

Valve Series V2001



Three-way Valve for Heat Transfer Oil Type 3535 with Pneumatic or Electric Actuator

ANSI version

Application

Mixing or flow-diverting valves designed for heat transfer systems using organic heat transfer media acc. to DIN 4754

Valve size NPS ½ to 3
Pressure rating ANSI Class 125 and 150
Temperature range 14 to 660 °F (-10 to 350 °C)



Type 3535 Three-way Valves for Heat Transfer Oil (as mixing or flow-diverting valves) can be equipped with either pneumatic or electric actuators:

- Electropneumatic actuator with integrated i/p positioner for Type 3535-IP or
- Pneumatic actuators for Type 3535-PP
- Electric actuators for Type 3535-E1 or Type 3535-E3

Valve body materials

- Spheroidal graphite iron, carbon steel or stainless steel for Class 125 and 150
- Valve sizes NPS ½ to 3
- Stem sealing with metal bellows and packing
- Valve plug with metal sealing
- Mixing valves in NPS ½ to 1 can also be used for flow-diverting service.

The control valves can be optionally equipped with positioners, limit switches and potentiometers.

Versions

with Type 3535 Three-way Valve for Heat Transfer Oil

Type 3535-IP Electropneumatic Mixing/Diverting Valve for Heat Transfer Oil (Fig. 1)

i/p positioner integrated into Type 3372 Pneumatic Actuator, plug connector, tight-closing function for completely venting or filling the actuator with air, reference variable 4 to 20 mA, max. 60 psi (4 bar) supply air, fail-safe position actuator stem extends or retracts, optionally with Type 4744-2 Limit Switch

Type 3535-PP Pneumatic Mixing/Diverting Valve for Heat Transfer Oil (Fig. 2)

with Type 3371 Pneumatic Actuator, bench range 20 to 34 psi (1.4 to 2.3 bar), optionally with Type 4744-2 Limit Switch

Type 3535-E1 Electric Mixing/Diverting Valve for Heat Transfer Oil (Fig. 3)

Type 5824-30 Actuator for power supply 230 V/50 Hz or 60 Hz, 120 V/60 Hz and 24 V/50 Hz, optionally with limit switches, potentiometer, positioner

Type 3535-E3 Electric Mixing/Diverting Valve for Heat Transfer Oil (Fig. 4)

Type 3374 Actuator for power supply 230 V/50 Hz or 60 Hz, 120 V/60 Hz and 24 V/50 Hz or 60 Hz, optionally with fail-safe action (typetested), limit switches, potentiometer, positioner



Type 3535 · Temperature range down to 94 °F (-70 °C) on request

Explosion-protected version with electric actuators on request

Type 3535 according to DIN standards · See T 8135 EN

Principle of operation

Depending on the version, the three-way valve for heat transfer oil can be used for either mixing or flow-diverting service.

In mixing valves, the media to be mixed enter at valve ports A and B. The combined media exit the valve at port AB (Fig. 6). The flow rate from valve port A or B to the common port AB depends on the cross-sectional area between the seats and plugs.

Mixing valves in NPS 1/2 to 1 are also suitable for flow-diverting service. In flow-diverting valves, in contrast, the medium enters at valve port AB and the partial flows exit at valve ports A and B (Fig. 5). The plug stem is sealed by a metal bellows and an additional packing.

Fail-safe position with pneumatic actuators

Depending on how the springs are arranged in the electropneumatic or pneumatic actuator, the control valve has two different fail-safe positions that become effective when the supply air fails:

Actuator stem extends (FA)

In mixing valves, port B is closed when the supply air fails. In diverting valves, port A is closed.

Actuator stem retracts (FE)

In mixing valves, port A is closed when the supply air fails. In diverting valves, port B is closed.

Associated documentation

Refer to the Mounting and Operating Instructions delivered with the product:

EB 8135/6 EN	Type 3535 Three-way Valve
EB 8313 EN	Pneumatic actuator for mixing/diverting valves Type 3535-IP
EB 5824 EN	Electric Actuator for Type 3535-E1
EB 8331-1 EN	Electric Actuator for Type 3535-E3

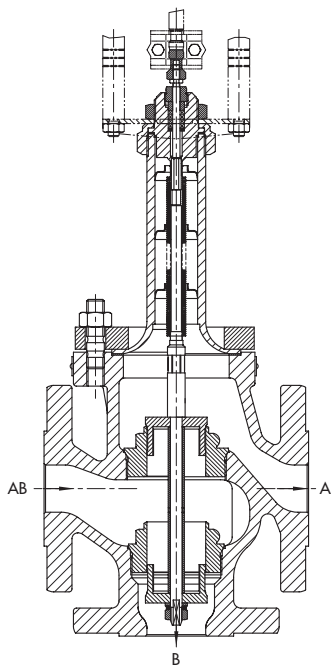


Fig. 5 · Type 3535 Three-way Valve for Heat Transfer Oil plug arrangement for diverting service

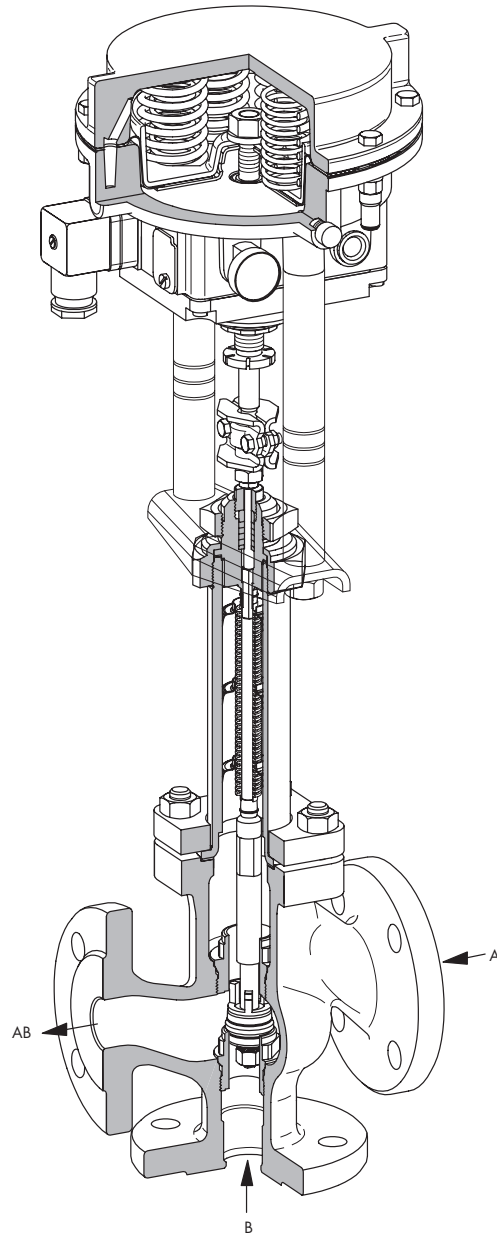


Fig. 6 · Type 3535-IP Mixing Valve for Heat Transfer Oil, pneumatic actuator with integrated i/p positioner

1. Type 3535 Three-way Valve for Heat Transfer Oil

Table 1.1 · Technical data

Valve size	NPS	½ · ¾ · 1 · 1½ · 2 · 2½ · 3		
Material		Spheroidal graphite iron · A 395	Carbon steel · A 216 WCC	Stainless steel · A 351 CF8M
Connection	Flanges	EN 1092-1 Form B1, Ra 3.2 to 12.5 µm · EN 1092-1, groove Form D		
Pressure rating		Class 125 · Class 150		
Seat/plug sealing		Metal sealing		
Characteristic		Linear		
Rangeability		30 : 1 up to NPS 1 · 50 : 1 for NPS 1½ or larger		
Temperature range		14 to 660 °F (–10 to 350 °C) · Extended temperature range down to –94 °F (–70 °C) on request		
Leakage class acc. to DIN EN 1349		Metal sealing: I (0.05 % of C _v)		

Table 1.2 · Materials · Material number according to DIN EN

Valve size	NPS	½ · ¾ · 1 · 1½ · 2 · 2½ · 3		
Valve body		Spheroidal graphite iron · A 395	Carbon steel · A 216 WCC	Stainless steel · A 351 CF8M
Valve bonnet		Carbon steel S235JR (St 37)		1.4408
Seat and plug	Seat	Up to NPS 1: 1.4305 · NPS 1½ or larger: 1.4104		
	Plug	1.4305		
Bellows seal		1.4541 · 1.4301		
Packing		PTFE		
Body gasket		Graphite on metal core		

Table 1.3 · Valve sizes, flow coefficients and seat diameters

Valve size	NPS	½	¾	1	1½	2	2½	3"
	DN	15	20	25	40	50	65	80
Flow rate	C _v	5	7.5	9.4	23	37	60	94
	K _{vS}	4	6.3	8	20	32	50	80
Seat Ø	in (mm)	0.94" · 24 mm			1.57" · 40 mm		2.56" · 65 mm	
Rated travel	in (mm)	0.59" · 15 mm						

Table 1.4 · Flow coefficients and associated valve sizes

C _v		5	7.5	9.4	23	37	60	94
K _{vS}		4	6.3	8	20	32	50	80
NPS	DN							
½	15	•						
¾	20		•					
1	25			•				
1½	40				•			
2	50					•		
2½	65						•	
3	80							•

2. Pneumatic actuators

Table 2.1 · Technical data

Actuator		Electropneumatic actuator for Type 3535-IP	Pneumatic actuator for Type 3535-PP
Actuator area		120 cm ²	120 cm ²
Fail-safe position		Actuator stem extends or retracts	
Reference variable/ bench range for fail-safe position	Stem extends	4 to 20 mA · Minimum current 3.6 mA Load impedance < 6 V (300 Ω/20 mA) Direction of operation >>, fixed	Bench range: 20 to 34 psi (1.4 to 2.3 bar)
	Stem retracts		
Characteristic		Linear, deviation from terminal-based conformity ≤ 2 %	-
Hysteresis		≤ 1 %	
Variable position		≤ 7 %	
Transit time for rated travel		p _{perm} = 60 psi (4 bar)	Approx. 3 s
Air consumption in steady-state condition		≤ 160 l _n /h at p _{perm} = 60 psi (4 bar)	-
Degree of protection		IP 54 2)	-
Perm. ambient temperature		-22 to 160 °F (-30 to +70 °C)	-31 to 194 °F (-35 to +90 °C)
Accessories		1 or 2 limit switches with changeover contact (IP 65, Ex d, 3 m lead) nominal voltage/current: 250 V~/5 A~ or 250 V-/0.4 A-	

Table 2.2 · Materials · Material number according to DIN EN

Actuator case		GD-Al Si 12		
Diaphragm		NBR		
Actuator stem		1.4305		
Positioner housing		POM-GF	-	Polyamide
Yoke	Rods	9SMn28K galvanized, matt black finish		-
	Crossbeam	1.4301		

Table 2.3 · Permissible differential pressures for plug with metal sealing, all pressures in psi and (bar)

Fail-safe position		Actuator stem extends			Actuator stem retracts		
Bench range		psi (bar)			psi (bar)		
Min./max. supply pressure		psi (bar)			psi (bar)		
C _v	K _{vS}	Δp when p ₂ = 0 psi (bar)					
5 to 9.4	4 to 8	230 (16)	-	-	230 (16)	-	-
23 · 37	20 · 32	-	145 (10)	-	-	145 (10)	-
60 · 94	50 · 80	-	-	50 (3.5)	-	-	50 (3.5)

3. Electric actuators

Table 3.1 · Technical data

Actuator		for	Type 3535-E1	Type 3535-E3
Nominal thrust			0.7 kN	1.8 kN Type 3374-11
Transit time for rated travel			90 s	120 s · Other transit times on request
Power supply	230 V/50 Hz		•	•
	230 V/60 Hz		Special version	•
	120 V/60 Hz		•	•
	24 V/50 Hz		•	•
	24 V/60 Hz		–	•
Power consumption	Motor		3 VA	7.5 VA
	With positioner		–	9.5 VA
Manual override			•	•
Degree of protection			IP 54 when mounted upright	IP 54 · IP 65 with cable gland
Mounting position			Suspended mounting position not permitted (see EB 5824 EN and EB 8331-1 EN)	
Perm. ambient temperature			32 to 122 °F (0 to 50 °C)	41 to 140 °F (5 to 60 °C)
Additional electrical equipment				
Limit switch			2	2
Potentiometer (not for version with positioner)			1 0 to 1000 Ω	2 0 to 1000 Ω
Positioner			Digital ¹⁾	Digital
Input signal			0(4) to 20 mA · 0(2) to 10 V	
Output signal			0(2) to 10 V	

¹⁾ Power supply for version with positioner: 24 V DC, 24 V/50 Hz and 60 Hz as well as 85 to 264 V/50 Hz and 60 Hz

Table 3.2 · Permissible differential pressure for plug with metal sealing, all pressures in psi and (bar)

Actuator		for	Type 3535-E1	Type 3535-E3
Thrust			0.7 kN	2.5 kN
C_V	K_{VS}		Δp when $p_2 = 0$ psi (bar)	
5 to 9.4	4 to 8		145 (10)	230 (16)
23 · 37	20 · 32		50 (3.5)	175 (12)
60 · 94	50 · 80		–	58 (4)

4. Dimensions and weights · Type 3535 Three-way Valve

Valve size	NPS	½	¾	1	1½	2	2½	3
	DN	15	20	25	40	50	65	80
Class 150								
Installation length L	in	7.25	7.25	7.25	8.75	10.0	10.87	11.75
	mm	184	184	184	222	254	276	298
H2	in	3.62	3.62	3.62	4.37	5	5.43	5.87
	mm	92	92	92	111	127	138	149

Table 4.1 · Type 3535-IP Electropneumatic Control Valve · Dimensions for fail-safe position actuator stem extends or retracts

H1 (stem extends)	in	18.54			18.94		23.07	
	mm	471			481		586	
H1 (stem retracts)	in	15.04			15.20		26.41	
	mm	382			386		671	
H3 (stem extends)	in	4.33			4.33		4.33	
	mm	110			110		110	
H3 (stem retracts)	in	8.27			8.27		8.27	
	mm	210			210		210	
Weight	lb	19.2	20.3	22.5	37.9	43.4	67.7	78.7
	kg	8.7	9.2	10.2	17.2	19.7	30.7	35.7

Table 4.2 · Type 3535-PP Pneumatic Control Valve · Dimensions valid for both fail-safe positions

H1	in	18.54			18.94		23.07	
	mm	471			481		586	
H3 (minimum distance)	in	4.33			4.33		4.33	
	mm	110			110		110	
Weight	lb	18.3	19.4	21.6	37.1	42.5	66.8	77.8
	kg	8.3	8.8	9.8	16.8	19.3	30.3	35.3

Table 4.3 · Type 3535-E1 Electric Control Valve

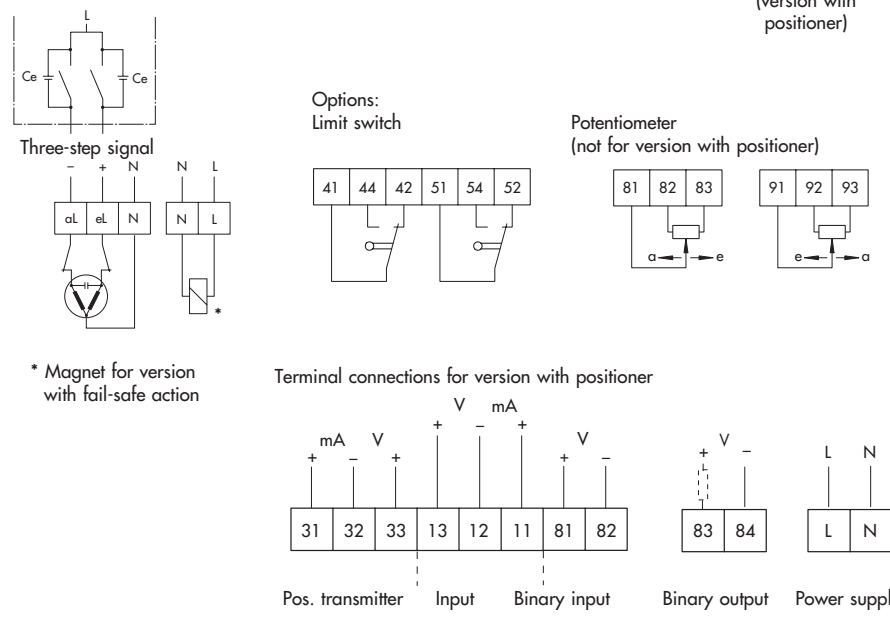
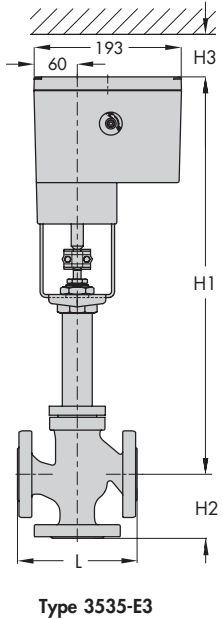
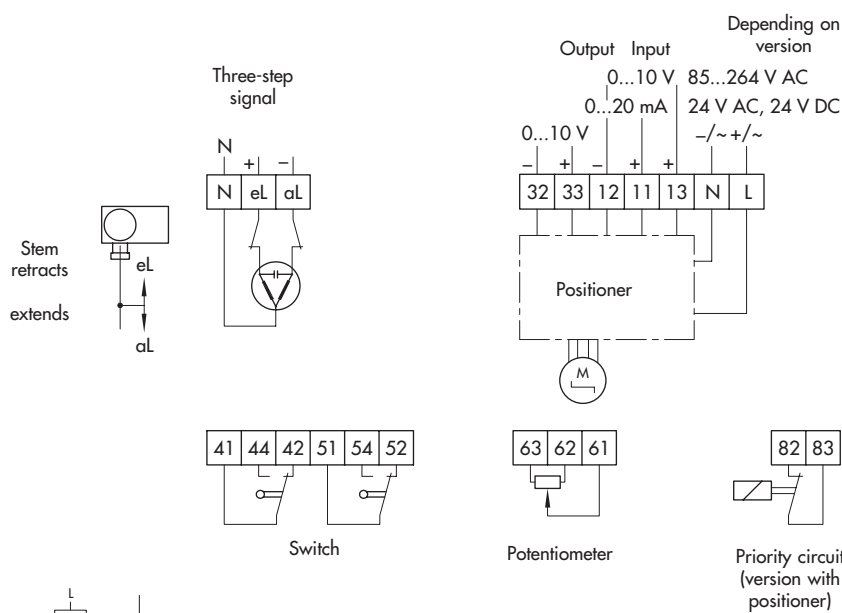
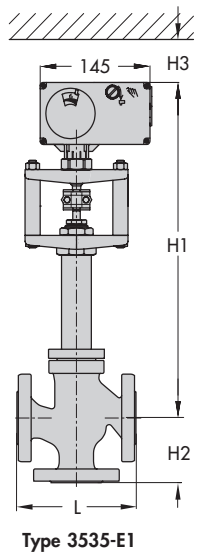
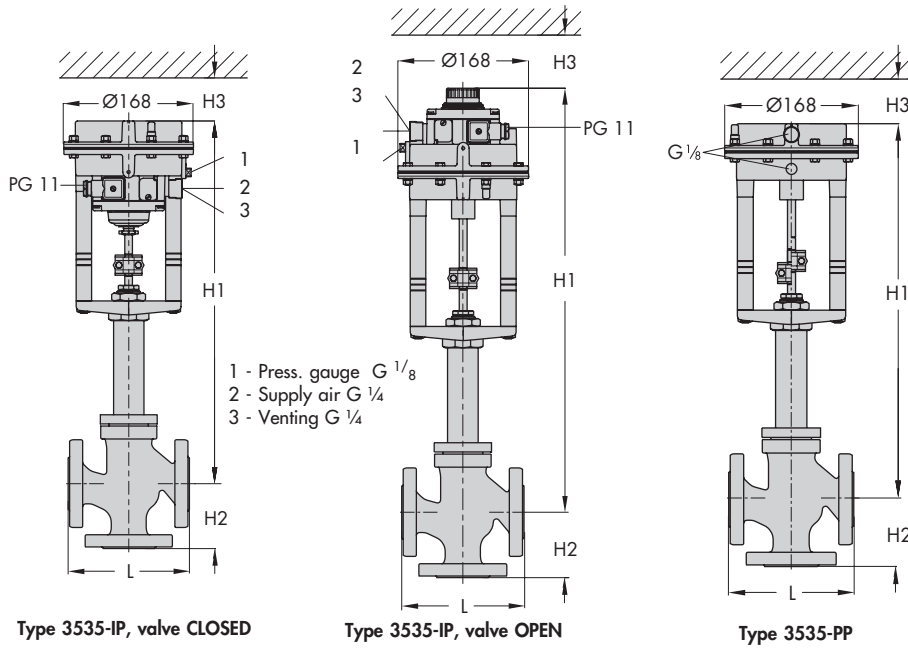
H1	in	16.89			17.28		-	
	mm	429			439			
H3 (minimum distance)	in	4.33			4.33			
	mm	110			110			
Weight	lb	15.0	16.1	18.3	33.7	39.3		
	kg	6.8	7.3	8.3	15.3	17.8		

Table 4.4 · Type 3535-E3 Electric Control Valve

H1	in	20.83			21.22		25.35	
	mm	529			539		644	
H3 ¹⁾ (min. distance)	in	4.33			4.33		4.33	
	mm	110			110		110	
Weight	lb	23.15	24.3	26.5	41.9	47.4	71.7	82.7
	kg	10.5	11	12	19	21.5	32.5	37.5

¹⁾ Note: Cover screws are inserted from the top

Dimensional diagrams and terminal connections



5. Ordering text

When ordering, please indicate the following details:

Type 3535 Three-way Valve for Heat Transfer Oil

	Mixing or flow-diverting valve
Valve size and flow rate	NPS ... Cv ...
Pressure rating	Class
Body material	Spheroidal graphite iron, carbon steel or stainless steel
Seat/plug sealing	Metal sealing

Actuators

for **Type 3535-IP**: Electropneumatic actuator

with integrated positioner 4 to 20 mA

optionally

Intrinsically safe Ex II 2 G EEx ia IIC T6 acc. to ATEX

Accessories

Limit switch 1 or 2

for **Type 3535-PP**: Pneumatic actuator

Fail-safe position: Actuator stem extends or
retracts

Bench range 20 to 34 psi
(1.4 to 2.3 bar)

Accessories

Limit switch 1 or 2

for **Type 3535-E1**: Electric actuator

Power supply

Three-step signal 230 V/50 Hz,
230 V/60 Hz,
120 V/60 Hz,
24 V/50 Hz

Version with positioner 24 V DC,
24 V/50 Hz, 60 Hz
85 to 264 V/50 Hz and 60 Hz

Accessories

Limit switches 2
Potentiometer 0 to 1000 Ω
Positioner input 0(4) to 20 mA or
0(2) to 10 V

for **Type 3535-E3**: Electric actuator

Nominal thrust 2.5 kN
(only without fail-safe action)

Power supply 230 V/50 Hz,
230 V/60 Hz,
120 V/60 Hz
24 V/50 Hz
24 V/60 Hz

Accessories

Limit switches 2
Potentiometer 0 to 1000 Ω
Digital positioner
Input and output 0(4) to 20 mA or
0(2) to 10 V

Specifications subject to change without notice.

