

## T 8135 EN

### Series V2001 Valves · Type 3535 Three-way Valve for Heat Transfer Oil

**With electropneumatic,  
pneumatic or electric actuator**

DIN version



#### Application

Mixing or diverting valve for heat transfer applications using organic media according to DIN 4754

<b>Nominal size</b>	<b>DN 15 to 80</b>
<b>Pressure rating</b>	<b>PN 25</b>
<b>Temperatures</b>	<b>-10 to +350 °C</b>

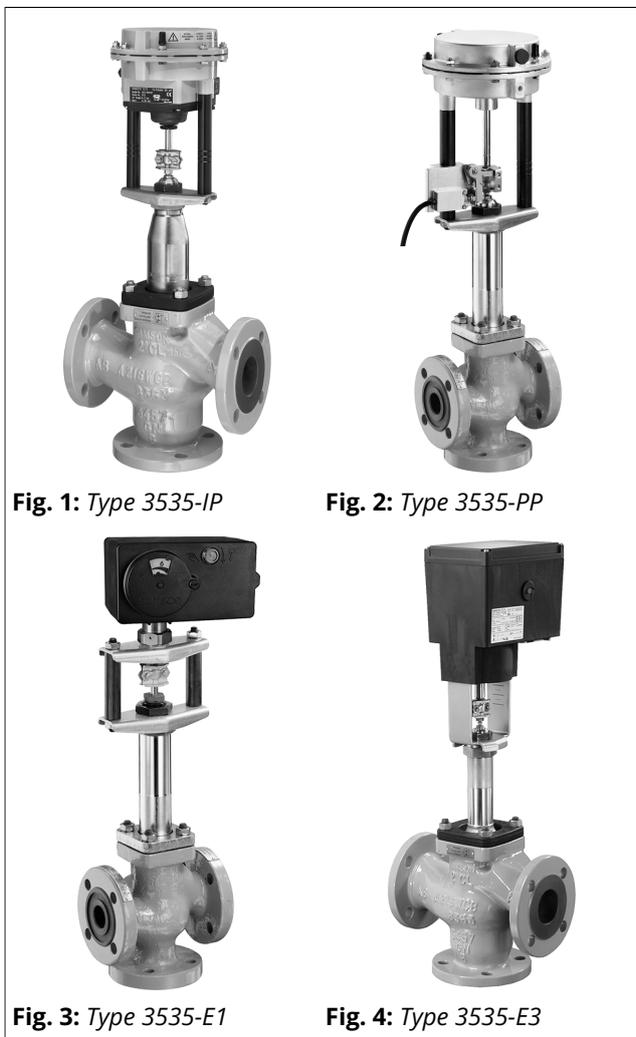


Fig. 1: Type 3535-IP

Fig. 2: Type 3535-PP

Fig. 3: Type 3535-E1

Fig. 4: Type 3535-E3

#### Special features

The Type 3535 Three-way Valve for Heat Transfer Oil (mixing or diverting valve) can be combined with either electric or pneumatic actuators:

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

Valve body made of

- Spheroidal graphite iron, cast steel or stainless steel for PN 25
- Nominal sizes DN 15 to 80

Mixing valves in DN 15 to 25 can also be used for diverting service.

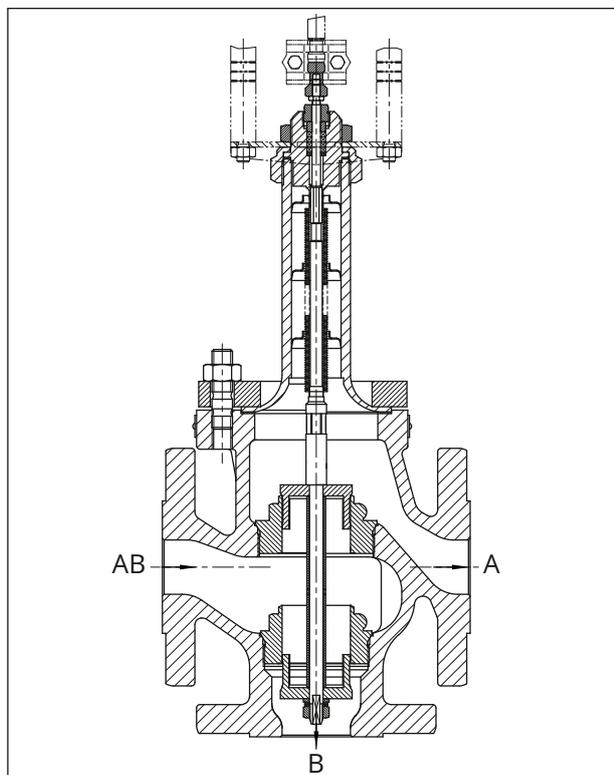
#### Other special features

- Stem sealed by metal bellows and packing
- Metal-seated valve plug

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

## Versions

- **Type 3535-IP Electropneumatic Control Valve (mixing or diverting valve) for Heat Transfer Oil** (Fig. 1) · Electropneumatic positioner integrated into Type 3372 Electropneumatic Actuator · Plug connector · Tight-closing function for completely venting or filling the actuator with air · 4 to 20 mA reference variable · Max. 4 bar supply air · Fail-safe position: actuator stem extends or retracts · Optionally with Type 4744-2 Limit Switch
- **Type 3535-PP Pneumatic Control Valve (mixing or diverting valve) for Heat Transfer Oil** (Fig. 2) · With Type 3371 Pneumatic Actuator · Bench range 1.4 to 2.3 bar · Optionally with Type 4744-2 Limit Switch
- **Type 3535-E1 Electric Control Valve (mixing or diverting valve)** (Fig. 3) · With Type 5827-N3 Electric Actuator for 230 V/50 Hz or 24 V/50 Hz, optionally with limit contacts, resistance transmitter, positioner
- **Type 3535-E3 Electric Control Valve (mixing/diverting valve) for heat transfer oil** (Fig. 4) · With Type 3374 Electric Actuator for 230 V/50 Hz, 230 V/60 Hz or 24 V/50 Hz or 24 V/60 Hz · Limit contacts, resistance transmitter, positioner



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

## Further versions

- **Type 3535** · Temperature range down to -70 °C · On request
- **Explosion-protected version** with electric actuators · On request
- **ANSI version of Type 3535** · See Data Sheet  
▶ T 8136

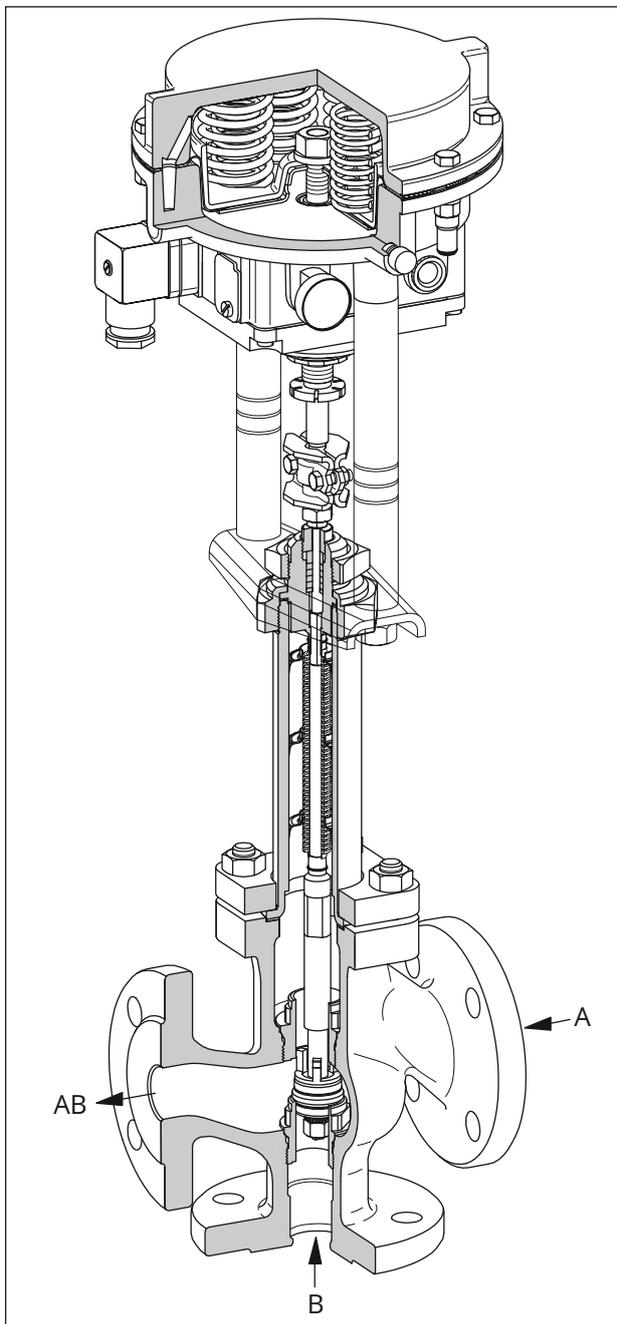
## Principle of operation

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

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

In diverting valves, the process medium enters at the valve port **AB** and the partial flows exit at ports **A** and **B** (see Fig. 5).

The plug stem is sealed by a metal bellows and an additional packing.



**Fig. 6:** Type 3535-IP Control Valve (mixing valve) for Heat Transfer Oil · Pneumatic actuator with integrated electropneumatic positioner

### 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:**  
Port **B** in mixing valves is closed and port **A** in diverting valves is closed when the supply air fails.  
Port **B** of diverting valves in DN 15 to 25 (NPS ½ to 1) is closed since these valves have the same construction as mixing valves.
- **Actuator stem retracts:**  
Port **A** in mixing valves is closed and port **B** in diverting valves is closed when the supply air fails.  
Port **A** of diverting valves in DN 15 to 25 (NPS ½ to 1) is closed since these valves have the same construction as mixing valves.

### Associated documentation

Valve and actuator are delivered separately. Instructions on how to mount the valve on the actuator can be found in the mounting and operating instructions:

- ▶ EB 8135/8136 Type 3535 Three-way Valve for Heat Transfer Oil
- ▶ EB 8313-X Pneumatic actuator for Type 3535-IP
- ▶ EB 5827-1 Electric actuator (three-step version) for Type 3535-E1
- ▶ EB 5827-2 Electric actuator (with positioner) for Type 3535-E1
- ▶ EB 8331-3 Electric actuator (three-step version) for Type 3535-E3
- ▶ EB 8331-4 Electric actuator (with positioner) for Type 3535-E3

**Table 1: Technical data for Type 3535 · DIN version**

Nominal size	DN	15 · 20 · 25 · 32 · 40 · 50 · 65 · 80		
Material		Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Stainless steel 1.4408
Connection	Flanges	DIN EN 1092-1 form B1, Ra 3.2 to 12.5 µm · DIN EN 1092-1, groove form D		
Pressure rating	PN	25		
Seat-plug seal		Metal seal		
Characteristic		Linear		
Rangeability		30:1 up to DN 25 · 50:1 for DN 32 and larger		
Conformity		CE		
Temperature range		-10 to +350 °C · Extended temperature range down to -70 °C on request		
Leakage class according to DIN EN 1349		Metal seal: I (0.05 % of K <sub>V5</sub> )		

**Table 2: Materials for Type 3535 · DIN version**

Valve body	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Stainless steel 1.4408
Valve bonnet	1.0460		1.4408
Bottom seat	DN 15 to 50: 1.4104 DN 65 and larger: 1.4006		DN 15 to 50: 1.4104 DN 65 and larger: 1.4401/1.4404
Top seat	DN 15 to 25: 1.4305 DN 32 to 50: 1.4104 DN 65 and larger: 1.4006		DN 15 to 25: 1.4305 DN 32 to 50: 1.4104 DN 65 and larger: 1.4401/1.4404
Plug	Up to DN 50: 1.4305 DN 65 and larger: 1.4006		Up to DN 50: 1.4305 DN 65 and larger: 1.4401/1.4404
Bellows seal	1.4571		
Packing	PTFE		
Body gasket	Graphite on metal core		

**Flow coefficients and seat diameters****Table 3: Overview of Type 3535**

Nominal size	DN	15	20	25	32	40	50	65	80
Flow rate	K <sub>V5</sub>	4	6.3	8	16	20	32	50	80
Seat Ø	mm	24	24	24	40	40	40	65	65
Rated travel	mm	15	15	15	15	15	15	15	15

**Table 4: C<sub>v</sub> and K<sub>v5</sub> coefficients with associated nominal sizes**

K <sub>V5</sub>	4	6.3	8	16	20	32	50	80
DN								
15	•							
20		•						
25			•					
32				•				
40					•			
50						•		
65							•	
80								•

## Pneumatic actuators with Type 3535

**Table 5:** Technical data for pneumatic actuators

Valve/actuator		Type 3535-IP with Type 3372 Actuator	Type 3535-PP with Type 3371 Actuator
Actuator area		120 cm <sup>2</sup>	120 cm <sup>2</sup>
Fail-safe action		Actuator stem extends (FA) or actuator stem retracts (FE)	
Reference variable		4 to 20 mA	-
Set point/bench range with fail-safe action	Stem extends (FA)	4 to 20 mA · Minimum current 3.6 mA Load impedance <6 V (300 Ω/20 mA) Direction of action >>, fixed	Bench range: 1.4 to 2.3 bar
	Stem retracts (FE)		
Characteristic		Linear · Deviation from terminal-based conformity: ≤2 %	-
Hysteresis		≤1 %	-
Variable position		≤7 %	-
Transit time for rated travel	p <sub>perm</sub> = 4 bar	Approx. 3 s	
Air consumption in steady state		≤160 l <sub>n</sub> /h when p <sub>perm</sub> = 4 bar	-
Degree of protection		IP54	-
Permissible ambient temperature		-30 to +70 °C	-35 to +90 °C
Additional electrical equipment		1 or 2 changeover contacts (IP65, Ex d, 3 m cable) Nominal voltage/current: 250 V~/5 A~ or 250 V-/0.4 A-	

**Table 6:** Materials for pneumatic actuators

Actuator		Type 3372	Type 3371
Actuator area		120 cm <sup>2</sup>	120 cm <sup>2</sup>
Actuator housing		GD-ALSi12	GD-ALSi12
Diaphragm		NBR	NBR
Actuator stem		1.4305	1.4571
Positioner housing		POM-GF	Polyamide
Yoke	Stem	9SMn28K zinc-plated, matt black finish	-
	Crossbeam	1.4301	-

**Table 7:** Permissible differential pressures for metal-seated plug

Fail-safe action	Actuator stem extends	Actuator stem retracts
Bench range	1.4 to 2.3 bar	1.4 to 2.3 bar
Min./max. supply pressure	3.7 to 4.0 bar	3.7 to 4.0 bar
K <sub>VS</sub> coefficients	Δp when p <sub>2</sub> = 0 bar	Δp when p <sub>2</sub> = 0 bar
4.0 to 8	16	16
16, 20 to 32	10	10
50 to 80	3.5	3.5

## Electric actuators with Type 3535

**Table 8:** Technical data for electric actuators

Three-way valve		Type 3535-E1	Type 3535-E3
Type ... Actuator		5827-N3	3374-11
Thrust		0.7 kN	2.5 kN
Transit time for rated travel		90 s	120 s · Other transit times on request
Supply voltage	230 V/50 Hz	•	•
	230 V/60 Hz	–	•
	24 V/50 Hz	•	•
	24 V/60 Hz	–	•
Power consumption	Motor	3 VA	7.5 VA
	With positioner	3 VA · 8 VA	12.5 VA · 20 VA
Manual override		•	•
Degree of protection		IP54 when installed upright	IP54 · IP65 with cable gland
	Mounting position	Suspended mounting not permitted (▶ EB 5827-1, ▶ EB 5827-2, ▶ EB 8331-3 and ▶ EB 8331-4)	
Permissible ambient temperature		0 to 50 °C	5 to 60 °C
Additional electrical equipment			
Limit contacts		2	2
Resistance transmitter (not for version with positioner)		1 0 to 1000 Ω	2 0 to 1000 Ω
Positioner		Digital	
Input signal		0/4 to 20 mA · 0/2 to 10 V	
Output signal		0/2 to 10 V	0/2 to 10 V · 0/4 to 20 mA

**Table 9:** Permissible differential pressures for metal-seated plug

Three-way valve		Type 3535-E1	Type 3535-E3
Type ... Actuator		5827-N3	3374-11
Thrust		0.7 kN	2.5 kN
K <sub>V5</sub> coefficients		Δp when p <sub>2</sub> = 0 bar	
4.0 to 8		10	16
16, 20 to 32		3.5	12
50 to 80		–	4

## Dimensions

**Table 10:** Dimensions for Type 3535 Valve · DIN version

Valve	DN	15	20	25	32	40	50	65	80
Height H	mm	235	235	235	245	245	245	350	350
Length L	mm	130	150	160	180	200	230	290	310
Height H2	mm	70	80	85	100	105	120	130	140

**Table 11:** Type 3535-IP Electropneumatic Control Valve · Dimensions for version with fail-safe action (actuator stem extends or retracts)

Valve	DN	15	20	25	32	40	50	65	80
H1 (stem extends)	mm	471	471	471	481	481	481	586	586
H1 (stem retracts)	mm	556	556	556	566	566	566	671	671
H3 (stem extends)	mm	110	110	110	110	110	110	110	110
H3 (stem retracts)	mm	210	210	210	210	210	210	210	210

**Table 12:** Type 3535-PP Pneumatic Control Valve · Dimensions apply to both fail-safe positions

Valve	DN	15	20	25	32	40	50	65	80
H1	mm	471	471	471	481	481	481	586	586
H3 (minimum distance)	mm	110	110	110	110	110	110	110	110

**Table 13:** Type 3535-E1 Electric Control Valve

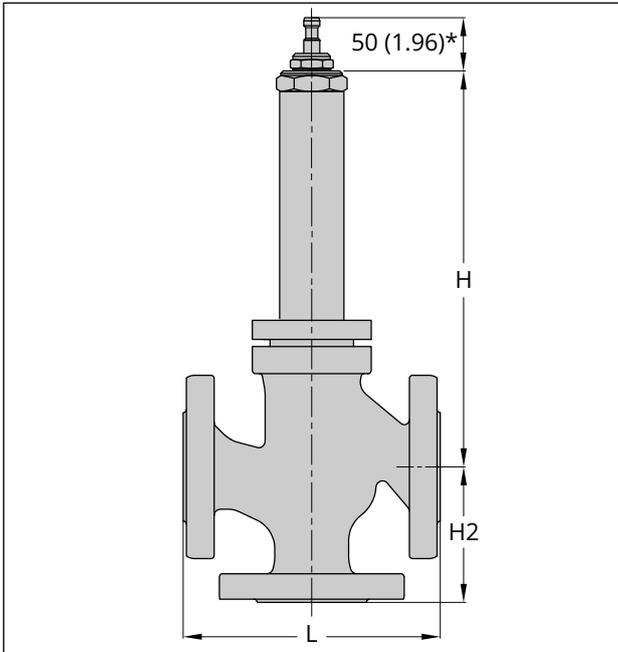
Valve	DN	15	20	25	32	40	50	65	80
H1 (Type 5827 Actuator)	mm	432	432	432	442	442	442	-	-
H3 (minimum distance)	mm	110	110	110	110	110	110	-	-

**Table 14:** Type 3535-E3 Electric Control Valve

Valve	DN	15	20	25	32	40	50	65	80
H1	mm	529	529	529	539	539	539	644	644
H3 <sup>1)</sup> (minimum distance)	mm	110	110	110	110	110	110	110	110

<sup>1)</sup> Cover screws are mounted from the top.

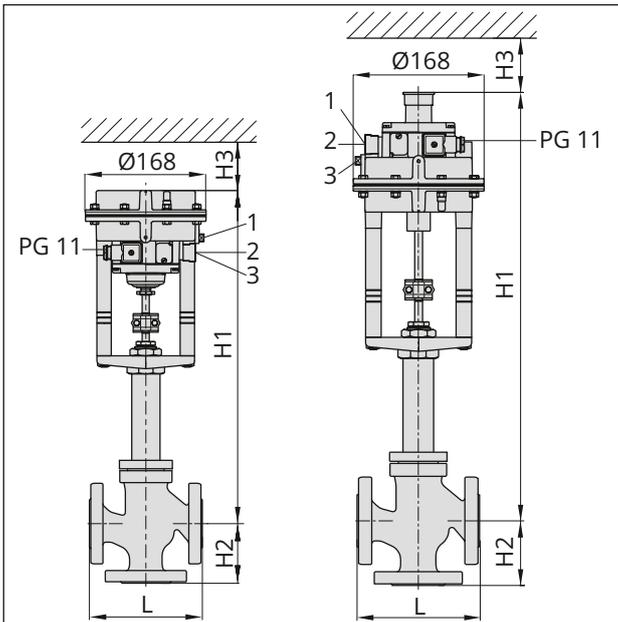
## Dimensional drawing of valve



**Fig. 7:** Dimensional drawing of Type 3535

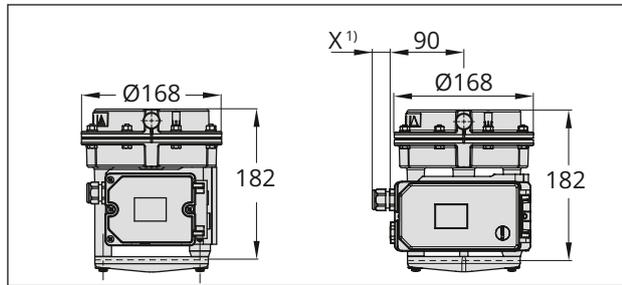
\* Dimension applies to plug stem pushed into the valve body

## Dimensional drawings for electropneumatic control valves



**Fig. 8:** Type 3535-IP Electropneumatic Control Valves

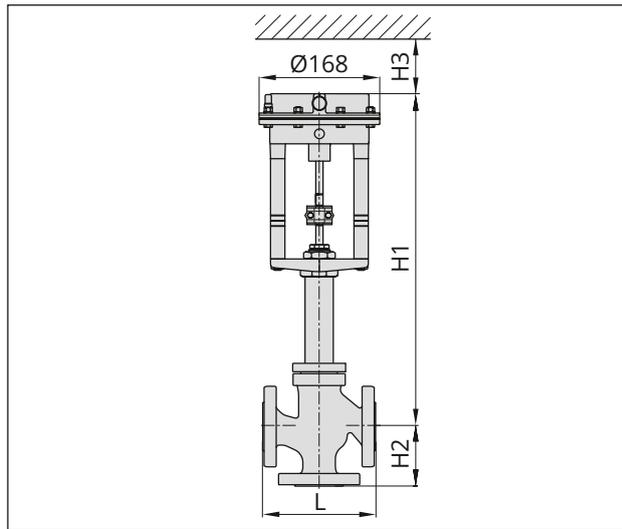
- 1 G ¼ pressure gauge ½
- 2 Supply air G ¼
- 3 Vent plug G ¼



**Fig. 9:** Left: Type 3372/120 cm<sup>2</sup> with Type 3725 Positioner  
Right: Type 3372/120 cm<sup>2</sup> with Series 3730 Positioner

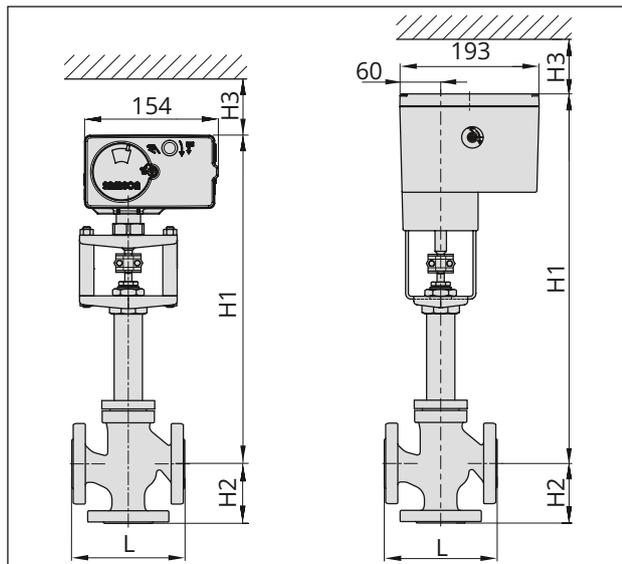
¹) The dimension X depends on the cable gland used.

## Dimensional drawing for pneumatic control valve



**Fig. 10:** Type 3535-PP Pneumatic Control Valve

## Dimensional drawings · Actuators for electric control valves



**Fig. 11:** Left: Type 3535-E1 Electric Control Valve (Type 5827 Actuator)

Right: Type 3535-E3 Electric Control Valve (Type 3374 Actuator)

## Weights

**Table 15:** *Weights<sup>1)</sup> for Type 3535 Valve*

Nominal size	DN	15	20	25	32	40	50	65	80
<b>Type 3535-IP</b> Control Valve	kg	8.7	9.2	10.2	16.7	17.2	19.7	30.7	35.7
<b>Type 3535-PP</b> Control Valve	kg	8.3	8.8	9.8	16.7	16.8	19.3	30.3	35.3
<b>Type 3535-E1</b> Control Valve	kg	6.8	7.3	8.3	14.8	15.3	17.8	-	-
<b>Type 3535-E3</b> Control Valve	kg	10.5	11	12	18.5	19	21.5	32.5	37.5

<sup>1)</sup> The weights specified apply to a specific standard device configuration. Weights of other valve configurations may differ depending on the version (material, trim etc.).

## Ordering text

The following specifications are required on ordering:

Valve	
<b>Type 3535</b> Three-way Valve for Heat Transfer Oil	Mixing or diverting valve
Nominal size	DN ...
Pressure rating	PN ...
Flow rate	K <sub>vs</sub> ...
Body material	See Table 2
Seat-plug seal	Metal seal
Actuators	
for <b>Type 3535-IP:</b> Type 3372 Electropneumatic Actuator	
With integrated positioner	4 to 20 mA
With positioner	Type 3725/Series 3730
Optional	Intrinsically safe Ex ia
Additional equipment	1 or 2 limit switches
for <b>Type 3535-PP:</b> Type 3371 Pneumatic Actuator	
Fail-safe action	Actuator stem extends or retracts
Bench range	1.4 to 2.3 bar
Additional equipment	1 or 2 limit switches
for <b>Type 3535-E1:</b> Type 5827-N3 Electric Actuator	
Supply voltage	Three-step version
	- 230 V/50 Hz
	- 24 V/50 Hz
	Version with positioner
	- 24 V/50 and 60 Hz and DC
	- 85 to 264 V/50 and 60 Hz
Additional equipment	- 2 limit contacts
	- Resistance transmitter 0 to 1000 Ω
	- Digital positioner
	- Input: 0/4 to 20 mA or 0/2 to 10 V
	- Output: 0/2 to 10 V
for <b>Type 3535-E3:</b> Type 3374 Electric Actuator	
Actuator thrust (without fail-safe action)	2.5 kN
Supply voltage	- 230 V/50 Hz
	- 230 V/60 Hz
	- 24 V/50 Hz
	- 24 V/60 Hz
Additional equipment	- 2 limit contacts
	- Resistance transmitter 0 to 1000 Ω
	- Digital positioner with input and output: 0/4 to 20 mA or 0/2 to 10 V