

# Type 3510-1 and Type 3510-7 Pneumatic Control Valves

## Type 3510 Micro-flow Valve



DIN version

### Application

Control valve especially designed for controlling low flow rates in pilot plants and technical research facilities

**Nominal size** G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4  
1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT  
DN 10 · DN 15 · DN 25

**Nom. pressure** PN 40 to 400

**Temperatures** -196 to +450 °C

Type 3510 Micro-flow Valve with

- Type 3271-5 Pneumatic Actuator
- Type 3277-5 Pneumatic Actuator

Available as

- Globe valve
- Angle valve

Valve body with

- G or NPT female thread
- Welding ends or flanges

Stainless steel is used as the standard body material. However, a wide variety of special materials can also be used on customer request.

A mounting kit (1400-9031) provides the valve with an interface according to IEC 60534-6-1 (NAMUR) for attachment of positioners, limit switches, solenoid valves and other valve accessories. We recommend using an insulating section or bellows seal for flanged valves to provide more space to mount valve accessories.

### Standard version

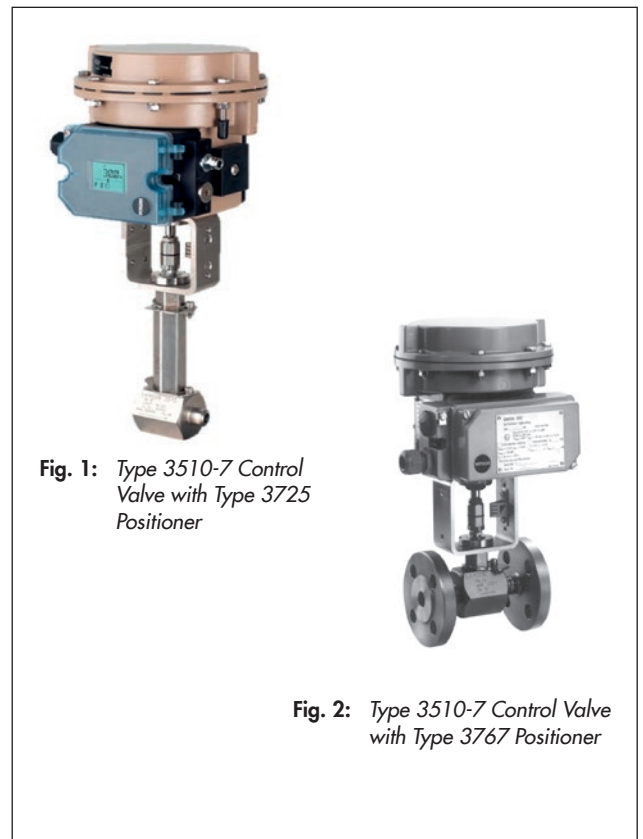
- For temperatures from -10 to +220 °C
- PN 40 to 400
- Globe or angle valve
- Female thread G 1/8, G 1/4, G 3/8, G 1/2, G 3/4 or 1/8 NPT, 1/4 NPT, 3/8 NPT, 1/2 NPT, 3/4 NPT
- Flanges DN 10, 15 or 25
- Welding ends DN 10, 15 or 25

**Type 3510-1** · With Type 3271-5 Pneumatic Actuator (120 cm<sup>2</sup>) · See Data Sheet ▶ T 8310-1

**Type 3510-7** (Fig. 1 and Fig. 2) · With Type 3277-5 Pneumatic Actuator (120 cm<sup>2</sup>) for integral positioner attachment  
See Data Sheet ▶ T 8310-1

### Further versions

- **Insulating section** for temperatures from -196 to +450 °C, with special material up to +650 °C
- **Metal bellows seal** up to PN 250 with a sealing performance of  $\leq 10^{-5}$  (mbar l)/s
- **Handwheel**



**Fig. 1:** Type 3510-7 Control Valve with Type 3725 Positioner

**Fig. 2:** Type 3510-7 Control Valve with Type 3767 Positioner

- **Electric actuator** · On request
- **Stainless steel actuator** for ambient temperatures down to -60 °C · On request
- **Body connections with threaded flanges** and lens ring gaskets in nominal sizes DN 6 and 10, nominal pressure PN 325, dimensions acc. to IG standard ( $K_{V_{Smax}} = 0.4$ )

### Principle of operation

The medium flows through the micro-flow valve in the direction indicated by the arrow. The plug position determines the cross-sectional area between the seat and plug.

The plug stem is connected to the actuator stem by the stem connector and sealed with an adjustable packing.

To comply with stricter environmental emissions requirements, the valve can be equipped with a double-walled metal bellows.

The anti-rotation fixture prevents a loosening of the screw connection between the valve body and the bonnet or the intermediate piece.

### Fail-safe position

Depending on how the springs are arranged in the pneumatic actuator (► T 8310-1), the valve has two different fail-safe positions.

#### Actuator stem extends (fail-close)

The valve closes when the supply air fails.

#### Actuator stem retracts (fail-open)

The valve opens when the supply air fails.

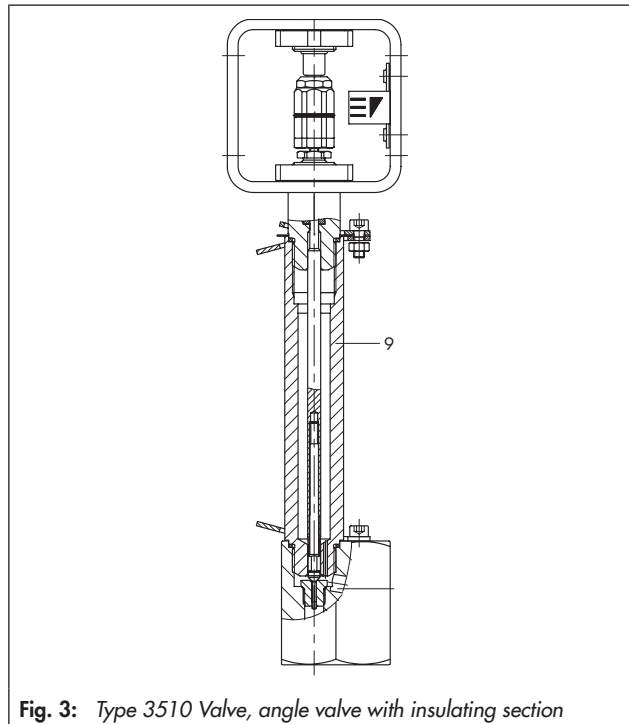


Fig. 3: Type 3510 Valve, angle valve with insulating section

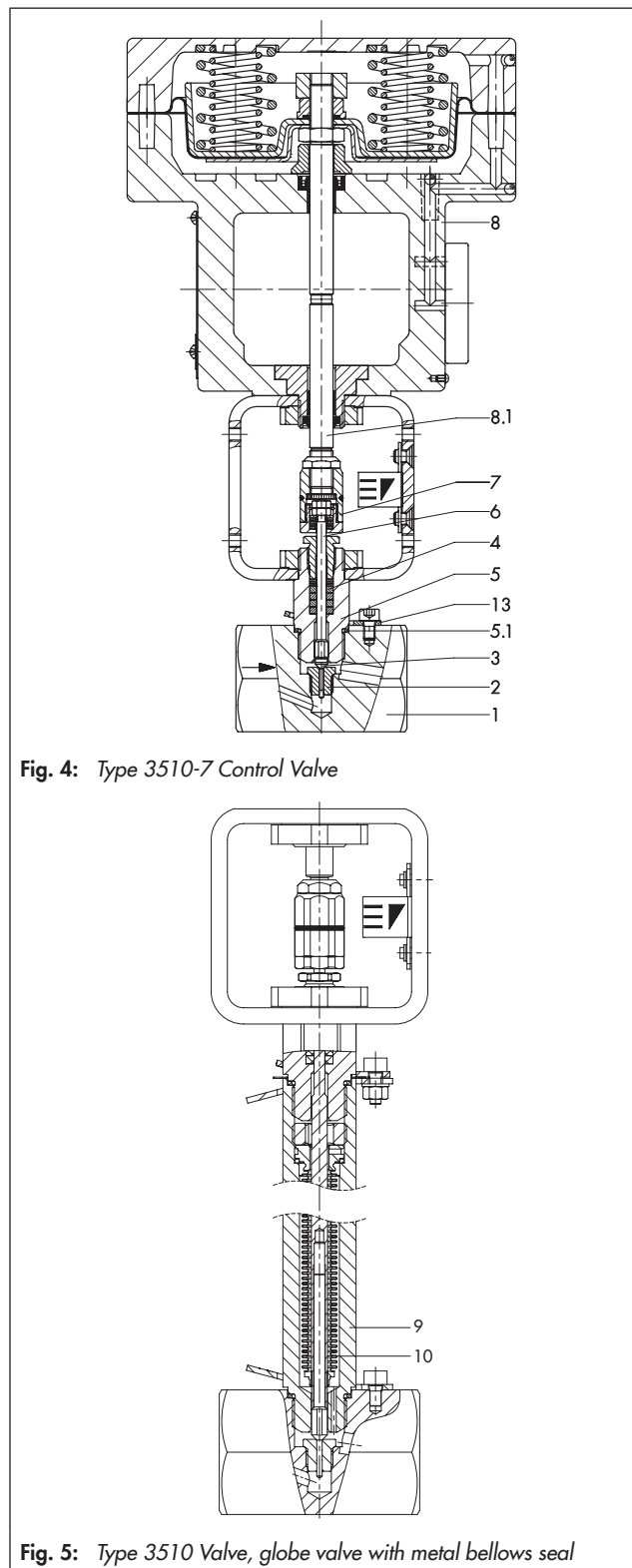


Fig. 4: Type 3510-7 Control Valve

Fig. 5: Type 3510 Valve, globe valve with metal bellows seal

### Legend

1	Valve body	5.1	Body gasket	9	Intermediate piece for insulating section or bellows seal
2	Seat	6	Plug stem	10	Metal bellows
3	Plug	7	Stem connector	13	Anti-rotation fixture
4	Packing	8	Actuator		
5	Valve bonnet	8.1	Actuator stem		

**Table 1: Technical data for Type 3510**

Connection	Female thread	Welding ends	Flanges
Valve size	G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT	DN 10 · DN 15 · DN 25	DN 10 · DN 15 · DN 25
Nominal pressure	PN 40 to 400		
Seat/plug seal	Metal seal		
Characteristic	Equal percentage with $K_{VS} \geq 0.01$ · Linear · Quick opening		
Rangeability	50:1 · < 50:1 with $K_{VS} < 0.1$		
Temperature range <sup>1)</sup>	-10 to +220 °C · With insulating section: -196 to +450 °C		
Leakage class according to IEC 60534-4	Metal seal: IV · High-performance metal seal: V		
Compliance	<b>ERC</b>		

<sup>1)</sup> Higher temperatures on request

**Table 2: Materials**

Valve body <sup>1)</sup> and valve bonnet <sup>2)</sup>	1.4401/1.4404	2.4610
Seat	1.4401/1.4404 <sup>3)</sup> 1.4122 Stellite®	2.4610 <sup>3)</sup>
Plug	1.4401/1.4404 <sup>3)</sup> 1.4112 Stellite®	2.4610 <sup>3)</sup>
Packing	PTFE compound	
Body gasket	1.4401/1.4404	2.4610
<b>Insulating section</b>	1.4401/1.4404	2.4610
<b>Metal bellows seal</b>		
Intermediate piece	1.4401/1.4404	2.4610
Metal bellows up to PN 250	1.4571	2.4819

<sup>1)</sup> Other materials on request

<sup>2)</sup> Wetted parts

<sup>3)</sup> Only with  $K_{VS}$  0.001 to 1.6

**Table 3:** Available  $K_{VS}$  coefficients

**Table 3.1:** Overview

$K_{VS}$ coefficient		0.0001 to 0.0063 <sup>1)</sup>	0.01 to 0.25	0.4	0.63 to 1.6 <sup>2)</sup>
Rangedability		<15:1	15:1 to 50:1	50:1	
Seat Ø	mm	2	3	4	10
Seat thread <sup>3)</sup>		M10 x 1			M16 x 1
Plug stem Ø	mm	4		4	
Travel	mm	7.5		7.5	

<sup>1)</sup> Seat and plug made only of 1.4122/1.4122, 1.4122/Stellite® or Stellite®/Stellite®

<sup>2)</sup> Only up to PN 100

<sup>3)</sup> Trims are only interchangeable within the  $K_{VS}$  coefficient ranges  $K_{VS}$  0.0001 to 0.4 (M10x1) and  $K_{VS}$  0.63 to 1.6 (M16x1) due to the different seat threads.

**Table 3.2:**  $K_{VS}$  coefficients and associated nominal sizes

Connection		Female thread				Welding ends			Flanges		
Flow coefficient $K_{VS}$	Characteristic		G 1/8 1/8 NPT 1/4 NPT	G 3/8 3/8 NPT	G 1/2 1/2 NPT 3/4 NPT	DN 10	DN 15	DN 25	DN 10	DN 15	DN 25
	Equal percentage	Linear									
0.00010	-	•	•	•	•	•	•	•	•	•	•
0.00016		•	•	•	•	•	•	•	•	•	•
0.00025		•	•	•	•	•	•	•	•	•	•
0.00040		•	•	•	•	•	•	•	•	•	•
0.00063		•	•	•	•	•	•	•	•	•	•
0.0010		•	•	•	•	•	•	•	•	•	•
0.0016		•	•	•	•	•	•	•	•	•	•
0.0025		•	•	•	•	•	•	•	•	•	•
0.0040		•	•	•	•	•	•	•	•	•	•
0.0063		•	•	•	•	•	•	•	•	•	•
0.010	•	•	•	•	•	•	•	•	•	•	
0.016	•	•	•	•	•	•	•	•	•	•	
0.025	•	•	•	•	•	•	•	•	•	•	
0.040	•	•	•	•	•	•	•	•	•	•	
0.063	•	•	•	•	•	•	•	•	•	•	
0.10	•	•	•	•	•	•	•	•	•	•	
0.16	•	•	•	•	•	•	•	•	•	•	
0.25	•	•	•	•	•	•	•	•	•	•	
0.40	•	•	•	•	•	•	•	•	•	•	
0.63 <sup>1)</sup>	•	•	-	•	-	•	•	-	•	•	
1.0 <sup>1)</sup>	•	•		•		•	•				
1.6 <sup>1)</sup>	•	•		•		•	•				

<sup>1)</sup> Versions can be used up to PN 100 at the maximum

**Table 3.3:** Valve selection guide

PN	16 to 40		63 to 100		160 to 250		400	
Metal bellows	Optional		Optional		Optional		-	Optional
$K_{VS}$								
0.0001	Type 3510		Type 3510		Type 3510		Type 3510	
0.00016								
0.00025								
0.0004								
0.00063								
0.001								
0.0016								
0.0025								
0.004								
0.0063								
0.01								
0.016								
0.025								
0.04								
0.063								
0.1								
0.16	Type 3252	Type 3241	Type 3252	Type 3251	Type 3252	Type 3251	Type 3252	Type 3251
0.25								
0.4								
0.63								
1								
1.6								
2.5								
4								
6.3								
10								

Refer to the following data sheets for detailed information on the corresponding valves:

- Type 3241: ▶ T 8015 (DIN) and ▶ T 8012 (ANSI)
- Type 3251: ▶ T 8051 (DIN) and ▶ T 8052 (ANSI)
- Type 3252: ▶ T 8053

**Table 4:** Permissible differential pressures · Pressures stated in bar (gauge)

**Table 4.1:** Standard version without bellows seal · Fail-close

Bench range with actuator area		120 cm <sup>2</sup>	0.4 to 8	0.8 to 1.6	1.7 to 2.1	2.4 to 3.1
Nominal size	K <sub>VS</sub> coefficient	Actuator	Δp when p <sub>2</sub> = 0 bar			
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	120 cm <sup>2</sup>	250	400	–	–
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	120 cm <sup>2</sup>	35	84	100	–

**Table 4.2:** Standard version with bellows seal · Fail-close

Bench range with actuator area		120 cm <sup>2</sup>	0.4 to 0.8	0.8 to 1.6	1.7 to 2.1	2.4 to 3.1
Nominal size	K <sub>VS</sub> coefficient	Actuator	Δp when p <sub>2</sub> = 0 bar			
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	120 cm <sup>2</sup>	30	72	160	250
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	120 cm <sup>2</sup>	25	68	100	–

**Table 4.3:** Standard version without bellows seal · Fail-open

Bench range with actuator area		120 cm <sup>2</sup>	0.4 to 0.8		
		Supply pressure	1.2	2.5	3.5
Nominal size	K <sub>VS</sub> coefficient	Actuator	Δp when p <sub>2</sub> = 0 bar		
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	120 cm <sup>2</sup>	254	400	–
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	120 cm <sup>2</sup>	36	100	–

**Table 4.4:** Standard version with bellows seal · Fail-open

Bench range with actuator area		120 cm <sup>2</sup>	0.4 to 0.8		
		Supply pressure	1.2	2.5	3.5
Nominal size	K <sub>VS</sub> coefficient	Actuator	Δp when p <sub>2</sub> = 0 bar		
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	120 cm <sup>2</sup>	27	160	250
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	120 cm <sup>2</sup>	27	100	–

**Table 5:** Dimensions in mm

**Table 5.1:** Dimensions for Type 3510 Valve

Connection		Female thread	Welding ends	Flanges		
Valve		G/NPT	DN 10. 15. 25	DN 10	DN 15	DN 25
L <sup>1)</sup>	PN 40	74	80	130	130	160
	PN 63 to 160			210	210	230
	PN 250 to 320			230	230	260
	PN 400			–	264	308
L1 <sup>1)</sup>	PN 40	34	40	90	90	100
	PN 63 to 160			105	105	115
	PN 250 to 320			115	115	130
	PN 400			115	127 <sup>3)</sup>	150 <sup>3)</sup>
H1	120 cm <sup>2</sup>			122		
H4 with insulating section	PN 40 to 400			263		
H4 with bellows seal	PN 40 to 100			263		
	PN 160 to 250			365		
H2 or flange ØD1	PN 40	23 <sup>2)</sup>	23 <sup>2)</sup>	90	95	115
	PN 63 to 160			100	105	140
	PN 250 to 320			125	130	160
	PN 400			125	145	180

<sup>1)</sup> Face-to-face dimensions of flanges according to DIN EN 558

<sup>2)</sup> H2 = 28 mm when body is made of 2.4610

<sup>3)</sup> Face-to-face dimensions determined by SAMSON

**Table 5.2:** Type 3271 and Type 3277 Pneumatic Actuators

<b>Actuator area</b>	<b>cm<sup>2</sup></b>	<b>120</b>
Diaphragm ØD	mm	168
H <sup>1)</sup>	mm	69
H3 <sup>2)</sup>	mm	110
H5	Type 3277 mm	88
Thread	Type 3271	M20 x 1.5
	Type 3277	M20 x 1.5
α	Type 3271	G 1/8 (1/8 NPT)

<sup>1)</sup> Minimum clearance required to remove the actuator

**Table 6:** Weights in kg

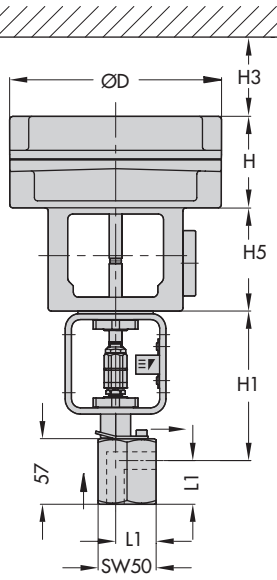
**Table 6.1:** Weights for Type 3510 Valve

Connection		Female thread	Welding ends	Flanges		
Valve		G/NPT	DN 10. 15. 25	DN 10	DN 15	DN 25
Valve without actuator	PN 40	1.7	1.5	2.9	3.1	4.2
	PN 63 to 160			3.9	4.2	7.3
	PN 250 to 320			5.6	6.0	8.7
	PN 400			7.1	9.1	9.8
Optional	Insulating section			0.5		
	Bellows seal			0.6		

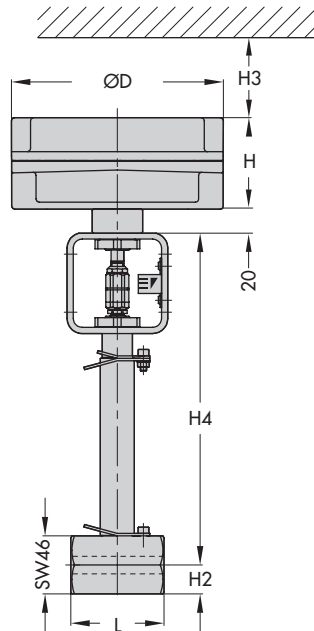
**Table 6.2:** Weight for actuator

<b>Actuator</b>	<b>120 cm<sup>2</sup></b>
kg (approx.)	3.5

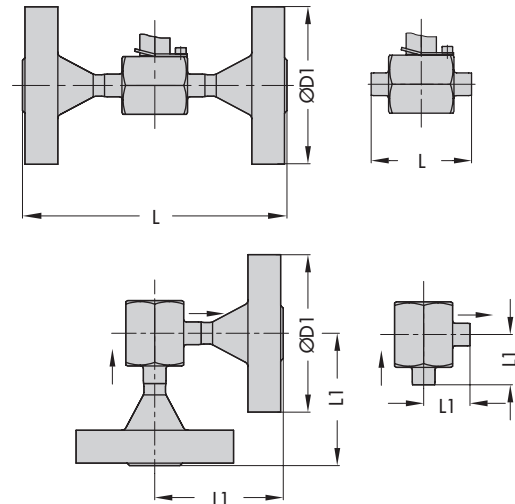
## Dimensional drawings



Type 3510-7 as angle valve with female thread



Type 3510-1 as globe valve with female thread, with bellows seal or insulating section



Type 3510 · Valve body with flanges and welding ends

## Ordering text

Type 3510 Micro-flow Globe or angle valve  
Valve

Nominal size	DN
Nominal pressure	PN
Body material	According to Table 2
Type of end connections	G or NPT female thread Flanges/welding ends
Direction of flow	Flow-to-open or flow-to-close
Characteristic	Equal percentage, linear or quick opening
Pneumatic actuator	Type 3271-5 or Type 3277-5, 120 cm <sup>2</sup>
Fail-safe position	Fail-close or fail-open
Process medium	Density in kg/m <sup>3</sup> and temperature in °C
Flow coefficient	kg/h or m <sup>3</sup> /h in standard or operating state
Pressure	p <sub>1</sub> and p <sub>2</sub> in bar (absolute pressure p <sub>abs</sub> ) (with minimum, normal and maximum flow rate)
Valve accessories*	Positioner and/or limit switch

\*Mounting kit (1400-9031) required

Specifications subject to change without notice



SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
samson@samson.de · www.samson.de

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