SR 18-TW

water-cooled



Different modular switch units available:

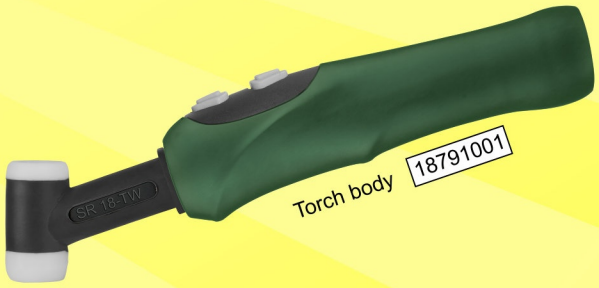
single push-button
double push-button
up/down (4 push-buttons)
single push-button
with potentiometer

320 Amp./100% duty cycle (DC)
240 Amp./100% duty cycle (AC)

HSN 570

SR 18-TW
water-cooled

Equipment:
A standard
B gas lens
D gas lens jumbo
E gas lens mini
F standard mini









Kir Royal argon nozzle
fits equipment line **E**

17930006
for 1,0 - 3,2

with firmly built-in sieves
for perfect gas circulation

A **B** **D** **E** **F**



Gas lens insulator
17089021



Gas lens insulator jumbo
17089031



Collet L50mm
17□□5002 **for** 1,0/1,6/2,4
18□□5002 **for** 3,2/4,0
□□**Please fill in size**



Collet L50mm
17□□5002 **for** 1,0/1,6/2,4
18□□5002 **for** 3,2/4,0
□□**Please fill in size**



Collet L50mm
17□□5002 **for** 1,0/1,6/2,4
18□□5002 **for** 3,2/4,0
□□**Please fill in size**



Collet L29mm
17□□3002 **for** 1,0/1,6/2,4
18323002 **for** 3,2
□□**Please fill in size**



Collet L29mm
17□□3002 **for** 1,0/1,6/2,4
18323002 **for** 3,2
□□**Please fill in size**



Collet body
1796□□02 **for** 1,0/1,6/2,4
1896□□02 **for** 3,2/4,0
□□**Please fill in size**



Gas lens
1796□□11 **for** 1,0/1,6/2,4
1896□□11 **for** 3,2/4,0
□□**Please fill in size**



Gas lens jumbo
1796□□21 **for** 1,0/1,6/2,4
1896□□21 **for** 3,2/4,0
□□**Please fill in size**



Gas lens mini
1796□□31 **for** 1,0/1,6/2,4
18963231 **for** 3,2
□□**Please fill in size**



Collet body mini
1796□□03 **for** 1,0/1,6/2,4
18963203 **for** 3,2
□□**Please fill in size**



Ceramic nozzle L47mm
for standard collet body
Please state size
Also available in
special length L76mm



Ceramic nozzle L42mm
for gas lens
Please state size
Also available in
special length L76mm



Ceramic nozzle L 48mm
for gas lens jumbo
Please state size



Ceramic nozzle L20mm
for gas lens mini
Please state size



Ceramic nozzle L30mm
for standard collet body mini
Please state size
Also available in special lengths
L48mm / L63mm / L89mm

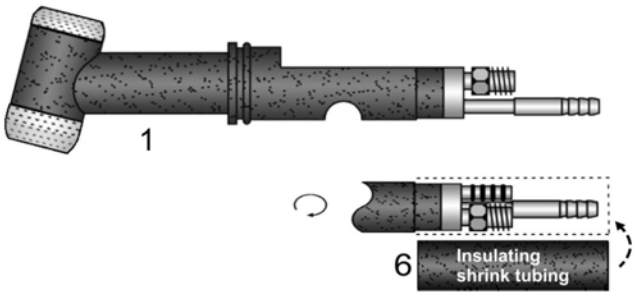
Holch Schweißbrenner

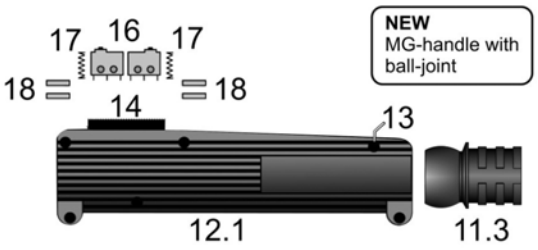
GETESTET EN 60974-7 ISO 9001:2015

www.holch-siegen.de

SR 18-TW water-cooled

320 Ampere at 100% duty cycle (DC) - 240 Ampere at 100% duty cycle (AC)

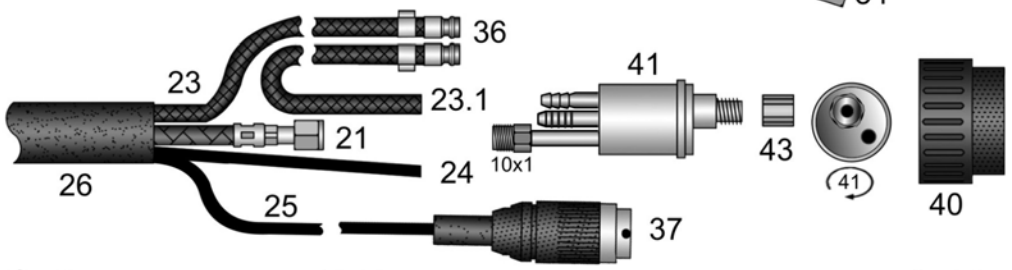


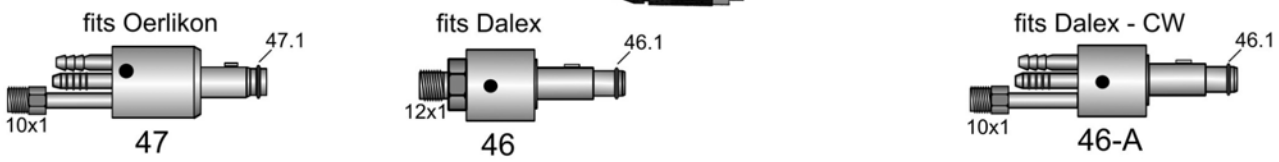


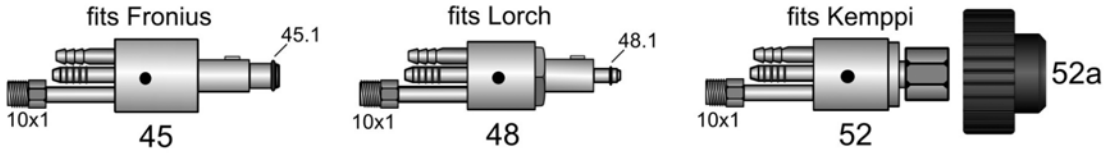
Forma WIG-handle with ball joint - different modular switch units - special switching modules on request

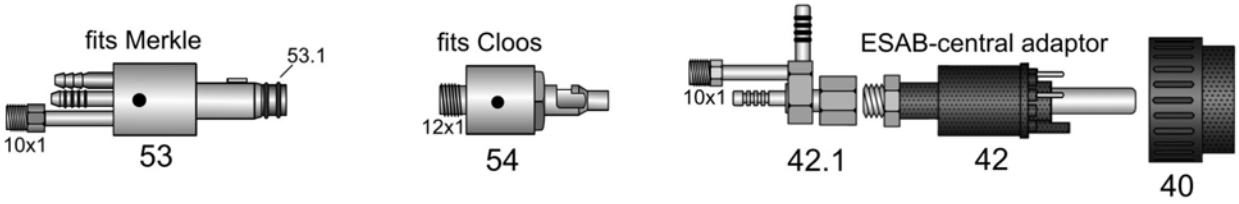


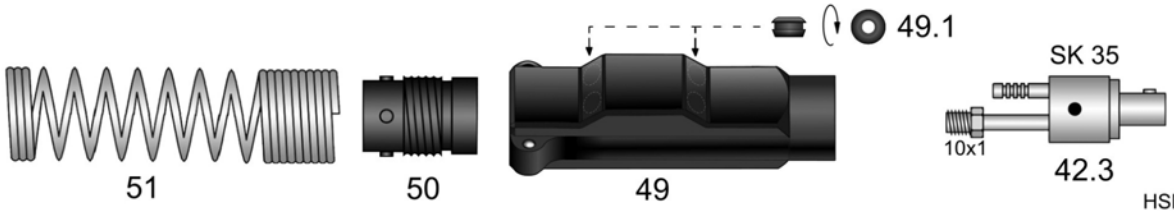






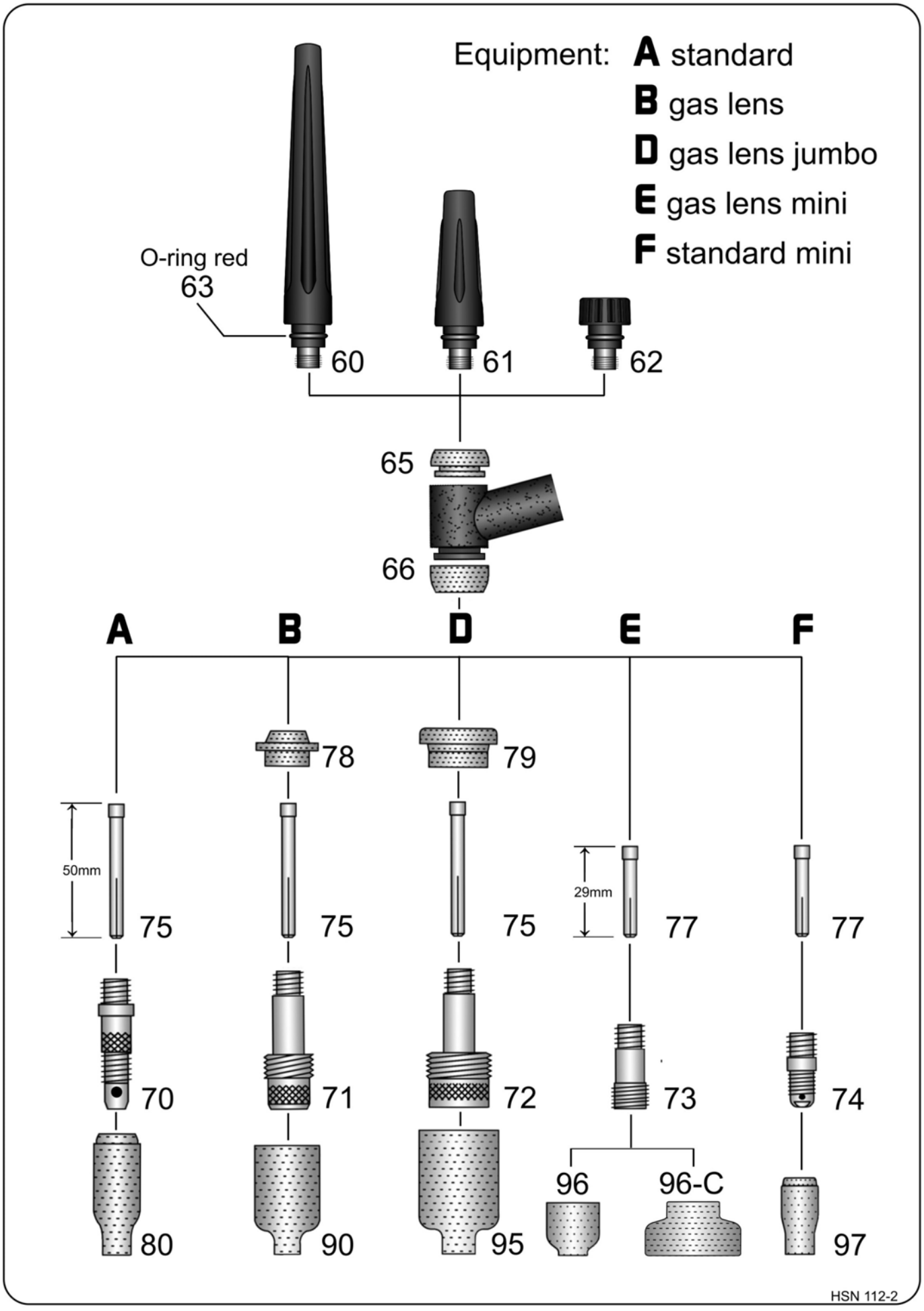






HSN 530-2

SR 18-TW water-cooled spare parts



SR 18-TW

Welding-torch TIG water-cooled

320A at 100% duty cycle (DC) - 240A at 100% duty cycle (AC)

	Art.-No.	
		Torches with first meter leather hose. Machine side separate connections with Tuchel plug.
		In variation to the torches listed below, the torches can also be produced with other power/ water cables (e.g. HT 180 silicone superflexible). This can also be combined with hoses in a lot of different qualities. Torches and cable assemblies can be produced in excess lengths. Please find the different options and surcharges in the attachment "Custom made products" appendix C. We produce torches for more than 40 different brands of machines with different connection systems.
	18700401	**Torch SR 18-TW / 4m cable assembly ST 80 PVC-NIT**
	18700801	**Torch SR 18-TW / 8m cable assembly ST 80 PVC-NIT**
		The following torches are equipped with very flexible and heat resistant HT110 rubber fabric hoses.
	1870040P	**Torch SR 18-TW-PLUS / 4m cable assembly HT 110**
	1870080P	**Torch SR 18-TW-PLUS / 8m cable assembly HT 110**
		TIG-spare cable assemblies in different qualities, machine side with separate connections and Tuchel plug, or, if ordered so, with the following connection systems:
	wig92402	**TIG-spare cable assembly water-cooled 4m - please state desired design!**
	wig92802	**TIG-spare cable assembly water-cooled 8m - please state desired design!**
		The following surcharges for machine side connections are only to find prices quickly. Please use our catalogue "TIG machine side connections" to find a "T"number which identifies a machine side connection system completely.
	29002102	**Surcharge: machine side power/water plug SK35 bayonet connection AD13mm**
	29000201	**Surcharge: machine side with EURO central adapter**
	29002109	**Surcharge: machine side power/water plug fits Merkle with 2 O-rings**
	29002106	**Surcharge: machine side power/water plug fits Fronius with 1 O-ring**
	29002101	**Surcharge: machine side power/water plug fits Dalex with 1 O-ring**
	29002108	**Surcharge: machine side power/water plug fits Oerlikon with 1 O-ring**
	29002104	**Surcharge: machine side power/water plug fits Lorch SK35 + gas-nipple**
	29002105	**Surcharge: machine side power/water plug fits Kemppi IT-G1/4"**
	29002110	**Surcharge: machine side power/water plug fits Cloos**
	29000212	**Surcharge: machine side fits ESAB central adapter, 4 pins installed at position 3,4,5,6**
		Please note that there might be additional charges for special control line plugs. See appendix D.
1	**18791001**	**Torch body SR 18-TW**
6	**18050002**	**Ignition insulating hose L75mm / ID32mm down to ID16mm**
11.1	**91914601**	**Forma TIG handle with screws, ball joint, without modular switch unit**
11.2	**91914602**	**Forma screw for handle**
11.3	**91914603**	**Forma hose bracket with ball joint ID21,5mm (also fits MG-handle)**
11.4	**91914611**	**Forma modular switch unit: 1 button with connecting adapter**
11.5	**91914621**	**Forma modular switch unit: 2 buttons with connecting adapter**
11.6	**91914631**	**Forma modular switch unit: 1 button + potentiometer (10k) with connecting adapter**
11.7	**91914641**	**Forma modular switch unit: 2 buttons + up/down (4 switches) with connecting adapter**
11.8	**91914651**	**Forma connecting adapter fits control line to modular switch unit**
N.i.	**91914661**	**Forma switch module safety nipple**
N.i.	**91914671**	**TW-steadying adapter, anti turn locking for TW-torch bodies**
12.1	**91914061**	**MG-handle with ball joint, push-button, 2 return springs, 2 microswitches and 4 cylindrical pins**

SR 18-TW

Welding-torch TIG water-cooled

320A at 100% duty cycle (DC) - 240A at 100% duty cycle (AC)

	Art.-No.	
13	**91914421**	**MG-tapping screw**
14	**91915002**	**MG-push button**
16	**91914121**	**MG-microswitch**
17	**91914221**	**MG-return spring**
18	**91914321**	**MG-cylindrical pin**
		Please state the machine side connection for the following power/ water cables.
		For 4m long torches:
20	**12942401**	**ST 80 PVC-NIT power/water cable 10mm² 12/18/20-TW / 4m**
20	**12942403**	**HT 110 rubber fabric hose power/water cable 10mm² 12/18/20-TW / 4m**
20	**12942405**	**HT 130 TPE power/water cable 10mm² 12/18/20-TW / 4m**
20	**12942408**	**HT 180 silicone super flexible power/water cable 10mm² 12/18/20-TW / 4m**
		For 8m long torches:
20	**12942801**	**ST 80 PVC-NIT power/water cable 10mm² 12/18/20-TW / 8m**
20	**12942803**	**HT 110 Rubber fabric hose power/water cable 10mm² 12/18/20-TW / 8m**
20	**12942805**	**HT 130 TPE power/water cable 10mm² 12/18/20-TW / 8m**
20	**12942808**	**HT 180 silicone super flexible power/water cable 10mm² 12/18/20-TW / 8m**
		The following power/ water cables are produced with M10x1 inner thread at the machine side for EURO central adapters. (fits to all Holch connection systems with outher thread M10x1).
		For 4m long torches:
21	**12942411**	**ST 80 PVC-NIT power/water cable 10mm² 12/18/20-TW / 4m**
21	**12942413**	**HT 110 rubber fabric hose power/water cable 10mm² 12/18/20-TW / 4m**
21	**12942415**	**HT 130 TPE power/water cable 10mm² 12/18/20-TW / 4m**
21	**12942418**	**HT 180 silicone super flexible power/water cable 10mm² 12/18/20-TW / 4m**
		For 8m long torches:
21	**12942811**	**ST 80 PVC-NIT power/water cable 10mm² 12/18/20-TW / 8m**
21	**12942813**	**HT 110 rubber fabric hose power/water cable 10mm² 12/18/20-TW / 8m**
21	**12942815**	**HT 130 TPE power/water cable 10mm² 12/18/20-TW / 8m**
21	**12942818**	**HT 180 silicone super flexible power/water cable 10mm² 12/18/20-TW / 8m**
		Reel goods:
		Prices are per meter and only applicable for purchasing of complete rolls
23	**50150001**	**Meter ST 80 PVC-NIT fabric hose ID5,0-W1,5mm blue for water (100m)**
23	**51700002**	**Meter HT 110 rubber fabric hose ID5,0-W1,7mm blue for water (150m)**
23.1	**50151001**	**Meter ST 80 PVC-NIT fabric hose ID5,0-W1,5mm red for water (100m)**
23.1	**51700003**	**Meter HT 110 rubber fabric hose ID5,0-W1,7mm red for water (150m)**
24	**31000001**	**Meter ST 70 PVC hose ID3,0-W1,0mm black for gas (100m)**
24	**31200002**	**Meter HT 130 TPE hose ID3-W1,2mm yellow for gas (100m)**
N.i.	**91902701**	**Meter control line 3x0,34mm² shielded black (100m)**
N.i.	**91902711**	**Meter control line 3x0,5mm² green (100m)**
25	**91902721**	**Meter control line 5x0,25mm² grey (100m)**
26	**22150002**	**Meter neoprene protective hose ID22mm black (40m)**
N.i.	**91915004**	**Leather protective hose ID22mm / 1 meter long**
N.i.	**91915007**	**Leather protective hose ID22mm / 1 meter long with ball joint and hose connector**
N.i.	**91915013**	**Hose connector leather protective hose / protection hose ID22,5mm (black) with slot, OD with grooves**
34	**91901501**	**Coupling nut IT-G1/4"**

SR 18-TW

Welding-torch TIG water-cooled

320A at 100% duty cycle (DC) - 240A at 100% duty cycle (AC)

	Art.-No.	
N.i.	91901211	Hose connector 4mm fits coupling nut R1/4""
35	91901601	Coupling nut IT-G3/8"
N.i.	91901301	Hose connector 5mm fits Coupling nut R3/8"
36	91901001	Cooling liquid plug nipples EURO
N.i.	91901008	Closing cap blue fits cooling liquid plug nipples EURO
N.i.	91901009	Closing cap red fits cooling liquid plug nipples EURO
37	91904101	Plug 3-poles Tuchel with bayonet-catch
37	91904111	Plug 5-poles Tuchel with bayonet-catch
		More control line plugs see appendix D
40	91900701	Terminal nut insulated fits EURO central adapter
41	91900211	TIG central adapter EURO central adapter water cooled
42	91900301	TIG central adapter identical ESAB, 4 contact pins at position 3,4,5,6
42.1	91918571	TIG power/cooling liquid junction fits ESAB central adapter
42.3	91918312	TIG central adapter SK-35 bayonet connection AD13mm
43	91900901	Swivel nut IT-M10x1 (rounded edges) fits EURO central adapter
45	91918327	Power/water plug fits Fronius with 1 O-ring (OT-M10x1 / like EURO central adapter)
45.1	62190001	O-ring ID6,2-W1,9mm fits Fronius
46	9190417e	Power/water plug fits Dalex (1 O-ring) (OT-12x1)
46-A	9190418n	Power-/gasplug fits Dalex with waterdeviation to outside, CW-System with 1 O-ring
46.1	63240001	O-ring ID6,3-W2,4mm fits Dalex
47	9190423n	Power/water plug fits Oerlikon with 1 O-ring (OT-M10x1 / like EURO central adapter)
47.1	60717801	O-ring ID6,07-W1,78mm fits Oerlikon
48	9190420n	Power/water plug fits Lorch SK35 + gas-nipple (OT-10x1 / like EURO central adapter)
48.1	91900801	O-ring ID4-W1mm fits gas-nipple EURO central adapter
o.A	91900552	TIG cable support long (like MIG-MAG) with screws fits ESAB central adapter
N.i.	91900554	Attachment screw M4x8mm fits ESAB central adapter
49	91900557	TIG cable support short with screws (fits water-cooled)
N.i.	91920702	Screw M3x11,5mm fits Ratio/Industry/RAUCH handle and cable support
N.i.	91920703	M3 mounting socket fits Ratio/Industry/RAUCH handle and cable support
o.A.	91900602	Screw M4x6mm fits TIG cable support short
49.1	91901012	Reduction-eyelet (rubber) from ID10,5mm to ID5mm fits TIG cable support short
N.i.	91921701	PUR hose ID8,5-W1,0mm 150mm long fits leading water hoses into cable support
50	91912801	Spring-socket fits cable support
51	91912601	Cable support spring
52	9190419n	Power/water plug fits Kemppi IT-G1/4" (AG-M10x1 / like EURO central adapter)
52a	91903503	Insulating sleeve with inner hexagonal shape A/F17 for TIG power-connection IT-G1/4"
53	9190424n	Power/water plug fits Merkle with 2 O-rings (OT-M10x1 / like EURO central adapter)
53.1	81600001	O-ring ID8-W1,6mm fits Lorch/Merkle
54	9190415n	Powerplug fits Cloos (special-plug) (OT-12x1)
60	17191311	Holch back cap long (USA version with red O-ring) SR 17-18-26 57Y02
61	17191321	Holch back cap medium (USA version with red O-ring) SR 17-18-26 57Y03
62	17191301	Holch back cap short (USA version with red O-ring) SR 17-18-26 57Y04
63	17189001	O-ring red ID8-W2mm for back cap
65	17289001	PTFE-back-cap gasket ring SR 17-18-26 18-7

SR 18-TW

Welding-torch TIG water-cooled

320A at 100% duty cycle (DC) - 240A at 100% duty cycle (AC)

	Art.-No.	
66	**17289021**	**PTFE-isolator SR 17-18-26 18CG**
70	**17961002**	**Collet body 17-18-26-220 / 1,0 10N30**
70	**17961602**	**Collet body 17-18-26-220 / 1,6 10N31**
70	**17962402**	**Collet body 17-18-26-220 / 2,4 10N32**
70	**18963202**	**Collet body 17-18-26-220 / 3,2 10N28**
70	**18964002**	**Collet body 17-18-26-220 / 4,0 406488**
71	**17961011**	**Gas lens 17-18-26-220 / 1,0 45V24**
71	**17961611**	**Gas lens 17-18-26-220 / 1,6 45V25**
71	**17962411**	**Gas lens 17-18-26-220 / 2,4 45V26**
71	**18963211**	**Gas lens 17-18-26-220 / 3,2 45V27**
71	**18964011**	**Gas lens 17-18-26-220 / 4,0 45V28**
72	**17961021**	**Jumbo-Gas lens 17-18-26-220 / 1,0 45V0204**
72	**17961621**	**Jumbo-Gas lens 17-18-26-220 / 1,6 45V116**
72	**17962421**	**Jumbo-Gas lens 17-18-26-220 / 2,4 45V64**
72	**18963221**	**Jumbo-Gas lens 17-18-26-220 / 3,2 995795**
72	**18964021**	**Jumbo-Gas lens 17-18-26-220 / 4,0 45V63**
73	**17961031**	**Gas lens "Mini" SR 17-18-26 / 1,0 conversion kit**
73	**17961631**	**Gas lens "Mini" SR 17-18-26 / 1,6 conversion kit**
73	**17962431**	**Gas lens "Mini" SR 17-18-26 / 2,4 conversion kit**
73	**18963231**	**Gas lens "Mini" SR 17-18-26 / 3,2 conversion kit**
74	**18961003**	**Collet body "Mini" SR 17-18-26 1,0 conversion kit**
74	**18961603**	**Collet body "Mini" SR 17-18-26 1,6 conversion kit**
74	**18962403**	**Collet body "Mini" SR 17-18-26 2,4 conversion kit**
74	**18963203**	**Collet body "Mini" SR 17-18-26 / 1,0 - 3,2 17CB20 conversion kit**
		Brazen collets L-50mm suitable equipment line (A) standard collet body suitable equipment line (B) gas lens suitable equipment line (D) gas lens jumbo
75	**17105002**	**Collet L50mm SR 17-18-26 wp-18SC / 1,0 10N22**
75	**17165002**	**Collet L50mm SR 17-18-26 wp-18SC / 1,6 10N23**
75	**17245002**	**Collet L50mm SR 17-18-26 wp-18SC / 2,4 10N24**
75	**18325002**	**Collet L50mm SR 17-18-26 wp-18SC / 3,2 10N25**
75	**18405002**	**Collet L50mm SR 17-18-26 / 4,0 10N20**
		Copper-collets L-29mm suitable equipment line (F) standard collet body mini
77	**17103002**	**Collet L29mm SR 17-18-26 "Mini" 1,0 10N22S**
77	**17163002**	**Collet L29mm SR 17-18-26 "Mini" 1,6 10N23S**
77	**17243002**	**Collet L29mm SR 17-18-26 "Mini" 2,4 10N24S**
77	**18323002**	**Collet L29mm SR 17-18-26 "Mini" 3,2 10N25S**
78	**17089021**	**PTFE-Gas-lens insulator 17-18-26-220 54N01**
79	**17089031**	**PTFE-Gas-lens insulator Jumbo 17-18-26-220 54N63**
		Ceramic gas nozzles in different lengths suitable equipment line (A) standard collet body
80	**17930401**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.4 10N50 (pu=10pieces)**

SR 18-TW

Welding-torch TIG water-cooled

320A at 100% duty cycle (DC) - 240A at 100% duty cycle (AC)

	Art.-No.	
80	**17930501**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.5 10N49 (pu=10pieces)**
80	**17930601**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.6 10N48 (pu=10pieces)**
80	**17930701**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.7 10N47 (pu=10pieces)**
80	**17930801**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.8 10N46 (pu=10pieces)**
80	**17930101**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.10 10N45 (pu=10pieces)**
80	**17930121**	**Ceramic gas nozzle L47mm 17-18-26-220 / Gr.12 10N44 (pu=10pieces)**
N.i.	**17930404**	**Ceramic gas nozzle L76mm 17-18-26-220 / Gr.4 10N50L (pu=10pieces)**
N.i.	**17930504**	**Ceramic gas nozzle L76mm 17-18-26-220 / Gr.5 10N49L (pu=10pieces)**
N.i.	**17930604**	**Ceramic gas nozzle L76mm 17-18-26-220 / Gr.6 10N48L (pu=10pieces)**
N.i.	**17930704**	**Ceramic gas nozzle L76mm 17-18-26-220 / Gr.7 10N47L (pu=10pieces)**
		Ceramic gas nozzles in different lengths suitable equipment line (B) gas lens
90	**22093041**	**Gas nozzle for gas lens L42mm / Gr.4 54N18 (pu=10pieces)**
90	**22093051**	**Gas nozzle for gas lens L42mm / Gr.5 54N17 (pu=10pieces)**
90	**22093061**	**Gas nozzle for gas lens L42mm / Gr.6 54N16 (pu=10pieces)**
90	**22093071**	**Gas nozzle for gas lens L42mm / Gr.7 54N15 (pu=10pieces)**
90	**22093081**	**Gas nozzle for gas lens L42mm / Gr.8 54N14 (pu=10pieces)**
90	**22093111**	**Gas nozzle for gas lens L42mm / Gr.11 54N19-11 (pu=10pieces)**
90	**22093121**	**Gas nozzle for gas lens L42mm / Gr.12 54N19 (pu=10pieces)**
N.i.	**22093054**	**Gas nozzle for gas lens L76mm / Gr.5 54N17L (pu=10pieces)**
N.i.	**22093064**	**Gas nozzle for gas lens L76mm / Gr.6 54N16L (pu=10pieces)**
N.i.	**22093074**	**Gas nozzle for gas lens L76mm / Gr.7 54N15L (pu=10pieces)**
N.i.	**22093084**	**Gas nozzle for gas lens L76mm / Gr.8 54N14L (pu=10pieces)**
		Ceramic gas nozzles jumbo in different lengths suitable eqipment line (D) gas lens jumbo
95	**22093066**	**Jumbo gas nozzle L48mm / Gr.6 57N75 (pu=10pieces)**
95	**22093086**	**Jumbo gas nozzle L48mm / Gr.8 57N74 (pu=10pieces)**
95	**22093106**	**Jumbo gas nozzle L48mm / Gr.10 53N88 (pu=10pieces)**
95	**22093126**	**Jumbo gas nozzle L48mm / Gr.12 53N87 (pu=10pieces)**
N.i.	**22093067**	**Jumbo gas nozzle L73mm / Gr.6 57N75L (pu=10pieces)**
N.i.	**22093087**	**Jumbo gas nozzle L73mm / Gr.8 57N74L (pu=10pieces)**
N.i.	**22093107**	**Jumbo gas nozzle L73mm / Gr.10 53N88L (pu=10pieces)**
N.i.	**22093127**	**Jumbo gas nozzle L73mm / Gr.12 53N87L (pu=10pieces)**
		Ceramic gas nozzles L-20mm suitable equipment line (E) gas lens mini
96	**17930502**	**Ceramic gas nozzle L20mm SR 17-18-26 / Gr.5 fits gas lens "Mini" 53N59MS (pu=10pieces)**
96	**17930602**	**Ceramic gas nozzle L20mm SR 17-18-26 / Gr.6 fits gas lens "Mini" 53N60MS (pu=10pieces)**
96	**17930702**	**Ceramic gas nozzle L20mm SR 17-18-26 / Gr.7 fits gas lens "Mini" 53N61MS (pu=10pieces)**
96-C	**17930006**	**Ceramic nozzle for gas lens Kir Royal 17-18-26 / fits tuncsten electrodes up to 3,2mm**
		Ceramic gas nozzles suitable equipment line (F) collet body standard mini
97	**20930401**	**Ceramic gas nozzle L30mm / Gr. 4 13N08 (pu=10pieces)**
97	**20930501**	**Ceramic gas nozzle L30mm / Gr. 5 13N09 (pu=10pieces)**
97	**20930601**	**Ceramic gas nozzle L30mm / Gr. 6 13N10 (pu=10pieces)**
97	**20930701**	**Ceramic gas nozzle L30mm / Gr. 7 13N11 (pu=10pieces)**

SR 18-TW

Welding-torch TIG water-cooled

320A at 100% duty cycle (DC) - 240A at 100% duty cycle (AC)

	Art.-No.	
97	**20930801**	**Ceramic gas nozzle L30mm / Gr. 8 13N12 (pu=10pieces)**
97	**20930101**	**Ceramic gas nozzle L30mm / Gr.10 13N13 (pu=10pieces)**
o.A	**20930304**	**Ceramic gas nozzle L48mm / Gr. 3 796F70 (pu=10pieces)**
o.A	**20930404**	**Ceramic gas nozzle L48mm / Gr. 4 796F71 (pu=10pieces)**
o.A	**20930504**	**Ceramic gas nozzle L48mm / Gr. 5 796F72 (pu=10pieces)**
o.A	**20930604**	**Ceramic gas nozzle L48mm / Gr. 6 796F73 (pu=10pieces)**
o.A	**20930306**	**Ceramic gas nozzle L63mm / Gr. 3 796F74 (pu=10pieces)**
o.A	**20930406**	**Ceramic gas nozzle L63mm / Gr. 4 796F75 (pu=10pieces)**
o.A	**20930506**	**Ceramic gas nozzle L63mm / Gr. 5 796F76 (pu=10pieces)**
o.A	**20930606**	**Ceramic gas nozzle L63mm / Gr. 6 796F77 (pu=10pieces)**
o.A	**20930408**	**Ceramic gas nozzle L89mm / Gr. 4 796F79 (pu=10pieces)**

Top quality tungsten electrodes in 8 different qualities, see appendix A.