to 65	500	600	836-A3J		836-A3E	
16 to 375	8 to 95	750	850	836-A4J		836-A4E	

❶ Copper alloy bellows may be used on water or air, and other liquids or gases not corrosive to this alloy.

❷ For applications where settings approach 0 psi, select a control that has an adjustable range that goes into vacuum.

❸ Transients (pulses) can occur in a system prior to reaching a steady-state condition. Surge pressures within published values generated during start-up or shut-down of a machine or system, not exceeding 8 times in a 24 hour period, are negligible.

❹ To determine differential in inches of mercury vacuum multiply valve in table by 2.036 (or approximately 2).

❺ The combined Type 7&9 and 4&13 Hazardous Gas and Dust service enclosure is supplied with special gasket and O-ring seal to diminish/exclude moisture, fluids, and dust from entering the enclosure. Enclosures rated 7&9 only are not designed to restrict moisture from entering the enclosure, which is common to outdoor service.

✻ Prices – Consult Sales Office or price list

Style C External Bellows — Copper Alloy, Type 1 With Pilot Light Option

Style C External Bellows — Copper Alloy, Type 4 & 13

Style C External Bellows — Copper Alloy Bellows❶ With 1/4" N.P.T.F. Female Pipe Connection

Pressure Specifications				Enclosure Type					
Adjustable Operating Range Hg Vac. to psi ❷	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum psi		Open Type Without Enclosure		Type 1		Type 4 & 13	
		Line Pressure	Occasional Surge Pressure ❸	Catalog Number	✻	Catalog Number	✻	Catalog Number	✻
12" Vac. to 8 ❹	0.2 to 2.5	25	30	836-C1		836-C1A		—	
30" Vac. to 10	0.4 to 6	65	75	836-C2		836-C2A		836-C2J	
0.8 to 30	0.4 to 6	80	80	836-C3		836-C3A		836-C3J	
30" Vac. to 45	1 to 12	175	190	836-C4		836-C4A		836-C4J	
2 to 80	1 to 12	190	210	836-C5		836-C5A		836-C5J	
30" Vac. to 100	2 to 25	300	375	836-C6		836-C6A		836-C6J	
4 to 150	2 to 25	300	375	836-C7		836-C7A		836-C7J	
6 to 250	4 to 45	500	650	836-C8		836-C8A		836-C8J	
35 to 375	6 to 80	900	1200	836-C9		836-C9A		836-C9J	
50 to 500	12 to 115	1300	1600	836-C10		836-C10A		836-C10J	
50 to 650	16 to 125	1300	1600	836-C11		836-C11A		836-C11J	
200 to 900	25 to 125	1300	1600	836-C12		836-C12A		836-C12J	

Style C External Bellows — Copper Alloy Bellows❶ With 1/4" N.P.T.F. Female Pipe Connection

Pressure Specifications				Enclosure Type			
Adjustable Operating Range Hg Vac. to psi ❷	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum psi		Type 4X		Type 7 & 9 and 4 & 13 ❻	
		Line Pressure	Occasional Surge Pressure ❸	Catalog Number	✻	Catalog Number	✻
12" Vac. to 8 ❹	0.2 to 2.5 ❺	25	30	—		—	
30" Vac. to 10	0.4 to 6 ❺	65	75	836-C2S		836-C2E	
0.8 to 30	0.4 to 6	80	80	836-C3S		836-C3E	
30" Vac. to 45	1 to 12 ❺	175	190	836-C4S		836-C4E	
2 to 80	1 to 12	190	210	836-C5S		836-C5E	
30" Vac. to 100	2 to 25 ❺	300	375	836-C6S		836-C6E	
4 to 150	2 to 25	300	375	836-C7S		836-C7E	
6 to 250	4 to 45	500	650	836-C8S		836-C8E	
35 to 375	6 to 80	900	1200	836-C9S		836-C9E	
50 to 500	12 to 115	1300	1600	836-C10S		836-C10E	
50 to 650	16 to 125	1300	1600	836-C11S		836-C11E	
200 to 900	25 to 125	1300	1600	836-C12S		836-C12E	

❶ Copper alloy bellows may be used on water or air, and other liquids or gases not corrosive to this alloy.

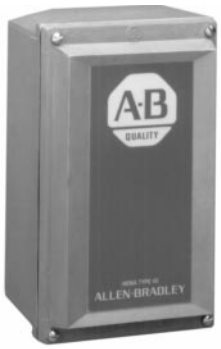
❷ For applications where settings approach 0 psi, select a control that has an adjustable range that goes into vacuum.

❸ Transients (pulses) can occur in a system prior to reaching a steady-state condition. Surge pressures within published values generated during start-up or shut-down of a machine or system, not exceeding 8 times in a 24 hour period, are negligible.

❹ With 3/8" N.P.S.F. female pipe connection.

❺ To determine differential in inches of mercury vacuum multiply valve in table by 2.036 (or approximately 2).

❻ The combined Type 7&9 and 4&13 Hazardous Gas and Dust service enclosure is supplied with special gasket and O-ring seal to diminish/exclude moisture, fluids, and dust from entering the enclosure. Enclosures rated 7&9 only are not designed to restrict moisture from entering the enclosure, which is common to outdoor service.



Style C External Bellows —
Type 4X Glass Polyester Enclosure

Style C External Bellows —
Stainless Steel, Type 7 & 9 and 4 & 13 combined

Style C External Bellows —
Type 316 Stainless Steel Bellows❶ With 1/4" N.P.T.F. Female Pipe Connection

Pressure Specifications				Enclosure Type					
Adjustable Operating Range Hg Vac. to psi ❷	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum psi		Open Type Without Enclosure		Type 1		Type 4 & 13	
		Line Pressure	Occasional Surge Pressure ❸	Catalog Number	✻	Catalog Number	✻	Catalog Number	✻
30" Vac. to 10	0.4 to 6 ❹	65	65	836-C60		836-C60A		836-C60J	
0.8 to 30	0.4 to 6	65	65	836-C61		836-C61A		836-C61J	
30" Vac. to 100	2 to 25 ❹	270	270	836-C62		836-C62A		836-C62J	
4 to 150	2 to 25	270	270	836-C63		836-C63A		836-C63J	
6 to 250	4 to 45	450	450	836-C64		836-C64A		836-C64J	
35 to 375	8 to 80	650	650	836-C65		836-C65A		836-C65J	

Style C External Bellows —
Type 316 Stainless Steel Bellows❶ With 1/4" N.P.T.F. Female Pipe Connection

Pressure Specifications				Enclosure Type			
Adjustable Operating Range Hg Vac. to psi ❷	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum psi		Type 4X		Type 7 & 9 and 4 & 13 ❺	
		Line Pressure	Occasional Surge Pressure ❸	Catalog Number	✻	Catalog Number	✻
30" Vac. to 10	0.4 to 6 ❹	65	65	836-C60S		836-C60E	
0.8 to 30	0.4 to 6	65	65	836-C61S		836-C61E	
30" Vac. to 100	2 to 25 ❹	270	270	836-C62S		836-C62E	
4 to 150	2 to 25	270	270	836-C63S		836-C63E	
6 to 250	4 to 45	450	450	836-C64S		836-C64E	
35 to 375	8 to 80	650	650	836-C65S		836-C65E	

❶ Type 316 stainless steel bellows are available for more corrosive liquids or gases.

❷ For applications where settings approach 0 psi, select a control that has an adjustable range that goes into vacuum.

❸ Transients (pulses) can occur in a system prior to reaching a steady-state condition. Surge pressures within published values generated during start-up or shut-down of a machine or system, not exceeding 8 times in a 24 hour period, are negligible.

❹ To determine differential in inches of mercury vacuum multiply valve in table by 2.036 (or approximately 2).

❺ The combined Type 7&9 and 4&13 Hazardous Gas and Dust service enclosure is supplied with special gasket and O-ring seal to diminish/exclude moisture, fluids, and dust from entering the enclosure. Enclosures rated 7&9 only are not designed to restrict moisture from entering the enclosure, which is common to outdoor service.

✻ Prices – Consult Sales Office or price list

Ordering Modifications

Modifications are ordered by adding the appropriate modification suffix code to the catalog number of the basic device. Add suffix codes to the catalog number in descending order (highest number first).

Modifications

Contact Blocks ❶

Description	Rating	Symbol	Suffix Code	✻ Open Type Without Enclosure	✻ Type 1	✻ Type 4 & 13 and 7 & 9
Automatic Operation						
Single pole double throw — slow acting contact with no snap action. Contacts close on rise and close on fall with an open circuit between contact closures.	Control Circuit Rating: AC–125VA, 24 to 250V		X171 ❷			
Single pole single throw, normally open — closes on rise.	.5 H.P., 115V AC 1 H.P., 230V AC Control Circuit Rating: AC–125VA, 24–110V AC–345VA, 110–600V DC–57.5VA, 110–250V		X221 ❷			
Single pole single throw, normally closed — opens on rise.			X231 ❷			
Single pole single throw, normally open — closes on rise.	1 H.P., 115V AC 1.5 H.P., 230V AC Control Circuit Rating: AC–600VA, 110–600V DC–57.5VA, 110–250V		X321 ❷			
Single pole single throw, normally closed — opens on rise.			X331 ❷			
Two circuit, single pole single throw, normally open — a common terminal is connected to two separate contacts which close on rise.	Non–inductive: 5A, 240V — 3A, 600V Control Circuit Rating: AC–125VA, 24 to 600V DC–57.5VA, 115 to 230V		X021 ❷			
Two circuit, single pole single throw, normally closed — a common terminal is connected to two separate contacts which open on rise.			X031 ❷			
External Manual Reset (Not available in Type 7 & 9 Enclosures) ❸❹						
Single pole single throw, normally open — contacts open at a predetermined setting on fall and remain open until system is restored to normal run conditions at which time contacts can be manually reset.	Non–inductive: 5A, 240V 3A, 600V Control Circuit Rating: AC–125VA, 24 to 600V DC–57.5VA, 115 to 230V		X140 ❸❹❺			
Single pole single throw, normally closed — contacts open on rise and remain open until system is restored to normal run conditions at which time contacts can be manually reset.			X150 ❸❹❺			
Single pole double throw, one contact normally closed — contact opens on rise and remains open until system is restored to normal run condition at which time contact can be manually reset. A second contact closes when the first contact opens.			X15A ❸❹❺			

❶ Contact blocks not available for field conversion or replacement.

❷ Minimum specified differential value approximately doubles.

❸ **Manual reset devices cannot be supplied with an adjustable differential. Inherent differential is approximately three times the differential of the corresponding adjustable differential control.**

❹ Available only for replacement of complete open type control in an existing Type 1 or 4 & 13 enclosure. Replacement in a Type 7 & 9 enclosure is not available because it would void UL and CSA. Return to factory for repairs.

❺ Type 7 & 9 enclosures for manual reset devices are not also rated Type 4 & 13.

Note: NEMA does not rate contacts to switch low voltage and current. Bulletin 836 Styles A and C Pressure Controls are supplied with silver contacts. The devices are designed to deliver high force snap action to the contacts. This provides exceptional contact fidelity at 24V DC I/O card current level entry when the control is protected in a suitable enclosure for the surrounding environment.

Ordering Modifications (cont'd)

Modifications are ordered by adding the appropriate modification suffix code to the catalog number of the basic device. Add suffix codes to the catalog number in descending order (highest number first).

Modifications

Oxygen / Nitrous Oxide Service

Description	Suffix Code	✻
Bellows and fittings are specially prepared for oxygen and nitrous oxide service. The devices are tested with pure oxygen, bellows are plugged for protection from contamination, and a warning tag is applied to avert contamination.	X2	

Tamper Resistant Adjustment

Description	Suffix Code	✻
Range and differential adjustment screws are designed so that after a setting has been applied to the control, the adjustment screws can be broken off with a pliers. **Note:** The "break-off" adjustment screw(s) will not be broken off unless a factory setting is given and the order specifies "Break-off Adjustment Screw(s)". **See paragraph entitled "Factory Set Pressure Controls" on page 15-15.** Price does not include factory setting charge.	X4	

Neon Pilot Light 120V AC

Description	Suffix Code	✻
A high intensity neon pilot light is available for 120V AC, 60 Hz applications and can be wired for ON or OFF operation. The current rating is 1.0mA. Not available on Type 7 & 9 enclosed devices or on manual reset devices.	X9	

LED Pilot Light 24V DC

Description	Suffix Code	✻
A high intensity LED 24V DC pilot light is available to meet the requirements of the automotive, machine tool builders and other industries. The current rating is 22mA and can be wired for ON or OFF operation. Not available on Type 7 & 9 enclosed devices or on manual reset devices.	X15	

5-Pin Mini-Type Receptacle No Pilot Light

Description	Suffix Code	✻
Supplied with Receptacle ready for field wiring.	X42	

5-Pin Mini-Type Receptacle With Pilot Light

Description	Suffix Code	✻
Supplied with Receptacle and Pilot Light ready for field wiring. Pilot Light Suffix Code **X9** (120 VAC Neon) or Suffix Code **X15** (24 VDC LED) must also be specified. See Suffix Codes **X9** or **X15** description above.	X43	

5-Pin Micro-Type Receptacle No Pilot Light

Description	Suffix Code	✻
Supplied with Receptacle ready for field wiring.	X142	

5-Pin Micro-Type Receptacle With Pilot Light

Description	Suffix Code	✻
Supplied with Receptacle and Pilot Light ready for field wiring. Pilot Light Suffix Code **X9** (120 VAC Neon) or Suffix Code **X15** (24 VDC LED) must also be specified. See Suffix Codes **X9** or **X15** description above.	X143	

Manual Test Button – Standard Contact Block

Description	Suffix Code	✻
Allows electrical testing of circuit – positive pressure setting only. Normally Closed contact (A-B) opens. Normally Open contact (B-C) closes. See photo page 15-5 and Suffix Codes **X221** and **X321**.	X47	

✻ Prices – Consult Sales Office or price list

Ordering Accessories

Accessories are ordered as separate catalog numbers. Select the required accessories from the tables below.

Accessories

Pipe Adapter

Description	Catalog Number	✻
1/4” male pipe adapter with copper seating washer for Style A only.	836-N1	

Contact Block Replacement Kit

Description	Catalog Number	✻
Kit consists of a standard contact block and instructions.	836-N2	

Hardware Kits for Mounting Open Type Controls in Special Enclosures

Description	Style A Controls			
	Type	Material	Catalog Number	✻
Hardware kits for mounting open type controls in special enclosures allow ease of connecting pressure lines to the enclosure. For use with Type 1 and Type 4 & 13 enclosures with wall thickness up to 0.25” (6.35 mm).	Open Type Controls	Plated Steel	836-N5	
	Style C Controls			
	Open Type Controls	Brass	836-N8	
		Stainless Steel	836-N10	

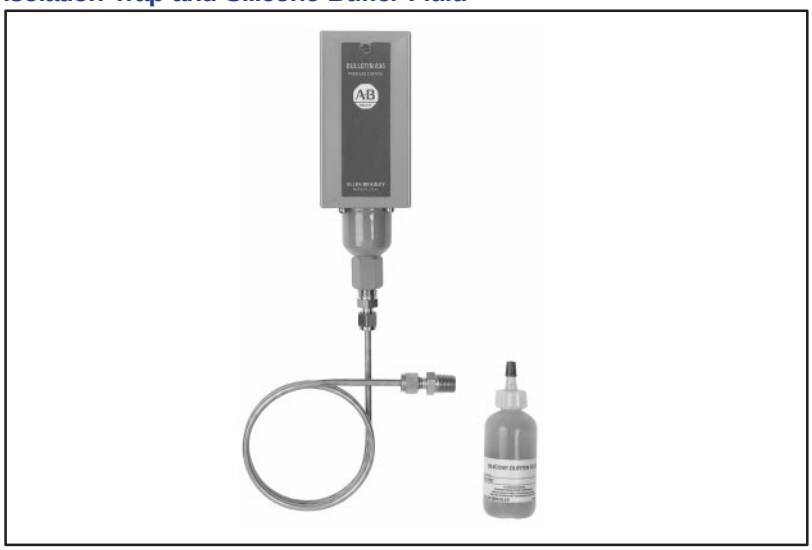
Angle Mounting Brackets

Description	Bracket Type	Catalog Number	✻
For mounting one or two Open Type Bulletin 836 Style A Pressure Controls on an enclosure mounting plate.	Single Bracket	836-N11	
	Dual Mounting Bracket	836-N12	

Isolation Traps

Description	Type	Catalog Number	✻
An isolation trap is available for high temperature media applications above 150°F and corrosive applications compatible with Type 316 stainless steel tubing and fittings. The isolation coil is inserted between the bellows of the pressure control and the elevated temperature line of the system. The isolation trap will fill with condensed water or can be filled with water or suitable fluid when installed. A silicone buffer fluid is available in a convenient dispenser. Copper alloy lower and higher pressure range bellows can be applied to many applications using the isolation trap. The silicone buffer fluid is used to isolate many corrosive substances form coming in contact with the bellows. The isolation trap is rated at 3000 psi working pressure.	Isolation Trap With Two 1/4” Male Pipe Fittings	836-N25	
	Isolation Trap With One 1/4” Male and One 1/4” Female Pipe Fitting	836-N26	
	Two Ounces of Buffer Fluid to Fill Bellows and Tubing	836-N27	

Isolation Trap and Silicone Buffer Fluid



Ordering Accessories (cont'd)

Accessories are ordered as separate catalog numbers. Select the required accessories from the tables below.

Accessories

External Fixed Pulsation Snubbers

Description	Type	Catalog Number	✻
Controls are supplied as standard with an internal pulsation snubber. However, a control properly selected and used within the adjustable range values yet having a short bellows life is a good indication of the presence of extreme surge pressures. External fixed pulsation snubbers are available to provide **additional** dampening when extreme pulsations or surges are present.	Snubber for Style A Controls	836-N6	
	Snubber for Style C Controls	836-N7	

Selectable Element Pulsation Snubbers

Description	Type	Catalog Number	✻
Controls are supplied as standard with an internal pulsation snubber. However, a control properly selected and used within the adjustable range values yet having a short bellows life is a good indication of the presence of extreme surge pressures. Selectable element pulsation snubbers are supplied with five different elements to provide a selectable balance between maximizing pressure control life and minimizing control response time. Pulsation snubbers are supplied with the mid-range element already mounted and four other color-coded porosity elements included in the package. See Selectable Pulsation Snubber Porosity Elements table below for porosity specifications.	Snubber for Style C Controls	836-N40	

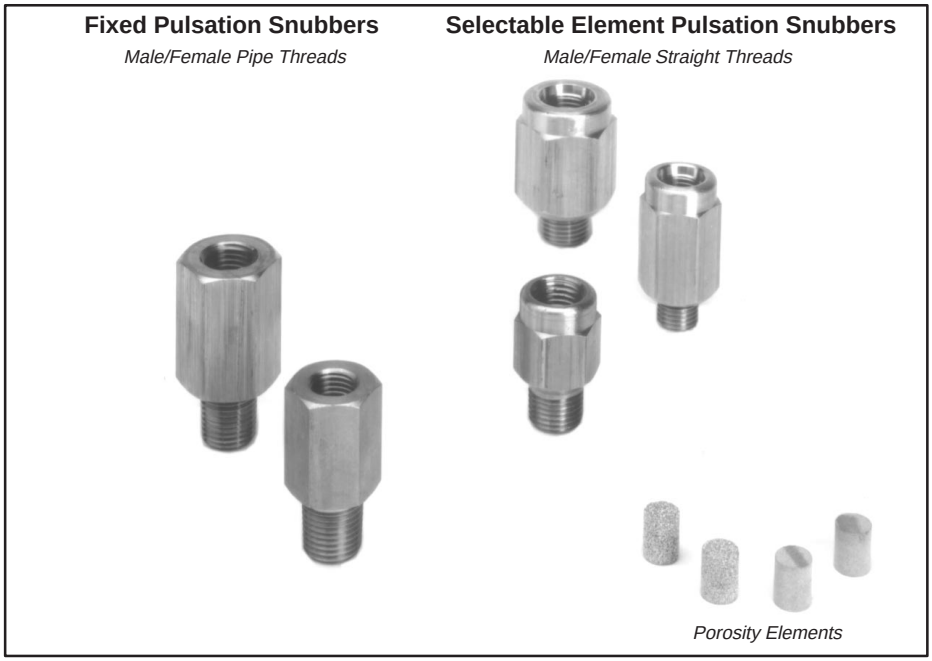
Selectable Pulsation Snubber Porosity Elements

Description	Recommended Type of Service	Color Code	Porosity	Catalog Number	✻
Package consists of five porosity elements and complete instructions. Elements are color-coded for easy identification. Elements are available in five different porosities for a wide range of applications.	Viscous fluids (over 500 SSU) ❶	None	Coarser	836-N43	
	Medium type oils (225 to 500 SSU) ❶	Black	↕	836-N44	
	Water and light oils (30 to 225 SSU) ❶	Brown		836-N45	
	Low viscosity fluids (under 30 SSU) ❶	Green		836-N46	
	Air and other gases	Red	Finer	836-N47	
	One (1) of each of the above	–	Assorted	836-N48	

❶ SSU Saybolt Seconds Universal – units of viscosity measurement.

Note: Color code is located on end of element.

Pulsation Snubbers



Factory Options

Factory Set Pressure Controls

Ordering Factory Set Pressure Controls.

- When a specific differential is unimportant, and the approximate inherent minimum differential satisfies the application, specify the factory setting as follows:

Ref: Set to open at __❶__ increasing pressure. Minimum differential.

–OR–

Ref: Set to close at __❶__ decreasing pressure. Minimum differential.

- When a specific differential is required, specify factory settings as follows:

Ref: Set to open at __❶__.
Close at __❶__.

For pricing consult your Master Price List or your nearest Allen-Bradley Sales Office.

Quality analog "Test"❷ gauges are used when applying requested factory settings to these rugged industrial grade pressure controls. (Gauges are calibrated and the accuracy is traceable to National Bureau of Standards.) The actual requested setting is applied to the control by reading the set point directly from the test gauge being used. However, traceable gauge tolerance variance between source and user, and possible severe shock during shipping and installation, may contribute to the factory settings deviating slightly from the specified values. Slight recalibration can easily be accomplished upon final installation to meet specific requirements for the more demanding applications. When installed, the controls will perform with a repeat accuracy as established in the paragraph on page 15-5 entitled "Repeat Accuracy and Mechanical Life". Special service is available to factory set controls on Digital Laboratory Instruments, up to 600 psi, when required for the more critical applications. An additional charge may be added for this service contingent upon setting tolerance and quantity. Consult your nearest Allen-Bradley Sales Office.

Two Style A Controls In One Enclosure

Bulletin 836 Style pressure controls which function independently may be mounted side by side in a single Type 1 enclosure. This design is ideal for installations where two controls would ordinarily be mounted. Each dual unit can be a combination of a Style A pressure control and a bulb and capillary type temperature control. See respective product tables.

To order this arrangement, specify the two desired catalog numbers in their mounted position within the dual enclosure to form a single catalog number. The list price is the sum of the two Type 1 enclosed devices.

For more information and pricing of special controls, consult your Master Price List or nearest Allen-Bradley Sales Office.

File and Guide Numbers

	UL		CSA	
	File Number	Guide Number	File Number	Class
Bulletin 836	E14842 E53048 (Haz. Loc.)	(NKPZ2) NKPZ NOWT	LR1234 LR11924 (Haz. Loc.)	1222-01 3211-03 3218-02
	Hazardous Location Enclosure not CE compliant.			

❶ Specify psi (pounds per square inch) or, in Hg Vac. (inches of mercury vacuum).
❷ Per ANSI B40.1 Grade 2A (0.5% accuracy full scale), Grade 3A (0.25% accuracy full scale), etc.

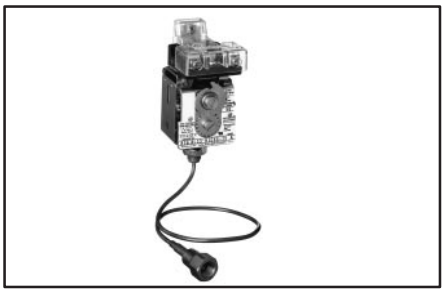
Refrigeration Controls

Description

Bulletin 836 Refrigeration Controls are similar to Bulletin 836 Style A Pressure Controls. However, refrigeration controls are constructed with additional pulsation dampening to filter out the severe pulsations generated by reciprocating refrigeration compressors. Pressure controls not supplied with the added snubber function may result in reduced bellows life. The reduced life results from pulsations severe enough to cause the bellows to squeal at the pump frequency or at the harmonic wave generated at specific pump loading demands. Refrigeration controls are supplied as standard with the pulsation snubber built into the stem of the bellows.

Allen-Bradley heavy duty refrigeration controls have copper alloy bellows for use with non-corrosive refrigerants. The devices can be supplied as single Open Type devices or mounted in a Type 1 enclosure. Standard controls have 7/16" – 20 SAE male threads for a 45 degree flare fuel and lubricant fitting. Optionally, the refrigeration controls can be supplied with capillary tubing. The capillary terminates with 1/4" N.P.T.F. tubing which is flared and supplied with a female nut. To modify the standard pressure connection, add suffix "**–36**" (denotes 36") to the catalog number. There is no price addition for changing to a capillary type pressure connection. Example: Catalog Number **836-H11-XHC**, modified for a 36" capillary connection is, **836-H11-XHC-36**.

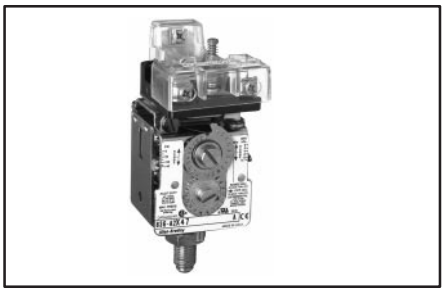
Style H — High Pressure Refrigeration Controls



Style H

- Copper alloy bellows with built-in pulsation snubber
- 7/16" – 20 SAE male thread for 45 degree flare fitting
- Adjustable Operating Range – 30 psi to 120 psi
- Maximum Line Pressure – 450 psi
- Occasional Surge Pressure – 800 psi
- With capillary and flare connection

Style L — Low Pressure Refrigeration Controls



Style L

- Copper alloy bellows with built-in pulsation snubber
- With capillary and tubing connection
- Adjustable Operating Range – 20" vacuum to 120 psi
- Maximum Line Pressure – 220 psi

Style P — High Pressure Definite Purpose Refrigeration Controls

Style P

- Copper alloy bellows with built-in pulsation snubber
- 7/16" – 20 SAE male thread for 45 degree flare fitting
- Operating Range – 30 psi to 700 psi
- Line and Occasional Surge Pressure – 800 psi
- Fixed Differential – 30 psi

Style H High Pressure — Copper Alloy, Open Type With Capillary Adjustable Differential

Style L Low Pressure — Copper Alloy, Open Type Adjustable Differential

Style P High Pressure — Copper Alloy, Open Type With Capillary Fixed Differential

Style H High Pressure — Copper Alloy Bellows ❶

Pressure Specifications				Enclosure Type				Contact Reference Number (See table below)
Adjustable Operating Range psi	Adjustable Differential psi (Approximate Mid-Range Values)	Max. Line Pressure psi	Limited Max. Stop psi	Open Type Without Enclosure		Type 1		
				Catalog Number	✻	Catalog Number	✻	
30 to 270	30 to 80	600	—	836-H11-XHCS		836-H11-XHC		1
50 to 450	40 to 100	800	—	836-H11-BLCS		836-H11-BLC		1
100 to 285	40 to 90	600	285	836-H33-XKKS		836-H33-XKK		3
200 to 425	40 to 90	800	425	836-H33-BLKS		836-H33-BLK		3
125 to 280	60 to 120	800	280	836-H33-BKKS		836-H33-BKK		3
Customer Specified, Factory Locked Operating Range With Fixed Differential of 30 psi								
75 to 350	35	800	—	836-H33-XNAS		836-H33-XNA		3

Style L Low Pressure — Copper Alloy Bellows ❶

Pressure Specifications			Enclosure Type				Contact Reference Number (See table below)
Adjustable Operating Range Hg Vac. to psi	Adjustable Differential psi (Approximate Mid-Range Values)	Maximum Line Pressure psi	Open Type Without Enclosure		Type 1		
			Catalog Number	✻	Catalog Number	✻	
20" Hg Vac. to 120 psi	5 to 30 ❷	220	836-AL11-NKCS		836-AL11-NKC		1
20" Hg Vac. to 120 psi	9 to 50 ❷	220	836-AL32-NKCHS		836-AL32-NKCH		2

Style P High Pressure Definite Purpose — Copper Alloy Bellows ❶

Pressure Specifications				Enclosure Type				Contact Reference Number (See table below)
Adjustable Operating Range psi	Fixed Differential psi	Max. Line Pressure psi	Limited Max. Stop psi	Open Type Without Enclosure		Type 1		
				Catalog Number	✻	Catalog Number	✻	
30 to 700	30	800	—	836-P11-ARBS		836-P11-ARB		1

Contact Reference Number Table

Reference Number	Description	Symbol	Rating
1	Single pole double throw — automatically opens or closes on rise or fall.		Non–inductive: 5A, 240V — 3A, 600V Control Circuit Rating: AC–125VA, 24 to 600V DC–57.5VA, 115 to 230V
2	Single pole single throw, normally open — closes on rise.		1 H.P., 115V AC 1.5 H.P., 230V AC Control Circuit Rating: AC–600VA, 110–600V DC–57.5VA, 110–250V
3	Single pole single throw, normally closed — opens on rise.		

❶ Copper alloy bellows may be used on water or air, and other liquids or gases not corrosive to this alloy.
❷ To determine differential in inches of mercury vacuum multiply valve in table by 2.036 (or approximately 2).

Factory Options for Refrigeration Controls

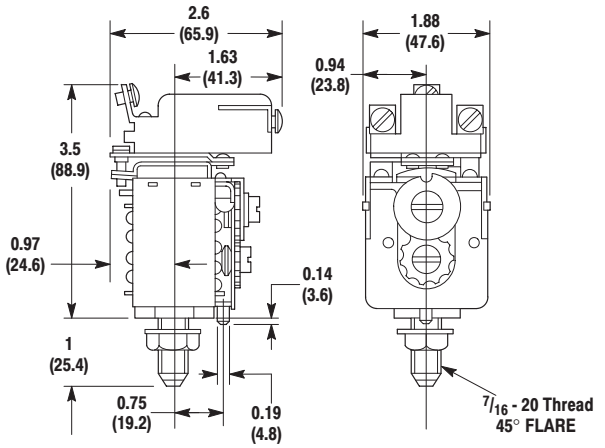
Two Controls In One Enclosure
It is common in the industry to supply a low pressure **Style L** and a high pressure **Style H** mounted in a common, dual Type 1 enclosure. This factory option can be supplied with the low pressure control on the left and the high pressure control on the right. To order, combine the two desired Type 1 catalog numbers into a single number, and add the price of both devices.
Example: Low pressure control **836-AL11-NKC-36**, plus high pressure control **836-H11-BLC-36**, becomes an **836-AL11-NKC-36/836-H11-BLC-36**. For pricing consult your Master Price List or nearest Allen-Bradley Sales Office.

Two Style A Pressure Controls in One Enclosure

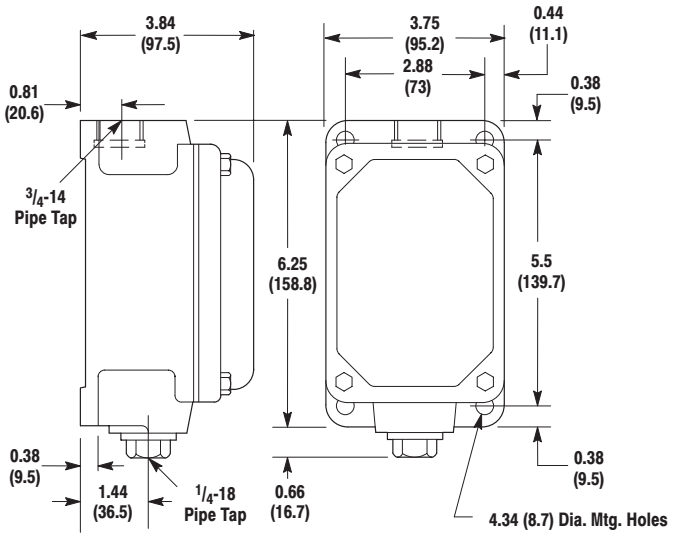
Approximate Dimensions and Shipping Weights

Dimensions in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

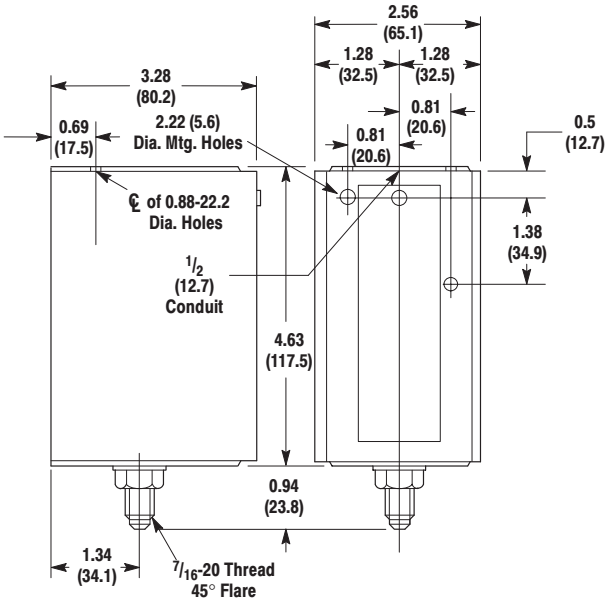
Style A



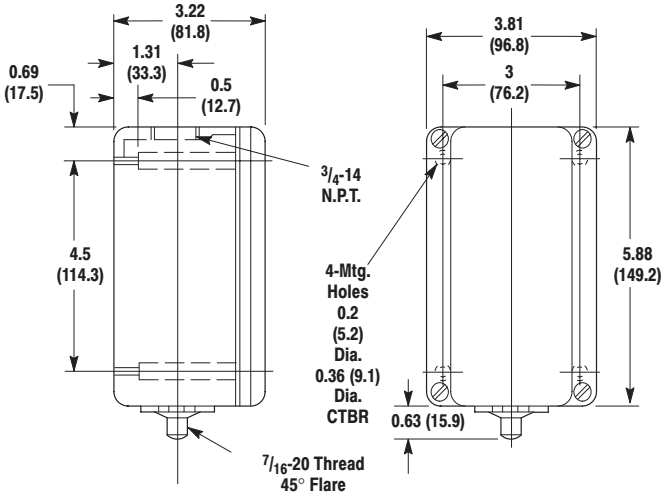
Open Type
Approximate Shipping Weight 1 lb. (.45 kg)



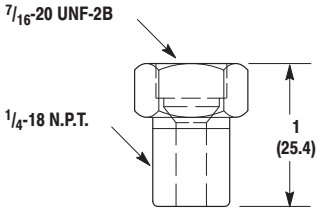
Type 7 & 9 and 4&13
Approximate Shipping Weight 9 lbs. (4.1 kg)



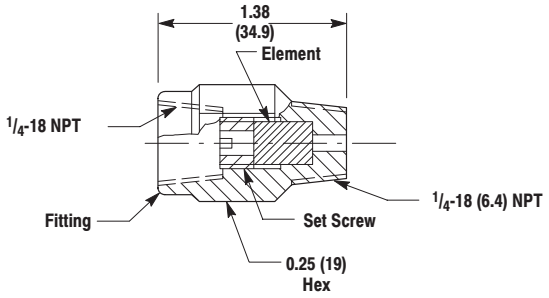
Type 1
Approximate Shipping Weight 2 lbs. (.91 kg)



Type 4 & 13
Approximate Shipping Weight 3 lbs. (1.4 kg)



Catalog Number 836-N1
Approximate Shipping Weight 1/4 lb. (.1 kg)

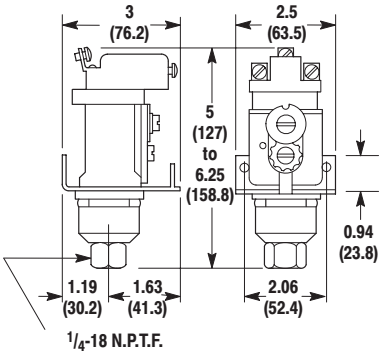


Catalog Number 836-N40
Approximate Shipping Weight 1/4 lb. (.1 kg)

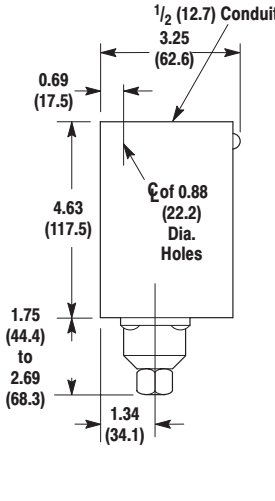
Approximate Dimensions and Shipping Weights

Dimensions in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

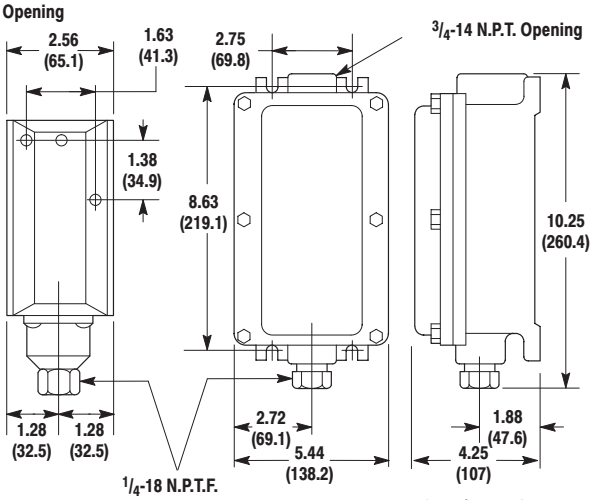
Style C



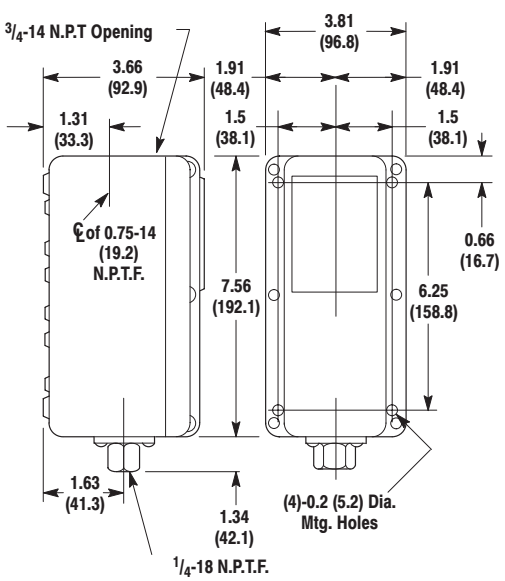
Open Type ❶
Approximate Shipping Weight 2 lbs. (.91 kg)



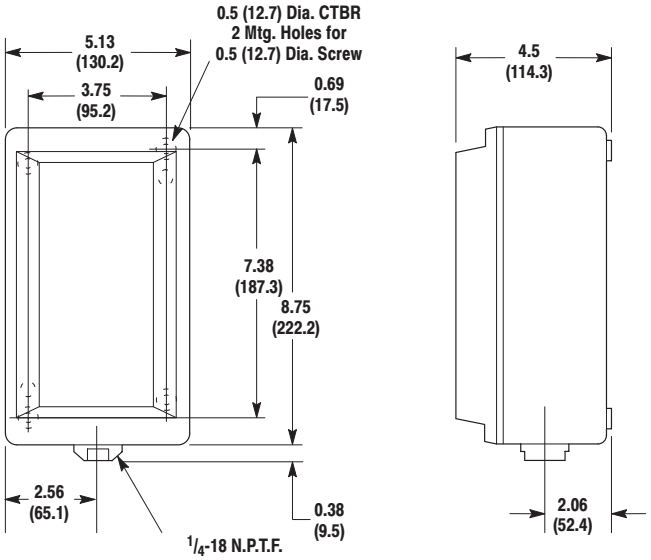
Type 1 ❶
Approximate Shipping Weight 2-1/2 lbs. (1.1 kg)



Type 7 & 9 and 4 & 13
Approximate Shipping Weight 10 lbs. (4.5 kg)



Type 4 & 13
Approximate Shipping Weight 5 lbs. (2.3 kg)



Type 4X
Approximate Shipping Weight 6 lbs. (2.7 kg)

❶ Catalog Numbers **836-C1** and **836-C1**A require a 2 inch swing radius from centerline of pressure connection. Mount control on 7/8 inch minimum spacers.

Note: N.P.T.F. - American Standard Taper Pipe Thread (Dryseal).