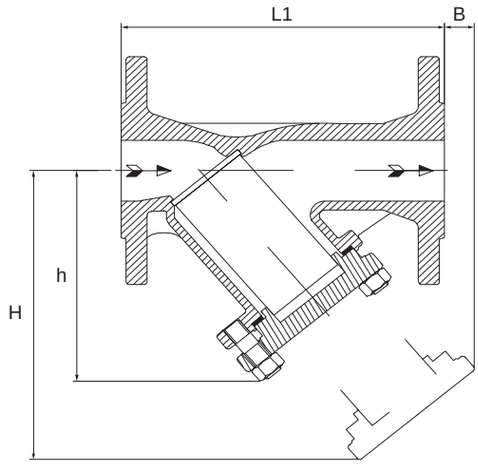
Main-Index

back to start page

All measurements and weights are approximate figures.
Illustrations are not bindig. Alteration rights reserved.

Strainer with flange connection,
for water, steam and heat transfer oil
Filter screen: made of alloy steel wire,
if desired with supporting basket
(from DN 200 onwards standard equipment)
and/or fein screen (mesh size 0,25 mm)
Body: GGG 40.3, PN 16
Flanges acc. to DIN 2533



Order text:
Strainer GGG 40.3, PN 16, DN . .
filter screen made of alloy steel,
Flanges acc. to DIN
List-No. 150 4 . .

Max. operating pressure:

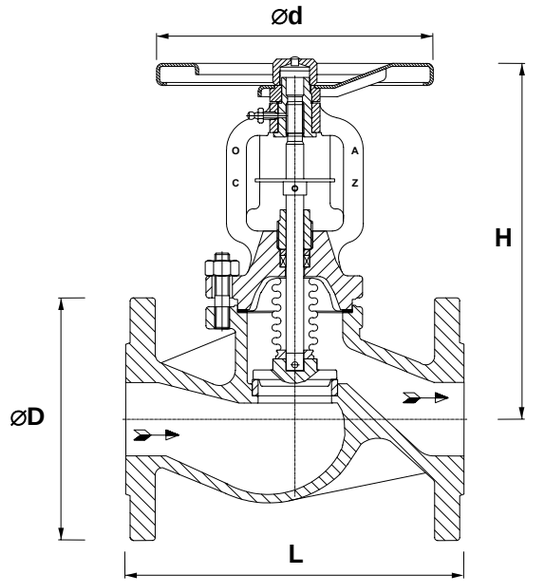
by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar

DN	List-No.	Weight	Immersion lenght	Height opened		Measure	Screen	Wire gauge x mesh size
		kg	L	h	H	B	∅ x height	
15	150 400	3,5	130	90	135	10	23 x 57	0,5 x 1
20	150 401	4	150	100	150	10	28 x 69	0,5 x 1
25	150 402	5,5	160	115	180	25	36 x 83	0,5 x 1
32	150 403	7	180	125	205	35	42 x 99	0,5 x 1
40	150.404	9	200	150	235	45	50 x 115	0,5 x 1
50	150 405	12	230	160	250	45	61,5 x 120	0,5 x 1
65	150 406	16	290	180	285	25	78,5 x 135	0,63x1,25
80	150 408	21	310	215	330	40	89,5 x 150	0,63x1,25
100	150 410	28	350	235	365	55	109,5 x 170	1,0 x 1,6
125	150 412	41	400	275	425	65	137,5 x 200	1,0 x 1,6
150	150 415	58	480	305	480	50	160 x 225	1,0 x 1,6
200	150 420	115	600	390	610	80	210 x 285	1,0 x 1,6

open printversion

Manual operated stop valve in two way form with VA bellow sealing, PN 16/25 Form A

Valve body: two way form**,**
for heat transfer oil, water and steam,
Flanges acc. to DIN,
Sealing: VA bellow
and safety stuffing box,
Internal parts: stainless steel
DN 15 - 100: throttling plug
for DN >100: shut-off plug
optionally throttling plug (appendix ...d)
Non-rising handwheel,
Locking device
Travel limiter



Material/nominal pressure:

GG-25	(EN-GJL-250)	PN 16	DN 15-300	List-No.: 246 **3**..a
GGG-40.3	(EN-GJS-400-18-LT)	PN 16	DN 15-350	List-No.: 246 **4**..a
GGG-40.3	(EN-GJS-400-18-LT)	PN 25	DN 15-350	List-No.: 246 **5**..a

Order text:
Manual operated stop valve, material . . ., PN . ., DN . .,
in two way form with VA bellow sealing,
List-No. 246 . . . a

Max. operating pressure:

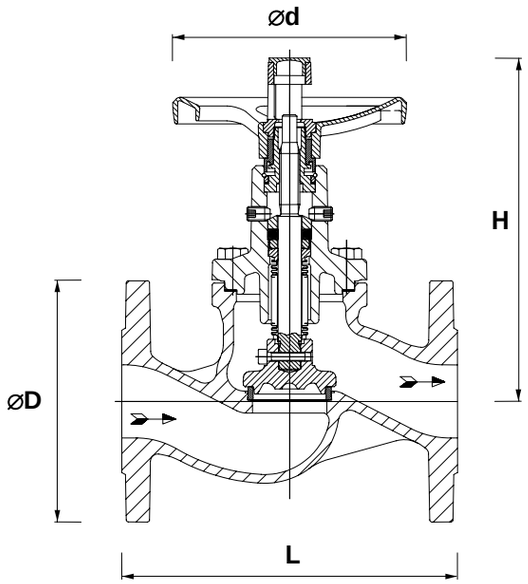
by:		-10 ...120	200	250	300	350	°C
GG-25	PN 16	16	12,8	11,2	9,6	---	bar
GGG-40.3	PN 16	16	14,7	13,9	12,8	11,2	bar
GGG-40.3	PN 25	25	23	21,8	20	17,5	bar

DN	List-No.	Kvs m³/h shut-off	Kvs m³/h throttling	Weight kg	Immersion length L	Height H	Handwheel Ød	Flange ØD PN16	Flange ØD PN25
15	246 _00a	4,7		3	130	205	126	95	95
20	246 _01a	7,4		4	150	205	126	105	105
25	246 _02a	11,2		5	160	210	126	115	115
32	246 _03a	18,3		8	180	210	126	140	140
40	246 _04a	29,3		9	200	225	150	150	150
50	246 _05a	44,2		11	230	230	150	165	165
65	246 _06a	73,2		17	290	245	175	185	185
80	246 _08a	112,2		22	310	265	175	200	200
100	246 _10a	173,0		32	350	365	225	220	235
125	246 _12a.	288,0	224,0	54	400	395	300	250	270
150	246 _15a.	410,0	330,0	70	480	425	400	285	300
200	246 _20a.	725,0	569,5	139	600	550	520	340	360
250	246 _25a.	1145,0	945,0	239	730	720	520	405	425
300	246 _30a.	1635,0	1635,0	343	850	775	520	460	485
350	246 _35a.	2220,0	2220,0	390	980	975	640	520	555

open printversion

Manual operated stop valve in two way form with VA bellow sealing, PN 16/25
Form B

Valve body: two way form**,**
for heat transfer oil, water and steam,
Flanges acc. to DIN EN 1092-2 type 21,
Sealing: VA bellow
and safety stuffing box,
Internal parts: stainless steel
DN 15 - 100: throttling plug
for DN >100: shut-off plug
optionally throttling plug (appendix ...d)
Non-rising handwheel,
Locking device
Travel limiter



Material/nominal pressure:

GG-25	(EN-GJL-250)	PN 16	DN 15-300	List-No.: 246 **3**..
GGG-40.3	(EN-GJS-400-18-LT)	PN 16	DN 15-350	List-No.: 246 **4**..
GGG-40.3	(EN-GJS-400-18-LT)	PN 25	DN 15-150	List-No.: 246 **5**..

Order text:
Manual operated stop valve, material . . ., PN . ., DN . .,
in two way form with VA bellow sealing,
List-No. 246 . . .

Max. operating pressure:

by:		-10 ...120	200	250	300	350	°C
GG-25	PN 16	16	12,8	11,2	9,6	---	bar
GGG-40.3	PN 16	16	14,7	13,9	12,8	11,2	bar
GGG-40.3	PN 25	25	23	21,8	20	17,5	bar

DN	List-No.	Kvs m³/h		Weight kg		Immersion length L	Height H	Handwheel Ød	Flange ØD	
		shut-off	throttling	PN16	PN25				PN16	PN25
15	246 _00		4,8	3	3	130	175	125	95	95
20	246 _01		8,3	4	4	150	178	125	105	105
25	246 _02		11,9	5	5	160	184	125	115	115
32	246 _03		19,9	8	8	180	205	125	140	140
40	246 _04		27,1	9	9	200	210	125	150	150
50	246 _05		43,3	11	11	230	235	160	165	165
65	246 _06		75,1	17	17	290	246	160	185	185
80	246 _08		116,7	22	29	310	282	200	200	200
100	246 _10		172,3	32	40	350	304	200	220	235
125	246 _12.	270,0	171,5	54	65	400	390	250	250	270
150	246 _15.	393,0	204,0	70	89	480	408	250	285	300
200	246 _20.	657,0	457,0	139	---	600	570	400	340	---
250	246 _25.	1035,0	714,0	239	---	730	606	400	405	---
300	246 _30.	1466,0	1028,0	343	---	850	660	400	460	---
350	246 _35.	1466,0	1028,0	390	---	980	660	400	520	---

open printversion

Body: GGG-40.3, three way form**,**
for heat transfer oil, as mixing valve,
(diverted purpose restricted ,
see page 038 990)
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
alternatively: weld-on ends (on request)
Sealing: VA-bellow, double wall,
and safety stuffing box,
Internal parts: stainless steel, replaceable seat rings,
Flow characteristic: linear
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator:
Manual operated

Accessories, special types**:**
Reduced kvs-values (on request)
Weld-on ends (on request)

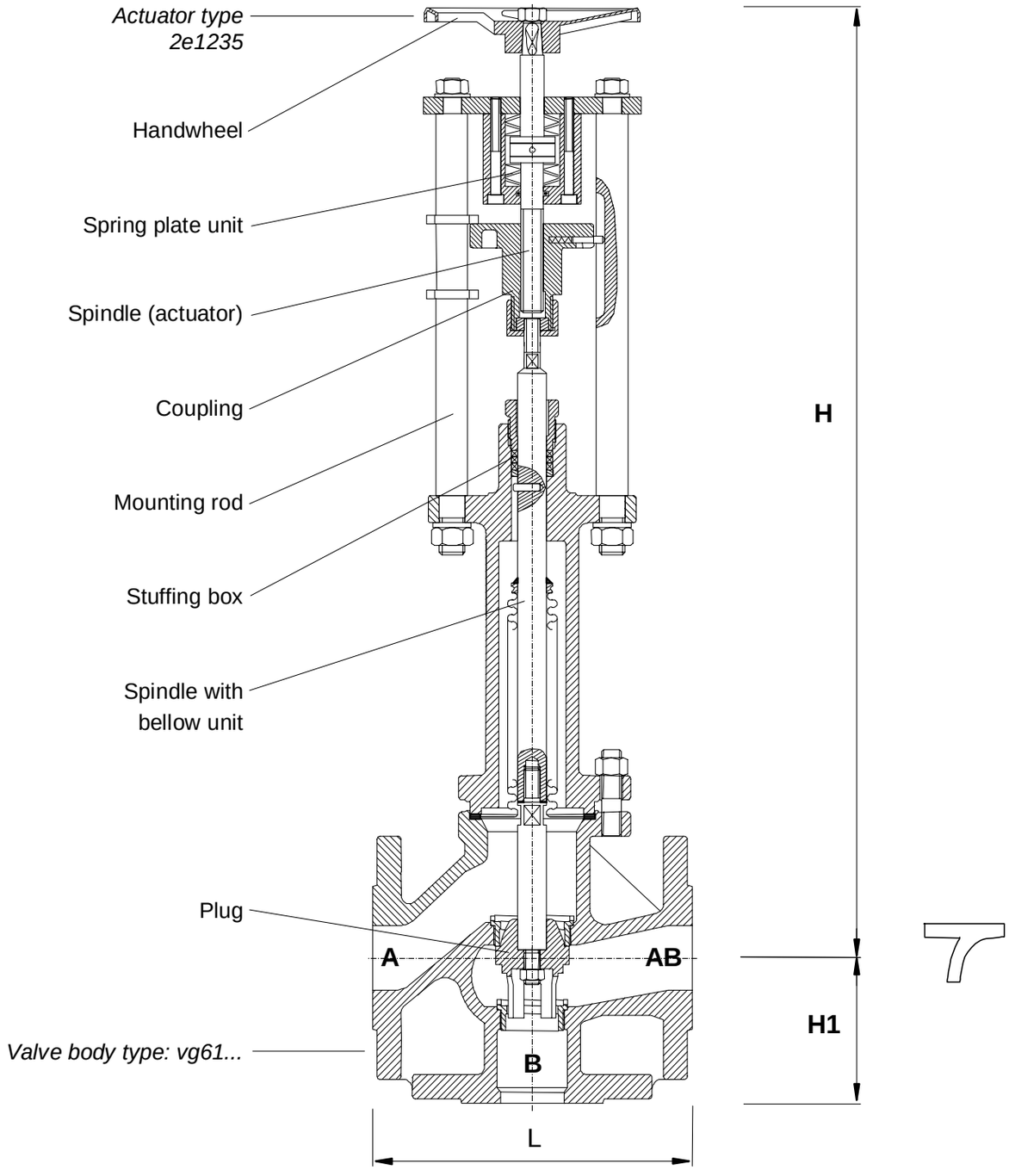
Order text:
Manual operated control valve PN . ., DN . .
in three way form with VA-bellow sealing,
List-No. 2661 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List-No.**		**Kvs**	**Stroke**
	PN 16	PN 25	m³/h	mm
15	2661 400	2661 500	4,0	20
20	2661 401	2661 501	6,3	20
25	2661 402	2661 502	10	20
32	2661 403	2661 503	16	20
40	2661 404	2661 504	25	20
50	2661 405	2661 505	40	20
65	2661 406	2661 506	63	30
80	2661 408	2661 508	100	30
100	2661 410	2661 510	160	30
125	2661 412	2661 512	230	35
150	2661 415	2661 515	330	40

open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H	590	605	599	605	611	613	743	744	751	855	870
Stud lenght H1	65	70	75	80	90	100	120	130	150	200	210
Immersion lenght L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	12	13	14	17	18	21	38	42	56	97	127

open printversion

Additional equipments
– see page 2 –

Operating instruction
– see group 0 –

Page 2

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25,
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite-packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Leakage: acc. to VDI/VDE 2174

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optional "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
another types: ...c: 3 bar, ...d: 6 bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Another kvs- values (on request)

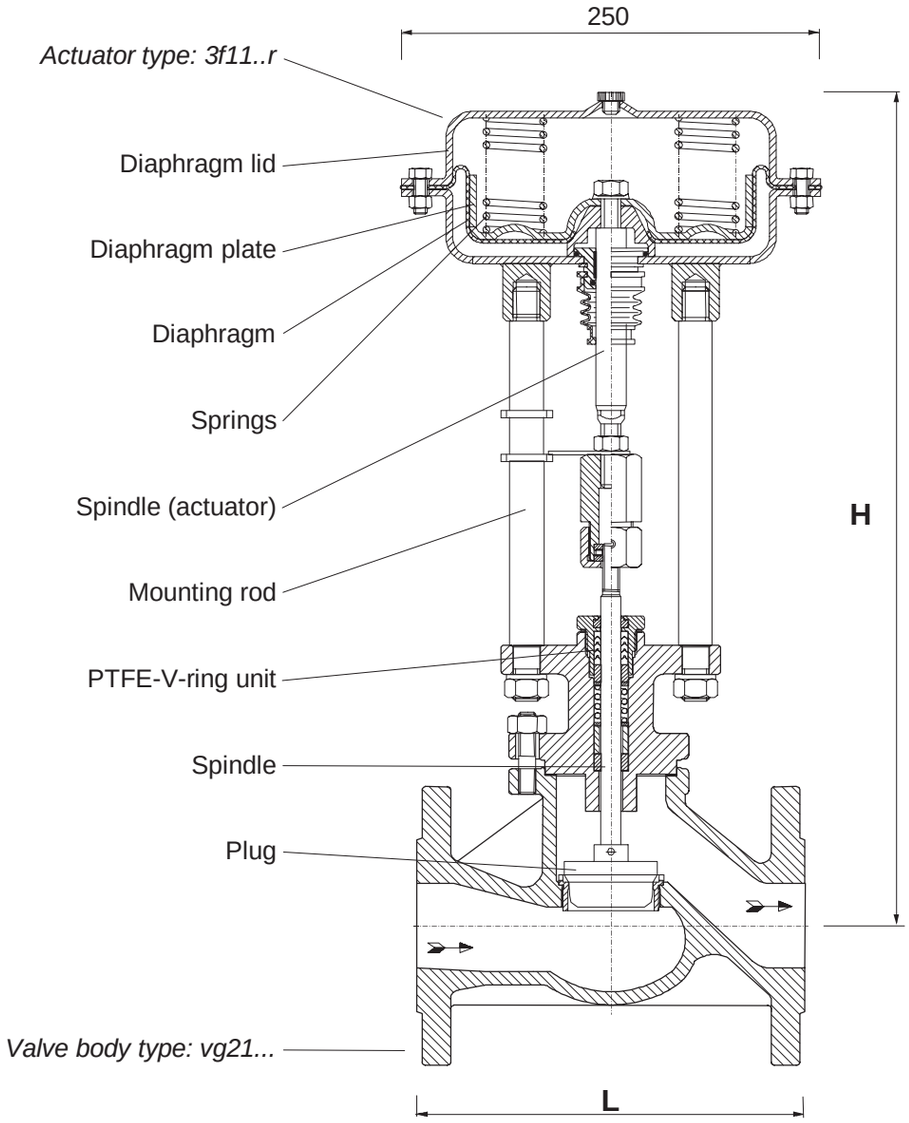
Order text:
Pneum. control valve PN . ., DN . .,
in two way form with PTFE-V-ring unit,
spring closes / spring opens straight-way
control signal . . . - . . . bar, List No. 321 . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List No.**		**Kvs**	**Stroke**	**Closing pressure** (bar) for control signal...		
	PN 16	PN25	m³/h	mm	0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	321 400.	321 500.	4	20	16,2	25,0	
20	321 401.	321 501.	6,3	20	13,3	25,0	
25	321 402.	321 502.	10	20	11,1	25,0	
32	321 403.	321 503.	16	20	6,3	22,8	25,0
40	321 404.	321 504.	25	20	3,6	14,4	25,0
50	321 405.	321 505.	40	20	1,9	8,9	20,7
65	321 406.	321 506.	63	30	0,6	4,8	11,9
80	321 408.	321 508.	100	30		3,0	7,7
100	321 410.	321 510.	160	30		1,7	4,7

open printversion



DN	15	20	25	32	40	50	65	80	100
Height H	460	474	468	474	480	482	525	526	533
Immersion lenght L	130	150	160	180	200	230	290	310	350
Weight kg	16	17	18	20	21	23	36	40	50

open printversion

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25,
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optional "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 3 bar, ...d: 6 bar

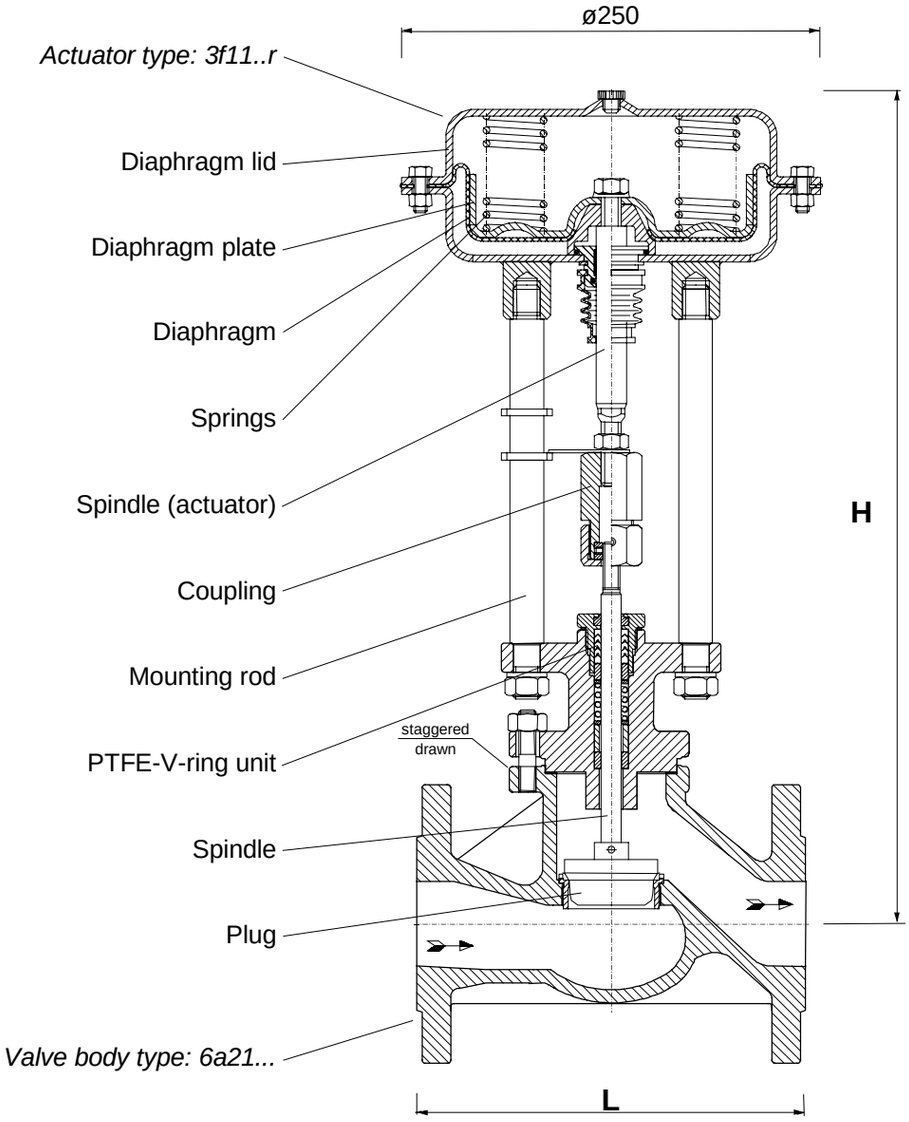
Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other reduced kvs-values (on request)

Order text:
Pneum. control valve PN . ., GGG-40.3, DN . .,
in two way form with PTFE-V-ring unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 321 . . . , kvs . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List No.** PN 16	PN25	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal... 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	321 400.	321 500.	4,0	20	17,9	25,0	
15	321 450.	321 550.	2,5	20	17,9	25,0	
15	321 470.	321 570.	1,6	20	17,9	25,0	
20	321 401.	321 501.	6,3	20	17,9	25,0	
20	321 451.	321 551.	4,0	20	17,9	25,0	
20	321 471.	321 571.	2,5	20	17,9	25,0	
25	321 402.	321 502.	10	20	11,1	25,0	
25	321 452.	321 552.	6,3	20	17,9	25,0	
25	321 472.	321 572.	4,0	20	17,9	25,0	
32	321 403.	321 503.	16	20	6,3	22,8	25,0
32	321 453.	321 553.	10	20	11,1	25,0	25,0
32	321 473.	321 573.	6,3	20	17,9	25,0	25,0
40	321 404.	321 504.	25	20	3,6	14,4	25,0
40	321 454.	321 554.	16	20	6,3	22,8	25,0
40	321 474.	321 574.	10	20	11,1	25,0	25,0
50	321 405.	321 505.	40	20	1,9	8,9	20,7
50	321 455.	321 555.	25	20	3,6	14,4	25,0
50	321 475.	321 575.	16	20	6,3	22,8	25,0



DN	15	20	25	32	40	50
Height H	460	474	468	474	480	482
Immersion length L	130	150	160	180	200	230
Weight kg	16	17	18	20	21	23

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25,
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% Kvs

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optional "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 3 bar, ...d: 6 bar

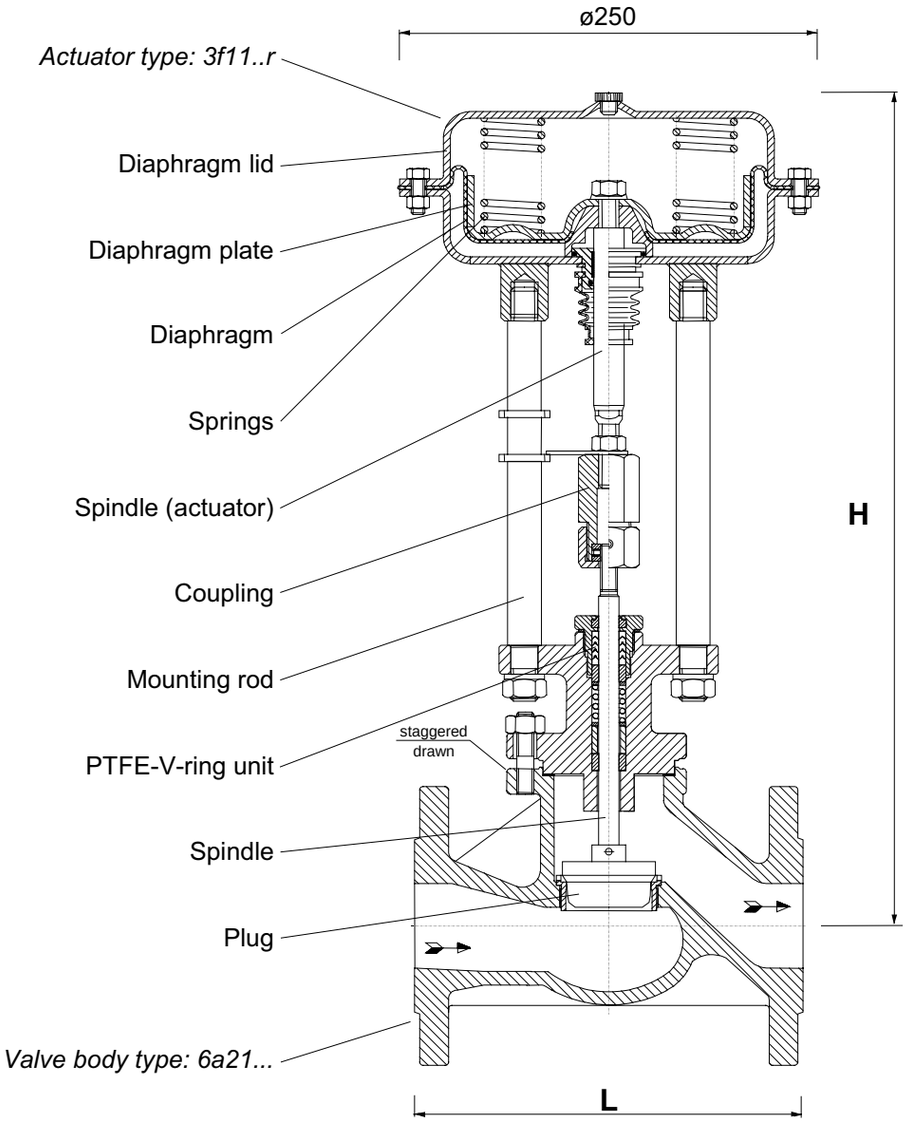
Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other reduced kvs-values (on request)

Order text:
Pneum. control valve PN . ., GGG-40.3, DN . .,
in two way form with PTFE-V-ring unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 321 . . . , kvs . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List No.** PN 16	PN25	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal... 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
65	321 406.	321 506.	63	30	0,6	4,8	11,9
65	321 456.	321 556.	40	20	1,9	8,9	20,7
65	321 476.	321 576.	25	20	3,6	14,4	25,0
80	321 408.	321 508.	100	30		3,0	7,7
80	321 458.	321 558.	63	20	0,6	4,8	11,9
80	321 478.	321 578.	40	20	1,9	8,9	20,7
100	321 410.	321 510.	160	30		1,7	4,7
100	321 460.	321 560.	100	22		3,0	7,7
100	321 480.	321 580.	63	22	0,6	4,8	11,9



DN	65	80	100
Height H	525	526	533
Immersion length L	290	310	350
Weight kg	36	40	50

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25,
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 800 cm², ∅ = 420 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optional "spring opens")
Air connection: G 1/4",
Operating pressure: 5,5 bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)

Order text:
Pneum. control valve PN . ., DN . ., kvs . . .
in two way form with PTFE-V-ring unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 321 . . . S .

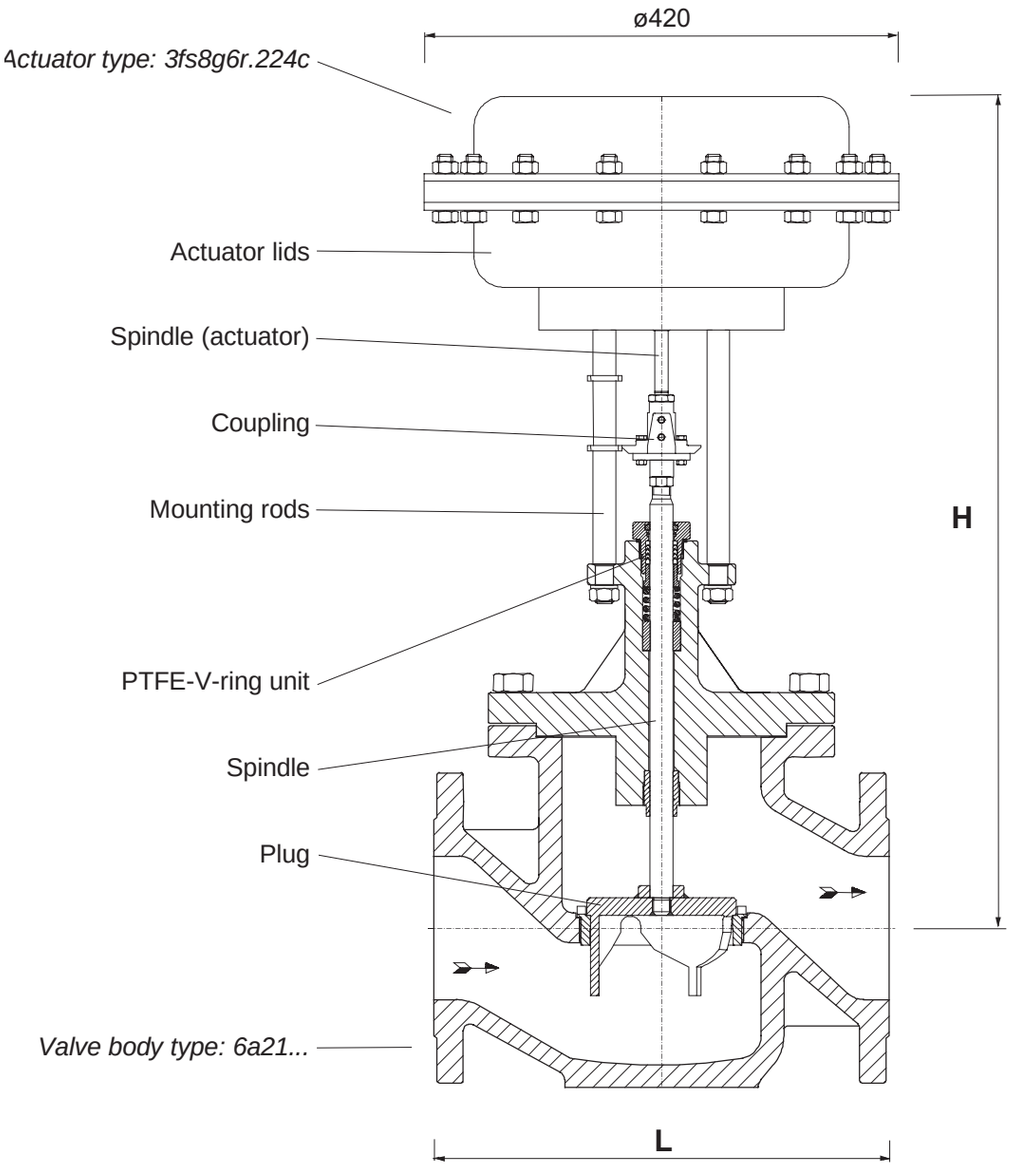
Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List No.** PN 16	PN25	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal...(bar) 1,3...5,0***** Type ...g	1,9...5,0****** Type ...h	2,5...5,0******* Type ...i
125	321 412Sg	321 512Sg	230	60	10,0		
125	321 412S._200	321 512S._200	200	50	10,0	13,0	
125	321 412S._160	321 512S._160	160	40	10,0	13,0	16,0
125	321 412S._100	321 512S._100	100	35	10,0	13,0	16,0
150	321 415Sg	321 515Sg	330	60	6,8		
150	321 415S._250	321 515S._250	250	50	6,8	9,0	
150	321 415S._190	321 515S._190	190	40	6,8	9,0	11,0
150	321 415S._150	321 515S._150	150	35	6,8	9,0	11,0

*= *Control signal: 1,3...**4,4** bar for stroke 50 mm, 1,3...**3,8** bar for stroke 40 mm, 1,3...**3,5** bar for stroke 35 mm*
= *Control signal: 1,9...4,4** bar for stroke 50 mm, 1,9...**3,8** bar for stroke 40 mm, 1,9...**3,5** bar for stroke 35 mm*
***= *Control signal: 2,5...**4,4** bar for stroke 50 mm, 2,5...**3,8** bar for stroke 40 mm, 2,5...**3,5** bar for stroke 35 mm*

open printversion



DN	125	150
Height H	790	805
Immersion length L	400	480
Weight kg	137	147

open printversion

Body: GS-C25N (GP240GH+N), two way form
for water and steam
Pressure range: PN 40
Flanges acc. to DIN
Spindle sealing: spring loaded PTFE-V-ring unit
for media temperatures up to 250°C
alternatively: graphite packing
for media temperatures up to 400°C
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optional "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 2,4 bar, ...d: 4,4 bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (see page 3217red1/2)
Weld-on ends (on request)

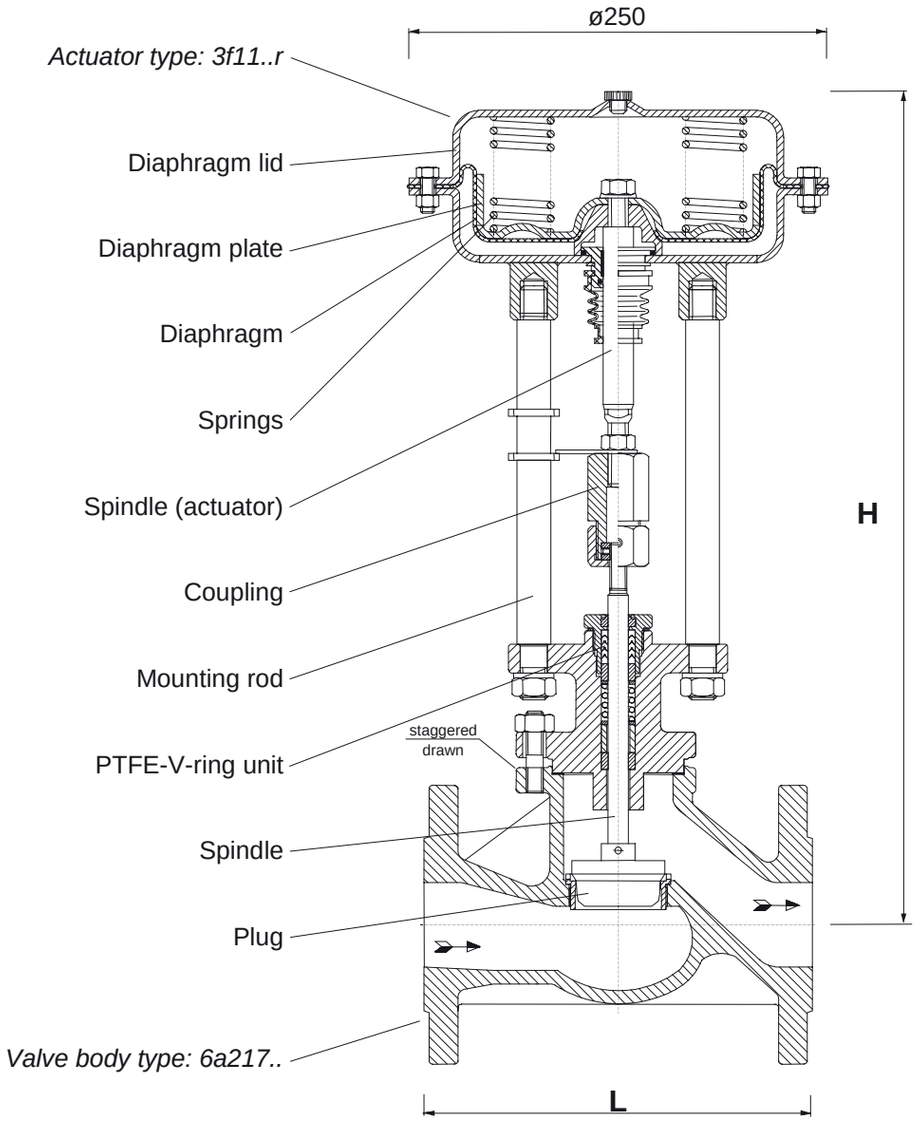
Order text:
Pneum. control valve PN 40, GS-C25N, DN . ., kvs . .,
in two way form with PTFE-V-ring unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 321 7 . . .

Max. operating pressure:

by:	-10...50	100	150	200	250	300	350	400	°C
PN40	40	37,3	34,7	30,2	28,4	25,8	24	23,1	bar

DN	**List No.** PN 40	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal... 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	321 700.	4	20	17,9	40,0	
20	321 701.	6,3	20	17,9	40,0	
25	321 702.	10	20	11,1	37,3	40,0
32	321 703.	16	20	6,3	22,8	40,0
40	321 704.	25	20	3,6	14,4	32,4
50	321 705.	40	20	1,9	8,9	20,7
65	321 706.	63	30	0,6	4,8	11,9
80	321 708.	100	30		3,0	7,7
100	321 710.	160	30		1,7	4,7

open printversion



DN	15	20	25	32	40	50	65	80	100
Height H	460	474	468	474	480	482	525	526	533
Length L	130	150	160	180	200	230	290	310	350
Weight kg	17	18	19	21	22	24	38	42	52

open printversion

Body: GGG-40.3, three way form**,**
for water and steam, as mixing valve,
(diverted purposes restricted,
see page 038 990)
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring-loaded PTFE-V-ring unit
for media temperatures up to 250°C
alternatively: graphite-packing
Internal parts: stainless steel
Flow characteristic: linear
Leakage: acc. to VDI/VDE 2174

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 3bar, ...d: 6bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (on request)

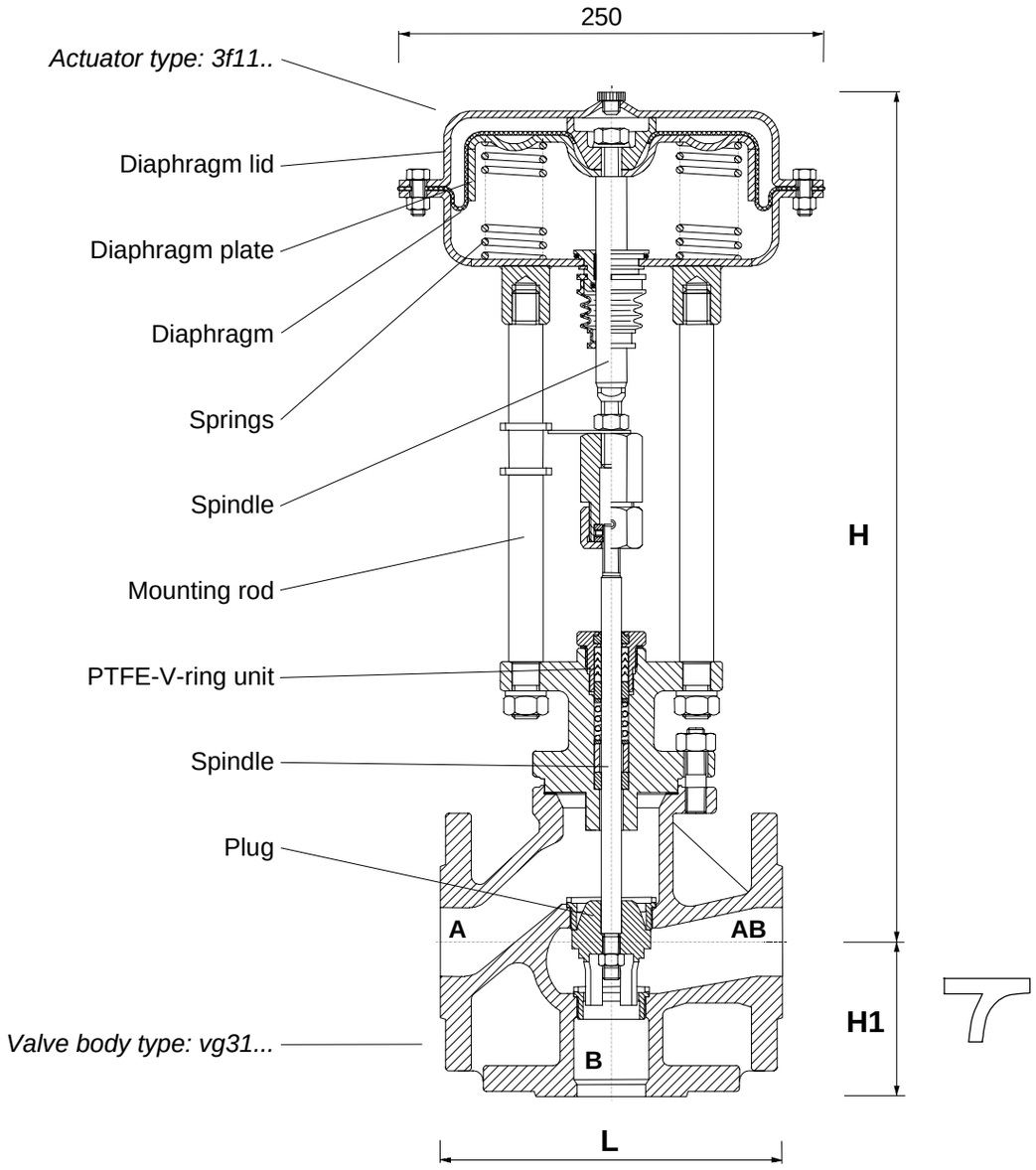
Order text:
Pneum. control valve PN . ., DN . .,
in three way form with PTFE-V-ring unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 331 . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List No.**		**Kvs**	**Stroke**	**Closing pressure** (bar) for control signal:		
	PN 16	PN25	m³/h	mm	0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	331 400.	331 500.	4,0	20	13,3	25,0	
20	331 401.	331 501.	6,3	20	13,3	25,0	
25	331 402.	331 502.	10	20	11,1	25,0	
32	331 403.	331 503.	16	20	6,3	22,8	25,0
40	331 404.	331 504.	25	20	3,6	14,4	25,0
50	331 405.	331 505.	40	20	1,9	8,9	20,7
65	331 406.	331 506.	63	30	0,6	4,8	11,9
80	331 408.	331 508.	100	30		3,0	7,7
100	331 410.	331 510.	160	30		1,7	4,7
125	331 412.	331 512.	230	35		0,7	2,5
150	331 415.	331 515.	330	40			1,6

open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H	460	474	468	474	480	482	525	526	533	685	700
Stud lenght H1	65	70	75	80	90	100	120	130	150	200	210
Immersion lenght L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	16	17	18	21	22	25	40	44	60	115	138

open printversion

Body: GGG-40.3, three way form with diverting plug
for water and steam,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring-loaded PTFE-V-ring unit
for media temperatures up to 250°C
alternatively: graphite-packing
Internal parts: stainless steel, replaceable seatrings
Flow characteristic: linear
Leakage: < 0,01% Kvs

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 3bar, ...d: 6bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (on request)
Weld-on ends (on request)

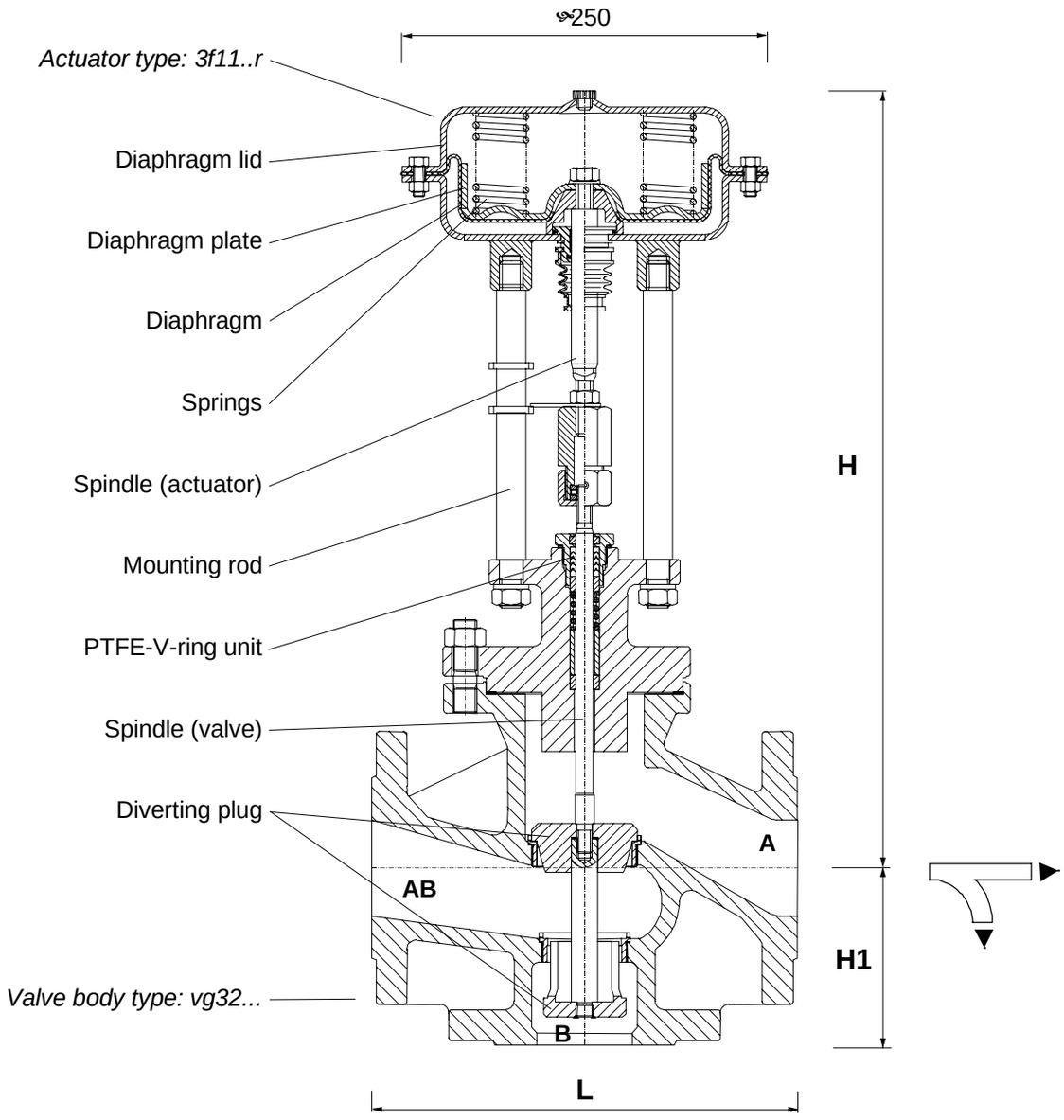
Order text:
Pneum. control valve PN . ., DN . .,
in three way form with diverting plug,
Sealing with PTFE-V-ring unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 332 . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List No.**		**Kvs**	**Stroke**	**Closing pressure** (bar) for control signal:		
	PN 16	PN25	m³/h	mm	0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
40	332 404.	332 504.	25	20	3,6	14,4	25,0
50	332 405.	332 505.	40	20	1,9	8,9	20,7
65	332 406.	332 506.	63	30	0,6	4,8	11,9
80	332 408.	332 508.	100	30		3,0	7,7
100	332 410.	332 510.	160	30		1,7	4,7
125	332 412.	332 512.	190	35		1,7	4,7
150	332 415.	332 515.	250	35		1,0	3,1

open printversion



DN	40	50	65	80	100	125	150
Height H	480	482	525	526	533	685	700
Stud lenght H1	90	100	120	130	150	200	210
Immersion lenght L	200	230	290	310	350	400	480
Weight kg	22	25	40	44	60	115	138

open printversion

Body: GGG-40.3, two way form**,**
for heat transfer oil
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Sealing: VA-bellow double wall
and safety stuffing box,
Internal parts: Niro,
Flow characteristic: equal percentage
Leakage: acc. to VDI/VDE 2174

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
another types: ...c: 3 bar, ...d: 6 bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Another kvs- values (on request)

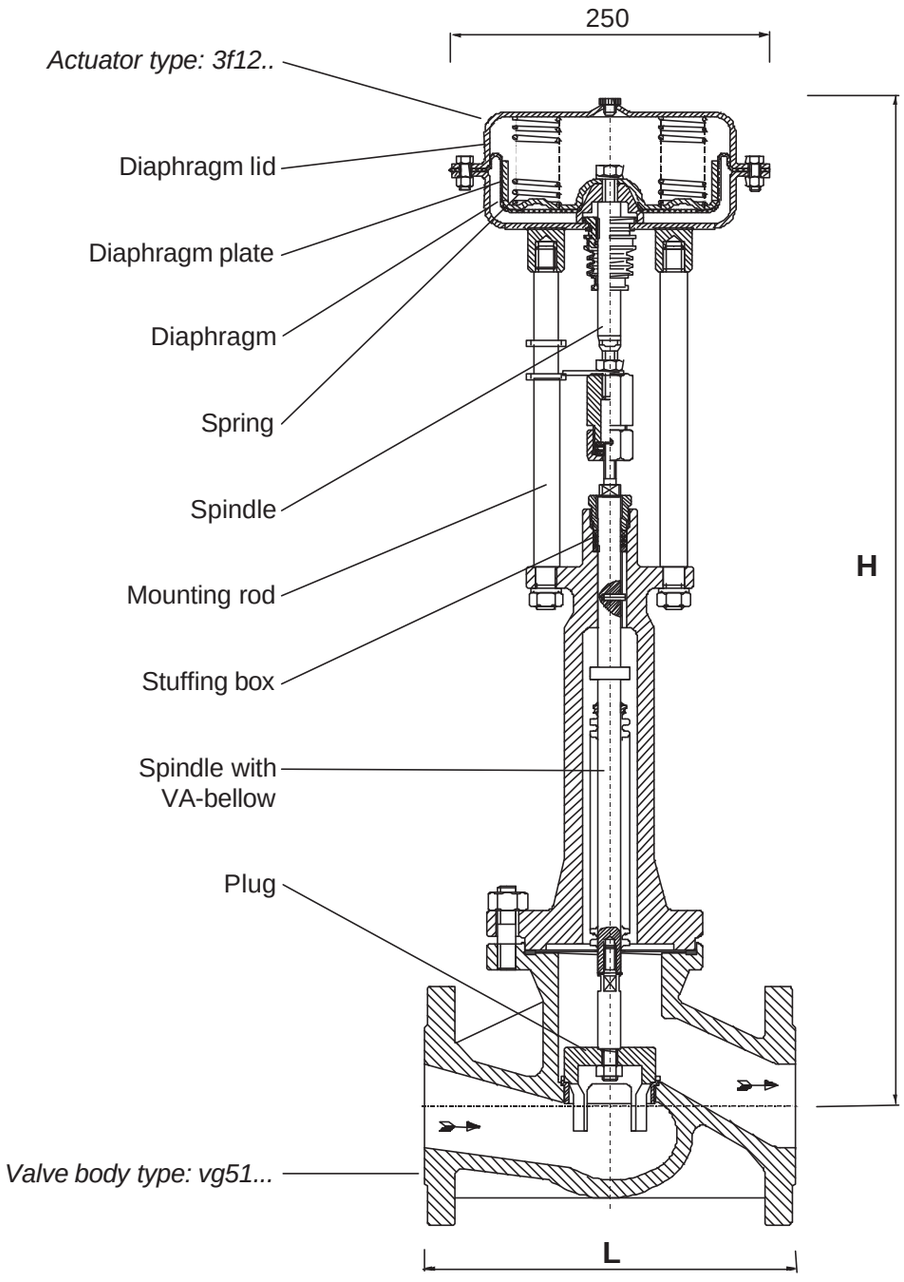
Order text:
Pneum. control valve PN . ., DN . .,
in two way form with VA-bellow sealing,
spring closes / spring opens straight-way
control signal . . . - . . . bar, List No. 351 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List No.** PN 16	PN25	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal: 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	351 400.	351 500.	4	20	16,2	25,0	
20	351 401.	351 501.	6,3	20	13,3	25,0	
25	351 402.	351 502.	10	20	11,1	25,0	
32	351 403.	351 503.	16	20	6,3	22,8	25,0
40	351 404.	351 504.	25	20	3,6	14,4	25,0
50	351 405.	351 505.	40	20	1,9	8,9	20,7
65	351 406.	351 506.	63	30	0,6	4,8	11,9
80	351 408.	351 508.	100	30		3,0	7,7
100	351 410.	351 510.	160	30		1,7	4,7

open printversion



DN	15	20	25	32	40	50	65	80	100
Height H	633	647	641	647	653	655	785	786	793
Immersion lenght L	130	150	160	180	200	230	290	310	350
Weight kg	17	18	19	21	22	24	39	43	53

open printversion

Body: GP240GH+N (GS-C25N), two way form**,**
for heat transfer oil
Pressure range: body PN 40
bellow PN 25
Flanges acc. to DIN,
Spindle sealing: 1.4571 bellow double wall
and safety stuffing box,
Internal parts: stainless steel,
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes"
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 2,4 bar, ...d: 4,4 bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (see page 3516red1/2)
Weld -on ends (on request)

Order text:
Pneum. control valve in two way form,
body PN 40, GP240GH+N (GS-C25N), DN . . , kvs . . . ,
spindle sealing with VA bellow PN 25,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 351 6 . . .

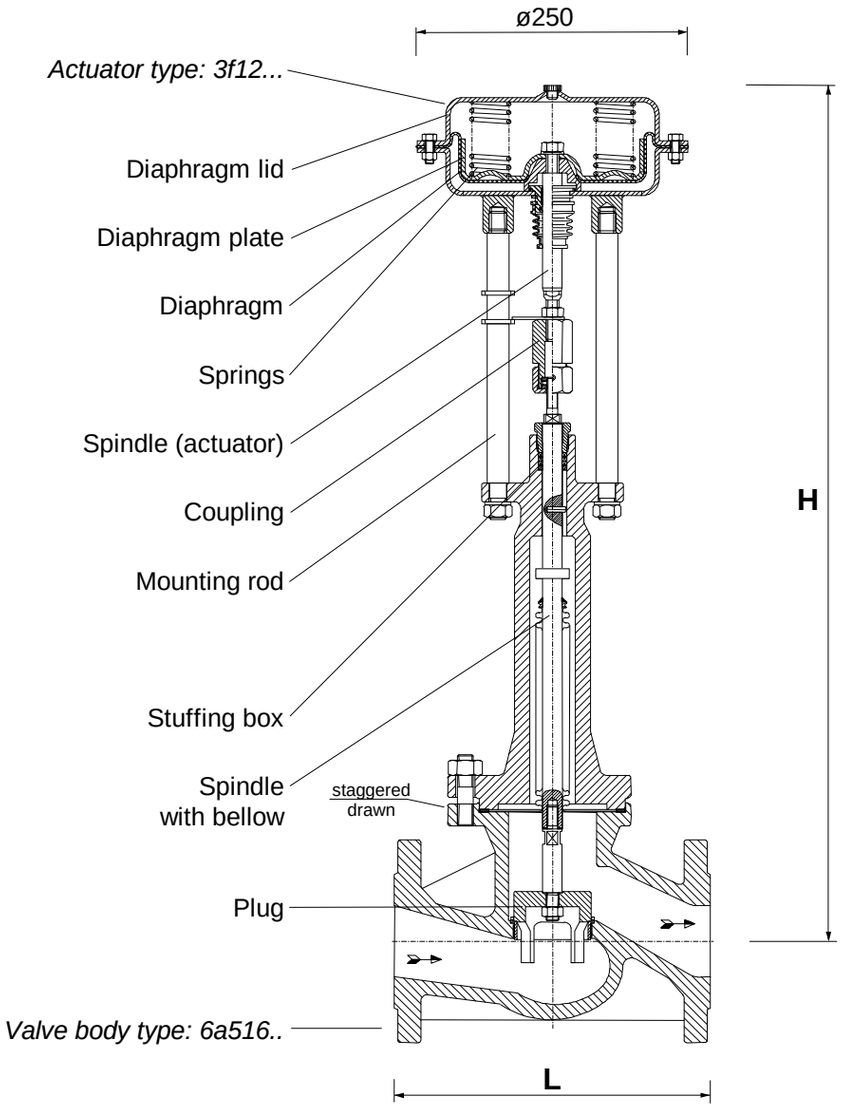
Max. operating pressure:

by:	-10	200	250	300	350	400	°C
	25	25	25	25	24	21	bar

DN	**List No.**	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal...* 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	351 600.	4,0	20	17,9	25,0	
20	351 601.	6,3	20	17,9	25,0	
25	351 602.	10	20	11,1	25,0	
32	351 603.	16	20	6,3	22,8	25,0
40	351 604.	25	20	3,6	14,4	25,0
50	351 605.	40	20	1,9	8,9	20,7
65	351 606.	63	30	0,6	4,8	11,9
80	351 608.	100	30		3,0	7,7
100	351 610.	160	30		1,7	4,7

** = for higher closing pressure see page 3516Se/g E*

open printversion



DN	15	20	25	32	40	50	65	80	100
Height H	633	647	641	647	653	655	785	786	793
Length L	130	150	160	180	200	230	290	310	350
Weight kg	18	19	20	21	23	26	46	49	59

open printversion

Body: GP240GH+N (GS-C25N), two way form**,**
for heat transfer oil
Pressure range: body PN 40
bellow PN 25
Flanges acc. to DIN,
Spindle sealing: 1.4571 bellow double wall
and safety stuffing box,
Internal parts: stainless steel,
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 400 cm² / 800 cm²
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes"
Air connection: G 1/4",
Operating pressure: type ...Se (10kN): 4,9 bar,
type ...Sg (14kN): 3,7 bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (see page 3516Se/gred1/2)
Weld -on ends (on request)

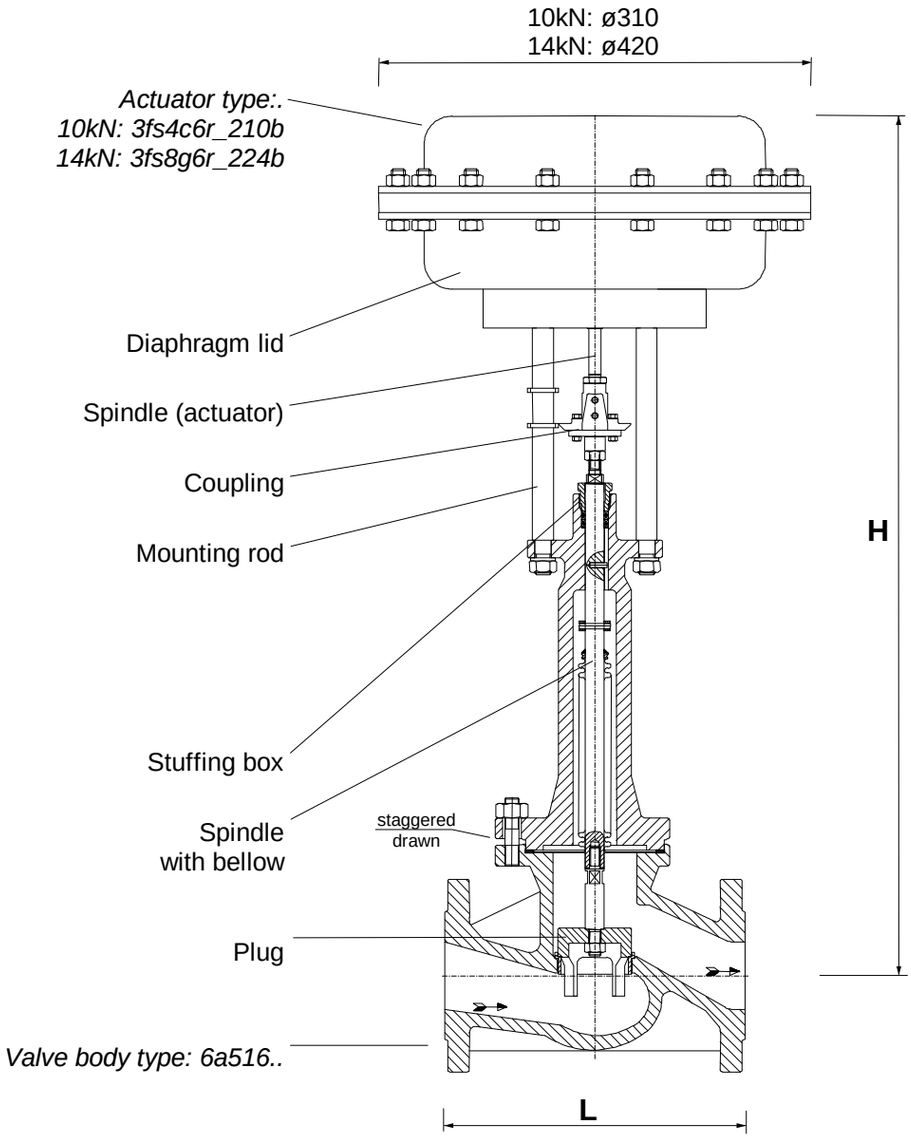
Order text:
Pneum. control valve in two way form,
body PN 40, GP240GH+N (GS-C25N), DN . . , kvs . . . ,
spindle sealing with VA bellow PN 25,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 351 6 . . S .

Max. operating pressure:

by:	-10	200	250	300	350	400	°C
	25	25	25	25	24	21	bar

DN	**List No.**	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal...***** 2,6...4,5bar: 10kN,type ...Se	1,3...3,3bar: 14kN, type ...Sg
50	351 605Se	40	20	25,0	
65	351 606Se	63	30	25,0	
80	351 608S.	100	30	17,0	24,5
100	351 610S.	160	30	10,0	15,5

** = for lower closing pressure see page 3516 E*



DN		50	65	80	100
Height H	10kN (...Se)	690	820	710	750
	14kN (...Sg)	735	865	755	795
Length L		230	290	310	350
Weight kg	10kN (...Se)	31	51	55	65
	14kN (...Sg)	61	81	85	95

Body: GGG-40.3, three way form**,**
for heat transfer oil, as mixing valve,
(diverted purpose restricted ,
see page 038 990)
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
alternatively: weld-on ends (on request)
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, replaceable seatrings,
Flow characteristic: linear
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 3bar, ...d: 6bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (on request)
Distributing valve plug (on request)
Weld-on ends (on request)

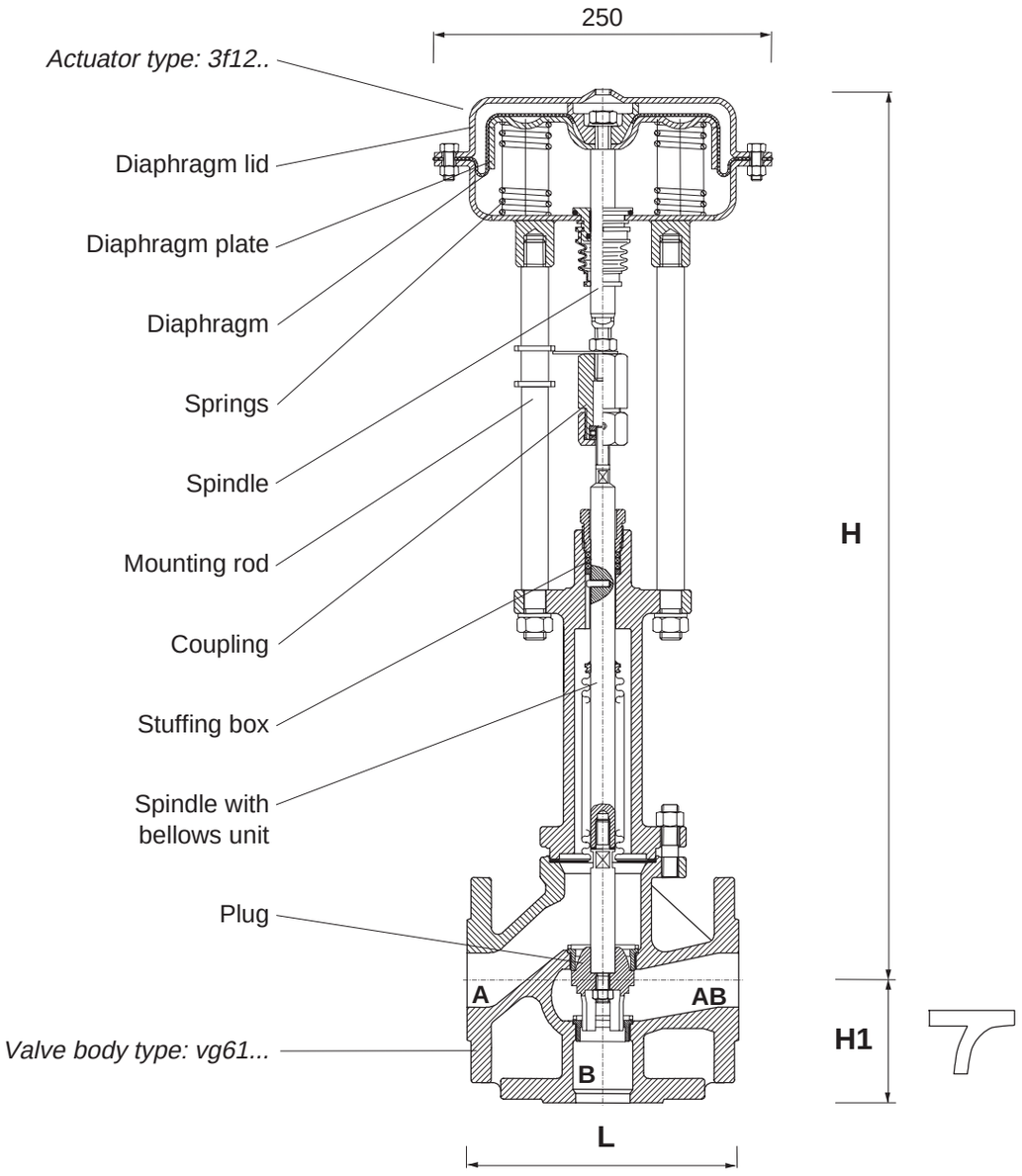
Order text:
Pneum. control valve PN . ., DN . .,
in three way form with VA-bellow sealing,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 361 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List No.** PN 16	PN25	**kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal: 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
15	361 400.	361 500.	4,0	20	13,3	25,0	
20	361 401.	361 501.	6,3	20	13,3	25,0	
25	361 402.	361 502.	10	20	11,1	25,0	
32	361 403.	361 503.	16	20	6,3	22,8	25,0
40	361 404.	361 504.	25	20	3,6	14,4	25,0
50	361 405.	361 505.	40	20	1,9	8,9	20,7
65	361 406.	361 506.	63	30	0,6	4,8	11,9
80	361 408.	361 508.	100	30		3,0	7,7
100	361 410.	361 510.	160	30		1,7	4,7
125	361 412.	361 512.	230	35		0,7	2,5
150	361 415.	361 515.	330	40			1,6

open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H	633	647	641	647	653	655	785	786	793	900	920
Stud lenght H1	65	70	75	80	90	100	120	130	150	200	210
Immersion lenght L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	18	19	20	23	24	27	44	48	62	103	133

open printversion

Body: GGG-40.3, three way form**,**
for heat transfer oil, as mixing valve,
(diverted purpose restricted),
(see page 038 990)
Pressure range: PN 16, PN 25
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, screwed seat rings,
Flow characteristic: linear
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
another types: ...c: 3bar, ...d: 6bar

Special design:
weld-on ends similar to DIN 3239,

Accessories, special types**:**
Positioner (see page 390 8)
Electro.-pneum. Transformer (see page 3903)
Limit switch (see page 39e)
Another kvs- values (on request)
Verteilventil- Kegel (auf Anfrage)
Distributing valve plug (on request)

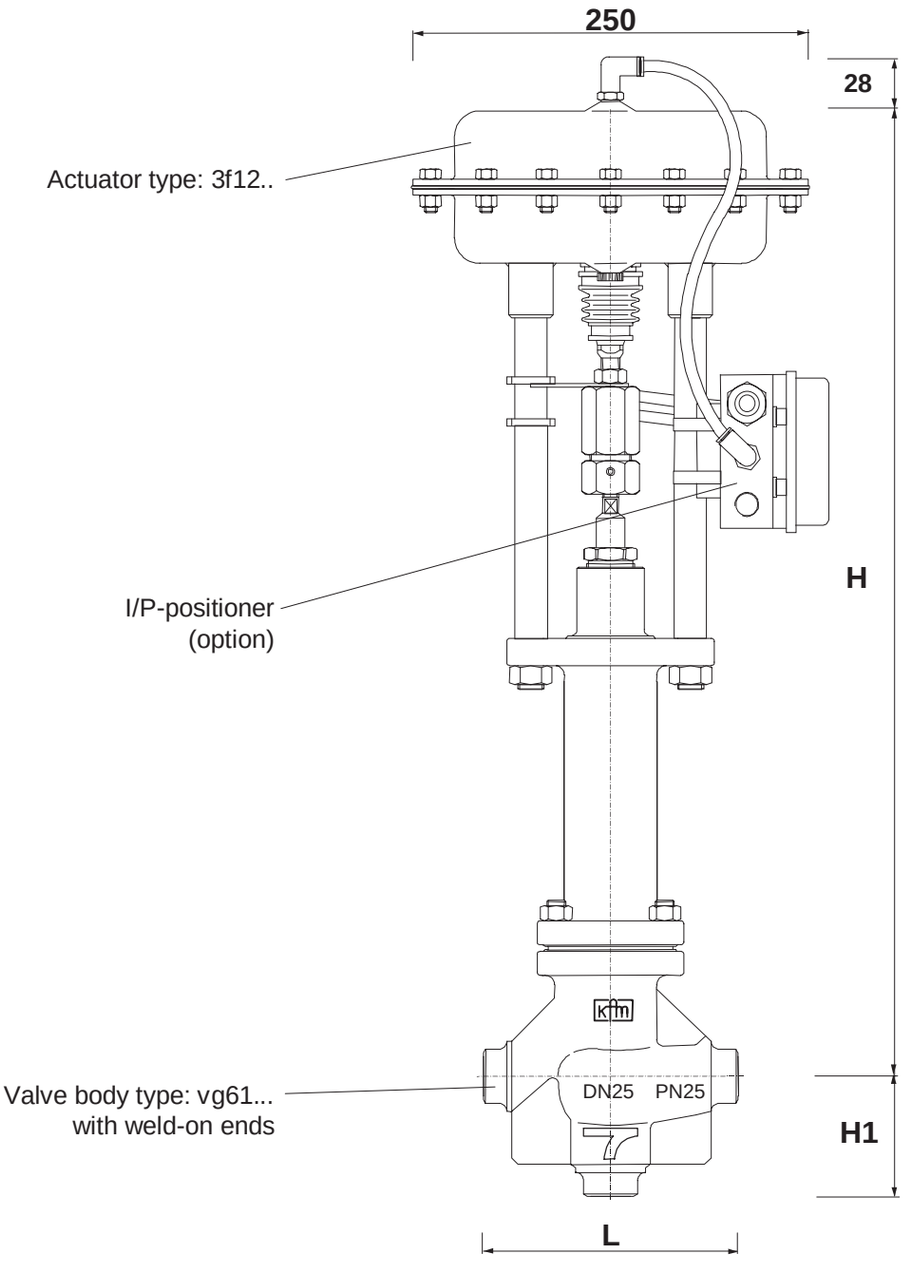
Order text:
Pneum. control valve PN . ., DN . . ,
in three way form with VA-bellow sealing,
spring closes / spring opens straight-way
control signal . . . - . . . bar,
List-No. 361 . . . / fs

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List-No.** PN 16	PN 25	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for signal... 0,4...1,2bar: standard	1,0...2,0bar: type ...c	2,0...4,0bar: type ...d
20	361 401. / fs	361 501. / fs	6,3	20	13,3	25,0	
25	361 402. / fs	361 502. / fs	10	20	11,1	25,0	
32	361 403. / fs	361 503. / fs	16	20	6,3	22,8	
40	361 404. / fs	361 504. / fs	25	20	3,6	14,4	25,0
50	361 405. / fs	361 505. / fs	40	20	1,9	8,9	20,7
65	361 406. / fs	361 506. / fs	63	30	0,6	4,8	11,9
80	361 408. / fs	361 508. / fs	100	30		3,0	7,7
100	361 410. / fs	361 510. / fs	160	30		1,7	4,7

open printversion



DN	20	25	32	40	50	65	80	100
Height H	647	641	647	653	655	785	786	793
Stud lenght H1	70	75	80	90	100	120	130	150
Immersion lenght L	150	160	180	200	230	290	310	350
Weight kg	18	19	22	23	26	42	46	60

open printversion

Pneumatic control valve in three way form for diverting function with VA bellow sealing, PN 16 / 25, GGG-40.3

Body: GGG-40.3, three way form with diverting plug
for heat transfer oil,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, replaceable seatrings,
Flow characteristic: linear
Leakage: < 0,01% K_{VS}

Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other types: ...c: 3bar, ...d: 6bar

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other kvs- values (on request)
Weld-on ends (on request)

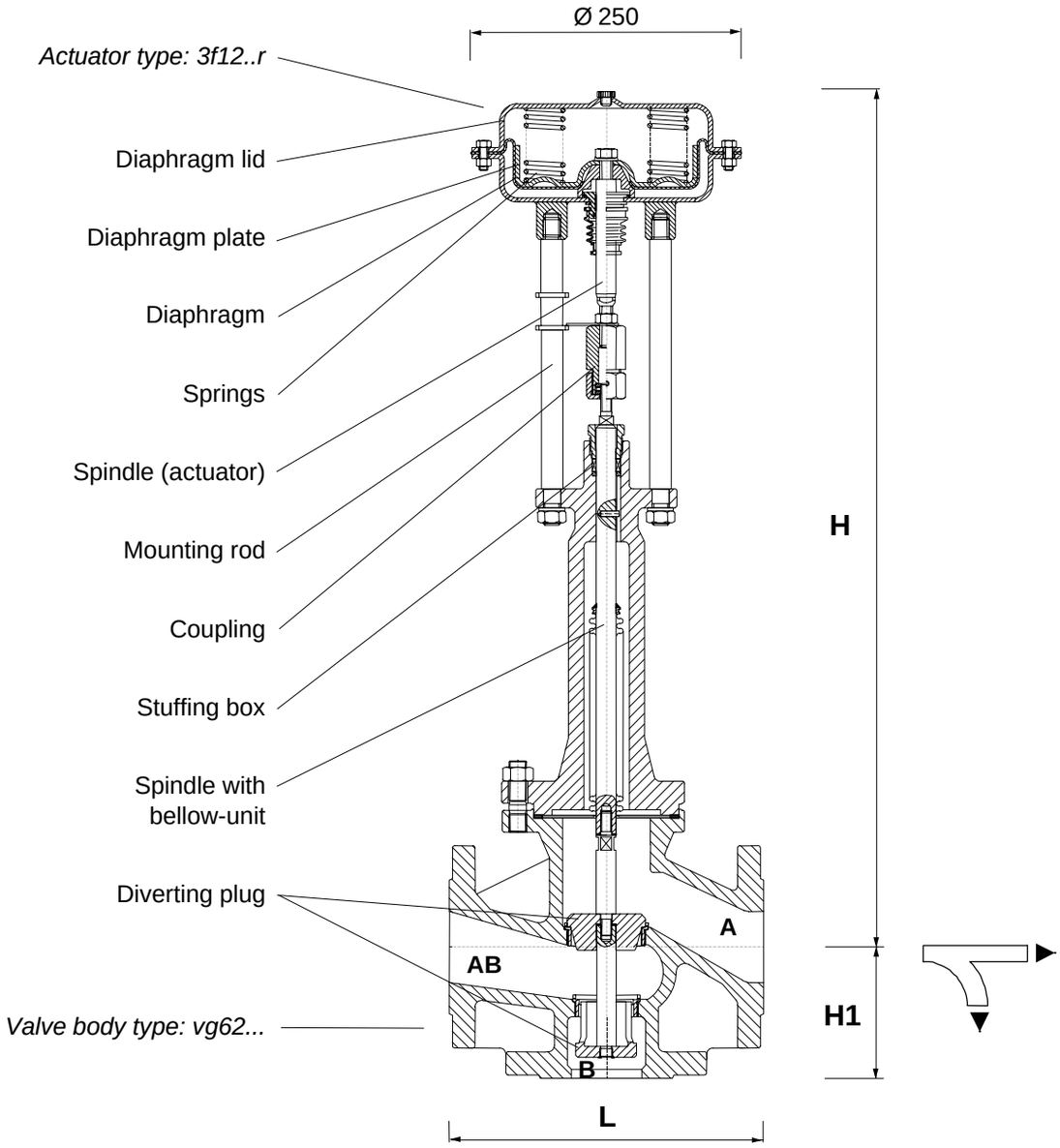
Order text:
Pneum. control valve PN . ., DN . .,
in three way form with diverting plug,
Sealing with VA-bellow-unit,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 362 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List No.**		**Kvs**	**Stroke**	**Closing pressure** (bar) for control signal:		
	PN 16	PN25	m³/h	mm	0,4...1,2bar: Normalausf.	1,0...2,0bar: Type ...c	2,0...4,0bar: Type ...d
40	362 404.	362 504.	25	20	3,6	14,4	25,0
50	362 405.	362 505.	40	20	1,9	8,9	20,7
65	362 406.	362 506.	63	30	0,6	4,8	11,9
80	362 408.	362 508.	100	30		3,0	7,7
100	362 410.	362 510.	160	30		1,7	4,7
125	362 412.	362 512.	190	35		1,7	4,7
150	362 415.	362 515.	250	35		1,0	3,1

open printversion



DN	40	50	65	80	100	125	150
Height H	653	655	785	786	793	920	940
Stud lenght H1	90	100	120	130	150	200	210
Immersion lenght L	200	230	290	310	350	400	480
Weight kg	24	27	44	48	62	103	133

open printversion

Body: bronze RG-5 CC491K
for water 0...150°C,
Internal thread connectors: acc. to DIN
including cap nut and connecting part
of galvanized malleable cast iron,
optionally of bronze,
Pressure range: PN 16,
Spindle sealing: EPDM-O-ring,
Plug: brass CW614N,
Spindle: stainless steel 1.4122,
Flow characteristic: A-AB equal percentage
B-AB linear
Positioning ratio: DN15: 50:1
DN20-50 100:1
Leakage: EN1349 – seat leakage VI G 1 (tight sealing)

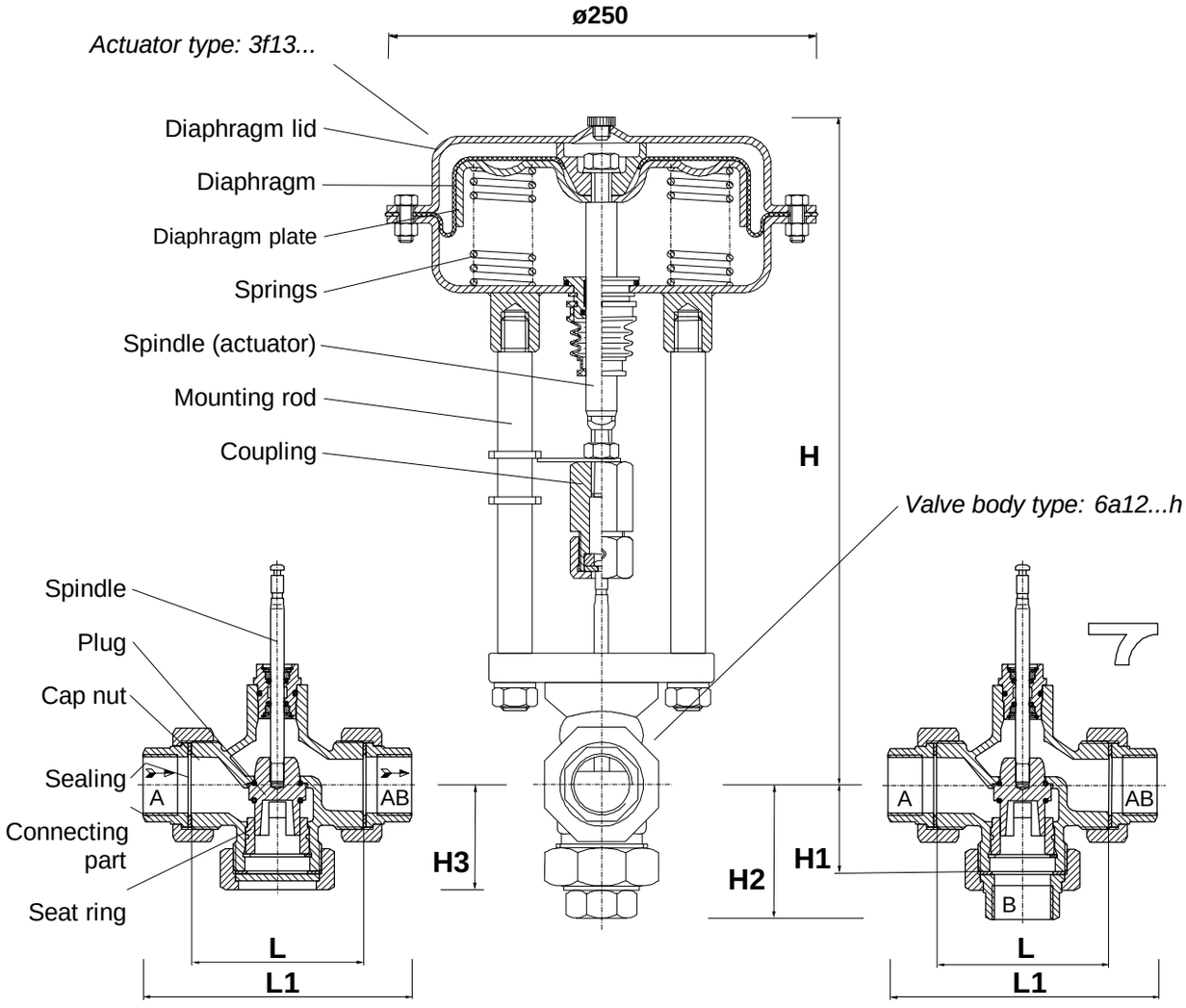
Actuator: diaphragm area: 250 cm², ∅ = 250 mm
Control signal / closing pressure: see table
Operating mode (reversible):
"Spring closes" (optionally "spring opens")
Air connection: G 1/4",
Operating pressure: standard type: 1,6 bar,
other type: ...c: 3bar,

Accessories, special types**:**
Positioner (see page 390 5 and 390 8)
Electro.-pneum. transformer (see page 3903)
Limit switch (see page 39e)
Other reduced kvs- values (on request)

Order text:
Pneumatic control valve of bronze PN 16, DN . . , kvs . . . ,
in two way form / three way form, with O-ring sealing,
spring closes / spring opens straightway
control signal . . . - . . . bar, List No. 38 1 . . .

DN	**List No.** three way	two way	**Kvs** m³/h	**Stroke** mm	**Closing pressure** (bar) for control signal... 0,4...1,0bar: standard	1,0...1,8bar: type ...c
1/2"	3813 100	3812 100	4	12	16,0	
3/4"	3813 101	3812 101	6,3	12	16,0	
1"	3813 102.	3812 102.	10	14	11,0	16,0
1 1/4"	3813 103.	3812 103.	16	14	6,3	16,0
1 1/2"	3813 104.	3812 104.	25	14	3,6	16,0
2"	3813 105.	3812 105.	40	14	2,0	16,0

open printversion



Two way form

Three way form

DN	1/2“	3/4“	1“	1 1/4"	1 1/2"	2“
Height H	370	373	376	385	388	388
Immersion length L	62	75	80	120	130	150
Length ~L1	114	127	138	184	198	222
Stud length H1	40	41	45	55	60	65
Stud length ~H2	66	67	74	89	94	101
Stud length ~H3	48	53	57	68	73	78
Weight kg	11,0	11,5	11,8	12,5	13,1	14,7

open printversion

Function:

The pneumatic positioner drives the plug of the control valve in position which depend on the input signal. The input signal can be adapted to the valve travel with various measuring springs and/or various levers for valve travel. Possible ranges are: 0,2...1,0 bar and for split-range operation 0,2...0,6 bar und 0,6...1,0 bar.
The valve plug position is transmited to the positioner with a lever. The minimum and the maximum of the input signal correspond to the end positions of the valve plug.
The positioner controls and changes the output pressure connected to the pneumatic actuator and causes valve positon changes, according to the input signal.

Technical data:

Input signal:	0,2...1,0 bar, 0,2...0,6 bar and 0,6...1,0 bar
Supply air:	1,4...6 bar (dry and free of any oil and dust)
Signal pressure:	0...supply air pressure
Charakteristic:	linear
Operating direction:	reversible
Max. ambient temperature:	-20°C...70°C
Air connection:	G 1/4"
Protection class	IP 54
Weight:	0,9 kg

Order text:

Pneumatic positioner, input signal . . . - . . . bar,
supply air max. 6 bar, attached to the pneumatic control valve 3 . .
List-No.: 390 540

open printversion

Samson type

Eckardt type

Function:

The electropneumatic positioner drives the plug of the control valve in position which depend on the input signal. The input signal can be adapted to the valve travel with various measuring springs and/or various levers for valve travel. Possible ranges are: 4...20 mA and for split-range operation 4...12 mA and 12...20 mA.
The valve plug position is transmited to the positioner with a lever. The minimum and the maximum of the input signal correspond to the end positions of the valve plug.
The positioner controls and changes the output pressure connected to the pneumatic actuator and causes valve positon changes, according to the input signal.

Technical data:

Input signal:	4...20 mA, 4...12 mA, 12...20 mA
Supply air:	1,4...6 bar (dry and free of any oil and dust)
Signal pressure:	0...supply air pressure
Charakteristic:	linear
Operating direction:	reversible, adjusted: direct (input increasing / output increasing)
Air connection:	G 1/4"

Type	a) Samson	b) Eckardt
Max. ambient temperature:	-20°C...70°C	-20°C...80°C
Protection class	IP 54	IP 65
Weight:	1,2 kg	1,7 kg
Explosion protection:	EEx ia IIC T6 (option)	EEx ia IIC T6 (standard)

Type list:	**List –No.**
Samson standard type:	390 841
Samson ex- version:	390 842
Eckardt type:	390 846x

alternative:
adjusted for operating direction invers (increasing / decreasing):
Type suffix: … i

open printversion

data subject to alteration

Solenoid valve

Material:	Brass
Nominal diameter	DN 2 mm
Air connection:	R 1/4" female thread on both sides
Voltage:	230V 50/60 Hz, alternatively: 115V 50/60 Hz, 24V =
Ambient temperature:	max. + 55°C

393 1xak

Two way form (2/2-ways)

Closed when de-energized

Operating pressure:	0...16 bar
Weight:	0,5 kg
Electrical connection:	cable plug with flat terminals
List-No.:	393 100

Open when de-energized

Operating pressure:	0...12 bar
Weight:	0,5 kg
Electrical connection:	cable plug with flat terminals
List-No.:	393 100 s

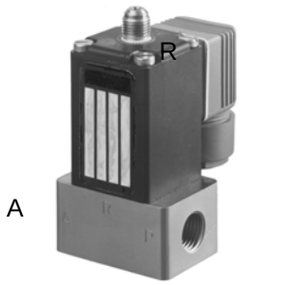
Closed when de-energized, Ex-version for hazardous locations

Type:	II 2 G EEx em II T4
Operating pressure:	0...7 bar
Weight:	0,8 kg
Electrical connection:	with terminal housing IP 65
Listen-Nr.:	393 1xak

Three way form (3/2-ways)

Service port A relieved, when de-energized

Operating pressure:	0...10 bar
Weight:	0,8 kg
Electrical connection:	cable plug with flat terminals
List-No.:	393 300



393 300

Service port A relieved, when de-energized, Ex-version for hazardous locations

Type:	II 2 G EEx em II T4
Operating pressure:	0...6 bar
Weight:	0,8 kg
Electrical connection:	with terminal housing IP 65
List-No.:	393 3xck

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

Throttling valve

Material:	brass
Connection:	R 1/4" female thread on both sides
Weight:	0,1 kg
List-No.:	394 800

Maintenance unit

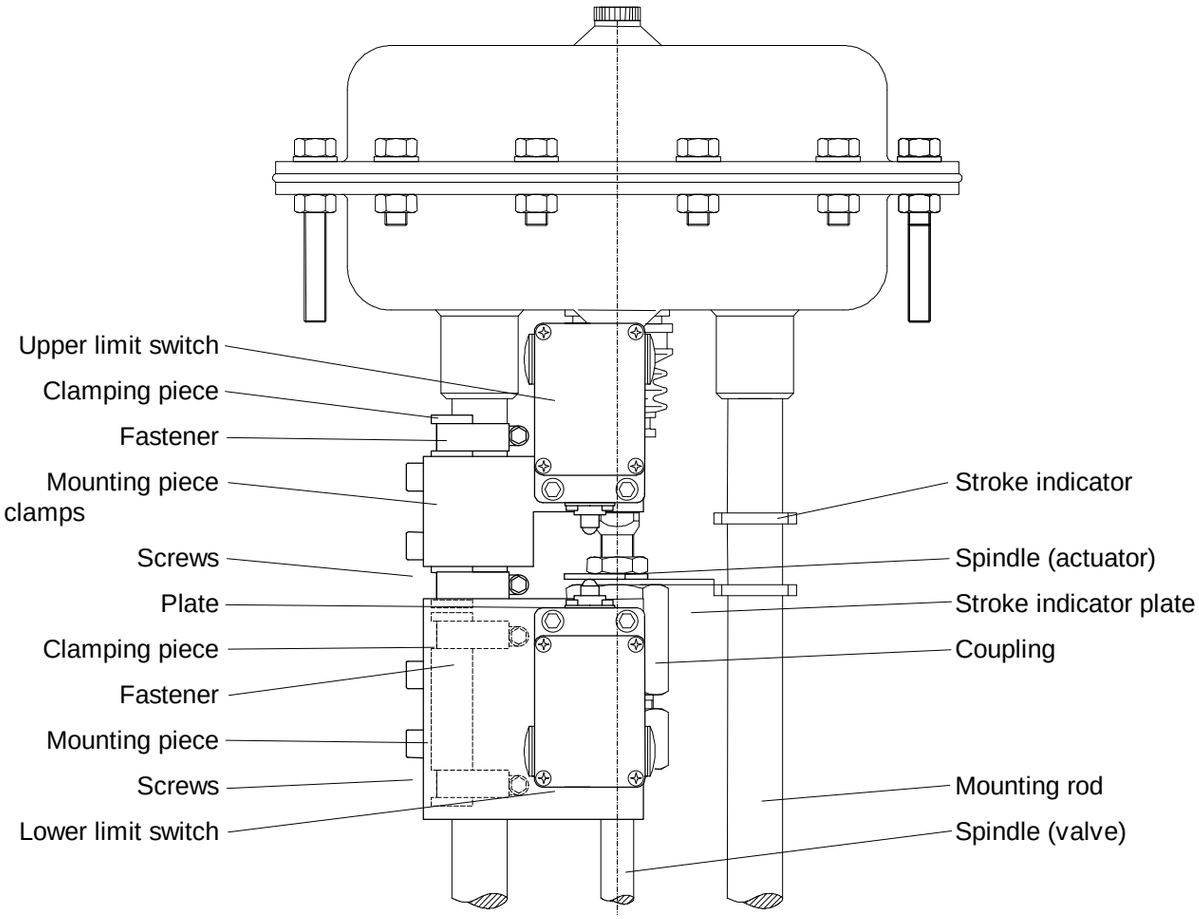
Line pressure:	max. 10 bar
Operating pressure:	adjustable 10...80 % of line pressure
Weight:	0,5 kg
Connection:	R 1/4" female thread on both sides

- with manometer for operating pressure 0...2,5 bar
List-No.: 394 150

- with manometer for operating pressure 0...6 bar
List-No.: 394 151

open printversion

Pneumatic actuators type 3f1... can be equipped with an additional limit switch with positive break normally closed contact, for valve position „up" and / or „down".



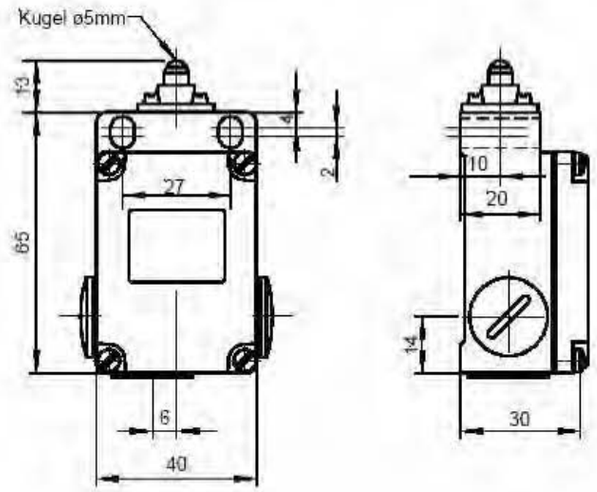
Limit switch (see also next page):

Switching system:	Snap action, positive break normally closed contact
Switching element:	1 opener / 1 closing contact
Electrical loading:	6A / 400V AC (AC-13)
Minimum load:	10mA / 24V
Protection class:	IP 65

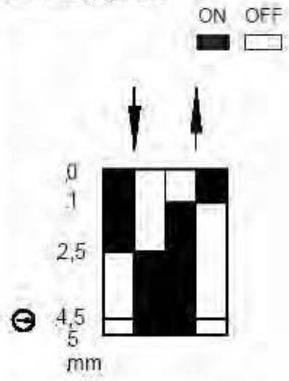
Type summary:	**List-No.**
1 additional upper limit switch for valve position „up"	**39eo**
1 additional lower limit switch for valve position „down"	**39eu**
2 additional limit switches for valve positions “up” and „down"	**39ev**

open printversion

Dimensional drawing



Switching path



Circuit diagramm

Technical Data:

Regulations:	IEC 947-5-1/EN 60947-5-1
Housing:	GD-AL alloy, colour painted
Type of protection:	IP 65 as per EN 60529/DIN VDE 0470-1
Contakt material:	Fine silver
Switching element:	1 normally closed 1 normally open
Switching system:	snap action , positive break normally closed contact
Temperature range:	- 20° C to + 80° C
Mounting connection:	Screw connection, self lifting clamp
Actuation:	ball plunger
Mounting:	Designed for M5
Fixing spacing:	27 mm
Cable inlet:	3 x M16x1,5
Electrical construction:	IEC 947-5-1, electrically isolated switching inserts
Electrical loading:	400 V AC 6 A (AC-13)
Minimum load:	24 V 10 mA
Short circuit protection:	6 A (slow blow)
Mechanical operating life:	>1 million switching cycles
Switching frequency:	max. 3600 switching cycles / h

Specifications:

- plastic cover

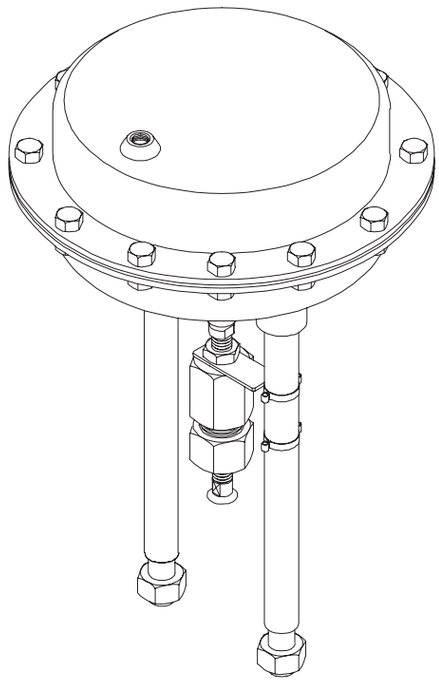
Fitting instructions:

When used as a safety switch (positive break of the normally closed contacts) ensure a plunger stroke of at least 4,5 mm and that the switch is fitted and secured so that it is not possible to move the switch when actuating !

Part No.: 45.1.01.0.01

open printversion

Pneumatic actuator for valves
Control pressure: max. 6 bar
Thread connection: G1/4"
Diameter: 250 mm
Diaphragm area: 250 cm²
Stroke: 15, 20, 30, 35, 40 mm
Spindle sealing: O-ring, maintenance free
Operating mode: Standard: Spring moves spindle upwards (reversible)
alternatively: Spring moves spindle downwards
Rods distance: 100 mm
Weight: 9 kg
Connection to valve spindle:
with coupling ring 20 x10 mm
with thread M10 or M12
Max. ambient temperature:
-20...110° C



Accessories, special types**:**
Limit switch (see page 39e)
Manual operating device (see page 39h)
Electro.-pneumatic Transformer (see page 3903)
Pneumatic positioner (see page 390 5)
Electro-pneumatic positioner (see page 390 8)

Order text:
Pneumatic actuator, Spring moves spindle upwards/downwards,
control signal . . . - . . . bar for Stroke . . . mm,
mounting rod size . . ., List-No. 3f1 . . .

Stroke	**Spring range (bar)**		
mm	0,4...1,2	1,0...2,0	2,0...4,0
15	x	x	x
20	x	x	x
30	x	x	x
35		x	x
40		x	x

Summary of types:

3f1 **x** **x** **x** **x**

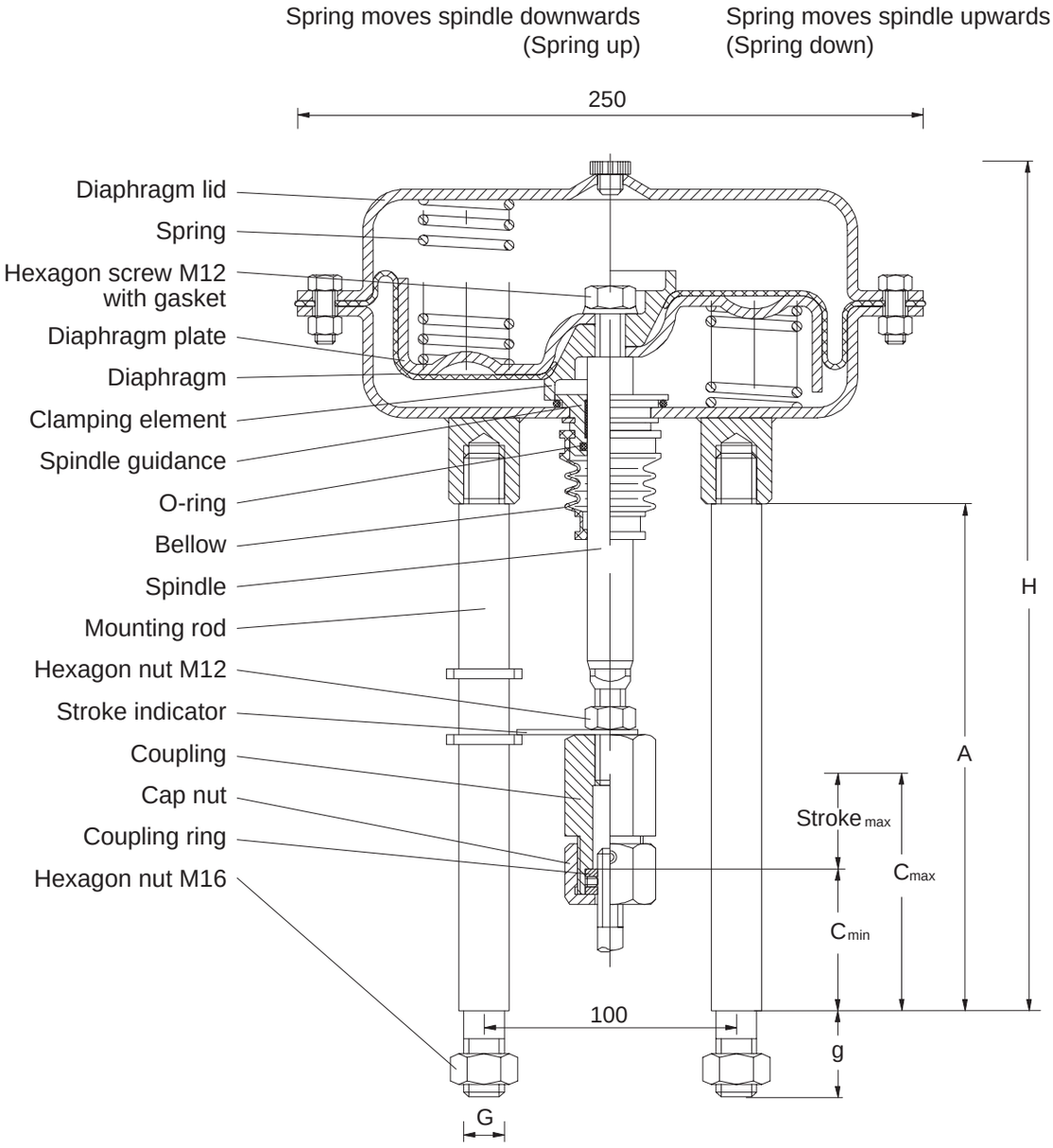
Reverse operating mode
r = Spring moves spindle downwards

Stroke
1 = 15 mm
2 = 20 mm
3 = 30 mm
4 = 35 mm
5 = 40 mm

Spring range
b = 0,4...1,2 bar
c = 1,0...2,0 bar
d = 2,0...4,0 bar

Mounting rod size
0 = 200 mm
1 = 180 mm
2 = 237 mm

open printversion



Rod lenght A (mm)	Cmin mm	Cmax mm	H mm	G mm	g mm
180	29	65	315	M12	24
200	49	85	335	M16	32
237	86	122	341	M16	32

Another mounting rod lenghts on request.

open printversion

Additional equipments
– see page 2 –

Operating instruction
– see group 0 –

Page 2

Motor control valve in two way form PN 16 / 25, GGG-40.

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Leakage: acc. to VDI/VDE 2174

Actuator: with integrated manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs-values (on request)

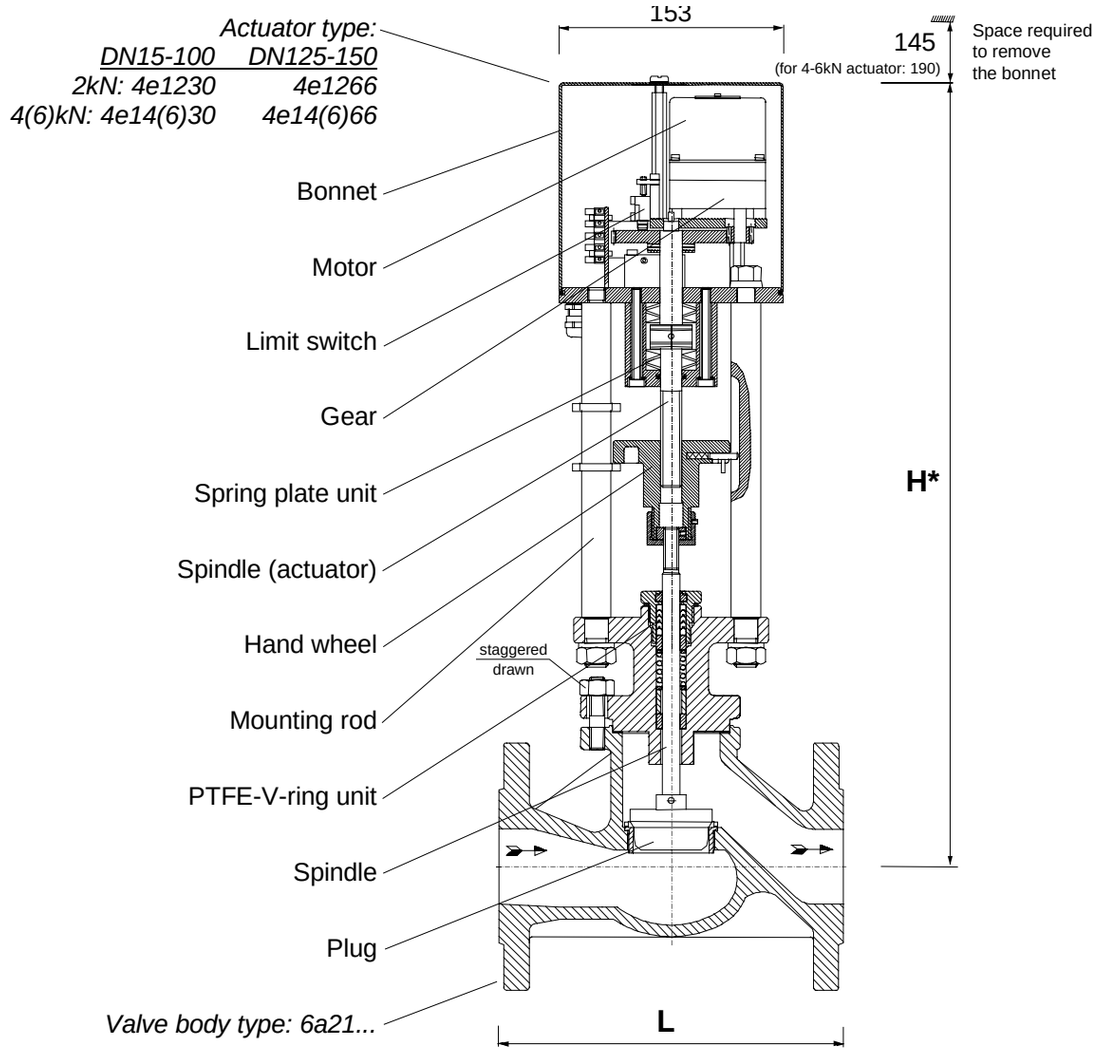
Order text:
Motor control valve PN . ., GGG-40.3, DN . .
in two way form with PTFE-V-ring unit,
Power supply . . ., List-No. 421 . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
15	421 400	421 500	4,0	20	66	25,0		
20	421 401	421 501	6,3	20	66	25,0		
25	421 402	421 502	10	20	66	25,0		
32	421 403	421 503	16	20	66	17,3	25,0	
40	421 404	421 504	25	20	66	10,8	25,0	
50	421 405	421 505	40	20	66	6,6	16,0	23,0
65	421 406	421 506	63	30	100	3,4	9,1	13,3
80	421 408	421 508	100	30	100	2,0	5,8	8,6
100	421 410	421 510	160	30	100	1,1	3,5	5,4
125	421 412	421 512	230	60	200	0,5	2,1	3,3
150	421 415	421 515	330	60	200		1,3	2,1

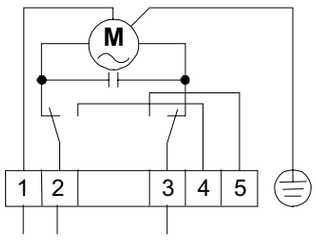
open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H *	491	505	499	505	511	513	556	557	564	760	775
Length L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	13	14	15	17	18	20	33	37	47	100	110

* = add. 45mm for 4-6 kN actuator

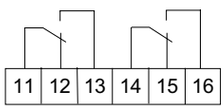
Electrical wiring:



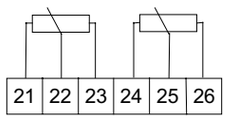
L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionally)**:**

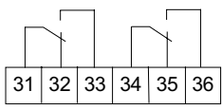
Limit switch load dependent for valve position CLOSE OPEN



Potentiometer



Signal switch travel dependent



open printversion

Motor control valve in two way form PN 16 / 25, GGG-40.3, DN 15-50 with reduced kvs-values

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: with integrated manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

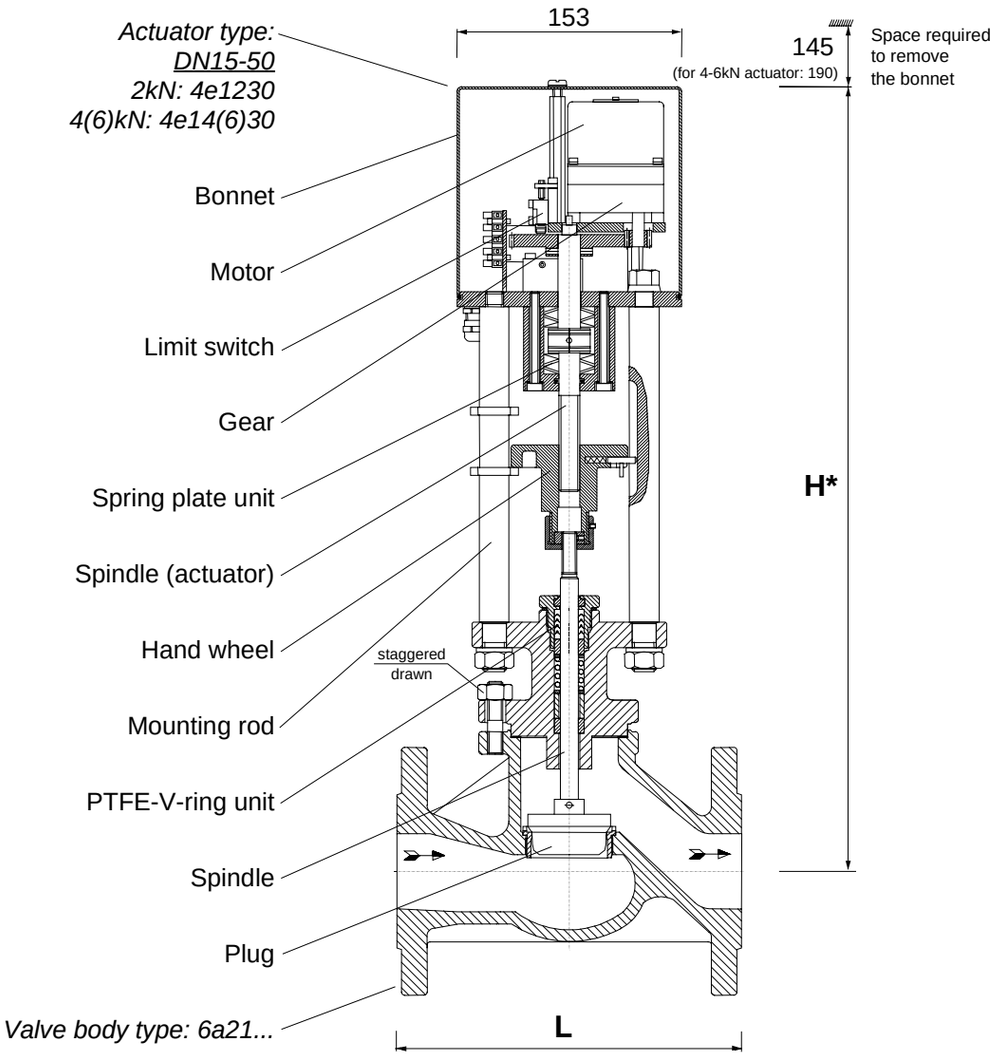
Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Other reduced kvs-values (on request)

Order text:
Motor control valve PN . ., GGG-40.3, DN . .
in two way form with PTFE-V-ring unit,
Power supply . . ., List-No. 421 . . . , kvs . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

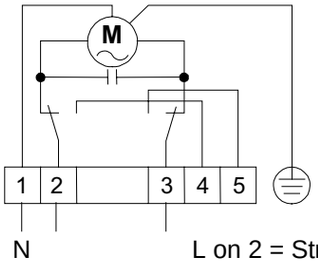
DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
15	421 400	421 500	4,0	20	66	25,0		
15	421 450	421 550	2,5	20	66	25,0		
15	421 470	421 570	1,6	20	66	25,0		
20	421 401	421 501	6,3	20	66	25,0		
20	421 451	421 551	4,0	20	66	25,0		
20	421 471	421 571	2,5	20	66	25,0		
25	421 402	421 502	10	20	66	25,0		
25	421 452	421 552	6,3	20	66	25,0		
25	421 472	421 572	4,0	20	66	25,0		
32	421 403.	421 503.	16	20	66	17,3	25,0	
32	421 453.	421 553.	10	20	66	25,0	25,0	
32	421 473.	421 573.	6,3	20	66	25,0	25,0	
40	421 404.	421 504.	25	20	66	10,8	25,0	
40	421 454.	421 554.	16	20	66	17,3	25,0	
40	421 474.	421 574.	10	20	66	25,0	25,0	
50	421 405.	421 505.	40	20	66	6,6	16,0	23,0
50	421 455.	421 555.	25	20	66	10,8	25,0	25,0
50	421 475.	421 575.	16	20	66	17,3	25,0	25,0



DN	15	20	25	32	40	50
Height H *	491	505	499	505	511	513
Length L	130	150	160	180	200	230
Weight kg	13	14	15	17	18	20

* = add. 45mm for 4-6 kN actuator

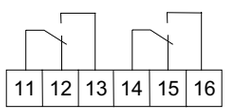
Electrical wiring:



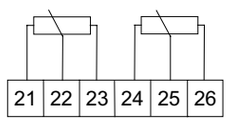
L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionally)**:**

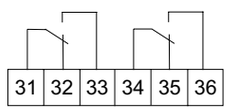
Limit switch load dependent for valve position
CLOSE OPEN



Potentiometer



Signal switch travel dependent



open printversion

Motor control valve in two way form PN 16 / 25, GGG-40.3, DN 65-150 with reduced kvs-values

Body: GGG-40.3, two way form**,**
for water and steam,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring loaded PTFE-V-ring unit,
for media temperatures up to 250°C
alternatively: graphite packing
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: with integrated manual emergency operation
and load dependent limit switches

Thrust:	2000 N
Power input:	10 VA
alternatively:	4000 N / 20 VA (appendix ..c)
	5500 N / 20 VA (appendix ..d)
Power supply:	230V /50...60Hz

other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Other reduced kvs-values (on request)

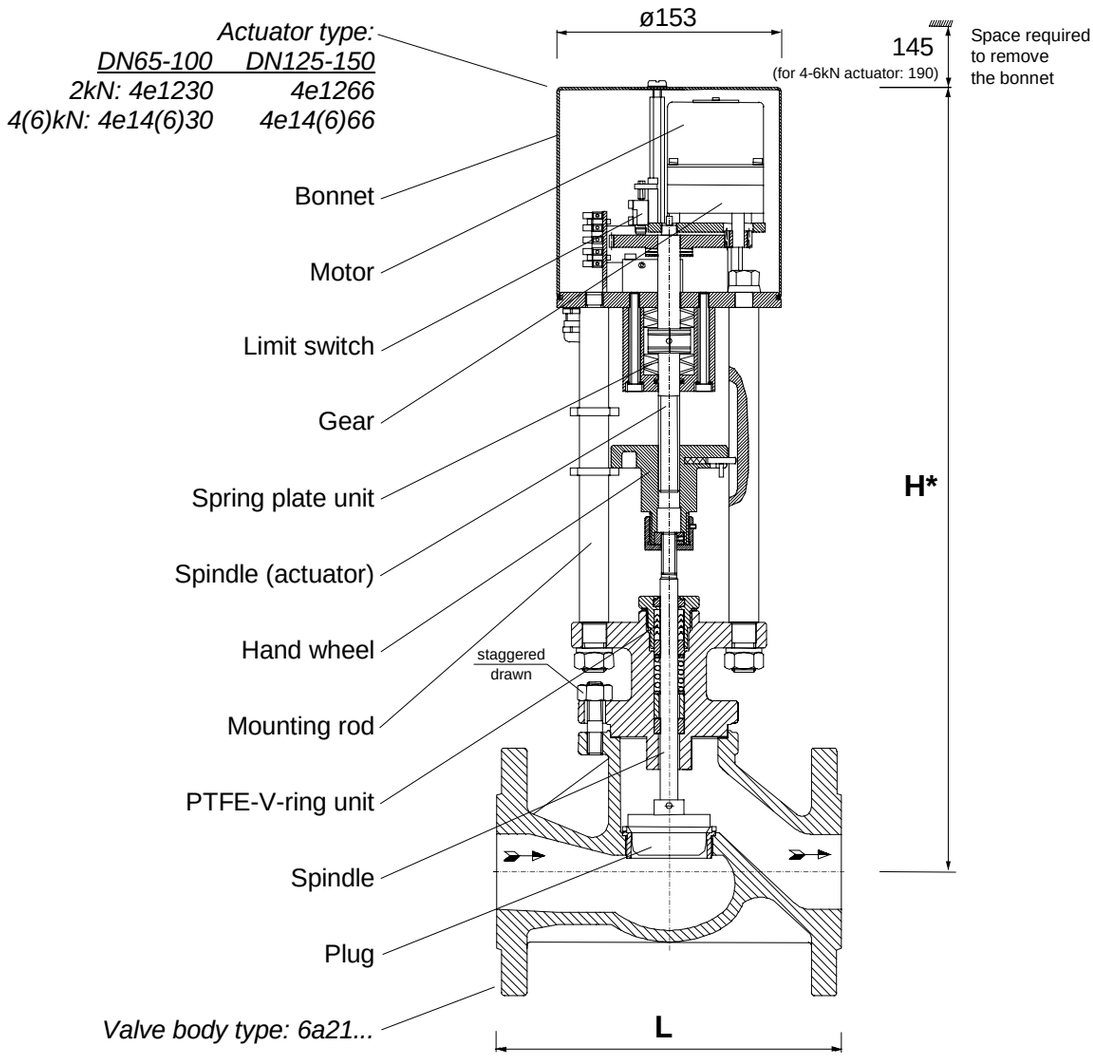
Order text:
Motor control valve PN . ., GGG-40.3, DN . .
in two way form with PTFE-V-ring unit,
Power supply . . ., List-No. 421 . . . , kvs . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
65	421 406.	421 506.	63	30	100	3,4	9,1	13,3
65	421 456.	421 556.	40	20	66	6,6	16,0	23,1
65	421 476.	421 576.	25	20	66	10,8	25,0	
80	421 408.	421 508.	100	30	100	2,0	5,8	8,6
80	421 458.	421 558.	63	20	66	3,4	9,1	13,4
80	421 478.	421 578.	40	20	66	6,6	16,0	23,1
100	421 410.	421 510.	160	30	100	1,1	3,5	5,4
100	421 460.	421 560.	100	22	73	2,0	5,8	8,6
100	421 480.	421 580.	63	22	73	3,4	9,1	13,4
125	421 412.	421 512.	230	60	200	0,5	2,1	3,3
125	421 412._200	421 512._200	200	50	165	0,5	2,1	3,3
125	421 412._160	421 512._160	160	40	132	0,5	2,1	3,3
125	421 412._100	421 512._100	100	35	116	0,5	2,1	3,3
150	421 415.	421 515.	330	60	200		1,3	2,1
150	421 415._250	421 515._250	250	50	165		1,3	2,1
150	421 415._190	421 515._190	190	40	132		1,3	2,1
150	421 415._150	421 515._150	150	35	116		1,3	2,1

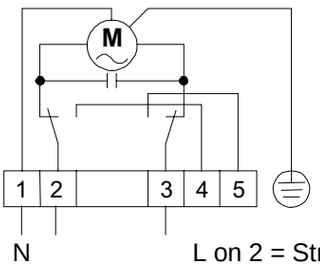
open printversion



DN	65	80	100	125	150
Height H *	556	557	564	760	775
Immersion length L	290	310	350	400	480
Weight kg	33	37	47	100	110

* = add. 45mm for 4-6 kN actuator

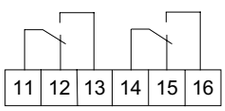
Electrical wiring:



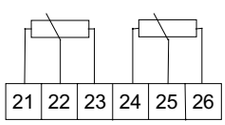
L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionally)**:**

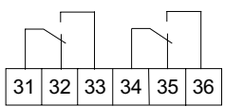
Limit switch load dependent for valve position CLOSE OPEN



Potentiometer



Signal switch travel dependent



open printversion

Body: GS-C25N (GP240GH+N), two way form
for water and steam
Pressure range: PN 40
Flanges acc. to DIN
Spindle sealing: spring loaded PTFE-V-ring unit
for media temperatures up to 250°C
alternatively: graphite packing
for media temperatures up to 400°C
Internal parts: stainless steel
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% Kvs

Actuator: with integrated manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Other kvs- values (see page 4217red1/2)
Weld-on ends (on request)

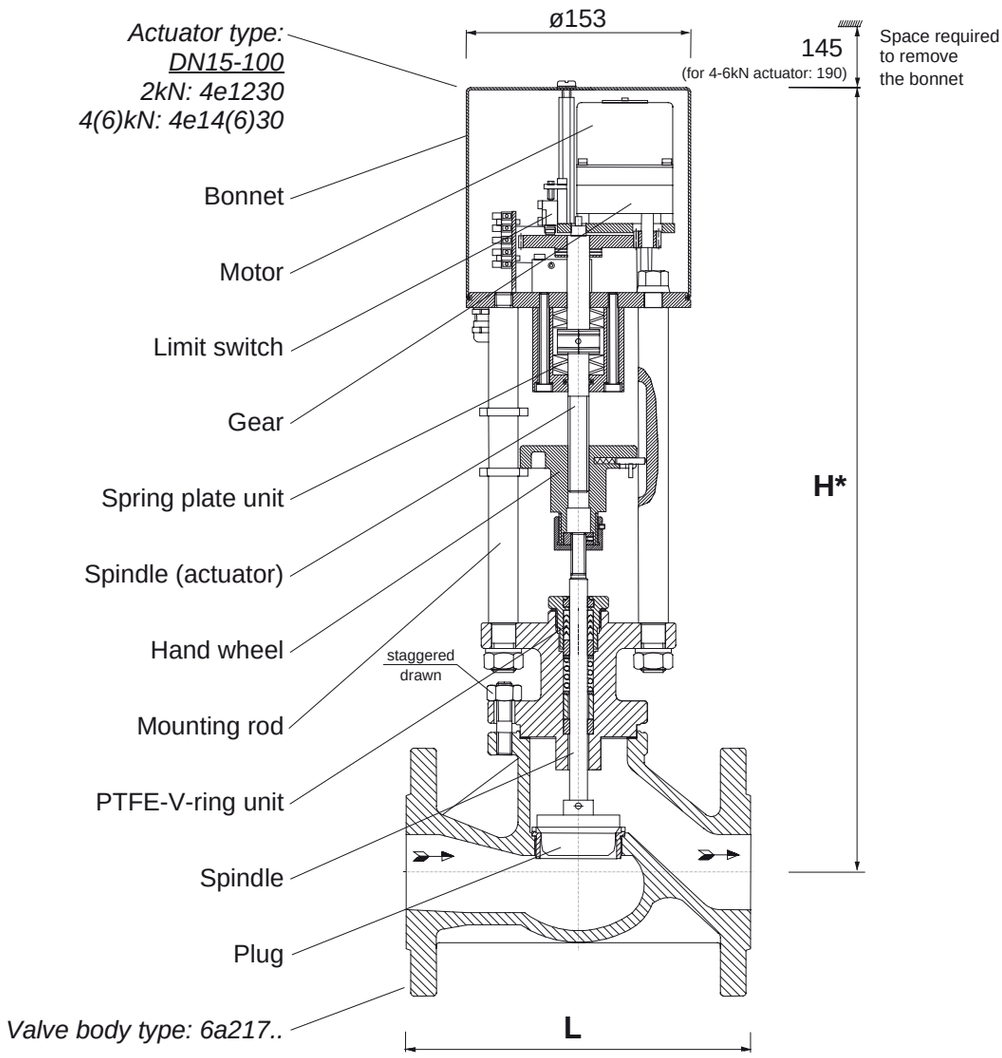
Order text:
Motor control valve PN 40, GS-C25N, DN . ., kvs . .,
in two way form with PTFE-V-ring unit,
Power supply . . ., List-No. 421 7 . .

Max. operating pressure:

by:	-10...50	100	150	200	250	300	350	400	°C
PN40	40	37,3	34,7	30,2	28,4	25,8	24	23,1	bar

DN	**List-No.** PN 40	**Kvs** m³/h	**Stroke** mm	**Pos. speed** sec	**Closing pressure** (bar) 2000N	4000N	5500N
15	421 700	4,0	20	66	40,0		
20	421 701	6,3	20	66	40,0		
25	421 702.	10	20	66	28,5	40,0	
32	421 703.	16	20	66	17,3	39,3	40,0
40	421 704.	25	20	66	10,8	25,2	36,0
50	421 705.	40	20	66	6,6	16,0	23,0
65	421 706.	63	30	100	3,4	9,1	13,4
80	421 708.	100	30	100	2,0	5,8	8,6
100	421 710.	160	30	100	1,1	3,5	5,4

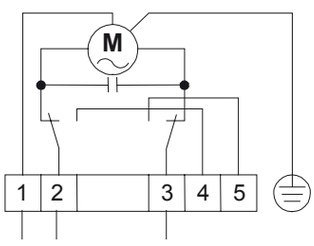
open printversion



DN	15	20	25	32	40	50	65	80	100
Height H *	491	505	499	505	511	513	556	557	564
Length L	130	150	160	180	200	230	290	310	350
Weight kg	14	15	16	18	19	21	35	39	49

* = add. 45mm for 4-6 kN actuator

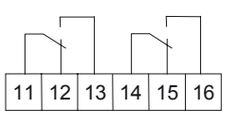
Electrical wiring:



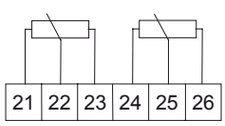
L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionally)**:**

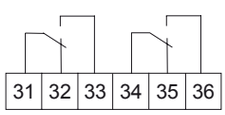
Limit switch
load dependent
for valve position
CLOSE OPEN



Potentiometer



Signal switch
travel dependent



open printversion

Body: GGG-40.3, three way form**,**
for water and steam, as mixing valve,
(diverted purpose restricted,
see page 038 990)
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring-loaded PTFE-V-ring unit
for media temperatures up to 250°C
alternatively: graphite-packing
Internal parts: stainless steel
Flow characteristic: linear
Leakage: acc. to VDI/VDE 2174

Actuator: with manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs-values (on request)

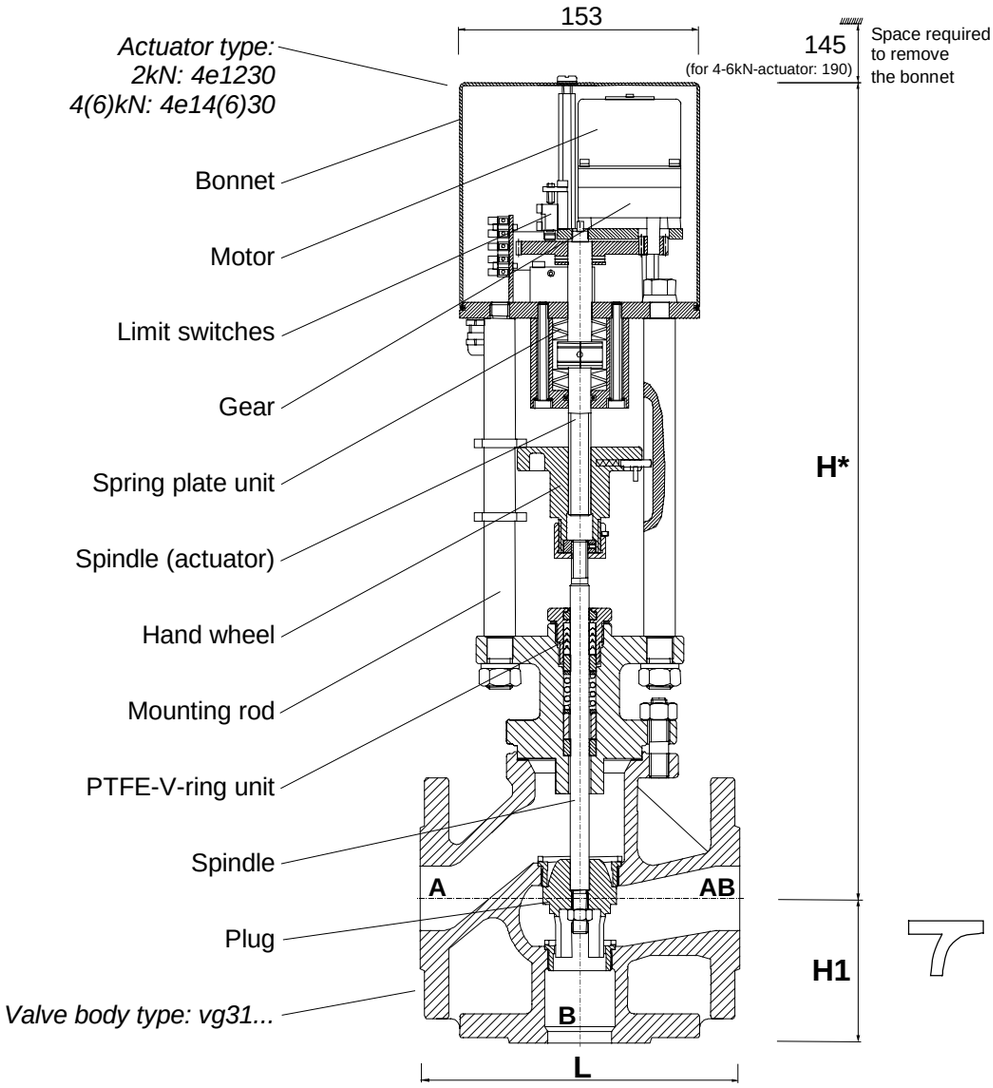
Order text:
Motor control valve PN . ., DN . .
in three way form with PTFE-V-ring unit,
Power supply . . ., List-No. 431 . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
15	431 400	431 500	4,0	20	66	25,0		
20	431 401	431 501	6,3	20	66	25,0		
25	431 402	431 502	10	20	66	25,0		
32	431 403	431 503	16	20	66	17,3	25,0	
40	431 404	431 504	25	20	66	10,8	25,0	
50	431 405	431 505	40	20	66	6,6	16,0	23,0
65	431 406	431 506	63	30	100	3,4	9,1	13,3
80	431 408	431 508	100	30	100	2,0	5,8	8,6
100	431 410	431 510	160	30	100	1,1	3,5	5,4
125	431 412	431 512	230	35	116		2,1	3,3
150	431 415	431 515	330	40	135		1,3	2,1

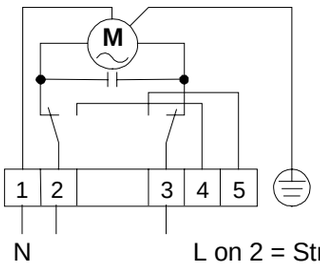
open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H *	493	507	501	508	513	516	560	560	567	720	735
Stud lenght H1	65	70	75	80	90	100	120	130	150	200	210
Immersion lenght L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	13	14	15	18	19	22	37	41	56	112	135

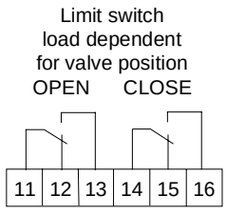
* = add. 45mm for 4-6 kN-actuator

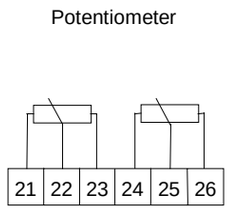
Electrical wiring:

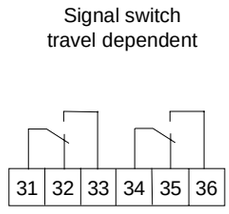


L on 2 = Straightway opens
L on 3 = Straightway closes

Accessories (optionaly)**:**







open printversion

Body: GGG-40.3, three way form with diverting plug
for water and steam,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Spindle sealing: spring-loaded PTFE-V-ring unit
for media temperatures up to 250°C
alternatively: graphite-packing
Internal parts: stainless steel, replaceable seatrings
Flow characteristic: linear
Leakage: < 0,01% Kvs

Actuator: with manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs-values (on request)
Weld-on ends (on request)

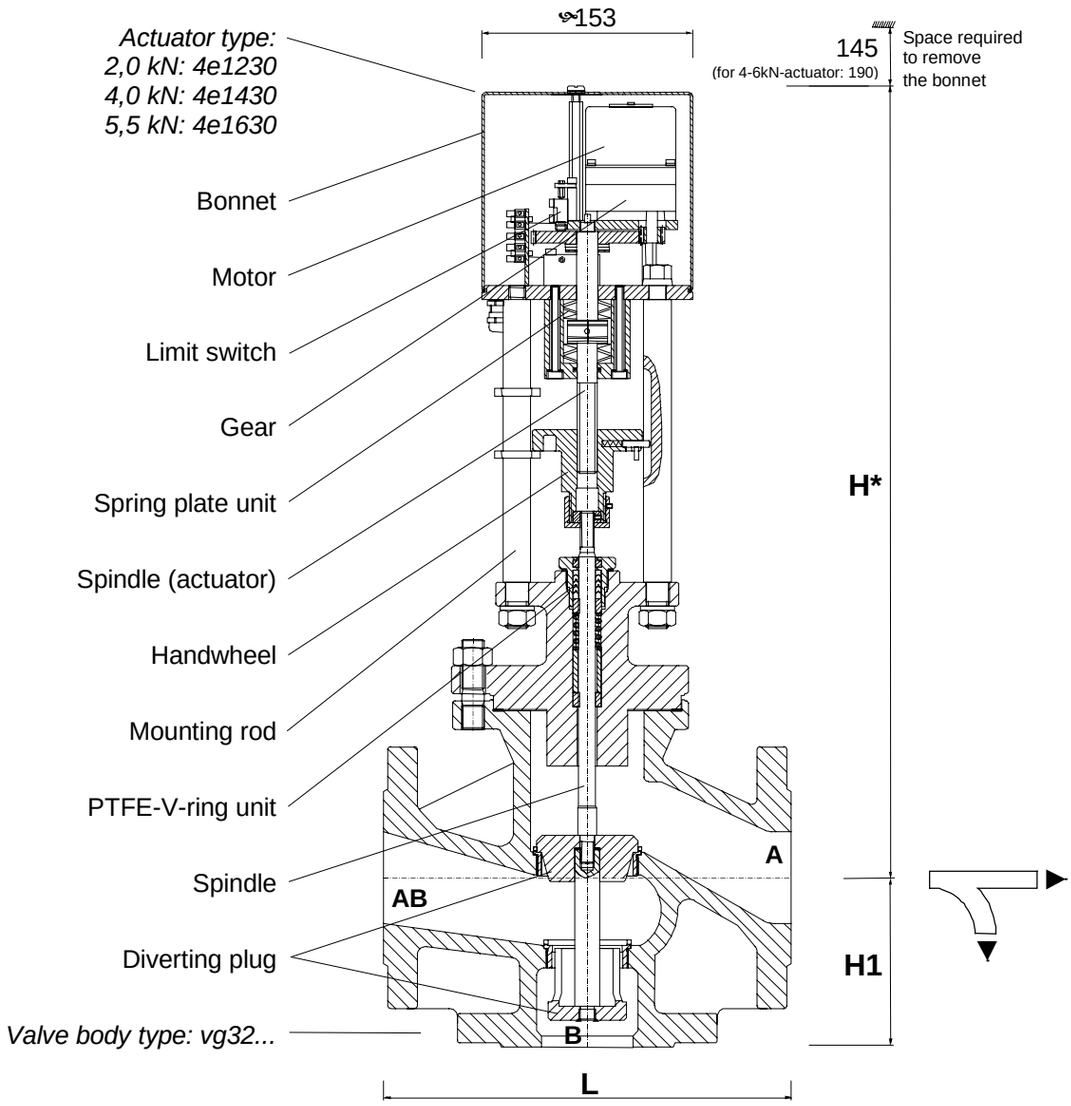
Order text:
Motor control valve PN . ., DN . .,
in three way form with diverting plug,
Sealing with PTFE-V-ring unit,
Power supply . . ., List-No. 432 . . .

Max. operating pressure:

by:	120	200	250	°C
PN 16	16	13	13	bar
PN 25	25	20	18	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
40	432 404	432 504	25	20	66	10,8	25,0	
50	432 405	432 505	40	20	66	6,6	16,0	23,0
65	432 406	432 506	63	30	100	3,4	9,1	13,3
80	432 408	432 508	100	30	100	2,0	5,8	8,6
100	432 410	432 510	160	30	100	1,1	3,5	5,4
125	432 412	432 512	190	35	116		3,5	5,4
150	432 415	432 515	250	35	116		2,3	3,6

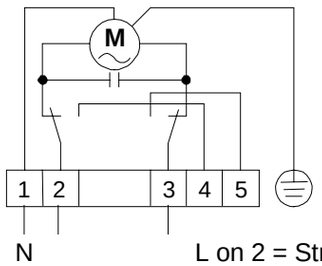
open printversion



DN	40	50	65	80	100	125	150
Height H *	511	513	556	557	564	720	735
Stud lenght H1	90	100	120	130	150	200	210
Immersion lenght L	200	230	290	310	350	400	480
Weight kg	19	22	37	41	56	112	135

* = add. 45mm for 4-5,5 kN-actuator

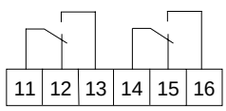
Electrical wiring:



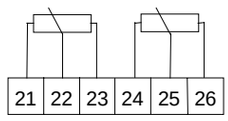
L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionaly)**:**

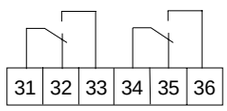
Limit switch
load dependent
for valve position
CLOSE OPEN



Potentiometer



Signal switch
travel dependent



open printversion

Body: GGG-40.3, two way form**,**
for heat transfer oil,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Sealing: VA bellow double wall
and safety stuffing box,
Internal parts: stainless steel,
Flow characteristic: equal percentage
Leakage: acc. to VDI/VDE 2174

Actuator: with integrated manual emergency operation
and load dependent limit switches

Thrust:	2000 N
Power input:	10 VA
alternatively:	4000 N / 20 VA (appendix ..c)
	5500 N / 20 VA (appendix ..d)
Power supply:	230V/50...60Hz

other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs values (on request)

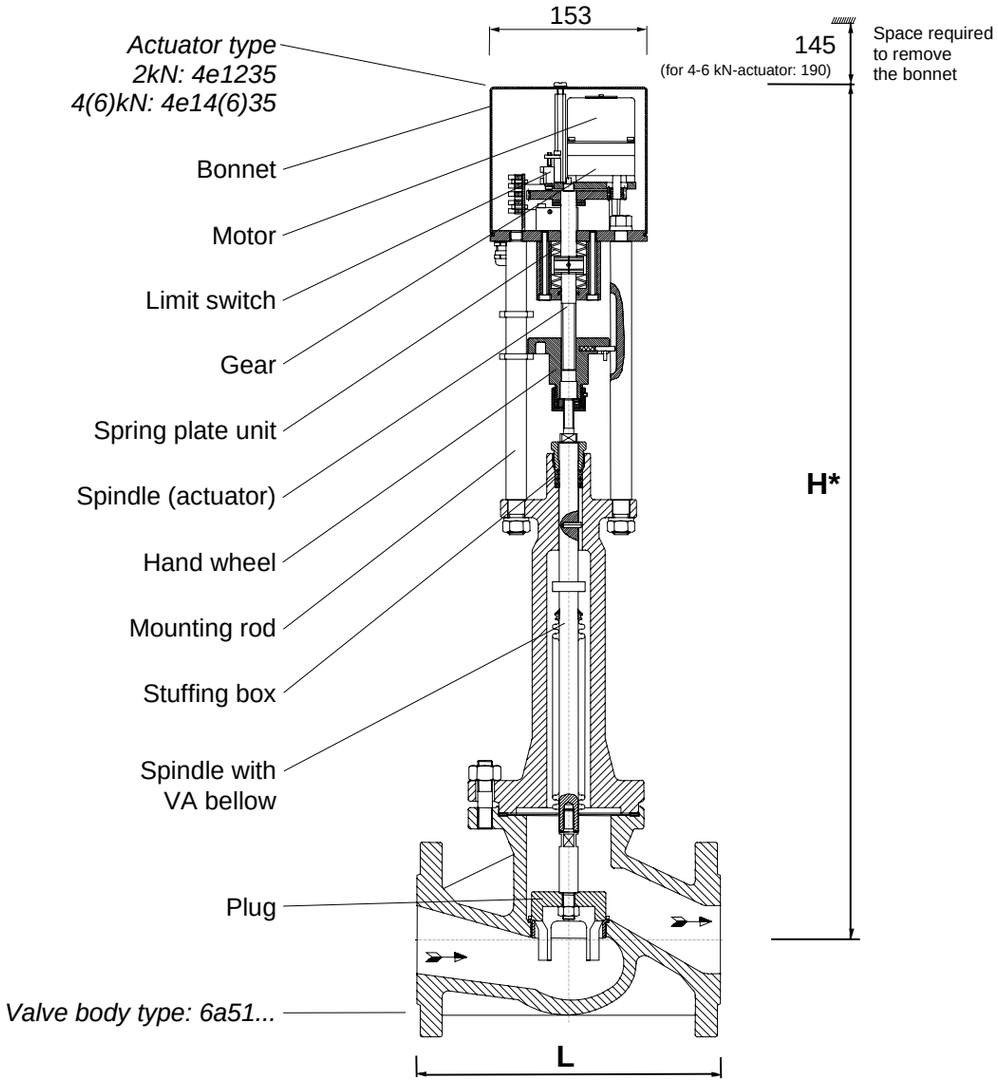
Order text:
Motor control valve PN . ., DN . .
in two way form with VA bellow sealing,
Power supply . . ., List-No. 451 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
15	451 400	451 500	4,0	20	66	25,0		
20	451 401	451 501	6,3	20	66	25,0		
25	451 402	451 502	10	20	66	25,0		
32	451 403	451 503	16	20	66	17,3	25,0	
40	451 404	451 504	25	20	66	10,8	25,0	
50	451 405	451 505	40	20	66	6,6	16,0	23,0
65	451 406	451 506	63	30	100	3,4	9,1	13,3
80	451 408	451 508	100	30	100	2,0	5,8	8,6
100	451 410	451 510	160	30	100	1,1	3,5	5,4
125	451 412	451 512	230	40	135	0,5	2,1	3,3
150	451 415		330	40	135		1,3	2,1

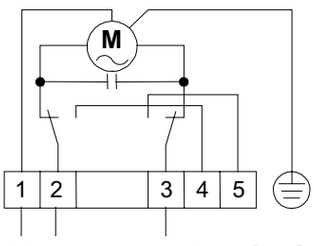
open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H *	661	675	669	675	681	683	813	814	821	925	940
Immersion length L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	13	14	15	17	18	20	33	37	47	102	113

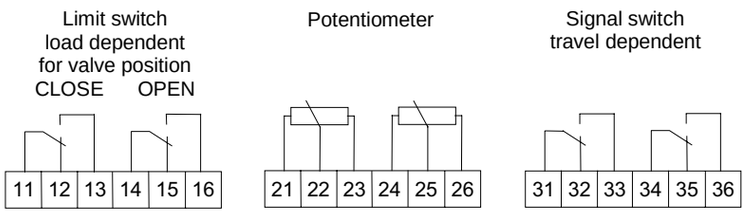
* = add. 45mm for 4-6kN-actuator

Electrical wiring:



L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionally)**:**



open printversion

Body: GGG-40.3, two way form**,**
for heat transfer oil
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Sealing: VA bellow double wall
and safety stuffing box,
Internal parts: stainless steel,
Flow characteristic: equal percentage
Leakage: acc. to VDI/VDE 2174

Actuator: with integrated manual emergency operation
and load dependent limit switches

Thrust:	8 kN / 33 W (appendix e)
	12 kN / 50 W (appendix f)
	15 kN / 50 W (appendix h)
Power supply:	230V / 50Hz
alternatively:	230V / 60Hz (appendix e6/f6/h6)
Motor rating standard:	S4 – 30% ED – 600 c/h
Protection class:	IP65

Other voltages on request

Accessories, special types**:**
Add. signal switches load dependent
Add. signal switches travel dependent
Feedback potentiometer
Integrated positioner
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs values (on request)

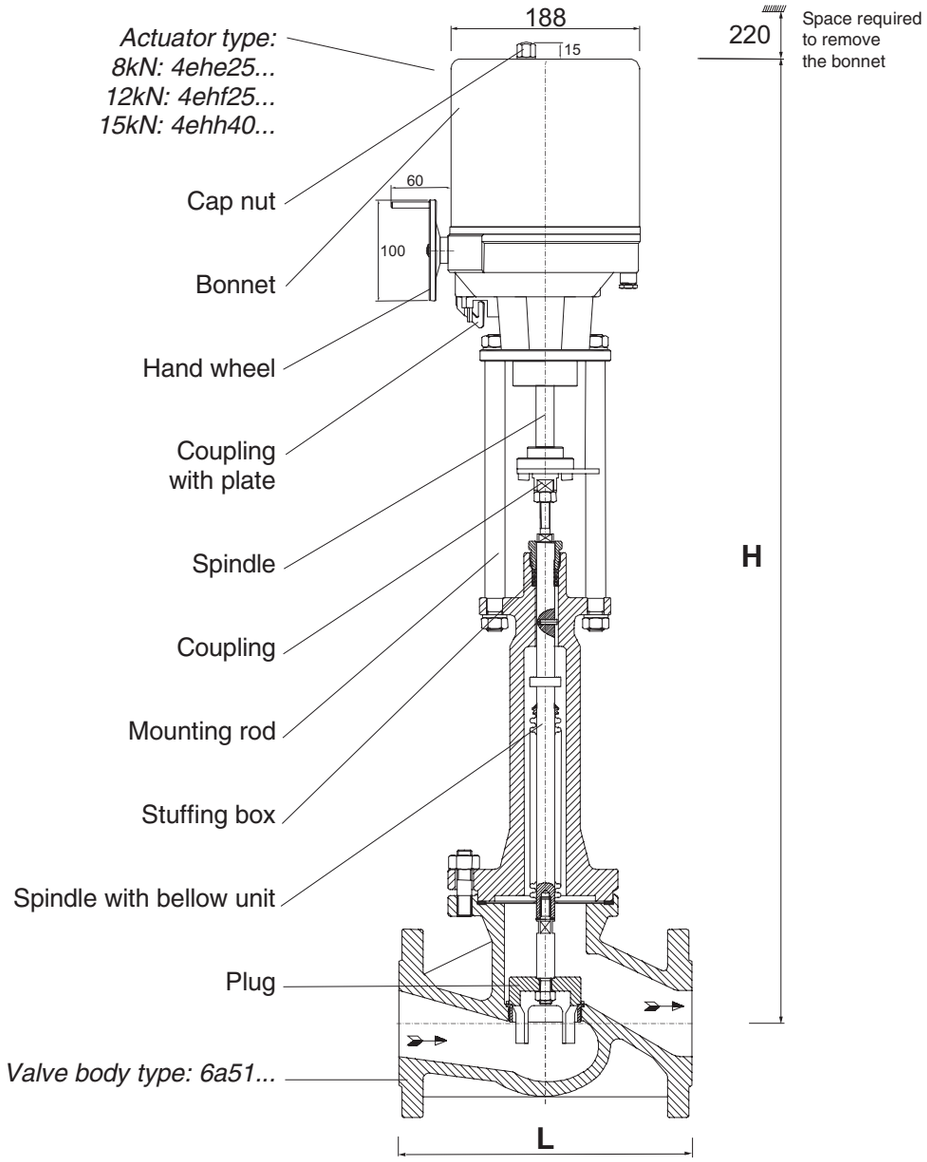
Order text:
Motor control valve PN . ., GGG-40.3, DN . .
in two way form with VA bellow sealing,
Power supply . . ., List-No. 451 . . . H .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

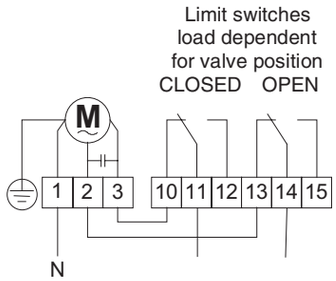
DN	**List No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	8 kN	12 kN	15 kN
50	451 405H.	451 505H.	40	20	50	25,0		
65	451 406H.	451 506H.	63	30	75	20,4	25,0	
80	451 408H.	451 508H.	100	30	75	13,4	20,9	25,0
100	451 410H.	451 510H.	160	30	75	8,4	13,3	17,0
125	451 412H.	451 512H.	230	40	100	5,2	8,4	10,8
150	451 415H.		330	40	100	3,5	5,7	7,4

open printversion



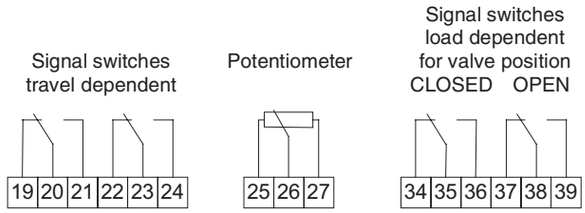
DN	50	65	80	100	125	150
Height H	793	923	924	931	1033	1048
Immersion length L	230	290	310	350	400	480
Weight kg	25	42	46	60	115	125

Electrical wiring:



L on 11= Straightway closes
L on 14= Straightway opens

Accessories (optionally)**:**



open printversion

Body: GP240GH+N (GS-C25N), two way form**,**
for heat transfer oil
Pressure range: body PN 40
bellow PN 25
Flanges acc. to DIN,
Spindle sealing: 1.4571 bellow double wall
and safety stuffing box,
Internal parts: stainless steel,
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: with integrated manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Motor rating standard: S1 – 100%
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Integrated process controller (see page 49r)
Other voltages (on request)
Other positioning speed (on request)
Other kvs- values (see page 4516red1/2)
Weld-on ends (on request)

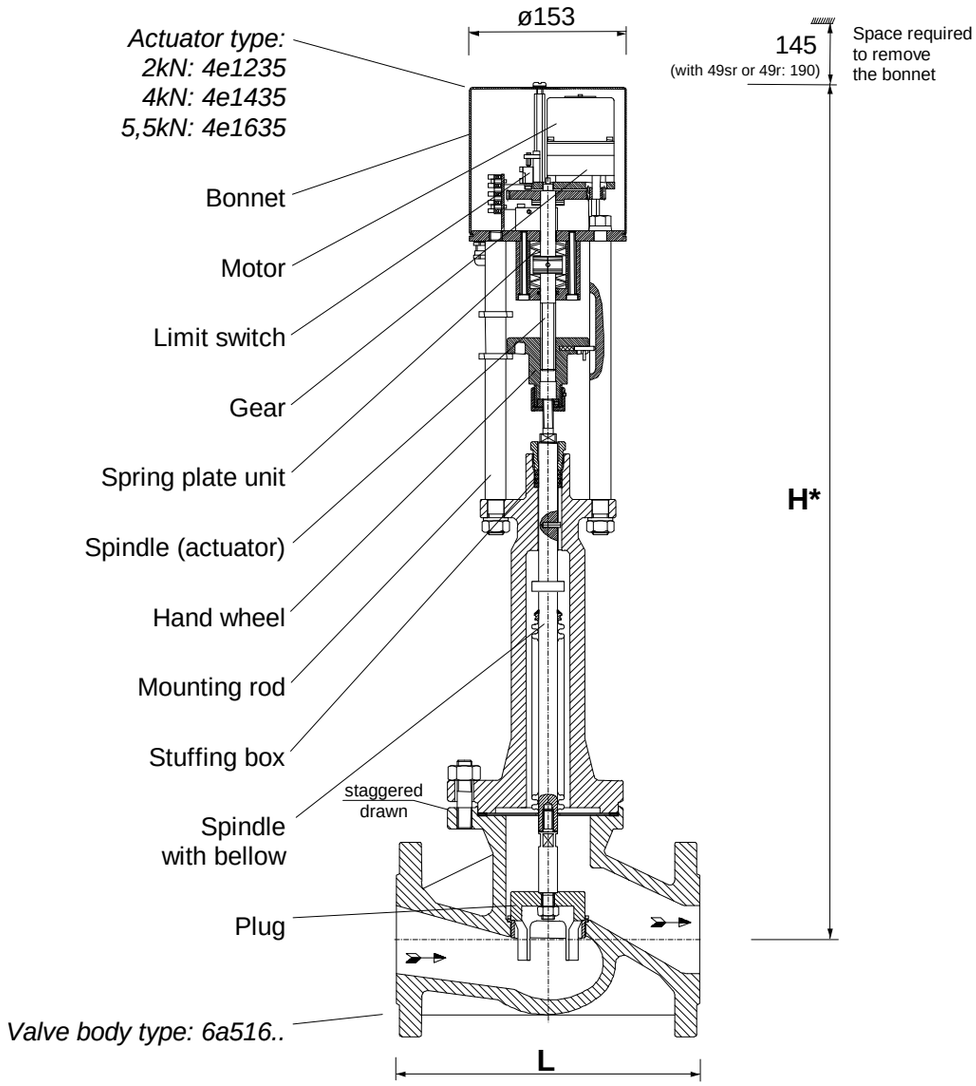
Order text:
Motor control valve in two way form,
Body PN 40, GP240GH+N (GS-C25N), DN . . , kvs . . . ,
spindle sealing with bellow PN 25,
Power supply . . ., List-No. 451 6 . . .

Max. operating pressure:

by:	-10	200	250	300	350	400	°C
	25	25	25	25	24	21	bar

DN	**List-No.**	**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar) *		
		m³/h	mm	sec	2000 N	4000 N	5500 N
15	451 600	4,0	20	66	25,0		
20	451 601	6,3	20	66	25,0		
25	451 602	10	20	66	25,0		
32	451 603.	16	20	66	17,3	25,0	
40	451 604.	25	20	66	10,8	25,0	
50	451 605.	40	20	66	6,6	16,0	23,0
65	451 606.	63	30	100	3,4	9,1	13,4
80	451 608.	100	30	100	2,0	5,8	8,6
100	451 610.	160	30	100	1,1	3,5	5,4

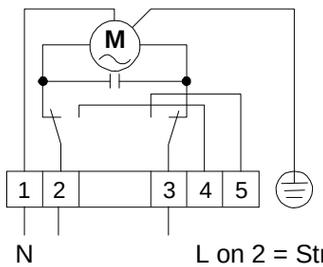
** = for higher closing pressure see page 4516He/f/h E*



DN	15	20	25	32	40	50	65	80	100
Height H *	661	675	669	675	681	683	813	814	821
Length L	130	150	160	180	200	230	290	310	350
Weight kg	16	17	18	19	21	24	44	47	57

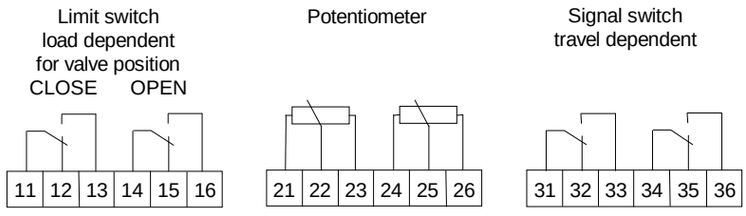
** = add.45mm for actuator with positioner 49sr5 or controller 49r*

Electrical wiring:



L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionally)**:**



open printversion

Body: GP240GH+N (GS-C25N), two way form**,**
for heat transfer oil
Pressure range: body PN 40
bellow PN 25
Flanges acc. to DIN,
Spindle sealing: 1.4571 bellow double wall
and safety stuffing box,
Internal parts: stainless steel,
Flow characteristic: equal percentage
Positioning ratio: 50:1
Leakage: < 0,01% K_{vs}

Actuator: with integrated manual emergency operation
and load dependent limit switches
Thrust: 8 kN / 33 W (appendix ...e)
12 kN / 50 W (appendix ...f)
15 kN / 50 W (appendix ...h)
Power supply: 230V / 50Hz
alternatively: 230V / 60Hz (appendix ...6)
other voltages on request
Motor rating standard: S4 – 30% ED – 600 c/h
Protection class: IP65

Accessories, special types**:**
Add. signal switches, travel dependent
Add. signal switches, load dependent
Feedback potentiometer
Integrated positioner
Other voltages (on request)
Other positioning speed (on request)
Other kvs- values (see page 4516He/f/gred1/2)
Weld-on ends (on request)

Order text:
Motor control valve in two way form,
Body PN 40, GP240GH+N (GS-C25N), DN . . , kvs . . . ,
spindle sealing with bellow PN 25,
Power supply . . ., List-No. 451 6 . . H .

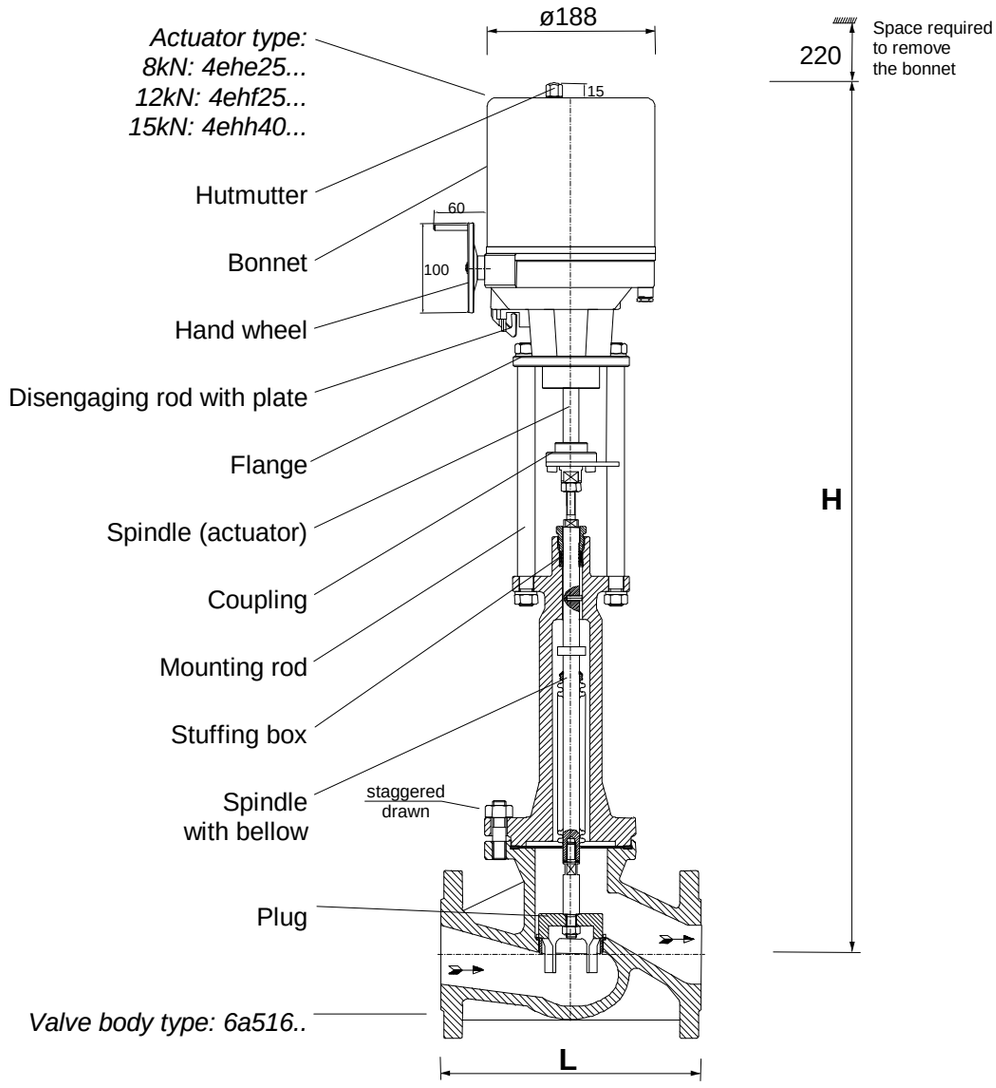
Max. operating pressure:

by:	-10	200	250	300	350	400	°C
	25	25	25	25	24	21	bar

DN	**List-No.**	**Kvs** m^3/h	**Stroke** mm	**Pos. speed** sec		**Closing pressure** (bar) *		
				8/12kN	15kN	8 kN ...e	12 kN ...f	15 kN ...h
50	451 605He	40	20	50		25,0		
65	451 606H.	63	30	75		20,4	25,0	
80	451 608H.	100	30	75	45	13,4	21,0	25,0
100	451 610H.	160	30	75	45	8,4	13,3	17,0

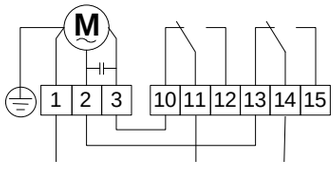
** = for lower closing pressure see page 4516 E*

open printversion



DN	50	65	80	100
Height H	793	923	924	931
Length L	230	290	310	350
Weight kg	28	48	51	61

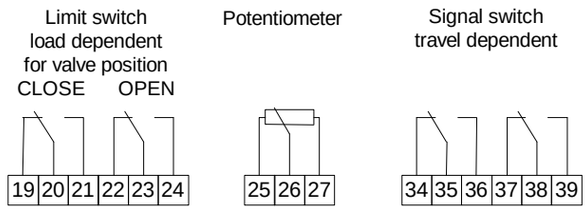
Electrical wiring:



N

L on 11 = Straightway closes
L on 14 = Straightway opens

Accessories (optionally)**:**



open printversion

Body: GGG-40.3, three way form**,**
for heat transfer oil, as mixing valve,
(diverted purpose restricted,
see page 038 990)
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
alternatively: weld-on ends (on request)
Sealing: VA-bellow double wall
and safety stuffing box,
Internal parts: stainless steel, screwed seat rings,
Flow characteristic: linear
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Actuator: with manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs-values (on request)
Weld-on ends (on request)

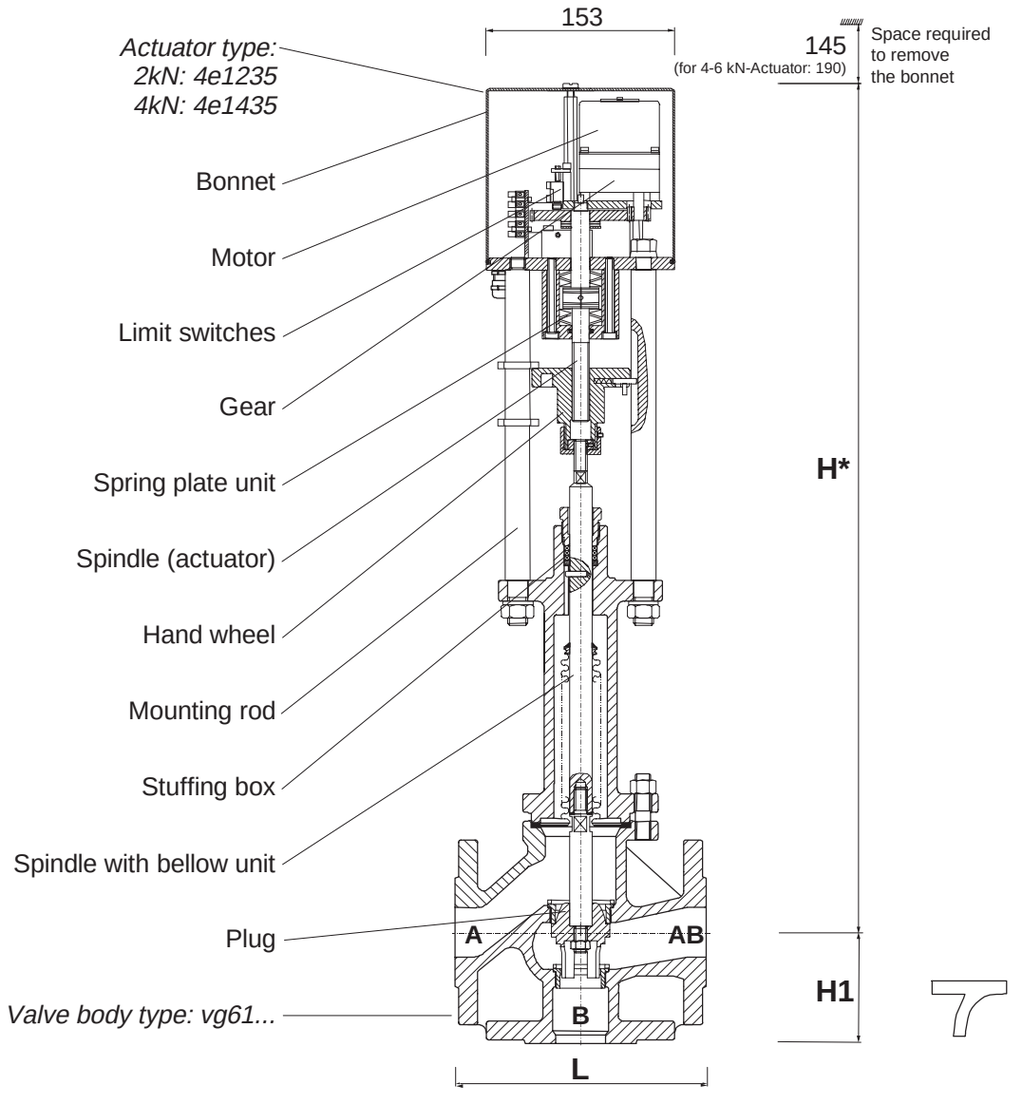
Order text:
Motor control valve PN . ., DN . .
in three way form with VA-bellow sealing,
Power supply . . ., List-No. 461 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
15	461 400	461 500	4,0	20	66	25,0		
20	461 401	461 501	6,3	20	66	25,0		
25	461 402	461 502	10	20	66	25,0		
32	461 403	461 503	16	20	66	17,3	25,0	
40	461 404	461 504	25	20	66	10,8	25,0	
50	461 405	461 505	40	20	66	6,6	16,0	23,0
65	461 406	461 506	63	30	100	3,4	9,1	13,3
80	461 408	461 508	100	30	100	2,0	5,8	8,6
100	461 410	461 510	160	30	100	1,1	3,5	5,4
125	461 412	461 512	230	35	116		2,1	3,3
150	461 415	461 515	330	40	135		1,3	2,1

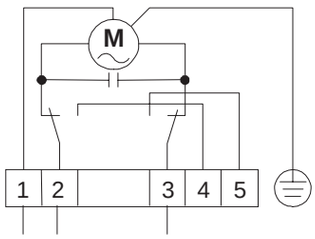
open printversion



DN	15	20	25	32	40	50	65	80	100	125	150
Height H *	661	675	669	675	681	683	813	814	821	930	950
Stud lenght H1	65	70	75	80	90	100	120	130	150	200	210
Immersion lenght L	130	150	160	180	200	230	290	310	350	400	480
Weight kg	15	16	17	20	21	24	41	45	59	100	130

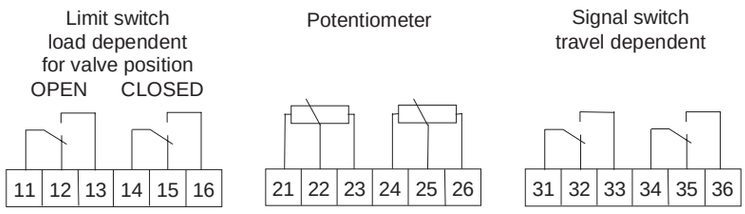
* = add. 45mm for 4-6 kN actuator

Electrical wiring:



L on 2 = Straightway opens
L on 3 = Straightway closes

Accessories (optional)**:**



open printversion

Body: GGG-40.3, three way form**,**
for heat transfer oil, as mixing valve,
(diverted purpose restricted),
(see page 038 990)
Pressure range: PN 16, PN 25
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, screwed seat rings,
Flow characteristic: linear
Positioning ratio: 50:1
Leakage: < 0,01% Kvs

Actuator: with integrated manual emergency
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Special design:
weld-on ends similar to DIN 3239,

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs-values (on request)
Distributing valve plug (on request)

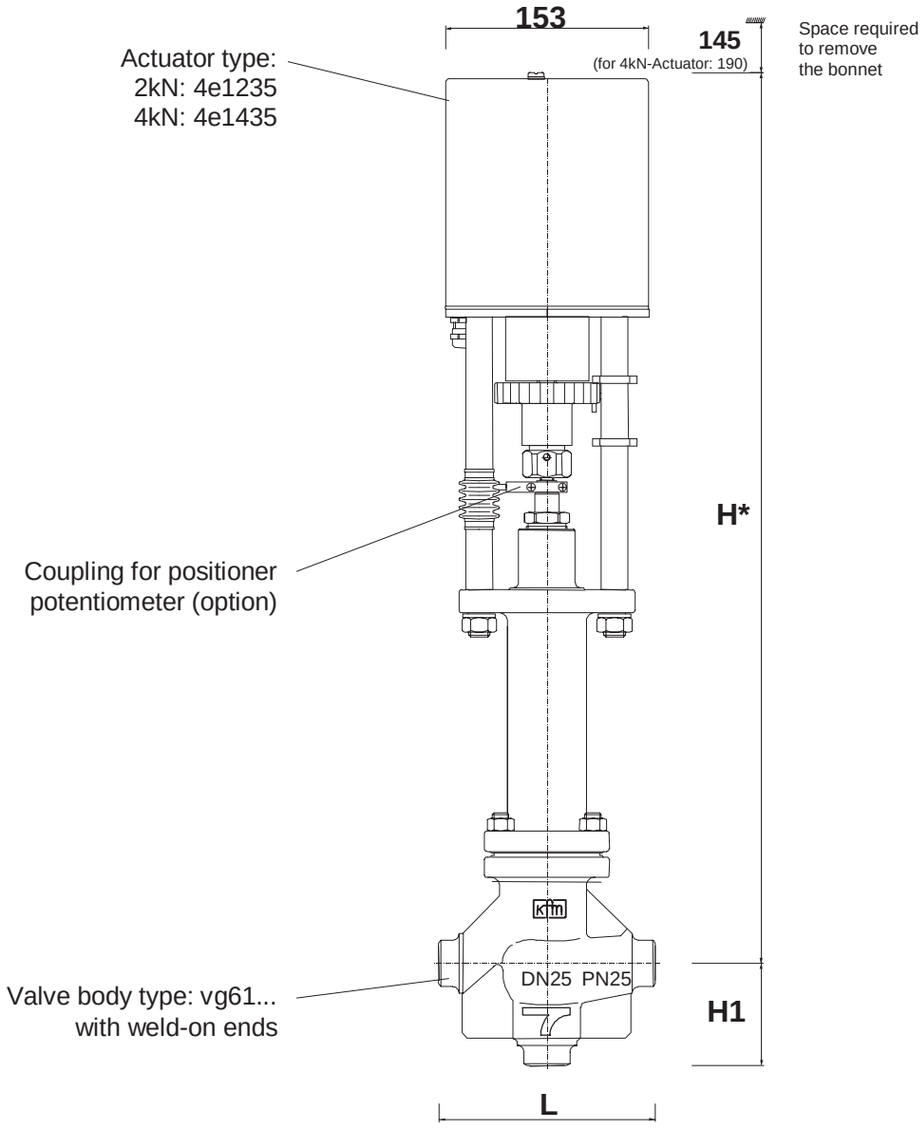
Order text:
Motor control valve PN . ., DN . :
in three way form with VA-bellow sealing,
Power supply . . ., List-No. 461 . . . / fs

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)	
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N
20	461 401 / fs	461 501 / fs	6,3	20	66	25,0	
25	461 402 / fs	461 502 / fs	10	20	66	25,0	
32	461 403 / fs	461 503 / fs	16	20	66	17,3	25,0
40	461 404 / fs	461 504 / fs	25	20	66	10,8	25,0
50	461 405 / fs	461 505 / fs	40	20	66	6,6	16,0
65	461 406 / fs	461 506 / fs	63	30	100	3,4	9,1
80	461 408 / fs	461 508 / fs	100	30	100	2,0	5,8
100	461 410 / fs	461 510 / fs	160	30	100	1,1	3,5

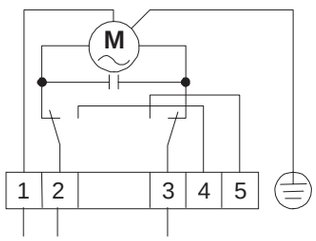
open printversion



DN	20	25	32	40	50	65	80	100
Height H *	675	669	675	681	683	813	814	821
Stud lenght H1	70	75	80	90	100	120	130	150
Immersion lenght L	150	160	180	200	230	290	310	350
Weight kg	15	16	19	20	23	39	43	57

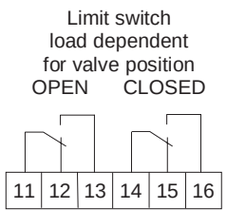
* = add. 45mm for 4kN actuator or actuator with integrated positioner

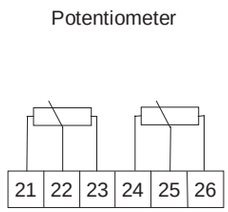
Electrical wiring:

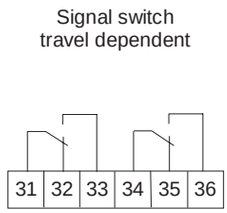


L on 2 = Straightway opens
L on 3 = Straightway closes

Accessories (option)**:**







open printversion

Body: GGG-40.3, three way form with diverting plug
for heat transfer oil,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, replaceable seatrings,
Flow characteristic: linear
Leakage: < 0,01% Kvs

Actuator: with manual emergency operation
and load dependent limit switches
Thrust: 2000 N
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
5500 N / 20 VA (appendix ..d)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Reduced kvs-values (on request)
Weld-on ends (on request)

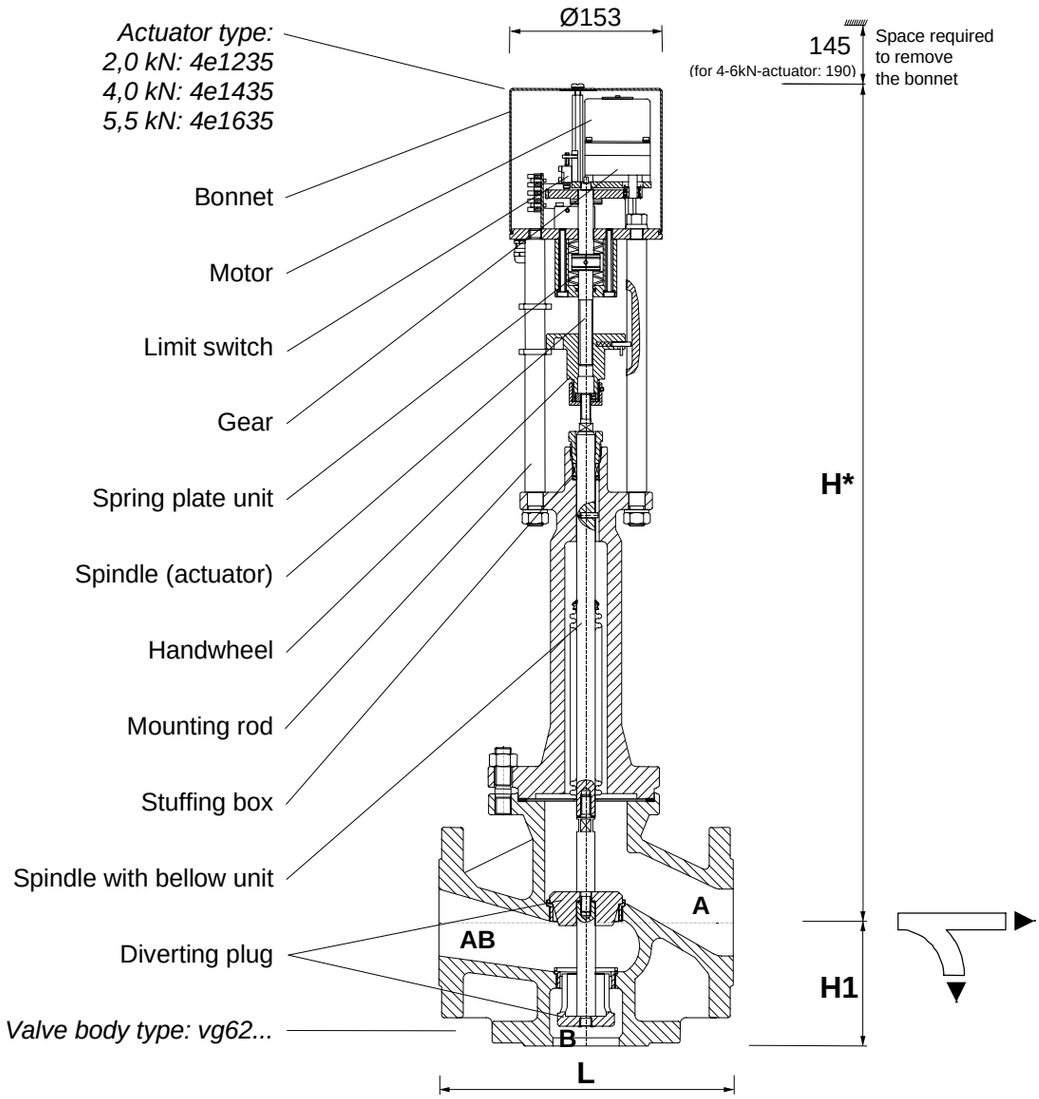
Order text:
Motor control valve PN . ., DN . .,
in three way form with diverting plug,
Sealing with VA-bellow-unit,
Power supply . . ., List-No. 462 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)		
	PN 16	PN 25	m³/h	mm	sec	2000N	4000N	5500N
40	462 404	462 504	25	20	66	10,8	25,0	
50	462 405	462 505	40	20	66	6,6	16,0	23,0
65	462 406	462 506	63	30	100	3,4	9,1	13,3
80	462 408	462 508	100	30	100	2,0	5,8	8,6
100	462 410	462 510	160	30	100	1,1	3,5	5,4
125	462 412	462 512	190	35	116		3,5	5,4
150	462 415	462 515	250	35	116		2,3	3,6

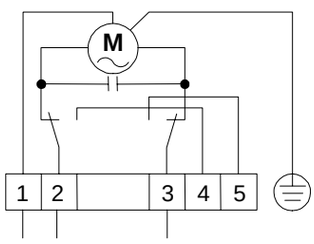
open printversion



DN	40	50	65	80	100	125	150
Height H *	681	683	813	814	821	930	950
Stud lenght H1	90	100	120	130	150	200	210
Immersion lenght L	200	230	290	310	350	400	480
Weight kg	21	24	41	45	59	100	130

* = add. 45mm for 4-5,5 kN-actuator

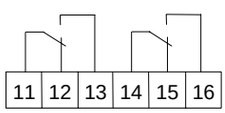
Electrical wiring:



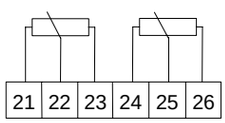
L on 2 = Straightway closes
L on 3 = Straightway opens

Accessories (optionaly)**:**

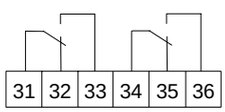
Limit switch
load dependent
for valve position
CLOSE OPEN



Potentiometer



Signal switch
travel dependent



open printversion

Body: bronze RG-5 CC491K
for water 0...150°C,
Internal thread connectors: acc. to DIN
including cap nut and connecting part
of galvanized malleable cast iron,
optionally of bronze,
Pressure range: PN 16,
Spindle sealing: EPDM-O-ring,
Plug: brass CW614N,
Spindle: stainless steel 1.4122,
Flow characteristic: A-AB equal percentage
B-AB linear
Positioning ratio: DN15: 50:1
DN20-50 100:1
Leakage: EN1349 – seat leakage VI G 1 (tight sealing)

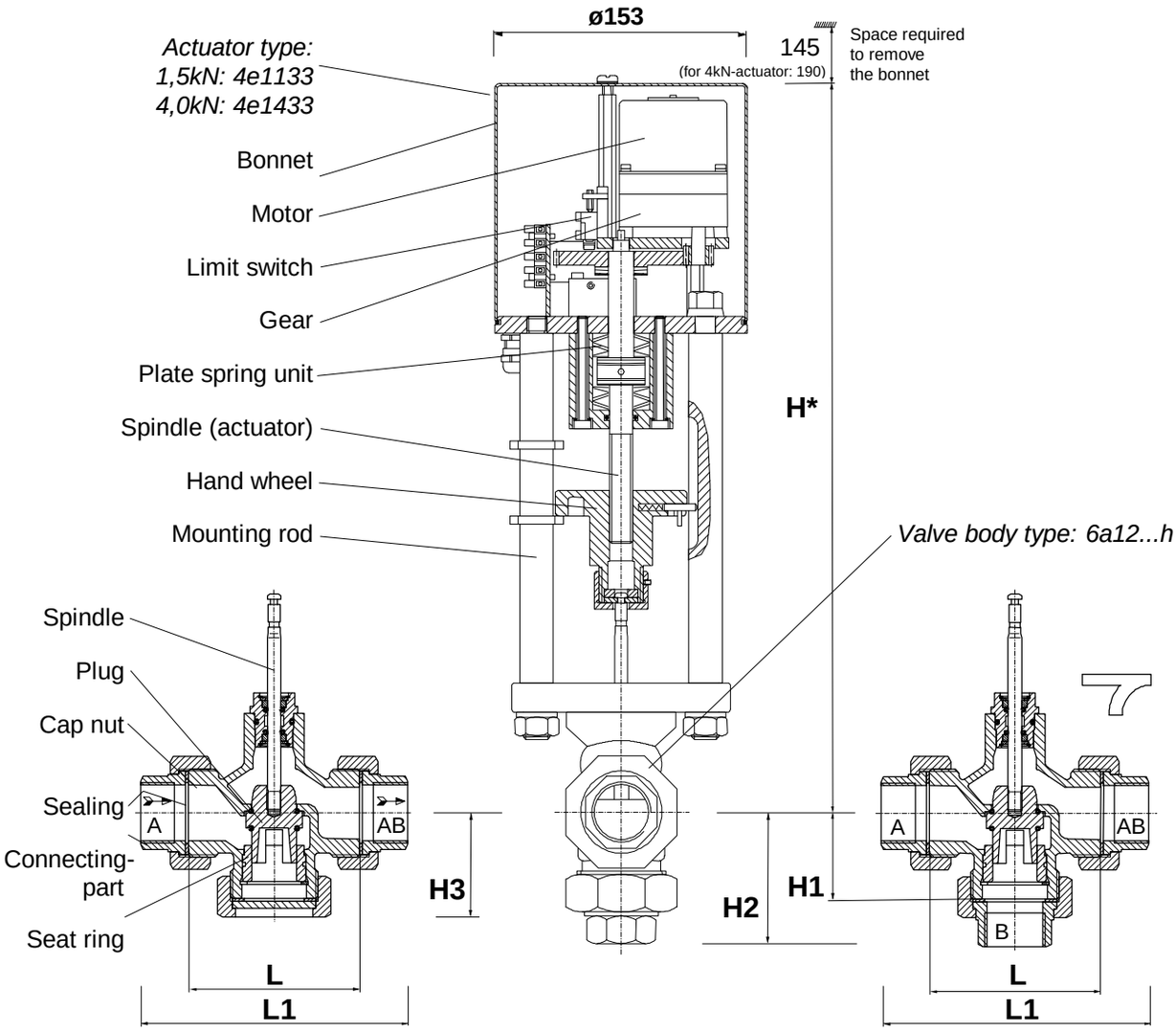
Actuator: with integrated manual emergency operation
and load dependent limit switches
Thrust: 1500 N (standard)
Power input: 10 VA
alternatively: 4000 N / 20 VA (appendix ..c)
Power supply: 230V /50...60Hz
other voltages on request
Protection class: IP65

Accessories, special types**:**
Add. signal switches (see page 49e, 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)
Other voltages (on request)
Other positioning speed (on request)
Other reduced kvs-values (on request)

Order text:
Motor control valve of bronze PN 16, DN . . , kvs . . . ,
in two way form / three way form, with O-ring sealing,
Power supply . . ., List-No. 48 1 . . .

DN	**List-No.**		**Kvs**	**Stroke**	**Pos. speed**	**Closing pressure** (bar)	
	three way	two way	m³/h	mm	sec	1500N	4000N
1/2"	4813 100	4812 100	4	12	40	16,0	
3/4"	4813 101	4812 101	6,3	12	40	16,0	
1"	4813 102	4812 102	10	14	47	16,0	
1 1/4"	4813 103.	4812 103.	16	14	47	11,8	16,0
1 1/2"	4813 104.	4812 104.	25	14	47	7,2	16,0
2"	4813 105.	4812 105.	40	14	47	4,2	16,0

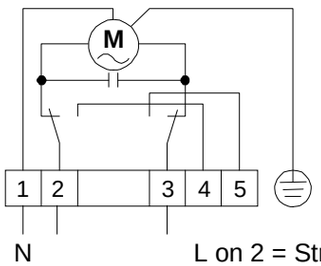
open printversion



DN	1/2“	3/4“	1“	1 1/4"	1 1/2"	2“
Height H *	390	393	396	405	408	408
Immersion length L	62	75	80	120	130	150
Length ~L1	114	127	138	184	198	222
Stud length H1	40	41	45	55	60	65
Stud length ~H2	66	67	74	89	94	101
Stud length ~H3	48	53	57	68	73	78
Weight kg	7,7	8,2	8,5	9,2	9,8	11,4

* = + 45mm for 4kN-actuators and actuators with positioner 49sr5

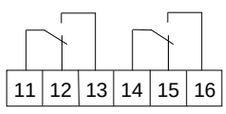
Electrical wiring:



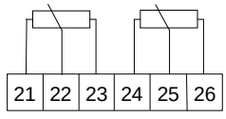
L on 2 = Straightway opens
L on 3 = Straightway closes

Accessories (optionally)**:**

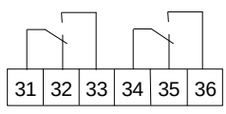
Limit switch load dependent for valve position
OPEN CLOSE



Potentiometer

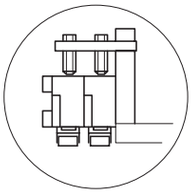


Signal switch travel dependent

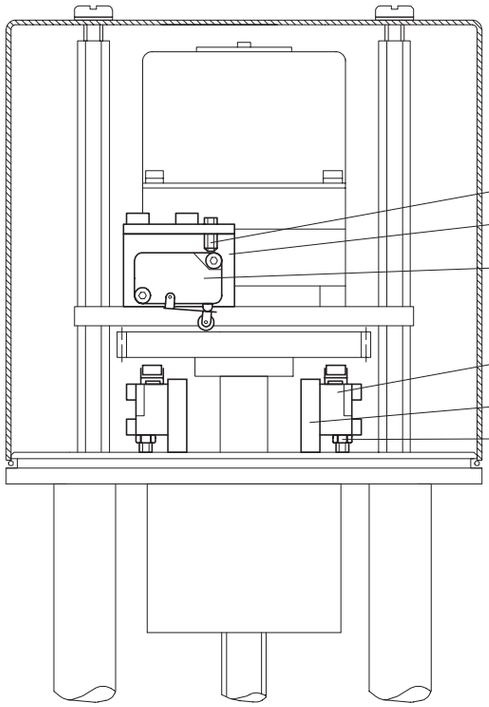


open printversion

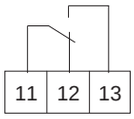
Electric actuators type 4e... can be equipped with an additional load dependent limit switch for valve positon "up" and/or "down". The zero-potential change over switches have a contact rating of 250V / 2A (ohmic load).



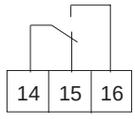
Lateral view
upper limit switch



Additional terminals:



Upper switch for valve position "down"



Lower switch for valve position "up"

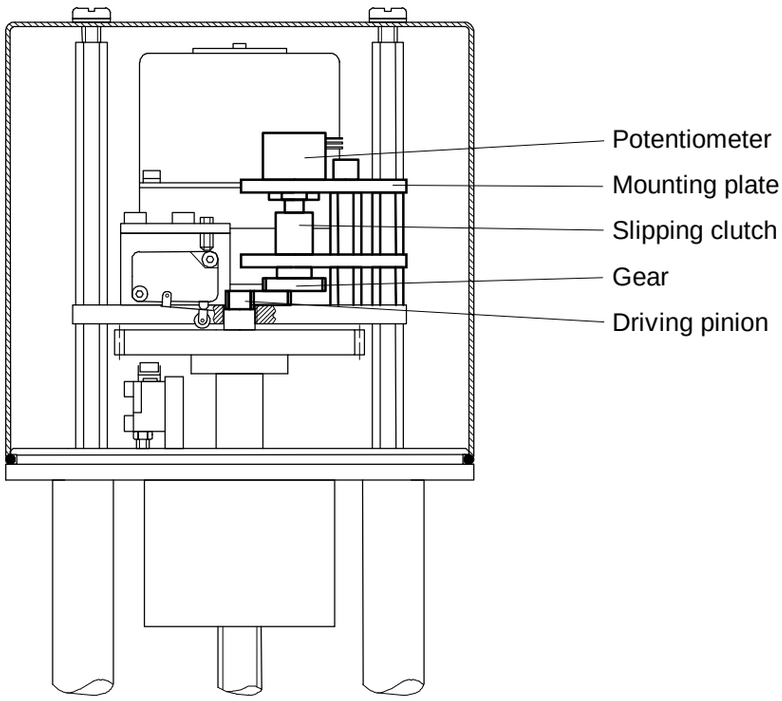
Summary of types:	**List-No.**
1 add. upper limit switch for valve position "down"	49eo
1 add. lower limit switch for valve position "up"	49eu
1 upper and 1 lower additional limit switch	49ev

open printversion

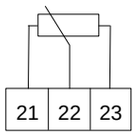
Electric actuators type 4e1… can be equipped with a potentiometer for position feedback.

The potentiometer is connected to the actuator by a slipping clutch. This effects an auto-adjustment after each manual operation and prevents damages by exceeding of the end position.

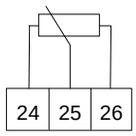
Attention! The potentiometer has to be readjusted after each manual operation with hand wheel. To readjust the potentiometer, the actuator has to be driven electrically in both end positions.



Additional terminals:



Potentiometer 1



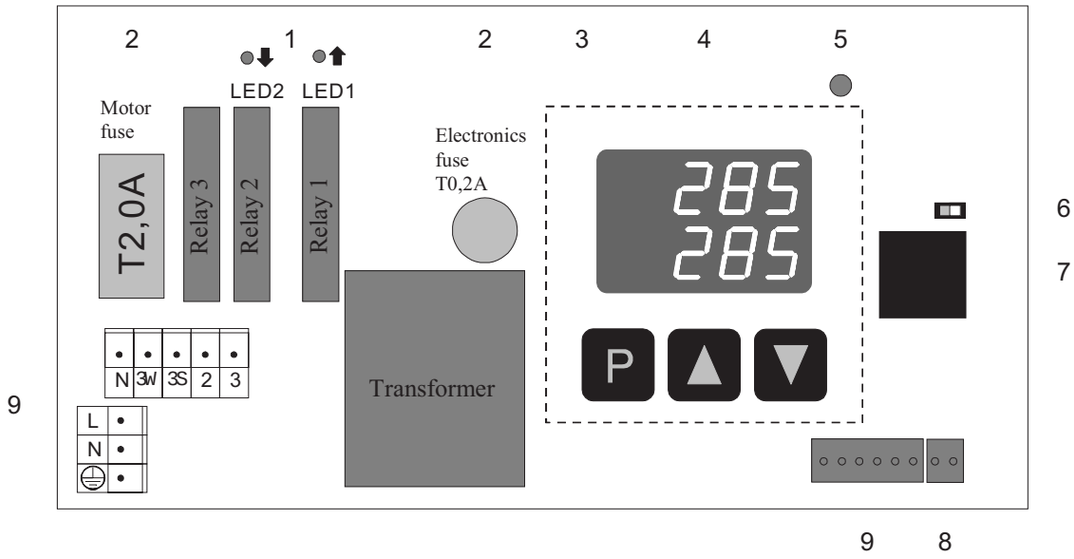
Potentiometer 2

Type summary:

49f	**x**	**x**	**x**	
			2	Double potentiometer
		1		100 Ohm
		2		200 Ohm
		5		500 Ohm
		0		1000 Ohm *
	1			Stroke 15 mm
	2			Stroke 20 mm
	3			Stroke 30/35 mm
	4			Stroke 40 mm

** default value: standard potentiometer 1000 Ohm*

open printversion



1 LEDs for displaying the relay function
2 Fuses for drive motor and control electronics
3 Operating keys for set values and parameters
4 Digital displays for actual value and second display value (if active)
5 Status LED
6 Switch for connection of interface / external display and operating unit
7 Connection for interface or external operating unit
8 Connector plug for signal output
9 Internal connections to mains voltage and actuator

Description

The KFM 49r is a series of microcomputer-based industrial regulators intended for mounting directly into actuator drives.
The entire control loop is very compact once the sensor has been connected.

All versions can conveniently be operated, parameterised and configured through the interface.
Depending on the version, an operating and display unit or a potentiometer is included for specifying the set value and adjusting the parameters.

Alternatively it is possible to connect a mobile display and operating unit instead of the interface adapter. The switch above the connector must be moved to the appropriate position for this purpose.

Type Summary	**Li.no.**
Basic version for external operation (operating unit or PC)	**49r700**
Basic version with operating and display unit	**49r70d**
Basic version with potentiometer operation	**49r70p**
Additional fittings:	
With additional, freely configurable switch contact	**49r71**...
With signal outputs 0/4...20mA / 0/2...10V	**49r7..o.**
With RS485 interface, KFM 2.0 protocol	**49r7...s**
With Profibus DP interface	**49r7...p**
Mobile display and control unit	**49sr59z**

Optional: additional input for position feedback

open printversion

Technical data:

Input*:	0 / 4...20 mA or 0 / 2...10 V Pt 100 DIN Remote resistance sensor 0 ... 100 - 1000 Ohm Other values optional
Output*:	3 relays, 230V max. 2 A 0 / 4...20mA for signal output, 500 Ohm load
Status indicator:	1 status LED for normal operation and fault (flashing) 2 LEDs for function display relay 1 and 2
Optional interfaces:	RS 485 / KFM 2.0 protocol, Profibus DP, others **= depending on the particular model*

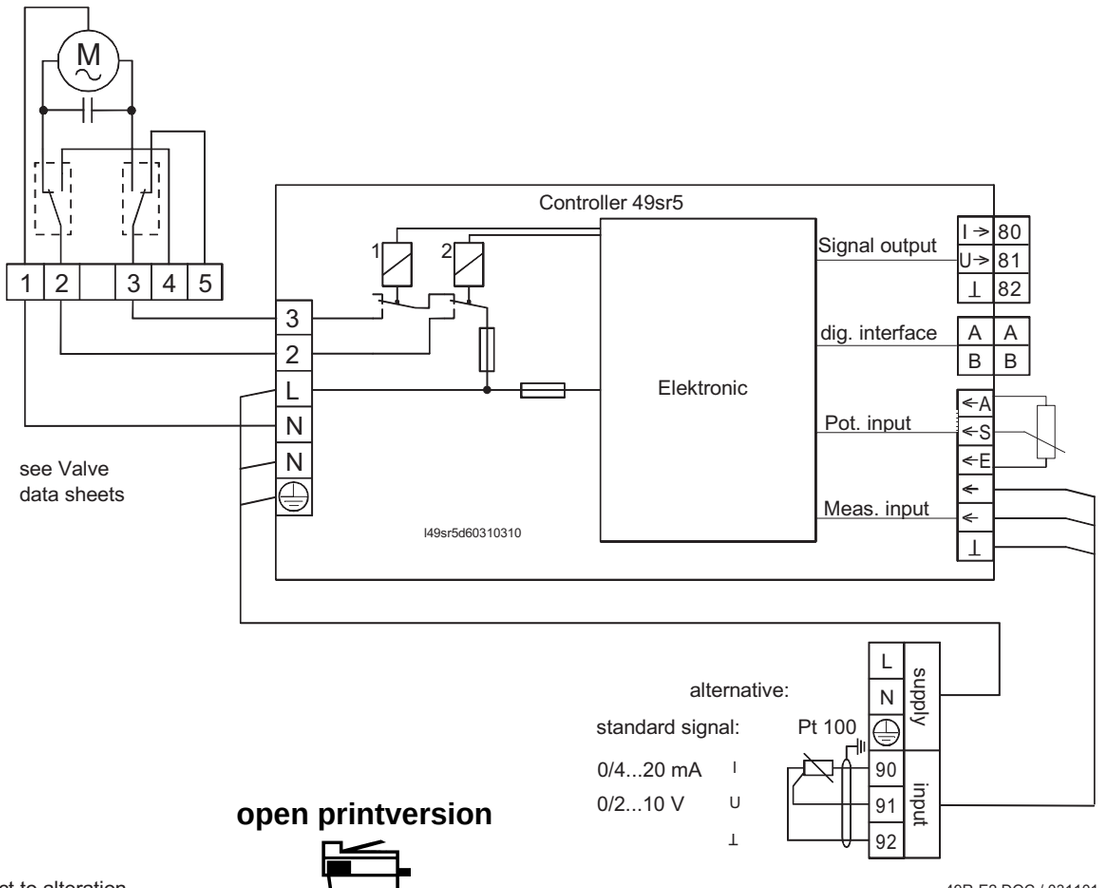
Other operating data:

Mains connection:	230V +/- 10 %, 48...62Hz, approx. 3VA alt. 115 V, other voltages by request
Permissible ambient temp.:	0...60°C, nominal temperature 20 °C
Climatic resistance:	Relative humidity <= 75 % annual average without condensation,
Interference emission/immunity:	In accordance with EN 61326, industrial requirements

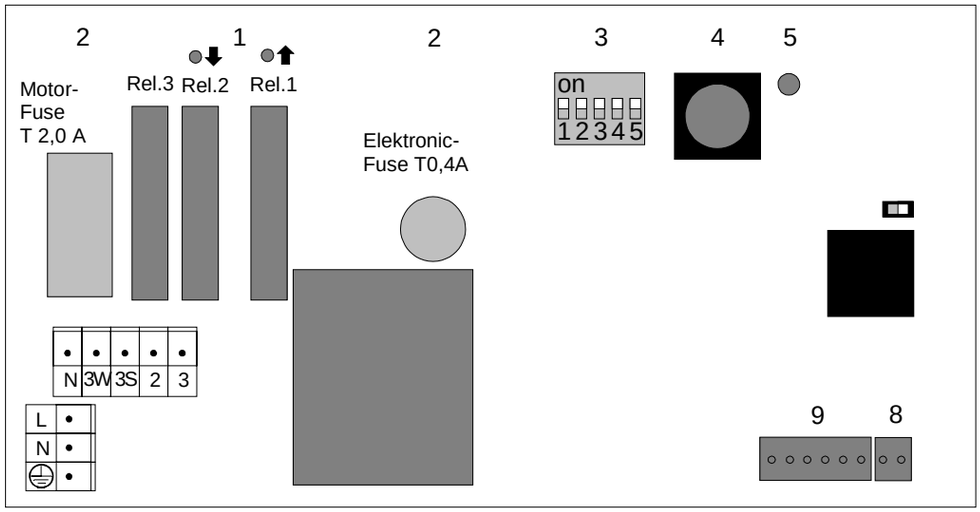
Characteristic values *(depending on type and version):*
Set in parameter level. Factory preset if desired.

Proportional range Xp:	0,1...999,9 %
Integral action time Tn:	0.0...999.9 min
Derivative action time Tv:	0.0...99.9 min
Response sensitivity Xsh:	0,1...1,0 %
Motor run time Tm:	6...600 sec
Characteristic curve change.:	direct / inverse
Switching point diff. SA (Zsk):	0..100.0 K
Switching difference Sd:	0.1...100.0 K

Connection and block diagram: Variant showing maximum configuration; some connections may not be available, depending on the version. The actual connection diagram (as supplied) is shown on the respective device.



open printversion



1 LEDs for displaying the relay function (relay 3* without LED)
2 Fuses for drive motor and control electronics
3 Coding switch for range settings, direction of control action and sensitivity
4 Push button for starting automatic regulating distance adjustment
5 Status LED
6 Switch-over for connection interface / external display and keyboard
7 Connection for service interface, external display and keyboard
8 Connector plug for signal output
9 Internal connector plug for feedback potentiometer and actuating signal
10 Internal connector plug for mains voltage and actuating output for actuator

Description

The position controller converts an incoming actuating signal into the associated drive position by comparing the signal with the position feedback from a potentiometer built into the drive, and by setting the drive position via relays 1 and 2. An output signal 4..20 mA for position feedback is in the standard equipment.

The automatic and maintenance-free device is integrated into the actuator. All main basic parameters for range, operationg direction and sensitivity are set via coding switches. Optionally, various interfaces to higher-level master computers or PLCs are available, both for data acquisition or remote maintenance purposes and for executing digital control commands.

The device is only accessible once the drive cover has been removed. Commissioning only consists of checking the settings and a single activation of the adjustment button; an LED indicates completion of the automatic adjustment to the end positions. The device is then ready for operation.

Type Summary	**Li.no.**
Basic unit	**49sr5**
Additional fittings:	
Extra voltage (1=115V AC, 2=24V AC, 8=24V DC), others on request	**49sr5_ ..**
Position feedback output 0..10V	**49sr5.k**
Interface RS485, protocol KFM 2.0	**49sr5.s**
Profibus DP interface	**49sr5.sp**
Mobile display and control unit	**49sr59z**

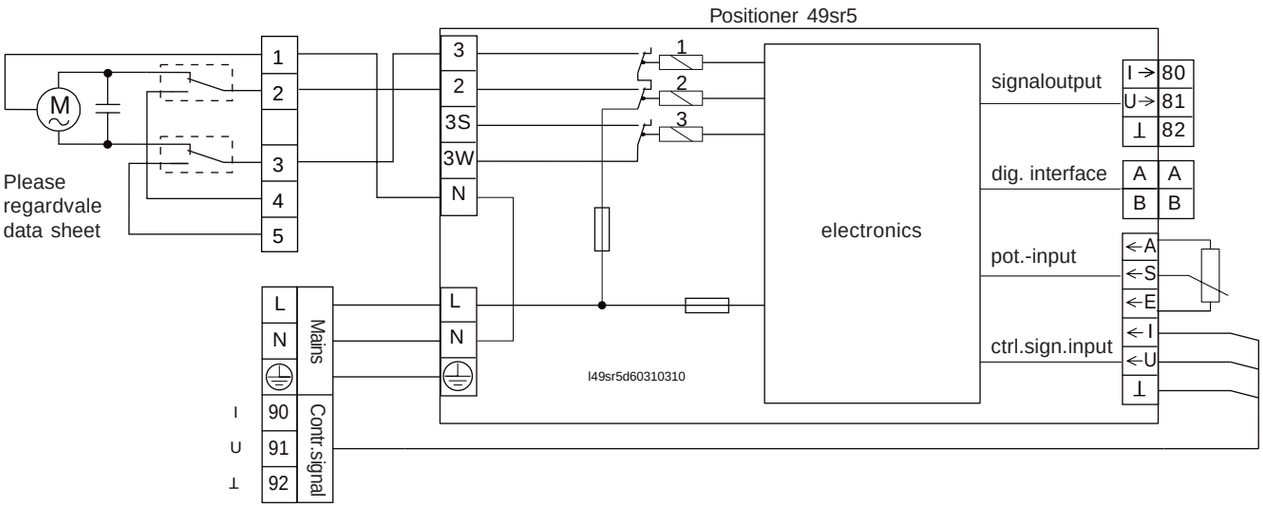
* = available depending on type

open printversion

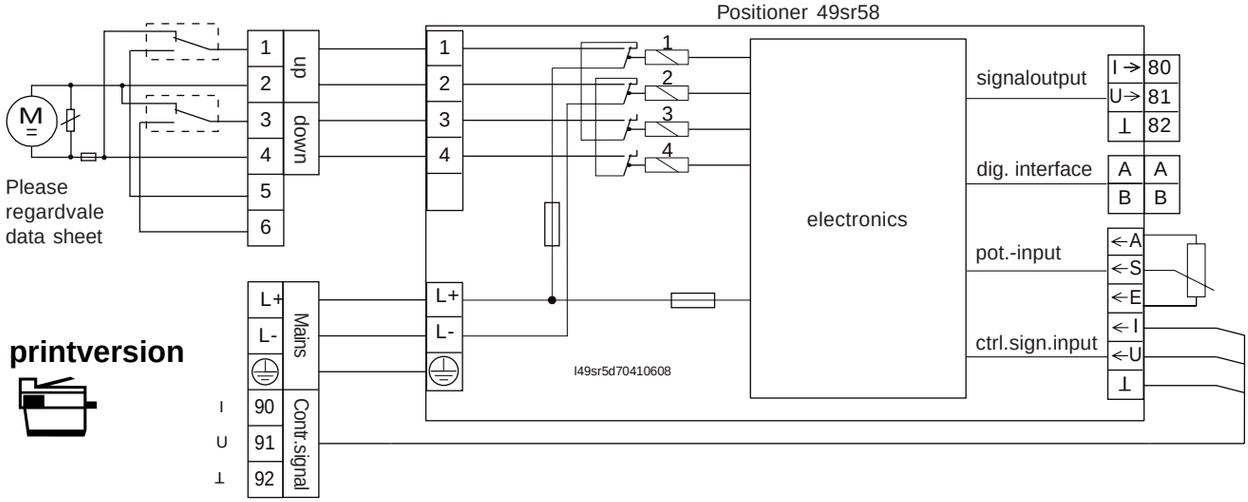
Technical data:

Input (adjustable):	0...20mA / 0...10V 4...20mA / 2...10V 0...10mA / 0...5V 4...12mA / 2...6V 10...20mA / 5...10V 12...20mA / 6...10V
Response sensitivity:	switchable normal / reduced
Output:	up to 4 relays, max. 250V, 2 A 4..20mA for position feedback, load imp. < = 500 Ohm, alt. 0..20mA optional 0 .. 10 V, load impedance > 500 Ohm, alt. 2..10V
Operating direction (adjustable):	direct: increasing input signal opens the straight way, inverse: increasing input signal closes the straight way
Status indicator:	1 status LED for adjustment procedure, normal operation, fault 2 LEDs for function display relay 1 and 2
Mains connection:	230V +/- 10 %, 48...62Hz, approx. 3VA alternatively 115 V, other voltages on request
Optional interfaces:	RS 485 / KFM 2.0 protocol, Profibus DP, others
Permissible ambient temp.:	0...60°C, nominal temperature: 20°C

Internal function and connections 230V / 115V / 24V AC*:



Internal function and connections 24V DC*:

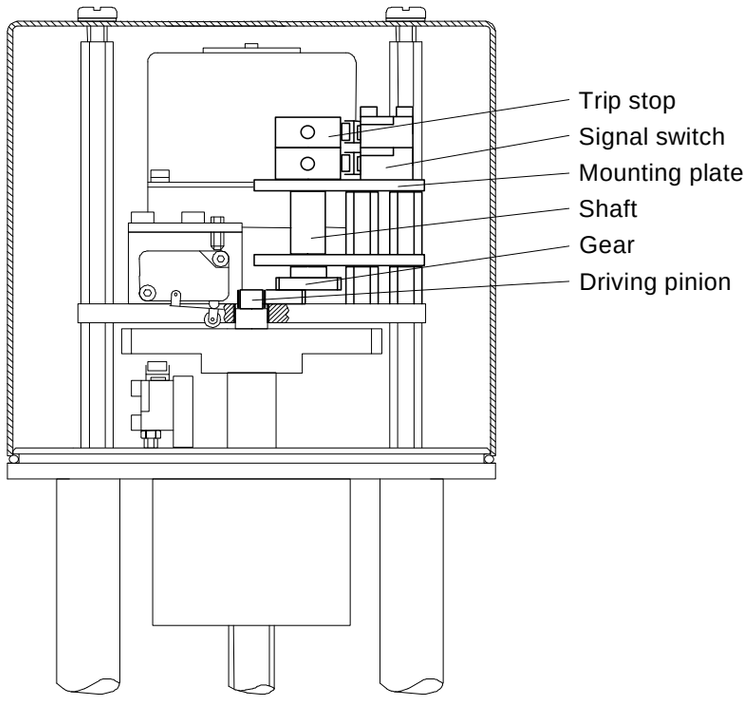


open printversion

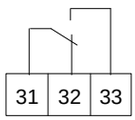
* Example, depending on sub type some details can be missed. The wiring diagram glued into the bonnet is only valid for each delivered controller.

Electric actuators type 4e1... can be equipped with 1 or 2 additional travel dependent switches.
The zero-potential change over switches have a contact rating of 250V / 2A (ohmic load).

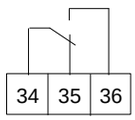
Attention! The signal switches have to be readjusted after each manual operation with hand wheel.



Additional terminals:



Signal switch 1



Signal switch 2

Type summary:

49w x x

2 2 travel dependent signal switches

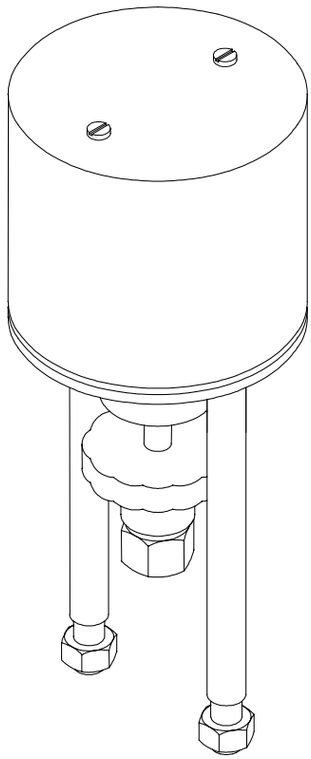
1 Stroke 15 mm
2 Stroke 20 mm
3 Stroke 30/35 mm
4 Stroke 40 mm

open printversion

Electric actuator for valves
with integrated manual emergency
Controlling device: 3-point step controller r

Power supply:	230V / 50...60Hz
alternatively:	115V / 50...60Hz (option 49u1)
	24V / 50...60Hz (option 49u2)
	24V DC (option 49u8)
Thrust:	2000 N
	Power input: 10 VA
alternatively:	4000/5500 N / 20 VA
Positioning time:	3,3 s/mm
alternatively:	2,2 s/mm (option 49t12)
Stroke:	41 mm
alternatively:	60 mm (on request)
Protection class:	IP 65
Limit switches:	1 changeover switch for each limit position, load dependent, ratings: 250V / 2A
Mounting position:	any, avoid hanging position (damaging by effluent media possible)

Max. ambient temperature: -15...60° C



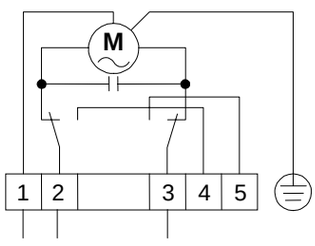
Accessories, special designs:
Add. load dependent signal switches (see page 49e)
Add. travel dependent signal switches (see page 49w)
Feedback potentiometer (see page 49f)
Integrated positioner (see page 49sr)

Order text:
Electric actuator, thrust . . ., power supply . . .,
pos. time . . ., mounting rod lenght . . .,
List-No. 4e1 . . .

List-No.	Thrust N	Mounting rod* mm	Pos.time s/mm	Weight kg
4e1134	1500	195	3,3	6
4e1230	2000	200	3,3	6
4e1231	2000	218	3,3	6
4e1232	2000	231	3,3	6
4e1235	2000	250	3,3	6
4e1430	4000	200	3,3	7
4e1431	4000	218	3,3	7
4e1432	4000	231	3,3	7
4e1435	4000	250	3,3	7
4e1630	5500	200	3,3	7
4e1631	5500	218	3,3	7
4e1632	5500	231	3,3	7
4e1635	5500	250	3,3	7

* = other rod lenghts on request

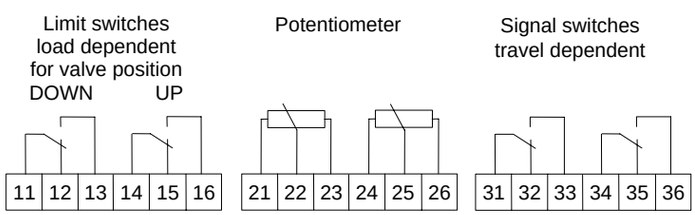
Electrical wiring:



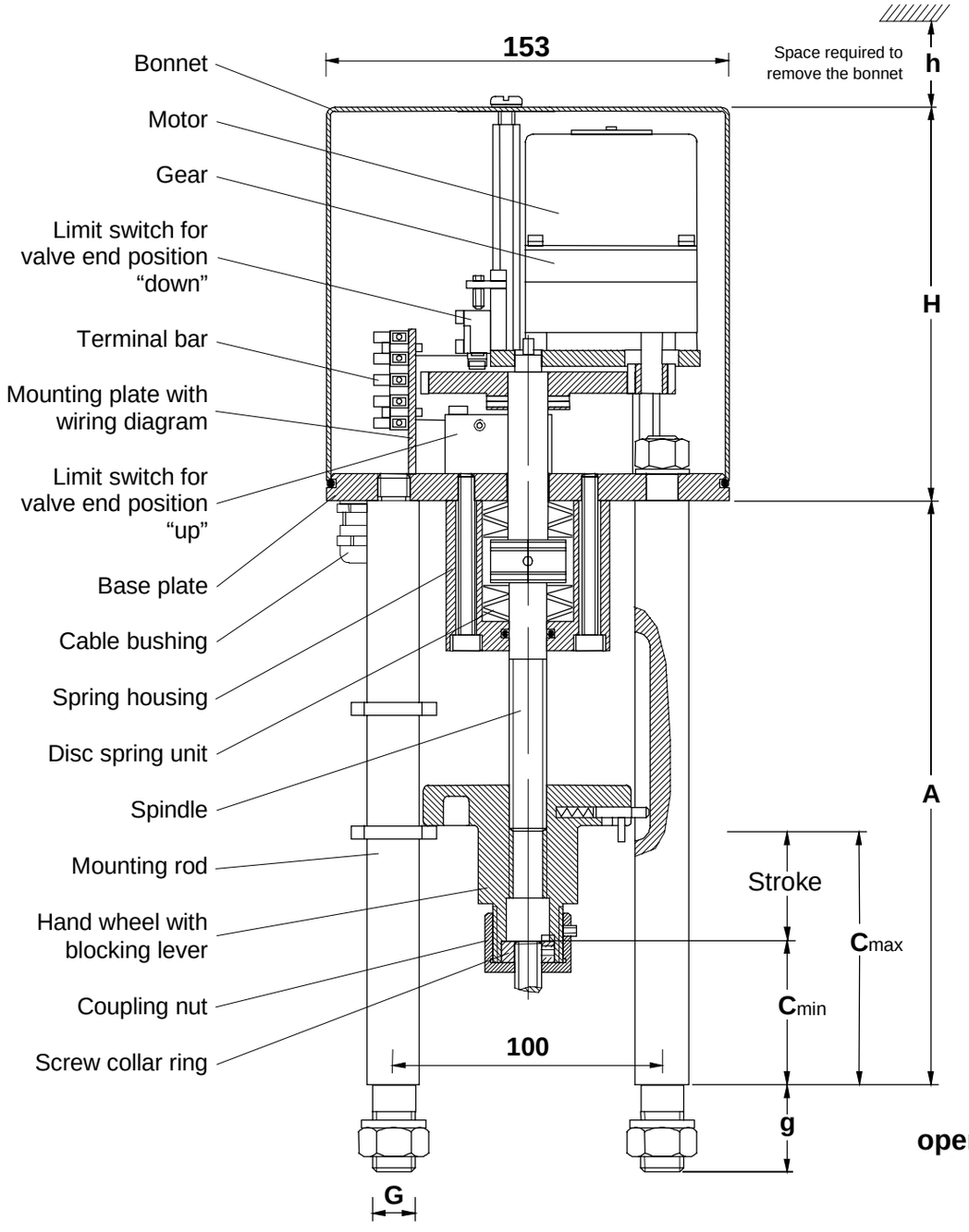
N

L on 2 = stroke downwards
L on 3 = stroke upwards

Accessories (optionaly)**:**



open printversion



open printversion

Type	Thrust N	A mm	Cmin mm	Cmax mm	H mm	h mm	G mm	g mm
4e1134	1500	195	40	81	146	145	M12	24
4e1230	2000	200	45	86	146	145	M16	32
4e1231	2000	218	63	104	146	145	M16	32
4e1232	2000	231	76	117	146	145	M16	32
4e1235	2000	250	95	136	146	145	M16	32
4e1430	4000	200	45	86	191	190	M16	32
4e1431	4000	218	63	104	191	190	M16	32
4e1432	4000	231	76	117	191	190	M16	32
4e1435	4000	250	95	136	191	190	M16	32
4e1630	5500	200	45	86	191	190	M16	32
4e1631	5500	218	63	104	191	190	M16	32
4e1632	5500	231	76	117	191	190	M16	32
4e1635	5500	250	95	136	191	190	M16	32

Body: GGG-40.3, three way form**,**
for heat transfer oil, as mixing valve,
(diverted purpose restricted),
(see page 038 990)
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
alternatively: weld-on ends (on request)
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, screwed seat rings,
Flow characteristic: linear
Positioning ratio: 50:1
Leakage: < 0,01% K_{VS}

Electro-hydraulic actuator: with emergency close function
(straightway A-AB closed by power failure)
and integrated manual emergency

Thrust:	ca. 2800 N
Power input:	DN 20...50: 15 VA,
	DN 65...100: 24 VA
Power supply:	230V/50...60Hz
Emergency close time:	DN 20...50: 10 s,
	DN 65...100: 14 s
Protection class:	IP54

Accessories, special designs:
Add. two signal switches (59e)
Feedback potentiometer (59f)
Reduced kvs-values (on request)
Weld-on ends (on request)

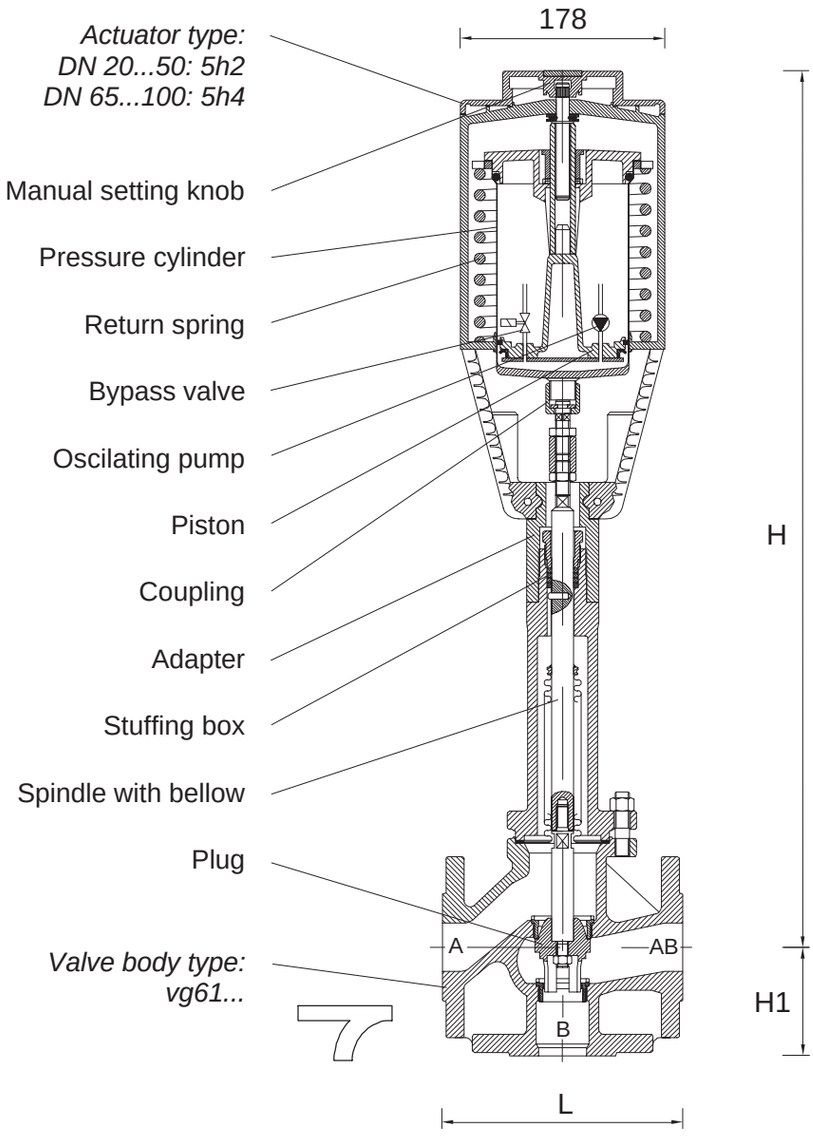
Order text:
Electro-hydraulic control valve PN . ., DN . .
in three way form with VA-bellow sealing,
and emergency close function, List-No. 561 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

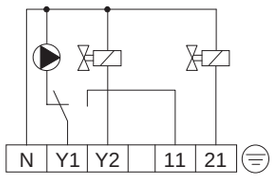
DN	List-No. PN 16	List-No. PN 25	Kvs m³/h	Stroke mm	Pos. speed sec	Closing pressure bar
20	561 401	561 501	6,3	20	120	25,0
25	561 402	561 502	10	20	120	25,0
32	561 403	561 503	16	20	120	25,0
40	561 404	561 504	25	20	120	16,5
50	561 405	561 505	40	20	120	10,3
65	561 406	561 506	63	30	100	5,7
80	561 408	561 508	100	30	100	3,7
100	561 410	561 510	160	30	100	2,0

open printversion



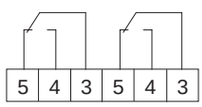
DN	20	25	32	40	50	65	80	100
Height H	725	719	725	731	733	863	864	871
Stud lenght H1	70	75	80	90	100	120	130	150
Immersion lenght L	150	160	180	200	230	290	310	350
Weight kg	18,5	19,5	22,5	23,5	26,5	45,0	49,0	64,0

Electrical wiring:

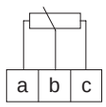


N/Y1 = Straightway opens
N/Y2 = Straightway closes
N/21 = Emergency close funktion
(closes straightway by power failure)

Accessoires (optional)**:**



add. signal switch
travel dependent



potentiometer

open printversion

Index Group 6

Other Valves

Safety equipement: acc. to DIN 4754
for shut off or discharge by emergency
and simultaneous disconnection of burner
through electrical signal contact.
Operating through release cord (supplied by customer)

Body: GGG-40.3, two way form,
for heat transfer oil,
Pressure range: PN 16,
Flanges acc. to DIN,
Sealing: VA-bellow,
and safety stuffing box,
Internal parts: stainless steel,

Switch: die cast metal enclosed,
Spring contact: 1x opening / 1x closing,
Opening contact forcibly actuated
Contact rating: 6A / 400V AC-11
Protection class: IP 65

Order text emergency stop valve:
Emergency stop valve PN 16, DN . .
List-No. 640 40 . s

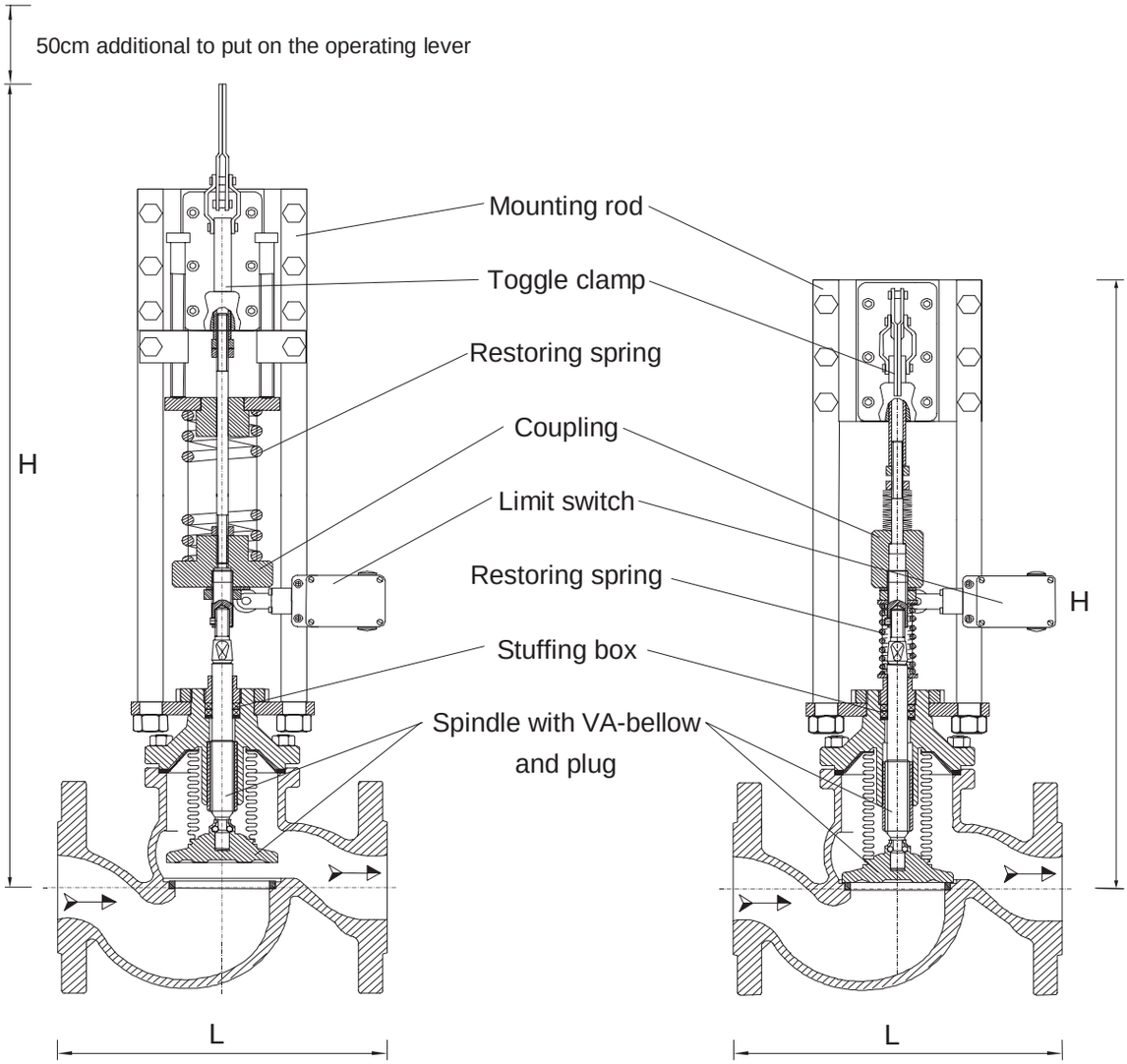
Order text emergency outlet valve:
Emergency outlet valve PN 16, DN . .
List-No. 640 40 . o

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar

DN	**List-No.** stop valve	**List-No.** outlet valve	**Kvs** m³/h
25	640 402s	640 402o	10,5
32	640 403s	640 403o	17,7
40	640 404s	640 404o	31,4
50	640 405s	640 405o	45,0
65	640 406s	640 406o	87,0

open printversion



Emergency stop valve
Shown in operating state

Emergency outlet valve
Shown in operating state

DN	List-No.		Immersion lenght	Height		Weight	
	stop valve	outlet valve		type s *	type o	type s *	type o
			mm	mm		kg	
25	640 402s	640 402o	160	745	460	18	16
32	640 403s	640 403o	180	755	470	21	19
40	640 404s	640 404o	200	770	485	22	20
50	640 405s	640 405o	230	770	485	25	23
65	640 406s	640 406o	290	790	505	32	30

***** add. ca. 50 cm to put on the operating lever

open printversion

Body: GGG-40.3, two way form,
for heat transfer oil,
Pressure range: PN 16, PN 25
Flanges acc. to DIN,
alternatively: weld-on ends (on request)
Sealing: VA-bellow double wall,
and safety stuffing box,
Internal parts: stainless steel, screwed seat rings,
Flow characteristic: linear
Positioning ratio: 50:1

Function:
The valve opens the straightway against outside spring
when the differential pressure on the valve plug is rising.
Response pressure: adjustable 1...4 bar with an adjusting key.

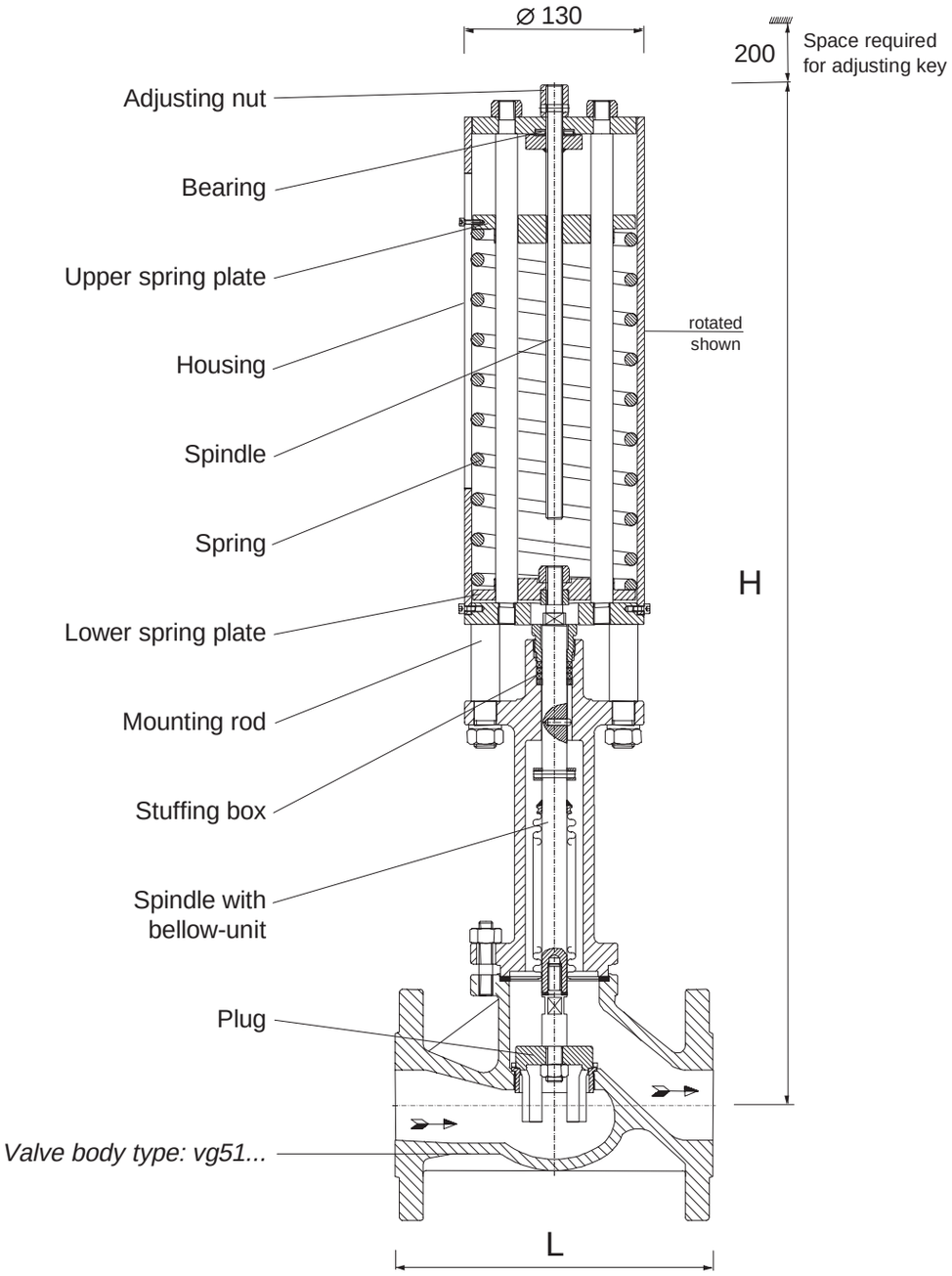
Order text:
Overflow valve PN . ., DN . .
with VA-bellow sealing, List-No. 651 . . .

Max. operating pressure:

by:	120	200	250	300	350	°C
PN 16	16	13	13	13	10	bar
PN 25	25	20	18	16	15	bar

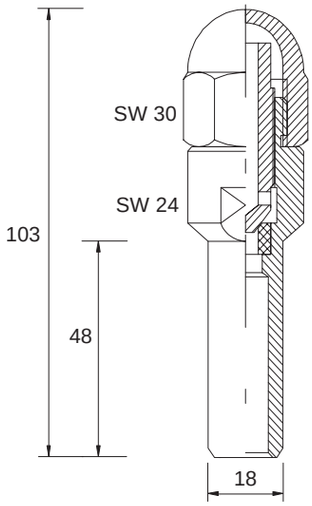
DN	List-No. PN 16	List-No. PN 25	Kvs m³/h	Stroke mm
25	651 402	651 502	10	20
32	651 403	651 503	16	20
40	651 404	651 504	25	20
50	651 405	651 505	40	20
65	651 406	651 506	63	30
80	651 408	651 508	100	30

open printversion

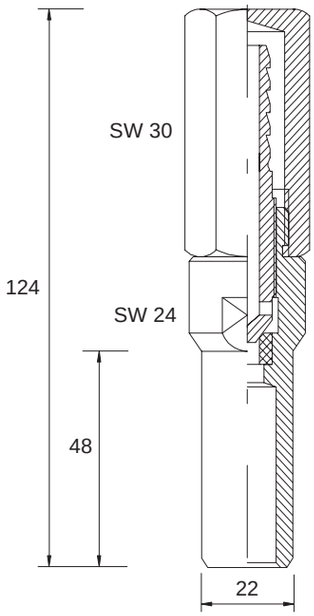


DN	25	32	40	50	65	80
Height H	721	728	732	735	920	921
Immersion lenght L	160	180	200	230	290	310
Weight kg	19	20	21	23	32	41

open printversion



691 511



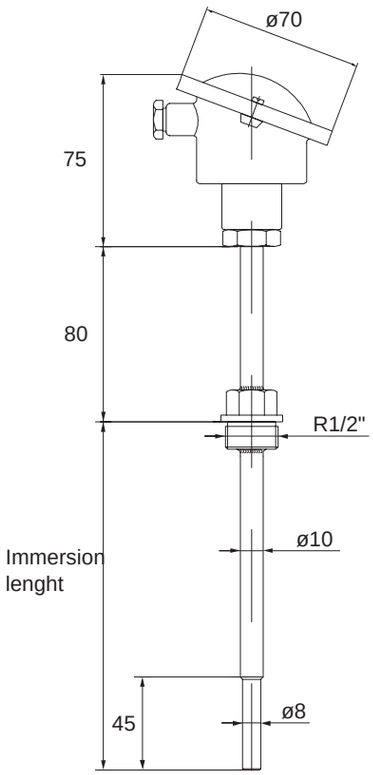
691 522

Technical data:

Housing:	RSt37-2
Seat and plug:	stainless steel
Pressure range:	PN 25
Connection:	weld-on ends
Nominal diameter:	DN 10, DN 15
Operation:	square shaft, SW 11
Locking cap:	steel, galvanized, SW 30
Weight:	0,3 kg (69151.) 0,4 kg (69152.)

Types:	**List-No.**
without tube nozzle:	
DN 10	**691 511**
DN 15	**691 512**
with tube nozzle:	
DN 10	**691 521**
DN 15	**691 522**

open printversion



Screw-in resistance thermometer with terminal head, measuring jaw poured in, vibration-safe,
alternatively: changeable (type suffix ..a)

Technical Data:

Sensor:

Terminal head:	form B, DIN 43 729
Max. ambient temperature:	100°C
Max. media temperature:	400°C
Neck tube:	10 x 80 mm
Connection:	R 1/2"
Material:	V4A
Immersion lenght:	160 mm, 250 mm, 400 mm, other lenghts on request

Transit times (water 0,4m/s):	*t_{05} in s*	*t_{09} in s*
Measuring jaw poured in	12	40
Measuring jaw changeable	15	50

Immersion lenght:	**List-No.:**	
mm	*1 x Pt100 DIN*	*2 x Pt100 DIN*
160	713 411	713 421
250	713 4125	713 4225
400	713 414	713 424

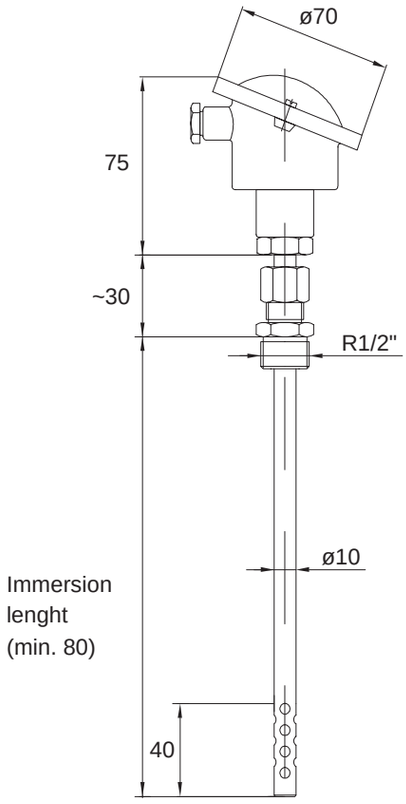
Order text:

Resistance thermometer .. x Pt100 DIN,
with terminal head form B, immersion lenght ... mm,
measuring jaw poured in / changeable
List.-No. 713 4...

open printversion

Resistance thermometer for gaseous media with terminal head form B

713 5.. E



Resistance thermometer with terminal head and slidable screw joint, measuring jaw poured in, vibration-safe.

Technical Data:

Sensor:

Terminal head:	form B, DIN 43 729
Max. ambient temperature:	100°C
Max. media temperature:	400°C
alternatively:	600°C (type suffix t)
Connection:	R 1/2"
Material:	V4A
Immersion lenght:	250 mm, 400 mm, with borings on lenght 40 mm, other lenghts on request

Transit times (air 1m/s):

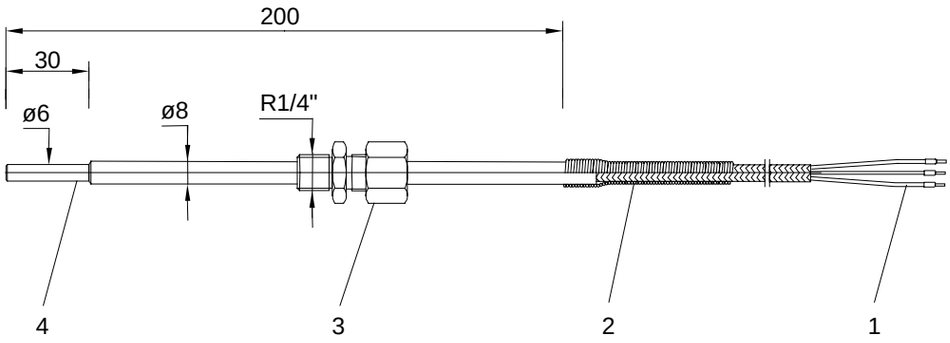
t_{05} *in s*	t_{09} *in s*
50	150

Immersion lenght: *mm*	**List-No.:** *1 x Pt100 DIN*	*2 x Pt100 DIN*
250	713 5125	713 5225
400	713 514	713 524

Order text:

Resistance thermometer .. x Pt100 DIN,
with terminal head form B, immersion lenght ... mm,
for media temperature up to 400°C / 600°C,
tube with borings, List.-No. 713 5...

open printversion



1. Cable terminal
2. Protective spring
3. Screw joint
4. Protective tube

Resistance thermometer, 3-wire-type with slidable screw joint and 3 m fixed PTFE measuring cable with alloy steel schielding and protective spring, wires with cable terminals.

Technical Data:

Measuring jaw:	1 x Pt100 DIN, poured in, vibration safe
Transmit times (air 1 m/s	t_{05} = 50 s $_{09}$ = 150 s
Protective tube:	VA, 200 x 8 mm / measuring tip 30 x 6 mm
Cable:	3 m PTFE measuring cable for max. 280°C
Protective spring:	VA, 40 mm
Screw joint:	R 1/4"

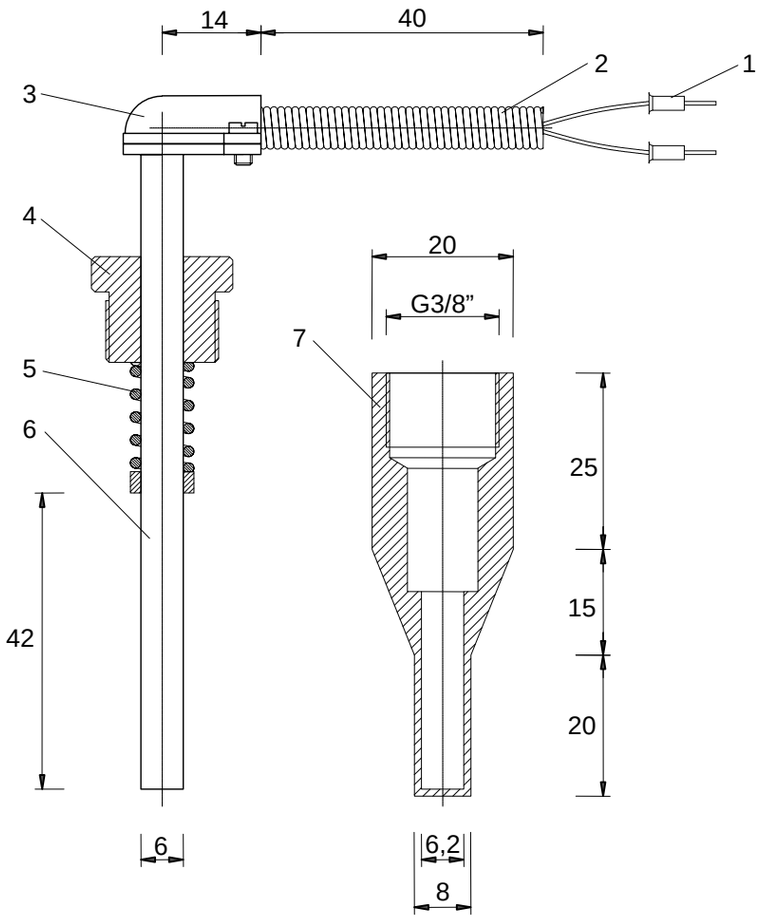
Order text:

Resistance thermometer 1 x PT100 DIN
with 3m fixed PTFE measuring cable,
three-wire-type,
VA-protective tube 200 x 8 mm / 30 x 6 mm,
slidable screw joint R 1/4"
List-No.: 714 400p3

open printversion

Resistance thermometer with weld-in immersion shell and fixed measuring cable

714 704



1. Cable terminal
2. Protective spring
3. Angle clamp
4. Screwed joint
5. Spring
6. Protective tube
7. Weld-in immersion shell

Angle-resistance thermometer, 2-wire-type with 2 m connection cable, with protective spring, cable single and common isolated, wires with AMP-cable-terminals.
Mounting in weld-in immersion shell trough G 3/8“ screwed joint.

Technical Data:

Measuring resistance:	1 x Pt100 DIN, vibration safe
Transmit times (water 0,4 m/s):	t_{05} = 15 s t_{09} = 50 s
Protective tube:	stainless steel
Angle clamp:	1.4541
Connection cable:	2 m
Protective spring:	stainless steel, 40 mm
Weld-in immersion shell:	C22.8, optionaly 1.4541

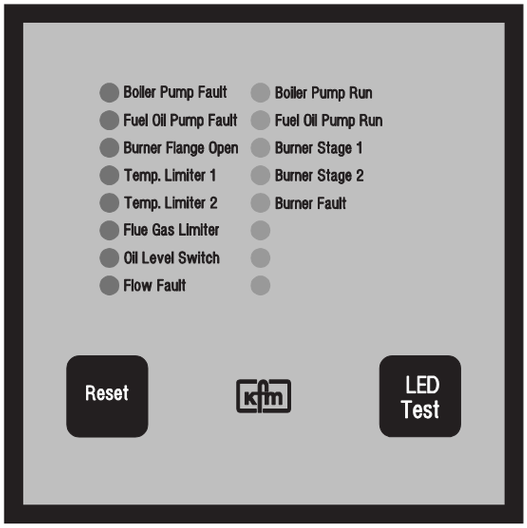
Order text:

Angle-resistance thermometer, 2-wire-type
with 2 m connection cable, 1 x Pt100 DIN,
Screwed joint G 3/8“, including
weld-in immersion shell from C22.8
List-No.: 714 704

open printversion

Index Group 8

Display- and monitor equipment



General description:

Compact unit in the 96 x 96 mm switch panel format for operating and fault messages in control and monitoring systems.

Faults are displayed by red LEDs on the front panel, operations are displayed by green LEDs. (Optional colours can be supplied).

Operating displays are triggered by contact inputs and have a mere display function.
In addition, fault messages entail an internal, automatically interlocking alarm circuit (relay k1).

The 'reset' - button releasing the alarm locking situation is mounted on the front panel, together with a lamp-test button. One further optional button can be provided.

The legend film is behind the front film and can be accessed following the removal of the front frame. Legends can either be produced by the supplier according to instructions, or by the user on a laser printer or copier.

Types (Examples):

821 0016	16 operation displays
821 0808	8 malfunction warnings, 8 operation displays
821 1006	10 malfunction warnings, 6 operation displays
821 1600	16 malfunction warnings
...e	Alternative version, first- value message
...n	Alternative version, new- value message

Additional devices:

821 902	relay K3 in user defined function
821 910	additional relay (K4)
821 9s	Interface

open printversion

Functions:
Operating displays have a mere display function. Their display is by green LEDs (optional colours can be supplied).

Fault messages are grouped as a multi-input fault warning message by relay k1. When a fault has occurred on one of these inputs, the collective relay is energized, the attendant red LED flashes. Once the *Reset button* on the front is actuated, the collective relay is out again. The fault warning LED now has steady light. *Following* the remedy of the malfunction, the fault warning LED extinguishes automatically.

Display logic, standard version: In the event of further faults occurring in addition to existing faults, the LEDs of all faults that have already been acknowledged will have steady light, whilst the LEDs of the messages that have not yet been acknowledged will flash.

Alternative version, new-value message (type add-on ...n): In the event of a further fault occurring in addition to an existing, not yet acknowledged fault, the relay for the audible alarm is energized again, and the LED for the new fault message will flash.

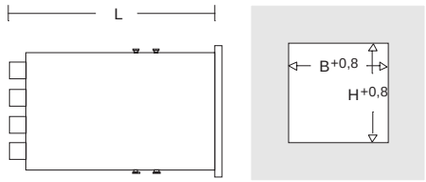
Alternative version, first-value message (type add-on ...e): In the event of a further fault occurring in addition to an existing, not yet acknowledged fault, the LED of the new fault message will have steady light, whilst the LED of the first fault message will continue to flash.

The button "LED test" is intended for a light diode function check.

Technical data:

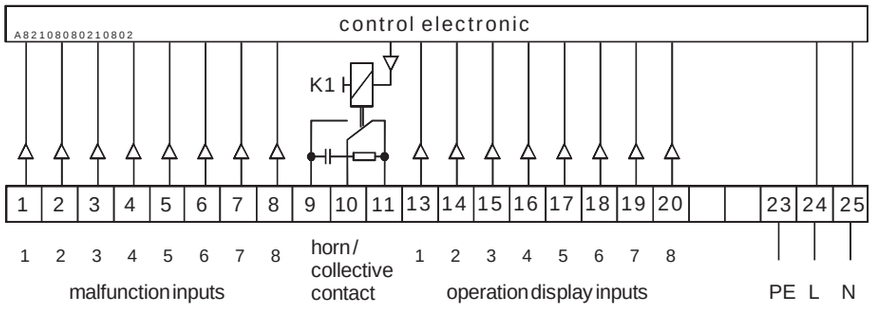
Operating- and fault- Display Inputs :	230 V, 48...62 Hz
Input current :	2 mA
Supply voltage :	230 V, approx. 3.5 VA
Relay outputs :	potential free change-over contacts for max.230 V / 2 A
Type of protection acc. DIN 40050 :	IP 54 (terminals IP 20)
Permissible ambient temperature :	0...60°C
Nominal temperature :	20°C
Service position :	optional
Permissible relative humidity :	75 % average annual value (group F DIN 40040), without dew formation

Installation dimensions:



L = 150 mm, B = 92 mm, H = 92 mm

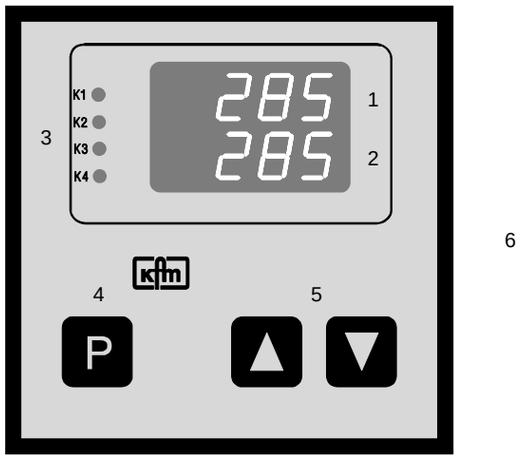
Connecting diagram:
(Example: 821 0808, depending on sub type there may be some additional details or some details are missing ; valid for each version is the wiring diagram on its casing only.)



open printversion

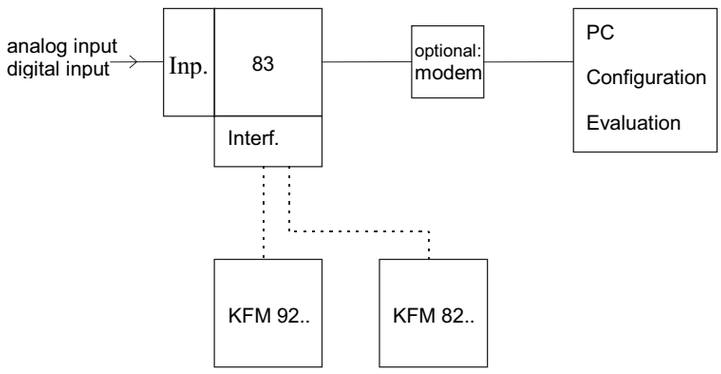
1 Digital display 1*
2 Digital display 2 (if active)*
3 LED display for relay function*
4 Operator mode button*
5 Settings and operating buttons*
6 Interlocking switch for setting mode (at rear)*

* = Type 831 only



General:
The KFM 830 data logger product line is used for the continuous recording and storage of operational data received at the digital and analog device inputs or (optionally) via an interface from other KFM devices, e.g. controller KFM9.. or fault indicator / controller KFM 82.
By means of a circular buffer, the oldest values are continuously overwritten once the memory volume has been exceeded. Alternatively, a signal contact can be triggered once a certain memory utilisation level has been reached. The device is optionally available in different performance levels, with 4, 8 or 16 recording channels, a maximum of 16 analog or 16 digital inputs and KFM connection interface. Optionally, up to 4 additional relay outputs with potential-free change-over contacts are available for messaging functions.
Versions for standard rail installation (type 830) or panel mounting (format 96 x 96mm, type 831) are available. For type 831, selected measurement readings in the operating mode can be displayed at up to 4 displays.
The device is configured and stored data are read (locally or via modem) with special Windows software that is part of the scope of supply.

Flow chart:



Types *(depending on configuration):*	*Type*
Basic unit for standard rail	830.
Basic unit for panel mounting	831.

Device variants:	*Last digits*
4, 8, 16 recording channels	1..,2..,4..
0, 4, 8, 16 analog inputs	..0,..1,..2,..4
0, 8, 16 binary inputs	.0.,.2.,.4.

Measuring inputs (maximum):
3 Universal inputs Pt100 DIN / standard signal
1 Input Pt100 DIN or standard signal
12 Standard signal inputs

Displays:
2 to 4 four-digit displays (type 831) with selectable decimal point, 4 LED displays for relay functions.

Outputs:
Up to 4 relays with potential-free change-over contact as alarm contacts, switching power: 250V 2A
incl. spark extinction (on NO contact)

Additional fittings:
Serial interfaces (99) s.

1 Digital display of set value
2 Pushbuttons for adjusting the set values recessed and lead-sealable
3 Internal reset pushbutton
4 LEDs for operating and error displays
5 Function check button

DIN assembly tests:

STB 114603 S ref. DIN 3440

CE 0045 ref. rule 97/23/EG, modul B and D

General:

Two-channel self-monitoring safety temperature limiter, constructed to meet the requirements for increased safety (DIN 3440).

The electrical safety circuit is switched off, i.e. opened, if the set value is exceeded or if there is a fault at the measurement input or in the device. A fault signal is also provided at the terminals. The limiter can only be unlatched manually after the fault has been rectified.

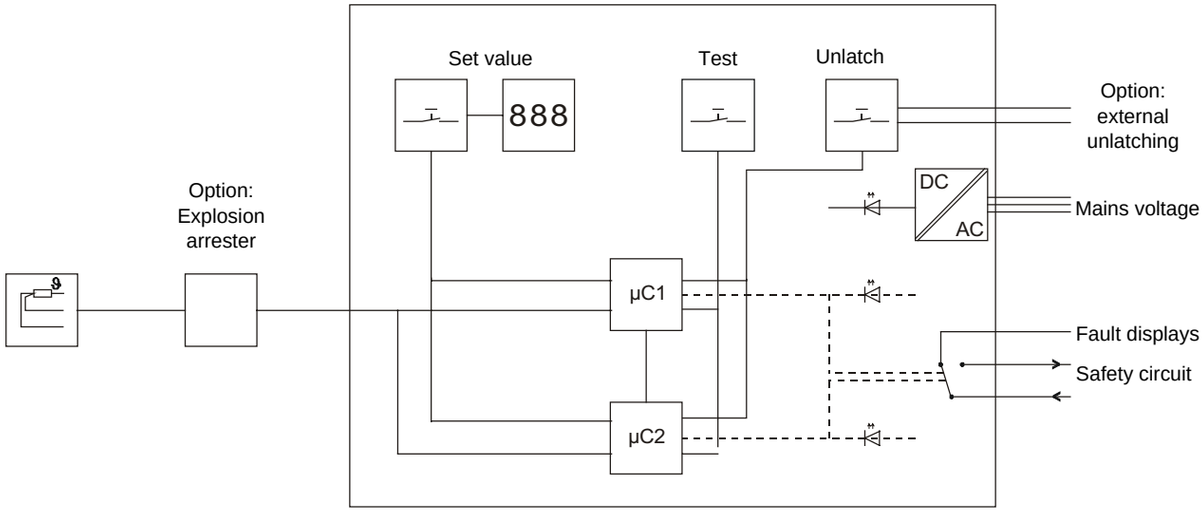
The Pt100 measurement input is of the 3-conductor type, so that compensation is automatically provided for cable resistances and intermediate explosion arresters.

The device includes test buttons with which the specified annual function checks can be carried out very conveniently, without having to disturb the connected cables.

Models:

845 210	Model without display
845 220	Model with display

Block diagram:



open printversion

INDEX

1 2 3 4 5 6 7 8 9 0

Acceptable sensors:

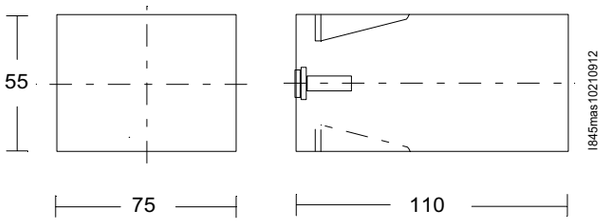
All temperature sensors demonstrably according to DIN 3440 are acceptable. Please observe the specifications about type, application range, installation conditions and time constant in the VDTÜV datasheet.

Type	Operating medium	Permissible operating pressure	Maximum switching point	Protection tube	Time constant
713 400	Water and oil	56 bar	400 °C	Without immersion sleeve	18 s
714 704	Water and oil	50 bar	400 °C	Only use protection tube supplied	22 s
715 712	Water and oil	70 bar	400 °C	Only use protection tube supplied	53 s
713 610	Air and exhaust fumes	No pressure	500 °C	Without immersion sleeve	120 s

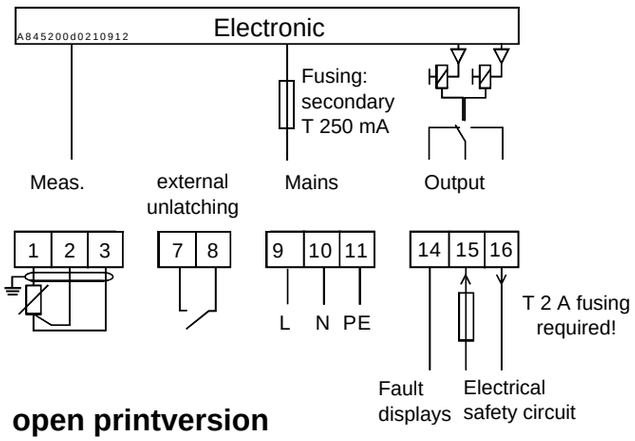
Characteristic values:

Input:	1 x Pt 100 DIN
Measuring range:	-200 ... + 600 °C, others optional
Set value adjustable range:	*Note: Observe the sensor's switching point!* Type 845 210: -200 °C (+10K) ... 600 °C (-10K) Type 845 220: -99 ... 600 °C
Adjusting the set values:	Using recessed, lead-sealable push-button
Output:	2 relays, max. 250 V 2 A
Switching hysteresis:	8 K +/- 1K, other values available on request (expressed as appendix to type identifier in plain text, e.g. 845 220 4K)
Housing:	For fastening to 35 mm mounting rail, or for screw fastening
Mains connection:	230 V AC + 10 % / - 15 %, 48...62Hz
Alternatively:	115 V AC, 48 V AC, 24 V AC
Power consumption:	Approx. 4 VA
Fusing:	Secondary side, T 250 mA
Type of protection acc. EN 60529:	IP 20, for mounting within a housing offering at least IP 40
Permissible ambient temperature:	0...60°C, Nominal temperature: 20°C
Storage and transport temperature:	-20 ... +80 °C
Climatic resistance:	Relative humidity <= 75 % annual average without condensation
Electromagnetic compatibility:	In accordance with EN 61326, industrial requirements
Installation orientation:	optional

Installation dimensions:



Connection diagram:



open printversion

Function extensions

Digital communication

Additional equipments

– see Page 2 –

Operating instructions

– see group 0 –

Page 2

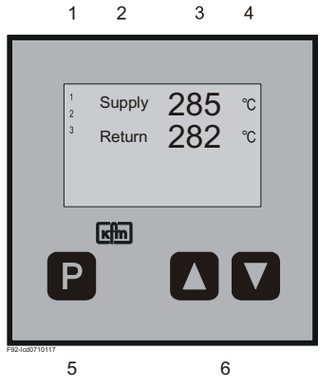
Additional equipments

Industry Controller, Function extensions

Digital communication

– see Page 1 –

Page 1



1 LCD display for relay function
2 Descriptive text for displayed values
3 Digital value displays
4 Unit of display
5 Key for setpoint and parameter mode
6 Setpoint adjustment

certifications: DIN, GL

General:
KFM 902 is an industrial microcomputer-based controller series in control panel format 96 x 96 mm with a performance range of up to 8 relay outputs, various signal inputs and outputs as well as numerous possible optional extras. Communication with control systems is also possible.
All relay contacts are implemented as potential-free changeover contacts. The N.O. contacts are internally wired with RC elements. The scope of delivery includes plugable terminal blocks.
The display is implemented using transflective LCD technology. In conjunction with the white background lighting, the display is easy to read in both light and dark environments. In operating mode, an additional value (setpoint, additional measuring inputs) can be displayed alongside the actual value, including freely adjustable description text and unit of display. Additional value displays, fixed texts or operating and error messages, including the corresponding hardware are optionally available. Custom display masks are also available on request. Stage controllers and three-point step controllers with auxiliary contact (e.g. burner controller) are fitted as standard with a 2nd measuring input.

Types *(depending on configuration):*	*Type*
indicator	9020..
single-stage controller	9021..
two-stage controller	9022..
three-point controller	9023..
positioner / follow-up controller	9024..
two-point PID controller	9025..
three-point PID controller	9026..
three-point step controller	9027..
continuous controller	9028..
continuous controller with 2 outputs	9029..
setpoint generator	902A..
custom combination	902K..

Sub-types:	*suffix*
Basic function	00
Basic function + 1..8 additional contacts	01..08
Basic function double, triple, quadruple	20,30,40
Logic output 0/10V max 20 / 40mA	..L /..M

Function extensions:	(*)
Cascade controller	991k
Program controller	991p
Ramp setpoint	991r
Stage controller	991t

Additional devices:	(*)
Additional analog inputs	(99) a.
External setpoint incl. switching	(99) bwa.
Second setpoint incl. switching	(99) bwz.
Binary inputs for special functions	(99) b..
Analog signal outputs	(99) o.
Serial interfaces	(99) s
Interfaces for Profibus, Interbus, others	(99) sp/si

*See also data sheets 99.. !
In the case of several supplementary equipment, “99..” is only written once, e.g.: 902700-99bwa-ogx-

Measuring inputs: (depending on version)

max, 4 measuring inputs,	*Type suffix*
Pt100 DIN, 0...400°C	without (or 0)
Pt100 DIN, 0...100°C	1.
Thermal element NiCr-Ni (Type K)0...1200°C	n.
Thermal element Fe-CuNi (Type J)0... 900°C	f.
Thermal element PtRh-Pt (Type S)0...1700°C	p.
Remote resistance transmitter 0…100/1000Ω	w.
Standardised signal 0(4)...20mA, 0(2)...10V	e.
Combined input Pt100 / standard signal	q.

Ranges:
Pt 100: 0..400°C, others optional, switchable to °F, standard signal: Display adjustable -999 to 4000, setpoint range can be limited via menu

Binary inputs:
Max. 20 inputs, alt. for potential-free contacts or for voltage 0 / 5..24V, for status messages (can optionally be saved) or control functions.

Displays:
Max. 4-digit value display with selectable decimal point, each including adjustable descriptive text and unit of display, choice of additional displays, also custom display masks, up to 8 displays for relay functions.

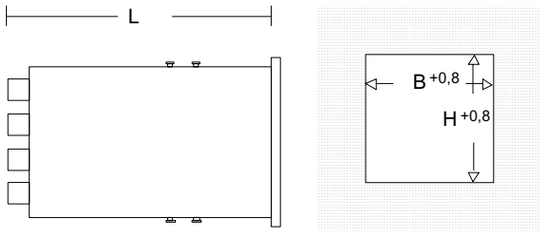
Outputs:
Up to 8 relays as setting outputs or additional contacts, with potential-free changeover contacts, switching power 250V 2A incl. spark extinction (on the N.O. contact)
up to 4 constant outputs 0/4...20mA, 0/2...10V (load <= 500 Ω), as setting or signal output
up to 8 logic outputs 0/10V max. 20 / 40 mA alternatively also as open collector, max 24 V / 100 mA

open printversion

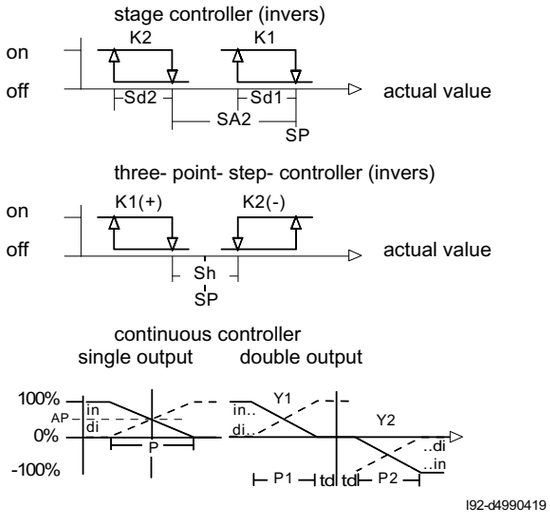
Characteristics:
Adjustment on parameter level, with lock switch, pre adjusted on customer´s demand.
(parameters depending on sub type:)
Proportional band Xp: 0,1...999,9 %
Integral action time Tn: 0,0...999,9 min
Rate time Tv: 0,0...99,9 min
Sensitivity of response Xsh: 0,1...1,0 %
Travel time of the actuator Tm: 6...600 sec
Switching frequency cy: 2...120 sec
Function characteristics: direct / inverted
Switching interval SA (add. contacts): 0..100,0 K
Switching difference Sd: 0,1...100,0 K

Additional contact functions:
As switching interval above and below setpoint or independent adjustable with own setpoint and measuring input, switching function adjustable (ref. to chapter additional switching contacts)

Installation dimensions:

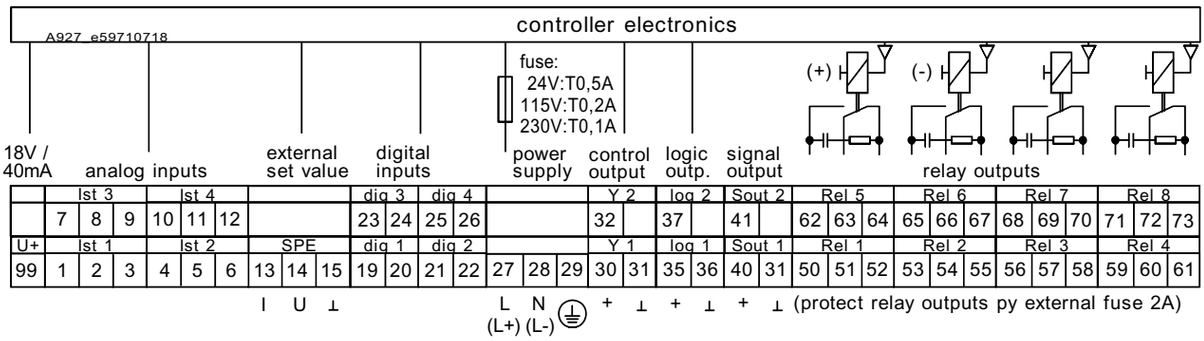


Form 96x96: L= 150mm, B= 92mm H=92mm
Form 72x144: L= 170mm, B=168mm H=139mm

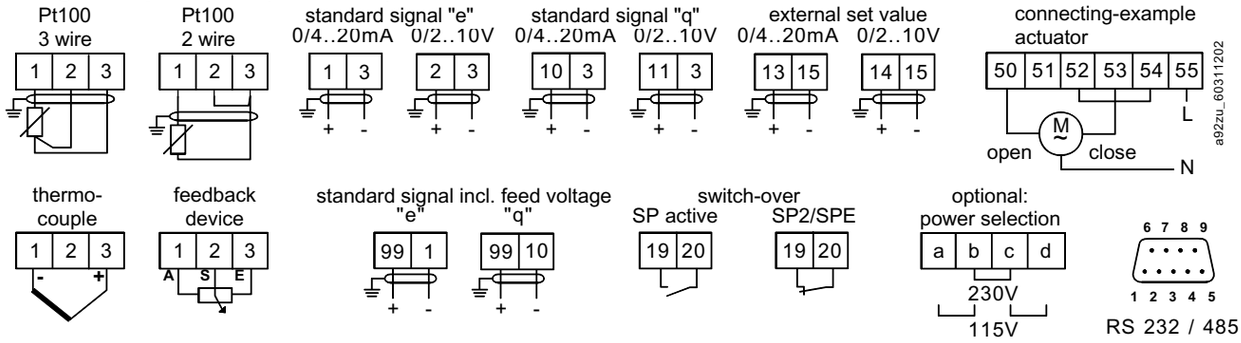


Other data:
Housing for panel mounting, 96 x 96 mm
Power supply: 230VAC +/- 10 %, 48...62Hz
alternative 115 VAC, 48 VAC, 24 VAC, 24 VDC
Power consumption: approx. 14 VA
Protective system DIN 40050: IP54 (terminals IP20)
Permissible ambient temperature: 0...60°C
Nominal temperature: 20°C
Climatic category: KUF to EN 60529
Relative humidity <= 75 % yearly average, no condensation
EMC: refer to EN 61326

Wiring diagram:
(Example, depending on sub type some details can be missed valid for each delivered controller is the wiring diagram on its casing only)



wiring examples (for input 1 each)



open printversion

INDEX

1 2 3 4 5 6 7 8 9 0

1 Digital display actual value
2 2nd digital display (if aktive)
3 LED-display relais function
4 Key for setpoint and parameter mode
5 Setpoint adjustment
6 Parameter mode lock switch (back face)

DIN-certificate: TR (TW) 949 ..

Brief description:

KFM 92 is a microprozessor based industry controller series in panel mounting- format 96 x 96 mm. Design and operating elements are especially devised for easy and convenient handling and operation.

An assembly system renders possible the simple basic version as well as a plurality of variants with up to 8 relays, several digital and analog out- and inputs and other additional devices.

Types:

(depending on configuration):*	*type:*
indicator	9201.
one stage controller	9210.
two stage controller	9220.
heating / cooling controller	9230.
positioner / follow-up controller	9240.
two- point- PID controller	9250.
three- point- PID controller	9260.
three- point- step controller	9270.
continuous controller	9280.
continuous controller, 2 outputs	9281.

Sub-types:

	suffix (*)
basic function	.0
basic function + 1 additional contact	.1
basic function + 2 additional contacts	.2
2 x basic function	.3
extension: logik output	..L

function extensions

	suffix (*)
cascade controller	991k
program controller	991p
ramp set point value	991r
step controller	991t

Additional devices:

	(*)
additional analog inputs	(99) a
external set value incl. switch-over	(99) bwa
second set value incl. switch-over	(99) bwz
binary input to switch special functions	(99) b..
additional switching contacts	(99) f..
analog signal outputs	(99) o.
serial interface RS 232/485	(99) s.
interface Profibus,Interbus S, other	(99) sp/si.

* In case of more than 1 extension there is at the data plate only once '99' , f.e. 92700-99aw-ogx-rü. For more information see corresponding data sheets.'
...

Inputs:

max. 4 measuring inputs, acc. to sub-type*:*	*type suffix*
Pt100 DIN, 0...400°C	none (or 0)
Pt100 DIN, 0...100°C	1.
thermo couple Ni Cr NI (type K)0...1200°C	n.
thermo couple Fe Cu NI (type J)0... 900°C	f.
thermo couple Pt Rh Pt (type S)0...1700°C	p.
feedback device 0...100 up to 1000 Ω	w.
standard signal 0(4)...20mA, 0(2)...10V	e.
combined input Pt100 / standard signal	q.

Ranges:

Pt 100: 0...400°C, switchable to °F, optional: other ranges; for standard signal range adjustable -999 to 4000. Setpoint ranges can be limited by menu

Displays:

2 four- figured digital displays, decimal point adjustable, upper display: actual value, lower display: other selectable data,
up to 8 LEDs for relays function display.
Display of function:
Hold down the P-key for more than 5 sec
to get a short-cut message of the configured function on the display (=position 3-5 of list number)
(in case of locked parameter mode only).
Measuring line monitoring:
Display "Err 1...4" in case of measuring line fault and adjustable safety shut down of all outputs

Outputs:

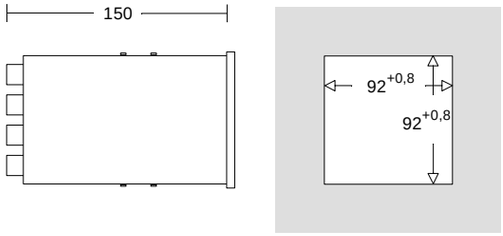
up to 8 relays with potential free change over switch, as control outputs or as additional contacts, capacity: 250V 2A,
incl. spark extinction (for normally open contacts)
1-2 continuous outputs 0/4...20mA, 0/2...10V as control or signal outputs(apparent ohmic load 500 Ω)

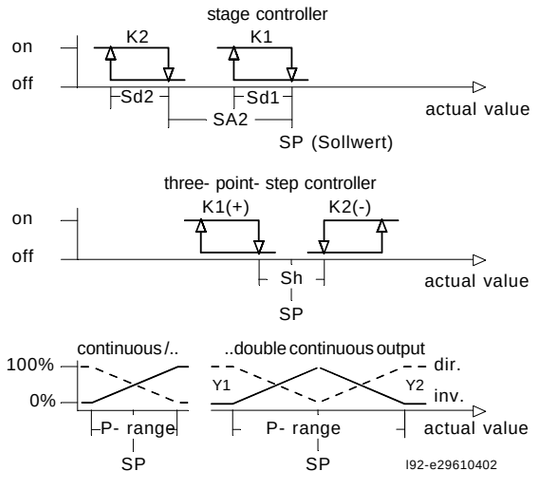
open printversion

Characteristics:
Adjustment on parameter level, with lock switch, pre adjusted on customer´s demand.
(parameters depending on sub type:)
Proportional band Xp: 0,1...999,9 %
Integral action time Tn: 0,0...999,9 min
Rate time Tv: 0,0...99,9 min
Sensitivity of response Xsh: 0,1...1,0 %
Travel time of the actuator Tm: 6...600 sec
Switching frequency cy: 2...120 sec
Function characteristics: direct / inverted
Switching interval SA (add. contacts): 0..100,0 K
Switching difference Sd: 0,1...100,0 K

Additional contact functions:
As switching interval above and below setpoint or independent adjustable with own setpoint and measuring input, switching function adjustable (ref. to chapter additional switching contacts)

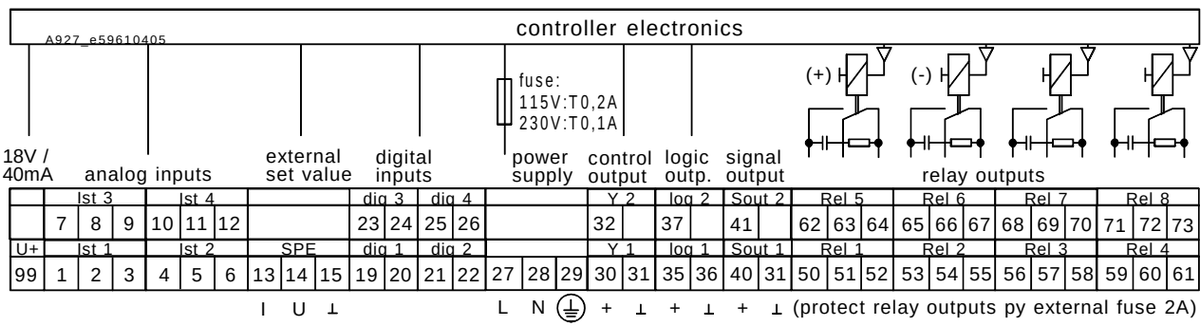
Installation dimensions:
(not valid for integrated version)



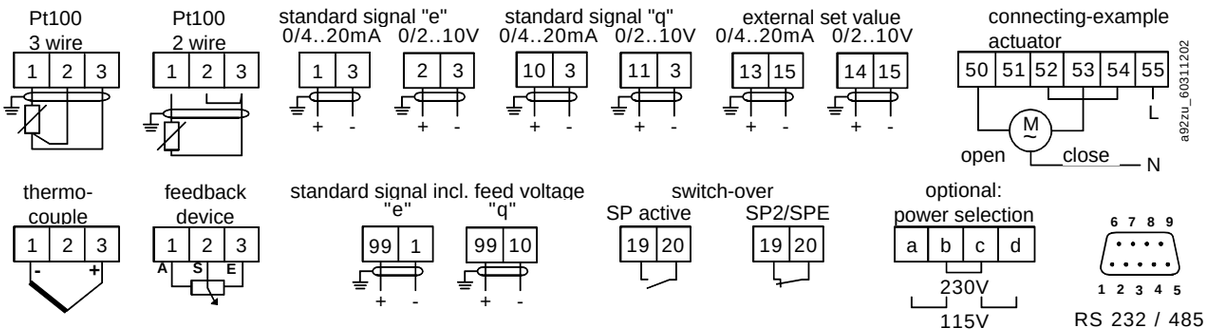


Other data:
Housing for panel mounting 96 x 96 mm
(or integrated version)
Power supply: 230V or 115 V +/- 10 %, 48...62Hz
Power consumption: approx. 14 VA
Protective system DIN 40050: IP54 (terminals IP20)
Permissible ambient temperature: 0...60°C
Nominal temperature: 20°C
Climatic category: KUF to DIN 40050
Relative humidity <= 75 % yearly average, no condensation
EMC: refer to EN 50081-2 and EN 50082-2

Wiring diagram:
(Example, depending on sub type some details can be missed
valid for each delivered controller is the wiring diagram on its casing only)



wiring examples (for input 1 each)



open printversion

1 Digital display actual value (depending on type)
2 Digital display setpoint
3 Key for setpoint and parameter mode
4 Setpoint adjustment
5 Parameter mode lock switch (back face)

5

General:

The units in 96 x 96 panel mounting format are based on the KFM 92 industrial control unit series and allow external setting of one to three setpoints or continuous control outputs and up to 4 three-level signals. Upper and lower limits can be assigned to the setting ranges.

The unit has a dual display. In operating mode, the target value or control output is displayed in the lower row. The upper row can optionally be used for the remote display of the actual value.

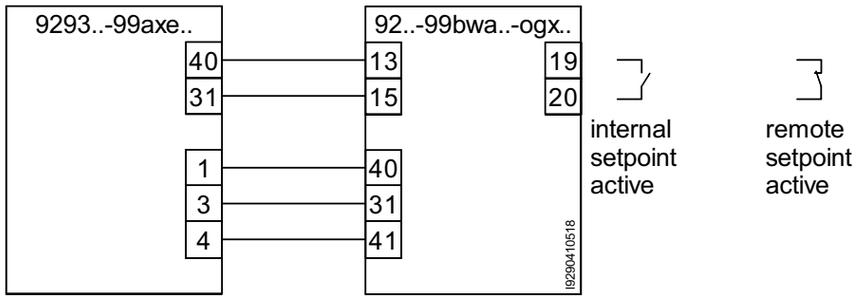
Accessories from the KFM 92 product range are available as an option.

Types:	*Type*
Setpoint generator	9293.
Setpoint generator with actual value remote display (Pt100 / standardised signal)	9293.0 / e
Actuator (three-point step)	9297.
Actuator (continuous)	9298.
Actuator (continuous, 2 outputs)	9299.

See data sheet 9200 for device variants and accessories

Wiring:

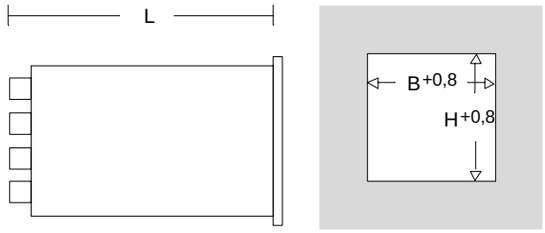
Example:Connections between **remote control unit** 92930e-99axe.. and **controller** 92..-99bwa-ogx-..



open printversion

Characteristics:
Adjustment on parameter level, with lock switch, pre adjusted on customer´s demand.
(parameters depending on sub type:)
Function characteristics: direct / inverted
Switching interval SA (add. contacts): 0..100,0 K
Switching difference Sd: 0,1...100,0 K

Installation dimensions:

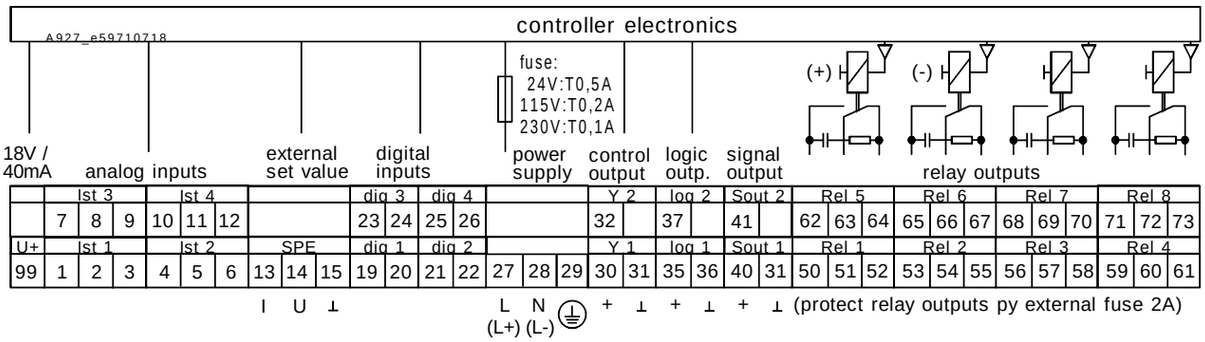


Form 96x96: L=150mm, W=92mm, H=92mm
Form 72x144: L=170mm, W=168mm, H=139mm

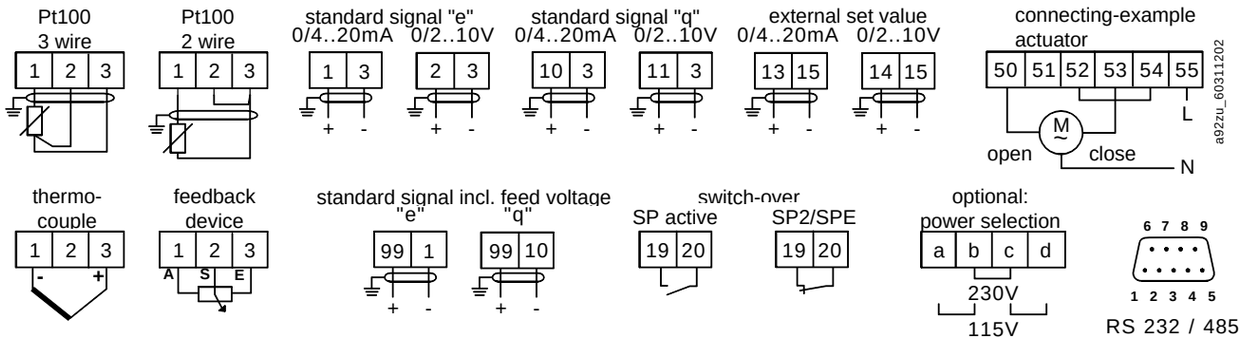
Additional contact functions:
As switching interval above and below setpoint or independent adjustable with own setpoint and measuring input, switching function adjustable (ref. to chapter additional switching contacts)

Other data:
Housing for panel mounting, 96 x 96 mm (type 92.., 93..) or 72 x 144 mm (type 94)
Power supply: 230VAC +/- 10 %, 48...62Hz
alternative 115 VAC, 48 VAC, 24 VAC, 24 VDC
Power consumption: approx. 14 VA
Protective system DIN 40050: IP54 (terminals IP20)
Permissible ambient temperature: 0...60°C
Nominal temperature: 20°C
Climatic category: KUF to DIN 40050
Relative humidity <= 75 % yearly average, no condensation
EMC: refer to EN 50081-2 and EN 50082-2

Wiring diagram: (Example, depending on sub type some details can be missed valid for each delivered controller is the wiring diagram on its casing only)



wiring examples (for input 1 each)

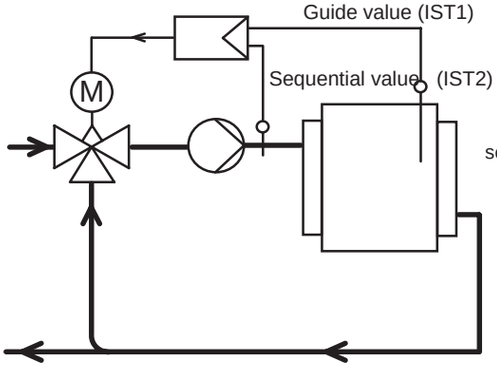


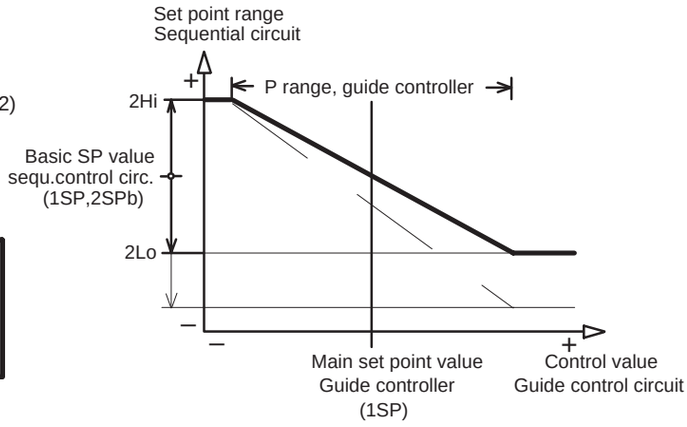
open printversion

Function:

For cascade controllers, the basic unit of the standard version serves as a sequential controller, acting on the control output. The function extension consists of an additional guide control circuit with its own measu-ring input, the output of which acts on the set point value of the sequential controller. A deviation between set point and actual value of the guide control circuit (e.g. product temperature) increases or decreases the basic set point value of the sequential control circuit (e.g. supply temperature or combustion chamber temperature) within an adjustable range.

In the basic version 991k, only the set point value for the guide control circuit is set. It also serves as basic set point value for the sequential circuit. In version 991kb the possible change of the set point value is limited by the adjusted minimum and maximum absolute values. In version 991ku the guide controller set point value and sequential controller basic set point value are set independently from each other.





Control behaviour, equipment:

Sequential controller:	as desired, depending on the selected basic version
Guide controller:	PI (PID), with especially modified integral action

Versions:	**List No.:**
Standard version	991k..
Standard version, with limitable sequential setpoint value range	991kb.
separate set point values	991ku..

Addition for measuring input of guide controller, if different from sequential controller:

Pt100 DIN, 0...400°C	..0
Pt100 DIN, 0...100°C	..1
Thermal element NiCr-Ni (Typ K)0...1200°C	..n
Thermal element Fe-CuNi (Typ J)0... 900°C	..f
Thermal element PtRh-Pt (Typ S)0...1700°C	..p
Reostatic teletransmitter 0...100/1000Ω	..w
Standard signal 0(4)...20mA, 0(2)...10V	..e

open printversion

INDEX

1 2 3 4 5 6 7 8 9 0

Characteristic features of cascade controller

Input IST1 (Terminal 1-3) = Guide value
Input IST2 (Terminal 4-6) = Sequential value

Set point value setting:

1SP Guide controller set point value, also basic set point value for sequential controller (except for type 991ku)

2SP Display: current sequential controller set point value = total of basic set point value and guide controller influence

Parameter level 1 (supplement):		*Factory setting:*	*Notes:*
CH	Channel selection of guide controller / sequential controller = CH1 / CH2		
FUE	Only for optimization, in CH2: guide controller influence An/AuS (ON/OFF)	An	___
2SPb	Basic set point value for sequential controller (only for type 99ku)	0	___

Parameter level 2 (supplement):			
2Lo / 2HI	admissible maximum difference of the sequential controller set point value	-50/50	___
2FLo / 2FHI	minimum / maximum limit of sequential controller set point value #/#= controller range	#/#	___

Configuration level (supplement):			
1 ib	Integration range of the guide controller: 0...100% of the proportional band	*100*	___

Commissioning

Prior to optimizing the control behaviour, correct the factory set set point value range limitations of the sequential circuit, if necessary. The admissible range of the sequential circuit set point value is dependent upon various factors (e.g. maximum heating surface temperature, design of the heating surfaces, etc.) and should be individually set for each machine system. The values "2Lo" for the bottom and "2Hi" for the upper limit are set in parameter level 2 as a *difference* to the basic set point (also refer to the function diagram). The factory setting for thermostats is -50K / +50 K, for controllers with signal input 0.0. In version 991kb is to adjust additional an upper and lower absolute limit value.

Once the sequential control circuit limit values are set, optimize the sequential control circuit *without* influence on the guide control circuit. For this purpose, switch off the guide controller function (parameter level 2: CH2, FUE AUS). Now undertake the standard optimization of the control parameters.

Subsequently, switch on the guide controller function again and optimize the parameter for the guide control circuit, taking into consideration that the guide control circuit often reacts more sluggish than the sequential circuit. Therefore, it can usually be operated as proportional action controller *without* integral action (value for I at 0.0) or with a relatively long integral action time (several minutes). As an option, the integration range may be limited with parameter ib.

Deviating rection to error messages:

At Err 1 the guide controller element does not function,
the sequential controller element continues to operate as standard controller with the set set point value.

At Err 2 the configurated safety circuit reacts (Factory setting: relay off or control signal on 0)

open printversion

Function:

Enter a series of set point values and allocated times in the parameter level, which are invoked in succession after a program start has been triggered. The controller operates in standard operation on the basis of the set basic set point value prior to a start and following a program sequence.

Enter the programs as steps with consecutive numbers, always consisting of a target set point value SP.. and the attendant time t.. If a direct switch-over (*jump*) to the next set point value is desired, t.. is set to ”0”. If a value of >0 is set for t.., the change to the attendant target set point value takes place within this time in form of a *Ramp.* If a set point value is to be kept unchanged for a specific amount of time, set the subsequent SP.. to the same value, the attendant time t.. serves as *holding time* .

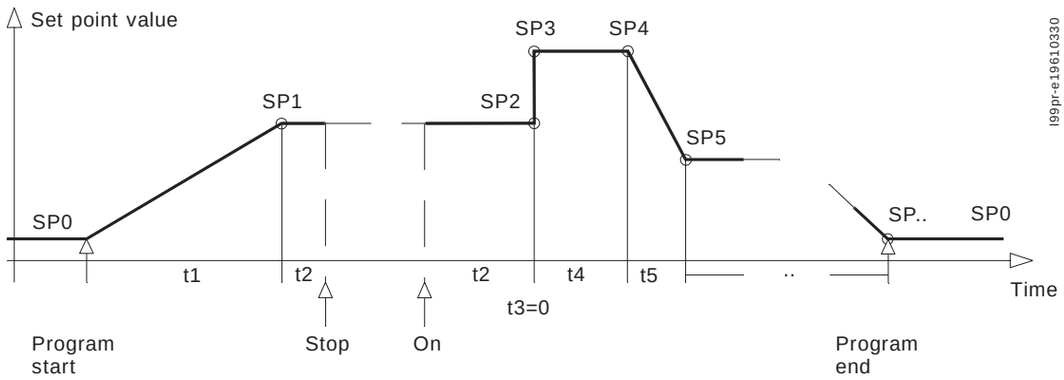
If fewer steps are required in the individual program than preset unter Pr-S, they can be suppressed by setting a set point value as above and a time of ”0”.

integrated set point monitoring:

Constant monitoring takes place during the program sequence, to check whether the actual value follows the current set point value. The program sequence is stopped as soon and as long as the difference set as admissible is exceeded:

With a *ramp*, the further increase or decrease of the set point value is stopped. With *holding times* the specified time increases accordingly. With a *jump* the next time segment does not start till afterwards.

Program sequence (example)



Versions:

	List No.:
1 program, max. 20 steps	991p1
4 programs, max. 20 steps	991p4
8 programs, max. 10 steps	991p8

open printversion

Special features of the program controllers:

Operation (supplement):

The *bottom display* continuously shows the current (ramp) set point value influence SP..
(Factory setting, other displays can be configurated)

Actuate the P key *(continuous):*

only when the program is running:

SP.. Display of the current (ramp) set point value influence SP..

only when program is OFF:

SP 0 Basic set point value, display and adjustment possibility via the ▲...▼ keys

P-nr Display of the current program No.,
.. only when program is OFF: program selection via the ▲...▼ keys

Pro Display of the current operating condition:
..
AN: program is running
Stop: program has stopped
AUS: program has been completed or aborted, basic set point value is active

Switch-over possibilities from the displayed operating condition by means of the ▲ key (continuous):
AN: start program or continue stopped program
Stop: stop the running program and continue at this point later
AUS: abort running program and continue with the basic set point value (SP0)

Note:The "ON" function may also be triggered by briefly closing the control input (sensor or wiping contact).

press the P key again*: return to operating condition.*

Parameter level 2 (supplement):

		Factory setting:
Pr-S	Select the number of program steps/time segments *uniformly* for *all* programs, 1...10/20, depending on the design	10/20
P-nr	Select the program number (1...4/8, depending on the design)	
t'.1	Enter the holding or ramp time (0.0...999.9 min), in which the subsequent (target) program set point value SP.1 is to be reached.	
SP.1	Enter the 1st (target) program set point value (see program example)	0
t..,SP..	Continuously enter times and set point values for further program steps by actuating the P key.	
	Return to the operating condition after the last setting. Next program: invoke parameter level 2 again.	

Configuration level (supplement):

d SP	Set point value monitoring: admissible deviation between set point and actual value (K or value)	5.0

open printversion

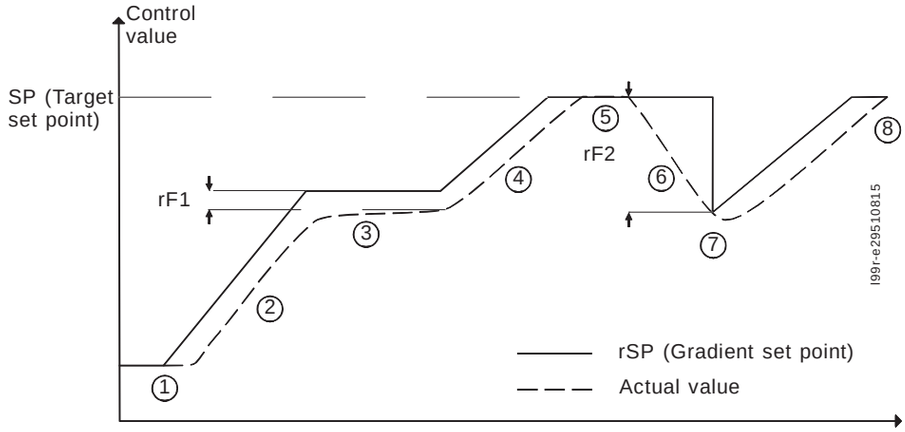
Function:

The set point value “SP” set at the controller serves as the target set point value. Once the controller has been switched on, the starting point of the ramp set point value “rSP” is set to the available actual value. Subsequently, the default set point value increases or decreases by the set gradient.

A synchronously running monitoring function causes the ramp set point value to be stopped as soon and as long as the actual value does not follow the default set point value at the set max. distance ("rF1").

The additional function "ramp set point value" switches off as soon as the target set point value is reached, however, it remains in readiness and starts again each time the set point value setting is changed or when the actual value is changed by more than the admissible difference ("rF2").

Operating phases of the ramp function (example)



1. Ramp set point value is set to actual value
2. Set point value increases at set gradient
3. Set point value does not continue to increase as the actual value does not follow
4. Set point value increases again, as actual value has dropped below the max. difference "rF1"
5. Actual value has reached the target set point value, ramp function is switched off
6. Possible malfunction: actual value drops by more than the admissible "rF2"
7. Ramp function is activated, ramp set point value is set to momentary actual value
8. Target set point value is reached again, ramp function is switched off.

Versions:	**List No.:**
Standard version (setting K/min)	991r.
Alternative version (setting K/h)	991rst
Possible additional functions	
Additional contact, active during falling gradient	99fr
binary input for extern stop of ramp function	99b1s14

Peculiarities of controllers with ramp set point value

Operation:

Parameter level 2 (supplement):

Gr Increase (gradient) of the ramp set point value in K (or value) per minute (0.0...100.0) (Setting 0.0 = ramp function switched off), factory setting: 0.0

dSPL Additional possibility when display is switched over: "r SP" => display of momentary ramp set point value

Configuration level (supplement):

rF1 "Waiting window": maximum deviation of the ramp set point value from the actual value, as stopping influence on the set point change. Factory setting : 2.0

rF2 "Start window": minimum deviation of actual value / standard set point value for renewed start of the ramp function. Factory setting: 10.0

Function:

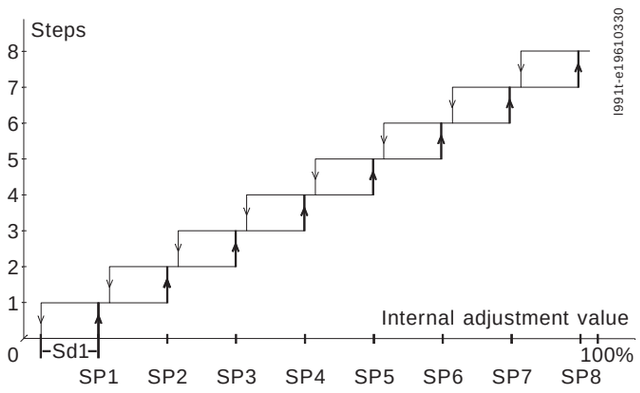
Completion of a continuous PID controller with subsequently arranged switching steps, optionally installed in the controller or in external accessory units. In principle, the operation, handling and optimization of the continuous controller remain unchanged, However, the continuous control signal is not led to the outside but immediately converted internally to an appropriate number of switched on relay switching steps, based on the actuating variable 0...100%.

In the factory setting, the switching points of the steps are evenly distributed throughout the entire adjustment range, however they may be changed as desired. An installed switch-on delay prevents simultaneous switch on of all steps and thus load jumps in the supply mains. It is set jointly for all steps.

All relays are potential free change over contacts, a spark quenching unit is installed for the normally open contacts. Relays which are not needed may be switched off through switch point >100%. Recommended supplement for heater controls: accessory equipment 99ax to display the return flow temperature.

The first step may be configured as switching output if desired. This causes an adaption of the power jumps between two steps and thus an almost infinitely variable behaviour.

Example of 8 steps



Versions:	**List No.:**
Internal controller switching steps: (maximum 8 (92..) or 6 (94../ 95..) steps)	991t..
Switching steps in external accessory units: (4,6 or 8 each, max 20 steps total) comprising of:	
- Controller connection for accessory units	91tw
- Accessory unit:	
for switchboard installation 96x96mm	991tz2..
for switchboard installation 72x144mm	991tz4..
as 19"- insert	991tz5..
for standard rail installation	991tz6..
Option:	
First step cycling, relay version	..t
ditto, logical output	..tL

open printversion

Special features of step controllers

Factory setting

Configuration level (supplement):

tE	Switch-on delay per step 1...60sec	5sec
SP..	Switch-on points for step 1...8, based on output 0...100% (or deactivation with setting 101%)	see table
Sd..	Switching differences %	see table

optional:

rel	Switching behaviour of first step: St (normal step) / CY" (cycling*)	St
cy"	Cycle for cycle behaviour (2...120 sec)	20 sec

Settings SP.., Sd..
in %, based on internal control signal 0...100%

	SP1	**SP2**	**SP3**	**SP4**	**SP5**	**SP6**	**SP7**	**SP8**	**Sd..**
for switching behaviour St= normal									
3 Steps	34	66	97						31
4 Steps	27	50	74	97					24
5 Steps	21	40	59	78	97				18
6 Steps	17	33	49	65	81	97			14
7 Steps	16	30	43	57	70	84	97		11
8 Steps	13	25	37	49	61	73	85	97	10
for switching behaviour CY= step1 cycling									
3 Steps		34	66						0.1
4 Steps		27	50	74					0.1
5 Steps		21	40	59	78				0.1
6 Steps		17	33	49	65	81			0.1
7 Steps		16	30	43	57	70	84		0.1
8 Steps		13	25	37	49	61	73	85	0.1

open printversion

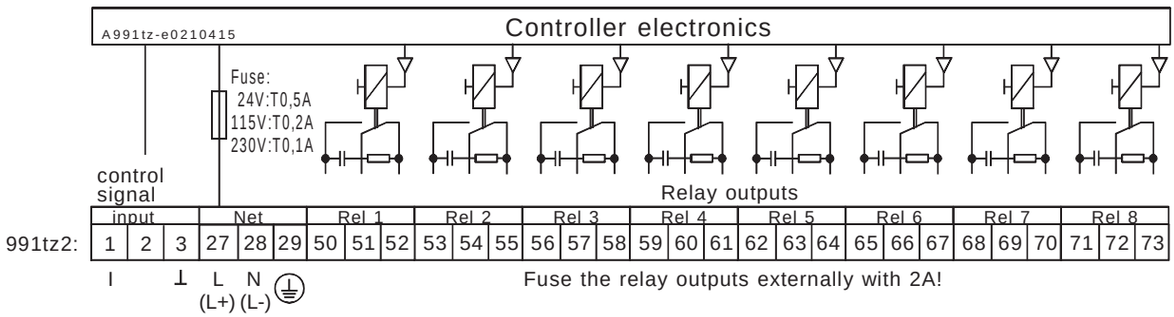
Method of operation:

The relay extension units are triggered by controllers of the series 9.. with the option 991tw, using a special direct current signal. The setting of all parameters (switching distance, switching difference, switching delay, etc.) is performed in the setting controller.

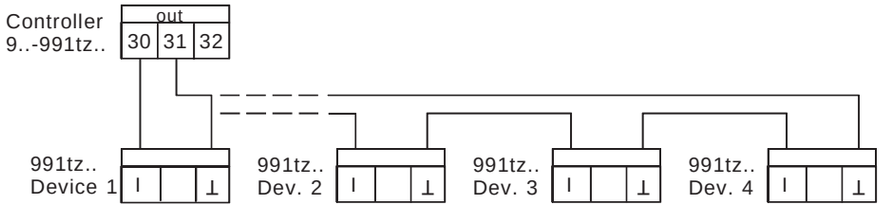
Technical data:

List no.	991tz2	991tz4	991tz5	991tz6
Housing	for panel mounting 96x96	for panel mounting 72x144	for 19" mounting	for norm rail or screw connections (H:75,W:100,D:110)
Output	8 relays max. 250V, 2A	6 relays max. 250V, 2A	6 relays max. 250V, 2A	5 relays max. 250V, 2A
max. number of cascaded devices	2	3	3	4*

Connection:



Connection of multiple devices (cascading) to the controller output out1 (terminal 30 / 31)



open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

Method of operation:

The functional extension for continuous PID controllers consists of a following electrical output for the operation of motors, control valves or other electrical actuators. The operation, control and optimisation of the continuous controller remain, in principle, unchanged.

The continuous control signal is converted via the relay outputs K1 (open) and K2 (closed) directly into a corresponding setting of the connected actuator (see the controller data sheet for the circuit diagram). At the same time, the usual continuous output is omitted (with the exception of Type 991uy).

In addition to the two additional relays, the necessary supplementary item, 99axr, the input for the position feed back, is also supplied. A feedback potentiometer for indication of the position must be present on the actuator that is being driven.

The expansion to version 2 consists of an additional input and an output for a second actuator, whose position is compared with the first and made to follow it.

The functional extension for a three-step controller allows a second actuator to be operated in parallel. The position is continuously compared with that of the first actuator, and made to follow it. In addition to the two additional relays, the two necessary items of supplementary equipment, 99axr, inputs for the position feed back, are also supplied. Feedback potentiometers for indication of the position must be present at both the actuators that are being driven.

Models:	**List no.:**
Position controller instead of continuous output	991u
Position controller in addition to continuous output	991uy
Double position controllers instead of continuous output	991u2
Position controller for continuous heating/cooling controller (9281.):	
- instead of 1st output (heating output)	991uh
- instead of 2nd output (cooling output)	991uk
Second (relay) position output for switching controllers	991uww

Operation (extension):

Parameter level:		Factory setting
SA..	Dead band relay no. to guidance signal (as a % of the regulating distance)	0.0
Sd..	Switching difference relay no. (as a % of the regulating distance)	0.5

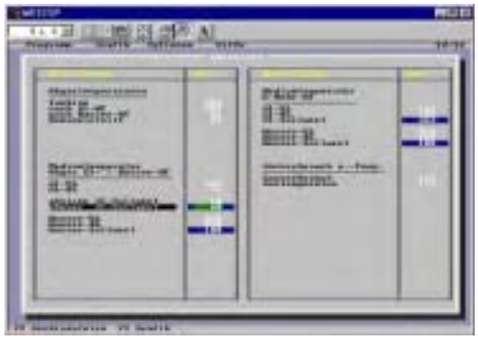
Configuration level:

FG. A..E Remote comparison, see data sheet 99axr or reverse side

open printversion

The basic version of the KFM – PCS interface software offers three different functional areas, which can be optionally and independently used. All are distinguished by simple handling. Optionally the software can be adapted to the customer requirements.

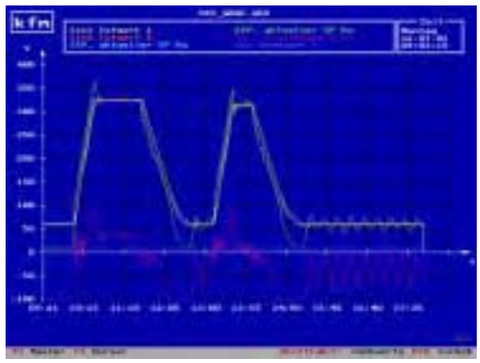
1. Summary Display of all Controllers



On starting, the program automatically searches for the connected controllers, and the summary display appears.
Actual and set values are displayed, together with other equipment dependent values. Also the display of status and error messages is possible. Some of the displayed settings can be changed and these have immediate effect in the controllers.

2. Graphical Display (Line Recorder)

The data arriving from each controller can be displayed as a separate, continuous diagram. Recordings made previously can also be recalled and displayed.



3. Automatic Data Recording (Logger)

The actual and set values, along with other values if chosen, can be automatically and continuously stored in a file. This file can be displayed as a graph, or may be used by other programs. The recording rate can be adjusted, as well as the number of recorded files that are archived before the oldest is overwritten.

4. Customer-Specific Options

A wide range of other additional equipment is available, including parameterisation and configuration of the individual controllers, set value programs with direct editing facilities, and pre-calculated graphical display for each controller.

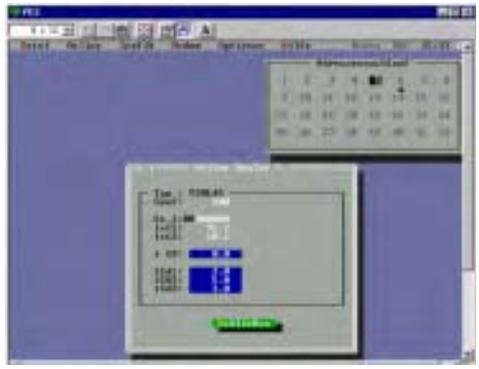
Order designation:	**Li. – no.**
KFM - PCS Interface Software	99pcs1

open printversion

The interface software KFM – PKS offers four different function areas, which can be optionally and independently used. The software is distinguished by simple handling.

1. Online remote operation

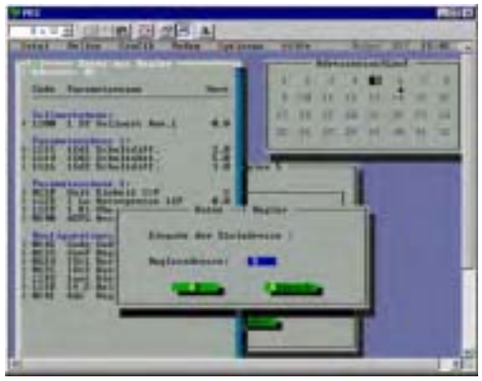
On starting, the program automatically searches for any connected controllers. A window then appears, displaying the actual value, set value and parameters of the first controller found. All settings are displayed can be changed; changes have immediate effect in the controller. If more than one controller is connected (RS485 only), the required controller can be selected via a menu.



2. Data transfer

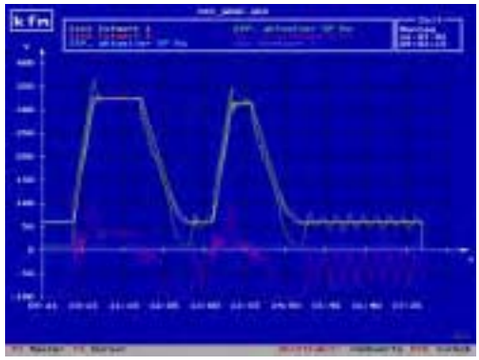
Optionally also the complete parameter block of the selected controller can be read out, edited, displayed as a table and printed out under DOS.

It is also possible to save the complete parameter setting as a file. Equally, parameter sets that have already been saved can be loaded into the controller.



3. Graphical Display (Line Recorder)

The data arriving from the controller can be displayed as a continuous diagram. Recordings made previously can also be recalled and displayed.



4. Data Recording (Logger)

Up to six types of data arriving from the controller can be stored continuously in a file. This file can later either be recalled and displayed as a graph, or can be used by other programs.

Order designation:	**Li. – no.**
KFM - PKS Interface Software	99pks1

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

General information:

Series interfaces enable digital communication with computers or higher ranking control systems. An RS 232 interface permits connection of one controller per computer interface. The RS485 interfaces enable the connection of max. 32 participants in one data bus. Here, the controllers must be set to different addresses for differentiation.(Controller configuration level).

Technical data:

Interface:	RS232	RS485
Connection:	series, asynchronous 2 wire (+GND)	series, asynchronous 2 wire (+GND)
Transfer medium:	twisted and screened cable	twisted and screened cable
Bus line length:	-	1000m
Dead-end feeder length:	15m	2m
Max. number of controllers:	1	31
Transfer rate:	9600 Bit / s	9600 Bit / s

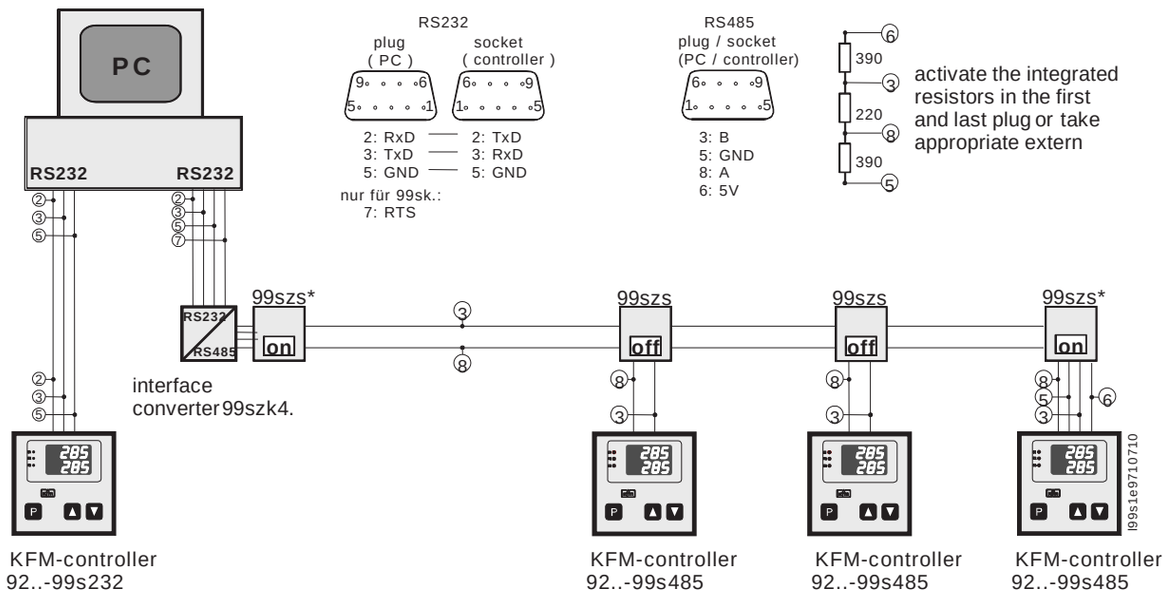
Hardware prerequisites:

IBM XT, AT or compatible PC, SPS etc.
RS232: series interface RS 232 (COM 1, COM..)
RS485: ser. interface RS485, alternative: RS232 with interface converter RS232/RS485 (KFM 99szk4)

Connection lines:

Use screened lines to connect the interfaces (e.g. KFM 99szl.). Place the screening on the controller earthing terminal. Connect the RS485 line at the beginning (PC or interface converter) and the end (last controller) with d- sub - plugs with integrated resistors (f.e. type 99szs) or appropriate extern resistors.

Wiring example



open printversion

The series field bus system INTERBUS-S offers an optimum solution to minimize wiring. The input and output assembly groups, e.g. of a PLC become unnecessary, instead all INTERBUS-S subscribers are directly activated by an INTERBUS-S controller card in the PLC. A bus cable is connected from subscriber to subscrib and the entire communication of the individual control units takes place via this bus line.

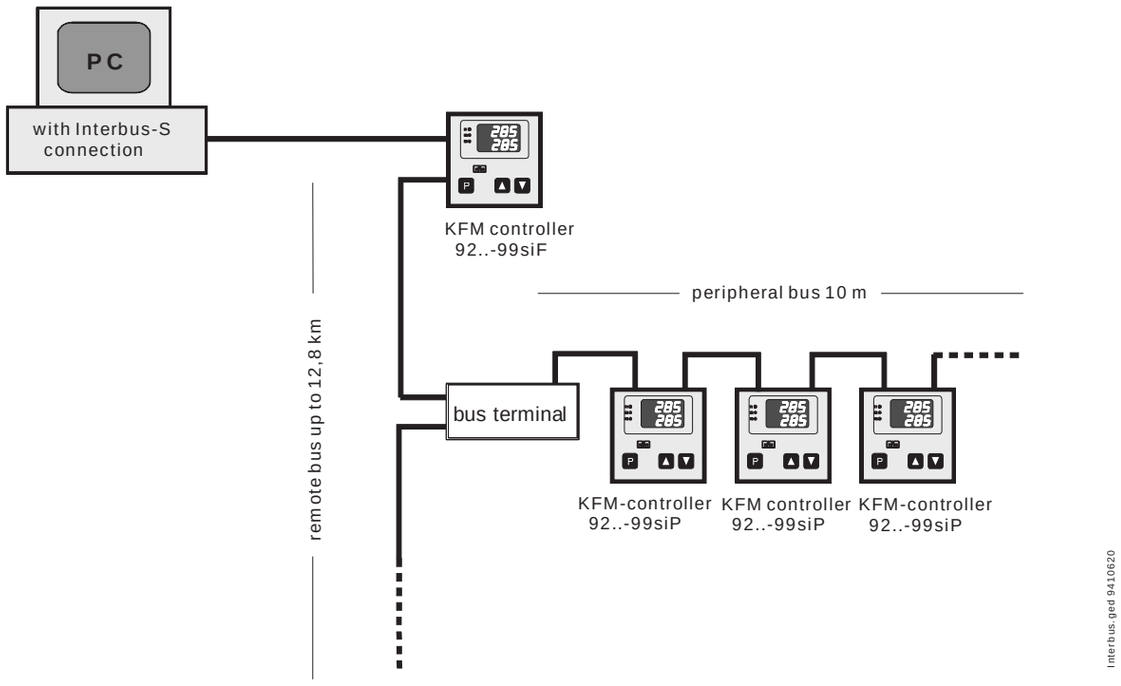
INTERBUS-S interfaces in KFM controller replace the wiring of external analog signals (external set point values, actual value, set point value outputs, etc.). Up to 8 values or parameters can be cyclically read and described via the INTERBUS-S. The bus connection is available in two versions. In both versions, the bus connection is isolated from the controller potential.

1. INTERBUS-S peripheral connection
A peripheral bus subscriber is used wherever the spatial distance to the next subscriber is limited to less than 10 m (e.g. switch cabinet). The connection to the higher ranking remote bus is undertaken with a so-called bus terminal. The physical connection on the controller takes place via a 15 pole D-SUB plug or 15 pole D-SUB-socket.

2. INTERBUS-S remote bus connection
The remote bus subscriber is always used when large distances must be bridged. For the remote bus, the physical connection at the controller takes place via a 9 pole D-SUB plug or 9 pole D-SUB socket.

Technical data:

Protocol:	INTERBUS-S (cyclical data exchange)
Max. expansion:	10m (peripheral bus) / 12.8 km (remote bus)
Interface:	TTL (peripheral bus) / RS 485(remote bus)
Data protection:	CRC 16
Max. number of I/O points:	4096
Telegram format:	Total frame message
Access procedure:	Master-Slave
Typical cycle time:	1024 I/O points in 3.7 ms reading and writing
Baud rate:	500 kBaud



open printversion

The PROFIBUS serial fieldbus system helps to minimise the amount of cabling. Input and output modules, suc as a PLC, become unnecessary. Instead of this, a bus cable is connected from one device to the next, and the entire communication between the individual control devices takes place over this bus line. All the PROFIBUS devices are addressed directly by the PROFIBUS controller card in the PLC or in the master computer.

In KFM controllers, the PROFIBUS interface replaces the cabling of external analogue signals (external set value inputs, actual values, set value outputs etc.).

TYPE 99spd: PROFIBUS-DP slave connection
The Profibus DP connection is implemented in accordance with EN 50170. The controller is connected directly to the bus line via a 9-pin D-SUB socket.

Technical data:

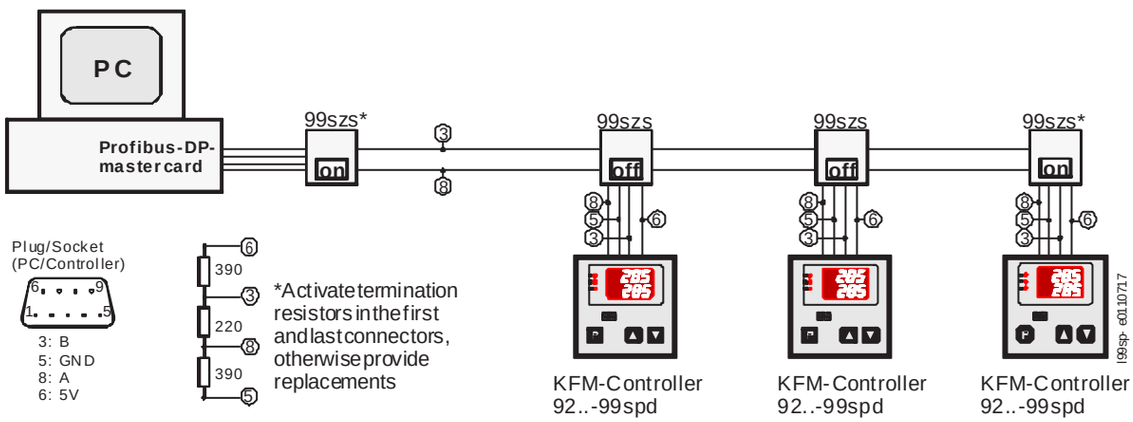
Protocol:	PROFIBUS-DP
Topology:	Linear bus with bus connections at each end
Interface:	RS 485
Addressing:	0...126 (can be set in the controller using a menu)
Max. number of devices:	32 per segment, can be increased to 127 with a repeater
Data format:	Modules for fixed or floating point data transmission
Baud rate:	Automatic baud rate detection up to max. 12 Mbaud

For other data, see the GSD file in the appendix

Pin-out of the 9-pin connector:

Pin no	Identification	Description
3	RxD / TxD-P	Receive/send data plus
4	CNTR-P	RTS control signal for optical fibres
5	DGND	Data reference potential for termination resistors
6	VP	5 V supply for termination resistors
8	RxD / TxD-N	Receive/send data minus

Wiring example:



open printversion

Accessory equipment, series 9.. additional analog inputs

Controllers of series 9.. may be equipped with up to 4 analog inputs per unit in addition to the measuring inputs available as standard. They may be used to display additional measuring values or as reference value for installed additional contacts.

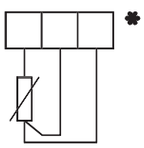
The display is continuously switched over to additional inputs by actuating the ▲ key. In addition, the bottom display shows the brief designation of the attendant measuring input. The display automatically switches back to the standard operating condition 30 seconds after the last key was pressed. Furthermore, input 2 may be configured as a second display in addition to the controller actual value.

For temperature sensor inputs, °C or °F may be selected as display unit, for standard signal inputs, a scaling between -999 and +4000 may be infinitely set..

Measuring input:	**List-No.:**	**Measuring/display range**
Resistance thermometer:		
Pt100 DIN	99ax	0...400 °C
Pt100 DIN	99ax1	0...100 °C
Pt100 DIN	99ax6	0...600 °C
Thermal elements:		
NiCrNi (Typ K)	99axn	0...1200 °C
FeCuNi (Typ J)	99axf	0...900 °C
PtRhPt (Typ S)	99axp	0..1700 °C
Standard signal:		
0(4)...20 mA or 0(2)...10 VDC alternatively connectable incl. voltage supply	99axe	adjustable
Rheostatic teletransmitter:		
0...100 to 0...1000 Ω	99axr	adjustable

Order text: Accessory equipment:
additional analog input for .....
Range: .....
Li-No.: 99a ..

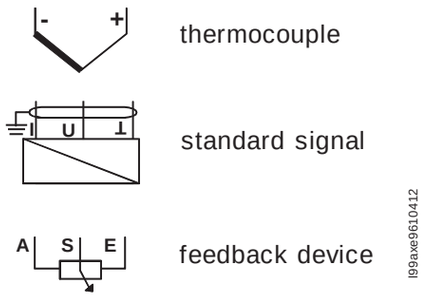
additional connection terminals:



*Terminal No. according to number of existing, or required analog inputs:

first input: terminal 1/2/3
second input: terminal 4/5/6
third input: terminal 7/8/9
fourth input: terminal 10/11/12
voltage supply: terminal 99

alternative:



I99axe9610412

open printversion

INDEX

Additional function for calculating the *difference* between two actual values. (Differential value = actual value 1.. – actual value 2..).
The calculated difference is displayed and made available both as a controlled variable and a reference for additional contacts or signal outputs (CH 0 / Ist0).

All controllers of the KFM 92 – 94 type series can be operated with this additional function as a differential value controller. Depending on the type, existing measuring inputs are accessed; the delivery scope includes an additional measuring input, if necessary.

Versions:		**Del.-No.**
	Incl. additional measuring input	**99ax.d**
Order text:	Optional equipment: Additional analogue input for ___*, range: 0..._____°C, including function for calculation of the difference X1-X2 for display and further measured value processing List No.: 99ax*_d (*possible measuring inputs and list end no. as analogue inputs, sheet 99ax)	
	For 2 *existing* measuring inputs	**99ax.dx**
Order text:	Optional equipment: Function for calculation of the difference X1-X2 from 2 actual values of existing measuring inputs, for display and further measured value processing List No.: 99axdx_ _** (**assigned measuring inputs in plain text added, Example: ..99axdx12 = difference between measuring input 1 and 2)	

Operation (special features)**:**

Operating status:

The top display indicates the *temperature difference* between actual value measuring input 1 and actual value measuring input 2. In addition, it is also possible to display the actual values of measuring input 1 and 2 in succession by pressing the ▲ - key.

Settings:

The differential value is displayed in the parameter levels, in as much as it is relevant for settings and displays, additionally as channel (CH) 0:

Parameter level 2:

0bLo/0bHi Range beginning / end for calculated difference

(if the difference goes under / exceeds the range limits: Error message Err0)

0nSt In as much as this function is provided: Setting the number of places after the decimal point of the differential value display

Supplement to error messages:

open printversion

Supplementary equipment for series 9..
Maximum/minimum selection from 2 measurement inputs

On devices with an additional measurement input (input 2), this supplementary equipment permits a maximum or minimum selection from the inputs 1 or 2. The values indicated by the two inputs are continuously compared, and only that input with the larger (or smaller) value is used as the regulating magnitude.

Ordering text: Supplementary equipment:
Minimum-maximum selection between 2 measurement inputs
Li. – no. 99ax1ma

Additional information for the operating instructions:

In the normal operating mode, the *upper* display indicates the **active** actual value.
The *lower* display remains empty, or, according to the version and the setting, indicates the (active) set value or the manipulated variable.

If the ▲ - button is pressed the *upper* display shows the value for input 1 and
the *lower* display shows the value for input 2.

Different reactions to error messages:

An error in one of the two measurement inputs is indicated by an “Err” in the display.

By pressing the ▲ - button it is possible to determine whether the error occurred at input 1, input 2, or at both inputs.

Used in conjunction with controllers with three-point step output, this option allows position indication of the accessed actuator equipped with a feedback potentiometer.

A program for convenient automatic adaptation of the display 0...100% to the electrical values of the respectively available feedback potentiometer in the configuration level, is included:

Operation:
After checking or correcting the floating time "Y" actuate the P-key, possible several times,
until **"FG A"** appears in the display.
Start compensation by *pressing the P-key for a prolonged time (longer than 5 sec.),*
until a flashing **"0"** appears in the bottom display.
(*Press the P-key briefly to skip compensation.)*
Relay 2 ("-") switches ON, actuator moves to starting/closed position,
Relay 2 switches OFF, **"0"** changes to steady display

After checking the mechanically correct position, acknowledge the default value 0% with the P-key,
"**FG E**" appearing in the top display for final value compensation,
a flashing **"100"** appears in the bottom display
Relay 1 ("+") switches ON, actuator moves to end/open position,
Relay 1 switches OFF, "**100**" changes to steady display

After checking the mechanically correct position, confirm the default value 100% with the P-key
(subsequently, the system switches to the next configuration)

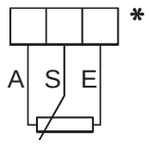
The program also checks whether the output has really caused an alteration of the position of the actuator and the potentiometer:
If identical values are measured at the start and the end, the error message "Err 300" appears.

Measuring input:	**List No.:**	**Measuring/display range**
Teletransmitter 0...100 to 0...1000 Ω	99axr	0...100.0 %

Order text:

Option:
Additional analog input 0-100...1000 Ω
for position feedback, display 0...100 %
List No. 99axr

Additional connecting terminal:



* Terminal No. per number of existing and/or required inputs:

1st analog input: Terminal 1/2/3
2nd analog input: Terminal 4/5/6
3rd analog input: Terminal 7/8/9
4th analog input: Terminal 10/11/12

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

additional device for standard signal input: alteration rate limitation

The adjustment *d* helps to avoid overshoots due to violent corrective actions, f.e.in steam contol circuits.

The additional adjustment *db* allows to restrict this influence to a part of the input range.

Order text: Additional device:
input signal alteration rate limitation
List No. 99azd*

Adjustment:
(in supplement to configuration level):

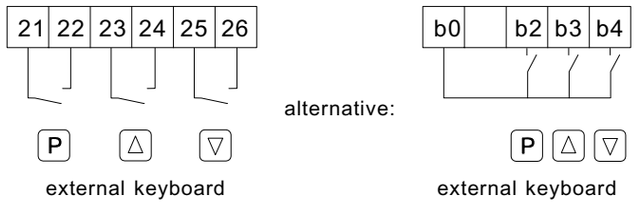
***d"** permissible speed of corrective action, % per second
(no function: adjust 0.0)
factory setting: 0.0

***db** influenced part (%) of input range
(no range restriction: adjust 100)
factory setting: 100

* = no. of measuring input

KFM-controllers of the series 9.. can be equipped with terminals for external keyboards. For this purpose please use potential-free change-over switches, e.g. push buttons. The internal keys have priority.

Additional terminals:



Remarks: *To avoid cross interference use shielded cable only for the low voltage signal leads, the shelding must be earthed one-sided.*

Avoid to cross with load wires.

Appropriated digital inputs depend on additional functions, valid for each delivered controller is the wiring diagram on its casing only.

INDEX
1
2
3
4
5
6
7
8
9
0

This function expansion makes it possible to switch over control units of series 92/93/94/95 from the internal equipment set point value to an externally specified set point value, as desired.

The analog input for processing the external set point value signal is identified on the connection terminals with the designation SPE, as well as the optional connection type of voltage (U) or direct current (I).

The voltage or current range may be configured to 0 or 2...10 V or 0 or 4...20 mA. Furthermore, the set point range allocated to the signal range is freely adjustable. The function of the value is selectable by menu as absolute (abs) adding (add) or subtracting (sub).

Depending on type, switch-over from the internal to the external set point value takes place through a binary control input (potential free normally open contact), alternative: voltage 5V...24V (type extension ..u") or is to select by menu adjustment in the set point level (F-SP: choice SP = intern or SPE = extern setpoint. (type extension "..u")

In the operating level, the incoming external set point value signal is displayed under the designation “SPE” after the set point value “SP”, once the P key is actuated again. In addition, it can be recognized whether this is currently effective, depending on the switch setting: The respective active value SP or SPE appears in the normal display, the inactive value only flashing.

Providing the set point value in the operating level is displayed in the bottom display, this display automatically switches over to the external set point value, i.e. as soon as it has been activated it displays the current effective set point value.

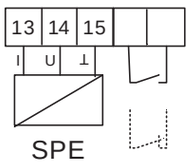
Types	**List No.**
Control input for potential free normally open contact	99bwa
Control input 0V / 5...24V	99bwau
to activate with menu function	99bwam

Order text:

Accessory equipment:
Function expansion for external set point value
with additional analog input 0/4...20mA o. 0/2...10V
control input.. / to activate.. List No.....

Additional connection terminals:

Li.No. 99bwa + 99bwam
Potential free normally open contact



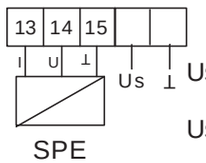
SPE
I=0/4-20mA
U=0/2-10V

*

internal setpoint is active*

external setpoint is active*
(*=only 99bwa)

Li.No. 99bwau
Switch-over with external voltage Us



SPE
I=0/4-20mA
U=0/2-10V

*

Us = 0V : internal setpoint is active

Us = 5...24V : external setpoint is active

I9awizE9610222

* Terminal No. depending on the number of available or required inputs:

1. binary input: terminal 19 (+Us) / 20 (⊥)
2. binary input: terminal 21 (+Us) / 22 (⊥)

open printversion

Accessory equipment 9..
additional set point value permitting switch-over

This function expansion for control units of series 92/93/94/95 makes it possible to enter one or several additional set point values in the operating level as an optional alternative to the main set point value SP.

Switch-over from the main set point value to a different set point value takes place through the allocated binary control input (potential free normally open contact, alternative: voltage 5V..24V (type addition "_u")). Only one contact may be switched at a time.

Providing the set point value in the operating level is displayed in the bottom display, this display automatically switches over to the external set point value, i.e. as soon as it has been activated it displays the current effective set point value.

In the operating level, the additional set point value is displayed and set under the designation “SP2” / ”SP3” for example, after the main set point value “SP”, once the P key is actuated again. In addition, it can be recognized which set point value is currently effective: The respective active value SP or SP_ appears in the normal display, the inactive value only flashing.

Order text:

Accessory equipment:
Function expansion for switching over
to additional set point values incl.
attendant binary control inputs
Li.-No. 99bwz_*: Control input for potential free normally open contact
Li.-No. 99bwz_*u: Control input 0V / 5...24V
* = Number of additional set point values

Additional connection terminals:

Li.No.99bwz_
Potential free normally open contact

*

Main setpoint is active

additional setp. is active

Li.No.99bwz_u
Switch-over with external voltage Us

*

Us = 0V : Main setpoint is active

Us = 5...24V : additional setp. is active

I99awiz9610222

* Terminal No. depending on the number of available or required inputs:

1. binary input (SP2): terminal 19 (+Us) / 20 (⊥)
2. binary input (SP3): terminal 21 (+Us) / 22 (⊥)
3. binary input (SP4): terminal 23 (+Us) / 24 (⊥)
4. binary input (SP5): terminal 25 (+Us) / 26 (⊥)

open printversion

The control function can be stopped with an external contact via a digital input.

Execution:	**List No.**
Control stop, manual function active	99bxh
for switching controllers:	
Control stop, all relays off	99bx70
Control stop, relay K2 actuated	99bx72
for permanently activated controllers:	
Control stop, corrective signal *0%*	99bx80
Control stop, corrective signal stop	99bx82
Control stop, manual function active	99bx80h
for ramp setpoint controllers:	
additional: setpoint ramp reset	-r
for additional switching contacts:	
Automatic function contact 1-4 stop, concerning relays off	99bxf1
Automatic function contact 2-4 stop, concerning relays off	99bxf2

Other executions upon request

Function:

Standard execution:
Open contact: Normal control function
Contact closed: Stopped control function

Alternative: reverse operation -u

Connection:

Refer to the wiring diagram contained in the general controller description Pg. 9200..

Note: Use a screened cable with earthing at one end for the signal lines to avoid stray pick-up, avoid close proximity to power lines.

open printversion

Option to cascade function 991.. activation by digital input

This option allows to activate the cascade function 991k by digital inputs (f.e. terminal 19 / 20 = digital input 1).

Contact closed: the cascade function is active. All influences to the setpoint value (f.e.external setpoint value, second setpoint value) refers to the guide controller.

Contact open: the cascade function is off. Only the sequential controller is active. All influences to the setpoint value (f.e.external setpoint value, second setpoint value) refers to the sequential controller.

Attention:
To avoid cross interference all low voltage measuring lines and pilot wires must be encased in a shielded cable (the shielding must be earthed one-sided) and avoid the neighbourhood of heavy current lines.

Special function:
Limitation of a continuous action control output

Description:

The control output of continuous action controllers can be limited to a settable value by way of a binary input or a relay linkage.

The desired maximum value of the control variable is set in the configuration level as parameter **Yhi**.

Versions:	**List No.**
Limitation by way of binary output	99bybb
Limitation by linking an auxiliary contact K1. The switching point is set as usual for K1; all standard function and allocation selection possibilities of the auxiliary contact are retained.	99bybf

By allocation of another measuring input it is also possible to trigger the limitation by conditions outside the control circuit (return temperature, other measuring value).

Alternative in each case: reverse action	.....u

open printversion

additional device for continous controllers: speed limitation of corrective action

This alternation helps to avoid overshoots due to violent corrective actions, f.e.in steam contol circuits.

Order text: Additional device:
speed limitation of corrective action
List No. 99byd

Adjustment:
(in supplement to configuration level):

tY permissible speed of corrective action, % per second
(no function: adjust 0.0)

factory setting: 0.0 %/sec

open printversion

In the *double* continuous controllers of the 9… series, this additional equipment is used to select, according to the setting, either the largest (maximum selection) or the smallest (minimum selection) of the two internal actuating signals, and to make it available at only *one* output present in hardware as a 0/4…20 mA signal.

Ordering text:

Additional equipment for continuous controllers:
Selection function for maximum or minimum selection of the internal actuating signal of a double continuous controller and connection to the position output.
List no.: 99bym

Operation:

Configuration levels (extension):

		Factory setting:	*Notes:*
1out	Position output characteristic curve control loop 1 direct / inverse "di / in"	in	
2out	Position output characteristic curve control loop 2 direct / inverse "di / in"	in	
out	Position output signal "0-20 / 4-20" mA	4-20	-------
out	Operation of the "Lo / Hi" selection	Lo	-------

INDEX
1
2
3
4
5
6
7
8
9
0

The control loop selection facility consists of an additional binary input in order to activate one or the other of two control loops.

According to the state of the binary input, the first (binary input unconnected) or the second (binary input bridged) control loop is activated. The output of the inactive control loop is set to 0%.

Further options (available on request):

- The signal selection function also includes an additional input for an external actuating signal.
- Additional minimum / maximum – selection switching

Ordering text: Supplementary equipment:
Signal selection function for continuous 2-channel controllers
Li.-no. 99byu2

Operation (extension):

Display of the actual value:

Temporary indication in the lower display by pressing the ▲ button,
permanent display can be configured in parameter level 2

Configuration levels (extension):		Factory setting
out	Min.- / Max. selection function (Lo / Hi)	Lo

open printversion

INDEX

Additional switching contacts are avaiable type dependent, up to 8 relays per controller.

1. Adjustments on *parameter* level, seperately per each contact:

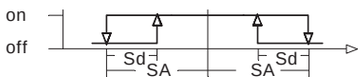
SP.. **S**witching **p**oint for independent additional contacts with own set value (type dependent).
SA.. **S**witching interval for following additional contacts, given as range (**a**bsolute value) above or below the set value of the controller.
(SA or SP alternatively, depending on the selected control function)

Sd.. **S**witching **d**ifference (hysteresis), dead zone between activating and deactivating switching function. (To the deactivating switching point it is necessary to take an adequate deviation (concerning the adjusted switching point) into account)

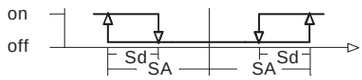
2. Selectable **switching functions** on *configuration* level, seperately per each contact:
(type dependent**)**

a) *following* contacts:

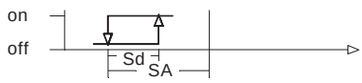
LC A Switching point on both sides of the set value (**L**imit **c**omparator). Relay drops out in case of rising deviation (**A**us)



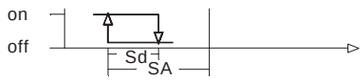
LC E Switching point on both sides of the set value (**L**imit **c**omparator). Relay cuts in in case of rising deviation (**E**in)



Su A Switching point below the set value. Relay drops out in case of decr. act. value (**A**us)



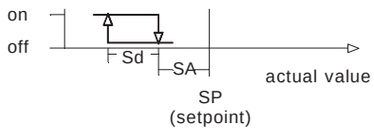
Su E Switching point below the set value. Relay cuts in in case of decr. actual value (**E**in)



So A Switching point above the set value. Relay drops out in case of rising act. value (**A**us)

So E Switching point above the set value. Relay cuts in in case of rising actual value (**E**in)

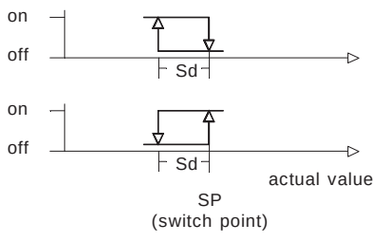
St A Heating stage below the set value. Relay drops out in case of rising act. value (**A**us)



b) *independent* contacts :

US A Relay drops out in case of rising actual value (**A**us)

US E Relay cuts in in case of rising actual value(**E**in)



3. further adjustments on configuration level:

Ist./ Y assigned value: actual value no. ... or Y (actuating signal)

CH.. assigned measuring input/ actual value (**ch**annel) no. .. for independent contacts or assigned control loop for following contacts

SI E "Safety" shut down (in case of measuring line fault): Relay **on**
SI A "Safety" shut down (in case of measuring line fault): Relay **off**

open printversion

Additional contact with special function: switchable common output for 2 control channels

INDEX

1
2
3
4
5
6
7
8
9
0

Additional device (only) for dual controller type 927030..

In devaition to the normal device (1 output for each control loop) there is only one output for both control loops.

Depending on the switching state of the additional contact (relay 3) the control channel 1 or the control channel 2 is connected to the output.

additional contact switched off: control channel 1 is connected to the output
additional contact switched on: control channel 2 is connected to the output

Besides the switching state of the additional contact (relay 3) the LED 3 gives the additional information of the active control channel.

The adjustments and the other functions of the additional contact are equal to the normal device.

Type:	**List - No.**
1 common output, switchable to control loop 1 or 2	99f1u
option: the setpoint of the 1st control channel(1 SP) can be adjusted at the configuration-level (for this setpoint the setpoint limitations 1 Lo/Hi are dropped)	99f1u2

open printversion

Optional equipment:
Auxiliary control circuit with limiting function

The limiting function consists of an additional control circuit with its own measuring input and its own settings (CH2), intervening in the output of the main control circuit. The function mode (min. or max. limitation, effective direction) can be set per menu.

Function:

In the case of 3-point step controllers the relay of one control direction (depending on the presetting) is locked and the relay of the other control direction is activated in increments as soon as the set limit value is exceeded or undergone. This causes the current position of the actuator to be maintained or adjusted so that the limit value is maintained.

In the case of continuous action controllers the larger or smaller current control signal, depending on the presetting, is selected from the two control circuits and switched to the output. In this way the control signal of the auxiliary control circuit is given priority as soon as the set limit value is no longer maintained.

Versions:	**List No.:**
Optional equipment for 3-point step controllers auxiliary control circuit with limiting function incl. additional input Pt100* (0..400°C)	99g7
Optional equipment for continuous action controllers auxiliary control circuit with limiting function incl. additional input Pt100* (0..400°C)	99g8

* alternatively other measuring inputs (type accessories such as main type Pg. 92)

Operation (supplement):

Actual value display:

Short-term display in the bottom display by actuating the ▲-key,
continuous display in the parameter level 2 can be configured

Setpoint value setting:

Actuate the P-key until "**2SP**" appears,
set the desired value using the arrow keys.

Parameter level1 :

After calling up the parameter level select **CH 2**.
Call up and set the parameters in succession as for CH1.
*Attention:: Do not change the setting of parameter **CH 1** for the main control circuit!*

Configuration level:		*Factory setting*
2out	effective auxiliary control circuit direction direct / inverse (di / in)	in
out	min. / max. limiting function (Lo / Hi)	Lo

open printversion

INDEX
1
2
3
4
5
6
7
8
9
0

This function expansion is designed to transmit actual values, set point values, additional correcting variables, etc. as standard signals from series 92/93/94/95 control units to display units, PLC or IPC.

The current or voltage range can be configured at 0...20mA, 4...20 mA, 0 ...10V or 2...10 V.
The signal range can be set as minimum and maximum value.

Designs:	**Type**
Output signal 0/4...20mA	99og.
Output signal 0/2...10 V	99ok.
As alternative:	
Actual value	x
2 actual values	xx
Set point value	....w
Actual value + set point value	....xw
dc decoupled (isolated), suffix:	.....t / tt

Additional designs available upon request

Order text:

Accessory equipment:
1(2) analog signal output(s) ...(mA,V)
for ... (value) and ...-(value)
Adjustable range
Li. No. 99o.....

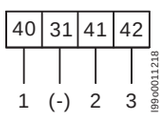
Operation:

Parameter level 2 (supplement):		*Factory setting*
(1)S Lo	Beginning of range setting (display value)	*(same as controller)*
(1)S Hi	End of range setting (display value)	*(same as controller)*

Configuration level (supplement):

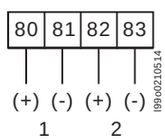
Sout **Sou1(2)**	Assignment of information signal (value): Ist1 = Act.1/ Ist2 = Act.2/ Setp. = SP/ control output =Y	*Ist 1*
Sout **Sou1(2)**	Selection of information signal (type): 0-20 / 4-20 mA or 0-10 / 2-10 V	*4-20*

Additional connecting terminals:



1 = Signal output 1
2 = Signal output 2
3 = Signal output 3
(-) = common reference potential

isolated design:



1 = Signal output 1
2 = Signal output 2

Hint: The signal output1 is also galvanic isolated from output 2

open printversion

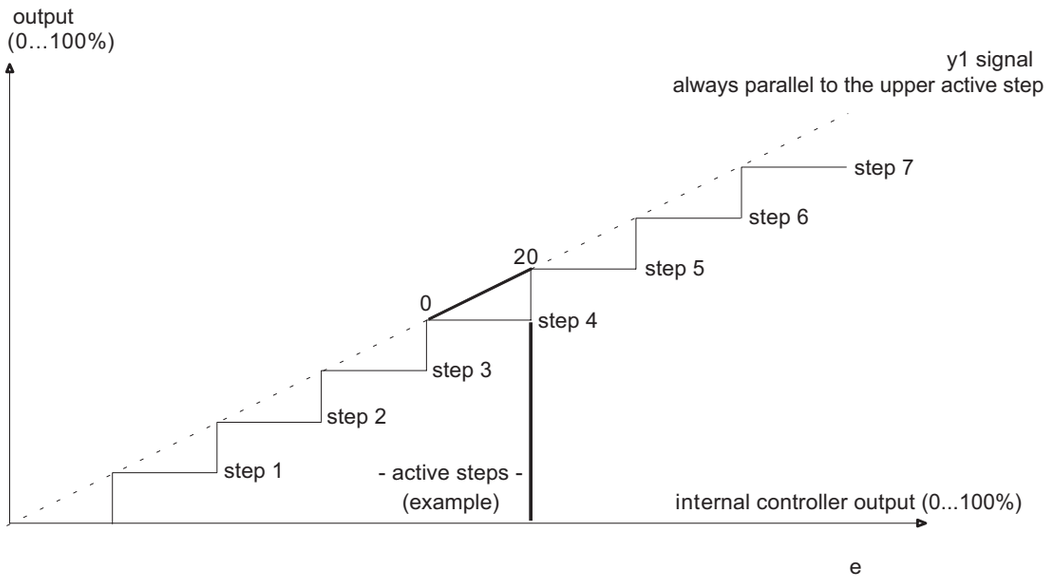
Function :

Additional analog signal output 0(4)...20 mA, or logic output for step controller Type 92D.. (or 92800-99st..) to compensate the power steps between the heating steps.

The signal range is always parallel to the upper active steps: it starts with the switch-on point of the step at 0% output signal and ends at 100% output signal immediately before the switch-on point of the next step.

In conjunction with a thyristor actuator that complements the normal step switch and takes effect on the remaining heating steps, a quasi continuous control of the total performance is guaranteed.

	Type
analog output	99ogy
logic output	99ogyL



Setting Possibilities:
(Configuration level; supplement):

tE	Switch-on delay time 1...60 sec. (for all steps)	- Standard setting: 5.0 sec.
tP	Time delay (switch interrupt) for the y1-output, when switching to the next step.	- Standard setting: 0.0 sec.
SP..	Switch-on points (e.g. 1...7 relays), relative to 0..100% of the controller output (or: deactivation of steps not needed: Value > 100%)	- Standard setting: - 12.5;25;37,5;50;62,5;75,87.5 - (4 relays: 20, 40, 60, 80)
Sd..	Switch difference of the steps (e.g. 1...7)	- Standard setting: 0.1

open printversion

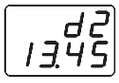
This supplementary equipment for Series 9 controllers allows one or more supplementary contacts to be regularly and automatically switched at particular times.

When and for how long the contact is switched on is set on the parameter level.

List no.: 99rtc.

Supplement to the operating instructions:

User level:



Display of day of the week and time: After pressing the ▲ -key, " **d** " appears on the upper display along with a number from **1** to **7** , where **1** represents Monday, **2** stands for Tuesday, etc.
The time in hours and minutes, separated by a point, can be read from the lower display.

Warning: The time should be checked at regular intervals. Switching from summer time to winter time and back has to be done manually. (Parameter level)

Parameter level 1 (extension):

Displaying and setting the switching times:

St*	lower display shows **" d "** and the day of the week that has been set for the start
St*	lower display shows **" h "** and the hour that has been set for the start
St*	lower display shows **" ' "** and the minute that has been set for the start
tL*	lower display shows **" d "** and the length of time in days that has been set for the switch to remain on
tL*	lower display shows **" h "** and the length of time in hours that has been set for the switch to remain on
tL*	lower display shows **" ' "** and the length of time in minutes that has been set for the switch to remain on

continue:
Press the P key to make further settings. Otherwise the display will return to normal after 30 seconds.

*An example in which contact 3 is switched **daily**:*
Switch on at 16:30, remain on for 14 hours and 15 minutes
***St3:** d = 0, h = 16, ` = 30, **tL3**: d = 0, h = 14, ` = 15*

*An example in which contact 4 is switched **once a week**:*
Switch on on Friday at 18:45, remain on for 2 days and 10 hours
***St4**: d = 5, h = 18, ` = 45, **tL3**: d = 2, h = 10, ` = 0*

Parameter level 2 (extension):

Adjusting the current time

rtc	Setting the real-time clock. The lower display shows **" d "** and the current day of the week
rtc	Setting the real-time clock. The lower display shows **" h "** and the current hour
rtc	Setting the real-time clock. The lower display shows **" ' "** and the current minute

continue:
Press the P key to make further settings. Otherwise the display will return to normal after 30 seconds.

Configuration levels (extension):

rEL*	Function mode of the associated additional contact:
	time-dependent switch on / switch off contact (**rtcE / rtcA**)

(* = associated switch contact)

open printversion

Operating instructions

Parts lists, CAD - Library

– see page 2 –

Page 2

Parts lists

Operating instructions

– see page 1–

CAD - Library

Full scale views of the control valves in DWG-format for the direct use in construction plans:
please see the directory „DWG“ on the CD

Installation:

Attention!: - *Installation, operation and maintenance should be done only by qualified personnel.*
- *Disconnect pressure air supply before working on the valve.*
- *It is not permitted to work on the valve body and to exchange the actuator as long as the valves are subjected to pressure and temperature.*

The mounting site should be easily accessible and have sufficient clearance for maintenance and for removing the actuator. Ensure that the pipe line axes are flush and connection flanges are parallel. Provide suitable measures to absorb possible tensile and pressure forces.
The valve must not serve as a fixed point. It must be carried by the piping.

Clean pipelines thoroughly prior to installing the control valves in order to avoid damage through residual installation material, welding beads or forging scale. If possible, provide a dirt trap in front of each control valve.

Installation position should be vertical to horizontal. Ensure that the installation direction is correct (directional arrows of the flow on the valve housing). Observe a 10 x DN spacing to flanges, elbows, etc., to avoid an impaired valve function.

Regard the permitted max. operating pressure and temperatur as described in the corresponding valve specification sheet.

Observe the ambient temperature limits (-20...+110°C), if necessary, for higher temperatures insulate the pipeline, provide conductive plates or cooling possibilities.

Retighten the screws of all flange connections (also lid and connection piece flanges) prior to commissioning/start-up and following initial heat-up.

Pneumatic connection:

The control pressure has to be regulated by means of a reducing unit.
For protection of aktuators, the reducing unit should be combined with filter unit.

The pneumatic supply tube has to be connected to the free thread connection G 1/4" on the pressure side of the actuator. The thread connection on the oposite spring side of the actuator is protected with the sealing cap. The vent hole in the cap must stay free.

By operating mode "spring closes", the pneumatic connections are situated by three way valves on the upper side of the actuator, by two way valves on the lower side of the actuator.
By operating mode "spring opens" is this reverse.

The right mounting side for pneumatic connection can be controlled with stroke indicator:
position without air supply up: pneumatic connection up,
position without air supply down: pneumatic connection down

Maintenance:

Following the initial temperature and pressure load, retighten the screws of all flange connections (also lid and connection piece flanges), the valve cone should be located in the centre.

Attention! *Never loosen the lid and flange screws as long as the fittings are subjected to pressure and temperature.*

Protect valve spindle against soiling, if necessary, clean and grease lightly in order to protect stuffing boxes and deflector hoods against increased wear.
Retighten stuffing box seals slightly in the event of leaks.
No further maintenance work is required for fittings with deflector hoods or bellows.

Undertake maintenance on the drive in accordance with the corresponding information in the separate operating instructions.

Disassembly of actuator:

- Move actuator with actuating pressure into the middle of the stroke
- Loosen headless setscrew in the cap nut (21)
- Secure coupling (20) position (width across flats 32), unscrew** cap nut (21)
- Unscrew nut (23)
- Remove actuator from valve
- Let off actuating pressure

Assembly of actuator:

- Position actuator onto valve, tighten nut (23)
- Move actuator into middle of stroke with actuating pressure
- Secure coupling (20) position (width across flats 32)
- Tighten cap nut (21) and headless setscrew
- Move valve into end positions, if necessary, and adjust clamping rings towards position indicator (17)

** ***Note:*** *Ensure that the position of coupling (20), indicating plate (19) and fastening nut (18) is not altered, otherwise the starting point of the actuator will require resetting.*

Setting the starting point

Ensure that the actuator is readily assembled on the valve before setting.
Release lock nut (18) (see fig. 1) on the actuator spindle (16) and screw slightly in the direction of the actuator. Temporarily remove the indicating plate (19) located beneath.

Set the desired starting pressure for the actuator on the control air reducing unit. If the access is performed via a positioner, set it to the maximum actuating pressure by the appropriate input signal.

Screw coupling (20) onto the actuator spindle (16) until the valve spindle is just in the CLOSED position or starts moving in the OPEN direction.

If the coupling cannot be adjusted sufficiently on the drive spindle, first of all adjust the coupling ring (22) by approx. 5 mm. It is accessible after the cap nut (21) has been screwed off the coupling (20) and can be turned slightly up or down on the spindle.

First of all loosen the headless setscrews of the position securing element on the coupling ring and cap nut. After completing the measure, ensure that all parts are restored to their original status.

Subsequently, reattach indicating plate (19), secure with lock nut (18) and restore to the normal operating status on the pressure reducing unit or positioner.

Exchanging the diaphragms

- Dismantle actuator from valve - as described above
- Unscrew coupling (20) and nut (18) from the drive spindle (16)
- Remove nuts and screws (5) and diaphragm lid (1)

Attention: *All actuators contain two long screws. Ensure that these screws are loosened last and uniformly on both sides to reduce the spring pretension / preloading.*
Non-observance of this information entails risk of injury !

- Remove springs (2) and spindle-diaphragm-diaphragm plate unit
- Secure spindle (16) position (width over flats 13) and screw off screw (4) together with retaining ring
- Remove clamping element (3) and diaphragm (8), insert new diaphragm (8) and clamping element (3)
- Replace retaining ring, insert screw (4) and tighten against the spindle (16)
- Insert springs (2) and spindle-diaphragm-diaphragm plate unit, ensuring at the same time that the springs are correctly positioned in the diaphragm plate (6) and the diaphragm is aligned in relation to the screw holes
- Put diaphragm lid (1) in place and align, insert screws (5) commencing with the two long screws and tighten in a cross pattern with the nuts
- Screw coupling (20) and nut (18) onto the actuator spindle (16), insert indicating plate (19)
- Mount actuator onto valve - as described above
- Set the starting point - as described above

open printversion

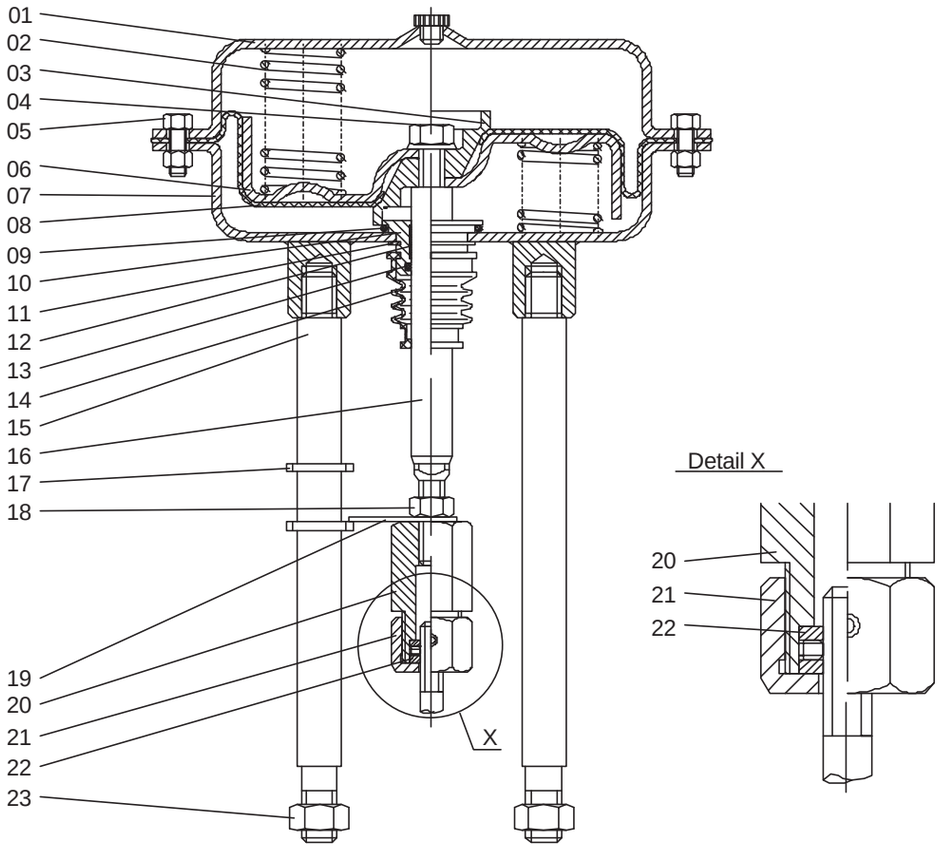


Fig. 1

No.	Designation	Part-No.
01	Diaphragm lid	f5h
02	Spring	f5f ***
03	Clamping element	f3ks
04	Screw M12 with retaining ring	e8av1230+f8ds12
05	Screw M8 with Nut	f8av0825+f8mv08
06	Diaphragm plate	f5mt
07	Diaphragm housing	f5b
08	Diaphragm	f5m
09	O-ring	f5o38x4
10	Spindle guidance	f3sd
11	Seeger-ring	f5sr31
12	Guiding tape	f9fb
13	O-ring	f5o18x3
14	Bellow	f5gf
15	Mounting rod	f3s200
16	Spindle	f3s12
17	Stroke indikators	e5ak
18	Nut M12	f8mv12f
19	Indicating plate	f3ab
20	Coupling	f3k60
21	Cap nut	f3um3/4
22	Coupling ring with headless setscrew	e3sr10 ****
23	Nut M16 with spring ring	e8mv16+e8fv16

*** = Stroke and control pressure dependent
**** = Only for valve spindle with thread M10

open printversion

Electropneumatic Positioner
Type 4763

Fig. 1 · Type 4763

Edition January 1999

Mounting and operating instructions

open printversion

EB 8359-2 EN

Contents . . . . . Page

WARNING

Assembly, start-up and operation of the device may only be performed by trained and experienced personnel familiar with this product.
According to these Mounting and operating instructions, trained personnel is referred to persons who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the relevant standards.
Explosion-proof versions of this device may only be operated by personnel who have undergone special training or instructions or who are authorized to work on explosion-proof devices in hazardous areas.
Any hazards which could be caused by the process medium, the signal pressure and moving parts of the control valve are to be prevented by means of appropriate measures.
If inadmissible motions or forces are produced in the actuator as a result of the level of the supply air pressure, this must be restricted by means of a suitable pressure reducing station.

Proper shipping and appropriate storage are assumed.

Technical data · All pressures in bar (gauge)

Controlled variable (travel range) in mm	7.5 to 60 with lever extension up to 90		
Input signal Split-range 0 to 50 % or 50 to 100 % input signal span (up to 50 mm travel)	4 to 20 mA	Ex	Internal resistance Ri at 20 °C approx. 250 Ω ±7%
	4 to 20 mA 0 to 20 mA	not Ex	Internal resistance R_i at 20 °C approx. 200 Ω ± 7%
	1 to 5 mA		Internal resistance R_i at 20 °C approx. 880 Ω ± 7%
	For type of protection EEx ia IIC, the data cited in the Certificate of Conformity are to be considered		
Range spring	Selection (see Table 2)		
Supply air	1.4 to 6 bar or 20 to 90 psi		
Signal pressure p_{st}	Max. 0 to 6 bar or 0 to 90 psi		
Characteristic	Linear characteristic Deviation from terminal-based conformity: < 1.5 %		
Hysteresis	< 0.5 %		
Sensitivity	< 0.1 %		
Operating direction	Reversible		
Proportional band X_p at 1.4 bar supply air	1 to 3 % for springs 1 and 2, 1 to 1.5 % for spring 3		
Steady-state air consumption, X_p = 1 %	At 1.4 bar supply air 0.19 m_n^3/h		At 6 bar supply air 0.5 m_n^3/h
Air delivery	At Δp 1.4 bar 3 m_n^3/h		At Δp 6 bar 8.5 m_n^3/h
Speed of response with Type 3271 Actuator, FA	240 cm^2: ≤ 1.8s	350 cm^2: ≤ 2.5s	700 cm^2: ≤ 10s
Permissible ambient temperature	–20 °C to +70 °C [1]		
External influence (X_p = 1 %)	Temperature: < 0.03 %/°C		Supply: < 0.3 %/0.1 bar
Effect of vibration	< 2 % between 10 and 150 Hz and 1.5 g		
Effect when rotated 180°	< 3.5 %		
Degree of protection	IP 54 (IP 65 special version)		
Weight (approximately)	1.2 kg		
Materials	Die-cast aluminum, chromized and plastic-coated Stainless steel		

[1] For explosion-proof versions, see PTB Certificate; extended temperature range available on request

Positioner versions

Model		4763 -	X	0	1	X	0	0	X	X	X	X	0
Explosion protection	Without		0										
	EEx ia IIC T6		1										
	Ex ia FM/CSA		3										
Measuring spring	1					1							
	2					2							
	3					3							
Pneumatic connections	G 1/4								1				
	NPT 1/4								3				
Electrical connections	Pg 13.5 blue									1			
	Pg 13.5 black									2			
	Plug connector Harting									5			
Reference input signal	4 to 20 mA										1	1	
	0 to 20 mA										2	2	
	1 to 5 mA										2	3	

open printversion

1. Design and principle of operation

The electropneumatic (I/P) positioner is used for the correlation between the valve stem position (controlled variable x) and the input signal (reference variable w) received from the controller. In this case, the input signal accepted from the control device is compared to the travel (valve stem position) of the control valve, and a pneumatic signal pressure (output variable y) is delivered.

The positioner basically consists of an electropneumatic converter unit (21) and the pneumatic section including the lever (1), shaft (1.1) and range spring (6), plus the control system composing nozzle, flapper and amplifier.

When the input signal is, for example, a 4 to 20 mA DC current signal, it is led directly to the electropneumatic converter unit (I/P converter) and converted to a proportional air pressure signal p_e.

Any change of the input current signal causes a proportional change of the air pressure p_e led to the pneumatic control system.

The air pressure p_e, in turn, produces a force which acts on the surface of the measuring diaphragm (8) and is compared to the force of the range spring (6). The motion of the measuring diaphragm (8) is transferred to the flapper (10.2) via the feeler pin (9.1), and the nozzle (10.1) releases pressure. Any change of either the air pressure p_e or the valve stem position causes the pressure to change in the amplifier (12) connected downstream of the nozzle. The signal pressure p_{st} which is released causes the plug stem to assume a position based on the input signal.

The adjustable volume throttle Q (14) and X_p (gain) adjustment (13) are used to optimize the control loop.

The range spring (6), which can be exchanged, is assigned to both the rated valve travel and the nominal voltage of the input signal.

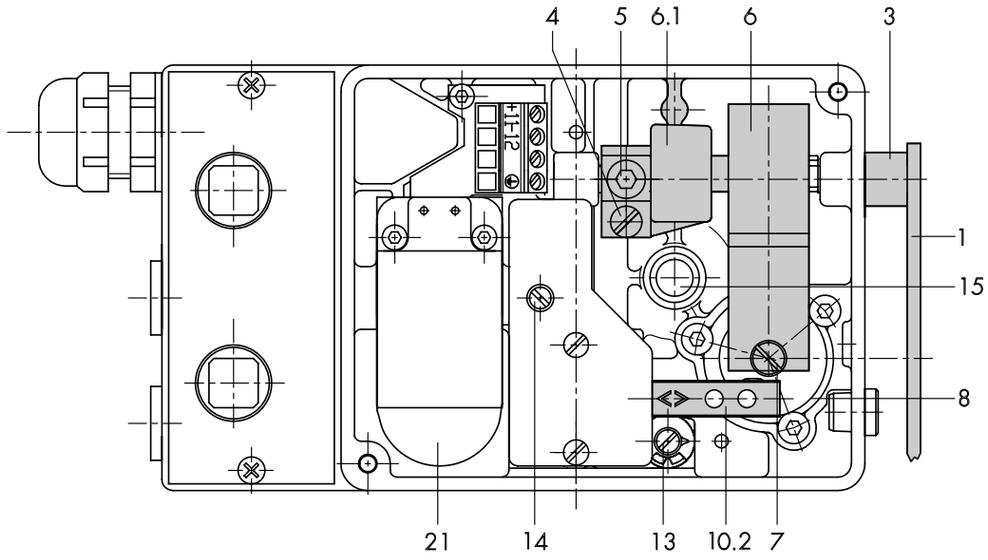


Fig. 2 · Positioner (cover removed)

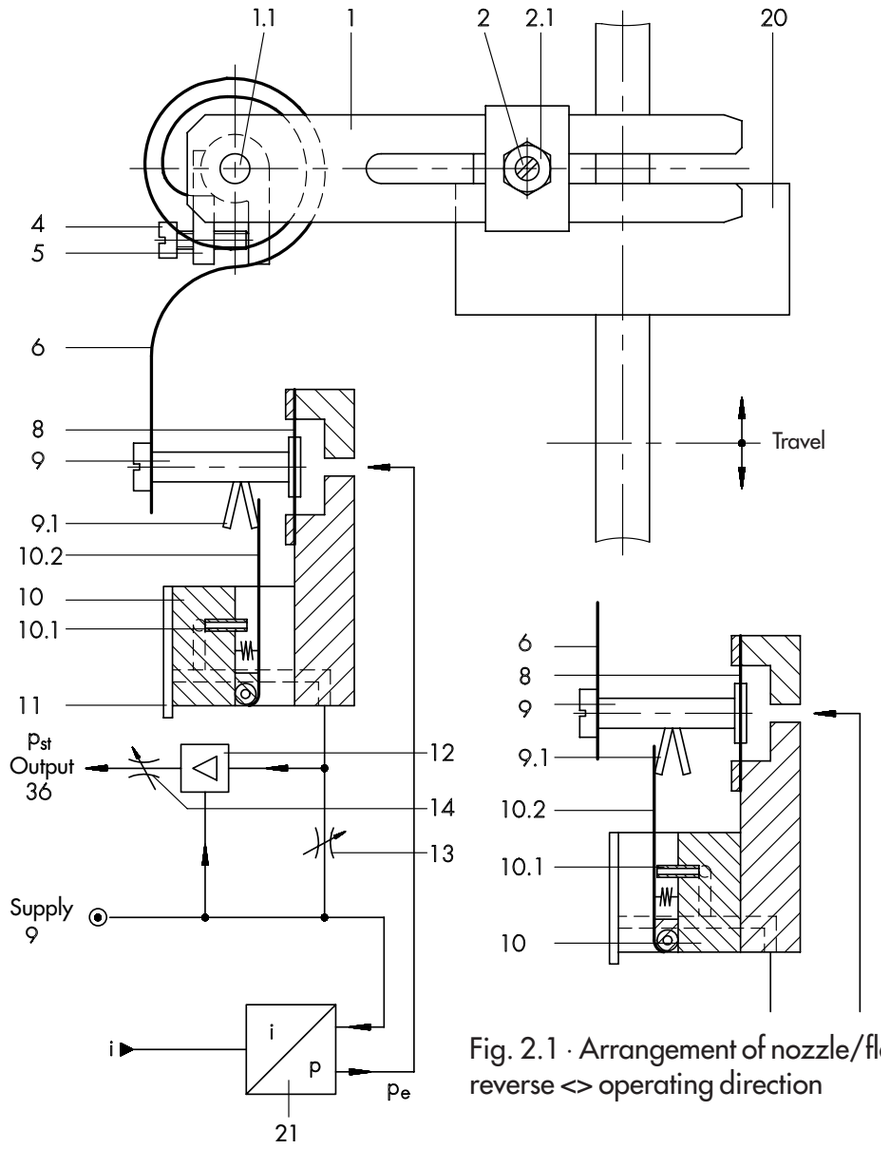


Fig. 2.1 · Arrangement of nozzle/flapper reverse <> operating direction

Legend

1	Lever for valve travel	7	Mounting screw	13	X_p (gain) adjustment
1.1	Shaft	8	Measuring diaphragm	14	Volume throttle Q
2	Pin	9	Diaphragm plate	15	Hole for mounting screw
2.1	Nut	9.1	Feeler pin	20	Plate for attachment to either the actuator stem or the plug stem of the control valve
3	Sleeve	10	Nozzle block		
4	ZERO adjustment screw	10.1	Nozzle		
5	Mounting screw	10.2	Flapper	21	I/P converter unit
6	Range spring	11	Cover plate		
6.1	Stop angle	12	Amplifier		

Fig. 3 · Functional diagram

open printversion

2. Attaching the positioner to the control valve

Two different types of mounting hardware (attachment kits) are necessary to attach the positioner to the valve depending on the respective valve version:

— Valves with NAMUR-rib yokes: **Product number 1400-5745**

— Valves with rod-type yoke (stud): **Product number 1400-5745** and, additionally, mounting hardware **product number: 1400-5342**

Since the positioner can be attached on either side of the valve, the physical location (left or right attachment) should be determined before actual installation (see corresponding Figs. 7 to 10 in section 4.1).

2.1 Valves with NAMUR-rib yokes (Fig. 4)

Fasten the plate (20) to the coupling clamp (22) of the valve using the screws (21). Unscrew the positioner cover, and secure the device to the valve yoke using the mounting screw (15). When doing so, ensure that the pin (2) is led inside the wire strap and therefore clamped against the plate (20).

2.2 Valves with rod-type yokes (Fig. 5)

Screw the plate (20), off-centered, to the travel indicator (24) of the plug stem (23) using the screws (21).

Place both the support (28) and the clamping plate (26) on the stud (27) and lightly fasten. Displace the support until both the center of the plate (20) and the support (28) are aligned at half the valve travel. Screw tight the support and clamping plate, and subsequently mount the positioner to the support using the mounting screw (15). In this process, ensure that the pin (2) is led inside the wire strap and therefore clamped against the plate (20).

2.3 Cover of positioner case

After having attached the positioner, make sure that the vent plug on the cover of the positioner case points downwards after the valve has been installed.

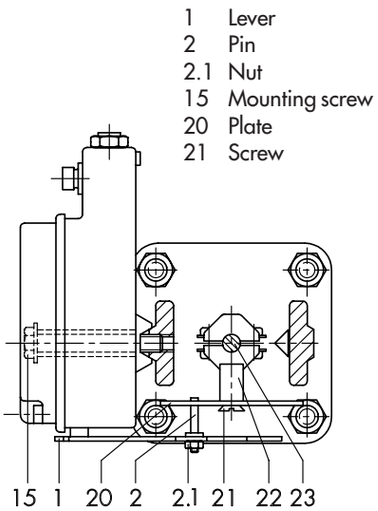


Fig. 4 · Attachment for valves with NAMUR-rib yokes (e.g., SAMSON Series 240 Valves)

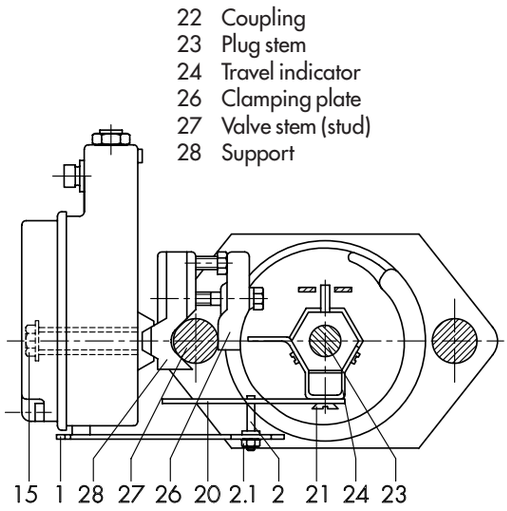


Fig. 5 · Attachment for valves with rod-type yokes

3. Electrical and pneumatic connections

3.1 Electrical connections

For electrical installations, you are required to observe the relevant electrotechnical regulations and the accident prevention regulations of your country.

In Germany, the VDE regulations and the accident prevention regulations of the employer's liability insurance association must be observed.

For assembly and installation in hazardous areas, EN 60079-14:1997 and VDE 0165 Part 1/8.98 apply.

For connection of intrinsically safe circuits, the data stipulated in the Certificate of Conformity apply.

Reversal of the electrical connections may cause the explosion protection to be ineffective!

Available accessories are:

Cable gland PG 13.5

black	Order no. 1400-6781
blue	Order no. 1400-6782

Adapter Pg 13.5 for $^1/_2$" NPT

metallic	Order No. 1400-7109
blue finish	Order No. 1400-7110

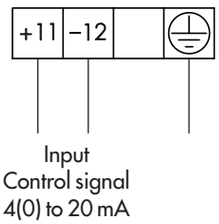


Fig. 6 · Electrical connections

3.2 Air connections

The pneumatic connections are designed as tapped holes with 1/4 NPT or ISO 2228/1-G1/4 thread. The conventional male connections for metal and copper tube (or plastic hoses) can be used. The supply air must be dry and free of any oil and dust. Always observe the maintenance instructions applicable to the connected pressure reducing stations. Air lines are to be thoroughly blown out before being connected.

The positioner output pressure is led to the top and bottom diaphragm case of the actuator as depicted in Figs. 7 to 10.

IMPORTANT

The supply air should be adjusted to exceed the upper bench range value of the actuator by approximately 0.4 bar (see nameplate).

4. Operating and adjusting the positioner

4.1 Combining positioner and actuator

The arrangement of the actuator, input signal, operating direction and mounting location is schematically represented in Figs. 7 to 10.

Each subsequent change such as, for example, reversal of the control loop's operating direction or field reversing the actuator version from direct **"Actuator stem extends"** to reverse **"Actuator stem retracts"** or vice versa also involves changing the mounting location of the positioner.

4.1.1 Determining/reversing the operating direction (Figs. 7 to 10 and Fig. 11)

When the input signal increases (reference variable w), the signal pressure p_{st} can either be of increasing nature (direct operating direction <<) or decreasing nature (reverse operating direction <>).

The same applies to a decreasing input signal; the output pressure either decreases (direct operating direction <<) or increases (reverse operating direction <>).

Symbols are located on the flapper (10.2) which identify the respective operating directions (direct << or reverse <>). Depending on the flapper position, the adjusted operating direction is marked with the corresponding symbol.
If the operating direction of the required function does not agree with the visible symbol or if the operating direction is to be changed, proceed as instructed below:
Remove both screws of the cover plate, and lift off the nozzle block (10) along with the cover plate.
Re-install the nozzle block turned 180° along with the cover plate, and screw tight.
Always ensure that the nozzle block and flapper are correctly located above or below the feeler pin (9.1) as exemplified in Fig. 11.
If the operating direction is to be changed after the initially determined arrangement of positioner and actuator, note that the positioner must be mounted in a different location and the nozzle block must be turned. Always consider the location of the lever (1) and the plate (20), "lever on top of plate" or reversed "plate on top of lever" as shown in Figs. 7 to 10.

Actuator version: **"Actuator stem extends"**

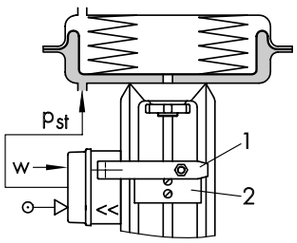


Fig. 7 · Direct action << (left attachment)

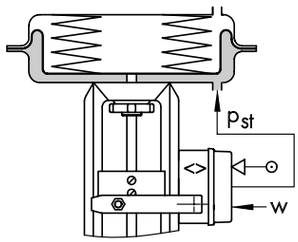


Fig. 8 · Reverse action <> (right attachment)

Actuator version: **"Actuator stem retracts"**

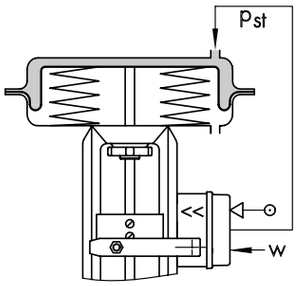


Fig. 9 · Direct action << (right attachment)

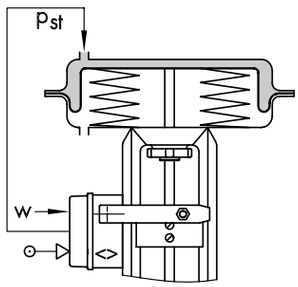


Fig. 10 · Reverse action <> (left attachment)

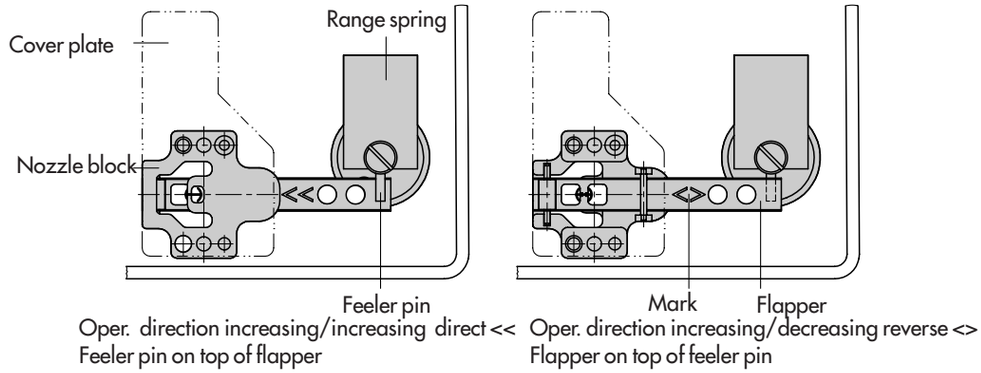


Fig. 11 · Location of the nozzle block

4.2 Starting point and input signal (reference variable)

The attached lever and the installed range spring of the positioner are assigned to the values of rated valve travel (mm) and the input signal (% reference variable) according to the table below.

Under normal conditions, the reference variable span comprises 100 % = 16 mA. A smaller span of, for example, 50 % = 8 mA is only required for split-range operation (Fig. 13). By subsequent replacement (section 4.4) of the range spring, the span can be changed.

When adjustment is made on the positioner, the travel must be adapted to the input signal and vice versa. With an input signal of, for example, 4 to 20 mA, travel through the entire range (0 to 100 %) must have occurred. **The starting point then is 4 mA, the end value, correspondingly, 20 mA.**

In split-range operation, the controller output signal used to control two control valves is divided in such a way that these travel through their entire travel each at a portion of the input signal range (e.g., first control valve adjusted to 4 to 12 mA, second to 12 to 20 mA). When it is necessary to prevent the two from crossing over, consider a dead band of ±0.5 mA as in Fig. 13.

The starting point (zero) is adjusted using the ZERO adjustment screw (4), the input signal span and, hence, the end value using the pin (2).

For adjustment, connect an ammeter to the control signal input at the terminals and the supply air to the supply input (supply 9).

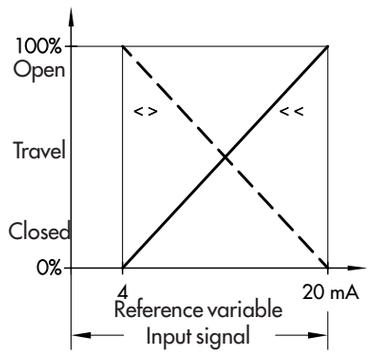


Fig. 12 · Standard operation

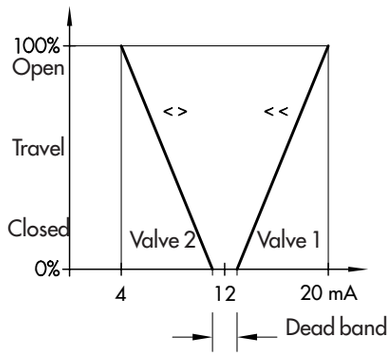


Fig. 13 · Split-range operation of two control valves operating in opposite directions

Table 2

Rated travel mm	Min./max. travel mm	Input signal (reference variable)	Range spring
Standard travels for SAMSON valves with lever (length 40 to 127 mm)			
15	7.5 to 15	100 % 50 %	1 2
30	14 to 32	100 % 50 %	2 3
60	30 to 70	100 %	3
Additional travel ranges with lever I and lever extension (length 40 to 200 mm)			
20	7.5 to 26	100 % 50 %	1 2
40	14 to 50	100 % 50 %	2 3
> 60	30 to 90	100 %	3

4.3 Adjusting the valve

4.3.1 Adjusting the the air delivery (volume throttle **Q) and the proportional band X_p**

Close the volume throttle (14) as far as the required speed of response allows. You can check the speed of response by pressing the range spring (6) against the rest.

Adjust the input signal to approximately 50 % of its range. Then, turn the ZERO adjustment screw (4) until approximately 50 % valve travel is indicated.

Adjust the X_p throttle with regard to the supply air pressure, as indicated in Fig. 14. The preset value of X_p should read approximately 3 %.

Check the plug stem's tendency to oscillation by pressing the range spring (6) shortly against the rest.

Xp should be adjusted to a value as small as possible, however, without causing noticeable hunting.

IMPORTANT

Always determine the X_p adjustment prior to adjusting the starting point. Subsequent modification displaces the zero point!

The latter can also be displaced by altering the adjusted supply air pressure. If applicable, check the ZERO adjustment under operating conditions of the plant and, when necessary, re-adjust.

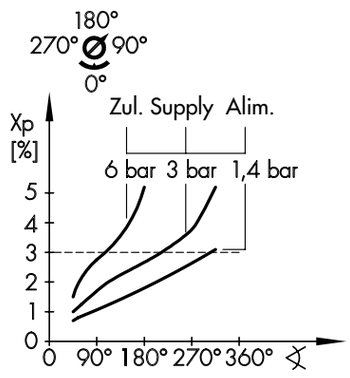


Fig. 14 · X_p adjustment

4.3.2 Adjusting the starting point and end value for actuator version: "Actuator stem extends"

Important: To ensure that the total closing force of the actuator can be effective in the control valve, the diaphragm chamber must be completely vented at the lower (operating direction <<) and at the upper (operating direction <>) range value of the reference input signal.

Therefore, set input signal to a slightly increased starting point of 4.5 mA when the operating direction is direct << and to a slightly lowered starting point of 19.5 mA when the operating direction is reverse <>.

This applies in particular to controllers and control systems whose output signal is limited to a range of 4 to 20 mA.

Starting point (ZERO) e.g., 4.5 mA

Turn the ZERO adjustment screw (4) until the plug stem just begins to move from the resting position (observe plug stem with travel indicator). Decrease the input signal on the ammeter and increase again slowly. Check whether the plug stem starts moving at a starting point of **4.5 mA** and, if necessary, correct.

End value (SPAN) e.g., 20 mA

After the starting point has been adjusted, increase the input signal. The plug stem must be motionless at an **end value of exactly 20 mA** and therefore have passed **100 % travel** (observe the travel indicator on the valve!). If the end value does not correlate, the pin (2) must be displaced as follows in order correct the signal:

Displace pin to
end of lever → increased travel
pivot → decreased travel

Whenever you correct the input signal, readjust the ZERO point afterwards. Subsequently, check the end value.

Repeat until the two values agree.

4.3.3 Adjusting the starting point and end value for actuator version: "Actuator stem retracts"

Important: For actuator version "Actuator stem retracts", the diaphragm chamber must be loaded with a pressure that is capable of tightly closing the control valve, even with available upstream pressure of the plant. This concerns an end value of the input signal corresponding to 20 mA (direct operating direction <<) or a lower-range value corresponding to 4 mA (reverse operating direction <>). The required signal pressure is indicated on the adhesive label attached to the positioner.

The **required signal pressure** is estimated as follows:

Req. signal = pressure [bar] $\dfrac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A} + F_{be} + 0.4$

d = Seat diameter [cm]
Δp = Differential pressure $p_1 - p_2$ [bar]
A = Diaphragm area [cm^2]
F_{be} = End value of the bench range of the actuator [bar]

In the absence of such specifications, the following is assumed:
Required signal pressure =
End value of the bench range of the actuator (spring range) + 1 bar.

Starting point e.g., 20 mA
Adjust the input signal to a **starting point of 20 mA** on the ammeter. Turn the ZERO adjustment screw (4) until the control valve just begins to move from the initial position.
Increase the input signal and slowly reduce to a starting point of **20 mA** again. Check if the valve begins to move at **exactly 20 mA.**
Correct deviation using the ZERO adjustment screw (4); counter-clockwise direction moves the control valve earlier from its final position, clock-wise direction, later.

End value (span) e.g., 4 mA
After having adjusted the starting point, adjust the input signal to an **end value of 4 mA** using the ammeter. With an end value of **exactly 4 mA**, the plug stem must be motionless and therefore have passed **100 % travel** (observe the travel indicator on the valve!).
If the end value does not agree, the pin (2) must be moved to correct the signal.
Adjust 20 mA and turn the ZERO adjustment screw (4) until the **required signal pressure** is indicated on the pressure gauge.

Should no pressure gauge be available, adjust, by way of substitution, 19.5 mA as starting point.

4.4 Exchanging the range spring (Fig. 3)

If the range is to be altered or change is to be made to split-range operation, replace the range spring as follows:
First remove the screw (7) on the range spring. Then, remove the hexagon socket screw (5), and remove the lever with shaft.
Replace the range spring. Then, move the lever with shaft through the sleeve (3), case and stop angle (6.1). Secure the range spring using the screw (7).
Slide the stop angle and shaft toward one another such that screw (5) sits on the flattened part of the shaft. Tighten the screw (5). Allow a play from 0.05 to 0.15 mm between the lever (1) and the sleeve (3) as well as between the range spring (6) and the case.

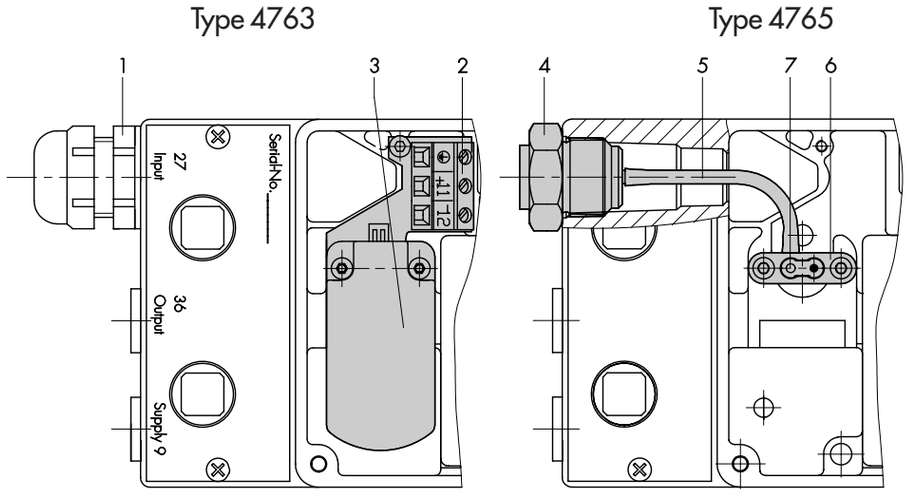
5. Conversion from electropneumatic to pure pneumatic positioner

Using the appropriate conversion kit, the electropneumatically functioning positioner can be converted to an air-operated Type 4765 Pneumatic Positioner.

NOTE
The "Mounting and operating instructions", EB 1-8359 E, applies to the converted Type 4765 Pneumatic Positioner.

Required conversion kit:
Order number 1400-6724
(for G threaded connection)
Order number 1400-6725
(for NPT threaded connection).

Remove the mounting screws and lift out the I/P converter unit along with the printed circuit board from the case. Remove the screw gland.
Plug on the hose first, and then screw the connecting fitting (nipple) of the conversion kit tightly on the case.
Plug the sealing element in the connecting plate and screw tight in the case.
Push the free end of the hose to the connecting plate.



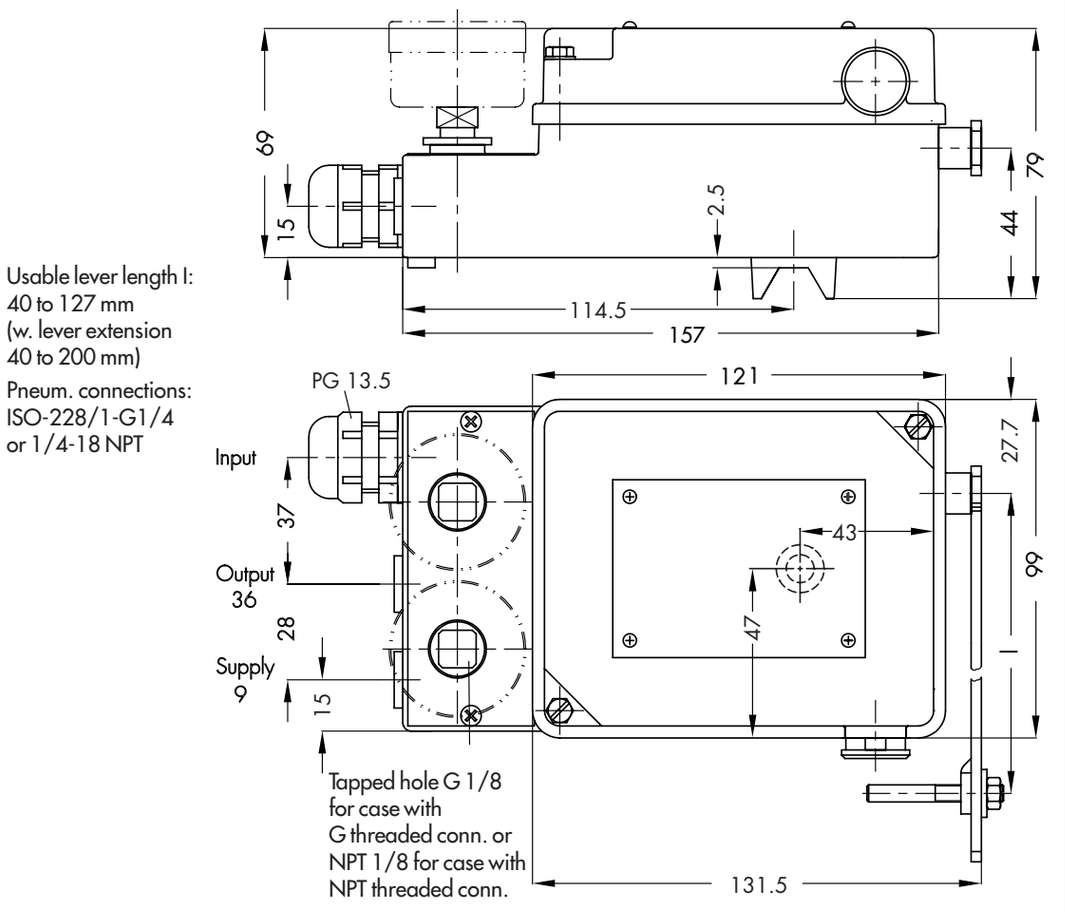
1 Screw gland
2 Printed circuit board
3 I/P converter unit
4 Connecting fitting
5 Hose
6 Connecting plate
7 Sealing element

Fig. 15 · Converting the positioner

6. Accessories and mounting hardware (attachment kits)

	Order number
Range spring 1 Range spring 2 Range spring 3 Lever I Lever extension Pressure gauge attachment Pressure gauge attachment (copper-free)	1190-0736 1190-0737 1190-0738 1690-6469 1400-6716 1400-6718 1400-6719
Attachment kit for valves with NAMUR-rib yokes Attachment kit for valves with NAMUR-rib yokes and rod-type yokes according to NAMUR for rod diameters 18...35 mm	1400-5745 1400-5745 and 1400-5342
Spare part range with seals and diaphragms	1400-6792
Adapter kit for degree of protection IP 65 (for more details see Samsomatic documentation Z 900-7)	1790-7408

7. Dimensions in mm



open printversion

PTB Certificate of Conformity for Type 4763-1 [1] I/P Positioner

[1]) SEV certification number 93.100906.03

Physikalisch-Technische Bundesanstalt

(1) KONFORMITÄTSBESCHEINIGUNG

(2) PTB Nr. Ex-93.C.4031

(3) Diese Bescheinigung gilt für das elektrische Betriebsmittel

i/p Stellungsregler Typ 4763-1

(4) der Firma SAMSON AG
D-6000 Frankfurt

(5) Die Bauart dieses elektrischen Betriebsmittels sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Konformitätsbescheinigung festgelegt.

(6) Die Physikalisch-Technische Bundesanstalt bescheinigt als Prüfstelle nach Artikel 14 der Richtlinie des Rates der Europäischen Gemeinschaften vom 18. Dezember 1975 (76/117/EWG) die Übereinstimmung dieses elektrischen Betriebsmittels mit den harmonisierten Europäischen Normen

Elektrische Betriebsmittel für explosionsgefährdete Bereiche

EN 50 014:1977 + A1 ... A5 (VDE 0170/0171 Teil 1/1.87) "Allgemeine Bestimmungen"
EN 50 020:1977 + A1 ... A2 (VDE 0170/0171 Teil 7/1.87) "Eigensicherheit"

nachdem das Betriebsmittel mit Erfolg einer Bauartprüfung unterzogen wurde. Die Ergebnisse dieser Bauartprüfung sind in einem vertraulichen Prüfprotokoll festgelegt.

(7) Das Betriebsmittel ist mit dem folgenden Kennzeichen zu versehen:

EEx ia IIC T4 bzw. EEx ia IIC T5 bzw. EEx ia IIC T6

(8) Der Hersteller ist dafür verantwortlich, daß jedes derart gekennzeichnete Betriebsmittel in seiner Bauart mit den in der Anlage zu dieser Bescheinigung aufgeführten Prüfungsunterlagen übereinstimmt und daß die vorgeschriebenen Stückprüfungen erfolgreich durchgeführt wurden.

(9) Das elektrische Betriebsmittel darf mit dem hier abgedruckten gemeinschaftlichen Unterscheidungszeichen gemäß Anhang II der Richtlinie des Rates vom 6. Februar 1979 (79/196/EWG) gekennzeichnet werden.

Im Auftrag

Dr.-Ing. Schebsdat
Regierungsdirektor

Braunschweig, 10.05.1993

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24

V 15 - 320 007 - 12.85

Physikalisch-Technische Bundesanstalt

ANLAGE

zur Konformitätsbescheinigung PTB Nr. Ex-93.C.4031

Die i/p-Stellungsregler Model 4763-1 ... werden an pneumatische Stellventile angebaut. Der Stellungsregler vergleicht das Stellsignal einer Regel- oder Steuereinrichtung im Bereich von (0) 4 ... 20 mA bzw. 1 ... 5 mA mit dem Hub des Stellventils und steuert als Ausgangsgröße einen pneumatischen Stelldruck aus.

Elektrische Daten

Eingangsstromkreis .... in Zündschutzart Eigensicherheit EEx ia IIC
(Anschlüsse + und -) nur zum Anschluß an bescheinigte eigensichere Stromkreise mit folgenden Höchstwerten

U_0 = 28 V
I_k = 100 mA bzw.
I_k = 85 mA

Die Zuordnung zwischen zulässiger Umgebungstemperatur, Temperaturklasse und Kurzschlußstrom ist der nachfolgenden Tabelle zu entnehmen.

Die wirksame innere Kapazität und Induktivität sind vernachlässigbar klein.

Temperaturklasse	Umgebungstemperatur [°C]	Kurzschlußstrom [mA]
T6	60	85
T6 T5 T4	55 70 80	100 100 100

Prüfungsunterlagen

1. Beschreibung (8 Blatt)
2. Zeichnung Nr.4763-1...R
   1150-6890 T
   1150 6896 S
   1150 6891 T
   1150 6016 T-4
   1150 6318 S-4
   1150-6939 T-3
3. Konformitätsbescheinigung PTB Nr. Ex-86.B.2038

Die Beschreibung und alle Zeichnungen sind unterschrieben.

Im Auftrag

Dr.-Ing. Schebsdat
Regierungsdirektor

Braunschweig, 10.05.1993

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24

Blatt 1/1

V 1 - 755 320 17-07 92

INDEX

Physikalisch-Technische Bundesanstalt

1. NACHTRAG
zur Konformitätsbescheinigung PTB Nr. Ex-93.C.4031

der Firma Samson AG
D-Frankfurt

Der i/p Stellungsregler Typ 4763-1 darf künftig auch entsprechend den unten aufgeführten Prüfungsunterlagen gefertigt werden.
Die Änderung betrifft den Umgebungstemperaturbereich, der auf -45 °C erweitert wird.

Prüfungsunterlage

Beschreibung (3 Blatt) unterschrieben am 03.09.1993

Im Auftrag

Braunschweig, 22.11.1993

Dr.-Ing. Schebsdat
Regierungsdirektor

V 1-755 320 17-07 92

EEx ia IIC T4 bzw. T5 bzw. T6 Blatt 1/1

Physikalisch-Technische Bundesanstalt

2. NACHTRAG
zur Konformitätsbescheinigung PTB Nr. Ex-93.C.4031

der Firma Samson AG
D-Frankfurt

Der i/p-Stellungsregler darf künftig auch entsprechend den unten aufgeführten Prüfungsunterlagen gefertigt werden.

Die Änderungen betreffen den inneren Aufbau.

Alle übrigen Daten bleiben unverändert.

Prüfungsunterlagen	unterschrieben am
1. Anlage zur Beschreibung (1 Blatt)	05.10.1993
2. Zeichnung Nr. 4763-1-R	05.10.1993
1150-6939T-4	05.10.1993

Im Auftrag

Braunschweig, 30.05.1994

Dr.-Ing. Schebsdat
Oberregierungsrat

Z.14-755 320 17-08 93

EEx ia IIC T4...T6 Blatt 1/1

Installation Manual for Apparatus for Use in Hazardous Locations in Compliance with CSA Approval

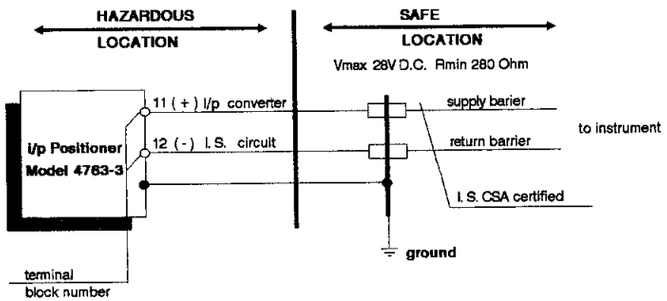
Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

i/p positioner max. values

$V_{max} \leq 28\ V$ Ci - OnF
$I_{max} \leq 100\ mA$ Li - OμH
$R_{min} \geq 280\ \Omega$

Intrisically safe when installed as specified in manufacturer's installation manual.

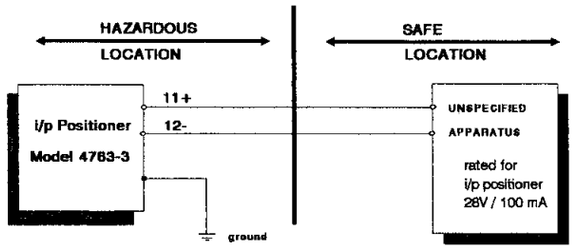
CSA certified for Hazardous Locations:
Class I, Division 1, Groups A, B, C, D.



Cable entry:

Cable entry Pg 13,5 or metal conduit according to drawing No. 1150-6928 T or drawing No. 1150 - 6016 T-4.

CSA certified for Hazardous Locations:
Class I, Division 2, Groups A, B, C, D.



Cable entry:

Cable entry only rigid metal conduit according to drawing No. 1150-6016 T-4.

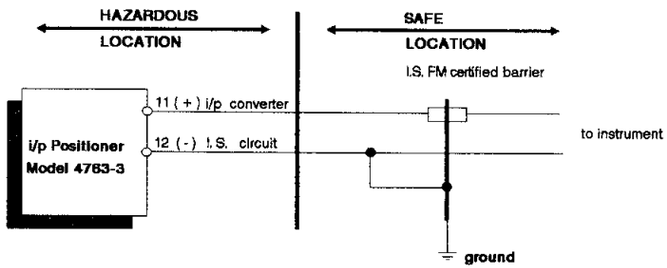
Installation Manual for Apparatus for Use in Hazardous Locations in Compliance with FM - Approval

Class I, II, III Division 1
Groups A, B, C, D, E, F and G

The apparatus may be installed in intrinsically safe circuits when used with an FM-approved intrinsically safe barrier.
Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

i/p positioner max. values

$V_{max} \leq 28$ V Ci - OnF
$I_{max} \leq 100$ mA Li - OμH
$R_{min} \geq 280\ \Omega$

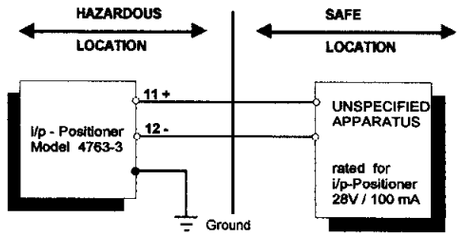


Cable capacitance plus the capacitance of the intrinsically safe apparatus shall be less than the capacitance marked on any associated apparatus used. The same requirements apply to inductance.

Cable entry:

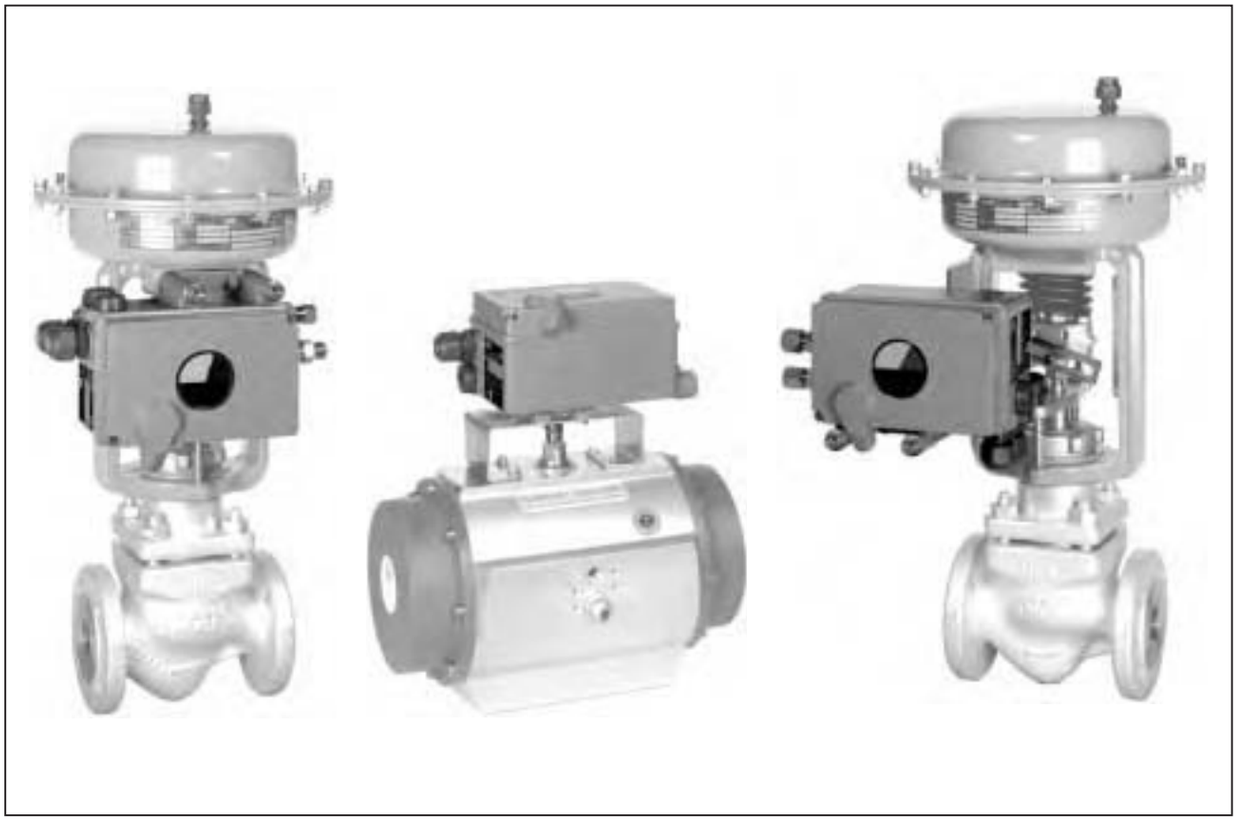
Cable entry Pg 13,5 or metal conduit according to drawing No. 1150-6928 T or drawing No. 1150 - 6016 T-4.

FM certified for hazardous Locations:
Class I, II, III Division 2, Groups A, B, C, D, E, F + G.



INDEX

SRI990 Analog Positioner



The analog Positioner SRI990 with analog input 4 to 20 mA is designed to operate pneumatic valve actuators. It offers an easy adjustment by means of switches and potentiometers. The modular structure of the POSYS positioner series enables conversion from an analog to a “digital” or “intelligent” positioner by exchanging the electronics.

FEATURES

- Configuration by means of switches and potentiometers
- Load 300
- Low air consumption
- Stroke 8 to 120 mm (0.3 to 4.7 inch)
- Angle range up to 95 degree
- Supply air pressure up to 6 bar (90 psig)
- Single acting or double acting
- Mechanical travel indicator
- Reverse polarity protection and interlock diode
- Attachment to stroke actuators directly or according to IEC 534 part 6 (NAMUR)
- Attachment to rotary actuators according to VDI/VDE 3845
- Failsafe position in case of failure of electronics
- Protection class IP 65 and NEMA 4X
- Explosion protection:
  EEx ia IIC according to CENELEC
  or “Intrinsic safety” according to FM and CSA

Additional equipments (compatible to SRD991/992):

- Integrated inductive limit switches, independent of device electronics

Accessories (compatible to SRD991/SRD992):

- Gauge attachment for supply air and outputs
- Booster relay

Repair and maintenance operations must be carried out by qualified personnel!

open printversion

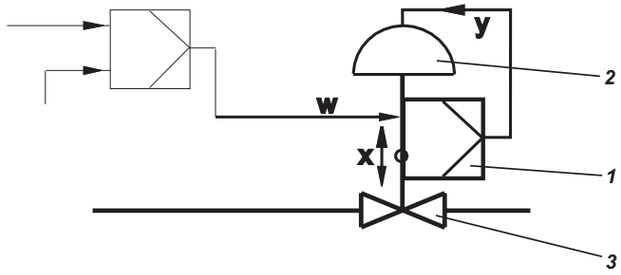
TABLE OF CONTENTS

open printversion

1 METHOD OF OPERATION

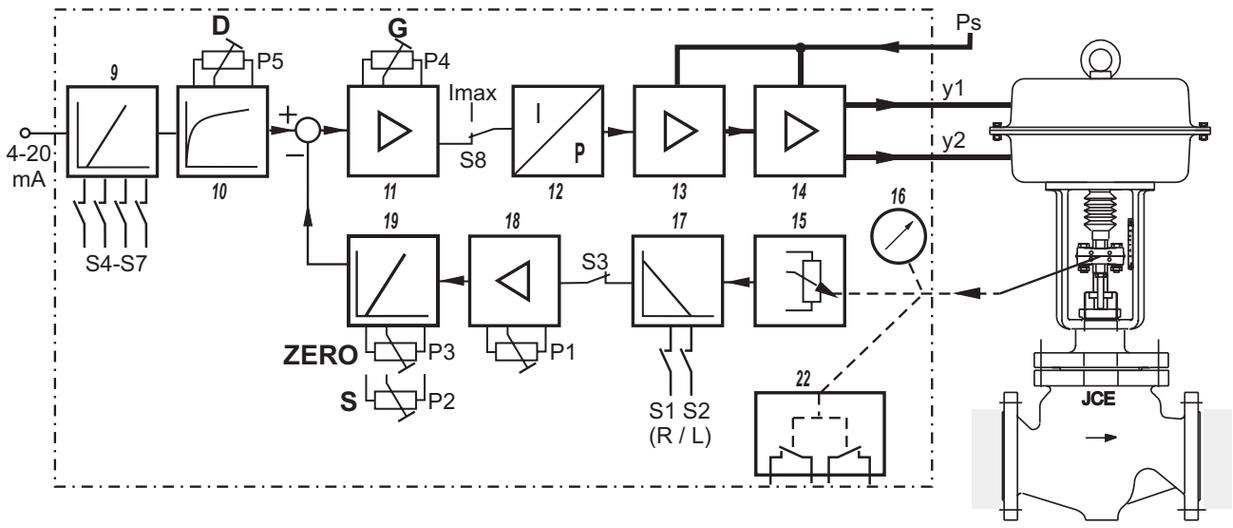
1.1 General

The intelligent positioner SRD991 ***1*** and the pneumatic actuator ***2*** form a control loop with the setpoint value w (from master controller or control system), the output pressure y and the position x of the actuator on valve ***3*** .
The positioner can be attached to both linear actuators and rotary actuators.
Actuators with spring force are controlled by a single acting positioner. Actuators without spring force are controlled by a double acting positioner. The positioner can be operated by means of switches and potentiometers.



For the supply air, we recommend the FOXBORO ECKARDT FRS923 filter regulator.

1.2 Block diagram



1.3 Operation

The supply of the electronics unit is diverted from the current signal 4 to 20 mA at the input.

The current value is measured and is suited in input circuit ***9*** to the desired input range (control action or split range) via switches S4 - S7. In circuit ***10*** the signal is provided with an adjustable time constant settable via potentiometer P5.

The resulting internal signal is guided to the analog control circuit ***11*** , the gain of which is adjustable via potentiometer P4. The output of the control circuit drives the electromechanic converter (IP module) ***12*** , which controls the analog single acting or double acting pneumatic amplifier ***14*** through the preampifier ***13***. The output of the amplifier ***14*** is the output pressure y (y_1,y_2) to the actuator. The pneumatic amplifiers are supplied with supply air ***Ps*** 1.4 to 6 bar (20 to 90 psig).

The position x of the actuator is measured by the position sensor (conductive plastic potentiometer) ***15*** . The desired direction of rotation is set in ***17*** via switches S1 and S2. The SPAN is suited to the stroke / rotation angle range via potentiometer P2, while ZERO is set in ***19*** via potentiometer P3. With switch S3 potentiometer P1 provides an internal zero adjustment in ***18*** carried out by the manufacturer (service function). The resulting feedback signal is guided to control circuit ***11*** .

The IP module receives its maximum drive current via switch S8 enabling checking of the funktion of the pneumatic unit.

The position x of the actuator is independently displayed at the mechanical travel indicator ***16*** .

The mechanical limit switch ***22*** (optional) enables independent alarm signals.

open printversion

1.4 Safety requirements

Accident prevention

This device complies with regulations for the prevention of accidents **Power-Driven Work Aids** (VGB 5) of 1st October 1985.

In option “limit switch” do not touch control vane during operation - danger of injuries!

Electrical safety

This instrument satisfies the conditions for safety class III, overvoltage category I according to EN 61010-1 or IEC1010-1.

Any work on electrical parts must be done by qualified personnel if any supply is connected to the instrument.

The instrument must be used for its designated purpose and connected in accordance with its connection diagram (see pages 17 and 27).
Locally applicable installation regulations for electrical equipment must be observed, e.g. in the Federal Republic of Germany DIN VDE 0100 resp. DIN VDE 0800. The instrument contains no built-in fuses.

The instrument must be operated with safety extra low voltage SELV or SELV-E.

Safety precautions taken in the instrument may be rendered ineffectual if the instrument is not operated in accordance with the Master Instructions.

Limitation of power supplies for fire protection must be observed due to EN 61010-1, appendix F or IEC 1010-1.

Explosion protection

(Only if ordered)

Technical data for explosion protection see Product Specifications Sheet PSS EVE0107 A-(en).

For installations located in explosive atmospheres, all relevant national regulations and installation conditions must be observed, e.g. in the Federal Republic of Germany ElexV and DIN VDE 0165.

Attention:
When repairing explosion-protected equipment, observe the national regulations.

Repairs involving parts must be manufacturer’s original parts.

The following applies to the Federal Republic of Germany: Repairs involving parts required for explosion protection must either be carried out by the manufacturer or by authorized personnel and confirmed by certificate.

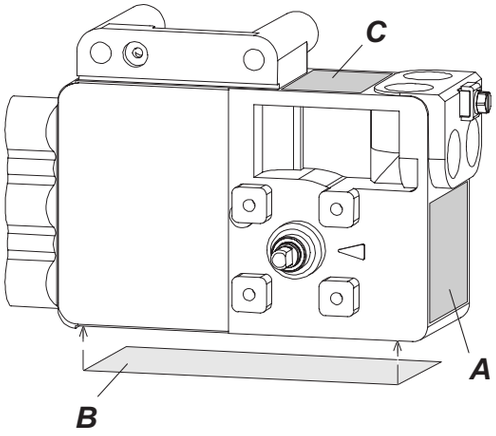
EMC and CE

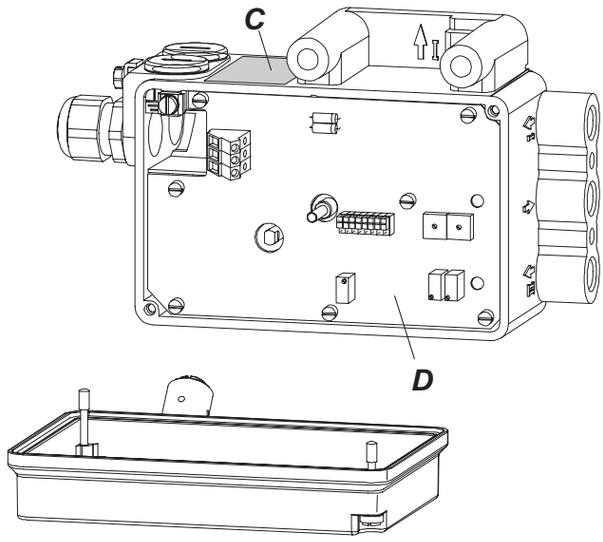
For notes regarding Electromagnetic compatibility EMC and CE labels see Product Specifications Sheet PSS EVE0107 A-(en).

In order to ensure EMC protection, the electronic board has to be screwed to the housing.

INDEX
1
2
3
4
5
6
7
8
9
0

2 LABELS





A Nameplate
B Additional label FM/CSA
C Additional label for option “Limit switches”
D Imprinted references regarding to settings

Nameplate *A* (Example)
Without Ex-protection

FOXBORO ECKARDT
SIEBE
SRI990-
SER.No ECEP
ZULUFT / SUPPLY : max. 6 bar (90 psi)
☐ EINFACH / SINGLE ☐ DOPPELT / DOUBLE
EINGANG / INPUT : 4 ... 20 mA
CE
REV. (0)
MADE IN FRANCE

Nameplate *A* (Example)
Classified intr. safe by CENELEC
Type of protection “EEx ia”

FOXBORO ECKARDT
SIEBE
SRI990-
SER.No ECEP
ZULUFT / SUPPLY : max. 6 bar (90 psi)
☐ EINFACH / SINGLE ☐ DOPPELT / DOUBLE
EINGANG / INPUT : 4 ... 20 mA
CE Ex TYPE BIA 636 EEx ia IIC T6
PTB Nr. Ex-99.x.xxxx
REV. (0)
$P_{max.}$ = 800 mW bei/at T6
$P_{max.}$ = 1000 mW bei/at T4
$U_{max.}$ = 40 V C_i = 6 nF
$I_{max.}$ = 150 mA L_i = 67 µH
MADE IN FRANCE

SRI990 [Device specification, Model Code]
SER.No [Serial number]
ECEP [Number for special engineered version]

Additional label *B* FM/CSA (Example)

FOXBORO ECKARDT
SIEBE
SRI990- SER.No
SUPPLY / ALIM: MAX. psi bar ECEP
☐ SINGLE / SIMPLE ☐ DOUBLE
I.S. CL I, II, III DIV 1, GP A-G; FOR/POUR:FM SEE 56 021 042; CSA SEE / VOIR 536 021 051
WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE
N.I. CL I, II, III, DIV 2, GP A-D, F, G
WARNING: DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
AVERTISSEMENT: NE PAS DEBRANCHER L'APPAREIL A MOINS QUE LA PUISSANCE AIT ETE COUPEE DU LA ZONE SOIT CONNUE COMME NON-DANGEREUSE.
REV.
MAX. AMB. / AMB. MAX.: T4 at / à + 80 °C / 176 °F
T6 at / à + 40 °C / 104 °F
NEMA TYPE / TYPE: 4X
CE (0) MADE IN FRANCE
FM APPROVED

Additional label *C* at option “Limit switches” (Example)

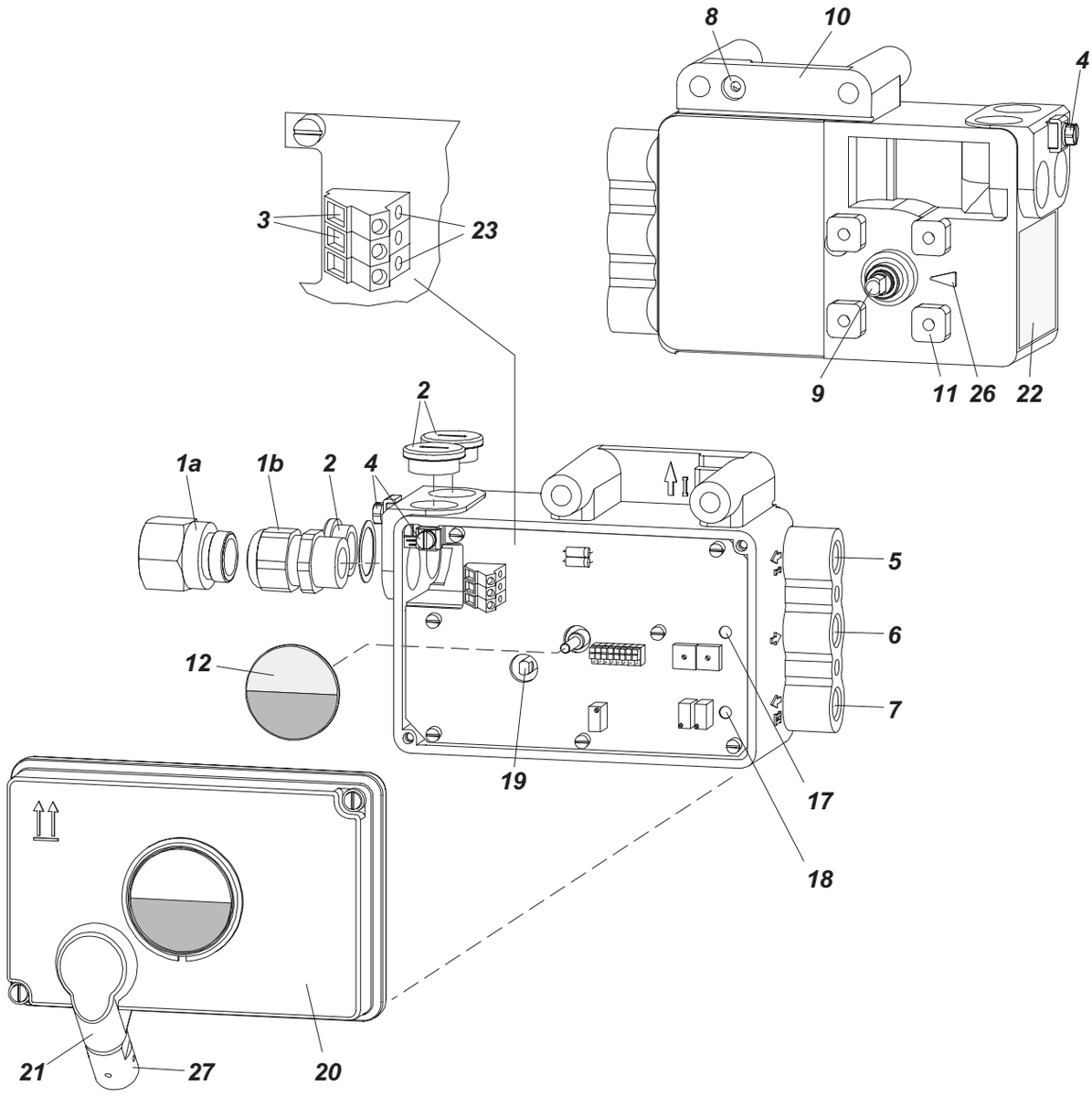
FOXBORO ECKARDT CE
GRENZWERTGEBER
LIMIT SWITCH
INDUKTIV KONTAKT
INDUCTIVE CONTACT
☐ NORMAL-AUSFÜHRUNG STANDARD-VERSION
☐ SICHERHEITS-AUSFÜHRUNG SECURITY-VERSION
Type BIA 636K EEx ia IIC T6
PTB Nr. Ex-99.x.xxxx
U_i = 16 V C_i = 60 nF
I_i = 76 mA L_i = 100 H
P_i = 242 mW
SIEBE Ex (0) MADE IN FRANCE
A Siebe Group Product

Measurement point label (Example)
Directly fixed or attached

XXX 09/16

open printversion

3 DESIGN



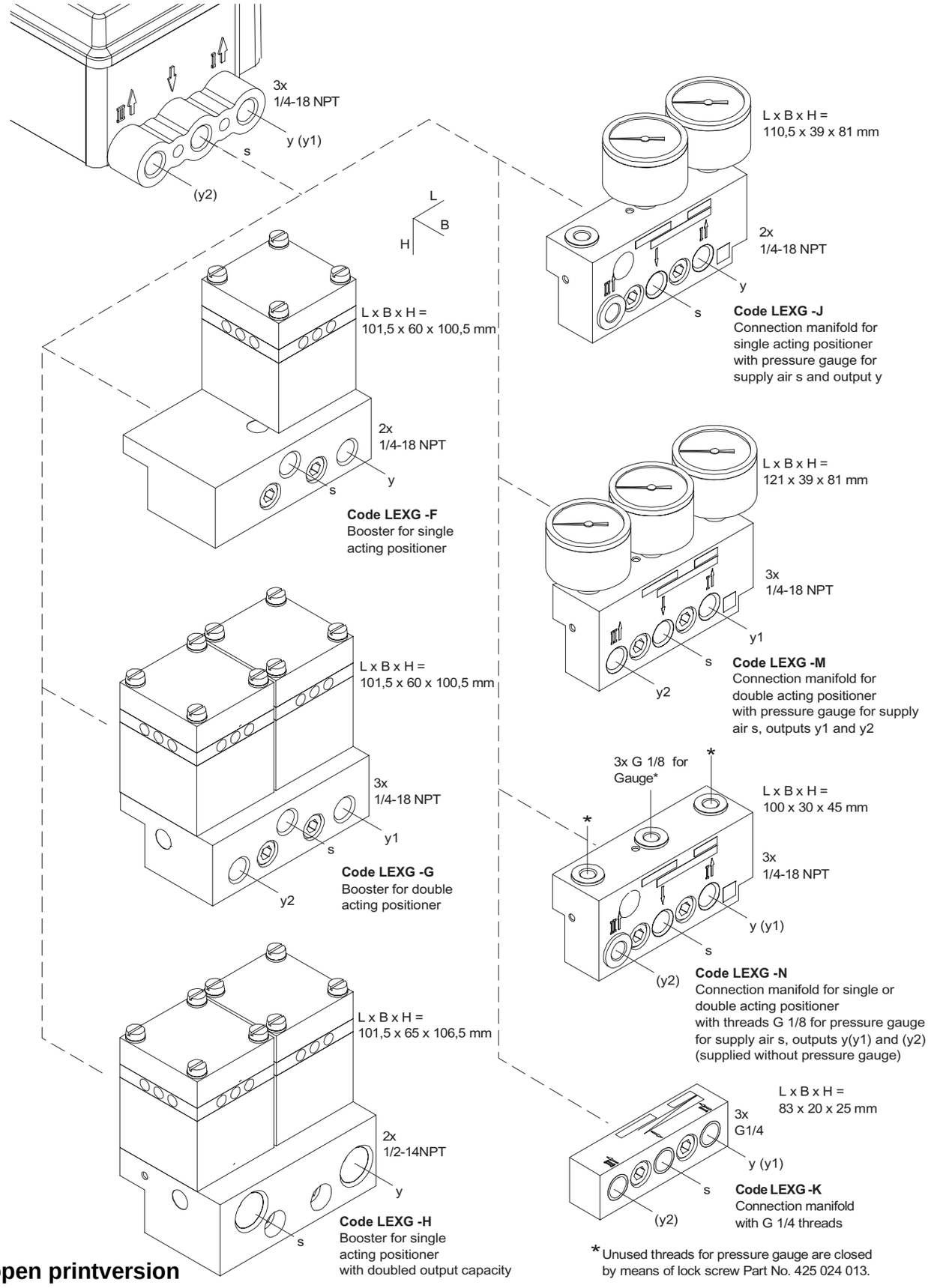
1a Adapter 1/2"-14NPT (see accessories)
1b Cable gland PG 13.5
2 Plug, interchangeable by Pos. ***1***
3 Screw terminals 11+ 12 for input (w)
I– to measure input current (see also item ***23***)
4 Ground connection
5 Female thread 1/4-18 NPT for output I (y1)
6 Female thread 1/4-18 NPT for air supply (s)
7 Female thread 1/4-18 NPT for output II (y2)
8 Direct connection hole for output I (y1)
9 Feedback shaft
10 Connection manifold for mounting to linear actuators
11 Connection base for mounting to rotary actuators
12 Travel indicator
17 Air reducing throttle* for output I
18 Air reducing throttle* for output II
19 Shaft for limit switch connection
20 Cover with window to ***12***
21 Air vent, dust and water protected
22 Nameplate
23 Connections for current measurement, 2 mm dia. (integrated in side of terminals)
26 Arrow points to flat of feedback shaft at angle 0°
27 Ball valve for protection class NEMA 4X

open printversion

* Service only

3.1 Pneumatic Accessories

When mounting, check the proper seating of the O-rings and bolt on the accessories with the two M8 bolts. Unused outputs are closed by means of plastic plugs.



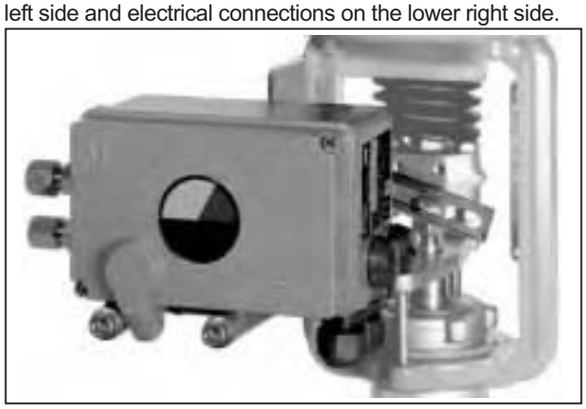
*Unused threads for pressure gauge are closed by means of lock screw Part No. 425 024 013.

open printversion

4 MOUNTING TO LINEAR ACTUTAORS

4.1 NAMUR Mounting - left hand -

Applicable to actuators with cast yoke or pillar yoke acc. to NAMUR (DIN IEC 534-6).
Mounting the positioner with pneumatic connections on the left side and electrical connections on the lower right side.



Attachment of the positioner to the actuator is made to the left using the mounting bracket and feedback lever for a NAMUR mount. Use:
attachment kit EBZG -H for a cast yoke, or
attachment kit EBZG -K for a pillar yoke.

- The side outputs I (or I and II, see page 6) are used. The rear output I is closed by means of a lock screw 522 588 013.

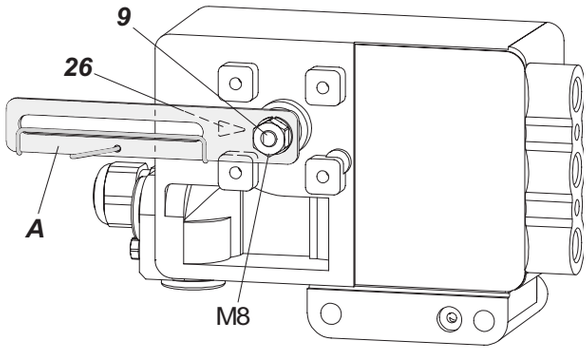
Pneumatic connections: Do not use Teflon tape for sealant. The fine fibres could disturb the function of the SRI990. Use only Loctite® #243 for sealant [1].

Screw-type glands for electrical connections are positioned on the lower or right side. Any unused threaded holes are closed by plugs.

When putting on the housing cover note that the air vent should face-down (see photo above).

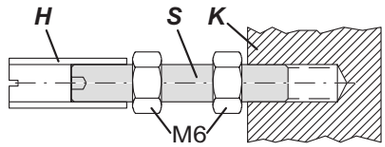
4.1.1 Preparation of the positioner

Rotate the shaft stub of shaft ***9*** so that the flat on the shaft stub is perpendicular to the arrow ***26*** on the housing (detail see page 13). Fasten the feedback lever ***A*** to the shaft by means of spring washer and nut M8.



4.1.2 Preparation of the actuator

Screw the carrier bolt to the stem connector (see page 9) and lock it by means of a counter nut.
A carrier bolt with an adjustable length is used to be able to screw on various coupling pieces.



It consists of a stud ***S***, which is screwed into the coupling piece ***K*** (with 3 mm Allen key) and locked with a lock nut M6. The threaded sleeve ***H*** is screwed onto it and locked with a lock nut M6. Make sure that the bolt is adjusted to the right length!
Fasten the mounting bracket to the left side of the yoke.
For a cast yoke use a screw M8 x 30,
for a pillar yoke use two U-bolts and two nuts.

4.1.3 Mounting of the positioner

Fasten the positioner to the mounting bracket using two spring washers and two screws M8 x 80.
Note, the carrier bolt ***B*** is in the slot of the feedback lever ***A*** and the compensating spring ***F*** touches the carrier bolt.

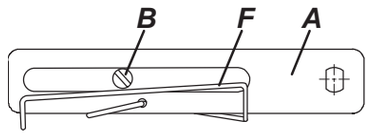


Fig.: Feedback lever

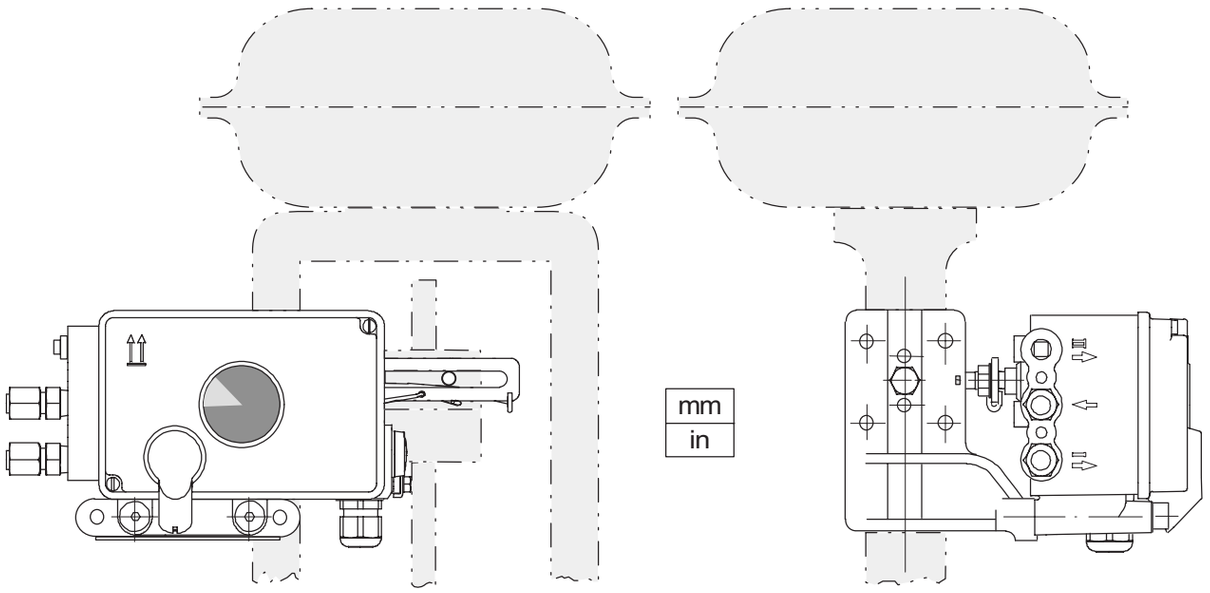
For optimum utilization of the positioner operating range, it is recommended that the arrangement is adjusted according to the following procedure before fixing. At an actuator position in the middle of travel range, the feedback lever position should be perpendicular to the actuator stem and the angle range should be between 10° ... +10° and 30° ... +30°.

Procedure:
Set the actuator to the middle of its travel range by supplying it with an independent pressure. Fasten the mounting bracket so that carrier bolt and the mark on mounting bracket are about the same distance from the valve body. Fasten the positioner to the mounting bracket so that a suitable angle range is selected.

It is recommended that the pneumatic and electrical connections are made after adjusting the position.

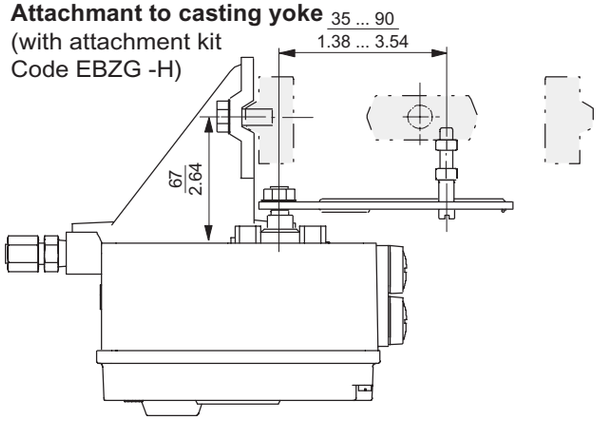
1) Apply only to male thread

4.1.4 NAMUR Mounting Dimensions – left hand –

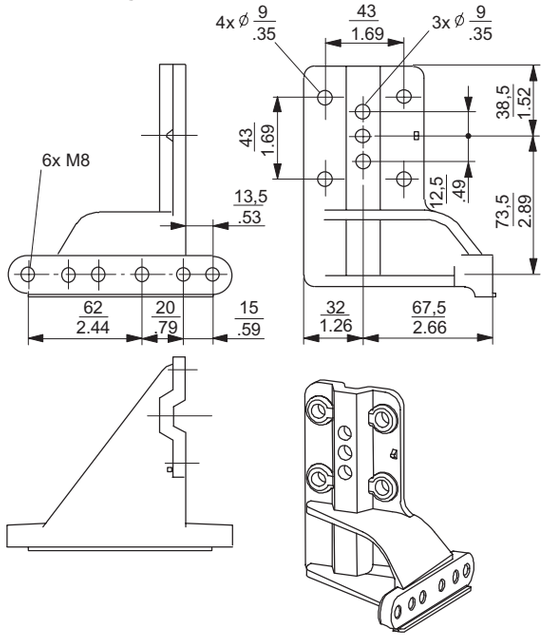


mm
in

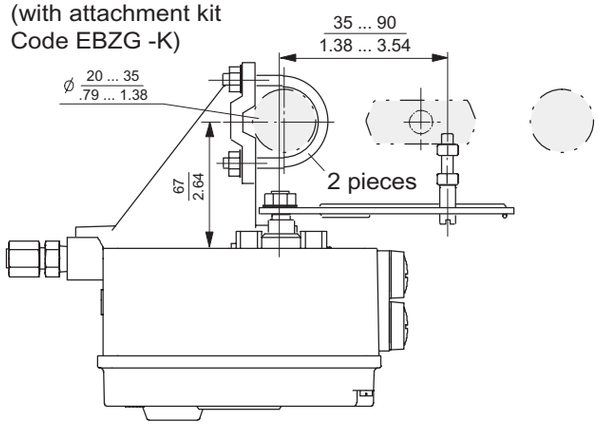
Attachmant to casting yoke (with attachment kit Code EBZG -H)



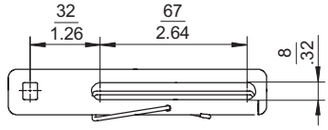
Mounting bracket



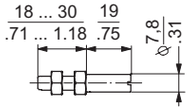
Attachment to pillar yoke (with attachment kit Code EBZG -K)



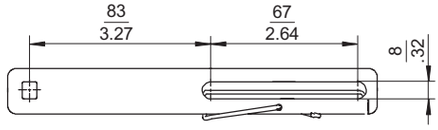
Feedback lever Code EBZG-A for 8..70 mm travel



Carrier bolt for connection to valve stem



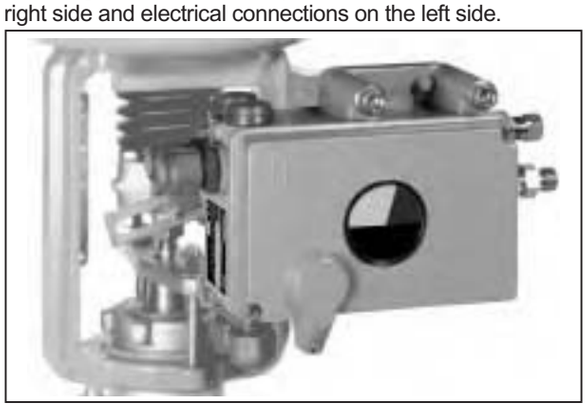
Feedback lever Code EBZG-B for 60..120 mm travel



open printversion

4.2 NAMUR Mounting - right hand -

Right-hand mounting is done if for instance left-hand mounting is not possible for structural reasons. Applicable to actuators with cast yoke or pillar yoke acc. to NAMUR (DIN IEC 534-6).
Mounting the positioner with pneumatic connections on the right side and electrical connections on the left side.



Attachment of the positioner to the actuator is made to the right using the mounting bracket and feedback lever for a NAMUR mount. Use:
attachment kit EBZG -H for a cast yoke, or
attachment kit EBZG -K for a pillar yoke.

- The side outputs I (or I and II, see page 6) are used. The rear output I is closed by means of a lock screw 522 588 013.

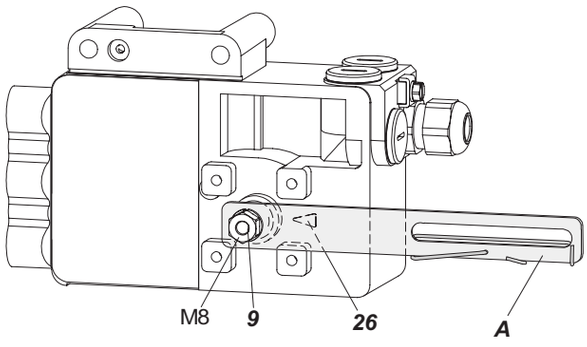
Pneumatic connections: Do not use Teflon tape for sealant. The fine fibres could disturb the function of the SRI990. Use only Loctite® #243 for sealant [1].

Screw-type glands for electrical connections are positioned on the left side. Any unused threaded holes are closed by plugs.

When putting on the housing cover note that the air vent should face-down (see photo above).

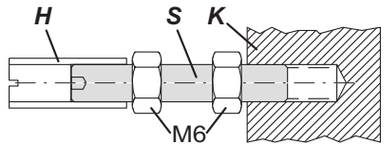
4.2.1 Preparation of the positioner

Rotate the shaft stub of shaft ***9*** so that the flat on the shaft stub is perpendicular to the arrow ***26*** on the housing (detail see page 13). Fasten the feedback lever ***A*** to the shaft by means of spring washer and nut M8.



4.2.2 Preparation of the actuator

Screw the carrier bolt to the stem connector (see page 9) and lock it by means of a counter nut. A carrier bolt with an adjustable length is used to be able to screw on various coupling pieces.



It consists of a stud ***S***, which is screwed into the coupling piece ***K*** (with 3 mm Allen key) and locked with a lock nut M6. The threaded sleeve ***H*** is screwed onto it and locked with a lock nut M6. Make sure that the bolt is adjusted to the right length!
Fasten the mounting bracket to the left side of the yoke. For a cast yoke use a screw M8 x 30, for a pillar yoke use two U-bolts and two nuts.

4.1.3 Mounting of the positioner

Fasten the positioner to the mounting bracket using two spring washers and two screws M8 x 80.
Note, the carrier bolt ***B*** is in the slot of the feedback lever ***A*** and the compensating spring ***F*** touches the carrier bolt.

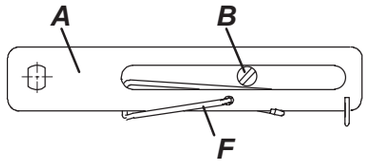


Fig.: Feedback lever

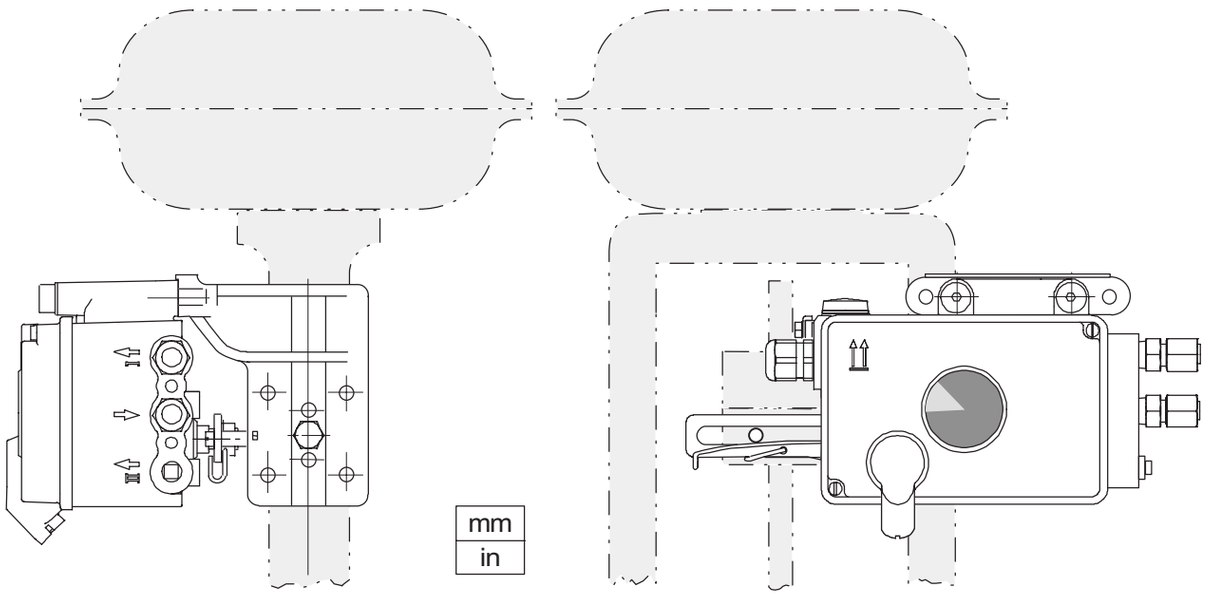
For optimum utilization of the positioner operating range, it is recommended that the arrangement is adjusted according to the following procedure before fixing. At an actuator position in the middle of travel range, the feedback lever position should be perpendicular to the actuator stem and the angle range should be between 10° ... +10° and 30° ... +30° .

Procedure:
Set the actuator to the middle of its travel range by supplying it with an independent pressure. Fasten the mounting bracket so that carrier bolt and the mark on mounting bracket are about the same distance from the valve body. Fasten the positioner to the mounting bracket so that a suitable angle range is selected.

It is recommended that the pneumatic and electrical connections are made after adjusting the position.

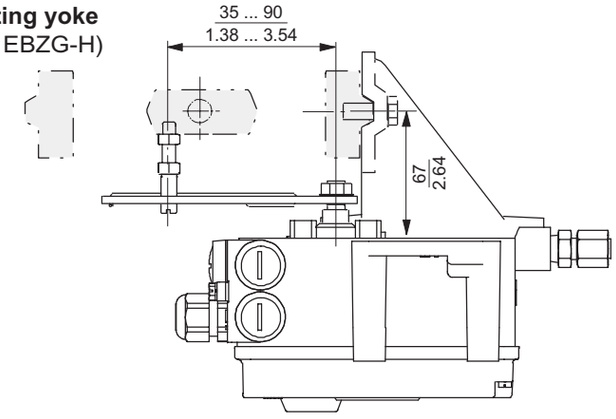
1) Apply only to male thread

4.2.4 NAMUR Mounting Dimensions – right hand –



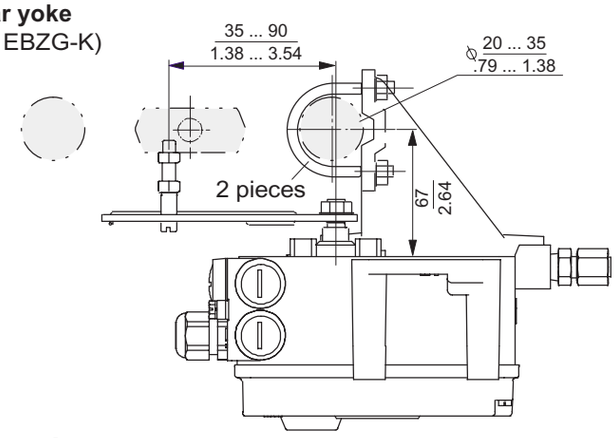
mm
in

Attachment to casting yoke
(with attachment kit EBZG-H)



Mounting bracket, feedback lever and **carrier bolt** see page 9

Attachment to pillar yoke
(with attachment kit EBZG-K)



open printversion

4.3 Direct Mounting

Actuators with appropriately prepared yoke (PA200, PA350) enable mounting of the SRD991 direcly to the actuator yoke.

The attachment of the positioner is accomplished by bolting it directly to the actuator yoke using the feedback lever for a direct mount (with attachment kit EBZG -D).

The rear output I and the side outputs I and II are used as follows (see page 6) :

- Actuator single acting, spring force closes:
  The rear output I is used (remove lock screw in hole ***D***).
  The side output I is closed by means of a lock screw 522 588 013.
- Actuator single acting, spring force opens:
  The side output I is used.
  The rear output I is closed by means of a lock screw.
- Actuator double acting:
  The rear output I and the side output II is used.
  The side output I is closed by means of a lock screw.

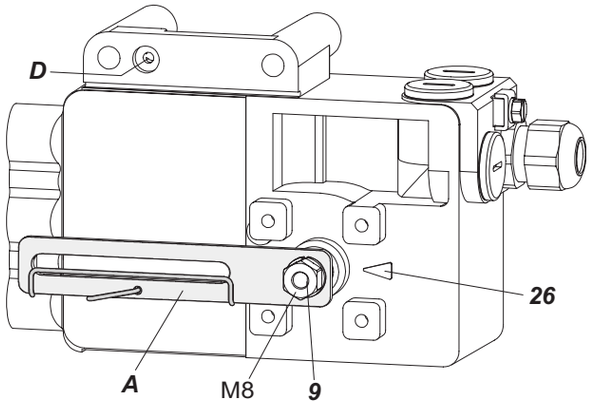
Pneumatic connections: Do not use Teflon tape for sealant. The fine fibres could disturb the function of the SRI990. Use only Loctite® #243 for sealant[1].

Screw-type glands for electrical connections are positioned on the side. Any idle female threads are closed by means of plugs.

When putting on the housing cover note that the air vent should face-down (see photo above).

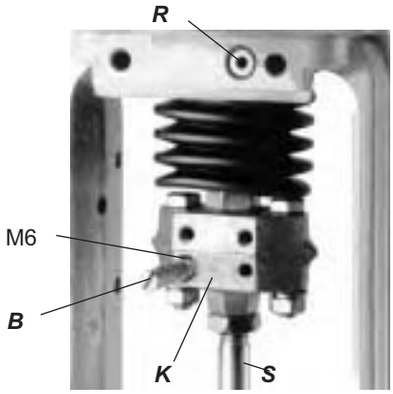
4.3.1 Preparation of the positioner

Rotate the shaft stub of shaft ***9*** so that the flat on the shaft stub is perpendicular to the arrow ***26*** on the housing (detail see page 13). Fasten the feedback lever ***A*** to the shaft by means of spring washer and nut M8.



4.3.2 Preparation of the actuator

Screw in the carrier bolt ***B*** on the coupling piece ***K*** on the drive spindle ***S*** at the lower left and lock it by means of a nut M6.



4.3.3 Mounting of the positioner

Fasten the positioner to the upper part of the yoke using 2 spring washers and 2 screws M8 x 80, as shown above. The rear output I of positioner has contact to the air duct ***R*** in the yoke.
Attention: Note the correct position of the O-ring on the yoke for the rear connection I!

Note, the carrier bolt ***B*** is in the slot of the feedback lever ***A*** and the compensating spring ***F*** touches the carrier bolt.

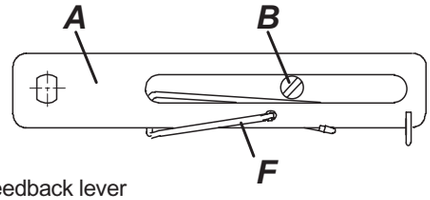
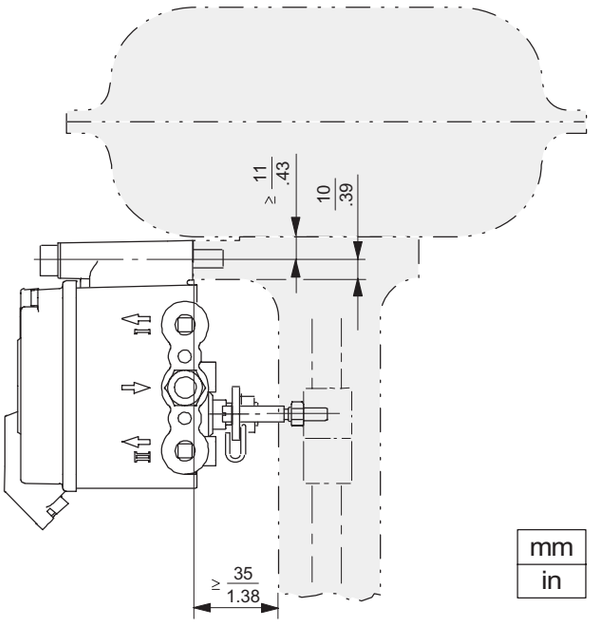


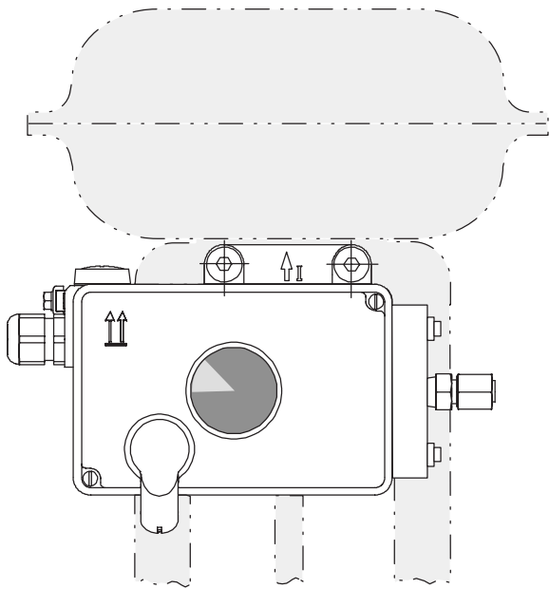
Fig.: Feedback lever

1) Apply only to male thread.

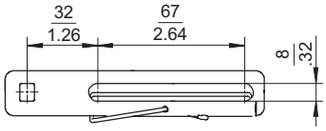
4.3.4 Mounting dimensions – direct mounting –



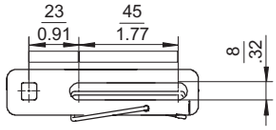
mm
in

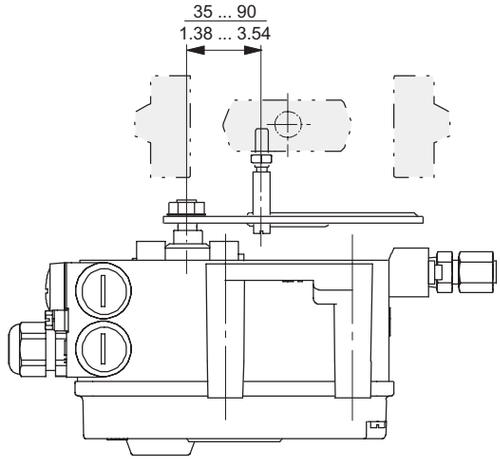


Feedback lever Code EBZG-A for 8..70 mm travel

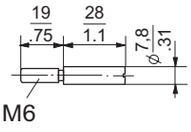


Feedback lever FoxPak/FoxTop in Code EBZG-E

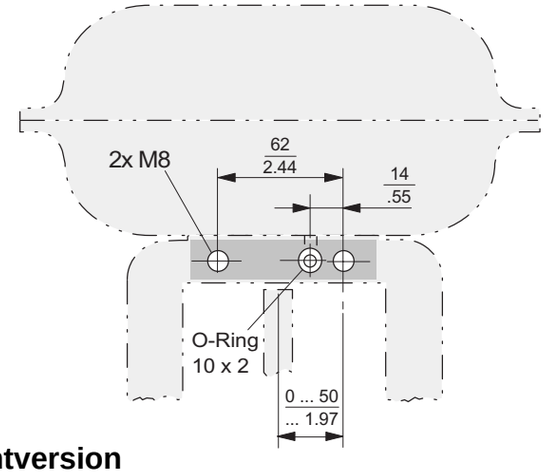




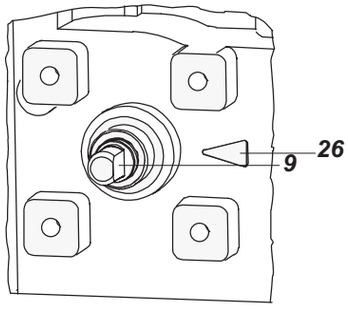
Carrier bolt for connection to valve stem



Connection to yoke using the direct connection hole for rear output I (y/y1)



Detail: shaft stub ***9*** is perpendicular to the arrow ***26*** on the housing

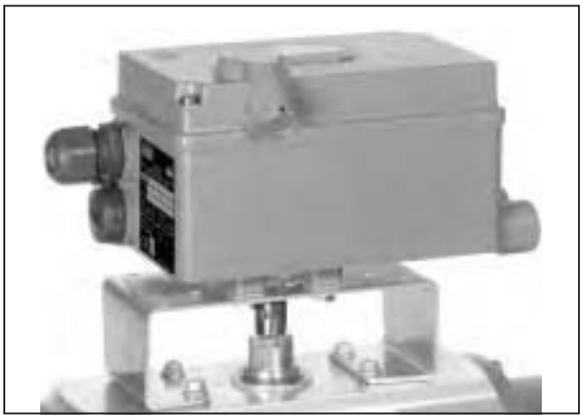


open printversion

5 MOUNTING TO ROTARY ACTUATORS

5.1 Type of mount

Applicable to rotary actuators that meet the VDI/VDE 3845 standard for mounting. Installation position of positioner: Mount the positioner so that the pneumatic connections are in the same direction as the longitudinal drive axis of the actuator as shown in the photograph below.



Attention: The feedback shaft ***9*** of the SRD has no mechanical stop, therefore may spin round. The permissible rotation angle range is between +50 and –50 degrees around the arrow at the housing concerning the flat area of the feedback shaft (also see detail page 13 bottom). Since a rotary actuator has a rotary angle of about 90 degrees the mounting as described in the following must be carried out very precise.

Attachment of the positioner to the actuator is made by using the rotary adaptor kit EBZG -R.

- Either the side outputs I (or I and II) are used and the rear output I is closed by means of the lock screw 522 588 013.

Pneumatic connections: Do not use Teflon tape for sealant. The fine fibres could disturb the function of the SRD. Use only Loctite® #243 for sealant [1].

Screw-type glands for electrical connections are used as needed. Any unused threaded holes are closed by plugs.

Caution! Prevent accumulation of water in the instrument in this mounting position by sealing cable entry against water. Provide a continuous supply of dry instrument air.

5.1.1 Preparation of positioner

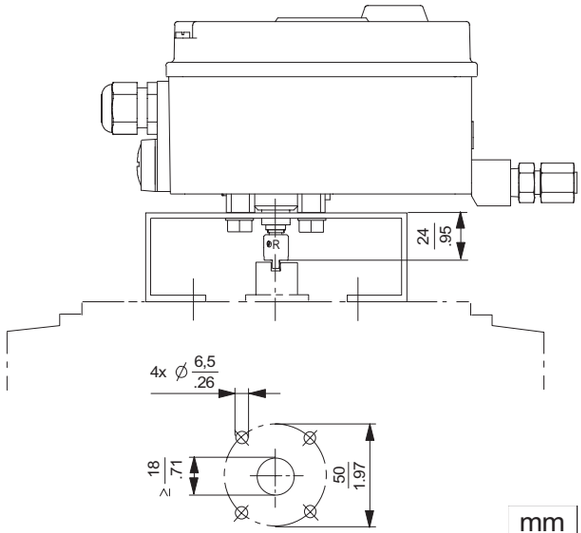
Valve must be in failsafe position[2] and the direction of rotation of the actuator drive shaft must be known. These items are extremely important for proper functioning. These items can be checked as follows in case they are not clear:

In the single-acting actuator the force of the installed springs closes. The pressure-less actuator is in failsafe position. Through manually feeding compressed air it can be seen whether the actuator drive shaft rotates to the left or to the right. In the powerless SRD is y1 pressureless.

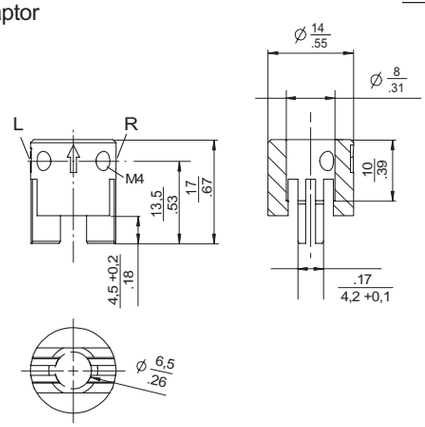
In the double-acting actuator without spring reset both air chambers are basically equal. Failsafe position can be either “open” or “close”. Therefore, indication of the fail- safe position has to be determined by engineering. Then the direction of rotation may be determined by manual feeding of compressed air. In the powerless SRD is y1 pressureless and y2 under pressure.

Bolt ***2*** is screwed into actuator drive shaft ***1*** for subsequent centering of the rotary adaptor ***3***. The attachment console is mounted to the stroke actuator (see photo).

Attachment diagram for bracket



Rotary adaptor



1) Apply only to male thread.
2) Failsafe position: Defined position in case of failure of input signal

open printversion

5.1.2 Preparation of the actuator

First the rotary adaptor is being prepared:

For attachment to a counter-clockwise or left turning actuator secure the stud screw ***4*** in the threaded hole "**L**" of the rotary adaptor; hole "R" remains open. See Fig. 27.

For attachment to a clockwise or right turning actuator secure the stud screw ***4*** in the threaded hole "**R**" of the rotary adaptor; hole "L" remains open. See Fig. 28.

Now place the rotary adaptor ***3*** with two washers ***5*** on the feedback shaft ***9*** of the positioner against the stop.
Note :

When the product temperature rises, the drive shaft ***1*** becomes longer. Therefore, the rotary adaptor ***3*** must be mounted so that approx. 1 mm (0.04 in.) of clearance results between the drive shaft ***1*** and the rotary adaptor ***3*** . This is achieved by placing an appropriate number of washers ***5*** on the feedback shaft stub ***9*** before attaching the rotary adaptor. Two washers should result in a clearance of 1 mm.

Now screw and tighten the bolt in the coupling against the flat part of the feedback shaft(do not screw against thread!).

Finally turn the feedback shaft in such a way that the arrow of the coupling points to the arrow of the SRI housing. Beginning and end positions of the actuator drive shaft ***1*** and feedback shaft ***9*** are marked in figure 27 (left-rotating actuator) and in figure 28 (right-rotating actuator) by arrows for the respective direction of rotation.
The feedback shaft is now in the normal position corresponding to the failsafe position of the actuator. No shifting of feedback shaft anymore!

5.1.3 Mounting of positioner

SRI and actuator are in failsafe position.
Attach the SRI on the console in such a way that the catch of coupling ***3*** is guided into the groove of shaft ***1***. Use bolt ***2*** to center and align the positioner to the actuator. Be careful not to shift shafts ***1*** and ***9*** and that both shafts are exactly flush.
Fasten the positioner to the bracket by means of 4 lock washers and 4 screws M6 x 12

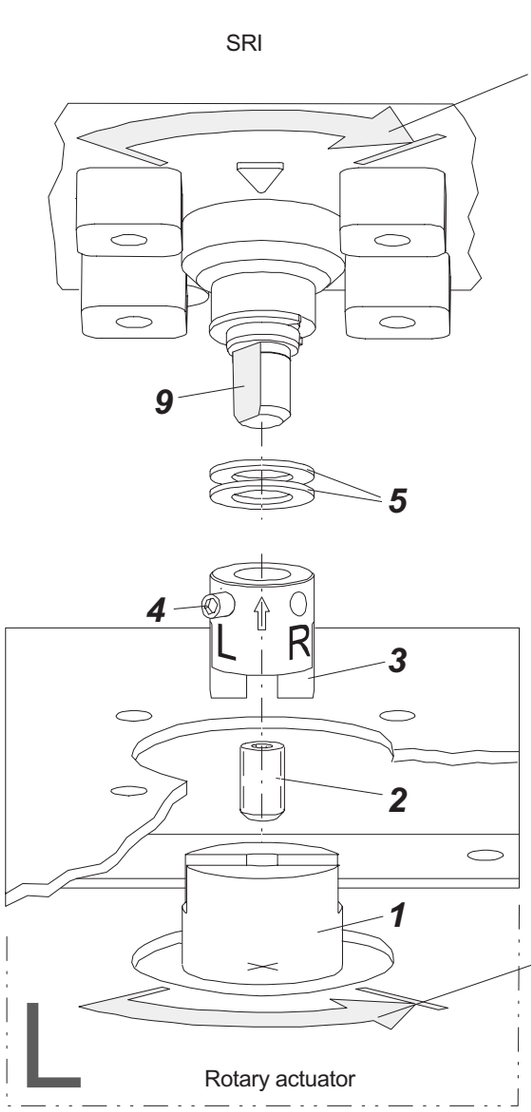


Figure 27: Mounting if actuator is rotating to the left

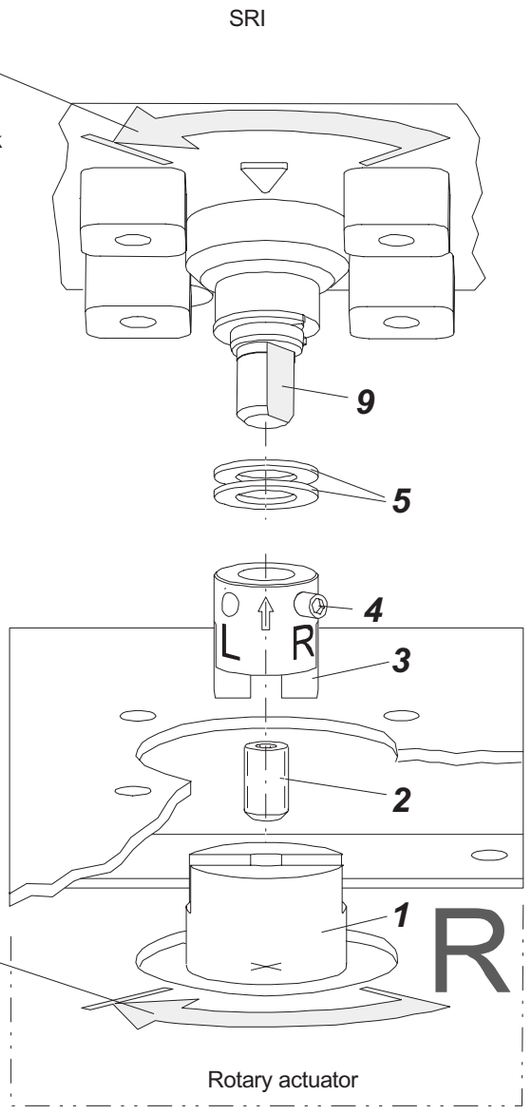
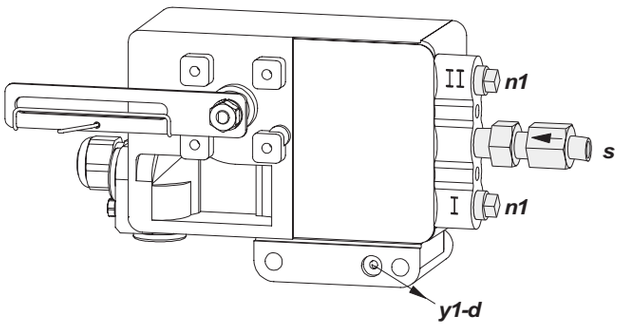
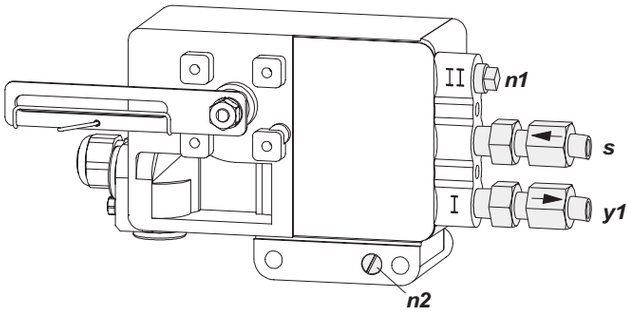


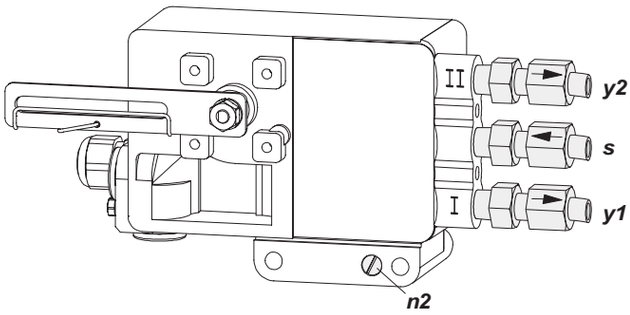
Figure 28: Mounting if actuator is rotating to the right

open printversion

6 PNEUMATIC CONNECTIONS







Following alignment and mounting of the positioner to the valve, pneumatic tubing has to be provided.

The connection illustrations depend on the respective version.

Explanation of abbreviatons:

s Supply air

y1-d Output 1 for direct mounting, depressurized at currentless electronics. When using this output ***y1*** has to be closed by means of hex. screw.

y1 Output 1, depressurized at currentless electronics. When using this output, ***y1-d*** has to be closed by means of sealing screw and O-ring.

y2 Output 2 for double-acting actuator. Full pressure at currentless electronics. Closed at single-acting actuator.

n1 Hex. screw with NPT thread

n2 Sealing screw with O-ring

INDEX
1
2
3
4
5
6
7
8
9
0

7 ELECTRICAL CONNECTION

The safety requirements on page 4 must be observed!

Unused cable glands should be closed off.
Guide cable through gland ***1***. The gland is suitable for cable diameters of 6 to 12 mm (0.24 to 0.47 in). Observe the tightness of the cable entry.
Provide electrical connection of input line at screw terminals ***3*** marked 11+ and 12 – . The terminals are suitable for wire cross-sections of 0.3 to 2.5 mm^2 (22 -14 AWG).

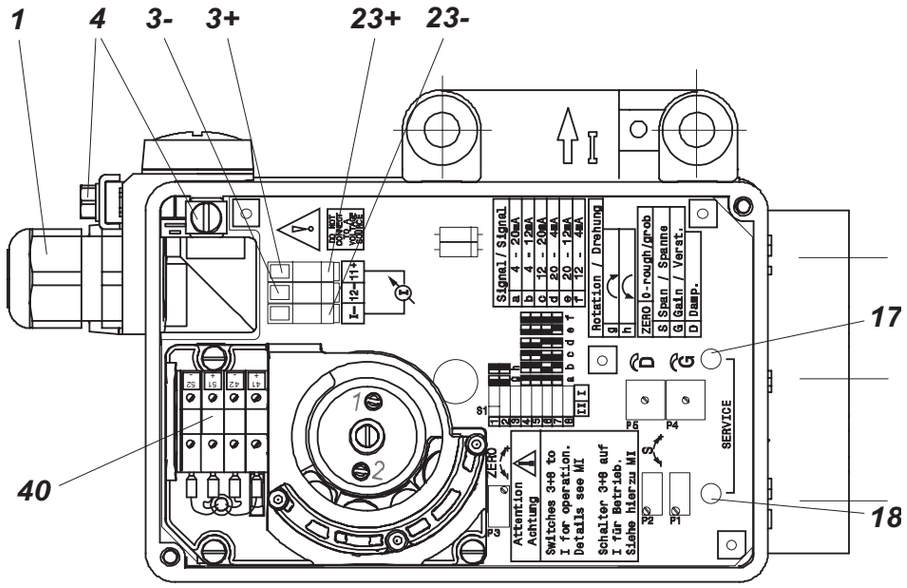
Note: When connecting shielded cable connect the cable shield only to the system! Do not connect the cable shield to the SRI !

Connection to terminals (pos. ***3+, 3–***):

11+ Input w+
12– Input w–

The input current can be measured at tip jacks 23+ and 23- (integrated in terminals, underneath the screws). The tip jacks fit plugs with a diameter of 2 mm (0.08 in)

In order to improve EMV protection by integration into local grounding the internal and external grounding conduct connection 4 is available.



Optional equipment 'limit switch' (see terminals ***40***)

SRI990-xxxT, U via inductive sensor	
Mark	Signal
41 +	GW1
42 –	GW1
51 +	GW2
52 –	GW2

GW Binary output ext. supplied

8 START-UP

8.1 General

First of all, the nameplate should be checked, especially with respect to references to Ex / non- Ex, input signal, single / double acting.

Before starting the positioner the SRI has to be mounted to the actuator; an input signal 4 to 20 mA or split range have to be available. The supply air connection must have sufficient capacity and pressure of 1.4 to 6 bar (20 to 90 psig) and should not exceed the maximum operating pressure of the actuator.

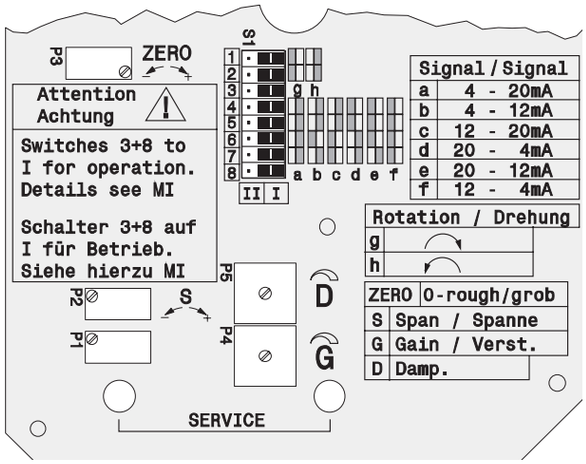
The SRI990 can be adjusted by means of switches and potentiometers when the housing cover is opened.

Attention: Configuration using switches and potentiometers may interfere with operation of the actual process! During configuration it is recommended that there is no flow through the valve.

At initial start-up various adjustments have to be set. The following procedure is recommended:

- Setting of direction of rotation of feedback lever (chapter 8.2)
- Setting of input signal range
  e.g. 4 to 20 mA or split range (chapter 8.3)
- Setting of gain (chapter 8.4)
- Setting of zero and span (chapter 8.5)
- Setting of damping (time constant, chapter 8.6)
- The position indicator ***12*** is attached to the desired position after selection of the transmission at indicator shaft (chapter 8.7)
- The air capacity throttles at the pneumatic output (screws ***17*** and ***18*** underneath of the SERVICE openings) are factory-set to the operating value and are normally not reset (exception see chapter 8.8).
- When attaching the housing cover make sure that the venting opening points to the bottom.

Settings via switches and potentiometers
For the setting of the SRI990 and the adjustment of various parameters 8 dip switches and 5 potentiometers are available. See electronics imprint as follows:



The potentiometers are for the setting of:

- Zero point (ZERO): P3
- Span (S): P2
- Gain (G): P4
- Damping (D): P5
- Electronics alignment: P1 [1)]

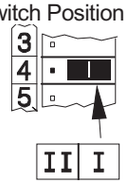
Single-threaded potentiometers with limited rotation angle to set gain (G) and damping (D) are available, where the actual position is indicated by an arrow. To set zero point (ZERO), span (S) and the electronics alignment[1)] multiple-threaded potentiometers (approx. 30 rotations) without rotation limitation are used.

The switches are for the setting of:

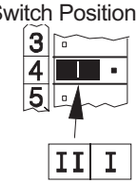
- Direction of rotation of feedback lever (switches 1, 2)
- Electronics adjustment (switch 3) [1)]
- Signal range (switches 4, 5, 6 and 7)
- Pneumatic test (switch 8)

The switch numbers (1 through 8) are imprinted on the electronics. The possible switch position ("I" and "II") are imprinted below switch 8. The switch positions are defined as follows:

Switch Position "I":



Switch Position "II":



Caution!
Switches 3 and 8 must be during operation in position "I". Prior to resetting switches 1 to 8 it is recommended to shut-off the respective part of the installation since processes are activated influencing and disturbing the current process. Therefore, it is recommended that no medium flows through the valve during configuration.

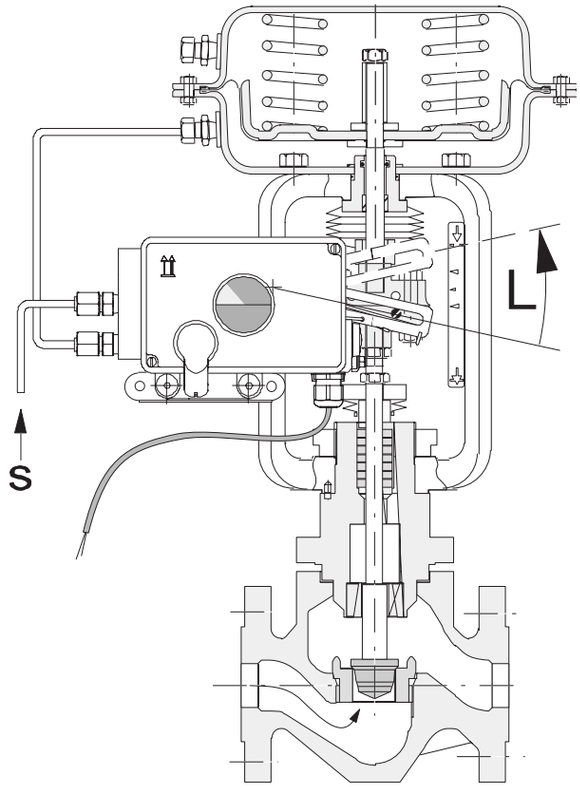
open printversion

1) Adjustment of electronic board (in workshop, see page 23)

8.2 Setting of direction of rotation of feedback shaft

If the actuator moves from starting to end position, the direction of rotation of the feedback shaft is to the right or left hand, depending on the mounting method of the positioner selected and on the configuration of the actuator (spring closes/ opens/ double-acting).
For proper functioning this direction of rotation must be set at positioner (via switches 1+2).

The direction of rotation is defined as direction of rotation of the feedback shaft from the starting to the end position looking at the positioner from the front. See following illustration (shown is: left hand mounting, spring closes, direction of rotation L).



Direction of rotation of feedback shaft of a single-acting **stroke actuator** with spring:

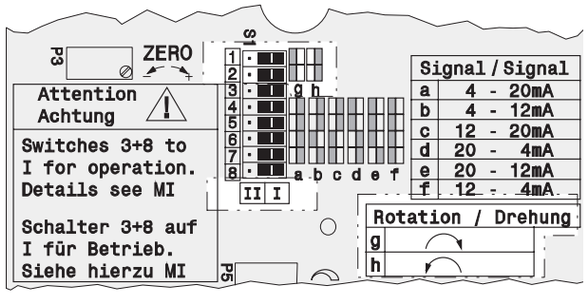
Left hand mounting, direct mounting	Spring in actuator	Right hand mounting
L	Spring closes	**R**
R	Spring opens	**L**

Direction of rotation of feedback shaft for a **rotary actuator**:

Actuator opens rotating to the left	Actuator opens rotating to the right
L	**R**

Direction of rotation of feedback shaft of the double-acting actuator is a. o. determined by the mounting side and the tubing of the pneumatic outputs to the actuator. It has to be considered that in a powerless SRI990 the output y1 will become pressureless and y2 contains air supply pressure.

The direction of rotation of the feedback shaft is set via switches 1+2; see the following illustration.



L: left-hand rotating feedback shaft switch 1+2 on “I”
R: right-hand rotating feedback shaftt: switch 1+2 on “II”

Remarks: If the direction of rotation is not in the right manner, the actuator moves to the end position with full force, and the positioner cannot be controlled.

Definitions

Stroke, stroke range of the membrane actuator is defined for rotary actuator as **angle, angle rang**e..

0 % position is the mechanical impact at actually closed valve (caution if using handwheel and mechanically adjustable stroke limitation!)

100 % position is the mechanical impact at actually open valve.

open printversion

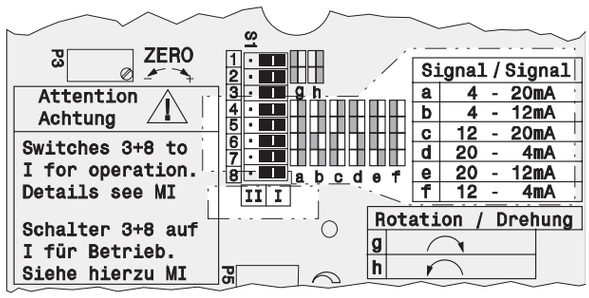
8.3 Setting of Input Signal Range

The following input signal ranges can be set for the SRI990 via switches 4 to 7:

0 %	100 %	item	S4	S5	S6	S7
4 mA	**20 mA**	**a**	**I**	**I**	**I**	**I**
4 mA	12 mA	b	I	I	II	I
12 mA	20 mA	c	I	I	II	II
20 mA	4 mA	d	II	II	I	I
20 mA	12 mA	e	II	II	II	I
12 mA	4 mA	f	II	II	II	II

The switch positions for the setting of various signal ranges are imprinted on the electronics. See illustration.

For 4 to 20mA the switches 4 to 7 are set to position “I” (as shown).
This concludes the setting of the input signal range!



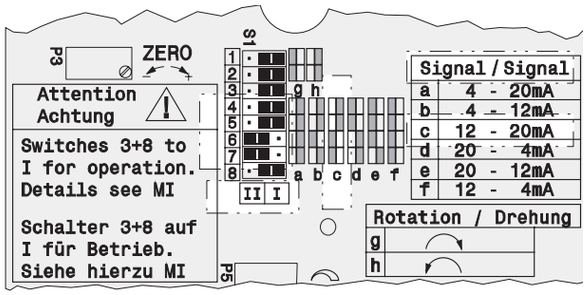
Split Range

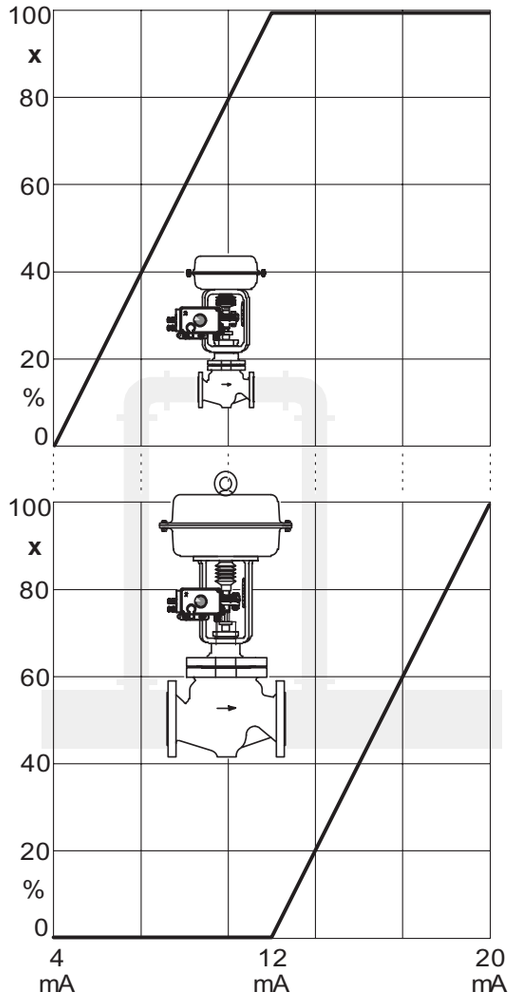
If several positioners are operated at one current loop in sequence with the standard signal 4 to 20 mA, individual valve positions may be allocated to each device, which also may overlap if necessary.

This function is useful if an additional control range is demanded which cannot be covered by one valve only. A valve of smaller nominal size can be applied overtaking the smallest quantities; a parallel mounted valve of bigger nominal size takes on the larger quantities.

Example: Setting the signal range to 12 to 20 mA
It is recommended to shut off current of the positioner prior to resetting of the input signal range (turn-off input signal). The switches 4 and 5 are set to position “I” and switches 6 and 7 to position “II”.

The individual switch positions are shown in the following illustration.





Split range, subdivision of input signal range
Example: At low current, only the smaller valve positions; from approx. 50 % the large valve is added

open printversion

8.4 Setting of gain (G)

The loop amplification of the positioner is set via potentiometer P4 for gain (G). The maximum possible gain is thereby determined by the stability behavior of the control loop. It is selected in such a way that the actuator no longer oscillates at constant given input value.

Rotation to the right P4: amplification is increased
Rotation to the left P4: amplification is reduced

If the positioner control loop oscillates, gain (G) must be reduced. It has to be considered that a change of gain changes the control deviation, therefore, requiring setting of the potentiometer for the position range (zero and span).

8.5 Setting of zero (ZERO) and span (S)

Following settings in chapters 8.2 through 6.4 at initial start-up setting of zero point (ZERO) and span (S) are performed as follows:

a) Enter starting value of command variable (beginning of stroke).
b) Turn potentiometer P3 for zero point (ZERO) until actuator just begins to move from its end position.

Rotation to the right P3: zero point is increased
Rotation to the left P3: zero point is reduced

c) Enter final value of variable (end of stroke)
d) Turn potentiometer P2 for span (S) until actuator exactly reaches its end position.

Rotation to the right P2: span is increased
Rotation to the left P2: span is reduced

These settings influence amplification, therefore adjusting in chapter 8.4 may become necessary.

8.6 Setting of damping (D)

Potentiometer P5 for damping (D) influences the dynamic behavior of the actuator at a discontinuous change of the input signal. The input signal is provided with an additional time constant for this purpose. The time constant is only noticeable in the position control loop if the time constant set via potentiometer is larger than the position time of the actuator.

Rotation to the right P5: damping is increased
Rotation to the left P5: damping is reduced

The effect of the positioning time may be checked by entering input signal jumps. The range limits and the gain are not influenced by a change.

8.7 Setting of the travel indicator

The mechanical travel indicator is coupled to the feedback shaft of the positioner by a gear. The gear has two selectable ratios 1 : 2 and 1 : 6. [1].

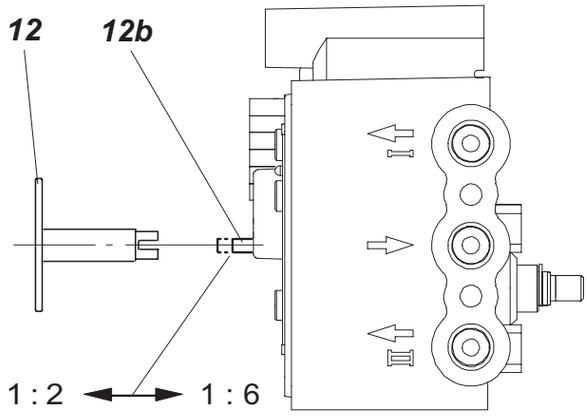
Selection of gear ratio:
For rotation angles of the feedback shaft less than 30° select a ratio 1 : 6. This gear selection amplifies the feedback shaft rotation angle six times and for example, a 20° angle is shown as 120°.

For rotation angles greater than 30 ° select a ratio of 1 : 2. This gear selection amplifies the shaft rotation angle by a factor of two and for example, a 45° angle is shown as 90°.

For rotary actuators the rotation angle is equal to the rotation angle of the actuator. Consequently, a 90° rotation angle will result in a 180° display angle for the 1 : 2 gear ratio.

For linear actuators the rotation angle is determined by travel span and feedback lever length. In this case, an exact 180° display angle can only be achieved for a 30° rotation angle using a 1 : 6 gear ratio. If any other rotation angle results, either the closed or full open positon can be set to be indicated at, for example 0° or 180°. However, if the closed position is chosen for display, then the full open display position angle is dependent on travel span, feedback lever length and gear ratio. If the full open position is chosen for display, then the closed positon angle becomes dependent.

Setting gear ratio:
Remove travel indicator ***12***. Pull out pin ***12b*** for a ratio 1 : 2 or push in the pin for a ratio 1 : 6. Use a smooth turning operation to free the gears and to set pin ***12b*** against the stop. See illustration.



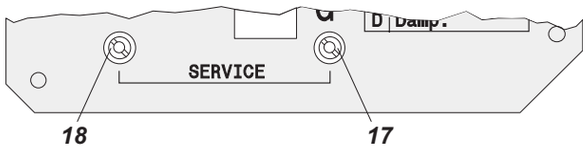
Turn the travel indicator ***12*** to the desired position, put it on the gear shaft against the stop and pinch the wire ring for secure coupling.

1) The values are rounded for making easier calculations. The exact ratios are 1 : 1.83 and 1 : 6.28 .

8.8 Air reducing throttles

Attention: Service only

Air flow to the actuator may be reduced via air reducing throttles ***17*** and ***18*** .



Ex-factory the air capacity is non-throttled; generally, this is the most favorable setting. In the non-throttled condition the screw head is even with the amplifier surface. Since the flatness of the screw heads is not visible in the installed electronics, the basic setting can be restored as follows:

- turn off air supply
- carefully turn air reducing throttle screw clockwise until impact, thereafter 5 complete return rotations (counter-clockwise)
- restart air supply

Reducing of output air capacity (Service only)
Output air capacity may be reduced in exceptional cases only in small volume actuators with a small spring range if after optimization of the control still oscillating tendency exists (amplification of control loop is too high). For this purpose turn air reducing throttle screws ***17*** and ***18*** to a maximum of 5 rotations clockwise.

Caution: Amplifier may be damaged if a loud noise can be heard from amplifier resulting from too strong reducing. Immediately turn back throttles significantly!

8.9 Basic adjustment of electronics

Attention: Service only

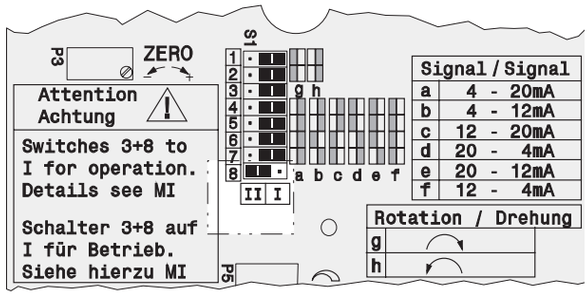
The electronics unit has been sufficiently factory-adjusted; an adjustment at delivery is not required. The potentiometer is secured by means of lacquer against unintentional operating.
In the event an adjustment of the electronics becomes necessary (e.g. following exchange of electronics) the procedure is as follows:

a) Enter input current 4 mA.
b) Switch S3 to “II”: positioner control loop is opened.
c) Turn potentiometer P1 until actuator just begins to move from its end position.
d) Return S3 to “I”.

8.10 Pneumatic test

Attention: Service only

To check the pneumatic parts of the positioner by directly applying current to the IP module (no control).
Procedure: Put switch 8 in position ”II” (see illustration).



Attention!
Resetting of switch 8 initiates actions influencing and possibly disturbing the current process! Therefore, no medium should flow through the valve during these settings.

Setting switch 8 to position “II” actuates a pneumatic test checking the function of the positioners pneumatic system including its control. If switch 8 is set from position “I” (condition of operation) to position “II”, the pressure in the actuator goes to nearly air supply pressure. The actuator moves to the direction associated with maximum pressure.

If no reaction is shown, check:
- does air supply exist?
- is plug connected to IP module?
If these items are okay, possibly the electronics or a pneumatic part are defect. Exchange see page 24.

During operation switch 8 must be in position “I” at all times!

9 DECOMMISSIONING

Before decommissioning the unit, disconnect supply air and the electrical input signal.

10 DIAGNOSIS

Fault	Possible cause	Solution
Actuator does not react to existing input signal or to changes of input signal	Pneum. connections were interchanged	Check pneum. connections, see page 16
	Electric connections were interchanged	Check electric connections, see page 17
	Wrong setting of zero and span	Check, see page 21
	IP module or pneumatic part defective	Carry out Pneumatic Test, possibly change part, see page 25
	Direction of rotation interchanged	Change direction of rotation
Output pressure does not reach full capacity	Supply air capacity insufficient	Check air supply
	IP module defect	Carry out Pneumatic Test, possibly change module, see page 25
	Filter in air supply connection plugged	Exchange filter, see page 24
Actuator moves to end position	Positioner mounted on wrong side or switch1+2 set faulty (**R/L**)	Check mounting side as per table page 19
	Pneumatik test still active (switch 8 = “II”)	Return switch 8 to “I”, see page 22
	Pneumatic connections were interchanged (double-acting version)	Check connections, see page 16
Unstable behaviour, position control circuit oscillates	Gain too high	Reduce gain, see page 21
	Friction on valve packing too great	Loosen packing gland slightly or replace
	Piston actuator: Friction at cylinder too great	Reduce gain, see page 21
Stroke range cannot be set	Positioner does not fully decompose pressure	Check air supply (max. 6 bar)
		Check gain, see page 21
		Carry out pneumatic test (switch 8 = “II”), see page 22
Pneumatic test is without effect	No air supply	Connect air supply
	No input signal	Connect input signal
	IP module is not connected, or IP module or a pneumatic part defective	Connect IP module, or exchange part (workshop)

INDEX
1
2
3
4
5
6
7
8
9
0

open printversion

11 MAINTENANCE

11.1 General

The positioner SRI990 requires little maintenance. When replacing components during repair work, the safety requirements on page 4 must be observed!

11.2 Supply filter replacement

An obstructed supply filter can be replaced. Unscrew the air supply fitting, remove the filter and exchange the filter with a new one.

11.3 Removal of electronics unit

Pull off travel indicator ***12*** . To remove the electronics unit ***40***, loosen the 7 screws at front, see illustration below.

Lift off electronics unit vertically to top. Disconnect plugs ***41*** and ***42*** (see page 25) from the board. Do not use tools to remove plugs because components could be damaged. Tight-fitting plugs can be easily removed by tilting them diagonally inward before pulling them off.

Connect plugs ***41*** and ***42*** to the new electronics unit ***40*** and attach the new unit by using the 7 screws at front (attention with the cables).

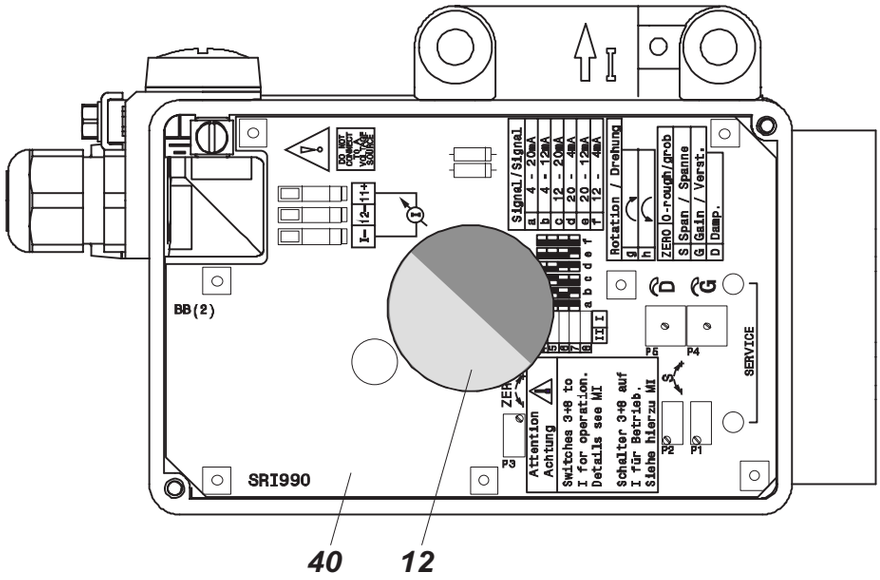
11.3.1 Conversion of positioner

Positioners of the POSYS series consist of identical mechanical and pneumatic components and accessories. A conversion to either a “digital” or “intelligent” positioner is possible by simply exchanging the electronics unit.

Procedure:
a) exchange electronics unit, see chapter 11.3
b) mark change on nameplate
c) start-up - see associated master instructions:

Device Model Code	Communi-cation	Setpoint	Documentation
SRD991-xH	HART	4-20 mA	MI EVE0105 A
SRD991-xE	FOXCOM	4-20 mA	
SRD991-xF	FOXCOM	digital	
SRD992	–	4-20 mA	MI EVE0106 A

Reference to explosion-proof devices:
Conversion of the electronics unit has to be considered as change to explosion-proof device, and therefore, only permitted in accordance with country specific regulations. Valid in the Federal Republic of Germany: Conversion to be certified as change according to § 9 ElexV by an authorized expert.



11.4 Replacement of mechanical and pneumatic units

First remove the electronics unit ***40*** (see preceding page).

11.4.1 Amplifier replacement

Release the pneumatic amplifier ***43*** from the base plate and replace O-rings between the amplifier and base plate[1]. Use 3 O-rings for a single-acting amplifier and 5 O-rings for a double-acting amplifier. If replacing a single-acting amplifier with a double acting, remove sealing screw ***44*** before installation.

The air capacity throttle screws have to be released until the screw head is even with the amplifier surface (= no throttling).

11.4.2 Preamplifier replacement

Unscrew the preamplifier ***45*** from the base plate by removing screws ***46*** and ***47*** .

Replace 4 O-rings between preamplifier ***45*** and base plate[1] and install new preamplifier.

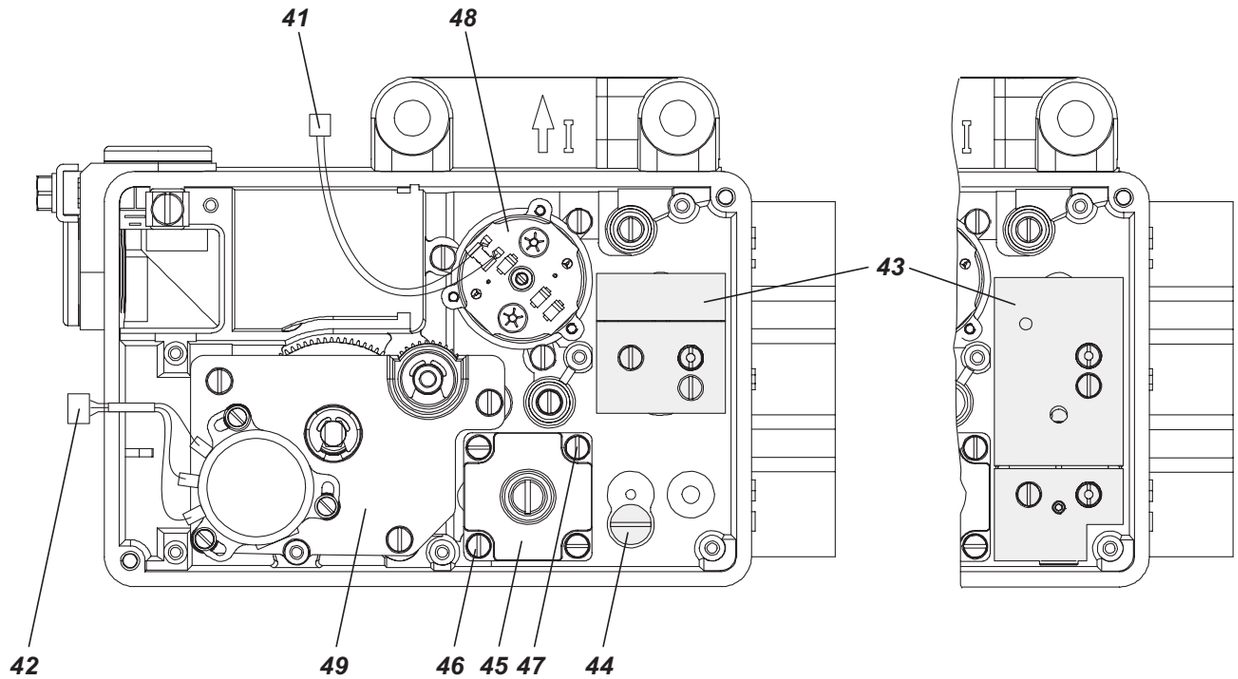
11.4.3 Replacement of IP module

Remove the IP module ***48*** from base plate and replace with new IP module. Replace the O-ring between IP module and base plate and install new IP module.

11.4.4 Replacement of Feedback unit

First remove feedback lever or rotary adapter from feedback shaft. Now remove retaining ring from feedback shaft ***9*** (see page 6). Remove screws and pull out complete unit ***49*** consisting of feedback shaft, gears and position sensor.

Insert new feedback unit ***49*** and secure with screws. Remember to replace the retaining ring at feedback shaft.



1) The base plate consists of a manifold and air ducts. O-rings are required to guarantee sealing of the mounted elements.

open printversion

12 OPTION “Limit switch”

Rebuild to this option resp. exchange

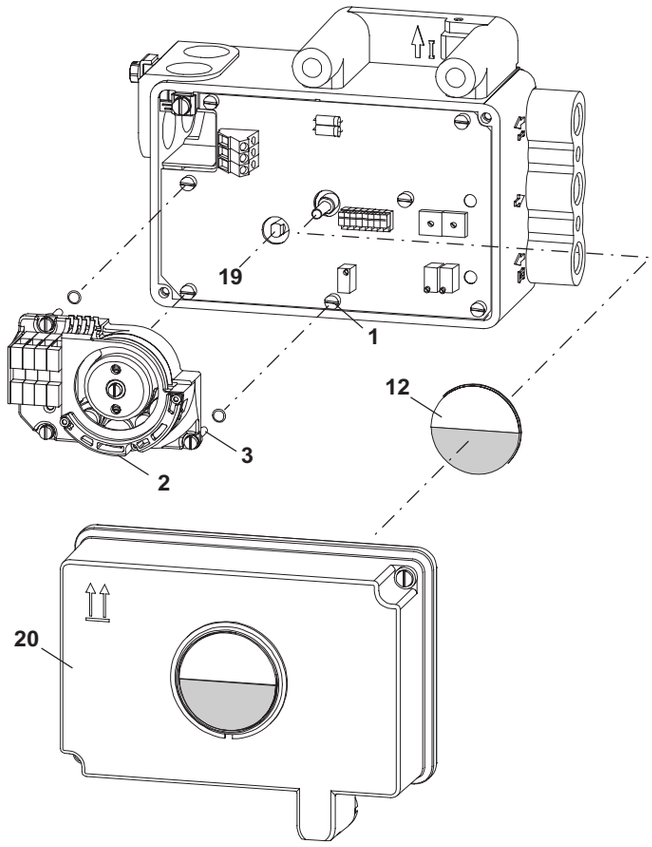
Remove three screws ***1*** including tooth lock washer from plastic cover.

Attach limit indicator ***2*** so that the flattened shaft end ***19*** contacts the groove of the limit indicator shaft in the positioner.

Attach limit indicator by means of three screws ***3*** and washers. The feedback shaft at back of positioner should easily be turnable, thereby also moving the vanes of the limit indicator. If this is not the case, loosen screws ***3*** and flush- align the shafts of positioner and limit switch (turn coupling shaft several times).

Replace short travel indicator **12** by long travel indicator.

Screw high cover ***20*** (or standard cover with insert frame) on housing.

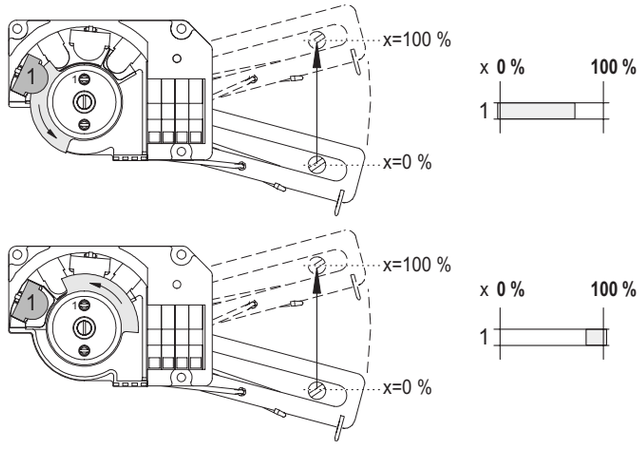


Switch functions

Feedback lever, feedback shaft and the control vanes are all connected to each other, without an intermediate transmission. The control vanes are therefore moving simultaneously with the same angle rate as the feedback lever. The length of the control vane corresponds with the swing angle of 120°.

Both control vanes are located on different planes. Each control vane can be seen independently from the other, because each has its own sensor.

By adjusting the screws (after loosening the center screw ***10***), the control vanes can be adjusted relatively to the angle rate, so that e.g. one vane dives into and another dives out of the sensor (see illustration).



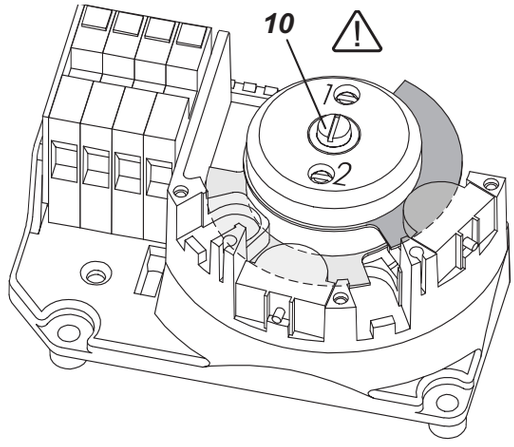
Setting limit switch trigger points

Loosen center screw ***10*** (1-2 turns; do not remove!), otherwise the control vanes will be damaged during the following steps.

Set trigger point switch GW1:
Turn screw at number 1 until desired switch behavior is reached.
Set trigger point switch GW2:
Turn screw at number 2 until desired switch behavior is reached.

To fix switch points retighten center screw ***10*** .

Do not touch control vanes during operation, danger of injuries!



Levels of control vanes (illustration without cover)

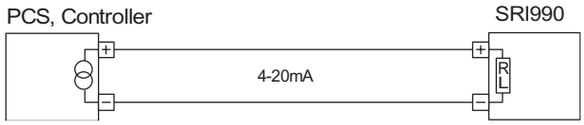
open printversion

13 SYSTEM CONFIGURATION

The safety requirements in page 4 must be observed!

13.1 Non-intrinsically safe operation

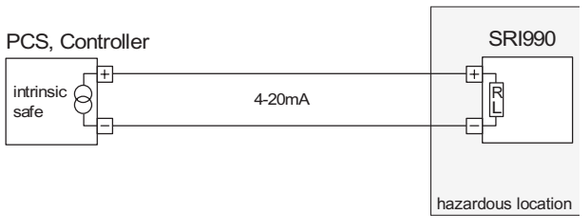
The SRI990 can be connected directly to the 4 to 20 mA output of the process control system or controller. Load RL approx. 300 Ohm.



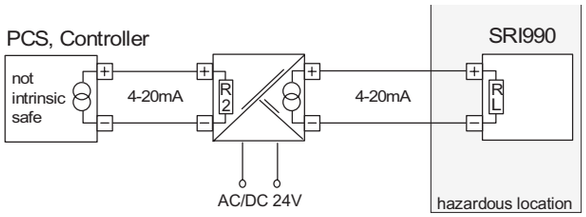
13.2 Intrinsically-safe operation

The SRI990 can be connected directly to an intrinsically safe 4 to 20 mA output of the process control system or controller. If no intrinsically safe output is available, a suitable buffer amplifier or safety barrier with an intrinsically safe output must be connected. During intrinsically safe operation the connection must be checked for conformance to intrinsic safety before commissioning.

Controller / process control system-output intrinsically safe:



Controller / process control system-output not intrinsically safe:



The following devices may be used:

Device	Input Load R2	Drives load at output	drives n *) SRI990
TV928	50	600	1 pc.
TV228	< 100	700	2 pcs.
II949	RL+200	580	1 pc.

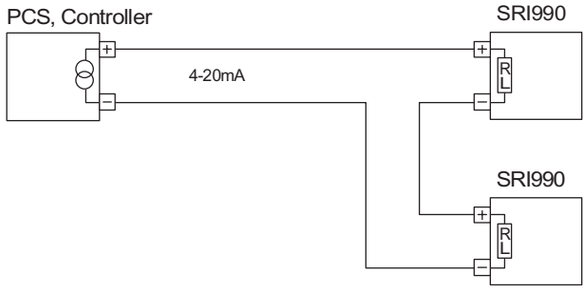
All components connected to the SRI990 in a hazardous location must be Ex-approved. The limits are not to be exceeded in any case. These limits are also valid for connection of other capacitances, inductances, voltages and currents. Additional options may have different limit values than the basic device. See Product Specification Sheet PSS EVE0107 A-(en) and/or Certificate of Conformity.

13.3 Split range

If several actuators are to be controlled from an identical conduct variable and carry out full stroke only in a certain portion of this conduct variable, an individual SRI990 is to be provided for each actuator the zero and span of which can be set to the respectively desired partial range of the conduct variable.

The positioners are electrically switched in series. It is important that the permissible load of the process control system or controller is not exceeded (RL of an SRI990 approx. 300 Ohm).
The output voltage (idle voltage) must be >8.5 V per connected positioner. The total line capacitance is not to exceed 1 F.

Example: 2-fold split range

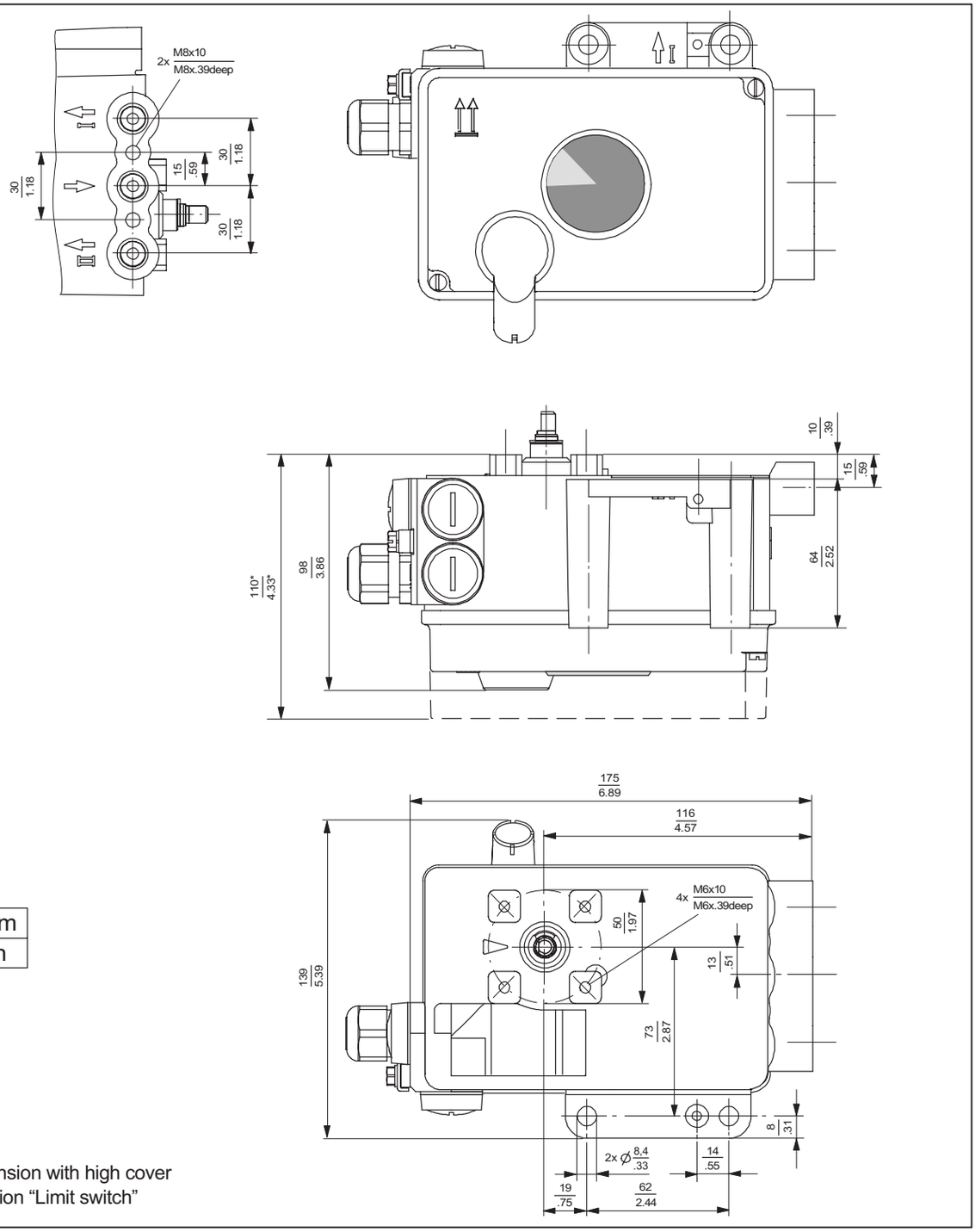


During intrinsically-safe operation identical conditions as described in chapter 13.2 are valid.

Setting of the positioners is described in page 20.

*) For split range

DIMENSIONS



*) Dimension with high cover at option “Limit switch”

FOXBORO ECKARDT GmbH
Postfach 50 03 47
D-70333 Stuttgart
Tel. # 49(0)711 502-0
Fax # 49(0)711 502-597

DOKT 536 022 046

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

Installation:

Attention!: - *Installation, operation and maintenance should be done only by qualified personnel.*
- *Disconnect supply before working on the valve.*
- *It is not permitted to work on the valve body and to exchange the actuator as long as the valves are subjected to pressure and temperature.*

The mounting site should be easily accessible and have sufficient clearance for maintenance and for removing the actuator. Ensure that the pipe line axes are flush and connection flanges are parallel. Provide suitable measures to absorb possible tensile and pressure forces.
The valve must not serve as a fixed point. It must be carried by the piping.

Clean pipelines thoroughly prior to installing the control valves in order to avoid damage through residual installation material, welding beads or forging scale. If possible, provide a dirt trap in front of each control valve.

Installation position should be vertical to horizontal. Ensure that the installation direction is correct (directional arrows of the flow on the valve housing). Observe a 10 x DN spacing to flanges, elbows, etc., to avoid an impaired valve function.

Regard the permitted max. operating pressure and temperatur as described in the corresponding valve specification sheet.

Observe the ambient temperature limits (-20...+60°C), if necessary, provide a drive heater at lower temperatures, and for higher temperatures insulate the pipeline, provide conductive plates or cooling possibilities.

Retighten the screws of all flange connections (also lid and connection piece flanges) prior to commissioning/start-up and following initial heat-up.

Electrical connection:

Check supply voltage according to the rating plate, loosen screws on the motor hood and remove hood

Route signal and control lines separately from high-voltage lines, if necessary, run in screened cables. Insert cables (1.5 mm²) through a wringing nipple or cable screw connection.

Perform electrical connection with the supply voltage switched off according to the connection diagram (observe VDE and EVU regulations).

In the event of deviations, the connection diagram in the motor hood has precedence

Maintenance:

Following the initial temperature and pressure load, retighten the screws of all flange connections (also lid and connection piece flanges), the valve cone should be located in the centre.

Attention! *Never loosen the lid and flange screws as long as the fittings are subjected to pressure and temperature.*

Protect valve spindle against soiling, if necessary, clean and grease lightly in order to protect stuffing boxes and deflector hoods against increased wear.
Retighten stuffing box seals slightly in the event of leaks.
No further maintenance work is required for fittings with deflector hoods or bellows.

Undertake maintenance on the drive in accordance with the corresponding information in the separate operating instructions.

open printversion

Attention:

- Adjustment of and work on the actuator may only be done by skilled labour
- Disconnect power supply before removing the cover
- Observe local instructions and terminal diagram

Actuator disassembly:

- disconnect supply
- loosen fixing screw (21) (see Fig.1)
- unscrew coupling nut (19)
- unscrew nuts (18)
- take off actuator from valve connection

Actuator assembly:

- lift actuator onto valve connection and secure nuts (18) (see Fig.1)
- tighten (19) coupling nut and fixing screw (21)
- connect lines acc.to wiring diagram
- if necessary, move actuator in both limit positions and adjust stroke indikators (17) on mounting rod

Maintenance: the spindle has to be kept cleen and lubricated, if necessary, lubricate the spindle with molykote including grease

Limit switches:

Attention! *The limit switches work load dependent and turn off automatically when the valve drives in end position, so that a readjustment, as for travel dependent limit switches, is not necessary and not allowed. Change of the factory adjustment endangers correct operation, no warranty will be given and no liability will be accepted in case of damage of the varnish sealing.*

If for extraordinary reasons, for instance by previous damages, a readjustment is exceptionally necessary, the actuator should preferably be sent in for new factory adjustment. Only if this is exceptionally not possible, a new coarse adjustment can be directly done, with our agreement and acc. to the following operating instruction.

Special information for actuators with integrated positioner:

No reaction of limit switch can occur when the positioner turns off the actuator to early, before the valve is in the end position. Don't readjust limit switch in this case, control at first adjustment of positioner and correct it if necessary.

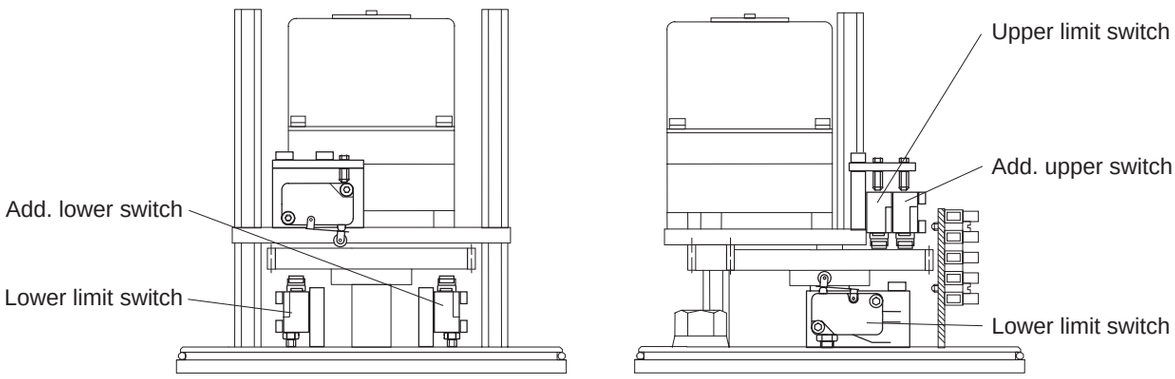


Fig.1

open printversion

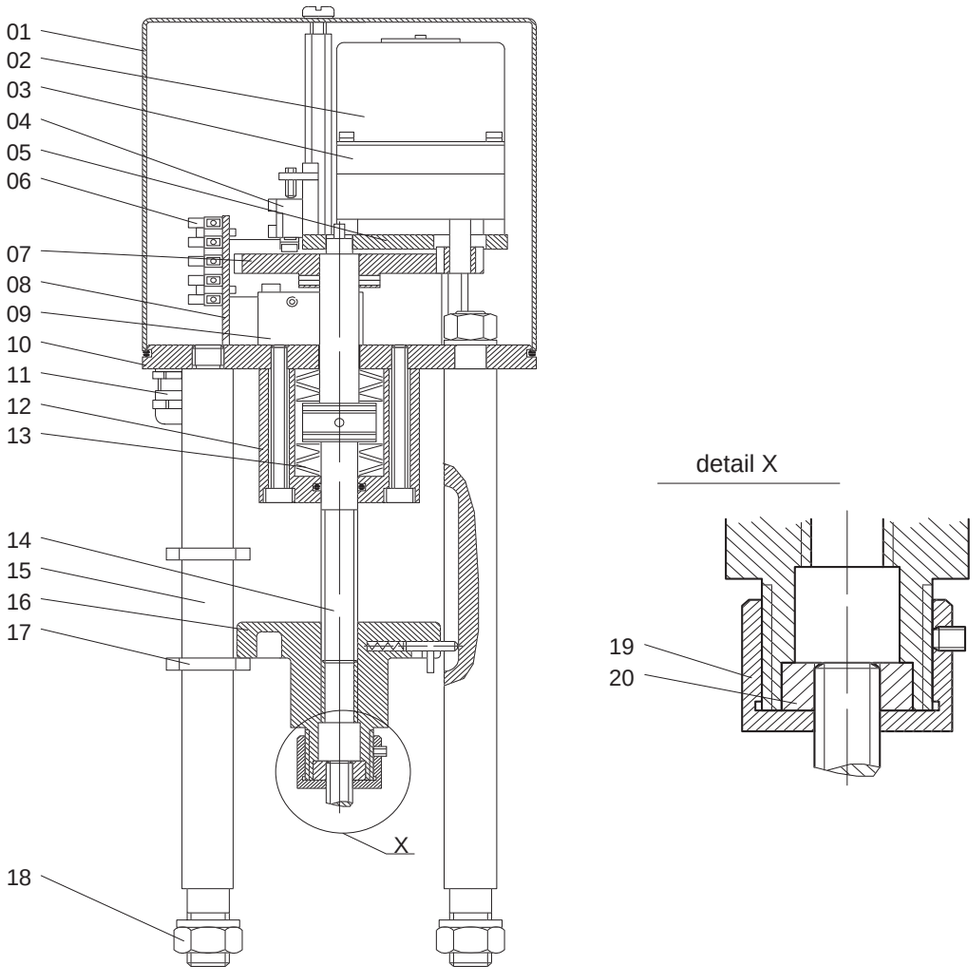
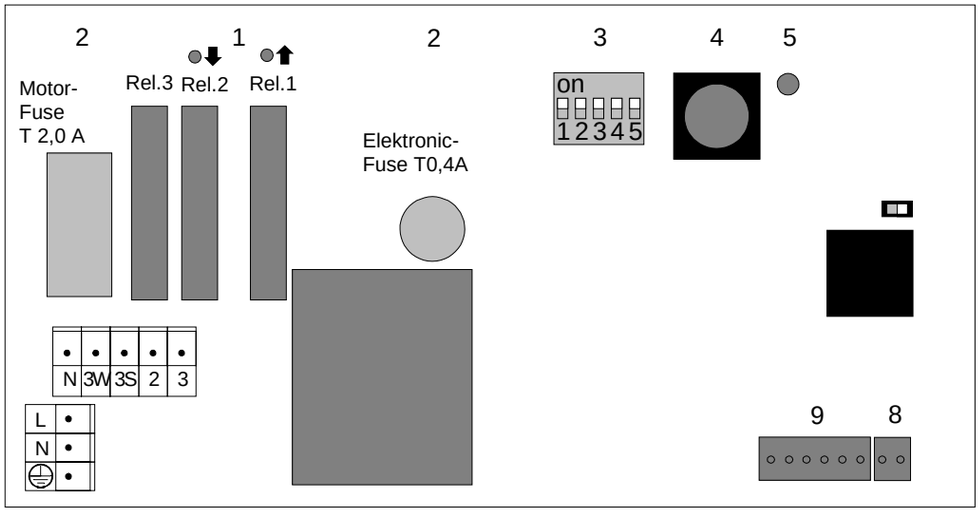


Fig.2

No.	Designation	Part-No.
01	Bonnet: 2kN / 4kN	e3h136 / e3h180
02	Motor 230V / 50/60Hz: 2kN / 4kN***	e2m220 / e2m220.4
02a	Capacitor: 2kN / 4kN	e2k033 / e2k068
03	Gear: pos. speed 3,3s/mm / pos. speed 2,2s/mm	e2g1875 / e2g1250
04	Limit switch for spindle position "down"	eheo
05	Mounting plate for motor	e3zp
06	Terminal bar	e6k12
07	Gear wheel	e3zr75
08	Mounting plate with wiring diagram	e3hb
09	Limit switch for spindle position "up"	eheu
10	Base plate	e3gp
11	Screw-type cable bushing PG11	e1kv11
12	Spring housing	e3fg
13	Set of disc springs	e5ft355+e5fs335
14	Spindle	e3s
15	Mounting rods	e3s... / e3s...n
16	Hand wheel with blocking lever	ehhr
17	Stroke indicator	e5ak
18	Hexagonal nut M16	e8mv16
19	Coupling nut	e5vk
20	Screw collar ring	e3sr...

*** = only for standard actuator: voltage 230V / 50/60Hz

open printversion



1 LEDs for displaying the relay function (relay 3* without LED)
2 Fuses for drive motor and control electronics
3 Coding switch for range settings, direction of control action and sensitivity
4 Push button for starting automatic regulating distance adjustment
5 Status LED
6 Switch-over for connection interface / external display and keyboard
7 Connection for service interface, external display and keyboard
8 Connector plug for signal output
9 Internal connector plug for feedback potentiometer and actuating signal
10 Internal connector plug for mains voltage and actuating output for actuator

Description

The position controller converts an incoming actuating signal into the associated drive position by comparing the signal with the position feedback from a potentiometer built into the drive, and by setting the drive position via relays 1 and 2. An output signal 4..20 mA for position feedback is in the standard equipment.

The automatic and maintenance-free device is integrated into the actuator. All main basic parameters for range, operationg direction and sensitivity are set via coding switches. Optionally, various interfaces to higher-level master computers or PLCs are available, both for data acquisition or remote maintenance purposes and for executing digital control commands.

The device is only accessible once the drive cover has been removed. Commissioning only consists of checking the settings and a single activation of the adjustment button; an LED indicates completion of the automatic adjustment to the end positions. The device is then ready for operation.

Type Summary	**Li.no.**
Basic unit	**49sr5**
Additional fittings:	
Extra voltage (1=115V AC, 2=24V AC, 8=24V DC), others on request	**49sr5_ ..**
Position feedback output 0..10V	**49sr5.k**
Interface RS485, protocol KFM 2.0	**49sr5.s**
Profibus DP interface	**49sr5.sp**
Mobile display and control unit	**49sr59z**

* = available depending on type

open printversion

Commissioning

Prior to commissioning, the mechanical setting of the potentiometer in the drive should be checked and corrected if necessary!

During commissioning, first check the settings of the coding switches for input signal, operating range and signal flow direction.

Then press the push button for the automatic regulating distance adjustment for 5 seconds. The actuator then consecutively drives to both end positions, and the positioner adjusts itself automatically.
Two LEDs indicate the function of the relay.

During the adjustment, the status LED flashes every 3 seconds. As soon as the adjustment process is complete, the LED changes to continuous light, thus indicating normal operating status.

Rapid flashing (1 second cycle) indicates a fault at the measuring inputs (feedback / control signal). Details can be displayed via an additional display and control unit or read via an interface and external software, e.g. KFM PKS.

Status indicator

Status LED:

Continuous light	Normal function
Flashing, 3s	Adjustment process running
Flashing, 1s	Fault at the measuring inputs

Settings

Range:	*Position of coding switches 1 to 3:*
0...20mA / 0...10V	000
4...20mA / 2...10V*	100
0...10mA / 0...5V	010
4...12mA / 2...6V	110
10...20mA / 5...10V	011
12...20mA / 6...10V	111

Response sensitivity:	*Position of coding switch 4:*
normal*	1
reduced	0

Operating direction	Position of coding switch 5:
direct*	0 for three-way valves 1 for straight-way valves (with off position below)
inverse	1 for three-way valves 0 for straight-way valves (with off position below)

direct: increasing input signal opens the straight way,
inverse: increasing input signal closes the straight way.

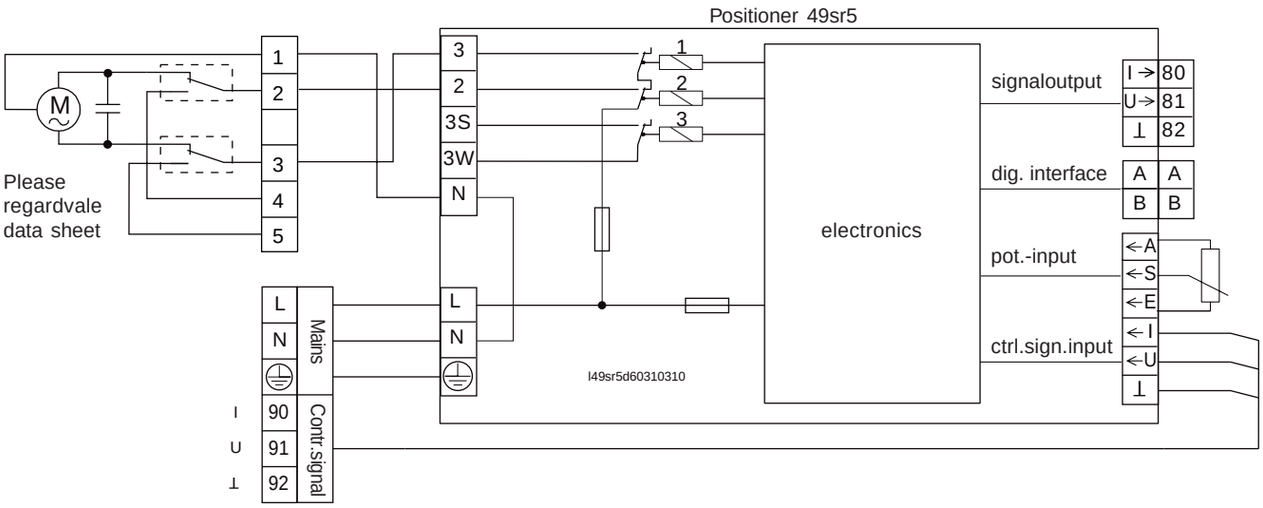
(= factory setting)*

open printversion

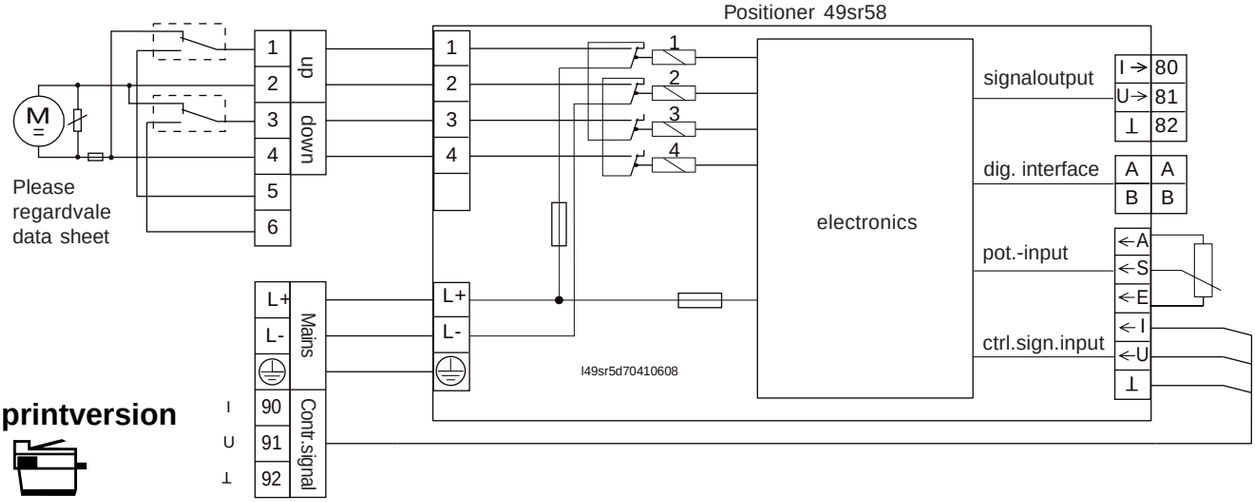
Technical data:

Input (adjustable):	0...20mA / 0...10V 4...20mA / 2...10V 0...10mA / 0...5V 4...12mA / 2...6V 10...20mA / 5...10V 12...20mA / 6...10V
Response sensitivity:	switchable normal / reduced
Output:	up to 4 relays, max. 250V, 2 A 4..20mA for position feedback, load imp. < = 500 Ohm, alt. 0..20mA optional 0 .. 10 V, load impedance > 500 Ohm, alt. 2..10V
Operating direction (adjustable):	direct: increasing input signal opens the straight way, inverse: increasing input signal closes the straight way
Status indicator:	1 status LED for adjustment procedure, normal operation, fault 2 LEDs for function display relay 1 and 2
Mains connection:	230V +/- 10 %, 48...62Hz, approx. 3VA alternatively 115 V, other voltages on request
Optional interfaces:	RS 485 / KFM 2.0 protocol, Profibus DP, others
Permissible ambient temp.:	0...60°C, nominal temperature: 20°C

Internal function and connections 230V / 115V / 24V AC*:



Internal function and connections 24V DC*:



open printversion

* Example, depending on sub type some details can be missed. The wiring diagram glued into the bonnet is only valid for each delivered controller.

INDEX

1
2
3
4
5
6
7
8
9
0

Installation:

Attention!: - *Installation, operation and maintenance should be done only by qualified personnel.*
- *Release the operating mechanism before working on the valve.*
- *It is not permitted to work on the valve body and to exchange the operating mechanism as long as the valves are subjected to pressure and temperature.*

The mounting site should be easily accessible and have sufficient clearance for maintenance.
Ensure that the pipe line axes are flush and connection flanges are parallel.
Provide suitable measures to absorb possible tensile and pressure forces.
The valve must not serve as a fixed point. It must be carried by the piping.

Clean pipelines thoroughly prior to installing the control valves in order to avoid damage through residual installation material, welding beads or forging scale. If possible, provide a dirt trap in front of each control valve.

Installation position should be vertical to horizontal. Ensure that the installation direction is correct (directional arrows of the flow on the valve housing).

Regard the permitted max. operating pressure and temperatur as described in the corresponding valve specification sheet.

Retighten the screws of all flange connections (also lid and connection piece flanges) prior to commissioning/start-up and following initial heat-up.

For operating from a distance, a release cord (supplied by customer) should be fastened with the delivered spring hook on the toggle clamp lever.
Notice: The valves are delivered with unloaded spring, not ready for operation. For operation readiness after assembly, it is necessary to tighten the actuating spring as described below.

Operation:

Operation readiness: Hang out the spring hook with release cord and put the lengthening lever on the toggle clamp lever.

Push the toggle clamp lever acc. to tighten-direction arrow up to the snap point, to open the straightway (emergency stop valves) or to close the straightway (emergency outlet valves) and to tighten the actuating spring.

Attension: *Injury danger by emergency function release!*

Subsequent take off the lengthening lever and fasten the release cord with the delivered spring hook on the toggle clamp lever.

Emergency release: The actuating spring will open the straightway (emergency outlet valves) or close the straightway (emergency outlet valves) when the toggle clamp lever will be moved back from the snap point with the release cord.

After emergency release, it is necessary to tighten the actuating spring for operation readiness as described above.

Maintenance:

Following the initial temperature and pressure load, retighten the screws of all flange connections (also lid and connection piece flanges), the valve cone should be located in the centre.

Attention! *Never loosen the lid and flange screws as long as the fittings are subjected to pressure and temperature.*

Protect valve spindle against soiling, if necessary, clean and grease lightly in order to protect stuffing boxes and deflector hoods against increased wear.
Retighten stuffing box seals slightly in the event of leaks.
No further maintenance work is required for fittings with deflector hoods or bellows.

Occasionally lubricate the slide guide on the toggle clamp.

open printversion

Installation:

Attention!: - *Installation, operation and maintenance should be done only by qualified personnel.*
- *Release the operating mechanism before working on the valve.*
- *It is not permitted to work on the valve body and to exchange the operating mechanism as long as the valves are subjected to pressure and temperature.*

The mounting site should be easily accessible and have sufficient clearance for maintenance.
Ensure that the pipe line axes are flush and connection flanges are parallel.
Provide suitable measures to absorb possible tensile and pressure forces.
The valve must not serve as a fixed point. It must be carried by the piping.

Clean pipelines thoroughly prior to installing the control valves in order to avoid damage through residual installation material, welding beads or forging scale. If possible, provide a dirt trap in front of each control valve.

Installation position should be vertical to horizontal. Ensure that the installation direction is correct (directional arrows of the flow on the valve housing).

Regard the permitted max. operating pressure and temperatur as described in the corresponding valve specification sheet.

Retighten the screws of all flange connections (also lid and connection piece flanges) prior to commissioning/start-up and following initial heat-up.

Function:

The overflow valve is a two way valve with spring load.
The spindle sealing is a double wall VA-bellow and safety stuffing box.
The valve plug is a regulating plug type with linear flow characteristic. Hereby, a sudden pressure fall is prevented when the valve responds.

The valve opens the straightway against outside spring when the differential pressure on the valve plug is rising. The response pressure is adjustable in 1...4 bar range. The preloading of the spring can be changed and the adjusted response pressure is schown on the scale.

The adjusted overflow pressure is not an absolute value, it is a differential pressure between inlet and outlet of the valve.

Operation:

The necessary overflow pressure can be adjusted with changing of the position of the upper spring plate. For this, an adjusting key (for hexagonal nut with17mm width) is necessary.
The value of the adjusted overflow pressure is schown on the scale in range of 1...4 bar.
Right hand turning of the nut causes falling of response pressure, left hand turning causes rising of response pressure

Maintenance:

Following the initial temperature and pressure load, retighten the screws of all flange connections (also lid and connection piece flanges), the valve cone should be located in the centre.

Attention! *Never loosen the lid and flange screws as long as the fittings are subjected to pressure and temperature.*

Protect valve spindle against soiling, if necessary, clean and grease lightly in order to protect stuffing boxes and deflector hoods against increased wear.
Retighten stuffing box seals slightly in the event of leaks.
No further maintenance work is required for fittings with deflector hoods or bellows.

Occasionally lubricate the bearing, the adjusting nut and the thread spindle.

open printversion

1 Digital display of set value
2 Pushbuttons for adjusting the set values recessed and lead-sealable
3 Internal reset pushbutton
4 LEDs for operating and error displays
5 Function check button

DIN assembly tests:

STB 114603 S ref. DIN 3440

CE 0045 ref. rule 97/23/EG, modul B and D

General:

Two-channel self-monitoring safety temperature limiter, constructed to meet the requirements for increased safety (DIN 3440).

The electrical safety circuit is switched off, i.e. opened, if the set value is exceeded or if there is a fault at the measurement input or in the device. A fault signal is also provided at the terminals. The limiter can only be unlatched manually after the fault has been rectified.

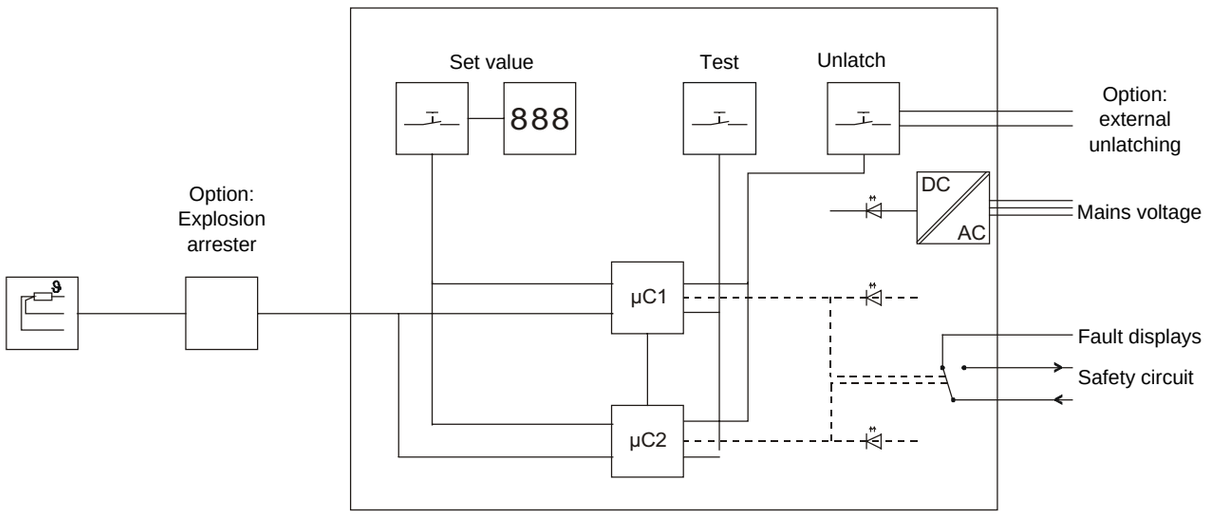
The Pt100 measurement input is of the 3-conductor type, so that compensation is automatically provided for cable resistances and intermediate explosion arresters.

The device includes test buttons with which the specified annual function checks can be carried out very conveniently, without having to disturb the connected cables.

Models:

845 210	Model without display
845 220	Model with display

Block diagram:



open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

Function:

After the mains voltage has been switched on, the operating indicator lights up. If the actual value is lower than the set value, both relays switch on, LEDs K1 and K2 light up, and the electrical output circuit is closed. If the actual value is higher than the set value, both relays are released and the LEDs go out. The electrical safety circuit is interrupted, and the normally closed contacts of the relays connect the voltage from terminal 16 to the fault signal output at terminal 14. Even if the actual value then falls again below the set value, or if the mains voltage is interrupted, the status remains unchanged. Only after the internal reset button, or an externally connected reset button, is pressed, and when the actual value is smaller than the set value (less the hysteresis), can the temperature limiter return to the operating state.

Adjusting the set values:

Type 845 210 (model without display of the set value):
Some appropriate means (a resistor decade box or similar simulator) is used to simulate the desired trigger temperature at the sensor input. This is entered as a new set value by pressing the "SET" button.
Note: Tolerance figures related to the components must be considered in relation to the set value range when using this version.

Type 845 220 (model with display of the set value):
The mode in which the set value is adjusted is activated by pressing the "SET" button, and the displayed value flashes. The new set value can now be adjusted using the arrow keys. The setting mode is deactivated by pressing the "SET" button again. The displayed value ceases to flash, and the adjusted value is adopted as the new set value.

For reasons of safety the set value should be adjusted on the Type 845 220 to a value 2K below the desired trigger value to allow for possible component tolerances. As an alternative, the determined trigger value can be noted on the safety label!

In accordance with DIN 3440, the set value must be secured against accidental or unauthorised modification. For this purpose, a safety label is applied over the "Set" button to seal it. In the case of devices of Type 845210 the set value must be recorded on the safety label.

Whenever the set value is adjusted, the function of the device is to be checked by simulating a corresponding temperature at the sensor input!

Function check:

In accordance with DIN 3440 the safety temperature limiter must be subjected to a function check once a year. To do this, the recessed test buttons are pressed in sequence, holding them down for about 3 seconds each. Pressing the first test button makes it possible to check that the associated relay releases, the corresponding LED goes out, the electrical safety circuit is interrupted and the external fault signal lamp lights up. The device must return to the normal condition by pressing the reset button. Both LEDs light up again, and the electrical safety circuit is closed. The second channel is then to be tested in the same way.

The annual function check specified by DIN 3440 is only carried out correctly if the two buttons are pressed independently, one after the other.

Faults:

There are a number of reasons why, after having been triggered in operation or after carrying out the function check, the device does not return again to the normal state despite the actual value being sufficiently low. The first step should be to check, e.g. by means of a resistance measurement, whether the sensor, including all the measurement cables, is OK.
Check also whether the actual value is indeed within the permissible measuring range. If the range is exceeded, the device switches off. When an attempt is made to reset the device, the relays close briefly but immediately open again, so that operation is not possible. Only when the actual value is within the acceptable range again is normal operation of the device possible following a reset.

If the possible sources of malfunction mentioned above had been ruled out, it can be assumed that there is an internal fault.
In that case, the device must be exchanged and returned to the factory for examination.

open printversion

Acceptable sensors:

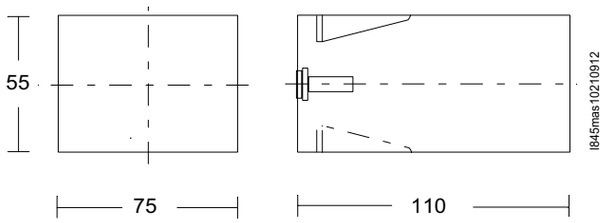
All temperature sensors demonstrably according to DIN 3440 are acceptable. Please observe the specifications about type, application range, installation conditions and time constant in the VDTÜV datasheet.

Type	Operating medium	Permissible operating pressure	Maximum switching point	Protection tube	Time constant
713 400	Water and oil	56 bar	400 °C	Without immersion sleeve	18 s
714 704	Water and oil	50 bar	400 °C	Only use protection tube supplied	22 s
715 712	Water and oil	70 bar	400 °C	Only use protection tube supplied	53 s
713 610	Air and exhaust fumes	No pressure	500 °C	Without immersion sleeve	120 s

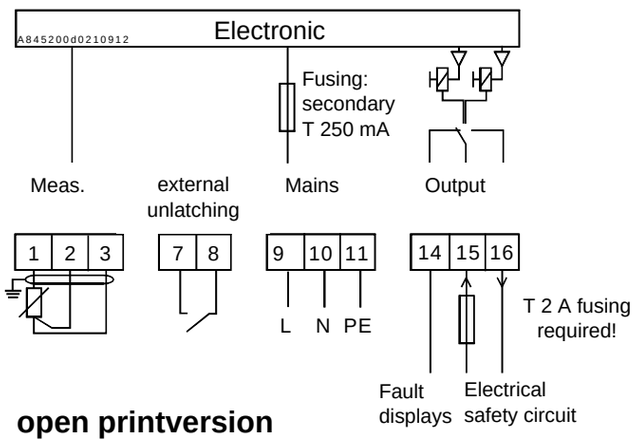
Characteristic values:

Input:	1 x Pt 100 DIN
Measuring range:	-200 ... + 600 °C, others optional
Set value adjustable range:	*Note: Observe the sensor's switching point!* Type 845 210: -200 °C (+10K) ... 600 °C (-10K) Type 845 220: -99 ... 600 °C
Adjusting the set values:	Using recessed, lead-sealable push-button
Output:	2 relays, max. 250 V 2 A
Switching hysteresis:	8 K +/- 1K, other values available on request (expressed as appendix to type identifier in plain text, e.g. 845 220 4K)
Housing:	For fastening to 35 mm mounting rail, or for screw fastening
Mains connection:	230 V AC + 10 % / - 15 %, 48...62Hz
Alternatively:	115 V AC, 48 V AC, 24 V AC
Power consumption:	Approx. 4 VA
Fusing:	Secondary side, T 250 mA
Type of protection acc. EN 60529:	IP 20, for mounting within a housing offering at least IP 40
Permissible ambient temperature:	0...60°C, Nominal temperature: 20°C
Storage and transport temperature:	-20 ... +80 °C
Climatic resistance:	Relative humidity <= 75 % annual average without condensation
Electromagnetic compatibility:	In accordance with EN 61326, industrial requirements
Installation orientation:	optional

Installation dimensions:



Connection diagram:

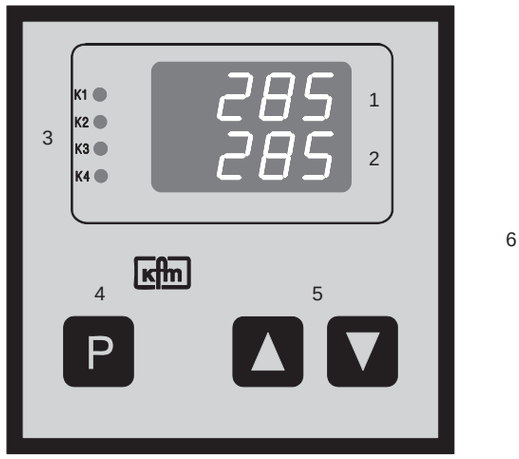


open printversion

INDEX

1 2 3 4 5 6 7 8 9 0

1 Digital display actual value
2 2nd digital display (if aktive)
3 LED-display relais function
4 Key for setpoint and parameter mode
5 Setpoint adjustment
6 Parameter mode lock switch (back face)



DIN-certificate: TR (TW) 949 ..

Brief description:

KFM 92 is a microprozessor based industry controller series in panel mounting- format 96 x 96 mm. Design and operating elements are especially devised for easy and convenient handling and operation.

An assembly system renders possible the simple basic version as well as a plurality of variants with up to 8 relays, several digital and analog out- and inputs and other additional devices.

Types:

(depending on configuration):*	*type:*
indicator	9201.
one stage controller	9210.
two stage controller	9220.
heating / cooling controller	9230.
positioner / follow-up controller	9240.
two- point- PID controller	9250.
three- point- PID controller	9260.
three- point- step controller	9270.
continuous controller	9280.
continuous controller, 2 outputs	9281.

Sub-types:

	suffix (*)
basic function	.0
basic function + 1 additional contact	.1
basic function + 2 additional contacts	.2
2 x basic function	.3
extension: logik output	..L

function extensions

	suffix (*)
cascade controller	991k
program controller	991p
ramp set point value	991r
step controller	991t

Additional devices:

	(*)
additional analog inputs	(99) a
external set value incl. switch-over	(99) bwa
second set value incl. switch-over	(99) bwz
binary input to switch special functions	(99) b..
additional switching contacts	(99) f..
analog signal outputs	(99) o.
serial interface RS 232/485	(99) s.
interface Profibus, Interbus S, other	(99) sp/si.

* In case of more than 1 extension there is at the data plate only once '99' , f.e. 92700-99aw-ogx-rü. For more information see corresponding data sheets.'

Inputs:

max. 4 measuring inputs, acc. to sub-type*:*	*type suffix*
Pt100 DIN, 0...400°C	none (or 0)
Pt100 DIN, 0...100°C	1.
thermo couple Ni Cr NI (type K)0...1200°C	n.
thermo couple Fe Cu NI (type J)0... 900°C	f.
thermo couple Pt Rh Pt (type S)0...1700°C	p.
feedback device 0...100 up to 1000 Ω	w.
standard signal 0(4)...20mA, 0(2)...10V	e.
combined input Pt100 / standard signal	q.

Ranges:

Pt 100: 0...400°C, switchable to °F, optional: other ranges; for standard signal range adjustable -999 to 4000. Setpoint ranges can be limited by menu

Displays:

2 four- figured digital displays, decimal point adjustable, upper display: actual value, lower display: other selectable data,
up to 8 LEDs for relays function display.
Display of function:
Hold down the P-key for more than 5 sec
to get a short-cut message of the configured function on the display (=position 3-5 of list number)
(in case of locked parameter mode only).
Measuring line monitoring:
Display "Err 1...4" in case of measuring line fault and adjustable safety shut down of all outputs

Outputs:

up to 8 relays with potential free change over switch, as control outputs or as additional contacts,
capacity: 250V 2A,
incl. spark extinction (for normally open contacts)
1-2 continuous outputs 0/4...20mA, 0/2...10V as control or signal outputs(apparent ohmic load 500 Ω)

INDEX

1
2
3
4
5
6
7
8
9
0

Installation:

Before installation inspect the controller for any visible signs of damage caused during transport
Check power supply acc. to name plate.
Push the housing from the front into the DIN- panel cut-out and secure from behind with the fastening devices supplied.

Electrical wiring:

Plug bar on the back face of the controller; connect up the controller at the rear following the wiring diagram; wire cross section max. 1,5 mm^2

- To avoid cross interference *all low voltage measuring lines and pilot wires* must be encased in a ***shielded cable*** (the shielding must be earthed one-sided).
- The control leads must be ***fused*** *externally* to protect the output relays.
- Phase wire and neutral wire must not be transposed.

Putting into operation:

Switch on power supply. Digital display and control lamps will light up according to the setpoint after some seconds. If nothing happens check the fine-wire fuse on the back panel of the controller and the electrical wiring. Adjust set value and check other adjustments.

Maintenance:

All electronic controllers in the KFM range are virtually maintenance-free. Provided that the controller is correctly installed and put into operation and is protected against mechanical damage and inadmissible operating conditions, it should give years of trouble-free service.
In case of faults repair work by the customer should be restricted to the externally accessible leads and connections and components the customer is expressly permitted to deal with himself. (bridge circuits, fuses).

All further work, especially on internal components will terminate warranty, makes subsequent inspection and fault repair more difficult and can cause considerable damage to the circuitry.

For repair remittance remove plug board with connected leads on the rear side, loosen fastening devices and remove controller from the panel.

In case of remittance please give precise details of the fault to reduce time and cost of repair.

Error messages:

Err 1...6	Fault on measuring input nr. ... check measuring lines for short circuit or breakage check measuring input by connecting a RTD
Err 55	Fault on loading the parameter; press any key, the controller starts in emergency operation mode, configuration of the parameters has to be checked
Err 50	Hardware error in program section
Err 52	Hardware error in data section no further operation possible, remit controller for repair
	Error messages during self adaptation:
Err 202	Ambient conditions are not suitable for self adaptation; adjust parameter manually
Err 205	routine exceeded the setpoint raise setpoint or lower actual value and start adaptation again
Err 206	Fault on measuring input during adaptation; check the wiring and start adaptation again

Operating status:

The *upper display* shows the actual value (channel / measuring input 1),

the *lower display* remains empty or (depending on the version and settings) shows
- the attendant unit of measure (°C, °F, %...)
- an additional actual value, the setpoint value or the controller output value Y
- or the additional actual value only when the ▲ key is pressed.

Alternative type:
switch over the *upper* display to the several actual values by pressing the ▲ key,
the lower display shows the number of the attendant measuring input.

Setpoint value setting:

press P - key *shortly* (do *not* hold down)

The *upper display* shows the abbreviation of
the activated setpoint adjustment mode,
the *lower display* shows the adjusted value.

The indicated value can now be changed by the ▼ (lower) and ▲ (higher) -keys.
Each variation of the set value is *immediately* active, without any more operating steps.
The arrow keys have a built-in accelerator mode:
longer pressing causes faster alterations.

***Return** to operating level:*
Press P - key shortly (or automatically after 30 seconds without any key-action)

optional: Press P - key *shortly* again: *SP =set values of further control loops (*=no.) /
SP* =further set values of the control loop / SPE =external setpoint (display mode only);
flashing display signifies that the function is *not* active at the moment.

Manual operation: *(optional)*

Hold down ▼ - key and press ▲ - key, then release both keys.
(optional: switch on and off using separate ⏻ - key)
(for multi-channel controllers first enter the channel number*,
and press P - key, then:)

The *lower diplay* shows "H *" and - if activated - the output position.
The *upper display* still shows the actual value. The automatic control is interrupted.

Manual control is now possible using the ▼...▲ - keys.

Return to operating level ***only*** by pressing the P - key (if present: the ⏻ - key) **.**
(*no* automatic return from the manual mode)

optional: starting the self adaptation (ref. to chapter Optimization):
On manual operation level P - key >5 sec ;
the *lower display* indicates "-Ad-".
Cancel: P - key >5 sec again

Access from operating level.

Unlock the access first**:**
Turn the switch on the rear panel of the controller to position "**U**" = unlocked
(Lock access after the adjustments: Switch position to "L" = locked).

After the parameter level (refer to the instructions to each level) has been invoked, the first setting is shown and can be modified.

*It is **not** possible to invoke the parameter level when the switch is locked .*
In this case the display shows the abbreviation of the configured controller type.

Confirm the entry and / or **move on** to next parameter:
press the P -key *briefly*

Settings in detail:
(not available on all types)

Level 1: Invoke: Hold down the P - key for more than 5 sec. until the display changes

		factory setting:	*notes:*
CH	channel selection (no.) for multi-channel controller (only)		
***P**	proportional range Xp (%) (ref. to chapter "Optimization")	25,0	___
***I**	integral action time Tn (min) (ref. to chapter "Optimization")	7,0	___
***d**	rate time Tv (min) (ref. to chapter "Optimization")	0,2	___
***Sh**	sensitivity of response Xsh (%)	0,1	___
***SA..**	switching interval (absolut value) for following (additional) contact no...	5,0*	___
SP..	set point for independent additional contact no...	0,0	___
***Sd..**	switching difference for additional contact no...	3,0	___
		(*201,701/SA3:10,0)	

***Return** to operating status:*
Briefly press the P - key (or automatically after 30 sec.)

Level 2: Invoke: Hold down P - key and press ▼ - key,
hold down both keys for more than 5 sec. until display changes.

Unit	switch-over the displayunit (°C / °F)	C	___
***bLo/*bHI**	start / end of display range for voltage- / current -input (only)	#	___
***ELo/*EHI**	start / end of range for external setpoint (only), referring to signal	#	___
***SLo/*SHI**	start / end of range for signal output (only), referring to signal	#	___
nSt	modification of decimal point characters (0 / 1 / 2)	0	___
***Lo / *HI**	start / end of setpoint range (°C /°F or value)	#	___
dSPL	select display function for lower display (AUS / SP / Y / IST2)	AUS	___

(AUS = off, SP = setpoint, Y = output, Ist2 = actual value of channel / measuring input 2)

***Return** to operating status:*
Briefly press the P - key (or automatically after 30 sec.)

***** = channel no. in case of multiple measuring inputs or control loops. *# = acc. to range*

1. manual optimization

An optimum adaptation of the control parameters (P,I,D) is necessary in order to balance an appearing deviation as quickly, non-oscillating and exactly as possible, according to the given operating conditions.

Generally these adjustments require a lot of professional knowledge that cannot be replaced by this brief information.
The following informations are for help purpose only:

P = proportional band Xp (%):
lower value = *longer* impulses, more sensitive reaction
higher value = *shorter* impulses, less sensitive reaction
Examples: - Oscillating temperature without distinct initial overshot: Xp too low;
- The setpoint is reached very slowly after initial exceeding: Xp too high.

I = integral action time Tn (min):
lower value= *shorter* impulse gaps, faster balancing
higher value= *longer* impulse gaps, slower balancing
Examples: - the set value is reached very slowly without overshooting: Tn too high;
- high initial overshot followed by fading oscillation: Tn too low.

D = rate time Tv (min):
increases the controller reaction in case of fast actual value or setpoint alterations (adjust only if necessary). Higher values cause higher increase.

2. Self-adaptation

The self-adaptation is an automatic procedure that determines and self-adjusts the optimum control parameters Xp, Tn and Tv.

Operation, if contained in supply schedule:
(Parameter-safety-switch on the rear panel of the controller has to be unlocked: position "u")

Check starting assumptions:
Actual value at least 20% below the adjusted set value,(e.g.:heating phase), otherwise first:
Lower actual value adequately by manual operation (position of final control element) (quick circuits) or increase setpoint adequately, if admissible. (faster procedure for slower circuits)

Call manual operation level: Press ▼ - key plus ▲ - key (optional: seperate key).
Check controller output: must not be higher than 85% , reduce if necessary.
Start self-adaptation: Hold down P - key for more than 5 sec. on manual operation level.
During operation the lower display shows: "-Ad-",
the upper display still shows permanently the actual value.

Information about computer operation: First the self-adaptation program waits for stabilization of the actual value according to the given controller output (actual value alteration < 0,1% / min), then it increases the output signal about 10% or, in case of three- point- step controller operation, it triggers an output impulse with about 10% of the adjusted regulating time.
The optimum parameters are computed according to the unit- step response.

Cancel: Press P - key for more than 5 sec. = return to manual operation level

After successfully finishing the procedure the controller will return **automatically** to operating level.

Unsuccessful adaptation (Display shows error code, ref.to chapter error messages):
Press P - key again: Return to manual operation level
eliminate the indicated error
start adaptation again: P - key > 5 sec.
or return to operating level: P - key shortly

Access from the operating level.
Unlock the access first: Turn the switch on the rear panel of the controller to position "**U**" (= unlocked). *It is **not** possible to configure the controller with **locked** switch.*
(Lock access after the adjustments: Switch position to "L"= locked)

Hold down the P - key and press the ▲ - key,
hold down both keys for more than 5 sec. until the display changes

Enter the code number (password) ▼...▲ (1...9999), factory setting: 1
move on to next input: *briefly* press P - key

Alternatively: Hold down key after entering code for more than 10 sec.
Possibility to modify code number (optional)

Select control function *(type dependent)*: the displayed ID number for the configured control function can be changed by pressing the ▲ - key.
(Example Type 930K31: choose (92..) 200, 201, 700, 701)

Return to operating level: *briefly* press the P - key
or
move on to following **adjustments**: hold down P - key for more than 5 sec.
Note: when switching is continued after a function has been changed, the display will first flash for several seconds, only then will the controller return to the selected level.

Configurations are displayed in succession (type and design dependent) and can be changed: ▼...▲
(move on to next input: press P - key *shortly)*

		factory setting
Ist*	correction value to change the controller display (+ / -)	*0.0*
EinG	type of measuring input Pt 100 / DC-signal: "rtd / Iu"	*rtd*
Ain*	type of DC signal for input No.*:rtd/ 0/4-20mA/ 0/2...10V	*4...20 mA*
	(observe different terminal connection I/U)	*(91..:rtd)*
SP 2/E	kind of 2nd/ external setpoint: Add/ Sub/ AbS	AbS
	(adding / subtracting / absolute)	
***Y' '**	travel time of the actuator "6...600" (sec.)	*60 sec.*
***cy' '**	switching frequency for 2-point controllers: "2...120" (sec.)	*20 sec.*
***out**	adjusting kind of output signal "0...20/ 4...20(mA)/ 0...10/ 2..10(V)“	*4...20 mA*
***out**	adjusting output characteristics direct / inverted "di / in"	*in*
	(for 2 output signals:"in in / in di / di in / di di")	
***td**	for 2 output signals: deadpoint between output 1 and 2 "0...10%"	*0*
AP	correction of the output signal operation position	*50%*
FG A/E	automatical adjustment for teletransmitter input (ref. sheet 99ar)	
Sou*	adjusting type of information signal "0..20/4..20(mA)/0..10/2..10(V)"	*4...20 mA*
Sou*	adjusting kind of information signal "Ist/Soll.." (actual/ setp.value)	*4...20 mA*
	(*Sout= signal 1, Sou2= signal 2)	
***Y_S**	behaviour of the output in case of measuring line fault:	
	relay position:"rel1 / rel2 / AUS" (AUS = relays off)	*rel2(70.),rel1(20.)*
	continuous output position: "0...100" (%)	*0*
reL..	function selection for add. switching contacts :	
	add. contact 1 (relay-no.*)	*SoA(701),StA(201)*
	add. contact 2 (relay-no.*)	*Su A*
	select the corresponding measuring input / control circuit	*CH 1*
	relay condition in case of measuring line fault: "SiE/SiA"(on/off)	*Si A*
Adr	bus adress (adress no.) (for interface equipment only)	*5*

Return to operating level: *briefly* press the P - key again

***** = In case of multiple measuring inputs or control loops: relay- or channel number

Selectable switching functions (depending on version)**:**
For setting please refer to configuration level under „reL...“

Switching functions for trailing contacts:

LC A Break contact on either side of setpoint (**L**imit **c**omparator). Relay drops out as deviation increases (**A**us = off)

LC E Make contact on either side of setpoint (**L**imit **c**omparator). Relay picks up as deviation increases (**E**in = on)

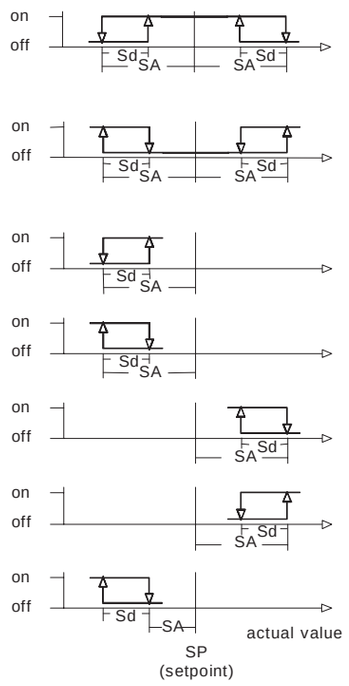
Su A Break contact below setpoint. Relay drops out as actual value decreases (**A**us = off)

Su E Make contact below setpoint. Relay picks up as actual value decreases (**E**in = on)

So A Break contact above setpoint. Relay drops out as actual value increases (**A**us = off)

So E Make contact above setpoint. Relay picks up as actual value increases (**E**in = on)

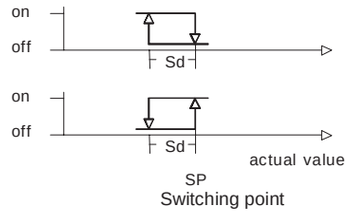
St A Heating stage below setpoint. Relay drops out actual value increases (**A**us = off)



Switching functions for independent contacts:

US A Relay drops out with increasing actual value (**A**us = off)

US E Relay picks up with increasing actual value (**E**in = on)



Service function:

Ein/Aus contact is constantly switched on (**Ein**) or off (**Aus**) respectively

Only for units with program option

Pr A Relay switched off (**a**us) during SP **pr**ogram level, otherwise switched on

Pr E Relay switched on (**e**in) during SP **pr**ogram level, otherwise switched off

Special function:

SF6 as SoA but switching point at setpoint, control output around SA below

In each case additional settings follow under "rEL." after the selection is acknowledged (P key) (depending on version):

Ist./ Y assigned value: actual value no. ... or Y (actuating signal)

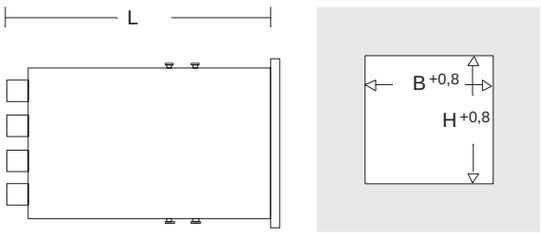
CH../.SP. (only) for trailing contacts: assigned control circuit / channel (no.) or assigned setpoint (1SP., rSP, SP.1, ..)
for independent contacts: assignment of parameter input (channel no..)

"Safety" shut down (in case of measuring line fault):
SI E Relay for "Safety" behaviour in event of measuring circuit error: relay **on**
SI A Relay for "Safety" behaviour in event of measuring circuit error: relay **off**

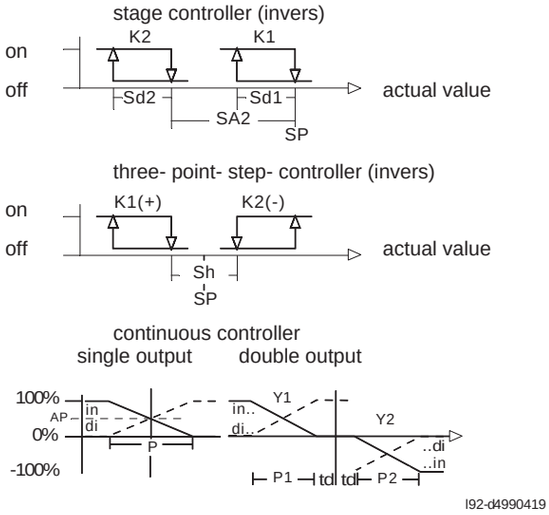
Characteristics:
Adjustment on parameter level, with lock switch, pre adjusted on customer´s demand.
(parameters depending on sub type:)
Proportional band Xp: 0,1...999,9 %
Integral action time Tn: 0,0...999,9 min
Rate time Tv: 0,0...99,9 min
Sensitivity of response Xsh: 0,1...1,0 %
Travel time of the actuator Tm: 6...600 sec
Switching frequency cy: 2...120 sec
Function characteristics: direct / inverted
Switching interval SA (add. contacts): 0..100,0 K
Switching difference Sd: 0,1...100,0 K

Additional contact functions:
As switching interval above and below setpoint or independent adjustable with own setpoint and measuring input, switching function adjustable (ref. to chapter additional switching contacts)

Installation dimensions:

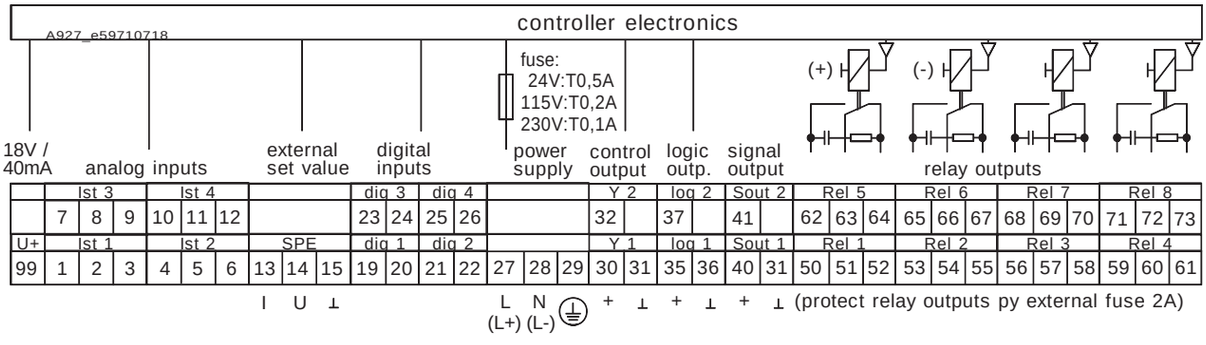


Form 96x96: L= 150mm, B= 92mm H=92mm
Form 72x144: L= 170mm, B=168mm H=139mm

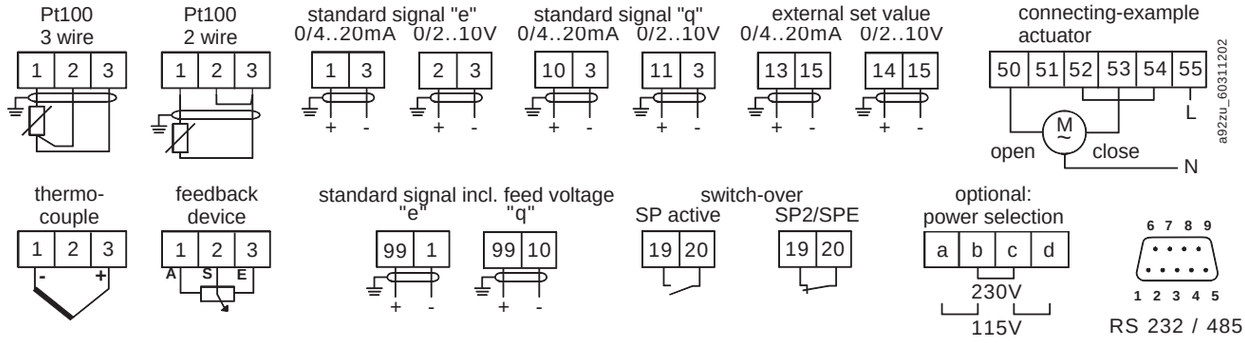


Other data:
Housing for panel mounting, 96 x 96 mm (type 92.., 93..) or 72 x 144 mm (type 94)
Power supply: 230VAC +/- 10 %, 48...62Hz
alternative 115 VAC, 48 VAC, 24 VAC, 24 VDC
Power consumption: approx. 14 VA
Protective system DIN 40050: IP54 (terminals IP20)
Permissible ambient temperature: 0...60°C
Nominal temperature: 20°C
Climatic category: KUF to DIN 40050
Relative humidity <= 75 % yearly average, no condensation
EMC: refer to EN 50081-2 and EN 50082-2

Wiring diagram:
(Example, depending on sub type some details can be missed
valid for each delivered controller is the wiring diagram on its casing only)



wiring examples (for input 1 each)



open printversion

INDEX

1 2 3 4 5 6 7 8 9 0

1 Digital display actual value
2 2nd digital display (if aktive)
3 LED-display relais function
4 Key for setpoint and parameter mode
5 Setpoint adjustment
6 Parameter mode lock switch (back face)

Brief description:

KFM 94 is a microprozessor based industry controller series in panel mounting- format 72 x 144 mm. Design and operating elements are especially devised for easy and convenient handling and operation. An assembly system renders possible the simple basic version as well as a plurality of variants with up to 6 relays, several digital and analog out- and inputs and other additional devices.

Types: *(depending on configuration*):*	*type:*
indicator	9401.
one stage controller	9410.
two stage controller	9420.
heating / cooling controller	9430.
positioner / follow-up controller	9440.
two- point- PID controller	9450.
three- point- PID controller	9460.
three- point- step controller	9470.
continuous controller	9480.
continuous controller, 2 outputs	9481.
Sub-types:	*suffix (*)*
basic function	.0
basic function + 1 additional contact	.1
basic function + 2 additional contacts	.2
2 x basic function	.3
extension: (continuous) logic output	..L
function extensions	*suffix (*)*
cascade controller	991k
program controller	991p
ramp set point value	991r
step controller	991t
Additional devices:	**(*)**
additional analog inputs	(99) a
external set value incl. switch-over	(99) bwa
second set value incl. switch-over	(99) bwz
binary input to switch special functions	(99) b..
additional switching contacts	(99) f..
analog signal outputs	(99) o.
serial interface RS 232/485	(99) s.
Interbus S interface	(99) si.

* In case of more than 1 extension there is at the data plate only once '99' , f.e. 92700-99aw-ogx-rü. For more information see corresponding data sheets.'
...

Inputs:

max. 4 measuring inputs, acc. to sub-type:	*type suffix*
Pt100 DIN, 0...400°C	none (or 0)
Pt100 DIN, 0...100°C	1.
thermo couple Ni Cr NI (type K)0...1200°C	n.
thermo couple Fe Cu NI (type J)0... 900°C	f.
thermo couple Pt Rh Pt (type S)0...1700°C	p.
feedback device 0...100 up to 1000 Ω	w.
standard signal 0(4)...20mA, 0(2)...10V	e.

Ranges:

Pt 100: 0...400°C, switchable to °F, optional: other ranges; for standard signal range adjustable -999 to 4000. Setpoint ranges can be limited by menu

Displays:

2 four- figured digital displays, decimal point adjustable, upper display: actual value, lower display: other selectable data,
up to 8 LEDs for relays function display.
Display of function:
Hold down the P-key for more than 5 sec
to get a short-cut message of the configured function on the display (=position 3-5 of list number)
(in case of locked parameter mode only).
Measuring line monitoring:
Display "Err 1...4" in case of measuring line fault and adjustable safety shut down of all outputs

Outputs:

up to 6 relays with potential free change over switch, as control outputs or as additional contacts, capacity: 250V 2A,
incl. spark extinction (for normally open contacts)
1-2 continuous outputs 0/4...20mA, 0/2...10V as control or signal outputs(apparent ohmic load 500 Ω)

open printversion

Installation:

Before installation inspect the controller for any visible signs of damage caused during transport
Check power supply acc. to name plate.
Push the housing from the front into the DIN- panel cut-out and secure from behind with the fastening devices supplied.

Electrical wiring:

Plug bar on the back face of the controller; connect up the controller at the rear following the wiring diagram; wire cross section max. 1,5 mm^2

- To avoid cross interference *all low voltage measuring lines and pilot wires* must be encased in a ***shielded cable*** (the shielding must be earthed one-sided).
- The control leads must be ***fused*** *externally* to protect the output relays.
- Phase wire and neutral wire must not be transposed.

Putting into operation:

Switch on power supply. Digital display and control lamps will light up according to the setpoint after some seconds. If nothing happens check the fine-wire fuse on the back panel of the controller and the electrical wiring. Adjust set value and check other adjustments.

Maintenance:

All electronic controllers in the KFM range are virtually maintenance-free. Provided that the controller is correctly installed and put into operation and is protected against mechanical damage and inadmissible operating conditions, it should give years of trouble-free service.
In case of faults repair work by the customer should be restricted to the externally accessible leads and connections and components the customer is expressly permitted to deal with himself. (bridge circuits, fuses).

All further work, especially on internal components will terminate warranty, makes subsequent inspection and fault repair more difficult and can cause considerable damage to the circuitry.

For repair remittance remove plug board with connected leads on the rear side, loosen fastening devices and remove controller from the panel.

In case of remittance please give precise details of the fault to reduce time and cost of repair.

Error messages:

Err 1...6	Fault on measuring input nr. ... check measuring lines for short circuit or breakage check measuring input by connecting a RTD
Err 55	Fault on loading the parameter; press any key, the controller starts in emergency operation mode, configuration of the parameters has to be checked
Err 50	Hardware error in program section
Err 52	Hardware error in data section no further operation possible, remit controller for repair
	Error messages during self adaptation:
Err 202	Ambient conditions are not suitable for self adaptation; adjust parameter manually
Err 205	routine exceeded the setpoint raise setpoint or lower actual value and start adaptation again
Err 206	Fault on measuring input during adaptation; check the wiring and start adaptation again

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

Operating status:

The *upper display* shows the actual value (channel / measuring input 1),

the *lower display* remains empty or (depending on the version and settings) shows
- the attendant unit of measure (°C, °F, %...)
- an additional actual value, the setpoint value or the controller output value Y
- or the additional actual value only when the ▲ key is pressed.

Alternative type:
switch over the *upper* display to the several actual values by pressing the ▲ key,
the lower display shows the number of the attendant measuring input.

Setpoint value setting:

press P - key *shortly* (do *not* hold down)

The *upper display* shows the abbreviation of
the activated setpoint adjustment mode,
the *lower display* shows the adjusted value.

The indicated value can now be changed by the ▼ (lower) and ▲ (higher) -keys.
Each variation of the set value is *immediately* active, without any more operating steps.
The arrow keys have a built-in accelerator mode:
longer pressing causes faster alterations.

***Return** to operating level:*
Press P - key shortly (or automatically after 30 seconds without any key-action)

optional: Press P - key *shortly* again: *SP =set values of further control loops (*=no.) /
SP* =further set values of the control loop / SPE =external setpoint (display mode only);
flashing display signifies that the function is *not* active at the moment.

Manual operation: *(optional)*

Hold down ▼ - key and press ▲ - key, then release both keys.

(optional: switch on and off using separate ⟲ - key)
(for multi-channel controllers first enter the channel number*,
and press P - key, then:)

The *lower diplay* shows „H *“ and - if activated - the output position.
The *upper display* still shows the actual value. The automatic control is interrupted.

Manual control is now possible using the ▼...▲ - keys.

Return to operating level ***only*** by pressing the P - key (if present: the ⟲ - key) **.**
(*no* automatic return from the manual mode)

optional: starting the self adaptation (ref. to chapter Optimization):
On manual operation level P - key >5 sec ;
the *lower display* indicates „-Ad-“.
Cancel: P - key >5 sec again

open printversion

Access from operating level.

Unlock the access first**:**
Turn the switch on the rear panel of the controller to position „**U**“ = unlocked
(Lock access after the adjustments: Switch position to „L“ = locked).

After the parameter level (refer to the instructions to each level) has been invoked, the first setting is shown and can be modified.

*It is **not** possible to invoke the parameter level when the switch is locked .*
In this case the display shows the abbreviation of the configured controller type.

Confirm the entry and / or **move on** to next parameter:
press the P -key *briefly*

Settings in detail:
(not available on all types)

Level 1: Invoke: Hold down the P - key for more than 5 sec. until the display changes

		factory setting:	*notes:*
CH	channel selection (no.) for multi-channel controller (only)		
***P**	proportional range Xp (%) (ref. to chapter „Optimization“)	25,0	___
***I**	integral action time Tn (min) (ref. to chapter „Optimization“)	7,0	___
***d**	rate time Tv (min) (ref. to chapter „Optimization“)	0,2	___
***Sh**	sensitivity of response Xsh (%)	0,1	___
***SA..**	switching interval (absolut value) for following (additional) contact no...	5,0*	___
SP..	set point for independent additional contact no...	0,0	___
***Sd..**	switching difference for additional contact no...	3,0	___
		(*201,701/SA3:10,0)	

***Return** to operating status:*
Briefly press the P - key (or automatically after 30 sec.)

Level 2: Invoke: Hold down P - key and press ▼ - ke**y,**
hold down both keys for more than 5 sec. until display changes.

Unit	switch-over the displayunit (°C / °F)	C	___
***bLo/*bHI**	start / end of display range for voltage- / current -input (only)	#	___
***ELo/*EHI**	start / end of range for external setpoint (only), referring to signal	#	___
***SLo/*SHI**	start / end of range for signal output (only), referring to signal	#	___
nSt	modification of decimal point characters (0 / 1 / 2)	0	___
***Lo / *HI**	start / end of setpoint range (°C /°F or value)	#	___
dSPL	select display function for lower display (AUS / SP / Y / IST2)	AUS	___

(AUS = off, SP = setpoint, Y = output, Ist2 = actual value of channel / measuring input 2)

***Return** to operating status:*
Briefly press the P - key (or automatically after 30 sec.)

***** = channel no. in case of multiple measuring inputs or control loops. # = *acc. to range*

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

1. manual optimization

An optimum adaptation of the control parameters (P,I,D) is necessary in order to balance an appearing deviation as quickly, non-oscillating and exactly as possible, according to the given operating conditions.

Generally these adjustments require a lot of professional knowledge that cannot be replaced by this brief information.
The following informations are for help purpose only:

P = proportional band Xp (%):
lower value = *longer* impulses, more sensitive reaction
higher value = *shorter* impulses, less sensitive reaction
Examples: - Oscillating temperature without distinct initial overshot: Xp too low;
- The setpoint is reached very slowly after initial exceeding: Xp too high.

I = integral action time Tn (min):
lower value= *shorter* impulse gaps, faster balancing
higher value= *longer* impulse gaps, slower balancing
Examples: - the set value is reached very slowly without overshooting: Tn too high;
- high initial overshot followed by fading oscillation: Tn too low.

D = rate time Tv (min):
increases the controller reaction in case of fast actual value or setpoint alterations (adjust only if necessary). Higher values cause higher increase.

2. Self-adaptation

The self-adaptation is an automatic procedure that determines and self-adjusts the optimum control parameters Xp, Tn and Tv.

Operation, if contained in supply schedule:
(Parameter-safety-switch on the rear panel of the controller has to be unlocked: position „u“)

Check starting assumptions:
Actual value at least 20% below the adjusted set value,(e.g.:heating phase), otherwise first:
Lower actual value adequately by manual operation (position of final control element) (quick circuits) or increase setpoint adequately, if admissible. (faster procedure for slower circuits)

Call manual operation level: Press ▼ - key plus ▲ - key (optional: seperate key).
Check controller output: must not be higher than 85% , reduce if necessary.
Start self-adaptation: Hold down P - key for more than 5 sec. on manual operation level.
During operation the lower display shows: „-Ad-“,
the upper display still shows permanently the actual value.

Information about computer operation: First the self-adaptation program waits for stabilization of the actual value according to the given controller output (actual value alteration < 0,1% / min), then it increases the output signal about 10% or, in case of three- point- step controller operation, it triggers an output impulse with about 10% of the adjusted regulating time.
The optimum parameters are computed according to the unit- step response.

Cancel: Press P - key for more than 5 sec. = return to manual operation level

After successfully finishing the procedure the controller will return **automatically** to operating level.

Unsuccessful adaptation (Display shows error code, ref.to chapter error messages):
Press P - key again: Return to manual operation level
eliminate the indicated error
start adaptation again: P - key > 5 sec.
or return to operating level: P - key shortly

Access from the operating level.
Unlock the access first: Turn the switch on the rear panel of the controller to position „**U**“ (= unlocked). *It is **not** possible to configure the controller with **locked** switch.*
(Lock access after the adjustments: Switch position to „L“= locked)

Hold down the P - key and press the ▲ - key,
hold down both keys for more than 5 sec. until the display changes

Enter the code number (password) ▼...▲ (1...9999), factory setting: **1**
move on to next input: *briefly* press P - key

Alternatively: Hold down key after entering code for more than 10 sec.
Possibility to modify code number (optional)

Select control function *(type dependent)*: the displayed ID number for the configured control function can be changed by pressing the ▲ - key.
(Example Type 930K31: choose (92..) 200, 201, 700, 701)

Return to operating level: *briefly* press the P - key
or
move on to following **adjustments**: hold down P - key for more than 5 sec.
Note: when switching is continued after a function has been changed, the display will first flash for several seconds, only then will the controller return to the selected level.

Configurations are displayed in succession (type and design dependent)
and can be changed: ▼...▲
(move on to next input: press P - key *shortly)*

		factory setting
Ist*	correction value to change the controller display (+ / -)	*0.0*
EinG	type of measuring input Pt 100 / DC-signal: „rtd / Iu“	*rtd*
Ain*	type of DC signal for input No.*:rtd/ 0/4-20mA/ 0/2...10V	*4...20 mA*
	(observe different terminal connection I/U)	*(91..:rtd)*
SP 2/E	kind of 2nd/ external setpoint: Add/ Sub/ AbS	AbS
	(adding / subtracting / absolute)	
***Y' '**	travel time of the actuator „6...600“ (sec.)	*60 sec.*
***cy' '**	switching frequency for 2-point controllers: „2...120“ (sec.)	*20 sec.*
***out**	adjusting kind of output signal „0...20/ 4...20(mA)/ 0...10/ 2..10(V)”	*4...20 mA*
***out**	adjusting output characteristics direct / inverted „di / in“	*in*
	(for 2 output signals:“in in / in di / di in / di di“)	
***td**	for 2 output signals: deadpoint between output 1 and 2 „0...10%“	*0*
AP	correction of the output signal operation position	*50%*
FG A/E	automatical adjustment for teletransmitter input (ref. sheet 99ar)	
Sou*	adjusting type of information signal „0..20/4..20(mA)/0..10/2..10(V)“	*4...20 mA*
Sou*	adjusting kind of information signal „Ist/Soll..“ (actual/ setp.value)	*4...20 mA*
	(*Sout= signal 1, Sou2= signal 2)	
***Y_S**	behaviour of the output in case of measuring line fault:	
	relay position:“rel1 / rel2 / AUS“ (AUS = relays off)	*rel2(70.),rel1(20.)*
	continuous output position: „0...100“ (%)	*0*
reL..	function selection for add. switching contacts :	
	add. contact 1 (relay-no.*)	*SoA(701),StA(201)*
	add. contact 2 (relay-no.*)	*Su A*
	select the corresponding measuring input / control circuit	*CH 1*
	relay condition in case of measuring line fault: „SiE/SiA“(on/off)	*Si A*
Adr	bus adress (adress no.) (for interface equipment only)	*5*

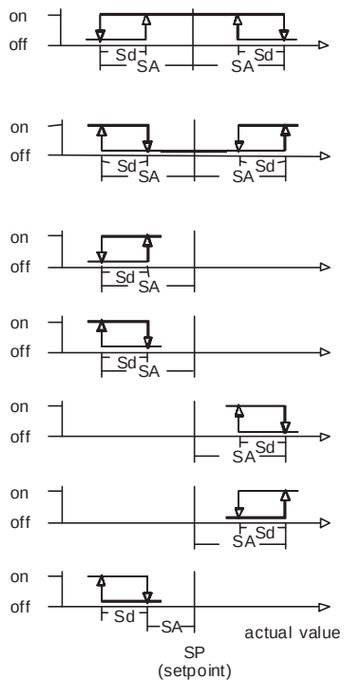
Return to operating level: *briefly* press the P - key again

***** = In case of multiple measuring inputs or control loops: relay- or channel number

open printversion

Selectable switching functions (depending on version)**:**
For setting please refer to configuration level under „reL...“

Switching functions for trailing contacts:



LC A Break contact on either side of setpoint (**L**imit **c**omparator). Relay drops out as deviation increases (**A**us = off)

LC E Make contact on either side of setpoint (**L**imit **c**omparator). Relay picks up as deviation increases (**E**in = on)

Su A Break contact below setpoint. Relay drops out as actual value decreases (**A**us = off)

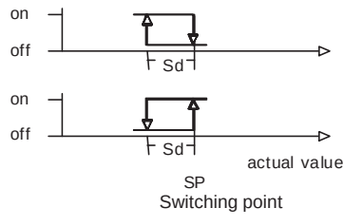
Su E Make contact below setpoint. Relay picks up as actual value decreases (**E**in = on)

So A Break contact above setpoint. Relay drops out as actual value increases (**A**us = off)

So E Make contact above setpoint. Relay picks up as actual value increases (**E**in = on)

St A Heating stage below setpoint. Relay drops out actual value increases (**A**us = off)

Switching functions for independent contacts:



US A Relay drops out with increasing actual value (**A**us = off)

US E Relay picks up with increasing actual value (**E**in = on)

Service function:

Ein/Aus contact is constantly switched on (**Ein**) or off (**Aus**) respectively

Only for units with program option

Pr A Relay switched off (**a**us) during SP **pr**ogram level, otherwise switched on

Pr E Relay switched on (**e**in) during SP **pr**ogram level, otherwise switched off

Special function:

SF6 as SoA but switching point at setpoint, control output around SA below

In each case additional settings follow under "rEL." after the selection is acknowledged (P key) (depending on version):

Ist./ Y assigned value: actual value no. ... or Y (actuating signal)

CH../.SP.(only) for trailing contacts: assigned control circuit / channel (no.) or assigned setpoint (1SP., rSP, SP.1, ..)
for independent contacts: assignment of parameter input (channel no..)

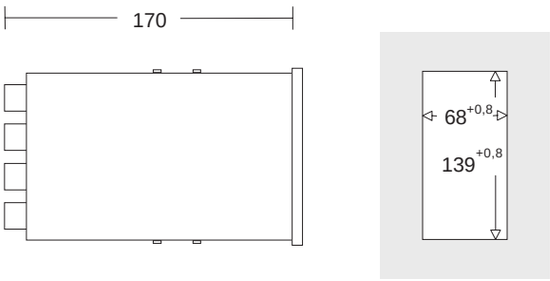
"Safety" shut down (in case of measuring line fault):
SI E Relay for "Safety" behaviour in event of measuring circuit error: relay **on**
SI A Relay for "Safety" behaviour in event of measuring circuit error: relay **off**

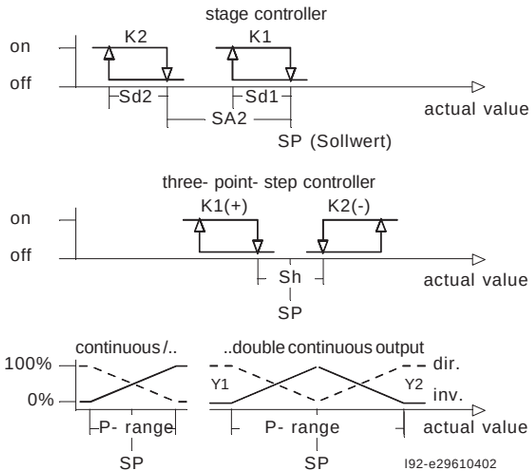
open printversion

Characteristics:
Adjustment on parameter level, with lock switch, pre adjusted on customer´s demand.
(parameters depending on sub type:)
Proportional band Xp: 0,1...999,9 %
Integral action time Tn: 0,0...999,9 min
Rate time Tv: 0,0...99,9 min
Sensitivity of response Xsh: 0,1...1,0 %
Travel time of the actuator Tm: 6...600 sec
Switching frequency cy: 2...120 sec
Function characteristics: direct / inverted
Switching interval SA (add. contacts): 0..100,0 K
Switching difference Sd: 0,1...100,0 K

Additional contact functions:
As switching interval above and below setpoint or independent adjustable with own setpoint and measuring input, switching function adjustable (ref. to chapter additional switching contacts)

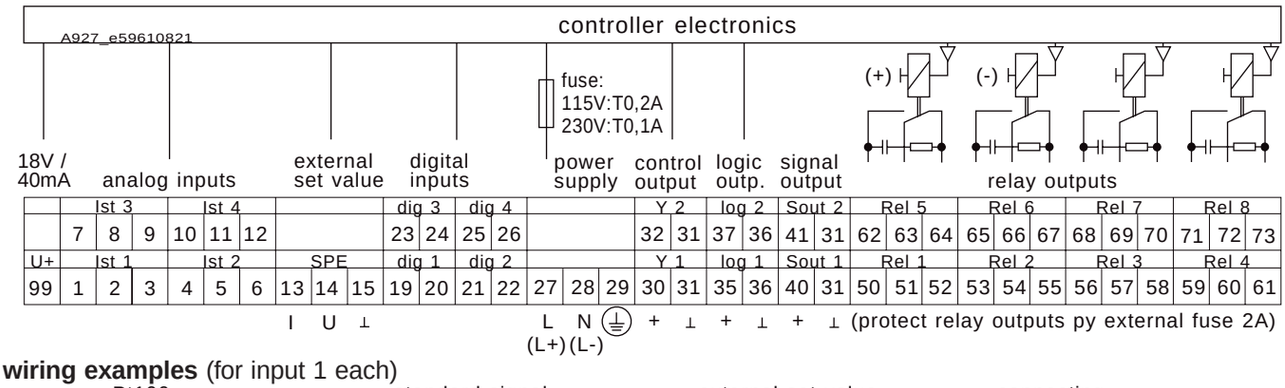
Installation dimensions:



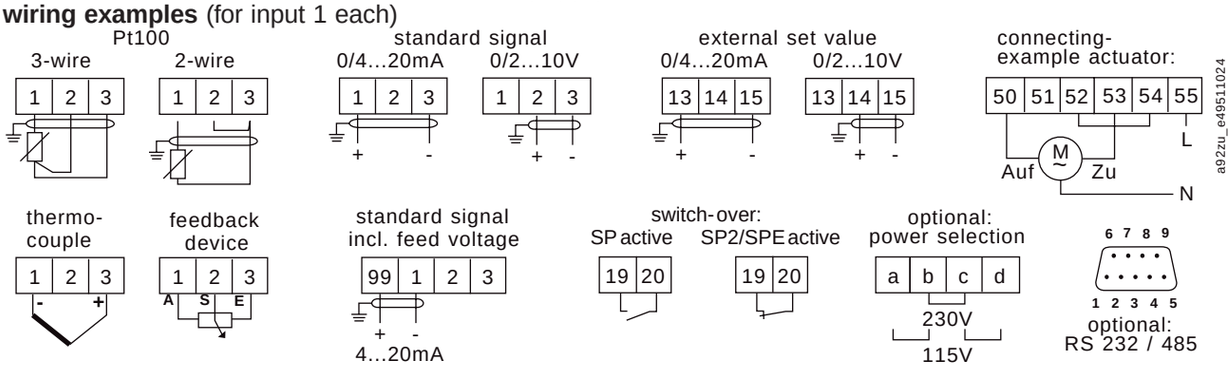


Other data:
Housing for panel mounting 96 x 96 mm
Power supply: 230V or 115 V +/- 10 %, 48...62Hz
Power consumption: approx. 14 VA
Protective system DIN 40050: IP54 (terminals IP20)
Permissible ambient temperature: 0...60°C
Nominal temperature: 20°C
Climatic category: KUF to DIN 40050
Relative humidity <= 75 % yearly average, no condensation
EMC: refer to EN 50081-2 and EN 50082-2

Wiring diagram:
(Example, depending on sub type some details can be missed valid for each delivered controller is the wiring diagram on its casing only)



wiring examples (for input 1 each)



open printversion

Remarks

Ensure that all connected controllers are assigned different addresses.

An interface converter is required for communication between the RS232 interface of the PC and the RS485 interfaces of the controllers.

If necessary, check the setting for the used serial port in the program settings menu. COM1 is preset. After changings of the serial port setting the program has to be restarted.

Before the program is started, the dongle has to be connected to the parallel port of the computer. If a printer is used, the dongle must be installed between computer and printer.

Exception: The demoversion needs no dongle but only supports addresses 1-5 and configurations for groups 1-2 only. The demoversion duration of validity is limited. Please refer to the menu "Help->About" for the date on which the user rights expire.

Keyboard operations:

Individual selection groups in the dialog windows may be selected using the <TAB>-key.

Menus and buttons with a highlighted letter can be activated by pressing the key combination <ALT>+letter.

The cursor bar in the process survey window can be moved via the cursor or the tab keys.

Close windows using the <ESC>-key.

Installation

Insert the PCS disk into the disk drive and change to the disk drive by entering (e.g.) "a:" <ENTER>, then start the setup program by entering: PCSSETUP

A dialog window appears to enter the complete path for the directory into which the PCS-files shall be copied, e.g. 'C:\PCS'.

The names of the subdirectories (terms between two '\'-tokens) must not contain more than 8 characters. If the desired directory does not exist, it will be created.
Confirm with <OK>..

Follow the instructions on the screen

- Alternative manual installation:
Create a directory on the hard drive, e.g. C:\PCS
Copy the following files from the disk into this directory:
'PCS.EXE'
'NORMAL.INI'
'EGAVGA.BGI'
'PCSREG.PNR'
'TD.DAT'

Operation

Start: Change to the directory containing the PCS.EXE file and start the program by entering: PCS

open printversion

Process survey

Once the program has been started, the overview window will appear automatically. It contains the cyclically interrogated parameters and their text descriptions, as well as pure text lines. Unless otherwise specified, actual value 1, setpoint value 1 and address 5 are pre-set.

Texts describing a receive value are shown in black, if a connection to the controller exists. If no connection can be established, the text will appear grey, and the corresponding value shows "---.-". Text-only rows are always displayed in black.

If actual values are shown, "ERROR" will be displayed instead of a received value, if there is a fault with the corresponding measuring input.

Parameters that can be modified are highlighted in blue. They can be selected with the cursor (black bar) and changed. The new value is sent to the controller with the <ENTER>-key.

Menu: GRAPH->START LOGGER

This menu item starts the data logger, i.e. the parameters selected in the configuration menu for the several graphic groups are continuously sampled and stored in files. Starting of the data logger is also a prerequisite for the display of active data in the menu "Graph ->Show actual data".

Each graphic group has its own file, which is updated continuously. The file names are GROUPx.GFK", with "x" representing the group number.

If the data logger is restarted after a logger stop or program restart, the data are appended to the file.

If the parameter structure of a group is changed, the associated logger file "GROUPx.GFK" is recreated when the logger is started. The data stored so far are then stored in a file named "Sx.Gy", with x representing a continuous number and y the group number.

The data generated during continuous operation are stored in the files "GROUPx.GFK" for up to one week, after which the files are recreated and the previous data are archived.

Remarks to the automatic data archiving

For each defined group a file is created in which the transferred data is stored intermediately until the weekly archiving is performed. As an example, the file "GROUP5.GFK" is created for logger group 5. If the program is restarted within the same week, the new data is appended to the end of the file.

Archiving takes place every Sunday during the first scan after 6 AM, however, no later than after 7 days. During this process, a recorded file is named and saved according to the date. Example: Recording file for group 5 ("GROUP5.GFK") on 29.11.1998: File name "19981129.G5".

The oldest archive file is always deleted on the occasion of the fourth subsequent archiving, in order to limit the required storage space. If you wish to defeat this automatic routine, always save the file in time or rename it.

Menu GRAPH->STOP LOGGER

Selecting this menu item will stop the data logger.

Menu GRAPH->SHOW ACTUAL DATA

The current data recordings are groupwise as configured displayed in several diagrams. The next group can be displayed with the <F4> key, <F3> will display the previous group.

The top edge of the mask shows the name of the group (if defined) , the designations of the recorded parameters as well as the currently transmitted values, the colors of which correspond to the displayed curves.

The current weekday, the date and time are displayed in the field >Time< . Beneath the time axis, a status window displays possible measuring input errors as a red bar indicating the respective time the error occurred.

Use the keys <Shift>+<TAB> (backward) and <TAB> (forward) to scroll through the graphics. Mask a grid out or in by pressing function key <F1>.

Press function key <F2> to switch the graphics cursor ON and OFF. The cursor can be moved with the aid of the cursor keys and tab keys. In the cursor mode, the respective values of the cursor position instead of the current data are displayed in the top edge of the mask. The masked in time coincides with the scanning time of the cursor position (green).

Optional possible adjustments using key <F5>:

A label for each group, appearing on the top of the graph, may be entered.

A different scanning time in minutes, may be entered. It is valid for all groups.

The y-axis (temperature) in the graphics mode can be scaled manually or automatically for each group. In the automatic setting, scaling takes place automatically based on the minimum and maximum value recorded. The manual setting allows values for the upper and lower range limit to be entered.

Menu GRAPH->SHOW ARCHIVED DATA

A data recording previously archived (also refer to:"Automatic data archiving"), is displayed in a diagram.

Enter the file name with the aid of a dialog window. The display corresponds to the function "GRAPH->SHOW ACTUAL DATA" in the cursor mode.

Menu PROGRAM->QUIT
Concludes the program.

Menu OPTIONS

->CONFIGURATION *(only accessible by entering a password)*

This menu selection will open an editor, allowing row-by-row configuration of the process survey window and parameter selection for the data logger (graphics). The editor entries are either discarded with the >Cancel< key or saved with >OK<.

Initially, the configuration of the left column of the overview window is displayed (column 01/02). The configuration of the second column (column 02/02) can be displayed with the "next column" button.

A. Configuration of the process survey

"name" field:
Here, text can be entered for each row, which is either associated with an adjacent value or serves as a heading or for structuring purposes.

"change" field:
Only effective in combination with a value in the "code" column. This determines whether the value can be changed or not. Permissible entries are "y" or "n". If "y" is entered, an entry field will appear in the process survey window.

"Adr" field:
Only effective in combination with a value in the "code" column. Address entry of the associated controller.

"Code" field:
Here, the parameter code of the value to be displayed is entered. The code can be found in the operating instructions of the controller.

B. Configuration of the data logger (graphics)

The settings for "graph" and "line" refer to the graphics window and the data logger functions.

A maximum of 30 graphics windows, so-called groups, can be defined. Each of these groups can display up to 6 parameters simultaneously as a line chart.

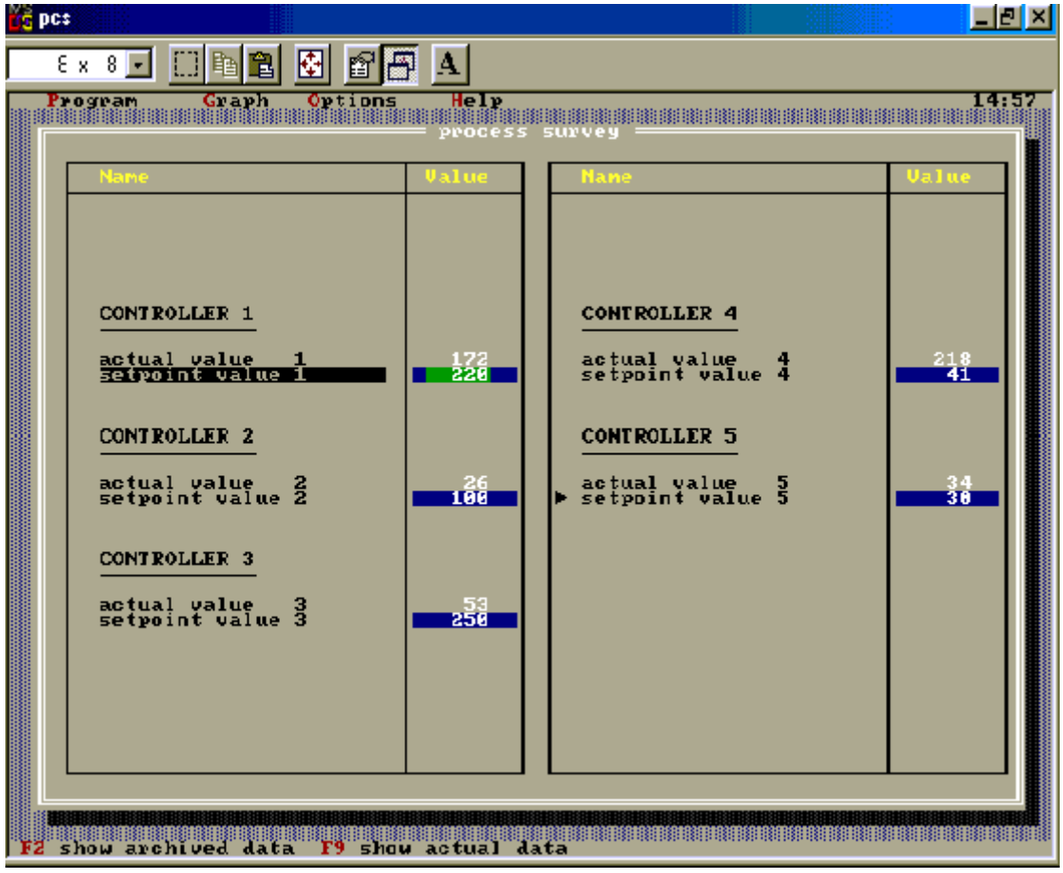
"Graph" field:
Entry determines in which group the parameter for this row will appear. Possible entries are "1" to "30".

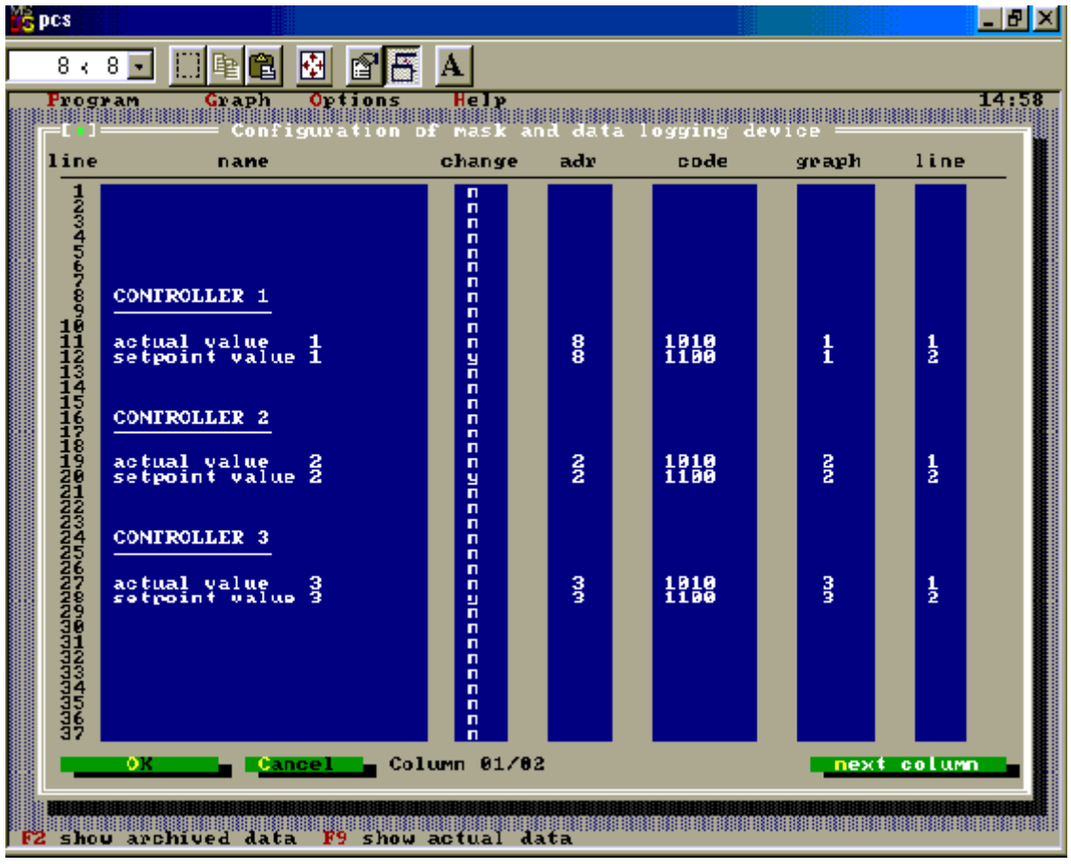
"Line" field:
The desired graphics line (colour) for this parameter is selected here. Possible entries are "1" to "6" for the colours yellow (1), red (2), light blue (3), green (4), purple (5) and deep blue (6).

->PROGRAM SETTINGS
Perform important initial setting in this dialog window. Check whether the serial port and the path for the internal parameter file "NORMAL.INI" are correctly set. If the serial port setting is changed, restart the program.

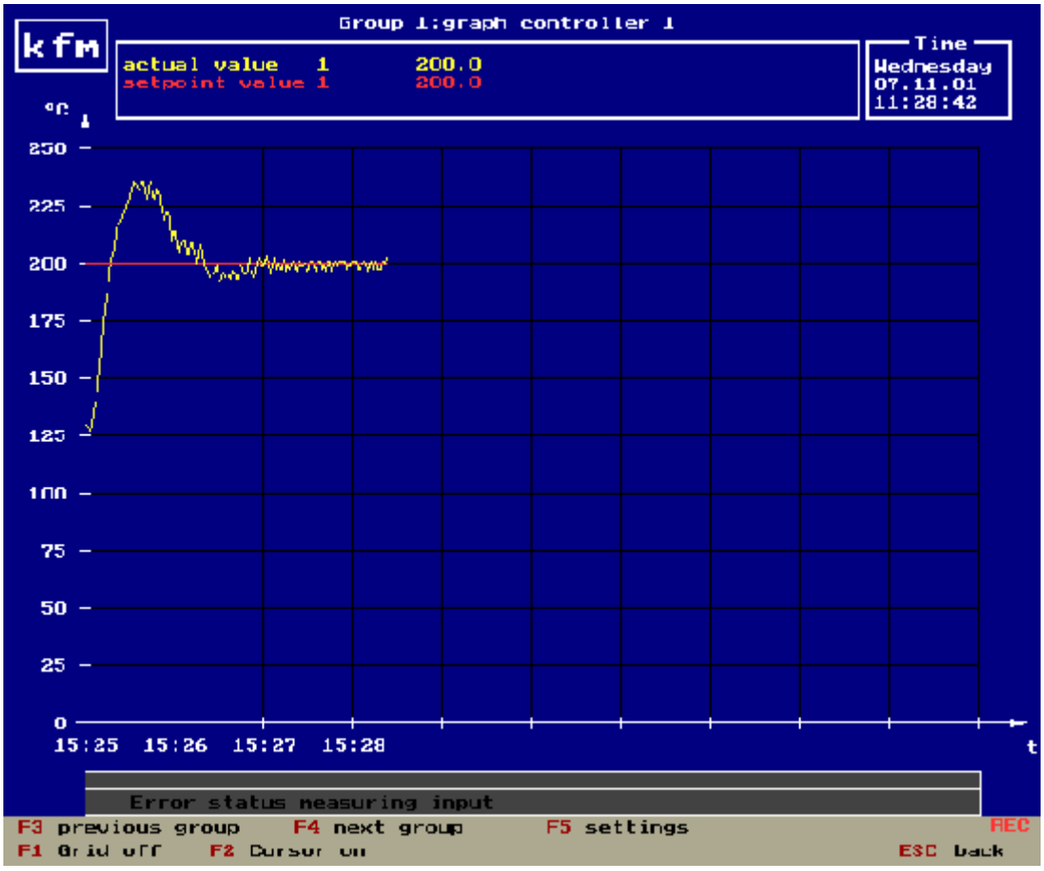
->DATE / TIME
Exercise caution when changing the date and time, as this has an effect on the data recording and the archiving system. New date and time data is only accepted for logically admissible entries and not taken over until confirmed by pressing >accept<.

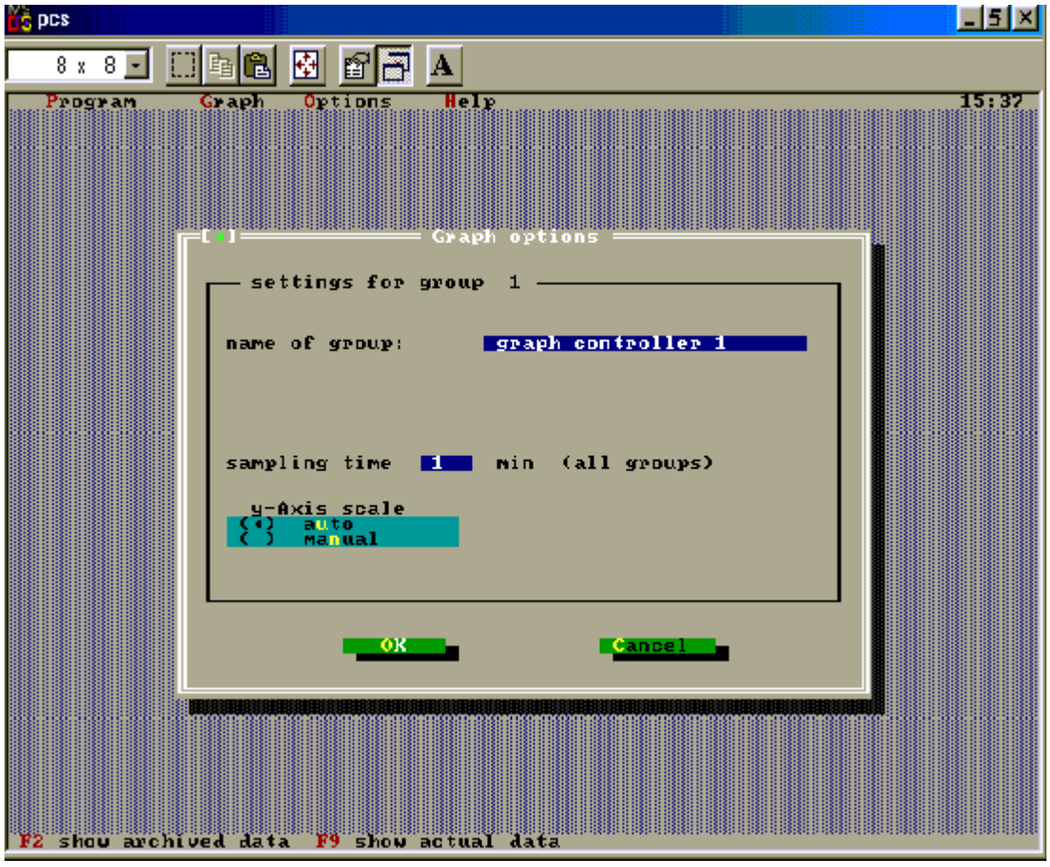
open printversion



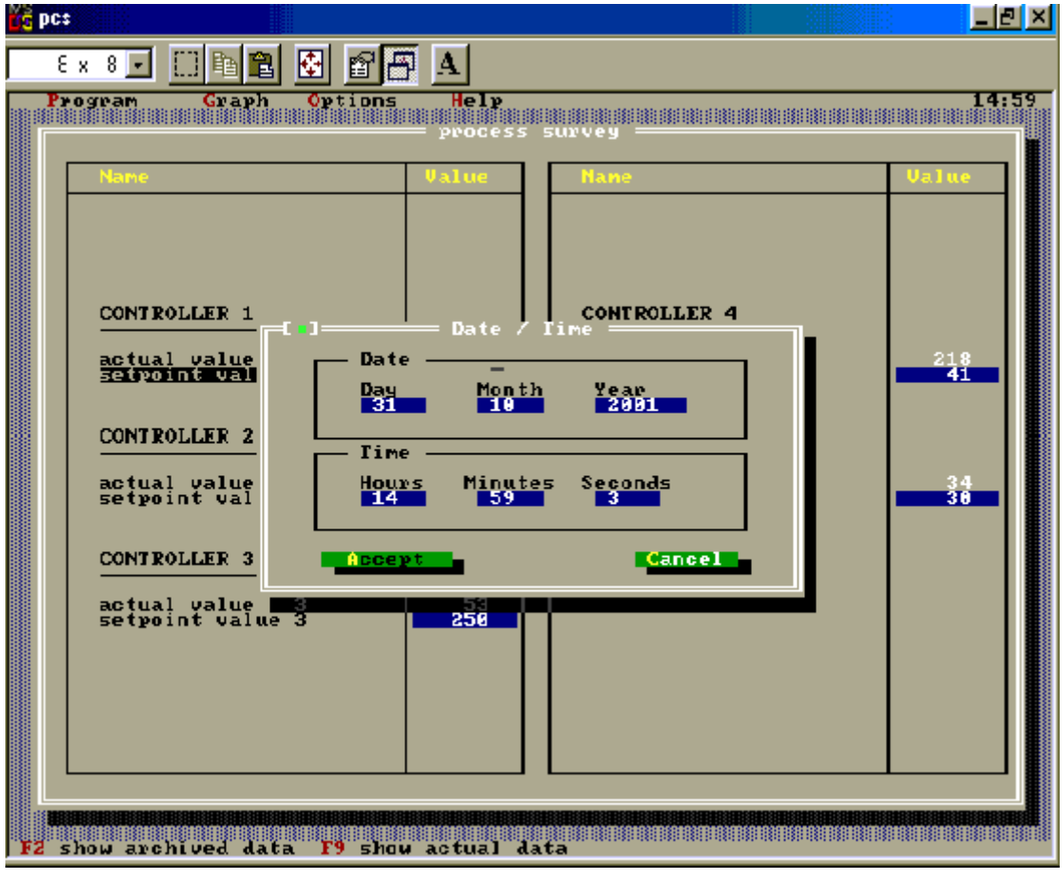


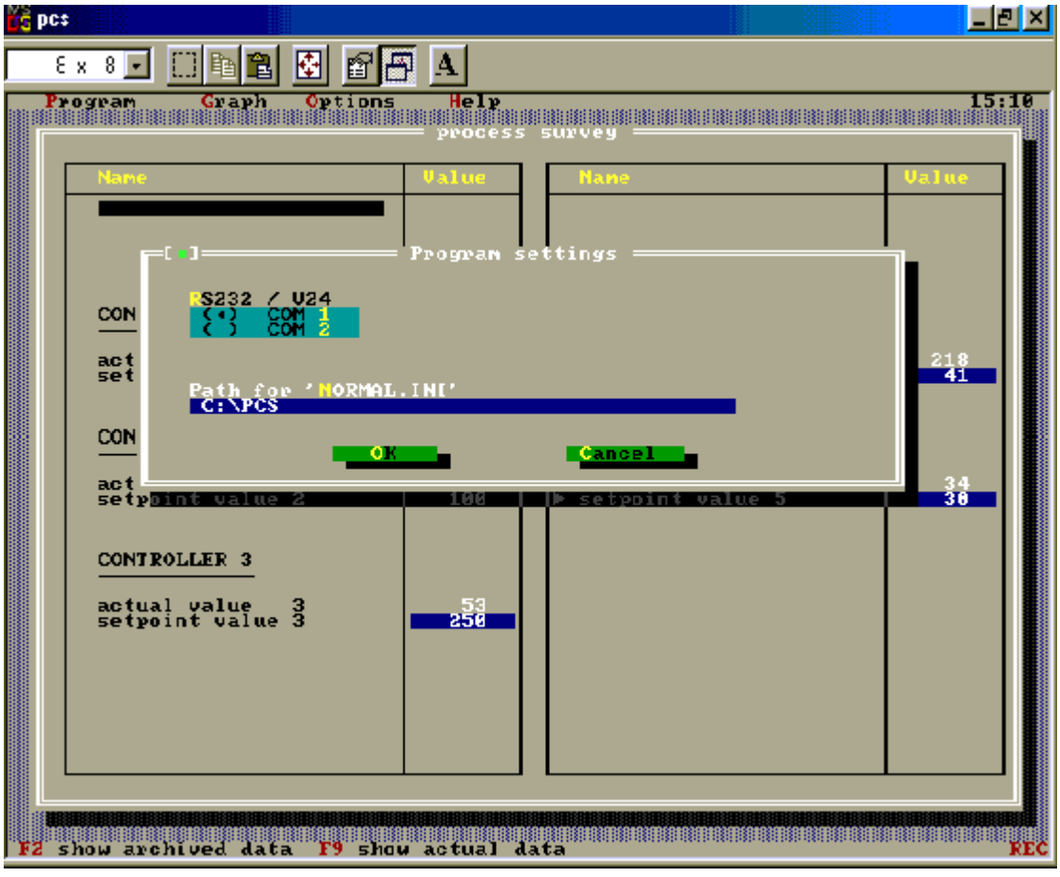
open printversion





open printversion





open printversion

Information on PKS Version 4.09 (last changed: 26.06.02)

Installation

1. Automatic installation

- Insert the PKS disk into the disk drive and start the setup program by entering: PKSSETUP
- Enter the complete path for the directory into which the PKS-files shall be copied, e.g. 'C:\PKS', and confirm with <OK>. If the desired directory does not exist, it will be created.

  Remark: The names of the subdirectories (terms between two '\'-tokens) must not contain more than 8 characters.
- Follow the instructions on the screen
- In case of successful installation: End the program, change to the target directory and start PKS by entering: PKS
- In case of faulty installation: Proceed with manual installation as described in paragraph 2.

2. Manual installation

- Create a directory on the hard drive, e.g. 'C:\PKS'

  Copy the following files from the disk into this directory:

'PKS.EXE'
'NORMAL4.INI'
'REG.PNR'
'EGAVGA.BGI'

- Change to the created directory and start the program by entering: PKS

Remark:
If necessary, change the settings for the printer port and the serial port (menu "Options"->"Program settings") following the initial program start. COM1 and LPT1 are preset. If the serial port setting was changed: End the program and restart it.

Operation

Change to the directory containing the PKS.EXE file and start the program by entering: PKS

Information on how to operate the keyboard:

Individual selection groups in the dialog windows may be selected using the <TAB>-key.

Markings may be changed using the space bar.

If several markings are possible (e.g. menu "Graph"->"Options"->"chan."), select the next line using the <ENTER>-key.

Close windows using the <ESC>-key.

open printversion

ADDRESS SEARCH window
Once the program has been started, it will search for connected controllers. The controller addresses are invoked in cycles. As soon as a controller is found, its address is shown with a black background and the ONLINE window appears automatically.

ONLINE window
The ONLINE window shows actual values, set point values and the most important parameters of the found controller. These values are frequently renewed. New values may be entered in the input fields with a blue background. If the entry is confirmed by pressing the <ENTER>-key, the value is sent to the controller immediately. The window may be closed by pressing <ESC>. It may be opened again by pressing <F8>.

Complete parameter exchange
1. Receiving data from controller

As an alternative to the ONLINE window, the complete data record of the controller may be received by pressing <F5>. The parameters are shown in the PARAMETER window and may be saved in a file or may be printed (menu "File"). Previously saved data records may be loaded also.

2. Sending data to controller

A loaded or edited data record may be sent to the controller by pressing the <F6>-key. Important: Changes will not be active until they are sent to the controller. This is contrary to the ONLINE window, where changes are accepted by the controller immediately.

3. Changing controller data

ATTENTION: Improper changes of the parameters may affect the correct function of the controller. Modifications should only be done by skilled persons.

Previously received data may be edited by pressing the 'F7'-key. Changed values have to be confirmed by pressing the <ENTER>-key. If a parameter allows a text selection, a list of selectable choices can be shown by pressing the <PageDown>-key in the corresponding input field. The selected text will be accepted by pressing the <ENTER>-key two times. The complete edited data record will be accepted by pressing the >OK<-button.

Graph/Data Logging Device
1. Show actual data

The data logging device offers the possibility to show current data recordings of the controller in a diagram, while saving them to a file in the PKS directory. In the factory setting the diagram shows the actual value of the controller (start: refer to 3.).

2. Show previously saved data

A data recording previously saved, is displayed in a diagram (menu "Graph"->"Show graph from file"). Enter the file name with the aid of a dialog window. The display corresponds to showing actual data in the cursor mode (refer to 3.).

3. Start graph/data logging device

After selecting the menu "Graph"->"Start/Show" the data logging device is activated and the current data recordings of the controller shown in the ONLINE window are displayed in a diagram.

The top edge of the mask shows the name of the controller (address), respectively the name of the data file, the designations of the recorded channels as well as the currently transmitted values, the colors of which correspond to the displayed curves.

open printversion

If the relay state is displayed (parameter 1005h), an additional diagram shows the several switching states of the relays as a bar graph. The relay state is also shown at the top edge of the mask as a bit sequence according to relay 8 to relay 1 (1:contact closed, 0:contact open).

Use the keys <Shift>+<TAB> (backward) and <TAB> (forward) to scroll through the graphics. Mask a grid out or in by pressing function key <F1>.

Press function key <F2> to switch the graphics cursor ON and OFF. The cursor can be moved along the time axis with the aid of the cursor keys and tab keys. In the cursor mode, the respective values of the cursor position instead of the current data are displayed in the top edge of the mask. The masked in time coincides with the scanning time of the cursor position (green).

The graphics can be compressed in x-direction (time axis) step by step using the function key <F7>. Use the <F6>-key to restore the original scale.

The graphics window may be closed by pressing the <ESC>-key.

If the following question "Continue saving graphics data" is answered with >No<, the data logging device is stopped and a question appears asking whether you want to save the recorded data for further use or not. If not, the recorded data will be overwritten the next time the data logging device is started.

If the question is answered with >Yes<, the data logging device remains active in the background. It is possible to return to the graphics window at any time by selecting the menu "Graph"->"Start/Show". The data logging device running in the background may be stopped by selecting the menu "Graph"->"Stop...". In that case a question will appear asking whether you want to save the recorded data for further use or not (refer to the paragraph above).

Remarks to the automatic data archiving

The data generated during the current recording are stored in the file "GRAPH.GFK".
This file will be overwritten if the data logging device is restarted.

During long time recordings the file "GRAPH.GFK" contains the data of the current week.
Archiving takes place every Sunday during the first scan after 6 AM, however, no later than after 7 days. During this process, a recorded file is named and saved according to the date. Example: Recording file "GRAPH.GFK" will be saved on 29.11.1998 as "19981129.GFK".

The oldest archive file is always deleted on the occasion of the fourth subsequent archiving, in order to limit the required storage space. In order to save this data for the future, always save the file in time into another directory or rename it.

4.Changing the presettings

The factory set graphics presettings can be changed in the menu "Graph"->"Options".

A different scanning time in minutes and seconds may be entered.

The y-axis (temperature) in the graphics mode can be scaled manually or automatically. In the automatic setting, scaling takes place automatically based on the minimum and maximum value recorded. The manual setting allows values for the upper and lower range limit to be entered.

In the field >chan.< a maximum of 6 channels to be recorded can be activated by marking them with a cross. Enter the parameter code to be recorded in the blue input line next to it. Please refer to the controller's operating manual for the allocation and meaning of the parameter code (example: Parameter code 1010 = actual value 1).

open printversion

Remarks for using several controllers

If several controllers are operating with PKS (only possible by using a RS-485 connection, interface converter required) the first found controller is registered and its data is shown in the ONLINE window. The address of this controller appears with a black background in the address search window. The addresses of further found controllers are displayed yellow. Before another controller may be selected, all windows (except the address search window) must be closed. Afterwards the new address may be selected in the address search window and the ONLINE window of this controller may be opened with the <F8> key. After that the funtions of PKS can be used with this controller as described above.

Economy mode

If there are less than 600 kByte of free lower memory on the computer, the programm will run with the following restrictions:

- Opening the ONLINE window will close the PARAMETER window and destroy the corresponding data record.
- Opening the PARAMETER window will close the ONLINE window.
- Data alignment with file will close the PARAMETER window.
- Starting the data logging device / graph view function will close all windows and destroy the active data record of the PARAMETER window.
- Using MODEM functions will close the PARAMETER window and destroy the corresponding data record.

INDEX

1
2
3
4
5
6
7
8
9
0

open printversion

INDEX

1
2
3
4
5
6
7
8
9
0

General information:

Series interfaces enable digital communication with computers or higher ranking control systems. An RS 232 interface permits connection of one controller per computer interface. The RS485 interfaces enable the connection of max. 32 participants in one data bus. Here, the controllers must be set to different addresses for differentiation.(Controller configuration level).

Technical data:

Interface:	RS232	RS485
Connection:	series, asynchronous	series, asynchronous
	2 wire (+GND)	2 wire (+GND)
Transfer medium:	twisted and screened cable	twisted and screened cable
Bus line length:	-	1000m
Dead-end feeder length:	15m	2m
Max. number of controllers:	1	31
Transfer rate:	9600 Bit / s	9600 Bit / s

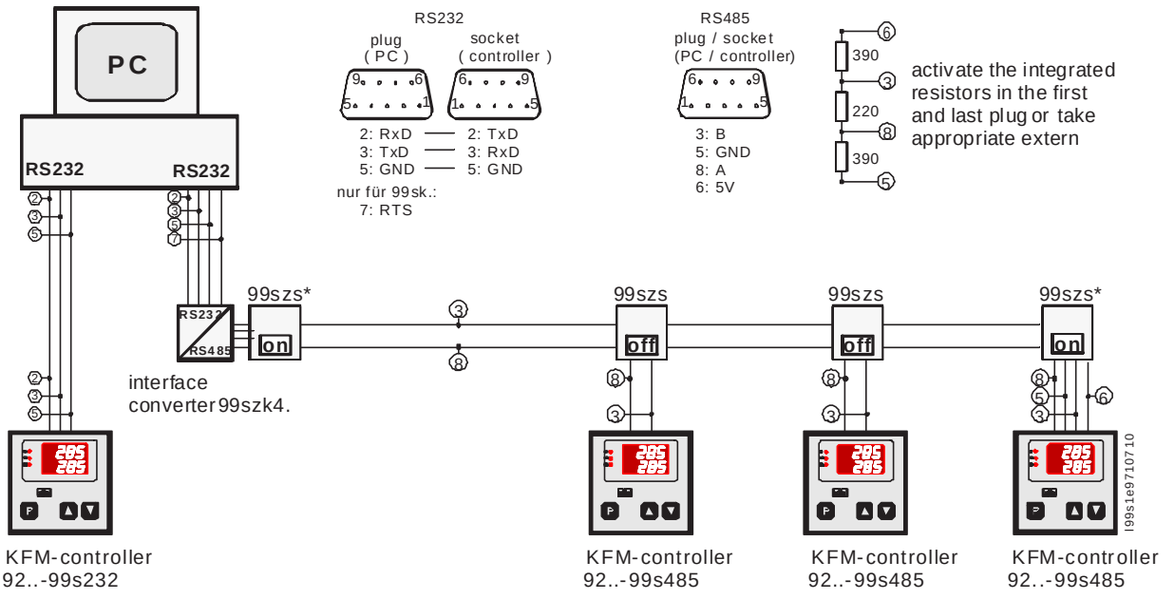
Hardware prerequisites:

IBM XT, AT or compatible PC, SPS etc.
RS232: series interface RS 232 (COM 1, COM..)
RS485: ser. interface RS485, alternative: RS232 with interface converter RS232/RS485 (KFM 99szk4)

Connection lines:

Use screened lines to connect the interfaces (e.g. KFM 99szl.). Place the screening on the controller earthing terminal. Connect the RS485 line at the beginning (PC or interface converter) and the end (last controller) with d- sub - plugs with integrated resistors (f.e. type 99szs) or appropriate extern resistors.

Wiring example



open printversion

Transmission protocol:

Data is transmitted according to the KFM log 2.0 which is laid out in line with the ISO 1745.

Data format:

Each field of the data frame comprises a start bit, the 7 bit ASCII value,
a parity bit for even parity and a stop bit.
Transmission rate: 9600 Bit/s (other interface configurations can be supplied).

Data frame (telegram) :

The data frame commences and ends with a control character (see table) and comprises of 2 bytes for the controller address (ADR) and 4 bytes for the parameter code (code) as well as up to 6 bytes for the number value, i.e.: number value on the left from the decimal point: up to 4 bytes; 1 byte for the decimal point, number value on the right of the decimal point: 1 byte.
1 byte = 1 digit or letter or control character = 1 ASCII value

Data integrity:

The data frames for parameter transmission are safeguarded with a "BCC" sign, i.e.the transmitted data is supplemented by a check sum consisting of the logic linking (EXOR) of all transmitted characters between STX (excl.) and ETX (incl.).
The controller acknowledges a successful transmission with "ACK". A faulty transmission is confirmed by "NAK".

Examples: The computer requests data

EOT	ADR	ADR	Code	Code	Code	Code	ENQ

the controller response:

STX	Code	Code	Code	Code	=	val.	val.	val.	val.	val.	ETX	BCC

The computer sends data. To this effect, the controller must operational, because the simultaneous entry of data via interface and controller keyboard is inadmissible.

EOT	ADR	ADR	STX	Code	Code	Code	Code	=	val.	val.	val.	val.	val.	ETX

controllers response to a successful transmission: ACK

controllers response to a faulty transmission: NAK

Control characters:

control characters	value(HEX)	meaning
STX	02	start of text
ETX	03	end of text
EOT	04	end of transmission
ENQ	05	enquire
ACK	06	acknowledge
NAK	15	not acknowledge
=	3D	value allocation

Permitted characters for code and value:

ASCII-code	value (HEX)	description	ASCII-Zeichen	value(HEX)	description
"0"	30	zero	"9"	39	nine
"1"	31	one	"A"	41	ten (code)
"2"	32	two	"B"	42	eleven (code)
"3"	33	three	"C"	43	twelve (code)
"4"	34	four	"D"	44	thirteen (code)
"5"	35	five	"E"	45	fourteen (code)
"6"	36	six	"F"	46	fifteen (code)
"7"	37	seven	"."	2E	dec.point (value)
"8"	38	eight	"-"	2D	minus sign(val.)

open printversion

data subject to alteration

1.) parameter codes that can only be **sent** by the controller: (online= controller continues normal operation)

CODE (HEX)	Parameter*	Symbol	value range
014D	guide controller on/off	FUE	0=off,1=on
1001..05	status- / control byte 1..5	-	
1010..15	actual value 1..6	IST1	
1020..24	controller output Y 1..5	Y(1)..5	
102A	active controller output (99g8..)	Y	
1030..34	active set point value chan. 1..5	(1..5SP)	
	active program set point value	(SP)	-
	ramp set point value	rSP	-
	actual program step	-	-
1050	difference actual value 1 / 2	FUE	0=off,1=on
1051	average actual value 1 / 2	FUE	0=off,1=on
3002	actual program step	SP..	

Contents of the statusbytes:

statusbyte 1*: :

0	0	Err6	Err5	Err4	Err3	Err2	Err1

Err1 ... Err6 = 0: no malfunction at the measuring input 1 ... 6,
Err1 ... Err6 = 1: malfunction at the measuring input 1 ... 6

statusbyte 2*:

			bin.inp. 5	bin.inp. 4	bin.inp. 3	bin.inp. 2	bin.inp. 1

Bit = 0: input bit is not set
Bit = 1: input bit is set

statusbyte 5*:

rel. 8	rel. 7	rel. 6	rel. 5	rel. 4	rel. 3	rel. 2	rel. 1

Bit = 0: output bit is not set
Bit = 1: output bit is set

2.) parameter codes that can be **sent or received** by the controller (online):

(The parameter code is exemplary for channel 1. For example: 1100 = int. setpoint value 1.
For the other channels change the number at the second place to the true channel number,
for example 1200 = int. set point value channel 2).

CODE (HEX)	Parameter*	Symbol	value range
1100	(internal) set point value channel 1	(1)SP	Lo...Hi
1101	second set point value channel 1	(1)SP2	Lo...Hi
1103..06	proportional band XP1..4 channel 1	(1)P(1)..4	0.0...999.9
1107..0A	integral action time Tn1..4 channel 1	(1)I(1)..4	0.0...999.9
110B..0E	derivative time Tv1..4 channel 1	(1)d(1)..4	0.0..99.9/0.00..99.99
110F	neutral zone Xsh channel 1	(1)Sh	0.05...1,0
1113..14	switching interval 1..2 channel 1	(1)SA1..2	0...range (bLo/Hi)
1115..16	switching difference 1..2 channel 1	(1)Sd1..2	0... range (bLo/Hi)
111C	switch-over SP/SPE (99bwam)	SP-F	0 = SP, 1 = SPE
2000..07	switching interval addit.contact 1..8	SA1..8	0.0... range
2008..0F	switching diff. addit.contact 1..8	Sd1..8	0.1... range
4101..14	1. .. 20. program setpoint value	SP.1 .. 20	Lo...Hi
3101..14	1. .. 20. attendant time	H' 1.. 20	0...6000
3001	actual program status	Pro	0=off,1=on,2=stop

* available depending on type and design

open printversion

Offline parameter:

In opposite to the online parameters the offline parameters can not be transmitted while the controller continues normal operation. So the controller has to be stopped by sending "FE = 7708" (the display shows "ConF"). After the transmission the controller has to be switched-over to the normal operating mode by sending "FF = 7708".

(The parameter code is exemplary for channel 1. For example: 113A = travel time of actuator channel 1. For the other channels change the number at the second place to the true channel number, for example 123A = travel time of actuator channel 2).

CODE (HEX)	parameter*	symbol	Value range
010C..11	min. value range input 1..6	1..6bLo	-999...bHi
0112..17	max. value range input 1..6	1..6bHi	blo...4000
0118..1d	decimal point input 1..6	1..6nst	0...2
011E..23	type of measuring input 1..6	Ain1..6	0...11
0124..29	correction actual value 1..6	Ist1..6	-5%...+5% of range
012A..2C	min. value range signal input	(1..3)SLo	-999...SHi
0130..32	max. value range signal input	(1..3)SHi	SLo...4000
0136..38	signal output 0/4...20mA	Sou(t/1..3)	0=0-20,1=4-20
013C	type of controller	ConF	
013D	cyclus time	Cy"	2...120
013F	display unit °C / °F	Unit	0=°C, 1=°F
0140	lower display indication	dSPL	0=off,1=SP, 2=rSP, 3=Y,4=°C,5=°F,6=bar, 7=%,8=Ist1,9=Ist2...
0141	controller address	Adr	1...255
0142	code number	Cod1	0...9999
0147	allowed deviation	d.SP	0.1...200.0
0148	number of program cycles	P-CY	0...20
0149	number of program steps	P-S	0...20
014E	wait time for input signal reception	t"	1...100
112B	meas. input for control loop 1	On1	1...6
112C	second meas. input	Ain	1...6
112D	function of the ext. setpoint	SPE	2=AbS,3=Add,4=Sub
112E	low limit set point value	(1) Lo	range (bLo/Hi)
112F	high limit set point value	(1) Hi	range (bLo/Hi)
1132..33	gradient 1..2	Gr1..2	0...100
1134..35	waiting window value 1..2	rF1..2	0.1...999.9
1137	output signal at act. val=setp.	(1)YAP	YLO...YHi
1138	low limit control output	(1)YLo	0...YHi
1139	high. limit control output	(1)YHi	YLo...100
113A	travel time of actuator channel 1	(1) Y"	6...600
113B	type of output signal 0 / 4-20mA	(1)out	0=0-20,1=4-20
113C	output direction di / in	(1)out	0=in(in),1=(in)di 2=diin,3=didi
113D	dead range	(1)td	0.0...10.0
113E	output reaction at meas.fault(relais)	(1)Y_S	0=off,1=K1,2=K2
113F	output reaction at meas.fault(Y)	(1)Y_S	YLo...YHi (continuous)
1140	integration range limit chan.1	(1) ib	0...100
1148	switch-over control val. on / off	YH	0=off,1=on
1149	external control value	YH	0...100
114E	switch-over SPE / YE	YE	0=SPE,1=YE
2010..17	function selection additional contact 1...8	rEL1..8	0=LCA...8=USE...
2018..1F	input selection additional contact 1...8	rEL1..8	Ist1...6, 11=1Y...
2020..27	channel selection additional contact 1...8	rEL1..8	1..4=(1)..4SP,11=rSP..
2028..2F	condition relay1...8 for measuring line default	rEL1..8	0=off,1=on

* available depending on type and design

open printversion

INDEX

1 2 3 4 5 6 7 8 9 0

programming example in “C” (extract):

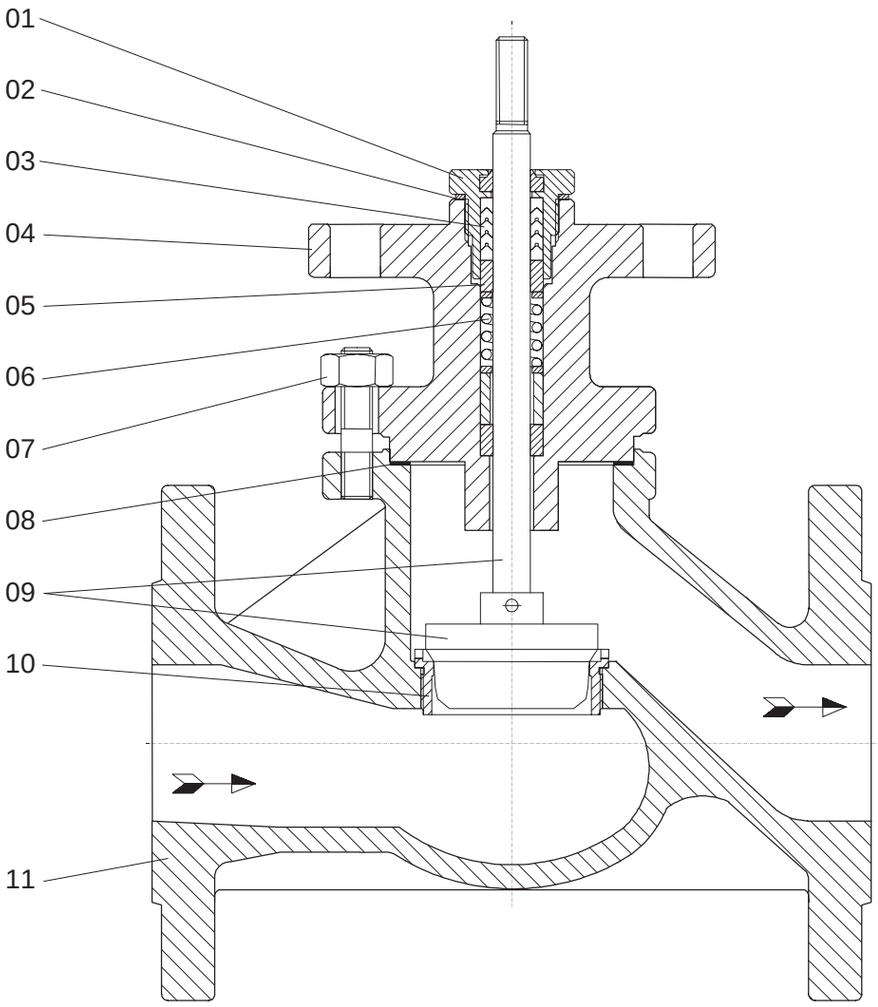
```
void send_data_frame( void)
{
int i;
char antwort=' ', z_buff[80];
unsigned char bcc;

printf( "\n\ndata ----> controller");
for ( i=0; i<=strlen( Ist); i++ )                    // send data - frame
    {
    if ( i==0 )
        {
        sende_byte( 0x04);                           // send 'EOT'
        sende_byte( adresse[0]);                     // send 1. adress-byte
        sende_byte( adresse[1]);                     // send 2. adress-byte
        sende_byte( 0x02);                           // send 'STX'
        sende_byte( code[0]);                        // send 1. code-byte
        bcc=code[0];
        sende_byte( code[1]);                        // send 2. code-byte
        bcc = bcc^code[1];
        sende_byte( code[2]);                        // send 3. code-byte
        bcc = bcc^code[2];
        sende_byte( code[3]);                        // send 4. code-byte
        bcc = bcc^code[3];
        sende_byte( EQL);                            // send '='
        bcc = bcc^EQL;
        }
    sende_byte( Ist[i]);                             // send data
    bcc = bcc^Ist[i];
    }//for
sende_byte( 0x03);                                   // send 'ETX'
bcc = bcc^0x03;
sende_byte( bcc & 0x00ff);                           // send BCC-byte

for ( i=1; i<=400; i++ )
    {
    if ( (inportb ( com+LSR) & 0x01) ) antwort=inportb( com+RBR);
    if ( antwort==NAK ) { printf( "\nOut of Range !"); break;}
    if ( antwort==ACK ) { printf( "\nOK !"); break; }
    delay( 1);
    }//for
if ( i==401 ) printf( "\nNo response !");
};
```

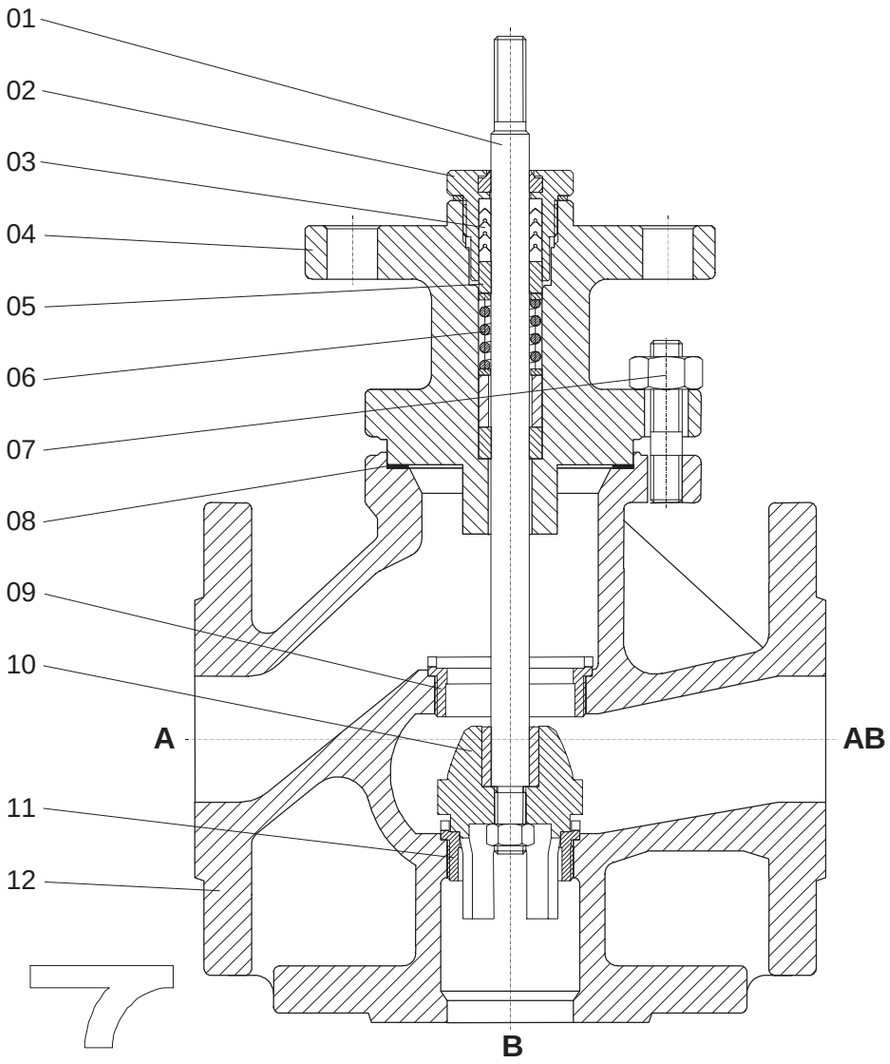
INDEX

1
2
3
4
5
6
7
8
9
0



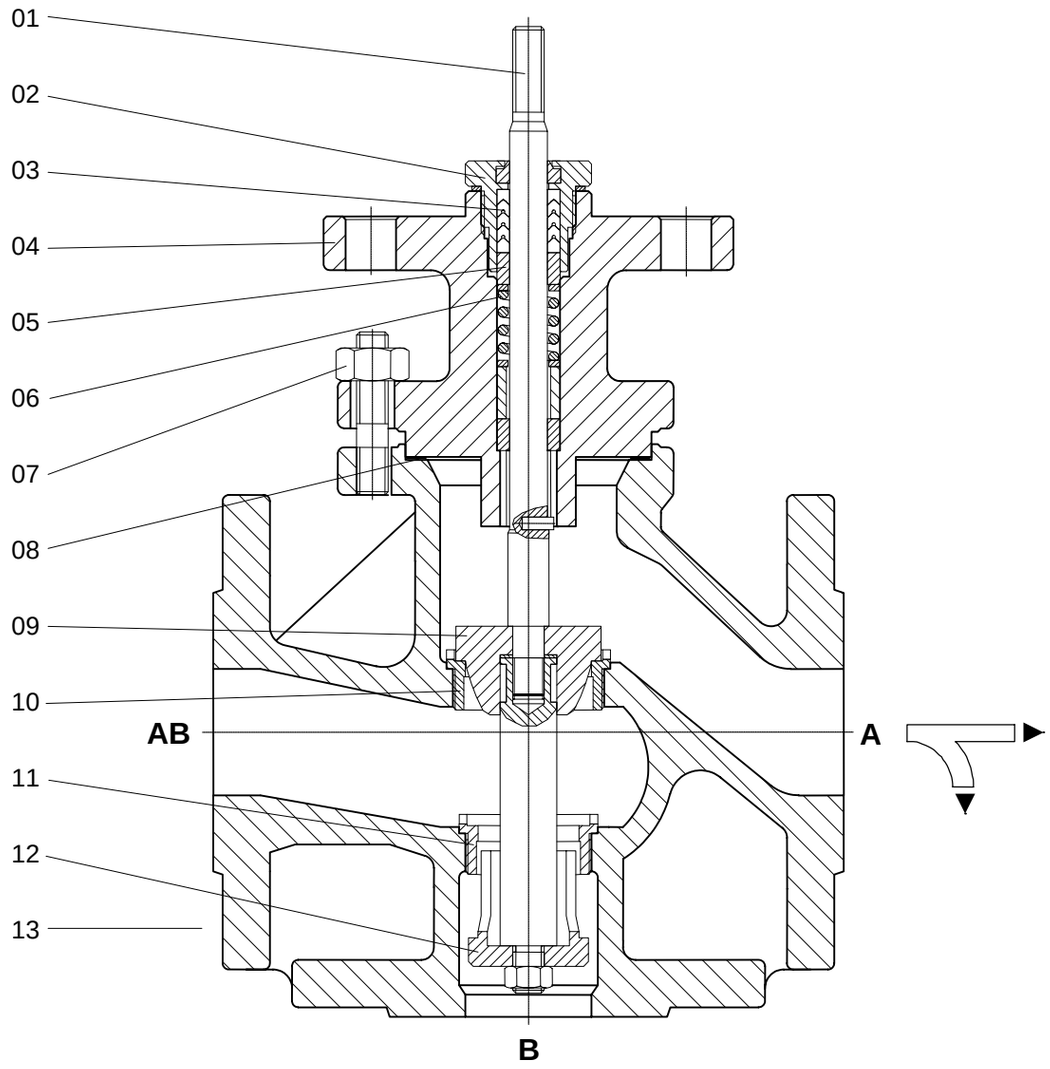
No.	Designation	Part-No.
01	Screw joint with scaper	6a21dv..
02	Gasket	6a21sd..
03	V-rings	6a21dm
04	Mounting bonnet	6a21vd..
05	Guiding bush	6a21gb
06	Spring	6a21f
07	Studs with hexagon nuts	6a21ss..
08	Gasket	6a21dd..
09	Plug with spindle	6a21ks..
10	Seat ring	6a21s..
11	Valve body	6a21vg..

open printversion



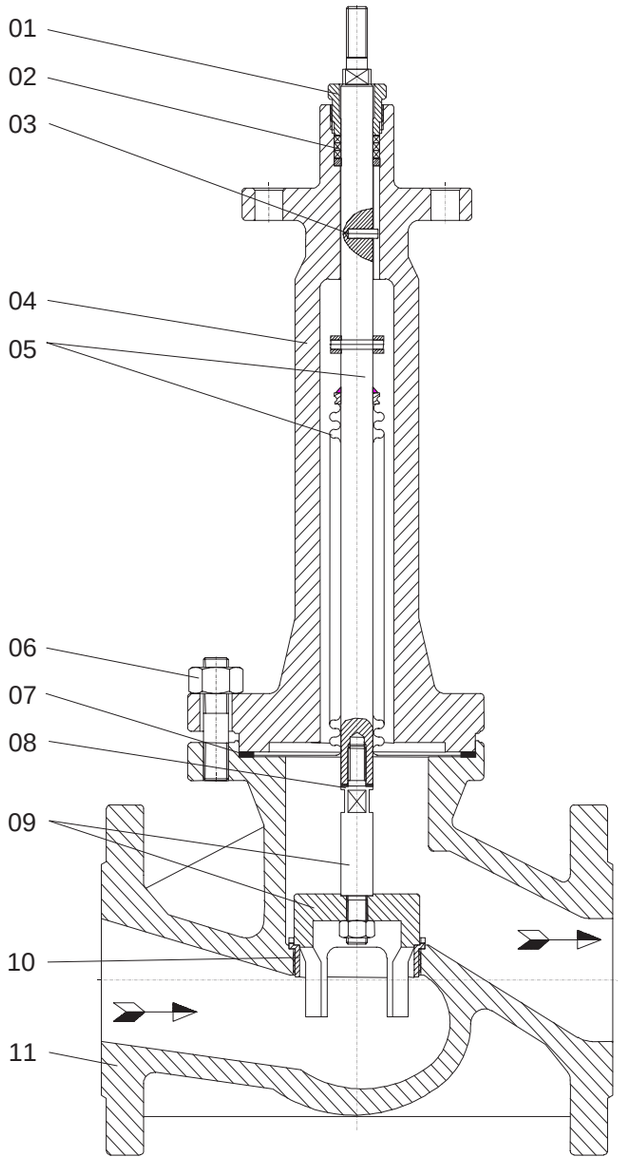
No.	Designation	Part-No.
01	Spindle	6a31s..
02	Screw joint with scaper	6a31dv..
03	V-rings	6a31dm
04	Mounting bonnet	6a31vd..
05	Guiding bush	6a31gb
06	Spring	6a31f
07	Studs with hexagon nuts	6a31ss..
08	Gasket	6a31dd..
09	Upper seat ring	6a31so..
10	Plug	6a31k..
11	Lower seat ring	6a31su..
12	Valve body	6a31vg..

open printversion



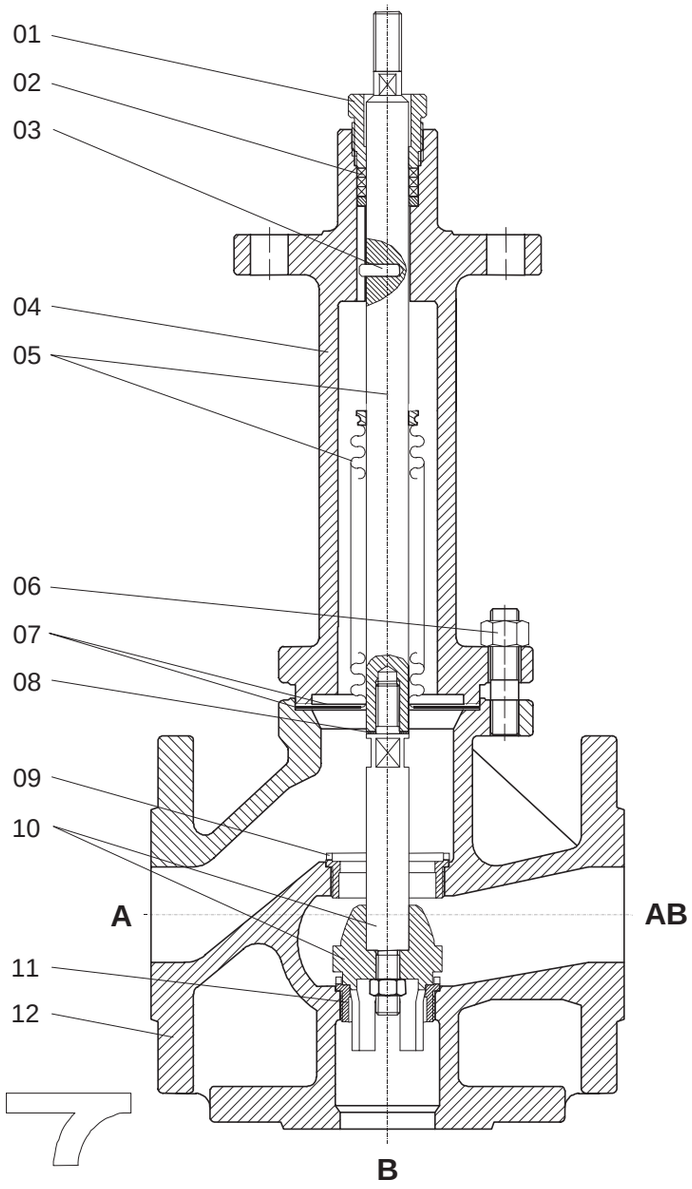
No.	Designation	Part-No.
01	Spindle•	6a32sp..
02	Screw joint with scaper	6a21dv..
03	V-ring-unit	6a21dm
04	Mounting bonnet	6a21vd..
05	Guiding bush	6a21gb
06	Spring	6a21f
07	Studs with hexagon nuts	6a21ss..
08	Gasket	6a21dd..
09	Upper plug	6a32ko..
10	Upper seat ring	6a32so..
11	Lower seat ring	6a32su..
12	Lower plug with spindle	6a32ksu..
13	Valve body complete	6a32...

open printversion



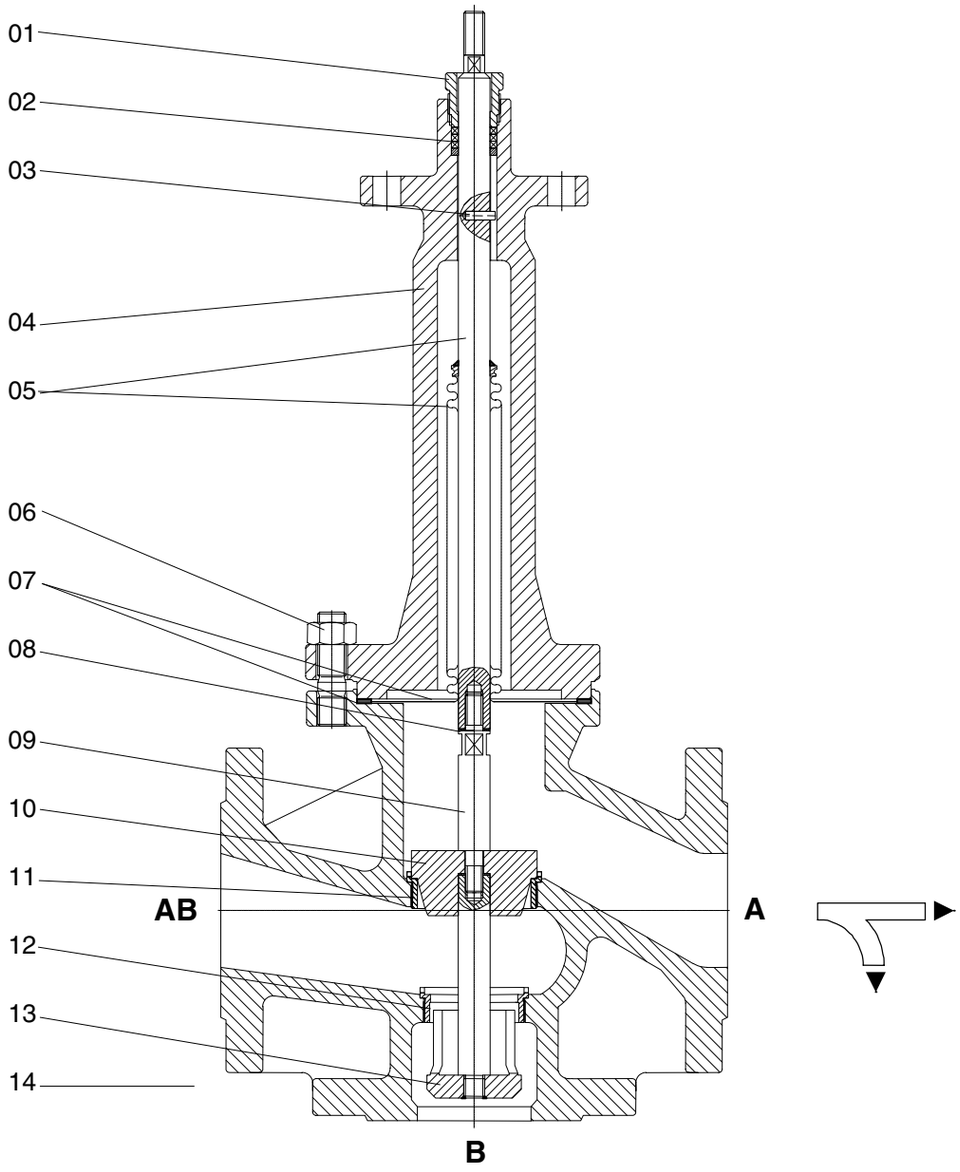
No.	Designation	Part-No.
01	Screw joint	6a51sv
02	Safety stuffing box	6a51st
03	Pin	6a51vss
04	Mounting bonnet	6a51vd..
05	Spindle with bellow	6a51sf..
06	Studs with hexagon nuts	6a51ss..
07	Gasket	6a51dd..
08	Lock washer	6a51ssc
09	Lower spindle with plug	6a51ks..
10	Seat ring	6a51s..
11	Valve body	6a51vg..

open printversion



No.•	Designation•	Part-No.•
01•	Screw joint	6a61sv
02	Safety stuffing box	6a61st
03	Pin	6a61vss
04	Mounting bonnet	6a61vd..
05	Spindle with bellow	6a61sf..
06	Studs with hexagon nuts	6a61ss..
07	Gasket	6a61dd..
08	Lock washer	6a61ssc
09	Upper seat ring	6a61so..
10	Lower spindle with plug	6a61ks
11	Lower seat ring	6a61su..
12	Valve body	6a61vg..

open printversion



No.	Designation	Part-No.
01	Screw joint	6a61sv
02	Safety stuffing box	6a61st
03	Pin	6a61vss
04	Mounting bonnet	6a61vd..
05	Spindle with bellow	6a61sf..
06	Studs with hexagon nuts	6a61ss..
07	Gasket	6a61dd..
08	Lock washer	6a61ss
09	Spindle middle part	6a62sz..
10	Upper plug	6a62ko..
11	Upper seat ring	6a62so..
12	Lower seat ring	6a62su...
13	Lower plug with spindle	6a62ksu...
14	Valve body complete	6a62...

open printversion