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Miniplast

Butt Fusion Machine

Operation & Maintenance Manual

Corrosion Resistant Fluid and Air Handling Systems.

Dated 03-12-2013

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1. Description of the Product

This chapter gives important basic information about the product and its prescribed use. All technical details of the machine are put together as a general arrangement.

1.1. Usage and Purpose-oriented Use

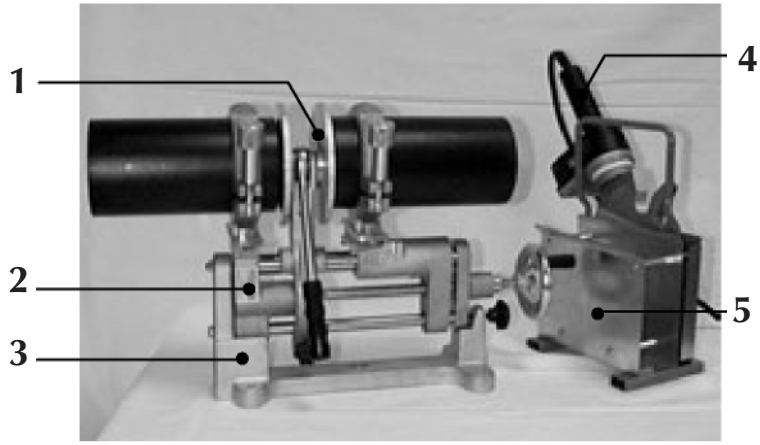
The **SIMTECH MINIPLAST 2** has been designed for heating element butt welding of pipes and fittings out of PE, PP and PVDF with a diameter range of Ø = 20 - 110 mm.

The machine is kept small so that it can easily be used in the pipe system.
For moulded narrow bends and fittings, special small basic clamping devices are available.

All use going beyond is not purpose-oriented.
The manufacturer is not responsible for damages caused by misuse. The risk is held only by the user.

Also part of the purpose-oriented use is
- Respecting all the indications of the working instructions and
- Performing the inspection and maintenance works.

1.2. Overview



No.	Denomination
1	Manual planer
without illustr.	Electric planer (optional)
2	Basic machine
3	Table support
4	Heating element
5	Reception box

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1.3. Safety Measures

In case of wrong use, wrong operation or wrong maintenance, the machine itself or products standing nearby can be damaged or destroyed.

Persons being in the endangered area may be injured. Therefore these working instructions have to be thoroughly read and the corresponding safety regulations must be necessarily adhered to.

1.4. Conformity

The machine corresponds in its construction to the valid recommendations of the European Community as well as to the according European standard specifications. The development, manufacturing and mounting of the machine were made very carefully.

1.5. Designation of the Product

The product is designated by a sign at the basic frame.
It contains the type of the machine, the serial number and the year of construction.

1.5.1 Technical data

1.5.1.1 SIMTECH MINIPLAST 2 General Data

Material:	PP, PE-HD, PVDF, PE 100
Pipe diameter range:	Outside Ø = 20 - 110 mm
Sheet steel carrying case (lxwxh):	450 x 300 x 365 mm
Weight (without packing):	30 kg
Fuse:	10 A
Wire cross section:	1.5 mm^2
Emissions:	- The sound intensity level is below 70 dB (A) - When using the named pipe materials and when welding below 260° C no toxicant damp arises.
Ambient conditions in the welding area	- Keep the workshop clean (no dust at the welding area) - do not weld below 5° C, if necessary preheat - avoid humidity, if necessary use a welding tent - avoid strong sun rays influence - protect from wind, shut the pipe ends

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1.5.1.2 Heating Element

Power:	600 Watt
Voltage:	230 V (± 10 %)
Current:	2.6 A (± 10 %)
Frequency:	50 Hz
Outside Ø :	145 mm
Surface:	nonstick-coated
Attached elements:	- electronic temperature control - control lamp - connecting cable with plug
Weight:	appr. 2 kg

1.5.1.3 Manual Planer

Weight:	appr. 2 kg

1.5.1.4 Basic Machine and Table Support

Material frame and clamping devices:	Aluminium
Max. force	600 N

1.5.1.5 Electric Planer (optional)

Power:	on request
Voltage:	230 V (± 10 %)
Current:	on request
Frequency:	50 Hz
Weight:	on request

See spare parts list for order numbers and single parts, when ordering, please state the machine number !

1.6. Equipment and Accessories:

Following tools and accessories are part of the delivery:

1 x	Hexagonal socket screw key size 3 for screwing in / out the reduction inserts
1 x	Hexagonal socket screw key size 4 for tightening the optional clamping shells for fittings
	Screws for reduction inserts, flat-head screws for reduction inserts, flat-head screws for mounting the optional clamping shells for fittings

2. Safety Rules

The base for the safe handling and the fault-free operation of this machine is the knowledge of the basic safety indications and rules.

- These working instructions contain the most important indications to run the machine safely.
- The safety indications are to be followed by all persons working on the machine.

2.1. Explanation of the Symbols and Indications

In the working instructions, the following denominations and signs are used for dangers:

This symbol signifies a possible danger for the life and the health of persons.
- The non-respect of these indications may have heavy consequences for the health.

This symbol means a possible dangerous situation.
- The non-respect of these indications may cause light injuries or damages on goods.

This symbol gives important indications for the proper use of the machine.
- The non-respect of these indications may conduct to malfunctions and damages on the machine or on goods in the surrounding.

Under this symbol you get user tips and particularly useful information.
- It is a help for using all the functions on your machine in an optimal way and helps you to make the job easier.

The regulations for the prevention of accidents are valid (UVV).

2.2. Obligations of the Owner

The owner is obliged only to let persons work at the machine who

- Know about basic safety and accident prevention rules and are instructed in the handling of the machine, as well as who
- Have read and understood the safety chapter of this manual and certify this by their signature.

The safety-conscious working of the staff has to be checked in regular intervals.

2.3. Obligations of the Worker

All persons who are to work at the machine are obliged before working:

- to follow the basic safety and accident protection rules.
- to have read and understood the safety chapter and the warnings in this manual and to confirm by their signature that they have well understood them.

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2.4. Measures of Organisation

- All equipment required for personal safety is to be provided by the owner.
- All available safety equipment is to be inspected regularly.
- The working instructions have to be permanently kept at the place of use of the machine. They are to be at the operator‘s disposal at any time and without much effort.
- In addition to the manual, the common valid and the local accident protection rules and regulations for the environmental protection must be available and followed.
- Every time the machine changes hands or is being rent to third persons, the working instructions are to be sent along with and their importance is to be emphasized.

2.5. Instructions for the Staff

- Only skilled and trained persons are allowed to work at the machine.
- It must be clearly defined who is responsible for transport, mounting and dismounting, starting the operation, setting and tooling, operation, maintenance and inspection, repair and dismounting.
- A person who is being trained may only work at the machine under supervision of an experienced person.

2.6. Structural Modifications on the Machine

- No modifications, extensions or reconstructions may be made on the machine without permission of the manufacturer.
- Machine parts which are not in a perfect condition are to be replaced immediately.
- Only use original SIMTECH spare and wear parts.

2.7. Cleaning the Machine

The used materials and tissues are to be handled and disposed of properly, especially:

- When cleaning with solvents
- When lubricating with oil and grease.

2.8. Danger while Handling the Machine

The machine SIMTECH MINIPLAST 2 is constructed according to the latest technical standards and the acknowledged technical safety rules. However, dangers for the operator or other persons standing nearby may occur. Also material damages are possible.

The machine may only be used

- According to the purpose-oriented usage
- In safety technical impeccable status

Disturbances which may affect the safety of the machine must be cleared immediately.

2.9. Dangers caused by Electric Energy

Only skilled persons are allowed to work at electrical appliances.

- The electrical equipment of the machine has to be checked regularly. Loose connections and damaged cables have to be replaced immediately.
- The heating element has to be protected from rain and dropping water, if need be use a welding tent.
- According to VDE 0100, the use on construction sites is only allowed with a power distributor with a FI-safety switch.

2.10. Specific Dangers

2.10.1 Danger of being burnt by Heating Element, Reception Box and Welding Area

You can burn yourself, inflammable materials can be ignited! The heating element is heated up to more than 200° C !

- Do not leave the heating element unsupervised.
- Take enough safety distance to inflammable materials.
- Do wear safety gloves.
- Always put the heating element back into the reception box before and after each use.
- Transport the heating element at the handle only, do not touch the surfaces of the heating element.

2.10.2 Danger of Stumbling over Electric Wires

- Make sure that no person has to step over the wires.

2.10.3 Danger of Cutting / Squeezing / Catching Clothes

- Always put the planer back into the reception box before and after each use.
- Transport the planer at the handle only and do not touch surfaces.
- Do not put hands between clamped pipe ends.
- Make sure that your clothes are not caught by the planer.

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2.11. Warranty and Liability

Fundamentally our “General Sales and Delivery Conditions” are valid.

They are at the owner’s disposal latest when signing the contract. Guarantee and liability demands referring to personal injuries or damages on objects are excluded if they are caused by one or several of the following reasons:

- Not using the machine according to the prescriptions.
- Inexpert transport, mounting, starting , operating and maintenance of the machine.
- Running the machine with defective or not orderly mounted safety appliances.
- Ignoring the information given in this manual.
- Structural modifications on the machine without permission.
- Unsatisfactory checking of parts of the machine which are worn out.
- Repairs performed in an inexpert way.
- In case of catastrophes and force majeure.

3. Functional Description

Basically the international and national guidelines are to be followed.

The plastic pipes are clamped by means of the clamping devices.

Then the front sides of the pipes are cut plane and parallel by means of the **planer** and the misalignment of the pipes is checked.

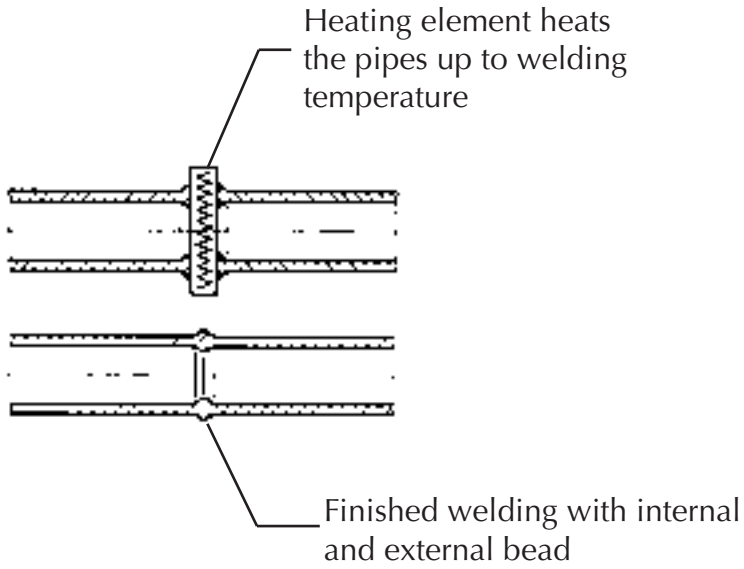
The heating element is inserted and the pipes are pressed against the heating element under defined adjusting pressure. This process is called **"adjusting".**

After the prescribed bead height being reached, pressure is reduced, the **heating time** begins. The function of this time is to heat up the pipe ends.

After expiration of the heating time, the slides are opened, the heating element is removed quickly and the pipes are driven together again. The time gap from the removal of the heating element to joining the pipes is called **change over time.**

The pipes are joined under prescribed welding pressure and then cool down under pressure **(cooling time).**

The welded joint can be un-clamped, the welding process is finished.



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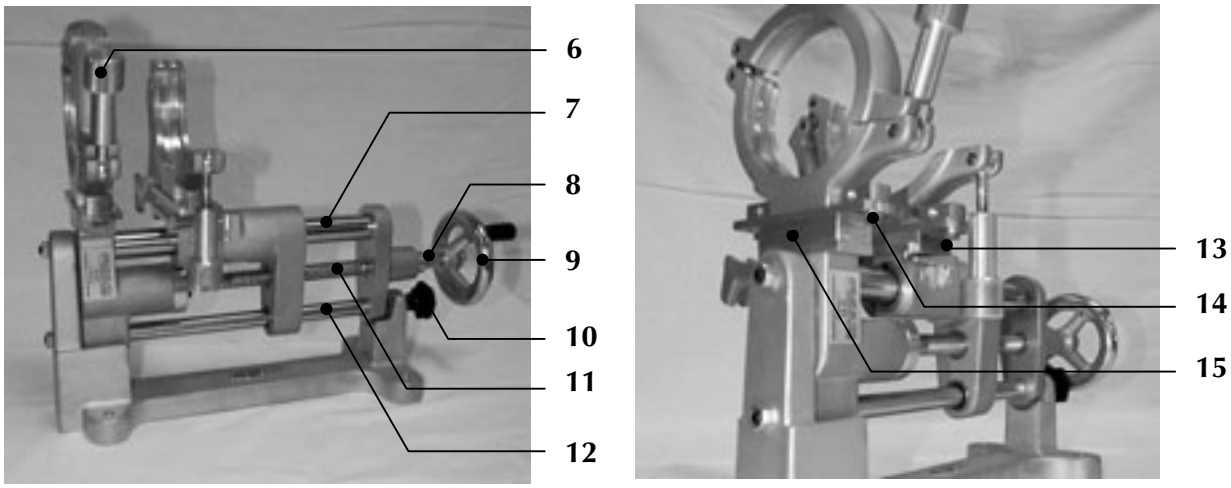
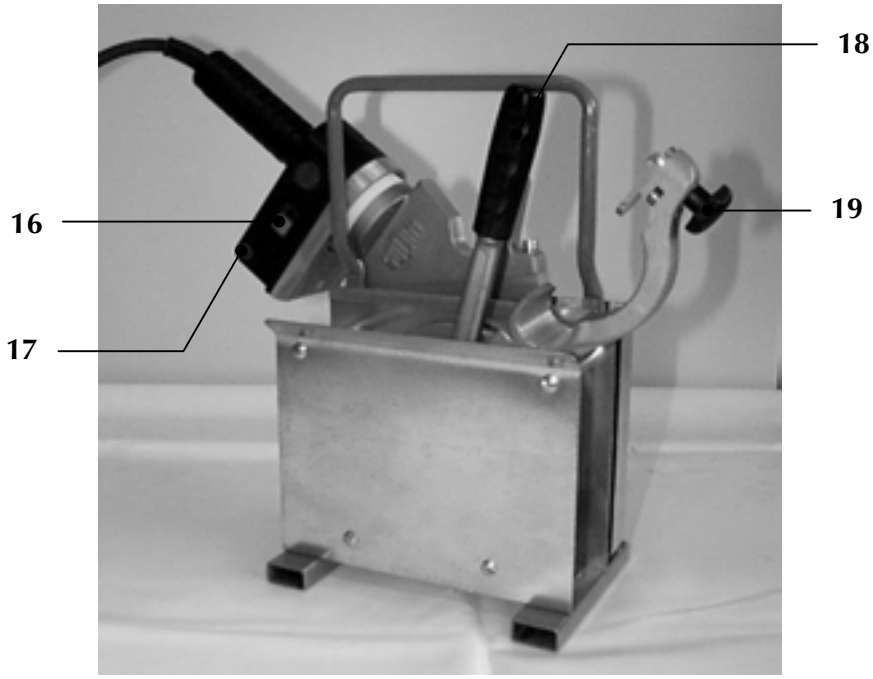
4. Operating and Indicating Elements

4.1. Elements on the Basic Machine / Table Support



No.	Denomination	Function
6	Tightening nut	- Tightening of the pipes
7	Upper guide bar	- Guidance for the slide
8	Scale	- Display of the applied welding force - max. 60 kp displayed
9	Handwheel	- Opening / closing the slides - application of the adjusting force
10	Star grip for basic machine	- Attaching the basic machine at the table support.
11	Spindle	- Advance of the slide
12	Lower guide bar	- Guidance for the slide - Fixing the planer - Rest for the heating element
13	Screws for vertical offset	- By loosening the screws the clamping device can be moved upwards or downards
14	Hexagon screw (4x)	- Setting the angle
15	Screws for horizontal offset	- By loosening the screws the clamping device can be moved to the left or to the right side

4.2. Elements at Heating Element and Planer



No.	Denomination	Function
16	Knob with slot	- Setting the temperature for the heating element
17	Control lamp green	- There are three different states: • Out: signalizes that the heating element is not heated up at the moment or that it cools down • Blinking: the temperature of the heating element is maintained by a pulse-position ratio. • On: signalizes that the heating element is heated up at the moment and has not yet reached the desired temperature.
18	Ratchet	- Turning around the planer
- -	On- / off – switch for electric planer (option)	- The planer can be switched on / off. - The planer has to be switched off after use.
19	Star grip screw	- Attaching the planer at the guidance bar by turning the screw

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4.3. Elements at the Electric Planer (optional)

No.	Name	Function
20	Button on/off	The button must be pushed for planing. The planer has to be switched off after each planing process
21	Locking knob	Keeps the on/off button in position: ON

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5. Starting and Operating

The instructions of this chapter are supposed to initiate in the operation of the machine and lead during the appropriate starting of the machine.

This includes

- The safe operation of the machine
- Using all the possible options of the machine
- Economic operation of the machine

5.1. Starting

The machine may only be operated by initiated and authorized persons.
For the qualification, a plastic welding exam can be taken according to DVS and DVGW.

- In situations of danger for persons and the machine, the mains plug has to be unplugged immediately.
- After completion of the welding work and during breaks the machine has to be switched off. Further take care that no unauthorized person has access.
- Protect the machine from wetness and humidity.
- According to VDE 0100, the use on construction sites is only allowed with a power distributor with a FI-security protective switch.
- Connect the heating element and the electric planer (optional) to the mains supply (230 V / 50 Hz).

Lay electric cables carefully (danger of stumbling) !

- Take into account the surrounding conditions:
- The welding may not be performed under direct sun rays influence, use a welding umbrella if necessary.
- If the surrounding temperature is under 5° C, measures have to be taken:
- Use a welding tent or preheat the pipe ends if necessary.
- In addition, take measures against rain, wind and dust.

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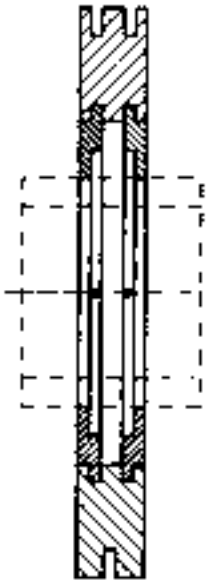
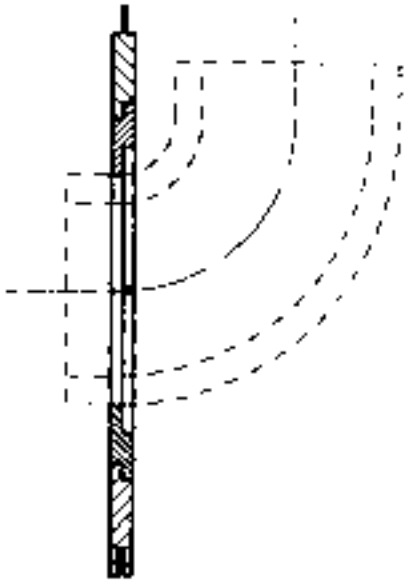
5.1.1 Exchanging the Reduction Inserts

- Unscrew the mounted reduction inserts by means of the provided Allan key.
- Screw the reduction inserts with the corresponding diameter into the clamping devices.
- When welding bends, the angle can be set on the basic clamping devices (on each side between -15° to +15°).
- If necessary (e.g. for T-pieces) a special basic clamping device can be provided by means of which very short sections can be clamped.



Large clamping device



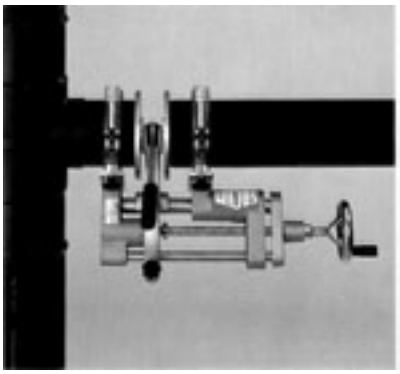
Small clamping device

5.2. Welding Process

The respectively valid welding prescriptions (ISO / CEN / DVS ...) are to be basically followed.

- Do wear safety gloves as protection against burning.
- A stop-watch must be available for recording the actual times for heating up and cooling.
- A welding table must be available from which the parameters for the pipe dimensions to be welded prescribed by the welding prescriptions may be taken.
- The heating element surfaces must be clean and especially non greasy. Therefore they need to be cleaned shortly before each welding or in case of dirtiness by means of a **fibre-free** paper and a cleaning agent (e.g. PE cleaner or pipe cleaning tissues which are available at the SIMTECH company). The anti-adhesive coating of the heating element must remain undamaged in the working area.

• Switch on heating element and set the required welding temperature (standard value PE-HD: 210° C) on the adjustment screw on the handle.
• As soon as the control light blinks, the nominal temperature has been reached and is maintained at a constant level by a pulse-position ratio.
• Screw in reduction inserts according to the outer diameter of the pipes to be welded, if necessary set the angle.
• Attach the basic frame at the table support, if required fix the table support at the support surface or insert machine without table support directly into the pipe system.



Machine working directly in the pipe system

• Put the work pieces into the clamping device, fasten clamping nuts tightly and align the work pieces with respect to one another.
• Insert the manual planer between the ends of the work pieces, lock it by turning the star grip on the guide bar and plane with low force.
• Insert the electric planer (optional) between the ends of the work pieces, lock it by turning the star grip at the guide rod. Switch on planer at the on/off button and keep it switched on with the locking knob. Plane the pipes with low force. For releasing the locking knob, push shortly the button.
• Planing should be carried out until a revolving cutting has been formed on both sides.
• Open slide again, remove the planer and put it into the reception box. Remove the produced cuttings without contacting the worked surfaces.
• Close slide again.
• Check pipe mismatch and gap on the joining pipe ends.
According to DVS 2207, the mismatch on the pipe outer side must not exceed 0.1 x pipe wall thickness, the admissible gap must not exceed 0.5 mm.
The mismatch compensation is carried out by further tightening or releasing the clamping nuts. In case mismatch compensation was carried out, planing must be repeated afterwards.
• The adjustment force for the pipe dimension to be welded can be gathered from the welding table. Add the movement force.
• Open slide again somewhat.
• Gather heating time, maximum change over time, cooling time and bead height for the pipe dimension to be welded from the table.

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• Move the heating element which has been cleaned and brought to desired temperature between the pipes with the handle facing downwards (hang into guide bar).
• Close the slide smoothly with the determined adjustment force.
The applied force can be read at the force scale on the hand wheel.
When the prescribed revolving bead height is reached, reduce the force
(Heating force = approx. 10 % of the adjustment force).
• The heating time starts now. Press the stop-watch and compare the actual time with the nominal time taken from the table.
• After expiration of the heating time, open the slide, remove the heating element as quickly as possible, put it into the heat protection box and close the slide smoothly. The maximum time frame for this process is predetermined by the value for the change over time taken from the table.
• Press the stop-watch when the welding pressure is built up.
If necessary, readjust the force during cooling (the force for cooling is the same as the adjustment pressure).
• After expiration of the cooling time, release the force, remove the welded parts and open the slide.

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6. Welding Tables

PP Welding Table

PP DVS Welding Times For the Following Machines:
- Miniplast
- Maxiplast
- PM-125
- PM-160

PP Welding Values																		DVS-2207-11
Diameter & Wall Thickness			SDR Rating	Weld Temperature			Melt Pressure & Bead Height			Heating Time			Change Over Time			Weld Pressure			Cooling Time
D	S			Temp			P1		Bead	P2	P2	T2	T3	T4	P5			T6
Size	Wall		SDR	C°	F°		Pressure kg	Pressure lbs	Height (mm)	Pressure kg	Pressure lbs	Seconds	Seconds	Seconds	Pressure kg	Pressure lbs		Minutes
½" (20mm)	1.9		11	210°	410°		2	4	0.5	0.2	0.4	135	5	6	2	4		6
¾" (25mm)	2.3		11	210°	410°		2	4	0.5	0.2	0.4	135	5	6	2	4		6
1" (32mm)	2.9		11	210°	410°		3	6	0.5	0.4	0.9	135	5	6	3	6		6
1¼" (40mm)	3.7		11	210°	410°		4	9	0.5	0.6	1.3	135	5	6	4	9		6
1½" (50mm)	4.6		11	210°	410°		7	15	0.5	0.9	2.0	137	5	6	7	15		6
2" (63mm)	5.8		11	210°	410°		11	23	0.5	1.4	3.1	156	6	7	11	23		9
	3.6		17.6	210°	410°		7	15	0.5	0.9	2.0	119	5	6	7	15		6
2½" (75mm)	6.8		11	210°	410°		15	33	0.5	2.0	4.4	172	6	7	15	33		12
	4.3		17.6	210°	410°		10	21	0.5	1.3	2.9	131	5	6	10	21		6
3" (90mm)	8.2		11	210°	410°		22	47	1	2.9	6.4	192	6	8	22	47		14
	5.1		17.6	210°	410°		14	31	1	1.8	4.0	145	5	6	14	31		7
	2.8		33	210°	410°		8	18	0.5	1.1	2.4	104	4	5	8	18		3
4" (110mm)	10		11	210°	410°		32	70	1	4.3	9.5	217	7	9	32	70		17
	6.3		17.6	210°	410°		21	46	1	2.8	6.2	164	6	7	21	46		10
	3.4		33	210°	410°		12	26.4	0.5	1.8	4.0	115	5	6	12	26.4		4

D = Pipe & Fitting O.D.
S = Pipe & Fitting Wall Thickness
Temp = 210° C +/- 10°
PI = Initial Weld Pressure
P2 = Heat Soak Pressure

T2 = Heat Soak Time in Seconds
T3 = Change over Time in Seconds
T4 = Time to Bring up to Full Weld Pressure in seconds
P5 = Ending Weld Pressure
T5 = Cool Down Time in Minutes

* Cool down time in the clamps can be reduced by 50% provided the parts being welded are not under duress until the complete cool down time has been achieved

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PVDF DVS Welding Times For the Following Machines:

- Miniplast
- Maxiplast
- PM-125
- PM-160

PVDF Welding Values															DVS-2207-15
Diameter & Wall Thickness		SDR Rating	Weld Temperature		Melt Pressure & Bead Height			Heating Time			Change Over Time		Weld Pressure		Cooling Time
D	S		Temp		P1		Bead	P2	P2	T2	T3	T4	P5		T6
Size	Wall	SDR	C°	F°	Pressure kg	Pressure lbs	Height (mm)	Pressure kg	Pressure lbs	Seconds	Seconds	Seconds	Pressure kg	Pressure lbs	Minutes
½" (20mm)	1.9	21	240°	464°	2	4	0.5	0.1	0.2	59	3	3	2	4	5
¾" (25mm)	1.9	21	240°	464°	2	4	0.5	0.1	0.2	59	3	3	2	4	5
1" (32mm)	2.4	21	240°	464°	3	7	0.5	0.2	0.4	64	3	3	3	7	5
1¼" (40mm)	2.4	21	240°	464°	3	7	0.5	0.3	0.7	64	3	3	3	7	5
1½" (50mm)	3.0	21	240°	464°	5	11	0.5	0.5	1.1	70	3	4	5	11	6
2" (63mm)	3.0	21	240°	464°	6	13	0.5	0.6	1.3	70	3	4	6	13	6
2½" (75mm)	3.6	21	240°	464°	9	20	0.5	0.8	1.8	76	3	4	9	20	6
3" (90mm)	4.3	21	240°	464°	12	26	0.5	1.2	2.6	83	3	4	12	26	7
	2.8	33	240°	464°	8	17	0.5	1.0	2.2	68	3	4	8	17	6
4" (110mm)	5.3	21	240°	464°	18	40	0.5	1.8	4.0	93	3	5	18	40	8
	3.4	33	240°	464°	12	26	0.5	1.5	3.3	74	3	4	12	26	6

D	=	Pipe & Fitting O.D.	T2	=	Heat Soak Time in Seconds
S	=	Pipe & Fitting Wall Thickness	T3	=	Change over Time in Seconds
Temp	=	210° C +/- 10°	T4	=	Time to Bring up to Full Weld Pressure in seconds
PI	=	Initial Weld Pressure	P5	=	Ending Weld Pressure
P2	=	Heat Soak Pressure	T5	=	Cool Down Time in Minutes

* Cool down time in the clamps can be reduced by 50% provided the parts being welded are not under duress until the complete cool down time has been achieved

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7. Maintenance and Repair

7.1. General

Replace damaged parts immediately, be particularly care full with electrical parts. Dirt and wetness are very good current conductors.

Prescribed maintenance and inspection works should be performed in time. The DVS gives the advice of inspection works after 1 year.
For machines with a specially high usage percentage the testing cycle should be shortened .

The works should be performed at the SIMTECH company or by an authorized partner.

7.2. Clamping Elements

• For a long service life clean and grease regularly the threaded spindles and the joint parts which are used for clamping the pipes.

7.3. Planer

• Do not lay the planer on its blades !
• Check the blades of the planer for sharpness, turn them if necessary (grinded on both sides, max. thickness of the shavings: 0,2 mm !).

7.4. Storage

• Cover the guide bars and the spindle with a thin oil film.
• Store dry.

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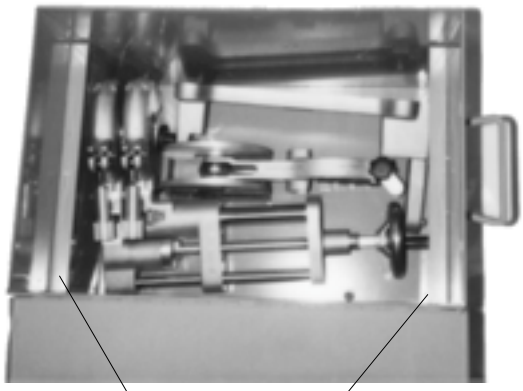
8. Transport

- Protect the machine from heavy chocs.
- Handle the machine carefully.
- Make sure that the case is closed correctly.

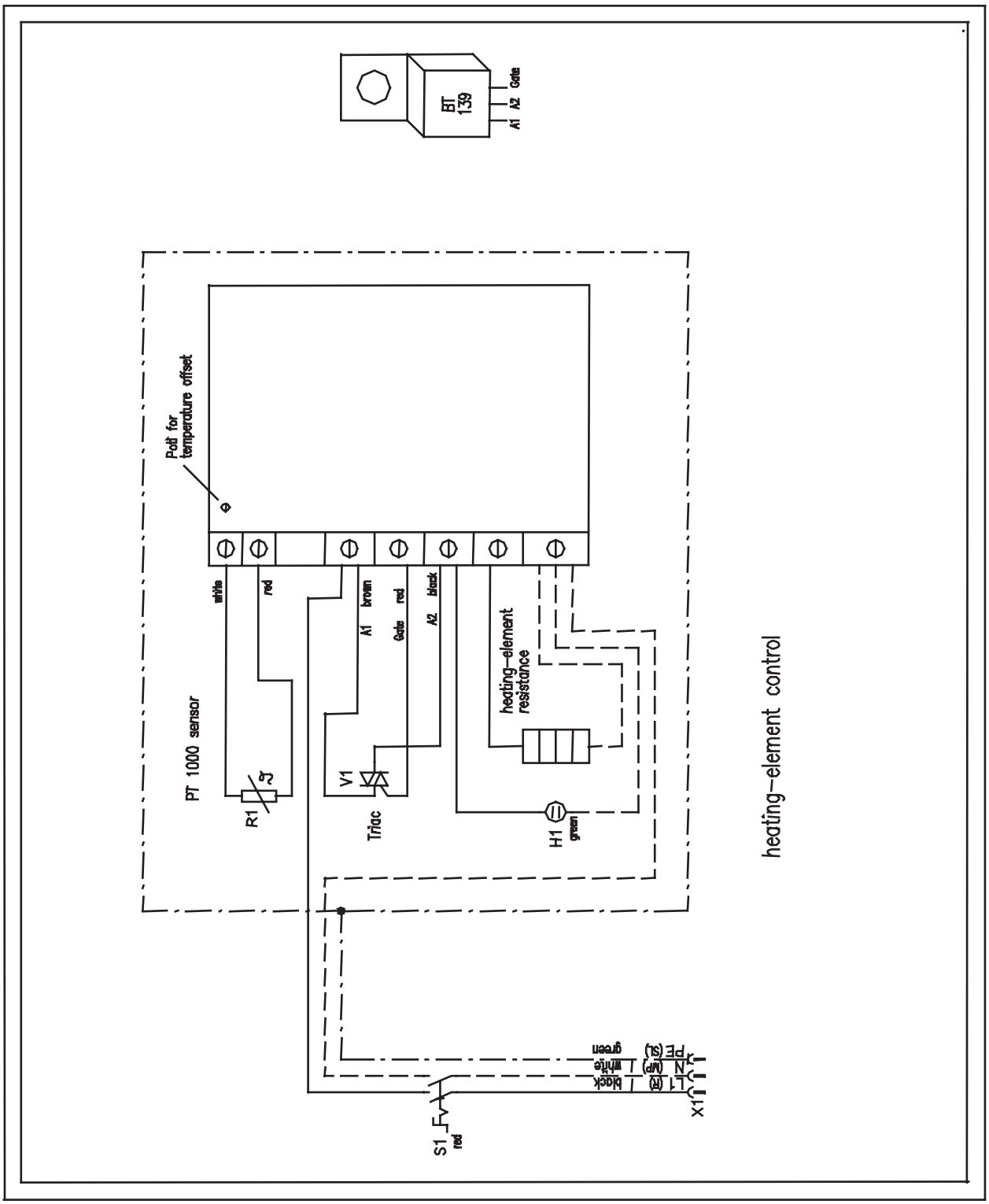
The machine is transported in a sheet steel carrying case.



Placing the single elements in the steel sheet carrying case:

- There is a rectangular shape inside of the box, in which the planer is inserted.
- Put in the table support and the basic machine next to it (see picture).
- Put in the heating element with the cable and temperature control in such a way that it is situated below the gibs for the reduction inserts.
- Insert both boxes containing the reduction inserts.

9. Wiring Diagrams



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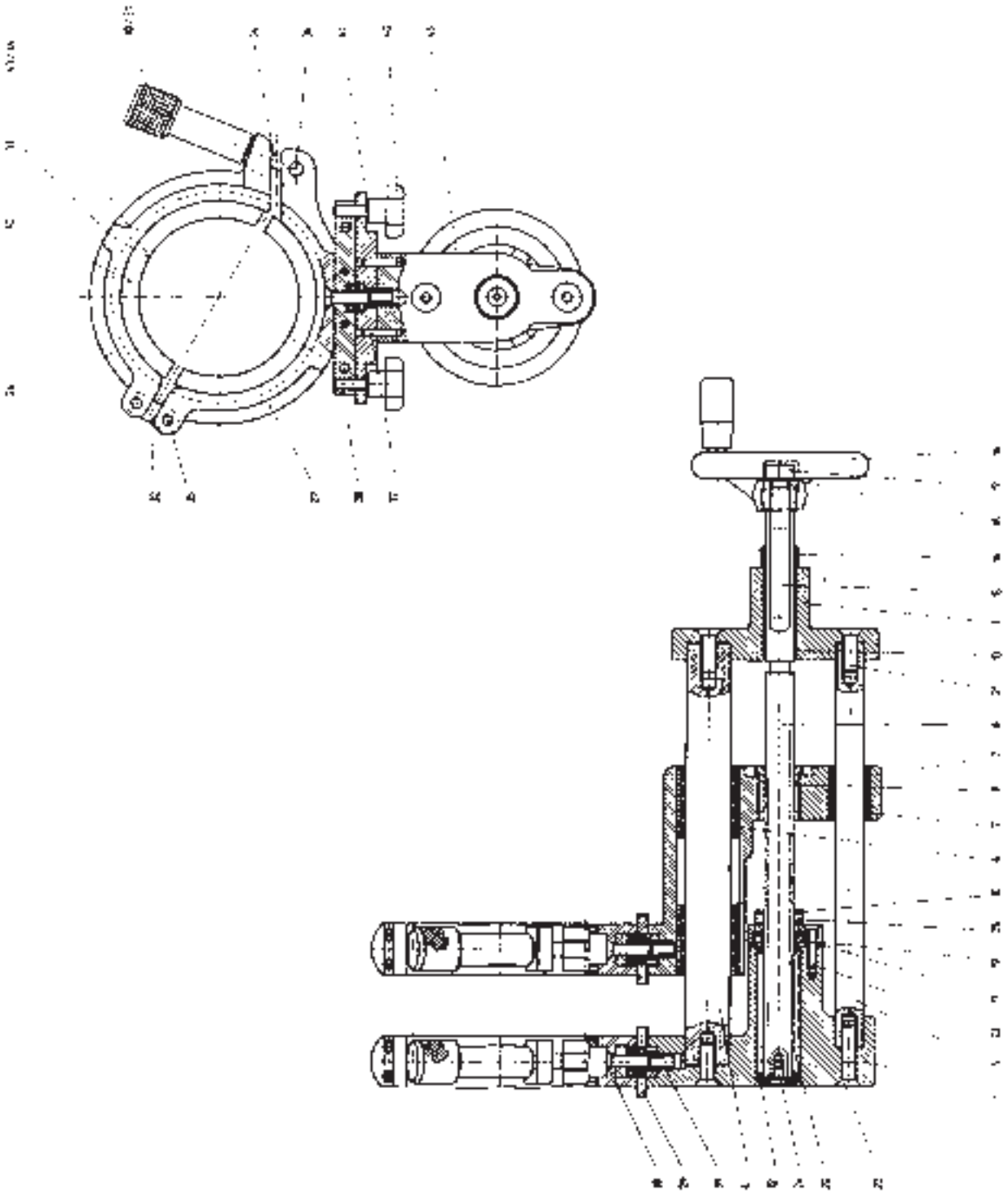
10. Spare Parts List

10.1. Basic Machine with Clamping Devices and Reduction Inserts



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Basic Machine with Clamping Devices and Reduction Inserts Miniplast 2

Pos.	Name	Piece	Order no.
1	Spring block	1	450113
2	Guidance	1	450102
3	Counter bracket	1	450103
4	Upper guide bar	1	450112
5	Lower guide bar	1	450111
6	Ball bushing	2	LKH 2540
7	Ball bushing	1	LKH 1630
8	Spindle	1	450104
9	Trapezoidal nut	1	450105
10	Adjusting nut	1	450106
11	Bearing plate	1	450107
12	Spring washer	1	450108
13	Sleeve	1	450109
14	Ring with pressure display	1	450110
15	Scale	3	450114
16	Handwheel	1	BH100
17	Hexagon nut M 10 DIN 934	1	0934J
18	Tooth lock washer J 10,5 DIN 6797	1	67979J
19	Thrust ball bearing	1	L51103
20	Pressure spring	1	200113
21	Flat-head screw M 8x25 DIN 7991	3	7991E025
22	Flat-head screw M 8x35 DIN 7991	1	7991E035
23	Flat-head screw M 5x25 DIN 7991	3	7991E025
24	Flat-head screw M 5x10 DIN 7991	1	7991E010
25	Headless pin M 5x6 DIN 916	2	0916E006
26	Pipe clamp, upper part	2	450701
27	Pipe clamp, lower part	2	450702
28	Gib for screwing	2	450703
29	Disk with scale	2	450707
30	Clamping nut	2	450705

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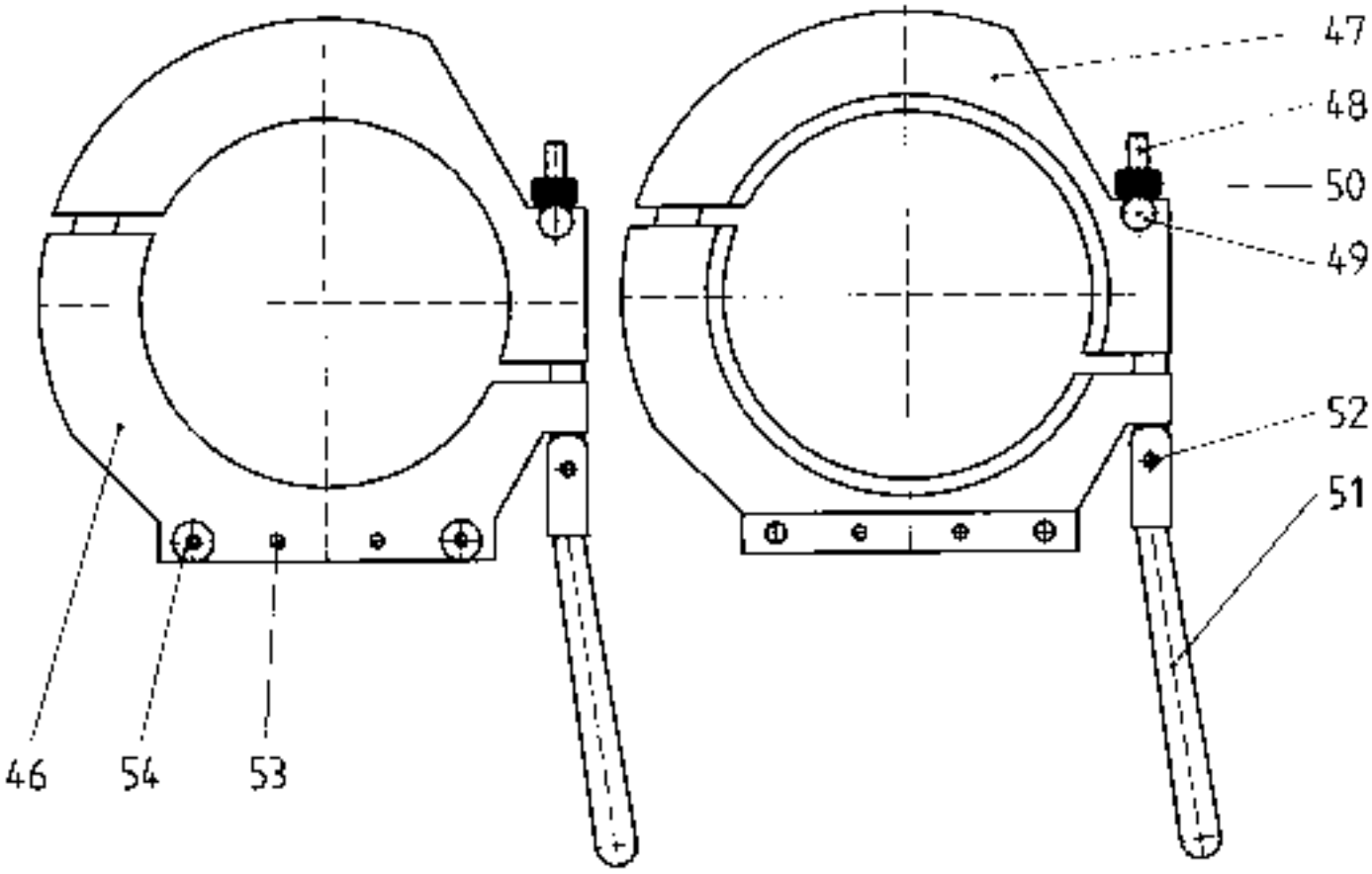
Basic Machine with Clamping Devices and Reduction Inserts Miniplast 2

31	Threaded insert M 8	2	GEW-M8
32	Coupling	4	450704
33	Threaded insert M 4	8	GEW-M4
34	Eye bolt BM 8x45 DIN 444	2	0444H045
35	Straight pin 6 M 6x28 DIN 6325	4	6325F028
36	Straight pin 8 M 6x26 DIN 6325	2	6325H026
37	Straight pin 4 M 6x20 DIN 6325	4	6325D020
38	Flat-head screw M 6x25 DIN 7991	2	7991F025
39	Cylinder-head screw	2	450706
40	Star grip M 6 DIN 6336	4	BG032
41	Washer 6,3 DIN 125	4	0125F
42	Reducer inserts OD 20-90	1 set	2008
	Half shells (optional)		
43	Cylinder-head screw M 4x20 DIN 912	8	0912D020
44	Cylinder-head screw M 4x25 DIN 912	8	0912D025
45	Type plate	1	SCHTMINI

10.3. Clamping Devices for Fittings



Pos.	Name	Piece	Order no.
46	Left-hand clamping device for fittings	1	45081 10L
47	Right-hand clamping device for fitting	1	45081 10R
48	Draw bar	2	S0115067
49	Hinge	2	S0112
50	Knurled screw	2	S0113
51	Handle	2	S0114-1
52	Rivet	2	S0110
53	Straight pin 4 M 6 DIN 6325	4	6325D012
54	Flat-head screw M 6x12 DIN 7991	4	7991F012

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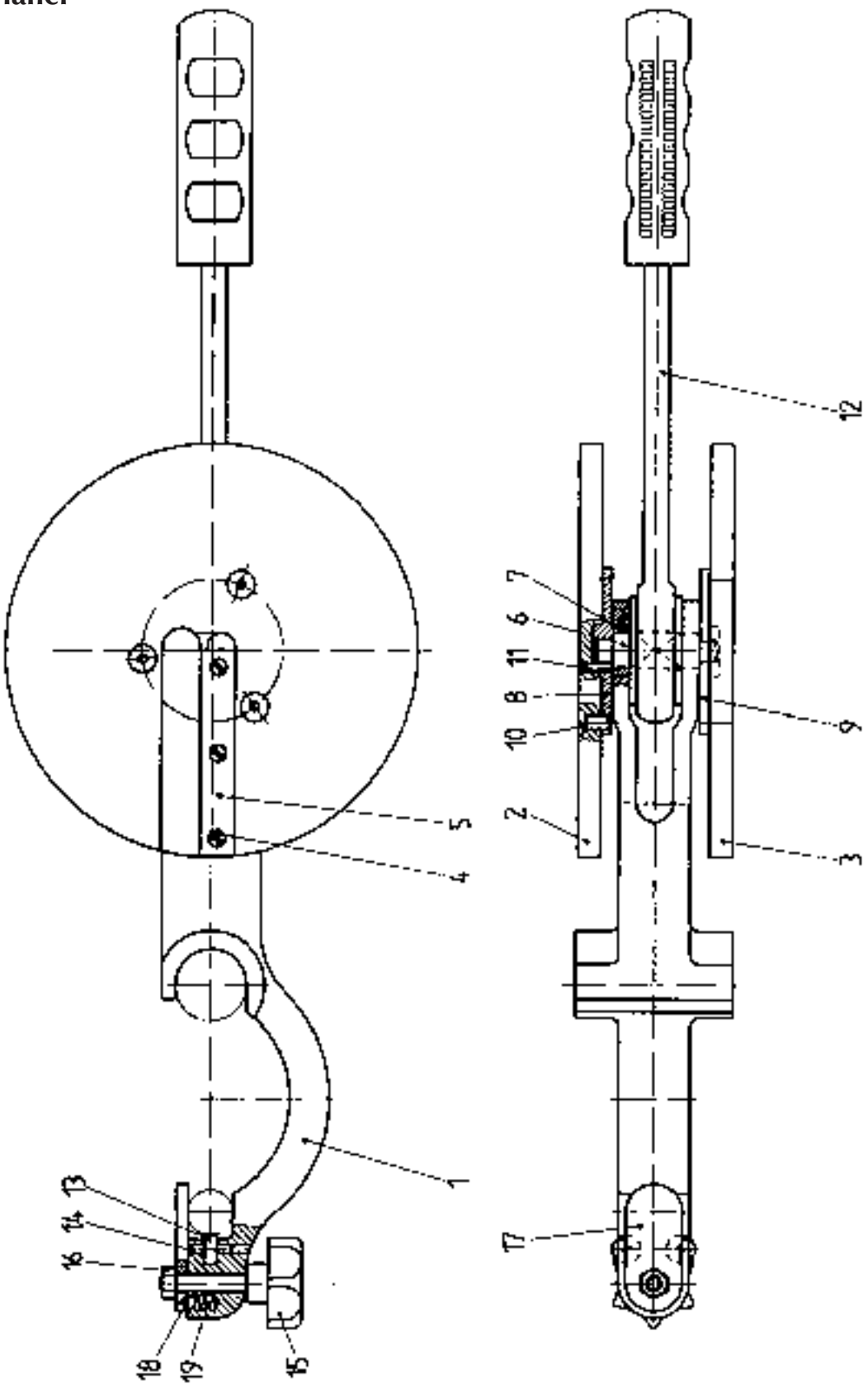
10.4 Manual Planer



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10.4 Manual Planer

Pos.	Name	Piece	Order no.
1	Holder for planer	1	450401
2	Planer disk, right-hand	1	450402
3	Planer disk, left-hand	1	450403
4	Blade	2	MES072
5	Flat-head screw M 3x6 DIN 965	6	0965C006
6	Square bar	1	450404
7	Bearing ring	2	450405
8	Driving plate, right-hand	1	450406
9	Driving plate, left-hand	1	450407
10	Flat-head screw M 5x10 DIN 7991	6	7991J010
11	Flat-head screw M 3x6 DIN 965	2	0965C006
12	Mechanical drive	1	450410
13	Ball bearing	1	L0623
14	Grooved taper pin 3x16 DIN 1471	2	1471C016
15	Star grip screw	1	BG3230
16	Hexagon nut M 6 DIN 934	1	0934F
17	Closing disc	1	450408
18	Ball Ø 4	1	L0004
19	Pressure spring	1	450409

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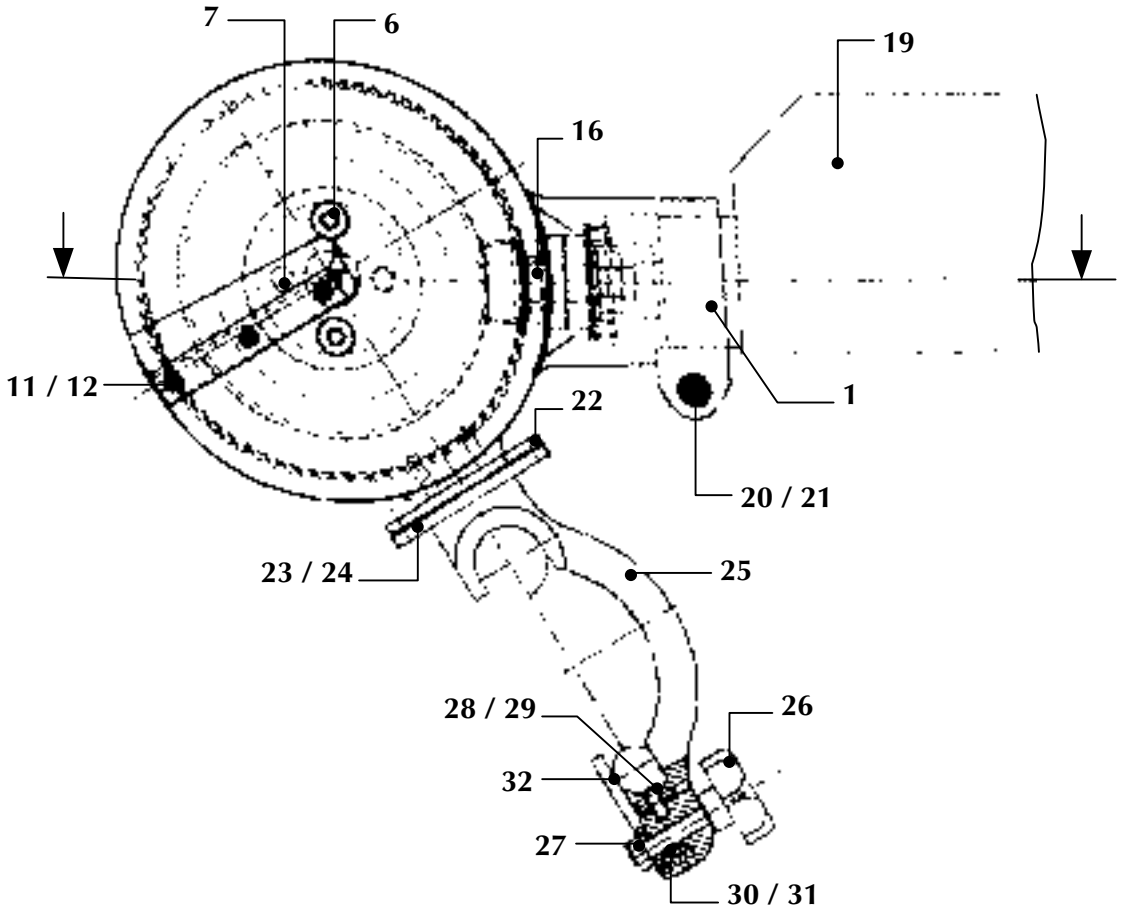
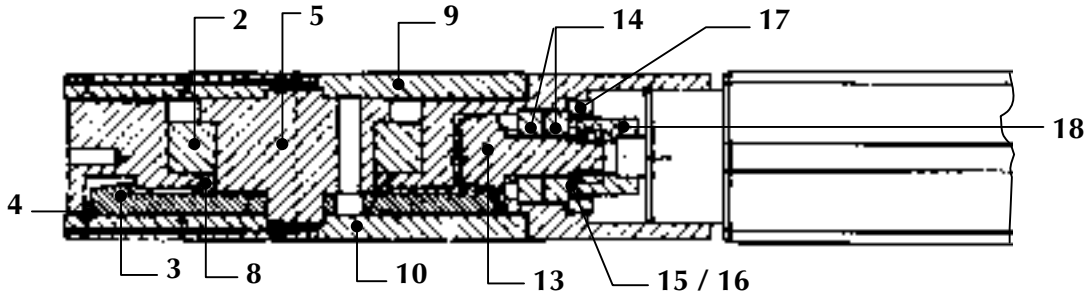
10.5. Electric Planer (optional)





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10.5. Electric Planer (optional)

Pos.	Name	Piece	Order no.
1	Planer housing	1	450431
2	Ball bearing 6010 RS	1	on request
3	Bevel gear m=1,5 / z=75	1	450438
4	O-ring 3x108	1	on request
5	Bolt for planer disk	1	450436
6	Flat head screw M 6x20 DIN 7991	2	7991F020
7	Flat head screw M 6x25 DIN 7991	2	7991F025
8	Adapter ring	1	450437
9	Planer disk, right-hand	1	450432
10	Planer disk, left-hand	1	450433
11	Blade	2	MES072
12	Flat head screw M 3x6 DIN 965	6	0965C006
13	Pinion with shaft m=1,5 / z=15	1	450439
14	Ball bearing 16101	2	on request
15	Washer M 10 DIN 125	1	0125J
16	Nut M 10x1, hardened and tempered	1	450442
17	Nut M 36x1,5	1	450441
18	Coupling piece	1	on request
19	Driving motor 230 V	1	on request
20	Washer M 6 DIN 433	1	0433F
21	Cylinder head screw M 6x30 DIN 912	1	0912F030
22	Adapter plate	1	on request
23	Counter-plate	1	on request
24	Hexagon head screw M 5x20 DIN 933	2	933.24E+
25	Holder for planer	1	4504011
26	Star grip screw	1	BG3230
27	Hexagon nut M 6 DIN 934	1	0934F
28	Ball bearing 623 2Z	2	L0623
29	Grooved taper pin 3x16 DIN 1471	2	1471C016
30	Ball Ø 4	1	L0004
31	Compression spring	1	450409
32	Closing disc	1	450408

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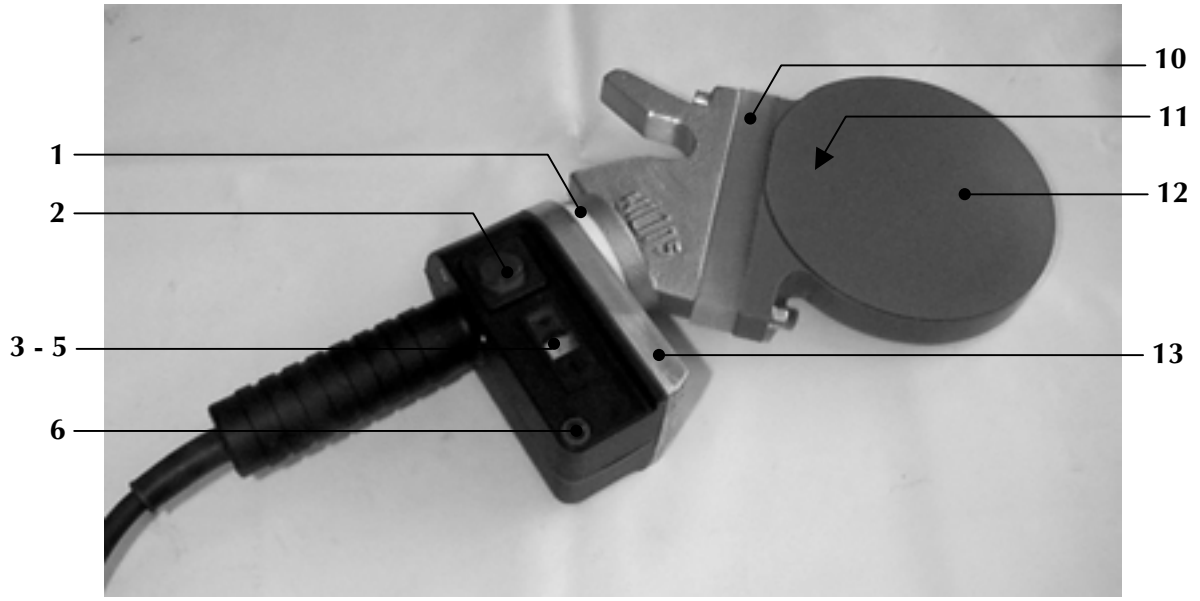
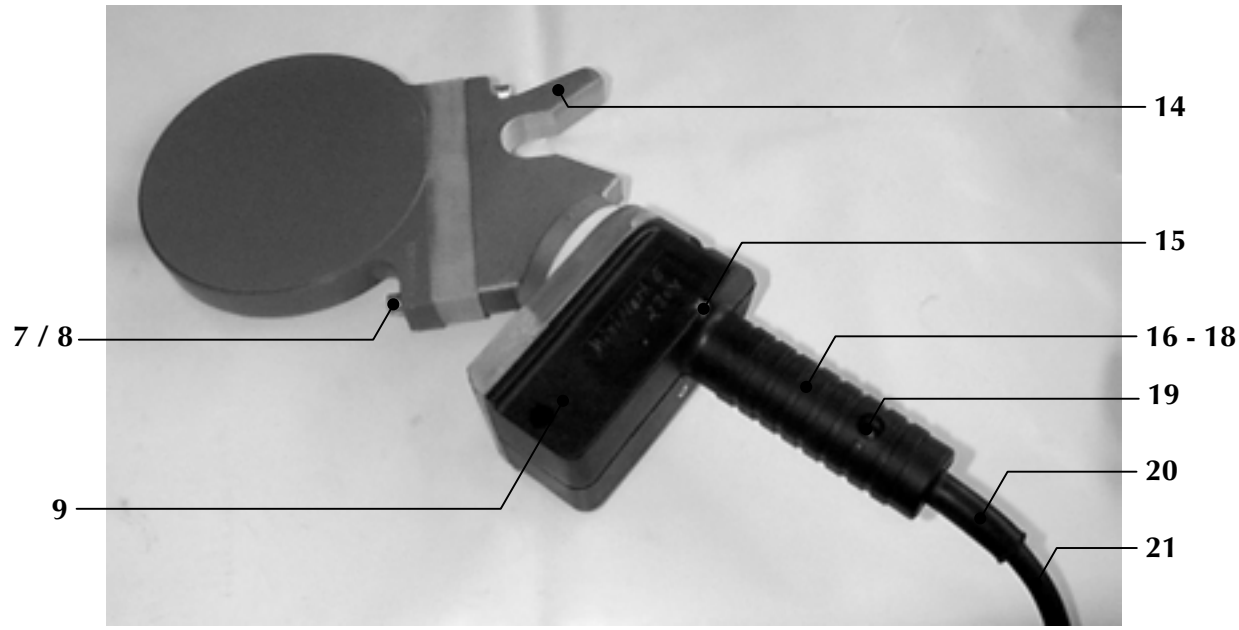
10.6. Heating Element





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10.6. Heating Element

Pos.	Name	Piece	Order no.
1	Teflon-conical nipple	1	H09091
2	Switch on/off with control lamp (red)	1	H0903
3	Control cnob with slot	1	H09075
4	Scale 180°-280° (d33)	1	H09074
5	Window cap for handle shell (white)	1	H09072
6	Control lamp (green)	1	H2105
7	Cylinder-head screw M 6x50 DIN 912	2	0912F075
8	Spring washer 6 DIN 7980	2	7980F
9	Electronic control without probe GZ4	1	H0918220
10	Isolator piece		1450506
11	Temperature probe PT1000	1	H09082
12	Heating element , complete	1	HMINIE
	Heating plate new, electric	1	HPMINIE
	Heating plate for change, electric	1	HPTMINIE
13	Triac with heat sink	1	H09081
14	Heating element holder		1450508
15	Cylinder-head screw M 4x70 DIN 912	3	0912D070
16	Handle shell	1	H0907
17	Strain relief	1	H09076
18	Sheet metal screw C 2,9x13 DIN 7981	2	7981C013
19	Sheet metal screw C 4,8x16 DIN 7981	3	798.19E+
20	Cable bushing	1	EKT08
21	Connection cable with plug	1	EK3220

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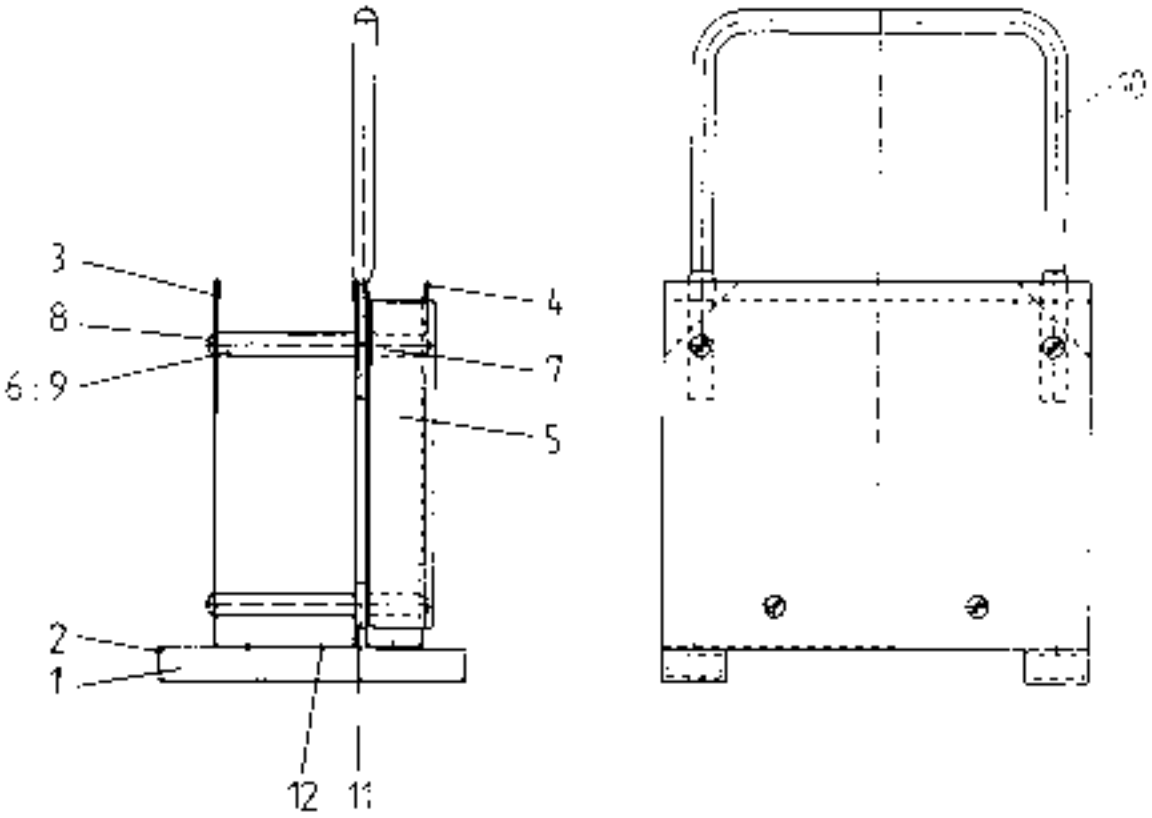
10.2. Basic Machine

Pos.	Name	Piece	Order no.
1	Basic frame	1	450101
2	Hexagon nut M 8 DIN 934	2	0934H
3	Fixing bolt	2	450116
4	Star grip DIN 6336-KU-M8-K	1	on request
5	Headless pin M 8x40S DIN 6332	1	on request
6	Threaded insert M 8x12	1	GEW-M8

10.7. Protection Box



Pos.	Name	Piece	Order no.
1	oot	2	450517
2	Screw cap	4	200117
3	Insert for planer	1	450511
4	Insert for heating element	1	450512
5	Protective sheet	1	450513
6	Bar for distance 1	4	450514
7	Bar for distance 2	4	450515
8	Sleeve nut M 6	8	HÜ006
9	Threaded bolt	4	450518
10	Hoop	1	450516
11	Washer 10,5 DIN 125	4	0125J
12	Rivet Ø 2,4x8 DIN 7337	10	7337B008

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