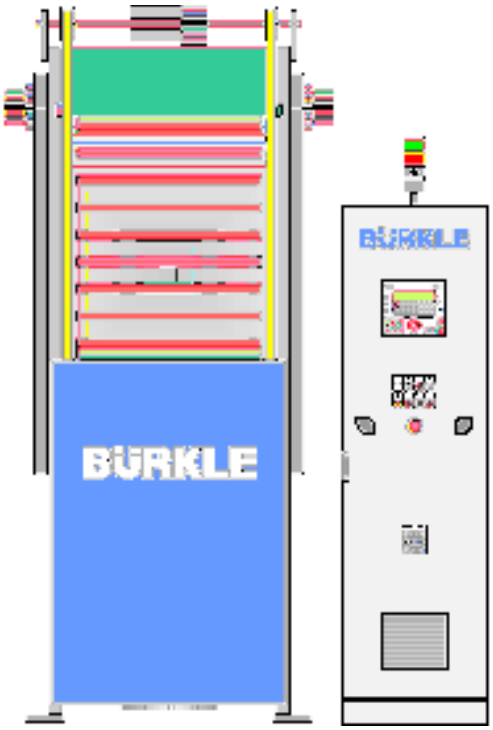
Operating Manual



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PREFACE

These Operating Instructions are intended to make it easier for you to familiarise yourself with the machine and make use of its intended capabilities.

The Operating Instructions contain all information required for operating the machine safely, correctly, and economically. Following these instructions will help you to avoid risks and dangers, cut repair costs and downtimes and increase the reliability and service life of the machine.

The descriptions and illustrations in the Operating Instructions apply analogously to all sizes of machine. Variants and options are described separately.

Please keep the Operating Instructions in a safe place on the machine.

All persons involved in installation, commissioning, operation, maintenance and servicing of the machine must have familiarised themselves with the contents of these Operating Instructions and must strictly follow all information, in particular the safety information.

The most important safety information is summarised in Chapter 2 *Safety*. Additional safety information in the other Chapters is identified by graphical symbols and signal words (see overleaf).

We have devoted the last page of the Operating Instructions to you. We would be grateful if you were to take a moment to write down any “comments" you may have.

The descriptions and technical data provided were correct on the date of going to print. We reserve the right to change the technical details or data by comparison with the information and illustrations in these Operating Instructions.

SYMBOLS USED

The following symbols are used in these Operating Instructions:

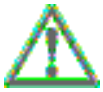
Symbol / Signal word	Significance
 DANGER	This points out imminent danger. Death or very serious injuries result.
 WARNING	This indicates a dangerous situation. Death or very serious injuries may result.
 CAUTION	This points out a possibly dangerous situation. Injuries may be the result.
 NOTE	This points out a possibly harmful situation. Damage to property may be the result.
	This points out tips for the user and other useful information.
	This indicates information about how to act in an environmentally-compatible fashion (e.g. energy saving tips).
	This points out help for possible problems.

Tabelle **Symbols Used**

1 MACHINE DESCRIPTION

1.1 Overview

Concept The hot press was designed for the lamination of multilayer.

Assembled press books (see Figure 1-1), consisting of: Top tool plate, bottom tool plate (transport plate), press pads, separation plates and laminate are heated up under a vacuum in this machine, are pressed and are cooled down again.

The machine was specially designed for the production of high-grade multilayer and is used both as a single machine and also in multilayer press systems.

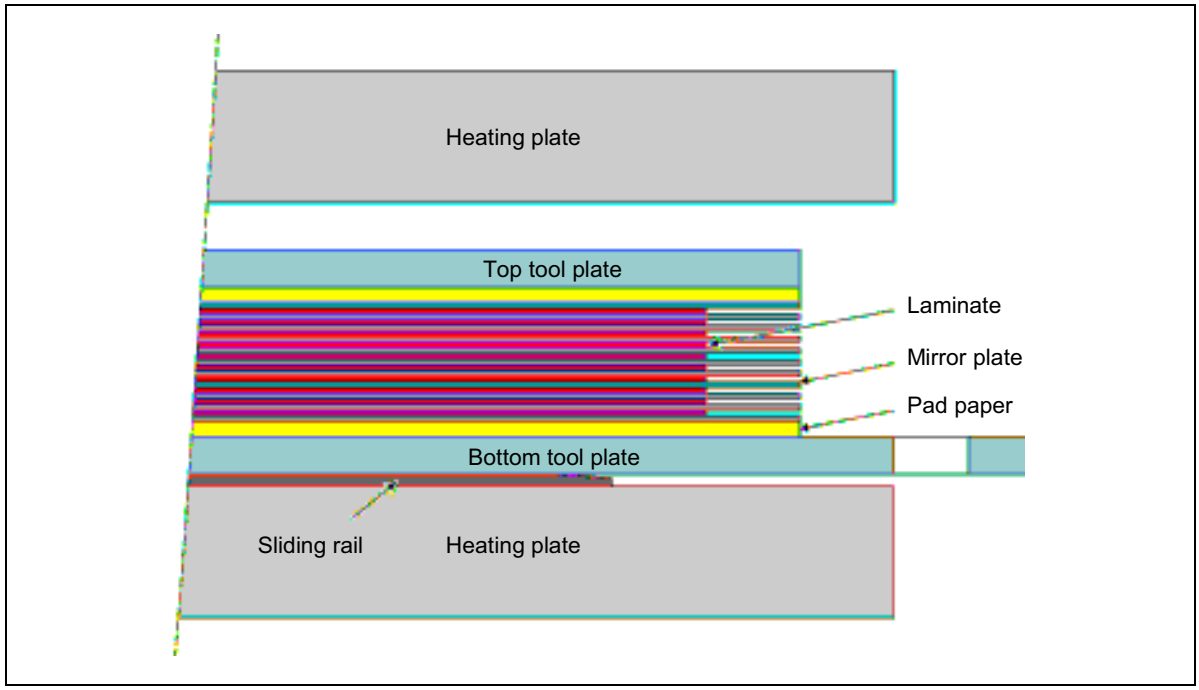
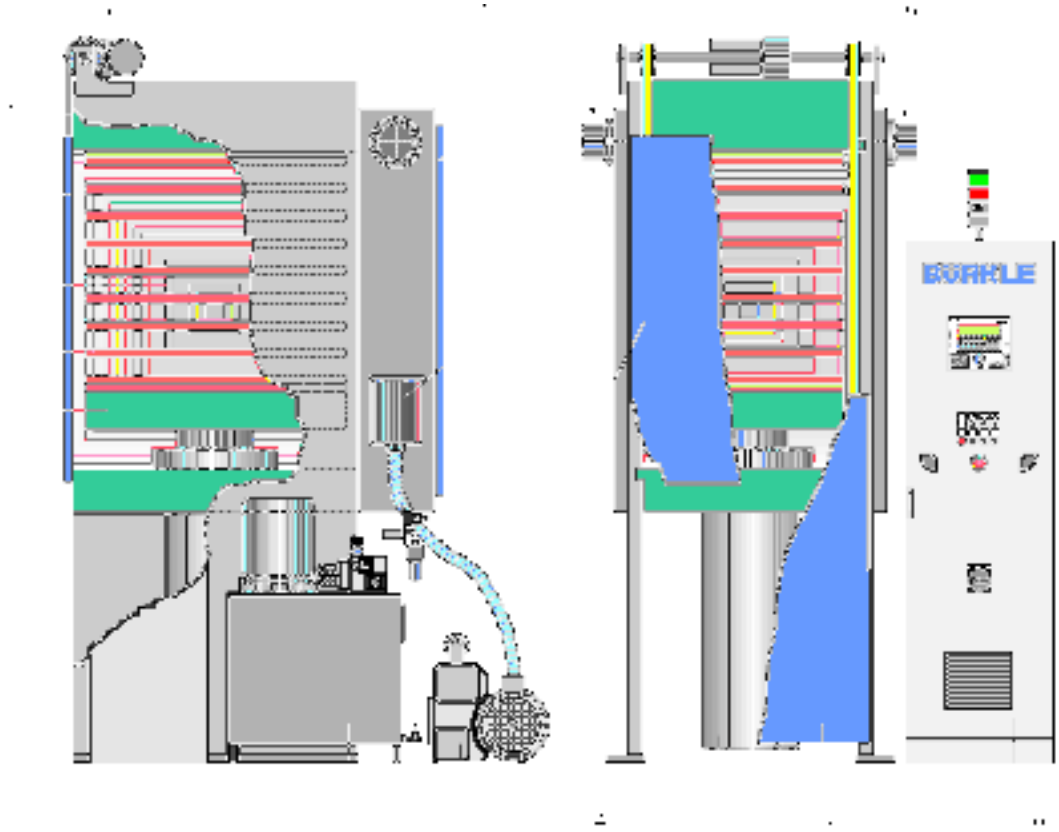


Figure 1-1 **Typical structure of press books: Overview**

Sizes The maximum dimensions of the laminates and the required throughput influence the size of the machine. The technical data for the standard sizes are listed in Chapter 1.6.

1.2 Mechanical construction and function



Legend:
1. Mobile press table
2. Heating plates
3. Vacuum chamber
4. Vacuum door
   ' open state
   '' closed state
5. Belts
6. Geared motor
7. Service door
8. Air filter / gas scrubber (option) in the suction pipe of the vacuum pump
9. Heating connections
10. Switch cabinet with operating elements
11. Hydraulic cylinder
12. Vacuum pump
13. Hydraulic drive

Figure 1-2 Mechanical construction of the machine

1.2.1 Mechanical construction

The machine is designed as a bottom-piston press.

Press frame

The press frame is a bolted frame construction. Temperature-resistant elastomer packings between the upper section, the lower section and the side sections ensure optimum vacuum conditions.

Vacuum chamber

The vacuum chamber (airtight pressing compartment, 3 Figure 1-2) is equipped on the front of the press with a moving vacuum door (4) and service door (7) sealed vacuum-tight on the rear of the press. Temperature-resistant silicone packings ensure an optimum vacuum seal.

A geared motor is fitted on the press, which opens and closes the vacuum door (4) by way of two belts. To protect the vacuum seal, the vacuum door is moved at a distance from the sealing face. Only at the end of the closing distance is the vacuum door pressed onto the sealing face of the press frame.

Vacuum pump

Before the pressing process, the vacuum pump (12) sucks the air out of the vacuum chamber (evacuation process).

Hydraulic drive

The hydraulic drive (13) generates the necessary hydraulic pressure to a pressure accuracy of +/- 1 bar. The pump switches off once the set pressure has been reached. The control block with hermetically tight seat valves ensures optimum holding of the pressure without additional activation of the pump. The hydraulic control is designed so as to ensure that the current pressure is kept to in the hydraulic system in the event of power deactivation.

Vee-guides

Low friction, wear-proof vee-guides guide the moving press table (1) and the hot plates (2). The special geometry of the vee-guides guarantees constant guidance conditions independently of the operating temperature.

Heating plates

The heating plates (2) are designed as solid steel plates with ground pressing faces. Heating ducts are drilled into the steel plates, through which thermal oil is pumped via manifolds and metal tubes. The arrangement of the heating ducts guarantees optimum temperature distribution in the heating plate.

If a corresponding size of machine is used, the heating plates are equipped on the face side with infeed rollers to facilitate pushing in or pulling out of the press books.

Sliding rails

Spring-mounted sliding elements (sliding rails) are fitted within the press surface of the heating plates. The sliding rails have the following functions:

- Protecting the heating plates against scratching when the press books are pushed in or pulled out.
- Preventing a premature transfer of heat from the heating plates into the press book during the evacuation process.

Thermal insulation

The face sides of the heating plates are lined with insulating plates to reduce the loss of heat as the result of radiation.

The top part of the press and the mobile press table are also protected against an excessive supply of heat by pressure-proof insulating plates

1.2.2 Hydraulic system

Hydraulic plan

The hydraulic system of the machine is shown in detail in the hydraulic plan (refer to the corresponding section of the technical documentation).

General instructions for servo and control valves

You can relieve the pressure of the hydraulic system for maintenance purposes by means of the *shut-off valves* and on the hydraulic drive (see also Chapter 5.10). In the case of hydraulic systems with pressure accumulators, pay attention to the manufacturer's operating instructions.

The *pressure limiting valves* on the hydraulic drive are set at the works and must not be adjusted!

The switching points of the *electronic pressure switch* are set at the works and must not be adjusted!

Manufacturer's operating instructions for hydraulic built-in components can be found in the corresponding sections of the technical documentation.

1.2.3 Vacuum system

Vacuum plan

The machine's vacuum system is described in detail in the vacuum plan (refer to the corresponding section of the technical documentation).

Vacuum pump

The vacuum pump is described in detail in the manufacturer's operating instructions (refer to the corresponding section of the technical documentation).

1.2.4 Thermal oil system

Thermal oil heating unit

The thermal oil heating unit is described in detail in the manufacturer's operating instructions (refer to the corresponding section of the technical documentation).

1.2.5 Electrics

Overview

The electrical components of the machine are connected to the switch cabinet by cables and plugs. The switch cabinet contains the facilities that are needed to control the machine.

The electric circuit diagrams, terminal connection diagrams and electric parts lists are contained in the corresponding section of the technical documentation.

Control concept

The machine's control concept is shown in Figure 1-3:

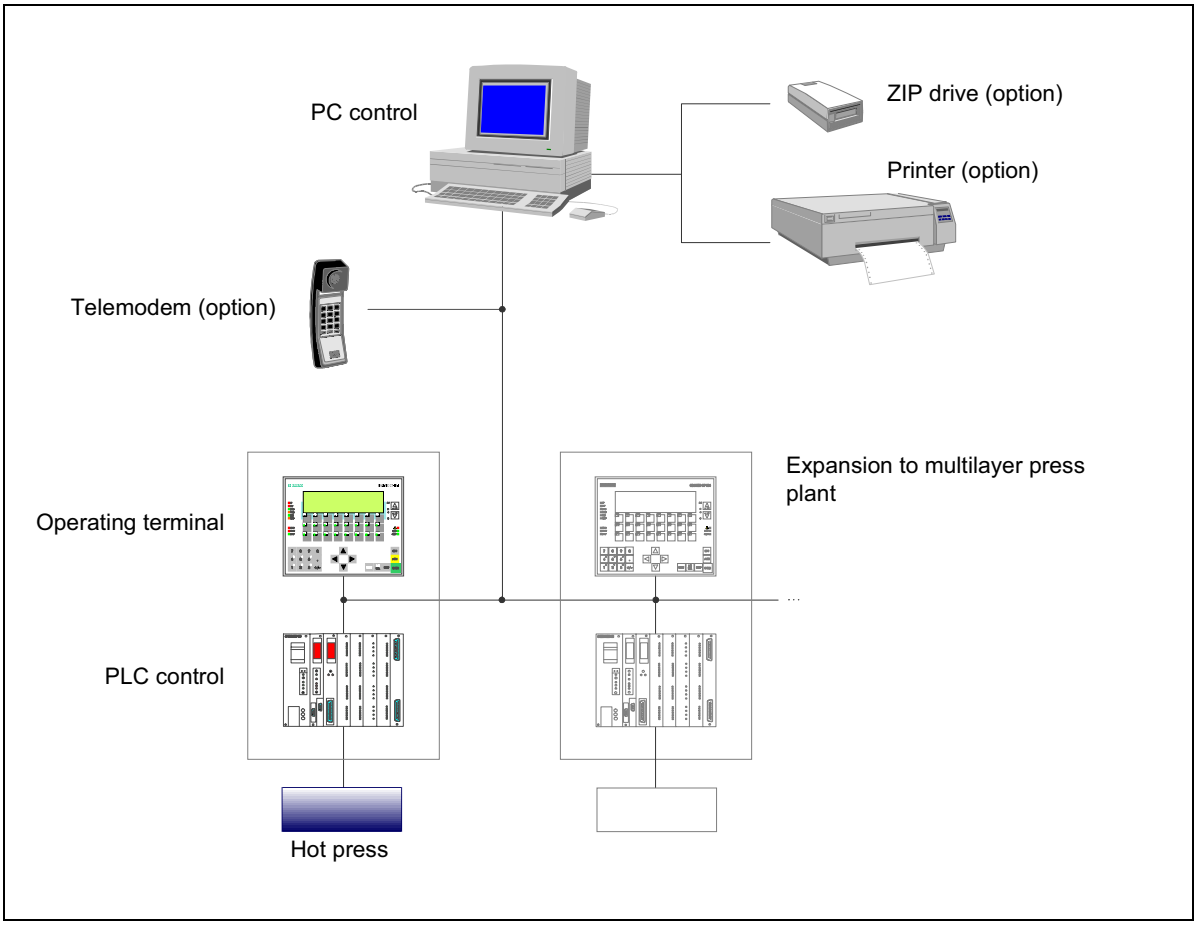


Figure 1-3 **Control concept: Overview**

The hot press is controlled by a PC. The software (process visualisation) needed for control of the machine runs on the PC.

The data for the pressing procedure (recipe) is selected or entered on the PC control and is transferred to the PLC control. The PLC control monitors and controls the pressing procedure in accordance with this recipe.

The machine can also be operated without a PC link (emergency mode). In this case, the data for the pressing procedure (recipe) are entered via the operating terminal. Only the recipe that is currently in the PLC control is modified.

Only ever one recipe can be active in the PLC control and on the operating terminal at one time. Therefore, recipes can only ever be managed with the PC control.

Operation of the machine by PC is not described in these operating instructions (see process visualisation operating instructions).

These operating instructions only describe the interfaces and the operator control actions that are necessary for operation without the PC.

Options

The *ZIP drive* enables storage of machine data (data backup) and recovery of data.

By means of the *printer,* machine data can be printed out for documentation purposes.

The *telemodem* enables remote diagnosis by our service team and easy location of malfunctions.

1.2.6 Operating principle

Overview

The data for the pressing procedure (recipe) is selected or entered on the PC control and is transferred to the PLC control. In conformity with the recipe, the PLC control monitors and controls the vacuum door, the vacuum pump, the hydraulic drive and the thermal oil heating system.

Structure of recipes

Recipes are combinations of data for the pressing procedure. The purpose of recipes is to transmit several items of data to the PLC control together.

Only ever *one* recipe can be active in the PLC control at one time.

A recipe basically consists of two parts:

- Parameters for start values
- Parameters for step values

Start values

Start values are all parameters that define the start of the press process / recipe (basic conditions). The following start values are distinguished (see Figure 1-4):

- Start temperature
  The temperature at which the pressing operation is started.
- Start pressure
  The pressure to which the press is closed after expiry of the „evacuating time“. The recipe will be started when the parameter "start pressure" is reached.
- Vacuum reached
  The vacuum pressure at which the „evacuating time“ is started.
- Evacuating time
  The time during which the vacuum chamber is still evacuated after the „vacuum reached at“ limit has been reached.

Step values

Step values are all parameters that define the course of the press process. The following step values are distinguished:

- Set value temperature
- Ramp time temperature
- Hold time temperature
- Set value hydraulic pressure
- Ramp time hydraulic pressure
- Hold time hydraulic pressure
- Vacuum yes/no
- Set value product temperature

With the parameters for the temperature and the hydraulic pressure (set value, ramp time, hold time), you define a continuous pressure and temperature profile within a pressing procedure (so-called pressure and temperature ramps; see Figure 1-4).

With the „vacuum yes / no“ parameter you vent the vacuum chamber during the pressing procedure.

By means of the “set value product temperature” parameter, you can define the press process depending on the product temperature.

You can define the progress of a pressing procedure via the PC control in a maximum of 19 steps and via the operating terminal in a maximum of 10 steps.

Function sequence

The pressing function sequence is described below. The individual phases of the press process (A - D) are shown in Figure 1-4:

Prerequisite: The set start temperature of the active recipe has been reached.

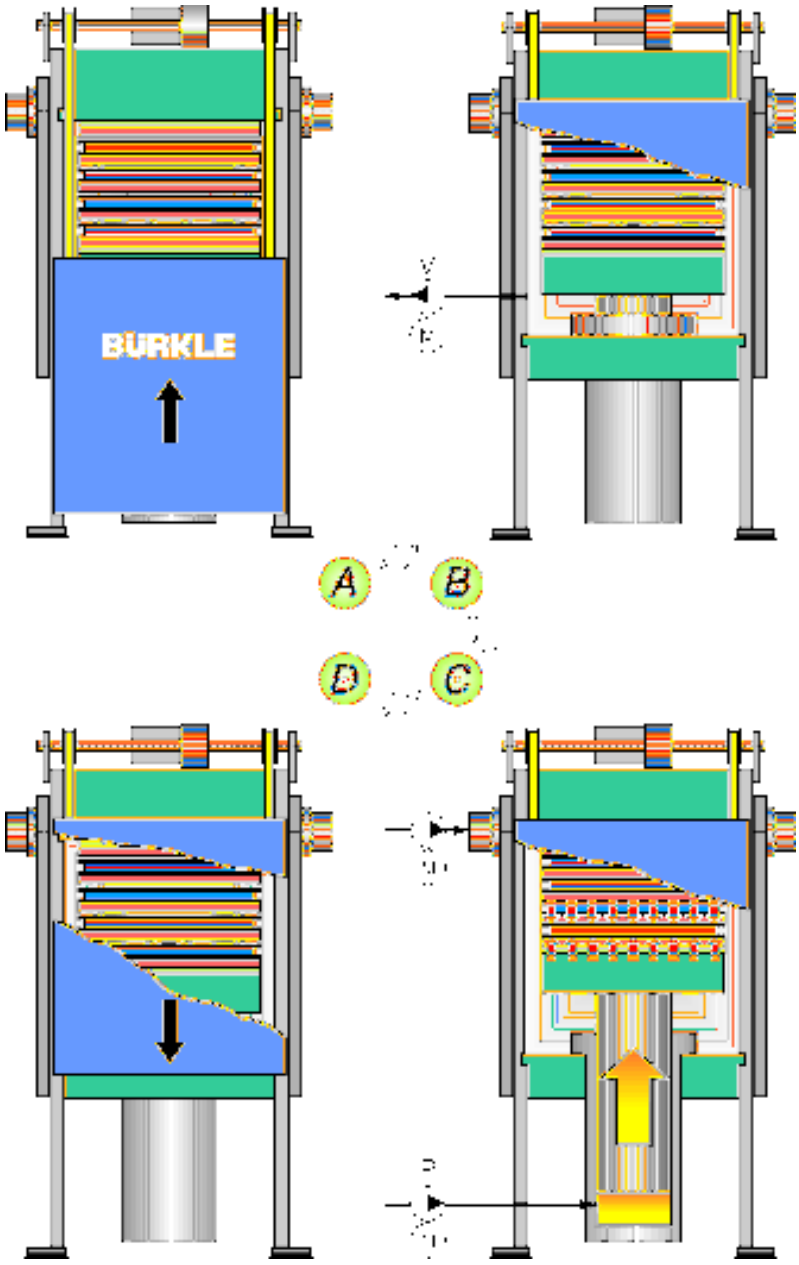
A
- Loading the press (automatically or manually). When the machine is operated as a single machine (manual loading), the start of the pressing procedure must be acknowledged by two-hand operation.
- The vacuum doors are closed. The limit switches report the vacuum door closed position to the controller.

B
- The vacuum chamber is evacuated with the press open.
  The „evacuating time“ begins when the vacuum pressure reaches the set limit („vacuum reached at“).

C
- The press is closed after expiry of the „evacuating time“ with distance-dependent changeover from fast closing to pressing speed.
  - The press first closes at the rapid speed (press fast closing function) up to the switch-over light barrier for the closing speed.
  - Once the switch-over light barrier is reached, the hook press closes at the pressing speed (press slow closing function).
- The pressure is built up to the set value („start pressure“).
- The active recipe defines the further course of the press process (such as pressing times for individual pressure and temperature ramps, vacuum off etc.).

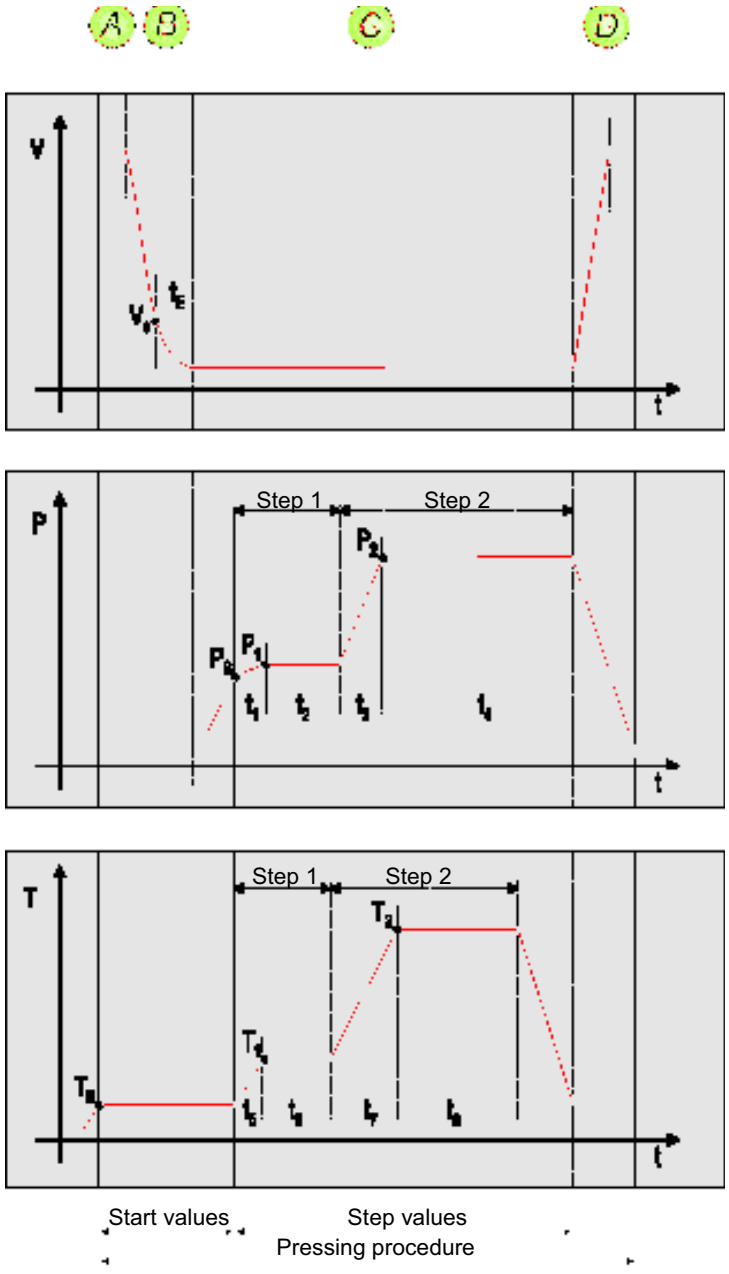
When the recipe is terminated:

D
- The press is opened.
- The green lamp of the warning lamp on the switch cabinet begins to blink.
- The vacuum chamber is vented.
- The vacuum door is opened.
- Unloading the press (automatically or manually).



Legend:
V Vacuum
P Hydraulic pressure
T Temperature

Figure 1-4 Phases of the press process



Legend:

V	Vacuum
P	Hydraulic pressure
T	Temperature
t	Time

Start values:

V_e	Vacuum reached
t_E	Evacuating time
P_S	Start pressure
T_S	Start temperature

Step values:

P_1, P_2	Set values hydraulic pressure
t_1, t_3	Ramp times hydraulic pressure
t_2, t_4	Hold times hydraulic pressure
T_1, T_2	Set values temperature
t_5, t_7	Ramp times temperature
t_6, t_8	Hold times temperature

Figure 1-4 Phases of the press process (continued)

0operation modes

With the operation modes, you define when the control system is to switch on to the next recipe step (*step switching*). The following operation modes are distinguished:

- Pressure (1)
  The controller switches to the next recipe step when the pressure times („ramp time pressure“, „hold time pressure“) have elapsed for the current recipe step.
- Temperature (2)
  The controller switches to the next recipe step when the temperature times („ramp time temperature“, „hold time temperature“) for the current recipe step have elapsed.
- Pressure + temperature (3)
  The controller switches to the next recipe step when the pressure and temperature times for the current recipe step have elapsed.

Product step switching

Product step switching is an *addition* to the step control operation modes.

With product step switching, you can *additionally* control the pressure/temperature-controlled press process as a function of the product temperature.

During pressing with product step switching, the controller switches to the next recipe step if

- the product temperature for the current recipe step has been reached *or*
- the pressure/temperature times for the current recipe step have elapsed.

Step forwarding has priority over product step switching.

Requirements for product step switching:

- Product sensors have been inserted into the press books and are connected to the connection terminals in the vacuum chamber.
- „With product measurement“ pressing option has been selected.
- „Product step switching“ is activated.
- „Set value product temperature“ is entered in the recipe.

Pressing options

You select the process mode with the press options. The following pressing options are distinguished:

- no press option (0)
- with vacuum (1)
- with product measurement (2)
- with product measurement and vacuum (3)
- with cold press (4)
- with vacuum and cold press (5)
- with product measurement and cold press (6)
- with vacuum, product measurement and cold press (7)

Pressing options meanings

- Vakuum (V)
  The press process is run with a vacuum.
  The „vacuum reached at“ and „evacuating time“ start values only influence the press process if a pressing option „with vacuum“ has been selected.
- Product measurement (PM)
  The pressing procedure is run with product temperature measurement (product sensor FeCuNi type J).
  Product sensor values are only displayed and logged if the product sensors inserted in the press books are connected to the connection terminals in the vacuum chamber.
  Selection of a pressing option with „product measurement“ is the requirement for product step switching.
  Peculiarities of the press option „with product measurement“:
  – The press can also be closed while the vacuum door is open.
  – Only restricted automatic operation is possible: The vacuum door and the press must be closed manually before the automatic mode can take effect.
- Cold press (CP)
  Information for the control system: the press books should be cooled down in a cold press after the pressing procedure in the hot press.
  This press option only makes sense in multilayer press plant with an integrated cold press.

1.3 Monitoring facilities

Overview

- 1 light barrier, press closed (switch-over light barrier for the closing speed).
- 1 limit switch, press opened.
- 1 light barrier, wrong allocation of the openings.
- 4 limit switches, vacuum door open/closed.
- 1 leak detector, leak in the thermal oil system within the vacuum chamber.
- 1 limit switch, switch cabinet closed (option, in conjunction with the **SERVICE SWITCH** on the control panel; see Chapter 1.4).
- 1 pressure sensor, operating pressure for hydraulic system.
- 1 pressure switch, pressure of accumulator (pressure accumulator option).
- 1 pressure sensor, vacuum pressure.
- 1 temperature sensor each per heating plate, measurement of temperature.
- 1 temperature sensor in the collective return pipe, temperature control of the press.
- 1 temperature sensor, measurement of the temperature of the primary circuit (thermal oil heating unit with primary / secondary circuit).
- 2 potentiometers, position of the control valves for heating / cooling (thermal oil heating unit with primary / secondary circuit).

1.4 Operating elements and indicators

Overview

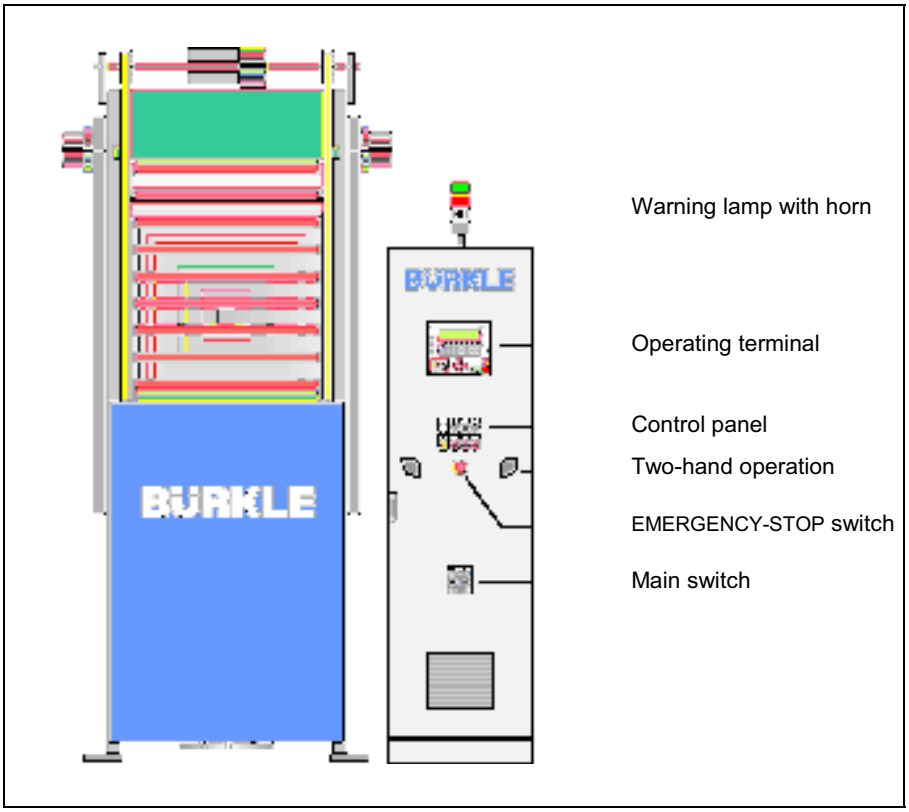


Figure 1-5 **Operator controls and indicators of the machine: Overview**

Warning lamp

The lamps in the warning lamp indicate operational conditions of the machine:

Lamp	State	Explanation
Green	Flashing	End of the pressing procedure (the press is ready for opening).
	Continuous	Press is in the press process (pressing procedure running).
Red	off	No failure (failure cleared and acknowledged)
	Flashing	Newly arriving malfunction (an audible signal by the horn additionally signals newly arriving malfunctions).
	Continuous	Failure acknowledged, but not *yet* remedied.

Table 1-1 **Traffic light displays: Explanation**

Horn The horn on the switch cabinet signals a newly arriving malfunction.

Operating terminal You operate the machine with the operating terminal.

The operating terminal is described in detail in Chapter 1.5.

Control panel With the control panel, you switch the PLC control of the machine on and off and you decide whether to operate with or without PC:

Button	Explanation
	**CONTROL VOLTAGE ON** Activates the control voltage supply. The button lights up when the control voltage is on.
	**CONTROL VOLTAGE OFF** Deactivates the control voltage supply. The outputs of the PLC control are set to "0“ (except the warning lamp) when the control voltage is switched off.
	**SERVICE SWITCH** (option) Acknowledgement of „power supply on“ when the switch cabinet is open (limit switch monitors the closed switch cabinet door). The key switch has two settings: • Vertical setting („0“): No power supply while the switch cabinet is open despite the fact that the main switch is on. • Right-hand setting („I“): Switches on the power supply (when the switch cabinet is open and the main switch is on).
	**EMERGENCY SERVICE** Switches the machine to standard mode or to emergency mode (see also Chapter 5). In the emergency mode, the machine is controlled via the operating terminal (operation without PC). The key switch has two settings: • Vertical setting („0“): Switches the machine to the standard mode. • Right-hand setting („I“): Switches the machine to the emergency mode.

Table 1-2 Control panel: Description of keys

Prevent unauthorised operation of the machine by making the keys for the service switch and for changeover to the emergency mode accessible to authorised personnel only.

In the standard mode, the press and the vacuum door cannot be opened and closed manually.

Two-hand operation

By two-hand operation

- open or close the press or the vacuum door.
- acknowledge the start of the pressing procedure (only necessary when the machine is used as a single machine).

Before you are able to operate the individual functions by two-hand operation, you must

- set the machine to the manual mode (only necessary when the machine is integrated in multilayer press plant, i.e. when it features automatic feeding).
  press the K9 / „Manual“ function key on the operating terminal.
- select the required function on the operating terminal:
  - *Opening the press*
    Press the function key K2 / “SELECTION PRESS OPENING“.
  - *Closing the press*
    Press the function key K10 / “SELECTION PRESS CLOSING“.
  - *Opening the vacuum door*
    Press the function key K3 / “SELECTION VACUUM DOOR OPENING“.
  - *Closing the vacuum door*
    Press the function key K11 / “SELECTION VACUUM DOOR CLOSING“.

EMERGENCY-STOP switch

With the EMERGENCY-STOP switch, you interrupt all movement sequences of the machine.

In an emergency, you can switch off the machine immediately with the EMERGENCY STOP switch:

➢ Press (1) the EMERGENCY-STOP switch.
All movements of the machine stop.
The EMERGENCY-STOP switch engages in position when it is pressed.

Release the EMERGENCY-STOP switch:

➢ Pull (2) the EMERGENCY-STOP switch out and allow the button to disengage.

Main switch

You switch the power supply of the machine on and off with the main switch.

Position "0" or "OFF"	=	power supply off
Position "I" or "ON"	=	power supply on

In the „0“ or „OFF“ setting, the main switch can be locked with a padlock to prevent reactivation.

1.5 Operating terminal

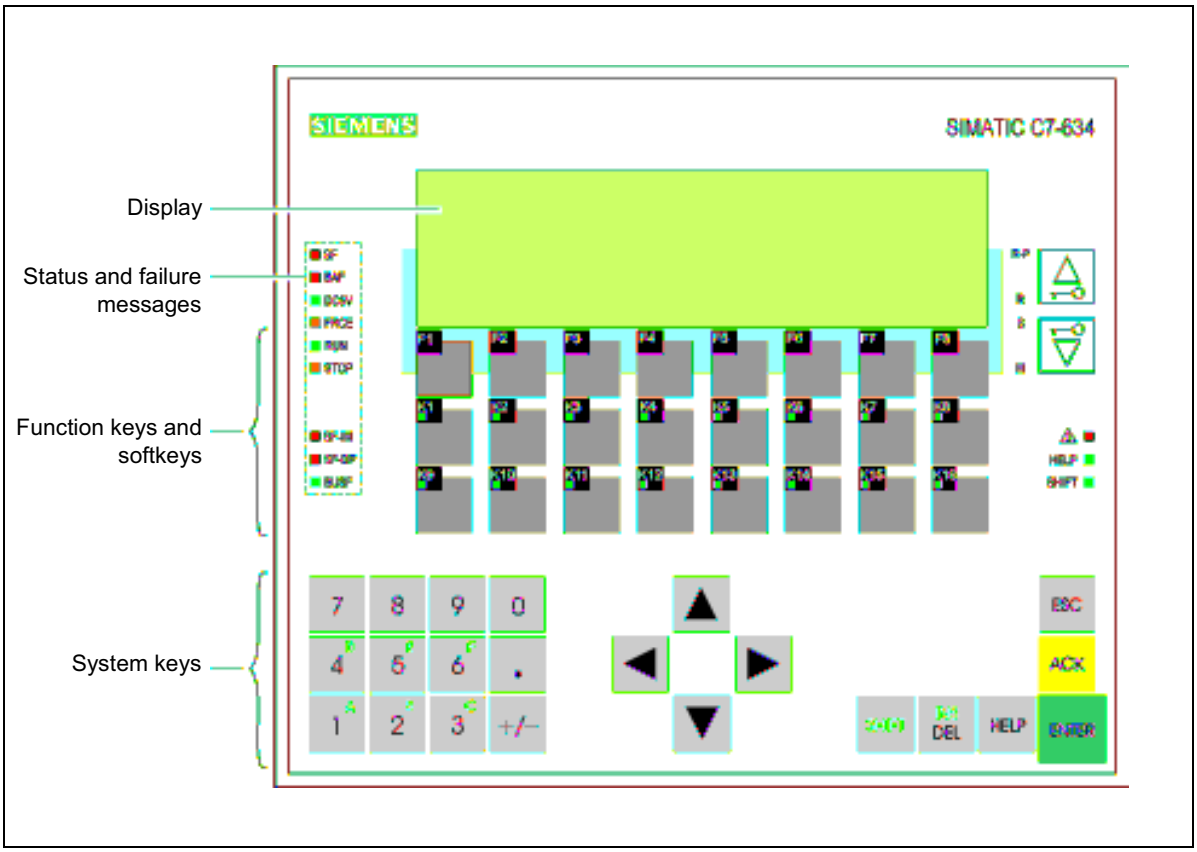


Figure 1-6 **Operating terminal: Overview**

Function You need the operating terminal (see Figure 1-6) for the following operating steps:

- Monitoring the pressing procedure (also possible by PC control).
- Entering process values (modifying recipes) in the emergency mode.
- Operating the machine in the manual mode.
- Recognizing and acknowledging malfunctions.

1.5.1 Keyboard

Key markings and functions

The operating terminal is operated via the keyboard. On the keyboard, three functional blocks (see Figure 1-6) have to be distinguished:

- Softkeys F1 - F8
- Function keys K1 – K16
- System keys

Softkeys F1 - F8

With the Softkeys F1 – F8, you call up the functions shown in the display (see Chapter 1.5.4).

Function keys K1 – K16

With the function keys K1 - K16, you execute the functions described in the following table:

Button	Explanation
	**AUTOMATIC** Switching the machine to the automatic mode (see also the process visualisation operating instructions). The LED in the key lights up when the automatic mode is on. To switch off the automatic mode, switch over to the manual mode (function key K9 / „MANUAL“). *Note:* If a press option „with product measurement“ is selected, despite the automatic mode the vacuum door and the press doe not close automatically. The vacuum door and the press must be closed manually before the automatic mode can take effect.
	**MANUAL** Switching the machine to the manual mode (see also the process visualisation operating instructions). The LED in the key lights up when the manual mode is on.

Table 1-3 Function keys K1 - K16: Description of keys

Button	Explanation
	**SELECTION PRESS OPENING** Selects press opening. The LED in the key lights up when the K2 key is activated. The press can now be opened by means of two-hand operation.
	**SELECTION PRESS CLOSING** Selects press closing. The LED in the key lights up when the K10 key is activated. The press can now be closed by means of two-hand operation. *Note:* The press cannot be closed until the vacuum door is closed. Only when a press option „with product measurement“ is selected can the vacuum door also be closed when the press is open.
	**SELECTION VACUUM DOOR OPENING** Selects vacuum door opening. The LED in the key lights up when the K3 key is activated. The vacuum door can now be opened by means of two-hand operation.
	**SELECTION VACUUM DOOR CLOSING** Selects vacuum door closing. The LED in the key lights up when the K11 key is activated. The vacuum door can now be closed by means of two-hand operation.
	**VACUUM PUMP ON** Switches on the vacuum pump. The LED in the key lights up when the vacuum pump is on. Note: Please let the vacuum pump be switched on during the whole shift. If the vacuum pump is switched on and off too often the pump may be damaged. The vacuum chamber is evacuated and vented via the vacuum valve.
	**VACUUM PUMP OFF** Switches off the vacuum pump. The LED in the key lights up when the vacuum pump is off.

Table 1-3 Function keys K1 - K16: Description of keys (continued)

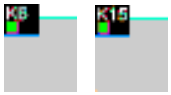
Button	Explanation
	**HEATING ON** Switches on the heating. The LED in the key lights up when the heating is on.
	**HEATING OFF** Switches off the heating. The LED in the key lights up when the heating is off.
	not used
	**LED TEST** Checks functioning of the operating terminal's LEDs and of the indicator lamps on the control panel as well as sounding of the horn.
	not used

Table 1-3 Function keys K1 - K16: Description of keys (continued)

System keys The key block with the „system keys“ is marked in Figure 1-6. The functionality of the individual keys is explained in the following table:

Button	Explanation
	**SHIFT KEY** Enables the second function of keys that are assigned two functions (e.g. switching over the digit keys 1 to 6 for input of the characters A to F). The LED of SHIFT at the right next to the function keys lights up when the SHIFT key is activated. The second function of a key assigned two functions can now be called up.
	**DELETE KEY** Deletes characters at the cursor's current position (only in the case of alphanumeric value inputs!). All characters that follow are shifted by one position to the left.
	**INSERT KEY** Inserts blanks at the cursor's current position (only in the case of alphanumeric value inputs!). All characters that follow are shifted by one position to the right.

Table 1-4 System keys: Description of keys

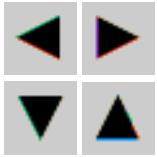
Button	Explanation
	**HELP KEY** Displays an info text. The LED of HELP at the right next to the function keys lights up when a help text is available for the current display.
	**ENTER KEY** The ENTER key has different functions depending on the operating situation: • Confirms and ends input. • Confirms selection.
	**ACKNOWLEDGE KEY** Acknowledges error messages. The LED of ACK (symbol ) at the right next to the function keys • **starts blinking** when there is at least one unacknowledged failure message. • **comes on** if only acknowledged failure messages are present.
	**ESCAPE KEY** The ESCAPE key has different functions depending on the operating situation: • Branches back to the next level in the display hierarchy and from the initial screen to the signal level. • Reverses a value input when this has not yet been confirmed by pressing ENTER. • Cancels a system message. • Cancels display of an info text. • Cancels scrolling in pending messages and resets the display to the currently pending message.
	**CURSOR KEYS** Moving the cursor. Depending on the operating situation, the cursor is moved by one character, entry or display to the left, the right, down or up. When the *SHIFT key* is *activated* (LED of SHIFT lights up): Scrolling in symbolic lists and calling up the extended character set. The cursor keys have a repeating function. When the key is pressed, the input is repeated after a brief delay until the key is released again.

Table 1-4 System keys: Description of keys (continued)

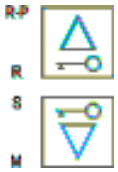
Button	Explanation
0 to 9	**DIGIT KEYS** • Input of numeric characters (0 to 9). • 1 to 6 when the SHIFT key is activated (LED lights up): Input of alphanumeric characters A to F. The digit keys have a repeating function. When the key is pressed, the input is repeated after a brief delay until the key is released again.
+/−	**SIGN KEY** Switches the sign (from „plus“ to „minus“ and vice versa).
	**SELECTING OPERATION MODE FOR CONTROL** Changing the operation mode of the control: • **R-P lights up: Mode RUN-P** Control processes program. Data can be loaded or changed! • **R lights up: Mode RUN** Control processes program. Data can *not* be loaded or changed! • **S lights up: Mode STOP** Control does *not* process the program. • **M lights up: Mode MRES** Memory reset (clears the memory and deletes the program)! **NOTES** The correct operation of the machine is guaranteed only in the RUN-P mode! If the wrong operation mode is set, it may lead to loss of data. Therefore, never change the set operation mode!

Table 1-4 System keys: Description of keys (continued)

In certain circumstances, pressing several keys simultaneously may lead to incorrect inputs.

1.5.2 Status and failure messages

Meanings of status and failure messages

The operating terminal has the status and failure messages shown in Figure 1-6. In the following table, the status and failure messages are explained in the order in which they are arranged on the operating terminal:

Display	Explanation
SF	**GROUP ERROR** The red LED lights up in the case of • Hardware faults • Firmware errors • Parameterisation errors • Timing errors • Faulty internal memory • Battery failure or in the event of missing buffering To exactly determine a fault, use must be made of a programmer and the diagnostic buffer must be read out. In this case, please contact our after-sales service (see annex „How to contact BÜRKLE“).
BAF	**BATTERY FAULT** The red LED lights up if the battery • has too low a voltage. • is defective. • is absent.
DC5V	**5V DC POWER SUPPLY** The green LED lights up when the internal 5V DC power supply of the control system is in proper working order.
FRCE	no function
RUN	**RUN OPERATING STATUS** The green LED lights up when the control system is executing a program. The green LED flashes while the control system is starting up (then, the STOP display additionally lights up).

Table 1-5 Status and failure messages: Explanation

Display	Explanation
STOP	**STOP OPERATING STATUS** The yellow LED lights up when the control system is not executing a program. The yellow LED flashes once every second when the control system requests a general reset.
SF-IM	**INTERFACE MODULE GROUP ERROR** The red LED lights up when the connection between the control and the interface module is faulty.
SF-DP BUSF	**DISPLAY ELEMENTS FOR PROFIBUS** The LEDs are assigned to the PROFIBUS DP. Depending on the state of the LEDs the following result: • **SF-DP: On BUSF: On** In the case of bus faults, interface faults or different transmission rates. • **SF-DP: On BUSF: Flashing** If the station has failed or one of the assigned slaves cannot be addressed. • **SF-DP: On BUSF: Off** If configuration is missing or faulty. • **SF-DP: Off BUSF: Off** If there is no failure.

Table 1-5 Status and failure messages: Explanation (continued)

1.5.3 Operator control levels

Overview As far as operation of the operating terminal is concerned, a distinction must be made between two operating levels, between which it is possible to switch to and fro:

Signal level The signal level is the highest level on the operating terminal. In the signal level, pending failure messages and system messages are displayed (see Chapter 1.5.8).

If the operating terminal operates in the signal level and there are no pending system or failure messages, then the so-called `initial message` is displayed:

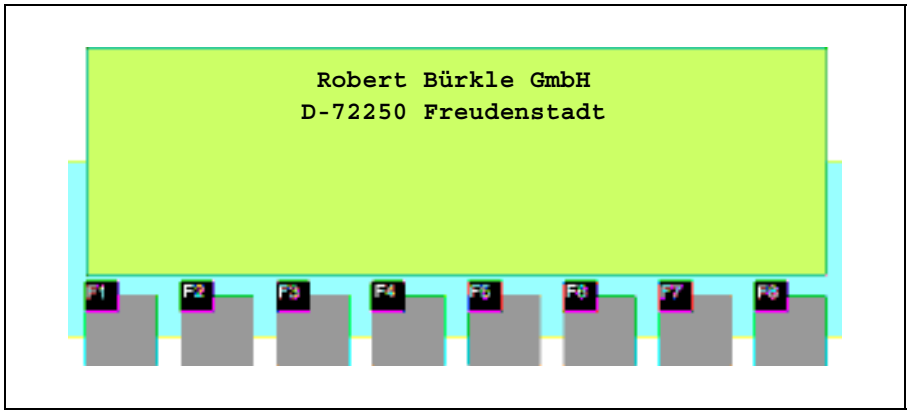


Figure 1-7 Initial message

Screen level After start-up of the operating terminal, it switches automatically from the signal level to the screen level (editing level) and calls up the `initial screen` (see Figure 1-8).

From here, you branch to further displays by means of the „softkeys“. In the displays you can operate and monitor the pressing procedure and you can define system settings.

The combination of individual displays is referred to as the display hierarchy. Chapter 1.5.4 provides an overview of the display hierarchy.

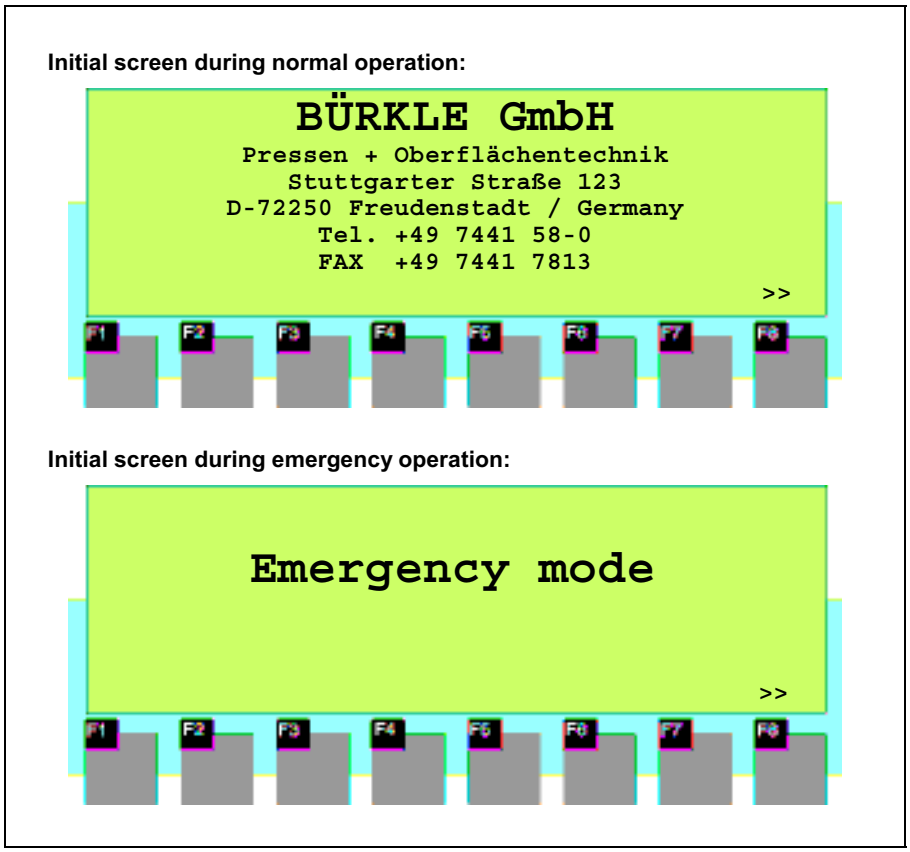


Figure 1-8 Initial screen[1]

Changing operating levels

The operating level can be changed either by the operator or automatically by the operating terminal (see Figure 1-9).

Change by the operator:

- Press the ENTER key in order to switch from the signal level to the screen level.
- Press the Escape key (ESC) in order to switch from the screen level to the signal level.

You cannot branch backward from the signal level by pressing the “Escape key” (ESC). The key is designed to terminate the display of a system message.

[1] The `initial screen` changes depending on wether the machine is operating in the normal or the emergency mode.

Forced change to signal level:

You exit from the screen level automatically whenever a system or failure message appears (see also Chapter 1.5.8). The operating terminal then switches to the signal level to display such a message. This cannot be terminated as long as a system message or an unacknowledged failure message is displayed.

Failure messages that have not been acknowledged flash on the display. The LED of ACK (symbol ⚠) at the right next to the function keys also starts blinking.

- Press the “acknowledgement key” (ACK) to acknowledge a failure message.
- Press the “Escape key” (ESC) in order to hide a system message.

After the failure message has been acknowledged or after the system message has been hidden, the operating terminal returns to the point from which it changed to the signal level.

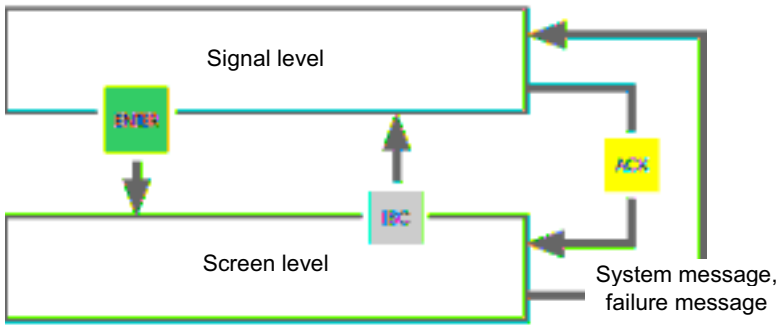


Figure 1-9 Changing between signal level and screen level: Overview

1.5.4 Display hierarchy

Screens The displays needed for operation of the machine are called up from a `main screen` by means of the „softkeys“. From the `main screen`, you can branch to the following displays:

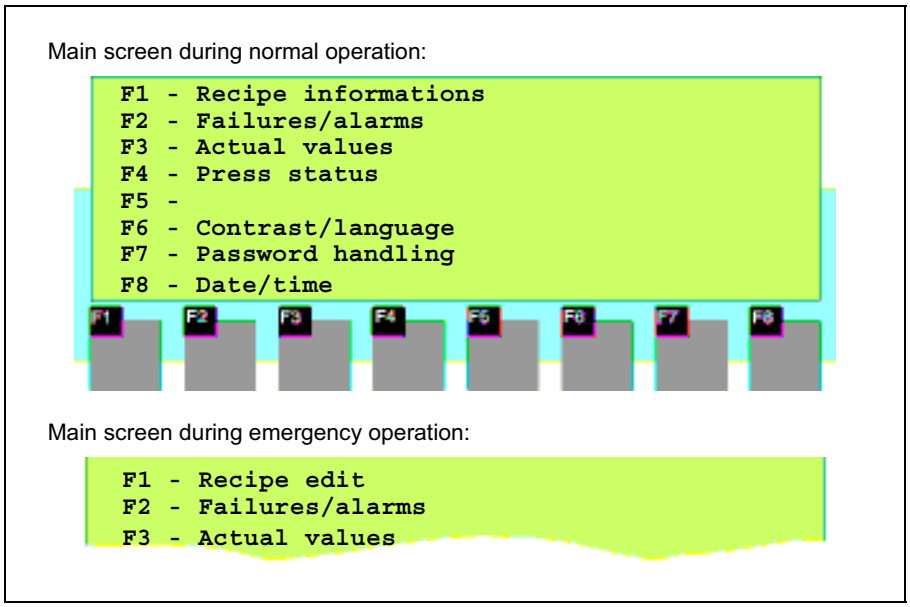


Figure 1-10 Main screen[2]

Screen	Explanation
`Recipe information`	see Chapter 1.5.6
`Recipe edit`	see Chapter 1.5.7
`Failure messages`	see Chapter 1.5.8
`Actual values`	see Chapter 1.5.9
`Press status`	see Chapter 1.5.10
`Contrast / language`	see Chapter 1.5.11
`Password handling`	see Chapter 1.5.12
`Date/time`	see Chapter 1.5.13

Table 1-6 Screens: Overview

[2] The `main screen` changes depending on wether the machine is operating in the normal or the emergency mode.

Display hierarchy

In an overview, Figure 1-10 shows how the individual displays are combinded. You will find detailed information about the functions and operation of the displays that are important to your needs in following chapters (see Table 1-6).

The operating situation on the operating terminal during the standard mode differs from the operating situation in the emergency mode (in the standard mode, the machine is controlled via the PC).

This is why the display hierarchy and the displays of the operating terminal change depending on whether the machine is operated in the standard mode or in the emergency mode (see Chapter 5).

Branching to displays

When you press the ENTER key, you switch from the signal level to the screen level. The `initial screen` appears once you have switched to the screen level.

In the sreen level, you call up the screens shown in the display by pressing the „softkey F1 - F8“.

With the „softkeys“ under the symbols „<<„ and „>>„, you can move the displayed section of the current screen.

When you move further down in the display hierarchy, you can return by one step by pressing the Escape key (ESC).

A maximum of 8 lines and 40 characters per line can be displayed on the screen at one time. If the displays contain longer texts, you can use the cursor keys to scroll through the displays:

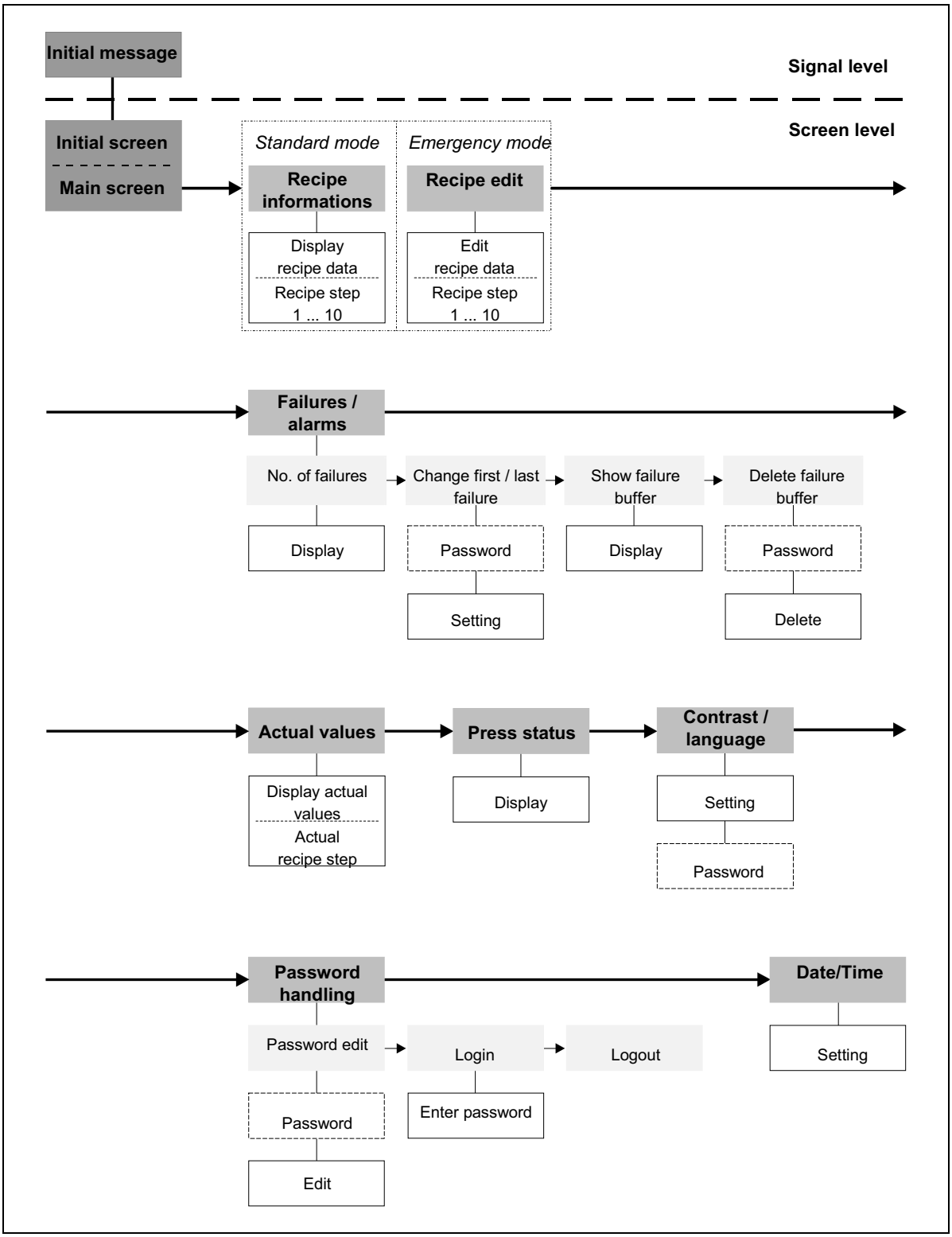


Figure 1-11 **Display hierarchy: Overview**

1.5.5 Entering values (operating notes)

Overview

In input fields of displays, you enter values on the operating terminal. There are various kinds of values, which you enter in various ways:

- Numeric values
- Alphanumeric values
- Symbolic values

Entering numeric values

1. Using the cursor keys, select the required input field within the called up display.
   The cursor is positioned on the input field.
2. Enter the required value with the digit keys.
   The input field flashes.
   The input field is right-justified. Entered digits are shifted to the left.
   The previous value in the input field disappears.
   Press the Escape key (ESC) in order to reverse an input. Then the original value is restored automatically in the field.

You can not enter values?

The SHIFT key is activated (LED of SHIFT at the right next to the function keys comes on).

➢ Turn off second functions of keys by pressing the SHIFT key.

3. Confirm your input by pressing the ENTER key.
   The value is accepted.
   The input field stops flashing.
4. Using the cursor keys, select a further input field and accept the next input as described above.
5. Close the display by pressing the Escape key (ESC).

It is possible that only specific values are permitted for numeric input fields. In this case, entered values are accepted only if they lie within the specified limits.

A failure message appears if the entered value lies outside these limits. The original value is restored in the field after cancellation of the error message.

Entering alphanumeric values

1. Using the cursor keys, select the required input field within the called up display.

   The cursor is positioned on the input field.

When you make alphanumeric inputs, you enter a mixture of digits and letters. If you wish to enter a letter at the cursor's current position, you must activate the alphanumeric character set.

2. Press the SHIFT key in the entry field.
   The LED of SHIFT at the right next to the function keys comes on.
   The „digit keys" 1 to 6 are now assigned the letters A to F.
   You can now scroll in the extended character set with the cursor keys:

    Scrolls up in the extended character set.

    Scrolls down in the extended character set.

3. Enter the required value with the „system keys". When using the extended character set, move the cursor by one character to the right to accept a character.
   The input field flashes.
   Press the Escape key (ESC) in order to reverse an input. Then the original value is restored automatically in the field.

4. Confirm your input by pressing the ENTER key.
   The value is accepted.
   The input field stops flashing.
5. Using the cursor keys, select a further input field and accept the next input as described above.
6. Close the display by pressing the Escape key (ESC).

Entering symbolic values

1. Using the cursor keys, select the required input field within the called up display.
   The cursor is positioned on the input field.
2. Press the SHIFT key in the entry field.
   The LED of SHIFT at the right next to the function keys comes on.
   The selection list containing possible values is activated.
3. Use the cursor keys to select the required value.
   The input field flashes.
   Press the Escape key (ESC) in order to close the selection list.
4. Confirm your selection by pressing the ENTER key.
   The value is accepted.
   The input field stops flashing.
5. Using the cursor keys, select a further input field and accept the next input as described above.
6. Close the display by pressing the Escape key (ESC).

1.5.6 Recipe information

Overview

The `Recipe information` screen displays the values of the current recipe in the PLC control. It consists of several sections:

- `General recipe data`
  The parameters for start values are specified in this section of the screen. Start values are basic conditions for starting the pressing procedure / recipe. Here, you also see the selected operation mode and the press options (see Chapter 1.2.6).
- `Step 1 ... 10`
  In the other sections, the parameters for step values are specified for recipe steps 1 to 10 (see Chapter 1.2.6).

By way of the PC control, the profile of the pressing procedure can be defined in a maximum of 19 steps. However, only the first 10 steps are displayed in the `Recipe information screen`.

Viewing a recipe

The `Recipe information` screen can only be called up when the machine is in the standard mode!

➢ Use the „softkeys“ to branch to the `Recipe information screen`.
  The current recipe in the PLC control is displayed.

The following abbreviations are used in the `Recipe information` screen:

V Vacuum

PM Product measurement

CP Cold press

General recipe data section

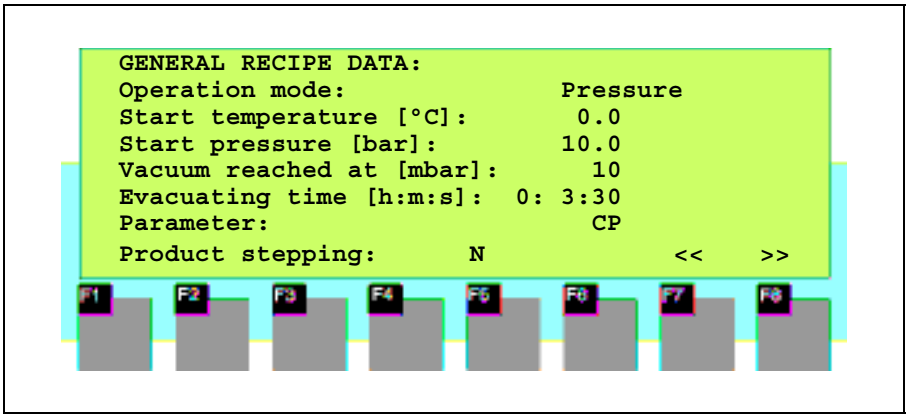


Figure 1-12 General recipe data: Example display

Display	Explanation
Operation mode	Information on the operation mode step control. The following operation modes are distinguished: 1. Pressure (1) The controller switches to the next recipe step when the pressure times (Ramp time pressure, Hold time pressure) have elapsed for the current recipe step. 2. Temperature (2) The controller switches to the next recipe step when the temperature times (ramp time temperature, hold time temperature) for the current recipe step have elapsed. 3. Pressure + temperature (3) The controller switches to the next recipe step when the pressure and temperature times for the current recipe step have elapsed.
Start temperature	Information on the temperature at which the pressing operation is started.
Start pressure	Information on the pressure to which the press is closed after expiry of the „evacuating time“. The recipe will be started when the parameter "start pressure" is reached.
Vacuum reached	Information on the vacuum pressure at which the „evacuating time“ is started.

Table 1-7 General recipe data: Explanation of displayed parameters

Display	Explanation
Evacuating time	The time during which the vacuum chamber is still evacuated after the „vacuum reached at“ limit has been reached. After expiry of the „evacuating time“, the press is closed until the „start pressure“ is reached.
Pressing options	Information on the press options. The following press options are possible: • no press option (0) • with vacuum (1) • with product measurement (2) • with product measurement and vacuum (3) • with cold press (4) • with vacuum and cold press (5) • with product measurement and cold press (6) • with vacuum, product measurement and cold press (7) Meanings of the pressing options: • *Vacuum* The press process is run with a vacuum. • *Product measurement* The press process is run with product temperature measurement (product sensor FeCuNi type J). • *Cold press* Information for the control system: The press books should be cooled down in a cold press after the pressing procedure in the hot press.
Product step switching yes / no	Information on whether the pressing procedure is run with or without product step switching. When product step switching is activated, the control system switches to the next recipe step when the specified product temperature of the current recipe step has been reached. *Requirements for product step switching:* • Product sensors have been inserted into the press books and are connected to the connection terminals in the vacuum chamber. • „With product measurement“ pressing option has been selected. • „Product step switching“ is activated. • „Set value product temperature“ is entered in the recipe.

Table 1-7 General recipe data: Explanation of displayed parameters (continued)

Step 1 ... section 10

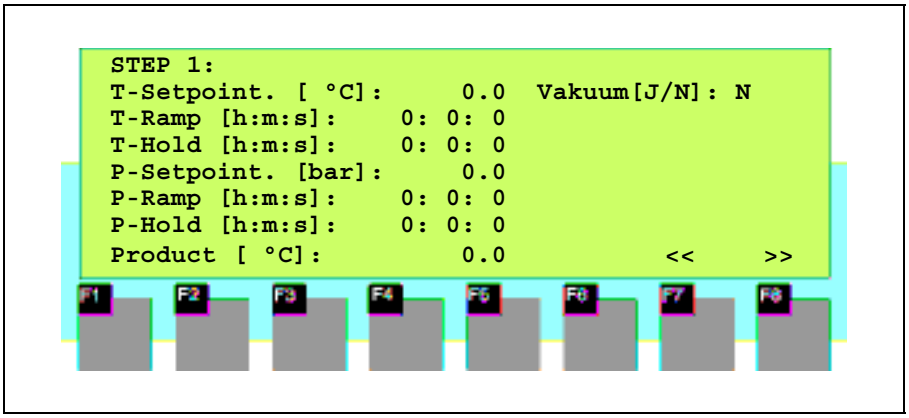


Figure 1-13 Step 1: Example display

Maximum possible duration of the complete recipe:
8h 59min 59 sec.

Display	Explanation
T-set.	Set value temperature Information on the target temperature for the temperature ramp of the current recipe step.
T-rampe	Ramp time temperature Information on the time up to when „T-set.“ (target temperature) for the current recipe step is to be reached.
T-hold	Hold time temperature Information on the time in which „T-set“ (target temperature) is to be kept constant for the current recipe step.
P-set.	Set value hydraulic pressure Information on the target pressure for the pressure ramp of the current recipe step.
P-ramp	Ramp time hydraulic pressure Information on the time up to when „P-set.“ (target pressure) for the current recipe step is to be reached.

Table 1-8 Step 1: Explanation of displayed parameters

Display	Explanation
P-hold	Hold time hydraulic pressure Information on the time in which „P-set“ (target pressure) is to be kept constant for the current recipe step.
Product	Set value product temperature Information on the product temperature at which switching is to take place in the next recipe step (product step switching only). *Requirements for product step switching:* • Product sensors have been inserted into the press books and are connected to the connection terminals in the vacuum chamber. • „With product measurement“ pressing option has been selected. • „Product step switching“ is activated. • „Set value product temperature“ is entered in the recipe.
Vacuum yes/no	Information as to whether the pressing procedure is to be run without a vacuum as from the current recipe step.

Table 1-8 Step 1: Explanation of displayed parameters (continued)

1.5.7 Recipe edit

Overview

You modify the current recipe in the PLC control in the `recipe edit` screen. It consists of several sections:

- `General recipe data`
  The parameters for start values can be modified in this section of the screen. Start values are basic conditions for starting the pressing procedure / recipe. Here, you also modify the selected operation mode and the press options (see Chapter 1.2.6).
- `Step 1 ... 10`
  In the other sections, the parameters for step values can be modified for recipe steps 1 to 10 (see Chapter 1.2.6).

The course of the pressing procedure can be defined in a maximum of 10 steps by way of the operating terminal (19 steps are possible via the PC control!).

Modifying a recipe

The `Recipe edit` screen can only be called up if the machine is in the emergency mode („emergency mode“ key switch on the control panel set to „I“)!

➢ Use the „softkeys“ to branch to the `Recipe edit screen`.
The current recipe in the PLC control is displayed.

The `Recipe edit` screen is identical in structure and content to the `Recipe information screen`. This is why the parameters contained in this screen are not explained any further here (see Chapter 1.5.6).

Refer to Chapter 1.5.5 for a description of how to enter or modify values, and what you have to pay attention to.

On the operating terminal, only ever the current recipe in the PLC control can be modified. The changes made in the recipe have a direct effect on the PLC control (the recipe is not transferred!).

Changes made in the recipe on the operating terminal only take effect in the PLC control and cannot be stored. Management of recipes is only possible with the PC control (see process visualisation operating manual).

1.5.8 Failure messages

Overview In the `Failure messages` screen, you call up or delete the failure message buffer.

Messages Messages in the display inform you about events and statuses in the control process. The following types of messages are distinguished:

- *Failure messages*
  Failure messages inform you about sequence or status faults. Owing to their urgency, failure messages must be acknowledged by pressing the „acknowledgement key“ (ACK) (see Chapter 7.1). Failure messages that have not been acknowledged flash on the display. The LED of ACK (symbol ) at the right next to the function keys also starts blinking.
- *System messages*
  System messages indicate internal operational conditions of the operating terminal. For example, they draw attention to operating errors or communication disturbances. System messages have the highest display priority. If a corresponding fault occurs, the currently displayed operating or failure message disappears and a system message is displayed instead.
  System messages are distinguished according to severe and non-severe system messages:
  - A severe system message is based on a fault that can only be remedied by restarting the operating terminal.
  - The non-severe system message refers to incorrect operation of the operating terminal. Display of these system messages can be cancelled by pressing the Escape key (ESC).

Display of messages

On the operating terminal, messages are always displayed at the signal level and according to display priorities and message priorities.

In any case, system messages have the highest priority, while unacknowledged failure messages always have the second highest.

The display level is terminated automatically as soon as a system or a failure message appears. The operating terminal then switches to the signal level to display such a message. This cannot be terminated for as long as a system message or an unacknowledged failure message is displayed (see also Chapter 1.5.3).

Viewing the number of messages in the failure message buffer

➢ Use the "softkeys" to branch to the `Failure messages ⇨ No. of failure messages` screen.

The sum of all failure messages in the buffer and the number of still pending messages are displayed.

Display of the first/last failure message

On the operating terminal, you can modify the setting defining whether the oldest (first) or the latest (last) failure message is to be displayed if there are several failure messages pending:

1. Use the softkeys to branch to the `Failure messages ⇨ change first/last failure` screen.
   The screen for setting the message type appears on the display.
   The cursor is positioned on the field for selection of the message type.
2. Press the SHIFT key in the selection field.
   The LED of SHIFT at the right next to the function keys comes on.
   The selection list containing possible message types is activated.
3. Use the cursor keys to select the required message type.
   The input field flashes.
4. Confirm your selection by pressing the ENTER key.
   The message type is accepted.
   The input field stops flashing.
5. Close the display by pressing the Escape key (ESC).

Viewing the failure message buffer

The control system stores the failure messages displayed on the operating terminal in a failure message buffer. The messages available in the buffer can be displayed:

➢ Use the "softkeys" to branch to the `alarms/failures ⇨ show failure buffer` screen.

The messages contained in the message buffer are displayed (failure message list):

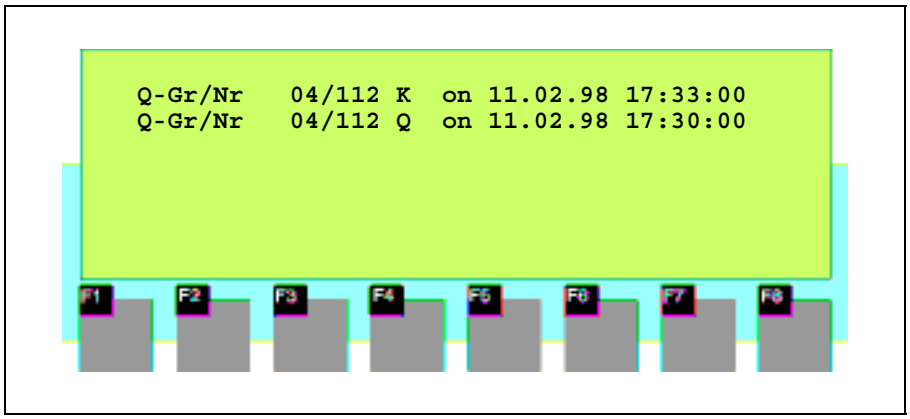


Figure 1-14 **Failure message buffer: Example display**

Message portion	Explanation
Q-Gr/Nr	Information on the reference of the next field: Acknowledgement group and failure message number.
04/112	The displayed failure message belongs to acknowledgement group 04, and the failure message number is 112.
K	Message has arrived.
Q	Message has been acknowledged.
G	Message has gone.
on date time	Date and time of arrival acknowledgement/disappearance of the failure message.

Table 1-9 **Failure message buffer: Explanation of displayed abbreviations**

With the cursor keys you can scroll in the existing messages and you can view the text belonging to the marked message:


Scroll in the failure message list.


Displays the text belonging to the marked failure message.


Returns you to the failure message list.

Clearing the failure message buffer

Failure messages are stored automatically in the failure message buffer. The failure message buffer is capable of retaining up to 256 events. To avoid a buffer overflow, *all* (not single!) acknowledged and disappeared failure messages can be deleted:

1. Use the "softkeys" to branch to the `alarms/failures ⇨ Clear failure buffer` screen.
   The screen for clearing the failure message buffer appears on the display.
   The cursor is positioned on the field for confirming deletion..
2. Confirm deletion by pressing the ENTER key.
   All acknowledged and disappeared failure messages in the failure message buffer are deleted.
3. Close the screen by pressing the Escape key (ESC).

Automatic deletion of the failure message buffer in the event of overflow

An overflow warning appears on the display if the failure message buffer reaches a certain remaining buffer size.

If the failure message buffer is no longer capable of accepting new messages, first acknowledged and disappeared failure messages are deleted until a certain remaining buffer size is reached.

If the remaining buffer size is also not freed up as the result of this, further messages are deleted in the following order:

- Acknowledged failure messages that have not yet gone.
- Unacknowledged failure messages that have already gone.
- Unacknowledged failure messages that have not gone.

1.5.9 Actual values

Overview The `Actual values` display shows you the current values of the pressing procedure. It contains general data pertaining to the pressing procedure as well as data concerning the current recipe step.

The set values in the `Actual values` screen correspond to the values in the `Recipe information` screen. This is why the parameters contained in this screen are not explained any further here (see Chapter 1.5.6).

1.5.10 Press status

Overview The `Press status` display shows you the current status of the hydraulics, vacuum, heating and the press in the pressing procedure as well as the selected operation mode pressing option (see Chapter 1.2.6).

1.5.11 Contrast / language

Overview

In the `Contrast/language` display you modify the contrast of the display and you can change over the language. A change in the language affects all messages, displays and information texts.

Setting the display contrast

1. Use the softkeys to branch to the `Contrast/language` display.
   The screen for setting the contrast and language appears on the display.
   The cursor is positioned on the field for input of the contrast.
2. Press the SHIFT key.
   The LED of SHIFT at the right next to the function keys comes on.
   The selection list containing contrast values available for selection is activated.
3. Use the cursor keys to select the required contrast (1 for the lowest, 16 for the highest contrast).
   The display can be read easiest at contrast values between 6 and 8.
   The input field flashes.
4. Confirm your input by pressing the ENTER key.

You can no longer see anything on the display?

The display contrast is set too high.

➢ Press the SHIFT key and then alter the contrast with the „+/- key“ until you are able to recognise something.

5. Close the screen by pressing the Escape key (ESC).

You can also set the contrast directly by means of the "system keyboard“. To do this, press the SHIFT key and then set the contrast to the required value with the „+/- key“. The contrast changes as long as you press the „+/- key“.

Setting the language

On the operating terminal, up to three languages can be loaded simultaneously and can be offered for selection:

1. Use the softkeys to branch to the `Contrast/language` display.
   The screen for setting the contrast and language appears on the display.
   The cursor is positioned on the field for input of the contrast.
2. Use the cursor keys to select the language selection field.
3. Press the SHIFT key.
   The LED of SHIFT at the right next to the function keys comes on.
   The selection list containing languages available for selection is activated.
4. Use the cursor keys to select the required language.
   The input field flashes.
5. Confirm your selection by pressing the ENTER key.
   The operating terminal restarts and displays all language-dependent texts in the new language.

1.5.12 Password handling

Overview

In the `Passwort handling` screen, you assign the passwords for the various password levels and you log on and off from the operating terminal.

Password protection

To prevent unauthorised operation of the machine, calling up certain functions on the operating terminal is protected by passwords and password levels.

If password protection is set up, you must log in and log out on the operating terminal.

Password levels and access privileges

When a password is assigned to a user, the privilege permitting execution of functions belonging to a certain password level is assigned at the same time.

Depending on the password level, a distinction is made between the following user groups:

- Password level 0:
  No password, operator access.
- Password level 9:
  Machine administrator password, access to the password-protect displays.

Password and password level modification

1. Use the "softkeys" to branch to the `Password handling ⇨ password edit` screen.
   The password list appears on the display.
   The cursor is positioned on the first field of the password input area.
2. Use the "system keys" to enter a new password or overwrite the old one with the new one. The password must be at least 3 and no more than 8 characters long. Leading zeroes are not permitted in the password.
3. Confirm your input by pressing the ENTER key.
4. Use the cursor keys to position the cursor in the password level field.
5. Use the digit keys to enter a new password level or overwrite the old password level with the new one.
6. Confirm your input by pressing the ENTER key.
7. Close the screen by pressing the Escape key (ESC).

To delete a password, overwrite the first character with a zero. The password for password level 9 can be modified, but it cannot be deleted.

Logging in on the operating terminal

1. Use the "softkeys" to branch to the `Password handling` ⇨ `Login` screen.
   The screen for password input appears on the display.
   The cursor is positioned on the first field of the password input area. The digit to the right of the input field indicates the current passcode level.

The screen for input of the password also appears if you call up a function for which the current password level is too low (automatic prompt to enter the password).

2. Use the "system keyboard" to enter the password.
   After input of each character, the cursor automatic jumps to the next field. Each entered character is represented by an asterisk (*) in the input area.
3. Confirm your input by pressing the ENTER key.
   If the password is valid, the corresponding password level is displayed after the password input area.
4. Close the screen by pressing the Escape key (ESC).
   You are switched to the previously set password level.

Logging out of the operating terminal

➢ Use the "softkeys" to branch to the `Password handling` ⇨ `Logout` screen.
The operating terminal switches from the current password level to the lowest password level and branches to the signal level.

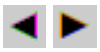
Prevent unauthorised operation of the machine by logging out after every session as described above.

1.5.13 Date / time

Overview

In the `date/time` screen you set the current date and time, in order to switch over the summer/winter time, for example. Changes affect all messages and screens on where the date / time are displayed.

Setting the date

1. Use the "softkeys" to branch to the `date/time` screen.
   The screen for setting the date and time appears on the display.
   The cursor is positioned on the field for input of the day of the week.
2. Set the required day of the week. To do this, press the SHIFT key and then set the required day of the week with the cursor keys:
    Next day of the week.
    Previous day of the week.
3. Confirm your selection by pressing the ENTER key.
4. Switch to input of the date. To do this, pres the SHIFT key and then jump to the left and right in the date field with the cursor keys:
    The cursor moves to the date input field and back.
5. Press the SHIFT key to turn off the second functions of keys with double assignments.
   The LED of SHIFT at the right next to the function keys goes off.
6. Enter the date with the digit keys.
7. Confirm your input by pressing the ENTER key.
8. Close the screen by pressing the Escape key (ESC).

Setting the time

1. Use the "softkeys" to branch to the `date/time` screen.
   The screen for setting the date and time appears on the display.
   The cursor is positioned on the field for input of the day of the week.
2. Use the cursor keys to switch between the date and time.
   
   The cursor moves to the time input field and back.
3. Enter the time with the digit keys.
4. Confirm your input by pressing the ENTER key.
5. Close the screen by pressing the Escape key (ESC).

1.6 Technical data

1.6.1 Hot press

Overview The following table contains an excerpt from the technical data for the standard sizes of the machine.

The complete technical data of the machine can be found in the assembly drawing (refer to the corresponding section of the technical documentation).

Model		LAMV 100	LAMV 150	LAMV 200	LAMVS 500
Pressing force range	kN	40 - 1000	60 - 1500	70 - 2000	100 - 5000
Operating pressure	bar	10 - 252	10 - 244	10 - 283	10 - 254
Piston diameter	mm	225	280	300	500
Heating plate dimensions W x L	mm	750 x 600	750 x 850	750 x 1050	1200 x 1350
Useful surface W x L	mm	700 x 550	700 x 800	700 x 1000	1150 x 1300
Specific pressure on the useful surface	N/cm²	260	268	272	308
Number of openings		4, 6, 8	4, 6, 8	4, 6, 8	6, 8, 10
Space between openings	mm	75	75	75	100
Distance between openings	mm	110	110	110	140
Heating medium		Thermal oil	Thermal oil	Thermal oil	Thermal oil
Operating temperature	max. °C	250	250	250	250
Heating up rate (empty press)	°C/min.	8	8	8	8
Heating up rate (with material)	°C/min.	6	6	6	6
Temperature accuracy (during heating up)	max. °C	15	15	15	15
Temperature accuracy (in hold phase)	max. °C	4	4	4	4
Cooling speed (with material)	°C/min.	6	6	6	6
Evacuating time to 30 mbar	min.	3	3	3	3
Final vacuum pressure (absolute)	mbar	≤ 10	≤ 10	≤ 10	≤ 10
Noise level at the control panel	max. dB(A)	75 +4	75 +4	75 +4	75 +4

Table 1-10 Technical data for standard sizes of the machine

1.6.2 Transport plate

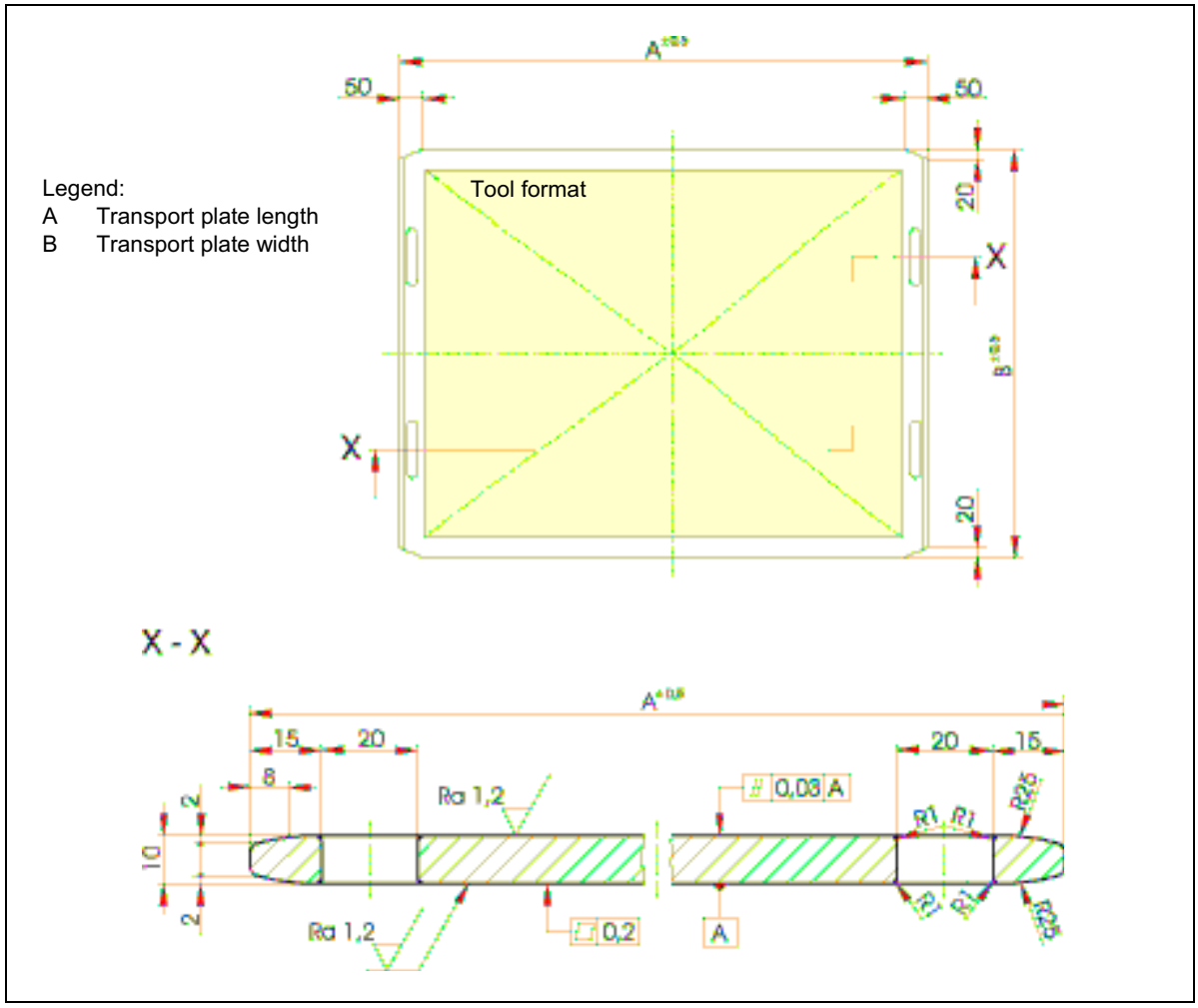


Figure 1-15 **Technical data for the transport plate**

Minimum requirements	Material	42CrMo4; 50CrV4
	Material No.	1.7225; 1.8159
	Hardness	40 ± 2 HRC
	Surface	ground Ra = 1.2
	Flatness	0.2 mm
	Parallelism	≤ 0.03 mm
	Edges chamfered on all sides	1 x 45°

2 SAFETY

In this Chapter

This chapter summarises the most important safety notes.

If the safety instructions are not followed, if the machine is operated incorrectly or if it is misused, this will pose danger and risk to

- the life and safety of personnel,
- the system and other assets of the owner.

All persons who have to do with setting up, commissioning, operation, servicing and maintenance must observe the following safety notes exactly.

They concern your own safety!

Die Sicherheitshinweise sind in allen gängigen Sprachen verfügbar. Falls Sie eine andere Sprachversion benötigen oder Fragen haben, wenden Sie sich bitte an die zuständige Niederlassung/ Vertretung oder direkt an BÜRKLE.

The safety instructions are available in all current languages. If you require another language or have any queries, please contact our representatives or BÜRKLE directly.

Les remarques de sécurité sont disponibles dans toutes les langues courantes. Dans le cas où vous auriez besoin d'une traduction dans une autre langue ou bien où vous auriez des questions, veuillez contacter soit notre agent/ succursale soit BÜRKLE directement.

2.1 Designated use

Designated use

The hot press may only be used to press multilayers in tools under a temperature, a pressure and a vacuum.

The machine is only intended and designed for the tool that is described in the order confirmation. The maximum dimensions and weights of tools must not be exceeded.

Misuse

For your safety, it is imperative that you observe the following points:

- For safety reasons, unauthorised conversions and changes to the machine and to programmable control systems (software) are forbidden! When replacing defective parts, only ever use original spare parts or standard parts approved by BÜRKLE.
- Modifications to the machine and to programmable control systems (software) may only be made by persons authorised by BÜRKLE and only with the express written permission of BÜRKLE.
- The instructions and prescribed operating, service and maintenance conditions detailed in this operating manual must be observed exactly and strictly obeyed.
- Besides the aforementioned stipulations and specifications, the stipulations and accident prevention regulations usual in the country of use must also be observed when handling this machine.

Possible liability claims against BÜRKLE may be rendered null and void if one of the aforementioned prerequisites is not met.

2.2 Hazards from accessories

Forklift trucks and other feed and emptying systems that are used must not render the safety devices of the machine inoperative. The EMERGENCY-STOP switch must remain freely accessible.

2.3 Emissions

Noise The principal noise source of the machine consists of the hydraulic drive and the vacuum pump. During automatic operation, the continuous sound pressure level on the control panel of the machine amounts to a maximum of 75 dB(A) + 4.

Gases and vapors The pressed materials may release harmful gases and vapors during the pressing procedure.

2.4 Danger sources

2.4.1 Hazards during operation

Leakage in the hydraulic system The machine operates hydraulically. The hydraulic oil is subject to a high pressure. It may spray out of defective components. An oil jet may cause cuts. This involves a risk of poisoning! There is also a risk of slipping on leaking hydraulic oil. Therefore:

- Regularly check that the hydraulic system is not leaking.
- Replace hoses at the prescribed intervals.
- Remedy leakages immediately.
- Bind leaking oil.

Leakage in the thermal oil system The machine is heated with thermal oil. The heated thermal oil may spray out of defective components. This poses a risk of burns. There is also a risk of slipping on leaking thermal oil. Therefore:

- Regularly check the thermal oil system for leaks.
- Replace hoses at the prescribed intervals.
- Remedy leakages immediately.
- Bind leaking oil.

Extreme temperatures

Heating plates, tools and thermal oil lines may heat up considerably. This poses the risk of burns! Therefore:

- Insulate thermal oil lines.
- Allow heating plates and tools to cool down before touching them.
- Wear suitable protective clothes.

Gases and vapors

The pressed materials may release harmful gases and vapors during the pressing procedure. Released gases and vapours accumulate directly in the press and on the exhaust air system of the vacuum pump. This involves a risk of poisoning. Therefore:

- Pay attention to the safety information sheets pertaining to the pressed materials.
- Ensure adequate ventilation.

2.4.2 Hazards during service work

General

Maintenance and repair does not constitute working under production conditions. Dismantled safety devices and unintentional starting of machine movements pose a risk of injury. Therefore:

- Shut down the machine during *all* service work (set the main switch to „0“) and secure it against inadvertaent reactivation.
- Organize access privileges to the machine. Define spheres of competence.

Cleaning the machine

Depending on the press materials used, harmful substances may deposit in the press. There is also a risk of burns on the heated heating plates and thermal oil lines. Therefore:

- Avoid direct contact with the substances.
- Wear suitable protective clothes.
- Ensure adequate ventilation.
- Allow heating plates and thermal oil lines to cool down before touching them.
- Dispose of residues from the press in accordance with regulations.

Working on the hydraulic system

Improper tampering with hydraulic systems may cause them to explode and may cause severe accidents. Therefore:

- Only personnel with a special knowledge and experience in hydraulics is permitted to work on hydraulic equipment.
- Depressurize the hydraulic system before working on it. Pay attention to the manufacturer's operating instructions in the case of hydraulic systems with pressure accummulators!

Working on the thermal oil system

Thermal oil lines may heat up to high temperatures. This poses the risk of burns! Therefore:

- Allow thermal oil lines to cool down before touching them.

oil change

Handling oils (hydraulic oil and thermal oil) may cause rashes and other health impairments. Therefore:

- All thermal oil to cool down before carrying an oil change.
- Pay attention to the oil supplier's information sheet.
- Wear suitable protective clothes.
- Avoid prolonged skin contact.
- Wash thoroughly after every contact.
- Dispose of changed oil and oil filters in accordance with regulations.

Oil change on the vacuum pump

Depending on the press materials used, harmful substances may deposit in the oil and filter of the vacuum pump. Therefore:

- Avoid direct contact with oil and filters.
- Wear suitable protective clothes.
- Wash thoroughly after every contact.
- Ensure adequate ventilation.
- Dispose of changed oil and oil filters in accordance with regulations.

Working underneath the press table

A pressure loss in the hydraulic system lowers the machine's press table. Anyone located underneath the press table may suffer severe crushing injury. Therefore:

- Before working underneath the press table, prevent it from moving down by fitting a suitable support.

Working inside the vacuum chamber

If a corresponding size of machine is used, persons working inside the vacuum chamber may get locked in. Anyone who gets locked inside the vacuum chamber may get killed. Therefore:

- Before entering the vacuum chamber, secure the vacuum door and the service door against inadvertent closing.

Working on electrical equipment

Electrical equipment may be live even when the main switch is switched off. This poses a risk of electric shocks from current flowing through parts of the body. Therefore:

- Keep the switch cabinets closed.
- Disconnect live wires from the mains before working on electrical equipment.
- Only a qualified electrician is permitted to work on electrical equipment.

2.5 Workplaces

Single machine

The workstation is located on the PC or on the control panel before the machine. Do not reach or climb into the running machine.

Machine integrated in plant

If the machine is integrated into a multilayer press plant, the workstation depends on the design of the plant. In this case, the workstation is located on the plant's control panel. The control panel on the machine is then only needed for the *manual mode*.

2.6 Personnel requirements

Permitted operators

Only persons who have received appropriate training and instruction are permitted to work on the machine.

Within the work area, the operator is responsible for third parties.

The operator on the machine may not perform any functions or change any values if the operator is not familiar with the machine's reactions.

Responsibilities for the various activities on the machine must be clearly defined and must be obeyed. Unclear areas of competence are a safety risk.

Qualified personnel

Transport, assembly, installation, commissioning and all work on *electrical* and *hydraulic* equipment of the machine and on the thermal oil heating may only be carried out by personnel who are qualified for the work.

These are understood to be persons who have been authorised by the responsible safety officer on the grounds of their training, knowledge and experience and who are able to recognise and avoid possible hazards.

User obligations

The user must make sure

- that only persons who have received appropriate training and instruction carry out the various activities (transport, assembly, commissioning, operation, maintenance and servicing) on the machine. No-one is permitted to work on the machine without the necessary training and instruction, not event briefly.
- that these persons have read and understood the operating manual and that they are aware of the safety regulations.
- that no unauthorised persons work on the machine.
- that regular checks are made to ascertain whether persons entrusted with tasks on the machine are conscious of safety aspects when carrying out their work.

2.7 Personal protective equipment

For operation

- Safety boots protecting against falling objects.

- Firm and heat-resistant protective gloves for protection against hot workpieces.

For cleaning

- Chemical resistance protective gloves to protect against possibly hazardous substances in the press.

For oil changes

- Chemical resistance protective gloves to protect against possibly hazardous substances in the oil.

2.8 Safety measures at the installation location

Support surface

The machine must be placed on a flat and firm floor that is designed for the load. If it falls over, the machine will pose a mortal hazard!

Organizational measures

Corresponding in-house instructions and checks must ensure that the environment of the workplace is always clean and tidy. Apply a coat of warning paint to protruding parts and cable ducts!

Safety fence

The machine must be safeguarded by means of the safety fencing shown in the assembly diagram to prevent access by operating personnel or third parties who have not received instruction. The safety fencing is mandatory for safe use of the machine and must be procured by and fitted by the user.

Fire extinguisher A fire extinguisher must be placed in the location of installation, in an easily accessible position.

Ventilation system Adequate ventilation must be ensured because the pressed materials may release harmful gases and vapors during the pressing procedure.

Thermal oil lines Connecting lines between the thermal oil heating unit and the press must be insulated.

2.9 Permissible ambient conditions

The machine must not be operated in an aggressive and flammable (explosion hazard) environment.

The installation location must be dry and weather-protected. The following ambient conditions must prevail to ensure disturbance-free operation of the machine:

- Temperature from 10°C to 40°C
- Humidity ≤ 80%
- Max. altitude 1000 m above mean sea level

2.10 Safety devices of the machine

2.10.1 Overview of safety devices

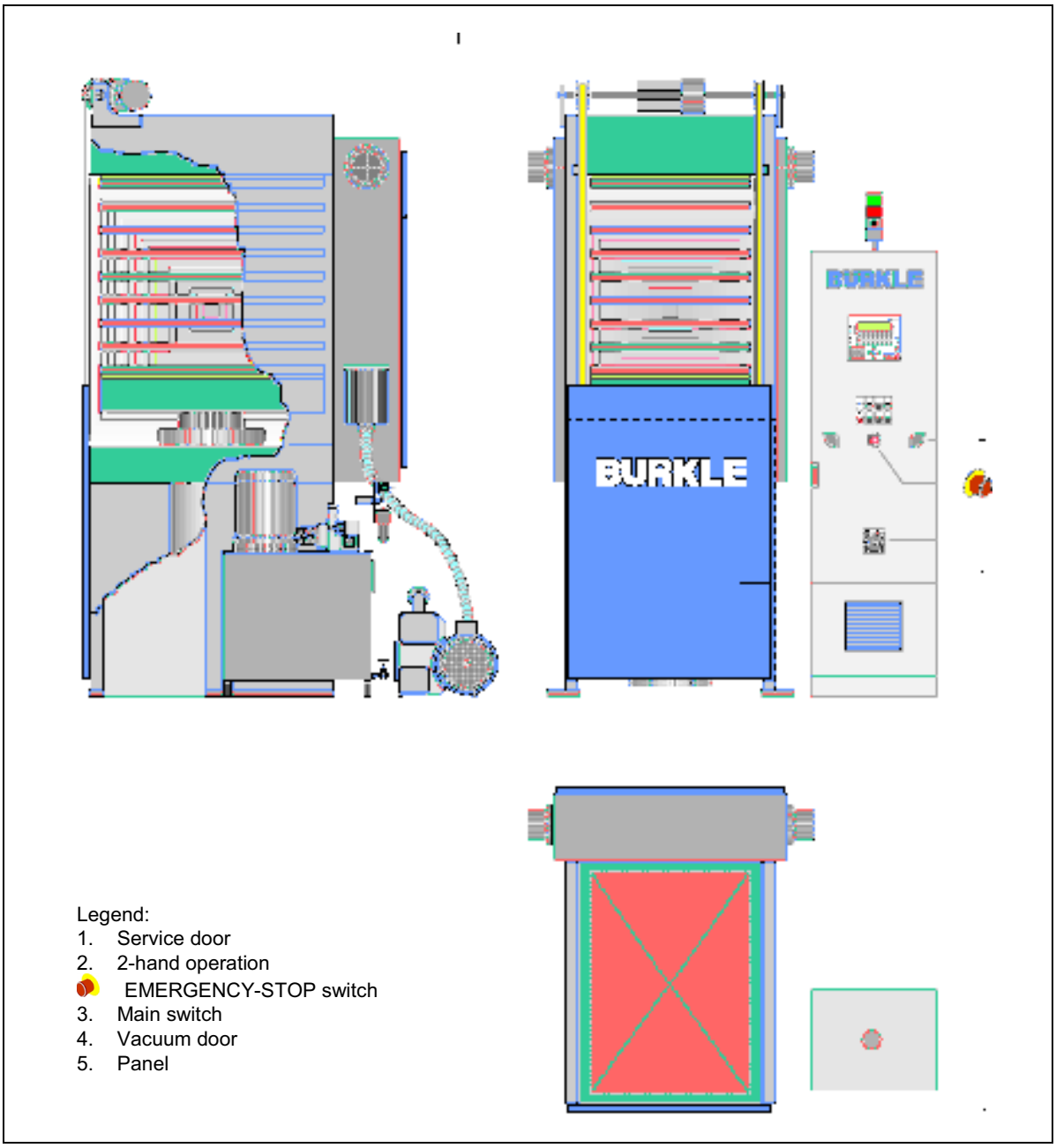


Figure 2-1 **Safety devices of the machine: Overview**

Service door

The service door (1, Figure 2-1) covers the closing motion of the press as well as the non-insulated thermal oil lines in the vacuum chamber.

2-hand operation

During manual operation, 2-hand operation (2, Figure 2-1) prevents access to the closing motion of the press.

EMERGENCY-STOP switch

The EMERGENCY-STOP switch (see Figure 2-1) interrupts all movements of the machine.

➢ Press the EMERGENCY- STOP switch.
The machine is shut down immediately.

Main switch

The main switch (3, Figure 2-1) prevents opening of the switch cabinet when the machine is on.

Vacuum door

The vacuum door (4, Figure 2-1) covers the closing motion of the press in the automatic mode.

Panel

The panel on the face side of the vacuum door (5, Figure 2-1) safeguards opening of the vacuum door.

Switch cabinet

The switch cabinet can only be opened using a special tool. It must be closed during operation.

Warning signs

For the safety of the operating personnel, the following warning signs are attached on the machine:

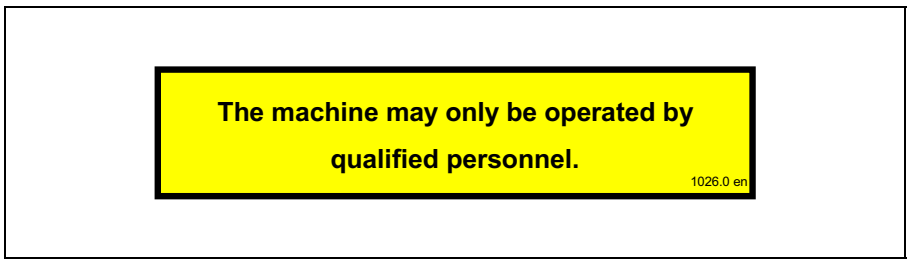


Figure 2-2 Warning sign 1 (on the control panel)

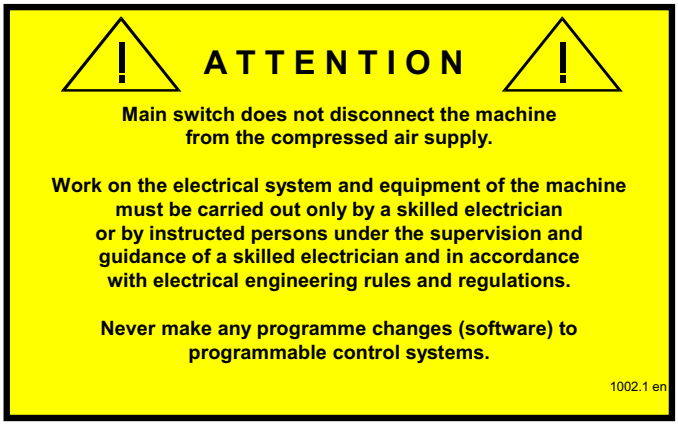


Figure 2-3 **Warning sign 2 (on the main switch)**

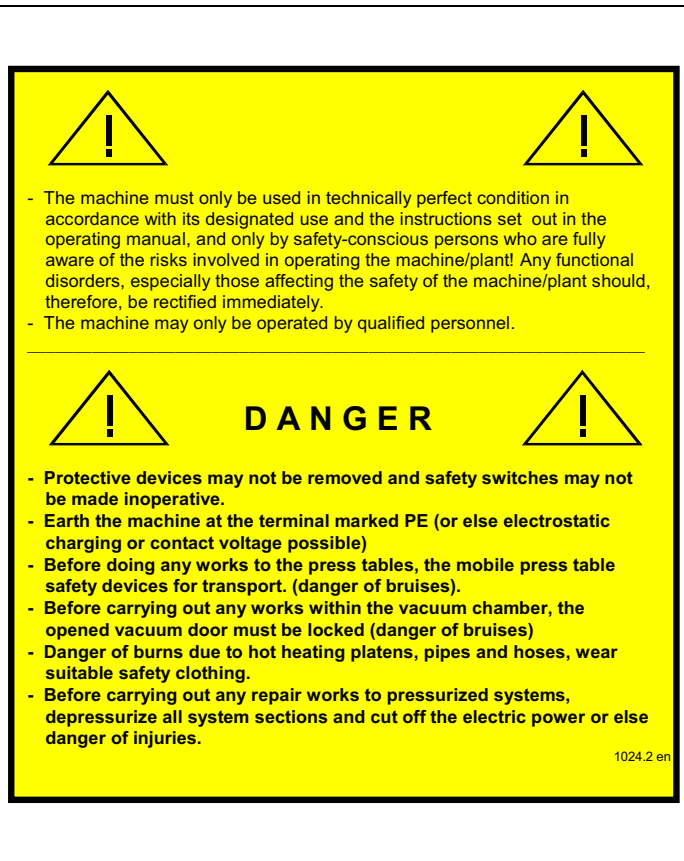


Figure 2-4 **Warning sign 3 (on the switch cabinet)**

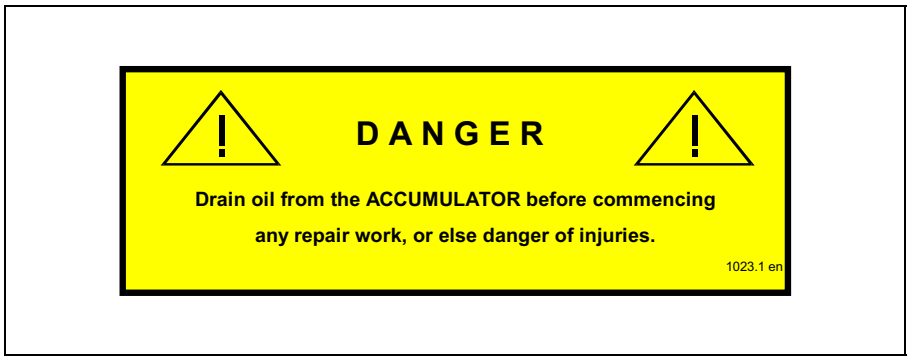


Figure 2-5 **Warning sign 4 (on the hydraulic drive)**

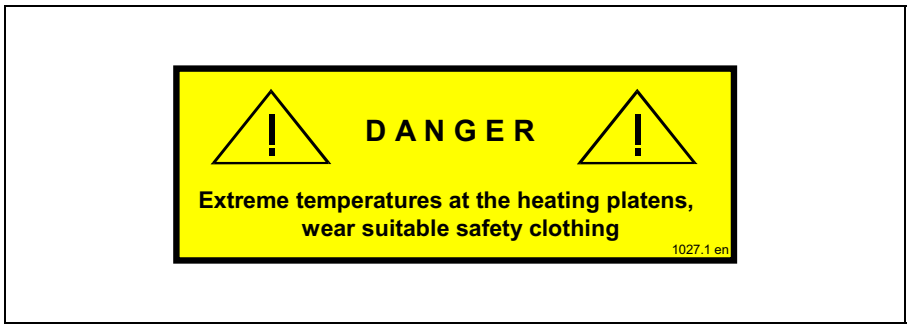


Figure 2-6 **Warning sign 5 (on the vacuum door)**

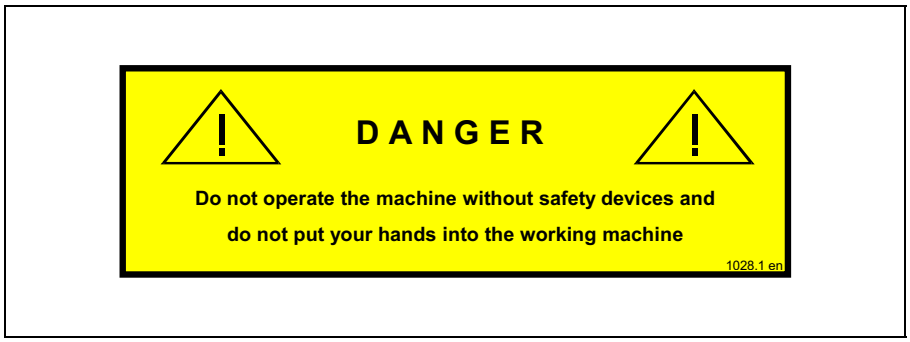


Figure 2-7 **Warning sign 6 (on the vacuum door)**

2.10.2 Check of the safety devices

- Check the protective facilities
  - at the start of each shift (interrupted operation).
  - once per week (continuous operation).
  - after every servicing or repair.
- In doing so, check the following:
  - prescribed condition,
  - prescribed position,
  - firm securing,
  - prescribed function.
- Use the checklist on the following page.

Deficiencies must be remedied before placing the machine into operation.

- Switch off the machine immediately if defects should be encountered during operation.
- Have the deficiency remedied by qualified specialists.
- Do not modify or remove any safety devices! Do not bypass any safety devices by modifications on the machine!
- Follow the warning signs on the machine.
- Check the safety devices for the thermal oil heating (see manufacturer's operating instructions).

Checklist for protective facilities

- ☐ On site safety devices fitted.
- ☐ Connecting lines between the thermal oil heating unit and the press insulated.
- ☐ Service door fitted.
- ☐ Vacuum door fitted.
- ☐ Panel on the face side of the vacuum door fitted. The panel must be fitted in such a way that there is no gap between the panel and the floor.
- ☐ Two-hand operation covers fitted.
- ☐ Warning signs present.
- ☐ Switch cabinet closed.
- ☐ Two-hand operation
  The press or the vacuum door closes or opens only if both 2-hand operation buttons are pressed.
- ☐ EMERGENCY-STOP switch
  All movements of the machine must be stopped if the EMERGENCY-STOP switch is pressed.

Machine type:_____ Machine No.: _____

Date checked: _____ Checked by:_____

2.11 Behaviour in the event of malfunctions

- Immediately switch off the machine in the event of malfunctions and secure it against unauthorised and inadvertent commissioning.

In the „0“ or „OFF“ setting, the main switch can be locked with a padlock to prevent reactivation.

- Also switch off the machine if you discover unusual operating behaviour, e.g.
  - unusual noises, vibrations or odours,
  - increased temperatures,
  - incorrect behaviour and wrong displays.
- Have the deficiency remedied by qualified specialists.

2.12 Behaviour in the event of an emergency

➢ In an emergency, immediately press the EMERGENCY-STOP switch.

3 TRANSPORT, STORAGE, INSTALLATION, CONNECTION

Before you begin

The machine is set up, installed and commissioned by our after-sales service. Operating and maintenance personnel is trained by BÜRKLE service technicians.

Therefore, the information given in this instruction manual on installation and connection of the machine is *not* complete (no step-by-step instructions)!

The machine is not intended for transportation or setting up in other rooms. Please contact BÜRKLE (see annex „How to contact BÜRKLE“) in the event that the machine needs to be transported and operated in new rooms.

3.1 Machine delivery

Overview

The machine is delivered in several parts.

- Press
- Hydraulic unit
- Vacuum pump
- Switch cabinet
- Thermal oil heating unit (option)

Checking delivery

1. Remove the transportation packaging from the individual machine and accessory components.
2. Examine the machine and accessory components for transportation damage.
3. Check the completeness of the delivery with reference to the delivery note.

What to do if you discover damage

1. Report transportation damage in good time to the haulage contractor.
2. Contact us or your transportation insurance company immediately.
3. Protect the machine and accessories against further damage.

3.2 Transporting the machine

Transporting the machine

You need a crane to transport the machine.

Determine the minimum crane load-bearing capacity by referring to the assembly diagram of the machine (refer to the corresponding section in the technical documentation).

DANGER

The machine may swivel out and drop during transportation!

Causes severe injuries and can kill you!

- ➢ Only ever use suitable, undamaged transportation methods, lifting appliances and hoisting gear with an adequate load-carrying capacity.
- ➢ Ensure an unobstructed transport route.
- ➢ Avoid jolting movements during transport.
- ➢ Never walk under the suspended load.

Depending on the size of the machine, the press must be transported upright or horizontally.

- ➢ For transportation, use suitable hoisting gear (e.g. a sling chain) to carry the machine as detailed in Figure 3-1 or Figure 3-2.

A specialist who is familiar with the peculiarities of the plant and the applicable regulations should be consulted if it is not possible to transport the machine to its place of installation by means of a crane.

BÜRKLE will be pleased to help you in such cases (see annex "How to contact BÜRKLE").

Upright transport

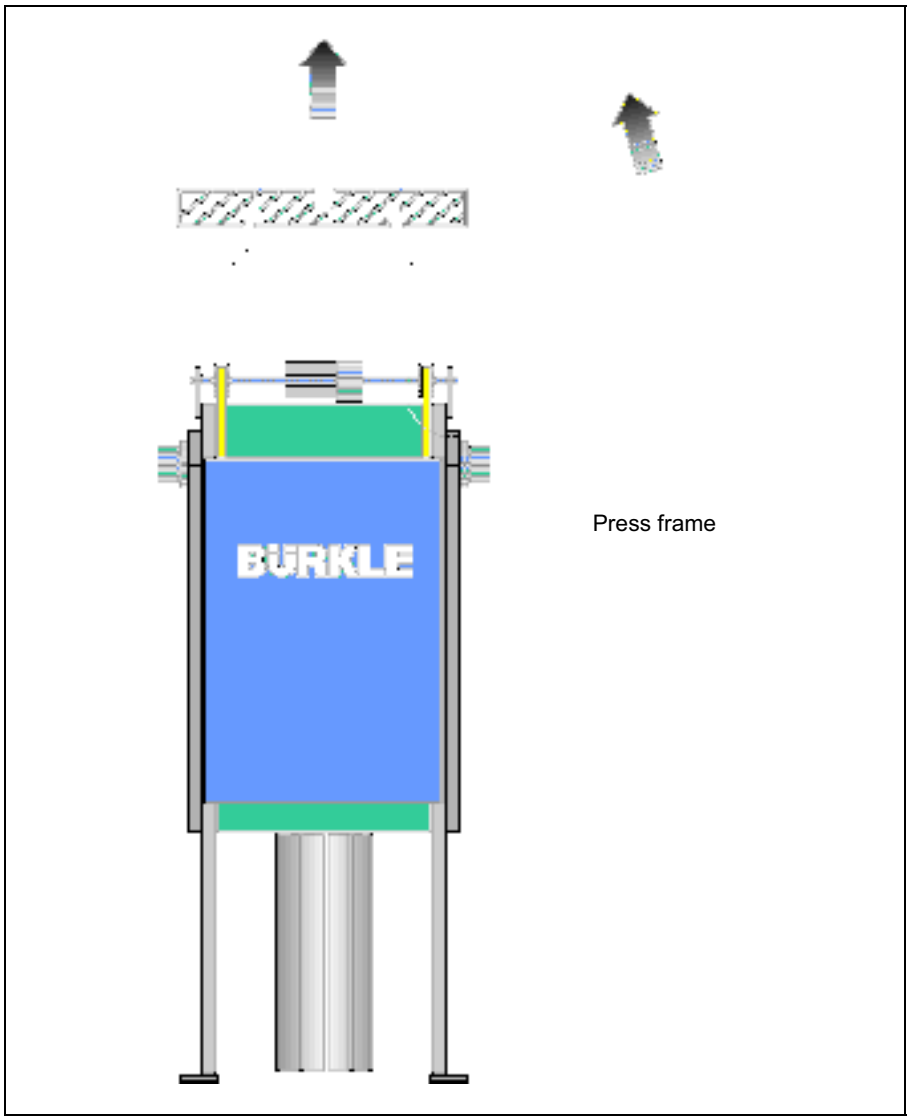


Figure 3-1 **Upright transport of the machine**

Horizontal transport

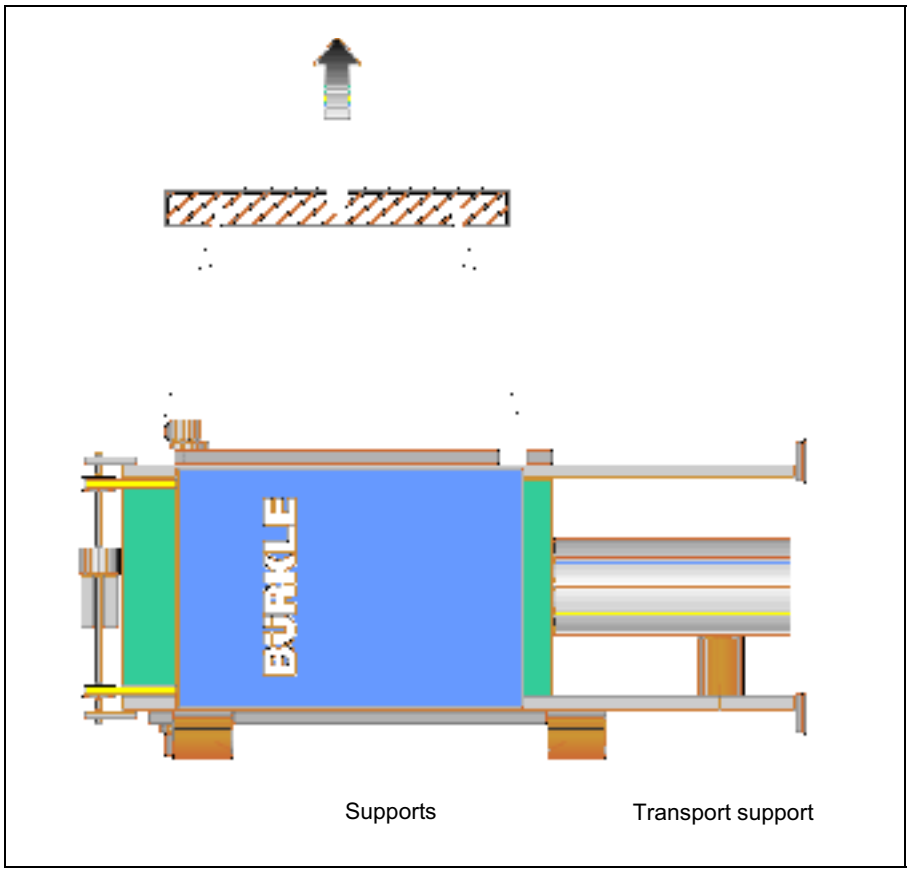


Figure 3-2 **Horizontal transport of the machine**

DANGER

The machine may swivel out while it is being set up!

Causes severe injuries and can kill you!

➢ Only ever set up the machine in the presence of BÜRKLE personnel.

3.3 Intermediate storage of the machine

Overview

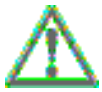
The aim of intermediate storage is to keep the machine in a perfect condition.

Depending on the location and duration of intermediate storage, measures may have to be taken to protect the machine against external influences.

Required measures

Measures required for

- a brief storage period; storage in heated rooms (approx. 20 °C) with only slight temperature fluctuations.
  - Preserve all bare metal parts with preserving oil.
  - Cover the machine properly to prevent dust ingress.
- storage for a longer period; storage in unheated rooms or in the open air down to max. -20 °C.
  - Drain the oil out of the hydraulic drive.
  - Drain the oil out of the vacuum pump.
  - Preserve all bare metal parts with high-resistance preserving agent.
  - Place the machine on a timber foundation.
  - Weld-seal the machine and accessory components in polyester film after adding desiccant.



NOTE

Incorrect storage will lead to damage to electrical components!

➢ Do not store the switch cabinet with control panel outdoors, not even in its packed state.

3.4 Setting up the machine

The machine is set up by BÜRKLE after-sales service.

Setting up the machine

The assembly diagram is decisive as regards installation of the machine (refer to the corresponding section of the technical documentation).

- Please note the building regulations applicable to stability of load bearing structures.
- Make sure that the flooring is adequate for the load produced by the machine.
- Remember to provide adequate clearance for operation and maintenance of the machine.

At the place of installation, precisely horizontally align and secure the machine. Reference surfaces are the press table and the piston of the hydraulic cylinder.

3.5 Connecting the machine

The machine is installed by BÜRKLE after-sales service.

3.5.1 Connecting the hydraulic drive

The hydraulic drive is prepared for connection at the works. The lines and hoses that are needed for connection are included in the scope of delivery.


DANGER

Improper tampering in hydraulic systems!

Hydraulic systems can explode and cause severe accidents!

- Only personnel with a special knowledge and experience in hydraulics is permitted to work on hydraulic equipment.

- Establish the connections between the machine and the hydraulic unit as detailed in the hydraulic diagram (refer to the corresponding section of the technical documentation).

3.5.2 Connecting the vacuum pump

The vacuum pump is prepared for connection at the works. The hoses that are needed for connection are included in the scope of delivery.

- Establish the connections between the machine and the vacuum pump as detailed in the hydraulic diagram (refer to the corresponding section of the technical documentation). Pay attention to the information given in the manufacturer's operating instructions for the vacuum pump.


The manufacturer's operating instructions for the vacuum pump can be found in the corresponding section of the technical documentation.

3.5.3 Electrical connection

DANGER

Electric voltage!

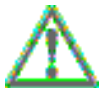
Causes severe injuries and can kill you!

➢ Electrical connection work must be done by a qualified electrician and, in doing so, the VDE and local regulations and in particular the safety measures must be observed.

Connection ratings

On the machine's switch cabinet there is a rating plate that shows the technical data for determination of the main fuse and of the conductor cross-section to be laid.

The conductor cross-section must be selected depending on cable length and fusing.



NOTE

An incorrect mains voltage will cause damage to electrical components.

➢ The mains voltage must correspond to the operating voltage specified on the rating plate. If your electrical mains has a different rating, do not connect the machine's electrical system to the mains.

Connection to the network (elec.)

1. Disconnect live cables from the mains.
2. Establish the machine's electrical connections as detailed in the electric circuit diagrams (refer to the corresponding section of the technical documentation).
   In the case of plug-in cable connections, pay attention to identical markings on the plugs and contact sockets!
3. Earth the machine.
4. Establish the connections between the switch cabinet of the machine and the mains (clockwise rotating field).

Telephone connection for modem (option)

➢ Establish the telephone connection for the modem as specified in the manufacturer's operating instructions.

The manufacturer's operating instructions for the modem can be found on the corresponding section of the technical documentation.

3.5.4 Connecting the thermal oil heating unit

Overview

The thermal oil heating unit is prepared for connection at the works. The following connections must be esablished by a user:

- Connecting line between the thermal oil heating unit and the press.
- Insulation of the connecting line.
- Cooling water connection.

DANGER

Incorrect design of connecting cables!

Connection cables for heating systems may explode. This may results in burns and other severe injuries!

➢ The connection cables must be connected by correspondingly trained personnel.

➢ Pay attention to the applicable regulations and standards (e.g. in Germany: DIN 4754 and VDI 3033).

➢ Pay attention to the information given in the manufacturer's operating instructions for the thermal oil heating unit.

The manufacturer's operating instructions for the thermal oil heating unit can be found in the corresponding section of the technical documentation.

4 COMMISSIONING

Before you begin

The machine is set up, installed and commissioned by our after-sales service. Operating and maintenance personnel is trained by BÜRKLE service technicians.

Therefore, the information given in this instruction manual on installation and connection of the machine is *not* complete (no step-by-step instructions)!

The machine is not intended for transportation or setting up in other rooms. Please contact BÜRKLE (see annex „How to contact BÜRKLE“) in the event that the machine needs to be transported and operated in new rooms.

4.1 Requirements for commissioning

The machine has been set up and connected properly as detailed in Chapter 3.

The machine should have enough time to adapt the actual ambient temperature.

An acclimatization period of at least 24 hours is recommended.

4.2 Preparations

1. Check all screwed and plug-in connections - both electrical and also mechanical (e.g. hydraulic lines etc.) - for secure attachment and retighten connections if necessary.
2. Remove preservative from all bare parts of the machine.

4.3 Pouring in hydraulic oil

Amount (quantity) of oil

You require hydraulic oil in conformity with DIN 51524 Part 2 HLP46 (see Chapter 6.3).for a selection of permissible types.

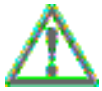
Allternative hydraulic fluids must not be used without out express written approval - warranty! For details of the oil filling quantity, please refer to the assembly diagram (refer to the corresponding section of the technical documentation).

Further general instructions

Protect the environment!

Handling and disposal of mineral oils are subject to legal regulations.

- Do not spill any hydraulic oil.
- Take precautions for collecting spilt oil (lay out oil type tarpaulins or set up a collecting basin.)



NOTE

Impurities in the oil may lead to malfunctions on the hydraulic drive!

- ➢ Leave hydraulic oil barrels to settle for a prolonged period of time before removing oil. Do not roll them to the tapping point.
- ➢ Clean screw glands of hydraulic oil barrels, oil filling caps and their surroundings before opening them.
- ➢ Never leave hydraulic oil barrels open for longer than necessary.
- ➢ Never remove the metal strainer from the filler opening of the hydraulic drive when pouring in oil.

CAUTION

Hydraulic oil!

Can cause rashes and other health impairments.

- ➢ Avoid prolonged skin contact.
- ➢ Wash thoroughly after every contact.

Pouring in oil

1. Turn the oil filling cap with ventilation filter on the hydraulic drive to the left.
2. Pour in oil up to the *minimum* marking of the oil level indicator.

Do not overfill the oil tank. Oil additionally passes from the hydraulic cylinder to the oil tank as soon as you open the press!

3. Reinsert the oil filler lid with aeration filter and turn it to the right.

After *commissioning*:

1. Check the oil level with the press open. If necessary, pour in oil up to the *maximum* marking of the oil level indicator.
2. Vent the hydraulic system as described in Chapter 6.1.7.

4.4 Pouring oil into the vacuum pump

Overview

You need „ANDEROL 555“ synthetic oil (see Chapter 6.3 for details of the order No.).

Alternative oils must not be used without out express written approval - warranty!

Refer to the manufacturer’s operating instructions for the vacuum pump for details of the oil filling (refer to the corresponding section of the technical documentation).

4.5 Commissioning the thermal oil heating unit

Overview

The following activities must be carried out when commissioning the thermal oil heating unit:

- Pour in thermal oil.
- Vent the thermal oil heating unit.
- Clean the filter of the dirt trap.
- Heat up the thermal oil heating unit slowly:
  Remove water or easily boiling components from the thermal oil ("boil out" the thermal oil).

Refer to the manufacturer's operating instructions for the thermal oil heating unit for further information about the activities listed above (refer to the corresponding section of the technical documentation).

4.6 Removing transport safety devices

Removing the vacuum door safeguard

For transport, the machine's vacuum door is fixed with 4 screws.

WARNING

The vacuum door may drop!

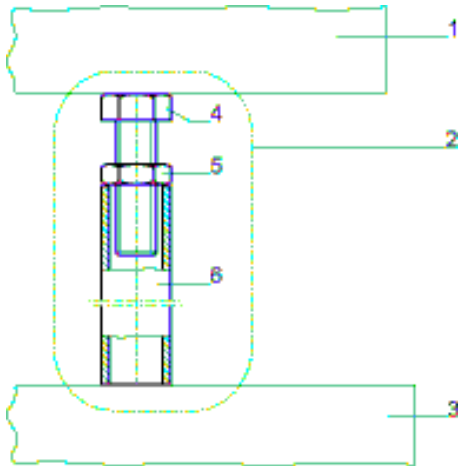
Causes crushing and bone fractures.

➢ Do not remove the screws safeguarding the vacuum door until it has been secured to prevent downward movement.

1. Safeguard the vacuum door with suitable spacers (e.g. wooden beams) to prevent downward movement.
2. Check that the door drive has been assembled properly (motor, shaft, belts etc.).
3. Remove the screws on the vacuum door.

Removing the support press table

For transport, the machine's press table is fixed with 4 - 6 supports (see Figure 4-1). If the machine has been transported horizontally, the press table is additionally safeguarded with lateral supports.



Legend:
1. Press table
2. Transport safety device
3. Press frame
4. Adjusting screw
5. Counter nut
6. Support

Figure 4-1 Support press table

NOTE

Operation of the pumps belonging to the hydraulic drive without oil will destroy the pumps!

➢ Pour oil into the hydraulic drive before you activate it.

1. Remove the lateral supports at the press table (there are only supports if the machine has been transported horizontally).
2. Switch on the machine's power supply (set the main switch on the switch cabinet to „I“ or „ON“).
3. Switch on the power supply of the PLC control (press the **CONTROL VOLTAGE ON** pushbutton on the control panel).
   The initial screen of the operating terminal appears.
   The machine is in the manual mode.
4. Switch the machine to the emergency mode (set the **EMERGENCY MODE** key-operated switch on the control panel to "I").
5. Press the function key **K10** („Selection press closing") on the operating terminal.
   The LED in the key lights up.

6. Briefly actuate the two-hand operation facility on the control panel.
   The hydraulic cylinder of the press is filled with oil.
7. Switch off the machine's power supply (set the main switch on the switch cabinet to „0“ or „OFF“).


WARNING

Press table lowering!

Causes crushing and bone fractures.

➢ Do not remove the transport safety device underneath the press table until it has been secured to prevent downward movement.

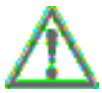
8. Safeguard the press table with suitable spacers (e.g. wooden beams) to prevent downward movement.
9. Undo the counter-nut (5, Figure 4-1), until the support (6) can be taken out.

4.7 Checking the direction of rotation of motors

Overview

Motor-driven functions of the machine are:

- Opening/closing the vacuum door
- Closing the press
- Evacuating the vacuum chamber (vacuum pump on)


NOTE

Operation of the pumps belonging to the hydraulic drive and the vacuum pump without oil will destroy the pumps!

➢ Pour oil into the hydraulic drive and the vacuum pump before you activate them.

Switching on motors

1. Switch on the machine's power supply (set the main switch on the switch cabinet to „I“ or „ON“).
2. Switch on the power supply of the PLC control (press the **CONTROL VOLTAGE ON** pushbutton on the control panel).
   The initial screen of the operating terminal appears.
   The machine is in the manual mode.

3. Switch the machine to the emergency mode (set the **EMERGENCY MODE** key-operated switch on the control panel to "I").
4. Briefly switch the individual motors of the machine *on* and *off again* with the pushbuttons and the two-hand operation facility.

The function keys K1 - K16 of the operating terminal are described in Chapter 1.5.1.

5. At the same you or a second person must observe the reactions of the machine.

Does the machine react according to the keyboard assignments?

Direction of rotation of the motors is in order.

➢ Switch off the machine correctly as detailed in Chapter 5.7.

Does the machine *not* react according to the keyboard assignments?

Under no circumstances may the machine be operated in this case!

1. Switch off the machine's power supply immediately (set the main switch on the switch cabinet to „0“ or „OFF“).

DANGER

Electric voltage!

Causes severe injuries and can kill you!

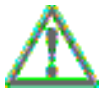
➢ Work on electrical equipment must be carried out by a qualified electrician, paying attention to the VDE and local regulations, in particular the safety measures.

2. Disconnect live cables from the mains.
3. Correct the electrical connection.
4. Check the direction of rotation of the motors again (as described above).

4.8 Heating up the press for the first time

„Heating up for the first time“?

To remove any moisture from the insulating plates of the heating plates, the machine must be brought slowly to 110°C during the course of first commissioning and after every prolonged shutdown period.



NOTE

Incorrect handling may lead to damage of the insulation and of the heating plates!

- ➢ Heat up the press slowly.
- ➢ Do not exceed an operating temperature of around 110°C.

Method

1. Switch on the thermal oil heating unit as detailed in the manufacturer's operating instructions (refer to the corresponding section of the technical documentation).
2. Switch on the machine's power supply (set the main switch on the switch cabinet to „I“ or „ON“).
3. Switch on the power supply of the PLC control (press the **CONTROL VOLTAGE ON** pushbutton on the control panel).
   The initial screen of the operating terminal appears.
   The machine is in the manual mode.

The PLC control still contains the values of the recipe with which you had worked last.

3. Switch the machine to the emergency mode (set the **EMERGENCY MODE** key-operated switch on the control panel to "I").
5. Press the function key **K3** („Selection press opening") on the operating terminal.
   The LED in the key lights up.

6. Actuate the two-hand operation facility on the control panel.
   The press opens.
7. In the `recipe edit` screen on the operating terminal, change the „start temperature“ to 40°C.
   The current recipe in the PLC control is modified.
8. Press the function key **K5** („heating on“) on the operating terminal.
   The LED in the key lights up.
   The press is heated up to the set initial temperature of 40°C.
9. Increase the "start temperature" of the press by approximately 10°C every 15 minutes until an operating temperature of 110°C is reached.
10. Keep the operating temperature of 110°C constant for one hour.
11. Switch off the machine correctly as detailed in Chapter 5.7.

Repeat this procedure after every prolonged shut down of the machine.

4.9 Fitting safety fencing

The machine must be safeguarded by means of the safety fencing shown in the assembly diagram to prevent access by operating personnel or third parties who have not received instruction. The safety fencing is imperative for safe use of the machine.

➢ Fit the safety fencing by referring to the assembly diagram of the machine (refer to the corresponding section in the technical documentation).

5 OPERATION

In this Chapter

In this chapter you find out how to work with the machine.

Operation of the machine changes depending on whether it

- is operated as a single machine *or* is used with multilayer press systems.
- is *or* is not controlled by a PC.

Operation of the machine by PC is not described in these operating instructions (see process visualisation operating instructions).

These operating instructions only describe the interfaces and the operator control actions that are necessary for operation without the PC (emergency mode).

Before working with the machine

- Read through the operating manual attentively.
- Familiarize yourself with the functions of the machine (see Chapter 1).
- Familiarize yourself with operation of the control panels (see Chapter 1.5).
- Familiarize yourself with operation of the PC (see Process visualisation operating manual).
- Familiarize yourself with the safety facilities of the machine (see Chapter 2.10).
- Familiarize yourself with operation of the thermal oil heating unit (refer to the manufacturer's operating instructions for the thermal oil heating unit).

5.1 Operation modes

5.1.1 Manual mode / automatic mode

Manual mode

In the manual mode, the individual motion sequences of the machine can be controlled manually via the operating terminal (see Chapter 1.5 for a description of the operating terminal).

Within multilayer press plants, the machine does not take part in the sequences of the automatic mode, if the machine is switched to manual mode (the loading/unloading carriage does no longer run to the machine).

Use the manual mode only for setting up, in the event of machine malfunctions and during product measurement.

Automatic mode

In the automatic mode, the pressing procedure runs automatically. The data for the pressing procedure (recipe) are transferred to the PLC control in *standard mode* from the PC control and in *emergency mode* from the operating terminal. The PLC control monitors and controls the pressing procedure in accordance with this recipe.

Check the current recipe in the PLC control before you set the machine to the automatic mode.

When you switch on the machine, the PLC control still contains the value of the recipe with which the plant was operated last.

5.1.2 Standard mode / emergency mode

Standard mode (operation *with* PC)

In the standard mode, the data for the pressing procedure (recipe) can be selected or entered on the PC control and be transferred to the PLC control.

The PC control monitors the actions of the PLC control.

Within multilayer press plants, the data interchange which takes place between the PC control and PLC control during normal operation makes it possible to track tool data and assign products to press batches and recipes. In the automatic mode, the recipes are transferred automatically from the PC control to the PLC control in accordance with the order definition.

Pay attention to the fact that the PLC control only accepts a new recipe from the PC control when the press is open.

The PC control is described in detail in the instruction manual for process visualization.

Emergency mode (operation *without* PC)

In the emergency mode, the data for the pressing procedure (recipe) can be entered via the operating terminal (see Chapter 1.5 for a description of the operating terminal). Only the recipe that is currently in the PLC control is modified. The changes made in the recipe have a direct effect on the PLC control (the recipe is not transferred!).

Changes made in the recipe on the operating terminal only take effect in the PLC control and cannot be stored. Management of recipes is only possible with the PC control (see process visualisation operating manual).

Only use the emergency mode when there is a failure in the PC control.

5.2 Switching on the machine

Requirements

The machine has been connected properly as detailed in Chapter 3 and first commissioning has been completed.

Checklist prior to switching on

For daily commissioning of the machine, check the points listed in the following checklist:

- Electrical connection is OK.
- The machine is properly earthed.
- The hydraulic oil level is OK (above the minimum indication).
- The oil level of the vacuum pump is OK (above the minimum indication).
- The oil level of the scrubber (option) is OK (above the minimum indication).
- The compressed air supply is in order and amounts to 6 bar (only in the case of pneumatically controlled vacuum valves).
- The thermal oil heating unit has been connected and commissioned in accordance with the manufacturer's operating instructions.
- The safety devices have been fitted and checked (see checklist in Chapter 2.10.2), and the EMERGENCY-STOP pushbutton has been released.

The machine can be switched on if all points in the checklist have been checked and found to be OK.

Switching on

Within multilayer press plants, each component of the plant must be switched on as described below.

1. Switch on the thermal oil heating unit as detailed in the manufacturer's operating instructions (refer to the corresponding section of the technical documentation).
2. Switch on the power supply of the PC control.
   The computer has already been programmed at the works so that it automatically calls up the main process visualisation menu.
3. Switch on the machine's power supply (set the main switch on the switch cabinet to „I“ or „ON“).
4. Switch on the power supply of the PLC control (press the **CONTROL VOLTAGE ON** pushbutton on the control panel).
   The initial screen of the operating terminal appears.
   The machine is in the manual mode.
5. Check the machine for malfunctions and remedy any malfunctions that have occurred (see Chapter 7.2).
6. Check the current recipe in the PLC control.

The PLC control still contains the values of the recipe with which you had worked last.

If you would like to continue working with a new recipe, you must first select or enter it, then load and transfer it to the PLC control (see Process visualisation operating manual).

Pay attention to the fact that the PLC control only accepts a new recipe from the PC control when the press is open.

7. Switch on the machine's vacuum pump.

8. Switch on the machine's heating system.
   The press is heated up to the "start temperature" of the current recipe in the PLC control.
   The heating up rate is app. 8°C/min.
9. You have checked the current recipe in the PLC control or you have transferred a new recipe to it? You can now switch the machine to the automatic mode.

Within multilayer press plant, the pressing procedure is started automatically when the "start temperature" of the current recipe is reached.

If the machine is used as a single machine, the two-hand operation facility must also be pressed to start the pressing procedure.

5.3 Product measurement

Overview In the case of product measurement, product sensors are inserted into the press books and are connected to the connection terminals in the vacuum chamber. If a pressing option "with product measurement" is selected, the product sensor values are displayed and logged by the control.

Peculiarities If you have selected a pressing option "with product measurement", you must take the following peculiarities into account:

- You can close the press even when the vacuum door is open.
- You can only make limited use of the automatic mode: The vacuum door and the press must be closed manually before the automatic mode can take effect.

Within multilayer press plants, you must move the loading/unloading carriage manually to load the press.

5.4 Working in the manual mode

Executing functions In the manual mode, you execute the functions shown in Figure 5-2 with the function keys **K1 - K16**:

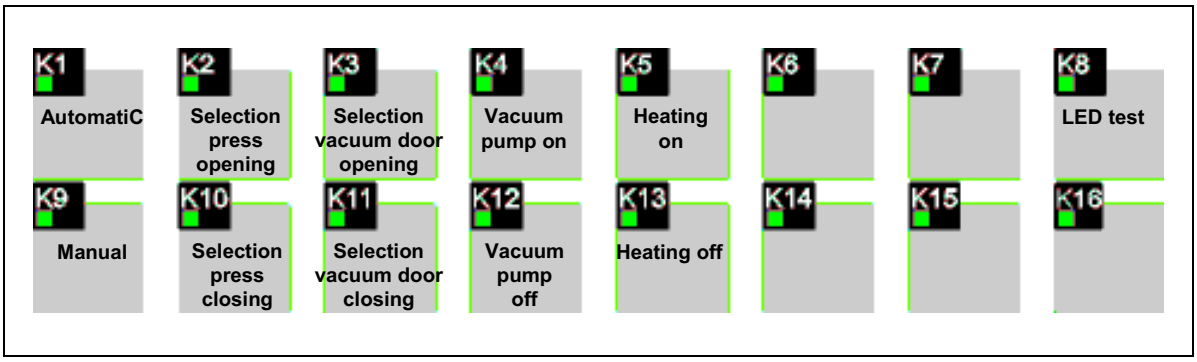


Figure 5-2 **Assignments of function keys K1 - K16: Overview**

You will find a detailed description of the individual function keys in Chapter 1.5.1.

5.5 Working in the emergency mode

Modifying a recipe

In the emergency mode, you can modify the current recipe in the PLC control in the `Edit recipe` screen on the operating terminal. The changes made in the recipe have a direct effect on the PLC control (the recipe is not transferred!).

The course of the pressing procedure can be defined in a maximum of 10 steps by way of the operating terminal (19 steps are possible via the PC control!).

Changes made to the recipe on the operating terminal cannot be stored. Management of recipes is only possible with the PC control (see process visualisation operating manual).

A detailed description of the individual parameters of a recipe and noted on input of values can be found in Chapter 1.5.7.

5.6 Instructions for handling the machine

Using approved transport plates

Transport plates (bottom tool plates) serve to transport the press books. Owing to extreme stresses (temperature fluctuations and mechanical wear and tear), the transport plates must fulfill quite specific requirements. The use of unsuitable transport plates may lead to damage and malfunctions. Therefore:

- ➢ Only use BÜRKLE transport plates or ones that have been approved by BÜRKLE (see Chapter 1.6.2 for requirements concerning transport plates).
- ➢ Regularly check transport plates and sliding rails inside the heating plates for damage (visually check the sliding surfaces).
- ➢ Replace damaged sliding rails and transport plated immediately.

Using dummies

Owing to the finely ground heating plates, it may happen that, as the result of adhesion, individual plates may get stuck when opening the press and may drop after adhesion has worn off. This may result in damage and malfunctions. Therefore:

- ➢ Never close the press when it is empty.
- ➢ Use transport plates with dummies if not all daylights of the press are occupied with material for press books.

Dummies may be:

- Transport plates only with separating sheets, pad paper and top tool plate.
- Transport plate containing an aluminium plate in the size and thickness that correspond to one press book.

Let the vacuum pump be switched on

If the vacuum pump is switched on and off too often the pump may get damaged or have malfunctions. Therefore:

- ➢ Please let the vacuum pump be switched on during the whole shift. The vacuum chamber is evacuated and vented via the vacuum valve.

5.7 Deactivating the machine

Requirements

The pressing procedure must be ended before you switch off the machine. By doing so, you will prevent damage to the press books.

Switching off

1. Switch off the machine in the manual mode.
2. Switch the vacuum pump off.
3. Switch the heating off.

Before you switch off the machine, we recommend you close the vacuum door. By doing so, you will prevent the ingress of dirt into the pressing compartment.

4. Close the vacuum door
5. Switch off the the power supply of the PLC control (press the **CONTROL VOLTAGE OFF** pushbutton on the control panel).
   The display on the operating terminal goes off.
6. Switch off the machine's power supply (set the main switch on the switch cabinet to „0“ or „OFF“).
7. Switch off the power supply of the PC control.
8. Switch off the thermal oil heating unit as detailed in the manufacturer's operating instructions (refer to the corresponding section of the technical documentation).

5.8 Switching off in an emergency

➢ In an emergency, press the EMERGENCY-STOP switch.
All movement sequences of the machine are stopped immediately.

5.9 Switching on again after EMERGENCY STOP

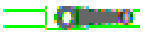
Proceed as follows to switch the machine on again:

1. Make sure that nobody can be endangered by the starting machine.
2. Release the EMERGENCY-STOP switch.
3. Press the **CONTROL VOLTAGE ON** pushbutton on the control panel.
4. Check the set and actual values of the hydraulic pressure. The control range of the pressure controllers may be exceeded if the set and actual values deviate excessively from one another. In this case, you must manually increase the hydraulic pressure for the press (close the press).
5. Switch the machine to the automatic mode.

5.10 Operation for maintenance purposes

Shut-off valve on the hydraulic drive

On the hydraulic drive of the machine there is a shut-off valve for pressure relief of the hydraulic system belonging to the press.



DANGER

Improper tampering in hydraulic systems!

Hydraulic systems can explode and cause severe accidents!

- ➢ Only personnel with a special knowledge and experience in hydraulics is permitted to work on hydraulic equipment.
- ➢ Depressurize the hydraulic system before working on it. Pay attention to the manufacturer's operating instructions for the pressure accummulator.

6 MAINTENANCE / SERVICING

Before you begin

It is imperative that you observe the safety instructions detailed in Chapter 2 and the instructions on operation of the machine in Chapter 5 when carrying out individual service operations.

If you have any questions on service and maintenance, you should consult a Expert who is familiar with the peculiarities of the machine and the relevant regulations.

BÜRKLE will be pleased to help you in such cases (see annex "How to contact BÜRKLE").

6.1 Maintenance

6.1.1 Maintenance schedule

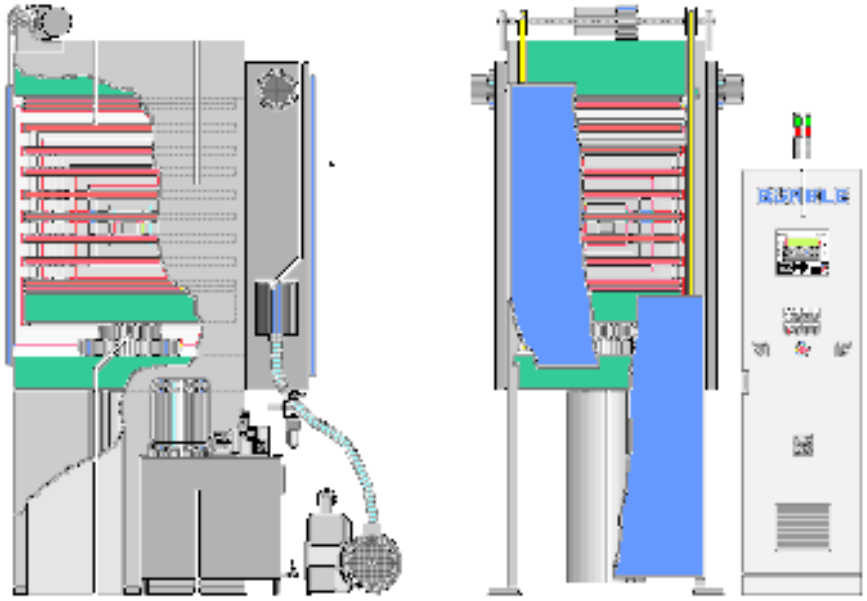
Pay attention to the deadlines specified here. By doing so, you will save yourself the bother of unnecessary malfunctions and repairs and you will prolong the useful life of your machine.

For one-shift operation, the specified hours of operation correspond to the following intervals:

Working hours	Rhythm
8 h	daily
40 h	weekly
160 h	monthly
500 h	quarterly
1000 h	every 6 months
2000 h	yearly

Table 6-1 Maintenance intervals for one-shift operation

The item numbers in the following table correspond to those in this illustration.



Legend:

- Check
- Clean
- Lubricate
- Change oil filter
- Change oil
- Replace battery
- Draining of condensate

Figure 6-1 Maintenance schedule

[1] required only after initial commissioning

WHEN?	Pos.	WHAT AND WHERE?	WHO?
8 hours	10	Check the oil level on the vacuum pump and replenish oil if necessary. Replace oil immediately if the oil is emulsified (whitish colour) or if dirt is recognisable in the oil (black colour, solid particles in the oil). Refer to the enclosed manufactuer's operating instructions for a description.	Operator
40 hours	2	Check pressing faces, sliding rails of the heating plates and transport plates for damage *(only after initial commissioning)*. See also Chapter 6.1.3.	Expert
40 hours	3	**In the case of pneumatically controlled vacuum valves:** Drain condensate on the filter pressure control valve. For a description, refer to Chapter 6.1.3 and the enclosed manufacturer's operating instructions.	Operator
40 hours	9	Check the oil level on the hydraulic drive and replenish oil if necessary. See Chapter 6.1.6 for a description.	Operator
160 hours		Clean the machine (pressing compartment, light barriers, reflectors and heating plates etc.). See Chapter 6.1.2 for a description.	Expert
160 hours	4	Clean and, if necessary, replace the paper cartridge of the air filter. **In the case of the scrubber option:** Check the oil level on the scrubber and top up/drain oil if necessary. Clean the filter system of the gas washer. Clean the dirt trap in the water inlet to the scrubber. Refer to the enclosed manufactuer's operating instructions for a description.	Expert
160 hours	6	Check securing of the belt on the vacuum door and tighten screws, if necessary. Check the belt for wear and, if necesarry, replace the belt *(*only after initial commissioning*)*.	Expert
160 hours	7	Clean and, if necessary, replace the air filter of the switch cabinet. See Chapter 6.1.4 for a description.	Expert
160 hours	8	Check the hydraulic cylinder for leaks *(only after initial commissioning)*.	Expert

Table 6-2 Maintenance schedule

WHEN?	Pos.	WHAT AND WHERE?	WHO?
160 hours	10	Replace the oil and oil filter of the vacuum pump *(only after initial commissioning)*. For oil recommendations, see Chapter 6.3. Check the air deoiling element and, if necessary, replace it. Clean the gas ballast valve. Refer to the enclosed manufactuer's operating instructions for a description.	Expert
500 hours	3	**In the case of pneumatically controlled vacuum valves:** Clean the filter cartridge of the filter pressure control valve. For a description, refer to Chapter 6.1.3 and the enclosed manufacturer's operating instructions.	Operator
500 hours	5	**At inlet temperatures of > 300°C for the thermal oil system:** Check the thermal oil system (thermal oil hoses, screw glands, flanges) for leaks. See also Chapter 6.2.4.	Expert
500 hours	9	Replace the filter element of the high pressure filter (*only after initial commissioning*). Refer to the enclosed manufactuer's operating instructions for a description.	Expert
500 hours	10	Replace the oil and oil filter of the vacuum pump. For oil recommendations, see Chapter 6.3. **In the case of the gas scrubber option:** Oil change *only after* approx. 1000 - 2000 hours! Refer to the enclosed manufactuer's operating instructions for a description.	Expert
1000 hours	2	Check pressing faces, sliding rails of the heating plates and transport plates for damage. See Chapter 6.1.4 for a description.	Expert
1000 hours	5	**At inlet temperatures of ≤ 300°C for the thermal oil system:** Check the thermal oil system (thermal oil hoses, screw glands, flanges) for leaks. See also Chapter 6.2.4.	Expert
1000 hours	6	Check securing of the belt on the vacuum door and tighten screws, if necessary. Check wear of the belt and replace the belt if necessary.	Expert
1000 hours	8	Check the hydraulic cylinder for leaks.	Expert

Table 6-2 Maintenance schedule (continued)

WHEN?	Pos.	WHAT AND WHERE?	WHO?
1000 hours	9	Check the hydraulic system (lines, screw glands, flanges) for leaks. Retighten hydraulic screw glands. Check the state of aging of hydraulic hoses. Replace hydraulic hoses every 4-6 years! See also Chapter 6.2.3.	Expert
1000 hours	10	Check the activated charcoal exhaust air filter and replace it if necessary. Clean the intake flange and fan hood. **In the case of the gas scrubber option:** Replace the oil and oil filter of the vacuum pump. For oil recommendations, see Chapter 6.3. Refer to the enclosed manufactuer's operating instructions for a description.	Expert
2000 hours	1	Grease the geared motor. Refer to the enclosed manufactuer's operating instructions for a description.	Expert
2000 hours	7	Replace the buffer battery of the control system on the operating terminal. See Chapter 6.2.5 for a description.	Expert
2000 hours	9	Replace the filter element of the high pressure filter. Refer to the enclosed manufactuer's operating instructions for a description.	Expert
5000 hours	1	Replace the oil of the geared motor. Refer to the enclosed manufactuer's operating instructions for a description.	Expert
5000 hours	9	Change hydraulic oil. See Chapter 6.1.6 for a description.	Expert

Table 6-2 Maintenance schedule (continued)

Safety devices

➢ Check the safety devices on the basis of the check list in Chapter 2.10.2:
- at the start of each shift (interrupted operation).
- once per week (continuous operation).
- after every servicing or repair.

Thermal oil heating unit

The table above does not contain any information about inspection and maintenance work on the thermal oil heating unit. For this information, please refer to the manufacturer's operating instructions in the corresponding section of the technical documentation.

Vacuum pump

The oil change intervals given in the table above for the vacuum pump (every 500 hours without scrubber; every 1000-2000 hours with scrubber) are based on our experience. Special operating conditions may result in substantially shorter maintenance intervals.

6.1.2 Cleaning the machine

Overview

Regular cleaning of the environment and of the machine is a prerequisite for fault-free operation of the machine.

CAUTION

Hot heating plates and thermal oil lines!

Finger, hand and arm burns.

➢ Allow heating plates and thermal oil lines to cool down before you begin cleaning the machine.

Cleaning

1. Open the vacuum door
2. Switch the machine off (set the main switch on the switch cabinet to „0“ or „OFF“).
3. Safeguard the machine to prevent it being switched back on again inadvertently.
4. Open the service door.
5. Secure the service door and the vacuum door to prevent inadvertent closing.

CAUTION

Deposits in the press!

Can cause rashes and can lead to poisoning.

- ➢ Avoid direct contact with the substances.
- ➢ Wash thoroughly after every contact.
- ➢ Wear chemically resistant gloves when cleaning.
- ➢ Ensure adequate ventilation.

6. Remove deposits from the pressing compartment. Clean the heating plates, the glass windows in front of the light barriers and reflectors and also the light barriers and reflectors themselves. Use lint-free cloths or brushes for cleaning.
7. Close the service door again.

Protect the environment!

Have deposits removed from the press disposed of by a specialist company.

6.1.3 Maintenance work on the filter pressure control valve

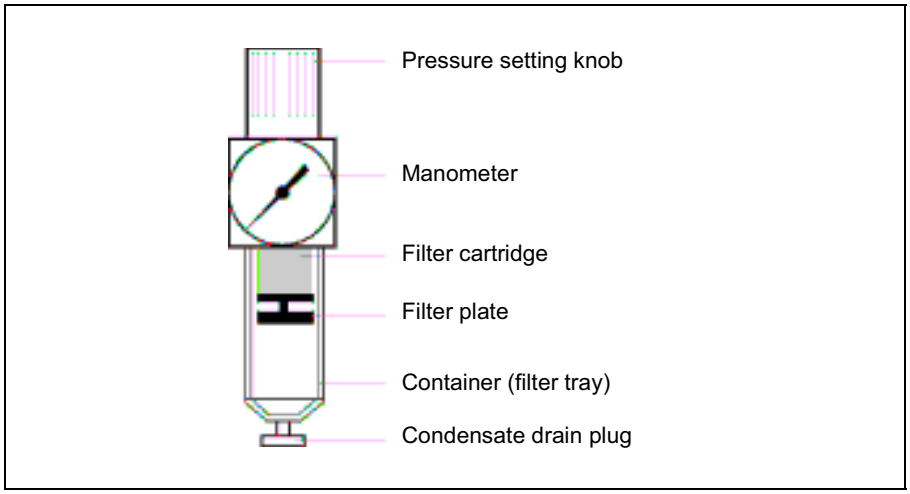


Figure 6-2 **Filter pressure control valve: Mechanical construction**

Draining off condensate

1. Place a suitable collecting vessel under the condensate drain plug.
2. Turn the condensate drain plug to the left.

Cleaning

1. Switch off the compressed air supply (close the shut-off valve of the compressed air supply).
2. Unscrew the container by turning it counterclockwise.
3. Unscrew the filter plate.
4. Remove the filter cartridge.
5. Wash out the filter cartridge with cleaning agent (do not use any cleaning agents containing trichloroethylene such as Benzol!). Replace the filter cartridge in the event of extreme soiling.
6. Blow the filter cartridge dry with compressed air from the inside to the outside.
7. Clean the container with benzine or paraffin oil.
8. Rub the container dry.
9. Fit the single components in the reverse order.

6.1.4 Cleaning the air filter of the switch cabinet


DANGER

Electric voltage!

Causes severe injuries and can kill you!

➢ Work on electrical equipment must be carried out by a qualified electrician, paying attention to the VDE and local regulations, in particular the safety measures.

1. Open the switch cabinet.
2. Unclip the grille from the mount in the control cabinet door.
3. To do this, cautiously tilt a small screwdriver in the lateral recess.
4. Remove the air filter.
5. Clean the air filter with compressed air.
6. If it is extremely soiled: replace the air filter.
7. Insert the air filter.
8. Clip on the grille.
9. Close the switch cabinet.

6.1.5 Checking the sliding rails of the heating plates and transport plates

Overview

The sliding rails and transport plated are subject to natural wear and tear (stresses from temperature fluctuations and mechanical wear). Their period of use is therefore limited.

As a requirement for fault-free operation of the machine, the transport plates and sliding rails must be in a perfect condition (for details of requirements for transport plates, see Chapter 1.6.2).

Checking heating plates and transport plates

The sliding plates of the heating plates and the transport plates must be checked at least every 6 months to ensure perfect operation and functioning (visual check).

Damaged sliding rails and transport plates must be replaced immediately!

6.1.6 Hydraulic oil change

Oil change intervals

Conscientiously pay attention to the oil change intervals and note down the date of each change (see Chapter 6.1.1) for oil change intervals

Independently of the maintenance intervals, have the hydraulic oil checked once every year by an oil company.

Amount (quantity) of oil

You require hydraulic oil conforming to DIN 51524 part 2 HLP46, DIN 51519 (see Chapter 6.3 for a selection of permissible types).

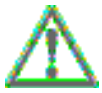
Allternative hydraulic fluids must not be used without out express written approval - warranty! For details of the oil filling quantity, please refer to the assembly diagram (refer to the corresponding section of the technical documentation).

Further general instructions

Protect the environment!

Handling and disposal of mineral oils are subject to legal regulations.

- Do not spill any hydraulic oil.
- Take precautions for collecting spilt oil (lay out oil type tarpaulins or set up a collecting basin.)
- Dispose of used oil at an authorized acceptance point.



NOTE

Impurities in the oil may lead to malfunctions on the hydraulic drive!

- ➢ Leave hydraulic oil barrels to settle for a prolonged period of time before removing oil. Do not roll them to the tapping point.
- ➢ Clean screw glands of hydraulic oil barrels, oil filling caps and their surroundings before opening them.
- ➢ Never leave hydraulic oil barrels open for longer than necessary.
- ➢ Never remove the metal strainer from the filler opening of the hydraulic drive when pouring in oil.

CAUTION

Hydraulic oil!

Can cause rashes and other health impairments.

- ➢ Avoid prolonged skin contact.
- ➢ Wash thoroughly after every contact.

Oil change

1. Open the press.
2. Switch the machine off (set the main switch on the switch cabinet to „0“ or „OFF“).


DANGER

Improper tampering in hydraulic systems!

Hydraulic systems can explode and cause severe accidents!

- ➢ Only personnel with a special knowledge and experience in hydraulics is permitted to work on hydraulic equipment.
- ➢ Depressurize the hydraulic system before working on it. Pay attention to the manufacturer’s operating instructions for the pressure accummulator.

3. Open the shut-off valve for the hydraulic system of the press (see Chapter 5.10).
   The hydraulic system of the press is pressure-relieved.
4. Depressure the pressure accumulator on the oil end. In doing so, pay attention to the instructions in the enclosed manufacturer’s operating instructions (refer to the corresponding section of the technical documentation).
5. Place a suitable collecting vessel under the oil drain valve on the hydraulic drive.
6. Turn the oil filler cap with ventilation filter to the left.
7. Open the oil drain valve.
8. Drain the oil.
9. Close the oil drain valve again.
10. Pour in oil up to the maximum oil level indication.
11. Reinsert the oil filler lid with aeration filter and turn it to the right.
12. Vent the hydraulic system as described in Chapter 6.1.7.

6.1.7 Bleeding the hydraulic system

When does the hydraulic system have to be bled?

It is always necessary to vent the hydraulic system whenever larger volumes of air may have reached into the system.

You should vent the hydraulic system in any case in the following circumstances:

- After filling the oil reservoir for the first time.
- After an oil change.
- After replacing the seals on the hydraulic cylinder.
- After a prolonged shutdown period of the machine.

Air in the hydraulic system?

Air in the hydraulic system is noticeable by:

- oil forming.
- Jolting closing or opening movements of the press.
- Abnormal noises.

Bleeding the hydraulic system

1. Place an intermediate liner on the heating plates.
2. Close the press with an operating pressure of around 50 bar.

WARNING

Press table lowering!

Causes crushing and bone fractures.

➢ Do not begin working with the press table until it has been safeguarded to prevent downward movement.

3. Safeguard the press table with suitable supports (e.g. shipping braces) to prevent downward movement.
4. Cautiously undo the bleed screw on the hydraulic cylinder until bubble-free hydraulic oil emerges.
5. Tighten the venting screw again.
6. Remove the support.
7. Open the press again.
8. After venting, check the oil level on the level indicator of the hydraulic drive and replenish oil if necessary (see Chapter 6.1.6).

6.2 Exchanging parts (repairs)

Spare and wearing parts that are not available at short notice should be kept on stock. Production outage is generally more expensive than the costs of the part itself.

Basically, repairs that are not described in these operating instructions should be carried out by BÜRKLE after-sales service.

6.2.1 Replacement of seals of vacuum door and service door

Dismantling the vacuum door

1. Lower the vacuum door on a suitable support.
2. Remove the guides of the vacuum door at both sides.

DANGER

Falling down of the vacuum door when tilting it!

Causes severe injuries and can kill you!

- ➢ Use only suitable undamaged lifting devices, lifting appliances and hoisting gear with an adequate load-carrying capacity.
- ➢ Make sure that no persons are near the vacuum door.
- ➢ Avoid jolting movements when tilting the door.
- ➢ Never walk under the suspended load.

3. Protect the vacuum door against inadvertently tilting.
4. Loosen the fixtures of the belts on the vacuum door.
5. Tilt the vacuum door cautiously away from the press using a suitable lifting device.
6. Mount the vacuum door in reverse order.

How to find out the length of the seals

1. Insert the *unglued* seal without any tension in the groove of the respective door.
2. Determine the length of the seal and subtract 5%.

Mounting of the seals

1. Put silicone glue on both ends of the seal.
2. Put the splice of the seal in the mounting device supplied with the machine.
3. Let the silicone glue cure for at least 24 hours.
4. Clean the groove of the door concerned. The groove must be dry and clean.
5. Place the seal on the groove without any tension. The splice must be at the top in the middle of the door!
6. Press the seal simultaneously with 2 or 3 helpers in all four corners of the groove. In this way only you obtain a uniform overhang of the seal which is necessary for an optimal sealing of the vacuum.
7. Check the uniform overhang of the seal.

6.2.2 Replacing seals on the hydraulic cylinder

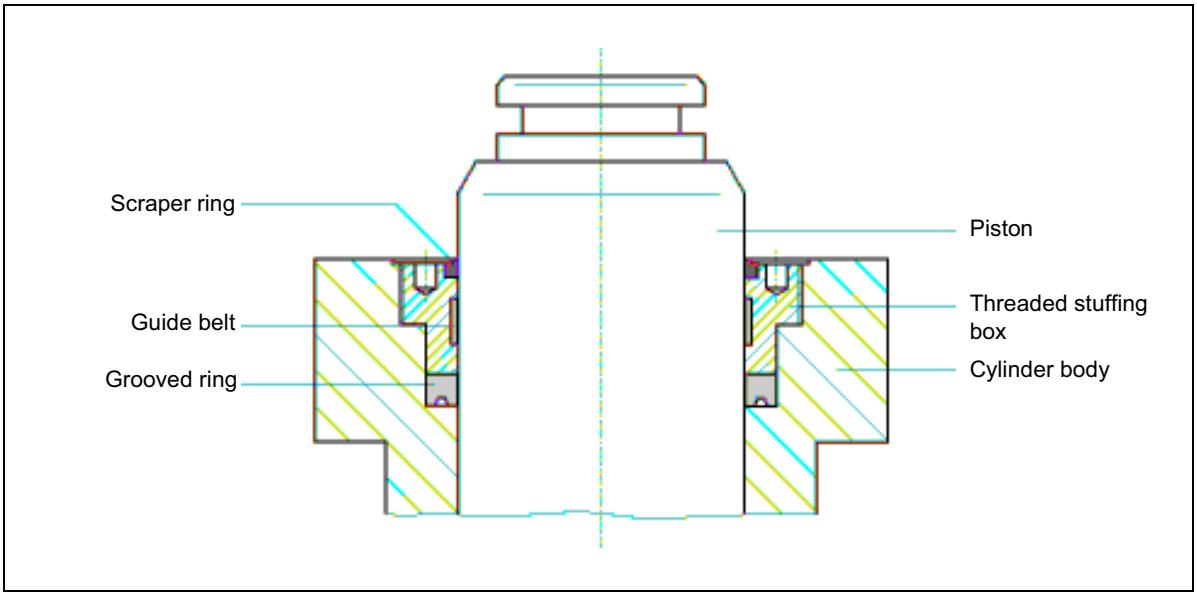


Figure 6-3 **Hydraulic cylinder with threaded stuffing box: Mechanical construction**

Figure 6-3 shows the basic structure of hydraulic cylinders.

Different hydraulic cylinders are used depending on the size of the machine. The hydraulic cylinder used for your machine is shown in detail in the spare parts drawing (refer to the corresponding section of the technical documentation).

Replacing seals

1. Place an intermediate liner on the heating plates.
2. Close the press with an operating pressure of around 50 bar.

WARNING

Press table lowering!

Causes crushing and bone fractures.

➢ Do not begin working with the press table until it has been safeguarded to prevent downward movement.

3. Safeguard the mobile press table of the press with suitable spacers (e.g. wooden beams) to prevent downward movement.
4. Switch the machine off (set the main switch on the switch cabinet to „0“ or „OFF“).
5. Undo the holding claws on the piston of the hydraulic cylinder.

DANGER

Improper tampering in hydraulic systems!

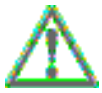
Hydraulic systems can explode and cause severe accidents!

➢ Only personnel with a special knowledge and experience in hydraulics is permitted to work on hydraulic equipment.

➢ Depressurize the hydraulic system before working on it. Pay attention to the manufacturer’s operating instructions for the pressure accummulator.

6. Open the shut-off valve for the hydraulic system of the press (see Chapter 5.10).
   The hydraulic system of the press is pressure-relieved.

7. Depressure the pressure accumulator on the oil end. In doing so, pay attention to the instructions in the enclosed manufacturer's operating instructions (refer to the corresponding section of the technical documentation).
8. Using a suitable tool, press down the piston of the hydraulic cylinder until it moves no further.
9. Take precautions for collecting spilt oil (lay out oil-tight tarpaulins or set up a collecting basin).


NOTE

Use of the wrong tool will damage the threaded stuffing box!

➢ Use a suitable face spanner to unscrew the threaded stuffing box.

10. Unscrew the threaded stuffing box to the left until it can be removed.
11. Screw two screws into the grooved ring and pull it out in the upward direction.

To be able to screw the screw better into the grooved ring, we recommend that you extend it beforehand with a rod (e.g. by welding on a rod).

12. Replace the grooved ring, the guide belt and the stripper ring. When installing the grooved ring, pay atteniton to the correct position (sealing lips pointing down).
13. Screw in the threaded stuffing box until it moves no further.
14. Switch on the machine.
15. Close the press in the jog mode (press the pushbutton briefly).
    The piston of the hydraulic cylinder moves up.
16. Fit the holding claws on the piston.
17. Remove the safeguards preventing lowering.
18. Open the press.
19. Vent the hydraulic system as described in Chapter 6.1.7.

6.2.3 Checking and replacing hydraulic hose lines

Checking hose lines

All hydraulic hose lines on the machine must be checked at least every six months to ensure they are in a safe operating state. This check must be done by an expert.

An expert is a person who, thanks to his technical training and experience, has an adequate level of knowledge in the field of hydraulics and is familiar with the applicable state industrial protection regulations, guidelines and generally recognized technical regulations to such an extent that he is able to access the safe operating state of the hydraulic hoses.

Possible defects

The following examples show the most important defects that might call for urgent replacement of the hose lines:

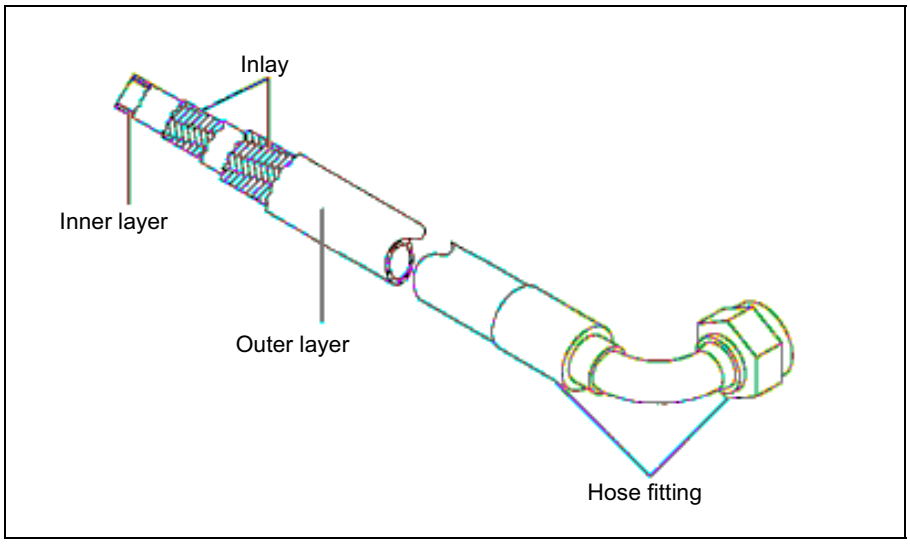


Figure 6-4 Hydraulic hose line: Mechanical construction

- The outer layer of the hose line is damaged down to the inlay (fraying, cuts or cracks).
- The outer layer is brittle (crack formation on the hose material).
- The hose line is deformed or deforms in the pressureless or pressurized state or when bent, e.g. as the result of separation of layers, bubble formation, crushed or kinked points.

- The hose line is leaking.
- The hose line gradually moves out of the fitting.
- The fitting is damaged or deformed (the strength of the fitting or the connection between hose and fitting is reduced).
- The fitting is damaged or deformed (reduced strength of the fitting or of the hose/fitting connection).
- The period of use has been exceeded slightly (see production date on the hose fitting).

Period of use of hose lines

Hose lines are subject to natural aging. Their period of use is therefore limited.

Make sure that hose lines are replaced at reasonable intervals, even if no defects relevant to safety are recognizable.

Hoses should not be used for *more than 6 years* as from the production date of the hydraulic hose line.

Replacing hose lines

- Only ever use original spare parts, thus ensuring that hose lines have the right load carrying capacity and their length or fittings agree.
- Keep to the original installation position; do not change any hose layouts or bending radii.
- Seal connection points with a stopper. This prevents ingress of soiling into the hydraulic system and it cannot drain empty.
- Keep new hose lines dirt-free.
- Install hose lines without stress or fraying.
- Tighten screw glands up to a clearly tangible increase of force.
- Check hose lines for leaks after fitting them.

DANGER

Improper tampering in hydraulic systems!

Hydraulic systems can explode and cause severe accidents!

➢ Only personnel with a special knowledge and experience in hydraulics is permitted to work on hydraulic equipment.

➢ Depressurize the hydraulic system before working on it. Pay attention to the manufacturer's operating instructions for the pressure accummulator.

6.2.4 Checking and replacing thermal oil lines

CAUTION

Hot thermal oil lines!

Finger, hand and arm burns.

➢ Allow thermal oil lines to cool down before touching them.

Check metal hoses

All metal hoses on the machine must be checked at least every six months in relation to their operation and functioning (visual check):

- At least every six months in the case of an inlet temperature of the thermal oil system amounting to ≤ 300°C.
- At least every three months in the case of an inlet temperature of the thermal oil system amounting to > 300°C.

Leaking metal hoses must be replaced immediately!

Replacing metal hoses

- Only ever use original spare parts, thus ensuring that metal hoses have the right load carrying capacity and that the length or the fittings are correct.
- Keep to the original installation position; do not change any hose layouts or bending radii.
- Keep new metal hoses free from dirt.
- Install metal hoses in a stress-free state.
- Tighten screw glands up to a clearly tangible increase of force.
- When installing metal hoses, avoid torsion about their own axis.

Compensating torsion

You can compensate any torsion of metal hoses occuring during installation by means of the following procedure:

1. Open and close the press 3 to 4 times after installation.
2. Undo the metal hoses at the rotating connection.
3. Immediately tighten the connection again.

You can recognize torsion-free installation of a metal hose by the fact that the crossing braid on the back of the hose runs in a straight line.

Rules for handling metal hoses

Protect metal hoses against mechanical damage!

- Do not kink metal hoses. If you store metal hoses in a suspended position, safeguard them by means of rolls or saddles.
- Avoid rotating metal hoses about their own axis.
- Transport long hoses with 2 or 3 helpers.
- Do not drag metal hoses over the floor or sharp edges.

6.2.5 Replacing the buffer battery

Overview

The buffer battery safeguards the data of the user memory in the PLC control when the main switch is switched off.

Data may be lost if the charge of the buffer battery drops. Therefore, you are advised to replace the buffer battery *annually* before it looses charge.

The data in the user memory of the PLC control is lost if you replace the buffer battery while the power supply is switched off.

Only ever replace the buffer battery with the power supply on.

DANGER

Electric voltage!

Causes severe injuries and can kill you!

- Work on electrical equipment must be carried out by a qualified electrician, paying attention to the VDE and local regulations, in particular the safety measures.
- Do not touch any components, terminals or cables in the switch cabinet except the cover of the battery compartment.

Replacing the buffer battery

1. Open the switch cabinet.
2. Switch on the power supply of the machine with the switch cabinet open:
   - In the case of the version without "repair switch": Turn the spindle of the main switch.
   - In the case of the version with "repair switch": Turn the **REPAIR SWITCH** on the control panel to the right-hand position („I“) and turn the spindle of the main switch.
3. Unscrew the cover of the battery compartment on the operating terminal.
4. Pull up the cover to the right. Make sure that you only raise the cover to the extent permitted by the length of the battery terminals.
5. Remove the battery connector from the buffer battery.
6. Undo the cable connector with which the buffer battery is secured on the cover.
7. Secure the new buffer battery with cable connectors on the cover.
8. Insert the battery connector of the new buffer battery in the affiliated socket in the battery compartment of the operating terminal. The notch on the battery connector must point to the left.
9. Fit the battery cover with the springs pointing to the left back onto the operating terminal and firmly screw down the cover again.
10. Switch off the machine's power supply.
11. Close the switch cabinet.

Protect the environment!

Disposal of batteries is subject to legal regulations.

Dispose of old buffer batteries at an authorized acceptance point.

Rules for handling buffer batteries

To avoid a hazard when handling buffer batteries, you must observe the following rules:

Buffer batteries

- must be stored in a cool and dry place.
- must not be charged up.
- must not be heated up.
- must not be burnt.
- must not be drilled through.
- must not be crushed.
- must not be shorted.

WARNING

Incorrectly handled buffer batteries may ignite or explode!

This may result in severe burns or property damage.

➢ Pay attention to the rules for handling buffer batteries.

6.2.6 Determining spare parts

Determining mechanical components

Use the spare parts list and drawings to identify mechanical components (refer to the corresponding section of the technical documentation). The mechanical spare and wearing parts of the machine are listed in the spare parts list.

Determining electrical components

Use the electrical circuit diagrams and electric parts lists to identify electrical components (refer to the corresponding section of the technical documentation):

1. Search for the component in the electrical circuit diagrams. All electrical components are shown with an abbreviated code in the circuit diagrams.
2. Note down the component's abbreviated code.
3. Search for the component in the electric parts list (list of appliances) with reference to the abbreviated code.

6.3 Hydraulic oil and lubricants

Overview

Expert lubrication and the best suitable lubricants are prerequisites for the full performance capabilities of our machines, longer useful life and avoiding malfunctions.

Use must only be made of hydraulic oils and lubricants that conform to the specified standards.

Do not use any hydraulic oils with a viscosity class in excess of 46.

Do not use any alternative hydraulic fluids without express written approval from BÜRKLE.

Keep to oil change and relubrication intervals.

Store oils in clean, closed receptacles (e.g. barrels) to prevent the ingress of dust and moisture and to minimize the oxydation effect of air as far as possible. Make sure that the storage location is dry and cool.

Do not mix two oil grades. Once chosen, an oil grade must not changed without compelling reasons. This might result in foaming or sludge formation.

Lubricating oils for the vacuum pump and the gas scrubber (option)

The lubricating oil specified below is best suited according to our experience:

Synthetic oil „ANDEROL 555“

Order No.: W 039 555 - 40

Hydraulic oils

The hydraulic oils specified below are a selection of suitable grades based on manufacturer's specifications:

Manufacturer	Hydraulic oil ISO VG46 DIN 51519 DIN 51524, part 2, HLP46
AGIP	OSO 46
ARAL	Vitam GF 46 Vitam HF 46 Vitam DE 46
AVIA	Avilup Hydraulic oil RSL 46 oder H-LPD 46
BP	Energol HLP 46 Energol HLPD 46
CASTROL	Hyspin AWS 46 Vario HDX
ESSO	Nuto H 46
MOBIL	Mobil D.T.E. 25
OEST Freudenstadt	Hydraulic oil H-LP 46 Hydraulic oil 46 DD
SHELL	Tellus Oel 46 Hydrol DO 46
TEXACO	Rando Oil HD B-46 Hydraulic Oil HDW 46

Table 6-3 Hydraulic oils

Thermal oils at inlet temperature of *up to* 300°C

The thermal oils specified below are recommended based on manufacturer's specifications:

Manufacturer	Thermal oil
BP	Transcal N
MOBIL	Mobiltherm 603
SHELL	Thermia B
HÜLS	Marlotherm

Table 6-4 Thermal oils

The selection of a suitable thermal oil depends on the maximum inlet temperature and the desired recooling temperature in the press. The individual oil grades differ especially in the lower temperature range! Therefore, the thermal oil should be chosen in accordance with the requirements or technical conditions after consultation with BÜRKLE and the oil supplier.

BÜRKLE will be pleased to help you in such cases (see annex "How to contact BÜRKLE").

Thermal oils at inlet temperature *above* 300°C

The suitable thermal oil will be selected by the manufacturer of the thermal oil heating unit according to the order and it is imperative to use this oil only (see manufacturer's operating instructions in the relevant register of the technical documentation).

It is *not* possible to give a generally valid recommendation for the use of oil for inlet temperatures of more than 300°C.

7 MALFUNCTION / ELIMINATION OF ERRORS

In this Chapter

This Chapter deals with failures which may occur during operation and provides you with hints on how to remedy these failures.

How are malfunctions indicated?

Malfunctions are detected by the machine control and indicated as follows:

- The red lamp of the warning lamp starts blinking.
- The horn sounds.
- Failure message on the PC control and on the operating terminal.

If a failure occurs, please try to establish the cause of the failure. Consider what basic action you can take to stop the failure recurring. This applies in particular to faults which may pose a safety risk (e.g. tripping of a residual-current-operated circuit-breaker).

Only then should you remedy the failure.

In difficult cases, please consult an expert who is familiar with the special aspects of the machine and the relevant regulations. BÜRKLE will be pleased to help you in such cases (see annex "How to contact BÜRKLE").

NOTE from our After-sales servicing specialists

Many failures which are considered to be machine failures turn out to be operating errors!

This is why we advise you to also consult the Operating Instructions if failures occur. Should any of the information be misleading, we would be grateful if you would point this out (see annex "Your opinion").

7.1 How to proceed when a failure occurs

Remedying failures

1. Press the ACK key on the operating terminal.
   The LED of the ACK (symbol ) at the right next to the function keys stops blinking and switches to steady light.
   The horn is switched off.
2. Determine the cause of the failure with reference to the failure message on the operating terminal (refer also the notes in Chapter 7.2).

You cannot determine the fault with reference to the failure message?

- ➢ Examine the failed subsystem for mechanical damage.
- ➢ Perfom additional the following checks:
  - Check the power supply of the machine.
  - Check all plug connections, screw connections, solder connections and clamp connections for firm seating.
  - Check all control voltages.
  - Check all relays, contactors and switches in the switch cabinet.
  - Check all fuses in the switch cabinet.

3. Eliminate the failure.
   The warning lamp goes out.
   The ACK-LED display (symbol ) disappears.
   The failure message on the operating terminal disappears.

7.2 Failure messages of the control

Overview

For the failure messages of the control system, the following table specifies when they occur and, if applicable, how the cause of a fault can be remedied.

Failure	Cause	Remedy
Heating plate alarm maximum HOLD temperature exceeded	Temperature exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Heating plate alarm maximum ramp temperature exceeded	Temperature exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Heating plate alarm minimum HOLD temperature less than the set value	Temperature is less than the set minimum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Heating plate alarm minimum ramp temperature less than the set value	Temperature is less than the set minimum tolerance (see configuration level on the PC).	➢ Check temperature ramp (temperature ramp too steep>?). ➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force alarm maximum HOLD pressure exceeded	Pressure exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force alarm maximum ramp pressure exceeded	Pressure exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force alarm minimum HOLD pressure less than set value	Pressure is less than the set minimum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force alarm minimum ramp pressure less than set value	Pressure is less than the set minimum tolerance (see configuration level on the PC).	➢ Check pressure ramp (pressure ramp too steep?). ➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.

Table 7-1 Malfunctions

Failure	Cause	Remedy
Loading locked	Light barrier 52B5-52B6 on the rear of the press • detects press books (wrong loading), • is soiled, • is defective.	➢ Get press books out of the light barrier. ➢ Clean light barrier. Request After-Sales Service if the failure message cannot be cancelled or if it occurs repeatedly.
Heating plate sensor broken	Heating plate sensor broken.	Have the heating plate sensor replaced by After-Sales Service.
Compensation sensor broken	Compensation sensor in the switch cabinet is broken.	Have the compensation sensor replaced by After-Sales Service.
Product sensor broken (The failure is only displayed if a pressing option "with product measurement" is selected.)	Product sensor • is broken, • is not connected correctly to the terminals in the vacuum chamber.	➢ Check product sensor.
Supply/return line sensor broken	Temperature sensor in the supply/return line of the thermal oil system is broken.	Have the temperature sensor replaced by After-Sales Service.
Slow hot press closing defective	Switch-over light barrier for the closing speed • is soiled, • is defective.	➢ Clean light barrier. Request After-Sales Service if the failure message cannot be cancelled or if it occurs repeatedly.
Hydraulic pump motor protection has tripped	Motor protection switch of the hydraulic pump has tripped.	➢ Check components and oil level on the hydraulic drive. ➢ Latch the motor protection switch. Request After-Sales Service if the fault occurs repeatedly.
Vacuum pump motor protection has tripped	Motor protection switch of the vacuum pump has tripped.	➢ Check oil filter and oil level on the vacuum pump. ➢ Latch the motor protection switch. Request After-Sales Service if the fault occurs repeatedly.

Table 7-1 Malfunctions (continued)

Failure	Cause	Remedy
Vacuum door motor protection has tripped	Motor protection switch of the vacuum door has tripped.	➢ Check functioning of the limit switches on the vacuum door. ➢ Latch the motor protection switch. Request After-Sales Service if the fault occurs repeatedly.
Hot press EMERGENCY-STOP	EMERGENCY-STOP switch of the hot press has been actuated.	➢ Reactivate after EMERGENCY-STOP (see Chapter 5.9).
Start temperature not reached	The "start temperature" required by the current recipe in the PLC control is not reached.	➢ Check whether heating is on. Request After-Sales Service if the failure message cannot be cancelled.
No control voltage	Control voltage is not switched on.	➢ Switch on the control voltage.
Heating plate fault maximum HOLD temperature exceeded	Temperature exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled or if it occurs repeatedly.
Heating plate fault maximum ramp temperature exceeded	Temperature exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Heating plate fault minimum HOLD temperature less than the set value	Temperature is less than the set minimum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Heating plate fault minimum ramp temperature less than the set value	Temperature is less than the set minimum tolerance (see configuration level on the PC).	➢ Check temperature ramp (temperature ramp too steep?). ➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.

Table 7-1 Malfunctions (continued)

Failure	Cause	Remedy
Leak detector failure	Initiator • detects oil (leak in the thermal oil system). • is soiled.	➢ Clean initiator. ➢ Check thermal oil lines for leaks. Request After-Sales Service if the failure message cannot be cancelled.
Maximum temperature exceeded fault	The maximum temperature of the press has been exceeded.	➢ Check the thermal oil system (see also the enclosed manufacturer's operating instructions for the thermal oil heating unit). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force fault maximum HOLD pressure exceeded	Pressure exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force fault maximum ramp pressure exceeded	Pressure exceeds the set maximum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force alarm minimum ramp pressure less than set value	Pressure is less than the set minimum tolerance (see configuration level on the PC).	➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Pressing force alarm minimum ramp pressure less than set value	Pressure is less than the set minimum tolerance (see configuration level on the PC).	➢ Check pressure ramp (pressure ramp too steep?). ➢ Check tolerances (see configuration level on the PC). Request After-Sales Service if the failure message cannot be cancelled.
Vacuum door opening fault	Vacuum door does not open. Vacuum chamber not completely vented.	➢ Check the vacuum chamber pressure sensor. ➢ Check the vacuum door drive.

Table 7-1 Malfunctions (continued)

Failure	Cause	Remedy
Vacuum monitoring time elapsed fault	The "vacuum reached" value required by the current recipe in the PLC control is not reached.	➢ Check correctness of the "vacuum reached" value. ➢ Check the vacuum pump. ➢ Check the vacuum system for leaks. Request After-Sales Service if the failure message cannot be cancelled.
Vacuum loss fault	When the vacuum is reached, it drops off again.	➢ Check the vacuum pump. ➢ Check the vacuum system for leaks. Request After-Sales Service if the failure message cannot be cancelled.

Table 7-1 Malfunctions (continued)

8 DECOMMISSIONING, DISMANTLING, DISPOSAL

8.1 Decommissioning

Temporary decommissioning

1. Clean the machine in accordance with Chapter 6.1.2.
2. Switch the machine off in accordance with Chapter 5.7.
3. Besides use of the lowering safeguards, additionally safeguard the moving press table with the transport safety devices (see Chapter 4.6).
4. Interrupt the machine's power supply (remove the mains plug or switch off the fuse and attach a suitable note).
5. Take appropriate precautions, depending on the location and duration of decommissioning or intermediate storage, in accordance with Chapter 3.3.

Final decommissioning

Protect the environment!

Owning to possible environmental pollution, have the machine disposed of by an authorised specialist company.

8.2 Information on disposal

Protect the environment!

Disposal is subject to legal regulations.

Dispose of used oil at an authorized acceptance point. More precise information can be had from the responsible administrative authority (water supervisory or trade supervisory board).

Have the following components, consumables and materials disposed of by an authorised specialist company:

- Components soiled with oil (e.g. hydraulic hoses, cylinder seals and oil filters) and consumables (e.g. oil binder, cleaning rags);
- Residues from the press and thus soiled consumables (e.g. cleaning rags);
- Buffer batteries
- Electrical and electronic components.