Type 6010, 6011, and Whisper Disk™ Inline Diffusers

Because valves can be substantial noise contributors when controlling industrial processes, a complete line of Fisher diffusers is offered to provide optimum noise attenuation. A diffuser is a pressure-reducing device that is installed downstream from the control valve. The total pressure drop of the system is divided across the valve and a diffuser. This enables the valve to operate at a lower drop pressure ratio and greatly reduce the control valve noise level generated by steam, gas, or vapor flow.

Inline Diffusers

The Types 6010, 6011 and Whisper Disk™ (figure 1) inline diffusers are installed downstream of any control valve. Flexibility is key, whereas several installation methods are available, based on design of the diffusers. They are used in steam, gas, or vapor flow applications to achieve minimum noise generation.

Note

Neither Emerson, Emerson Process Management, nor Fisher assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Fisher product remains solely with the purchaser and end-user.

Figure 1. Inline Diffusers

Table 1. Construction Materials

MATERIAL	DIFFUSER FLANGE OR WHISPER DISK	DIFFUSER TUBE	DIFFUSER HEAD CAP	TEMPERATURE LIMITS	
				°C	°F
Steel[1]	Steel (SA-105)	Grade B (SA-106)	Grade WPB (SA-234)	–29 to 427	–20 to 800
Alloy Steel[2] (1-1/4 Cr-1/2 MO)	Grade F11 (SA-182)	Grade P11 (SA-335)	Grade WP11 (SA-234)	-29 to 537	–20 to 1000
Alloy Steel[3] (2-1/4 Cr-1 MO)	Grade F22 (SA-182)	Grade P22 (SA-335)	Grade WP22 (SA-234)	–29 to 566	–20 to 1050
S31600 (316 SST)	Grade F316 (SA-182)	Grade TP316 (SA-312)	Grade WP316H (SA-403)	–198 to 593	–325 to 1100
S30400 (304 SST)	Grade F304 (SA-182)	Grade TP304 (SA-312)	Grade WP304H (SA-403)	–198 to 593	–325 to 1100
Nickel Alloy (Alloy 400)	Grade 400 (B564)	Grade 400 (B165)	Grade WPNC (B366)	–198 to 427	–325 to 800

1. Sour gas diffuser assembly can be heat treated to 22 RHC (Rockwell C) maximum hardness as required by NACE MR0175.
2. Wrought equivalent to WC6.
3. Wrought equivalent to WC9.

Features

- **Versatility—** The diffuser concept is used in several unique versions, providing optimum solutions for various applications. The diffuser need not be installed adjacent to the control valve.

- **Noise Attenuation—** A properly selected diffuser-valve combination can result in up to 40 dBA noise reduction.

- **Total Control—** A diffuser-valve combination retains the pressure/flow control associated with a standard control valve. Just as important, it controls the generation of potentially damaging noise and vibration.

- **Lower Life-Cycle Cost—** Two types of diffusers are available: the flat diffuser and the tube-and-shell diffuser for higher capacities. Both are ruggedly built static devices requiring no maintenance after installation. These features combine to offer increased noise control at a minimum investment.

Ordering Information

Contact your Fisher sales office to order diffusers. All Fisher diffusers are designed in Marshalltown Iowa, 50158, USA. The Diffuser Data Form, available on FishWEB, should be completed and sent to Marshalltown, along with the standard order entry.

Type 6010 Diffuser

See figure 2 and table 2.

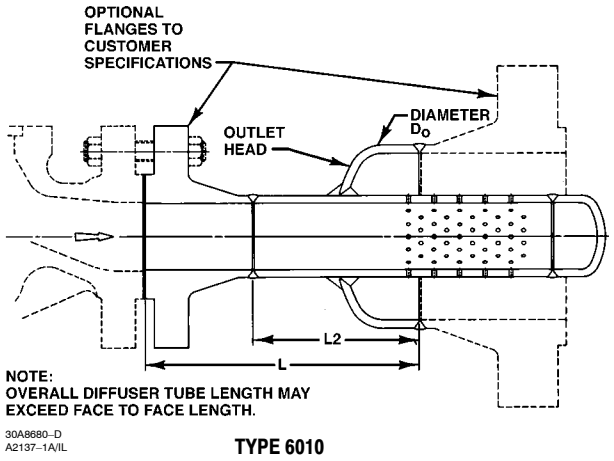

Figure 2. Type 6010 Diffuser Dimensions (also see table 2)

Table 2. Typical Type 6010 Diffuser Dimensions(1)

DIFFUSER SIZE(2)	FLANGED L		BUTTWELD L_2		D_o(3)		APPROXIMATE WEIGHT(4)	
	mm	Inch	mm	Inch	mm	Inch	kg	lb
1 x 3	152	6.00	84	3.31	76	3	1.3	2.75
1.5 x 3	165	6.50	89	3.50	76	3	1.6	3.50
2 x 4	203	8.00	122	4.81	102	4	2.5	5.50
2 x 6	229	9.00	148	5.81	152	6	4.3	9.50
2.5 x 6	229	9.00	141	5.56	152	6	5.2	11.50
3 x 6	229	9.00	138	5.44	152	6	7.8	17
3 x 8	241	9.50	151	5.94	203	8	10	23
4 x 8	279	11.00	170	6.69	203	8	14	31
6 x 12	330	13.00	205	8.06	305	12	33	72
8 x 16	381	15.00	240	9.44	406	16	48	105
10 x 14	356	14.00	195	7.69	356	14	73	160
10 x 16	406	16.00	246	9.69	406	16	77	170
10 x 20	457	18.00	297	11.69	508	20	93	205
12 x 24	483	19.00	319	12.56	610	24	122	270
14 x 28	483	19.00	310	12.19	711	28	249	550
16 x 32	483	19.00	297	11.69	813	32	374	824
18 x 36	508	20.00	316	12.44	914	36	443	976
20 x 36	508	20.00	310	12.19	914	36	536	1181
24 x 36	533	21.00	322	12.69	914	36	714	1573

1. Dimensions may vary to meet specific sound attenuation or piping requirements.
2. Inlet x outlet nominal pipe sizes.
3. Dimensions are nominal pipe size.
4. Weights do not include optional flanges.

Table 3. Minimum Outlet Head Size for Type 6010 Diffusers(1)

INLET TUBE NOMINAL PIPE SIZE, INCHES	MINIMUM OUTLET HEAD (NOMINAL PIPE SIZE), INCHES	MAXIMUM HEAD(2) SCHEDULE	MAXIMUM HEAD WALL THICKNESS	
			mm	Inches
1	2	80	5.5	0.218
1	2.5	80	7.0	0.276
1.5	3	80	7.6	0.300
2	4	XXS	17.1	0.674
2.5	4	80	8.6	0.337
3	5	80	9.5	0.375
4	6	80	10.9	0.432
6	10	160	28.6	1.125
8	12	160	33.3	1.312
10	14	XS	12.7	0.500
12	18	80	23.8	0.938
14	20	80	26.2	1.031
16	20	STD only	9.5	0.375
18	24	40	17.5	0.688
20	26	20	12.7	0.500
24	30	30	15.9	0.625

1. This chart may be used to determine physical size limitations. It is not intended to be used as a guide or substitute for outlet velocity calculations, or outlet sizing.
2. Larger head sizes are available on all inlet sizes.

Type 6011 Diffuser

See figure 3 and tables 4 and 5.

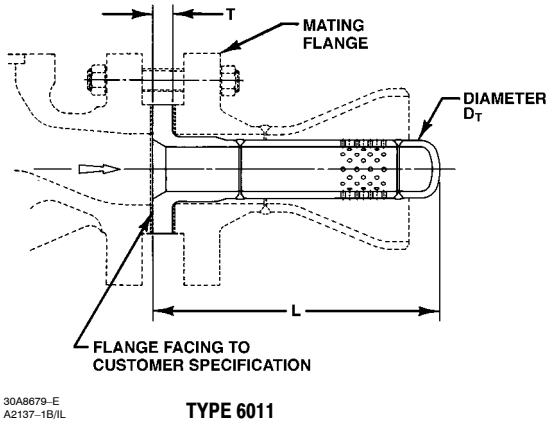

Figure 3. Type 6011 Diffuser Dimensions (also see table 4)

Table 4. Typical Type 6011 Diffuser Dimensions(1)

DIFFUSER SIZE(2) (MATING FLANGE)	MAXIMUM L		T		MAXIMUM TUBE SIZE D_T(3,4)		APPROXIMATE WEIGHT	
	mm	Inch	mm	Inch	mm	Inch	kg	lb
2	483	19	16	0.63	32	1.25	2.7	6
3	635	25	19	0.75	64	2.50	9	20
4	711	28	22	0.88	76	3	14	30
6	1295	51	28	1.12	127	5	41	90
8	1473	58	32	1.25	152	6	68	150
10	1778	70	38	1.50	203	8	113	250
12	2134	84	44	1.75	254	10	159	350
14	2184	86	44	1.75	254	10	181	400
16	2286	90	51	2.00	356	14	268	590
18	2286	90	51	2.00	356	14	340	750
20	2286	90	51	2.00	406	16	397	875
24	2286	90	51	2.00	508	20	544	1200
30	2286	90	70	2.75	610	24	635	1400

1. Dimensions may vary to meet specific sound attenuation or piping requirements.
2. Specify mating flange size for diffuser size.
3. Heavy schedule mating flange may require smaller tube size.
4. Smaller tube sizes available for increased annular area.

Table 5. Maximum Tube Size for Type 6011 Diffusers(1)

MATING LINE				MAXIMUM TYPE 6011 TUBE SIZE NPS (INCHES)
Mating Flange Line Size Inches	Maximum Schedule Allowed	Maximum Allowable Wall Thickness		
		mm	Inches	
2	STD only	3.9	0.154	1.5
2	XS	5.5	0.218	1.25
3	STD only	5.4	0.216	2.5
3	160	11.1	0.438	2
4	80	8.6	0.337	3
6	80	11.0	0.432	5
6	160	18.3	0.719	4
8	120	18.3	0.719	6
10	100	18.3	0.719	8
12	160	33.3	1.312	8
12	60	14.3	0.562	10
14	80	19.1	0.750	10
16	80	21.4	0.844	12
18	80	23.8	0.938	14
20	60	20.6	0.812	16
24	XS	12.7	0.500	20
30	XS	12.7	0.500	24

1. This chart may be used to determine physical size limitations. It is not intended to be used as a guide or substitute for outlet velocity calculations, or outlet sizing.

Whisper Disk™ Diffuser

See figure 4 and tables 6, 7, and 8.

Table 6. Available Size/Pressure Class for Whisper Disk Diffusers

NOMINAL PIPE SIZE, INCHES	ANSI CLASS(1)						
	150	300	400	600	900	1500	2500
2	X	X	X	X	X	X	X
2.5	X	X	X	X	X	X	NA(2)
3	X	X	X	X	X	X	NA
4	X	X	X	X	X	NA	NA
6	X	X	X	X	NA	NA	NA
8	X	X	X	NA	NA	NA	NA
10	X	X	NA	NA	NA	NA	NA
12	X	X	NA	NA	NA	NA	NA
14-24	X	NA	NA	NA	NA	NA	NA

1. Ratings are for raised face flanges. Flange ratings higher than those listed may be available. Consult your Fisher sales office for higher flange ratings, other sizes, and RTJ (ring-type joint) facing.
2. Not Available

Table 7. Whisper Disk Maximum Allowable C_g (1) Per Disk Size and Pressure Drop Ratio (Pressure Drop Ratio of Disk, Not System)

Size, Inches	$\Delta P/P_1$ (psia) Maximum of 0.60	$\Delta P/P_1$ (psia) Maximum of 0.75	$\Delta P/P_1$ (psia) Maximum of 0.85	$\Delta P/P_1$ (psia) Maximum of 0.99
2	383	164	73	25
2.5	610	280	140	65
3	1030	935	400	340
4	2650	985	900	600
6	5300	3340	2064	1000
8	9000	5500	2840	2300
10	14,000	9000	4680	3500
12	20,100	13,500	6890	5500
14	24,900	14,000	8510	6550
16	25,000	18,200	11,400	9080
18	25,000	23,500	14,800	9600
20	25,000	25,000	21,600	12,100
24	25,000	25,000	25,000	18.000

1. Above C_g values based on standard weight pipe upstream and downstream of disk diffuser. For heavier schedule or heavier flange maximum C_g values, consult your Fisher sales office.

Table 8. Thickness Dimension T for Whisper Disk Diffusers

NOMINAL PIPE SIZE, INCHES(1)	T, MILLIMETERS						T, INCHES					
	ANSI Class						ANSI Class					
	150	300	400	600	900	1500	150	300	400	600	900	1500
2	19	22	32	32	44	44	0.75	0.88	1.25	1.25	1.75	1.75
2.5	22	25	35	35	48	48	0.88	1.00	1.38	1.38	1.88	1.88
3	24	28	38	38	44	54	0.94	1.12	1.50	1.50	1.75	2.12
4	24	32	41	44	51	54	0.94	1.25	1.62	1.75	2.00	2.12
6	25	37	48	54	- - -	- - -	1.00	1.44	1.88	2.12	- - -	- - -
8	28	41	54	- - -	- - -	- - -	1.12	1.62	2.12	- - -	- - -	- - -
10	30	48	- - -	- - -	- - -	- - -	1.19	1.88	- - -	- - -	- - -	- - -
12	32	51	- - -	- - -	- - -	- - -	1.25	2.00	- - -	- - -	- - -	- - -
14	35	- - -	- - -	- - -	- - -	- - -	1.38	- - -	- - -	- - -	- - -	- - -
16	37	- - -	- - -	- - -	- - -	- - -	1.44	- - -	- - -	- - -	- - -	- - -
18	40	- - -	- - -	- - -	- - -	- - -	1.56	- - -	- - -	- - -	- - -	- - -
20	43	- - -	- - -	- - -	- - -	- - -	1.69	- - -	- - -	- - -	- - -	- - -
24	48	- - -	- - -	- - -	- - -	- - -	1.88	- - -	- - -	- - -	- - -	- - -

1. For sizes and ratings not shown, contact your Fisher sales office.

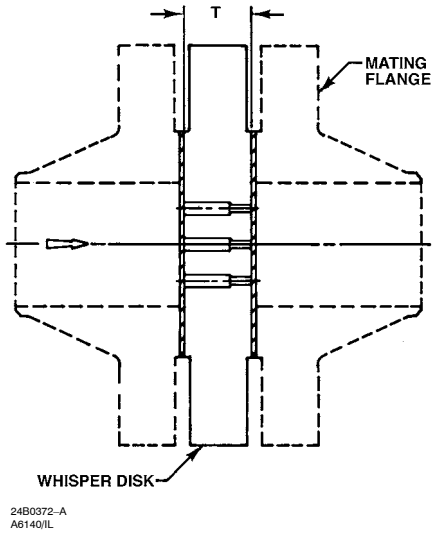

Figure 4. Thickness Dimension T for Whisper Disk Diffusers (also see table 8)

Specifications

Available Configurations

Type 6010: Inline diffuser (with integral outlet head)
Type 6011: Inline diffuser (insert type)
Whisper Disk: Inline diffuser (flat plate)

Sizes and End Connections

Type 6010: Both ends buttwelding end or both ends flanged; any combination is optional. Sizes and schedules are available to meet your application (see table 3)

Note

Inline diffusers are not hydrostatically tested.

Type 6011: No bolted connections; designed to be retained between mating flanges. Sizes are available to meet your application (see table 5)

Whisper Disk: See table 6 for raised-face flanges; other sizes and connections are available. Consult your Fisher sales office

Materials

See table 1

Weights & Dimensions(1)

Type 6010: See figure 2 and table 3.
Type 6011: See figure 3 and table 5.
Whisper Disk: See figure 4

Sizing

Types 6010 and 6011: See Fisher Catalog 12, Section 3
Whisper Disk: See table 7

1. Your Fisher sales office can determine actual weights and lengths after the diffuser has been sized for pressure and noise conditions.

Note

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Inline Diffusers

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