

# **LAVATEC**

*Laundry Technology GmbH*

## **SPARE PARTS LIST**

**L A V A D R Y**  
**MODELL**

**FL 643**



**Serial N°**  
**Wiring Diagram**

**LAVATEC**  
**Laundry Technology GmbH**  
Wannenäckerstraße 53  
D – 74078 Heilbronn  
Telefon 0 71 31 / 29 80  
[www.lavatec-laundry.com](http://www.lavatec-laundry.com)

**ET-FL643-V13.01.10\_GB**

## **9. SPARE PARTS LIST**

### **ORDERING SPARE PARTS**

When ordering spare parts, please include the following information with your order:

1. Model and serial number of the equipment (located on the name plate).
2. Part number, part name, and quantity required. Use the manual to facilitate ordering.
3. When ordering electrical motors please include complete name plate data, motor manufacturer, and wiring diagram number.

Our service and service parts department is staffed with specially trained personnel to assist you with your needs. Please do not hesitate to call if we can be of any assistance.

**SUBJECT TO CHANGES WITHOUT NOTIFICATION**

## **9-0.1 TABLE OF CONTENTS**

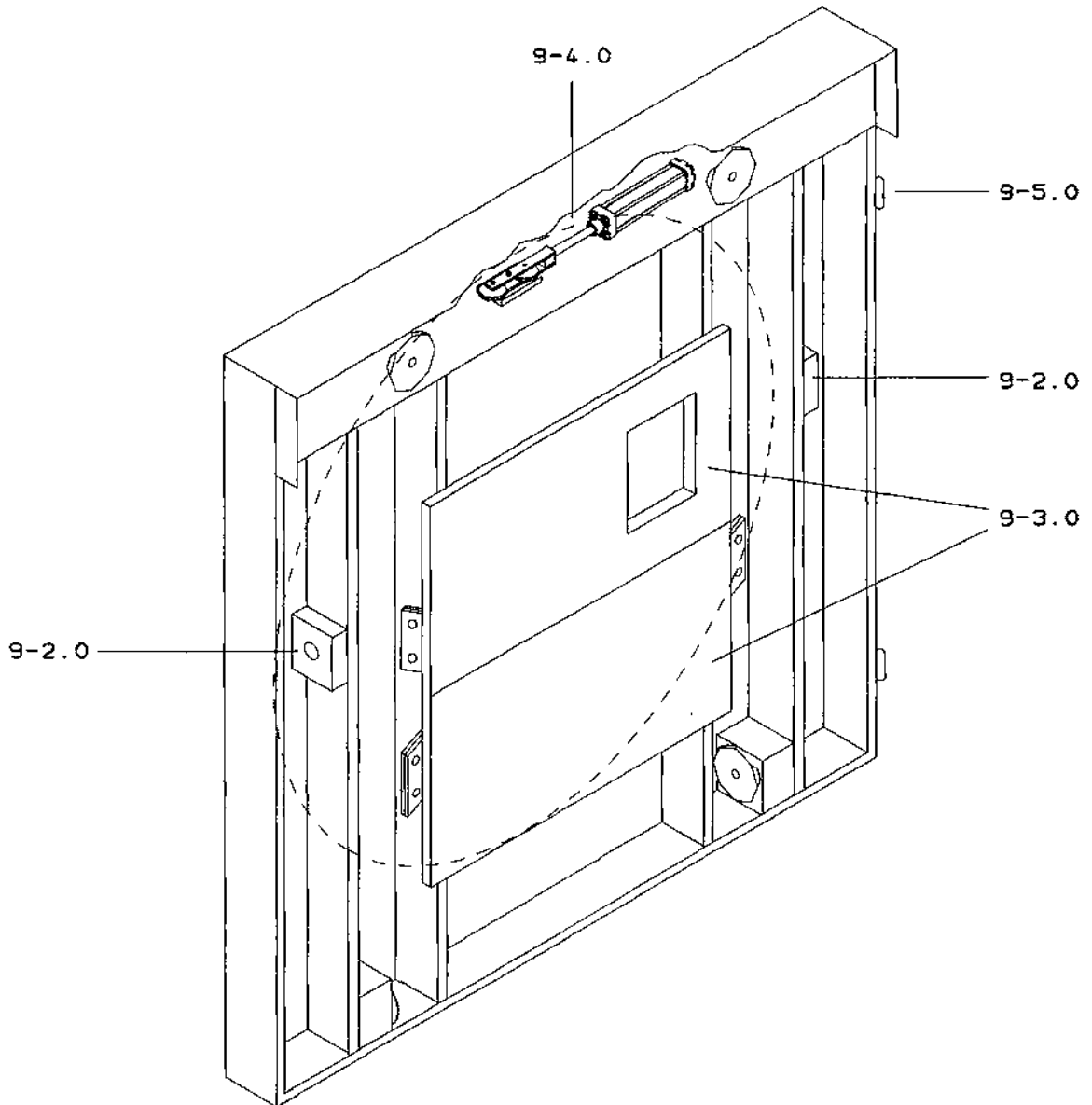
	Page
Front panel (overview)	9-1.0
Thrust roller assembly front and rear panel	9-2.0
Loading door assembly	9-3.0
Cable system and cylinder front panel	9-4.0
Hinge assembly and side door	9-5.0
Free	9-6.0
Free	9-7.0
Drum drive assembly	9-8.0
Drum suspension assembly	9-9.0
Drum and seals assembly	9-10.0
Free	9-11.0
Lint screen	9-12.0
Gas burner with blower and control flap	9-13.0
Free	9-14.0
Monitoring devices	9-15.0
Blower housing (overview) gas	9-16.0
Gas control assembly, 230V / 50Hz      valid until Dec. 95	9-17.0
Gas control assembly, 230V / 50Hz      valid from Jan. 96	9-17.5
Gas control assembly, 115V / 60Hz      valid until Dec. 95	9-17.10
Gas heating surface burner minnox, version: Europe	9-18.0
Gas heating surface burner minnox, version: USA-CND	9-19.0
Gas heating line burner, Version: Europe	9-20.0
Gas heating line burner, Version: USA-CND	9-20.10
Blower housing (overview) steam - bypass	9-21.0
Steam exchanger and steam screens	9-22.0
Cylinder (bypass) - Cylinder (make-up air)	9-23.0
Fresh air flap, from serial nr. 6430133	9-24.0
Pneumatic system valid until May 2010	9-25.0
Tilt cylinder assembly	9-26.0
Blower assembly	9-27.0
Sprinkler system	9-28.0
Pneumatic system valid from June 2010	9-29.0

TYPE 643

FRONT PANEL (OVERVIEW)

Page

9-1.0



TYPE 643

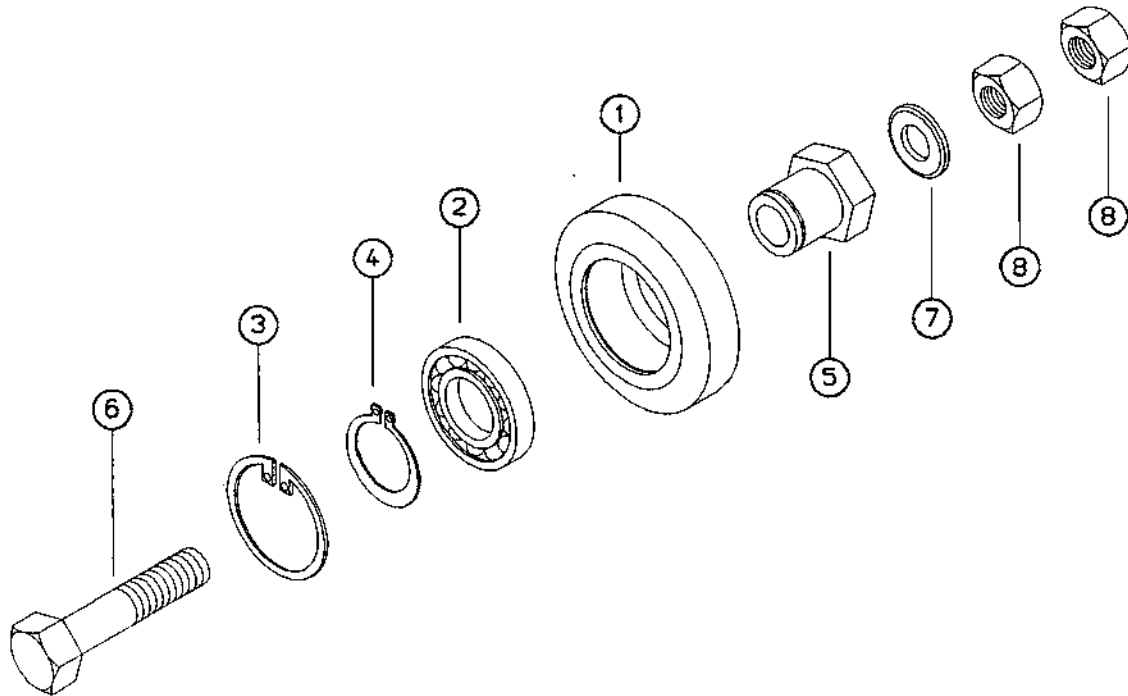
THRUST ROLLER ASSEMBLY  
FRONT AND REAR PANEL

Page

9-2.0

Adjustment Instruction

If the friction wheel is at the forward drum ring, then the friction wheel at the back should be free and not rotating. This means, that at least on one side of the drum, the friction wheel must run free.



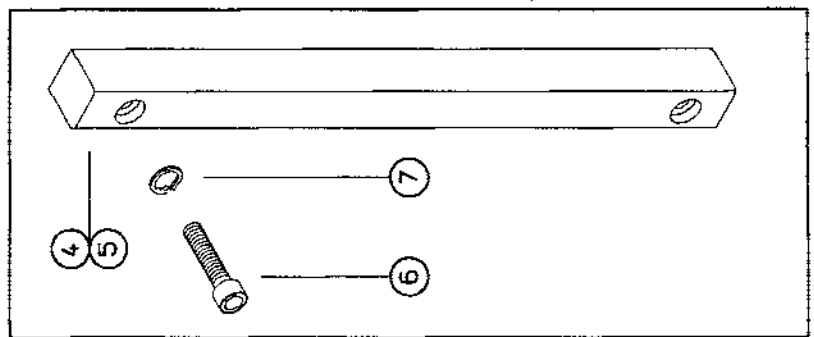
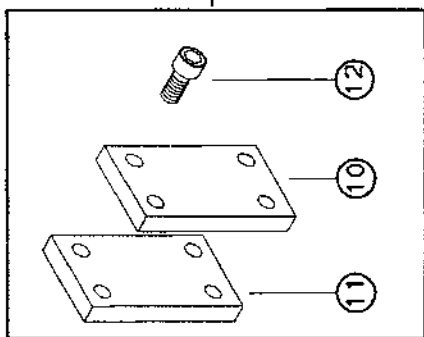
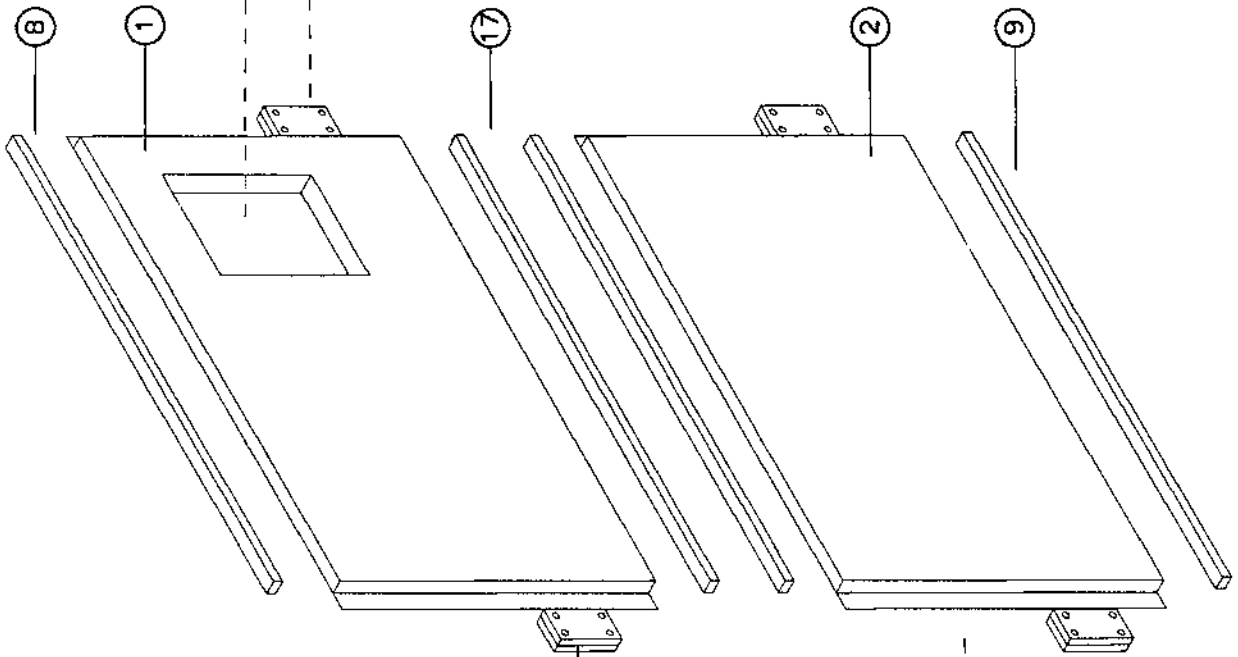
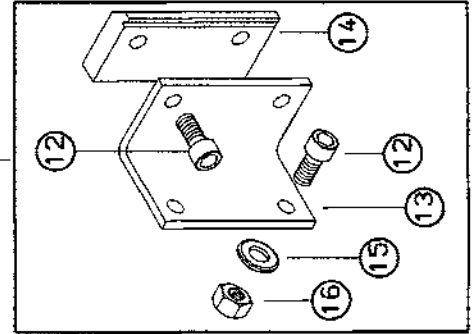
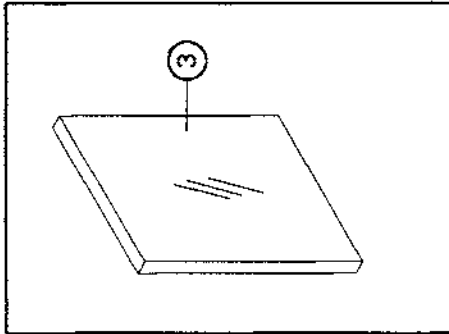
Type		Spare Parts List			Page
643		Thrust Roller Assembly Front and Rear Panel			9-2.1
Pos.	Part-No.	Part Name	Description	Quant.	
1	223 342-4	Wheel, Friction	d=100 mm	4	
2	100 031	Bearing, Ball	6205 2 RS	4	
3	025 007	Ring, Snap	DIN 472 52x2	4	
4	025 005	Ring, Snap	DIN 472 25x1.2	4	
5	223 343-4	Bolt, Eccentric		4	
6	020 452	Bolt, Hex	DIN 931 M10x70	4	
7	020 713	Washer, Tension	DIN 6796 10.0	4	
8	020 038	Nut, Hex	DIN 934 M10	8	
	914 046-5	Wheel, Friction Pos. 1,2,3.	d=100 mm	4	
	236 613-4	Wheel, Friction consists of: Positions 1, 2, 3, 4, 5			

TYPE 643

LOADING DOOR ASSEMBLY

Page

9-3.0



Type		Spare Parts List			Page
643		Loading Door			9-3.1
Pos.	Part No.	Part Name	Description	Quant.	
1	223 994-2	Door, Loading - top, Replacem.	239 966-5	1	
	239 966-5	Door, Loading - top with Pane		1	
2	223 993-2	Door, Loading - bottom, Replacem.	228 724-2	1	
	228 724-2	Door, Loading - bottom,		1	
3	220 130-4	Washer		1	
4	224 023-4	Slide - top	MS 408 mm	2	
5	224 087-4	Slide - bottom	MS 653 mm	2	
6	020 566	Bolt, Allen	DIN 912 M6x25	8	
7	020 562	Washer, Spring	DIN 7980 6	8	
8	005 734	Moltopren-Insulation - top	25x20x1040	1	
9	005 733	Moltopren-Insulation - bottom	25x15x1040	1	
10	223 971-4	Bracket, Clamping (narrow)		4	
11	223 970-4	Bracket, Clamping (wide)		3	
12	020 006	Bolt, Allen	DIN 912 M8x16	16	
13	224 583-3	Bracket		1	
14	225 114-4	Bracket, Clamping		1	
15	020 712	Washer, Tension	DIN 6796 A8.0	2	
16	020 037	Nut, Hex	DIN 934 M8	2	
17	123 047	Strip, Felt	5x40x1300	1	
18	124 022-3	Cable	10130 mm	1	



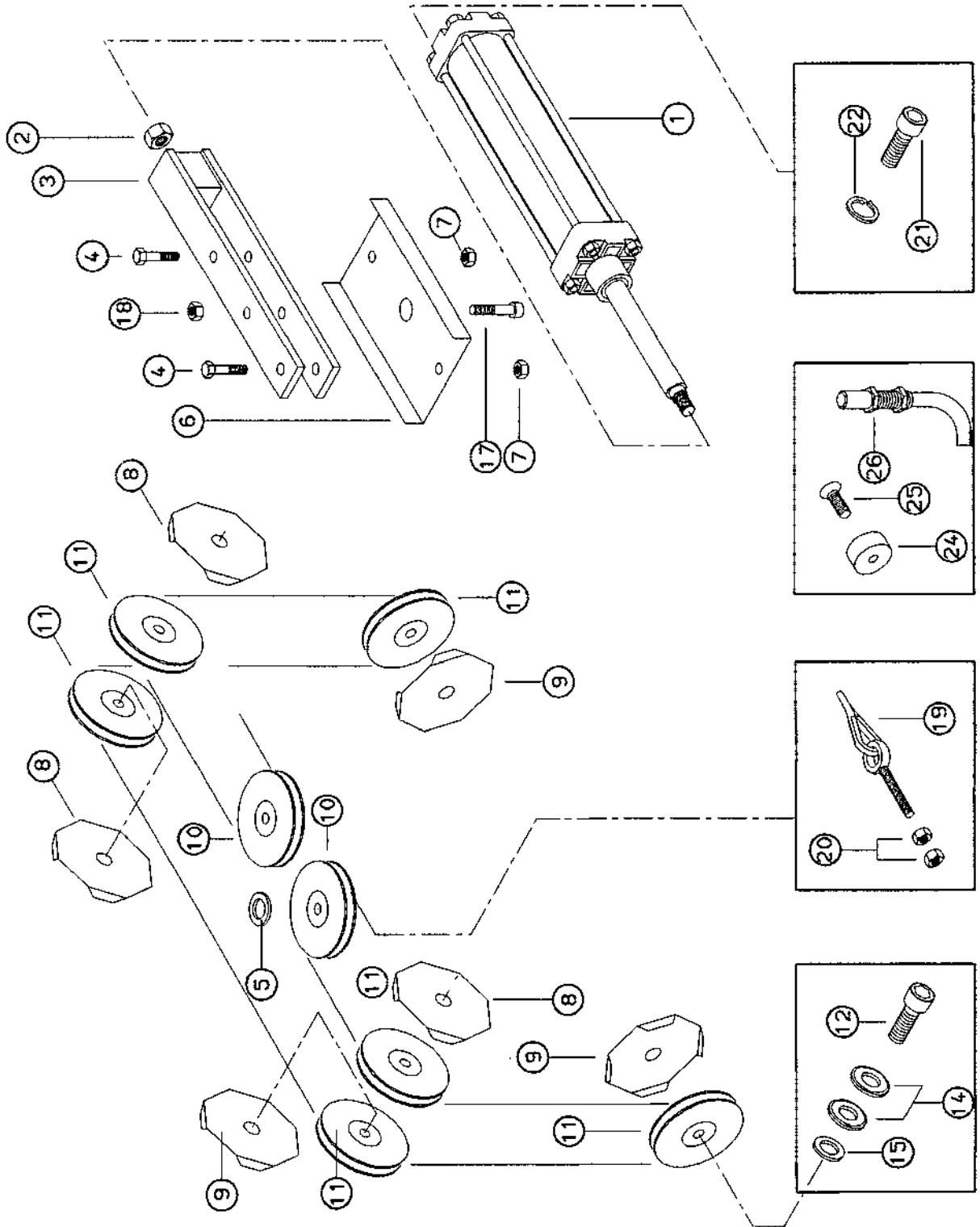
TYPE 643

CABLE SYSTEM AND CYLINDER

Page

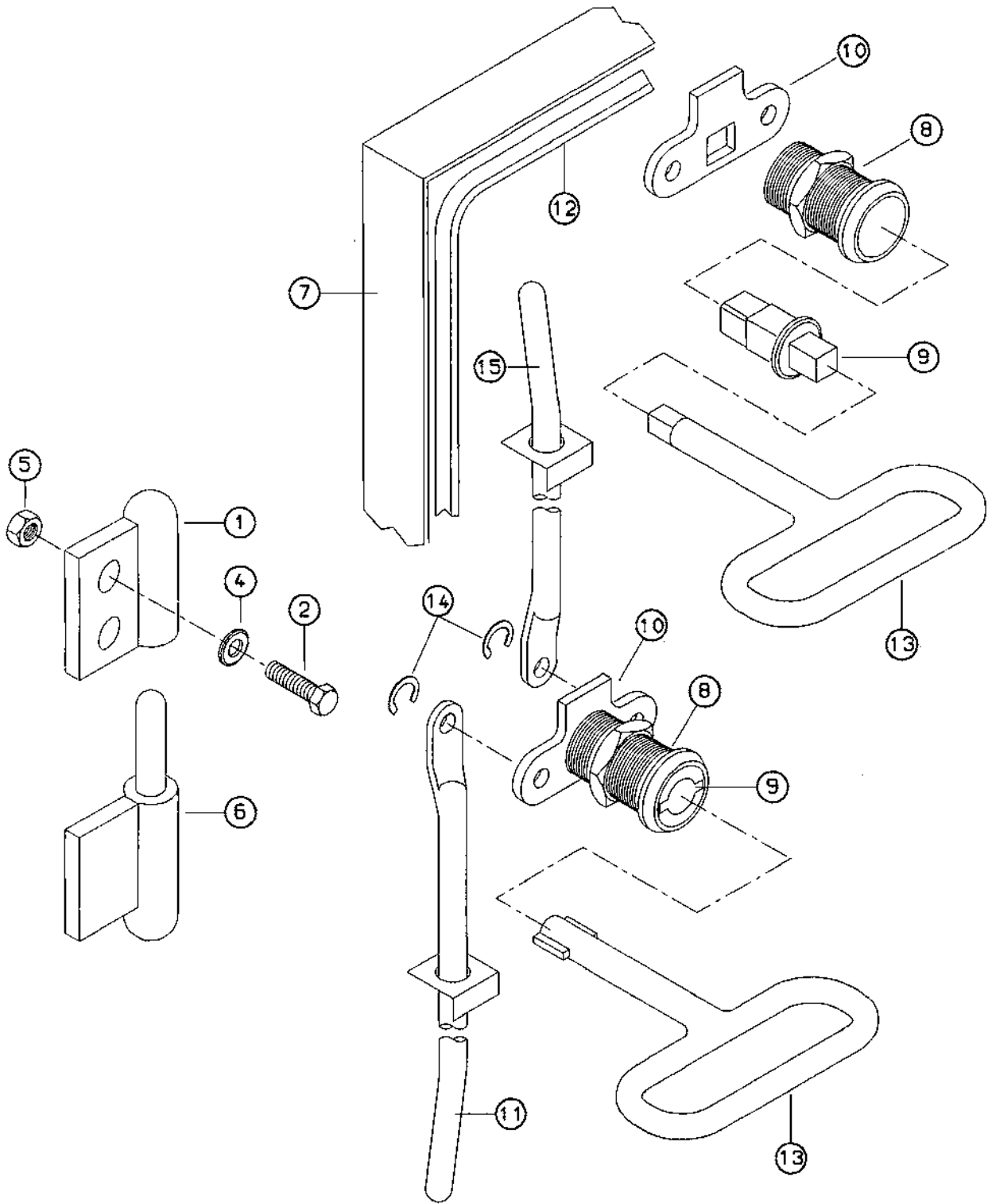
FRONT PANEL

9-4.0

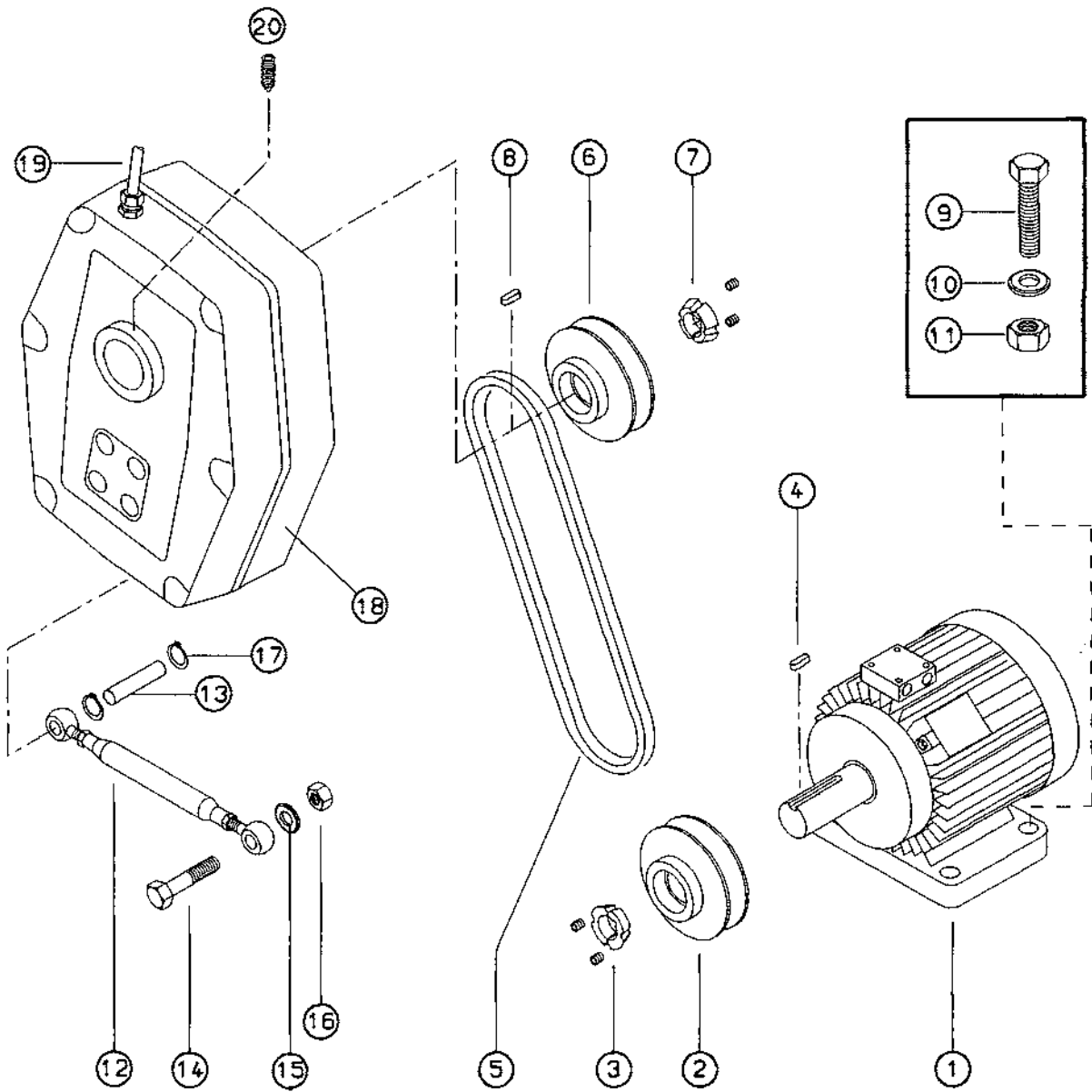


Type 643		Spare Parts List Cable System and Cylinder Front Panel		Page 9-4.1
Pos.	Part No.	Part Name	Description	Quant.
1	111 060	Cylinder, Lift  Notice: Part No. 111 060 valid only for serial no. 6430001 - 6430011 and 6430014, as of 6430208 standard.  Repair kit for cylinder 111 060	DN63/Hub 250  Indic. serial no.	1
	111 627	Hubzylinder  Repair kit for cylinder 111 627	DN25/Hub250  Indic. serial no.	1
2	020 040	Nut, Hex DIN 934	M16	1
3	222 001-3	Bracket, Pulley Replacem. 224 934-3		1
	224 934-3	Bracket, Pulley		1
4	020 454	Bolt, Hex DIN 931	M12x45	2
5	121 867-4	Spacer, Replacem. 221 867-4		4
	221 867-4	Spacer		4
6	222 003-3	Cover, Pulley obsolete		1
7	020 039	Nut, Hex DIN 934	M12	2
8	223 968-3	Cover, Pulley		3
9	223 969-3	Cover, Pulley		3
10	221 865-4	Pulley (with Bearing)	d=100 mm	2
11	223 974-4	Pulley (with Bearing)	d= 96 mm	6
12	020 077	Bolt, Allen DIN 912	M10x25	6

Type 643		Spare Parts List Cable System and Cylinder Front Panel			Page 9-4.2
Pos.	Part No.	Part Name	Description	Quant.	
14	020 052	Washer, Replacem. 020 713	DIN 125 10.5	6	
	020 713	Washer, Tension	DIN 6796 10.0	6	
15	223 752-4	Spacer		6	
16					
17	020 076	Bolt, Allen	DIN 912 M10x45	1	
18	020 038	Nut, Hex	DIN 934 M12	1	
19	124 022-3	Cable	10130 mm	1	
20	020 036	Nut, Hex	DIN 934 M6	2	
21	020 354	Bolt, Allen	DIN 912 M8x16	4	
22	020 058	Washer, Spring	DIN 127 B8	4	
23					
24	135 473	Magnet		2	
25	020 220	Screw, CS	DIN 964 M4x20	2	
26	135 472	Switch, Magnetic		2	



Type		Spare Parts List			Page
643		Hinge Assembly and Side Door			9-5.1
Pos.	Part No.	Part Name	Description	Quant.	
1	220 628-4	Hinge, Front Panel		2	
2	020 017	Bolt, Hex	DIN 933 M8x25	4	
3					
4	020 712	Washer, Tension	DIN 6796 A8.0	4	
5	020 037	Nut, Hex	DIN 934 M8	4	
6	220 332-4	Hinge		8	
7		Door, Side	Please indicate exact pos.		
8	121 061	Housing, Latch		2	
9	121 059	Insert		2	
	121 138	Insert, Square	7 mm	2	
10	121 005	Bracket, Bar		2	
11	121 067-4	Bar		2	
12	005 703	Seal			
13	121 062	Key			
	121 139	Key, Square	7 mm		
14	025 028	Washer, safety	DIN 6799		
15	121 066-4	Bar		2	



Type		Spare Parts List		Page
643		Drum Drive Assembly		9-8.1
Pos.	Part No.	Part Name	Description	Quant.
1		Motor Indicate voltage, frequency and kW.		1
2		<b>Motor Pulley 50Hz</b>		
	103 032	for Renolds Gearbox	DW 150	1
	103 040	for Fenner Gearbox	DW 118	1
	103 040	for Stiebel Gearbox	DW 118	1
		<b>Motor Pulley 60Hz</b>		
	103 040	for Renolds Gearbox	DW 118	1
	103 218	for Fenner Gearbox	DW 95	1
	103 218	for Stiebel Gearbox	DW 95	1
3		<b>Taper Lock, Motor 50Hz</b>		
	103 035	for Renolds Gearbox	1610/24	1
	103 035	for Fenner Gearbox	1610/24	1
	103 035	for Stiebel Gearbox	1610/24	1
		<b>Taper Lock, Motor 60Hz</b>		
	103 035	for Renolds Gearbox	1610/24	1
	103 088	for Fenner Gearbox	1210/24	1
	103 088	for Stiebel gearbox	1210/24	1
4		Key	8x7x32	1

Type		Spare Parts List		Page
643		Drum Drive Assembly		9-8.2
Pos.	Part No.	Part Name	Description	Quant.
5		<b>V-Belt, 50Hz</b>		
	103 039	for Renolds Gearbox	SPZ 10x8x837	1
	103 231	for Fenner Gearbox	SPZ 10x8x850	1
	103 231	for Stiebel Gearbox	SPZ 10x8x850	1
		<b>V-Belt, 60Hz</b>		
	103 086	for Renolds Gearbox	SPZ 10x8x800	1
	103 086	for Fenner Gearbox	SPZ 10x8x800	1
	103 086	for Stiebel Gearbox	SPZ 10x8x800	1
	6		<b>Pulley, 50Hz</b>	
103 032		for Renolds Gearbox	DW 150	1
103 220		for Fenner Gearbox	DW 125	1
103 220		for Stiebel Gearbox	DW 125	1
		<b>Pulley, 60Hz</b>		
103 032		for Renolds Gearbox	DW 150	1
103 220		for Fenner Gearbox	DW 125	1
103 220		for Stiebel Gearbox	DW 125	1
7			<b>Taper Lock, 50Hz</b>	
	103 036	for Renolds Gearbox	1610/19	1
	103 083	for Fenner Gearbox	1610/22	1
	103 083	for Stiebel Gearbox	1610/22	1



Type		Spare Parts List			Page
643		Drum Drive Assembly			9-8.3
Pos.	Part No.	Part Name	Description	Quant.	
		<b>Taper Lock, 60Hz</b>			
	103 036	for Renolds Gearbox	1610/19	1	
	103 083	for Fenner Gearbox	1610/22	1	
	103 083	for Stiebel Gearbox	1610/22	1	
8		Key	6x6x36	1	
9	020 016	Bolt, Hex	DIN 933 M8x35	4	
10	020 712	Washer, Tension	DIN 6796 8.0	4	
11	020 037	Nut, Hex	DIN 934 M8	4	
12	220 682-3	Bar, Torque for Renolds Gearbox		1	
	225 636-3	Bar, Torque for Fenner Gearbox		1	
	236 835-3	Bar, Torque for Stiebel Gearbox		1	
13	236 858-4	Bolt for Stiebel Gearbox		1	
14	020 329	Bolt, Precision	DIN 610 M12x45	1	
15	020 134	Washer, Tension	DIN 6796 13	1	
16	020 254	Nut, Hex selflock	DIN 985 M12	1	
17	025 062	Ring, Snap	A16x1	2	

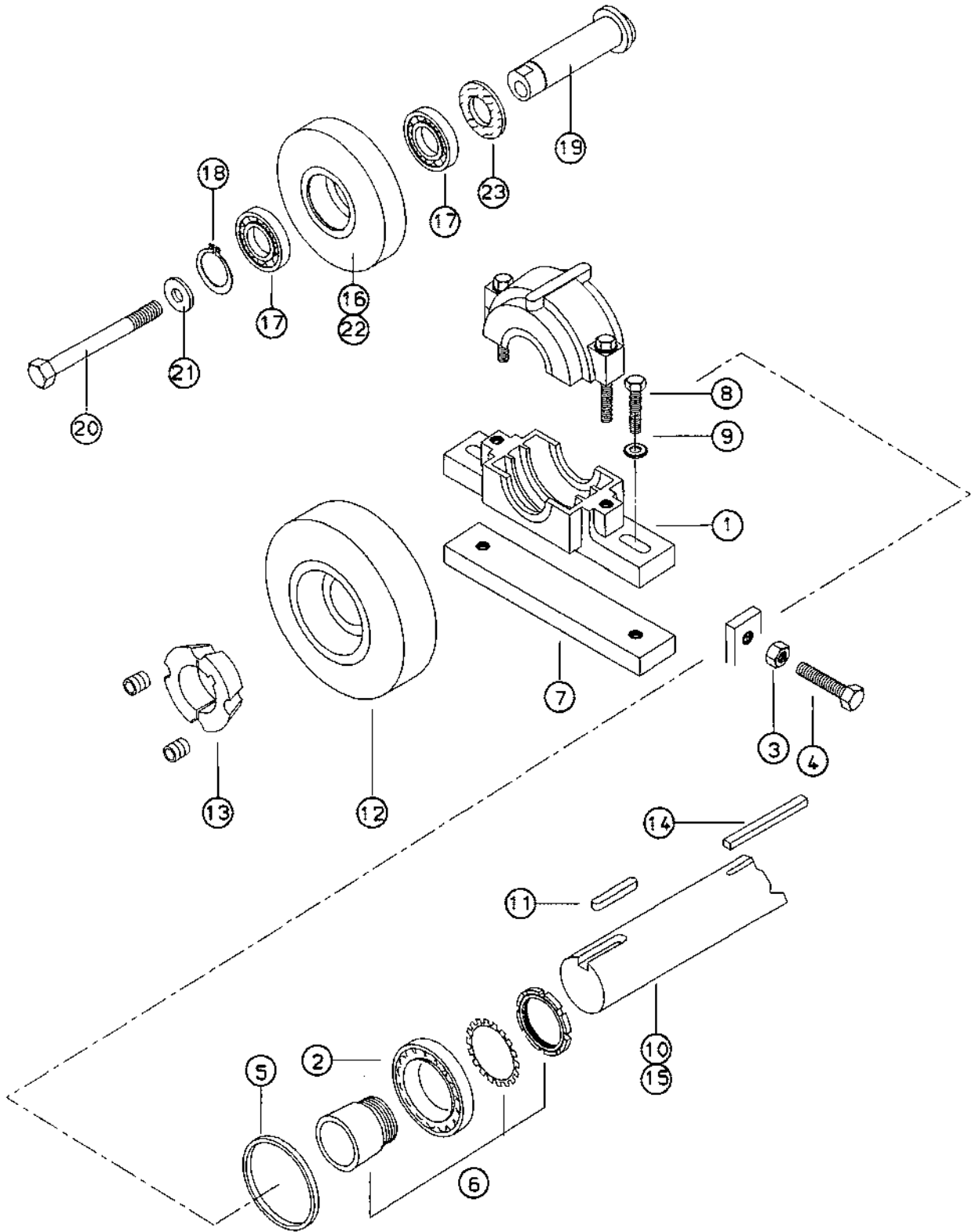
Type		Spare Parts List			Page
643		Drum Drive Assembly			9-8.4
Pos.	Part No.	Part Name	Description	Quant.	
18		<b>Gearbox</b>			
	103 084	Gearbox Renolds	SMH 20	1	
	103 217	Gearbox Fenner	C13-45	1	
	103 391	Gearbox Stiebel	l=14.02	1	
		<b>Gearbox Conversion Kit, 50 Hz</b>			
	237 795-2	from Renolds to Stiebel Gearbox		1	
	236 953-2	from Fenner to Stiebel Gearbox		1	
		<b>Gearbox Conversion Kit, 60 Hz</b>			
	237 913-2	from Renolds to Stiebel Gearbox		1	
	236 953-2	from Fenner to Stiebel Gearbox		1	
19	111 608	Breather for Renolds Gearbox		1	
20	021 013	Screw, Set	DIN 915 M10x35	4	
		Oil quantity, Gearbox	0,45 Ltr		

TYPE 643

DRUM SUSPENSION ASSEMBLY

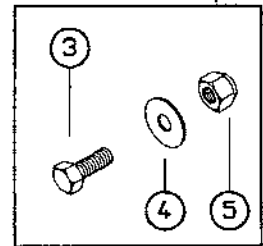
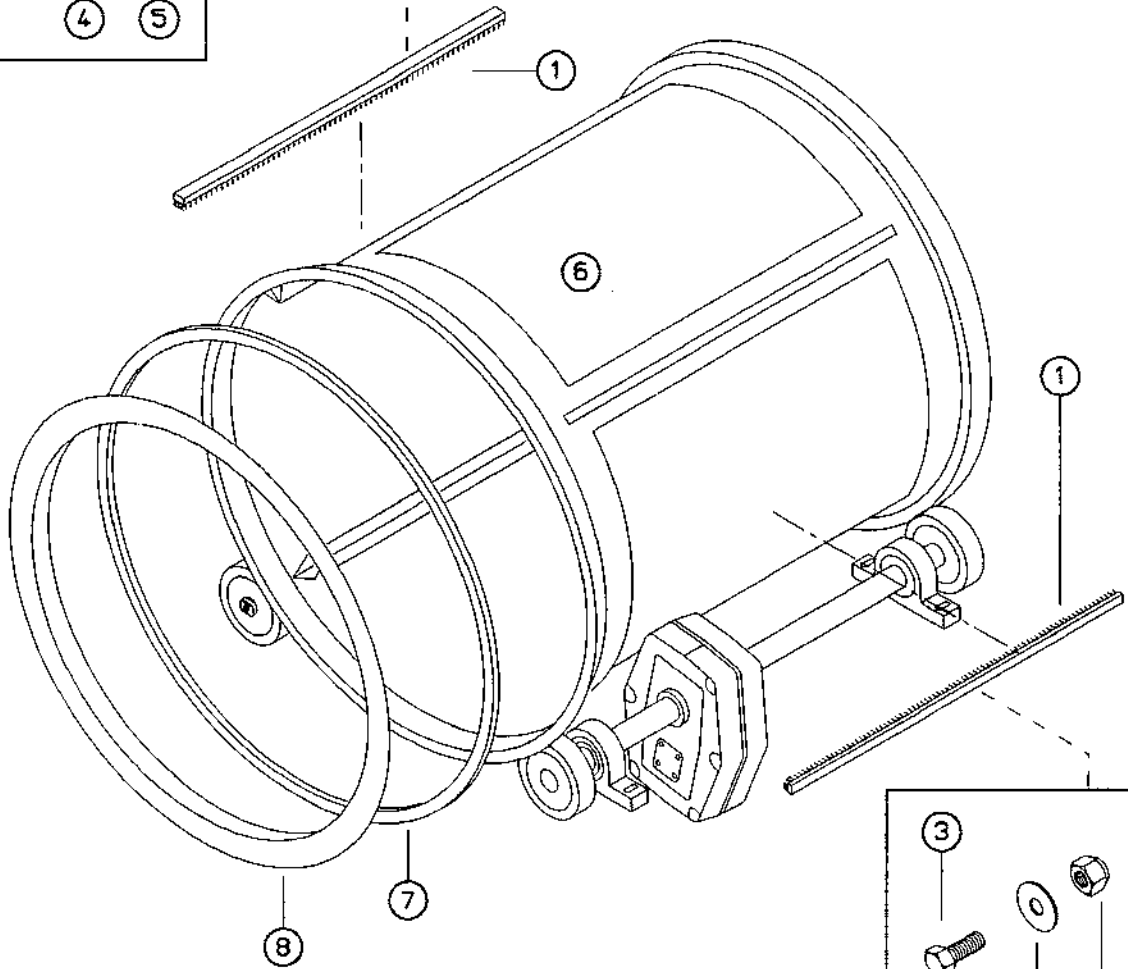
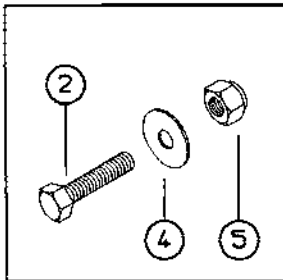
Page

9-9.0



Type		Spare Parts List			Page
643		Drum Suspension Assembly			9-9.1
Pos.	Part No.	Part Name	Description	Quant.	
1	100 018	Housing, Pillow Block	SN 510	2	
2	100 019	Bearing, Roller	22210K	2	
3	020 038	Nut, Hex	DIN 934 M10	6	
4	020 439	Bolt, Hex	DIN 933 M10x90	2	
5	100 021	Spacer	FR 90/9	1	
6	100 024	Sleeve	H 309	2	
	100 020	Sleeve	H 310	2	
7	224 550-4	Bracket	40x12x200	2	
8	020 024	Bolt, Hex	DIN 931 M12x60	4	
9	020 134	Washer, Tension	DIN 6796 13	4	
	914 048-5	Bearing complete		2	
10	224 785-3	Shaft, Drive	45x960	1	
11	103 017	Key	9x14x60	2	
12	220 423-3	Wheel, Friction	230x75x140	2	
13	103 106	Taper Lock	2517/45	2	
14	103 027	Key	9x14x170	1	
15	225 648-2	Gearbox/Shaft compl. Replacem. 236 868-2	Fenner	1	
	236 868-2	Gearbox/Shaft complete		1	
	236 868-2	Gearbox/Shaft complete	Stiebel	1	

Type		Spare Parts List			Page
643		Drum Suspension Assembly			9-9.2
Pos.	Part No.	Part Name	Description	Quant.	
16	220 428-3	Wheel, Friction with Hub	250-140-75	2	
17	100 016	Bearing, Ball	6206 Z	4	
18	025 003	Ring, Snap	DIN 471 30 od	2	
19	220 368-3	Bolt, Eccentric		2	
20	020 085	Bolt, Hex	DIN 931 M16x120	2	
21	020 463	Washer, Tension	DIN 6796 16	2	
22	220 427-3	Wheel, Friction complete	d=247 mm	2	
23	228 655-4	Ring, Felt		2	



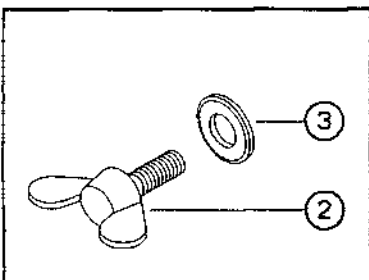
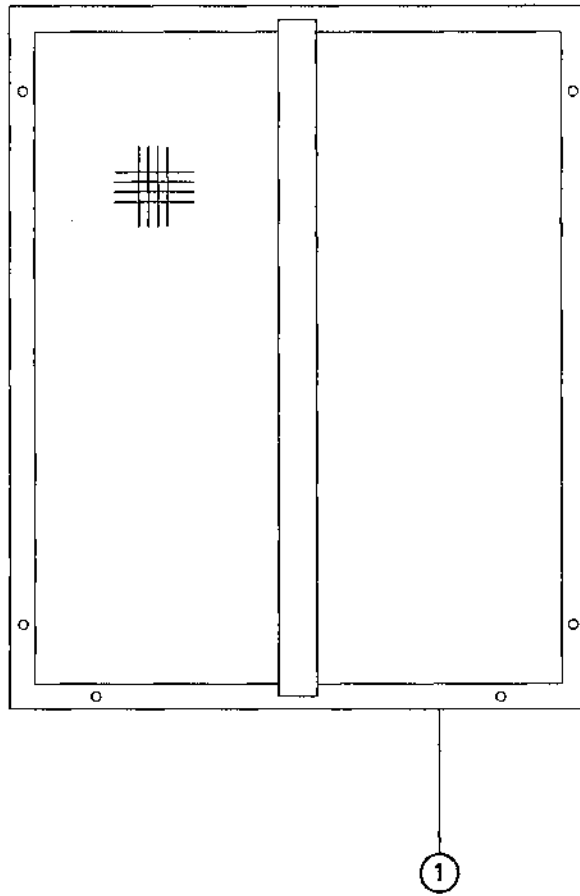
Type		Spare Parts List			Page
643		Drum and Seals Assembly			9-10.1
Pos.	Part No.	Part Name	Description	Quant.	
1	125 001-3	Seal, Brush Steam Heating	770 long	2	
	125 001-3	Seal, Brush Gas Heating	770 long	1	
2	020 120	Bolt, Hex	DIN 933 M4x20	6	
3	020 158	Bolt, Hex	DIN 933 M4x12	6	
4	020 195	Washer Steam Heating	DIN 9021 4.3	24	
	020 195	Washer Gas Heating	DIN 9021 4.3	12	
5	020 121	Nut, Hex selflock. Steam Heating	DIN 985 M4	12	
	020 121	Nut, Hex selflock. Gas Heating	DIN 985 M4	6	
6	224 781-2	Drum	Steam		
	225 701-5	Drum Teflon	Steam		
	223 467-2	Drum	Gas		
	225 702-5	Drum Teflon	Gas		
7	123 005	Seal, Felt	8x20x4470 white	1	
	008 002	Adhesive	Zement B	2	
8	239 956-4	Ring Segment Teflon		1	

TYPE 643

LINT SCREEN

Page

9-12.0





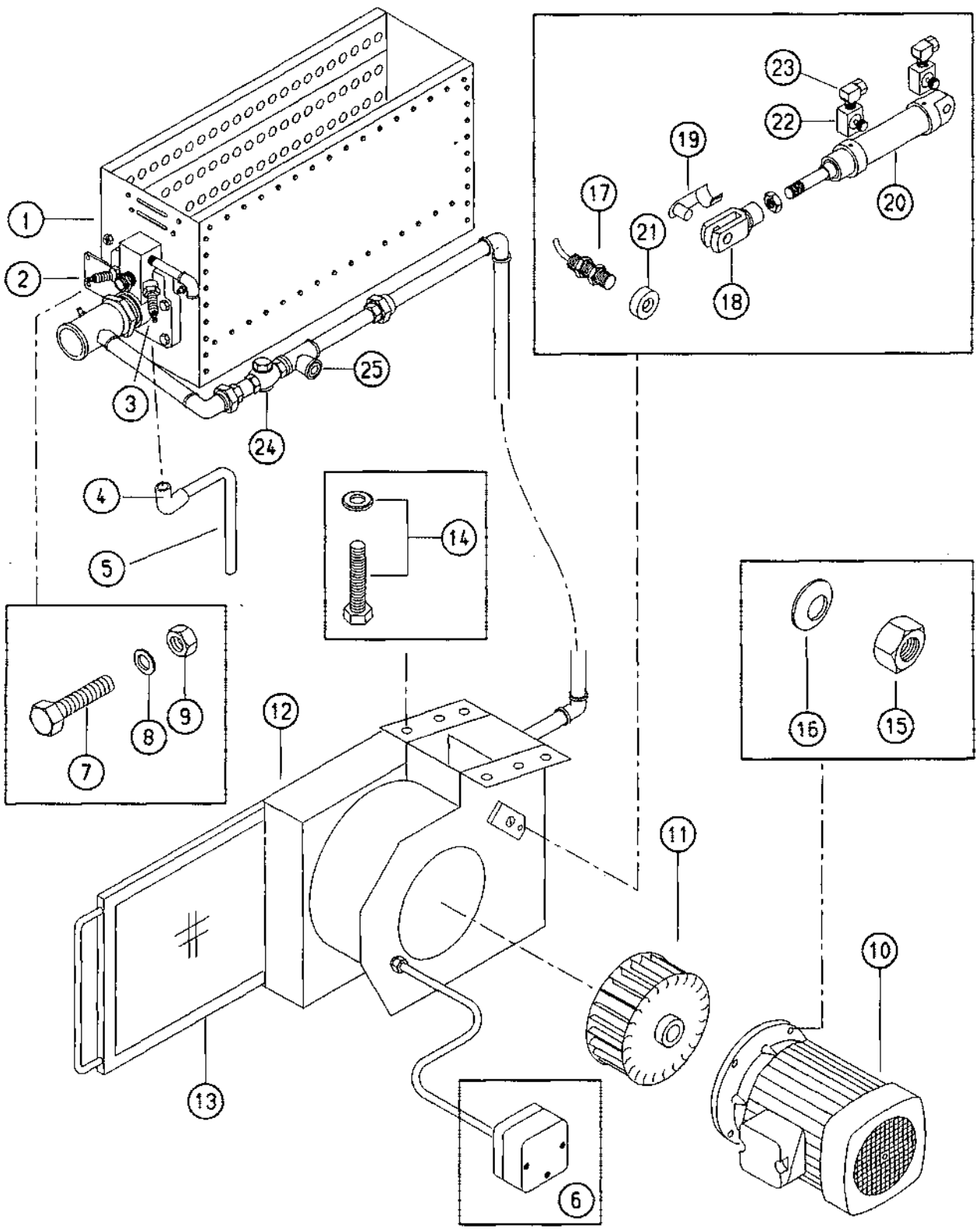
Type		Spare Parts List			Page
643		Lint Screen			9-12.1
Pos.	Part No.	Part Name	Description	Quant.	
1	224 829-2	Screen, Lint Steam Textile fine	1180x940	1	
	228 758-3	Screen, Lint Gas Textile coarse		1	
2	020 019	Screw, Wing	DIN 316 M6	6	
3	020 050	Washer	DIN 125 6,4	6	

TYPE 643

GAS BURNER WITH BLOWER  
AND CONTROL FLAP

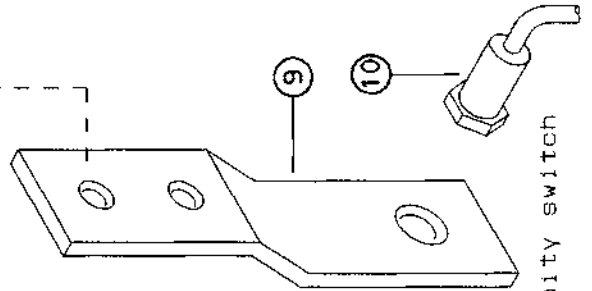
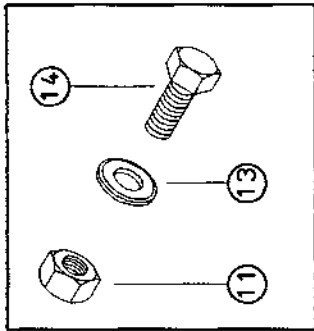
Page

9-13.0

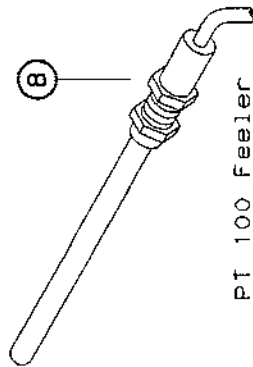


Type 643		Spare Parts List Gas Burner with Blower and Control Flap		Page 9-13.1
Pos.	Part No.	Part Name	Description	Quant.
1	119 002	Burner	Flameco RAH 80	1
2	119 019	Rod, Flame		1
3	119 013	Plug, Spark		1
4	119 016	Cap, Spark Plug		1
5	007 241	Cable, Spark Plug		1
6	135 986	Monitor, Pressure	DWL 03A	1
7	020 015	Bolt, Hex	DIN 933 M8x20	4
8	020 712	Washer, Tension	DIN 6796 8.0	4
9	020 037	Nut, Hex	DIN 934 M8	4
10		Motor, Flange Indicate voltage, frequency and kW		1
11	116 005	Wheel, Blower	d = 160	1
12	220 712-1	Housing, Blower, Replacem. 237 048-1		1
	237 048-1	Housing, Blower		1
13	220 719-3	Screen, Lint		1
14	020 345	Bolt, Hex with Washer	DIN 933 M6x16	5
15	020 037	Nut, Hex	DIN 934 M8	4
16	020 712	Washer, Tension	DIN 6796 8.0	4

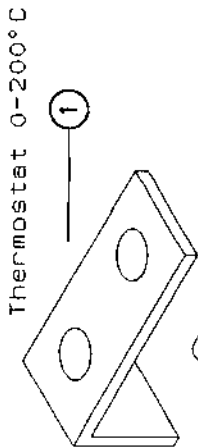
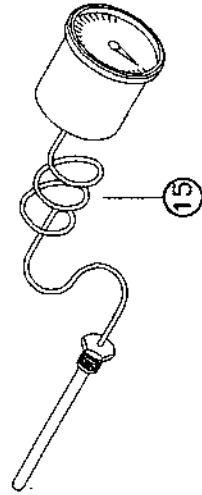
Type		Spare Parts List		Page
643		Gas Burner with Blower and Control Flap		9-13.2
Pos.	Part No.	Part Name	Description	Quant.
17	136 411	Switch, Magnetic		1
18	021 077	Clevis	DIN 71752 20x20x52	1
19	020 130	Pin, Clevis	D10x20	1
20	112 304	Cylinder	DN25/Hub 35	1
		Repair kit for cylinder 112 304	Indicate serial no.	1
21	136 797	Magnet		1
22	112 164	Valve, Throttle	DV 06 1/8"	2
23	111 096	Elbow	ESVS WE 8 LLR 1/8	2
24	119 110	Valve, Check	1/2"	1
25	119 111	Fitting, Tee	1/2"	1



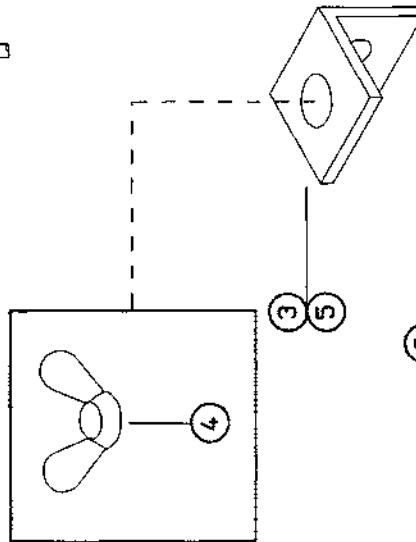
Proximity switch



PT 100 feeler



Thermostat 0-200°C



Thermostat 0-300°C

Type		Spare Parts List			Page
643		Monitoring Devices			9-15.1
Pos.	Part No.	Part Name	Description	Quant.	
1	220 747-4	Bracket		1	
2	135 007	Thermostat	0-200 Deg.	1	
3	220 742-4	Bracket		1	
4	020 119	Nut, Wing	DIN 315 M6	2	
5	220 743-4	Bracket		1	
6	135 008	Thermostat	0-300 Deg.	1	
7					
8	136 344	Feeler, Temperature, Replacem. 227 465-3	PT 100	1	
9	223 146-4	Bracket		1	
10	136 415	Switch, Proximity	IIA-2010-FRKG	1	
11	020 036	Nut, Hex	DIN 934 M6	2	
12					
13	020 523	Washer, Tension	DIN 6796 6.0	2	
14	020 345	Bolt, Hex	DIN 933 M6x16	2	
15	135 028	Limiter, Temperature	1 B 1560	1	

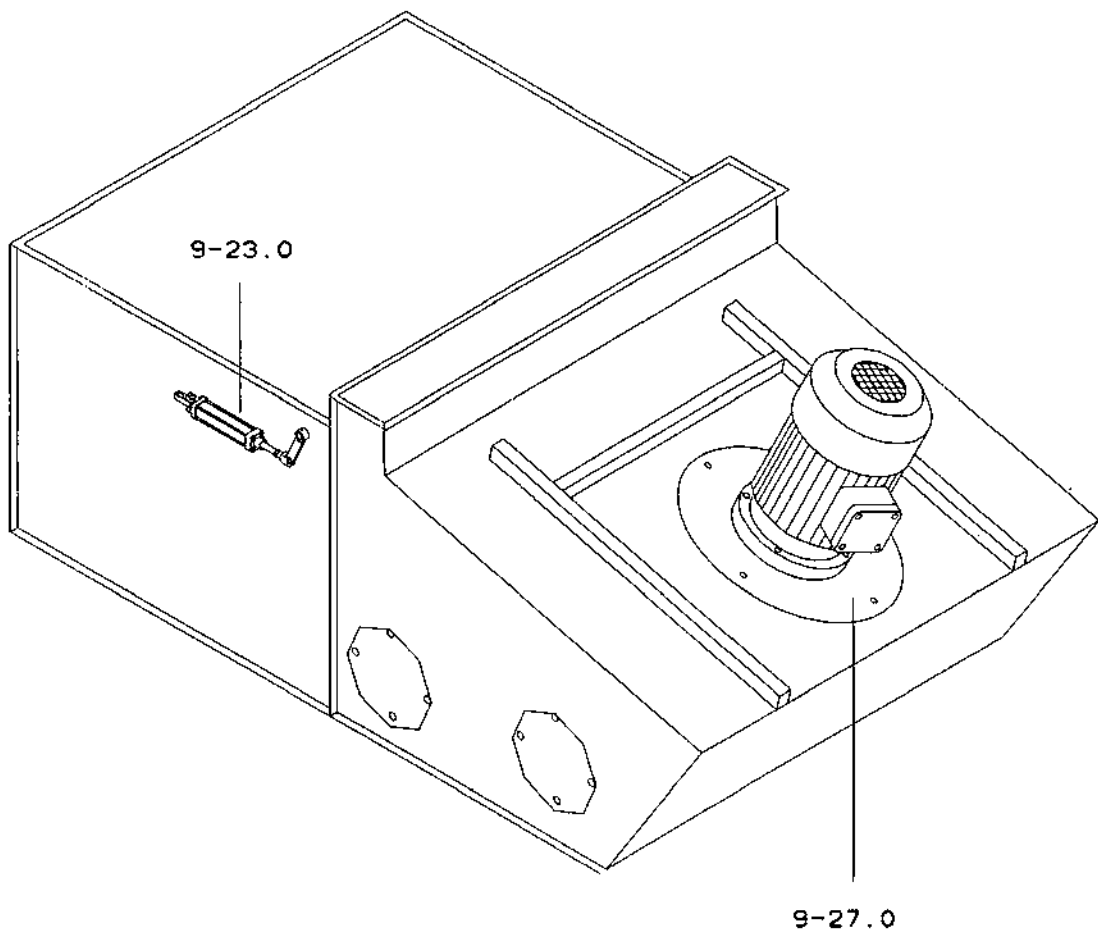
TYPE 643

BLOWER HOUSING

Page

OVERVIEW GAS

9-16.0

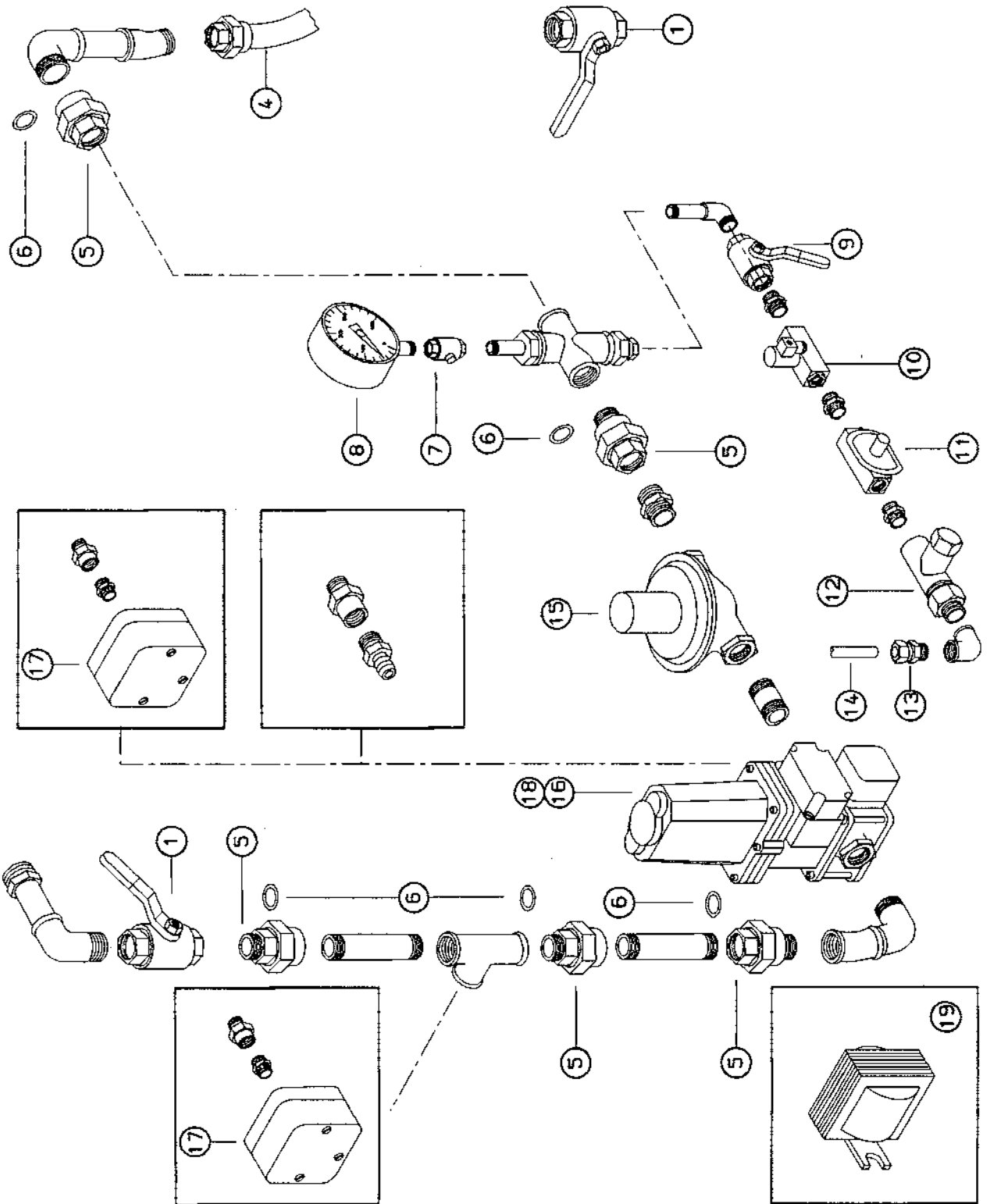


TYPE 643

GAS CONTROL ASSEMBLY  
230 V / 50 HZ  
Valid until Dec. 95

Page

9-17.0





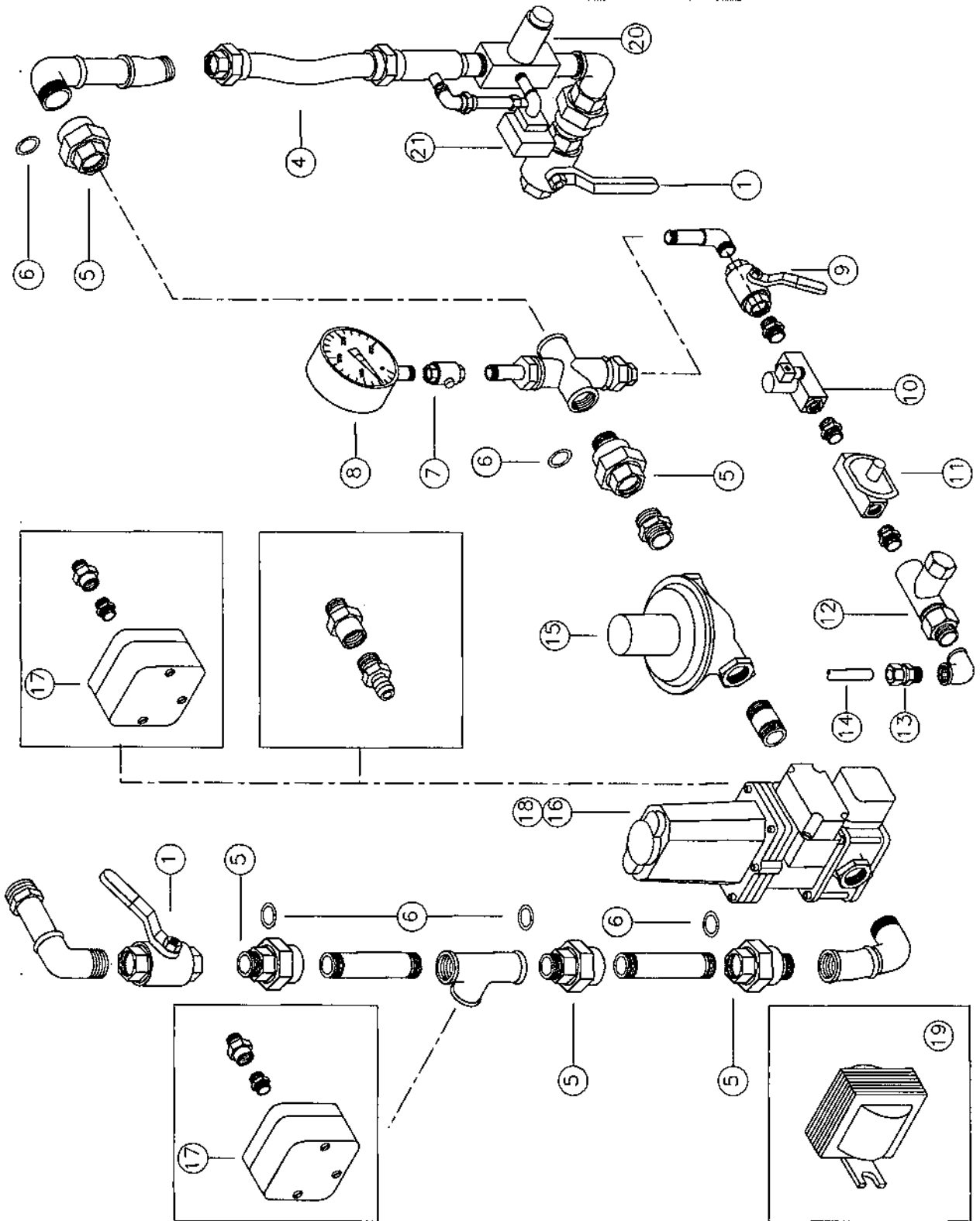
Type		Spare Parts List			Page
643		Gas Control Assembly 230 V / 50 Hz valid until Dec. 95			9-17.1
Pos.	Part No.	Part Name	Description	Quant.	
1	111 041	Valve, Shut Off	1"	2	
2					
3					
4	121 015	Hose - Turboflex	600 mm	1	
5	030 065	Coupling	1"	3	
6	028 027	Seal, Rubber	1"	3	
7	111 008	Valve, Button	1/4"	1	
8	111 033	Manometer	1/2" 0-100 mbar	1	
9	111 040	Valve, Shutt Off	1/4"	1	
10	119 007	Valve, Solenoid	VG 8 230V/50Hz RO5/N60 1/4"	1	
11		Regulator, Pressure		1	
12		T-Regulator		1	
13	111 039	Fitting	GE 12 LR 1/4"	2	
14		Ermeto-Pipe	12	1	
15	119 009	Regulator, Pressure	GBF25 1"	1	
16	119 005	ITT-Valve	SH130 NVS25 230V/50Hz	2	
17	135 985	Guard, Pressure (min./max.)	DWG 50	2	
18	119 018	Valve, Gas ON-OFF (GB only)	SH 110 NV SL40 230V/50Hz	1	
19	136 009	Transformer, Ignition	TG 15 230V/50Hz	1	

TYPE 643

GAS CONTROL ASSEMBLY  
230 V / 50 Hz  
Valid from Jan. 96

Page

9-17.5



Type		Spare Parts List		Page
643		Gas Control Assembly 230 V / 50 Hz valid from Jan. 96		9-17.6
Pos.	Part No.	Part Name	Description	Quant.
1	111 041	Valve, Shut Off	1"	2
2				
3				
4	121 015	Hose - Turboflex	600 mm	1
5	030 065	Coupling	1"	3
6	028 027	Seal, Rubber	1"	3
7	111 008	Valve, Button	1/4"	1
8	111 033	Manometer	1/2" 0-100 mbar	1
9	111 040	Valve, Shut Off	1/4"	1
10	119 007	Valve, Solenoid	VG 8 230V/50Hz RO5/60 1/4"	1
11	119 061	Regulator, Pressure	Maxitrol 1/2"	1
12	119 083	T-Regulator		1
13	111 039	Fitting	GE 12 LR 1/4"	2
14		Ermeto-Pipe	12	1
15	119 009	Regulator, Pressure, Replacem. 119 105-5	GBF25 1"	1
	119 105-5	Regulator, Pressure		1
16	119 005	ITT-Valve	SH130 NVS2 5S 230V/50Hz	2
17	135 985	Guard, Pressure (min./max.)	DWG 50	2
18	119 017	Valve, Gas ON-OFF (GB only)	SH 110 NV S25 230V/50 Hz	1

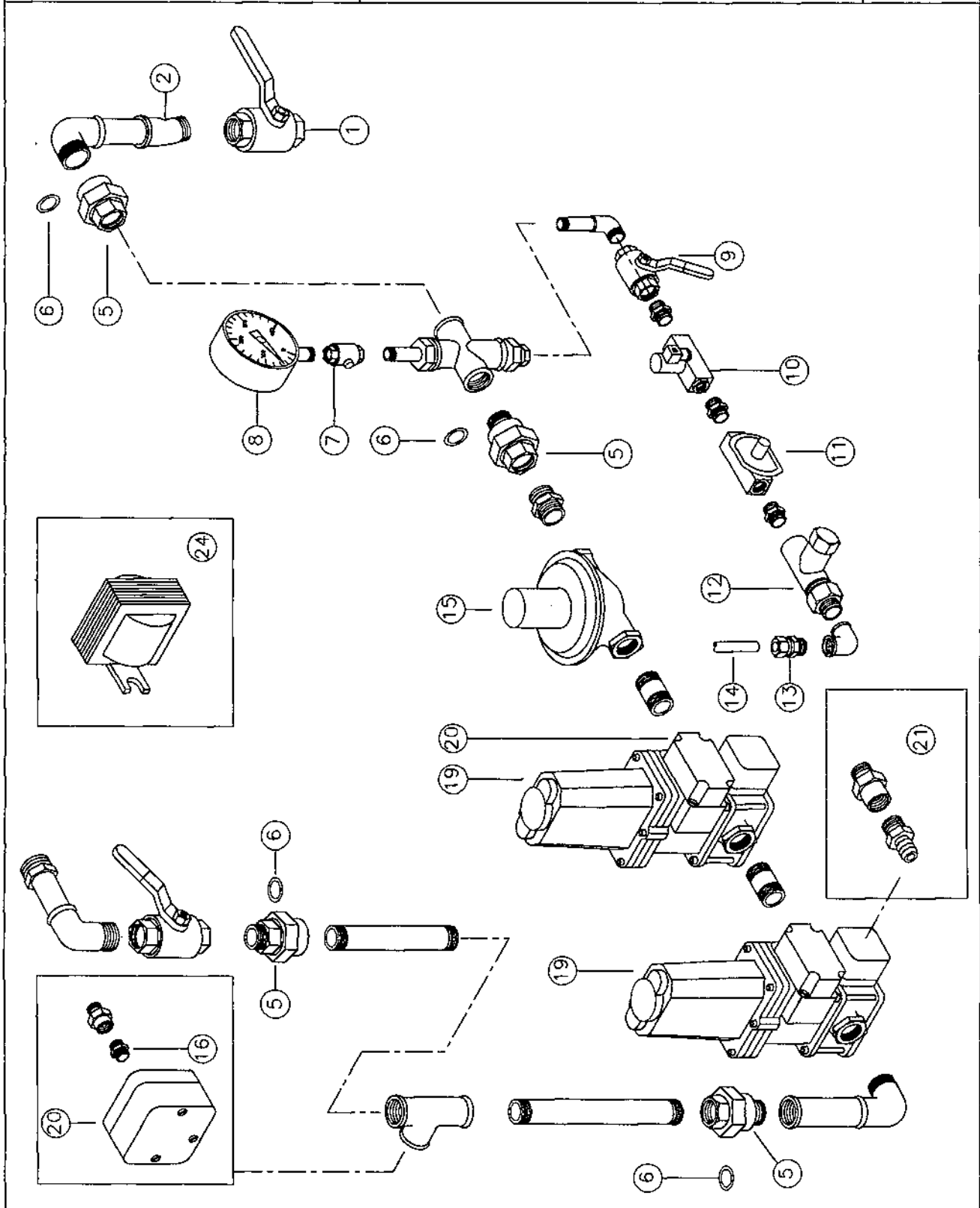
Type		Spare Parts List		Page
643		Gas Control Assembly 230 V / 50 Hz valid from Jan. 96		9-17.7
Pos.	Part No.	Part Name	Description	Quant.
19	136 009	Transformer, Ignition (until Dec. 95)	TG 15 230V/50Hz	1
	136 026	Transformer, Ignition (from Jan. 96)	ZE 30/7 ENR 4041661 230V/50 Hz	1
20	119 056	Valve, Safety	TC 208 RV 3T	1
21	136 019	Unit, Leakage Control		1

TYPE 643

GAS CONTROL ASSEMBLY  
115 V / 60 Hz  
Valid until Dec. 95

Page

9-17.10



Type		Spare Parts List		Page
643		Gas Control Assembly 115 V / 60 Hz valid until Dec. 95		9-17.11
Pos.	Part No.	Part Name	Description	Quant.
1	111 577	Valve, Ball	MS 1" NPT	1
2	030 274	Adapter	1" id 1" NPT	1
3				
4				
5	030 065	Coupling	1", 331	3
6	028 027	Seal, Rubber	1"	3
7	111 008	Valve, Button	1/2"	1
8	111 033	Manometer	1/2"	1
9	111 040	Valve, Shut Off	1/4"	1
10	119 008	Valve, Solenoid	1/4"	1
11		Regulator, Pressure		1
12		T-Regulator		1
13	111 039	Fitting	GE 12 LR 1/4"	1
14		Ermeto-Pipe		1
15	119 009	Regulator, Pressure	GBF25 1"	1
16	030 029	Coupling, Straight	1/4" MS	3
17				
18				

Type		Spare Parts List		Page
643		Gas Control Assembly 115 V / 60 Hz valid until Dec. 95		9-17.12
Pos.	Part No.	Part Name	Description	Quant.
19	119 006	ITT Valve		2
20	135 985	Guard, Pressure	DWG 50 max.	2
21	119 014	Nipple, Test	1/8"	2
22				
23				
24	136 010	Transformer, Ignition	115V/60Hz TG1 5/15	1

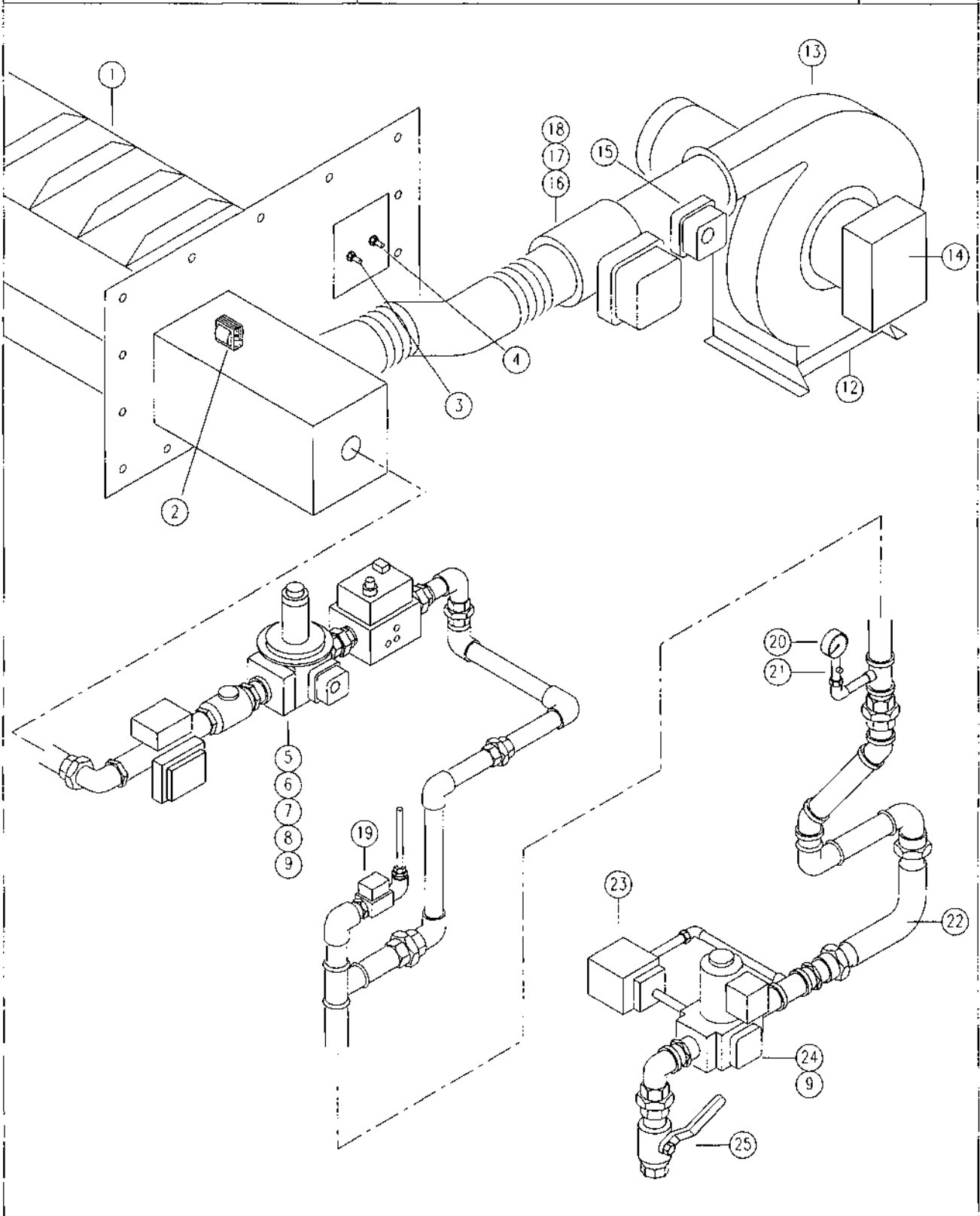
Type 643

GAS HEATING SURFACE BURNER MINNOX

VERSION: EUROPE

Page

9-18.0





Type		Spare Parts List			Page
643		Gas Heating Surface Burner Minnox			
		Version: Europe			9-18.1
Pos.	Part No.	Part Name	Description	Quant.	
1	119 135	Burner incl. Pos. 2,3,4	170CCS-LS	1	
2	136 029	Transformer, Ignition	1820, 10m, 230V	1	
3	119 154	Rod, Flame		1	
4	119 155	Sparkplug, bent until 13.11.2003		1	
	119 196	Sparkplug, straight from 13.11.2003		1	
5	119 136	Valve Train compl. with Pos. 6-9	G25 A70 50Hz 1"	1	
6	112 982	Valve, Solenoid	DVD 512/11Rp 1.1/2	1	
7	119 160	Regulator, Gas Pressure	FRNG510, Rp 1"	1	
8	119 161	Flap, Control	S211, Rp 1"	1	
9	138 056	Switch, Pressure	LGW 50 A4 2.5-50 mbar	2	
10					
11					
12	119 138	Set, Blower compl. with Pos. 13-15	MHR 501 50Hz.	1	
13	108 024	Blower	MHR 501, RD90	1	
14	123 122	Filter		1	
15	138 057	Switch, Pressure	LGW 50/A2 2,5-50 mbar	1	
16	119 137	Set, Air Control compl. with Pos. 17-18	12 BV-AR	1	
17	119 163	BV-Flap	112-BVM-R RC 3"	1	
18	119 162	Motor, Servo	235R3-024-01-S1	1	
19	119 056	Valve, Gas Safety	MVD 210/5 220V 50Hz 1"	1	
20	112 314	Manometer, Replacem. 111 033	½" 400 mbar	1	
	111 033	Manometer	0-100 mbar	1	

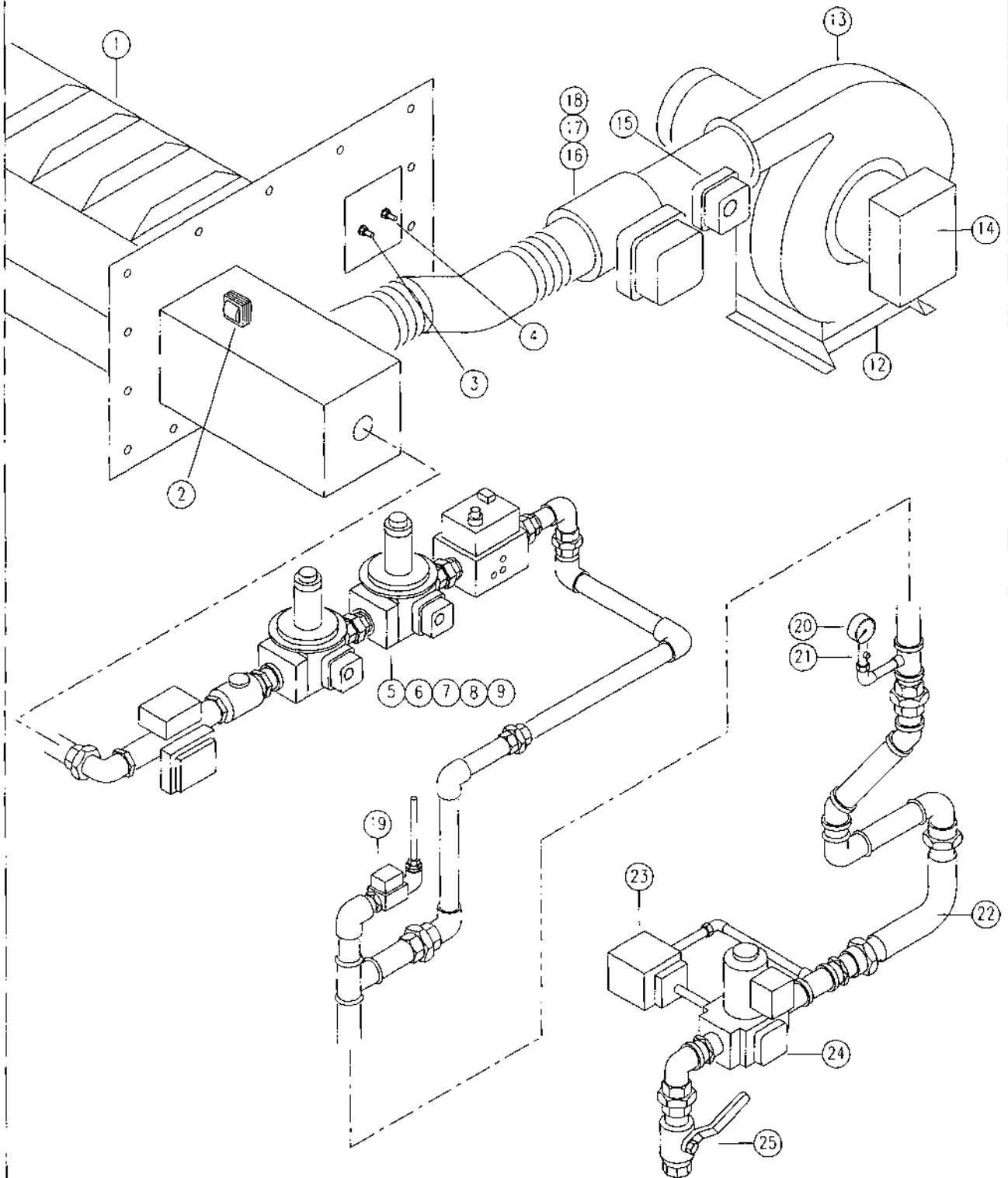
Type		Spare Parts List			Page
643		Gas Heating Surface Burner Minnox			
		Version: Europe			9-18.2
Pos.	Part No.	Part Name	Description	Quant.	
21	111 008	Valve, Push Button	½"	1	
22	121 337	Hose, Spiral	DN25x750	1	
23	136 019	Unit, Leakage Control	TC 218 ROS-T 230V, 50Hz	1	
24	119 056	Valve, Gas Safety	MVD 210/5 220V 50Hz 1"	1	
25	111 041	Valve, Ball	1" DIN DVGW	1	

Type 643

GAS HEATING SURFACE BURNER MINNOX  
VERSION: USA-CND

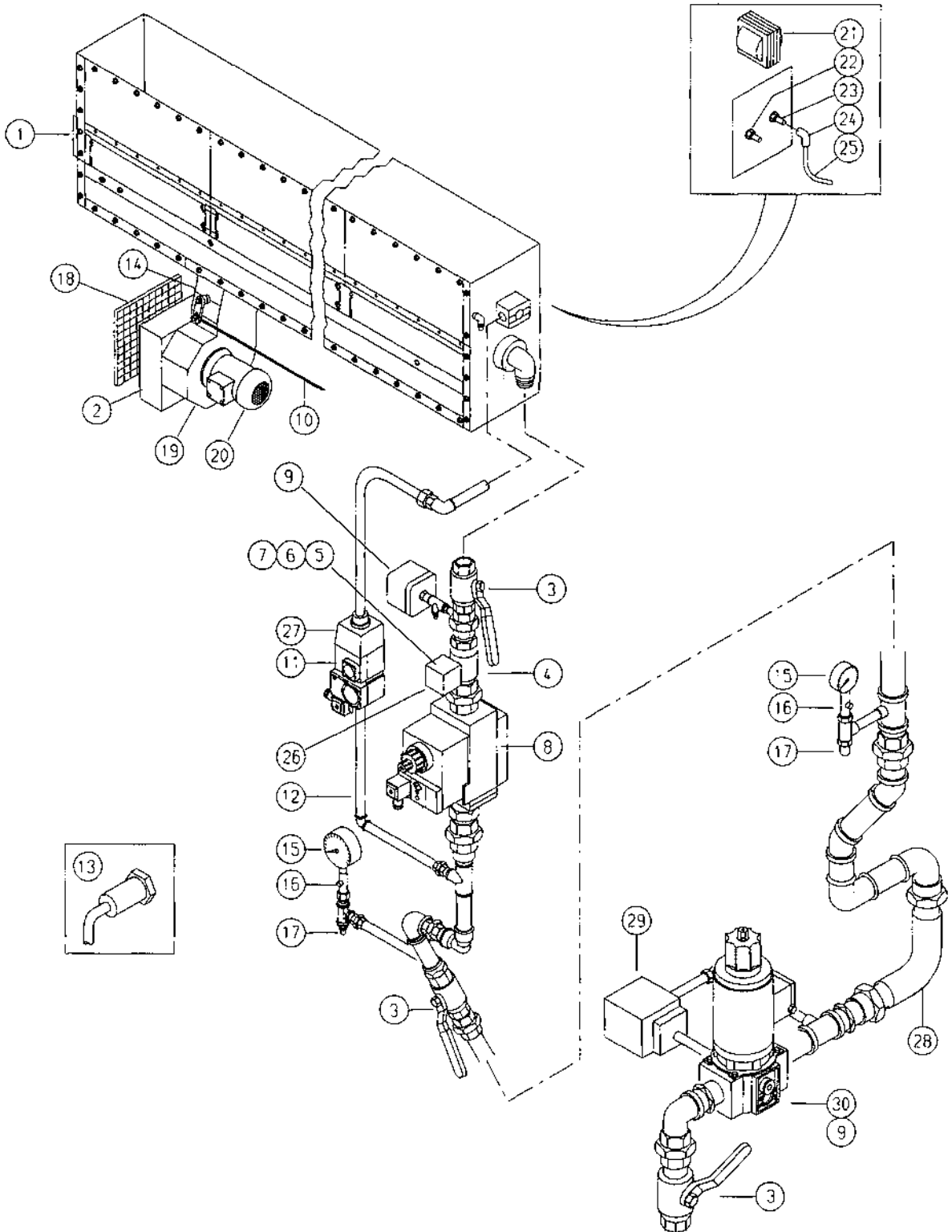
Page

9-19.0



Type		Spare Parts List			Page
643		Gas Heating Surface Burner Minnox			
		Version: USA-CND			9-19.1
Pos.	Part No.	Part Name	Description	Quant.	
1	119 135	Burner incl. Pos. 2,3,4	170CCS-LS	1	
2	136 030	Transformer, Ignition	1820, 10m, 110V	1	
3	119 154	Rod, Flame		1	
4	119 155	Sparkplug		1	
5	119 144	Valve Train compl. with Pos. 6-9	G25 A70 60Hz 1"	1	
6	112 985	Valve, Solenoid	MVD 510/6 1" NPT	2	
7	119 166	Regulator, Gas Pressure	FRG 710 1" NPT	1	
8	119 161	Flap, Control	S211, Rp 1"	1	
9	138 058	Switch, Pressure	GAO A4-4-6 12-50" WC 30-150 mbar	1	
10					
11					
12	119 138	Set, Blower compl. with Pos. 13-15	MHR 501 60Hz.	1	
13	108 024	Blower	MHR 501, RD90	1	
14	123 122	Filter		1	
15	138 057	Switch, Pressure	AA-A2-4-5 60Hz 2-20" WC	1	
16	119 137	Set, Air Control compl. with Pos. 17-18	12 BV-AR	1	
17	119 163	BV-Flap	112-BVM-R RC 3"	1	
18	119 162	Motor, Servo	235 R3-024-01- S1	1	
19	112 985	Valve, Gas Safety	MVD 510/6 115V-60Hz 1" NPT	1	
20	111 033	Manometer	½" KP 100D 201 0-100 mbar	1	

Type		Spare Parts List			Page
643		Gas Heating Surface Burner Minnox			
		Version: USA-CND			9-19.2
Pos.	Part No.	Part Name	Description	Quant.	
21	111 008	Valve, Push Button	½"	1	
22	121 337	Hose, Spiral	DN25x750	1	
23	136 020	Unit, Leakage Control	TC 218 ROS-T 115V, 60Hz	1	
24	112 985	Valve, Gas Safety	MVD 510/6 115V 60Hz 1" NPT	1	
25	112 004	Valve, Ball	1" NPT	1	



Type		Spare Parts List			Page
643		Gas Heating Line Burner			9-20.1
		Version : Europe			
Pos.	Part-No.	Part Name	Description	Quant.	
1	276 780-1	Burner Natural Gas compl.	Type 643	1	
2	276 879-1	Blower, Burner Natural Gas	Type 643-750 600-1800	2	
3	110 041	Valve, Ball	DIN DVGW 100030365	3	
4	119 204	Flap, Motor	DMK512 D=23	1	
5	A02081	Drive Motor, Flap	24 VDC 90 ° Belimo LMC 24	1	
6	277 543-4	Plate for Line Burner	Belimo LMC24A 4x65x125	1	
7	277 074-4	Shaft	Belimo LMC24A D16x80	1	
8	119 206	Multiblock	MB-DLE-412- B01-S20	1	
9	135 985	Switch, Pressure	Dg 50T 2,5-50 mbar 84447350 DIN-DVGW 93.03c030	1	
10	277 217-4	Rod, Control for Burner Blower	Type 643	1	
11	125 161	Rod End	M6 LFD KI 6-D	2	
12	277 228-3	Line, Pilot Gas compl.	Type 735-748	2	
13	136 415	Switch, Proximity, inductive	10mm B lia-2010-FRKG PNP/NPN	1	
14	135 986	Switch, Pressure	DL3A 0,3-3mbar 84444402 DIN DVGW 89.08c030	1	

Type		Spare Parts List		Page
643		Gas Heating Line Burner		
		Version : Europe		9-20.2
Pos.	Part-No.	Part Name	Description	Quant.
15	111 033	Manometer		1
16	111 008	Valve, Push Button		1
17	119 014	Nipple, Measuring		1
18	220 719-3	Screen, Lint		1
19	116 149	Wheel, Blower	SLE 180x74 R04/14H8	1
20		Flange Motor, Indic. Voltage, Freq. + kW		1
21	136 026	Transformer, Ignition	Trafounion ZE30/7	1
22	270 897-4	Rod, Flame		1
23	119 013	Sparkplug		1
24	119 016	Cap, Sparkplug		1
25	007 241	Cable, Sparkplug		1
26	276 915-4	Lever for Gas Flap		1
27	119 205	Multiblock	MB-C65-DLE S20 230V, 50Hz	1
28	121 337	Hose, Spiral	DN25x750	1
29	136 019	Control Unit, Leakage	TC 218 ROS-T 230V, 50Hz	1
30	119 056	Valve, Safety Gas	MVD 210/5 230V, 50Hz	1



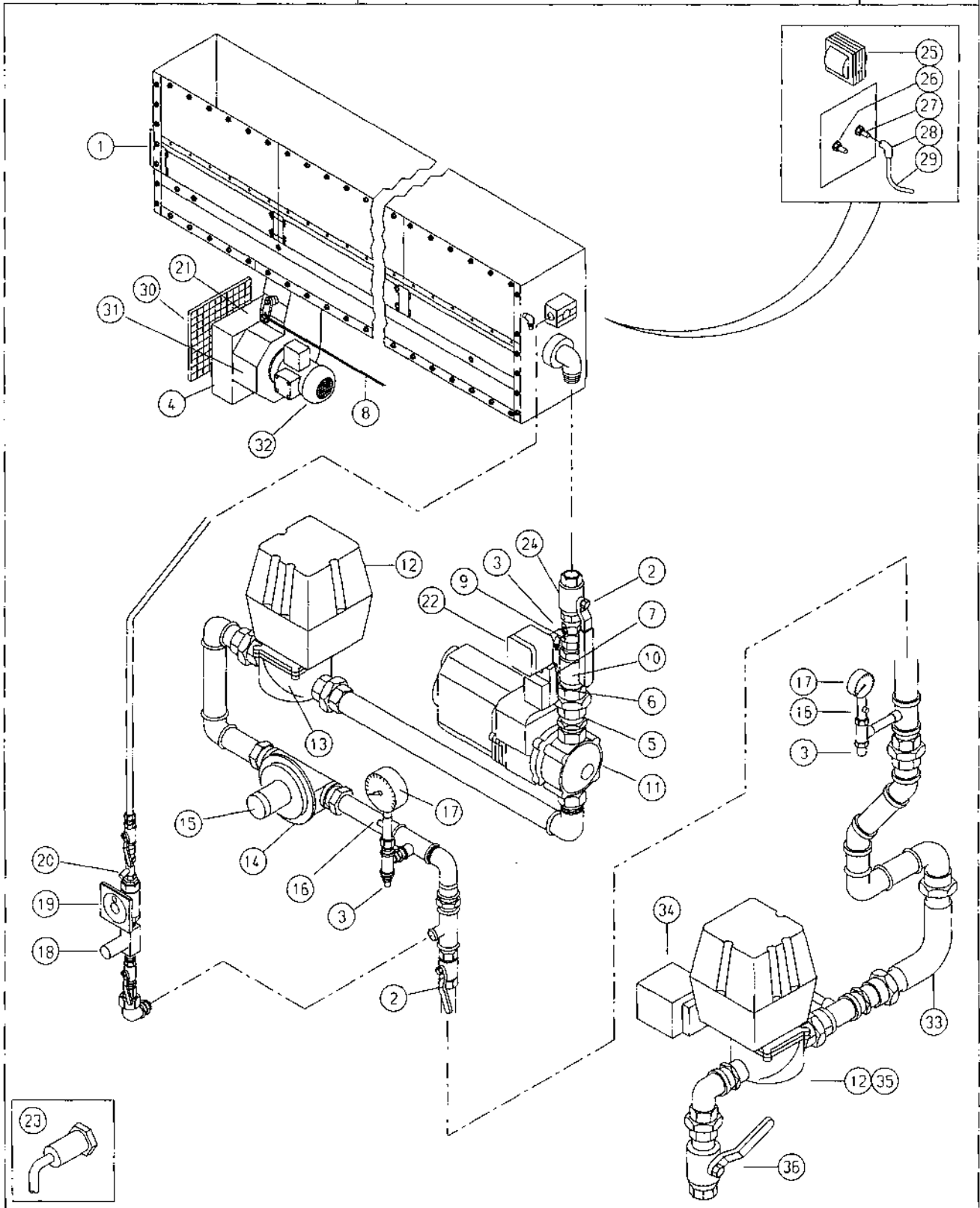
TYPE 643

GAS HEATING LINE BURNER

VERSION: USA, CANADA

Page

9-20.10



Type		Spare Parts List			Page
643		Gas Heating Line Burner			
		Version : USA-Canada			9-20.11
Pos.	Part-No.	Part Name	Description	Quant.	
1	276 780-1	Burner Natural Gas compl.	Type 643 6-tier L=1800mm	1	
2	110 041	Valve, Ball	DIN DVGW 100030365	2	
3	119 014	Nipple, Measuring		1	
4	276 879-1	Blower, Burner Natural Gas	Type 643-750 600-1800	2	
5	A02081	Drive Motor, Flap	24 VDC 90 ° Belimo LMC 24	1	
6	276 915-4	Lever for Gas Flap		1	
7	277 074-4	Shaft	Belimo LMC24A D16x80	1	
8	277 217-4	Rod, Control for Burner Blower	8x970	1	
9	125 161	Rod End	M6 LFD KI 6-D	2	
10	119 204	Flap, Motor	DMK512 D=23	1	
11	119 003	Valve, Hydra Motor	SH-H132NVSL NW40S 110v, 60Hz	1	
12	111 670	Valve, Gas Fluid-Pow	V4055 A 1031 3 120/240V, 50/60Hz	2	
13	111 668	Valve, Gas	NPT 1.1/2" V5055 A 1020 3	1	
14	119 094	Regulator, Pressure	GDJ40 R04-0 1.1/2"	1	
15	119 096	Spring for 119 094		1	
16	111 008	Valve, Push Button		1	
17	111 033	Manometer		1	

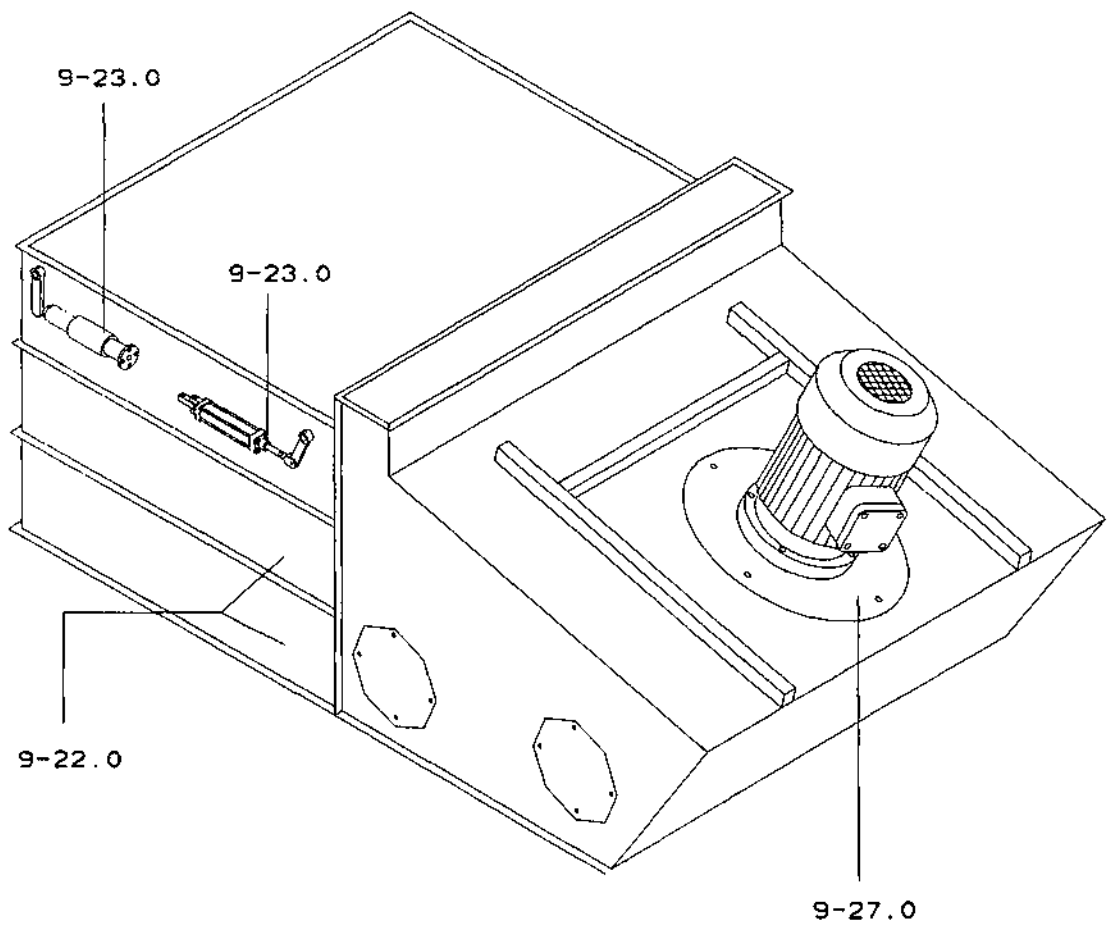
Type		Spare Parts List			Page
643		Gas Heating Line Burner			
		Version : USA-Canada			9-20.12
Pos.	Part-No.	Part Name	Description	Quant.	
18	119 008	Valve, Pilot Gas	VG 8R 05/N60 110v, 60Hz	1	
19	119 061	Pressure, Regulator Gas	RV 48 LM 2,5-9 mbar	1	
20	119 111	Bushing, Regulator	Gf599A 1/2"	1	
21	135 999	Switch, Pressure	DL3AT 0,3-3mbar 84444952	1	
22	135 998	Switch, Pressure	Dg 50T 2,5-50mbar 84447820	2	
23	136 415	Switch, Proximity, inductive	10mm B Iia-2010-FRKG PNP/NPN	1	
24	277 543-4	Plate for Line Burner	Belimo LMC24A 4x64x125	1	
25	136 014	Transformer, Ignition	60Hz	1	
26	270 897-4	Rod, Flame		1	
27	119 013	Sparkplug		1	
28	119 016	Cap, Sparkplug		1	
29	007 241	Cable, Sparkplug		1	
30	220 719-3	Screen, Lint		1	
31	116 149	Wheel, Blower	SLE 180x74 RO4/14H8	1	
32		Flange Motor, Indic. Voltage, Freq. + kW		1	
33	121 337	Hose, Spiral	DN25x70	1	
34	136 020	Control Unit, Leakage	TC 218 ROST-T 115V, 60Hz	1	
35	112 062	Valve, Gas	V5055 A 1" NPT	1	
36	112 004	Valve, Ball	1" NPT	1	

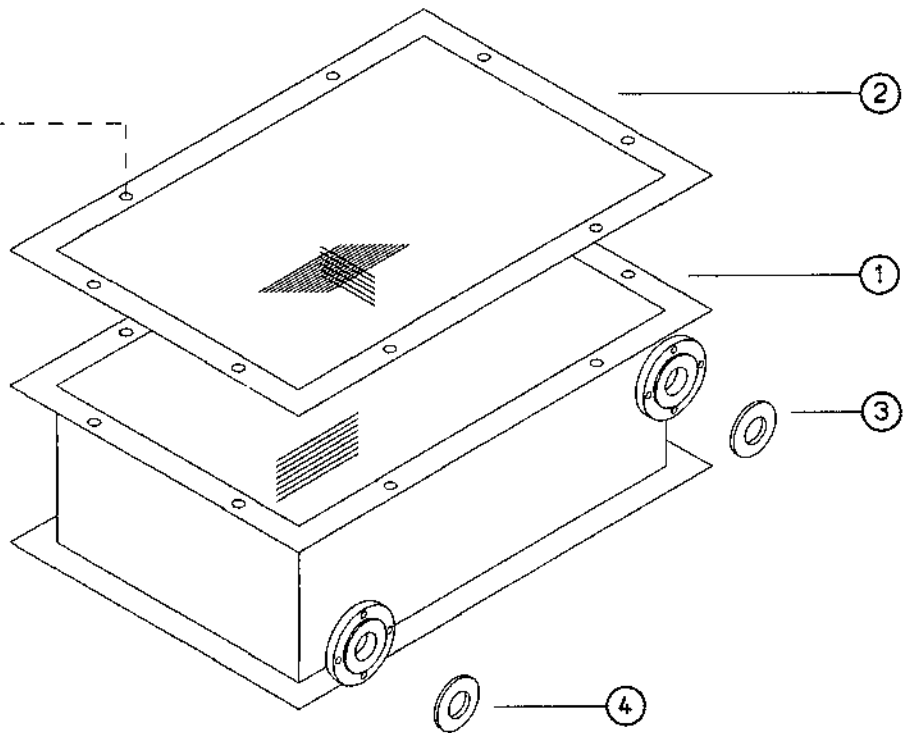
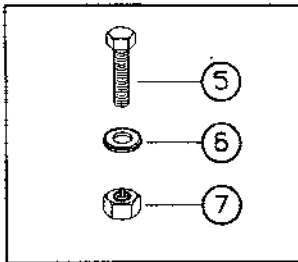
TYPE 643

BLOWER HOUSING  
OVERVIEW STEAM - BYPASS

Page

9-21.0





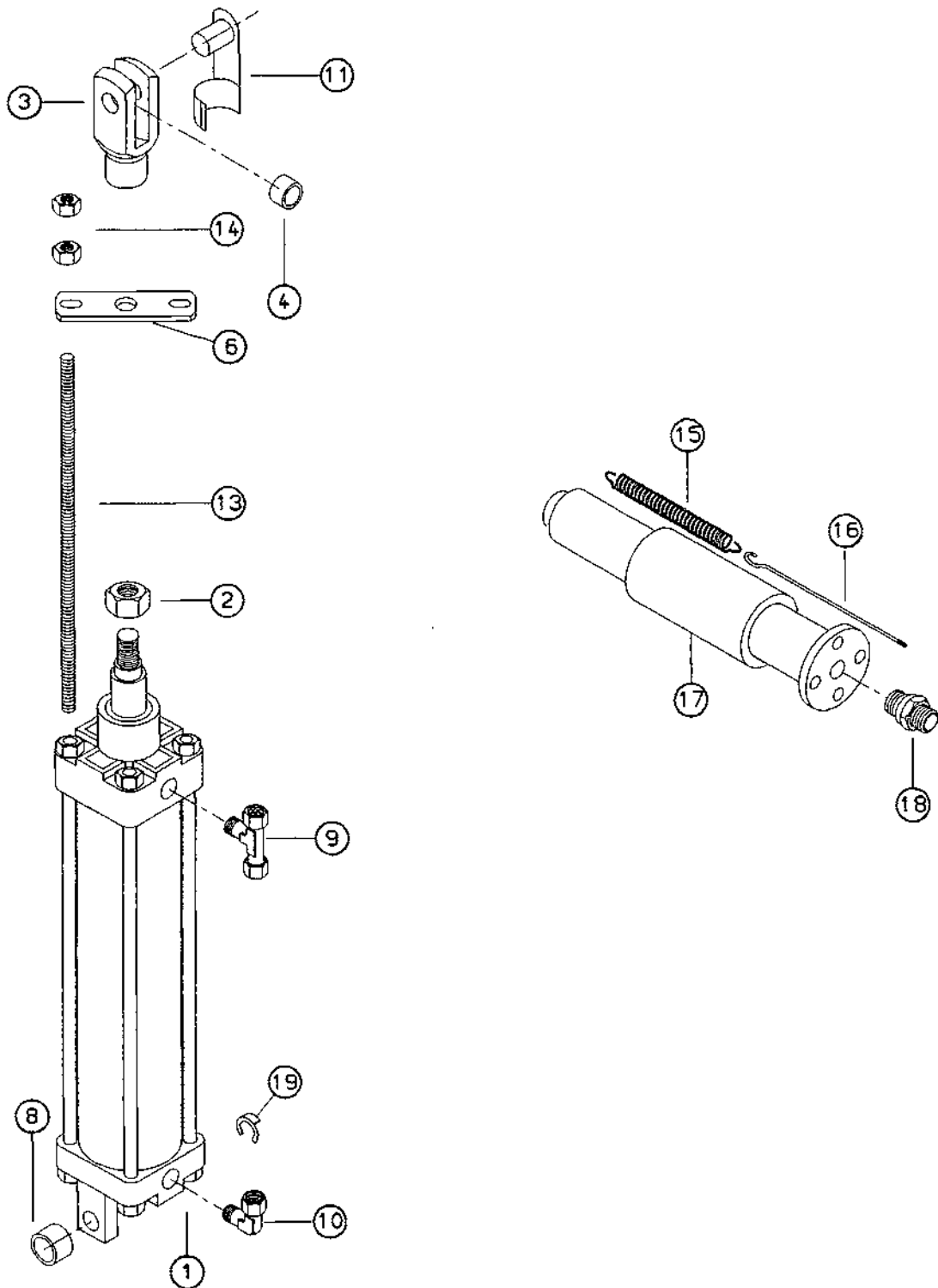
Type		Spare Parts List			Page
643		Steam Exchanger and Steam Screens			9-22.1
Pos.	Part No.	Part Name	Description	Quant.	
1	118 056-3	Exchanger, Heat Steam	6 Rows	1	
	118 162	Exchanger, Heat Steam SS	6 Rows	1	
	118 149	Exchanger, Heat TÜV Steam	6 Rows	1	
	118 060-3	Exchanger, Heat Steam Bypass	4 Rows	2	
	118 205	Exchanger, Heat Steam Bypass TÜV	4 Rows	2	
			Exchanger, Thermal Oil	4 Rows	2
	118 099-3	Exchanger, Thermal Oil TÜV	6 Rows	1	
2	224 832-3	Screen, Steam Bypass	1045x943	1	
	224 855-2	Screen, Steam without Bypass	1094x994	1	
3	028 015	Seal, Flange	DN 40	2	
4	028 014	Seal, Flange	DN 25	2	
5	020 345	Bolt, Hex with Washer DIN 933	M6x16	8	
6	020 523	Washer, Tension DIN 6796	6.0	8	
7	020 036	Nut, Hex DIN 934	M6	8	

TYPE 643

CYLINDER ( BYPASS )  
CYLINDER ( MAKE-UP AIR )

Page

9-23.0



Type		Spare Parts List		Page
643		Cylinder (Bypass) Cylinder (Make-up Air)		9-23.1
Pos.	Part No.	Part Name	Description	Quant.
1	111 061	Cylinder, Lift	DN40/Hub 100	1
		Repair kit for cylinder 111 061	Indic. serial no.	1
2	020 435	Nut, Hex	DIN 439 M12	1
3	020 161	Clevis	GK-M12	1
4	100 003	DU-Bushing	12x14x10	1
5				
6	222 610-4	Plate		1
7				
8	100 072	DU-Bushing	12x14x15	1
9	111 055	Coupling	TE 8 LR	1
10	111 049	Coupling	WE 8 PLR 1/4"	1
11	020 162	Pin, Clevis	FKB 12x24	1
12				
13	020 657	Bar, Thread	M6x170	2
14	020 036	Nut, Hex	DIN 934 M6	4
15	027 016	Spring, Tension	Z 109 G	2
16	224 418-2	Screw, Eyelet		2
17	224 705-4	Cylinder complete		1
18	111 035	Fitting	GE 8 LR 1/4	1
19	025 031	Ring, Snap	KL 12+9	2



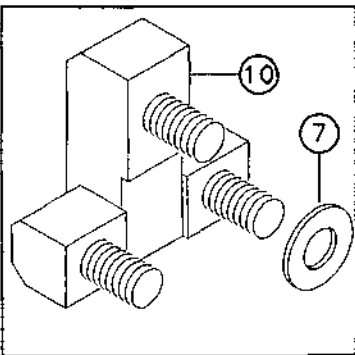
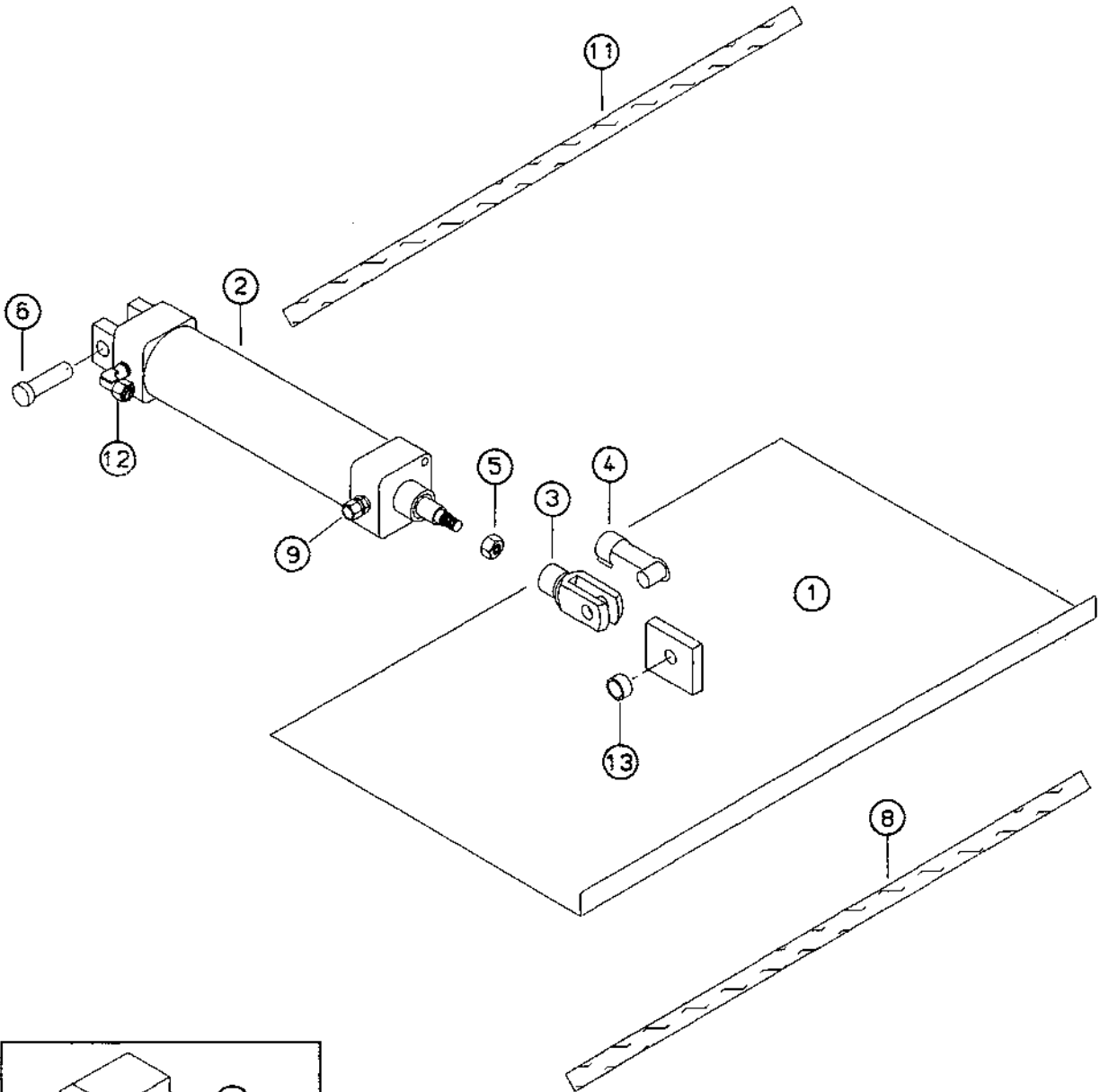
TYPE 643

FRESH AIR FLAP

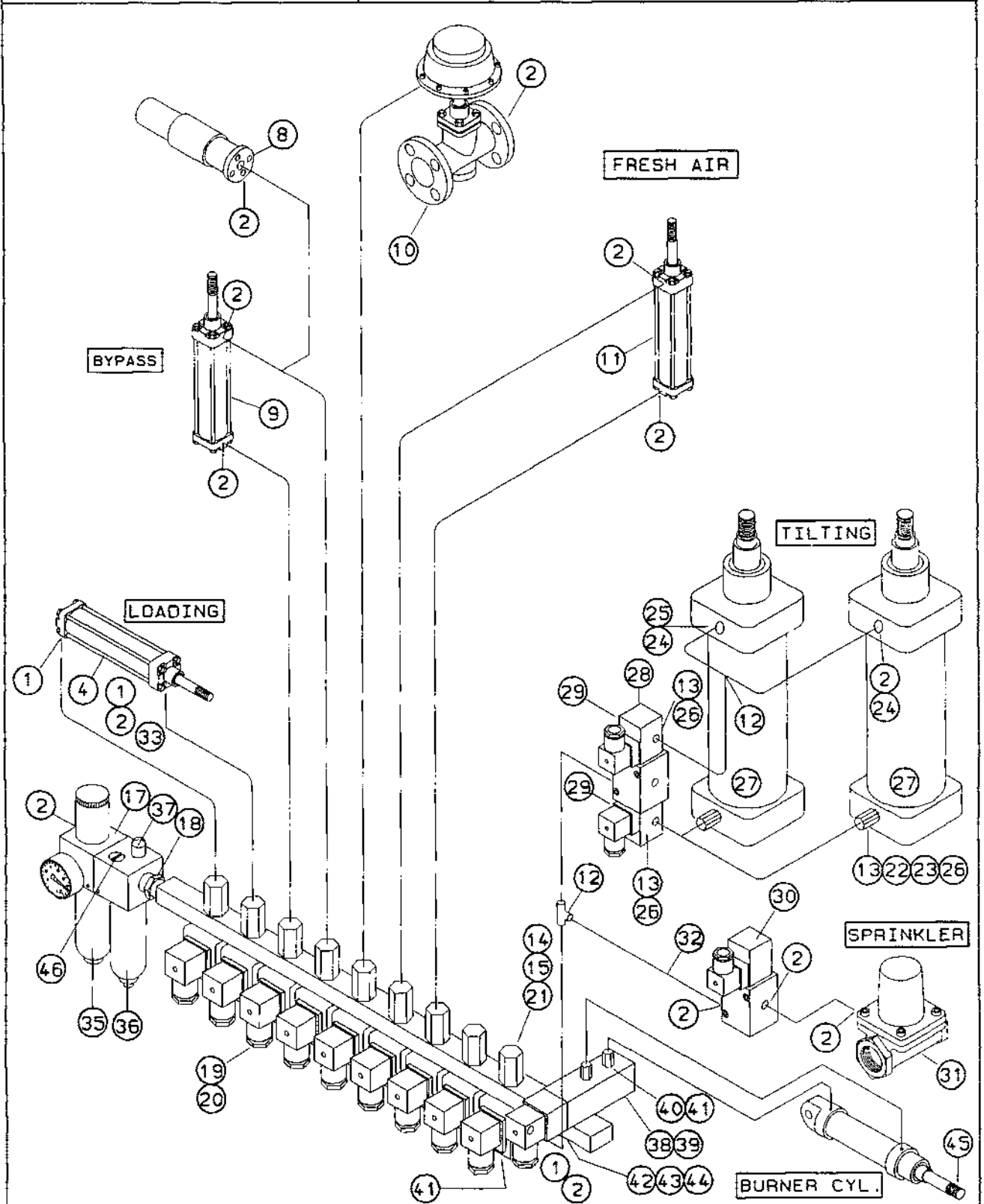
From serial no. 6430133

Page

9-24.0



Type		Spare Parts List			Page
643		Fresh Air Flap from serial no. 6430133			9-24.1
Pos.	Part No.	Part Name	Description	Quant.	
1	236 085-2	Flap, Fresh Air		1	
2	111 062	Cylinder, Lift	DN40 Hub 150	1	
		Repair kit for cylinder 111 062	Indic. serial no.	1	
3	020 161	Clevis	DIN 1752 M12x24	1	
4	020 162	Bolt	D12x24	1	
5	020 435	Nut, Hex	DIN 439 M12	1	
6	020 908	Bolt		1	
7	020 712	Washer, Tension	DIN 6796 8	13	
8	123 001	Strip, Felt	3x15x2000	3	
9	111 044	Coupling	GE 8 LR 1/4"	1	
10	121 154	Hinge, Bolt-on		3	
11	123 041	Strip, Felt	3x20x960	2	
12	111 049	Fitting	WE 8 PLR 1/4"	1	
13	100 003	DU-Bushing	12x14x10	1	

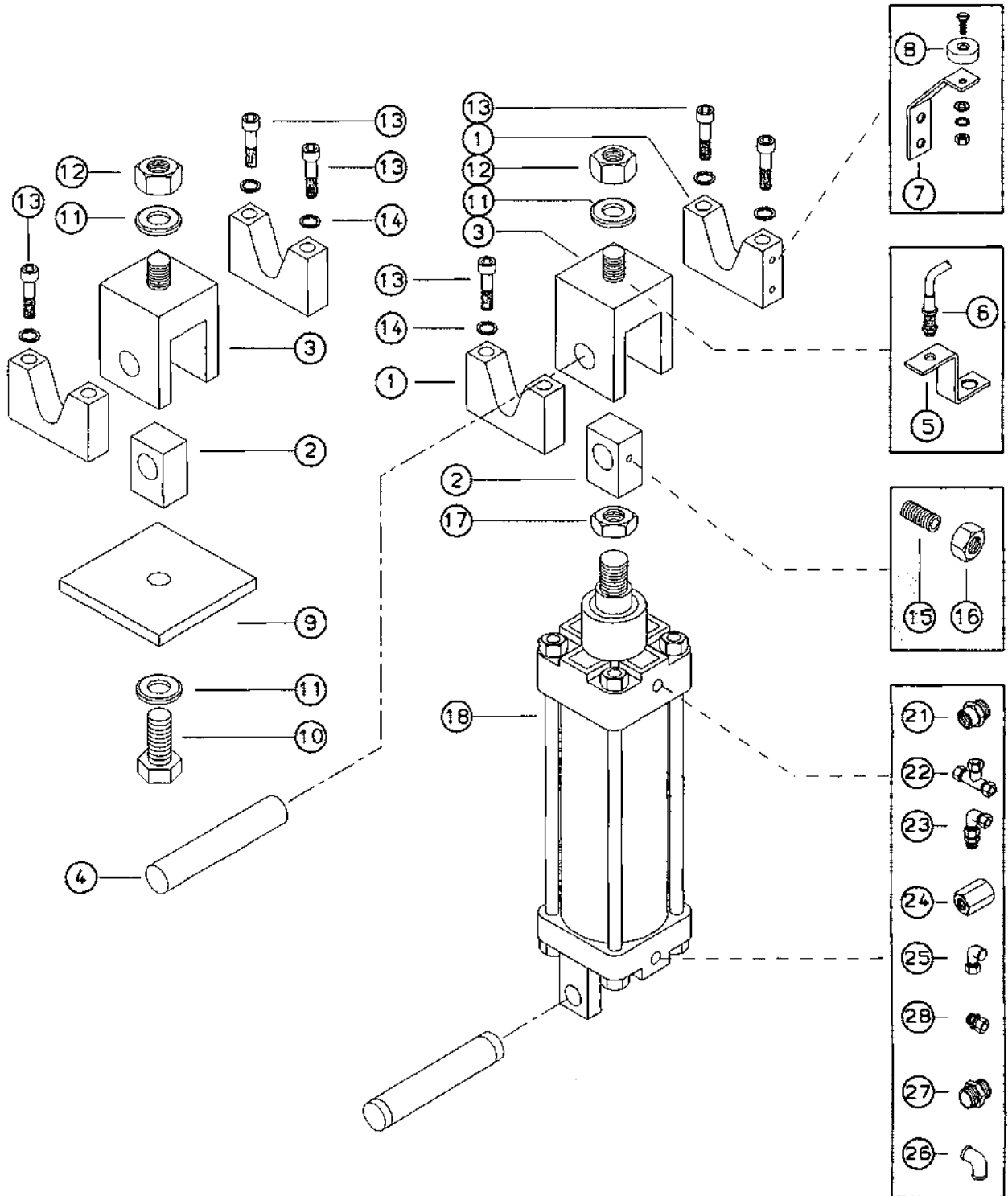


Type		Spare Parts List			Page
643		Pneumatic System			9-25.1
Pos.	Part No.	Part Name	Description	Quant.	
1	030 024	Fitting, Reducer	3/8"x1/4"	4	
2	111 045	Coupling, Elbow, Replacem. 111 049	WE 8 LR 1/4"	14	
	111 049	Coupling, Elbow	WE 8 PLR 1/4"	14	
3					
4	111 060	Cylinder, Lift	DZS 1063A/250 PD 28313	1	
		Notice: only in serial no. 6430001- 6430011 & 6430014 as of 6430208 standard			
		Repair kit for pos. 4, Nr. 111 060	Indic. serial no.		
	111 627	Cylinder, Lift	DZS 1025A/250 PD 21872	1	
		Repair kit for pos. 4, Nr. 111 627	Indic. serial no.		
5	06 002	Hose, Polyamid	8x1 Nylon	1	
6	111 104	Ring, Cutting	8 L	1	
7	111 029	Sleeve, Reinforcement	VHS 8x1		
8	224 705-4	Cylinder, Lift	Brass	1	
	028 087	Seal	32.92x3.53	2	
	223 522-1	Piston			
	020 088	Ring, Glide	32.0x0.85x3.55	2	
9	111 061	Cylinder, Lift	DZS 1040/100 PD 38312	1	
		Repair kit for pos. 9, Nr. 111 061	Indic. serial no.	2	

Type		Spare Parts List		Page
643		Pneumatic System		9-25.2
Pos.	Part No.	Part Name	Description	Quant.
10	111 258	Valve, Steam	512/25/D885-1-2	1
		Repair kit for pos. 10	Satz 9 + 6	1
11	111 062	Cylinder, Lift	DZS 1040/150 PD 28312 PD 29344	1
		Repair kit for pos. 11	Indic. serial no.	1
12	111 055	T-Fitting	TE 8 LR 1/4"	3
13	111 035	Fitting, Straight	GE 8 LR 1/4"	3
14	111 279	Throttle	1/8" 4048004	9
15	111 034	Fitting, Straight	GE 8 LLR 1/8"	7
16	111 095	Fitting-T	TE 8 LLR 1/8"	2
17	111 063	Regulator, Air	MKL 08-H-MW	1
18	030 070	Fitting, Straight	3/8"x1/4"	1
19	111 233	Valve, Solenoid (1x)	115V/60Hz	9
	111 149	Valve, Solenoid (1x)	230V/50Hz	
20	111 238	Bank, Solenoid Valve (9x)	115V/60Hz	1
	111 237	Bank, Solenoid Valve (9x)	230V/50Hz	
	111 236	Bank, Solenoid Valve (5x)	115V/60Hz	1
	111 235	Bank, Solenoid Valve (5x)	230V/50Hz	

Type		Spare Parts List		Page
643		Pneumatic System		9-25.3
Pos.	Part No.	Part Name	Description	Quant.
21	111 103	Ring, Cutting	8 LL	11
22	111 065	Valve, Throttle	DRV 08-1/4"	2
23	030 029	Coupling, Straight	Brass 1/4"x1/4"	2
24	030 001	Coupling, Reducer	1/2"x1/4"	4
25	111 054	Coupling	EVW 8 L	4
26	030 008	Elbow	90° 1/4"x1/4"	1
27	111 700	Cylinder, Lift	DN125/Hub100.	2
		Repair kit for pos. 27	Fabriknr. angeb.	2
28	111 067	Valve, Solenoid	26364- 115V/60Hz	1
	111 066	Valve, Solenoid	26364- 230V/50Hz	1
29	111 064	Valve, Throttle	DVE 08 1/4"	2
30	111 379	Valve, Solenoid	S8-382-1/4" 24V 50/60 Hz	1
31	111 378	Valve, Air	ARKV 25 PA 1X	1
32	020 076	Ermeto-Pipe	Ermeto 8 mm	
33	111 065	Valve, Throttle Check	DRV8 1/4"	2
34				

Type		Spare Parts List		Page
643		Pneumatic System		9-25.4
Pos.	Part No.	Part Name	Description	Quant.
35	111 395	Glass for Water Separator	MK08-PL 15204H	1
36	111 396	Glass for Oiler	ML08-08990	1
37	111 397	Glass, Level		1
38	111 967	Valve, Solenoid	4/2 230V/50Hz	1
39	112 286	Valve, Solenoid	4/2 115V/60Hz	1
40	111 034	Fitting, Straight	GE 8 LLR 1/4	2
41	112 034	Muffler	1/8"	8
42	111 941	Bolt, Banjo		1
43	028 160	O-Ring		1
44	028 287	Seal		1
45	112 304	Cylinder	DN25/Hub 35	1
		Repair kit for cylinder 112 304	Indic. serial no.	1
46	112 747	Plug		1





Type		Spare Parts List			Page
643		Tilt Cylinder Assembly			9-26.1
Pos.	Part No.	Part Name	Description	Quant.	
1	220 318-4	Bracket, Tilting		8	
2	220 323-4	Bracket, Pivot		4	
3	220 322-3	Clevis with Pin		4	
4	220 324-4	Pin, Clevis		4	
5	223 136-4	Bracket for Magnetic Switch		1	
6	135 472	Switch, Magnetic		1	
7	223 135-4	Bracket, Magnet		1	
8	135 473	Magnet		1	
9	220 317-4	Plate	100x120 mm	2	
10	020 180	Bolt, Hex	M27x3 50 long.	2	
11	020 135	Washer, Tension	DIN 6796 28	8	
12	020 083	Nut, Hex	DIN 934 M27	4	
13	020 080	Bolt, Allen	DIN 912 M10x60	16	
14	020 081	Washer, Spring	DIN 127 10	16	
15	020 603	Screw, Set	DIN 915 M8x25	4	
16	020 037	Nut, Hex	DIN 934 M8	4	

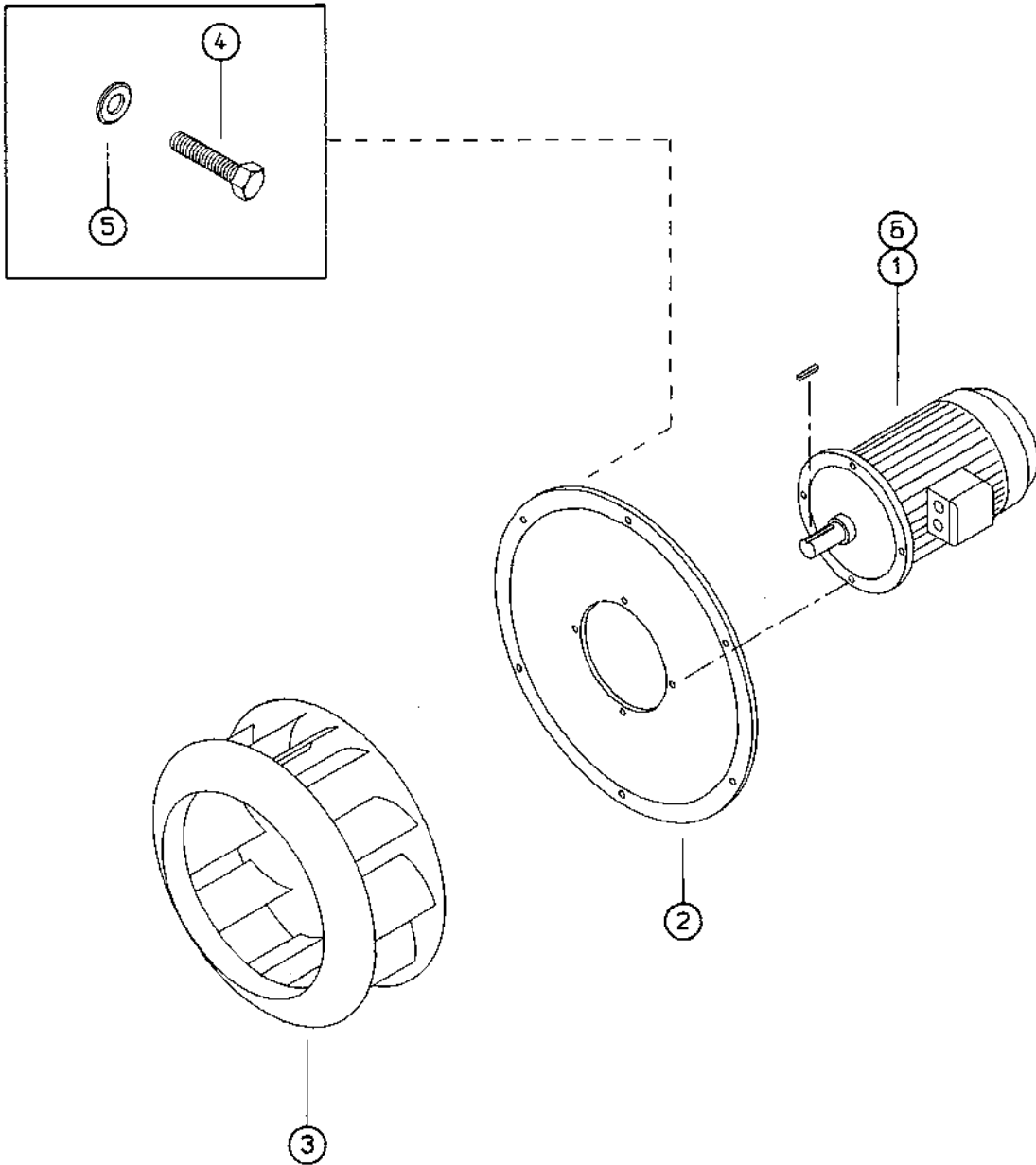
Type		Spare Parts List			Page
643		Tilt Cylinder Assembly			9-26.2
Pos.	Part No.	Part Name	Description	Quant.	
17	020 184	Nut, Hex	DIN 934 M27x3	1	
18	111 700	Cylinder with extended Ram	DN125/Hub 100	2	
		Repair kit for cylinder 111 700	Indic. serial no.	1	
19					
20					
21	030 001	Nipple, Reducer	1/2"-1/4"	2	
22	111 055	TE Coupling	TE 8 LR	2	
23	111 054	Coupling, Elbow	EVW 8-PL	2	
24	111 065	Throttle	DRV 08 1/4	2	
25	111 045	Coupling, Elbow	WE 9 LR	1	
26	030 008	Elbow	1/4" 92	1	
27	030 029	Fitting, Straight	1/4" MS	2	
28	111 035	Coupling	GE 8 LR	1	

TYPE 643

BLOWER ASSEMBLY

Page

9-27.0



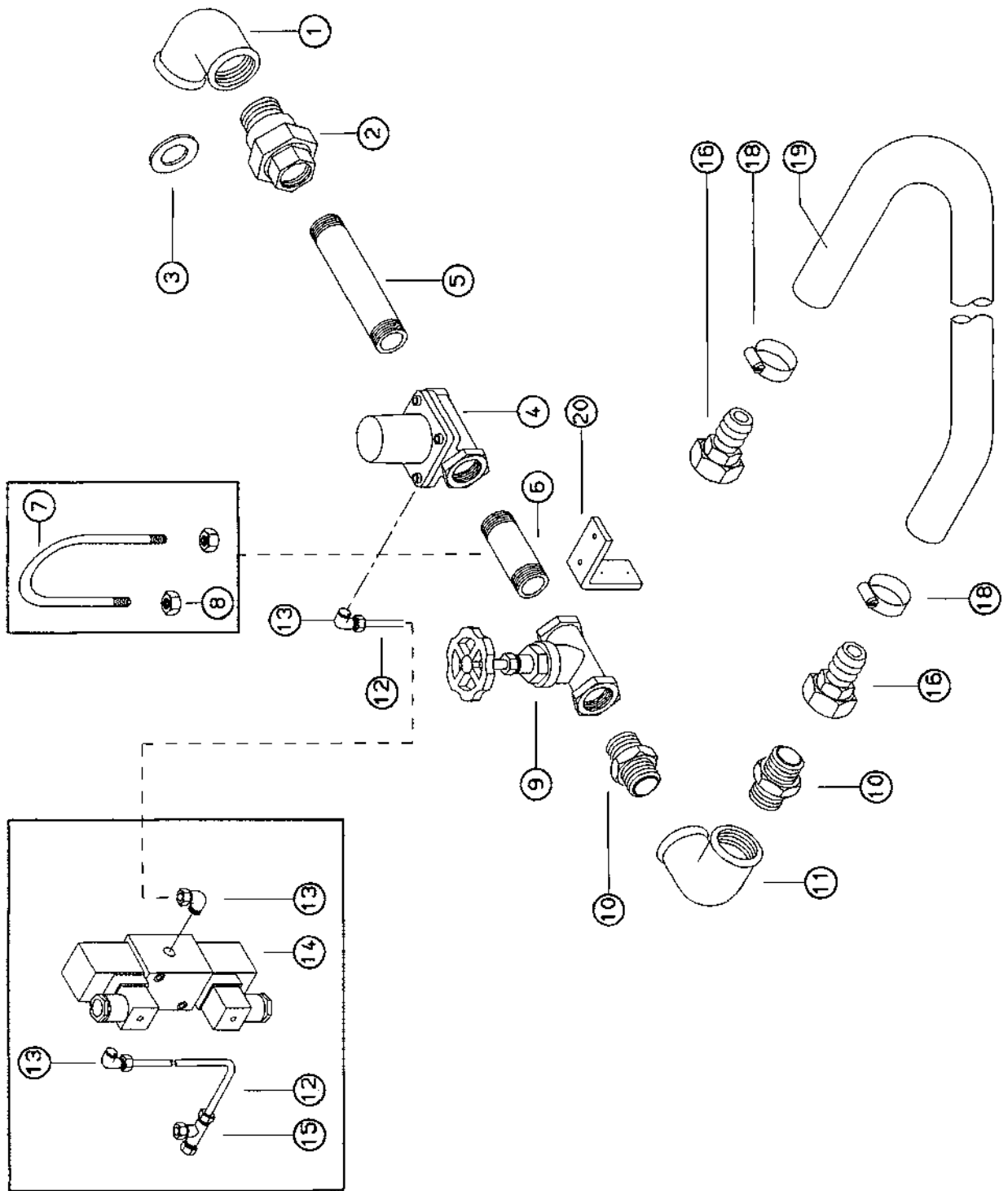
Type		Spare Parts List		Page
643		Blower Assembly		9-27.1
Pos.	Part No.	Part Name	Description	Quant.
1		Motor, Flange Indicate voltage, frequency and kW		1
2		Flange		1
3		Wheel, Fan	Indic. serial no.	1
4		Bolt, Hex		6
5		Washer, Tension		6
6		Blower Assembly compl. Indicate voltage, frequency and kW		1

TYPE 643

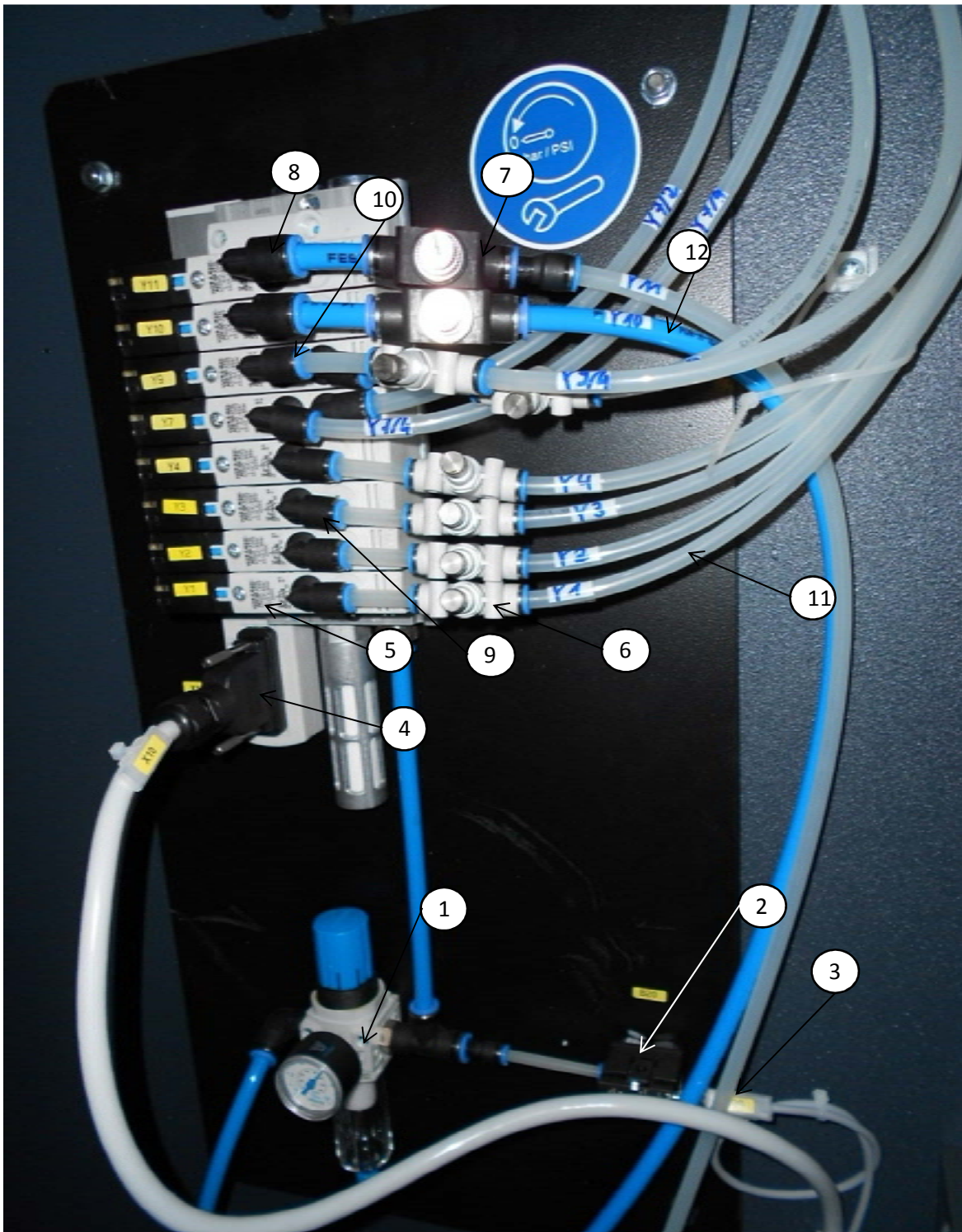
SPRINKLER SYSTEM

Page

9-28.0



Type		Spare Parts List			Page
643		Sprinkler System			9-28.1
Pos.	Part No.	Part Name	Description	Quant.	
1	030 095	Coupling, Elbow	90°	1	
2	030 111	Coupling		1	
3	028 118	Gasket	d = 44x33	1	
4	111 378	Valve, Pneumatic	ARV 25 PAIX	1	
5	030 158	Fitting, Straight	150 mm long	1	
6	030 160	Fitting, Straight	80 mm long	1	
7	020 742	Bolt, U	M6	1	
8	020 036	Nut, Hex	DIN 934 M6	2	
9	111 320	Valve, Shut Off	1" ND16	1	
10	030 108	Fitting, Straight	1"	2	
11	030 157	Elbow	1" 90°	1	
12	002 276	Ermeto-Pipe	8x1 3m	1	
13	111 049	Coupling, Elbow	WE 8 LR	3	
14	111 379	Valve, Solenoid	58-382 1/4" 24 V-50/60 Hz	1	
15	111 052	Fitting, Tee	8 L	1	
16	030 165	Coupling, Hose	27 1"	2	
17					
18	121 049	Clamp, Hose, Replacem. 121 273	1"	2	
	121 273	Clamp, Hose	Mikaler 36-39	2	
19	06 035	Hose, Multi-purpose	25x5.5x1500 20 bar	1	
20	244 455-4	Bracket, Sprinkler		1	



TYP(E) 643		Ersatzteilliste, Spare parts list, Liste de pièces		Blatt Page 9-29.1
		PNEUMATIKSYSTEM PNEUMATIC SYSTEM SYSTEME PNEUMATIQUE		
POS. REP.	Ident-Nr. Part No. Ref. N°	Benennung Part Name Désignation	Bezeichnung Description	Menge Quant.
1	113312	Filterregelventil filter-control valve filtre-régulateur-soupape	Festo	1
2	113319	Drucksensor Pressure sensor pression capteur	Festo	1
3	138908	Kabel Cable Câble	Festo	1
4	138902	Kabel Cable Câble	Festo	1
5	113320	Ventil Valve Soupape	Festo	8
6	113313	Drossel-Rückschlag-Ventil 8mm Air regulator-blow-valve 8mm inductance d'arrêt-soupape 8mm	Festo	6
7	113448	Drossel-Rückschlag-Ventil 10mm Air regulator-blow-valve 10mm inductance d'arrêt-soupape 10mm	Festo	2
8	113417	Steckanschluß Ventil 10mm cartridge valve 10mm borne à fiche soupape 10mm	Festo	2
9	113310	Steckanschluß Ventil 8mm cartridge valve 8mm borne à fiche soupape 8mm	Festo	6
10	113311	Steckanschluß Ventil 8mm cartridge valve 8mm borne à fiche soupape 8mm	Festo	2
11	006002	Schlauch 8 hose 8 Tuyau 8	Festo	



TYP(E) 643		Ersatzteilliste, Spare parts list, Liste de pièces		Blatt Page
		PNEUMATIKSYSTEM PNEUMATIC SYSTEM SYSTEME PNEUMATIQUE		9-29.2
POS. REP.	Ident-Nr. Part No. Ref. N°	Benennung Part Name Désignation	Bezeichnung Description	Menge Quant.
12	006137	Schlauch 10 hose 10 Tuyau 10	Festo	