

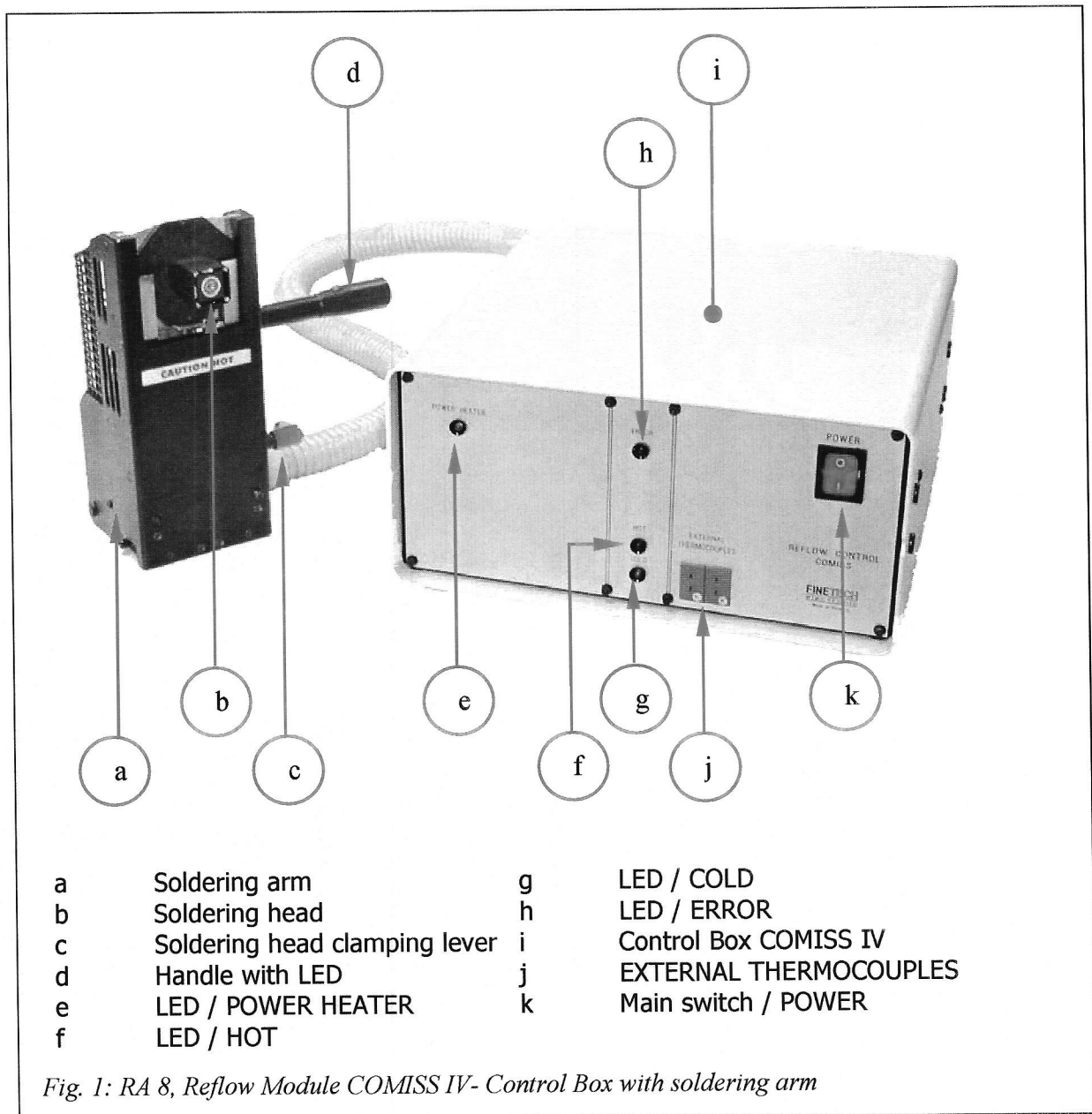
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1 Module Description

The **COMISS IV** Soldering Module (**CONTROLLED MIX SOLDERING SYSTEM**) allows the soldering and desoldering of components as well as "Fluxing", "Reballing" of BGAs with the required tools. Also the side dressing of solder remains is possible using the FINETECH Solder Removal Module (Option RC 4). For repair (Rework) we recommend the use of inert gas. An acceptable technical and economic consumption of inert gas can be controlled with the help of the FINETECH "Inert Gas Switching" (Option R...GS). The start of the heating process, the control of the temperature, gas flow and choice of gas are determined by the PC program of the COMISS Reflow Module during the heating phase.

Therefore the Control Boxes of the top and bottom heating (option) as well as the Placer Control Box are linked by the Interface Module Cable (see fig. 6). The Placer Control Box and the PC are connected by a RS232-cable to a free COM-port.



The top heating has two operation modes:

Stand-by: less air flow (≈ 20 l/ min), Stand-by temperature 60°C
Heating mode: powerful air flow ($\approx 20\ldots 80$ l/ min, selectable) working temperature ($90^{\circ}\text{C} \ldots 360^{\circ}\text{C}$, adjustable)

Further descriptions of the various program options and soldering profiles please find in the manual of the reflow software of the COMISS Reflow-Module.

2 Assembly, Set-up

2.1 Soldering and Placer Arm Exchange

Depending on the delivered configuration (Reflow or Placer) of the basic system it is either provided by the factory with a placer or soldering arm (see fig. 1). Soldering or placer arm respectively can be easily exchanged according to the required application. If the basic system is already fitted with a soldering arm please continue with point 2.4. Otherwise assemble the soldering arm as described as follows and shown in fig 2:

- Mounted tools should be removed from placer arm first. Move the arm into a horizontal position. Hold steady with one hand and loosen the 2 Allen screws (4 mm) on the back side. The Allen screws are secured against dropping out.



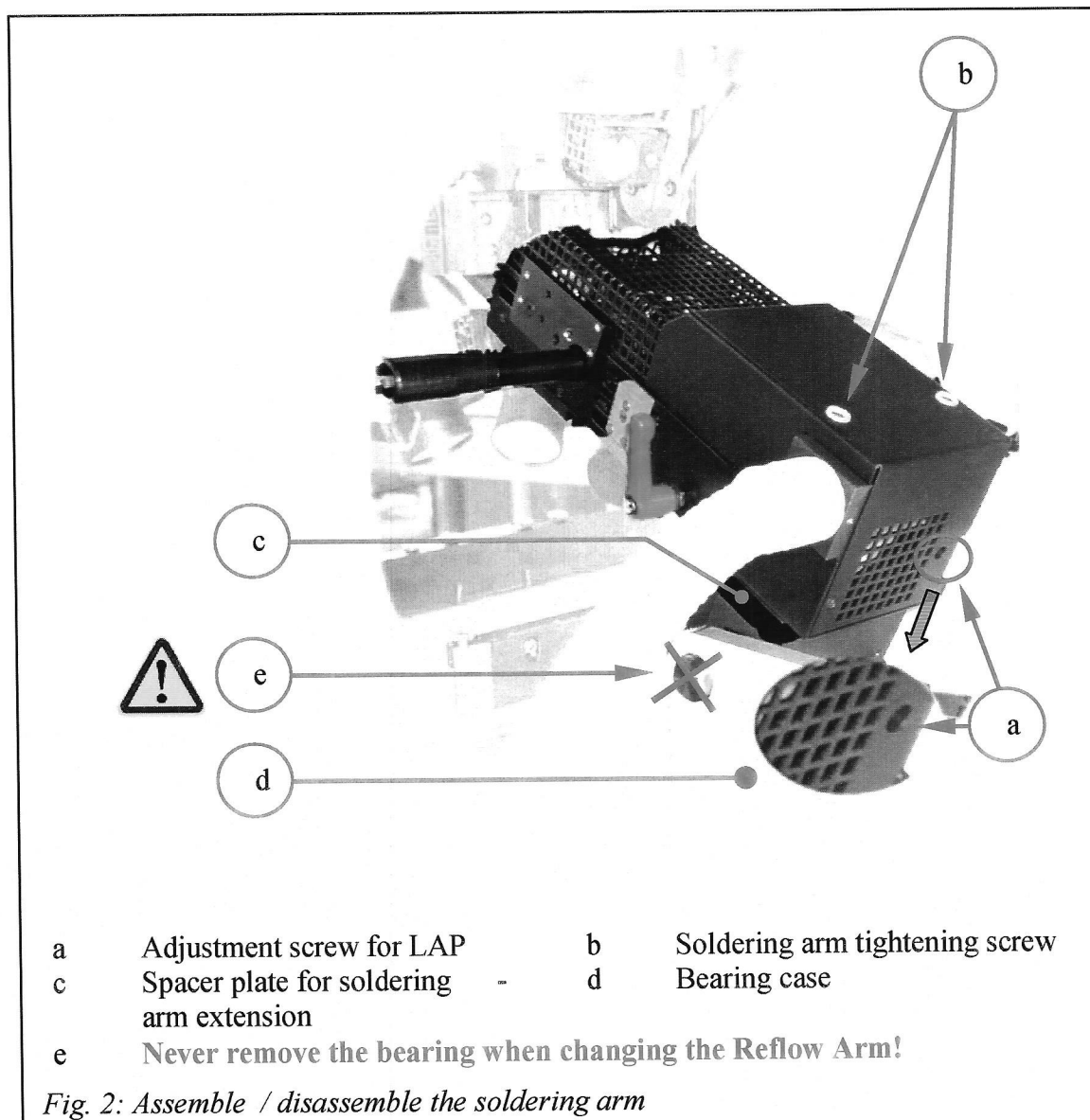
NEVER LOOSEN THE BEARING CLAMPING BOLT (FIG. 2, e)! THIS RESULTS IN A MALADJUSTMENT OF THE SOLDERING ARM AND CONSIDERABLE MALFUNCTIONING OF THE COMPLETE FINEPLACER® SYSTEM!

- Remove the placer arm and store it in a safe place.
- Place the soldering arm on the bearing case with an angle of about 30°. Position the bearing case upwards by hand so that the 2 Allen screws (4 mm) of the soldering arm can be inserted into the threaded holes. In case of special constructions it is necessary to mount an appropriate spacer plate between arm and bearing case (fig. 2). After tightening the screws the arm must be movable from a horizontal to an upright position without any resistance.



IF THE SOLDERING ARM CAN NO LONGER BE MOVED INTO THE UPRIGHT POSITION AFTER FASTENING THEN THE CAM OF THE LOWERING LEVER (FIG. 4, E) IS NOT IN THE RIGHT POSITION IN RELATION TO THE SOLDERING ARM. THE SOLDERING ARM **MUST** BE LOOSENED AGAIN MOUNTED WITH THE RECOMMENDED ANGLE OF AT LEAST 30° POINTING UPWARDS.

After each alteration of the soldering or placer arm respectively a check and if necessary an adjustment of the arm position (fig. 3) is recommended. Therefore perform the steps as described in point 2.2 and. 2.3.



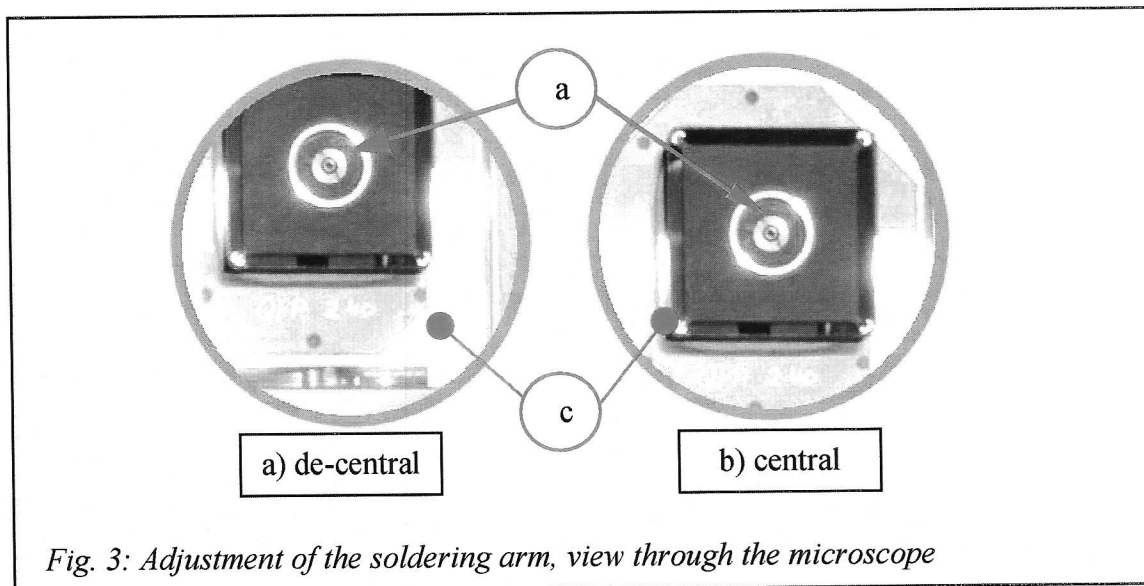
2.2 Adjust the Soldering Arm Position

An insufficient adjustment of the soldering arm position does not influence the placing accuracy of the FINEPLACER® it however leads to the effect that the center of the mounted tool is not found the middle of the visual field. To avoid this effect carry out the following steps:

- Move the soldering arm into the upright position and mount a soldering head (preferably with a centered suction cup) (Fig. 3, a/b).
- Switch off the TARGET lamp and illuminate the soldering head with the HEAD lamp (Dimmer on the Placer Control Box). Zoom the microscope until distinct

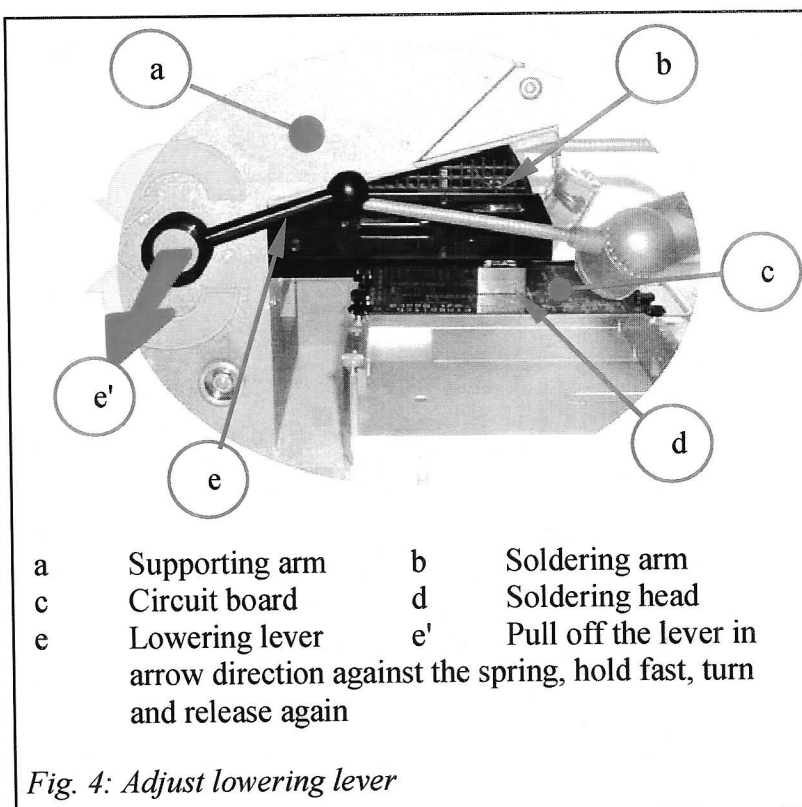
contours e. g. the edges of the soldering head nest or the seam of the suction cups fill the visual field (Fig. 3, a/b).

- Zoom out a little and adjust the soldering arm with loosened Allen screws until the contours are centered (Fig. 3). After that tighten the Allen screws again.



2.3 Adjust the Lower Arm Position (LAP)

- Clamp a circuit board into positioning table and bring the soldering arm with mounted soldering head into the horizontal position. Move the lowering lever (Fig. 4, e) upwards. The soldering head must perform an upwards motion now. After reaching the upper dead point lower the lever again, so that the soldering head just touches the circuit board. Now adjust the lowering lever parallel to the supporting arm.



Hence pull off the lever in axial direction against the spring power, hold fast, turn into position and release again (Fig. 4, e).

- For checking the optimal lever adjustment move it first upwards and then downwards. When the horizontal position has been reached the soldering head should just touch the surface of the circuit board.
- If the circuit board is not touched the arm has to be readjusted with the help of the Allen screws (Allen key 2.5 mm) (Fig. 2, a).

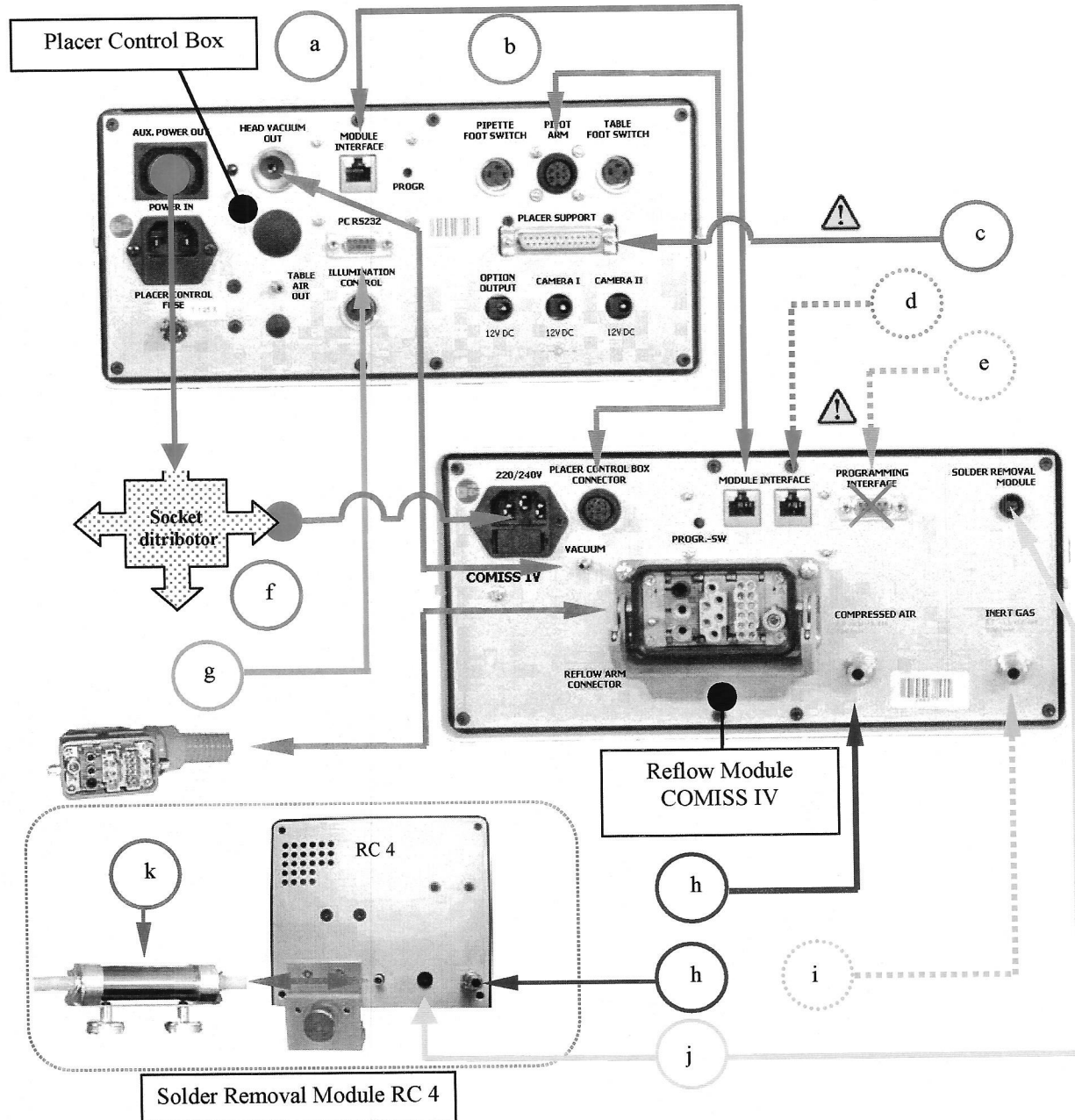
Turning clockwise	--> Lift up
Turning anticlockwise	--> Lower

2.4 Connecting the Control Box

- Place the Control Box in position and install all cable and hose connections (Fig. 5 and 6). Lay the connecting cable between soldering arm and Control Box so that it does not impair the movement of the arm within the whole swing range.
- The chain dotted arrows and lines on fig 5 point to connectors which will be needed optionally for additional devices or essentially for special operation modes and not for common use.



The pictogram "Attention" points out connections for which it is recommended to pay attention to specific advice in this handbook



- a Interface-Module cable
- b Connection cable to the Placer Control Box
- c Connection cable to supporting arm, **never connect to the computer!**
- d Interface-Module-cable to the next Control Box or if it is the last Box plug in a terminal resistor plug!
- e **Only connect with the computer in case of software update!**
- f Mains connection via multiple socket adaptor to further Control Boxes
- g RS232-cable connection to a serial interface of the computer (COM1 .. COMx).
- h Hose coupling for compressed air, see Technical Data
- i **Option**, hose coupling for inert gas
- j **Option**, Signal connection cable to the Solder Removal Module RC 4
- k Solder Removal Filter

Fig. 4: Connection of Placer Control Box, Reflow Control Box RA8 and Solder Removal Module RC 4

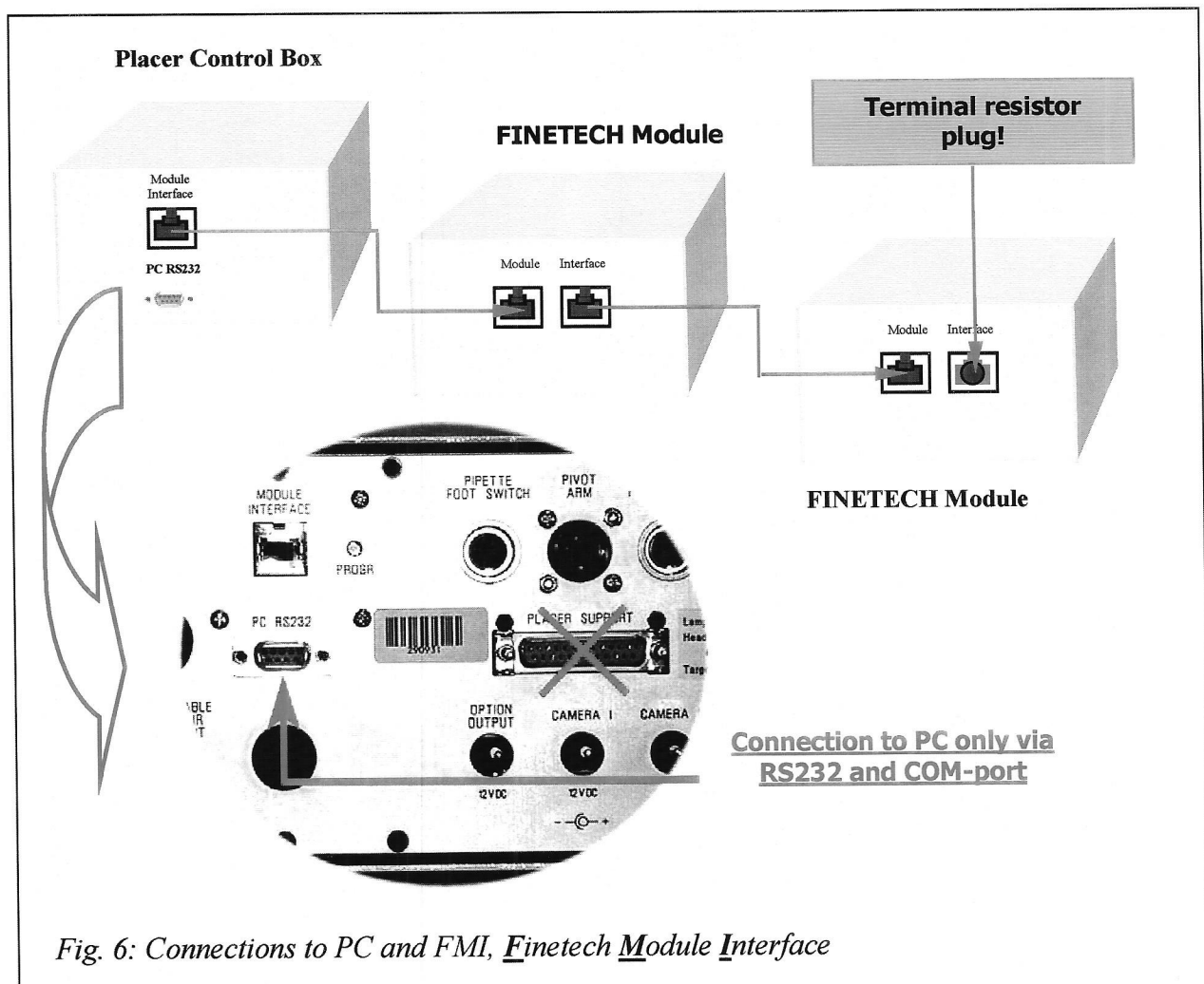
- Connect the external air / gas source to the COMISS IV Control Box. Always pay attention to permissible pressure (see Technical Data).



ONLY USE CLEAN GAS, THIS MEANS IN PARTICULAR FREE FROM WATER, OIL AND PARTICLES. **CONTAMINATION COULD LEAD TO SERIOUS MALFUNCTIONS OR DAMAGES!** SUITABLE AIR FILTERS ARE PROVIDED BY FINETECH SEE ORDER NUMBER #RF1.

- Connect the main cable with the central power supply (multiple socket adaptor) of the Placer Control Box and turn on the main switch. The power supply is controlled for all modules by the main switch on the Placer Control Box. Nevertheless it is possible to switch the connected module on or off separately by the switch on the corresponding Control Box.

The connection to the PC is made exclusively by 9-pole PC RS232-connector of the Placer Control Box (Fig. 5). The 9-pole "PROGRAMMING INTERFACE"-connector and the switch "PROGR.-SW." is exclusively for programming mode and the update of the



control software (firmware) and must not be connected to the PC or activated in the common working mode. Update instructions can be found in the Reflow Software Description. Upon delivery the software is always up-to-date.

The system parameters necessary for operation can be entered with the help of the computer using the COMISS soldering software. Detailed information can be found in the Reflow software description.

3 Operation

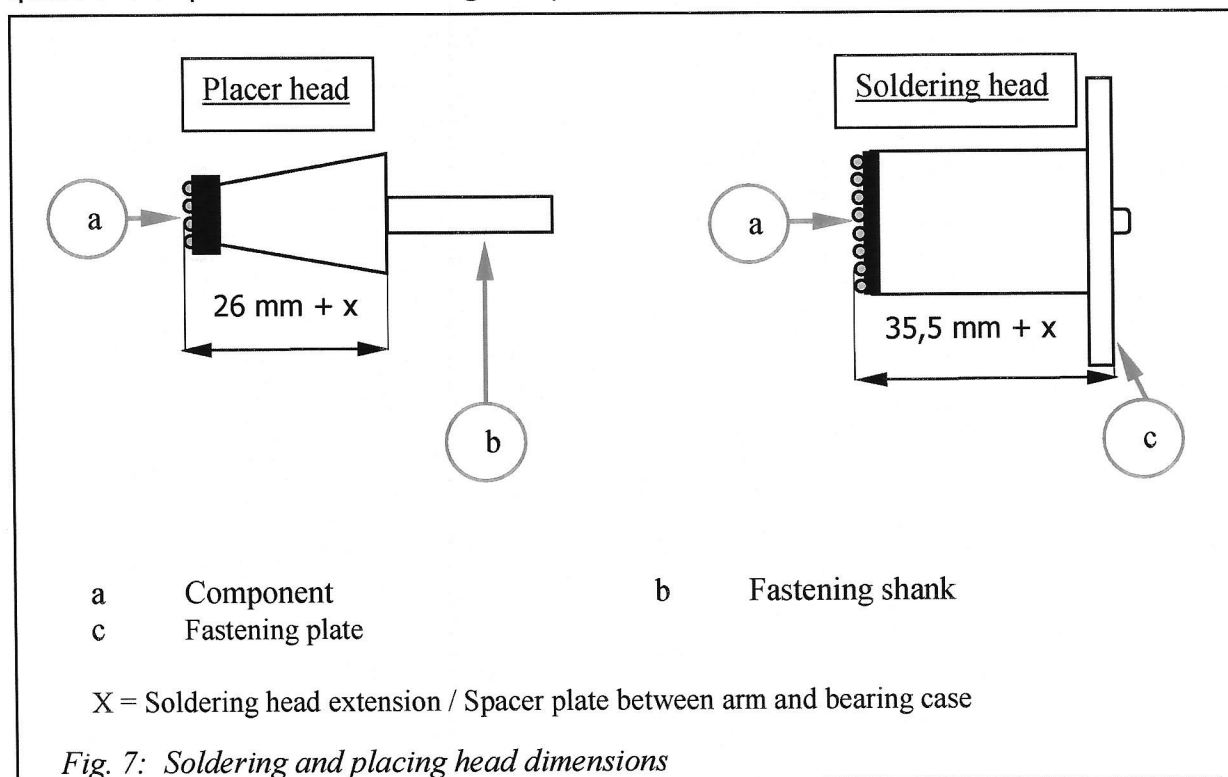
3.1 Soldering Heads

3.1.1 Soldering Head Versions

Soldering heads (special accessories) do not belong to the basic equipment of the soldering module, because as a rule they must be adapted to the corresponding components and the specific application.

In case of special construction it is necessary to compensate height differences with the delivered suitable spacers, which are mounted between soldering arm and bearing case. (see point 2.1 and fig. 7).

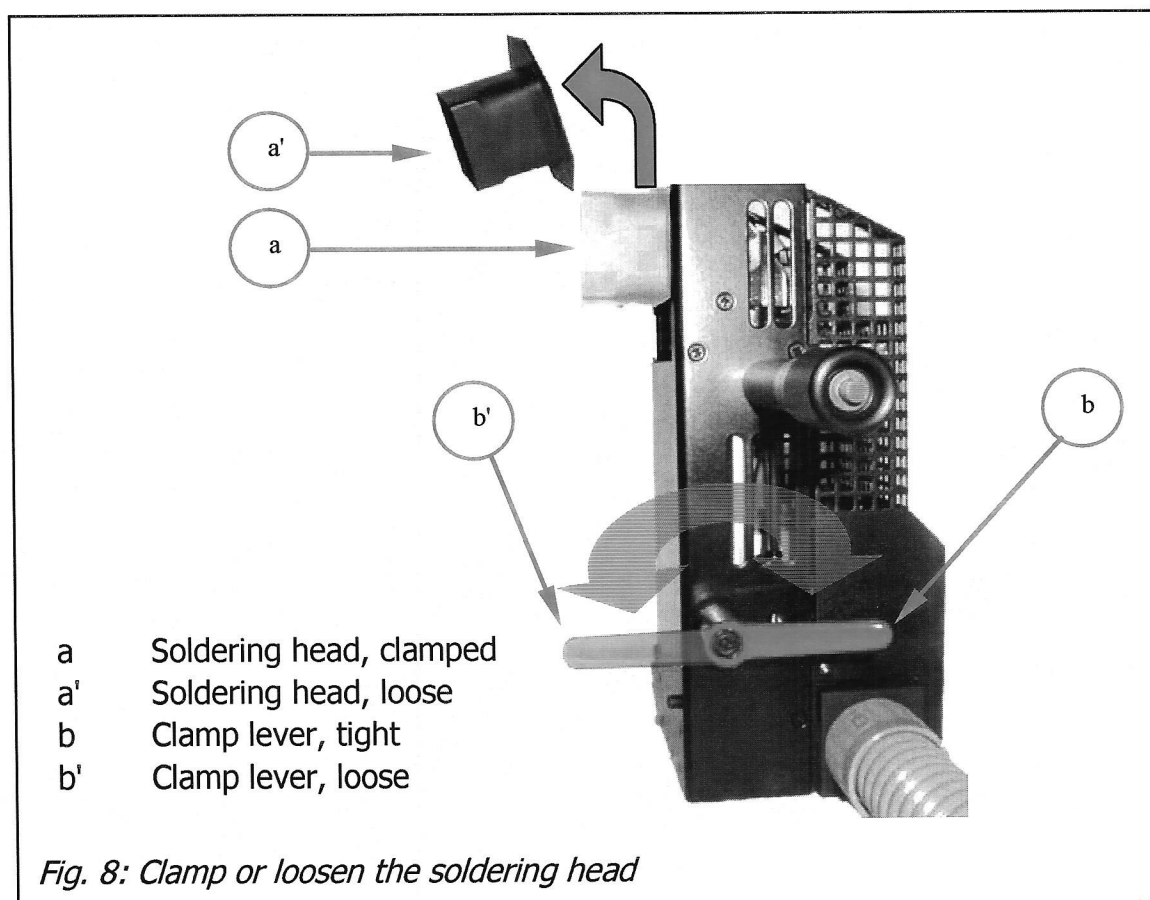
According to the application further special construction could exist. If you have any questions or problems concerning this please contact our customer service.



3.1.2 Changing a Soldering Head

Depending on the application a suitable soldering head corresponding to the component can be changed quickly with help of the soldering head clamping lever. (Fig 8).

By turning the soldering head about 180° towards the front the clamping appliance for the soldering head is loosened. This can now be taken out with a movement forwards and upwards.



IMMEDIATE AFTER USE A DANGER OF BURNING EXISTS, IF SOLDERING HEADS ARE REMOVED BY HAND WITHOUT COOLING BEFORE! AS A PRECAUTION THE SOLDERING HEAD TONGS (STANDARD SUPPLY) SHOULD ALWAYS BE USED.



NEVER USE FORCE WHEN TAKING OUT OR MOUNTING THE HEADS! IF A SOLDERING HEAD CANNOT BE CHANGED EASILY, IT IS MORE THAN LIKELY TILTED OR THE CLAMPING APPLICATION IS NOT COMPLETELY LOOSENED (FIG. 8, b').

To fit the soldering head, insert the base plate of the head behind the holder when the clamp is loosened. After that bring the clamping lever into the "fastened" position. (Fig. 8 b). To guaranty a proper function it is necessary to make sure that the head with its base plate sits firmly and form fitted in the mounting fixture. For asymmetric

components the tool's contours must correspond to those of the components. Therefore the alignment to the circuit board must be paid attention to.

3.2 Process Information and Operation State

On the front of the control device 4 LED displays can be found (Fig. 1):

- **HEATER (yellow), (e)**
lights if the heating cartridge is in operation. A flashing display (on/off, light/dark) shows that the device is working.
- **ERROR (red), (h)**
lights if failure like overheating (temperatures over 420° C) or sensor breakage occurs. In the case of repeated failure messages please do not continue the work but inform the technical service.
- **HOT (red), (f)**
lights when the magnetic valve for hot air is open.
- **COLD (green), (g)**
lights when the magnetic valve for cold air is open.

3.3 Start of the Reflow Program

Necessary settings for the Reflow process are keyed into the PC. For this the software must be installed into the Computer.

If all connections have been established, the devices switched on and the software installed the settings can be accepted and the process started. (see Software description).

3.4 Use of Bottom Heating

In connection with the COMISS IV Reflow module, an optional hot gas bottom heating can be connected for the additional heating of the circuit board from underneath. This consists of an extra Control Box and a heating module, whose exhaust area can be adapted to the circuit board area which is to be heated. The control is carried out by the common PC program, which also controls the top heating.

3.5 Soldering and Desoldering of Components

3.5.1 Placing of Components

Pick up the component using the pipette and transfer it to the soldering or placing head. The component can also be removed from the tray or circuit board using the soldering / placing head, after the positioning table has been moved into the picking up area of the arm.

The image of the circuit board and component appears in the microscope and available video optics. According to individual opinion the brightness of both pictures can be adjusted individually by the light dimmer on the Placer Control Box. For the positioning the table is moved with the circuit board until both pictures coincide. The rough movement of the positioning table is achieved by means of the air table, fine movement in x and y direction using the vernier screws. The angle adjustment is achieved by turning the positioning table on the base plate.

THE FINE POSITIONING AND ANGLE ADJUSTMENT IS ACHIEVED CONSTANTLY WITHOUT AIR CUSHION.

IT IS STRICTLY RECOMMENDED TO PAY ATTENTION TO THE WORKING LEVELS:

The placement level is defined by the lower edge of the positioning table clamping fixture. Placement should not take place above or below this level because the component can only be placed parallel on this level. Depending on the thickness of the board the clamping space can be enlarged or reduced by which the inner terminal strips of the clamps are moved down or up. Note, that this has no influence on the placing level and accuracy.

The correct level of the component is given, if it is found by spatial viewing (looking with both eyes through the microscope) on the same level as the circuit board. If this is given the component must not spring into the x direction while looking alternatively the right or left eye. Corrections can be made with the adjustment knob on the bottom left hand side of the supporting arm.

After positioning the component deposit it on the surface of the circuit board. For this the lowering lever on the left hand side of the supporting arm can be very helpful.

3.5.2 Setting Up a Soldering Profile

A soldering profile consists of 4 main phases as a standard:

1. Preheat using bottom heating
2. Simultaneous preheating by means of bottom and top heating
3. Reflow process by means of bottom and top heating
4. Cooling phase

The operator is free to use only the preselected phases or to add further sections the steps 2. to 3.. The four phases as stated above are however necessary in most cases.

With the bottom heating the circuit board should be brought to a heating level within the biggest possible area, which lies underneath the 'glass point' of the circuit board, but still no a local sagging of the circuit board occurs. It is recommended to preheat until the top of the circuit board has reached a temperature of 80...100° C.

After this time the top heating is started.

The gradient of the temperature increase of the top heating depends on the components to be soldered, the surroundings of these components on the circuit board and whether a fluxing agent or old solder remains are used for soldering.

A typical sub profile for soldering a QFP is "**QFP 208**".

If the component is found close to other components that are heat-sensitive the soldering temperature must be reached in the shortest possible time. This profile can be found in "**QFP 100**".

A typical BGA sub-profile is "**BGA**".

For desoldering the shortest possible profile with high gas flow should be used because the quality of the soldering joint does not matter but time is saved.

Depending on the structure of the circuit board and the way it is equipped it is possible to vary these default profiles.

3.5.3 Site Dressing/Cleaning Circuit Boards

After desoldering of BGA or CSP components solder remains on the circuit board which would impair the soldering of a new component. Therefore residual solder must be removed.

For this purpose the FINETECH Solder Removal Module RC 4 can be used. The operation is described below. Further details can be found in the special manual of RC 4.

1. Create a side dressing sub-profile

A side dressing sub-profile must consist of at least two sections because the solder removal module is activated and operates only when the last section of the current profile is reached.

Within the **first section** the circuit board may be preheated however the solder should not be melted in this phase. It is recommended to select a temperature just below the melting point.

The **second section** should guarantee the complete melting of the solder but

should not exceed 300°C because the rubber wiper would be damaged. If necessary you can additionally heat from underneath with the bottom heating but below the melting point of the solder joints on the under-side.

2. Site dressing

The solder removal head is adjusted so that the wiper is beside the solder remains but the vacuum holes of the head are above. With the lever the height of the soldering arm is adjusted so that the wiper cleans the surface without removing too much solder leaving the intermetallic phase open.

Now start the process. When the second section is reached the vacuum is activated and the positioning table lock is released. This means that the table can be moved along under the lowered arm with the help of the air cushion.

It is highly recommended using an inert gas instead of air for hot gas purpose. It is obligatory to apply a residue free fluxing agent.

Should the result of the first attempt not be satisfactory, the process can be repeated.

3.5.4 Reballing

By reballing a desoldered but still functioning BGA which can be used again after it is provided with new solder balls proceed as follows:

1. Cleaning of the BGA-Interposer

Before the application of new solder balls on the underside of the BGA it is recommended to remove the remaining solder. In addition the base plate of the reballing module is clamped into the tracks of the positioning table. The component specific BGA picking up frame is inserted into the base plate and the BGA with interposer upwards into the picking up frame. Now the solder remains can be removed from the interposer using the solder removal module.

2. Application of new balls

The positioning table is moved into a position which allows fluxing agent to be applied to the connection side of the clean BGA. Fluxing agent gel is best suited for this. The reballing template is laid onto the BGA and fixed with the spring of the base plate. The bore holes of the reballing template must be aligned to the pads of the BGA interposer and fixed with help of the second spring. Next the alignment must be checked again and if necessary corrected, for this the microscope should be used.

For carrying out the next following steps it is recommended that the complete reballing module is removed from the positioning table.

Many solder balls are poured onto the reballing template so that it is completely covered. The balls are evenly spread with a clean brush until all holes are filled with balls. Superfluous balls are wiped so that they collect in the groove of the base plate.

From there they can be poured back through the opening in the reservoir. The entire filled reballing module is clamped back into the positioning table again.

3. Melting

A suitable reballing nozzle is fixed into the reflow arm and with a movement of the positioning table coincided with the BGA interposer. Move the reflow arm into a horizontal position so that the air outlet of the reballing nozzle is positioned horizontally with a distance of about 8 mm above the Interposer. The sub profile "Reballing" is used to melt the solder balls. It is highly recommended that inert gas is used instead of air. After completion of the reflow process and cooling period has ended the reballed BGA can be taken out of the reballing frame.

4 Maintenance of Soldering Heads

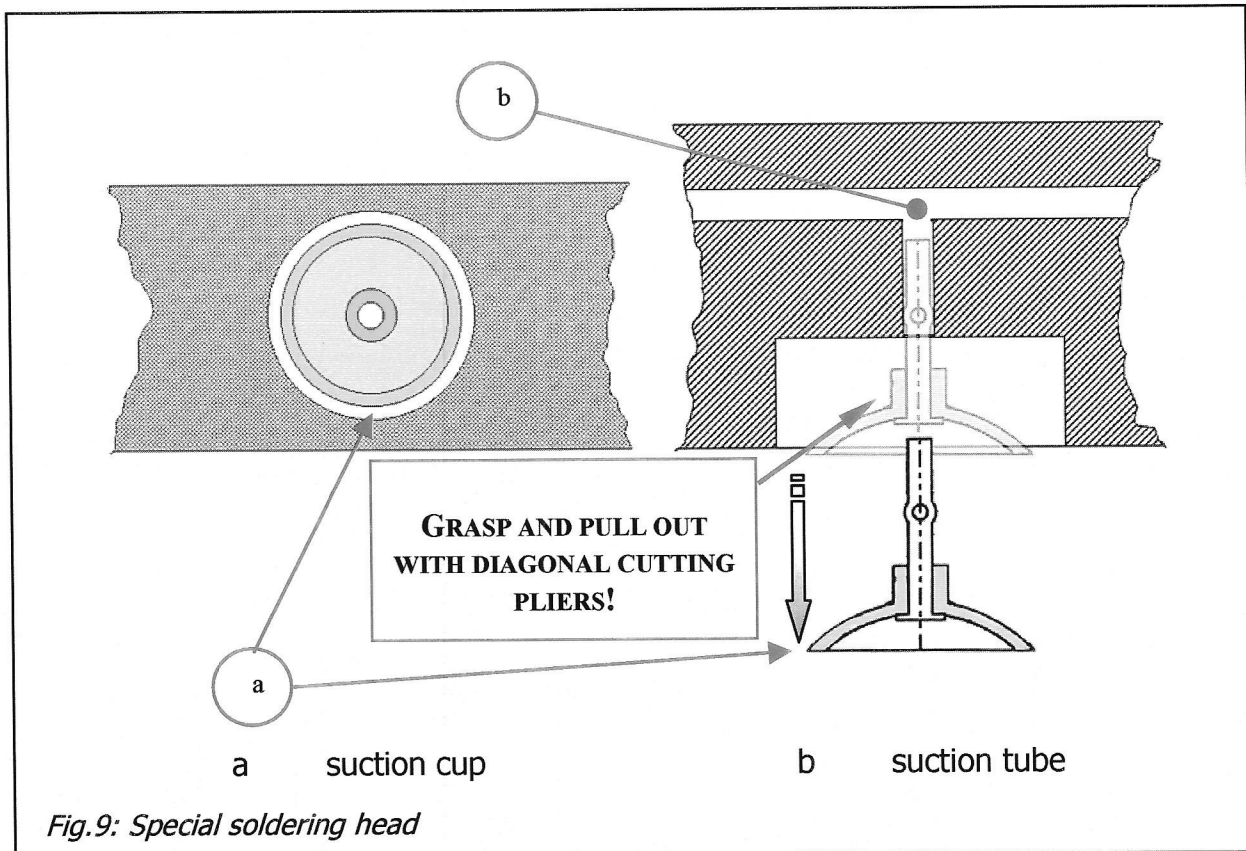
4.1 Function of Soldering Heads

In case of soldering heads with vacuum function the suction cups (silicon rubber) have the task to pick up the appointed components and to hold them into position as long as a vacuum is lead to the cups. The suction cups are connected within the soldering head via a vacuum duct and a sealing ring with the vacuum connector of the soldering arm. Depending on mechanical and thermal burden during the reflow process the suction cups and the sealing rings suffer more or less from wear and tear.

If the components can no longer be picked up or held safely although a vacuum exists on the suction cup, the suction cup and / or sealing ring must be exchanged (see point 4.2 and 4.4 spare parts).

4.2 Exchange of the Suction Cups

According to the construction of the soldering head the suction cup can be grasped from the front together with the holding tube using a small electronic diagonal cutting pliers and levered out (see special soldering heads, fig. 9). In other cases it is possible to push it out from behind with the help of a special push out tool (spare part #012) (see standard soldering heads, fig. 10).



So that the holding tube fits properly into the suction tube it must be pinched slightly with a small pincer before placing (see fig. 1). Beware, do not deform the tube too much! The suction air must flow unhindered through the tube.

The exchanged suction cups are pushed into the suction tube with smooth object. For this the handle of the push out tool is particularly suitable. Do not press it in too far! The seam of the suction cup should stick out about 0.2 to 0.3 mm.

4.3 Exchange of the Sealing Ring

The sealing ring connects the suction tube of the soldering head with the vacuum connector of the soldering arm. The o-ring inlaid in the sealing ring must stick out about 0.15 mm to seal securely.

For exchange screw out the sealing ring with a pincer (right hand thread). However do not loosen the inner parts e. g. suction tube of the soldering head. Place the new sealing ring and tighten so that the o-ring is pushed out approximately 0.15 mm.

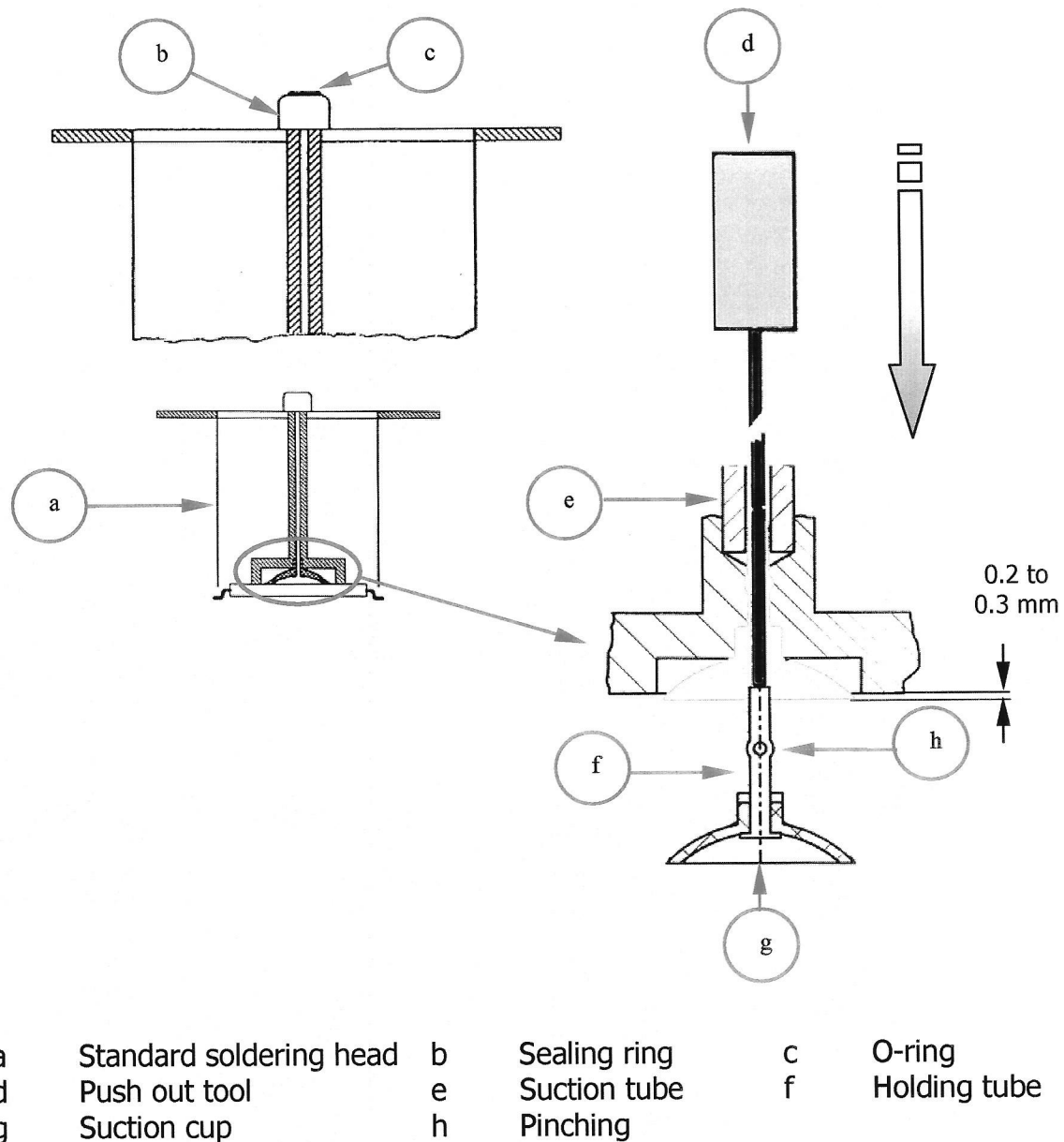


Fig. 10: Standard soldering head, push out tool

4.4 Spare Parts

Spare part number	Description
007	Suction cup 10 mm, with holding tube
008	Suction cup 8.1 mm, with holding tube
009	Suction cup 6.3 mm, with holding tube
010	Suction cup 5.0 mm, with holding tube
011	Suction cup 3.5 mm, with holding tube
026	Sealing ring for soldering heads
012	Push out tool for ...mm holding tubes

5 Technical Data

Device description	Inert gas / compressed air reflow module COMISS IV RA8, PC controlled
Mains voltage	230-240 V 50...60 Hz
Max. Power consumption	700 W
Temperature constancy at the measuring point	±3 %
Main fuse	6,3 A T
Max. air flow temperature	360° C
Over heat shut down	> 420° C
Entrance pressure	6 bar +1/-0,5
Air consumption	80 norm liter/min at 6 bar
Surrounding temperature	15°...40° C
Measurements / weight:	
Control Box	310x290x155 mm (d x w x h) approx. 7,8...8,5 kg depend. on construction

6 Safety Instructions

- Read and pay attention to the enclosed safety instructions and general safety guidelines (see Part A of technical handbook).
- Do not operate the reflow module without supervision. When not in use switch off, therefore you save energy and increase shelf life of the heater.
- If using a bottom heating (option) do not switch off immediately after heating! It should be left to cool for at least 30s.
- The maximum air flow temperature is limited to 360°C.
- If the thermocouple element should break (not in case of short circuit) the heating shuts down automatically.
- Caution, do not touch the hot parts of the reflow module. Danger of serious burning!

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