Dwyer E-71 Series V4 Flotect Vane Operated Flow Switch Instruction Manual

Contents

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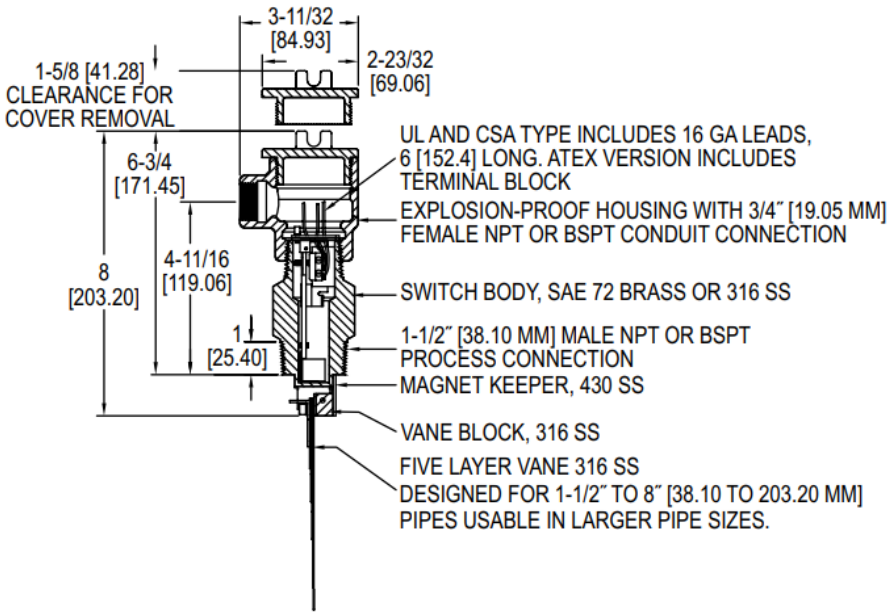
PRODUCT OVERVIEW



Rugged and reliable the Flotect® V4 Vane Operated Flow Switch operates automatically to protect equipment and pipeline systems against damage from reduction or loss of flow. The V4 is time tested being installed in thousands of pipelines and processing plants around the world. A unique magnetically actuated switching design gives superior performance. There are no bellows, springs, or seals to fail. Instead, a free-swinging vane attracts a magnet within the solid metal switch body, actuating a snap switch by means of a simple lever arm.

FEATURES

- Leak proof body machined from bar stock
- Choice of custom vane calibrated for your application, Model V4, or field adjustable multilayer vane, Model V4-2-U (see set point chart on page 4)
- Weatherproof, designed to meet NEMA 4

- Explosion-proof (listing included in specifications)
- Installs directly and easily into pipeline with a thredolet, tee, or flange (see application drawings on page 4)
- Can be used in pipes 1-1/2″ and up
- Electrical assembly can be easily replaced without removing the unit from installation so that the process does not have to be shut down
- High pressure rating of 1000 psig (69 bar) with the brass body and 2000 psig (138 bar) with the 316 SS body

APPLICATIONS

- Protects pumps, motors and other equipment against low or no flow
- Controls sequential operation of pumps
- Automatically starts auxiliary pumps and engines
- Stops liquid cooled engines, machines and processing when coolant flow is interrupted
- Shuts down burner when air flow through heating coil fails
- Controls dampers according to flow

Notes:

- Check all ratings given in the instructions and on the product to make sure that the product is suitable for your application. Do not exceed electrical ratings, pressure ratings, or temperature ratings of the product.
- Disconnect power supply before beginning installation to prevent possible equipment damage or electrical shock.

MAINTENANCE

Inspect and clean wetted parts at regular intervals. The cover should be in place at all times to protect the internal components from dirt, dust, and weather, and to maintain hazardous location ratings. Disconnect device from the supply circuit before opening to prevent ignition of hazardous atmosphere. Repairs to be conducted by Dwyer Instruments, Inc. Units in need of repair should be returned to the factory prepaid.

SPECIFICATIONS

- **Service:** Gases or liquids compatible with wetted materials.
- **Wetted Materials:** Vane: 316 SS; Body: Brass or 316 SS standard; Magnet keeper: 430 SS standard, 316 SS optional; Options: Other materials also available, consult factory (e.g. PVC, hastelloy, nickel, monel, titanium).
- **Temperature Limit:** -4 to 275°F (-20 to 135°C) standard, MT high temperature option 400°F (205°C) [MT option not UL, CSA, ATEX or IECEx] ATEX and IECEx options, ambient temperature -4 to 163°F (-20 to 73°C); Process temperature -4 to 163°F (-20 to 73°C).
- **Pressure Limit:**
    - Brass body 1000 psig (69 bar), 316 SS body 2000 psig (138 bar), optional 5000 psig (345 bar) available with 316 SS body and SPDT switch only. Enclosure Rating: Weatherproof and explosion-proof. Listed with UL and CSA for Class I, Groups C and D;
    - Class II, Groups E, F, and G.
    - ATEX 2813 II 2 G Ex db IIB T6 Gb -20°C≤Tamb≤73°C.
    - -20°C≤Process Temp≤73°C.

    - EU-Type Certificate No.: KEMA 03 ATEX 2383.
- **ATEX Standards:** EN60079-0: 2012 + A11: 2013; EN60079-1: 2014.
- **IECEx Certified:** For Ex db IIB T6 Gb -20°C≤Tamb≤73°C. -20°C≤Process Temp≤73°C.
- **IECEx Certificate of Conformity:** IECEX DEK 11.0071.
- **IECEx Standards:** IEC 60079-0: 2011; IEC 60079-1: 2014.
- **Zone I.** Also FM approved.
- **Switch Type:** SPDT snap switch standard, DPDT snap switch optional. Electrical Rating: UL, FM, ATEX and IECEx models 10A @ 125/250 VAC (V~). CSA models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V). MV option: 1A @125 VAC (V~); 1A res., .5A ind. @ 30 VDC (V). MT option: 5A @ 125/250 VAC (V~). [MT and MV option not UL, CSA, FM, ATEX or IECEx].
- **Electrical Connections:** UL and CSA models: 16 AWG, 6″ (152 mm) long. ATEX or IECEx unit: Terminal block.
- **Conduit Connection:** 3/4″ female NPT or M25 x 1.5 with -BSPT option.
- **Process Connection:** 1-1/2″ male NPT or 1-1/2″ male BSPT.
- **Mounting Orientation:** Within 5° of vertical for proper operation. Units for horizontal installation (vertical pipe with up flow) available.
- **Set Point Adjustment:** For universal vane: five vane combinations.
- **Weight:** 4 lb 8 oz (1.9 kg).

MODEL CHART											
Example	**V4**	**-SS**	**-3**	**1**	**6**	**-C**	**-F**	**2**	**S**	**1**	**V4-SS-316-C-F2S1**
Construction	V4									1	Brass body, SPDT switch
Construction Options		SS 2 DU									316 SS body Type 2 body style DPDT switch Universal vane (omit for a custom vane)

Magnet Keeper Material Options			1 3								430 SS (standard) 316 SS
Vane Material Options				1 2 3 4 5							316 SS (standard) Carpenter 20 Hastelloy B Hastelloy C Monel
Body Material Options					1 2 3 4 5 6 7						Brass (standard) Carpenter 20 CPVC* Hastelloy B Hastelloy C 316 SS (must also use SS construction selection) Monel

Other Options						AT BS PT IEC EP OX Y F SV FT R H P HV MT MV NA CE NB NH SW TB C T RD TRI V					ATEX 1-1/2″ female BSPT process connection, M25 x 1.5 conduit connection IECEx Epoxy coated housing Full swing vane Flow test report High pressure*, 5000 psi (345 bar) (only with S S body) Hinged vane High temperature* (see specifications for rating) Gold contact snap switch* (see specifications f or rating) NACE heat treated body* Neoprene boot* No electrical housing* Socket weld connection* Terminal block wire connections* Time delay re lay* (on flow decrease) Time delay relay* (on fl ow increase) Vertical up flow applications
Flange*							F				Flange process connection
Flange Size								2 2. 5 3 4			2″ 2-1/2″ 3″ 4″

Flange Material									C S M B H		Carbon steel 316 SS Monel Hastelloy B Hastelloy C
Flange Rating										1 3 6 9	150# 300# 600# 900#
Bushing*							B				Bushing process connection
Bushing Size								1 2 4			2″ 2-1/2″ 4″
Bushing Type									H F		Hex Flush
Bushing Material										B C S 4	Brass Carbon steel 316 SS 304 SS

Tee*							T				Tee process connection
Tee Size								1			1-1/2˝
Tee with Bushing*							T B				Tee with bushing process connection (both same material)
Tee Size								2 3			2˝ 3˝
Tee Material and Type										B 0 B 1 B 2 C C P S P	Brass 125 # Brass 150 # Brass 250 # Carbon steel 2000 # (only with 2˝ and 3˝) CPVC SCH 80 316 SS 150 # PVC SCH 80
*Options that do not have ATEX or IECEx.											

Attention: Units without the “AT” suffix are not Directive 2014/34/EU (ATEX) compliant. These units are not inte nded for use in potentially hazardous atmospheres in the EU. These units may be CE marked for other Directiv es of the EU.

INSTALLATION

1. Remove packing material from switch body-cap and remove tape from magnet keeper. Adjust vane length if necessary on multi-layer vanes only (see flow rate charts on next page). Install switch in thredolet previously welded to line. In some cases, it may be necessary to install the switch in a flange or tee (see installation drawings on next page). Note: extreme care must be exercised in welding the fitting to the line so that it is plumb and level.

   Adjustment of Multi-layer Vane

   Remove only those layers which are too long. Leave the smaller layers to reinforce the vane. The longest vane fits 6˝ (150 mm) or larger pipe, the second longest vane fits 4˝ (100mm) pipe, etc. Actuation-Deactuation rates are shown in the charts on the next page. To remove vane layers, proceed as follows:

   - Remove the two screws and lockwashers holding the layers together. Do not lose these special corrosion resistant type 316 stainless steel screws and lockwashers.
   - Remove the unwanted layers.
   - Resecure the vane with the original two screws and lockwashers.
     1. If using a product with the 316 SS vane block option, a second pair of screws are included in the package. Resecure the vane with the correct screws per the below:

# of Vanes Used	**Use Screw Length**
1,2	7/16˝ (included in box)
3, 4, 5	1/2˝ (pre-installed)

   - With a hammer, lightly peen the ends of the screws so that they can’t back out.
   - If you lose the screws or lockwashers, don’t replace with other parts which may corrode and break. That will void the warranty and might cause severe damage to equipment located downstream of the switch.

     Note: Custom vane units have been calibrated at factory to meet requirements. Do not change.
2. The arrow on the side of the switch must point in the direction of flow.
3. Wiring: UL and CSA units only: thread connecting wires through conduit and connect. Wire in accordance with

local electrical codes.

- **Black** – Common
- **Blue** – N.O.
- **Red** – N.C.

  Note: Double pole, double throw switches have dual black, blue and red leads. These are connected in the same manner as single pole, double throw switches, as described above.

  ATEX and IECEx Installation Instructions

  - **Cable Connection**

    The cable entry device shall be certified in type of explosion protection flameproof enclosure “d”, suitable for conditions of use and correctly installed. Cable entry may exceed 70°C. Conductors and cable gland rated ≥95°C shall be used.
  - **Conduit Connection**

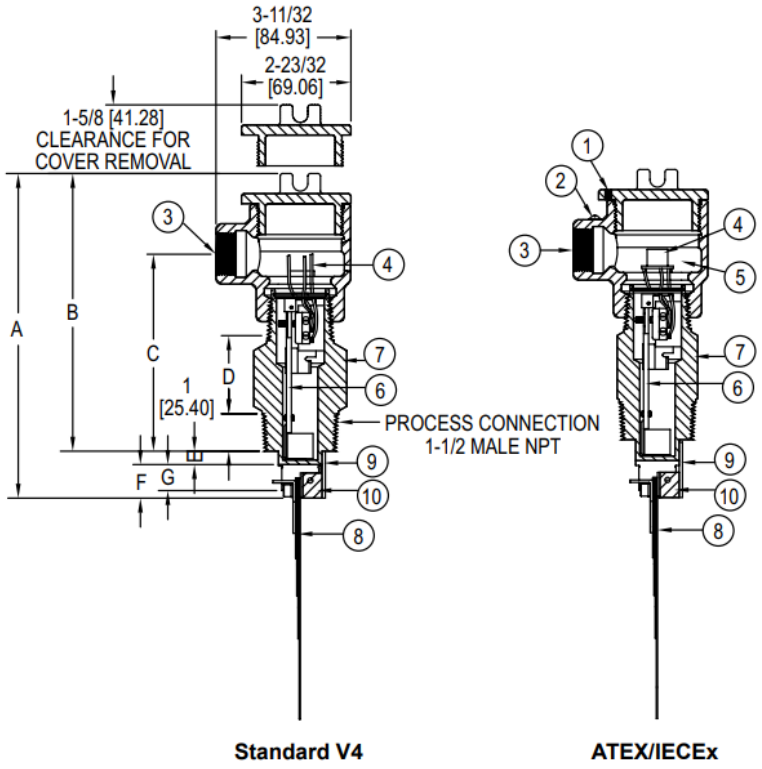
    An Ex d certified sealing device such as a conduit seal with setting compound shall be provided immediately to the entrance of the valve housing. Cable entry may exceed 70°C. Conductors and cable gland rated ≥95°C shall be used. Note: The switch is deactivated and contacts are in normal condition when there is no flow in the line.

4. Make sure conduit or cable are properly sealed. Electrical components must be kept free of moisture, including condensation, at all times.

   CAUTION

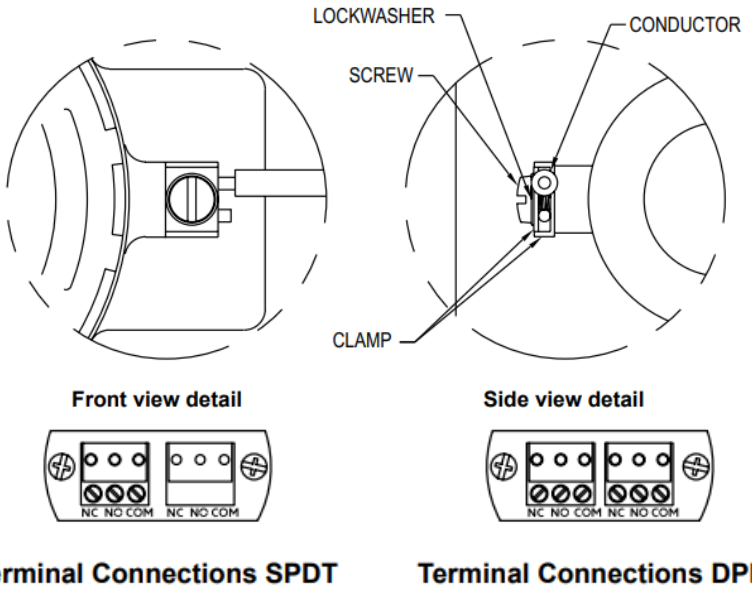
   To prevent ignition of hazardous atmosphere, disconnect the device from the supply circuit before opening. Keep assembly tightly closed when in operation.

   Note: ATEX and IECEX units only: The temperature class is determined by the maximum ambient and or process temperature. Units are intended to be used in ambient of -20°C≤Tamb≤73°C. Units may be used in process temperatures up to 133°C providing the enclosure and switch body temperature do not exceed 73°C. The standard Temperature Class is T6 Process Temp ≤73°C.



5. For units supplied with both internal ground and external bonding terminals, the ground screw inside the

housing must be used to ground the control. The external bonding screw is for supplementary bonding when allowed or required by local code. When external bonding conductor is required, conductor must be wrapped a minimum of 180° about the external bonding screw. See below.



Terminal Connections SPDT **Terminal Connections DPDT**

Dim	V4 in [mm]	V4-2 in [mm]
A	8-3/16 [207.96]	8 [203.20]
B	6 [152.40]	6-3/4 [171.45]
C	4-11/16 [119.06]	3-15/16 [100.01]
D	1 [25.40]	1-3/4 [44.45]
E	1-5/16 [33.34]	9/16 [14.30]
F	7/8 [22.23]	11/16 [17.63]
G	11/16 [17.46]	1/2 [12.70]

Ref #	Standard V4	ATEX/IECEx
1	N/A	Cover lock.

2	N/A	External ground
3	Explosion-proof housing with 3/4″	Explosion-proof housing with 3/4″
	female NPT conduit connection	female NPT conduit connection
4	16 AWG, 6″ (152 mm) long	terminal block
5	Internal	Internal ground
6	Magnet arm and switch assembly	Magnet arm and switch assembly
7	Switch body of SAE 72 Brass or	Switch body of SAE 72 Brass or
	316 SS	316 SS
8	Five layer vane, 316 SS, designed	Five layer vane, 316 SS, designed
	for 1/2″ to 8″ pipes. Usable in larger	for 1/2″ to 8″ pipes. Usable in larger

	pipe sizes	pipe sizes
9	Magnet keeper of 430 SS	Magnet keeper of 430 SS
10	Vane block of 316 SS	Vane block of 316 SS

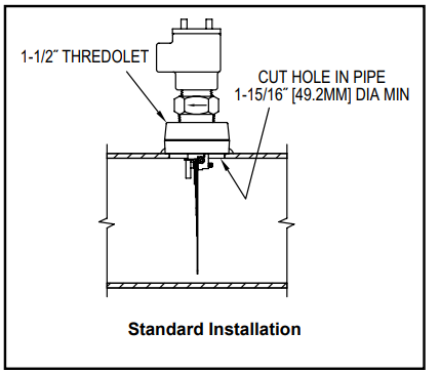
V4 UNIVERSAL VANE FLOW CHARTS

Values shown in both charts are nominal. If normal flows exceed actuation rates by less than 10%, custom vanes are recommended. Figures are based on standard vertical installation in a 1-1/2˝ thredolet in a horizontal run of pipe.

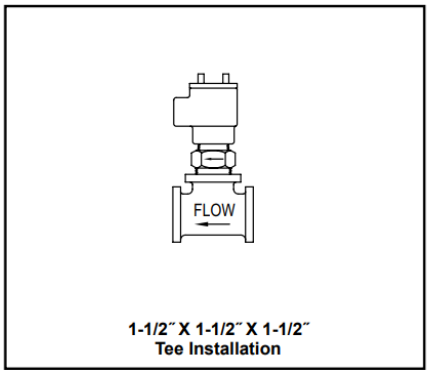
APPROXIMATE ACTUATION/DEACTUATION FLOW RATES FOR COLD WATER – UPPER FIGURES IN GPM. LOWER FIGURES IN LPM												
Vane Layers	**1.5″ Pipe**	**2″ Pipe**	**3″ Pipe**	**4″ Pipe**	**6″ Pipe**	**8″ Pipe**	**10″ Pipe**	**12″ Pipe**	**14″ Pipe**	**16″ Pipe**	**18″ Pipe**	**20″ Pipe**
1	7-3	15-8	45-22	95-40	210-120	375-175	600-300	900-450	1200-600	1400-800	2000-1000	2400-1200
	26.67-11.67	56.7-30	167-83.3	367-150	800-450	1417-667	2267-1133	3400-1700	4550-2267	5300-3033	7567-3783	9083-4550
1 and 2		7-4	23-14	50-35	130-90	230-150	450-250	650-350	900-500	1200-650	1450-800	1800-1000
		26.7-15	86.7-53.3	190-132	500-333	867-567	1700-950	2467-1317	3400-1900	4550-2467	5483-3033	6817-3783
1, 2, and 3			11-7	27-19	80-60	160-115	300-180	450-275	600-350	750-450	1000-600	1200-700
			41.7-26.7	102-71.7	300-233	600-433	1133-683	1700-1033	2267-1317	2750-2083	3783-2267	4550-2650
1, 2, 3, and 4				17-12	60-45	120-90	230-150	310-200	430-280	550-360	700-450	850-550
				65-45	233-167	450-333	867-567	1167-750	1633-1067	2083-1367	2650-1700	3217-2083
1, 2, 3, 4, and 5					40-30	80-65	135-100	200-140	290-200	360-250	460-325	575-400
					152-113	300-250	517-383	750-533	1100-750	1367-950	1733-1233	2183-1517
Note: Actuation rates are based on cold water at a specific gravity of 1.0. For fluids of different specific gravity, actuation rates may be approximated by dividing the rate shown by the square root of the specific gravity.												

APPROXIMATE ACTUATION/DEACTUATION FLOW RATES FOR AIR – UPPER FIGURES IN SCFM. LOWER FIGURES IN LPS												
Vane Layers	**1.5″ Pipe**	**2″ Pipe**	**3″ Pipe**	**4″ Pipe**	**6″ Pipe**	**8″ Pipe**	**10″ Pipe**	**12″ Pipe**	**14″ Pipe**	**16″ Pipe**	**18″ Pipe**	**20″ Pipe**
1	32-17	65-32	210-105	400-200	950-475	1550-850	2400-1300	3450-1900	4700-2600	6400-3500	8000-4400	10000-5500
	15-8	30-20	100-50	190-90	450-220	730-400	1100-600	1600-900	2200-1200	3000-1700	3800-2100	4700-2600
1 and 2		23-13	120-70	195-140	550-375	1100-700	1850-1200	2700-1750	3400-2200	4800-3100	6000-3900	7400-4800
		10-6	60-30	90-70	260-180	520-330	870-570	1300-800	1600-1000	2300-1500	2800-1800	3500-2300
1, 2, and 3			60-48	135-100	375-265	725-500	1200-850	1850-1300	2600-1800	3350-2350	4300-3000	5300-3700
			30-20	60-50	180-130	340-240	570-400	870-610	1200-800	1600-1100	2000-1400	2500-1700
1, 2, 3, and 4				65-50	260-200	500-400	875-700	1250-1000	1900-1500	2500-2000	3100-2500	3900-3100
				30-20	120-90	240-190	410-330	590-470	900-710	1200-900	1500-1200	1800-1500
1, 2, 3, 4, and 5					130-100	310-250	650-525	1000-800	1600-1250	2200-1750	2800-2250	3550-2850
					60-50	150-120	310-250	470-380	760-590	1040-830	1300-1100	1700-1300
Note: Actuation rates are based on air at standard conditions. For gases at other pressures, temperatures, or specific gravities, consult factory for equivalent flow approximations.												

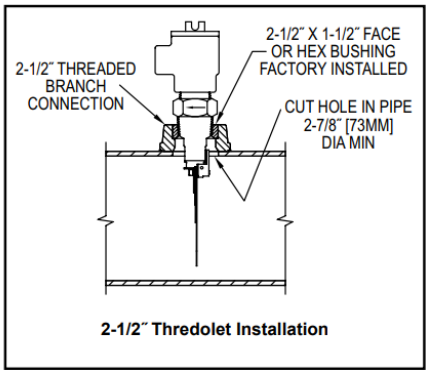
APPLICATION DRAWINGS FOR FLOTECT® AUTOMATIC FLOW SWITCHES



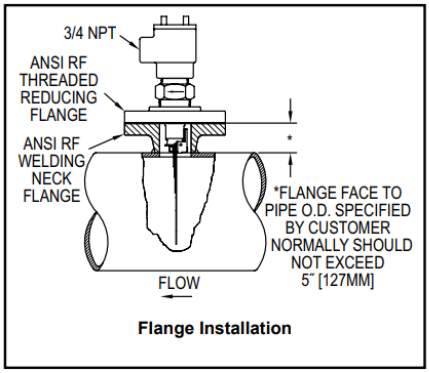
Standard Installation



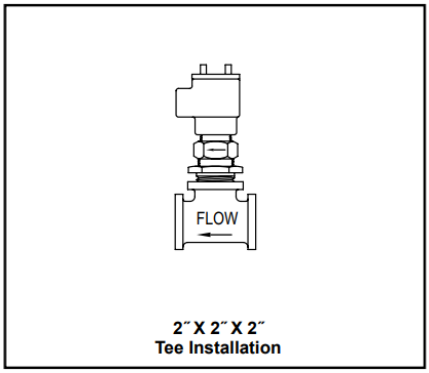
1-1/2″ X 1-1/2″ X 1-1/2″
Tee Installation



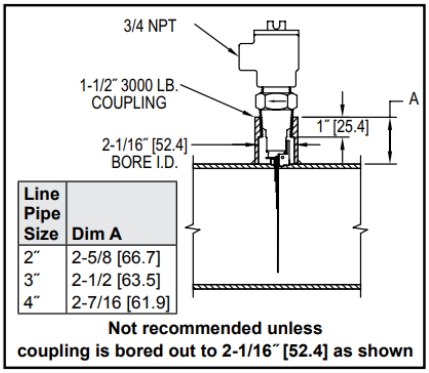
2-1/2″ Thredolet Installation



Flange Installation



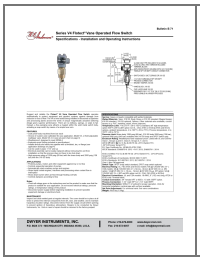
2" X 2" X 2" Tee Installation



Line Pipe Size	Dim A
2"	2-5/8 [66.7]
3"	2-1/2 [63.5]
4"	2-7/16 [61.9]

Not recommended unless coupling is bored out to 2-1/16" [52.4] as shown

Documents / Resources



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E-71, Series V4 Flotect Vane Operated Flow Switch, E-71 Series V4 Flotect Vane Operated Flow Switch, V4 Flotect Vane Operated Flow Switch, Vane Operated Flow Switch, Operated Flow Switch, Flow Switch

References

- Dwyer Home