Type ACE95jr Tank Blanketing Valve

Features

- **Fully Balanced Plug Design Reduces Inlet Pressure Sensitivity**
- **High Sensitivity**
- **Bubble Tight Shutoff**
- **Stainless Steel Construction Available**
- **Self-Contained**
- **Vacuum Settings Available**

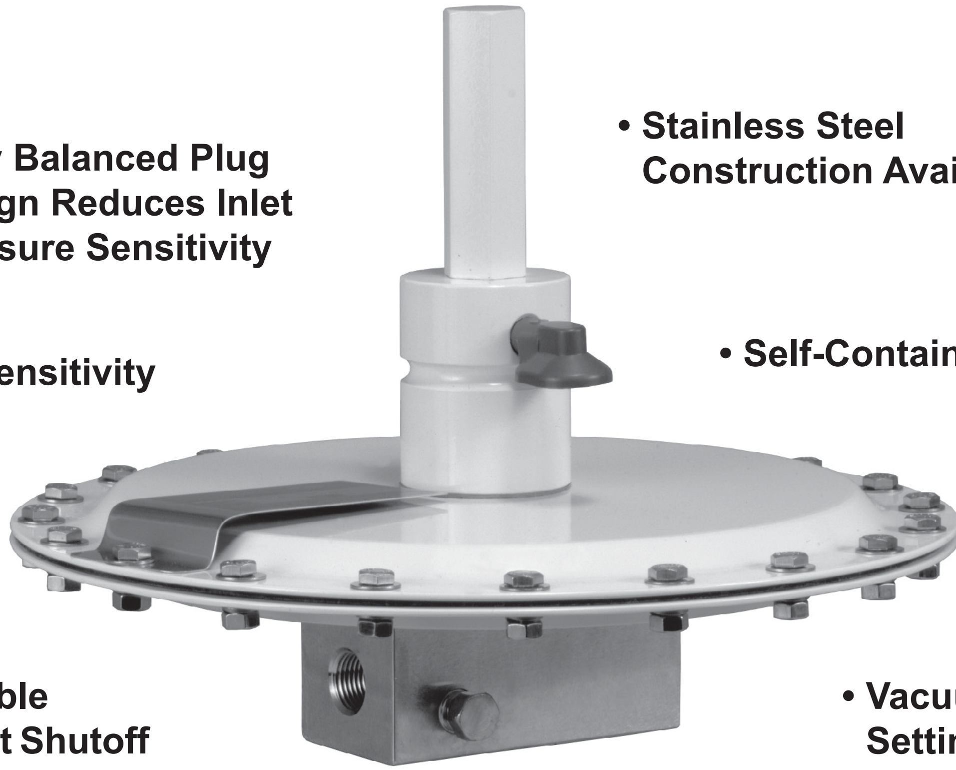

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Figure 1. *Type ACE95jr Tank Blanketing Valve*

Introduction

Tank blanketing is the process of using a gas, usually an inert gas such as nitrogen, to maintain a slightly positive pressure in an enclosed storage tank. Tank blanketing prevents a stored product from vaporizing into the atmosphere, reduces product combustibility and prevents oxidation or contamination of the product by reducing its exposure to air. Tank blanketing is utilized with various products, including: adhesives, pharmaceuticals, pesticides, fertilizers, fuels, inks, photographic chemicals and food additives.

The Type ACE95jr valves are self-contained, fully balanced and used for accurate pressure control on tank blanketing systems. These valves help control emissions and provide protection against atmospheric contamination. Type ACE95jr valves maintain a positive tank pressure which reduces the possibility of tank wall collapse during pump out operations and prevents a stored product from vaporizing to atmosphere.

Specifications

This section lists the specifications and ratings for the Type ACE95jr Tank Blanketing Valve. Factory specifications are stamped on the nameplate fastened to the actuator of the valve.

Sizes and End Connection Styles
1/2 NPT
1 x 1/2 NPT
1 NPT
NPS 1/2 / DN 15, CL150 RF
NPS 1 / DN 25, CL150 RF
NPS 1 x 1/2 / DN 25 x 15, CL150 RF
NPS 1 / DN 25, Sanitary Flange

Maximum Operating Inlet Pressure(1)
200 psig / 13.8 bar

Maximum Emergency Outlet (Casing) Pressure(1)
20 psig / 1.4 bar

Maximum Operating Control Pressure(1)
1.5 psig / 0.10 bar

Control Pressure Ranges(1)
See Table 1

Maximum Differential Pressure
Up to 200 psig / 13.8 bar

Main Valve Flow Characteristic
Linear

Pressure Registration
External

Capacities
See Table 4

Temperature Capabilities(1)
Nitrile (NBR):
-20 to 180°F / -29 to 82°C
Fluorocarbon (FKM):
0 to 212°F / -18 to 100°C
Ethylenepropylene (EPDM - FDA):
-20 to 212°F / -29 to 100°C
Perfluoroelastomer (FFKM):
-20 to 212°F / -29 to 100°C

Flow Coefficients for Relief Valve Sizing
(110% of rated C_v)
C_v 0.2 use C_v 0.22
C_v 0.4 use C_v 0.44

IEC Sizing Coefficients
X_T: 0.655; F_D: 0.86; F_L: 0.89

Construction Materials
Body: 316 Stainless steel
Trim: 304 Stainless steel and 316 Stainless steel
Elastomers: Nitrile (NBR), Fluorocarbon (FKM), FDA-Ethylenepropylene (EPDM), or Perfluoroelastomer (FFKM)
Diaphragm: Polytetrafluoroethylene (PTFE)
Actuator: 316 Stainless steel or Carbon steel

Approximate Weight (with all accessories)
30 lbs / 14 kg

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.

Table 1. *Control Pressure Ranges*

OUTLET (CONTROL PRESSURE RANGE)		SPRING PART NUMBER	SPRING MATERIAL	SPRING FREE LENGTH		SPRING WIRE DIAMETER	
in. w.c.	mbar			in.	mm	in.	mm
-5 to -0.5	-12 to -1	GC220701X22	Stainless steel	2.75 0.88	69.8 22.4(1)	0.080 0.085	2.03 2.16(1)
-1 to 1	-2 to 2	GC220701X22	Stainless steel	2.75 1.60	69.8 40.6(1)	0.080 0.065	2.03 1.65(1)
0.5 to 5 4 to 10 8 to 15 0.5 to 1.5 psig	1 to 12 10 to 25 20 to 37 34 to 103	GC220701X22 GC220702X22 GC220703X22 GC220708X22	Stainless steel Stainless steel Stainless steel Stainless steel	2.75 2.00 2.00 2.75	69.8 50.8 50.8 69.8	0.080 0.112 0.125 0.225	2.03 2.84 3.17 5.71

1. The second spring is located under the diaphragm assembly.

Features and Benefits

Large PTFE Diaphragm—Resistant to corrosion and highly sensitive to changes in tank pressure.

Fully Balanced—Eliminates setpoint changes caused by variations in inlet pressure.

Large Actuator—Large actuator diaphragm increases sensitivity to tank pressure changes.

Rolling Diaphragm—The rolling diaphragm balances the pilot valve and eliminates friction, resulting in extremely accurate control.

Special Service Capabilities—Optional materials are available for applications handling sour gases.

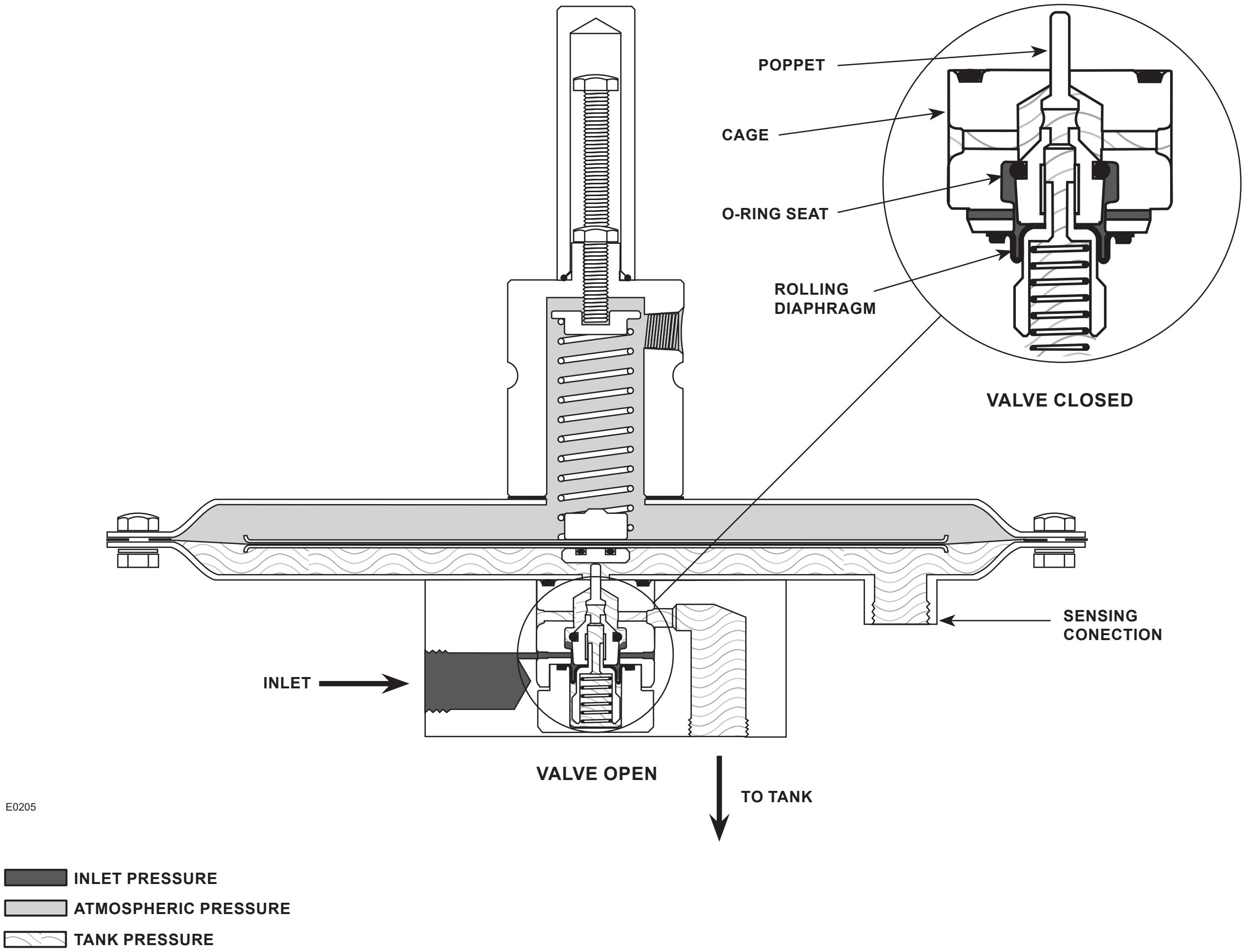

Figure 2. *Operational Schematic*

Options and Accessories

Inlet Pressure Gauge—Displays pressure of blanketing gas supply to the tank blanketing valve.

Control Pressure Gauge—Low-pressure gauge to measure control pressure (tank pressure).

Purge Meter (Rotameter)—Maintains a small amount of flow through the sensing or main line. Prevents corrosive tank vapors from damaging upstream equipment.

Pressure Switch—Allows installation of an alarm system to indicate low or high-pressure on the tank.

Outlet Check Valve—Prevents corrosive gases and vapors from flowing back into the blanketing system through the delivery line.

Single Array Manifold (SAM)[(1)]**—**Provides sense line connection and main valve connection through a single tank nozzle.

Inlet Filter—Screens out any foreign material upstream that may cause blockage in the gas flow.

Principle of Operation

The Type ACE95jr Tank Blanketing Valve controls the vapor space pressure over a stored liquid. When liquid is pumped out of the tank or vapors in the tank condense, the pressure in the tank decreases. Tank pressure is sensed by the large actuator diaphragm. When tank pressure is less than the valve set pressure, spring force moves the actuator diaphragm downward.

When the actuator moves downward, it pushes open the valve plug which allows flow in to the tank. See Figure 2. When pressure in the tank increases above setpoint, the large actuator diaphragm is pushed upward, allowing the valve plug to close.

The valve plug is balanced (inlet pressure creates equal upward and downward force on these components); therefore, the outlet (control) pressure of the unit is not affected by fluctuating inlet pressure.

1. Installation of single array manifold requires the blanketing gas supply pipe to extend into the vapor space a minimum of 6 in. / 152 mm beyond the tank roof.

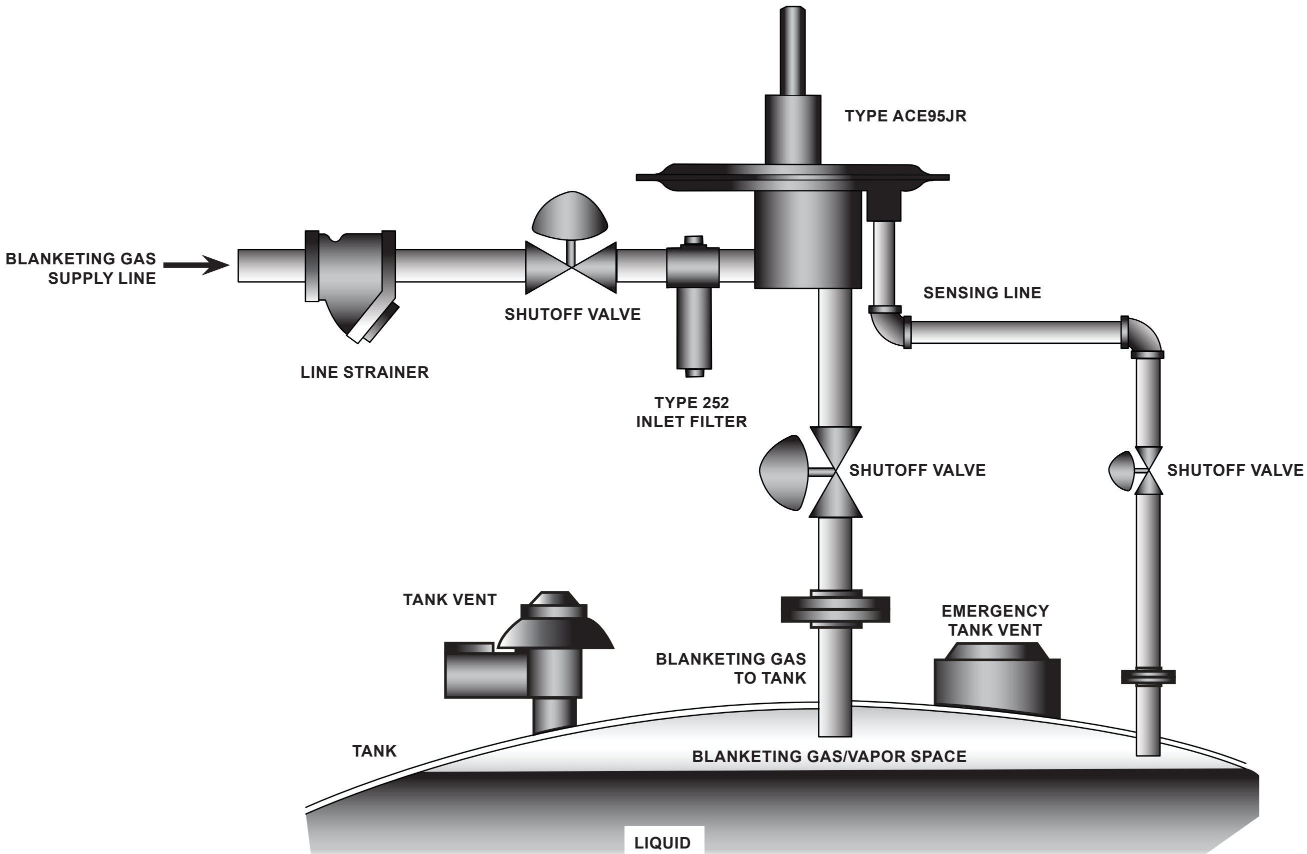

Figure 3. *Type ACE95jr Tank Blanketing Valve Installation*

Installation

The Type ACE95jr Tank Blanketing Valve was assembled and preset to the customer specified pressure and setpoint at the factory. The outlet (control) pressure range of the valve is stamped on the nameplate fastened to the upper actuator case. The gas blanketing setpoint is the only adjustable feature on this unit.

When installing Type ACE95jr, the sensing line and gas-to-tank line must always be above the tank liquid level and should slope down towards the tank without any traps to avoid catching of liquid. Inlet supply line may be installed with a filter and the outlet piping should be full-sized and self draining to the tank and also valves and vents must be full line size and should be mounted above the tank.

NACE Compliance

Optional materials are available for applications handling sour gases. These constructions comply with the recommendations of NACE International sour service standards.

The manufacturing processes and materials used by Emerson assure that all products specified for sour gas service comply with the chemical, physical and metallurgical requirements of NACE MR0175 ISO-2002, NACE MR0103 and/or NACE MR0175/ISO 15156. Customers have the responsibility to specify correct materials. Environmental limitations may apply and shall be determined by the user.

Table 2. *Flow Rate Conversion[1]*

MULTIPLY MAXIMUM PUMP RATE OUT	BY	TO OBTAIN[1]
U.S. GPM U.S. GPH m^3/h	8.021 0.1337 1.01	SCFH SCFH Nm^3/h
Barrels/h Barrels/day	5.615 0.2340	SCFH SCFH
1. Gas flow of blanketing gas to replace liquid pumped out.		

Table 3. *Correction Factors (for converting nitrogen flow rates to other gas flow rates)*

BLANKET GAS	SPECIFIC GRAVITY	CORRECTION FACTOR
Natural Gas	0.60	1.270
Air	1.00	0.985
Dry CO_2	1.52	0.797
Correction Factor = $\frac{0.985}{\sqrt{SG}}$		

Sizing Methods

Direct Displacement

Use the direct displacement method with extreme caution. The direct displacement method determines the amount of blanketing gas required to replace liquid pumped out of the tank. Direct displacement does not account for fluctuating temperature or other factors that may affect pressure in the vapor space. This method is typically applied to tanks operating at constant temperatures and containing non-flammable, non-volatile products.

$$Q_{total} = Q_{pump}$$

where,

Q_{total} = Required Flow Rate
Q_{pump} = Required Flow Rate to replace pumped out liquid from Table 2

API 2000

The American Petroleum Institute Standard 2000 (API 2000) sizing criteria accounts for liquid pump out as well as contraction of tank vapors due to cooling. When using API methods:

$$Q_{total} = Q_{pump} + Q_{thermal}$$

where,

Q_{total} = Required Flow Rate
Q_{pump} = Required Flow Rate to replace pumped out liquid from Table 2
$Q_{thermal}$ = Required Flow Rate due to thermal cooling. See Thermal Equations 1 through 4.

Thermal Equations

For tanks up to 840,000 gal / 3180 m^3 capacity:

Equation 1:

$$Q_{thermal} \text{ [SCFH air]} = V_{tank} \times 0.0238$$

Equation 2:

$$Q_{thermal} \text{ [SCFH nitrogen]} = V_{tank} \times 0.0238 \times 1.015$$

Equation 3:

$$Q_{thermal} \text{ [Nm}^3\text{/h air]} = V_{tank} \times 0.169$$

Equation 4:

$$Q_{thermal} \text{ [Nm}^3\text{/h nitrogen]} = V_{tank} \times 0.169 \times 1.015$$

where,

For Equations 1 and 2: V_{tank} = tank volume, gallons
For Equations 3 and 4: V_{tank} = tank volume, m^3

Depending on the method, there can be a significant difference in the calculated required capacity. **No matter which method is used, the tank must be equipped with supplemental venting to protect the tank, product, and personnel in cases of equipment failure, fire exposure, or other conditions that could cause the tank pressure or vacuum to exceed operating limits.**

Capacity Information

Capacity tables are based on 0.97 specific gravity nitrogen. Nitrogen is the most common blanketing gas. Should you use a different gas, convert the tabular values as follows. For blanketing (pad) gases other than nitrogen, multiply the given nitrogen flow rate by the correction factors in Table 3. For gases of other specific gravities, multiply the given nitrogen flow rate by 0.985, and divide by the square root of the appropriate specific gravity.

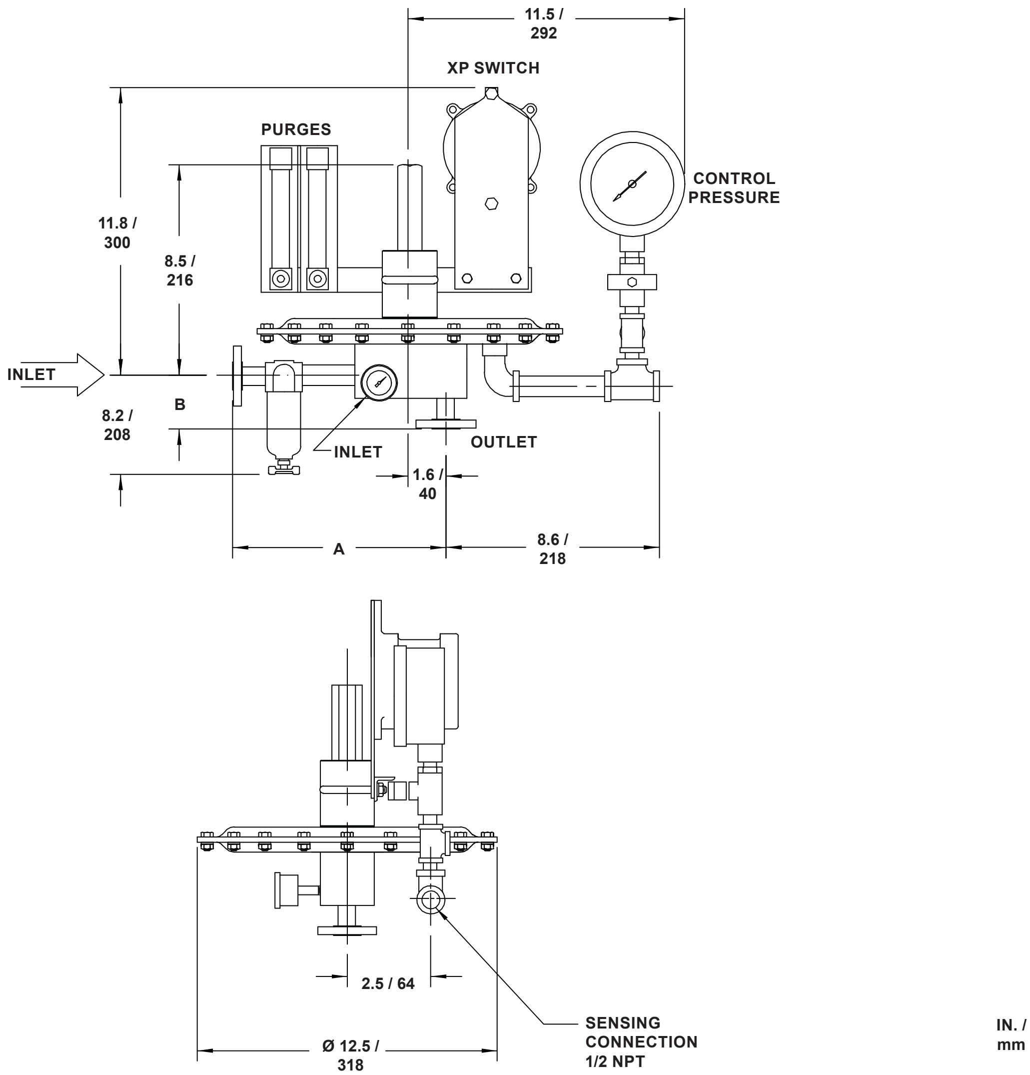

Figure 4. *Type ACE95jr Dimensions*

Table 4. *Capacities in 0.97 Specific Gravity Nitrogen*

INLET PRESSURE				C_v = 0.2		C_v = 0.4	
psig	bar	kg/cm	kPa	SCFH	Nm^3/h	SCFH	Nm^3/h
1(1)	0.07	0.07	6.90	42	1.1	84	2.2
2(1)	0.14	0.14	13.8	61	1.6	120	3.2
5(1)	0.34	0.35	34.5	98	2.6	210	5.6
10	0.69	0.70	69.0	130	4.6	310	8.3
15	1.0	1.06	103	160	4.3	400	10.7
20	1.4	1.41	138	210	5.6	480	12.9
25	1.7	1.76	172	250	6.7	550	14.7
30	2.1	2.11	207	290	7.7	630	16.9
40	2.8	2.81	276	370	9.9	780	20.9
50	3.4	3.52	345	450	12.1	930	24.9
60	4.1	4.22	414	530	14.2	1070	28.7
70	4.8	4.92	483	610	16.3	1230	33.0
80	5.5	5.63	552	690	18.5	1390	37.3
90	6.2	6.33	621	780	20.9	1560	41.8
100	6.9	7.03	690	860	23.0	1720	46.1
120	8.3	8.44	827	1020	27.3	2040	54.7
140	9.6	9.85	965	1180	31.6	2360	63.2
160	11.0	11.3	1103	1340	35.9	2680	71.8
180	12.4	12.7	1241	1500	40.2	3000	80.4
200	13.8	14.1	1379	1660	44.5	3330	89.2

1. Assumes an outlet (control) pressure of 5 in. w.c. / 12 mbar or less.

***Table 5.** Type ACE95jr Dimensions*

BODY SIZE		STRUCTURE	DIMENSIONS					
			NPT		CL150 RF Flange		Sanitary	
A								
NPS	DN		in.	mm	in.	mm	in.	mm
1/2	15	without Filter	3.7	94	9.7	246	- - - -	- - - -
		with Filter	8.1	206	10.1	256	- - - -	- - - -
1	25	without Filter	7.5	190	9.8	249	9.4	238
		with Filter	11.8	300	10.2	259	10.0	254
B								
1/2	15	without Check Valve	1.0	25	2.9	74	- - - -	- - - -
		with Check Valve	3.8	96	5.7	145	- - - -	- - - -
1	25	without Check Valve	4.7	119	3.0	76	2.8	71
		with Check Valve	7.5	190	5.8	147	5.6	142

Ordering Information

Refer to the Specifications section on page 2. Carefully review each specification and construction feature, then complete the Ordering Guide.

Also, please complete the Specifications Worksheet at the bottom of the Ordering Guide on page 8.

Ordering Guide

Body Size and Connection Styles (Select One)
- ☐ 1/2 NPT
- ☐ 1 x 1/2 NPT
- ☐ 1 NPT
- ☐ NPS 1/2 / DN 15, CL150 RF
- ☐ NPS 1 / DN 25, CL150 RF
- ☐ NPS 1 x 1/2 / DN 25 x 15, CL150 RF
- ☐ NPS 1 / DN 25, Sanitary Flange

Actuator/Diaphragm (Select One)
- ☐ Carbon steel with PTFE Diaphragm
- ☐ Stainless steel with PTFE Diaphragm

Elastomers (Select One)
- ☐ Nitrile (NBR)
- ☐ Fluorocarbon (FKM)
- ☐ Ethylenepropylene (EPDM - FDA)
- ☐ Perfluoroelastomer (FFKM)

Main Valve Coefficient (Select One)
- ☐ C_v - 0.2
- ☐ C_v - 0.4

Control Pressure Range (Select One)
- ☐ -5 to -0.5 in. w.c. / -12 to -1 mbar
- ☐ -1 to 1 in. w.c. / -2 to 2 mbar
- ☐ 0.5 to 5 in. w.c. / 1 to 12 mbar
- ☐ 4 to 10 in. w.c. / 10 to 25 mbar
- ☐ 8 to 15 in. w.c. / 20 to 37 mbar
- ☐ 0.5 to 1.5 psig / 34 to 103 mbar

Accessories (Optional)
- ☐ Inlet Pressure Gauge
- ☐ Control Pressure Gauge
- ☐ Purge Meter (Rotameter)
- ☐ Pressure Switch
- ☐ Outlet Check Valve
- ☐ Inlet Filter

Single Array Manifold (Optional)
- ☐ Yes, please add a SAM unit to my order. Applicable only for 1/2 NPT body size and end connection.

Parts Kit (Optional)
- ☐ Yes, please send one parts kit to match this order.

NACE
- ☐ MR0175-2002
- ☐ MR0103
- ☐ MR0175/ISO 15156

Ordering Guide (continued)

Regulators Quick Order Guide	
* * *	Readily Available for Shipment
* *	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult Your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Specification Worksheet

Application Specifications:

Product in Tank ____________________

Tank Size ____________________

Pump In Rate ____________________

Pump Out Rate ____________________

Blanketing Gas (Type and Specific Gravity) ________

Conservation Vent

Setpoints: ________ Pressure ________ Vacuum

Pressure Requirements (Please Designate Units):

Maximum Inlet Pressure (P_{1max}) ____________________

Minimum Inlet Pressure (P_{1min}) ____________________

Control Pressure Setting (P_2) ____________________

Maximum Flow (Q_{max}) ____________________

Other Specifications:

Is a vapor recovery regulator required?

☐ Yes ☐ No

Other Requirements: ____________________

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