



Application

Electric actuator for industrial applications

Special features

The electric actuator is suitable for mounting on Series 240, 250 and 280 Valves with 15 to 120 mm travel. The following limit switches and signaling components are included in the actuator:

- Two torque-dependent changeover switches
- Three travel-dependent changeover switches
- Anti-rotation fixture

Versions

- Three-step version
- Version with positioner
- Single-phase or multi-phase operation
- Operation with DC voltage
- Standard version with surface-cooled squirrel-cage motor

Options

- Electronic positioner with input and output signals 0/4 to 20 mA or 0 to 10 V
- Electronic position transmitter with an output signal from 0/4 to 20 mA
- One or two resistance transmitters 100, 200, 1000 or 2000 Ω
- Additional travel-dependent changeover switch
- Temperature monitor (depending on actuator model)
- Heating for the terminal compartment
- Integrated reversing contactor for multi-phase operation

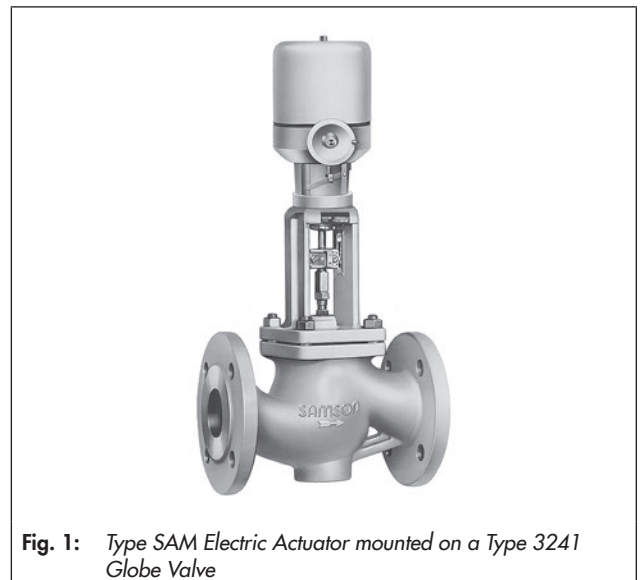


Fig. 1: Type SAM Electric Actuator mounted on a Type 3241 Globe Valve

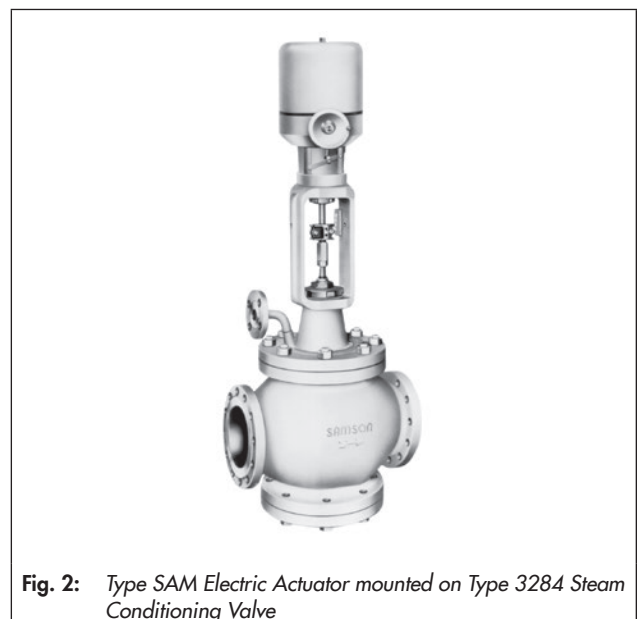


Fig. 2: Type SAM Electric Actuator mounted on Type 3284 Steam Conditioning Valve

Design and principle of operation

The actuator motor converts the output pulses of the three-step controller into steps of travel. The length of these steps and the direction of rotation depend on the amount and the sign of the control deviation.

The rotary motion of the motor is transferred to the gear wheel by the gearing; the gear wheel is shrunk on a bushing with female thread. The top section of the actuator stem which is provided with the matching male thread engages the female thread. Due to the rotary motion of the gear wheel and bushing, the actuator stem screws into the female thread and performs a lifting, linear motion. The actuator stem can be moved manually after decoupling the motor.

The electrical components are housed beneath the sealed actuator cover in a compartment where they are separated from the gearing. They are protected against dust in this compartment and can be easily accessed after lifting off the actuator cover.

- Switch

All versions are equipped with two torque switches (S1 and S2 in Fig. 4) switch off the motor when the adjusted force is reached, e.g. when the valve plug rests against the seat or when the linear motion is obstructed in any way.

The three floating travel switches (S3 to S5 in Fig. 4) can be continuously adjusted. They issue a limit signal when the adjusted limit values are exceeded.

The switch (S3) functions as a NC contact and is used to limit the travel in retracting direction. The actuator is switched off when the adjusted travel limit is reached.

The switches (S4 and S5) can be used to indicate the actuator stem position or when the adjusted travel is reached.

The travel switch S3 must be adjusted in such a way that the valve travel is restricted in the retracting direction by switching off the motor.

- Resistance transmitters

The resistance transmitters are linked to the motor gear and produces a resistance signal, which is proportional to the valve travel.

- Position transmitter (ESR)

The position transmitter is a 0/4 to 20 mA signal, which is proportional to the travel.

Mounting

The actuator can be combined with the Series 240, 250 and 280 Valves (form A). It is fastened to the valve bonnet with a ring nut. The actuator and plug stems are fastened together by a stem connector.

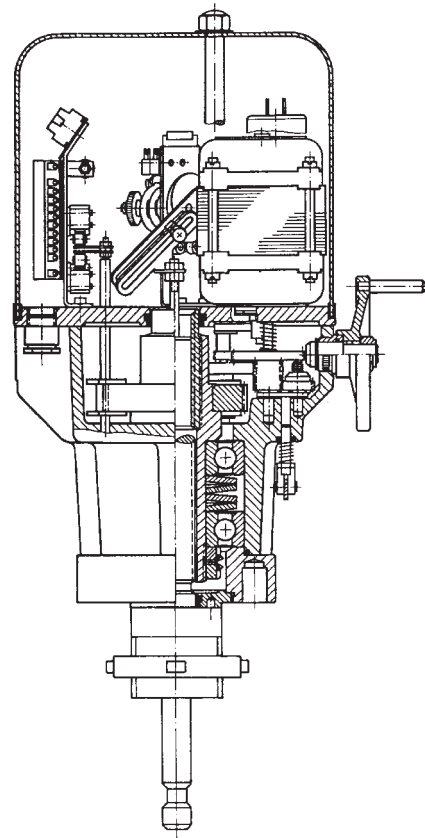


Fig. 3: Type SAM Electric Actuator

Electrical connection

Either the internal terminal block (standard version) or the 32-pole terminal block in the terminal box can be used to connect the actuator.

i Note

The wiring plan is stuck in the actuator cover.

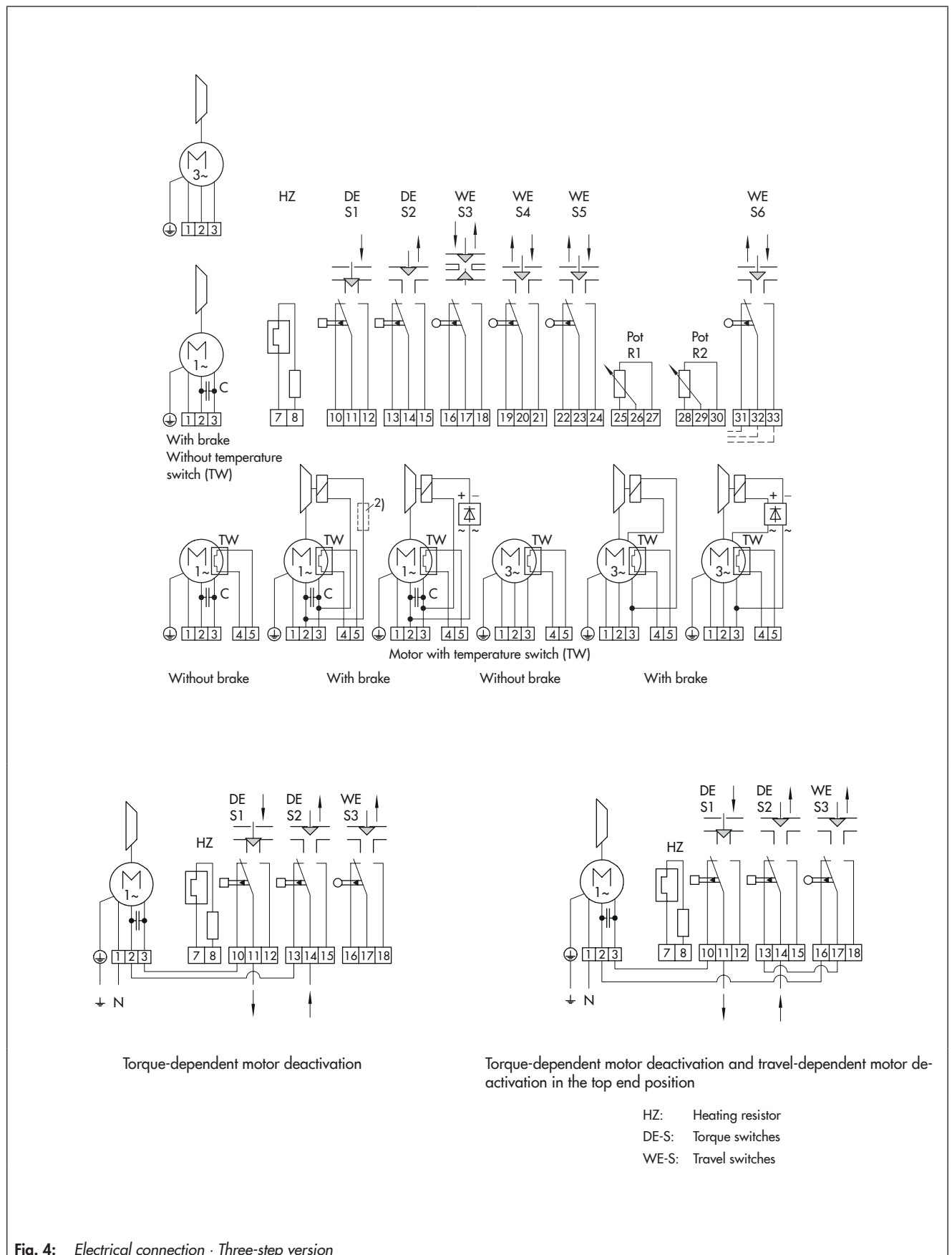
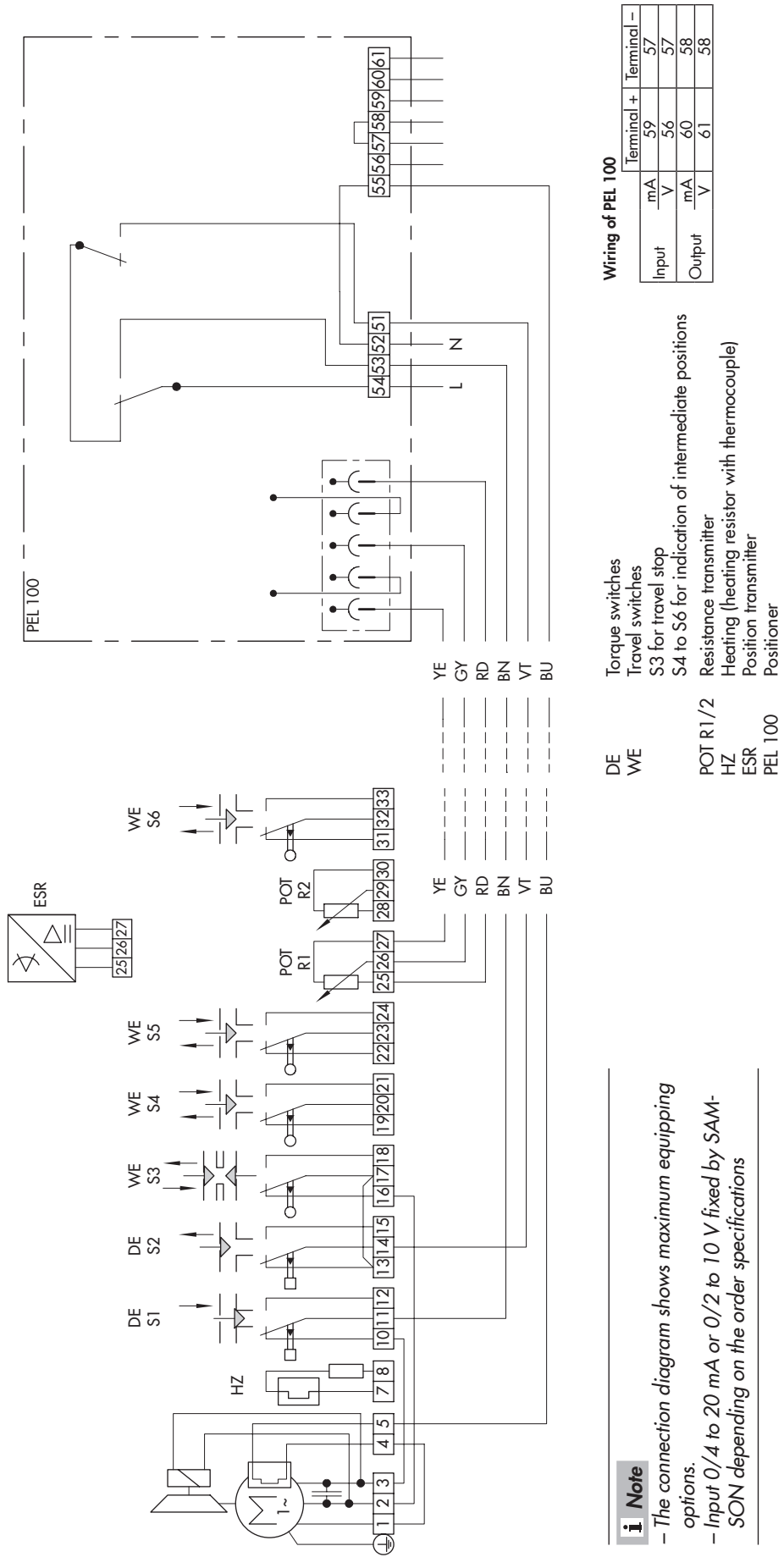


Fig. 4: Electrical connection · Three-step version



Wiring of PEL 100

Terminal +	Terminal -
mA	59
V	57
mA	60
V	58

- DE Torque switches
- WE Travel switches
- S3 for travel stop
- S4 to S6 for indication of intermediate positions
- POT R1/2 Resistance transmitter
- HZ Heating (heating resistor with thermocouple)
- ESR Position transmitter
- PEL 100 Positioner

Note
 - The connection diagram shows maximum equipping options.
 - Input 0/4 to 20 mA or 0/2 to 10 V fixed by SAM-SON depending on the order specifications

Fig. 5: Electrical connection · Version with positioner, single-phase operation

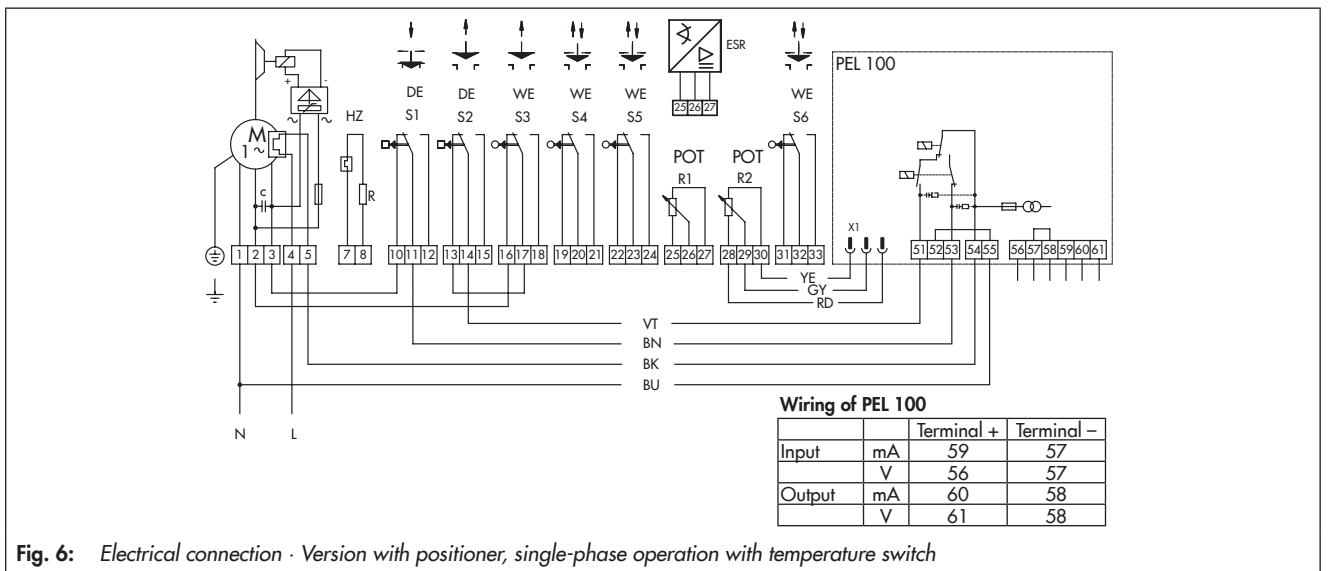


Fig. 6: Electrical connection · Version with positioner, single-phase operation with temperature switch

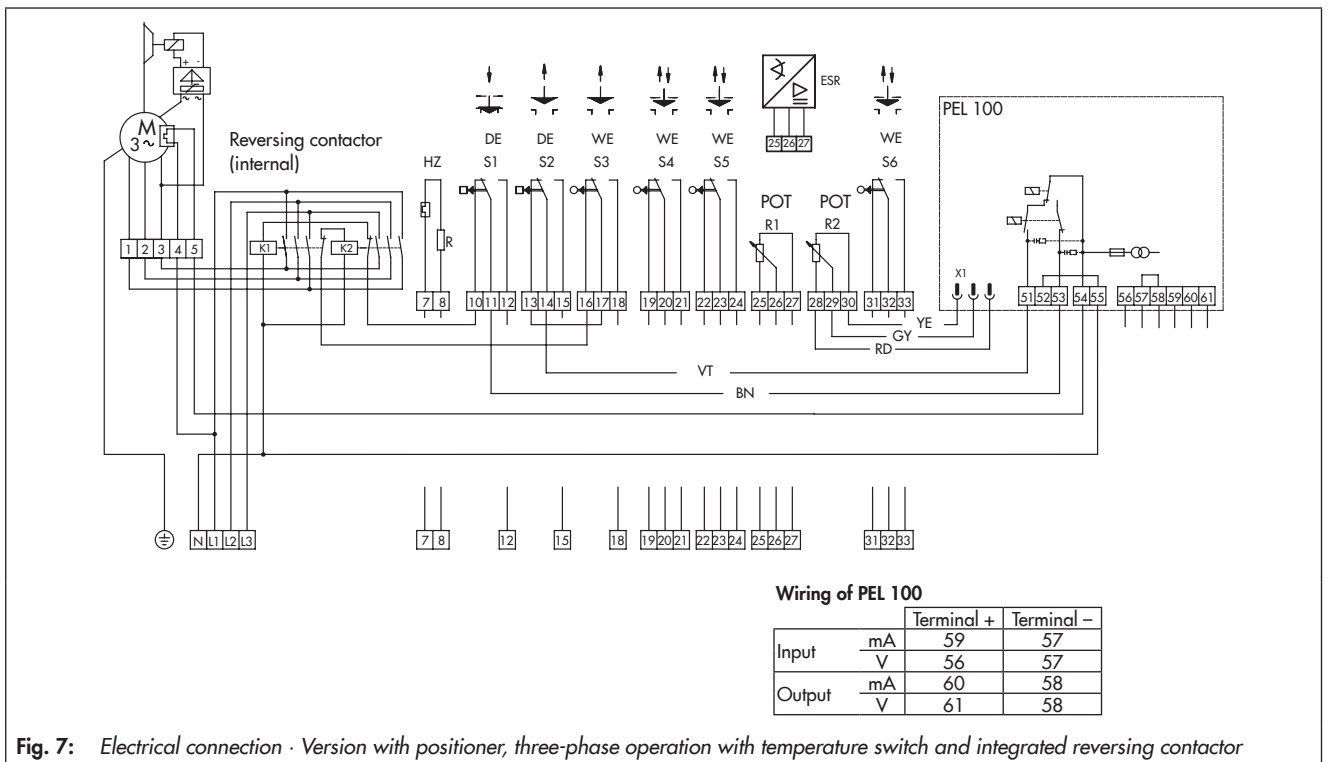


Fig. 7: Electrical connection · Version with positioner, three-phase operation with temperature switch and integrated reversing contactor

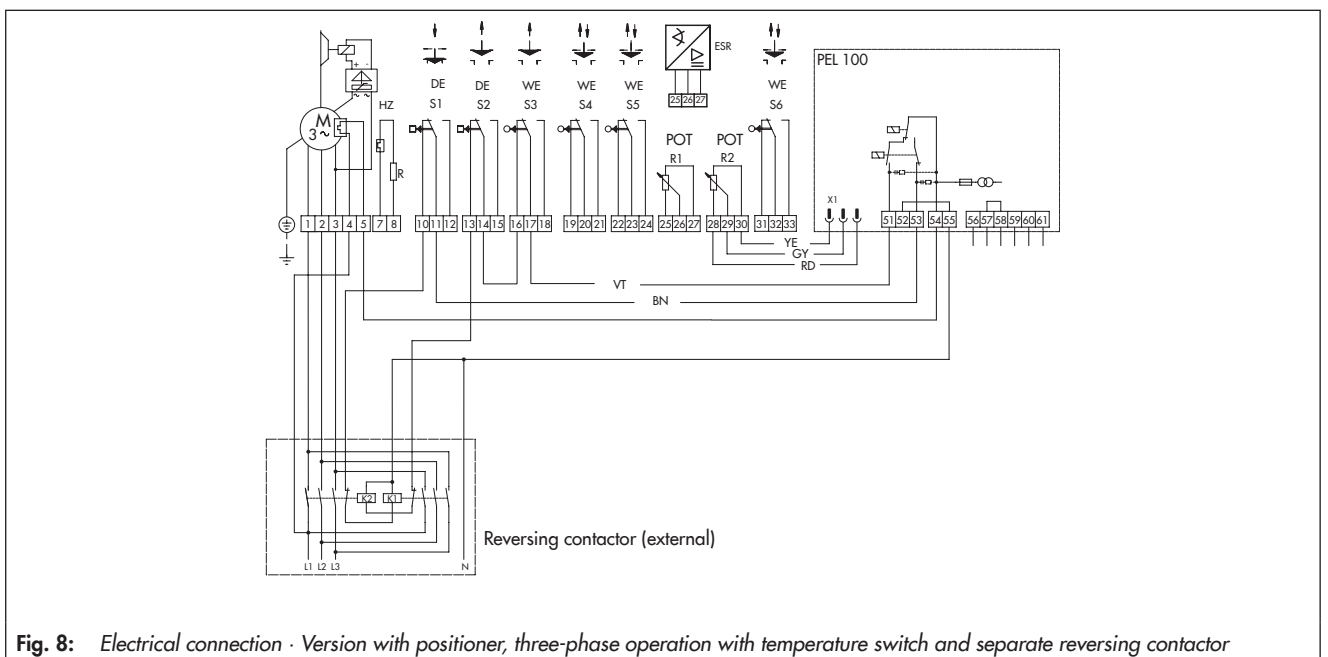


Fig. 8: Electrical connection · Version with positioner, three-phase operation with temperature switch and separate reversing contactor

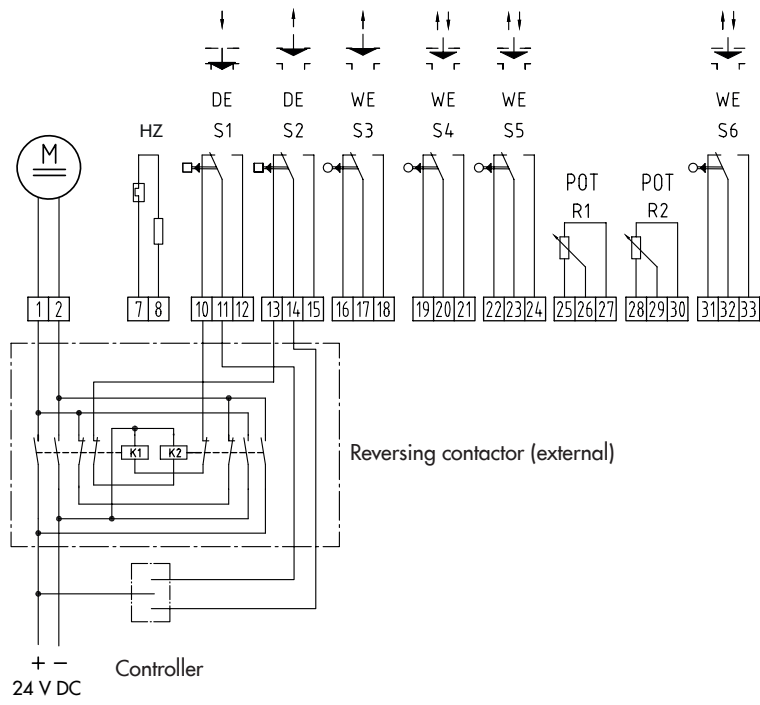
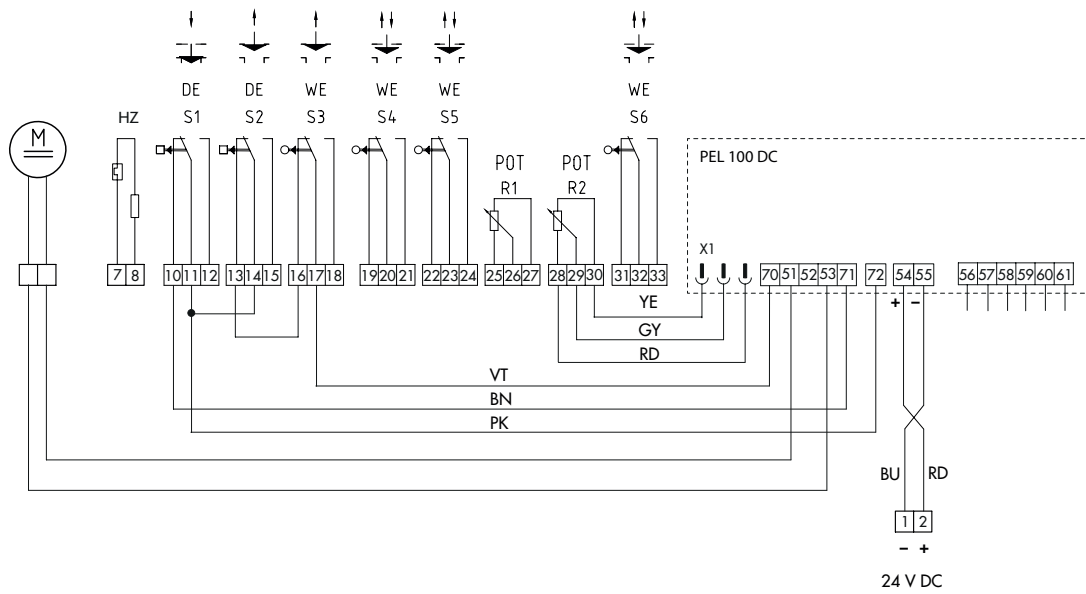


Fig. 9: Electrical connection · Three-step version for 24 V DC with external reversing contactor



Wiring of PEL 100 DC

		Terminal +	Terminal -
Input	mA	59	57
	V	56	57
Output	mA	60	58
	V	61	58

Fig. 10: Electrical connection · Version with positioner for 24 V DC

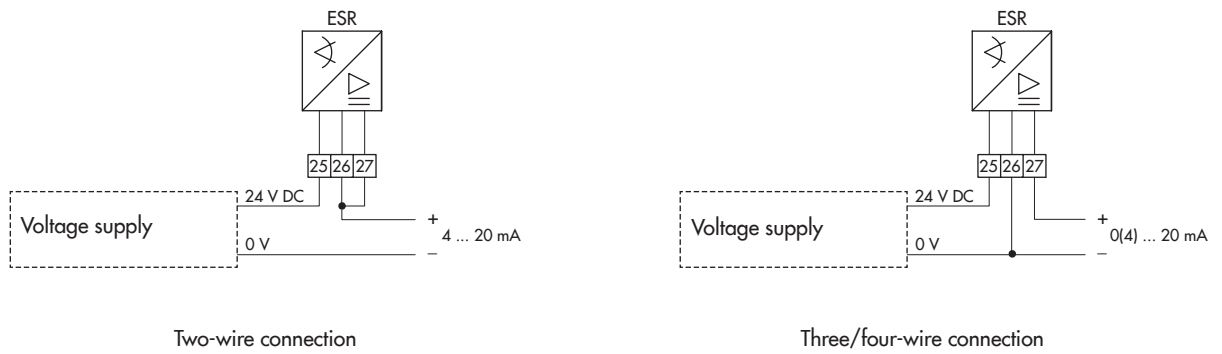


Fig. 11: Electrical connection · Position transmitter (ESR)

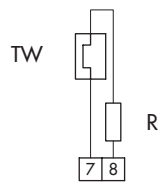


Fig. 12: Electrical connection · Heating resistor (R) with temperature switch (TW)

Terminal and connector assignment

Table 1: Terminal X2

Terminal	Function
54	L (supply voltage)
55	N (supply voltage)

Table 2: Terminal X3

Terminal	Function
51	L ↑ (connection for actuator stem retracts)
52	N (supply voltage)
53	L ↓ (connection for actuator stem extends)

Table 3: Terminal X4

Terminal	Function
60	0/4 to 20 mA current output
61	0/2 to 10 V voltage output
58	GND
57	GND
56	0/2 to 10 V voltage input
59	0/4 to 20 mA current input

Table 4: Connector X4

Pin	Function	Color code
1	Max. value	Blue
2	Sensing at the slider	Red
3	Zero point	Green

Technical data

Table 5: Mechanical and general data

Type SAM ...		-01	-10	-11	-12	-13	-20	-21	-22	-23	-30	-31	-32	-33	-40	-41	-42	-50	-51	-52	
Thrust	kN	2	2	3.5	4.5	6	6	8	12	15	6	8	12	15	15	20	25	15	20	25	
Rated travel	mm	15 · 30									15 · 30 · 60						60 100 120	60 · 120			
Mounting orientation	Any mounting position except suspended																				
Actuator stem	No mechanical travel stops, protected against being rotated by tongue and groove																				
Manual adjuster	Side-mounted handwheel																				
Attachment	M30x1.5									M60x1.5						M100x2					
Degree of protection	IP65 according to DIN EN 60529																				
Protection class	I according to DIN EN 61140																				
Cable entry																					
Cable glands	2x M16x1.5									2x M20x1.5											
Blanking plug	1x M16x1.5									1x M20x1.5											
Permissible ambient temperature range	-20 to +60 °C																				
Weight	kg	8					13					19									
Conformity ¹⁾	CE																				

¹⁾ Others on request

Table 6: Technical data · Supply voltage 230 V AC, 400 V AC, 110 V AC

Type SAM ...	-01	-10	-11	-12	-13	-20	-21	-22	-23	-23	-20	-21	-22	-23	-40	-41	-42	
Electrical connection	Terminal block inside or in terminal box, mounted onto the actuator or as compact connector																	
Supply voltage	230 V (±10 %), 50/60 Hz (±5 %) · 400 V (±10 %), 50/60 Hz (±5 %) · 110 V (±10 %), 50/60 Hz (±5 %) ¹⁾																	
Power consumption (see Table 9 to Table 11)																		
Stroking speed in mm/min ²⁾	15	25 · 50	17 · 25 · 50	17 34		13.5 25 · 50		13.5 22 40	22		13.5 · 25 · 50	40		15 · 25 50			25	
Motor type (depending on the stroking speed)																		
Synchronous motor	•	–	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	–
Operating mode according to DIN VDE 0530 part 1, section 4	S1 100 %	–				Intermittent periodic duty S3-50 % ED-600 c/h										–		
Asynchronous motor with brake	–	•	•	•	•	–	–	–	–	–	–	–	–	–	–	–	–	–
Asynchronous motor (optional brake, required with positioner)	–	–	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	•
Operating mode according to DIN VDE 0530 part 1, section 4	–	Intermittent periodic duty S4-50 % ED-600 c/h																
Temperature monitoring	Not required, on request only										Bimetallic switch							

¹⁾ Others on request

²⁾ With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

Table 7: Technical data · Supply voltage 24 V AC

Type SAM ...	-01	-10	-11	-12	-13	-20	-21	-22	-23	-30	-31	-32	-33
Electrical connection	Terminal block inside or in terminal box, mounted onto the actuator or as compact connector												
Supply voltage	24 V (±10 %), 50/60 Hz (±5 %)												
Power consumption (see Table 12)													
Stroking speed in mm/min ¹⁾	15	25	17 · 25	17		13.5 · 25		13.5 · 22		13.5 · 25			
Motor type													
Synchronous motor	•	–	–	–	–	•	•	•	•	•	•	•	•
Asynchronous motor	–	•	•	•	•	–	–	–	–	–	–	–	–
Operating mode according to DIN VDE 0530 part 1, section 4	S1-100 %	Intermittent periodic duty S4-30 % ED-600 c/h					Intermittent periodic duty S3-30 % ED-600 c/h						

¹⁾ With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

Table 8: Technical data · Supply voltage 24 V DC

Type SAM ...	-01	-10	-11	-12	-13	-20	-21	-22	-23	-30	-31	-32	-33	-40	-41	-50	-51
Electrical connection	Terminal block inside or in terminal box, mounted onto the actuator or as compact connector																
Supply voltage	24 V DC																
Power consumption (see Table 13)																	
Stroking speed in mm/min ¹⁾	30 · 50					25 · 60						30 · 60					
Power consumption in W	8.5 · 16.8					26.5 · 64.8						48 · 118					
Motor type																	
Direct-current motor	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

¹⁾ The stroking speed varies depending on the load acting on the actuator.

Table 9: Max. power consumption in VA · 230 V AC version ¹⁾

	Stroking speed in mm/min ¹⁾							
	13.5	15	17	22	25	34	40	50
SAM-01	–	6.7	–	–	–	–	–	–
SAM-10	–	–	–	–	41.4	–	–	61.4
SAM-11/-12	–	–	41.4	–	41.4	–	–	61.4
SAM-13	–	–	41.4	–	–	61.4	–	–
SAM-20/-21/-22/ -30/-31/-32	25.3	–	–	–	51.8	–	–	323.4
SAM-23/-33	25.3	–	–	51.8	–	–	323.4	–
SAM-40/-41/ 50/-51	–	51.8	–	–	271.7	–	–	480.7
SAM-42/-52	–	–	–	–	271.7	–	–	480.7

¹⁾ With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

Table 10: Max. power consumption in VA · 400 V AC (three-phase) version ¹⁾

	Stroking speed in mm/min ¹⁾							
	13.5	15	17	22	25	34	40	50
SAM-01	-	10	-	-	-	-	-	-
SAM-10	-	-	-	-	63.7	-	-	80.4
SAM-11/-12	-	-	63.7	-	63.7	-	-	80.4
SAM-13	-	-	63.7	-	-	80.4	-	-
SAM-20/-21/-22/ -30/-31/-32	42	-	-	-	76.2	-	-	456.7
SAM-23/-33	42	-	-	76.2	-	-	456.7	-
SAM-40/-41/-50/-51	-	76.2	-	-	304.8	-	-	1006
SAM-42/-52	-	-	-	-	304.8	-	-	1006

¹⁾ With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

Table 11: Max. power consumption in VA · 110 V AC version ¹⁾

	Stroking speed in mm/min ¹⁾							
	13.5	15	17	22	25	34	40	50
SAM-01	-	7	-	-	-	-	-	-
SAM-10	-	-	-	-	38.3	-	-	76.4
SAM-11/-12	-	-	38.3	-	38.3	-	-	76.4
SAM-13	-	-	38.3	-	-	76.4	-	-
SAM-20/-21/-22/ -30/-31/-32	25.3	-	-	-	54.1	-	-	259.4
SAM-23/-33	25.3	-	-	54.1	-	-	259.4	-
SAM-40/-41/-50/-51	-	66.7	-	-	197.8	-	-	481.3
SAM-42/-52	-	-	-	-	197.8	-	-	481.3

¹⁾ With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

Table 12: Max. power consumption in VA · 24 V AC version ¹⁾

	Stroking speed in mm/min ¹⁾				
	13.5	15	17	22	25
SAM-01	-	6.6	-	-	-
SAM-10	-	-	-	-	46.5
SAM-11/-12	-	-	46.5	-	46.5
SAM-13	-	-	46.5	-	-
SAM-20/-21/-22/- 30/-31/-32	25.2	-	-	-	49.4
SAM-23/-33	25.2	-	-	49.4	-

¹⁾ With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

Table 13: Max. power consumption in W · 24 V DC version ¹⁾

	Stroking speed in mm/min ¹⁾			
	25	30	50	60
SAM-01/-10/-11/ -12/-13	-	8.5	16.8	-
SAM-20/-21/-22/ -23/-30/-31/-32/-33	26.5	-	-	64.8
SAM-40/-41/-50/-51	-	48	-	118

¹⁾ The power consumption of actuators with positioners is 1.8 W higher.

Table 14: Electrical equipment

Torque switches DE		
Switch DE-S ... ¹⁾	Two switches S1 and S2, max. 250 V AC	
Travel switches WE-...		
Switch WE-S... ¹⁾	One switch S3 for direction of action "retracting" and "extending" Two switches S4 and S5 for indication of intermediate positions or end positions One switch S6 as indication switch (optional)	
Load	cos φ = 1: max. 5 A · cos φ = 0.8: max. 3 A · Light bulbs: max. 2 A	
Additional electrical equipment		
Resistance transmitters POT R ...		
Potentiometer R ...	One or two potentiometers R1 and R2: 100 Ω , 200 Ω , 1 k Ω , 2 k Ω	
Load	Max. 1.5 W · Sliding contact current max. 30 mA	
Position transmitter (ESR)		
Connection	Three/four-wire connection	Two-wire connection
Supply voltage U_H	18 to 30 V DC	18 to 30 V DC
Max. load R_L	50 x ($U_H - 2.5$) Ω	50 x ($U_H - 12$) Ω
Output signal	0 to 20 mA or 4 to 20 mA	4 to 20 mA
Current draw	Max. 30 mA	
Positioner (PEL 100)		
Input and output signal	0/4 to 20 mA or 0 to 10 V	
Current input impedance	50 Ω	
Voltage input impedance	20 k Ω	
Fuse protection (230 V)	250 mA	
Fuse protection (24 V)	1 A	
Heating		
Heating resistor	With temperature switch 24 V, 110 V or 230 V (AC/DC), 15 W	

¹⁾ Not wired upon delivery when actuators have an external reversing contactor unit

Dimensions

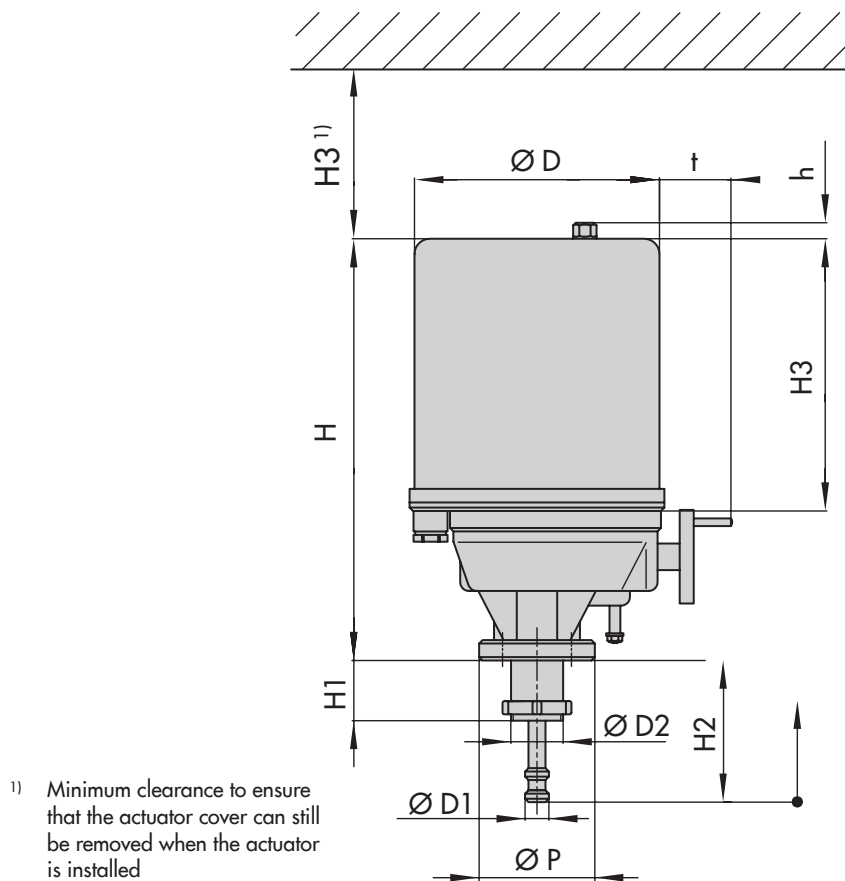


Fig. 13: Dimensions in mm

Table 15: Dimensions in mm

Type	SAM-01 to SAM-13	SAM-20 to SAM-23	SAM-30 to SAM-33	SAM-40 to SAM-42	SAM-50 to SAM-52
Rated travel	15/30	30	60	60	120
H ¹⁾	268 (283)	334 (357)	334 (357)	413 (452)	448 (487)
H1	34	34	54	54	92
H2 min.	60/75	60	105	165	195
H2 max.	75/90	90	165	225	315
H3 ¹⁾	156 (171)	174 (197)	174 (197)	197(226)	187 (226)
Ø D	144	188	188	216	216
Ø D1	16	16	22	22	40
Ø D2 Thread	M30x1.5	M30x1.5	M60x1.5	M60x1.5	M100x2
Ø P	74	130	140	140	158
t	42	62	62	70	70
h	10	15	15	15	15

¹⁾ Dimensions in parentheses apply to actuator with positioner

Accessories

	Material ¹⁾	Order no.
SAM-01 to SAM-13 and SAM-20 to SAM-23 (for valves with stem ends Ø 16 mm)		
Mounting set Consisting of: 1x Castellated nut M30x1.5 2x Clamps for stem ends Ø 16 mm 2x Screws M6x25	1.0727+C 1.4301 (SS304) A4-70	0900-2679
SAM-01 to SAM-13 and SAM-20 to SAM-23 (for valves with stem ends Ø 10 mm)		
1x Castellated nut M30x1.5	1.0727+C	0250-0615
1x Clamp for stem ends Ø 10/16 mm Consisting of: 2x Clamps for stem ends Ø 10/16 mm 2x Screws M5x25	1.4404 (SS316) A4-70	1990-8689
SAM-30 to SAM-33 and SAM-40 to SAM-42		
1x Castellated nut M60x1.5	1.0727+C	0250-0700
1x Clamp for stem ends Ø 22 mm	1.4301 (SS304)	0300-1084
1x Clamp for stem ends Ø 22 mm	1.4301 (SS304)	0300-1085
2x Screws M12x35	1.4301 (SS304)	8320-0884
SAM-50 to SAM-52		
1x Castellated nut M100x2	1.0727+C	0250-0701
1x Clamp for stem ends Ø 40 mm	1.4301 (SS304)	0300-1078
1x Clamp for stem ends Ø 40 mm	1.4301 (SS304)	0300-1079
2x Screws M16x50	1.4301 (SS304)	8320-0973

¹⁾ Other on request

Ordering text

Type SAM-... Electric Actuator

Thrust

2 ... 25 kN

Rated travel

15/30/60/120 mm

Stroking speed

... mm/min

Supply voltage:

230 V/400 V/24 V, 50/60 Hz

24 V DC

Reversing contactor

Without/mounted before delivery (only with multi-phase operation or DC power supply)

Actuation

Three-step version/version with positioner

Brake motor (three-step version only, not with 24 V DC)

With/without

Additional electrical equipment

Additional travel switch

With/without

Resistance transmitters

None/1/2

100, 200, 1000, 2000 Ω

Position transmitter ESR

With/without

Heating

With/without

Mounting

Mounted on Type ... Valve

Associated Mounting and Operating Instructions

– Type SAM

▶ **EB 8330**