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SPECIAL TOOLS LIST

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		Project Name 2nd ZAGROS METHANOL PLANT			Lurgi Doc. No.		Vendor Doc. No. SAM-140	Sheet / of 1/23	Revision 00

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1 SPECIAL TOOLS LIST

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1.1 Special tools WA 029 EN/11.2000-19 003



Fig. 1 · Seat wrenches and supporting flanges

WA 029 EN

Edition November 2000

1. General information

Special seat tools are required to install or remove the seats of the control valves listed in the following tables. These special tools have to be combined with adjustable click-type torque wrenches or with direct-reading torque wrenches to ensure that the right tightening torques are applied. Valves with larger nominal sizes require high tightening torques which can only be reached by using torque multipliers or hydraulic power tools.

Note! Torque wrenches or torque multipliers fitting SAMSON's special seat tools can be ordered from SAMSON whereas hydraulic power tools have to be ordered from specialist shops.

The other special tools listed in the following tables are necessary for installing or removing a metal bellows, for clamping the plug stem and for removing springs.

The valve versions and the first four digits of their former model numbers (which correspond to the valve type numbers in some cases) are indicated in the following tables. Please note that the former model numbers have been substituted by new ones which are listed in the table below.

New -		Former model numbers
2710	Single-seated globe valves with threaded ends or flanges	2431, 2432, 2435, 2436, 2437, 2111, 2121, 3222, 3213, 2438
2720	Pressure regulators or differential pressure regulators with threaded ends	2440, 2441, 2442, 2443, 2445, 2446, 2447, 2448, 2451, 2452, 2453, 2454, 2456, 2468, 2478
2730	Flow regulators (and combination technology) with threaded ends	2459, 2465, 2466, 2467, 2471, 2474, 2475, 2469, 2479, 2489, 2491, 2494, 2495, 2451
2713	Unbalanced three-way valves with threaded ends or flanges	2118, 2433, 3260, 3226
2811	Unbalanced single-seat globe valves with flanges	2111, 2121, 2421, 2141, 3531, 3321, 3213
2814	Balanced single-seat globe valves with flanges	2114, 2422, 3214
2823	Flow regulators (and combination technology) with flanges	2423
2803	Balanced or unbalanced three-way valves with flanges	2119, 3260, 3535, 3323
2812		2412 with bellows seal (external sealing), 2392, 2363
2817		2417, 2368

2. Tools DN 15 to 150

For valves with Model Numbers 2111, 2114, 2330, 2336, 2362, 2367, 2411, 2412, 2416, 2421, 2422, 2423, 3201, 3241, (2814)

Seat tool DN	Seat wrench (complete)	Supporting flange (individual part)	Socket (individual part)	Extension (individual part)
15...25	9110-2403	–	0440-0065	–
32...50	9110-2464	1490-6707	0440-0066	–
65...80	9110-2467	1690-3078	0440-0067	0320-1160
100	9110-2471	1690-3079	0440-0068	
125	9110-4075	1690-3080	0440-0069	
150	9110-4076	1690-3081	0440-0070	
Other tools				
15...80 100...150	Bellows nut wrench			1280-4002 1280-4005
15...80	Bellows-holding wrench for 3241			1280-3018
100...150	Bellows-holding wrench for 3241			1280-3019
	Clamp pliers for plug stem Ø10 and 16 mm			9129-1995

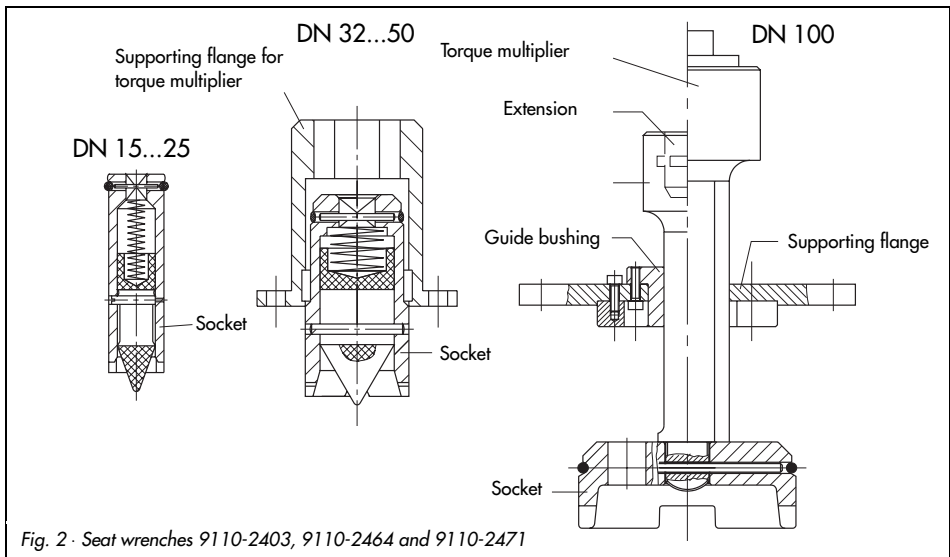
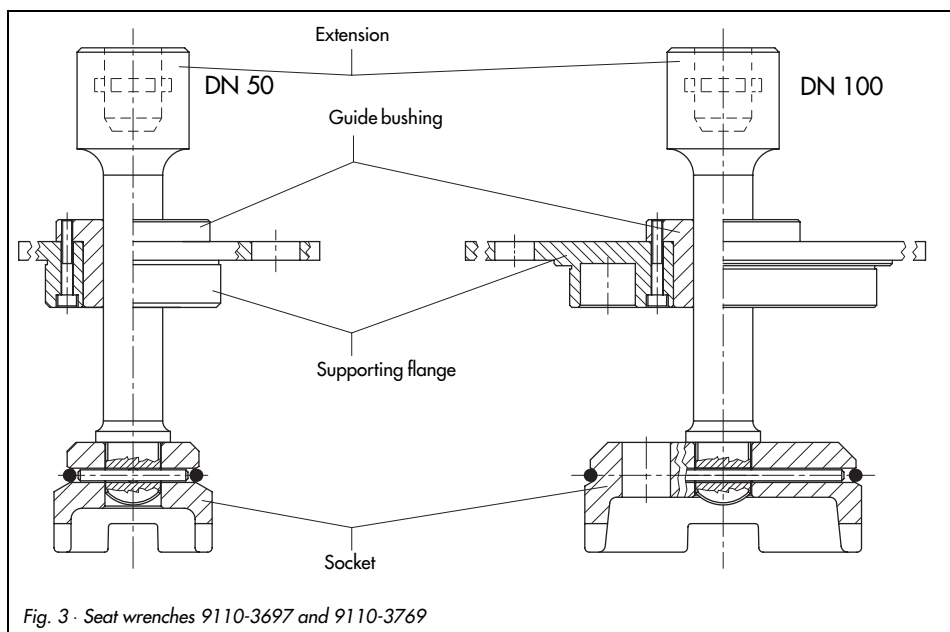


Fig. 2 · Seat wrenches 9110-2403, 9110-2464 and 9110-2471

For valves with Model Numbers 3251, 3253, 3254, 3256, 3281, 3284, 3286

Seat tool DN	Seat wrench (complete)	Supporting flange (individual part)	Socket (individual part)	Extension (individual part)
15...25	9110-2403	—	0440-0065	—
32...40	9110-3666	1590-7124	0440-0094	—
50	9110-3697	0410-3026	0440-0089	—
65...80	9110-3729	0410-3027	0440-0093	—
100	9110-3769	0410-3028	0440-0092	—
125: up to PN 160	—	0900-1597	0900-1595	0900-1589 130 mm in length
150: up to PN 160	—		0900-1596	
125 : for PN 250 and higher	—		0900-1595	0900-1588 260 mm in length
150: for PN 250 and higher	—		0900-1596	
				For Type 3253 0900-1590 500 mm in length

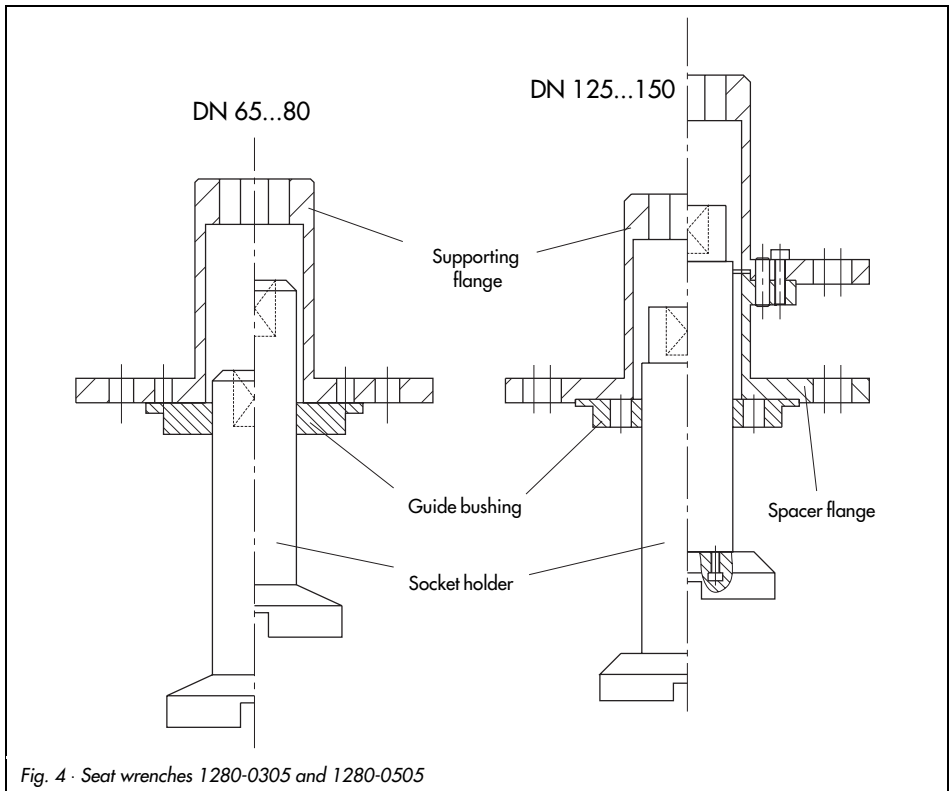


For three-way valves with Model Number 3244

Seat tool DN	Seat wrench (complete)	Supp. flange (individ. part)	Socket (individ. part)	Socket holder (individ. part)	Guide bushing (individ. part)	Spacer flange (individ. part)
15...25	1280-0105	–	0440-0107	–	0310-2079	–
32...50	1280-0205	1790-7288	0440-0108	–	0310-2080	–
65...80	1280-0305		0440-0109	–	0310-2081	–
100	1280-0405	1790-7289	0440-0110	1790-7294	0310-2082	–
125	1280-0505	1790-7290	0440-0111	1790-7295	0310-2083	1790-7299
150	1280-0605		0440-0112		0310-2084	

Note for DN 100 to 150:

2 screws with M5 x 16 (8333-0515) are required to mount the socket onto the socket holder.



Tools DN 15 to 150

Other tools		
15...50	Plug-holding wrench	1280-4003
65...150		1280-4004

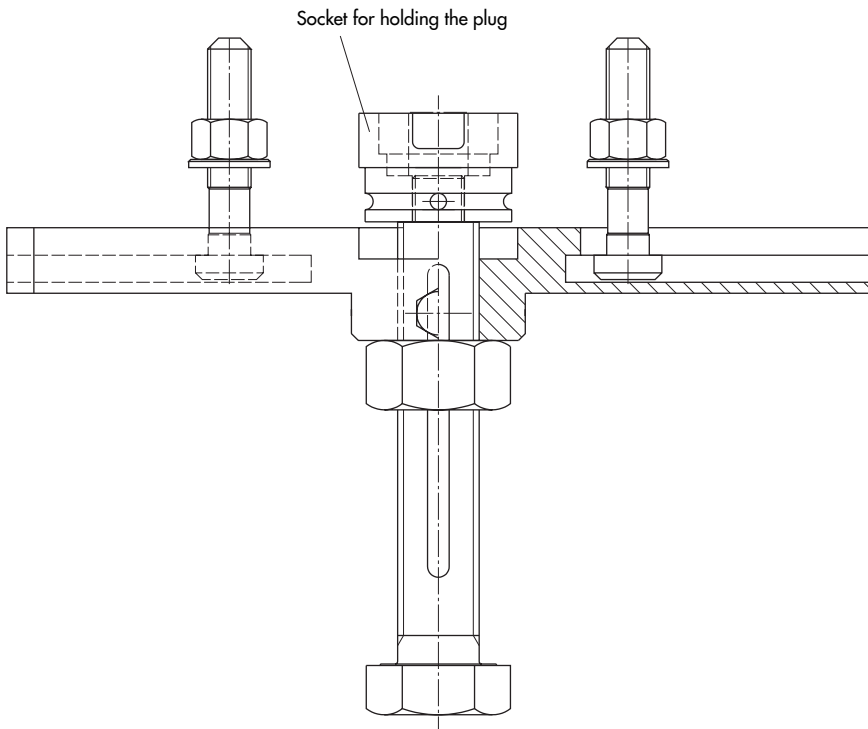


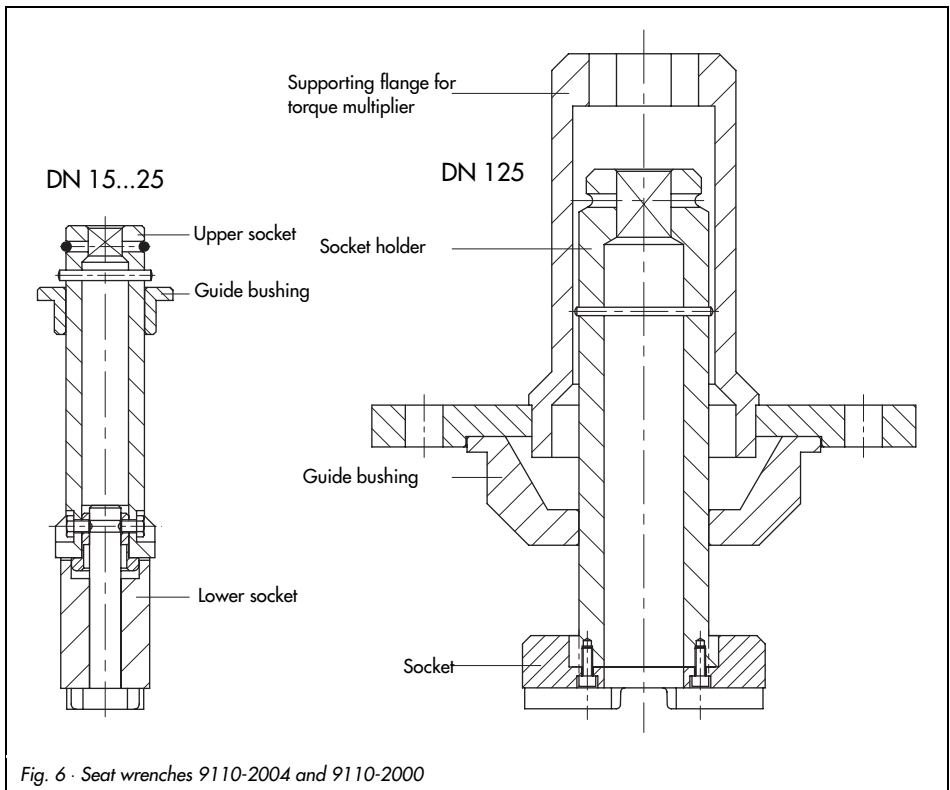
Fig. 5 · Plug-holding wrench 1280-4004

For valves with Model Numbers 2118, 2119, 3205, 3243, 3265

Seat tool DN	Seat wrench (complete)	Socket (individ. part)	Socket (individ. part)	Socket holder (individ. part)	Supp. flange (individ. part)	Guide bushing (individ. part)
15...25	9110-2004	1490-6705	1490-6704	—	—	0460-0470
32...50	9110-1838	0440-0077	1490-6706	—	1490-6707	0460-0471
65...80	9110-1994	0440-0078	—	0320-1337	1490-6708	0460-0472
100	9110-2034	0440-0079	—	0320-1340	1490-6709	0460-0473
125	9110-2000		—		1490-6710	0460-0474
150	9110-2009		—		1490-6711	0460-0469

Note for DN 65 to 100:

2 screws with M5 x 10 (8333-0512) are required to mount the socket onto the socket holder.



For valves with Model Numbers 2392, 2417

Seat tool DN	Seat wrench (complete)	Socket (individual part)	Guide bushing (individual part)	Supporting flange (individual part)
15...25	9110-2003	1490-6705	0460-0470	–
32...50	9110-1837	0440-0077	0460-0471	0410-2804

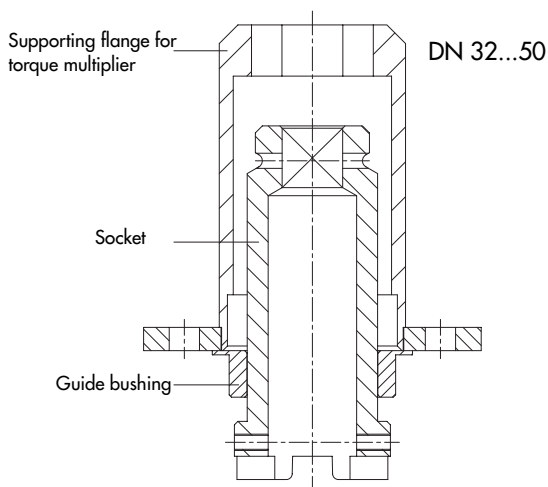


Fig. 7 · Seat wrench 9110-1837

For Type 3510 Micro-flow Control Valves with Model Number 3510

Tools	Order No.
Socket wrench insert for seat bore 10 mm	1280-0001
Socket wrench insert for seat bores 2 to 4 mm	9932-3317
Slotted round nut wrench	1280-3015
Bellows nut wrench	1280-4001
Hook wrench	9932-3001
Bellows rod holder and plug holder	9932-3519
Long socket wrench insert for intermediate piece 24 x 1/2"	9932-3427
Long socket wrench insert for bellows seal bonnet 27 x 1/2"	9932-3429

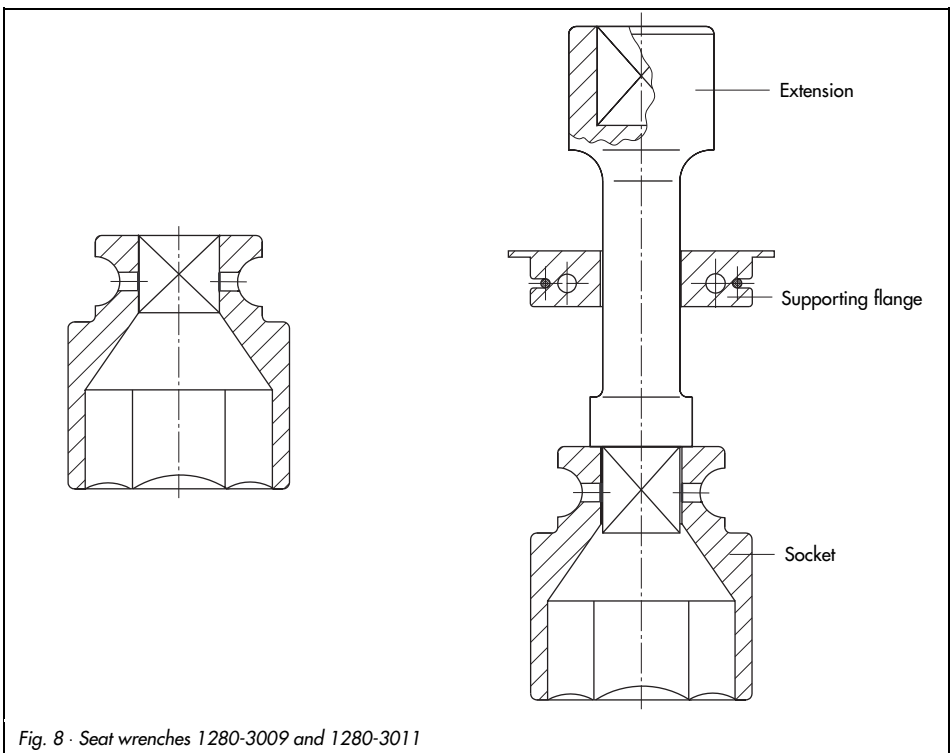
For self-operated regulators with hexagonal seats and flanges**Model Numbers 2111, 2114, 2368, 2392, 2417, 2421, 2422, 2423, (2811)**

DN	Seat wrench (complete)	Width across flats	Socket (individual part)	Supporting flange (individual part)
15...25	–	27	9932-3330	–
32...50	1280-3009	55	–	1790-7288

Screw clamp for removing springs: 9129-2747

For three-way valves with Model Numbers 2118, 2119, (2813)

DN	Seat wrench (complete)	Width across flats	Socket (individ. part)	Extension (individ. part)	Guide bushing (individ. part)
15...25	1280-3010	27	0440-0151	0290-6890	0460-0610
32...50	1280-3011	55	0440-0119	0290-6022	1790-8194



**For self-operated regulators with threaded ends
Model Numbers 2710 to 2730**

DN	Seat wrench	Seat bore in mm	Plug wrench
1/2...1"	1280-3012	4, 8, 12	1280-3001
1/2...1"	1280-3013	20	
1 1/4...2"	1280-3014	40	1280-3007

Note: A plug wrench is required to remove the seat.

For three-way valves with Model Number 2713

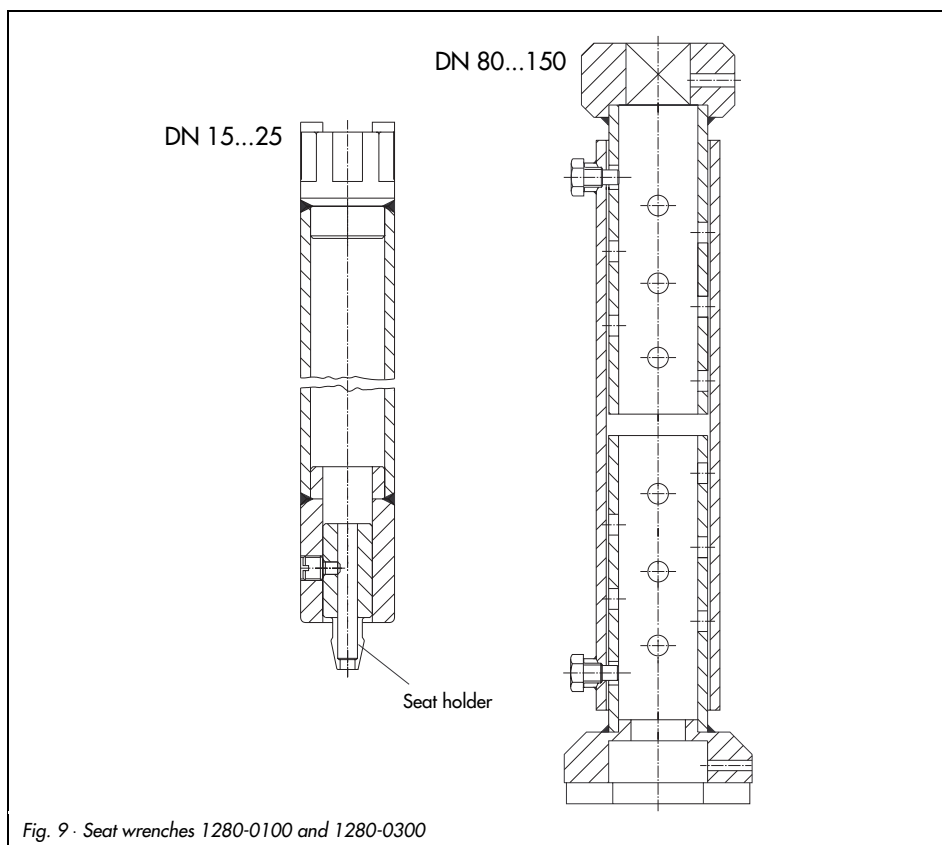
DN	Tools	Order No.
DN 1/2...2"	2 socket wrenches	9932-2344
	Clamp wrench for extension bonnet	1280-3006

For on/off valves with Model Number 3351

Assembly and disassembly tools				
DN	Spring compression plate	Seat wrench	Extension (Air-to-close)	Tightening torque in Nm
15...25	9351-8112	9119-0022	0900-9464	150
32...50	9351-8412	9119-0024	0900-9465	400
65...80	9351-8712	9119-0026	0900-9466	850
100	9351-8012	9119-0076	–	1050

For cryogenic valves with Model Number 3248

DN	Seat wrench with plastic seat holder(s)	
15...25	1280-0100	One or more plastic seat holders belong to each seat wrench.
32...50	1280-0200	
65...150	1280-0300	
or subdivided into		
65...80	1280-0302	
100	1280-0402	
150	1280-0600	



Other tools

Assembly and disassembly tools for Type 3271 and 3277 Actuators		
For	Effective actuator area cm ²	Order No.
Wiper ring	240	1280-3023
	350 and 700	1280-3020
Shaft sealing ring	240	1280-3024
	350 and 700	1280-3021
Dry bearing	240	1280-3025
	350 and 700	1280-3022
Torque wrench		
	Adjustable torque	Order No.
	20 to 120 Nm	9932-3812
	60 to 320 Nm	9932-3814
Torque multiplier		
	Type	Order No.
	IP 30.16 TRS	9932-3800
	IP 70 KRS	9932-3801
Slotted round nut wrench head for torque wrench		
		Order No.
		1280-3005

3. Tools for DN 200 to 400

For valves with nominal sizes DN 200 to 400, you need a hydraulic power tool which produces the tightening or loosening torques necessary for installing or removing seat rings and which generates the same torques at both hexagonal pinion heads (width across flats 36) of the seat wrench.

Note

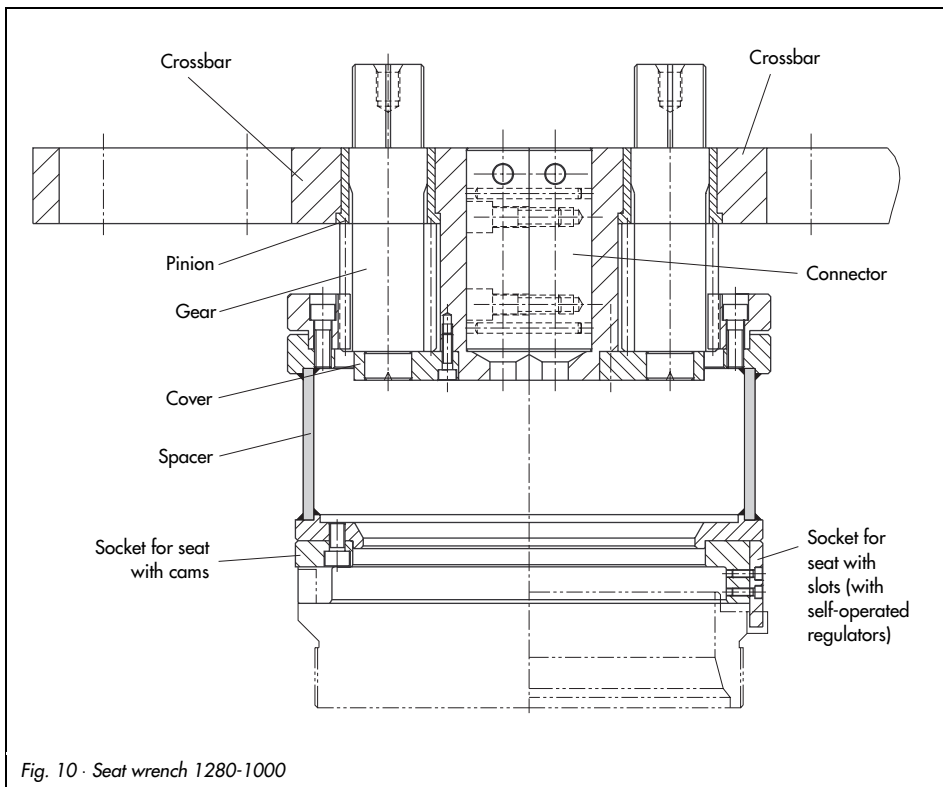
The seat wrenches necessary for removing or installing the seats of all the valves listed in the table below are always equipped with the same completely preassembled crossbars which are parts subjected to wear and which can be ordered from SAMSON (Order No. 0900-5153). Note that you always need two crossbars for one seat wrench.

If you already have one seat wrench or if you need several seat wrenches, it is advisable to contact SAMSON because other parts can be identical apart from the crossbars.

Table: seat wrenches for hydraulic power tool			
Valve Model Number/Type	Nominal size DN in mm	Pressure ratings PN in bar	Order No.
3254, 3284 3251, 3281 3241, 3251, 3281 3241	200 200 200 250	10 to 160 63 to 160 10 to 40 10 to 40	1280-1000
3251, 3254, 3281, 3284	200	250 to 400	1280-1001
3253 - split three-way valve body	200	10 to 160	1280-1002
3253 - undivided three-way valve body	200	63 to 160	1280-1003
3253 - undivided three-way valve body	200	250 to 400	1280-1004
2114, 2422, 2423, 3214	200, 250	10 to 40	1280-1005
3254, 3284 - former body shape until October 1996	250	10 to 40	1280-1100
3254, 3284 - new body shape from October 1996 onward	250 250	63 to 160 10 to 40	1280-1101
3254, 3284	250	250 to 400	1280-1102
3253 - split body	250	10 to 40	1280-1103
3253 - undivided three-way valve body	250	63 to 160	1280-1104
3253 - undivided three-way valve body	250	250 to 400	1280-1105

Tools for DN 200 to 400

3254, 3284, 3253	DN 300	PN 10 to 160	Order No. 1280-1200
3254, 3284	300	250 to 400	1280-1201
2114, 2422	300	10 to 40	1280-1202
3253 - undivided three-way valve body	300	63 to 160	1280-1203
3253 - undivided three-way valve body	300	250 to 400	1280-1204
3253 - split three-way valve body	300	10 to 160	1280-1205
3254, 3284	400	16 to 160	1280-1300
2114, 2422	400	16 to 160	1280-1301
Other tools for 3241, 3243, 3251, 3253, 3254, 3281, 3284			
Hook wrench for gland nut	200, 250	–	1280-3000



4. Tightening torques in Nm

Tightening torques for seats of Series 240 and for self-operated regulators with flanges

(For DN 32 and higher, the torque values indicated are the input torque values. These values have to be multiplied by the multiplication factor in order to calculate the output torque values, tolerance $\pm 1\%$.)

DN	Seat material 1.4006/2.4610	Red. seat bore 1.4571	Max. seat bore 1.4571	Torque multiplier	Multiplication ratio approx.
15...25	170	150	150	Without	–
32...50	50/25*	45	40	9932-3800	1 : 10
65...80	105/60*	90	85		
100	155/80*	140	105		
125	190	170	155		
150	260	230	210		
* Flanged valves with throttle					

Tightening torques for full-shaft studs and reduced-shaft bolts (graphite rings)

DN	Thread	Number of screws	Tightening torque
15...25	M10	4	10
32...50	M12	4	30
65...80	M16	4	60
100	M20	4	100
125	M16	8	60
150	M20	8	100
200	M27	8	230
250	M24	16	170

Tightening torques in Nm

Tightening torques for seats of Series 250 and 280

(For DN 32 and higher, the torque values indicated are the input and not the output torque values.)

DN	All seats of material 1.4006	Red. seat bore 1.4571/1.4301	Max. seat bore 1.4571/1.4301	Torque multiplier	Multiplication ratio approx.
15...25	180	160	160	Without	–
32...40	45	40	36	9932-3800	1 : 10
50	55	50	44		
65...80	130	117	104		
100	180	162	144		
125	93	84	75	9932-3801	1 : 30
150	133	120	107		
With hydraulic power tool					
200	650	585	530	Hydraulic power tool	1 : 7.7
250	810	730	660		1 : 9.25
300	1210	1090	980		1 : 10.7
400	1230	1110	990		1 : 13.8
500	1120	1010	910		1 : 17

Tightening torques for full-shaft studs and reduced-shaft bolts (metal gaskets)

Material: 24 Cr Mo 5					Material: A 193 B7				
PN	DN	Thread	Pieces	Nm	Class	NPS	Thread	Pieces	Nm
40	15	M12	4	30	300	1/2"	5/8" - 11	4	40
	20	M12	4	30		3/4"	5/8" - 11	4	40
	25	M12	4	30		1"	5/8" - 11	4	40
	32	M12	4	30					
	40	M12	4	30		1 1/2"	5/8" - 11	5	54
	50	M16	4	70		2"	3/4" - 10	6	80
	65	M16	6	70					
	80	M16	6	70		3"	3/4" - 10	8	108
	100	M16	6	86		4"	3/4" - 10	12	108
	125	M20	6	172					
	150	M20	8	148		6"	1" - 8	14	200
	200	M27	8	308		8"	1" - 8	8	308
	250	M24	16	228		10"	7/8" - 9	16	200

PN	DN	Thread	Pieces	Nm	Class	NPS	Thread	Pieces	Nm		
40	300	M27	16	334	300	12"	1" - 8	16	334		
	400	M36	16	740		16"	1 3/8" - 6	16	760		
	500	M36	20	800							
					600	1/2"	5/8" - 11	4	40		
						3/4"	5/8" - 11	4	40		
						1"	5/8" - 11	4	40		
						1 1/2"	5/8" - 11	5	54		
						2"	3/4" - 10	6	80		
						3"	3/4" - 10	8	108		
						4"	3/4" - 10	12	108		
						6"	1" - 8	14	200		
						8"	1 1/2" - 6	8	910		
						10"	1 3/2" - 6	12	910		
						12"	1 3/4" - 5	16	1420		
						16"	1 3/4" - 5	16	1890		
160	15	M16	4	64	900	1/2"	3/4" - 10	4	94		
	25	M16	4	64		1"	3/4" - 10	4	94		
	32	M16	5	82							
	40	M16	5	82		1 1/2"	3/4" - 10	8	94		
	50	M20	6	156		2"	1 1/8" - 7	6	280		
	65	M20	8	190							
	80	M20	8	190		3"	3/4" - 10	8	148		
	100	M20	12	174		4"	3/4" - 10	12	136		
	125	M24	12	316							
	150	M24	14	316		6"	1" - 8	14	296		
	200	M39	8	1510		8"	1 1/2" - 6	8	1240		
	250	M39	12	1590		10"	1 1/2" - 6	12	1240		
	300	M39	16	1690		12"	1 3/4" - 5	16	1740		

Tightening torques in Nm

Material: 24 Cr Mo 5					Material: A 193 B7				
PN	DN	Thread	Pieces	Nm	Class	NPS	Thread	Pieces	Nm
320	15	M20	4	148	1500	1/2"	3/4" - 10	4	94
	25	M20	4	148		1"	3/4" - 10	4	94
	40	M20	8	148		1 1/2"	3/4" - 10	8	94
	50	M27	6	360		2"	1 1/8" - 7	6	280
	80	M27	8	472		3"	1 1/8" - 7	8	390
	100	M27	10	506		4"	1 1/8" - 7	10	400
	150	M33	12	960		6"	1 1/4" - 7	12	710
	200	–	–	–		8"	1 3/4" - 5	12	1770
	250	–	–	–		10"	2" - 4.5	12	2950
	300	–	–	–		12"	2" - 4.5	16	3000
400	15	M20	4	174	2500	1/2"	3/4" - 10	4	148
	25	M20	4	174		1"	3/4" - 10	4	148
	40	M20	8	148		1 1/2"	3/4" - 10	5	132
	50	M27	6	440		2"	1 1/8" - 7	6	464
	80	M27	10	470		3"	1 1/8" - 7	8	500
	100	M30	10	694		4"	1 1/4" - 7	12	710
	150	M45	10	1400		6"	1 3/4" - 5	14	1970
	200	–	–	–		8"	–	–	–
	250	M48	16	3500		10"	2 1/4" - 4.5	16	3910

Tightening torques for Type 3510 Micro-flow Control Valves when assembling

Intermediate piece/body	Intermediate piece/bellows bonnet seal	Bellows bonnet seal (extension bonnet)/body	Bellows/bellows bonnet seal	Seat/body
120	120	120	90	20



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Index of Revisions

Rev.	Sheet	Prepared, revised		Checked	Approved			Remark, kind of revision
		Name	Date	Name	Name	Date	Status	
00	1 of 23	V12/sro	2004-09-01	V12/lf	V12/di	2004-09-10	IFR	First issue / FINAL ISSUE