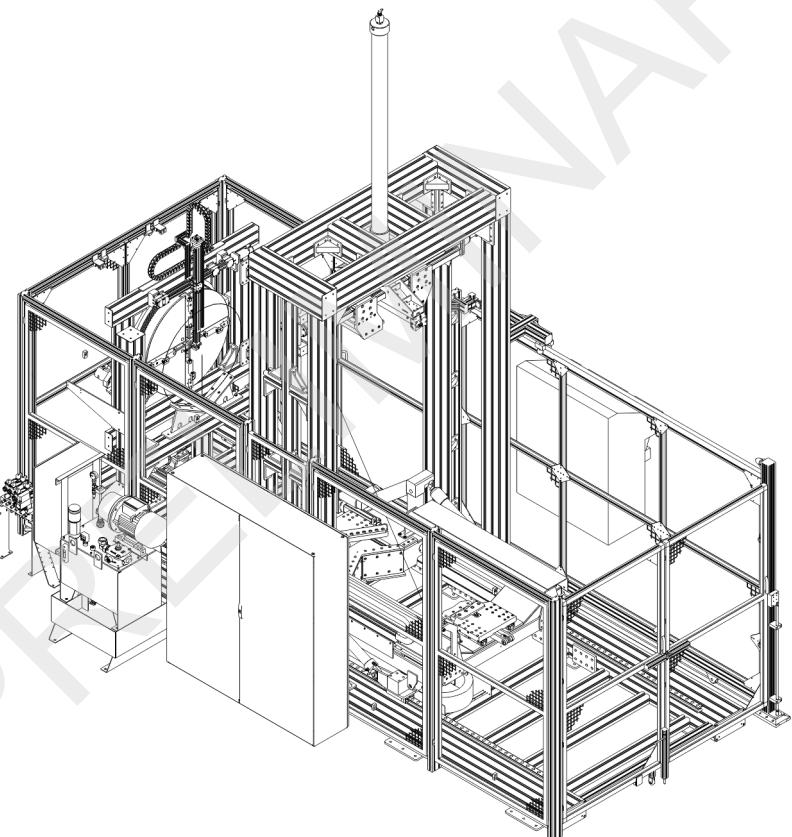


Centralizer Performance Test Stand 90kN



Serial number: 101 / 102

Original operating manual
Status: 10-2015

Product name Centralizer Performance Test Stand 90kN

Serial number 101 / 102

Part number 2427886

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Suggestions and comments ...regarding this documentation or the machine should be sent to the above address.

Most recent amendment 10-2015



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PRELIMINARY



1 Product information

In this section you will find information regarding the machine.

- Key data (Page 7)
- Designated Use (Page 7)
- Type Plate (Page 8)
- Technical Data (Page 8)
- Scope of Supply (Page 9)
- EU Declaration of Conformity (Page 10)

1.1 Key data

Key data of the machine

Machine type:	Centralizer Performance Test Stand 90kN
Machine numbers	101 (Unit, Germany) 102 (Unit, USA)
Year of manufacture	2015

1.2 Designated Use

The machine is intended exclusively for the performance of tests on centralizers.

A different application or an application in excess of the intended rating does not comply.

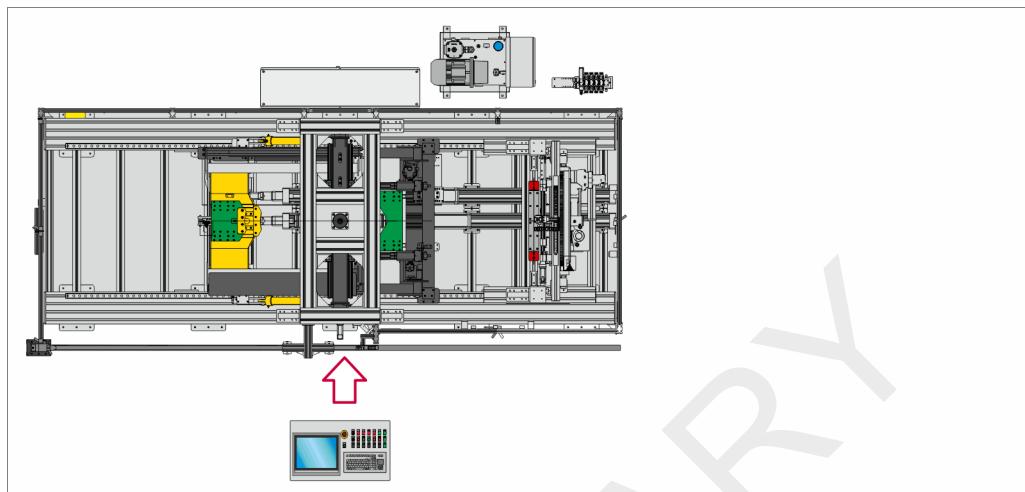
Info



The manufacturer will not accept any liability for damage resulting from any use of the machine that is not in accordance with its designated use.

1.3 Type Plate

The type plate of the machine can be found at the following location:



Location of the type plate

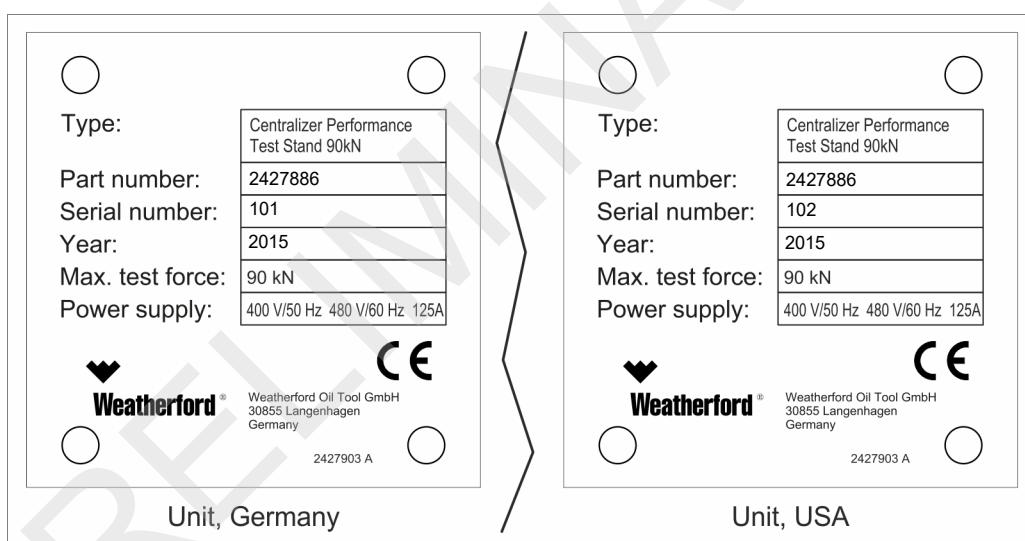


Illustration of the type plate

1.4 Technical Data

Technical Data

Dimensions (length x breadth x height)	5.980 mm (19.619 ft) x 2.500 mm (8.202 ft) x 5.900 mm (19.356 ft)
Weight	approx. 6.500 kg (14.330,047 lbm)
Electrical connection	400 V / 50 Hz 480 V / 60 Hz 125 A
Maximum test force	90 kN
Permissible ambient temperature	- 5 °C (23 °F) to + 40 °C (104 °F)
Noise emission	67 dB [A]



Pipe diameter

Minimum diameter: inner pipe	60 mm (2.362")
Maximum diameter: inner pipe	815 mm (32.087")
Minimum diameter: external pipe	88,9 mm (3.5")
Maximum diameter: external pipe	915 mm (36,024")

Pipe length

Inner pipe length	1,450 mm (57,087")
External pipe length	930 mm (36,614")

1.5 Scope of Supply

The machine is supplied in completely assembled segments. Assemble these segments into a complete machine before starting up.

The completeness of the scope of delivery must be checked on receipt of the goods. The Weatherford Oil Tool GmbH firm must be informed immediately in writing regarding any missing or damaged parts.

1.5.1 Standard accessories

No accessories are supplied with the machine:

1.5.2 Spare parts

No spare parts are delivered with the machine. Spare parts can be obtained on request. The spare parts list and the parts list are to be found in the supplier documentation.

1.5.3 Applicable documentation

All supplied documentation is considered to be applicable documentation. Archive the complete supplier documentation received from the manufacturer. The following documentation forms part of the scope of supply of the machine:

- Wiring diagrams / circuit diagrams
- Power unit (Viereck)
- API 10D

1.6 EU Declaration of Conformity

 Weatherford®	EC-Declaration of Conformity																												
Weatherford Oil Tool GmbH Münchner Strasse 52 30855 Langenhagen Germany																													
4-38-0136 A1.docx																													
<p>We,</p> <p style="text-align: center;">Weatherford Oil Tool GmbH,</p> <p>herewith declare that the following product complies with the mentioned European Directives at the time it was brought into circulation by us.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Description of Product:</td> <td colspan="2" style="width: 70%;">Automated hydraulic pressure test stand for Weatherford centralizers</td> </tr> <tr> <td>Type of Product:</td> <td colspan="2">Centralizer performance test stand 90KN</td> </tr> <tr> <td>Product Type Reference Nos.:</td> <td colspan="2">2427886</td> </tr> <tr> <td>Serial Numbers:</td> <td colspan="2">101 ff.</td> </tr> <tr> <td>European Directives:</td> <td>2006/42/EC</td> <td>Machinery Directive</td> </tr> <tr> <td></td> <td>2006/95/EC</td> <td>Low Voltage Directive</td> </tr> <tr> <td></td> <td>2004/108/EC</td> <td>EMC Directive</td> </tr> <tr> <td>Harmonized Standards:</td> <td>EN 12100:2010, EN 60204-1:2006, EN 61000-6-2:2005, EN 61000-6-4:2007</td> <td>EN 13849-1:2008, EN 4413:2010, EN 61000-6-4:2007</td> </tr> <tr> <td>Documentation by:</td> <td colspan="2">Weatherford CE Test Report 4.38.5206</td> </tr> </table>			Description of Product:	Automated hydraulic pressure test stand for Weatherford centralizers		Type of Product:	Centralizer performance test stand 90KN		Product Type Reference Nos.:	2427886		Serial Numbers:	101 ff.		European Directives:	2006/42/EC	Machinery Directive		2006/95/EC	Low Voltage Directive		2004/108/EC	EMC Directive	Harmonized Standards:	EN 12100:2010, EN 60204-1:2006, EN 61000-6-2:2005, EN 61000-6-4:2007	EN 13849-1:2008, EN 4413:2010, EN 61000-6-4:2007	Documentation by:	Weatherford CE Test Report 4.38.5206	
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EU Declaration of Conformity

As soon as this machine has been changed in a material way this declaration becomes null and void. A new conformity process in accordance with the EU Machine Directive is then required.



2 Notes for the Reader

In this chapter you will find information regarding the use of the operating manual.

- Validity (Page 11)
- Illustrations (Page 11)
- Abbreviations used (Page 11)
- Accentuated text (Page 12)

2.1 Validity

This original operating manual is valid for two machines "Centralizer Performance Test Stand 90kN" with machine numbers 101 / 102. The two machines are structurally identical.

This original operating manual contains information and the code of behaviour for the safe operating of the machine. Please read this original operating manual carefully before commissioning. Keep this original operating manual in a place where it is accessible to anyone.

In order to operate the machine effectively, this original operating manual provides inter alia information covering the following topics:

- Transportation of the machine, setting up and commissioning.
- Working with the machine
- Maintaining and servicing the machine
- Detecting and rectifying faults

This operating manual applies to:

- the operator
- all persons working on or with the machine.

2.2 Illustrations

The illustrations in this original operating manual show the machine in a partly simplified form. The positions of individual assemblies shown here can vary at the installation location.

2.3 Abbreviations used

The following abbreviations are used in this operating manual:

Abbreviations

PLC	Programmable logic controller
HPU	Hydraulic Power Unit

2.4 Accentuated text

In these Operating Instructions, important information is highlighted by symbols or special formatting. The following examples illustrate the most important types of highlighting.

- Safety Note (Page 12)
- Safety instruction (Page 12)
- Warning note (Page 13)
- Guideline (Page 13)
- Sequence of actions (Page 14)
- Pictograms (Page 14)

2.4.1 Safety Note

Safety instruction: Special note for an informative section

Explanation of the note.

- The dot identifies measures that relate to the note.

2.4.2 Safety instruction

Safety Instruction

For safe implementation, keep precisely to the following steps:

1. First step of a safety instruction.
 Important tip regarding this step.
2. Second step of a safety instruction.
 The result of this step.
 The safety instruction is complete, the goal of the safety instruction has been achieved.



2.4.3 Warning note



DANGER

Warning: Fatal injuries.

Ignoring the warning can result in serious damage to health, including death.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.



WARNING

Warning: Serious Injuries.

Failure to observe the warning can cause serious damage to health, or even death.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.



CAUTION

Warning: Injuries.

Failure to observe the warning can result in serious damage to health.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

NOTICE

Warning: Damage to property.

Non-observance of the warning can cause serious damage to the machine or in its vicinity.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

2.4.4 Guideline

Carry out the following steps: = Start of a set of instructions.

1. First step in a sequence of operations.

Required settings Setting values

2. Second step in a sequence of operations.

→ The result of this step.

✓ The operation is complete, the goal has been achieved.

2.4.5 Sequence of actions

Sub-goal of the first sequence of actions



Carry out the following steps: = Start of the first working guide.

1. First step in the first sequence of actions.
 - First alternative guideline to the step.
 - Second alternative guideline to the step.
 - ...
 - Last alternative guideline to the step.
2. Second step in the first sequence of actions.
 - !** Important tip regarding this step.

Sub-goal of the first sequence of actions has been achieved.

Sub-goal of the second sequence of actions



Carry out the following steps: = Start of the second working guide.

- Only step in the second sequence of actions.
- ? *Problem An expected fault has arisen*
Cause of the fault
→ Troubleshooting Table

Sub-goal of the second sequence of actions has been achieved.

- ✓ The operation is complete, the goal of the sequence of action has been achieved.

2.4.6 Pictograms

Pictograms used

Pictogram	Meaning
	Further useful information.
	Requirements that must be fulfilled, in order to perform an action.
	Tool or material required, in order to perform an action.



3 Safety

This chapter contains information regarding the safe operation of the machine.

- Safety instructions (Page 15)
- Local regulations (Page 19)
- Operator's Duties (Page 19)
- Qualification of Staff (Page 21)
- Safety devices (Page 23)
- Lockout/Tagout procedure (Page 28)
- Signs on the machine (Page 31)
- Residual Risk (Page 32)
- Instructions for first aid (Page 36)
- Reaction in the case of fire (Page 37)

3.1 Safety instructions

These safety instructions are directed at the operating company and the operator of the machine.

- Notes for operational safety (Page 15)
- Notes regarding operation (Page 16)
- Notes regarding commissioning (Page 16)
- Instructions for tagout (Page 17)
- Instructions for recommissioning (Page 17)
- Notes on maintenance and repair (Page 17)
- Notes regarding transportation (Page 18)
- Notes on environmental protection (Page 18)
- Improper Operating Conditions (Page 18)

3.1.1 Notes for operational safety

The machine is safe to operate. It was built according to state-of-the art standards.

Nevertheless, the machine can pose hazards:

- if the machine is not used in accordance with its intended use,
- if the machine is not used correctly,
- if the valve is operated under impermissible conditions.

The following instructions apply to anyone who works on or with the machine:

- When performing any work on the machine, follow the factory regulations laid down for it.
- Ensure that no one can be injured by moving machine parts during cleaning and refitting work.
- Ensure that all protective safety devices are installed.
- Report any changes in the sequence of movements or faults immediately.
- Always wear close-fitting clothing and do not wear objects such as necklaces or bracelets that can be caught up in the moving assemblies.

3.1.2 Notes regarding operation

Safety-conscious and pre-emptive behaviour on the part of personnel will prevent dangerous situations during operation.

Take note of the following points when dealing the machine

- Install and operate the machine only using personnel who are qualified to do so.
- Rectify faults only when the machine is switched off in the "Safe Off" condition. Take the machine out of operation according to the Lockout/Tagout procedure (see page 30: Performing the lockout/tagout procedure).
- Changes to the software of the programmable control systems are forbidden. If changes must be made, contact the manufacturer.
- Never change, dismantle or bypass the safety devices.
- Never take the safety devices out of operation.
- Never undertake constructional changes to the machine.
- Never change the working areas.
- Any change on the machine must be reported immediately to the responsible person.
- Always keep the danger zones unobstructed. Persons may only enter the danger zones if the machine has been disconnected from the electrical power supply. Never place objects in the danger zones.
- Monitor the machine permanently during operation. Switch the machine off immediately in the event of a malfunction.
- Never climb onto the machine. Always use suitable climbing aids, such as fixed ladders with handrails.

3.1.3 Notes regarding commissioning

The following principles apply to commissioning:

- Ensure that the machine is only set up and installed by personnel qualified to do so.
- Never make changes to the software of the programmable control systems.
- Ensure that the danger zones are clear when the machine is switched on.



3.1.4 Instructions for tagout

The following principles apply to tagout:

- Disconnect the machine from the mains.
- Clean the machine of all material residue, tools and contamination.

3.1.5 Instructions for recommissioning

The following principles apply to recommissioning:

- Ensure that the work area is free of equipment, tools and material.
- Completely remove any liquids that may have spilled.
- Restore all connections as required faultlessly.
- Ensure that all safety devices are complete and function faultlessly.

3.1.6 Notes on maintenance and repair

Safety-conscious and pre-emptive behaviour on the part of personnel will prevent dangerous situations from arising during maintenance and repair work.

For maintenance and repair, the following principles apply:

- Maintain the intervals prescribed in the maintenance schedule.
- Ensure that the maintenance and repair tasks are performed only by personnel qualified to do so.
- Before performing maintenance or repair, shut the machine down according to the Lockout/Tagout procedure (see page 30: Performing the lockout/tagout procedure).
- Disconnect the machine from the mains.
- Block off access by unauthorised personnel Set up warning signs that indicate the maintenance and repair tasks, as necessary.
- When changing parts, only suitable, fault-free load-lifting equipment and lifting tackle must be used.
- Never climb onto the machine. Always use suitable climbing aids, such as fixed ladders with handrails.
- For maintenance work, keep an adequate working distance of at least 80 cm around the machine free of objects.

3.1.7 Notes regarding transportation

Safety-conscious and pre-emptive behaviour on the part of personnel will prevent dangerous situations during transport.

For transportation the following principles apply:

- Only allow properly qualified staff may carry out transportation.
- Block off access by unauthorised personnel If required, signs should be set up, indicating the transportation operations.
- Properly secure moving parts.
- When transporting, only suitable, fault-free load-lifting equipment and lifting tackle must be used.
- When transporting, take into account the mass as well as the centre of gravity of the machine.

3.1.8 Notes on environmental protection

Safety-conscious and pre-emptive behaviour on the part of personnel will avoid environmentally hazardous effects.

To act in an environmentally responsible manner, the following principles apply:

- Ensure that environmentally hazardous substances do not enter the soil or the sewage system.
- Always abide by regulations concerning the avoidance, disposal and recycling of waste.
- Ensure that environmentally hazardous substances are stored in suitable containers.
- Clearly identify the containers with environmentally hazardous materials.

3.1.9 Improper Operating Conditions

Operational safety cannot be guaranteed under impermissible conditions. Avoid improper operating conditions on all accounts.

The machine may not be operated only the following circumstances.

- People or objects are in the danger zone.
- Safety installations are not functioning or have been removed.
- Errors in function have been detected.
- Damage has been detected.
- Service intervals have been exceeded.
- Operating parameters have been changed in a prohibited manner.
- The control system has been improperly altered.
- The machine has been changed, for example: converted.



3.2 Local regulations

In addition to these instructions, the proper use of this machine is determined by laws and regulations.

The following regulations apply to the operation of the machine:

- Regulations governing the the operation of machines (including laws and regulations not expressly named here),
- Accident prevention regulations,
- Internal company regulations'
- Notes on the machine.

3.3 Operator's Duties

In this section you will find information regarding the duties of the machine operator.

- Planning and checking safety measures (Page 19)
- Minimising the risk of injury (Page 19)
- Operating the machine in a faultless condition (Page 20)
- Precautions against fire (Page 20)

3.3.1 Planning and checking safety measures

The operator's duty of care includes planning the necessary safety measures and checking that these measures are observed.

3.3.2 Minimising the risk of injury

The following principles apply in minimising the risk of injury:

- Work on the machine may only be performed by qualified personnel.
- The personnel must be authorised by the operator for the activity concerned.
- Before commencing work, the personnel must have familiarised themselves with all safety devices.
- Equip your personnel with padlocks, so that the lockout/tagout procedure can be performed.
- Keep an adequate supply of closing devices at a central point for the lockout/tagout procedure.
- Keep an adequate supply of identification signs at a central point for the lockout/tagout procedure.
- Ensure that your personnel secure the machine against unintended reactivation after the lockout/tagout procedure. Check regularly, to see if your personnel stick to this!
- Tidiness and cleanliness must be maintained at the machine, its surroundings as well as the work places.

- Mark the work areas of the machine on the factory floor. Ensure that the work areas are always free of objects.
- The personnel must wear the protective equipment prescribed for this machine. The required protective equipment is laid down in the factory regulations.
- Qualified first-aiders must be on call during the operation of the machine, so that the necessary first aid measures can be taken if required.
- Processes, competencies and responsibilities with regards to the machine must be laid down unambiguously. Everybody must know what to do in case of an emergency. Personnel must be instructed regularly in this regard.
- Warning signs and instructions on the machine must be complete and clearly legible. Clean the warning signs and instructions regularly. Replace them as required.
- Missing signs must be replaced immediately.
- Safety devices must never be bypassed. Check regularly, to see if your personnel stick to this!

3.3.3 Operating the machine in a faultless condition

For fault-free operation, the following principles apply:

- Store the instruction manual in a complete, legible condition in a place where it can be accessed by anyone in the operating location of the machine.
- The machine must only be used in an appropriate manner.
- The machine must only be operated in a fault-free and properly functioning condition.
- The operational safety of the machine must be checked before commencing work.
- The proper functioning of the machine and the safety installations must be checked regularly.

Info



Carry out regular checks. In this manner, you can ensure that these measures are actually observed.

3.3.4 Precautions against fire

The operator is compelled to provide appropriate equipment for a fire and must train his personnel accordingly.

- Only use fire extinguishers that are suitable for your machine.
- Place the fire extinguishers in direct proximity to the danger zones.
- Perform the prescribed servicing of the fire extinguishing devices at regular intervals.
- Perform evacuation drills at regular intervals.



3.4 Qualification of Staff

All work on the machine requires the personnel to have special knowledge and skills.

Anyone who works on the machine must satisfy the following requirements:

- Personally suitable for the relevant task.
- Sufficiently qualified for the relevant task.
- Trained to handle the machine.
- Familiar with the safety devices and their function.
- Familiar with this operating manual, especially with the safety instructions and the sections that are relevant to the task at hand.
- Familiar with the basic regulations with regard to occupational health and safety and accident prevention.

Basically, the personnel must have at least one of the following minimum qualifications:

- Trained as a specialist, in order to work on the machine independently.
- Sufficient instruction to work on the machine under the supervision and direction of a qualified specialist.

The following user groups are distinguished in this operating manual:

User groups	
Staff	Qualifications
Operating staff	<p>Appropriate instruction in terms of:</p> <ul style="list-style-type: none">• Functional processes of the machine• Operating processes• Quality control <p>Knowledge in terms of:</p> <ul style="list-style-type: none">• Lines of authority and responsibilities with respect to the task.• What to do in case of an emergency
Machine setter	<p>Authorisation for the actions:</p> <ul style="list-style-type: none">• Starting the machine up on a daily basis• Resetting the emergency stop function• Making settings on the control system.• Switching the machine to the "Manual" mode.• Performing manual movements on the machine. <p>Sound knowledge of the test process and the programmable parameters therein.</p> <p>Well-founded knowledge regarding the settings and their effect on the machine.</p> <p>Well-founded knowledge of the structure and functioning of the machine.</p>

User groups (Cont.)

Staff	Qualifications
Maintenance staff	<p>Sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Mechanical equipment • Electrical equipment <p>Authorisation for the tasks (in accordance with the standards of safety technology)</p> <ul style="list-style-type: none"> • Setting devices into operation • Earthing of devices • Marking of devices <p>Authorisation for the actions:</p> <ul style="list-style-type: none"> • Switching the machine on • Resetting the emergency stop function • Switching the machine to the "Manual" mode. • Performing manual movements on the machine. <p>Well-founded knowledge of the structure and functioning of the machine.</p> <p>Safe mastery and performance of the lockout/tagout procedure.</p>

The following tasks may only be performed by personnel with specialised knowledge:

User groups

Task:	Qualifications
Work on hydraulic installations	Special knowledge and experience concerning hydraulic systems
Work on electrical installations	Electricians or Instruction; the work may be performed under the guidance and supervision of an electrician in accordance with the electro-technical regulations.
Work on mechanical installations	Industrial mechanics or Instruction; the work may be performed under the guidance and supervision of an industrial mechanic in accordance with the technical regulations.



3.5 Safety devices

This chapter contains information regarding the safety devices of the machine.

- Notes regarding safety devices (Page 23)
- Fixed safety devices (Page 23)
- Movable safety devices (Page 24)
- Signalling devices (Page 24)
- Emergency stop devices (Page 25)
- Triggering the emergency stop function (Page 26)
- Resetting the emergency stop function (Page 27)

3.5.1 Notes regarding safety devices

Safety devices have been installed at hazardous areas of the machine.

Without properly set-up safety devices, persons working on the machine may suffer fatal injury. Safety devices must not be modified, removed or taken out of service. All safety devices must be accessible at any time.

The machine is equipped with safety devices at hazardous places. Familiarise yourself with all safety devices, so that injury to personnel and machine failures can be minimised in the event of an emergency.

3.5.2 Fixed safety devices

Fixed safety devices secure hazardous areas on the machine. They have no effect on the movements of the machine.

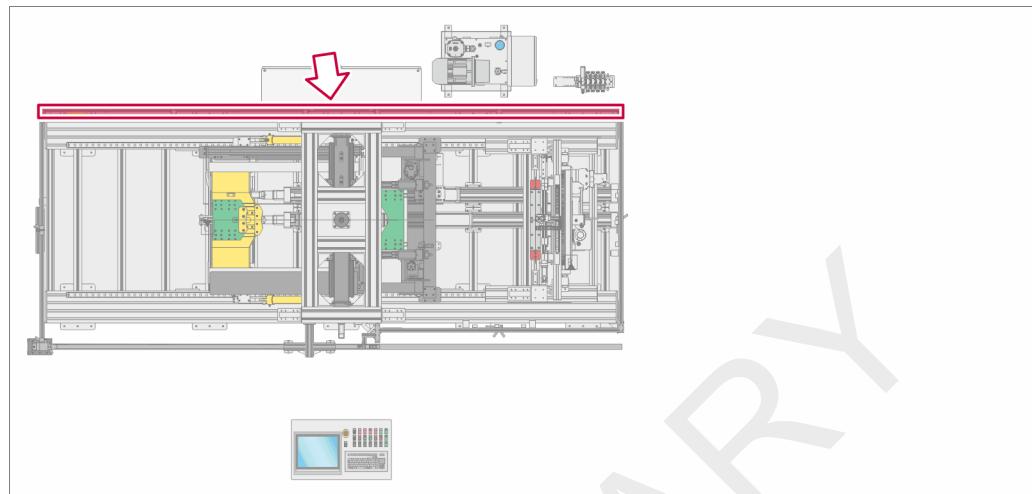
The fixed safety devices consist of:

- Protective covers
- Hoods and cladding
- Maintenance hatches
- Safety valves
- Position sensors

Fixed safety devices prevent or hinder direct access to:

- rotating and/or moving parts of the machine,
- parts of the machine connected to the electrical power supply,
- parts of the machine subjected to pressure,
- hot machine parts

The fixed safety devices may only be removed for maintenance tasks or repair tasks. The fixed safety devices must be re-installed before taking back into service. The machine is completely enclosed.



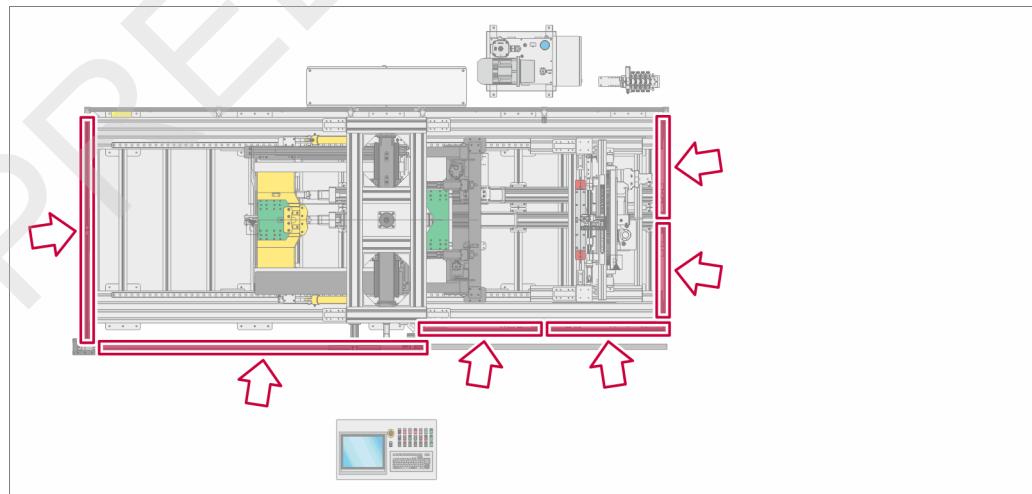
Fixed safety devices

3.5.3 Movable safety devices

The following movable safety devices are installed on the machine:

- Swing door
- Sliding door
- Hinged doors

All moving safety devices are monitored by sensors. As soon as a door is opened, the "Safety doors open" function is triggered. In doing so, the 480 V voltage as well as all motors are switched off.



Movable safety devices

3.5.4 Signalling devices

The machine is not equipped with any signalling devices.



3.5.5 Emergency stop devices

The emergency stop switch triggers the emergency stop function. The machine is stopped safely. You can trigger the emergency stop function at any time by means of the emergency stop switch (see page 26: Triggering the emergency stop function).

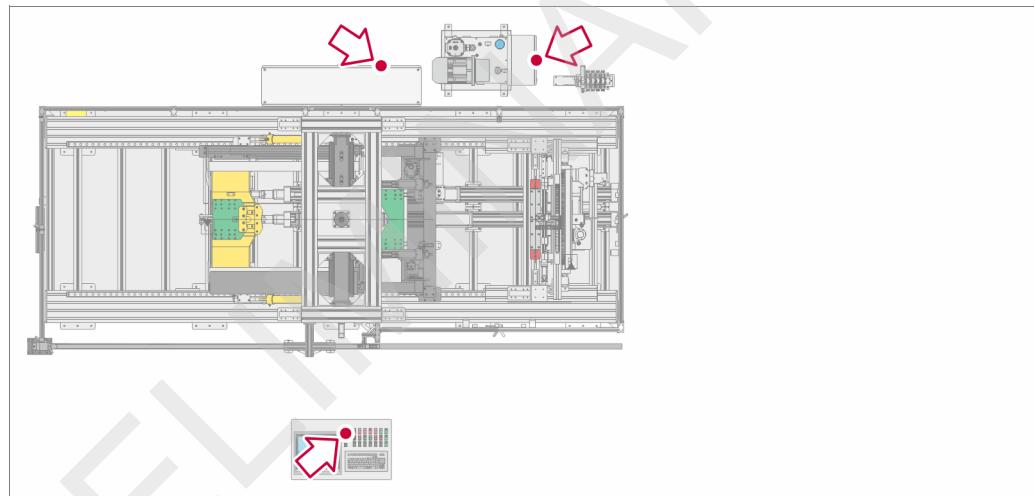
The emergency stop function is also triggered by the following scenarios:

- Loss of serviceability of the control system.
- Loss of control voltage.

The machine is equipped with three fixed emergency-stop devices:

- Emergency stop switch at the operator panel
- Emergency stop switch at the control box
- Emergency stop switch at the switch box of the power unit.

In addition to the three fixed emergency stop switches, there is an emergency stop switch on the manual mode remote control. The manual mode remote control is not linked to any fixed location..



Location of the fixed emergency stop switches on the machine

The emergency stop function has the following effects on the machine and its movements.

- The power supply to the actuators and drives is switched off.
- All process movements are stopped.
- The power unit is switched off.

3.5.6 Triggering the emergency stop function

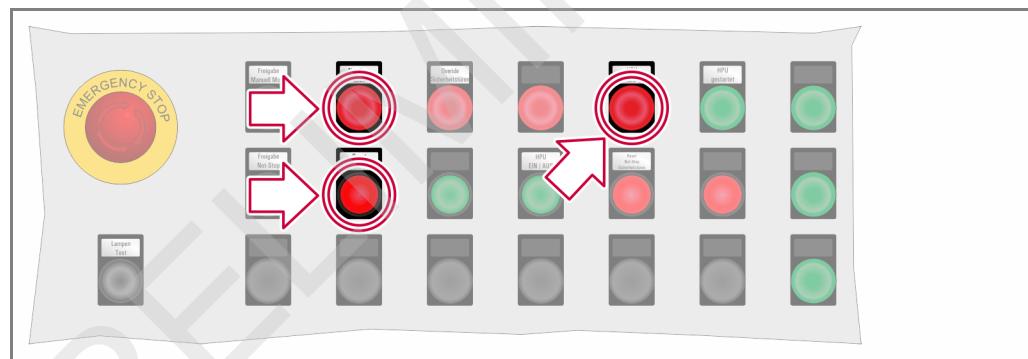
Only touch the emergency stop switch in the event of an emergency, to stop the machine.

Safety instruction: Misuse of the emergency stop function

The emergency stop function is only intended for an emergency. In normal use, switch the machine off as prescribed (see page 204: Operation > Daily tagout).

Carry out the following steps:

1. Press an **EMERGENCY STOP SWITCH**.
 - The **EMERGENCY STOP SWITCH** latches in the pressed position.
 - The power supply to the actuators and drives is switched off. All process movements are stopped.
 - The control system prevents the unintended restarting of the machine.
 - The **POWER UNIT** is switched off.
 - The **ELECTRICAL SYSTEM MAIN SWITCH** of the machine remains in the **on** position.
 - The 24V DC control voltage is not switched off.
 - The **EMERGENCY STOP ACTIVE** and **HPU FAULT** indicator lamps, as well as the **RESET EMERGENCY STOP** illuminated button on the **OPERATOR PANEL** glow continuously.



2. Inform your supervisor immediately.

✓ Done.

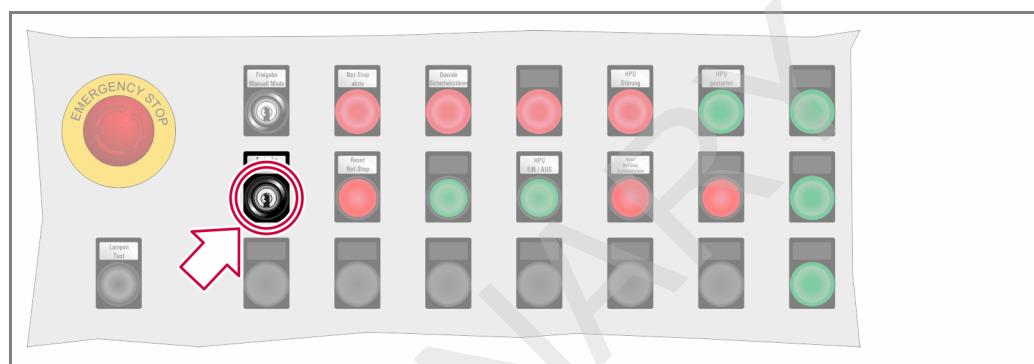


3.5.7 Resetting the emergency stop function

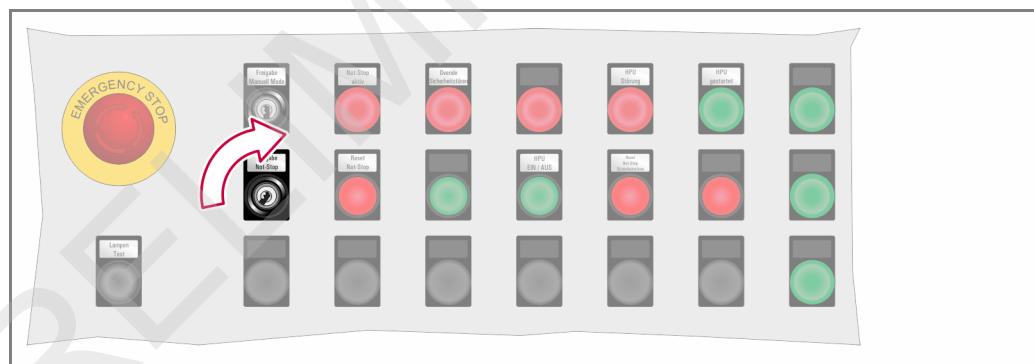
If there is no danger: Before taking the machine back into use, reset the emergency stop function.

Carry out the following steps:

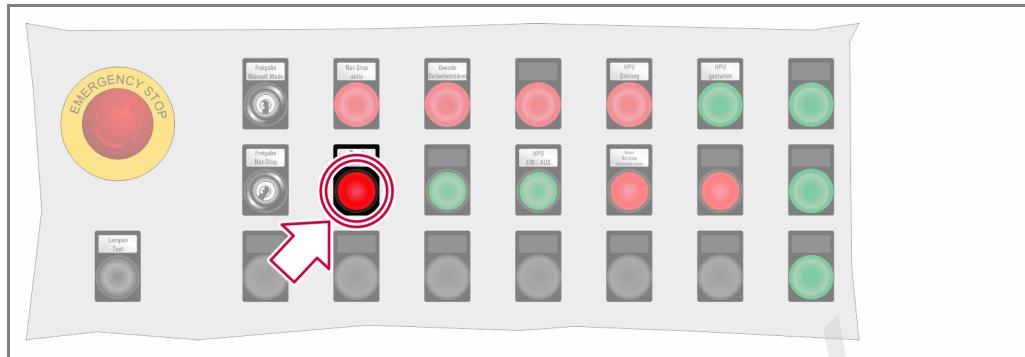
1. Turn and pull the cap of the **EMERGENCY STOP SWITCH**.
→ The cap of the emergency stop switch jumps back to the initial position.
2. Insert the key into the **EMERGENCY STOP RELEASE** key switch on the **OPERATOR PANEL**.



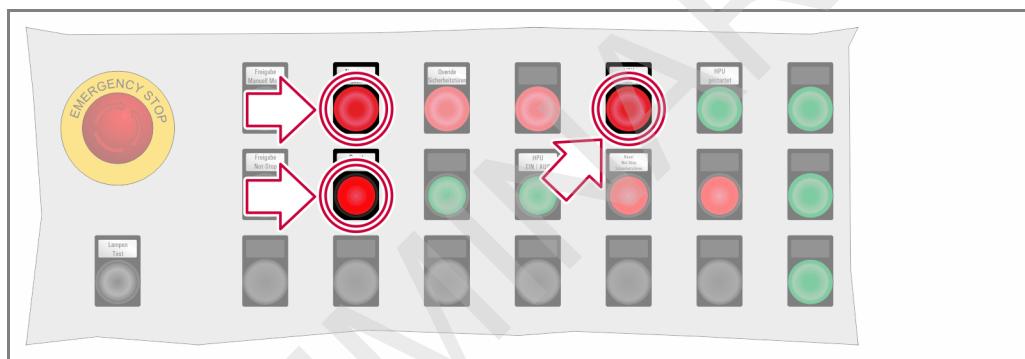
3. Turn the key in the **EMERGENCY STOP RELEASE** key switch on the **OPERATOR PANEL** clockwise to Position 1.



4. Press the **<RESET EMERGENCY STOP>** illuminated switch on the **<OPERATOR PANEL>**.



- The emergency stop function has been acknowledged.
- The **<EMERGENCY STOP ACTIVE>** indicator lamp as well as the **<RESET EMERGENCY STOP>** illuminated switch on the **<OPERATOR PANEL>** go out. The **<HPU FAULT>** indicator lamp goes out a few seconds later.



5. Turn the key in the **<EMERGENCY STOP RELEASE>** key switch on the **<OPERATOR PANEL>** counter-clockwise to Position 0.
6. Switch the **<POWER UNIT>** on (see page 180: Operation > Switching on the power unit).

✓ Done.

3.6 Lockout/Tagout procedure

This chapter contains information regarding the lockout/tagout procedure.

- Functional principle (Page 29)
- Instructions (Page 29)
- Lockout/Tagout points (Page 29)
- Performing the lockout/tagout procedure (Page 30)

3.6.1 Functional principle

The lockout/tagout procedure is a procedure for the safe switching off of utility supplies to the machine. In this process, the respective main switch of the supply that has been switched off is secured by means of a padlock. The maintenance technician attaches the padlock and locks it (lockout). In this way it is ensured that the machine can only be started up if the maintenance technician has removed the padlock.

In addition, an identification sign is applied to each padlock that has been used (tagout).

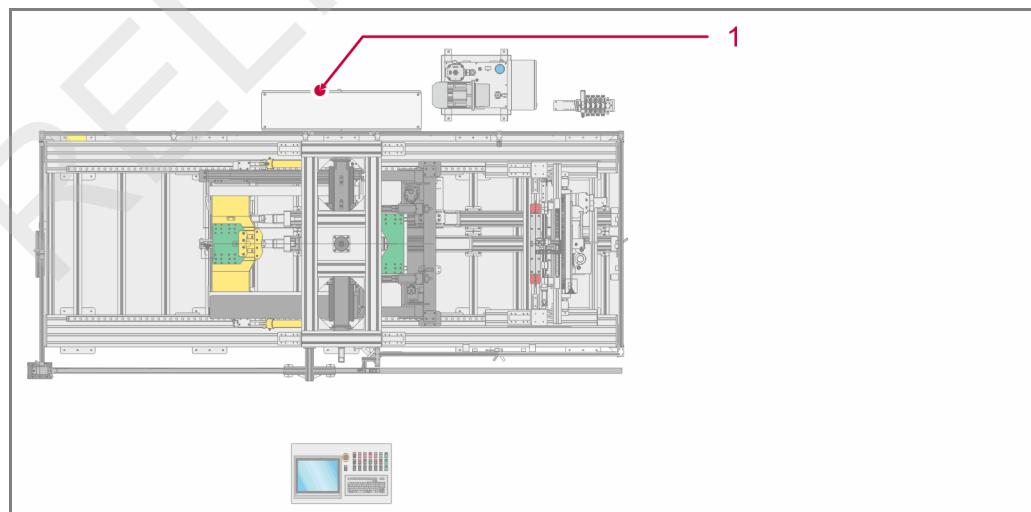
3.6.2 Instructions

Follow the following instructions for the lockout/tagout procedure.

- The lockout/tagout procedure is a procedure for the machine to be switched off safely.
- The lockout/tagout procedure offers protection against the machine being restarted unintentionally.
- The lockout/tagout procedure must always be performed in the case of maintenance and repair work on the machine.
- Take note of the internal "Locking and identification of lines in the event of maintenance and repair work" operating instructions.

3.6.3 Lockout/Tagout points

The machine must be switched off at the following Lockout/Tagout points. The machine is secured against an unintentional restart by means of a padlock at the lockout/tagout point.



Lockout/tagout points on the machine

Legend

No.	Designation
1	Main safety switches on the control panel

3.6.4 Performing the lockout/tagout procedure

Tools required:



- 1 padlock
- 1 identification sign



WARNING

Injury risk due to moving machine parts!

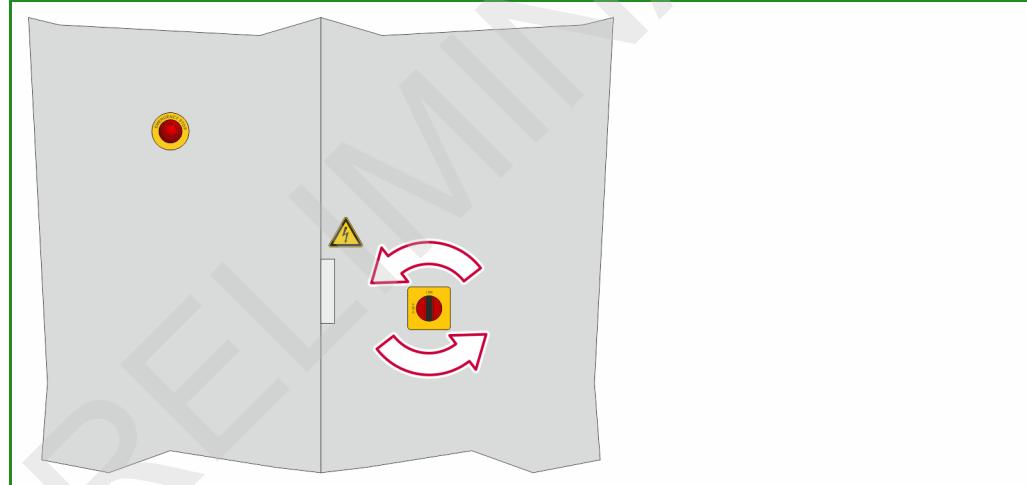
You can sustain severe crushing injuries if the machine starts up unexpectedly and performs process movements.

- Always perform the following safety instruction before performing maintenance and repair work.

Safety Instruction

For safe implementation, keep precisely to the following steps:

1. Turn the main safety switch on the control panel counter-clockwise to Position 0.



2. Secure the main safety switch with a padlock.
3. Remove the key from the padlock.
! Keep the key on your person.
4. Hand the identification sign on the machine.

The machine is in a safe condition.



3.7 Signs on the machine

Dangerous places on the machine are identified by signs (warning signs, prohibition signs, mandatory signs) in accordance with DIN 4844 and BGV A8.

Warning signs and other instructions on the machine must always be clearly legible. Illegible signs and instructions must be replaced immediately. Missing signs must be replaced immediately.

Overview of signs on the machine

Sign	Meaning
	Warning: Electrical current
	Warning: Laser beam
	Content: Laser radiation Do not look into the beam Class 2 laser according to DIN EN 60825-1:2001-11
	Content: $P \leq 1\text{mW}$ $\lambda = 655$

3.8 Residual Risk

The safety installations of the machine offer personnel effective protection against injury.

In the case of certain activities, remaining in hazardous areas is still unavoidable. In those areas, residual risks cannot be ruled out completely. Wearing personal safety equipment as well the safety-conscious and pre-emptive behaviour of personnel avoids dangerous situations from developing.

Residual risks on the machine and measures

Danger	Cause	Measure
Danger to life Crushing when transporting and setting up the machine.	The machine is large and heavy. A crushing hazard exists during transportation!	Always wear your personal safety equipment. • Safety shoes • Protective gloves Only use suitable transportation and lifting equipment. Never step underneath suspended loads!
Risk of injury Being knocked down when pipes are inserted.	The machine must be fitted with a pipe before a test run. In doing so, it is possible that a pipe may begin to swing. This may result in the risk of being knocked down by the pipe.	Fitting work may only be performed by one person. Ensure that no person remains in the area of the fitting work.
Risk of injury Crushing when clamping pipes	The pipes are clamped and centred on the table device with the aid of a clamp. There is a risk of being crushed in this process!	Always wear your personal safety equipment. • Safety shoes • Protective gloves Fitting work may only be performed by one person. Ensure that no person remains in the area of the fitting work. Never reach into the moving parts of the machine! Ensure that no-one can reach into moving machine parts.
Risk of injury Being crushed when performing maintenance work on the table device.	The table on the table device is swivelled with the aid of hydraulic cylinders. If the hydraulic system leaks, there is a risk of the upright table swivelling back on its own. When in the upright position, the table is not secured against dropping unintentionally if the hydraulic system is faulty. There is a risk of being crushed!	If possible, perform maintenance and repair work on the table only in the lowered condition. If the table must be placed upright for maintenance and repair work, secure the table with suitable load suspension and load lifting devices against unintentional dropping.



Residual risks on the machine and measures (Cont.)

Danger	Cause	Measure
Risk of injury Being pulled into the rotary table during maintenance work.	It is possible that manual movements may need to be performed in the event of maintenance and repair work. There is a risk of being pulled in!	Only perform manual movements of the rotary table while keeping a sufficiently safe distance. Ensure that no-one can reach into moving machine parts.
Danger of injury Being pulled in by process movements of the machine.	It is possible that manual movements may need to be performed in the event of maintenance and repair work. There is a risk of being crushed!	Only perform manual movements while keeping a sufficiently safe distance. Ensure that no-one can reach into moving machine parts. Ensure that there are no persons in the danger zone. If necessary, install a camera for interior monitoring.
Risk of injury Tripping while moving in the interior of the machine.	The danger zone (interior of the machine) can be accessed for maintenance and repair work. There is a risk of tripping!	Allow only skilled, trained personnel to perform the maintenance and repair work and to enter the danger zone.
Risk of injury Slipping while moving in the interior of the machine.	The danger zone (interior of the machine) can be accessed for maintenance and repair work. The machine operates with hydraulic fluid. There is a risk of slipping!	Allow only skilled, trained personnel to perform the maintenance and repair work and to enter the danger zone. Clean the slippery surfaces immediately after they have been identified. Dispose of the hydraulic fluid that has been collected in a proper manner.
Risk of injury In the case of maintenance and repair work	There is always a risk of injury during maintenance and repair work. There is a risk of persons being injured as a result of the lockout/tagout procedure being ignored.	Allow only skilled, trained personnel to perform the maintenance and repair work. Take the machine out of operation according to the lockout/tagout procedure before performing maintenance and repair work (see page 30: Performing the lockout/tagout procedure). Ensure that your personnel secure the machine against unintended reactivation after the lockout/tagout procedure. Check regularly, to see if your personnel stick to this!

Residual risks on the machine and measures (Cont.)

Danger	Cause	Measure
Risk of injury Crushing when opening and closing the swing door.	For operational reasons the machine must be fitted with pipes. To do so, the swing door must be opened. There are various squeeze points in the vicinity of the swing door.	Ensure that opening and closing of the door is performed by one person. Ensure that no persons are in close proximity to the swing door when this is being opened or closed. Always work in a safety-orientated manner.
Risk of injury Eye damage	The machine has Class 1 and 2 lasers. There is a risk of damage to the eyes in the event of long and direct eye contact with the laser beam.	Ensure that no-one looks directly into the laser beams. Check regularly, to see if your personnel stick to this!
Risk of injury Crushing when opening and closing the hinged doors.	There is a risk of the hands being crushed at a few places when opening and closing the hinged doors.	Ensure that opening and closing of the hinged doors is performed by one person. Ensure that no persons are in close proximity to the hinged doors when they are opened or closed. Always work in a safety-orientated manner.
Risk of injury Being crushed when closing the sliding door.	There is a risk of the foot being crushed when the sliding door is closed.	When closing the sliding door, never place a foot on the rail. Ensure that the hinged doors are closed by one person alone. Ensure that no persons are in close proximity to the sliding door when this is being closed. Always work in a safety-orientated manner.
Danger to life Electrical shock on the protective enclosure	The entire protective enclosure is connected with earthing cables. If one or more earthing cables are damaged, there is a risk of an electrical shock when touching the protective enclosure.	Ensure that the earthing cables are never removed. Replace the defective earthing cable immediately.
Danger to life Being crushed by moving machine parts.	All access points to the danger zone of the machine are monitored by sensors. If these sensors are bypassed or a person is deliberately locked in, there is a risk of fatality posed by the process movements of the machine.	Ensure that the safety devices of the machine are never bypassed or altered. Check regularly, to see if your personnel stick to this!



Residual risks on the machine and measures (Cont.)

Danger	Cause	Measure
Risk of injury Back problems and postural defects during operation.	The manner in which the machine operates offers many rest periods for the operator of the machine during the performance of the tests. There is a risk of back problems and postural defects if the operator sits continuously in his/her seat during operations.	Ensure that the operators do not merely sit during operations in automatic mode. It is possible to operate the operator panel while standing. Check regularly, to see if your personnel stick to this!

PRELIMINARY

3.9 Instructions for first aid

In this section you will find recommendations and directions for correct reaction to an accident occurring.

If you or another person is injured while working on the machine:

- Stay calm.
- Carry out first aid.
- In any event, contact the factory first aider.
- Inform the competent supervisor or his/her representative.

If you must make an emergency call, keep the following points in mind:

- What has happened?
- Where has it happened?
- Who is reporting?
- How many casualties?
- Wait for enquiries!

Info



Familiarise yourself with the alarm system and the rescue equipment at your place of work, such as: What is the emergency number? Where is the nearest telephone? Where is the nearest fire alarm? Where can I find a fire extinguisher? Where can I find the nearest first aid kit?

Attend a first aid course in order to be able to render immediate assistance in an emergency.



3.10 Reaction in the case of fire

In this section you will find recommendations and directions for correct reaction in the case of fire.

Approved and tested fire extinguishers are in the immediate vicinity of dangerous places

Correct procedure in the case of minor fires:

- Rescue all injured persons from the danger area and render first aid!
- Extinguish the fire that has broken out with a fire extinguisher in your vicinity!
- If the fire cannot be extinguished with a single fire extinguisher, ensure that further fire extinguishers are brought to the location of the fire. Avoid a long interruption in the attempts to extinguish the fire!
- If necessary, make an emergency call promptly (see page 36: Instructions for first aid)!
- Inform the competent supervisor or his/her representative!

Correct procedure in the case of major fires:

- Rescue all injured persons from the danger area and render first aid!
- Make an emergency call immediately (see page 36: Instructions for first aid)!
- Warn all persons and direct them to evacuate to the assembly point.
- Do not attempt any extinguish the fire! Do not place yourself in danger!
- Proceed to the assembly point specified for cases of fire
- If possible, close all open fire doors when evacuating.
- Inform the competent supervisor or his/her representative!

4 Overview of the machine

In this section you will find information regarding the use of the machine.

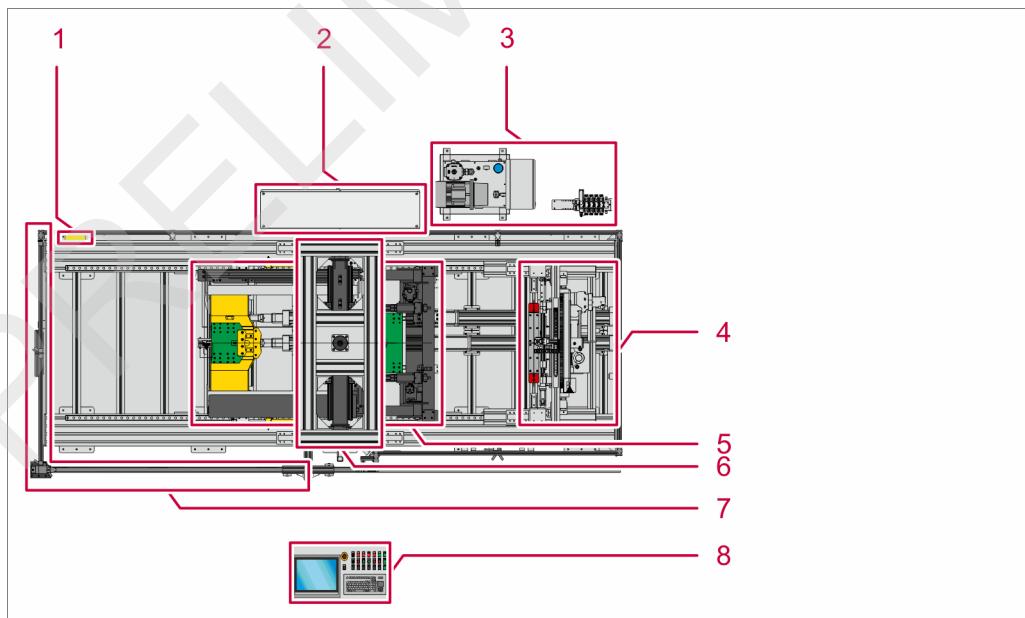
- Components of the machine (Page 38)
- Centralizer attachment variants (Page 48)
- Working area and danger zone (Page 52)
- Control elements (Page 53)
- Function description (Page 58)

4.1 Components of the machine

In this section you will find information regarding the components of the machine.

- Overview (Page 38)
- Power unit (Page 39)
- Rotary table (Page 40)
- Table device (Page 42)
- Protective enclosure (Page 44)
- Top side clamp (Page 47)

4.1.1 Overview



Parts of the machine - overview (plan view)

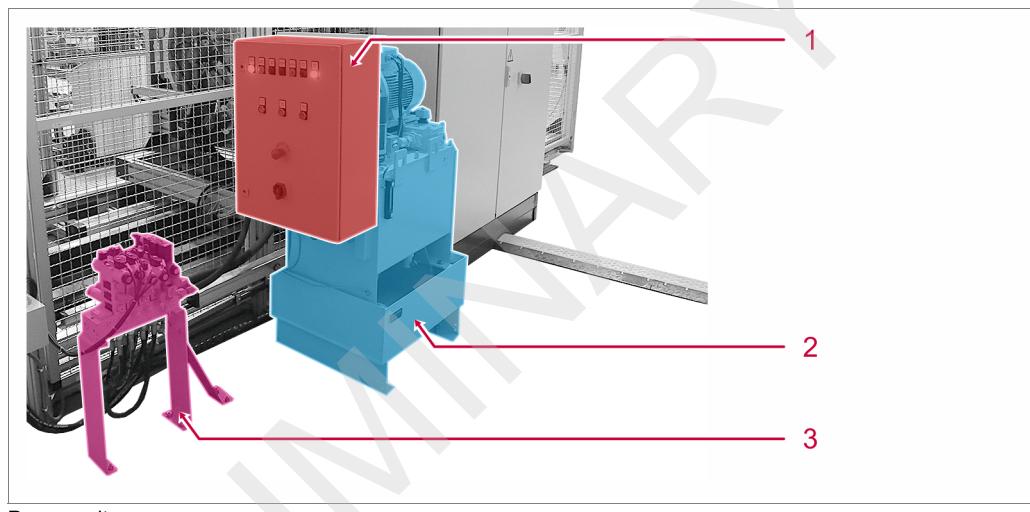
Legend

No.	Designation	Description
1	Remote control - Manual mode	See Section "Remote control - Manual mode" (Page 57).
2	Control box	See Section "Control box" (Page 53).
3	Power unit	See Section "Power unit" (Page 39).

Legend (Cont.)

No.	Designation	Description
4	Rotary table	See Section "Rotary table" (Page 40).
5	Table device	See Section "Table device" (Page 42).
6	Top side clamp	See Section "Top side clamp" (Page 47).
7	Protective enclosure	See Section "Protective enclosure" (Page 44).
8	Operator panel	See Section "Operator panel" (Page 54).

4.1.2 Power unit



Power unit

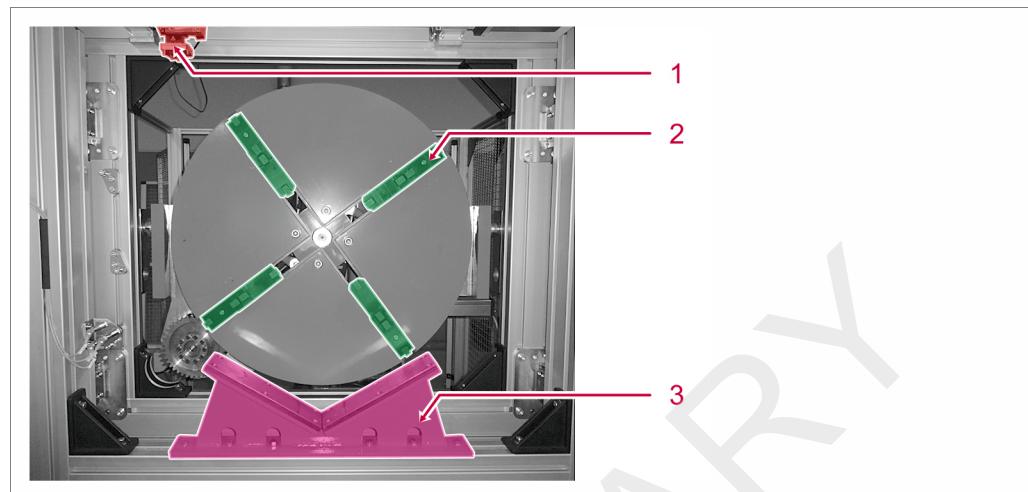
Legend

No.	Designation
1	Control box – power unit
2	Power unit
3	Valve terminal

The operator can read the temperature and the level of the hydraulic fluid at the power unit. Further information regarding the power unit and its components can be found in the documentation supplied (Viereck company).

4.1.3 Rotary table

4.1.3.1 Overview



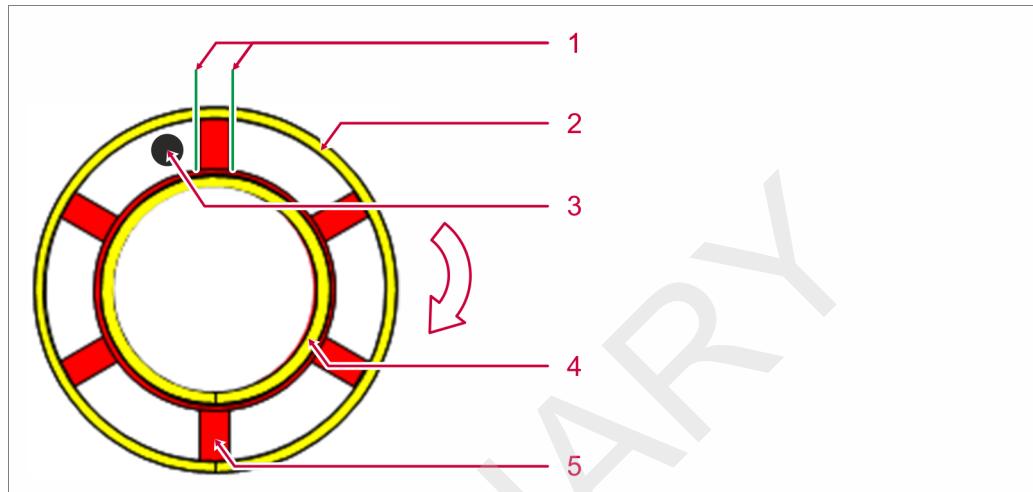
Rotary table – Overview

Legend

No.	Designation	Description
1	Bow recognition sensor	See Section "Bow recognition sensor" (Page 41).
2	Inner pipe clamping jaws	Clamps the inner pipe for the test to be performed. The clamping jaws can clamp the following inner-pipe diameters: <ul style="list-style-type: none">• minimum outer diameter: 60 mm (2,362")• maximum outer diameter: 815 mm (32,087")
3	Inner pipe support device	Serves as a support for the inner pipe while the test is being performed.

4.1.3.2 Bow recognition sensor

The bow recognition sensor detects the bows of the centralizer before the start of the test. In doing so, the clamp is rotated clockwise. The sensor scans the clamped inner pipe and transfers the actual condition to the control system. All measuring points are recorded at both the beginning and end of the respective bows.



Bow recognition sensor - Functional principle

Legend

No.	Designation
1	Measuring points of the bow recognition sensor
2	External pipe
3	Bow recognition sensor
4	Inner pipe
5	Centralizer

4.1.4 Table device

4.1.4.1 Overview

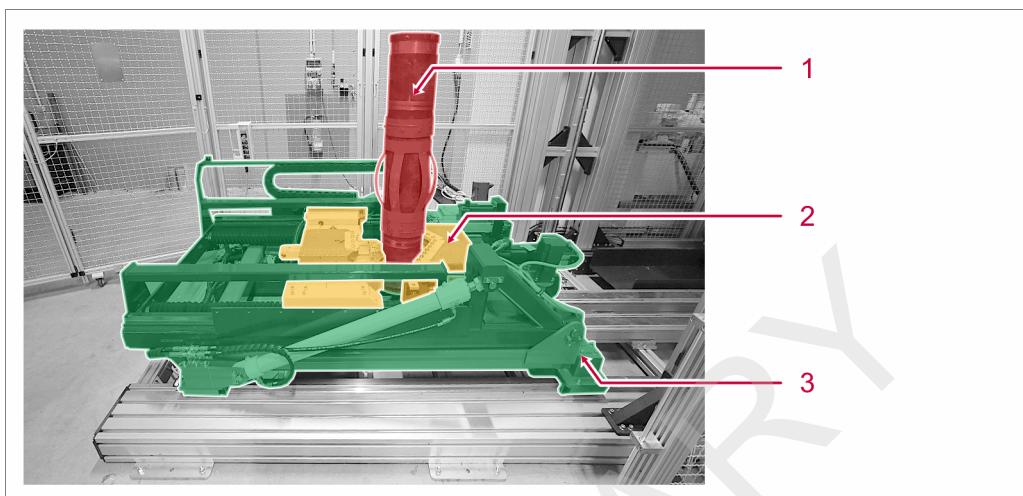


Table device - Overview

Legend

No.	Designation	Description
1	Inner pipe	Clamped inner pipe with centralizer mounted.
2	Clamp	See Section "Clamp" (Page 43).
3	Table	Serves to swivel the entire clamp. The table is swivelled if a test is to be performed in the vertical position.

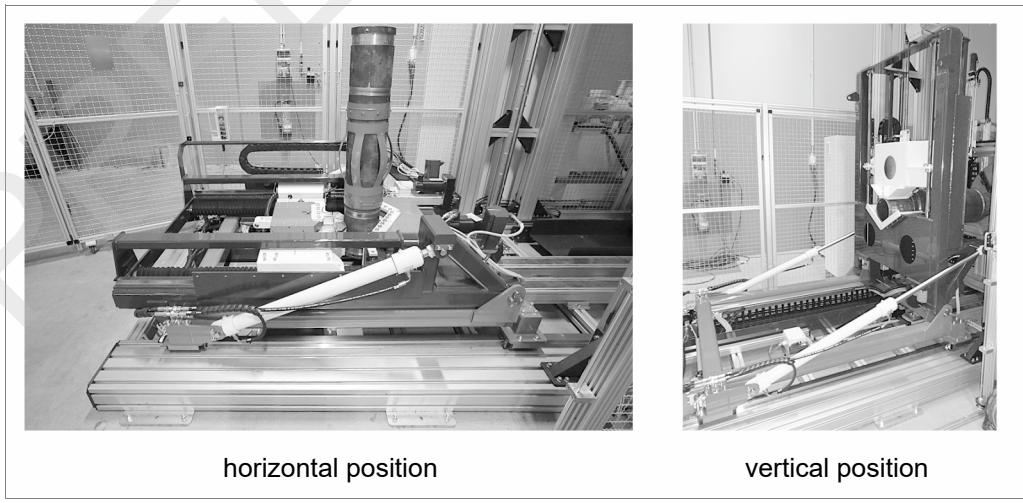


Table device - horizontal and vertical position

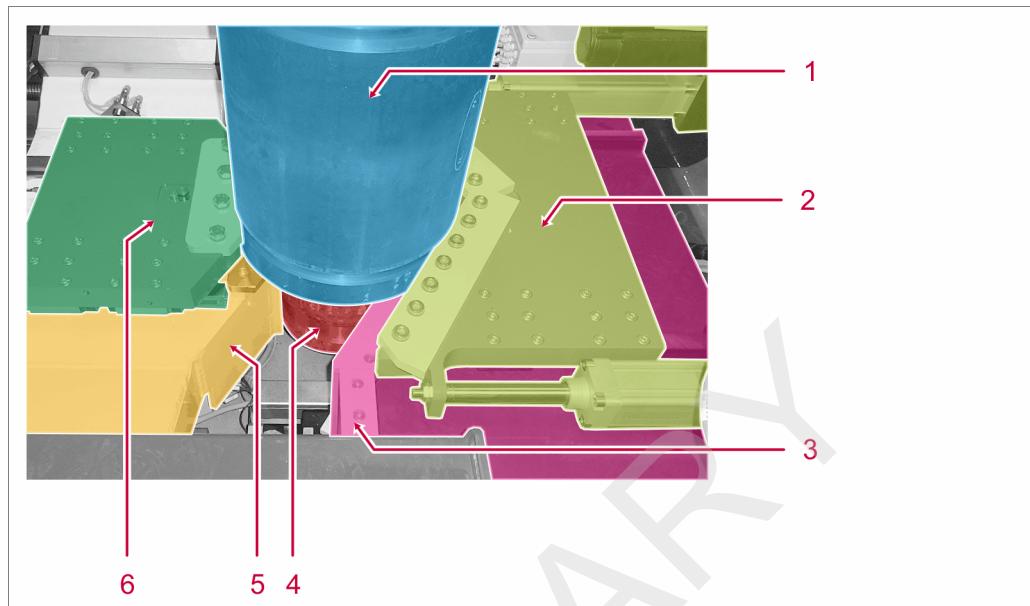
4.1.4.2 Clamp


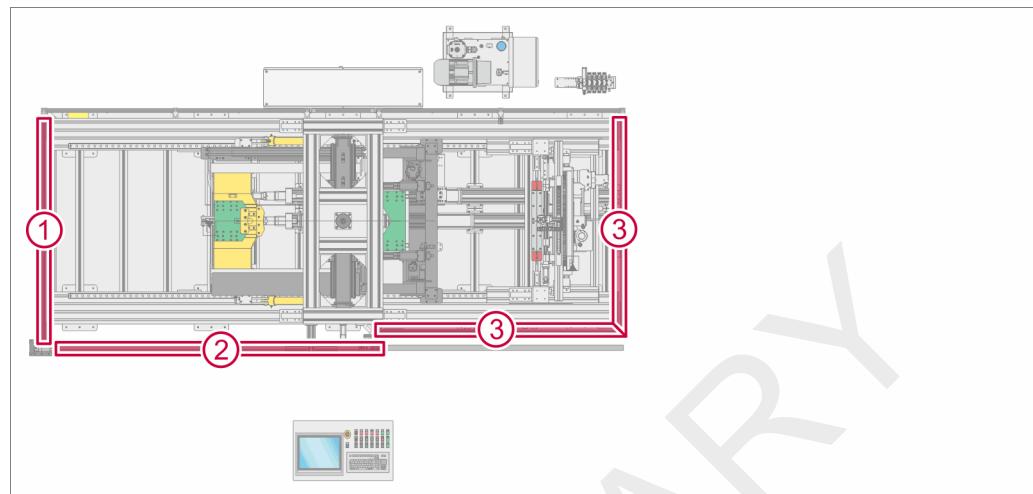
Table device - Clamp

Legend

No.	Designation	Description
1	External pipe	-
2	Movable jaw - external pipe	Serves to clamp the external pipe. The possible dimensions of the external pipe are to be found in the Technical Data chapter (see page 8: Product information > Technical Data).
3	Fixed jaw - inner pipe	Serves as the fixed point of the inner pipe in the clamp. The possible dimensions of the inner pipe are to be found in the Technical Data chapter (see page 8: Product information > Technical Data).
4	Inner pipe	-
5	Movable clamping jaw - inner pipe	Serves to clamp the inner pipe. The possible dimensions of the inner pipe are to be found in the Technical Data chapter (see page 8: Product information > Technical Data).
6	Movable jaw - external pipe	Serves to clamp the external pipe. The possible dimensions of the external pipe are to be found in the Technical Data chapter (see page 8: Product information > Technical Data).

4.1.5 Protective enclosure

4.1.5.1 Overview



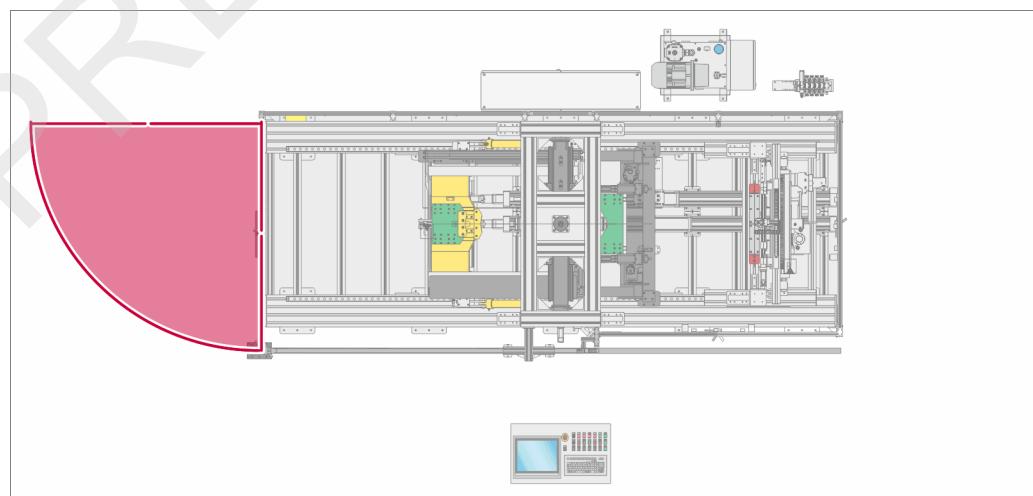
Protective enclosure - Overview (Plan view)

Legend

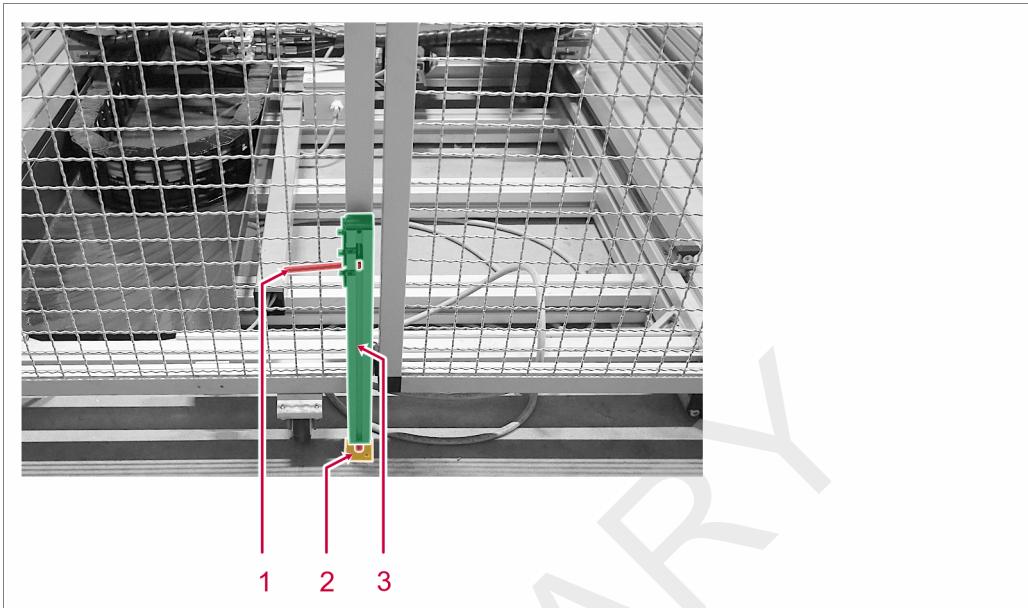
No.	Designation	Description
1	Swing door	See Section "Swing door" (Page 44).
2	Sliding door	See Section "Sliding door" (Page 46).
3	Hinged doors	See Section "Hinged doors" (Page 47).

4.1.5.2 Swing door

The swing door secures the table device area. If a pipe is loaded onto the machine, this door must be completely open (see page 145: Fitting > Opening and closing the swing door). The swing door is scanned by sensors and triggers the "Safety doors opened" function when opened.



Swing door (plan view)



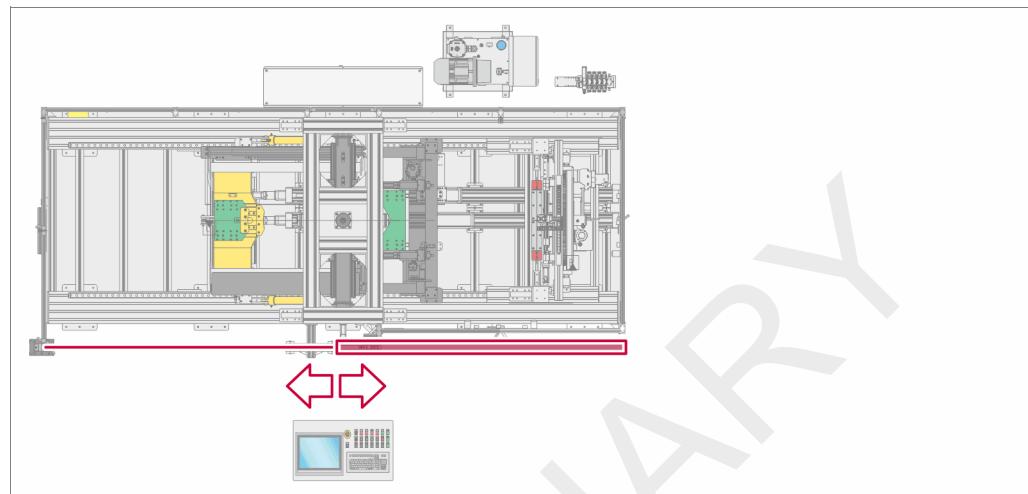
Swing door - Locking device

Legend

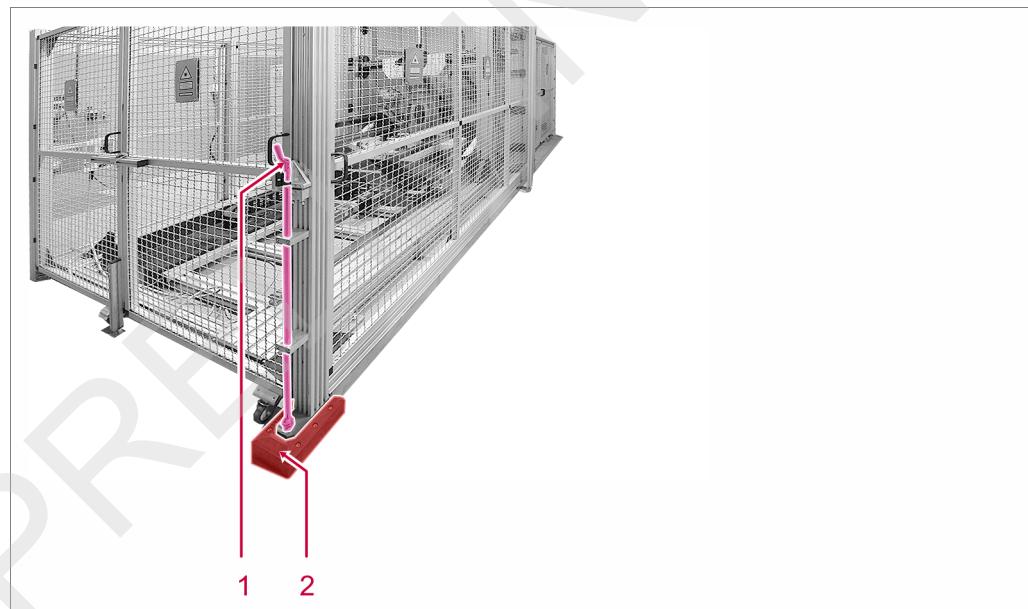
No.	Designation	Description
1	Locking device	Locks the swing door in the closed position. The locking device can be locked and unlocked with the aid of the lever.
2	Floor opening	Serves as the mount for the locking device in the closed condition.
3	Guide	Serves as a guide for the locking device. There are two holding positions in the guide. In the upper holding position, the swing door can be moved. In the lower holding position, the swing door is locked in the floor opening by the locking device.

4.1.5.3 Sliding door

The sliding door secures the table device area. If a pipe is loaded onto the machine, this door must be completely open (see page 148: Fitting > Opening and closing the sliding door). The sliding door is scanned by sensors and triggers the "Safety doors opened" function when opened.



Sliding door (plan view)



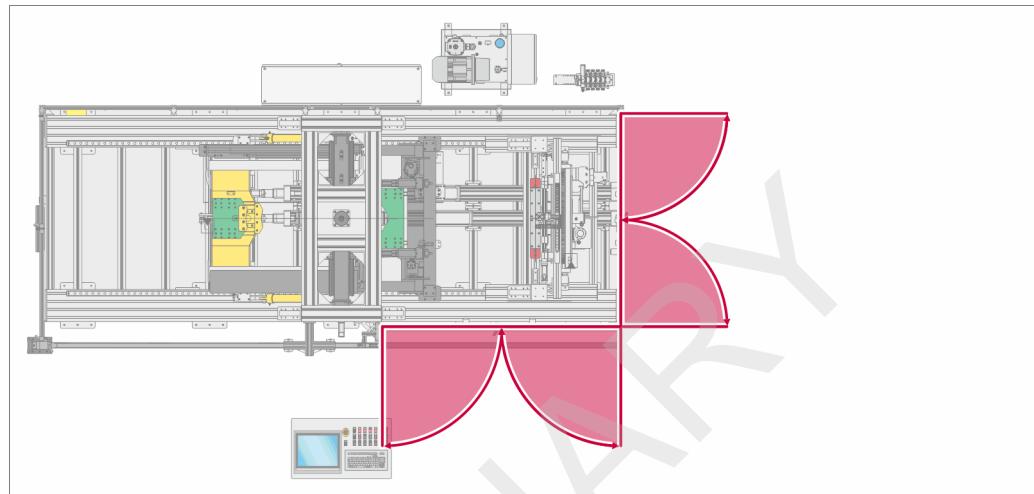
Sliding door - Locking device

Legend

No.	Designation	Description
1	Locking device	Locks the sliding door in the closed position. The locking device can be locked and unlocked with the aid of the lever.
2	Door guide with locking device mount	Serves as guide and mount for the locking device in the closed condition.

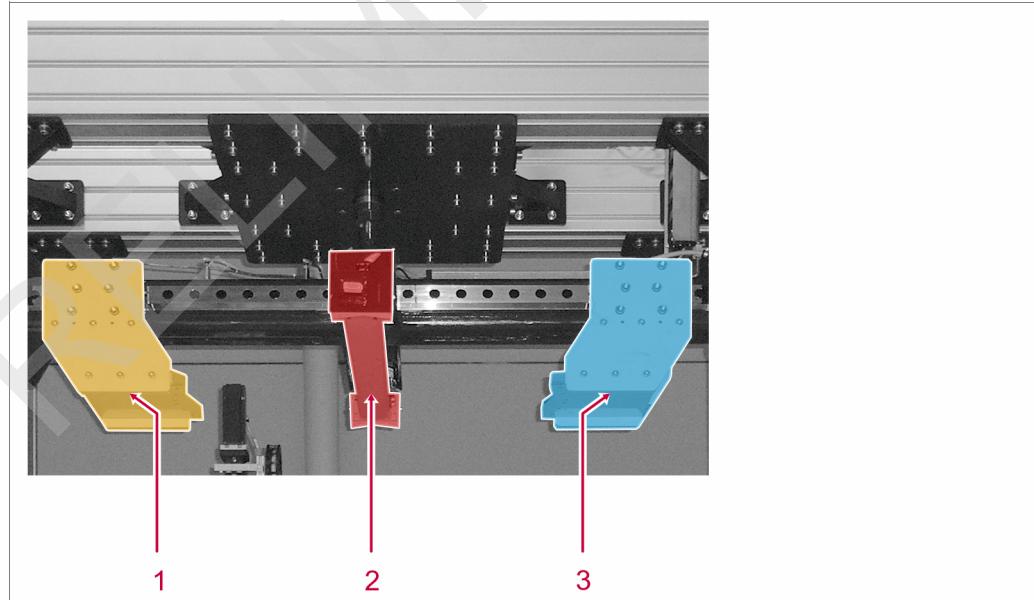
4.1.5.4 Hinged doors

The hinged doors secure the area around the rotary table. The doors can be opened for maintenance and repair work (see page 150: Fitting > Opening and closing the hinged doors). The hinged doors are scanned by sensors and trigger the "Safety doors opened" function when opened.



Hinged doors (plan view)

4.1.6 Top side clamp



Top side clamp

Legend

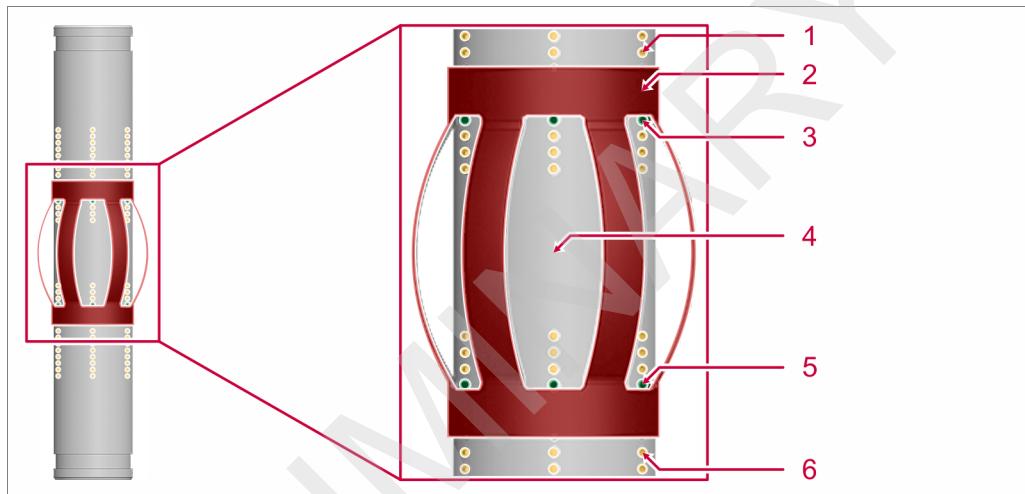
No.	Designation	Description
1	Left-hand clamping jaw	Clamps the inner pipe
2	Force measurement	The forces are recorded with the aid of two load cells.
3	Right-hand clamping jaw	Clamps the inner pipe.

4.2 Centralizer attachment variants

There are three variations for mounting the centralizer on the inner pipe. Before assembling, check which attachment variant must be used for the respective centralizer.

- "Lugs" (Page 48)
- "Between Stop Collar" (Page 49)
- "Over Stop Collar" (Page 50)
- "Casing Collar" (Page 51)

4.2.1 "Lugs"



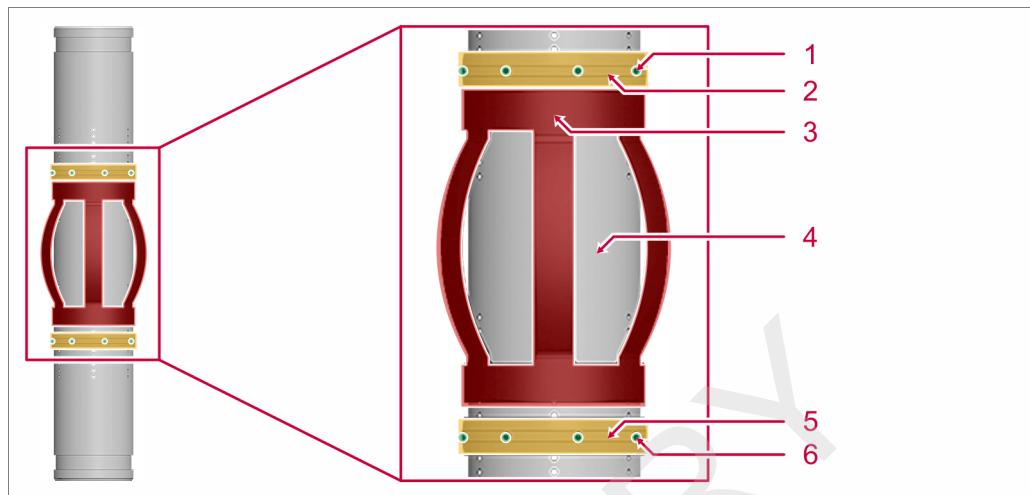
Centralizer attachment variants - "Lugs"

Legend

No.	Designation
1	Threaded holes in the inner pipe for retaining screws in the upper area.
2	Centralizer
3	Upper row of screws
4	Inner pipe
5	Lower row of screws
6	Threaded holes in the inner pipe for retaining screws in the lower area.

Information regarding the assembly of the centralizer by means of the "Lugs" attachment method are to be found in Chapter "Fitting" > "Mounting the centralizer - "lugs"" (Page 154).

4.2.2 "Between Stop Collar"

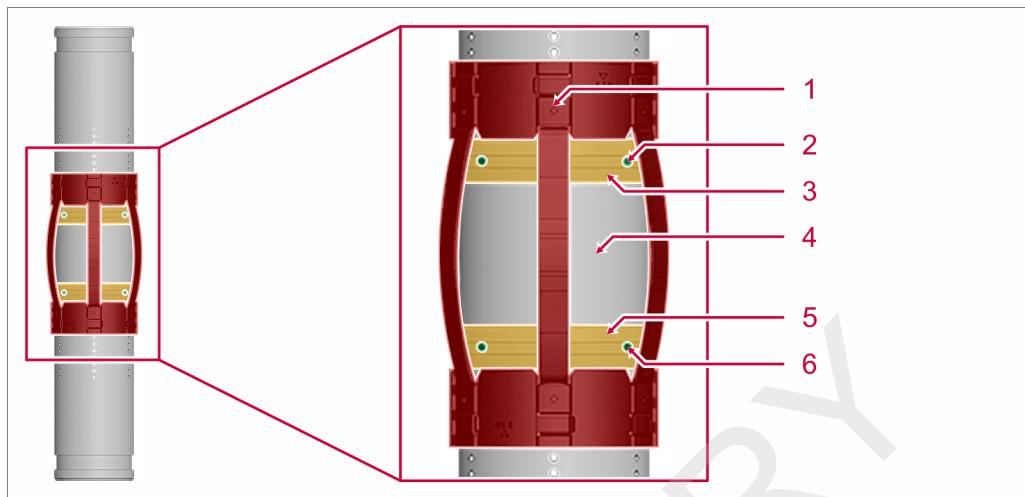


Legend

No.	Designation
1	Clamping screws
2	Top side stop collar
3	Centralizer
4	Inner pipe
5	Bottom side stop collar
6	Clamping screws

Information regarding the assembly of the centralizer by means of the "Between Stop Collar" attachment method are to be found in Chapter "Fitting" > "Installing the centralizer – "Between Stop Collar"" (Page 156).

4.2.3 "Over Stop Collar"



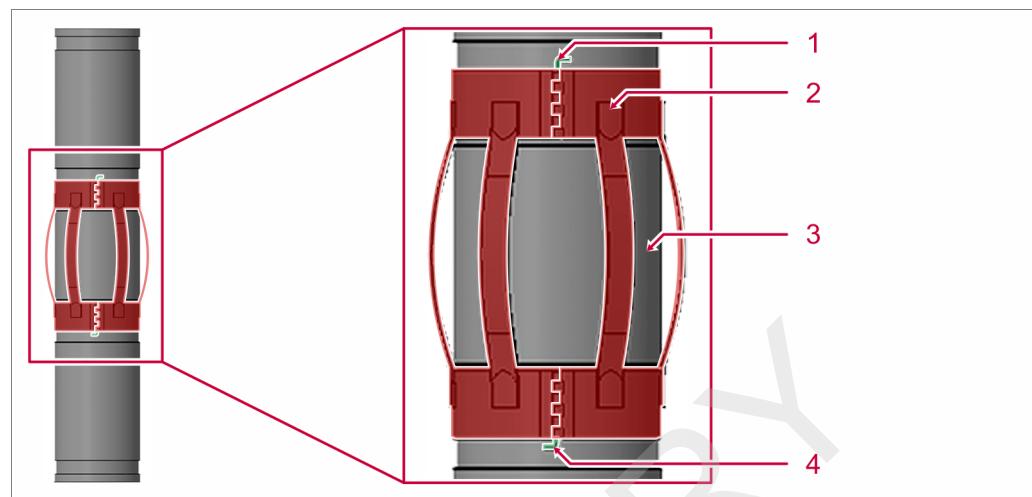
Centralizer attachment variants - "Over Stop Collar"

Legend

No.	Designation
1	Centralizer
2	Clamping screws
3	Top side stop collar
4	Inner pipe
5	Bottom side stop collar
6	Clamping screws

Information regarding the assembly of the centralizer by means of the "Over Stop Collar" attachment method are to be found in Chapter "Fitting" > "Installing the centralizer – "Over Stop Collar"" (Page 158).

4.2.4 "Casing Collar"



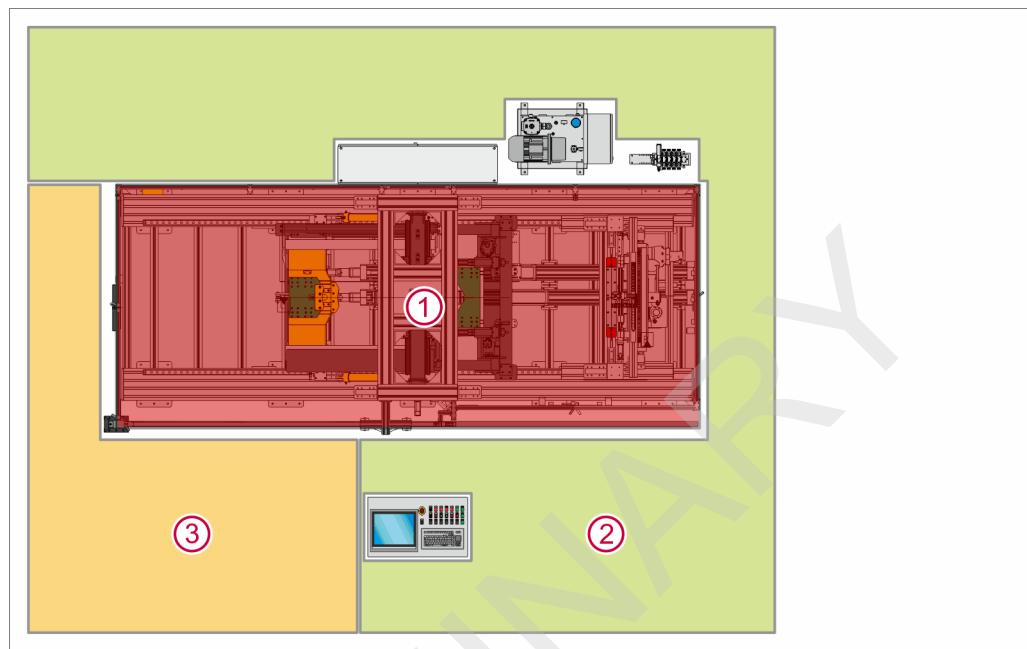
Legend

No.	Designation
1	Nail
2	Centralizer
3	Inner pipe
4	Nail

Information regarding the assembly of the centralizer by means of the "Casing Collar" attachment method are to be found in Chapter "Fitting" > "Installing the centralizer – "Casing Collar"" (Page 160).

4.3 Working area and danger zone

In this section you will find information regarding the working areas and danger zones of the machine.



Working area and danger zone

Legend

No.	Designation	Description
1	Danger zone	The danger zones must be kept free of obstacles. You are not permitted to reach into these zones during operations. If the machine is switched off and secured against being switched on inadvertently, you may then reach into and enter these zones to perform service work.
2	Working area	Keep the working areas of the operating personnel free of objects. For maintenance and repair work, a working distance of at least 80 cm around the machine must be kept easily accessible and free of objects. Always ensure that the working area of the machine is tidy and clean.
3	Fitting area	For loading and unloading, always keep the fitting area clear of objects.

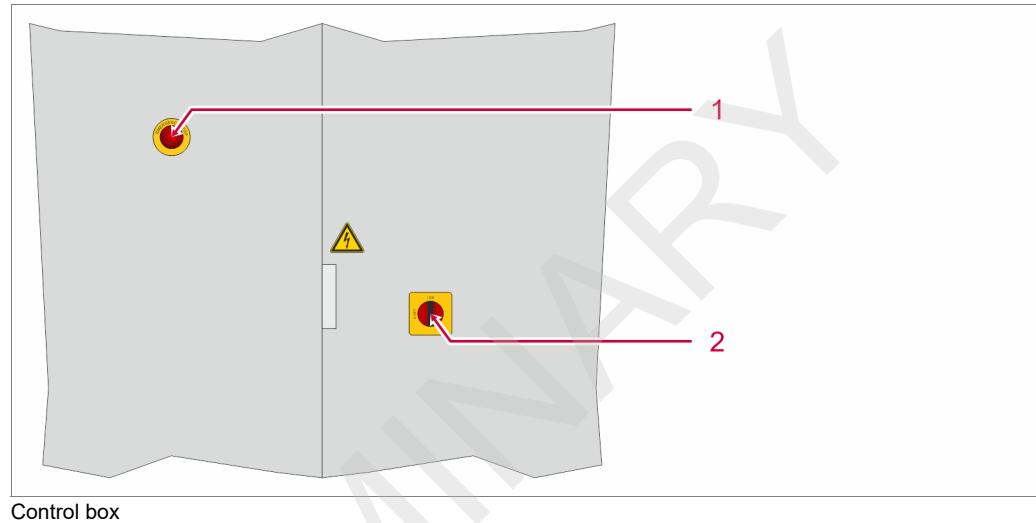


4.4 Control elements

In this chapter you will find information regarding the operating elements of the machine.

- Control box (Page 53)
- Operator panel (Page 54)

4.4.1 Control box



Legend

No.	Designation	Type	Position	Function
1	EMERGENCY STOP	Mushroom push button	pressed	Triggers the emergency stop function (see page 26: Safety > Triggering the emergency stop function).
2	Main safety switch	Toggle switch	I ON	The electrical power supply to the machine is switched on.
			0 OFF	The electrical power supply to the machine is switched off.

4.4.2 Operator panel

4.4.2.1 Overview

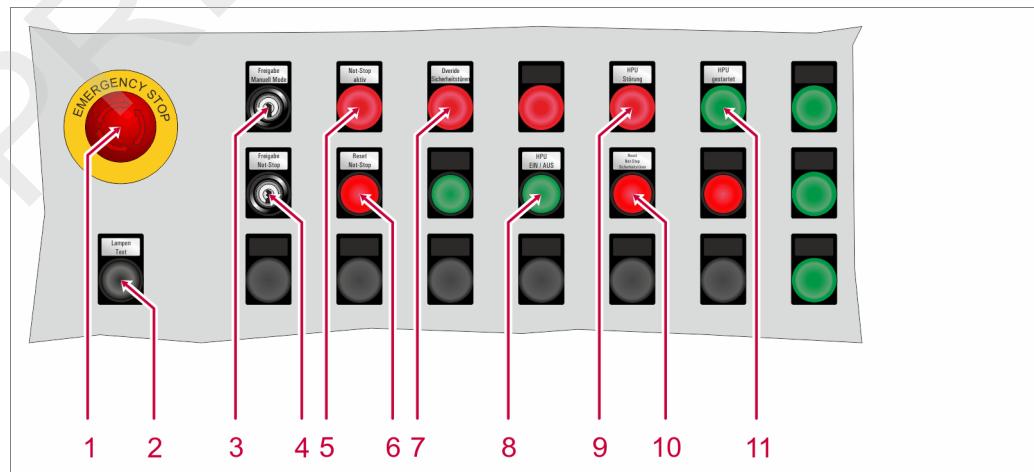


Operator panel - overview

Legend

No.	Designation	Type	Function
1	Touch screen	-	Displays the operating screens of the machine (see page 68: Control system > Operator displays of the control system) Settings to the control system can be made via the touch screen.
2	-	Switches and buttons	See Section "Extract - Control elements" (Page 54).
3	Keypad	-	Serves to enter values in the control system.

4.4.2.2 Extract - Control elements



Extract - Control elements



Legend

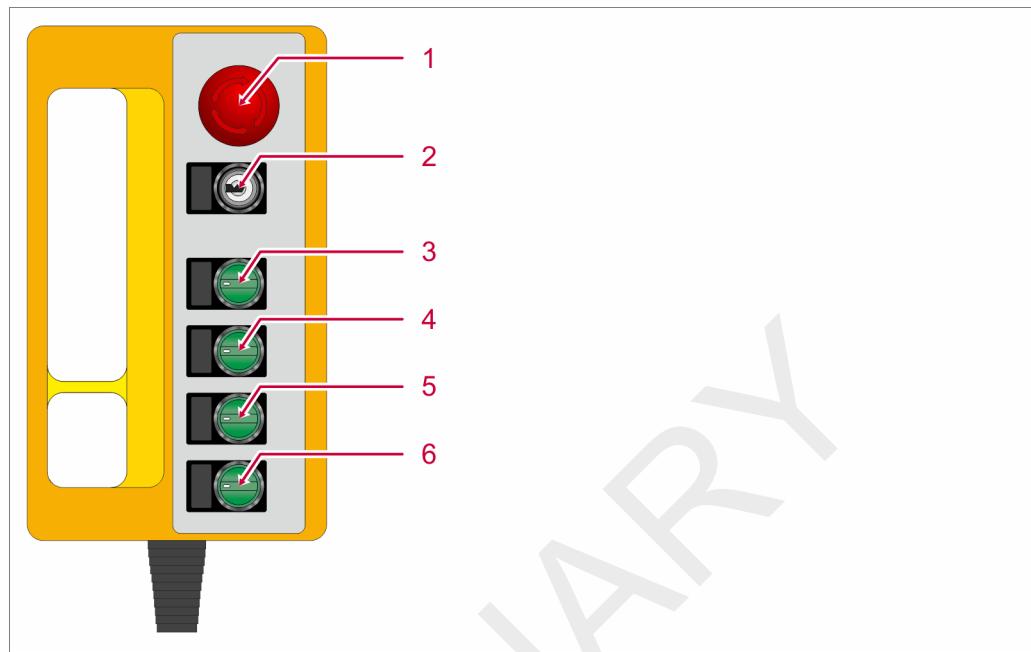
No.	Designation	Type	Position	Function
1	EMERGENCY STOP	Mushroom push button	pressed	Triggers the emergency stop function (see page 26: Safety > Triggering the emergency stop function).
2	Lamp test	Push-button	press	Serves to check the functioning of the lamps in the illuminated push buttons and the indicator lamps. If a lamp is defective, inform your supervisor.
3	Manual mode release	Key switch	0	"Manual" mode is deactivated. The machine is in "Automatic" mode.
			1	"Automatic" mode is preset. The key can only be pulled out in the 0 position, whereby this mode is always active. The automatic mode is also active if the key switch is switched to manual mode. There is also the option of intervening manually. The machine is in "Manual" mode. Inform an authorised person, if a switch must be made to "Manual" mode.
4	Emergency stop release	Key switch	0	The release for acknowledging the emergency stop is deactivated. The emergency stop function cannot be acknowledged. The release for acknowledging the "Override safety doors" is deactivated. The "Override safety doors" function cannot be acknowledged.
			1	The release for acknowledging the emergency stop is activated. The emergency stop function can be acknowledged. The release for acknowledging the "Override safety doors" is activated. The "Override safety doors" function can be acknowledged.
5	Emergency stop active	Indicator lamp	lights up	The emergency stop function has been triggered and is active.

Legend (Cont.)

No.	Designation	Type	Position	Function
6	Reset emergency stop	Illuminated push-button	lights up	The emergency stop function has been triggered and is active. The emergency stop function can be acknowledged.
			press	The emergency stop function has been acknowledged.
7	Safety doors override	Indicator lamp	flashes	A door in the safety enclosure is open. The "Safety doors opened" function is triggered. The "Override safety doors" function can be acknowledged. The "Override safety doors" function can be acknowledged. The Manual mode remote control unit is deactivated .
			lights up	The Manual mode remote control unit is activated . The "Override safety doors" function cannot be acknowledged.
8	HPU ON / OFF	Illuminated push-button	lights up	The power unit can be switched on.
			press	Switches the power unit on and off.
9	HPU fault	Indicator lamp	lights up	The power unit reports a fault. <ul style="list-style-type: none">• The temperature of the hydraulic fluid is too high.• Too little hydraulic fluid in the system. The emergency stop function has been triggered and is active.
10	Reset the emergency stop safety doors	Illuminated push-button	lights up	The "Override safety doors" function is active. The "Safety doors opened" function is active. The "Override safety doors" function can be acknowledged.
			press	The "Override safety doors" function has been acknowledged.
11	HPU started	Indicator lamp	lights up	The power unit is switched on.



4.4.3 Remote control - Manual mode



Remote control - Manual mode

Legend

No.	Designation	Type	Position	Function
1	Emergency stop switch	Mushroom push button	pressed	Triggers the emergency stop function (see page 26: Safety > Triggering the emergency stop function).
2	-	Key switch	0	The manual mode remote control unit is deactivated .
			1	The manual mode remote control unit is activated . You can perform manual process movements with the aid of the selector switch.
3 - 6	-	Illuminated selector switch	lights up	A function has been assigned to the respective illuminated selector switch by the control system. The function can be performed.
			1 / 0	Performs the function assigned by the control system. For this it makes no difference whether the respective illuminated selector switch moves upwards or downwards.

4.5 Function description

In this section you will find information regarding the functioning of the machine.

4.5.1 General function description

The machine can be operated in the following operating modes:

- "Automatic" mode (always active)
- "Manual" mode (see page 169: Fitting > Activating the "Manual" mode).

At the beginning of the test, the operator mounts the centralizer to be tested on a suitable inner pipe (see page 154: Fitting > Mounting the centralizer on the inner pipe).

The operator switches the machine on (see page 177: Operation > Switching on the machine) and transfers the required parameters to the control system according to API 10D (see page 181: Operation > Entering parameters according to / following API 10D into the control system).

The operator loads the inner pipe with the centralizer onto the machine with the aid of a crane or forklift and suitable lifting devices (see page 161: Fitting > Loading an inner pipe on the machine) and then loads the external pipe (see page 165: Fitting > Loading an external pipe on the machine).

once the machine has been loaded, the operator performs the tests on the centralizer according to / following API 10D (see page 187: Operation > Performing the test). The "Starting Force", "Running Force" and if required, the "Restoring Force" tests are performed.

Once the tests have ended, the operator unloads the machine once more.

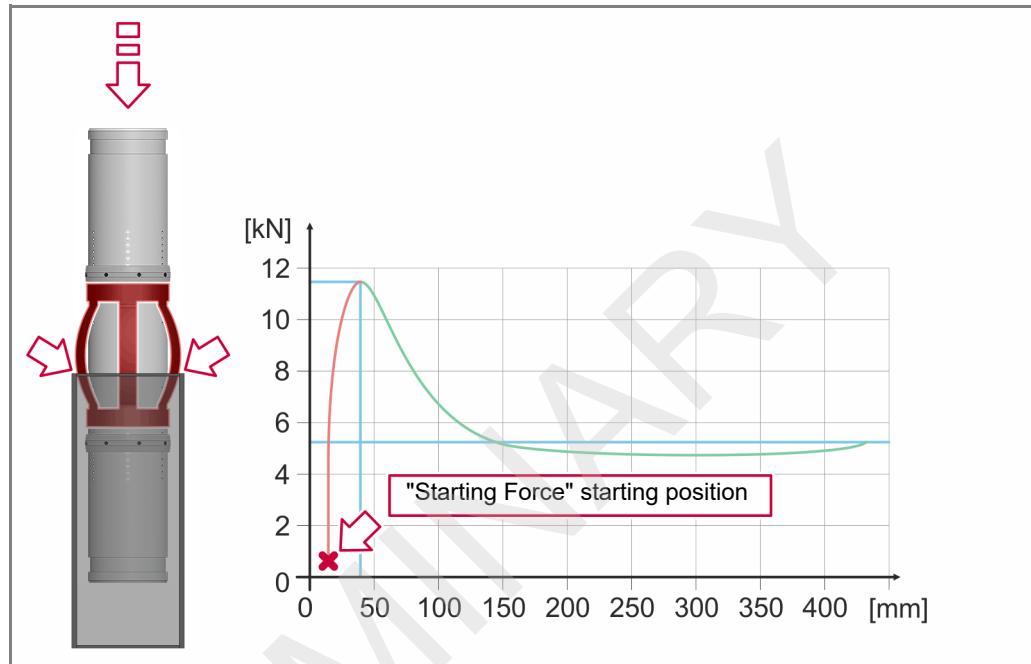
4.5.2 API 10D Test

In this section you will find information regarding the tests according to / following API 10D:

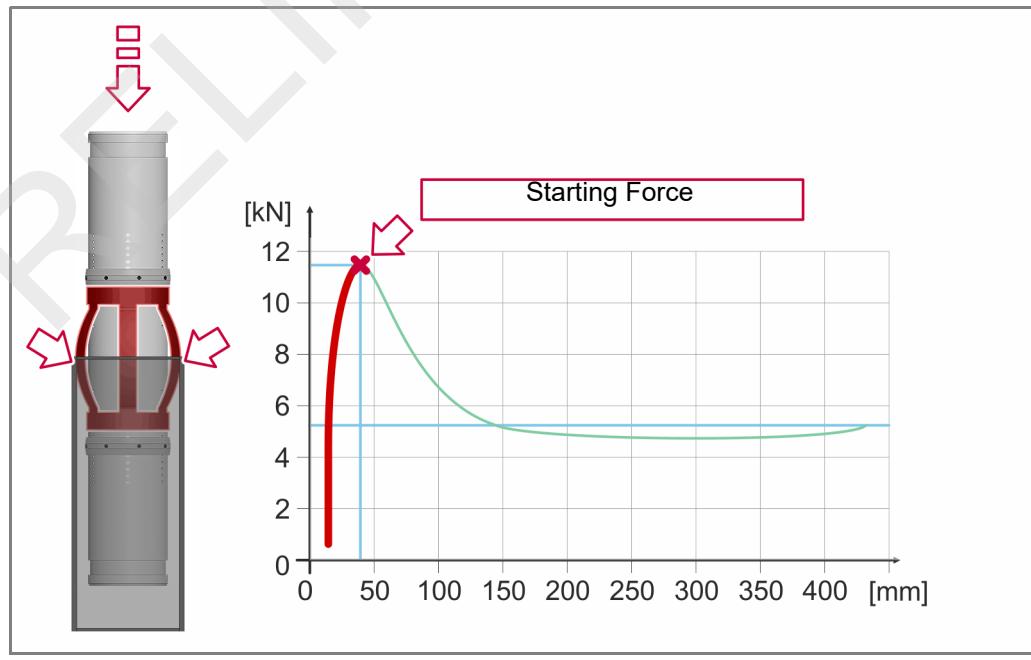
- Starting Force (Page 59)
- Running Force (Page 60)
- Restoring Force (Page 60)

4.5.2.1 Starting Force

In the case of the "Starting Force" test, the **TOP SIDE CLAMP** with the clamped **INNER PIPE** moves slowly ahead of the **EXTERNAL PIPE**, until the **CENTRALIZER** is supported on the **EXTERNAL PIPE**. Thereafter, the **INNER PIPE** is driven slowly, with force being expended, into the **EXTERNAL PIPE**. The measured values are recorded and displayed by the control system.



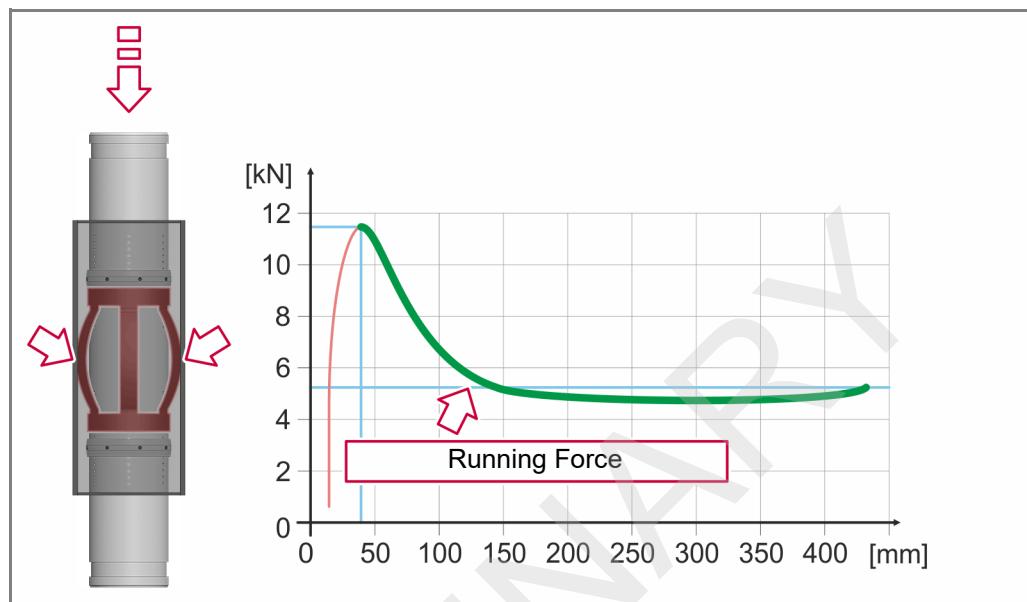
Presentation of the starting position of the "Starting Force" test



Presentation of the "Starting Force" test

4.5.2.2 Running Force

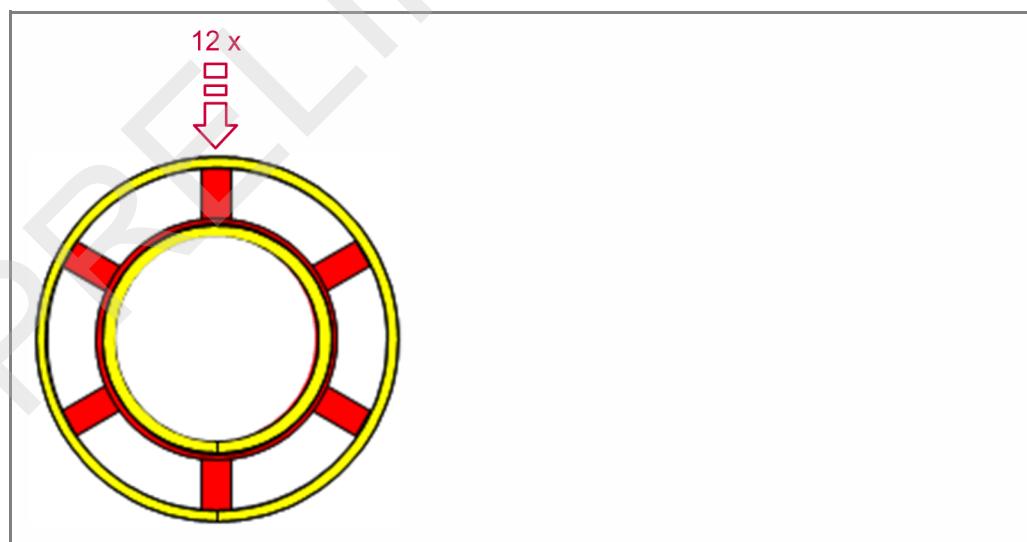
In the case of the "Starting Force" test, the **TOP SIDE CLAMP** with the clamped **INNER PIPE** moves slowly further to a defined position in the **EXTERNAL PIPE**. The measured values are recorded and displayed by the control system.



Presentation of the "Running Force" test

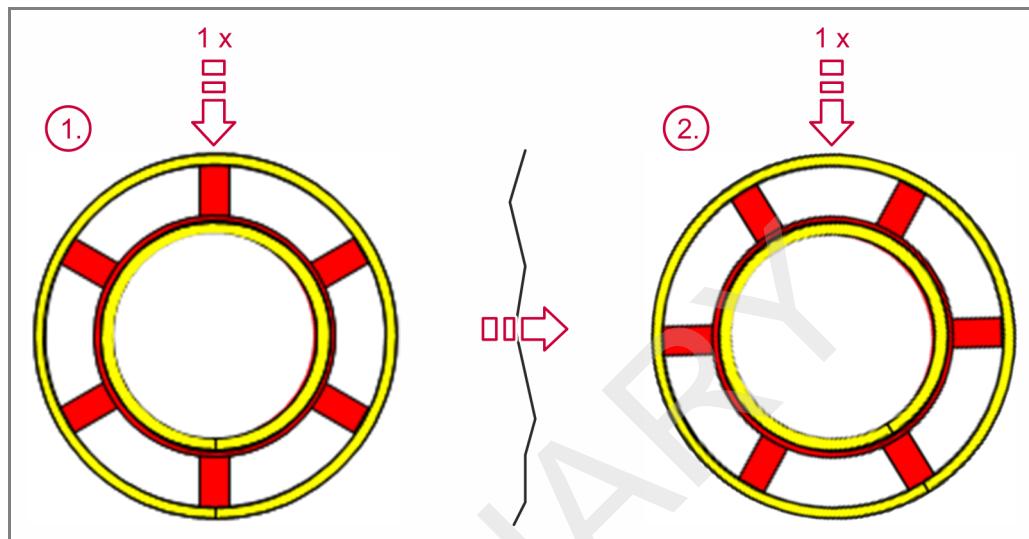
4.5.2.3 Restoring Force

In the first step of the "Restoring Force" test the **TOP SIDE CLAMP** loads each bow of the **CENTRALIZER** twelve times consecutively with a defined force.

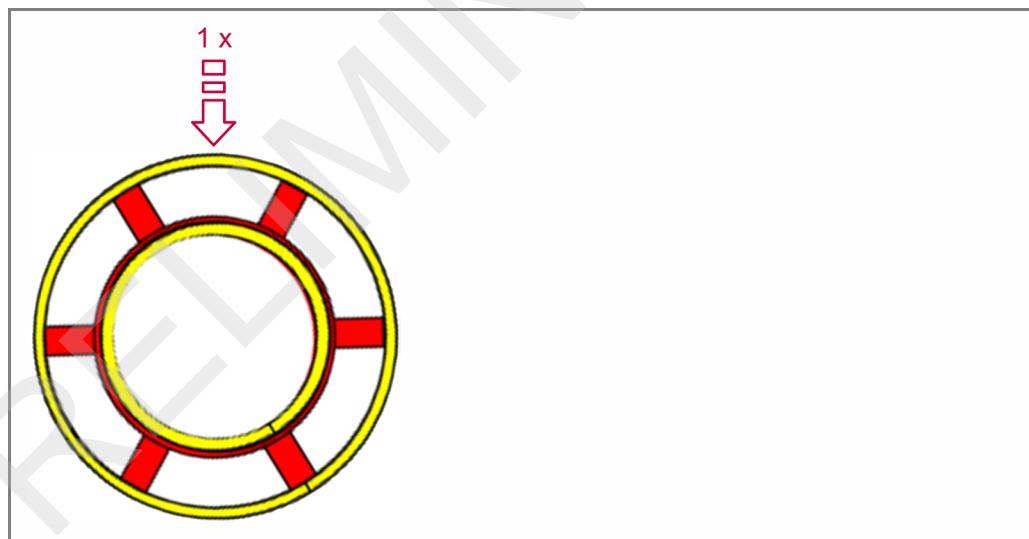


Presentation of the "Restoring Force" test - first step

In the second step of the "Restoring Force" test the **TOP SIDE CLAMP** first loads each successive bow of the **CENTRALIZER** once with a defined force. After the centralizer bow, the **TOP SIDE CLAMP** loads the next gap between two bows once with a defined force. The measured values are recorded and displayed by the control system.



Presentation of the "Restoring Force" test - second step | Part 1



Presentation of the "Restoring Force" test - second step | Part 2

5 Transporting, setting up and connecting

This chapter contains information regarding the transportation, setting-up and connection of the machine.

- Transporting the machine (Page 62)
- Unpacking the machine components (Page 63)
- Lifting and moving the machine components (Page 63)
- Setting up the machine (Page 64)
- Connecting the machine (Page 66)

5.1 Transporting the machine

Safety-conscious and pre-emptive behaviour on the part of personnel will prevent dangerous situations during transport.

For transportation the following principles apply:

- Only allow properly qualified staff to carry out the transportation.
- Access by unauthorised persons must be barred. If required, signs should be erected, drawing attention to the transportation operations.
- Moving parts must be properly secured
- Only suitable, fault-free load-lifting equipment must be used for transportation.
- During transportation, the mass of the machine as well as the position of its centre of gravity must be taken into consideration.
- Transport the machine components in a packed form as near as possible to the installation location.

Prepare the machine for transportation as follows:

- If the machine was in operation before transportation, first remove the machine from the service (see page 211: Maintenance, repair and decommissioning > Long-term tagout).
- Remove all cladding.
- Clean the machine as required.
- Secure the machine components against slipping, note the centre of gravity.
- Secure moving parts of the machine.

During transportation, act in accordance with the following instructions

- Observe accident prevention measures as well as local regulations.
- No persons must remain beneath suspended loads.
- Only use lifting devices in the prescribed manner.
- Lifting devices must be suitable and approved for the mass of the machine components.
- Use only lifting devices that are in faultless condition..
- Transport the machine components carefully. Do not lift, push or support the machine by delicate parts (such as levers).



5.2 Unpacking the machine components

Before unpacking the machine, remove the transport packaging, lashings and aids as required. Transport the machine components in a packed condition as close as possible to the installation location. Only when the machine components are no longer subject to environmental and transportation influences may they be unpacked.

Next test the machine as follows:

- Can any damage be identified, which were caused by the transportation?
- Is the delivery complete? Compare the parts as delivered with the entries on the delivery note.

If the machine components have been damaged in transit, or if the consignment is incomplete, kindly notify the manufacturer.

Dispose of the packaging material in accordance with the applicable regulations.

5.3 Lifting and moving the machine components

In this section you will find information regarding the safe lifting and moving of the machine components.

Info



Contact the manufacturer before lifting and moving the machine (sales-germany@weatherford.com).

Requirement:



- The machine components are disconnected from all supply lines and prepared for transportation.

Tools required:



- At least two persons are required for the safe transportation of the machine.
- Fork lift or crane.
- Suitable, approved lifting devices



WARNING

Risk of injury due to heavy, falling machine components!

You can sustain severe injuries to your body and limbs due to falling machine components!

- ➔ Never step underneath suspended loads!
- ➔ Always perform the work with two persons!
- ➔ If possible, lift the machine components maximally only so high that the machine components can still be "guided" by hand!
- ➔ Take note of the high centre of gravity of the machine components!
- ➔ Wear safety shoes at all times!

**CAUTION****Hazard of crush injuries to limbs!**

You can be crushed at some places on the machine components!

→ Always wear protective gloves!

Carry out the following steps:

1. Fasten the machine components properly.
! Take note of the centre of gravity of the machine components.
2. Before lifting, check that no cables and hoses are damaged.
3. Lift the machine components carefully.
! Only lift the machine components as high as is necessary.
4. Move the machine components to the desired position.
5. Before setting down, check that no cables and hoses are damaged.
6. Carefully place the machine components in the desired position.

✓ Done.

5.4 Setting up the machine

This chapter contains information regarding the setting up of the machine.

- Environmental requirements (Page 64)
- Installation plan (Page 65)
- Setting up and aligning the machine (Page 66)

5.4.1 Environmental requirements

Environmental requirements

Environment	Free of aggressive media and dust
Ambient temperature Storage	- 5 °C (23 °F) to + 40 °C (104 °F)
Ambient temperature Transport	- 5 °C (23 °F) to + 40 °C (104 °F)
Ambient temperature Operation	- 5 °C (23 °F) to + 40 °C (104 °F)

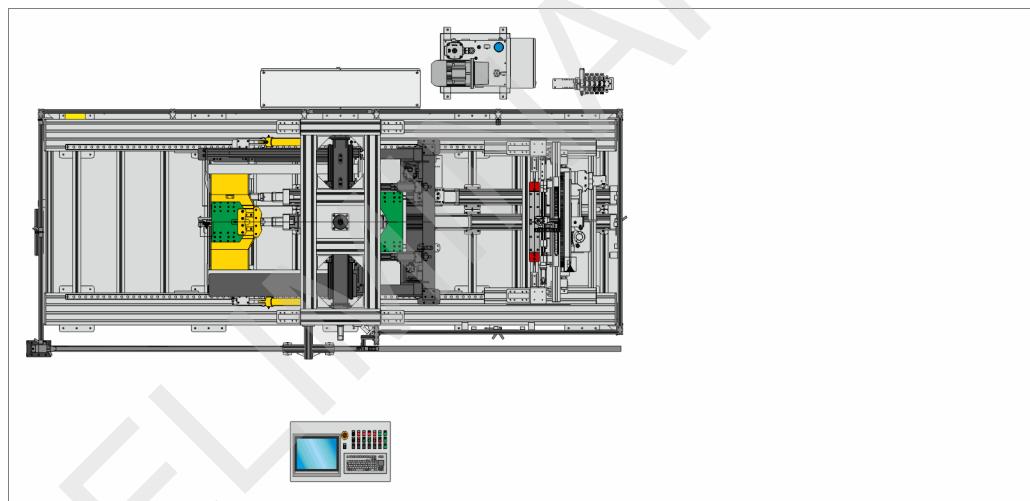


The environment must satisfy the following requirements:

- The installation area must be in an enclosed factory hall or correspondingly equipped spaces.
- The installation area must offer a flat, horizontal surface.
- The foundation is constructed according to the area-specific specifications (in Germany: BN25 according to DIN 1045 Steel and ferro-concrete construction).
- The foundation must be free of vibration.
- The environment must be free of interference from electric installations (high frequency), take note of electromagnetic compatibility (EMC Directive).
- Plan an area of at least 2 m around the machine that is always free of objects and is always easily accessible.

5.4.2 Installation plan

The following figure depicts the installation plan of the machine.



Installation plan of the machine (plan view)

5.4.3 Setting up and aligning the machine

Requirement:



- The requirements for the environment have been fulfilled (see page 64: Environmental requirements).

Carry out the following steps:

1. Transport the machine to the intended location (see page 62: Transporting the machine) and (see page 63: Lifting and moving the machine components).
! Ensure that there is adequate space around the machine (see page 52: Overview of the machine > Working area and danger zone).
2. Remove the machine packaging and transportation lashings (see page 63: Unpacking the machine components).
3. Set the machine up according to the installation plan (see page 65: Installation plan).
4. Align the machine components.
5. Anchor the machine in the factory floor.
6. Check that all plug and threaded connections are firmly seated.

✓ Done.

5.5 Connecting the machine

This chapter contains information regarding the connection of the machine.

- Electrical connection values (Page 66)
- Restoring the electrical connections (Page 67)

5.5.1 Electrical connection values

The mains power connection must satisfy the requirements contained in (see page 8: Product information > Technical Data) in terms of operating voltage and frequency.



5.5.2 Restoring the electrical connections

Requirement:



- Switch off the machine and secure against unintentional reconnection.

Tools required:



- Standard tools
- Suitable power supply cable

Installing the cable trays



Carry out the following steps:

- Install suitable cable trays or use suitable cable ducts

The cable trays have been installed.

Establishing the electrical connections



Risk to life posed by 3-phase alternating current

The machine requires 3-phase alternating current to operate. When coming into contact with live parts, there is a risk of electrical shock.

- Only trained and qualified electricians may carry out the electric system installation.
- Take the machine out of operation according to the lockout/tagout procedure before performing maintenance and repair work (see page 30: Safety > Performing the lockout/tagout procedure).

Carry out the following steps:

1. Look up the minimum bending radius of the cables.
2. Ensure that the power supply cable has a cross-section that matches the total current consumption.
3. Lay the power supply cable
 - ! Take care that no power supply cables are pinched or crushed. Lay the power supply cables in such a manner that no tripping-places are created and that they cannot be damaged.
4. Ensure that the mains connection complies with the specifications listed in the technical data, see Chapter "Technical Data" (Page 8).
 - ! Secure the power supply cable according to the nominal output of the machine.

The electrical connection has been established.

Laying the electrical supply lines



Carry out the following steps:

- Lay all the required cables.

- ! Take care that no cable is trapped and crushed. Lay the cables in such a manner that they do not create tripping places and that the cable cannot be damaged.

The electrical supply lines have been laid.

- ✓ Done.

6 Control system

The machine is controlled by a PLC (programmable logic controller). The control system is housed in the control box. The touch screen on the operator panel is the user interface of the control system. In this chapter you will find information regarding the control of the complete machine.

- Touch screen (Page 68)
- Operator displays of the control system (Page 68)

6.1 Touch screen

The touch screen is located on the operator panel of the machine.

The control system of the machine can be influenced by means of the touch screen. The operating condition of the machine can be observed on the touch screen. You have direct access to the processes by simply touching the buttons and input fields.

The description of the operator displays on the touch screen can be found in Chapter Operator displays of the control system (see page 68: Operator displays of the control system).

Do not use pointed or sharp objects when operating, to ensure that the plastic surface is not damaged. Do not operate the touch screen with dirty gloves.

6.2 Operator displays of the control system

In this chapter you will find information regarding the operator screens of the machine control system.

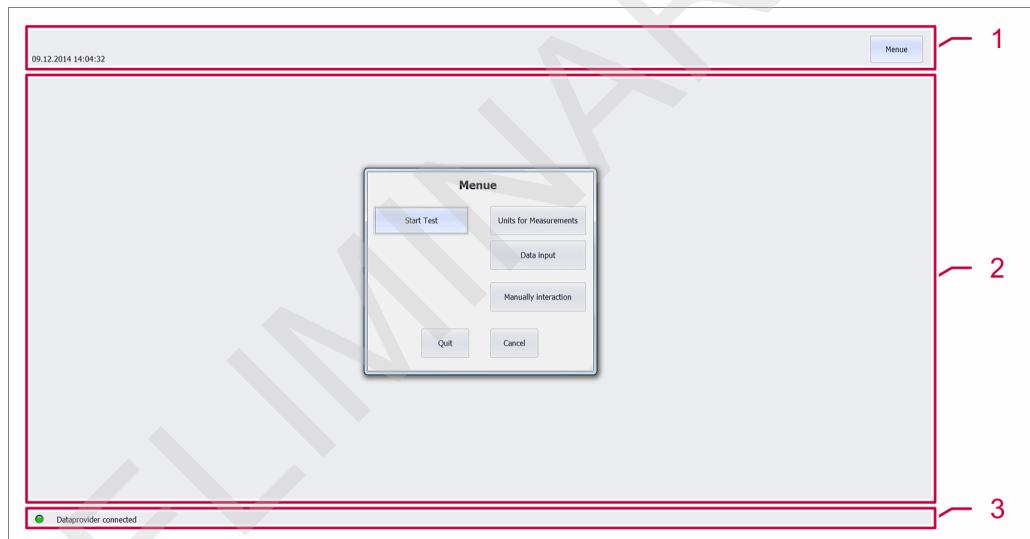
- Subdivision of the operator screens (Page 69)
- Startup screen / "Menu" pop-up window (Page 70)
- Unit Dialog (Page 71)
- General Information (Page 73)
- "Centralizer Data" pop-up window (Page 79)
- "Inner pipe data" pop-up window (Page 80)
- "External pipe data" pop-up window (Page 81)
- "Set Start Point For Automode" pop-up window (Page 82)
- "Start Of Auto Mode Test" pop-up window (Page 83)
- "Inner pipe placed" pop-up window (Page 84)
- Starting Running Force Test View Auto Mode (Page 85)
- Bow Detection Sensor Correction Of Position (Page 91)
- Read Bow Flex Bow View Auto Mode (Page 93)
- Restoring Force Test View Auto Mode (Page 96)
- Manual Interaction: Start Screen (Page 99)
- Manual Interaction: Measurement Cylinder Manual (Page 100)
- Manual interaction: Loading Table Manual (Page 106)
- Manual interaction: Rotary Table Horizontal (Page 114)
- Manual interaction: Rotary Table Vertical (Page 117)



- Manual interaction: Rotary Table Jaws (Page 119)
- Manual interaction: Rotary Table Rotation (Page 122)
- Manual interaction: IP Clamp (loading table) (Page 125)
- Manual interaction: Lower EP Clamp (Page 128)
- Manual interaction: Upper EP Clamp (Page 131)
- Manual interaction: IP Clamp (measurement cylinder) (Page 134)
- Manual interaction: Bow Detection Sensor (Page 136)
- Error Handling (Page 141)
- Error Read Bow Auto Mode Manual Rotation (Page 142)

6.2.1 Subdivision of the operator screens

6.2.1.1 Subdivision of the operator screens - overview



Subdivision of the operator screens - overview

Legend

No.	Designation	Function
1	Header	See Chapter "Subdivision of the operator screens - header" (Page 70).
2	Content	Here the content of the respective operator screen is shown. Input fields, output fields, buttons and graphics are arranged in this area, depending on the operator screen.
3	Footer.	The condition of the connection to the "data provider" is displayed here. The following conditions can be displayed here: <ul style="list-style-type: none">• green: Data provider connected• red: Data provider disconnected

6.2.1.2 Subdivision of the operator screens - header



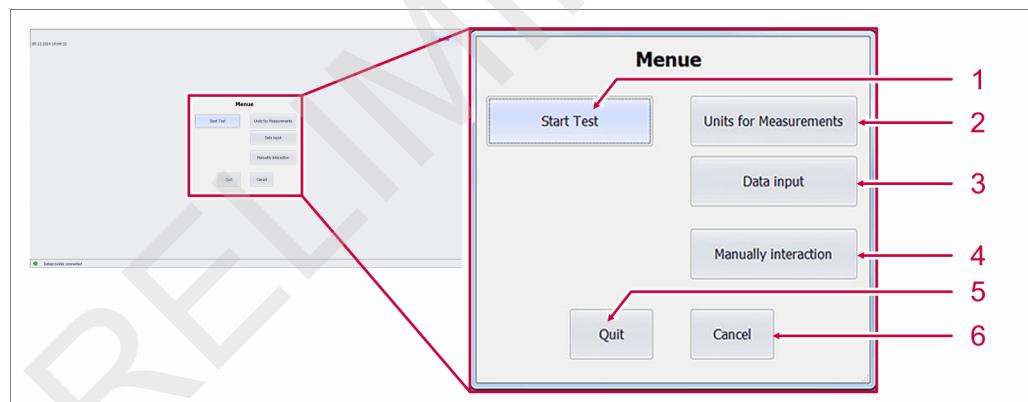
Subdivision of the operator screens - header

Legend

No.	Designation	Element	Function
1	Date and time	Display field	Displays the current date and time.
2	-	Display field	Displays the designation of the current operator screen
3	Menus	Button	Activates the "Menue" pop-up window in each operator screen (see page 70: Startup screen / "Menue" pop-up window).

6.2.2 Startup screen / "Menue" pop-up window

The "Menue" pop-up window can be activated in all operator screens.



"Menue" pop-up window

Legend

No.	Designation	Element	Function
1	Start test	Button	Starts the test First requires input of data. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).
2	Units for Measurements	Button	Proceeds to the operator screen: UNIT DIALOG (see page 71: Unit Dialog).
3	Data input	Button	Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).



Legend (Cont.)

No.	Designation	Element	Function
4	Manual interaction	Button	Proceeds to the operator screen: MANUAL INTERACTION START SCREEN (see page 99: Manual Interaction: Start Screen). If the MANUAL MODE RELEASE key-switch is in Position 1, manual movements of the machine can be performed. If the MANUAL MODE RELEASE key-switch is in Position 0, no manual movements of the machine can be performed. The button is then greyed out.
5	Quit	Button	Ends the program.
6	Cancel	Button	Closes the dialog. The previously selected operator screen is displayed.

6.2.3 Unit Dialog

Units for Measurement

The dialog box contains the following elements:

- 1: Diameter dropdown menu (mm)
- 2: Save As Default button
- 3: Length dropdown menu (mm)
- 4: Weight dropdown menu (kg)
- 5: Load Default button
- 6: Standoff dropdown menu (%)
- 7: Ok button
- 8: Cancel button
- 9: Space below the Ok button

Unit Dialog

Legend

No.	Designation	Element	Function
1	Diameter	Selection list	Serves to select the unit of measurement of the diameter.
2	Save As Default	Button	Saves the displayed data as the default.

Legend (Cont.)

No.	Designation	Element	Function
3	Length	Selection list	Serves to select the unit of measurement of the length.
4	Weight	Selection list	Serves to select the unit of measurement of the weight.
5	Load Default	Button	Loads the old default.
6	Force	Selection list	Serves to select the unit of measurement of the force.
7	Standoff	Selection list	Serves to select the distance between the inner and external pipes.
8	Cancel	Button	Rejects the set values and closes the operator screen. Proceeds to the operator screen: STARTUP SCREEN / "MENU" POP-UP WINDOW (see page 70: Startup screen / "Menu" pop-up window).
9	OK	Button	Accepts the set values and closes the operator screen. Proceeds to the operator screen: STARTUP SCREEN / "MENU" POP-UP WINDOW (see page 70: Startup screen / "Menu" pop-up window).



6.2.4 General Information

6.2.4.1 General Information – Overview

The screenshot shows the 'General Information – Overview' screen with four main sections:

- Centralizer Data**: Contains fields for Name, Type of Centralizer, Code No., No. of Bows, Bow Type, Bow Width, Manufacturer, Part No., Weight, Length, Max. OD, Min. OD, and Rigid OD. It includes 'Save' and 'Load' buttons at the top and 'Ok' and 'Cancel' buttons at the bottom.
- Inner Pipe Data**: Contains fields for Name, Outer Diameter, Inner Diameter, Length, Weight, and Clamp Mod. It includes 'Save' and 'Load' buttons at the top.
- External Pipe Data**: Contains fields for Name, Outer Diameter, Inner Diameter, Length, and Weight. It includes 'Save' and 'Load' buttons at the top.
- Test Data**: Contains fields for Test Name, Test No., Tested By, Test Method, Location, Date, API Starting Force, API Restoring Force, and Comment. It includes 'Save' and 'Load' buttons at the top.

Red numbers 1 through 4 are overlaid on the screen, pointing to the following elements:

- 1: Points to the 'Centralizer Data' section.
- 2: Points to the 'General Information' header above the 'Inner Pipe Data' section.
- 3: Points to the 'Test Data' section.
- 4: Points to the 'External Pipe Data' section.

General Information – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "General Information – Extract 1" (Page 74).
2	-	-	See Chapter "General Information – Extract 2" (Page 76).
3	-	-	See Chapter "General Information – Extract 3" (Page 77).
4	-	-	See Chapter "General Information – Extract 4" (Page 78).

6.2.4.2 General Information – Extract 1

The screenshot shows the 'General Information – Extract 1' screen with three data entry windows:

- Centralizer Data:** Contains fields for Name, Type of Centralizer, Code No., No. of Bows, Bow Type, Bow Width, Manufacturer, Part No., Weight, Length, Max. OD, Min. OD, Rigid OD, and Comment.
- Inner Pipe Data:** Contains fields for Outer Diameter, Inner Diameter, Length, and Weight.
- Test Data:** Contains fields for Test Name, Tested By, Test Method, Location, Date, API Starting Force, and API Restoring Force.

Red numbers 1 through 17 point to specific UI elements in the 'Centralizer Data' window:

- Save button
- Load button
- Name input field
- Type of Centralizer input field
- Code No. input field
- No. of Bows input field
- Bow Type input field
- Bow Width input field
- Manufacturer input field
- Part No. input field
- Weight input field
- Length input field
- Max. OD input field
- Min. OD input field
- Rigid OD input field
- Comment input field
- Ok button
- Cancel button

General Information – Extract 1

Legend

No.	Designation	Element	Function
1	Save	Button	Saves the entered parameters under the name entered in the control system.
2	Load	Button	Proceeds to the operator screen: " CENTRALIZER DATA " POP-UP WINDOW (see page 79: "Centralizer Data" pop-up window).
3	Name	In- and output field	Displays the name of the respective centralizer. Serves to enter the relevant parameter.
4	Type of Centralizer	In- and output field	Displays the respective centralizer type. Serves to enter the relevant parameter.
5	Code No.	In- and output field	Displays the code number of the respective centralizer. Serves to enter the relevant parameter.
6	No. of Bows	In- and output field	Displays the number of bows of the respective centralizer. Serves to enter the relevant parameter.



Legend (Cont.)

No.	Designation	Element	Function
7	Bow Type	In- and output field	Displays the bow type of the respective centralizer. Serves to enter the relevant parameter.
8	Bow Width	In- and output field	Displays the bow width of the respective centralizer. Serves to enter the relevant parameter.
9	Manufacturer	In- and output field	Displays the manufacturer of the respective centralizer. Serves to enter the relevant parameter.
10	Part No.	In- and output field	Displays the part number of the respective centralizer. Serves to enter the relevant parameter.
11	Weight	In- and output field	Displays the weight of the respective centralizer. Serves to enter the relevant parameter.
12	Length	In- and output field	Displays the length of the respective centralizer. Serves to enter the relevant parameter.
13	Max. OD	In- and output field	Displays the maximum outer diameter of the respective centralizer. Serves to enter the relevant parameter.
14	Min. OD	In- and output field	Displays the minimum outer diameter of the respective centralizer. Serves to enter the relevant parameter.
15	Rigid OD	In- and output field	Displays the rigid diameter of the respective centralizer. Serves to enter the relevant parameter.
16	Ok	Button	Confirms the selection and inputs.
17	Cancel	Button	Rejects the entered values.

6.2.4.3 General Information – Extract 2

The screenshot shows the 'General Information – Extract 2' interface. On the left, there is a main screen titled 'Centralizer Data' with various input fields and buttons for 'Save' and 'Load'. A red callout arrow points from the 'Inner Pipe Data' section of the main screen to a detailed 'Inner Pipe Data' pop-up window on the right. The pop-up window contains fields for 'Name', 'Outer Diameter', 'Inner Diameter', 'Length', 'Weight', and 'Clamp Mod'. Each field is numbered 1 through 8, corresponding to the legend below.

General Information		Test Data		Inner Pipe Data	
Name:	Save	Outer Diameter:	0 mm	Name:	Save
Type of Centralizer:	Load	Inner Diameter:	0 mm	Test No.:	0
Code No.:		Length:	0 mm	Test Method:	StopCollar
No. of Boxes:	0	Weight:	0 kg	Location:	Langenlengen
Bow Type:		Clamp Mod.:	None	Date:	04.07.2015
Bow Width:	0 mm	API Data			
Manufacturer:		API Starting Force:	0 N		
Part No.:	0	API Restoring Force:	0 N		
Weight:	0 kg	Comments:			
Length:	0 mm				
Max. OD:	0 mm				
Min. OD:	0 mm				
Rigid OD:	0 mm				
Weight:	0 kg				
Length:	0 mm				
Max. OD:	0 mm				
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Rigid OD:	0 mm				
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Weight:	0 kg				
Length:	0 mm				



6.2.4.4 General Information – Extract 3

General Information – Extract 3

External Pipe Data

Save	Load
Name:	0 mm
Outer Diameter:	0 mm
Inner Diameter:	0 mm
Length:	0 mm
Weight:	0 kg

Legend

No.	Designation	Element	Function
1	Save	Button	Saves the entered parameters under the name entered in the control system.
2	Load	Button	Proceeds to the operator screen: "EXTERNAL PIPE DATA" POP-UP WINDOW (see page 81: "External pipe data" pop-up window).
3	Name	In- and output field	Displays the name of the respective external pipe. Serves to enter the relevant parameter.
4	Outer Diameter	In- and output field	Displays the outer diameter of the respective external pipe. Serves to enter the relevant parameter.
5	Inner Diameter	In- and output field	Displays the inner diameter of the respective external pipe. Serves to enter the relevant parameter.
6	Length	In- and output field	Displays the length of the respective external pipe. Serves to enter the relevant parameter.
7	Weight	In- and output field	Displays the weight of the respective external pipe. Serves to enter the relevant parameter.

6.2.4.5 General Information – Extract 4

The screenshot shows a software interface for managing pipe test data. It includes sections for Centralizer Data, Inner Pipe Data, and Test Data. The Test Data section is detailed below:

Test Data	
Test Name:	<input type="text"/> 1
Test No.:	<input type="text"/> 2
Tested By:	<input type="text"/> 3
Test Method:	<input type="button" value="StopCollar"/> 4
Location:	<input type="text"/> Langenhagen 5
Date:	<input type="text"/> 04.07.2015 6
API Data	
API Starting Force:	<input type="text"/> 0 N 7
API Restoring Force:	<input type="text"/> 0 N 8
Comment: <input type="text"/> 9	

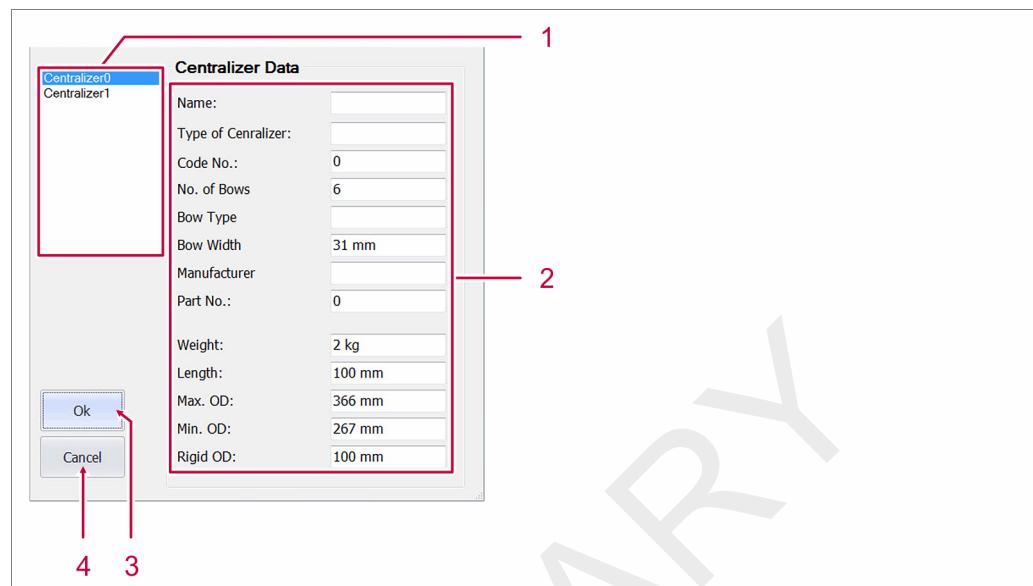
General Information – Extract 4

Legend

No.	Designation	Element	Function
1	Test Name	In- and output field	Serves to enter the designation of the test to be performed.
2	Test No.	In- and output field	Serves to enter the test number of the test to be performed.
3	Tested By	In- and output field	Serves to enter the name of the person performing the test.
4	Test Method	Selection list	Serves to select the test method: • Lugs • Push • StopCollar • CasingCollar
5	Location	In- and output field	Serves to enter the location at which the test is performed.
6	Date	Selection list	Serves to select the date on which the test is performed.
7	API Starting Force	In- and output field	Serves to enter the starting force according to API 10D
8	API Restoring Force	In- and output field	Serves to enter the restoring force according to API 10D
9	Comment	In- and output field	Serves as an option to enter comments regarding the test.



6.2.5 "Centralizer Data" pop-up window

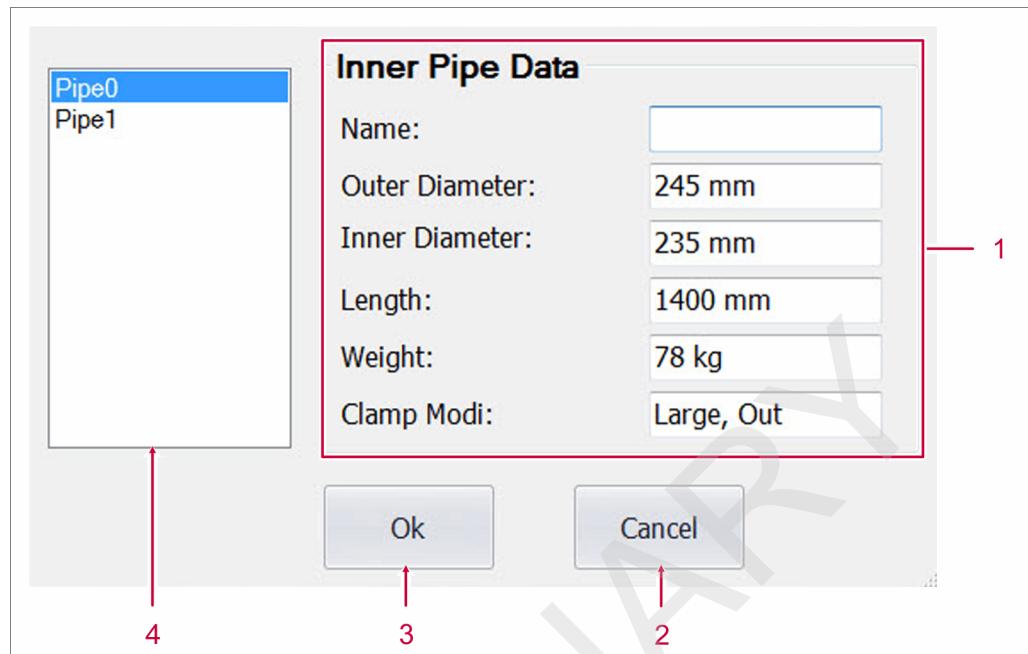


"Centralizer Data" pop-up window

Legend

No.	Designation	Element	Function
1	-	Selection list	Displays all centralizers stored in the control system so far.
2	-	In- and output field	See Chapter "General Information – Extract 1" (Page 74).
3	Ok	Button	Confirms the selection and inputs. Closes the pop-up window. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).
4	Cancel	Button	Closes the pop-up window. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).

6.2.6 "Inner pipe data" pop-up window



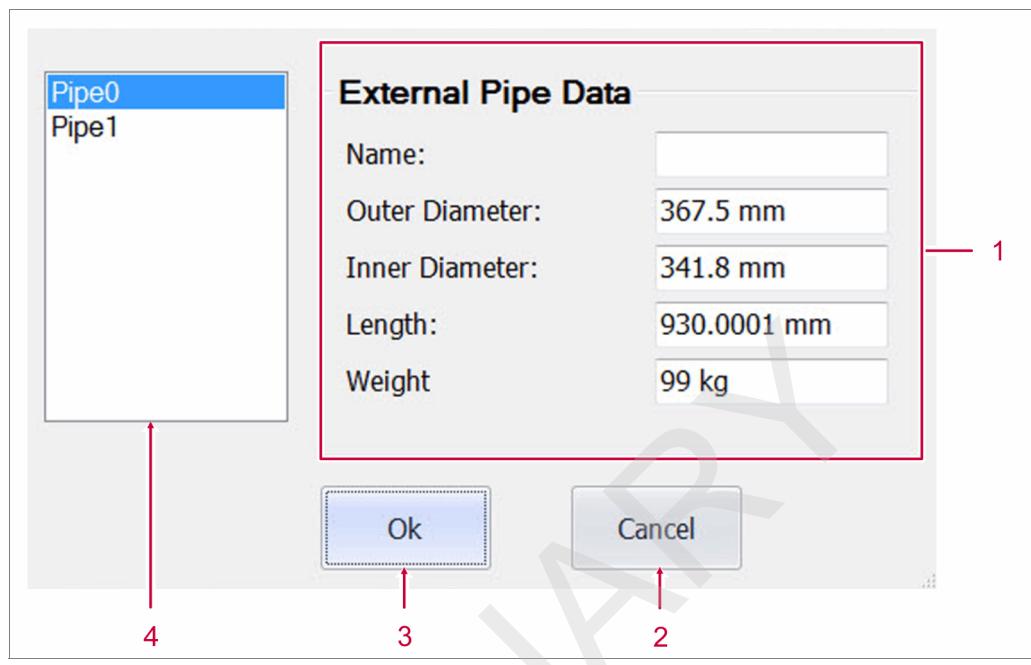
"Inner pipe data" pop-up window

Legend

No.	Designation	Element	Function
1	-	In- and output field	See Chapter "General Information – Extract 2" (Page 76).
2	Cancel	Button	Closes the pop-up window. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).
3	Ok	Button	Confirms the selection and inputs. Closes the pop-up window. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).
4	-	Selection list	Displays all inner pipes stored in the control system so far.



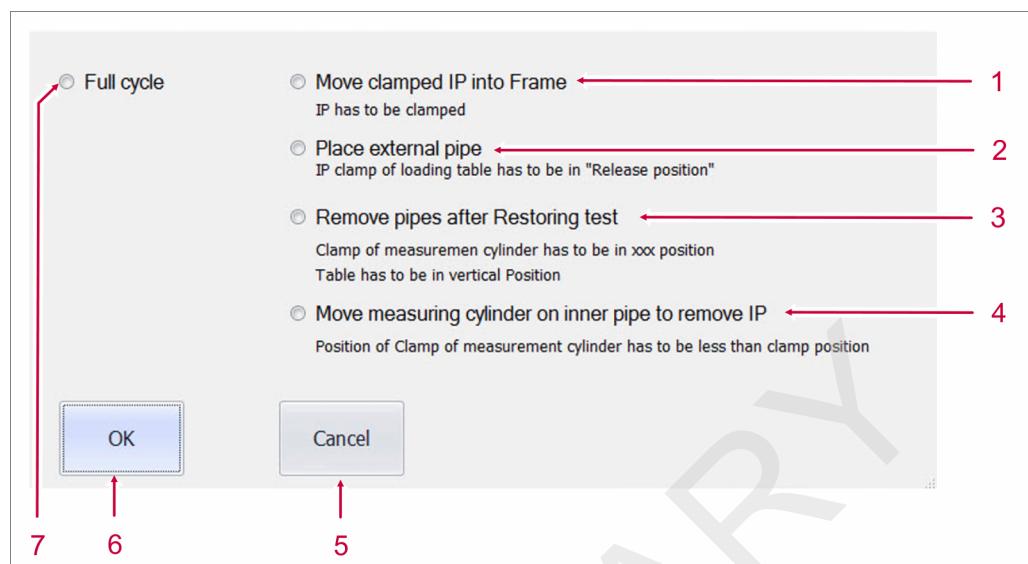
6.2.7 "External pipe data" pop-up window



Legend

No.	Designation	Element	Function
1	-	In- and output field	See Chapter "General Information – Extract 3" (Page 77).
2	Cancel	Button	Closes the pop-up window. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).
3	OK	Button	Confirms the selection and inputs. Closes the pop-up window. Proceeds to the operator screen: GENERAL INFORMATION (see page 73: General Information – Overview).
4	-	Selection list	Displays all external pipes stored in the control system so far.

6.2.8 "Set Start Point For Automode" pop-up window

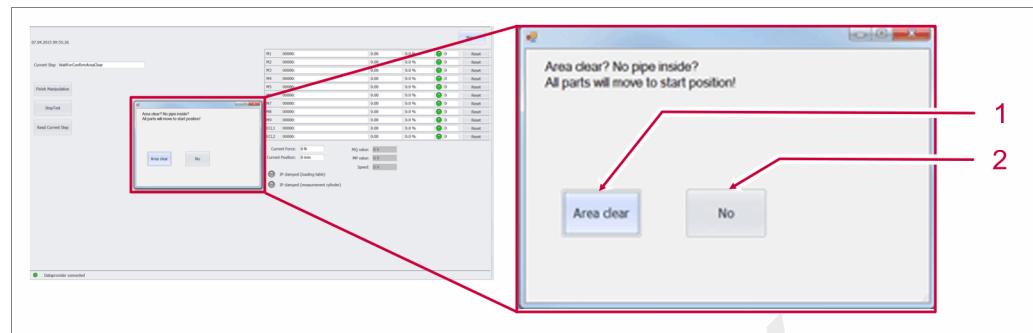


Legend

No.	Designation	Element	Function
1	Move clamped IP into Frame	Option field	The test shall start from this sub-step.
2	Place external pipe	Option field	The test shall start from this sub-step.
3	Remove Pipes after Restoring test	Option field	The test shall start from this sub-step.
4	Move measuring cylinder on inner pipe to remove	Option field	The test shall start from this sub-step.
5	Cancel	Button	Cancels the test. The dialog is closed, the sequence moves to the Init-step. A new test can be started via the "Menu" button or one can switch over to manual mode.
6	OK	Button	Starts the complete test or as from a selected sub-step. If "Full cycle" is selected, proceeds to the operator screen: " START OF AUTO MODE TEST " POP-UP WINDOW (see page 83: "Start Of Auto Mode Test" pop-up window). Otherwise, the sequence starts as from the specified point.
7	Full cycle	Option field	A complete test cycle shall be performed.



6.2.9 "Start Of Auto Mode Test" pop-up window

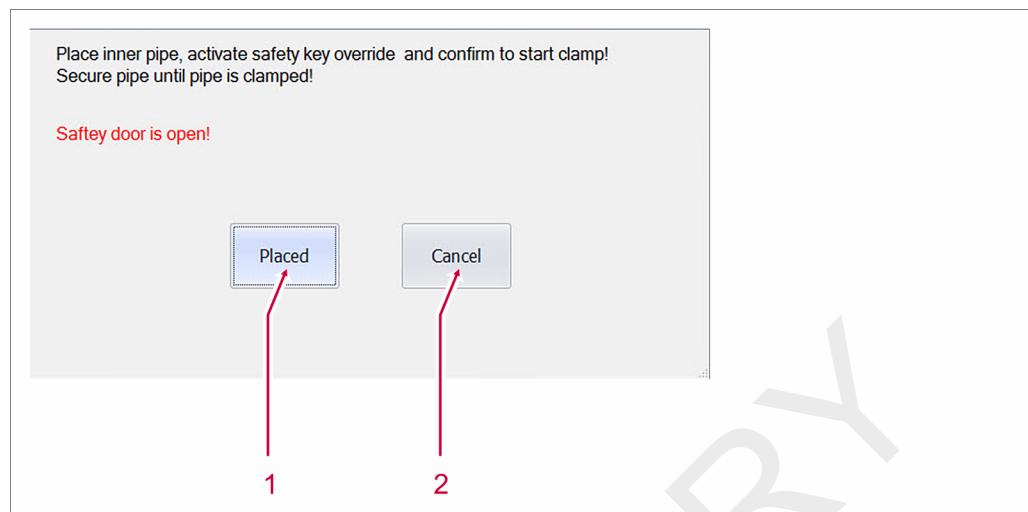


"Start Of Auto Mode Test" pop-up window

Legend

No.	Designation	Element	Function
1	Area clear	Button	<p>Confirms that the interior of the machine is free of objects, pipes and persons.</p> <p>The confirmations allows all axes to move to their starts positions. Any clamped pipes would fall over or fall down.</p> <p>Proceeds to the operator screen: "INNER PIPE PLACED" POP-UP WINDOW (see page 84: "Inner pipe placed" pop-up window).</p>
2	No	Button	<p>Ends the sequence for starting the test.</p> <p>The operator must then explicitly start the test afresh.</p>

6.2.10 "Inner pipe placed" pop-up window



"Inner pipe placed" pop-up window

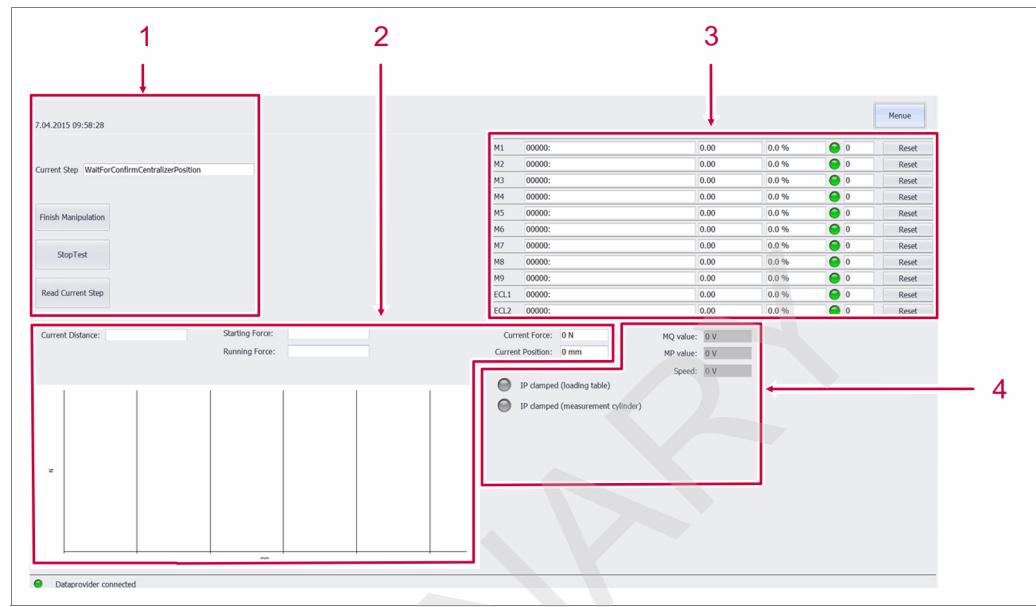
Legend

No.	Designation	Element	Function
1	Placed	Button	Confirms that the inner pipe has been placed in the machine.
2	Cancel	Button	Opens an error dialog (see page 141: Error Handling), the operator can then decide if he/she wishes to proceed (if permitted), to cancel the test or to repeat the step in the sequence.



6.2.11 Starting Running Force Test View Auto Mode

6.2.11.1 Starting Running Force Test View Auto Mode - Overview

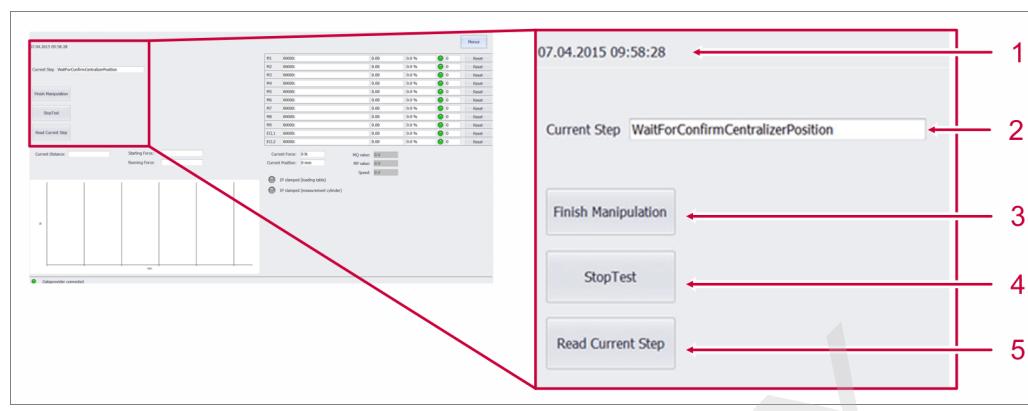


Starting Running Force Test View Auto Mode - Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 1" (Page 86).
2	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 2" (Page 87).
3	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 3" (Page 88).
4	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 4" (Page 89).

6.2.11.2 Starting Running Force Test View Auto Mode - Extract 1



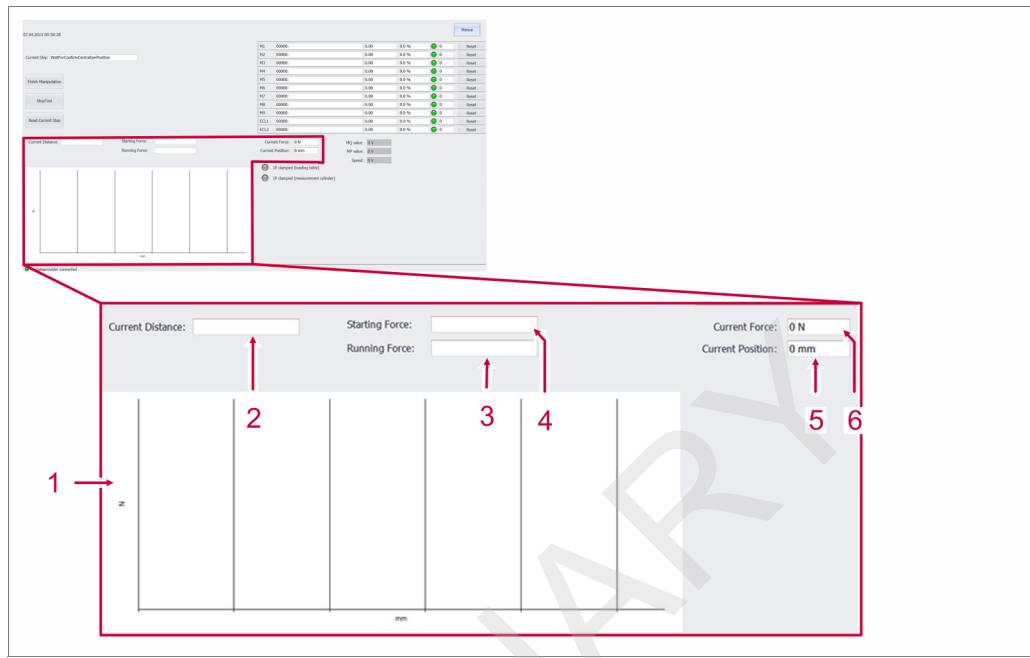
Starting Running Force Test View Auto Mode - Extract 1

Legend

No.	Designation	Element	Function
1	-	Display field	Displays the current date and time.
2	Current Step	Output field	Shows the name of the current step in the automatic sequence.
3	Finish Manipulation	Button	If an error has arisen and the "Manipulate" button has been pressed in the error dialog (see page 141: Error Handling), the dialog can be called up once more by means of the "Finish Manipulation" button. The sequence can then be resumed by means of the "Go On", "Cancel" or "Try again" button.
4	Stop Test	Button	Interrupts the sequence. Normally, the error dialog is then displayed (see page 141: Error Handling). The operator can decide if and how the test is to continue.
5	Read Current Step	Button	In the event of a dialog being closed accidentally, it can be re-opened by means of the dialog corresponding to the current step.



6.2.11.3 Starting Running Force Test View Auto Mode - Extract 2



Starting Running Force Test View Auto Mode - Extract 2

Legend

No.	Designation	Element	Function
1	-	Graphic presentation	Displays the starting force graph and the running force graph as soon as the test has been started (Force over Distance).
2	Current Distance	Output field	Displays the distance measured that the inner pipe has travelled in the external pipe from the start of the test to the current point in time.
3	Running Force	Output field	Displays the measured force that is required to move the inner pipe with the centralizer in the external pipe.
4	Starting Force	Output field	Displays the measured force that is required to push the inner pipe with the centralizer in the external pipe.
5	Current Position	Output field	Displays the position measured of the die by which the inner pipe is held.
6	Current Force	Output field	Displays the currently measured force.

6.2.11.4 Starting Running Force Test View Auto Mode - Extract 3



Starting Running Force Test View Auto Mode - Extract 3

Legend

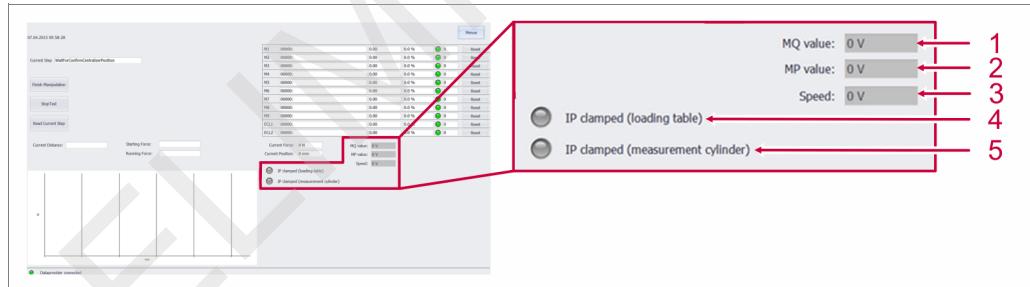
No.	Designation	Element	Function
1	M1	Output fields	Inner pipe clamp (Loading table) Master.
2	M2	Output fields	Inner pipe clamp (Loading table) slave coupled with M1.
3	M3	Output fields	Inner pipe clamp (measurement cylinder).
4	M4	Output fields	Rotary table: Rotation.
5	M5	Output fields	Bow detection Sensor: vertical movement.
6	M6	Output fields	Bow detection Sensor: horizontal movement.
7	M7	Output fields	Rotary table: vertical movement.
8	M8	Output fields	Loading table.
9	M9	Output fields	Rotary table: horizontal movement.
10	ECL1	Output fields	Lower external pipe clamp Master.
11	ECL2	Output fields	Lower external pipe clamp, Slave, coupled with ECL1.
12	-	Output fields	Displays the status number and status text of the respective axis. Example: D012: Control and power section ready



Legend (Cont.)

No.	Designation	Element	Function
13	-	Output fields	Displays the current position of the axis.
14	-	Output fields	Displays the currently applied current or the force that is currently applied to the axis in % of the maximum current/force. Current and force are proportional to each other.
15	-	Display elements	green: Correct red: Axis has an error, must be reset by means of "Reset".
16	-	In- and output field	Error number (Beckhoff or Rexroth): 0: Correct
17	Reset	Buttons	In the event of an error the axis must be reset. LED (No. 12) changes from red to green.

6.2.11.5 Starting Running Force Test View Auto Mode - Extract 4



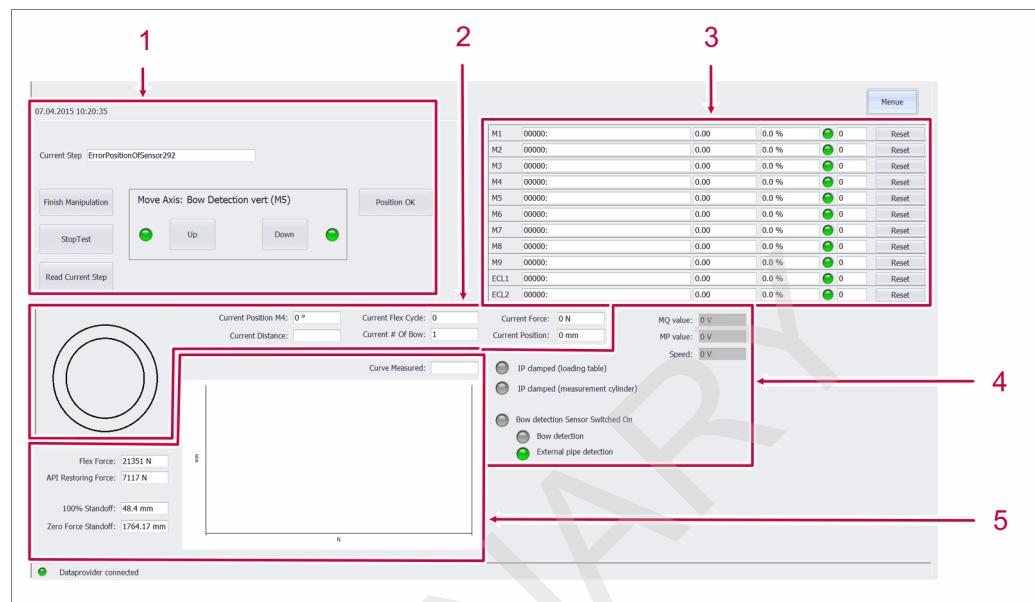
Legend (Cont.)

No.	Designation	Element	Function
3	Speed	Display field	<p>Value for the control of the hydraulic system: Only required for the measuring cylinder.</p> <p>Value of 0 V: Neutral position, cylinder has no pressure.</p> <p>Value >0 V to max. 10 V: Cylinder movement upwards.</p> <p>Value <0 V to min. -10 V: Cylinder movement downwards.</p>
4	IP clamped (loading table)	Display element	<p>The inner pipe is clamped (loading table) if the green LED is displayed.</p> <p>Recognition via the position and clamping force of the motors (M1 and M2).</p>
5	IP clamped (measurement cylinder)	Display element	<p>The inner pipe is clamped (measurement cylinder) if the green LED is displayed.</p> <p>Recognition via the position and clamping force of the motor (M3).</p>



6.2.12 Bow Detection Sensor Correction Of Position

6.2.12.1 Bow Detection Sensor Correction Of Position - Overview

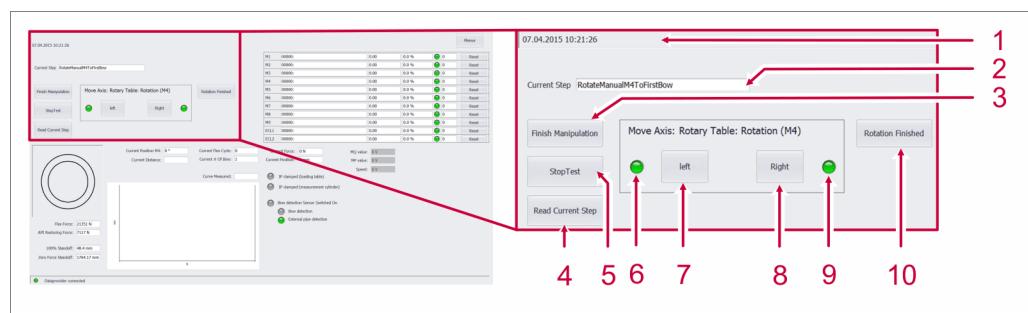


Bow Detection Sensor Correction Of Position - Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Bow Detection Sensor Correction Of Position - Extract 1" (Page 92).
2	-	-	See Chapter "Read Bow Flex Bow View Auto Mode - Extract 2" (Page 94).
3	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 3" (Page 88).
4	-	-	See Chapter "Restoring Force Test View Auto Mode – Extract 4" (Page 98).
5	-	-	See Chapter "Read Bow Flex Bow View Auto Mode - Extract 5" (Page 95).

6.2.12.2 Bow Detection Sensor Correction Of Position - Extract 1



Bow Detection Sensor Correction Of Position - Extract 1

Legend

No.	Designation	Element	Function
1	-	Display field	Displays the current date and time.
2	Current Step	Output field	Shows the name of the current step in the automatic sequence.
3	Finish Manipulation	Button	If an error has arisen and the "Manipulate" button has been pressed in the error dialog (see page 141: Error Handling), the dialog can be called up once more by means of the "Finish Manipulation" button. The sequence can then be resumed by means of the "Go On", "Cancel" or "Try again" button.
4	Read Current Step	Button	In the event of a dialog being closed accidentally, it can be re-opened by means of the dialog corresponding to the current step.
5	Stop Test	Button	Interrupts the sequence. Normally, the error dialog is then displayed (see page 141: Error Handling). The operator can decide if and how the test is to continue.
6	-	Display element	Displays the status of the limit sensors (hardware). green: not triggered red: Limit reached. Motor is switched off by the hardware.
7	Up	Button	Moves the sensor upwards.
8	Down	Button	Moves the sensor downwards.

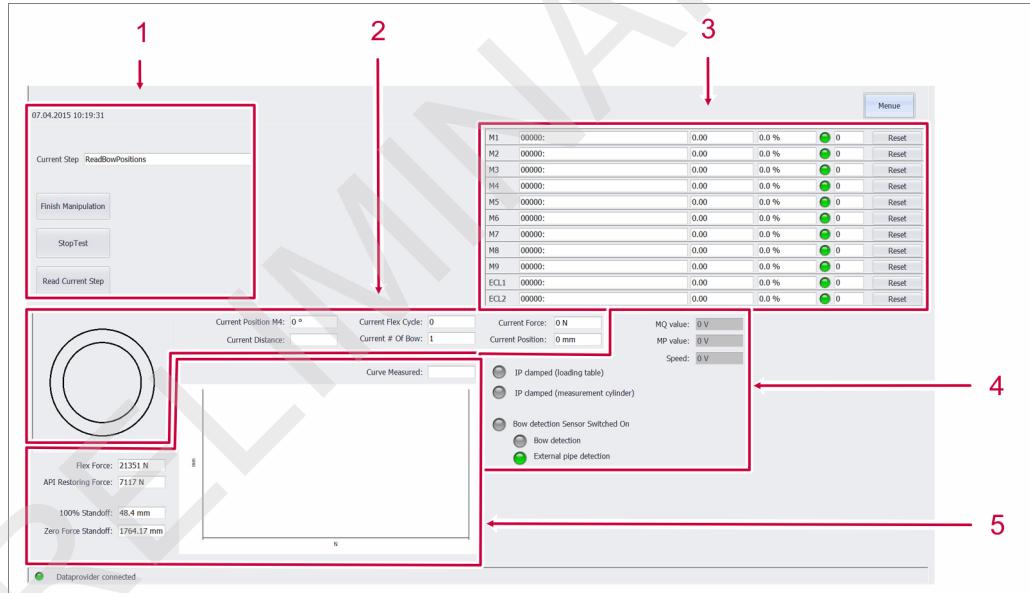


Legend (Cont.)

No.	Designation	Element	Function
9	-	Display element	Displays the status of the limit sensors (hardware). green: not triggered red: Limit reached. Motor is switched off by the hardware.
10	Position OK	Button	Confirms that the sensor is in the correct position. The sequence proceeds after confirmation.

6.2.13 Read Bow Flex Bow View Auto Mode

6.2.13.1 Read Bow Flex Bow View Auto Mode - Overview

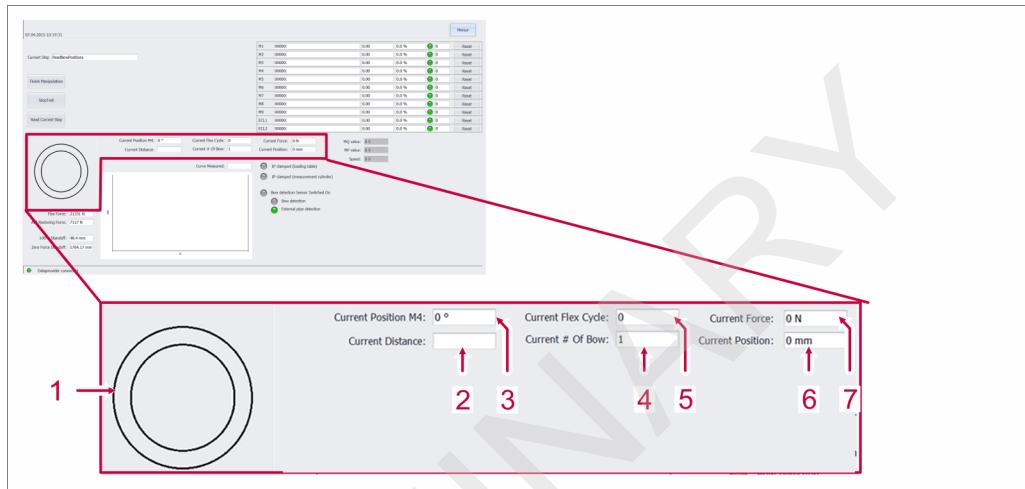


Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 1" (Page 86).
2	-	-	See Chapter "Read Bow Flex Bow View Auto Mode - Extract 2" (Page 94).
3	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 3" (Page 88).
4	-	-	See Chapter "Restoring Force Test View Auto Mode – Extract 4" (Page 98).

Legend (Cont.)

No.	Designation	Element	Function
5	-	-	See Chapter "Read Bow Flex Bow View Auto Mode - Extract 5" (Page 95).

6.2.13.2 Read Bow Flex Bow View Auto Mode - Extract 2

Read Bow Flex Bow View Auto Mode - Extract 2

Legend

No.	Designation	Element	Function
1	-	Graphic presentation	Presentation: inner circle = inner pipe outer circle = external pipe If bows are detected, a bar appears between the inner and external pipe, with the angle. In Chapter "Manual interaction: Rotary Table Rotation - Overview" (Page 122) the graphic is displayed with the bows.
2	Current Distance	Output field	Displays the distance covered by the die as measured currently.
3	Current Position	Output field	Displays the currently measured position of the die.
4	Current # Of Bow	Output field	Displays the number of the current bow.
5	Current Flex Cycle	Output field	Displays in which cycle of the set the sequence is.
6	Current Position	Output field	Displays the position measured of the die by which the inner pipe is held.
7	Current Force	Output field	Displays the currently measured force.



6.2.13.3 Read Bow Flex Bow View Auto Mode - Extract 5



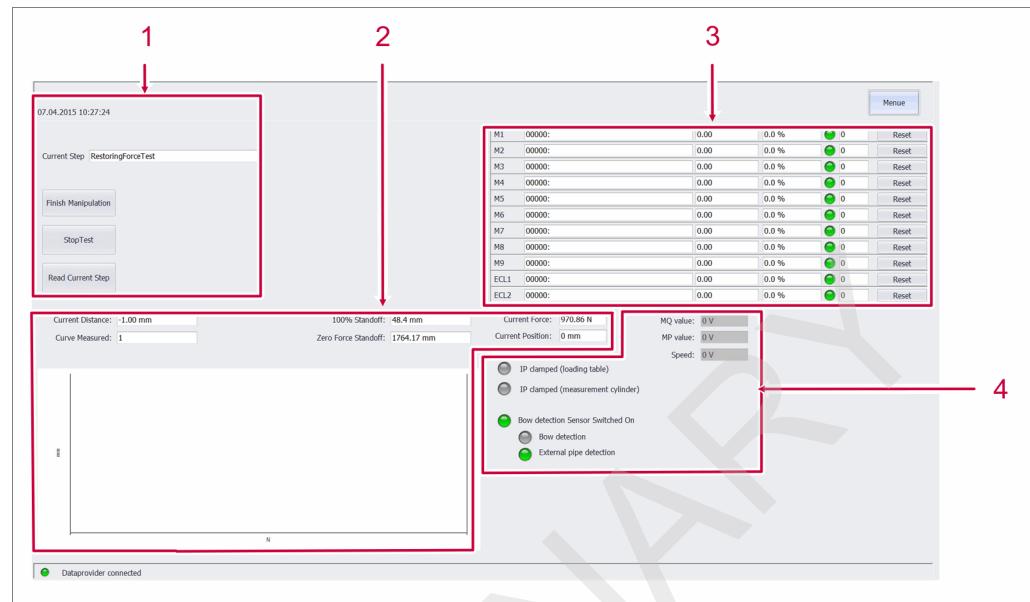
Read Bow Flex Bow View Auto Mode - Extract 5

Legend

No.	Designation	Element	Function
1	Curve Measured	Output field	Displays the numbered of the measured curves.
2	-	Graphic presentation	As soon as the set has been started, the currently measured graph is displayed (Distance over Force). The current curve is shown in blue; the curve of the current bow is shown in dark grey and all others in silver/light grey.
3	Flex Force	Display field	Displays the force used to place the bow. According to API, three times with the API force
4	API Restoring Force	Output field	Displays the force prescribed by the API. The force depends on the size of the pipe.
5	100% Standoff	Output field	Displays the calculated 100% standoff.
6	Zero Force Standoff	Output field	Displays the distance between the inner pipe and the external pipe, upon which a force must be applied.

6.2.14 Restoring Force Test View Auto Mode

6.2.14.1 Restoring Force Test View Auto Mode – Overview



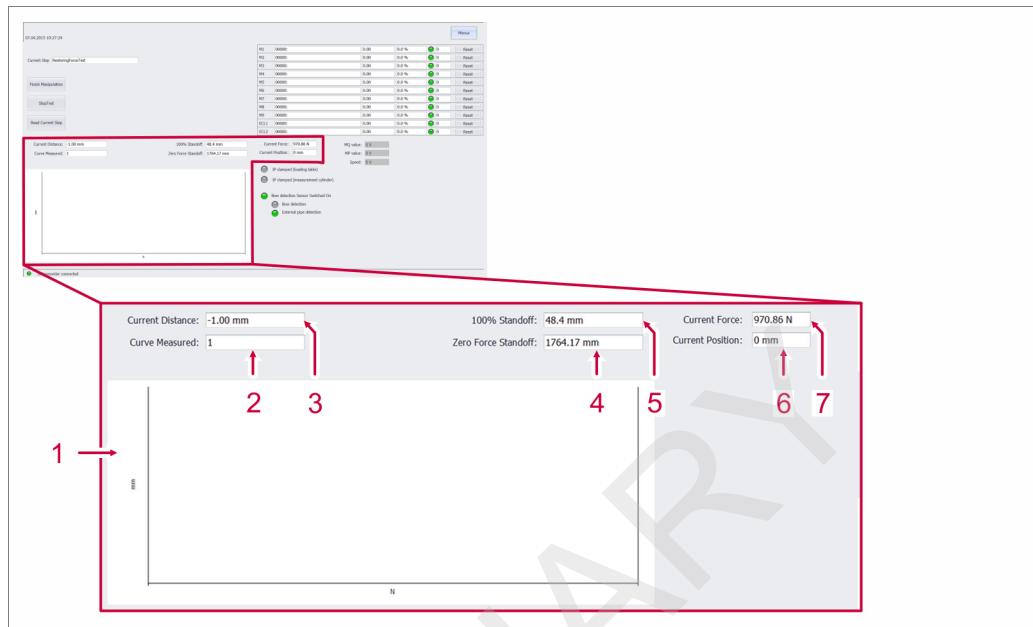
Restoring Force Test View Auto Mode – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 1" (Page 86).
2	-	-	See Chapter "Restoring Force Test View Auto Mode – Extract 2" (Page 97).
3	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 3" (Page 88).
4	-	-	See Chapter "Restoring Force Test View Auto Mode – Extract 4" (Page 98).



6.2.14.2 Restoring Force Test View Auto Mode – Extract 2

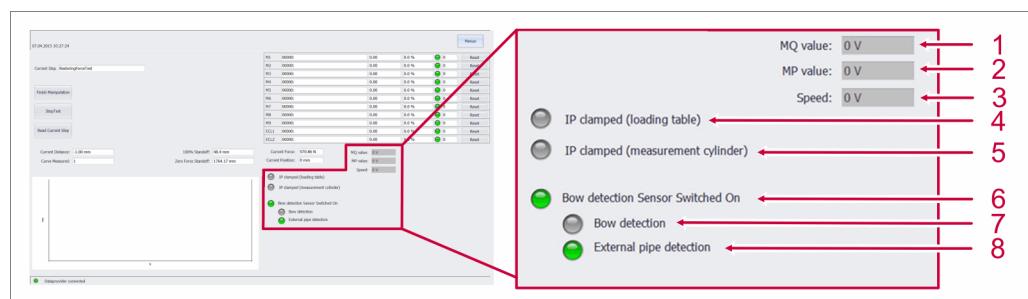


Restoring Force Test View Auto Mode – Extract 2

Legend

No.	Designation	Element	Function
1	-	Graphic presentation	As soon as the restoring force test has been started, the measured curves (Distance over Force) are displayed. The current curve is shown in blue, the others in dark grey.
2	Curve Measured	Output field	Displays the numbered of the measured curves.
3	Current Distance	Output field	Displays the distance covered by the die as measured currently.
4	Zero Force Standoff	Output field	Displays the distance between the inner pipe and the external pipe, upon which a force must be applied.
5	100% Standoff	Output field	Displays the calculated 100% standoff.
6	Current Position	Output field	Displays the position measured of the die by which the inner pipe is held.
7	Current Force	Output field	Displays the currently measured force.

6.2.14.3 Restoring Force Test View Auto Mode – Extract 4



Restoring Force Test View Auto Mode – Extract 4

Legend

No.	Designation	Element	Function
1	MQ value	Display field	Value for the control of the hydraulic system: MQ: The greater the value (max. 10 V) the greater the speed of the hydraulic cylinder.
2	MP value	Display field	Value for the control of the hydraulic system: MP: The greater the value (max. 10 V) the greater the pressure/force of the hydraulic cylinder.
3	Speed	Display field	Value for the control of the hydraulic system: Only required for the measuring cylinder. Value of 0 V: Neutral position, cylinder has no pressure. Value >0 V to max. 10 V: Cylinder movement upwards. Value <0 V to min. -10 V: Cylinder movement downwards.
4	IP damped (loading table)	Display element	The inner pipe is clamped (loading table) if the green LED is displayed. Recognition via the position and clamping force of the motors (M1 and M2).
5	IP damped (measurement cylinder)	Display element	The inner pipe is clamped (measurement cylinder) if the green LED is displayed. Recognition via the position and clamping force of the motor (M3).
6	Bow detection Sensor Switched On	Display element	The output of the "Bow detection sensor" is switched on. The laser is also switched on.



Legend (Cont.)

No.	Designation	Element	Function
7	Bow detection	Display element	The LED is displayed as green if the laser encounters a bow or something else. It cannot differentiate if a bow or something else has been detected if the reflection is the same.
8	External pipe detection	Display element	The LED is displayed as green if the external pipe is recognised. High reflection in comparison to a bow.

6.2.15 Manual Interaction: Start Screen



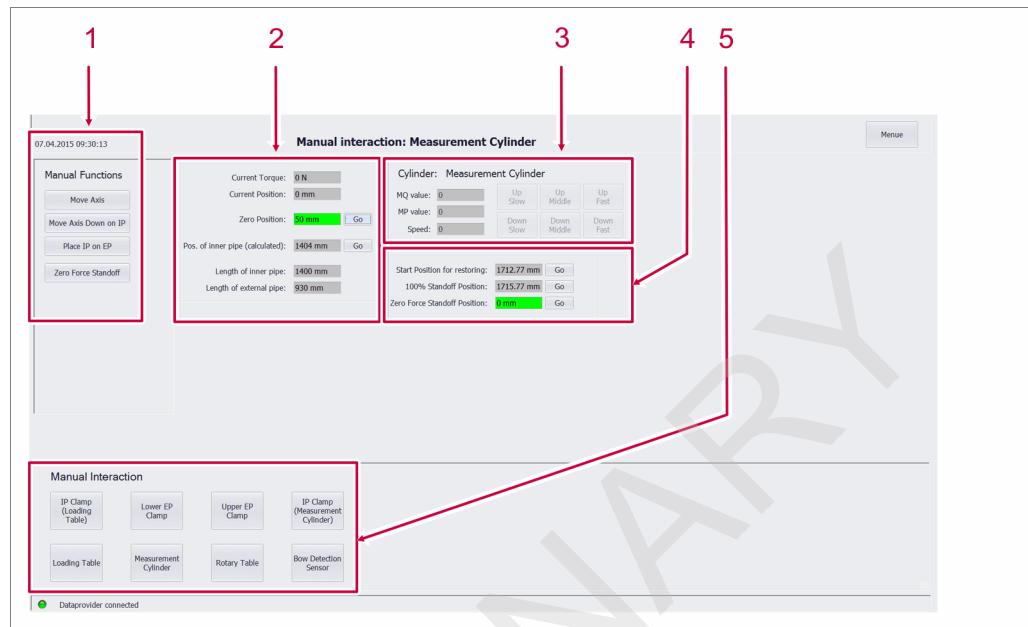
Manual Interaction: Start Screen - Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).

6.2.16 Manual Interaction: Measurement Cylinder Manual

6.2.16.1 Manual Interaction: Measurement Cylinder Manual - Overview



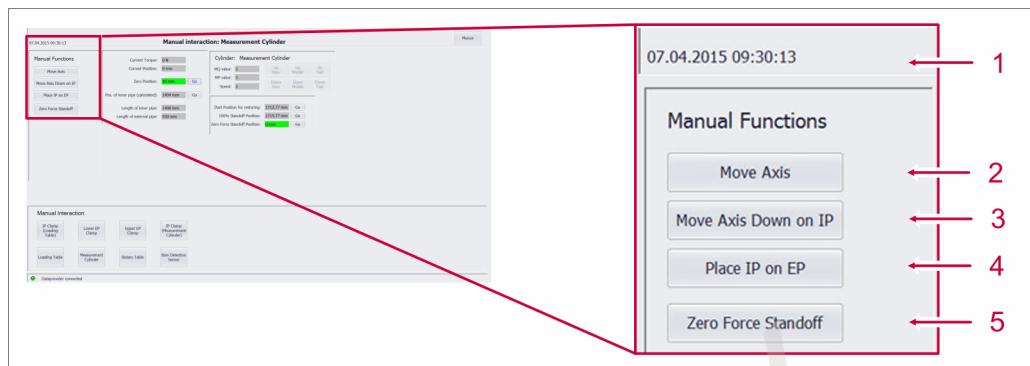
Manual Interaction: Measurement Cylinder Manual - Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: Measurement Cylinder Manual - Extract 1" (Page 101).
2	-	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 2" (Page 102).
3	-	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 3" (Page 103).
4	-	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 4" (Page 104).
5	-	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).



6.2.16.2 Manual Interaction: Measurement Cylinder Manual - Extract 1



Manual Interaction: Measurement Cylinder Manual - Extract 1

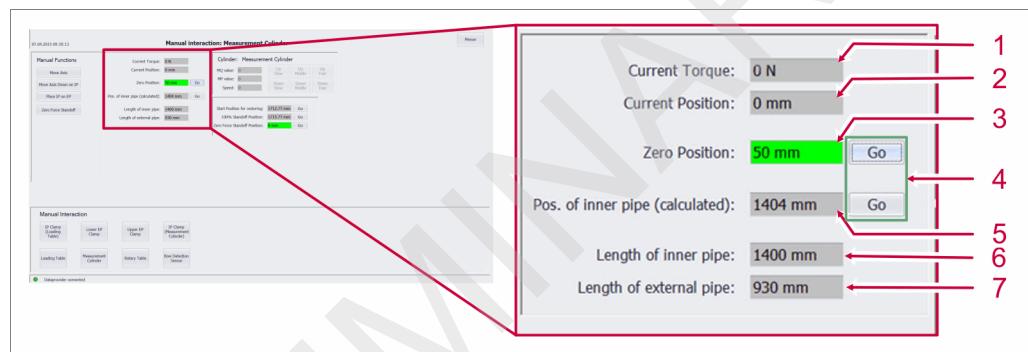
Legend

No.	Designation	Element	Function
1	-	Display field	Displays the current date and time.
2	Move Axis	Button	After operating the button, the axis (in this case the HCL 4 measurement cylinder) can proceed manually. The buttons in Extract 3 (see page 103: Manual interaction: Measurement Cylinder Manual - Extract 3) are activated. The cylinder can thus be moved.
3	Move Axis Down on IP	Button	Once the button has been activated, the measurement cylinder is moved downwards until an excessive pressure is measured or the cylinder has reached the position of the inner pipe.
4	Place IP on EP	Button	The measurement cylinder moves downwards until a specific force is exceeded. This function is used to place the inner pipe with the centralizer onto the external pipe. As soon as the centralizer is placed onto the external pipe, the force rises and the cylinder stops. This function does not, however, function with the centralizer. For this reason, the cylinder stops after a specific length of travel.

Legend (Cont.)

No.	Designation	Element	Function
5	Zero Force Standoff	Button	Measures the Zero Force Standoff. This means that the pipes are in position for the Restoring Force Test. The cylinder is moved downwards until a specific, very low force is exceeded. The value can then be calculated from the distance covered in conjunction with the 100% standoff.

6.2.16.3 Manual interaction: Measurement Cylinder Manual - Extract 2



Manual interaction: Measurement Cylinder Manual - Extract 2

Legend

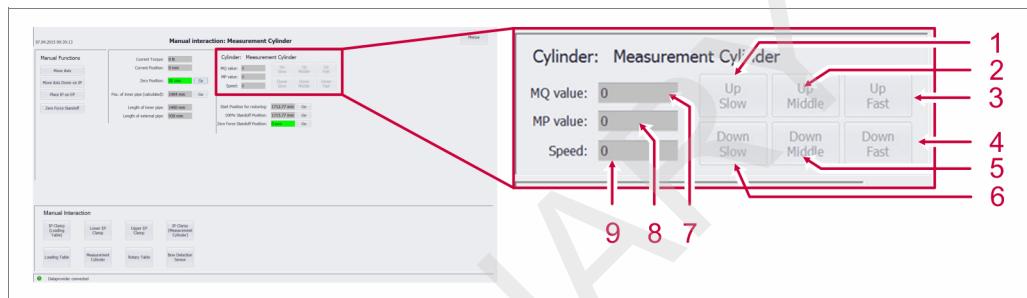
No.	Designation	Element	Function
1	Current Torque	Display field	Displays the currently measured position.
2	Current Position	Display field	Displays the currently measured position.
3	Zero Position	Display field	Start Position or Home Position.
4	Go	Button	When activated, the cylinder moves to the previously-specified position. Once the position has been reached, the field becomes green.
5	Pos. of inner pipe (calculated)	Display field	Displays the position above the inner pipe, in order, for example, to lift the pipe.
6	Length of inner pipe	Display field	Displays the length of the inner pipe. The length has been entered in "General Information (see page 73: General Information – Overview)".



Legend (Cont.)

No.	Designation	Element	Function
7	Length of external pipe	Display field	Displays the length of the external pipe. The length has been entered in "General Information (see page 73: General Information – Overview)."

6.2.16.4 Manual interaction: Measurement Cylinder Manual - Extract 3



Manual interaction: Measurement Cylinder Manual - Extract 3

Legend

No.	Designation	Element	Function
1	Up Slow	Button	Moves the cylinder slowly upwards for as long as the button is pressed.
2	Up Middle	Button	Moves the cylinder upwards at medium speed for as long as the button is pressed.
3	Up Fast	Button	Moves the cylinder quickly upwards for as long as the button is pressed.
4	Down Fast	Button	Moves the cylinder quickly downwards for as long as the button is pressed.
5	Down Middle	Button	Moves the cylinder downwards at medium speed for as long as the button is pressed.
6	Down Slow	Button	Moves the cylinder quickly downwards for as long as the button is pressed.
7	MQ value	Display field	Value for the control of the hydraulic system: MQ: The greater the value (max. 10 V) the greater the speed of the hydraulic cylinder.

Legend (Cont.)

No.	Designation	Element	Function
8	MP value	Display field	Value for the control of the hydraulic system: MP: The greater the value (max. 10 V) the greater the pressure/force of the hydraulic cylinder.
9	Speed	Display field	Value for the control of the hydraulic system: Only required for the measuring cylinder. Value of 0 V: Neutral position, cylinder has no pressure. Value >0 V to max. 10 V: Cylinder movement upwards. Value <0 V to min. -10 V: Cylinder movement downwards.

6.2.16.5 Manual interaction: Measurement Cylinder Manual - Extract 4



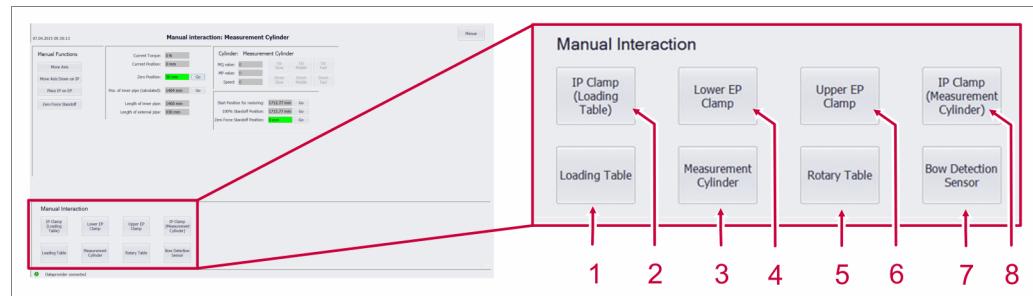
Manual interaction: Measurement Cylinder Manual - Extract 4

Legend

No.	Designation	Element	Function
1	Start Position for restoring	Display field	Displays the start position of the cylinder for the Restoring Force Test.
2	100% Standoff Position	Display field	Displays the position of the cylinder in which the cylinder is located in the 100% standoff position.
3	Go	Buttons	When activated, the cylinder moves to the previously-specified position. Once the position has been reached, the field becomes green.
4	Zero Force Standoff Position	Display field	Displays the position of the cylinder in which the cylinder is located in the zero force standoff position.



6.2.16.6 Manual interaction: Measurement Cylinder Manual - Extract 5

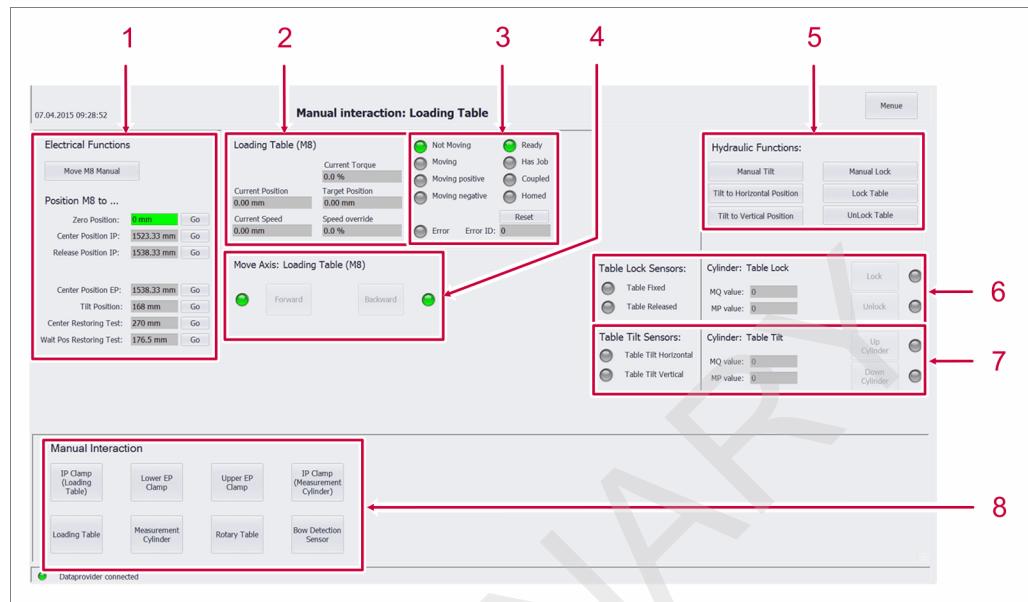


Legend

No.	Designation	Element	Function
1	Loading Table	Button	Switches to manual operation of the loading table.
2	IP Clamp (Loading Table)	Button	Switches to manual operation of the inner pipe clamp (loading table).
3	Measurement Cylinder	Button	Switches to manual operation of the measurement cylinder.
4	Lower EP Clamp	Button	Switches to manual operation of the lower external pipe clamp.
5	Rotary Table	Button	Opens the sub-menu for the rotary table.
6	Upper EP Clamp	Button	Switches to manual operation of the upper external pipe clamp.
7	Bow Detection Sensor	Button	Switches to manual operation of the bow detection sensor.
8	IP Clamp (Measurement Cylinder)	Button	Switches to manual operation of the inner pipe clamp (measurement cylinder).

6.2.17 Manual interaction: Loading Table Manual

6.2.17.1 Manual interaction: Loading Table Manual – Overview



Manual interaction: Loading Table Manual – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: Loading Table Manual – Extract 1" (Page 107).
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
4	-	-	See Chapter "Manual Interaction: Loading Table Manual – Extract 4" (Page 110).
5	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 5" (Page 111).
6	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 6" (Page 112).
7	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 5" (Page 111).
8	Manual Interaction	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).



6.2.17.2 Manual Interaction: Loading Table Manual – Extract 1

The screenshot shows a software interface titled 'Manual interaction: Loading Table'. It includes sections for 'Electrical Functions' (Move M8 Manual), 'Position M8 to ...' (Zero Position, Center Position IP, Release Position IP), and 'Hydraulic Functions' (Table Lock Sensors). Buttons for 'Go' are shown next to each position value.

Position	Value (mm)	Status
Zero Position	0 mm	Green (Go)
Center Position IP	1523.33 mm	Grey (Go)
Release Position IP	1538.33 mm	Grey (Go)
Center Position EP	1538.33 mm	Grey (Go)
Tilt Position	168 mm	Grey (Go)
Center Restoring Test	270 mm	Grey (Go)
Wait Pos Restoring Test	176.5 mm	Green (Go)

Manual interaction: Loading Table Manual – Extract 1

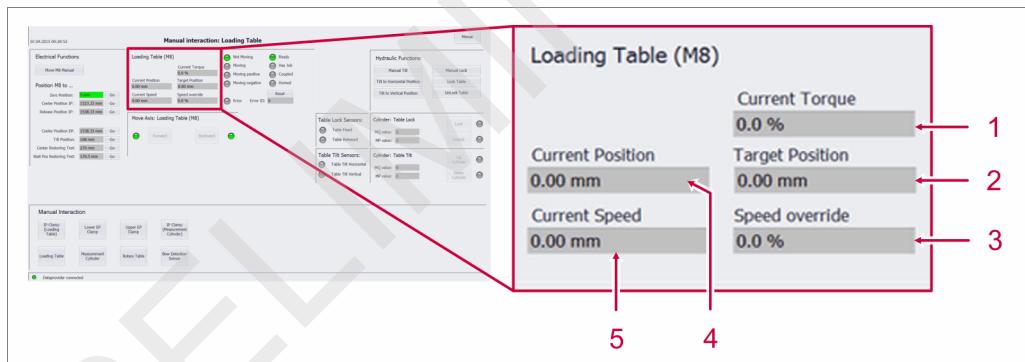
Legend

No.	Designation	Element	Function
1	Move M8 Manual	Button	After operating the button, the axis (in this case the HCL 4 measurement cylinder) can be moved manually. The buttons in Extract 4 (see page 110: Manual Interaction: Loading Table Manual – Extract 4) are activated and the axis can thus be moved.
2	Zero Position IP	Display field	Start Position or Home Position.
3	Center Position IP	Display field	Center position of the loading table beneath the measurement cylinder, so that the inner pipe can be clamped centrally with the inner pipe clamp of the measurement cylinder. The value depends on the diameter of the inner pipe.
4	Release Position IP	Display field	Position of the table if, for example, the inner pipe is pushed into the external pipe.
5	Go	Buttons	When activated, the axis moves to the position specified for it. Once the position has been reached, the field becomes green.

Legend (Cont.)

No.	Designation	Element	Function
6	Center Position EP	Display field	Center position of the loading table beneath the measurement cylinder, so that the center point of the inner pipe corresponds to the centre point of the external pipe.
7	Tilt Position	Display field	Position of the table, into which the table is brought into the horizontal or vertical position.
8	Center Restoring Test	Display field	Position into which the table must move, so that the inner pipe can be clamped on the other side of the rotary table.
9	Wait Pos Restoring Test	Display field	Position to which the table moves back to allow sufficient space for the restoring force test.

6.2.17.3 Manual interaction: Loading Table Manual – Extract 2



Legend

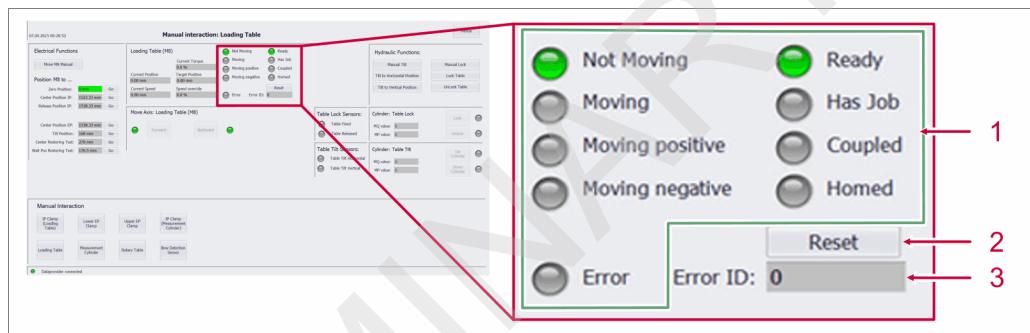
No.	Designation	Element	Function
1	Current Torque	Display field	Displays the current power consumption of the axis as a % of the maximum power. In the case of the axes this is principally current, that is nevertheless proportional to power.
2	Target Position	Display field	Displays the target position of the axis. If, for example, the "Zero Position" has been activated, the value of the zero position will stand there.



Legend (Cont.)

No.	Designation	Element	Function
3	Speed override	Display field	Displays the speed override. Example: 100 % speed override means 100 % of the pre-set speed.
4	Current Position	Display field	Displays the current position of the axis.
5	Current Speed	Display field	Displays the current speed of the axis.

6.2.17.4 Manual interaction: Loading Table Manual – Extract 3

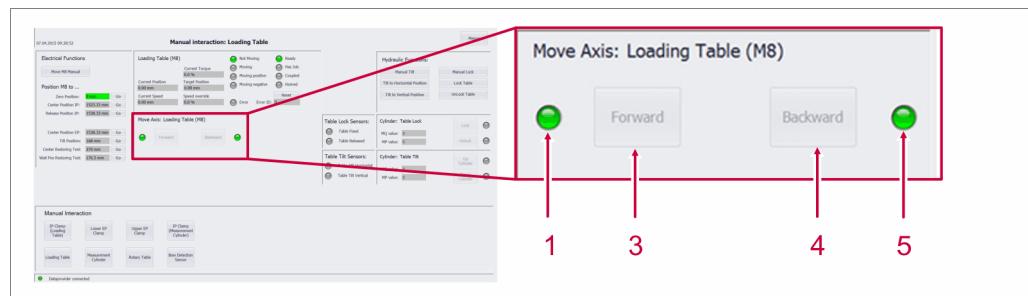


Manual interaction: Loading Table Manual – Extract 3

Legend

No.	Designation	Element	Function
1	-	Display elements	The following actions are displayed graphically (grey: inactive green: active): <ul style="list-style-type: none">• Not Moving• Moving• Moving positive• Moving negative• Error• Ready• Has Job• Coupled• Homed
2	Reset	Button	Resets the axis if an error has occurred. If the axis moves, it is also stopped by operating the button.
3	Error ID	Display field	Displays an error code (Beckhoff or Rexroth).

6.2.17.5 Manual Interaction: Loading Table Manual – Extract 4



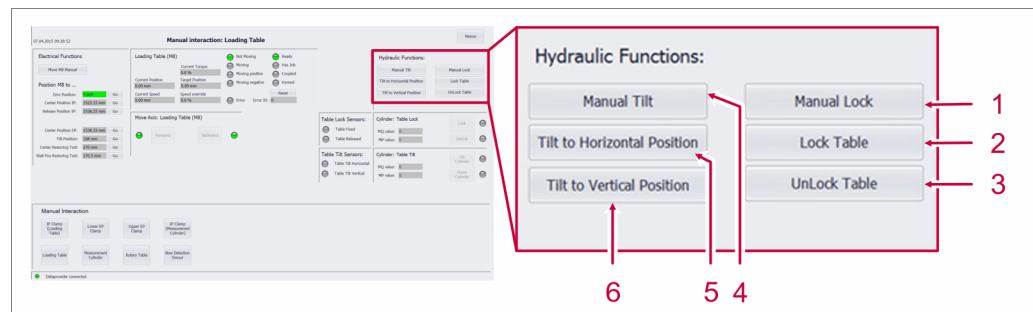
Manual interaction: Loading Table Manual – Extract 4

Legend

No.	Designation	Element	Function
1	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
2	Forward	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves forwards.
3	Backward	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves backwards.
4	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.



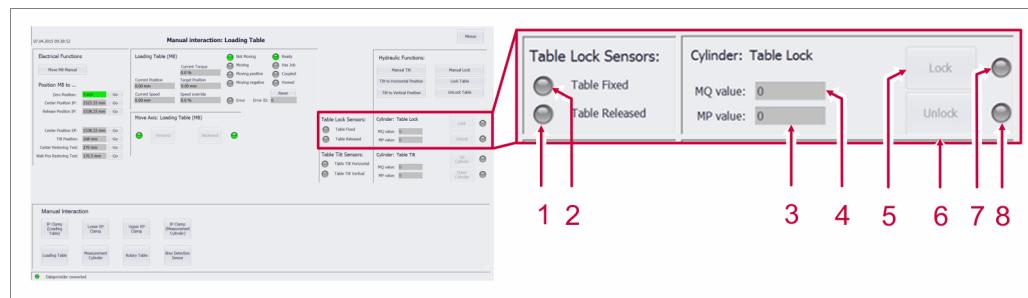
6.2.17.6 Manual interaction: Loading Table Manual – Extract 5



Legend

No.	Designation	Element	Function
1	Manual Lock	Button	Activates the buttons for manual movement of the lock cylinder. (Buttons 5 and 6 in Extract 6 (see page 112: Manual interaction: Loading Table Manual – Extract 6)).
2	Lock Table	Button	Extends the cylinder to secure the table. (Prevents the table from being raised).
3	Unlock Table	Button	Retracts the cylinder to secure the table. (It is possible to raise the table).
4	Manual Tilt	Button	Activates the buttons for manual movement of the tilt cylinder. (Buttons 5 and 6 in Extract 7 (see page 113: Manual interaction: Loading Table Manual – Extract 7)).
5	Tilt to Horizontal Position	Button	Lowers the table until the sensors show that the table is completely folded (horizontal).
6	Tilt to Vertical Position	Button	Lowers the table until the sensors show that the table is in the vertical position (90 °).

6.2.17.7 Manual interaction: Loading Table Manual – Extract 6



Manual interaction: Loading Table Manual – Extract 6

Legend

No.	Designation	Element	Function
1	Table Released	Display element	Displays the sensor signal that indicates whether the lock cylinder is retracted. green: retracted grey: not retracted
2	Table Fixed	Display element	Displays the sensor signal that indicates whether the lock cylinder is extended. green: extended grey: not extended
3	MQ value	Display field	Value for the control of the hydraulic system: MQ: The greater the value (max. 10 V) the greater the speed of the hydraulic cylinder.
4	MP value	Display field	Value for the control of the hydraulic system: MP: The greater the value (max. 10 V) the greater the pressure/force of the hydraulic cylinder.
5	Lock	Button	Activated by the "Manual Lock" button. (see page 111: Manual interaction: Loading Table Manual – Extract 5). All lock cylinders are extended when this is activated.
6	Unlock	Button	Activated by the "Manual Lock" button (see page 111: Manual interaction: Loading Table Manual – Extract 5). All lock cylinders are retracted when this is activated.



Legend (Cont.)

No.	Designation	Element	Function
7	-	Display element	Displays the status of the cylinder in the lock direction. green: Control of the cylinder active in the lock direction. grey: inactive
8	-	Display element	Displays the status of the cylinder in the unlock direction. green: Control of the cylinder active in the unlock direction. grey: inactive

6.2.17.8 Manual interaction: Loading Table Manual – Extract 7



Manual interaction: Loading Table Manual – Extract 7

Legend

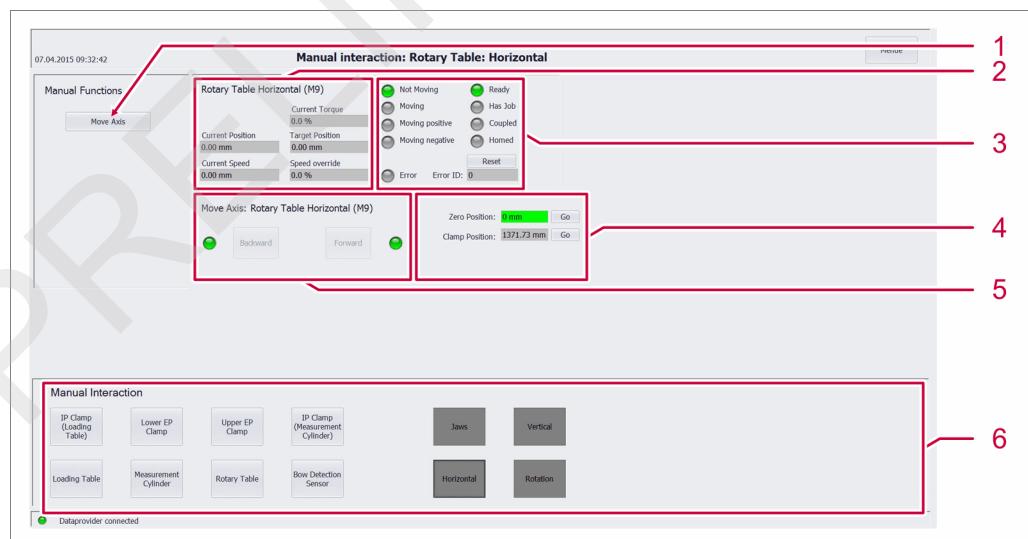
No.	Designation	Element	Function
1	Table Tilt Vertical	Display element	Displays the sensor signal that indicates whether the table is in a vertical position (90°). green: in vertical position grey: not in vertical position
2	Table Tilt Horizontal	Display element	Displays the sensor signal that indicates whether the table is in a horizontal position (0°). green: in horizontal position grey: not in horizontal position
3	MP value	Display field	Value for the control of the hydraulic system: MP: The greater the value (max. 10 V) the greater the pressure/force of the hydraulic cylinder.
4	MQ value	Display field	Value for the control of the hydraulic system: MQ: The greater the value (max. 10 V) the greater the speed of the hydraulic cylinder.

Legend (Cont.)

No.	Designation	Element	Function
5	Up Cylinder	Button	Activated by the "Unlock Table" button. The table is lifted when this is activated.
6	Down Cylinder	Button	Activated by the "Unlock Table" button. The table is lowered when this is activated.
7	-	Display element	Displays the status of the cylinder for raising the table. green: Control of the cylinder for raising the table is active. grey: inactive
8	-	Display element	Displays the status of the cylinder for lowering the table. green: Control of the cylinder for lowering the table is active. grey: inactive

6.2.18 Manual interaction: Rotary Table Horizontal

6.2.18.1 Manual interaction: Rotary Table Horizontal - Overview



Manual interaction: Rotary Table Horizontal - Overview



Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual Interaction: Loading Table Manual – Extract 4" (Page 110) are activated. The axis can thus be run.
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
4	-	-	See Chapter "Manual interaction: Rotary Table Horizontal – Extract 3" (Page 115).
5	-	-	See Chapter "Manual Interaction: Loading Table Manual – Extract 4" (Page 110).
6	Manual Interaction	-	See Chapter "Manual interaction: Rotary Table Horizontal – Manual Interaction" (Page 116).

6.2.18.2 Manual interaction: Rotary Table Horizontal – Extract 3



Manual interaction: Rotary Table Horizontal – Extract 3

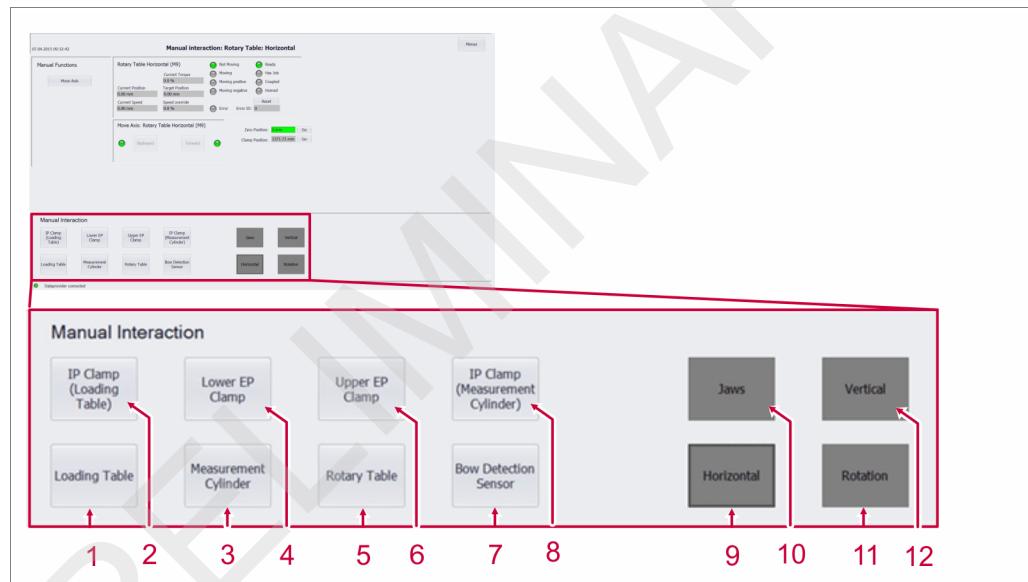
Legend

No.	Designation	Element	Function
1	Zero Position	Display field	Displays the start position of the axis.
2	Go	Button	When activated, the axis moves to the position previously specified for it. Once the position has been reached, the field becomes green.

Legend (Cont.)

No.	Designation	Element	Function
3	Go	Button	When activated, the axis moves to the position previously specified for it. Once the position has been reached, the field becomes green.
4	Clamp Position	Display field	Displays the position into which the axis moves to clamp the inner pipe. Required when setting a bow and for the restoring force test.

6.2.18.3 Manual interaction: Rotary Table Horizontal – Manual Interaction



Manual interaction: Rotary Table Horizontal – Manual Interaction

Legend

No.	Designation	Element	Function
1	Loading Table	Button	Switches to manual operation of the loading table.
2	IP Clamp (Loading Table)	Button	Switches to manual operation of the inner pipe clamp (loading table).
3	Measurement Cylinder	Button	Switches to manual operation of the measurement cylinder.
4	Lower EP Clamp	Button	Switches to manual operation of the lower external pipe clamp.
5	Rotary Table	Button	Opens the sub-menu for the rotary table.
6	Upper EP Clamp	Button	Switches to manual operation of the upper external pipe clamp.



Legend (Cont.)

No.	Designation	Element	Function
7	Bow Detection Sensor	Button	Switches to manual operation of the bow detection sensor.
8	IP Clamp (Measurement Cylinder)	Button	Switches to manual operation of the inner pipe clamp (measurement cylinder).
9	Horizontal	Button	Sub-menu of rotary table: Switches to manual operation of the horizontal rotary table.
10	Jaws	Button	Sub-menu of rotary table: Switches to manual operation of the jaws.
11	Rotation	Button	Sub-menu of rotary table: Switches to manual operation of the rotating part of the rotary table.
12	Vertical	Button	Sub-menu of rotary table: Switches to manual operation of the vertical rotary table.

6.2.19 Manual interaction: Rotary Table Vertical

6.2.19.1 Manual interaction: Rotary Table Vertical - Overview



Manual interaction: Rotary Table Vertical - Overview

Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual Interaction: Loading Table Manual – Extract 4" (Page 110) are activated. The axis can thus be run.
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
4	-	-	See Chapter "Manual interaction: Rotary Table Vertical – Extract 3" (Page 118).
5	-	-	See Chapter "Manual Interaction: Loading Table Manual – Extract 4" (Page 110).
6	Manual Interaction	-	See Chapter "Manual interaction: Rotary Table Horizontal – Manual Interaction" (Page 116).

6.2.19.2 Manual interaction: Rotary Table Vertical – Extract 3

Manual interaction: Rotary Table Vertical – Extract 3

Legend

No.	Designation	Element	Function
1	Zero Position	Display field	Displays the start position.
2	Go	Button	When activated, the axis moves to the position previously specified for it. Once the position has been reached, the field becomes green.

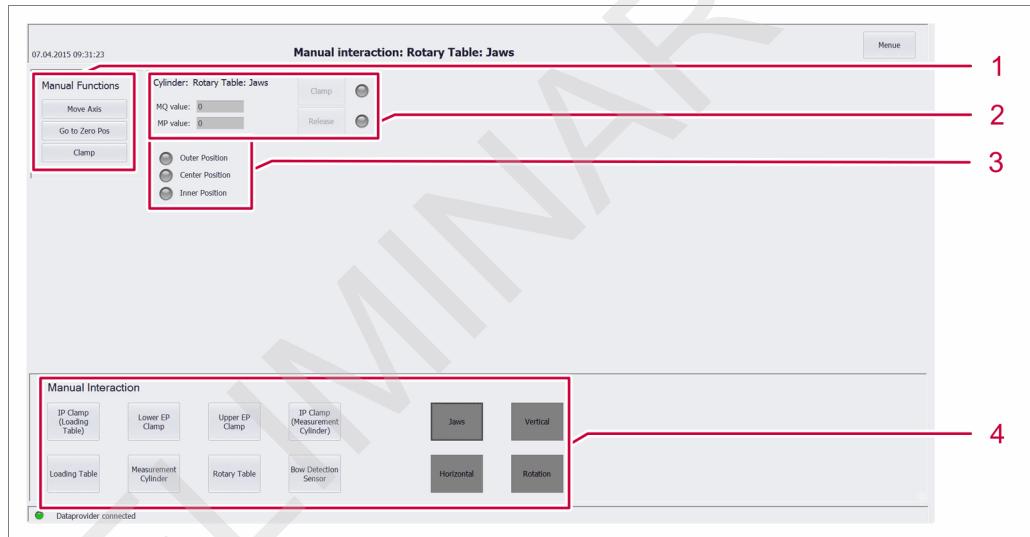


Legend (Cont.)

No.	Designation	Element	Function
3	Clamp Position	Display field	Displays the vertical position of the rotary tables, at which the center point of the rotating part is also the center point of the inner pipe. The value depends on the diameter of the inner pipe.

6.2.20 Manual interaction: Rotary Table Jaws

6.2.20.1 Manual interaction: Rotary Table Jaws - Overview

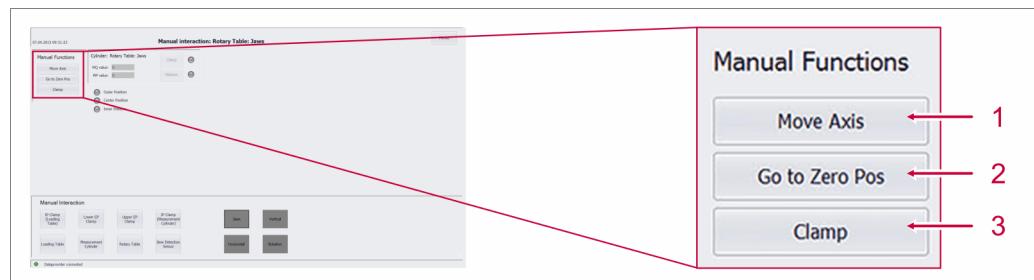


Manual interaction: Rotary Table Jaws - Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual interaction: Rotary Table Jaws – Extract 1" (Page 120).
2	-	-	See Chapter "Manual interaction: Rotary Table Jaws – Extract 2" (Page 120).
3	-	-	See Chapter "Manual interaction: Rotary Table Jaws – Extract 2" (Page 120).
4	Manual Interaction	-	See Chapter "Manual interaction: Rotary Table Horizontal – Manual Interaction" (Page 116).

6.2.20.2 Manual interaction: Rotary Table Jaws – Extract 1

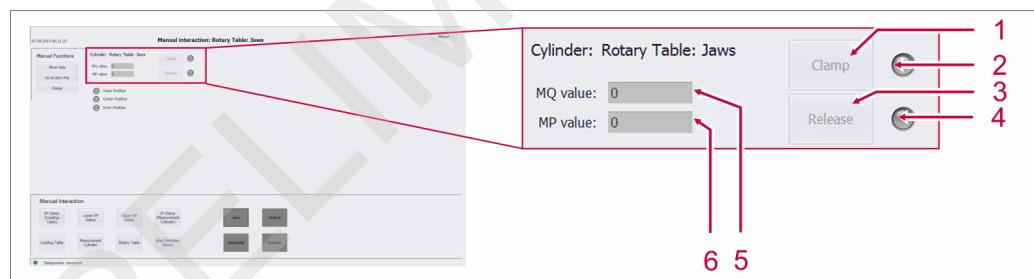


Manual interaction: Rotary Table Jaws – Extract 1

Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can be run manually. The buttons under "Manual interaction: Rotary Table Jaws – Extract 2" (Page 120) are activated. The axis can thus be run.
2	Go to Zero Pos	Button	Opens the jaws.
3	Clamp	Button	Closes the jaws.

6.2.20.3 Manual interaction: Rotary Table Jaws – Extract 2



Manual interaction: Rotary Table Jaws – Extract 2

Legend

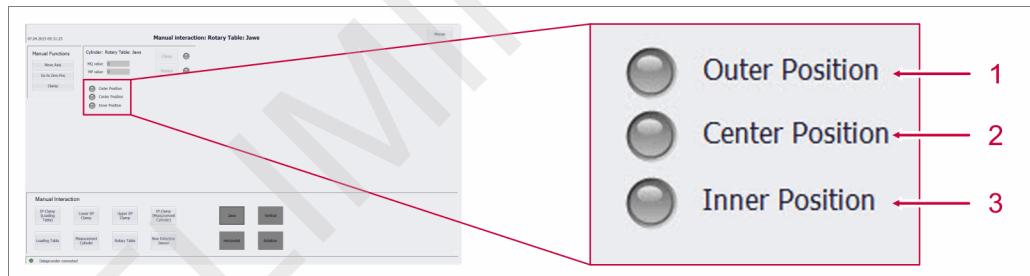
No.	Designation	Element	Function
1	Clamp	Button	Is activated by means of the "Move Axis" button. The jaws are closed for as long as the button is pressed.
2	-	Display element	Displays the status of the control system for closing the jaws. green: Control system for closing the jaws is active. grey: not active
3	Release	Button	Is activated by means of the "Move Axis" button. The jaws are opened for as long as the button is pressed.



Legend (Cont.)

No.	Designation	Element	Function
4	-	Display element	Displays the status of the control system for opening the jaws. green: Control system for opening the jaws is active. grey: not active
5	MQ value	Display field	Value for the control of the hydraulic system: MQ: The greater the value (max. 10 V) the greater the speed of the hydraulic cylinder.
6	MP value	Display field	Value for the control of the hydraulic system: MP: The greater the value (max. 10 V) the greater the pressure/force of the hydraulic cylinder.

6.2.20.4 Manual interaction: Rotary Table Jaws – Extract 3

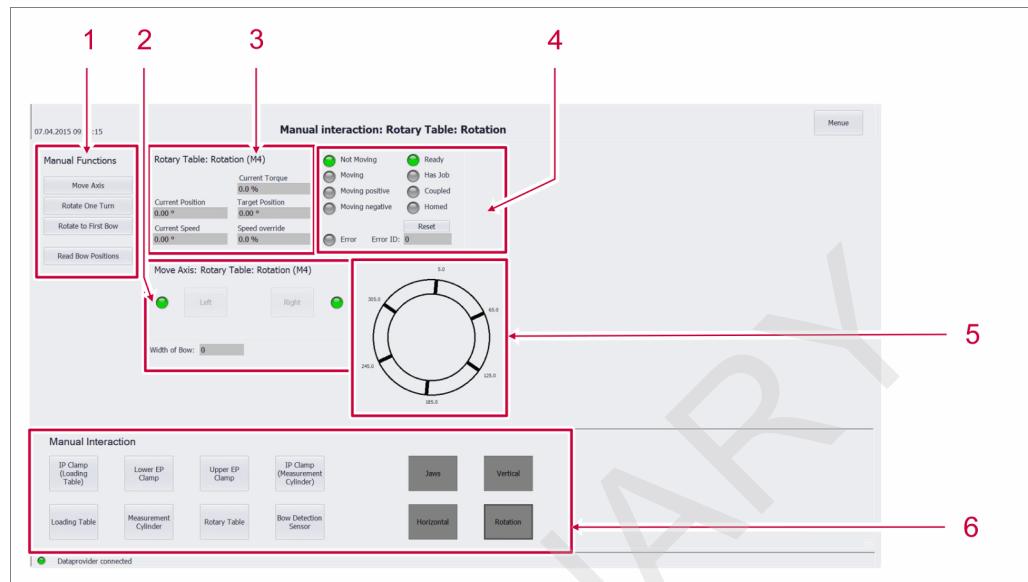


Legend

No.	Designation	Element	Function
1	Outer Position	Display element	Displays the status of the sensor: green: occupied grey: not occupied The sensor is occupied if the jaws are open.
2	Center Position	Display element	Displays the status of the sensor: green: occupied grey: not occupied The sensor is occupied if the jaws are in centre position.
3	Inner Position	Display element	Displays the status of the sensor: green: occupied grey: not occupied The sensor is occupied if the jaws are closed. (Software display only, no hardware sensor)

6.2.21 Manual interaction: Rotary Table Rotation

6.2.21.1 Manual interaction: Rotary Table Rotation - Overview



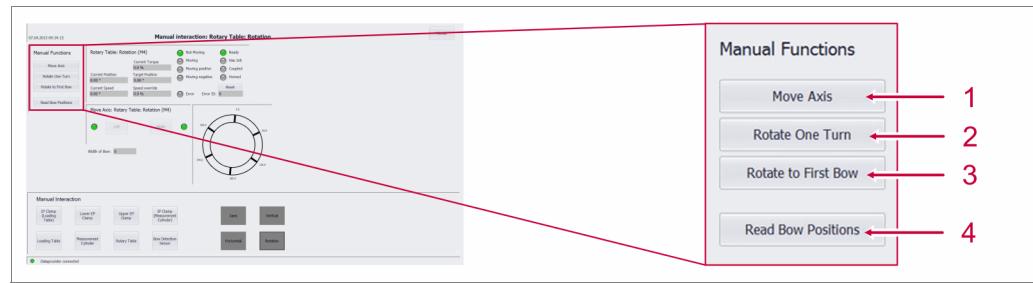
Manual interaction: Rotary Table Rotation - Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual interaction: Rotary Table Rotation – Extract 1" (Page 123).
2	-	-	See Chapter "Manual interaction: Rotary Table Rotation – Extract 2" (Page 123).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
4	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
5	-	-	See Chapter Manual interaction: Rotary Table Rotation – Extract 5.
6	Manual Interaction	-	See Chapter "Manual interaction: Rotary Table Horizontal – Manual Interaction" (Page 116).



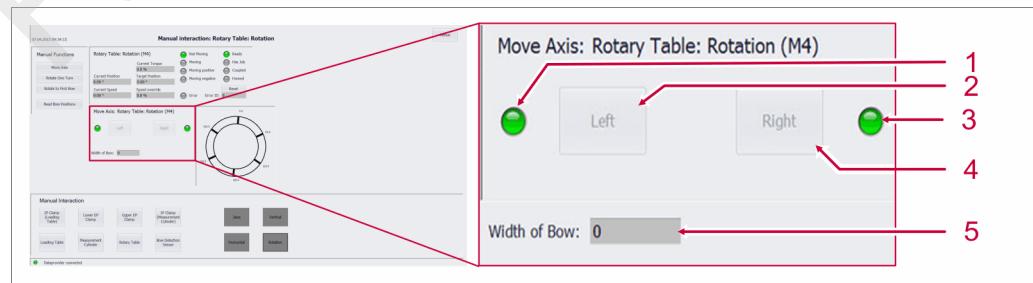
6.2.21.2 Manual interaction: Rotary Table Rotation – Extract 1



Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual interaction: Rotary Table Rotation – Extract 2" (Page 123) are activated. The axis can thus be run.
2	Rotate One Turn	Button	Allows the axis to rotate one revolution when operated.
3	Rotate to First Bow	Button	Rotates to the first recognised bow. Only functions once "Read Bow Positions" has been performed, otherwise the axis only rotates to 0 °.
4	Read Bow Positions	Button	Detects the bow positions. The axis rotates by one revolution. The bow positions are identified and saved with the aid of a sensor.

6.2.21.3 Manual interaction: Rotary Table Rotation – Extract 2



Legend

No.	Designation	Element	Function
1	-	Display element	Is permanently indicated as green, as no limit sensor is installed here.

Legend (Cont.)

No.	Designation	Element	Function
2	Left	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves to the left.
3	-	Display element	Is permanently indicated as green, as no limit sensor is installed here.
4	Right	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves to the right.
5	Width of Bow	Display field	Displays the width of a bow. Indicated in the General Information. "Read Bow Positions" requires the information in order, for example, to be able to differentiate a screw on the centralizer from a bow.

6.2.21.4 Manual interaction: Rotary Table Rotation – Extract 5



Manual interaction: Rotary Table Rotation – Extract 5

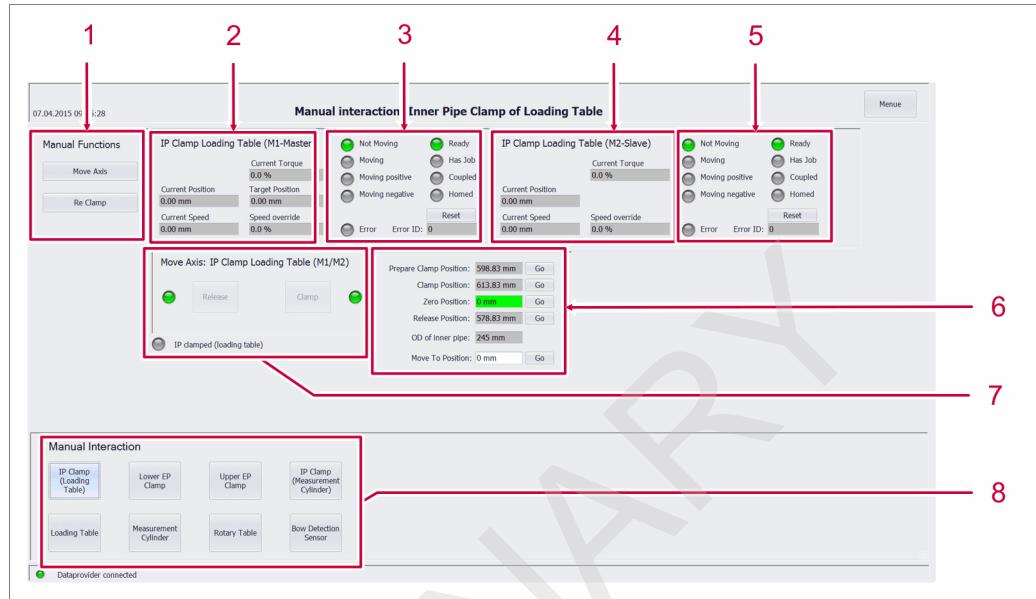
Legend

No.	Designation	Element	Function
1	-	Graphic presentation	Displays the bows that have been found: inner circle = inner pipe outer circle = external pipe Bar between = Bows with position displayed in °.



6.2.22 Manual interaction: IP Clamp (loading table)

6.2.22.1 Manual interaction: IP Clamp (loading table) – Overview

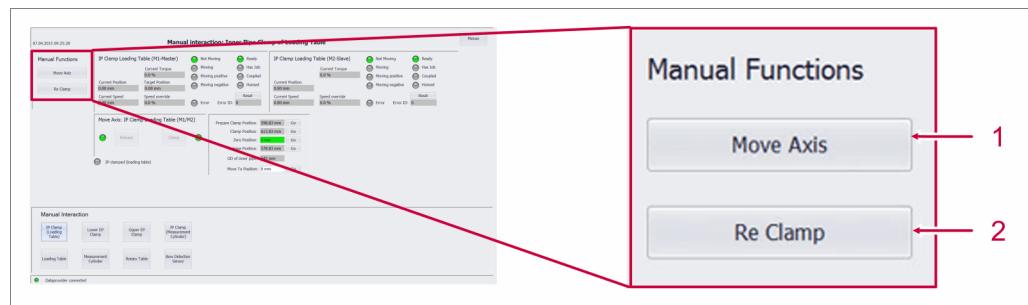


Manual interaction: IP Clamp (loading table) – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: IP Clamp (loading table) – Extract 1" (Page 126).
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
4	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
5	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
6	-	-	See Chapter "Manual interaction: IP Clamp (loading table) – Extract 6" (Page 126).
7	-	-	See Chapter "Manual interaction: IP Clamp (loading table) – Extract 7" (Page 127).
8	Manual Interaction	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).

6.2.22.2 Manual Interaction: IP Clamp (loading table) – Extract 1

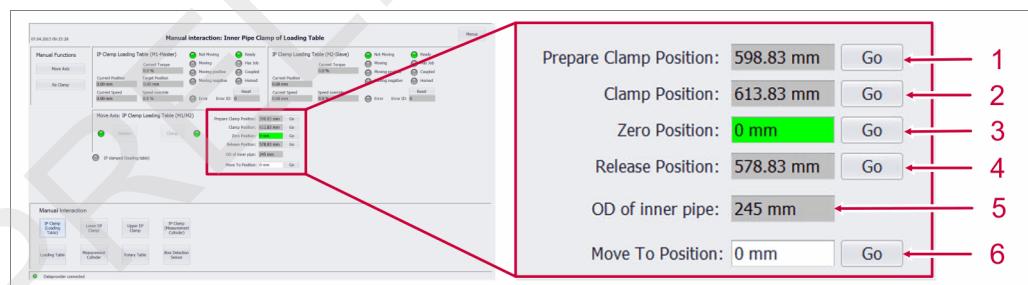


Manual interaction: IP Clamp (loading table) – Extract 1

Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual interaction: IP Clamp (loading table) – Extract 7" (Page 127) are activated. The axis can thus be run.
2	Re Clamp	Button	Moves the axis until a specific force (specified clamping force) is exceeded or a specific distance is exceeded (in the case of no pipe being present). Can be used to retighten a pipe.

6.2.22.3 Manual interaction: IP Clamp (loading table) – Extract 6



Manual interaction: IP Clamp (loading table) – Extract 6

Legend

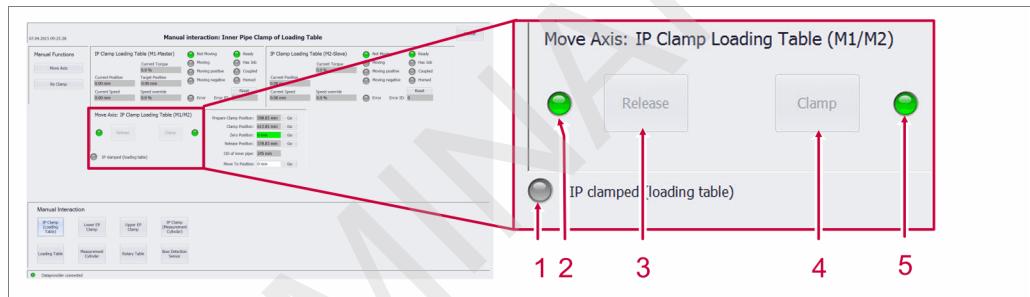
No.	Designation	Element	Function
1	Prepare Clamp Position	Button	Sets the position of the axis for insertion of the inner pipe.
2	Clamp Position	Button	Sets the position of the axis for clamping the inner pipe. The axis proceeds until a specific clamping force is achieved or, if no pipe is present, until a specific distance is exceeded.
3	Zero Position	Button	Sets the start position.



Legend (Cont.)

No.	Designation	Element	Function
4	Release Position	Button	Sets the position of the axis for various operations, such as the insertion of the external pipe or the start of the starting force test and the running force test.
5	OD of Inner pipe	Display field	Displays the outer diameter of the inner pipe. Indicated in "General Information".
6	Move to Position	Button	When the "Go" button is activated, the axis moves to the position specified in this field.

6.2.22.4 Manual interaction: IP Clamp (loading table) – Extract 7



Manual interaction: IP Clamp (loading table) – Extract 7

Legend

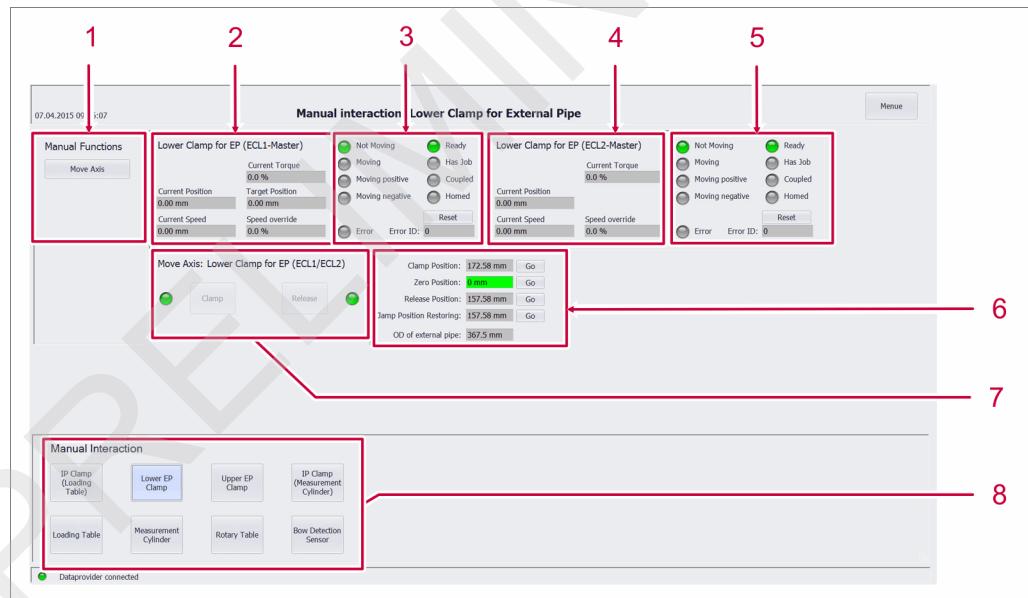
No.	Designation	Element	Function
1	IP clamped (loading table)	Display element	Displays the status of the clamping of the inner pipe: green: The clamping force has been reached and the axis is in the clamping position.
2	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
3	Release	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis is moved away from the pipe.

Legend (Cont.)

No.	Designation	Element	Function
4	Clamp	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis is moved towards the pipe.
5	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.

6.2.23 Manual interaction: Lower EP Clamp

6.2.23.1 Manual interaction: Lower EP Clamp – Overview



Manual interaction: Lower EP Clamp – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: IP Clamp (loading table) – Extract 1" (Page 126).
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).



Legend (Cont.)

No.	Designation	Element	Function
4	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
5	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
6	-	-	See Chapter "Manual interaction: Lower EP Clamp – Extract 6" (Page 129).
7	-	-	See Chapter "Manual interaction: Lower EP Clamp – Extract 7" (Page 130).
8	Manual Interaction	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).

6.2.23.2 Manual interaction: Lower EP Clamp – Extract 6



Manual interaction: Lower EP Clamp – Extract 6

Legend

No.	Designation	Element	Function
1	Clamp Position Restoring	Button	Sets the position of the axis for clamping the external pipe before and after the restoring force test.
2	Clamp Position	Button	Sets the position of the axis for the insertion and clamping of the external pipe for the start of the starting force test and the running force test.
3	Zero Position	Button	Sets the start position.
4	Release Position	Button	Sets the position of the axis for re-chucking the external pipe after the starting force test and the running force test.

Legend (Cont.)

No.	Designation	Element	Function
5	OD of Inner pipe	Display field	Displays the outer diameter of the external pipe. Indicated in "General Information".

6.2.23.3 Manual interaction: Lower EP Clamp – Extract 7



Manual interaction: Lower EP Clamp – Extract 7

Legend

No.	Designation	Element	Function
1	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
2	Clamp	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis is moved towards the pipe.
3	Release	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis is moved away from the pipe.
4	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.



6.2.24 Manual interaction: Upper EP Clamp

6.2.24.1 Manual interaction: Upper EP Clamp – Overview



Manual interaction: Upper EP Clamp – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: Upper EP Clamp – Extract 1" (Page 132).
2	-	-	See Chapter "Manual interaction: Upper EP Clamp – Extract 2" (Page 132).
3	-	-	See Chapter "Manual interaction: Upper EP Clamp – Extract 3" (Page 133).
4	Manual Interaction	-	See Chapter "Manual interaction: Measurement Cylinder Manual – Extract 5" (Page 105).

6.2.24.2 Manual Interaction: Upper EP Clamp – Extract 1

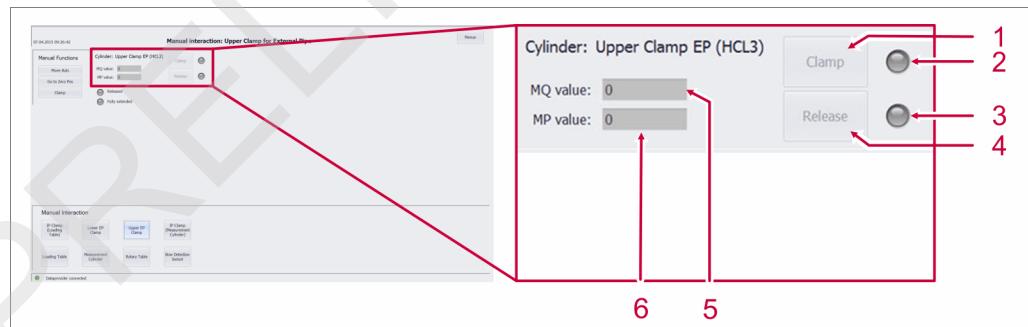


Manual interaction: Upper EP Clamp – Extract 1

Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual interaction: Upper EP Clamp – Extract 2" (Page 132) are activated. The axis can thus be run.
2	Go to Zero Pos	Button	When activated, the cylinder moves away from the pipe to the start position.
3	Clamp	Button	The cylinder moves up to the pipe, in order to clamp.

6.2.24.3 Manual interaction: Upper EP Clamp – Extract 2



Manual interaction: Upper EP Clamp – Extract 2

Legend

No.	Designation	Element	Function
1	Clamp	Button	Is activated by means of the "Move Axis" button. As long as the button is pressed, the cylinder moves towards the pipe.
2	-	Display element	Displays the the "Clamp" control is active.
3	-	Display element	Displays that the "Release" control is active.



Legend (Cont.)

No.	Designation	Element	Function
4	Release	Button	Is activated by means of the "Move Axis" button. As long as the button is pressed, the cylinder moves away from the pipe.
5	MQ value	Display field	Value for the control of the hydraulic system: MQ: The greater the value (max. 10 V) the greater the speed of the hydraulic cylinder.
6	MP value	Display field	Value for the control of the hydraulic system: MP: The greater the value (max. 10 V) the greater the pressure/force of the hydraulic cylinder.

6.2.24.4 Manual interaction: Upper EP Clamp – Extract 3



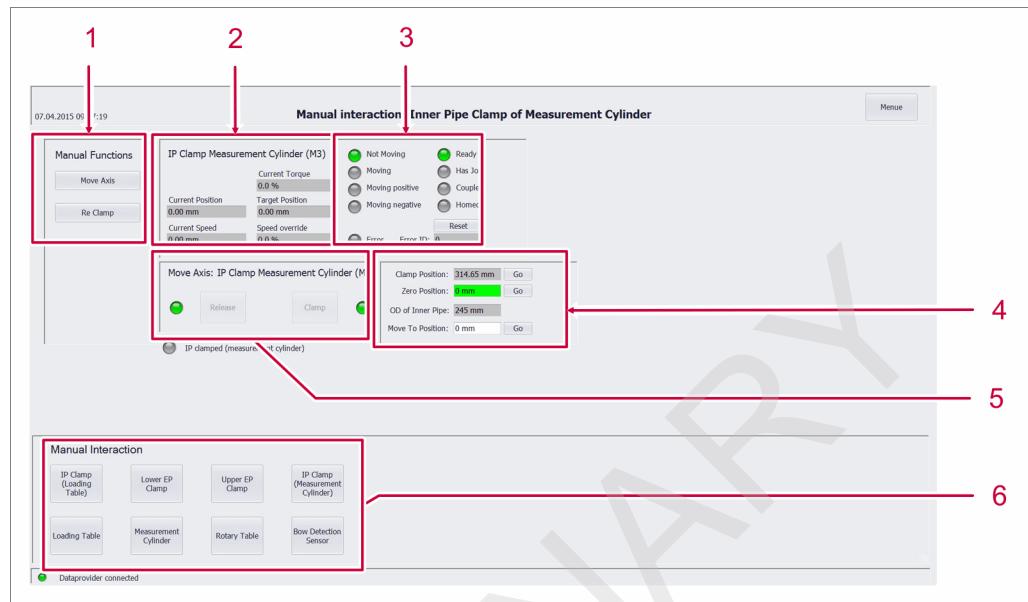
Manual interaction: Upper EP Clamp – Extract 3

Legend

No.	Designation	Element	Function
1	Released	Display element	Displays the status of the start position limit sensor: green: The start position limit sensor has been reached. grey: not at limit
2	Fully extended	Display element	Displays the status of the start position limit sensor: green: Cylinder limit sensor is fully extended. Should not be reached if an external pipe is inserted.

6.2.25 Manual interaction: IP Clamp (measurement cylinder)

6.2.25.1 Manual interaction: IP Clamp (measurement cylinder) – Overview



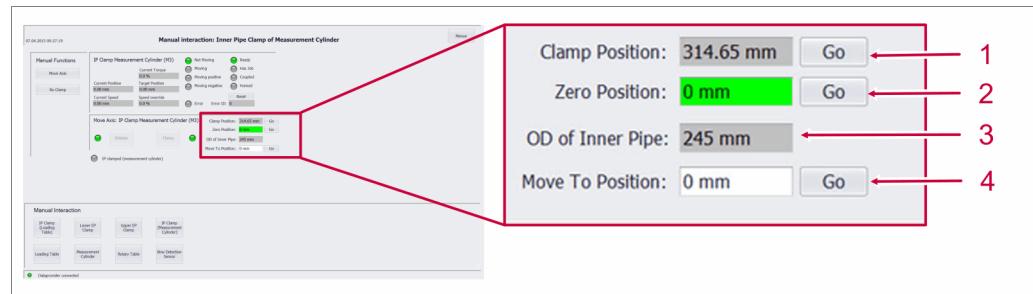
Manual interaction: IP Clamp (measurement cylinder) – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: IP Clamp (loading table) – Extract 1" (Page 126).
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
4	-	-	See Chapter "Manual interaction: IP Clamp (loading table) – Extract 7" (Page 127).
5	-	-	See Chapter "Manual interaction: IP Clamp (measurement cylinder) – Extract 5" (Page 135).
6	Manual Interaction	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).



6.2.25.2 Manual interaction: IP Clamp (measurement cylinder) – Extract 5



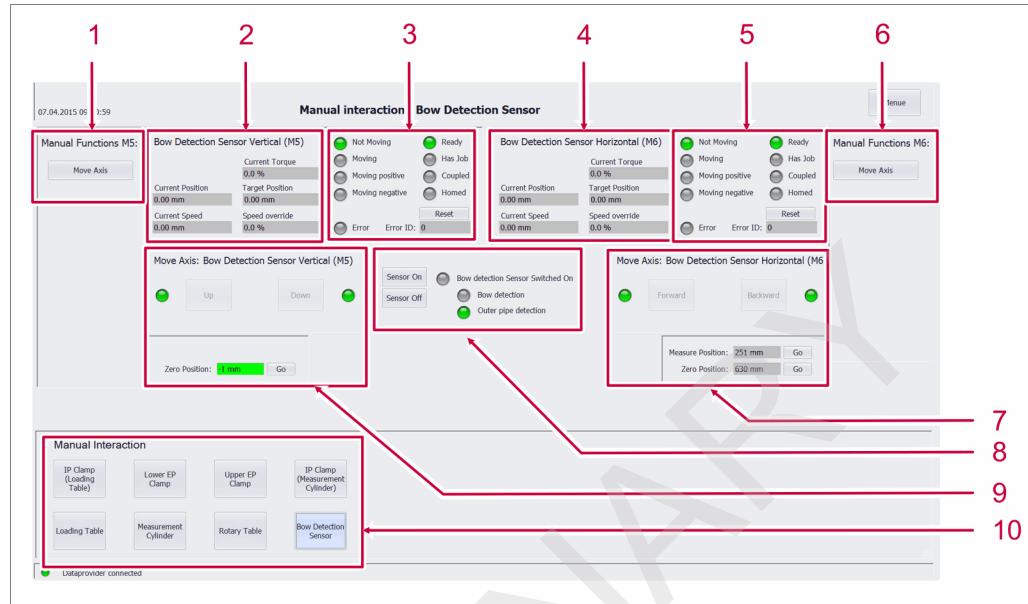
Manual interaction: IP Clamp (measurement cylinder) – Extract 5

Legend

No.	Designation	Element	Function
1	Clamp Position	Button	Sets the position of the axis for clamping the inner pipe. The axis proceeds until a specific clamping force is achieved or, if no pipe is present, until a specific distance is exceeded.
2	Zero Position	Button	Sets the start position.
3	OD of Inner pipe	Display field	Displays the outer diameter of the inner pipe. Indicated in "General Information".
4	Move to Position	Button	When the "Go" button is activated, the axis moves to the position specified in this field.

6.2.26 Manual interaction: Bow Detection Sensor

6.2.26.1 Manual interaction: Bow Detection Sensor – Overview



Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Manual Interaction: Bow Detection Sensor - Extract 1" (Page 137).
2	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
3	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
4	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 2" (Page 108).
5	-	-	See Chapter "Manual interaction: Loading Table Manual – Extract 3" (Page 109).
6	-	-	See Chapter "Manual interaction: Bow Detection Sensor - Extract 6" (Page 137).
7	-	-	See Chapter "Manual interaction: Bow Detection Sensor - Extract 7" (Page 138).
8	-	-	See Chapter "Manual interaction: Bow Detection Sensor - Extract 8" (Page 139).



Legend (Cont.)

No.	Designation	Element	Function
9	-	-	See Chapter "Manual interaction: Bow Detection Sensor - Extract 9" (Page 140).
10	Manual Interaction	-	See Chapter "Manual interaction: Measurement Cylinder Manual - Extract 5" (Page 105).

6.2.26.2 Manual Interaction: Bow Detection Sensor - Extract 1

Manual interaction: Bow Detection Sensor - Extract 1

Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual interaction: Bow Detection Sensor - Extract 7" (Page 138) are activated. The axis can thus be run.

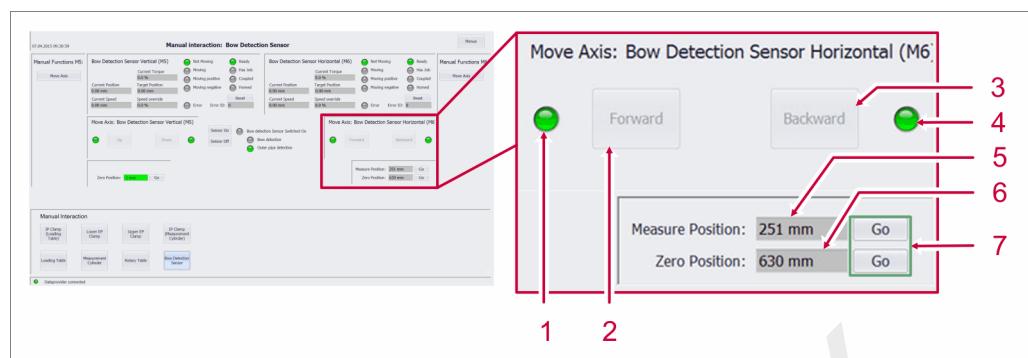
6.2.26.3 Manual interaction: Bow Detection Sensor - Extract 6

Manual interaction: Bow Detection Sensor - Extract 6

Legend

No.	Designation	Element	Function
1	Move Axis	Button	After operating the button, the axis can proceed manually. The buttons under "Manual interaction: Bow Detection Sensor - Extract 8" (Page 139) are activated. The axis can thus be run.

6.2.26.4 Manual interaction: Bow Detection Sensor - Extract 7



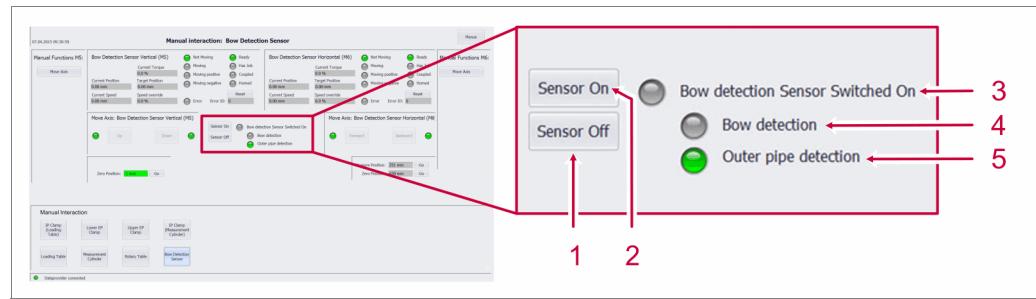
Manual interaction: Bow Detection Sensor - Extract 7

Legend

No.	Designation	Element	Function
1	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
2	Forward	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves forwards.
3	Backward	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves backwards.
4	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
5	Measure Position	Display field	Displays the position of the axis for bow detection.
6	Zero Position	Display field	Displays the start position.
7	Go	Button	When the button pressed, the axis moves to the position previously specified. Once the position has been reached, the field becomes green.



6.2.26.5 Manual interaction: Bow Detection Sensor - Extract 8

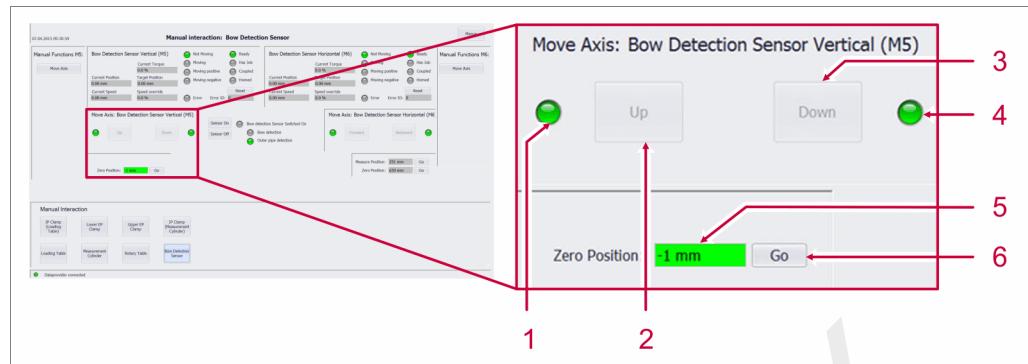


Manual interaction: Bow Detection Sensor - Extract 8

Legend

No.	Designation	Element	Function
1	Sensor Off	Button	Switches the bow detection sensor off.
2	Sensor On	Button	Switches the bow detection sensor on.
3	Bow detection Sensor Switched On	Display element	Displays the status of the bow detection sensor: green: on green: off
4	Bow detection	Display element	Displays the status of the detected bow: green: Bow detected grey: no bow detected
5	Outer pipe detection	Display element	Displays the status of the detected external pipe. green: External pipe detected grey: no external pipe detected

6.2.26.6 Manual interaction: Bow Detection Sensor - Extract 9



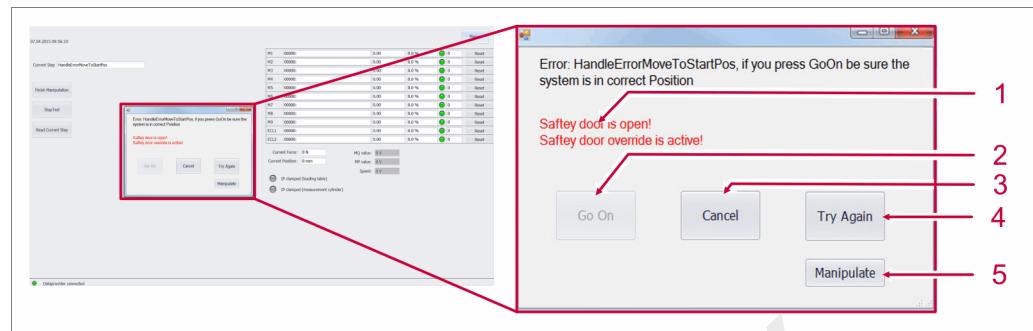
Manual interaction: Bow Detection Sensor - Extract 9

Legend

No.	Designation	Element	Function
1	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
2	Up	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves upwards.
3	Down	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves downwards.
4	-	Display element	Displays the status of the limit sensors. green: not active red: active If an limit sensor is activated, the axis is also switched off by the hardware.
5	Zero Position	Display field	Displays the start position.
6	Go	Button	When activated, the axis moves to the position previously specified for it. Once the position has been reached, the field becomes green.



6.2.27 Error Handling



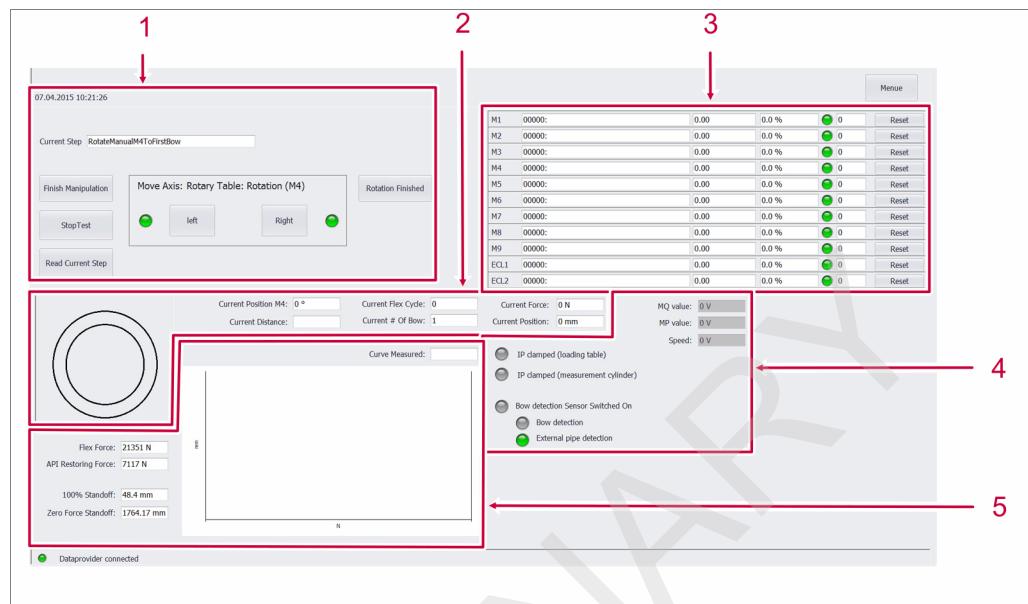
Manual interaction: Error Handling

Legend

No.	Designation	Element	Function
1	-	Text field	Displays error messages and instructions.
2	Go On	Button	Sets the sequence in motion. Can only be operated if the system is in the correct position. Otherwise, the button is greyed out.
3	Cancel	Button	In normal use, ends the sequence. In exceptional cases, this is described in the text.
4	Try Again	Button	Starts a fresh pass of the current step in the sequence in which the error has occurred. It is greyed out if a fresh pass is not possible.
5	Manipulate	Button	Closes the dialog window. If the key of the key switch is present, manual operation via the axes is possible. The dialog can be called up once more by means of the "Finish Manipulation" button.

6.2.28 Error Read Bow Auto Mode Manual Rotation

6.2.28.1 Error Read Bow Auto Mode Manual Rotation – Overview



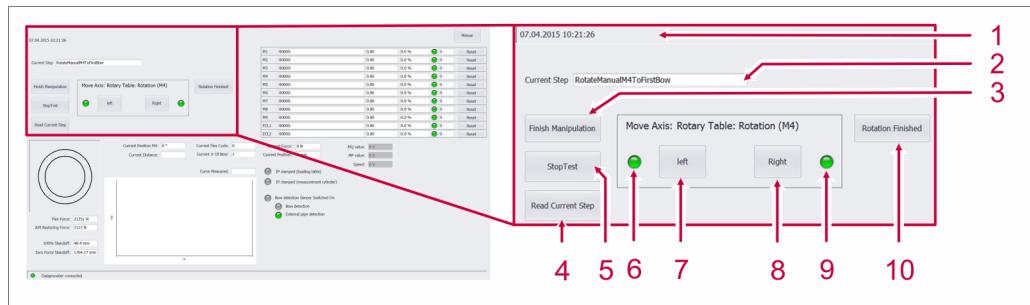
Error Read Bow Auto Mode Manual Rotation – Overview

Legend

No.	Designation	Element	Function
1	-	-	See Chapter "Error Read Bow Auto Mode Manual Rotation – Extract 1" (Page 143).
2	-	-	See Chapter "Read Bow Flex Bow View Auto Mode - Extract 2" (Page 94).
3	-	-	See Chapter "Starting Running Force Test View Auto Mode - Extract 3" (Page 88).
4	-	-	See Chapter "Restoring Force Test View Auto Mode – Extract 4" (Page 98).
5	-	-	See Chapter "Read Bow Flex Bow View Auto Mode - Extract 5" (Page 95).



6.2.28.2 Error Read Bow Auto Mode Manual Rotation – Extract 1



Error Read Bow Auto Mode Manual Rotation – Extract 1

Legend

No.	Designation	Element	Function
1	-	Display field	Displays the current date and time.
2	Current Step	Output field	Shows the name of the current step in the automatic sequence.
3	Finish Manipulation	Button	If an error has arisen and the "Manipulate" button has been pressed in the error dialog (see page 141: Error Handling), the dialog can be called up once more by means of the "Finish Manipulation" button. The sequence can then be resumed by means of the "Go On", "Cancel" or "Try again" button.
4	Read Current Step	Button	In the event of a dialog being closed accidentally, it can be re-opened by means of the dialog corresponding to the current step.
5	Stop Test	Button	Interrupts the sequence. Normally, the error dialog is then displayed (see page 141: Error Handling). The operator can decide if and how the test is to continue.
6	-	Display element	Is permanently indicated as green, as no limit sensor is installed here.
7	Left	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves to the left.

Legend (Cont.)

No.	Designation	Element	Function
8	Right	Button	Is only active if the function has been activated via the "Move Axis" button. As long as the button is pressed, the axis moves to the right.
9	-	Display element	Is permanently indicated as green, as no limit sensor is installed here.
10	Rotation Finished	Button	Confirms that the current position of the rotary table is correct and that the sequence can be continued.



7 Fitting

This chapter contains information regarding the fitting of the machine.

- Opening and closing doors (Page 145)
- Resetting the "Override safety doors" function (Page 152)
- Mounting the centralizer on the inner pipe (Page 154)
- Loading and unloading the machine (Page 161)
- Activating and deactivating the "Manual" mode (Page 169)
- Manual process movements (Page 171)
- Commissioning (Page 172)
- Remote control - Activating and deactivating the manual mode (Page 173)

7.1 Opening and closing doors

Information regarding the opening and closing of the safety doors on the machine is to be found in this chapter:

- Opening and closing the swing door (Page 145)
- Opening and closing the sliding door (Page 148)
- Opening and closing the hinged doors (Page 150)

7.1.1 Opening and closing the swing door

Information regarding the opening and closing the swing door is to be found in this chapter:

- Opening the swing door (Page 146)
- Closing the swing door (Page 147)

7.1.1.1 Opening the swing door


CAUTION
Risk of being crushed in squeeze points created by the swing door!

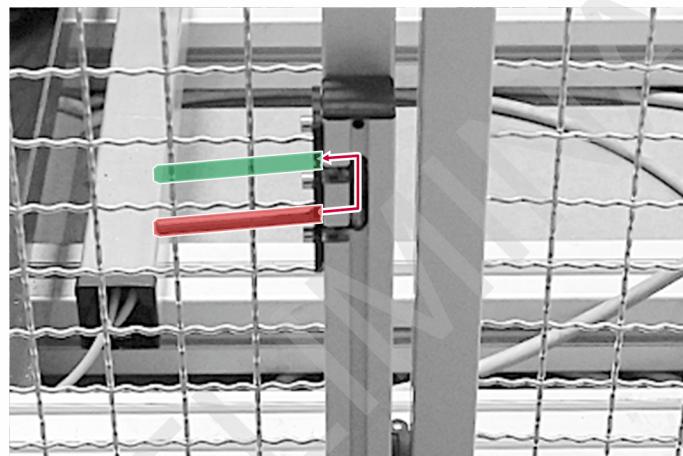
There are various squeeze points in the vicinity of the swing door. Improper operation may result in you being squeezed and crushed.

- Always open and close the swing door on your own.
- Ensure that no persons are in close proximity to the swing door when this is being opened or closed.
- Always work in a safety-orientated manner.

Carry out the following steps:

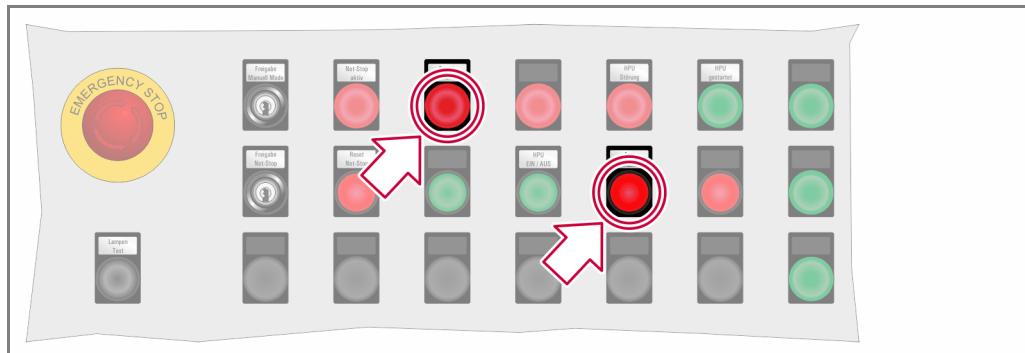
1. Using the lever, unlock the **<SWING DOOR SAFETY MECHANISM>**.

! Secure the lever by placing the lever in the upper holding position.



2. Open the **<SWING DOOR>** completely.

- !** Move the **<SWING DOOR>** only by means of the grip.
- The "Safety doors opened" function is triggered.
 - The operating voltage of the machine is switched off.
 - The **<POWER UNIT>** remains switched on.
 - The **<OVERRIDE SAFETY DOORS>** indicator lamp flashes continuously, and the **<RESET SAFETY DOORS EMERGENCY STOP>** illuminated button glows continuously.



✓ Done.



7.1.1.2 Closing the swing door

**CAUTION****Risk of being crushed in squeeze points created by the swing door!**

There are various squeeze points in the vicinity of the swing door. Improper operation may result in you being squeezed and crushed.

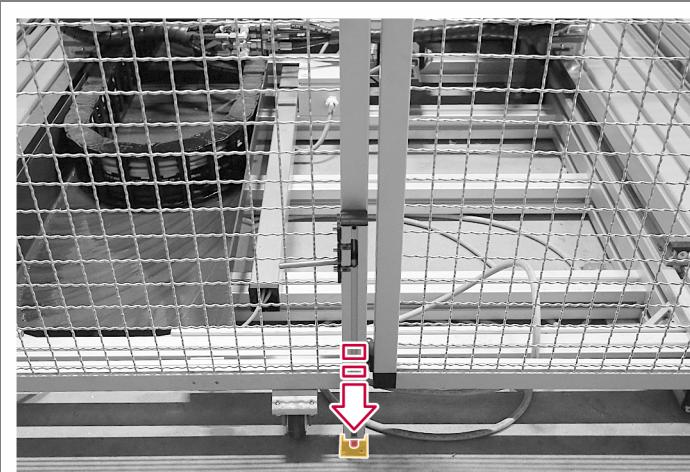
- Always open and close the swing door on your own.
- Ensure that no persons are in close proximity to the swing door when this is being opened or closed.
- Always work in a safety-orientated manner.

Carry out the following steps:

1. Close the **«SWING DOOR»** completely.
! Move the **«SWING DOOR»** only by means of the grip.
2. Using the lever, lock the **«SWING DOOR SAFETY MECHANISM»**.
! Secure the lever by placing the lever in the lower holding position.



3. Ensure that the **«SWING DOOR SAFETY MECHANISM»** is securely located in the **«FLOOR OPENING»**.



4. Reset the "Override safety doors" function (see page 152: Resetting the "Override safety doors" function).

✓ Done.

7.1.2 Opening and closing the sliding door

Information regarding the opening and closing the sliding door is to be found in this chapter:

- Opening the sliding door (Page 148)
- Closing the sliding door (Page 149)

7.1.2.1 Opening the sliding door



CAUTION

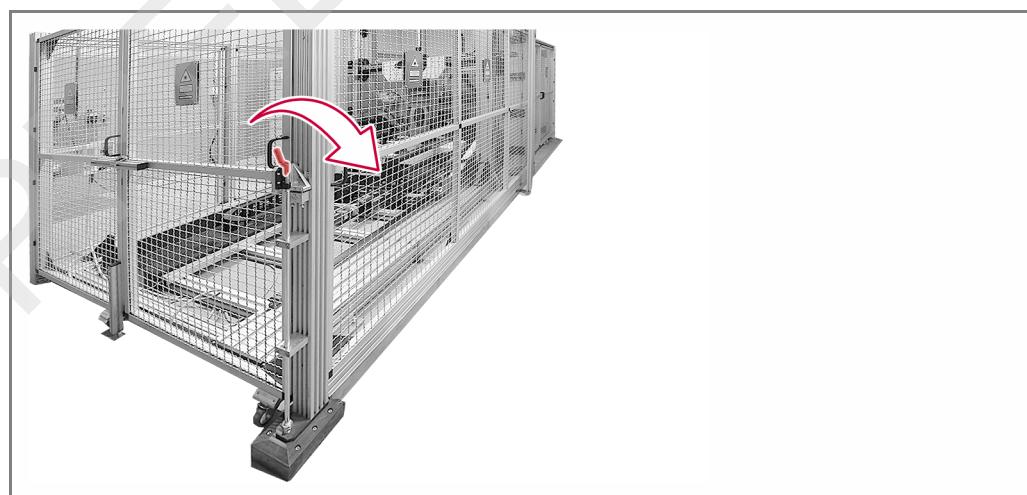
Risk of being crushed in squeeze points created by the sliding door!

There are various squeeze points in the vicinity of the sliding door. Improper operation may result in you being squeezed and crushed.

- Always open and close the sliding door on your own.
- Ensure that no persons are in close proximity to the sliding door when this is being opened or closed.
- When closing the sliding door, never place a foot on the rail.
- Always work in a safety-orientated manner.

Carry out the following steps:

1. Using the lever, unlock the **SLIDING DOOR SAFETY MECHANISM**.

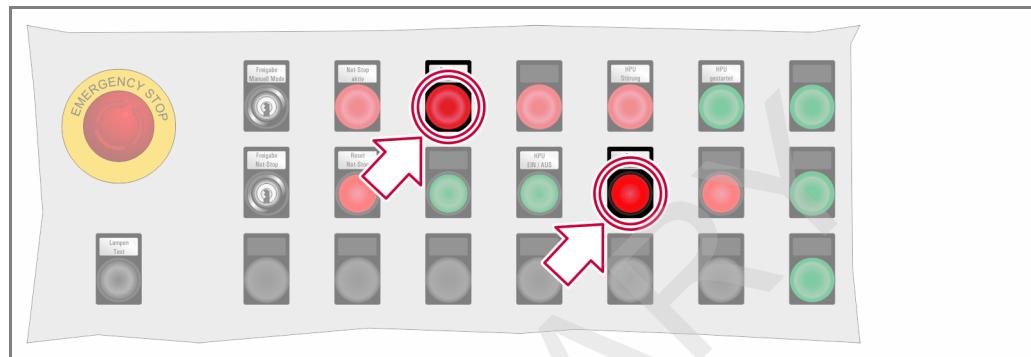


- The **SLIDING DOOR** is unlocked.
- The **SWING DOOR** is unlocked.



2. Slide the **<SLIDING DOOR>** completely open.

- !** Move the **<SLIDING DOOR>** only by means of the grip.
- The "Override safety doors" function is triggered.
- The operating voltage of the machine is switched off.
- The **<POWER UNIT>** remains switched on.
- The **<OVERRIDE SAFETY DOORS>** indicator lamp flashes continuously, and the **<RESET SAFETY DOORS EMERGENCY STOP>** illuminated button glows continuously.



✓ Done.

7.1.2.2 Closing the sliding door



CAUTION

Risk of being crushed in squeeze points created by the sliding door!

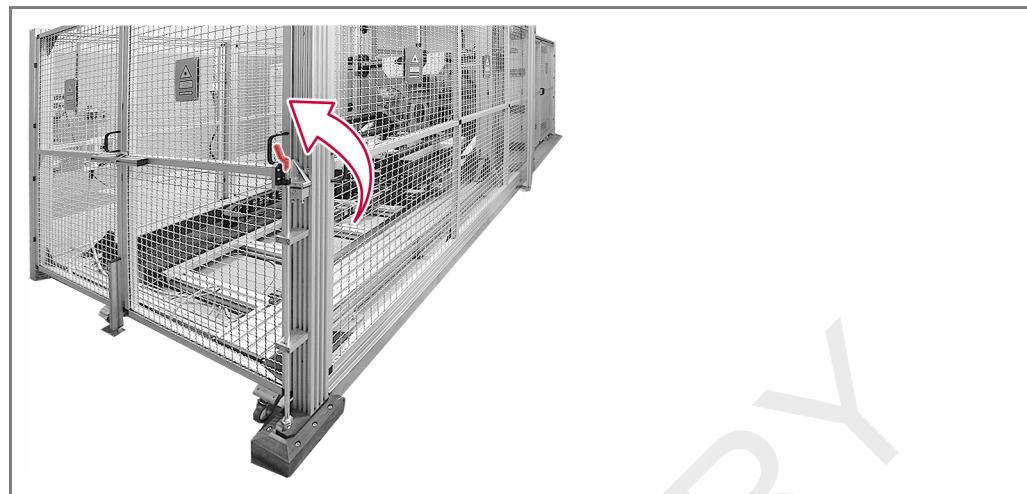
There are various squeeze points in the vicinity of the sliding door. Improper operation may result in you being squeezed and crushed.

- Always open and close the sliding door on your own.
- Ensure that no persons are in close proximity to the sliding door when this is being opened or closed.
- When closing the sliding door, never place a foot on the rail.
- Always work in a safety-orientated manner.

Carry out the following steps:

1. Close the **<SLIDING DOOR>** completely.

- !** Move the sliding door only by means of the grip.

2. Using the lever, lock the **«SLIDING DOOR SAFETY MECHANISM»**.

- The **«SLIDING DOOR»** is locked.
- The **«SWING DOOR»** is locked.

3. Reset the "Override safety doors" function (see page 152: Resetting the "Override safety doors" function).

✓ Done.

7.1.3 Opening and closing the hinged doors

This chapter contains information regarding the opening and closing of the hinged doors.

- Opening the hinged doors (Page 150)
- Closing the hinged doors (Page 152)

7.1.3.1 Opening the hinged doors

Requirement:



- The sliding door is closed, if the front hinged doors are to be opened (see page 149: Closing the sliding door).



CAUTION

Risk of being crushed in squeeze points created by the sliding door!

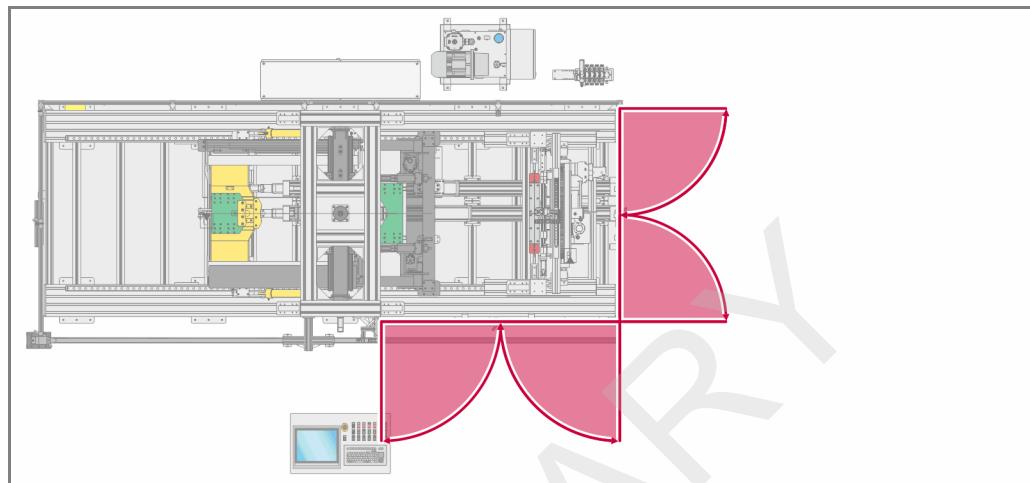
There are various squeeze points in the vicinity of the sliding door. Improper operation may result in you being squeezed and crushed.

- Always open and close the hinged doors doors on your own.
- Ensure that no persons are in close proximity to the hinged doors when they are being opened or closed.
- Always work in a safety-orientated manner.

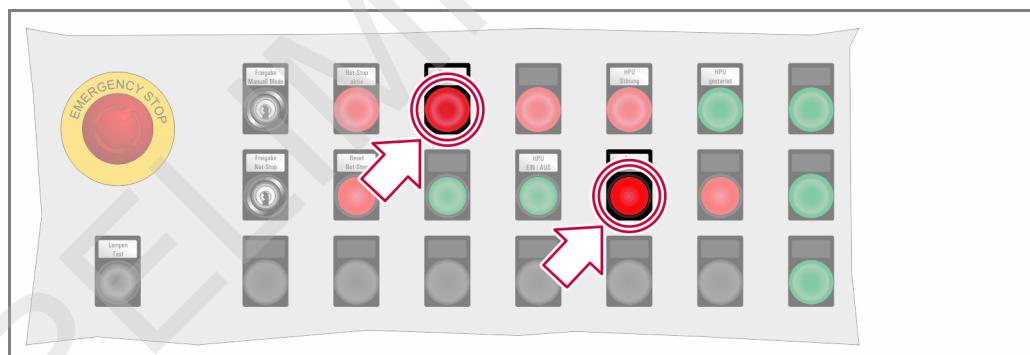


Carry out the following steps:

- ➔ Open the respective **HINGED DOOR** completely.
- ❗ Move the respective **HINGED DOOR** only by means of the grip.



- ➔ The "Override safety doors" function is triggered.
- ➔ The operating voltage of the machine is switched off.
- ➔ The **POWER UNIT** remains switched on.
- ➔ The **SAFETY DOOR OVERRIDE** indicator lamp flashes continuously, as and the **RESET SAFETY DOORS EMERGENCY STOP** illuminated button glows continuously.



✓ Done.

7.1.3.2 Closing the hinged doors

**CAUTION****Risk of being crushed in squeeze points created by the sliding door!**

There are various squeeze points in the vicinity of the sliding door. Improper operation may result in you being squeezed and crushed.

- Always open and close the hinged doors doors on your own.
- Ensure that no persons are in close proximity to the hinged doors when they are being opened or closed.
- Always work in a safety-orientated manner.

Carry out the following steps:

1. Close the respective **<HINGED DOOR>** completely.
! Move the respective **<HINGED DOOR>** only by means of the grip.
 2. Reset the "Override safety doors" function (see page 152: Resetting the "Override safety doors" function).
- ✓ Done.

7.2 Resetting the "Override safety doors" function

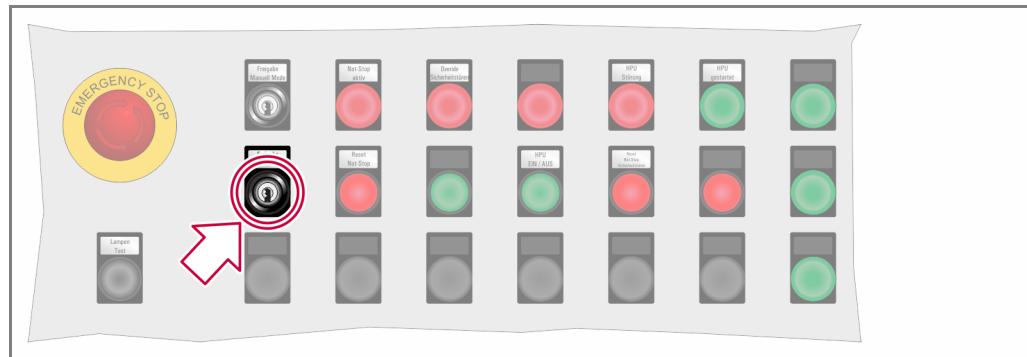
Requirement:



- The swing door of the machine is closed (see page 147: Closing the swing door).
- The sliding door of the machine is closed (see page 149: Closing the sliding door).
- The hinged doors of the machine are closed (see page 152: Closing the hinged doors).
- The Manual mode remote control unit is deactivated (see page 175: Deactivating the manual mode remote control).

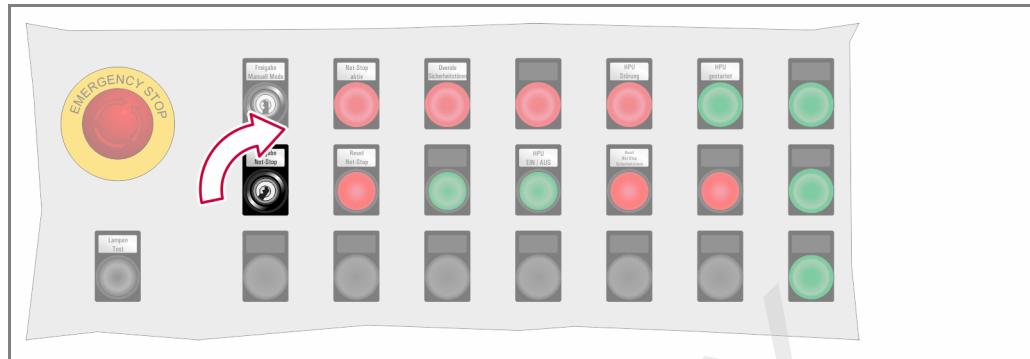
Carry out the following steps:

1. Insert the key into the **<EMERGENCY STOP RELEASE>** key switch on the **<OPERATOR PANEL>**.

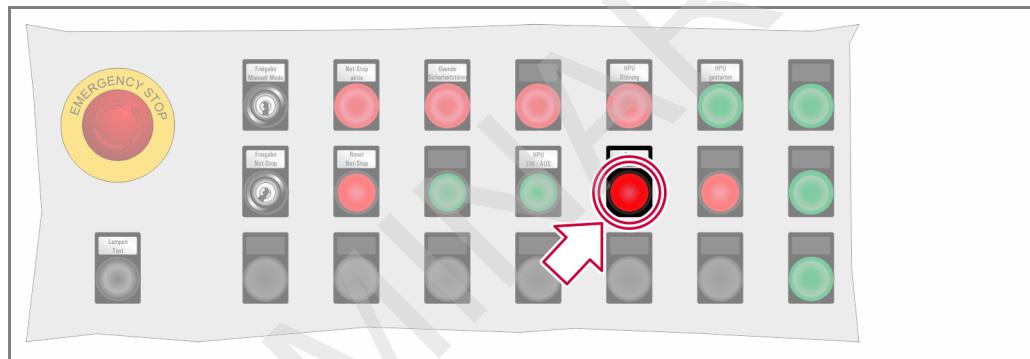




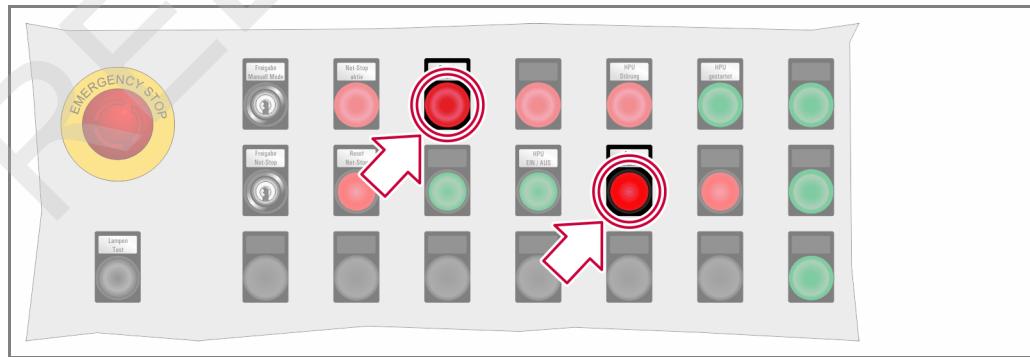
2. Turn the key in the **EMERGENCY STOP RELEASE** key switch on the **OPERATOR PANEL** clockwise to Position 1.



3. Press the **RESET SAFETY DOORS EMERGENCY STOP** illuminated switch on the **OPERATOR PANEL**.



- The "Override safety doors" function has been acknowledged.
- The operating voltage of the machine is switched on again.
- The **SAFETY DOOR OVERRIDE** indicator lamp as well as the **RESET SAFETY DOORS EMERGENCY STOP** go out.



4. Turn the key in the **EMERGENCY STOP RELEASE** key switch on the **OPERATOR PANEL** counter-clockwise to Position 0.

✓ Done.

7.3 Mounting the centralizer on the inner pipe

This chapter contains information regarding the mounting of the centralizer on the inner pipe. The actions shown here are examples. The size and nature of the centralizer as well as the pipes may vary.

- Mounting the centralizer - "lugs" (Page 154)
- Installing the centralizer – "Between Stop Collar" (Page 156)
- Installing the centralizer – "Over Stop Collar" (Page 158)
- Installing the centralizer – "Casing Collar" (Page 160)

7.3.1 Mounting the centralizer - "lugs"

The "Lug" mounting method is suitable for one-piece and multi-piece centralizers.

Tools required:



- Desired and suitable centralizers (one-piece and multi-piece).
- If required, sufficient nails to connect the parts of the centralizer (multi-piece)
- Inner pipes suitable for the centralizer (with threaded holes).
- Suitable Allen keys for the retaining screws in the screw row.
- Paintbrush
- Lubricating grease



WARNING

Health hazard posed by lubricating grease!

Prolonged contact between the skin and the lubricating grease can create the risk of damage to the skin.

- ➔ Always wear protective gloves when applying lubricating grease.
- ➔ Absolutely avoid prolonged contact between lubricating grease and your skin.

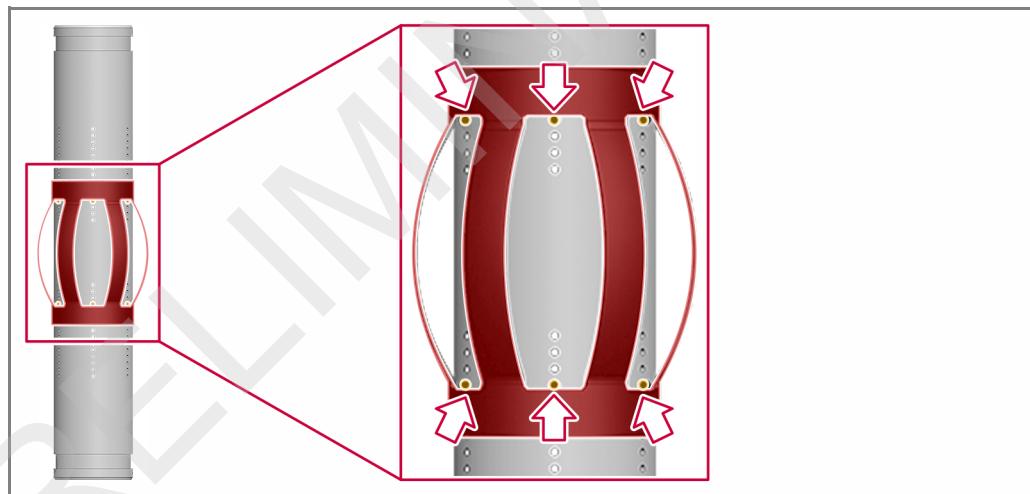


Carry out the following steps:

1. Position the **CENTRALIZER** about 5 mm to 8 mm off centre on the **INNER PIPE**.



2. With the aid of an Allen key, screw in all **RETAINING SCREWS** for the top and bottom stops.



3. Using a paintbrush, grease all bows of the **CENTRALIZER** with lubricating grease.

✓ Done.

7.3.2 Installing the centralizer – "Between Stop Collar"

The "Between Stop Collar" mounting method is suitable for one-piece and multi-piece centralizers.

Requirement:



- The maximum expansion of the centralizer to be tested is known.

Tools required:



- Desired and suitable centralizer (one-piece and multi-piece).
- If required, sufficient nails to connect the parts of the centralizer (multi-piece)
- Inner pipe suitable for the centralizer
- Top and bottom stop collars suitable for the inner pipe.
- Suitable Allen key for the retaining screw of the stop collar
- Paintbrush
- Lubricating grease



WARNING

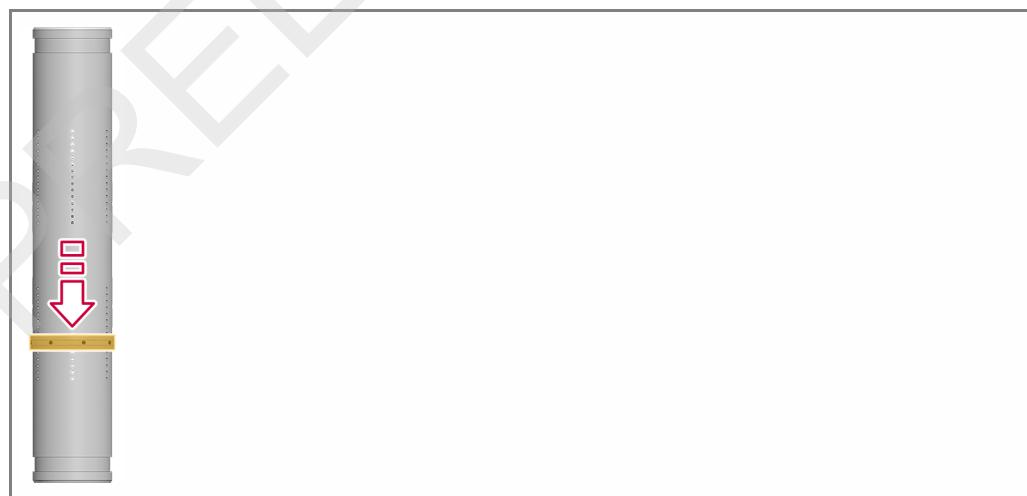
Health hazard posed by lubricating grease!

Prolonged contact between the skin and the lubricating grease can create the risk of damage to the skin.

- ➔ Always wear protective gloves when applying lubricating grease.
- ➔ Absolutely avoid prolonged contact between lubricating grease and your skin.

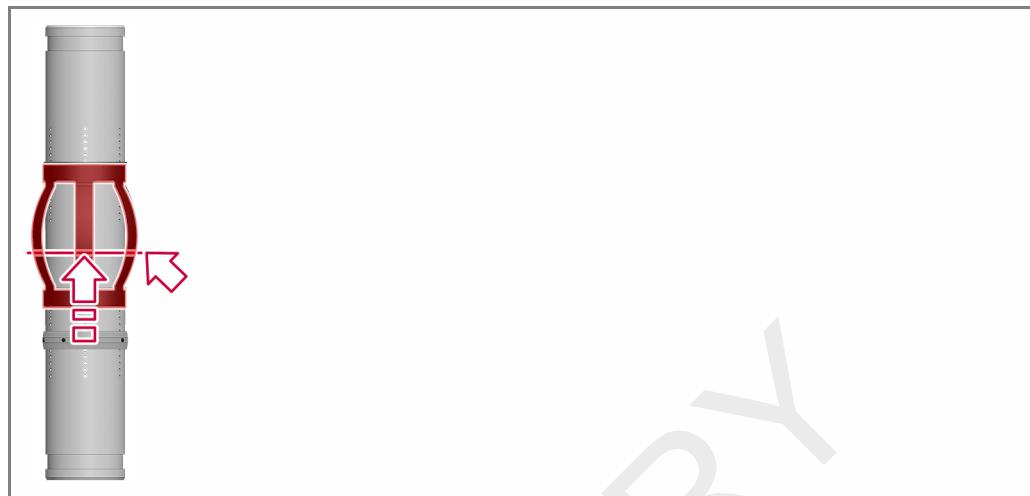
Carry out the following steps:

1. Position the <BOTTOM STOP COLLAR> in the lower third of the <INNER PIPE>.





2. Position the **CENTRALIZER** about 5 mm to 8 mm off centre on the **INNER PIPE**.



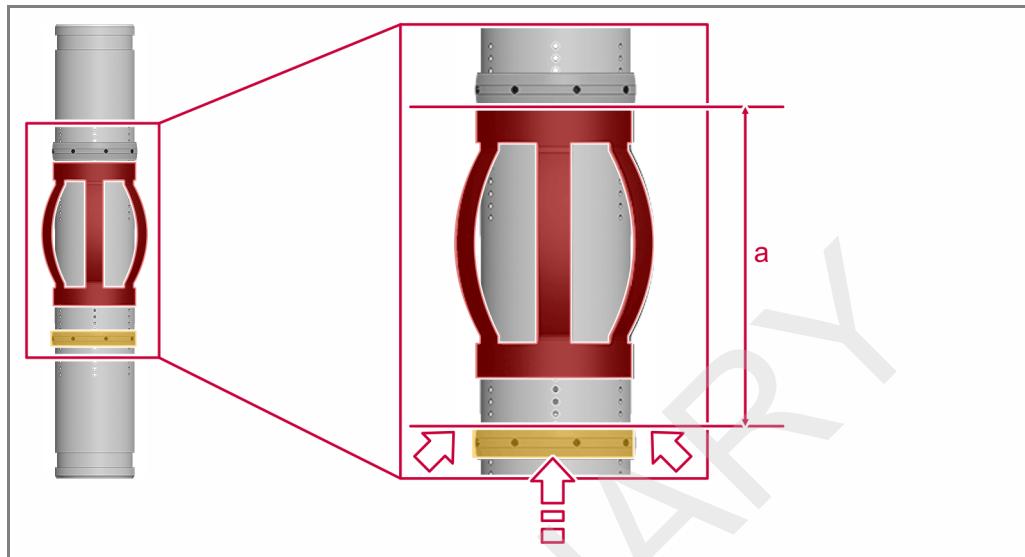
3. Position the **TOP STOP COLLAR**
in the lower third of the **CENTRALIZER**



4. With the aid of an Allen key, screw the **FIXING SCREWS** on the **TOP STOP COLLAR** fast.

5. Position the **<BOTTOM STOP COLLAR>** sufficiently far below the **<CENTRALIZER>**, for it to be able to expand to its maximum.

! a = Compressed Length = maximum expansion of the centralizer.



6. With the aid of an Allen key, screw the **<FIXING SCREWS>** on the **<BOTTOM STOP COLLAR>** fast.

7. Using a paintbrush, grease all bows of the **<CENTRALIZER>** with lubricating grease.

✓ Done.

7.3.3 Installing the centralizer – "Over Stop Collar"

The "Over Stop Collar" mounting method is suitable for multi-piece centralizers only.

Tools required:



- Desired and suitable centralizer (multi-piece).
- Sufficient nails to connect the parts of the centralizer (multi-piece)
- Inner pipe suitable for the centralizer
- Top and bottom stop collars suitable for the inner pipe.
- Suitable Allen key for the retaining screw of the stop collar
- Paintbrush
- Lubricating grease

**WARNING****Health hazard posed by lubricating grease!**

Prolonged contact between the skin and the lubricating grease can create the risk of damage to the skin.

- Always wear protective gloves when applying lubricating grease.
- Absolutely avoid prolonged contact between lubricating grease and your skin.

Carry out the following steps:

1. Position the **TOP STOP COLLAR** and the **BOTTOM STOP COLLAR** about 5 mm to 8 mm off centre on the **INNER PIPE**.
! The length of the two outer edges corresponds to the inner length of the multi-part centralizer to be tested.



2. With the aid of an Allen key, screw the **FIXING SCREWS** on the **TOP STOP COLLAR** and the **BOTTOM STOP COLLAR** fast.
3. Place the multi-part **CENTRALIZER** to be tested onto the **INNER PIPE**.
! Take care that the inner sides of the multi-part **CENTRALIZER** fit against the **TOP STOP COLLAR** and the **BOTTOM STOP COLLAR**.



4. Close and secure the multi-part **CENTRALIZER** with the aid of nails.
 5. Using a paintbrush, grease all bows of the **CENTRALIZER** with lubricating grease.
- ✓ Done.

7.3.4 Installing the centralizer – "Casing Collar"

The "Casing Collar" mounting method is suitable for multi-piece centralizers only.



Tools required:

- Desired and suitable centralizer (multi-piece).
- Sufficient nails to connect the parts of the centralizer (multi-piece)
- Inner pipes suitable for the centralizer (with notches).
- Paintbrush
- Lubricating grease



WARNING

Health hazard posed by lubricating grease!

Prolonged contact between the skin and the lubricating grease can create the risk of damage to the skin.

- ➔ Always wear protective gloves when applying lubricating grease.
- ➔ Absolutely avoid prolonged contact between lubricating grease and your skin.

Carry out the following steps:

1. Place the multi-part **CENTRALIZER** to be tested onto the **INNER PIPE**.
! Take care that the insides of the multi-part **CENTRALIZER** fit against the sides of the **INNER PIPE**.





2. Close and secure the multi-part **CENTRALIZER** with the aid of nails.
 3. Using a paintbrush, grease all bows of the **CENTRALIZER** with lubricating grease.
- ✓ Done.

7.4 Loading and unloading the machine

This chapter contains information regarding the loading and unloading of the machine.

- Loading an inner pipe on the machine (Page 161)
- Loading an external pipe on the machine (Page 165)

7.4.1 Loading an inner pipe on the machine

Requirement:



- The desired centralizer is mounted on an inner pipe (see page 154: Mounting the centralizer on the inner pipe).
- The machine is in the loading position.

Tools required:



- A suitable crane or forklift

Prepare the
machine for
loading



CAUTION

Risk of injury caused by disregarding personal safety equipment!

Various actions must be performed when loading the machine. If your personal safety equipment is not used as prescribed, there is a risk of being injured.

- Wear the prescribed protective equipment throughout the loading process (safety shoes and safety gloves).

Carry out the following steps:

1. Open the **SLIDING DOOR** (see page 148: Opening the sliding door).
2. Open the **SWING DOOR** (see page 146: Opening the swing door).

The machine has been prepared for loading.

Insert the inner pipe in the clamp.



WARNING

Risk of injury caused by heavy, falling pipe!

Severe injuries to the body and limbs can be suffered as a result of a pipe falling!

- Never step underneath suspended loads.
- Always perform the loading activities with two persons.
- Always wear safety shoes.
- Ensure that no person remains in the area of the loading operation.



CAUTION

Risk of injury caused by toppling pipes!

When loading the machine with pipes there is a risk that the pipes may begin to swing. This can result in your being knocked down and injured.

- Always perform the loading activities with two persons.
- Ensure that no person remains in the area of the loading activities.



CAUTION

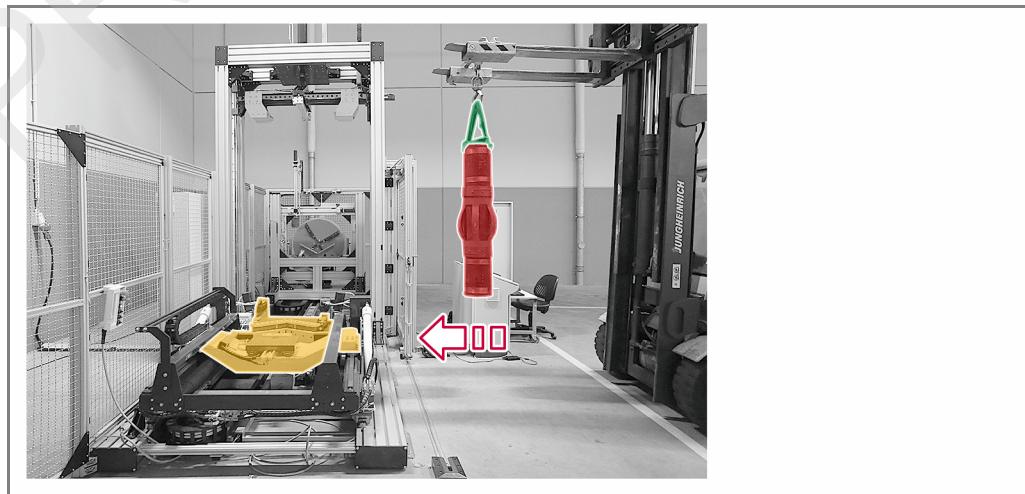
Risk of injury caused by tripping!

You must enter the interior of the machine when loading the machine with pipes. There are various tripping spots in this area.

- Ensure that only skilled and trained personnel perform the loading activities.

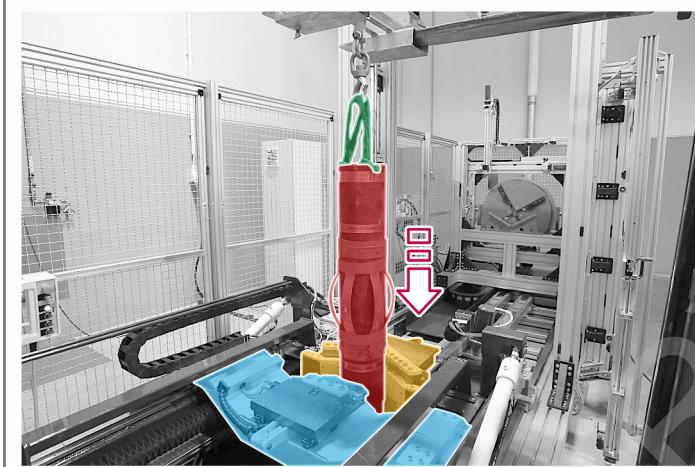
Carry out the following steps:

1. Fasten the **<INNER PIPE>** properly, using the holes provided, to the crane or forklift with suitable and authorised load handling attachments.
2. Using a crane or forklift, lift the **<INNER PIPE>** slowly and carefully.
! Lift the **<INNER PIPE>** only as high as is necessary.
3. Using a crane or forklift, move the **<INNER PIPE>** carefully towards the **<CLAMP>**.



4. Using a crane or forklift, place the **INNER PIPE** carefully in the **CLAMP**.

! Lower the crane or forklift sufficiently for the load handling attachments not to be under tension.



The inner pipe has been inserted in the clamp.

Clamp the inner pipe in the clamp.



WARNING

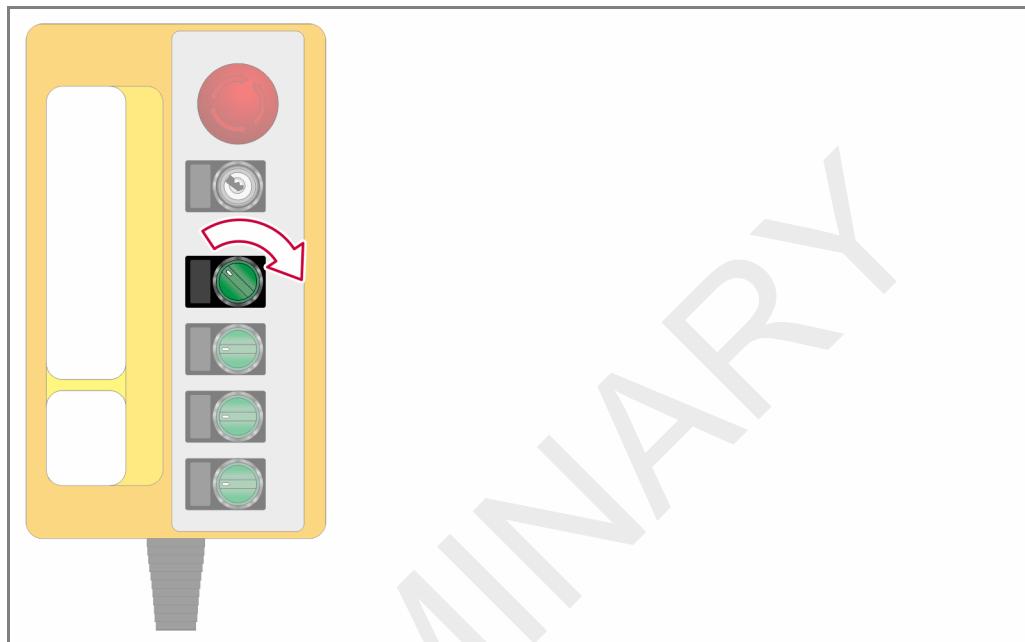
Risk of being crushed when clamping pipes!

The pipes are clamped with the aid of the clamp. This leads to the risk of being crushed.

- Always wear safety shoes.
- Always wear protective gloves.
- Always perform the loading activities with two persons.
- Ensure that no person remains in the area of the loading activities.
- Never reach into the moving parts of the machine.
- Ensure that no-one can reach into moving machine parts.

Carry out the following steps:

1. Activate the **«MANUAL MODE REMOTE CONTROL»** (see page 174: Activating the manual mode remote control).
2. Turn the **«ILLUMINATED SELECTOR SWITCH»** on the **«MANUAL MODE REMOTE CONTROL»** upwards or downwards.



- The **«INNER PIPE»** is clamped in the **«CLAMP»** automatically.
- The **«ILLUMINATED SELECTOR SWITCH»** on the **«MANUAL MODE REMOTE CONTROL»** goes out, when the **«INNER PIPE»** is clamped.

 3. Deactivate the **«MANUAL MODE REMOTE CONTROL»** (see page 175: Deactivating the manual mode remote control).
 4. Release the load handling attachments from the **«INNER PIPE»**.
 5. Carefully move the crane or forklift out of the machine.

The inner pipe has been clamped in the clamp.

Close the safety doors.



Carry out the following steps:

1. Close the **«SWING DOOR»** (see page 147: Closing the swing door).
2. Close the **«SLIDING DOOR»** (see page 149: Closing the sliding door).
3. Reset the "Override safety doors" function (see page 152: Resetting the "Override safety doors" function).

The safety doors are closed.

✓ Done.



7.4.2 Unloading the inner pipe from the machine

Requirement:



- The machine is in the unloading position.

Carry out the following steps:

- Unloading the **INNER PIPE** from the machine takes place the reverse order, in a manner analogous to loading the machine with an **INNER PIPE** (see page 161: Loading an inner pipe on the machine).

✓ Done.

7.4.3 Loading an external pipe on the machine

Requirement:



- The machine is in the loading position.



Tools required:

- A suitable crane or forklift

Prepare the
machine for
loading



CAUTION

Risk of injury caused by disregarding personal safety equipment!

Various actions must be performed when loading the machine. If your personal safety equipment is not used as prescribed, there is a risk of being injured.

- Wear the prescribed protective equipment throughout the loading process (safety shoes and safety gloves).

Carry out the following steps:

- Open the **SLIDING DOOR** (see page 148: Opening the sliding door).
- Open the **SWING DOOR** (see page 146: Opening the swing door).

The machine has been prepared for loading.

Insert the external
pipe in the clamp.



WARNING

Risk of injury caused by heavy, falling pipe!

Severe injuries to the body and limbs can be suffered as a result of a pipe falling!

- Never step underneath suspended loads.
→ Always perform the loading activities with two persons.
→ Always wear safety shoes.
→ Ensure that no person remains in the area of the loading activities.

**CAUTION****Risk of injury caused by toppling pipes!**

When loading the machine with pipes there is a risk that the pipes may begin to swing. This can result in your being knocked down and injured.

- Always perform the loading activities with two persons.
- Ensure that no person remains in the area of the loading activities.

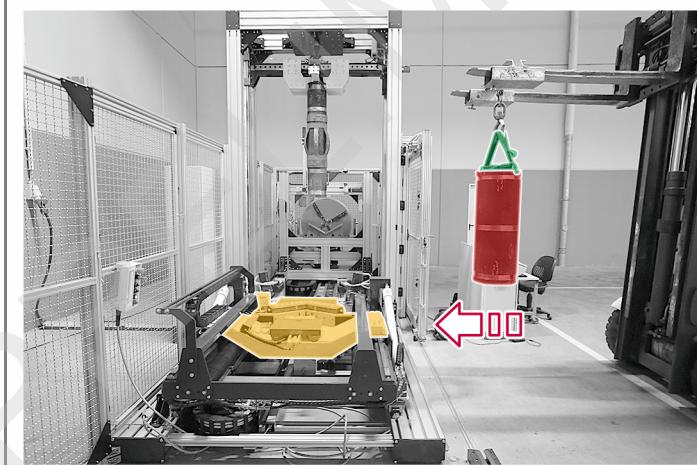
**CAUTION****Risk of injury caused by tripping!**

You must enter the interior of the machine when loading the machine with pipes. There are various tripping spots in this area.

- Ensure that only skilled and trained personnel perform the loading activities.

Carry out the following steps:

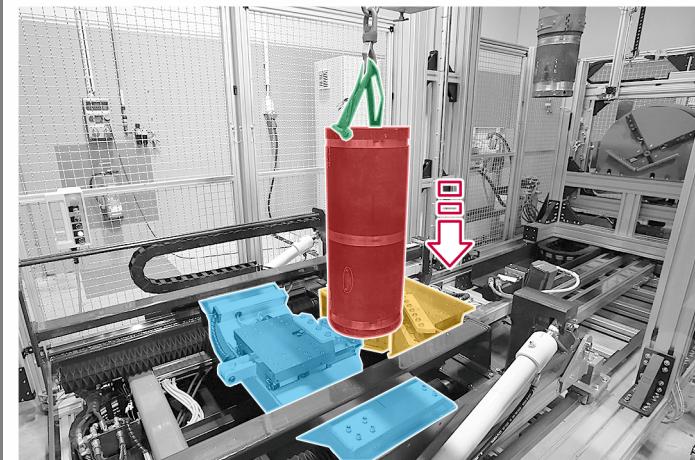
1. Fasten the **(EXTERNAL PIPE)** properly, using the holes provided, to the crane or forklift with suitable and authorised load handling attachments.
2. Using a crane or forklift, lift the **(EXTERNAL PIPE)** slowly and carefully.
! Lift the **(EXTERNAL PIPE)** only as high as is necessary.
3. Using a crane or forklift, move the **(EXTERNAL PIPE)** carefully towards the **(CLAMP)**.





4. Using a crane or forklift, place the **(EXTERNAL PIPE)** carefully in the **(CLAMP)**.

! Lower the crane or forklift sufficiently for the load handling attachments not to be under tension.



The external pipe has been inserted in the clamp.

Clamp the external pipe in the clamp.



WARNING

Risk of being crushed when clamping pipes!

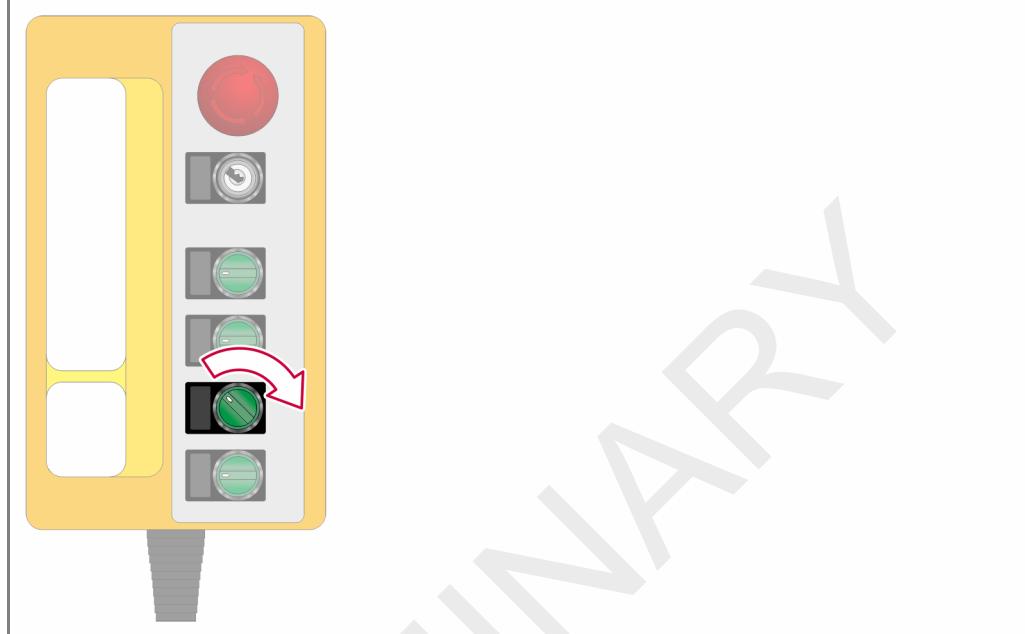
The pipes are clamped with the aid of the clamp. This leads to the risk of being crushed.

- Always wear safety shoes.
- Always wear protective gloves.
- Always perform the loading activities with two persons.
- Ensure that no person remains in the area of the loading activities.
- Never reach into the moving parts of the machine.
- Ensure that no-one can reach into moving machine parts.

Carry out the following steps:

1. Activate the **(MANUAL MODE REMOTE CONTROL)** (see page 174: Activating the manual mode remote control).

2. Turn the **<ILLUMINATED SELECTOR SWITCH>** on the **<MANUAL MODE REMOTE CONTROL>** upwards or downwards.
- !** Alternatively, you have the option on the **<TOUCH SCREEN>** in the "INNER PIPE PLACED" OPERATOR SCREEN POP-UP WINDOW of confirming the action.



- The **<EXTERNAL PIPE>** is clamped in the **<CLAMP>** automatically.
 - The **<ILLUMINATED SELECTOR SWITCH>** on the **<MANUAL MODE REMOTE CONTROL>** goes out, when the **<EXTERNAL PIPE>** is clamped.
3. Deactivate the **<MANUAL MODE REMOTE CONTROL>** (see page 175: Deactivating the manual mode remote control).
 4. Release the load handling attachments from the **<EXTERNAL PIPE>**.
 5. Carefully move the crane or forklift out of the machine.

The external pipe has been clamped in the clamp.

Close the safety doors.



Carry out the following steps:

1. Close the **<SWING DOOR>** (see page 147: Closing the swing door).
2. Close the **<SLIDING DOOR>** (see page 149: Closing the sliding door).
3. Reset the "Override safety doors" function (see page 152: Resetting the "Override safety doors" function).

The safety doors are closed.

✓ Done.



7.4.4 Unloading the external pipe from the machine

Requirement:



- The machine is in the unloading position.

Carry out the following steps:

- Unloading the **EXTERNAL PIPE** from the machine takes place the reverse order, in a manner analogous to loading the machine with an **EXTERNAL PIPE** (see page 165: Loading an external pipe on the machine).

✓ Done.

7.5 Activating and deactivating the "Manual" mode

This chapter contains information regarding the activation and deactivation of the "Manual" mode.

- Deactivating the "Manual" mode (Page 170)
- Activating the "Manual" mode (Page 169)

7.5.1 Activating the "Manual" mode

Safety instruction: Change the operating mode only after consultation!

Manual mode functions may only be performed after consultation with and under the supervision of an authorised representative.

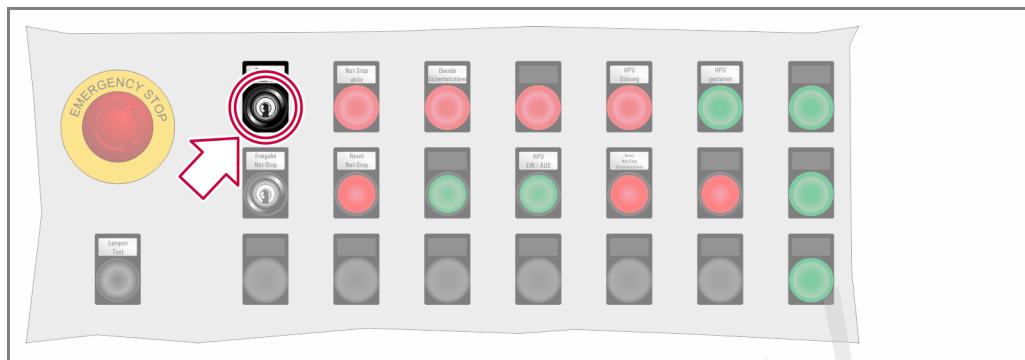
- Inform an authorised representative before switching to the manual operating mode!
- The key for the key switch is kept by an authorised representative!
- Never switch to manual mode without consulting an authorised representative and without receiving authorisation.
- Only perform functions in manual mode under the supervision of an authorised representative.

Carry out the following steps:

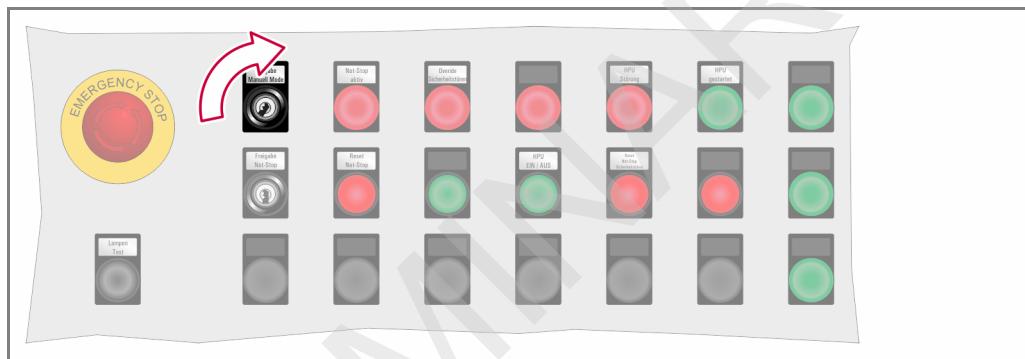
- Inform an authorised representative before switching to manual mode.

! You may only switch to manual mode after consultation with an authorised representative.

2. The authorised representative inserts the key into the **<MANUAL MODE RELEASE>** key switch on the **<OPERATOR PANEL>**.



3. Turn the key in the **<MANUAL MODE RELEASE>** key switch on the **<OPERATOR PANEL>** clockwise to Position 1.

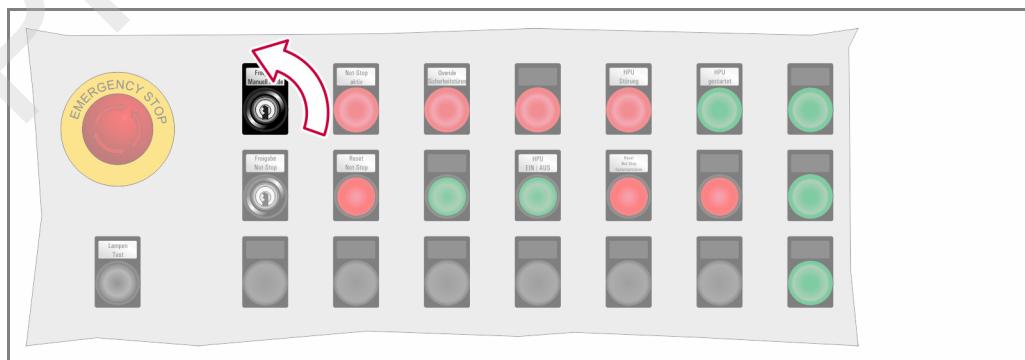


✓ Done.

7.5.2 Deactivating the "Manual" mode

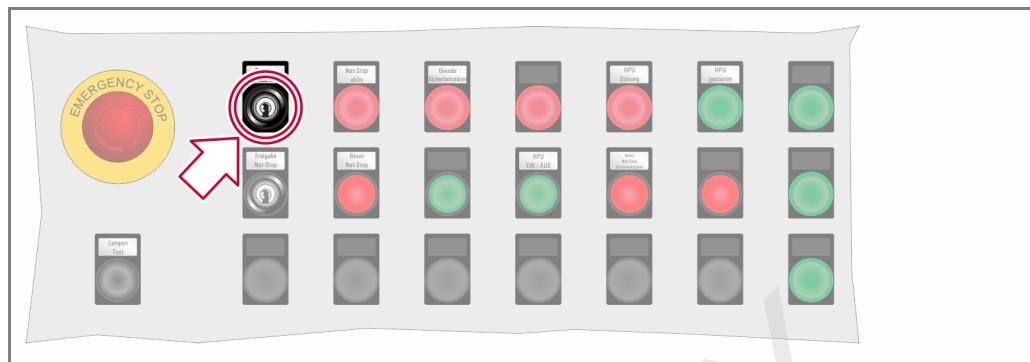
Carry out the following steps:

1. Turn the key in the **<MANUAL MODE RELEASE RELEASE>** key switch on the **<OPERATOR PANEL>** counter-clockwise to Position 0.





2. Insert the key into the **<MANUAL MODE RELEASE>** key switch on the **<OPERATOR PANEL>**.



✓ Done.

7.6 Manual process movements

Manual process movements may only be performed by an authorised person or under the supervision of an authorised person.

Requirement:



- The machine is switched on (see page 177: Operation > Switching on the machine).



WARNING

Injury hazard posed by machine movements!

Manual process movements can also be made with the safety doors open. The risk of being crushed thus arises.

- Ensure that there are no persons in the vicinity of the machine if you perform manual process movements.
- If necessary, barricade the area around the machine.
- If required, signs should be set up, indicating the manual process movements.
- Ensure that only trained, authorised personnel perform manual process movements.

Carry out the following steps:

1. Switch the machine to manual mode (see page 169: Activating the "Manual" mode).
2. Perform the manual process movements.
3. Deactivate the "Manual" mode (see page 170: Deactivating the "Manual" mode).

✓ Done.

7.7 Commissioning

At commissioning, the machine is adapted to the production process. At this stage, be on the lookout for any possible malfunctions, such as parts that grind against each other or seized gears.

7.7.1 Notes regarding commissioning

Safety instruction: Danger of injury during operation!

The danger of injury arises when the machine is operated. Pay attention to the following points:

- Read the safety instructions that apply to this machine before performing the work (see page 15: Safety > Safety instructions).
- Only commission the machine once all covers, operational protective devices and safety installations have been installed.
- Before commissioning, activate all safety devices. Take note of the Chapter Safety devices (see page 23: Safety > Safety devices).
- After commissioning, test that all safety installations function faultlessly.
- When switching off the machine, always secure it against being switched on unintentionally. Take the machine out of operation according to the Lockout/Tagout procedure (see page 30: Performing the lockout/tagout procedure).
- Ensure that only authorised personnel are in the vicinity of the machine.

At commissioning, pay attention to the following points:

- Has the machine been set up correctly? - (see page 66: Transporting, setting up and connecting > Setting up and aligning the machine).
- Has the machine been connected correctly? - (see page 66: Transporting, setting up and connecting > Connecting the machine).
- Is the machine free of tools?
- Are the back-up fuses on the electrical main connection correctly dimensioned?

7.7.2 Performing the commissioning

Safety instruction: Commissioning must only be performed by machine setters!

At commissioning, the machine is set up for operation. Here it is necessary to perform manual process movements on the machine. For this reason, commissioning may only be performed by a machine setter.

 Requirement:

- All instructions regarding commissioning have been tested and executed (see page 172: Notes regarding commissioning).

Carry out the following steps:

1. Switch the machine on (see page 177: Operation > Switching on the machine).
2. Test that all sensors on the machine function correctly.



3. Enter the operating parameters of the machine onto the respective centralizer (see page 181: Operation > Entering parameters according to / following API 10D into the control system).
4. Perform the test (see page 187: Operation > Performing the test).
5. Check the measurement results.
! If necessary, make settings to the machine if the result does not meet your expectations.
6. Switch the machine off (see page 204: Operation > Daily tagout).

✓ Done.

7.8 Remote control - Activating and deactivating the manual mode

This chapter contains information regarding the activation and deactivation of the manual mode remote control.

- Activating the manual mode remote control (Page 174)
- Deactivating the manual mode remote control (Page 175)

7.8.1 Activating the manual mode remote control

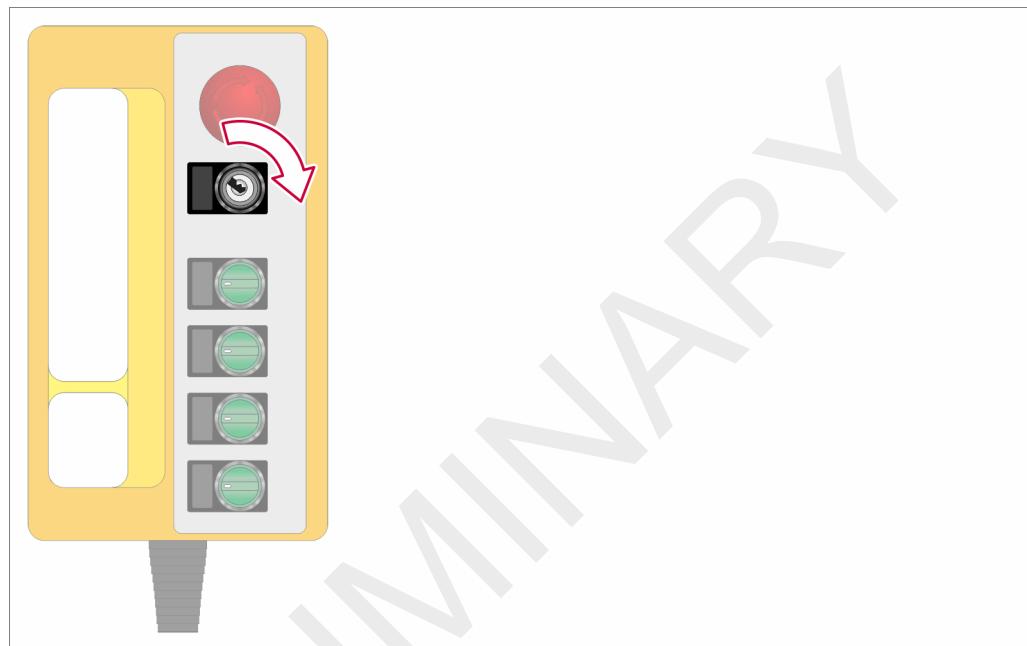
Requirement:



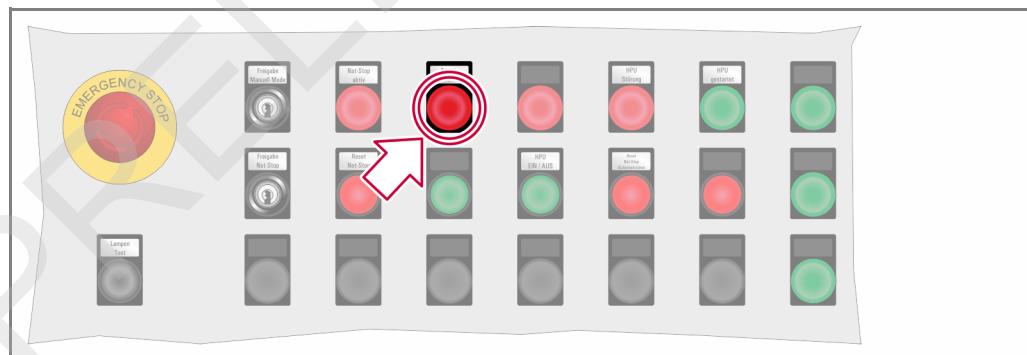
- The swing door is open (see page 146: Opening the swing door).

Carry out the following steps:

- Turn the key in the **<KEY SWITCH>** on the **<MANUAL MODE REMOTE CONTROL>** clockwise to Position 1.



- The **<SAFETY DOORS OVERRIDE>** indicator lamp glows continuously.



- Manual process movements can be made by means of the **<ILLUMINATED SELECTOR SWITCH>** on the **<MANUAL MODE REMOTE CONTROL>**.

- ✓ Done.



7.8.2 Deactivating the manual mode remote control

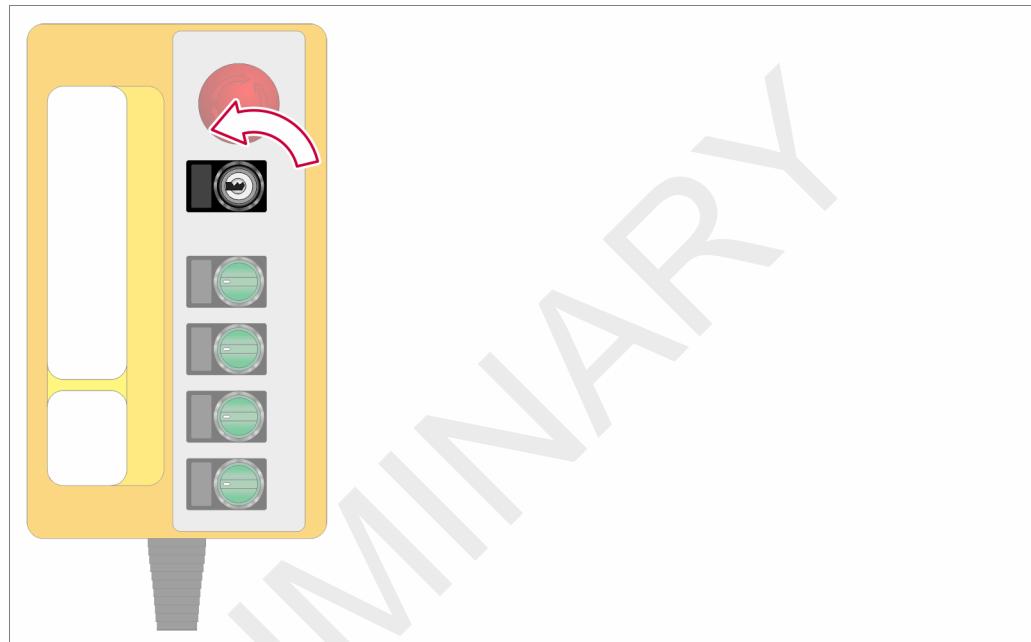
Requirement:



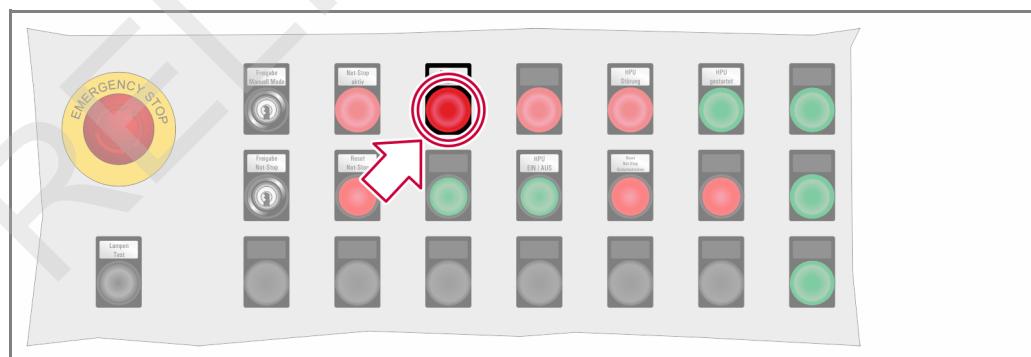
- The swing door is open (see page 146: Opening the swing door).

Carry out the following steps:

- Turn the key in the **«KEY SWITCH»** on the **«MANUAL MODE REMOTE CONTROL»** counter-clockwise to Position 0.



- The **«SAFETY DOORS OVERRIDE»** indicator lamp flashes continuously.



- No manual process movements can be made by means of the illuminated selector switch on the **«MANUAL MODE REMOTE CONTROL»**.

✓ Done.

8 Operation

This chapter contains information regarding the operation of the machine.

- Test process (Page 176)
- Daily start-up (Page 176)
- Entering parameters according to / following API 10D into the control system (Page 181)
- Performing the test (Page 187)
- Operating faults (Page 203)
- Daily tagout (Page 204)

8.1 Test process

The machine is designed for operation by only one operator. The operator must load the machine with inner and external pipes under the supervision of an authorised person. The operator then performs the tests alone, according to / following API 10D. After performing the test, the operator must unload the inner and external pipes from the machine. Manual movement of the machine must always be formed by two persons.

You should watch out for the following malfunctions in particular:

- Are there unusual noises?
- Is the process speed no longer correct?

If no notice a malfunction, stop the machine immediately. Rectify the cause of the malfunction, insofar as you are authorised to do so (see page 203: Operating faults). Only resume operations with the machine if you are certain, that the machine is working faultlessly.

8.2 Daily start-up

In this chapter you will find information regarding the daily start-up of the machine.

- Requirements for daily start-up (Page 177)
- Switching on the machine (Page 177)
- Switching on the power unit (Page 180)



8.2.1 Requirements for daily start-up

Before starting up the machine, please ensure that you can answer **Yes** to the following questions:

- Are all safety installations, as provided by the manufacturer, installed and are they functioning flawlessly?
- Is the working area free of all material and objects that are not necessary for production?
- Are only authorised persons in the working area of the machine?
- Are there no persons in the danger zone of the machine?
- Can no one be injured by the running of the machine?
- Do I know how to act in the event of malfunctions?

8.2.2 Switching on the machine

The machine may only be switched on by an authorised person or under the supervision of an authorised person.

Requirement:



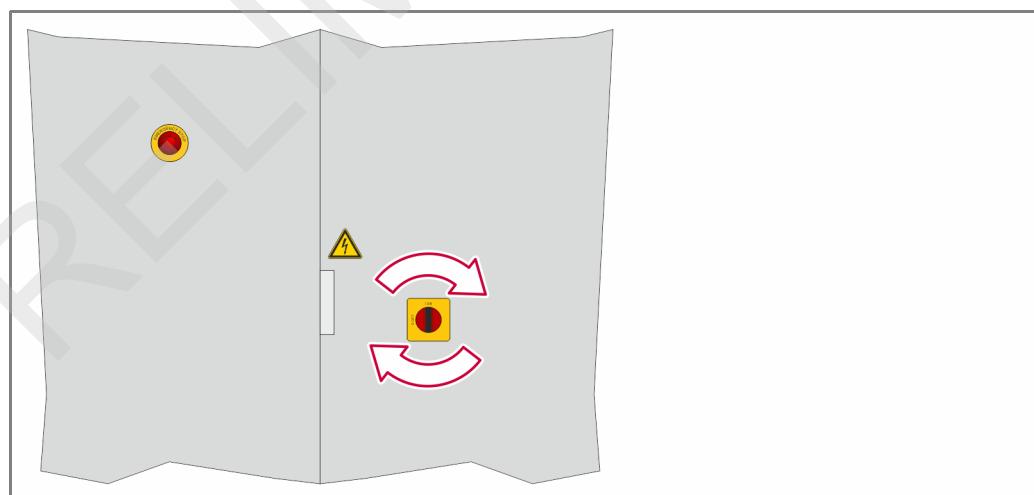
- The power supply line to the machine is switched on.

Booting up the control system



Carry out the following steps:

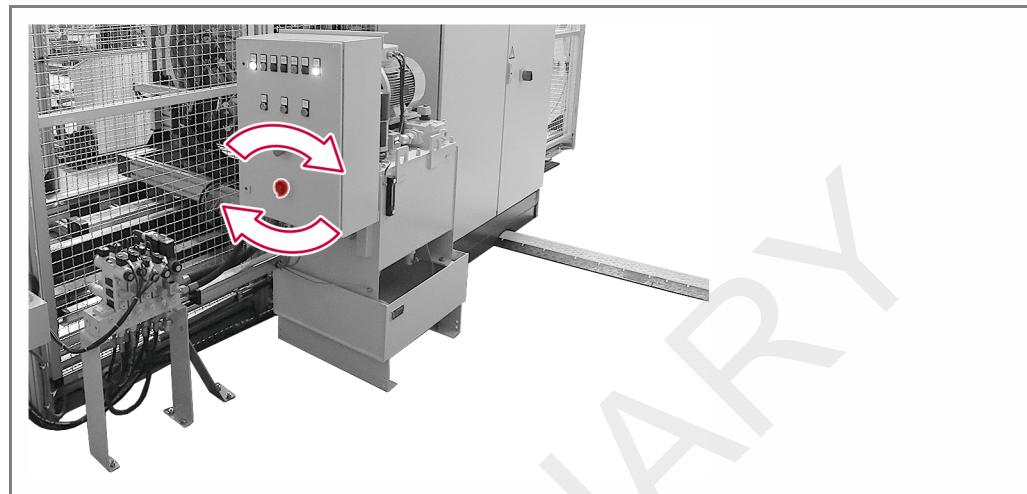
1. Turn the **MAIN SAFETY SWITCH** on the **CONTROL PANEL** clockwise to Position **I ON**.



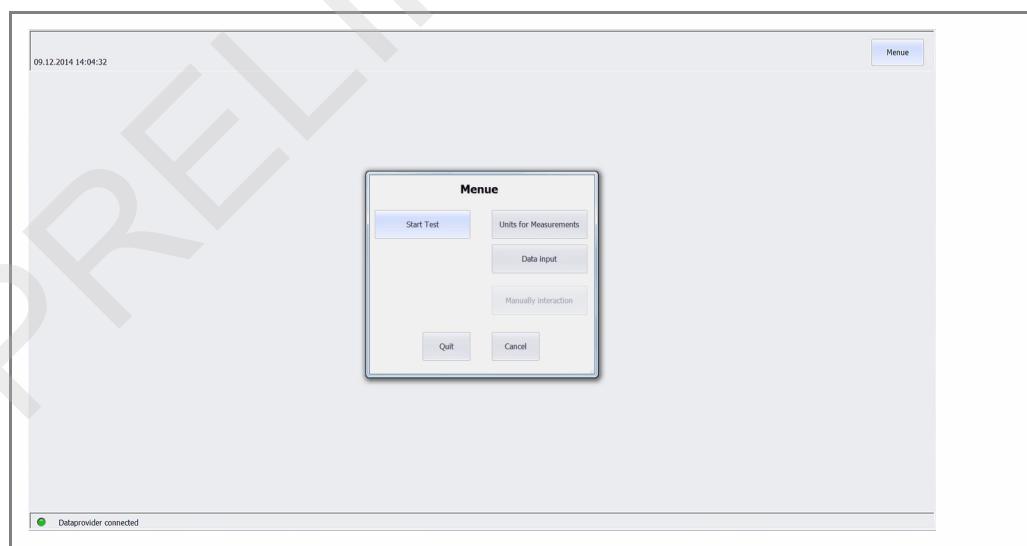
- The machine is supplied with electrical current.
- The control system boots up.
- The Windows desktop is displayed on the **TOUCH SCREEN** on the **OPERATOR PANEL**.

2. Turn the MAIN SAFETY SWITCH

on the control box of the **POWER UNIT**
counter-clockwise to Position **I ON**



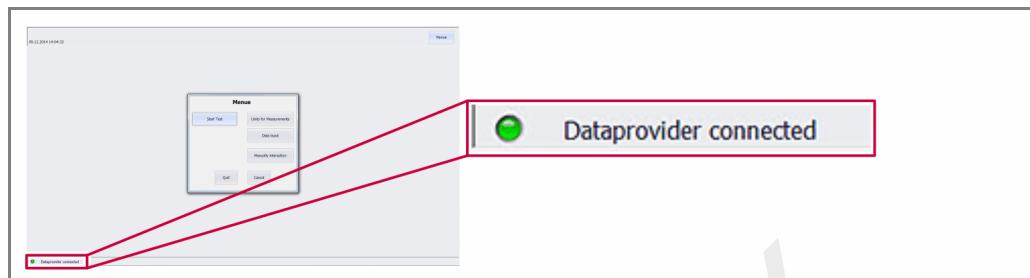
- 3.** If necessary, activate the "Manual" mode (see page 169: Fitting > Activating the "Manual" mode).
- 4.** Double-click on the **<CENTRALIZER_CLIENT.EXE>** shortcut on the **<TOUCH SCREEN>** on the **<OPERATOR PANEL>**.
 - The **CENTRALIZER PERFORMANCE TEST UNIT** program is started.
 - The **STARTUP SCREEN / "MENU" POP-UP WINDOW** operator screen is displayed.





5. Wait before proceeding with this action.

! Wait until the graphic display on the STARTUP SCREEN / "MENU" POP-UP WINDOW operator screen changes from red to green.



6. Reset the emergency stop function (see page 27: Safety > Resetting the emergency stop function).

7. Reset the "Override safety doors" function (see page 152: Fitting > Resetting the "Override safety doors" function).

The control system has booted up.

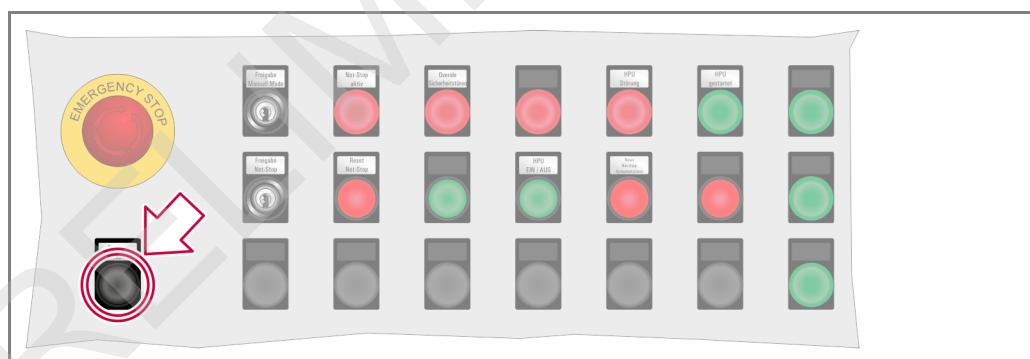
Perform a function check.



Carry out the following steps:

1. Press the **LAMP TEST** button on the **OPERATOR PANEL**.

! Check the functioning of the lamps in the illuminated push buttons and the indicator lamps.



→ The lamps in the illuminated push buttons and the indicator lamps glow continuously while being pressed.

? One or more lamps do not glow?

→ Inform your supervisor.

2. Perform a function test of the **EMERGENCY STOP SWITCH** on the machine (see page 26: Safety > Triggering the emergency stop function).

3. Reset the **EMERGENCY STOP SWITCH** on the machine (see page 27: Safety > Resetting the emergency stop function).

4. Open a safety door on the machine.

→ Opening the swing door (see page 146: Fitting > Opening the swing door).

→ Opening the sliding door (see page 148: Fitting > Opening the sliding door).

→ Opening the swing door (see page 150: Fitting > Opening the hinged doors).

- Reset the "Override safety doors" function (see page 152: Fitting > Resetting the "Override safety doors" function).

The function check has been performed.

Switching on the power unit



Carry out the following steps:

- Switch the **POWER UNIT** on (see page 180: Switching on the power unit).

The power unit is switched on.



Done.

8.2.3 Switching on the power unit

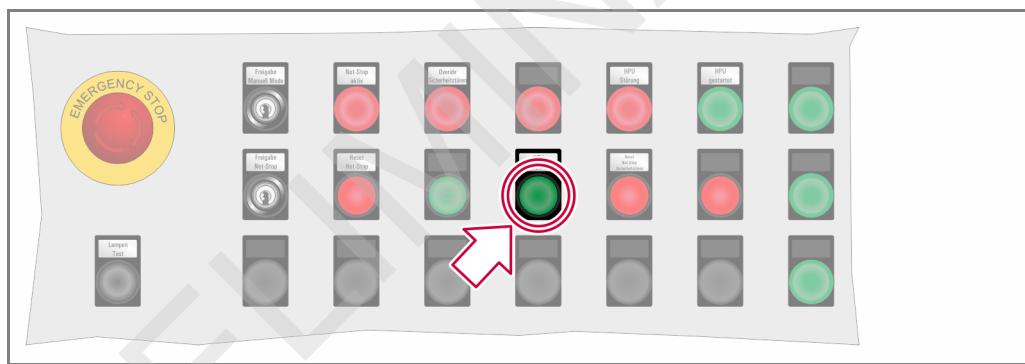
Requirement:



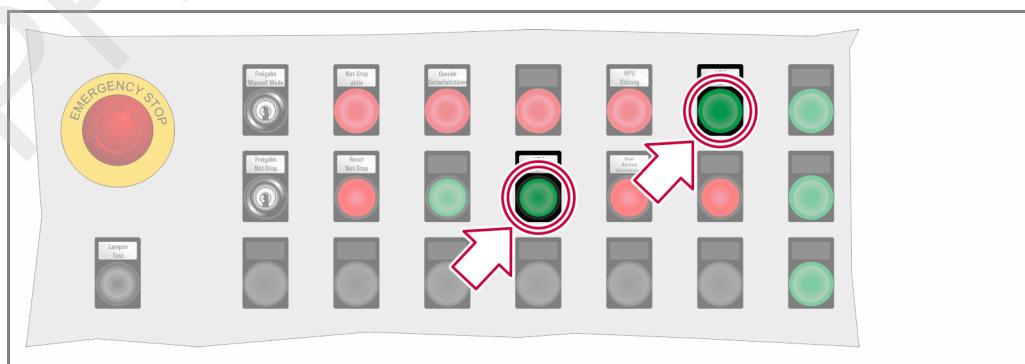
- The machine is switched on (see page 177: Switching on the machine).

Carry out the following steps:

- Press the **HPU ON / OFF** illuminated switch on the **OPERATOR PANEL**.



- The **POWER UNIT** is switched on.
- The **HPU STARTED** indicator lamp glows continuously and the **HPU ON / OFF** illuminated switch goes out.



Done.



8.3 Entering parameters according to / following API 10D into the control system

Requirement:



- The machine is switched on (see page 177: Switching on the machine).
- The precise weight of the centralizer to be tested is known.

Tools required:



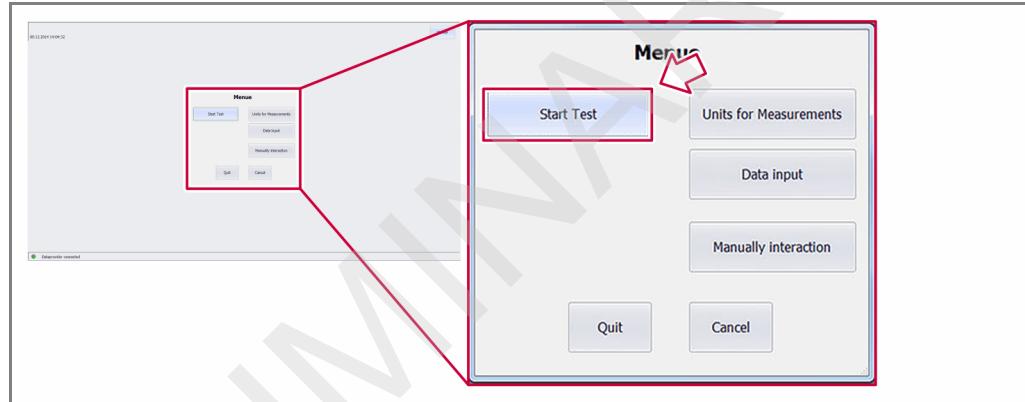
- Copy of the API 10D
- Data sheet of the centralizer to be tested

Selecting the centralizer



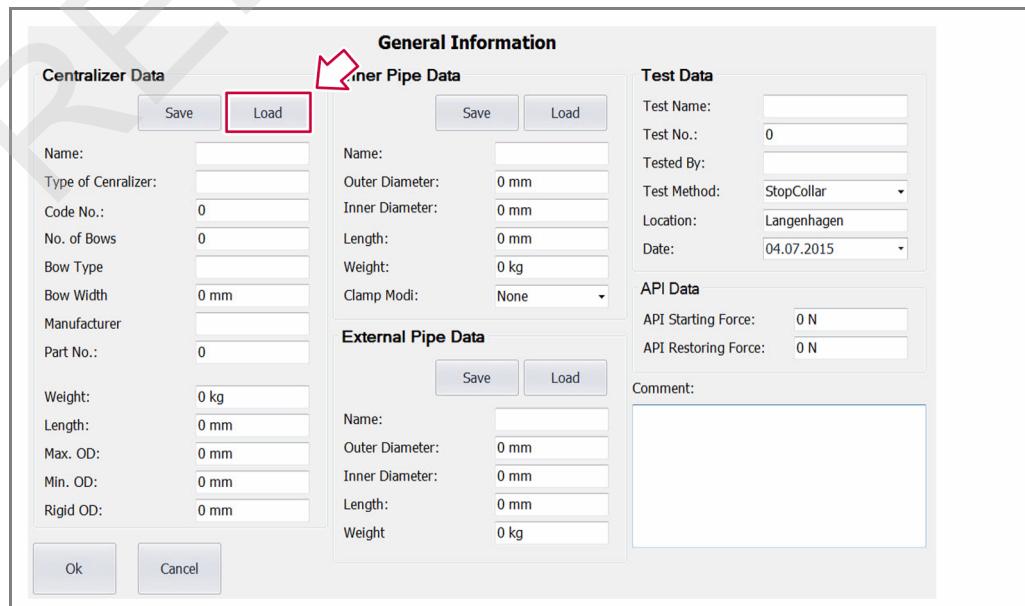
Carry out the following steps:

- On the **STARTUP SCREEN / "MENU" POP-UP WINDOW** operator screen, press the **<START TEST>** button.



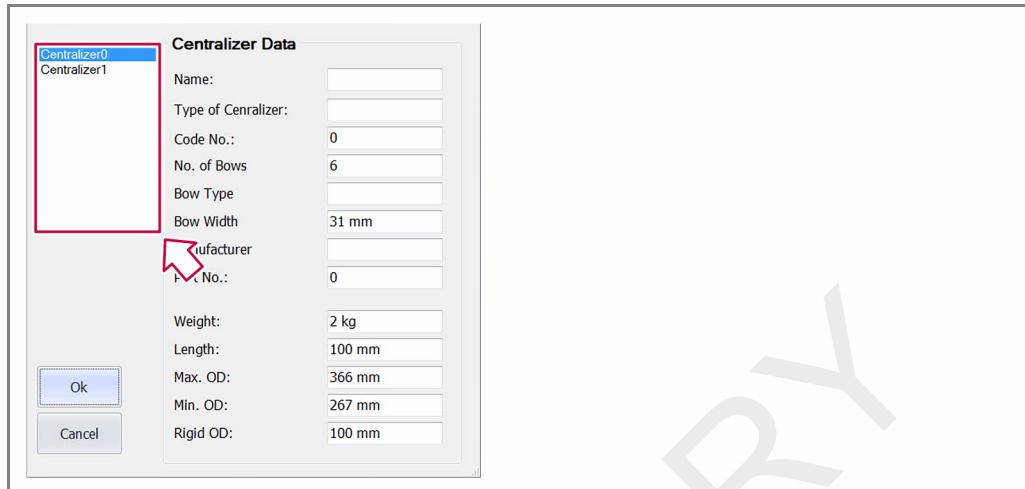
→ The **GENERAL INFORMATION** operator screen is displayed.

- On the **GENERAL INFORMATION** operator screen, in the **Centralizer Data** section, press the **<LOAD>** button.

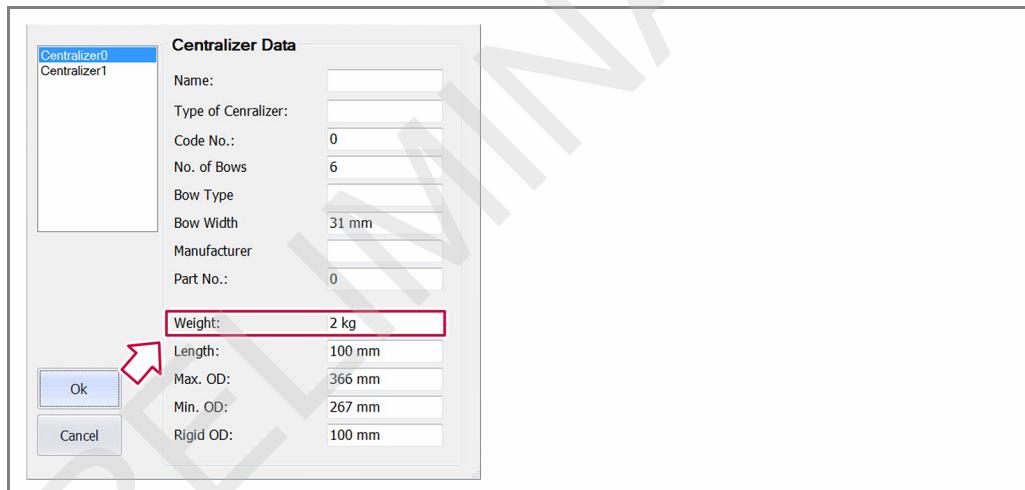


→ The **"CENTRALIZER DATA" POP-UP WINDOW** operator screen is displayed.

3. In the "CENTRALIZER DATA" POP-UP WINDOW operator screen select the desired centralizer from the selection list.



4. In the "CENTRALIZER DATA" POP-UP WINDOW, enter the weight in kilogram [kg] of the centralizer to be tested in the *Weight* input and output field.



5. Check all parameters on the "CENTRALIZER DATA" POP-UP WINDOW operator screen with the parameters specified in the data sheet on the centralizer to be tested.



6. In the "CENTRALIZER DATA" POP-UP WINDOW, press the <OK> button.

Centralizer Data	
Name:	
Type of Centralizer:	
Code No.:	0
No. of Bows	6
Bow Type	
Bow Width	31 mm
Manufacturer	
Part No.:	0
Weight:	2 kg
Length:	100 mm
Max. OD:	366 mm
Min. OD:	267 mm
Rigid OD:	100 mm

- The data of the selected centralizer is selected for the test and loaded into the program.
- The "CENTRALIZER DATA" POP-UP WINDOW operator screen is closed.
- The GENERAL INFORMATION operator screen is displayed.

The centralizer has been accepted.

Selecting the inner pipe

Carry out the following steps:

1. On the GENERAL INFORMATION operator screen, in the *Inner Pipe Data* section, press the <LOAD> button.

General Information			
Centralizer Data		Inner Pipe Data	
Name:	Save	Name:	Save
Type of Centralizer:	Load	Outer Diameter:	0 mm
Code No.:	0	Inner Diameter:	0 mm
No. of Bows	0	Length:	0 mm
Bow Type		Weight:	0 kg
Bow Width	0 mm	Clamp Mod.:	None
Manufacturer			
Part No.:	0		
Weight:	0 kg		
Length:	0 mm		
Max. OD:	0 mm		
Min. OD:	0 mm		
Rigid OD:	0 mm		

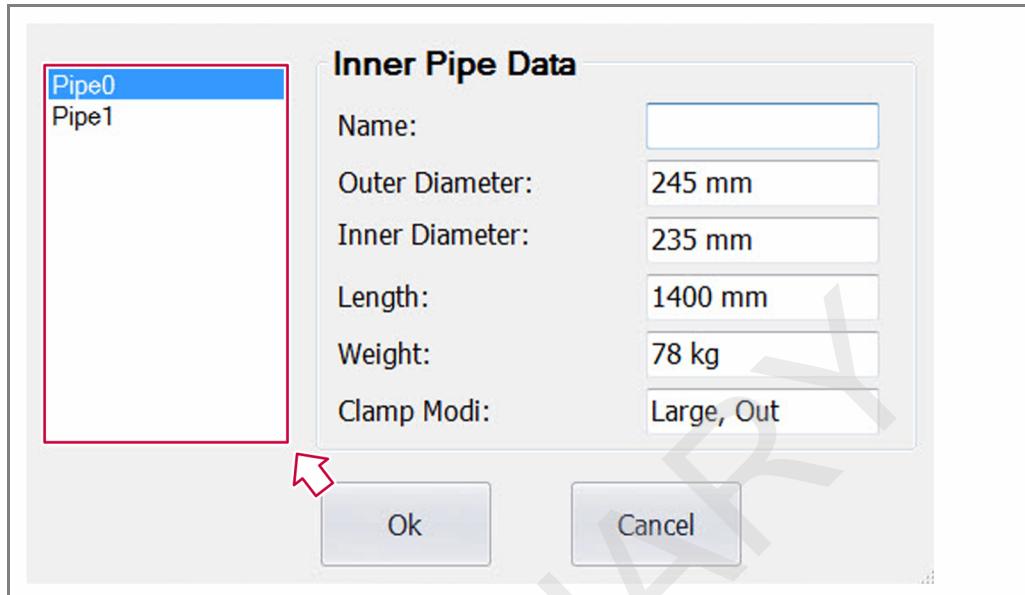
Test Data	
Test Name:	
Test No.:	0
Tested By:	
Test Method:	StopCollar
Location:	Langenhagen
Date:	04.07.2015

API Data	
API Starting Force:	0 N
API Restoring Force:	0 N

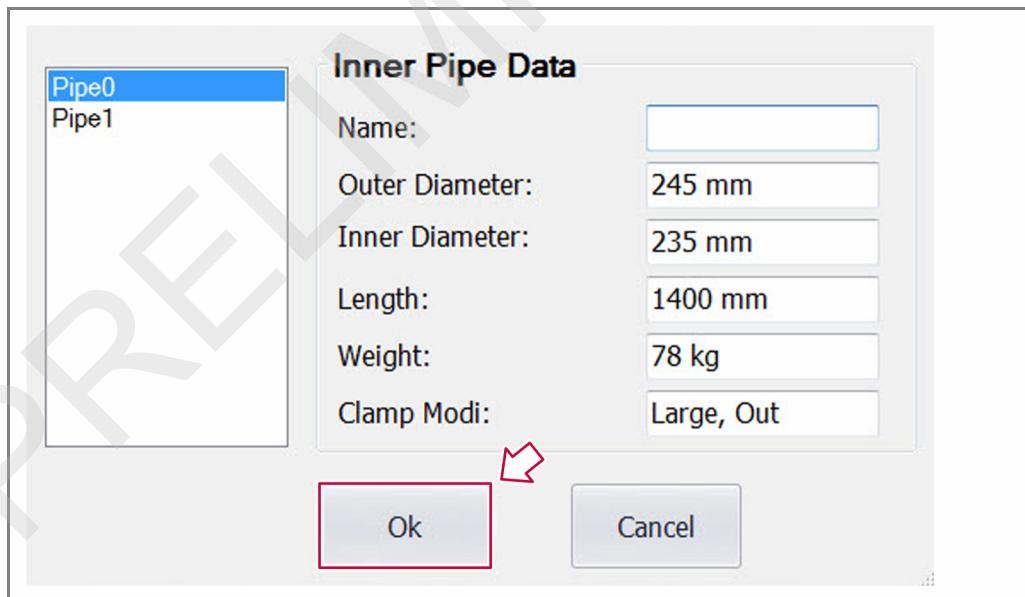
Comment:	

- The "INNER PIPE DATA" POP-UP WINDOW operator screen is displayed.

2. In the "INNER PIPE DATA" POP-UP WINDOW operator screen select the desired inner pipe from the selection list.



3. Check all parameters on the "INNER PIPE" POP-UP WINDOW operator screen with the parameters specified in the data sheet on the centralizer to be tested.
4. In the "INNER PIPE" POP-UP WINDOW, press the <OK> button.



- The data of the selected inner pipe is selected for the test and loaded into the program.
- The "INNER PIPE DATA" POP-UP WINDOW operator screen is closed.
- The GENERAL INFORMATION operator screen is displayed.

The inner pipe has been selected.



Selecting the
external pipe.



Carry out the following steps:

1. On the **GENERAL INFORMATION** operator screen, in the *External Pipe Data* section, press the **<LOAD>** button.

The screenshot shows the 'General Information' operator screen. In the 'External Pipe Data' section, there is a 'Load' button highlighted with a red box and a red arrow pointing to it. Other fields in this section include 'Name', 'Outer Diameter', 'Inner Diameter', 'Length', 'Weight', and 'Clamp Modi'. The 'Clamp Modi' dropdown has 'None' selected. The 'Test Data' and 'API Data' sections are also visible on the right.

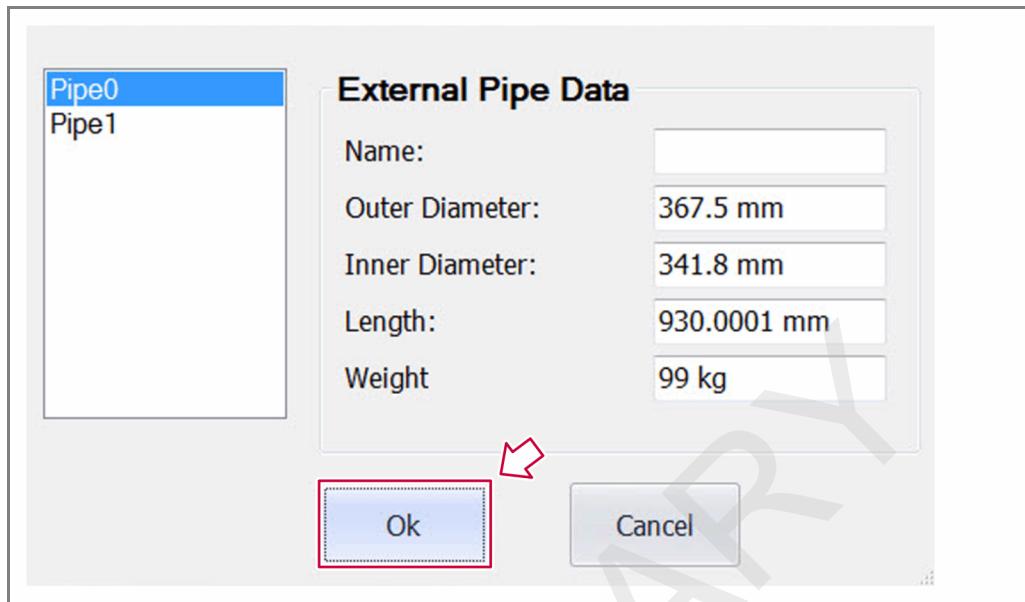
→ The "EXTERNAL PIPE DATA" POP-UP WINDOW operator screen is displayed.

2. In the "EXTERNAL PIPE DATA" POP-UP WINDOW operator screen select the desired external pipe from the selection list.

The screenshot shows the 'External Pipe Data' pop-up window. On the left, there is a list box containing 'Pipe0' and 'Pipe1', with 'Pipe0' selected and highlighted by a red box and a red arrow. On the right, there are input fields for 'Name', 'Outer Diameter' (367.5 mm), 'Inner Diameter' (341.8 mm), 'Length' (930.0001 mm), and 'Weight' (99 kg). At the bottom are 'Ok' and 'Cancel' buttons.

3. Check all parameters on the "EXTERNAL PIPE DATA" POP-UP WINDOW operator screen with the parameters specified in the data sheet on the centralizer to be tested.

4. In the "EXTERNAL PIPE DATA" POP-UP WINDOW, press the **OK** button.



- The data of the selected external pipe is selected for the test and loaded into the program.
- The "EXTERNAL PIPE DATA" POP-UP WINDOW operator screen is closed.
- The GENERAL INFORMATION operator screen is displayed.

The external pipe has been selected.

Entering the test data



Carry out the following steps:

1. On the GENERAL INFORMATION operator screen, in the **Test Data** section, enter the required information (Test Name, Test No., Tested By, Test Method, Location, Date).



2. On the **GENERAL INFORMATION** operator screen, in the **Test Data** section, enter the required information according to / following API 10D (API Starting Force, API Restoring Force).

General Information	
Centralizer Data	
<input type="button" value="Save"/>	<input type="button" value="Load"/>
Name:	<input type="text"/>
Type of Centralizer:	<input type="text"/>
Code No.:	0
No. of Bows	0
Bow Type	<input type="text"/>
Bow Width	0 mm
Manufacturer	<input type="text"/>
Part No.:	0
Weight:	0 kg
Length:	0 mm
Max. OD:	0 mm
Min. OD:	0 mm
Rigid OD:	0 mm
<input type="button" value="Ok"/>	<input type="button" value="Cancel"/>
Inner Pipe Data	
<input type="button" value="Save"/>	<input type="button" value="Load"/>
Name:	<input type="text"/>
Outer Diameter:	0 mm
Inner Diameter:	0 mm
Length:	0 mm
Weight:	0 kg
Clamp Modi:	None
External Pipe Data	
<input type="button" value="Save"/>	<input type="button" value="Load"/>
Name:	<input type="text"/>
Outer Diameter:	0 mm
Inner Diameter:	0 mm
Length:	0 mm
Weight:	0 kg
Test Data	
Test Name:	<input type="text"/>
Test No.:	0
Tested By:	<input type="text"/>
Test Method:	StopCollar
Location:	Langenhangen
Date:	04.07.2015
API Data	
API Starting Force:	0 N
API Restoring Force:	0 N
Comment: <input type="text"/>	

→ The test data has been entered, but not yet transferred to the control system.

The test data has been entered.

✓ Done.

8.4 Performing the test

Operation is semi-automatic.

Requirement:



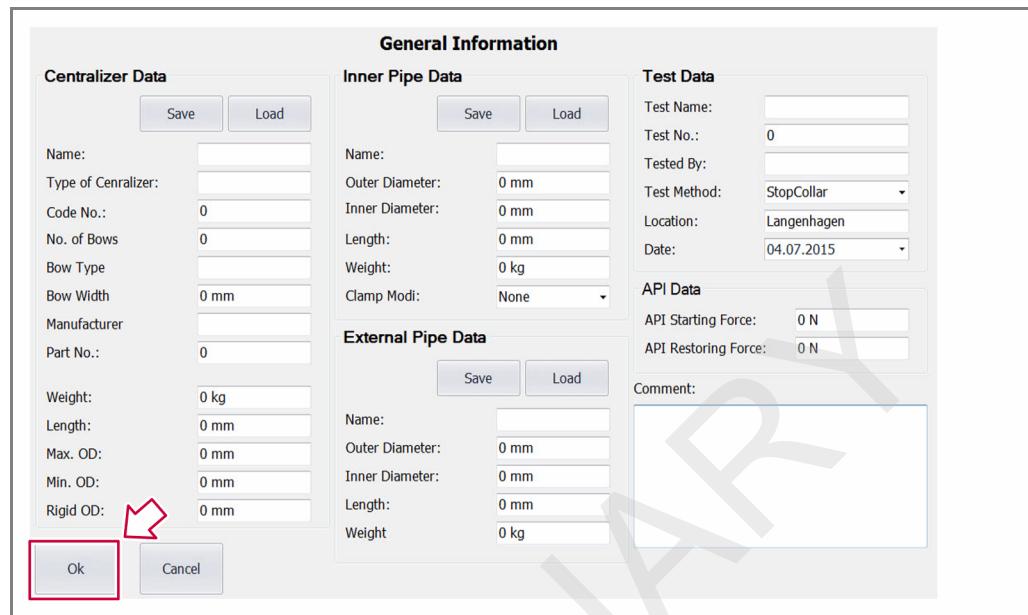
- The machine is switched on (see page 177: Switching on the machine).
- The machine is set to the respective centralizer (see page 181: Entering parameters according to / following API 10D into the control system).
- You are at the **GENERAL INFORMATION** operator screen.

Accepting the parameters and starting the test cycle



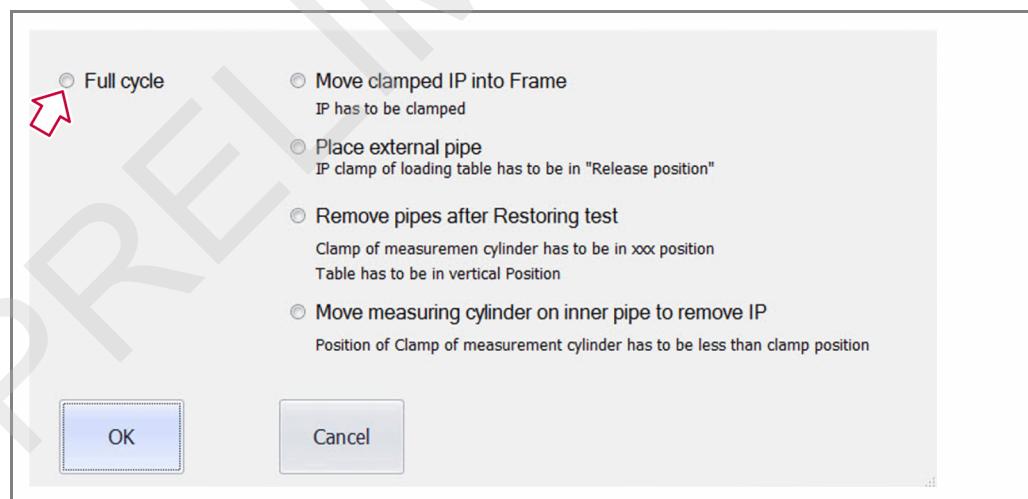
Carry out the following steps:

- On the **GENERAL INFORMATION** operator screen, press the **OK** button.



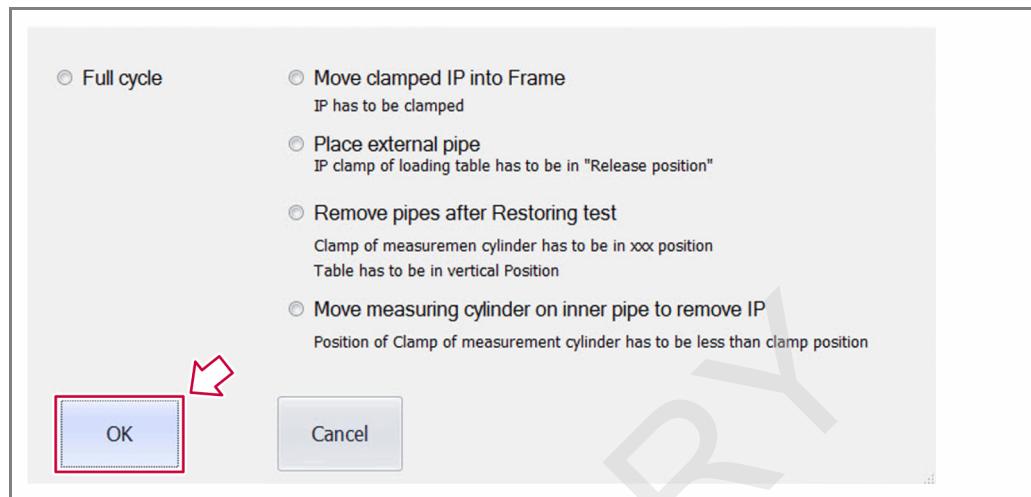
- The entered test data is transferred to the control system.
- The "**SET START POINT FOR AUTOMODE**" POP-UP WINDOW operator screen is displayed.

- On the "**SET START POINT FOR AUTOMODE**" POP-UP WINDOW operator screen, select the **Full cycle** option.





3. On the "SET START POINT FOR AUTOMODE" POP-UP WINDOW operator screen, press the **OK** button.



→ The "START OF AUTO MODE TEST" POP-UP WINDOW operator screen is displayed.

The parameters are accepted and the test cycle is started.

Loading an inner pipe on the machine



WARNING

Risk of being crushed when clamping pipes!

The pipes are clamped with the aid of the clamp. This results in the risk of being crushed.

- Wear safety shoes at all times.
- Always wear protective gloves.
- Always perform loading activities with two persons!
- Ensure that no person remains in the area of the loading activities.
- Never reach into the moving parts of the machine.
- Ensure that no-one can reach into moving machine parts.
- Ensure that no tool remains within the interior of the machine.



CAUTION

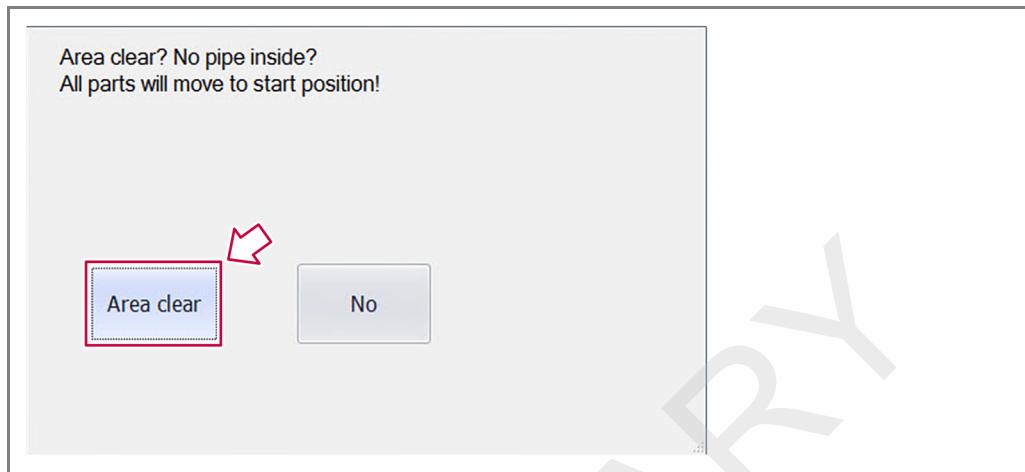
Risk of injury caused by disregarding personal safety equipment!

Various actions must be performed when loading the machine. If your personal safety equipment is not used as prescribed, there is a risk of being injured.

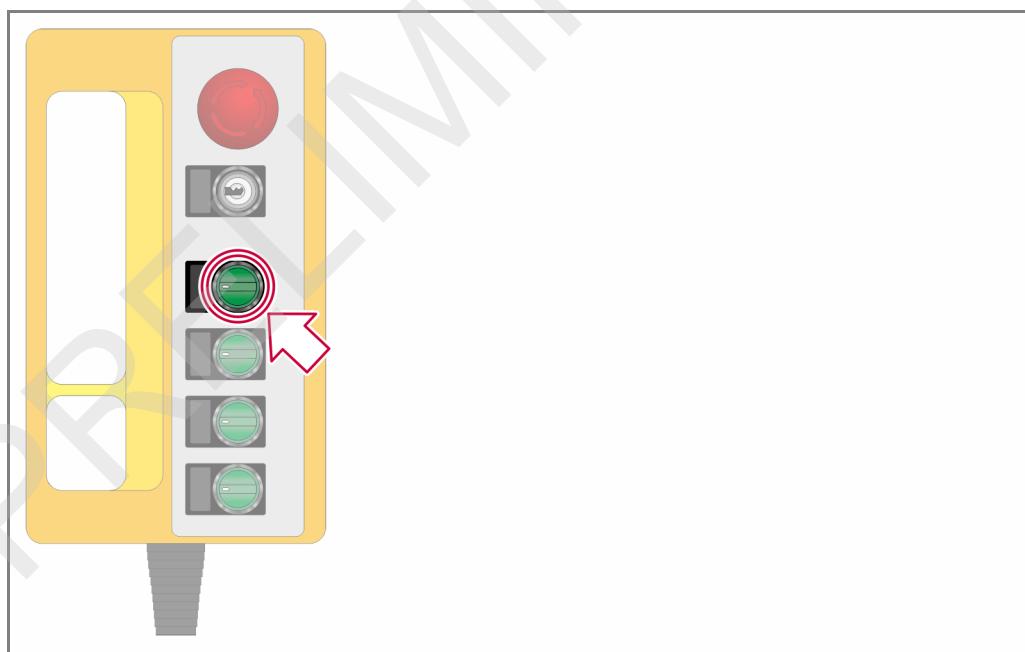
- Wear the prescribed protective equipment throughout the loading process (safety shoes and safety gloves).

Carry out the following steps:

1. On the "START POINT OF AUTO MODE TEST" POP-UP WINDOW operator screen, press the **<AREA CLEAR>** button.



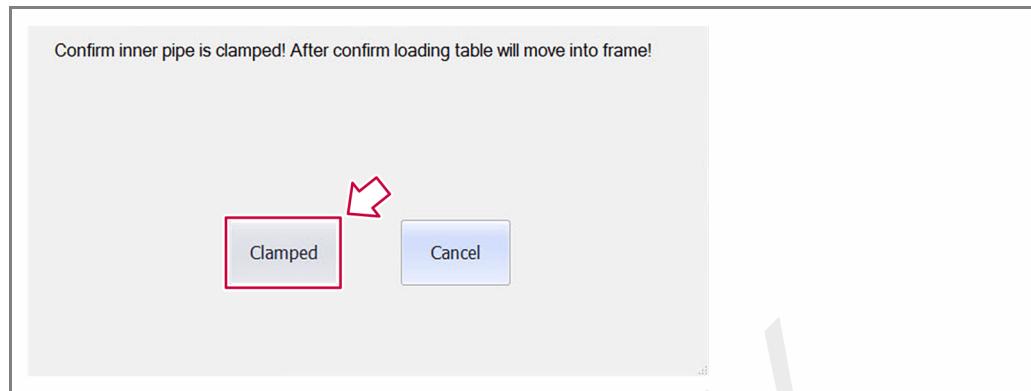
- The machine moves to the loading position for the **<INNER PIPE>**.
- Once the machine has reached the loading position, the "**INNER PIPE PLACED**" **POP-UP WINDOW** is displayed.
- The **<ILLUMINATED PUSH-BUTTON>** on the **<MANUAL MODE REMOTE CONTROL>** flashes.



2. Load the **<INNER PIPE>** onto the machine. (see page 161: Fitting > Loading an inner pipe on the machine).

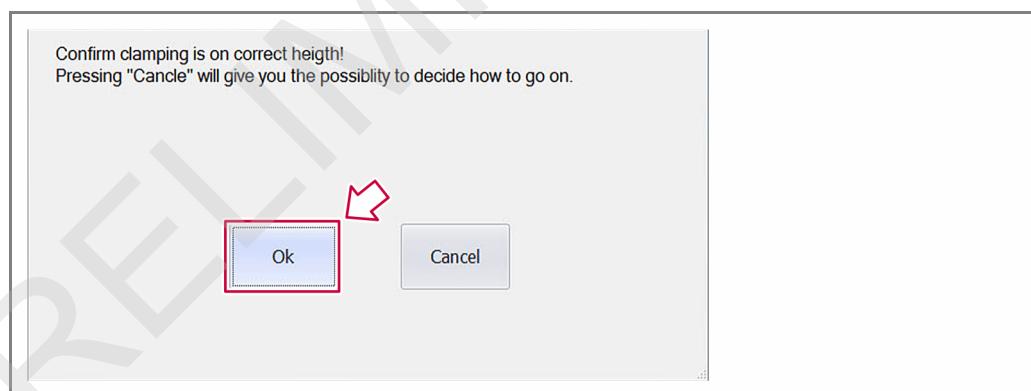


3. In the "INNER PIPE IS CLAMPED" POP-UP WINDOW, press the <CLAMPED> button.



- The entire <TABLE DEVICE> with the clamped <INNER PIPE> is moved beneath the <TOP SIDE CLAMP> automatically.
- The <TOP SIDE CLAMP> lowers itself slowly upon the clamped <INNER PIPE> automatically.
- The <LEFT- AND RIGHT-HAND SIDE JAWS> of the <TOP SIDE CLAMP> move up to the notch of the <INNER PIPE> slowly. A small gap between the <INNER PIPE> and the <LEFT- AND RIGHT-HAND SIDE JAWS> still remains.
- The "CONFIRM CLAMPING IS AT CORRECT HEIGHT" POP-UP WINDOW operator screen is displayed.

4. In the "CONFIRM CLAMPING IS AT CORRECT HEIGHT" POP-UP WINDOW, press the <OK> button.



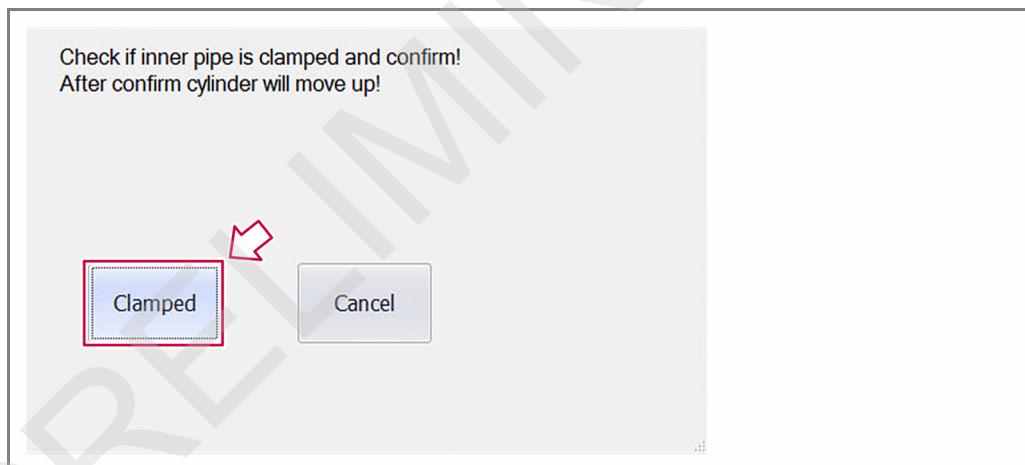
- The <CLAMP> on the <TABLE DEVICE> is automatically opened slightly.
- The <INNER PIPE> is clamped by the <LEFT- AND RIGHT-HAND SIDE JAWS> of the <TOP SIDE CLAMP> automatically.

5. Check if the **LEFT- AND RIGHT-HAND SIDE JAWS** of the **TOP SIDE CLAMP** have clamped the **INNER PIPE** properly.

! A gap between the **LEFT- AND RIGHT-HAND SIDE JAWS** and the **INNER PIPE** should no longer be present.



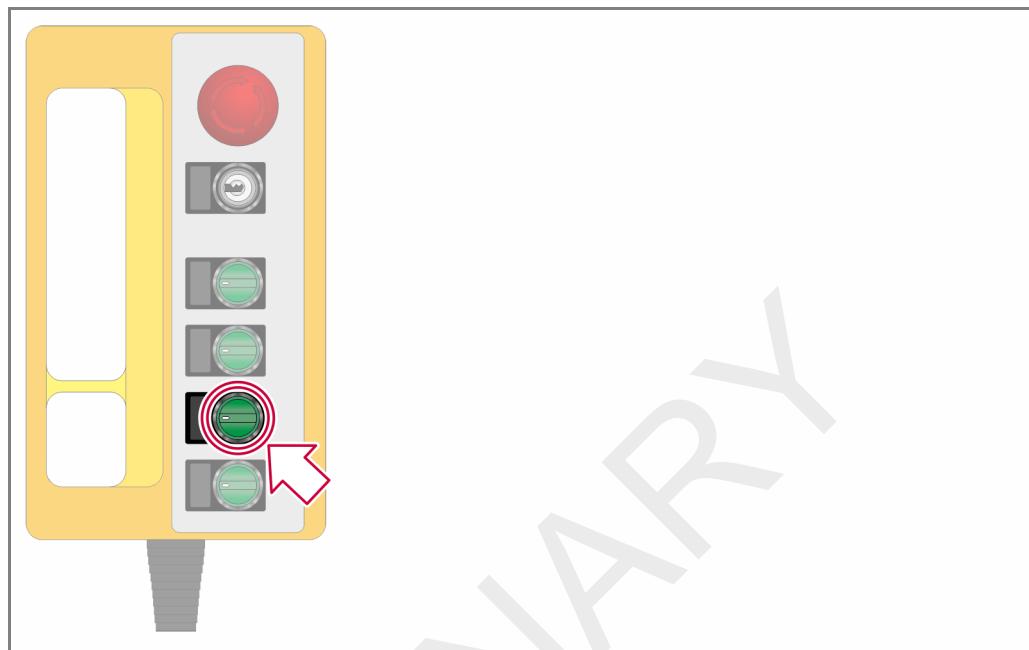
6. In the "CONFIRM INNER PIPE IS CLAMPED" POP-UP WINDOW, press the **CLAMPED** button.



- The **TOP SIDE CLAMP** is moved with the clamped **INNER PIPE** to the top position automatically.
- The machine moves to the loading position for the **EXTERNAL PIPE**.
- Once the machine has reached the loading position, the "**EXTERNAL PIPE PLACED**" POP-UP WINDOW is displayed.



- The **<ILLUMINATED PUSH-BUTTON>** on the **<MANUAL MODE REMOTE CONTROL>** flashes.



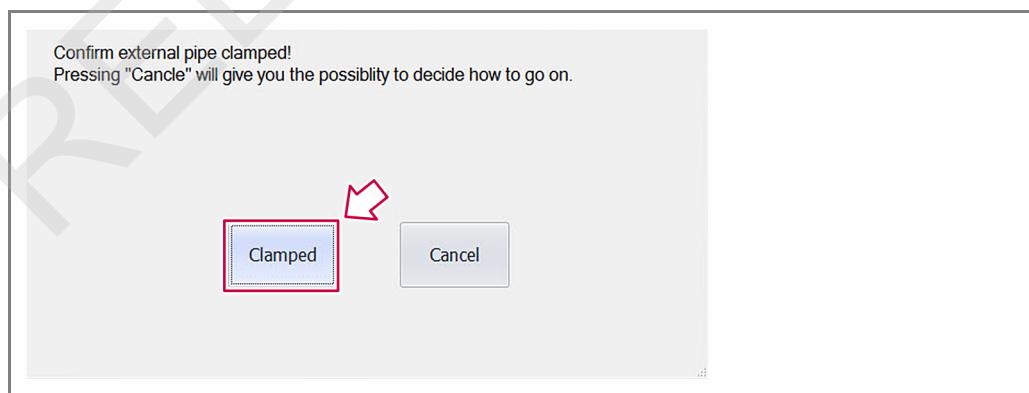
The inner pipe has been loaded onto the machine. .

Loading an
external pipe on
the machine



Carry out the following steps:

1. Load the **<EXTERNAL PIPE>** onto the machine (see page 165: Fitting > Loading an external pipe on the machine).
2. In the "CONFIRM EXTERNAL PIPE IS CLAMPED" POP-UP WINDOW, press the **<CLAMPED>** button.



- The entire **<TABLE DEVICE>** with the clamped **<EXTERNAL PIPE>** is moved beneath the **<TOP SIDE CLAMP>** with the clamped **<INNER PIPE>** automatically.
- The "CHECK SITUATION" POP-UP WINDOW operator screen is displayed.

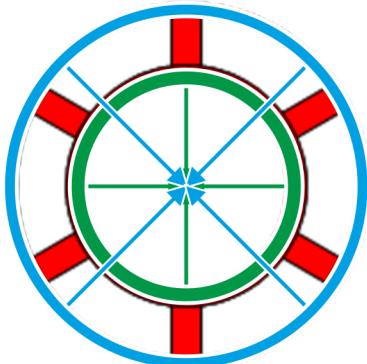
The external pipe has been loaded onto the machine. .

Preparing for the
"Starting Force"
test

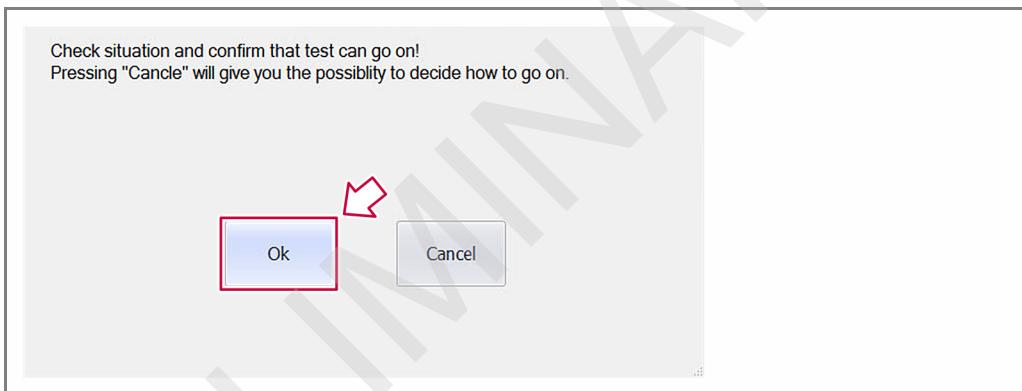


Carry out the following steps:

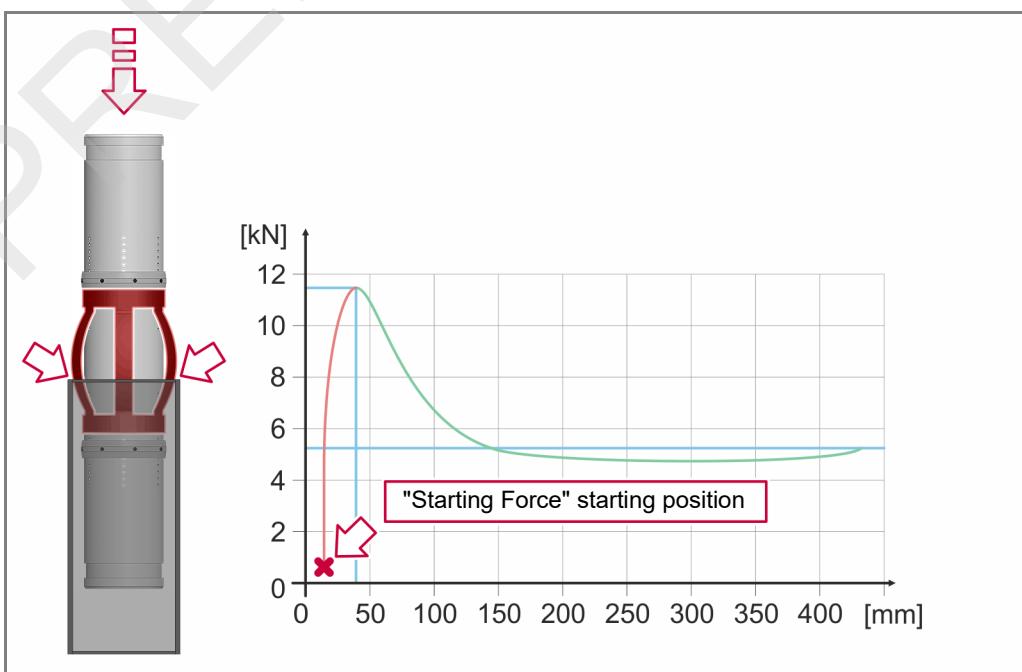
1. Check if the **<INNER PIPE>** and the **<EXTERNAL PIPE>** are positioned concentrically over each other.



2. In the "CHECK SITUATION" POP-UP WINDOW, press the **<OK>** button.



- The **<TOP SIDE CLAMP>** with the clamped **<INNER PIPE>** moves slowly to the position in which the **<CENTRALIZER>** rests on the **<EXTERNAL PIPE>**.





- The **STARTING RUNNING FORCE TEST VIEW AUTO MODE** operator screen is displayed.

The preparations for the "Starting Force" test have been performed.

Performing the
"Starting Force"
and "Running
Force" tests

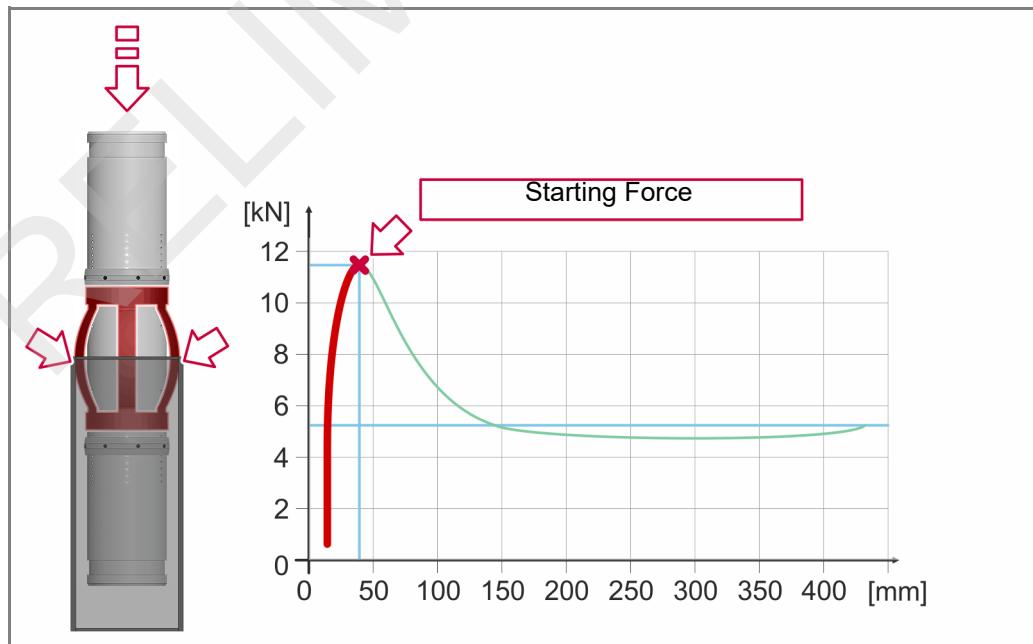


Carry out the following steps:

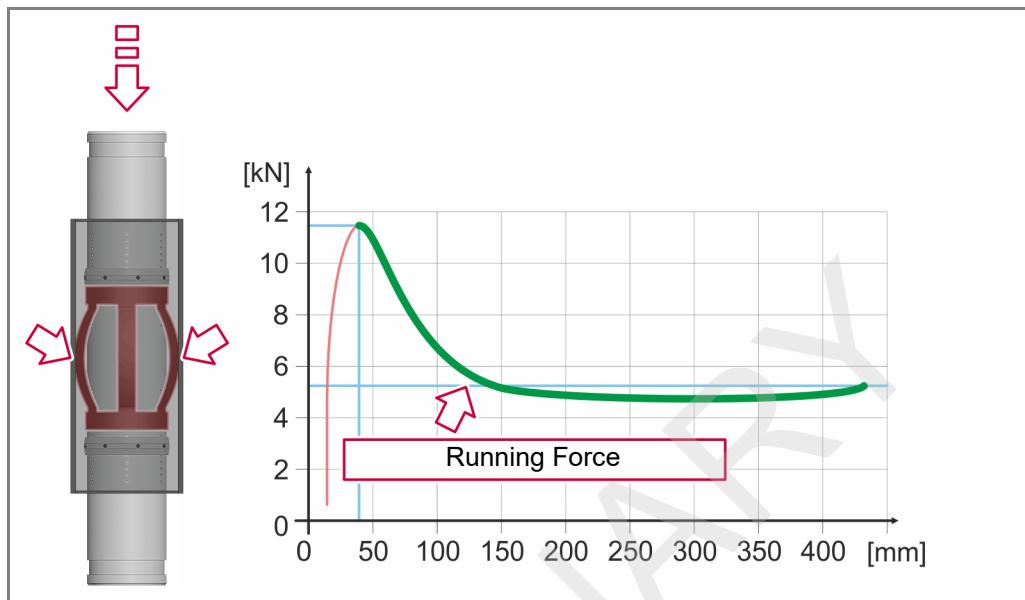
1. Check the correct positioning of the **CENTRALIZER**.
2. In the "**CHECK CENTRALIZER**" POP-UP WINDOW, press the **OK** button.



- The **TOP SIDE CLAMP** with the clamped **INNER PIPE** moves slowly with force being expended into the **EXTERNAL PIPE**. The measured values are recorded and displayed by the control system.

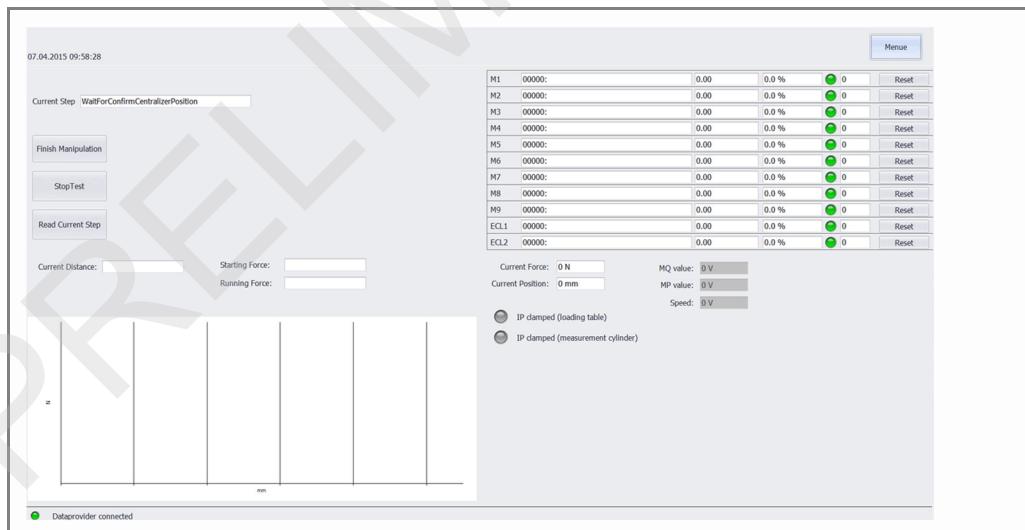


- The **TOP SIDE CLAMP** with the clamped **INNER PIPE** moves slowly further to a defined position in the **EXTERNAL PIPE**. The measured values are recorded and displayed by the control system.



- The **STARTING RUNNING FORCE TEST VIEW AUTO MODE** operator screen is displayed.

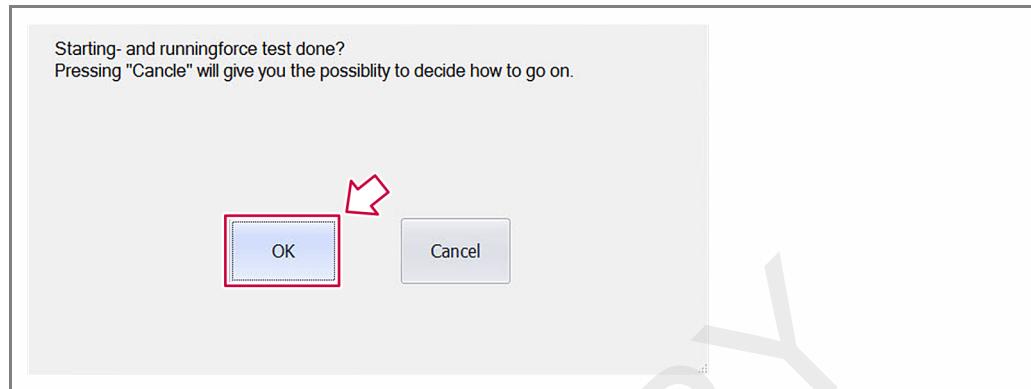
3. In the **STARTING RUNNING FORCE TEST VIEW AUTO MODE** operator screen, monitor the "Starting Force" and "Running Force" tests being performed.



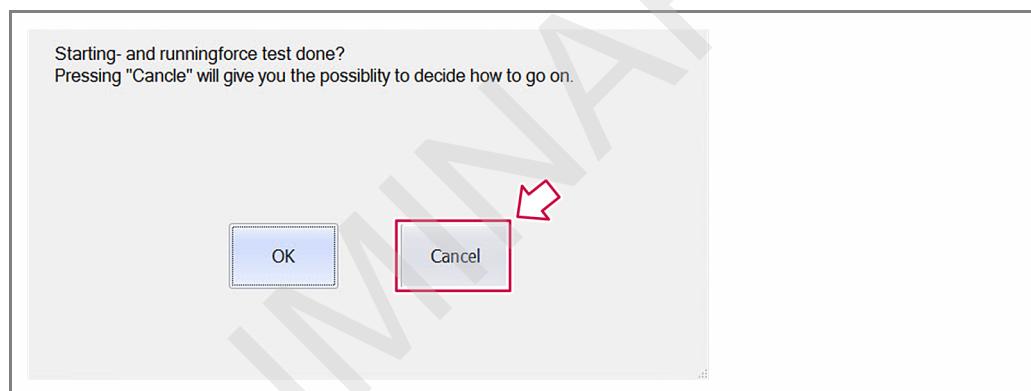
- Once the "Starting Force" and "Running Force" tests have ended, the "**STARTING FORCE AND RUNNING FORCE TEST DONE**" POP-UP WINDOW is displayed.



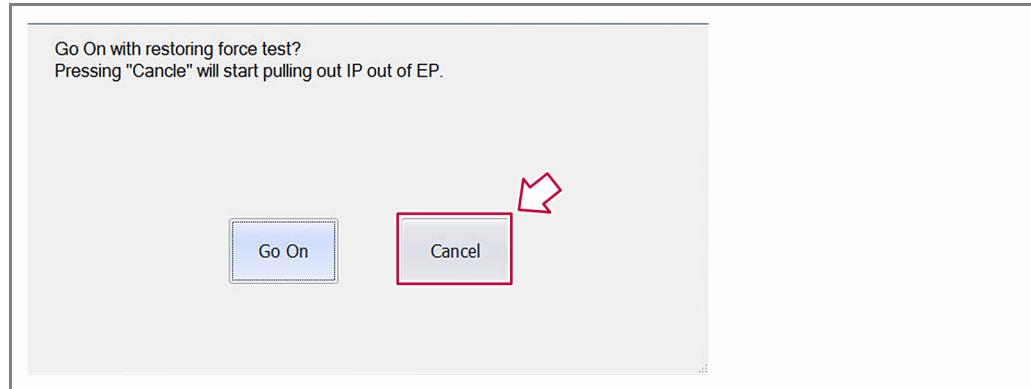
4. Check the data recorded in the "Starting Force" and "Running Force" tests.
→ Is the test data "OK"? In the "**STARTING FORCE AND RUNNING FORCE TEST DONE**" POP-UP WINDOW, press the **OK** button.



- The test data is not "OK"? In the "**STARTING FORCE AND RUNNING FORCE TEST DONE**" POP-UP WINDOW, press the **CANCEL** button.

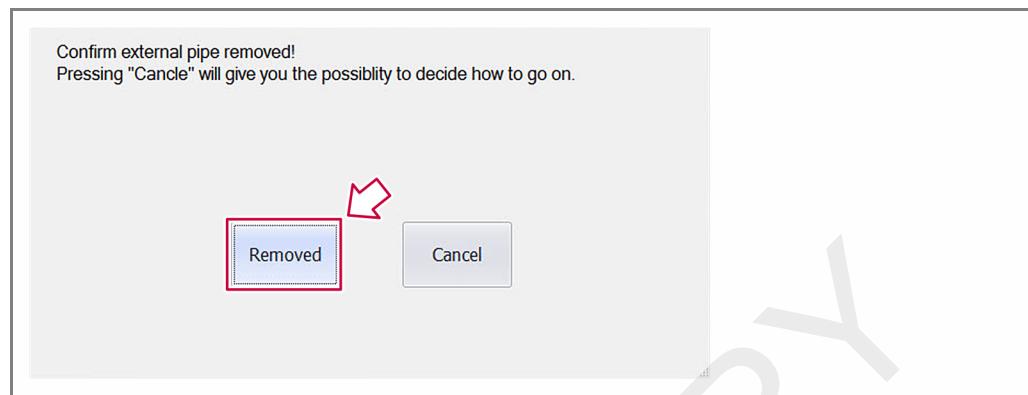


- The "**GO ON WITH RESTORING FORCE**" POP-UP WINDOW is displayed, if the **OK** button has been pressed.
 - The **ERROR HANDLING** operator screen is displayed if the **CANCEL** button has been pressed.
5. In the "**GO ON WITH RESTORING FORCE**" POP-UP WINDOW, press the **CANCEL** button.
- !** Only press the Cancel button if you do not wish to perform the "Restoring Force" test. If a "Restoring Force" test is to be performed, perform the following sequence of actions *Perform "Restoring Force" Test*.



- The machine moves to the unloading position for the **EXTERNAL PIPE**.
- The "**EXTERNAL PIPE REMOVED**" POP-UP WINDOW operator screen is displayed.

6. Unload the **EXTERNAL PIPE** from the machine (see page 169: Fitting > Unloading the external pipe from the machine).
7. In the "EXTERNAL PIPE REMOVED" POP-UP WINDOW, press the **REMOVED** button.



- The machine moves to the unloading position for the **INNER PIPE**.
8. Unload the **INNER PIPE** from the machine (see page 165: Fitting > Unloading the inner pipe from the machine).

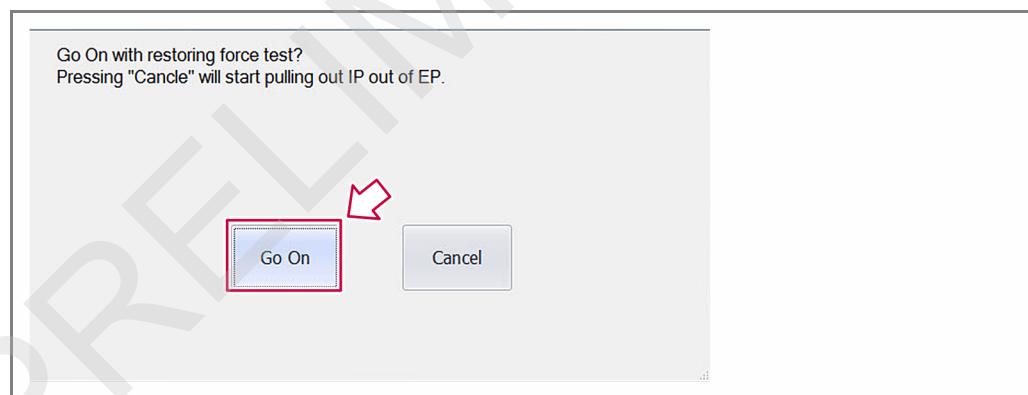
The "Starting Force" and "Running Force" tests have been performed.

Performing the "Restoring Force" test



Carry out the following steps:

1. On the "GO ON WITH RESTORING FORCE" POP-UP WINDOW operator screen, press the **GO ON** button.



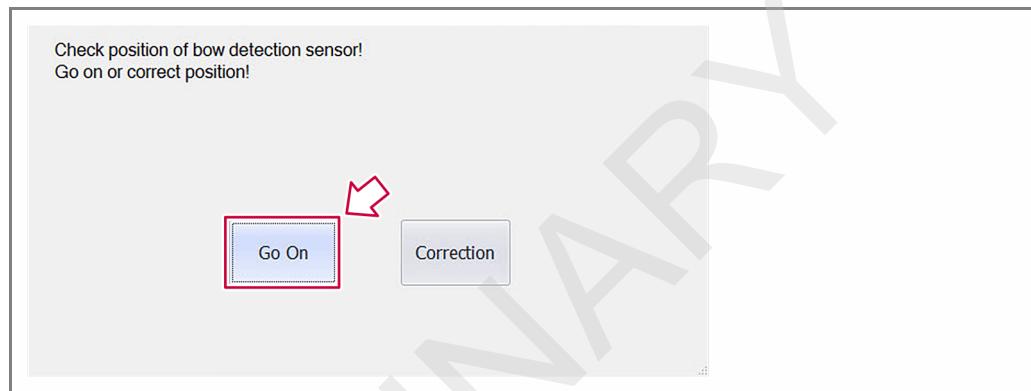
- The **CLAMP** of the **TABLE DEVICE** clamps the **INNER PIPE**.
- The **TOP SIDE CLAMP** releases the clamping of the **INNER PIPE**.
- The **TOP SIDE CLAMP** moves to the top-most position.
- The **TABLE DEVICE** moves to the rotation position.
- The **TABLE DEVICE** moves to the clamping position.
- The **TABLE DEVICE** rotates the **TABLE** through 90°.
- The **INNER PIPE** clamped in the **CLAMP** of the **TABLE DEVICE** rests on the **INNER PIPE SUPPORT DEVICE** on the **ROTARY TABLE**.



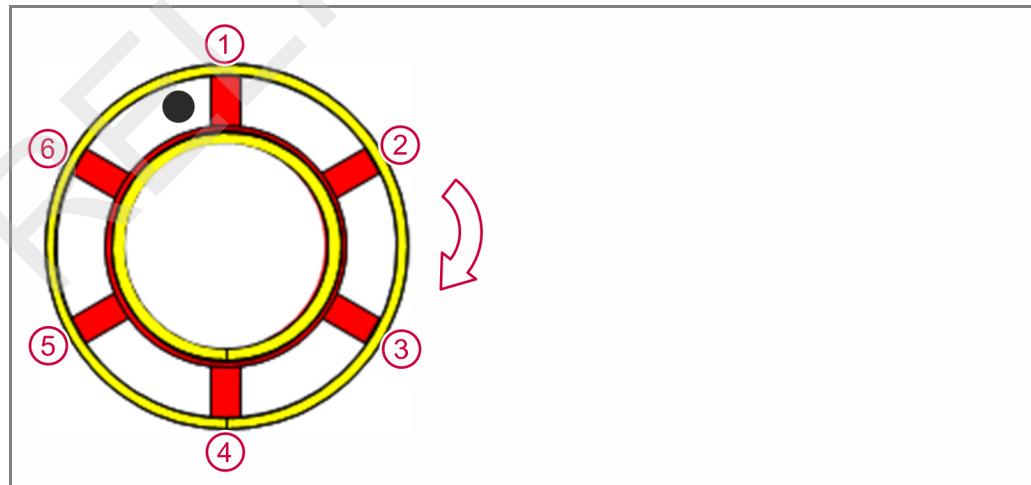
- The **ROTARY TABLE** moves slowly up to the **INNER PIPE**.
- The **ROTARY TABLE** clamps the **INNER PIPE** by means of the **INNER PIPE JAWS**.
- The **SENSOR - BOW DETECTION** moves slowly to the position between the **INNER PIPE** and **EXTERNAL PIPE**.
- The **TOP SIDE ROTARY TABLE** moves slowly onto the **EXTERNAL PIPE**.
- The "CHECK POSITION OF BOW DETECTION SENSOR" POP-UP WINDOW operator screen is displayed.

2. Check the correct positioning of the **SENSOR - BOW DETECTION**.

- Is the position correct? On the "CHECK POSITION OF BOW DETECTION SENSOR" POP-UP WINDOW operator screen, press the **Go On** button.



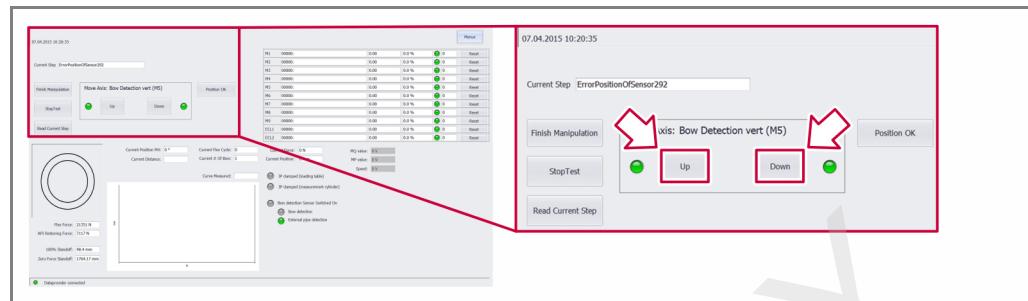
- Is the position not correct? On the "CHECK POSITION OF BOW DETECTION SENSOR" POP-UP WINDOW operator screen, press the **CORRECTION** button.
- The **ROTARY TABLE** turns the **INNER PIPE WITH THE EXTERNAL PIPE**, if the **SENSOR - BOW DETECTION** does not have to be readjusted.
- The **SENSOR - BOW DETECTION** detects all bows of the **CENTRALIZER**, if the **SENSOR - BOW DETECTION** does not have to be readjusted.



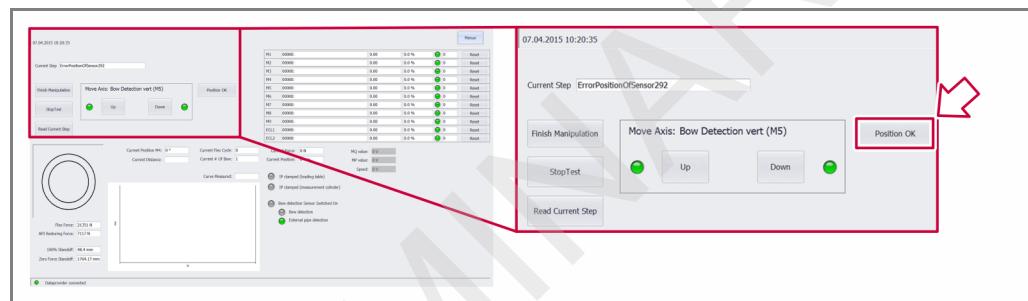
- The **BOW DETECTION SENSOR CORRECTION OF POSITION** operator screen is displayed if you wish to make a correction.

3. If necessary, in the **BOW DETECTION SENSOR CORRECTION OF POSITION** operator screen, press the **<UP>** and **<DOWN>** buttons.

! Readjust the **<SENSOR - BOW DETECTION>** manually. Then confirm the correct position.

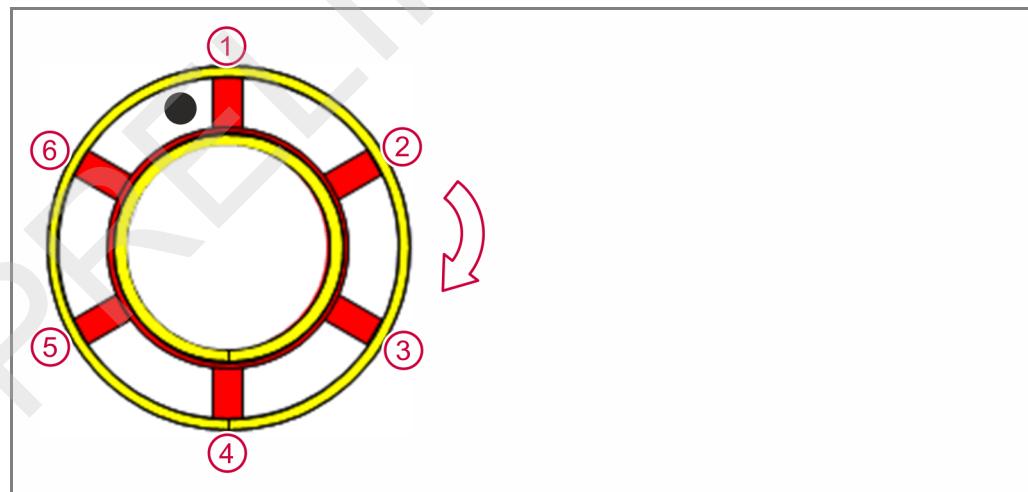


4. If necessary, on the **BOW DETECTION SENSOR CORRECTION OF POSITION** operator screen, press the **<POSITION OK>** button.



→ The **<ROTARY TABLE>** turns the **<INNER PIPE WITH THE EXTERNAL PIPE>**.

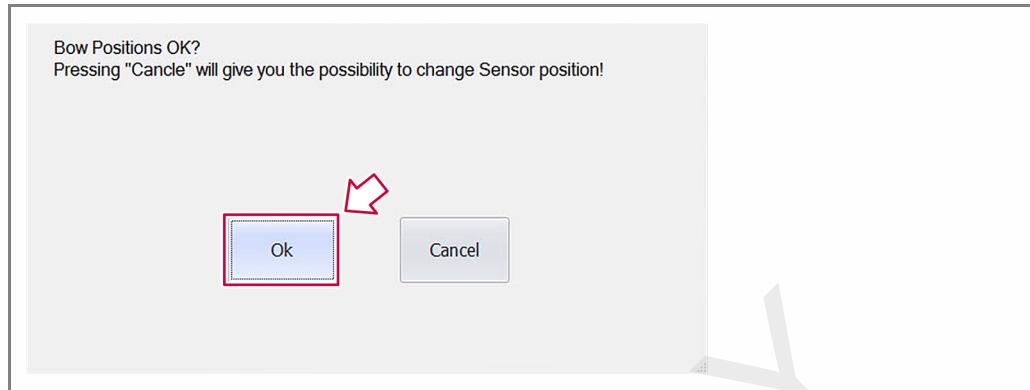
→ The **<SENSOR - BOW DETECTION>** detects all bows of the **<CENTRALIZER>**.



5. Check if the number of bows of the **<CENTRALIZER>** that have been counted agrees with the specified bows of the **<CENTRALIZER>**.



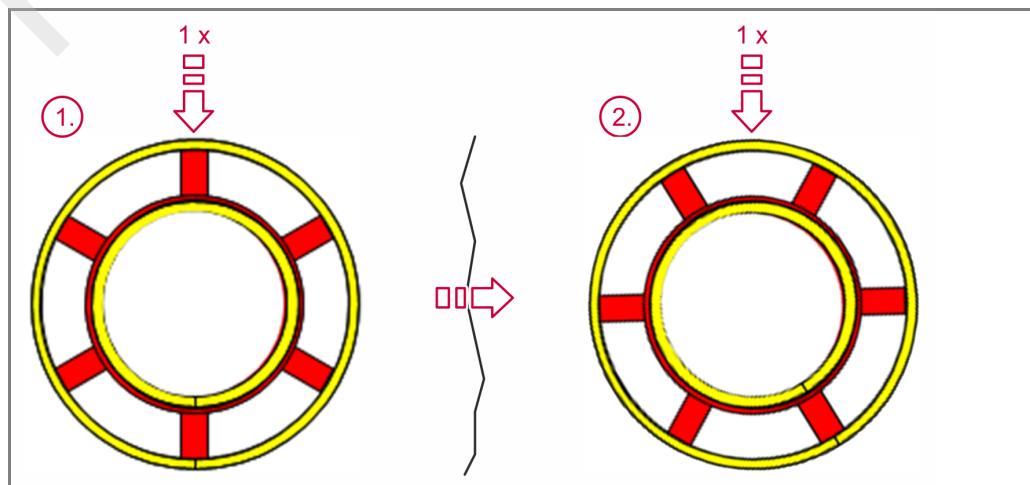
6. In the "CHECK POSITION OF BOWS" POP-UP WINDOW operator screen, press the <OK> button.



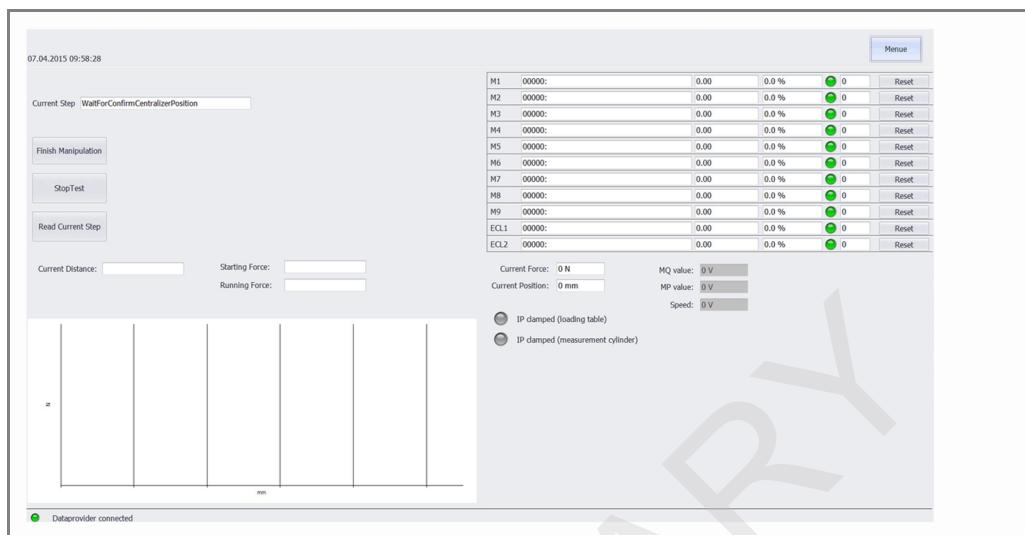
- The machine moves up to the first bow of the <CENTRALIZER>.
- The <TOP SIDE CLAMP> loads each bow of the <CENTRALIZER> 12 times consecutively with a defined force.



- The <TOP SIDE CLAMP> first loads a bow of the <CENTRALIZER> once with a defined force. After the centralizer bow, the <TOP SIDE CLAMP> loads the next gap between two bows once with a defined force. The measured values are recorded and displayed by the control system.



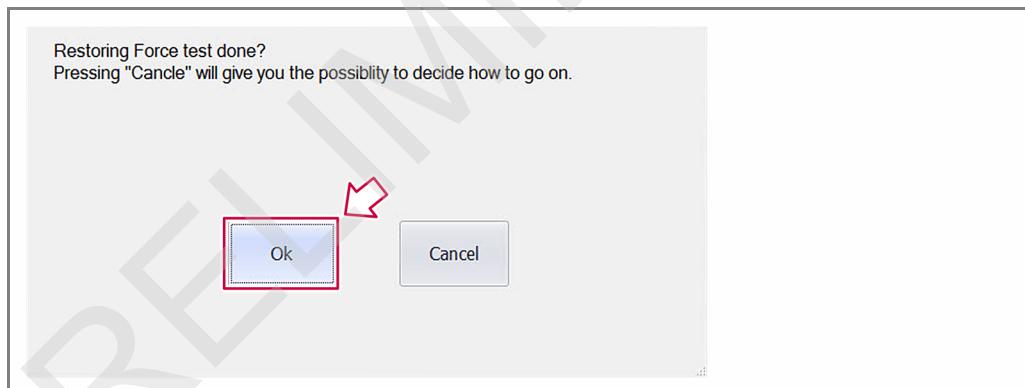
7. In the RESTORING FORCE TEST VIEW AUTO MODE operator screen, monitor the "Restoring Force" test being performed.



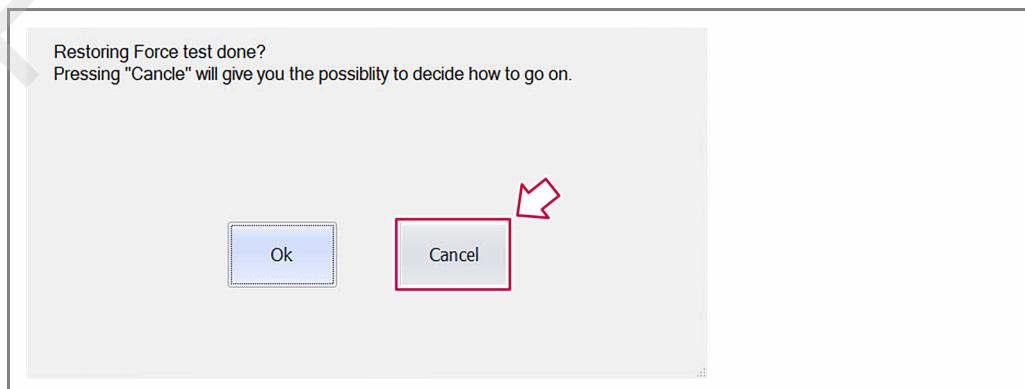
Once the "Restoring Force" force test has ended, the "RESTORING FORCE TEST DONE" POP-UP WINDOW operator screen is displayed.

8. Check the data recorded in the "Restoring Force" test.

→ Is the test data "OK"? In the "RESTORING FORCE TEST DONE" POP-UP WINDOW, press the <OK> button.



→ Is the test data "OK"? In the "RESTORING FORCE TEST DONE" POP-UP WINDOW, press the <CANCEL> button.

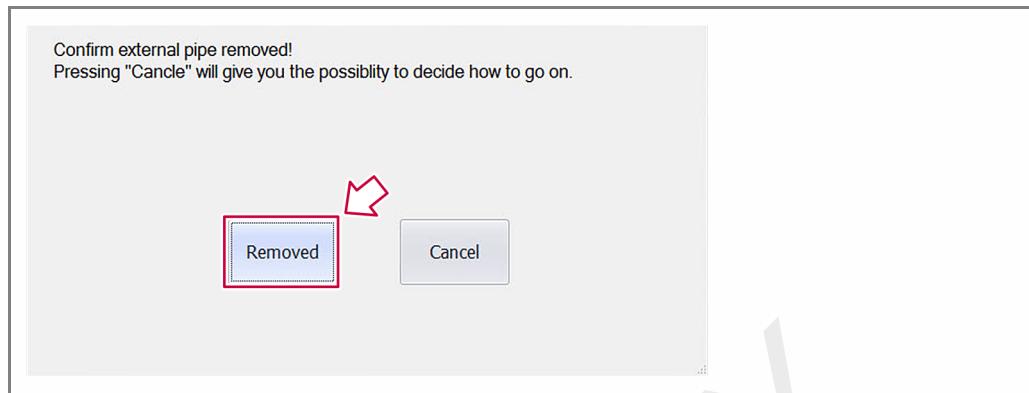


→ The machine moves to the unloading position for the <EXTERNAL PIPE>.

9. Unload the <EXTERNAL PIPE> from the machine (see page 169: Fitting > Unloading the external pipe from the machine).



10. In the "EXTERNAL PIPE REMOVED" POP-UP WINDOW, press the **REMOVED** button.



→ The machine moves to the unloading position for the **INNER PIPE**.

11. Unload the **INNER PIPE** from the machine (see page 165: Fitting > Unloading the inner pipe from the machine).

The "Restoring Force" test has been performed.

✓ Done.

8.5 Operating faults

If faults should arise during operation, the machine pauses. The operator panel displays an error message.

Only rectify the fault if you are qualified to do so (see page 21: Safety > Qualification of Staff). If you are not authorised or cannot rectify the fault, inform your supervisor.

8.6 Daily tagout

Daily tagout means that you wish to take the machine out of service at the end of the day or at the end of a shift for a few hours

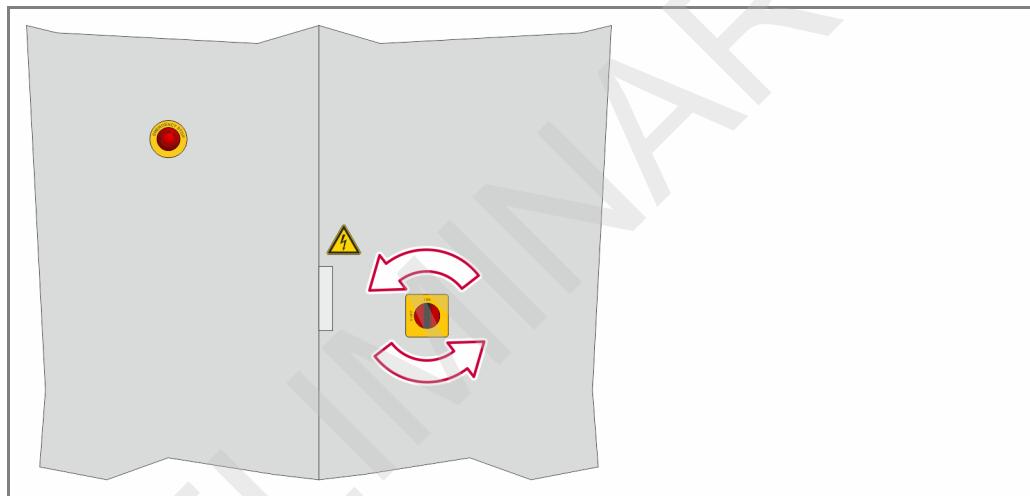
Requirement:



- The machine is switched on (see page 177: Switching on the machine)
- All movements of the machine are stopped.
- There is no inner pipe in the machine.

Carry out the following steps:

1. Using the **TOUCH SCREEN** shut the machine control system down properly.
2. Turn the **MAIN SAFETY SWITCH** on the **CONTROL BOX** counter-clockwise to Position **0 OFF**.



3. Clean the machine.

✓ Done.



9 Maintenance, repair and decommissioning

This chapter contains information regarding the maintenance, repair and decommissioning of the machine.

- Notes on maintenance and repair (Page 205)
- Maintenance work (Page 206)
- Securing the table when performing maintenance. (Page 207)
- Maintenance schedule (Page 208)
- Lubrication points (Page 210)
- Safety data sheets (Page 211)
- Long-term tagout (Page 211)
- Decommissioning (Page 211)

9.1 Notes on maintenance and repair

Safety instruction: There is a danger of injury as a result of the machine running unintentionally.

A risk of injury to personnel arise from the unintentional running of the machine. Take note of the following points when performing maintenance on the machine.

- Turn the main safety switch on the control box to Position 0.
- Before performing maintenance or repair, shut the machine down according to the Lockout/Tagout procedure (see page 30: Performing the lockout/tagout procedure).
- Use warning signs to indicate that maintenance or repair work is in progress.

Safety-conscious and pre-emptive behaviour on the part of personnel will prevent dangerous situations from arising during maintenance and repair work.

Service all motors and gearboxes regularly according to the manufacturer's recommendations. Likewise, check these components for damage.

Take note of the maintenance intervals in the documentation supplied with the power unit.

Damaged components must be replaced immediately in order to ensure the safety of the operating personnel and the fault-free functioning of the machine.

Check and test the safety devices (emergency stop switches) at regular intervals for fault-free functioning.

Check the contamination level of the entire machine regularly. Clean the machine completely if necessary.

For maintenance and repair, the following principles apply:

- Maintain the intervals prescribed in the maintenance schedule.
- Ensure that the maintenance and repair tasks are performed only by personnel qualified to do so.
- Before performing maintenance or repair, shut the machine down according to the Lockout/Tagout procedure (see page 30: Performing the lockout/tagout procedure).
- Disconnect the machine from the mains.
- Block off access by unauthorised personnel Set up warning signs that indicate the maintenance and repair tasks, as necessary.
- When changing parts, only suitable, fault-free load-lifting equipment and lifting tackle must be used.
- Check all threaded connections that have been loosened for firm seating and leaks after maintenance and repair work.
- Check that the safety system of the machine is functioning correctly after maintenance and repair work.
- Check the hydraulic system and the oil line regularly. In this way, frequent maintenance work on the hydraulic system is avoided.
- Never climb onto the machine. Always use suitable climbing aids, such as fixed ladders with handrails.
- For maintenance work, keep an adequate working distance of at least 80 cm around the machine free of objects.

Info

A clean machine not only looks better but also lasts longer.

9.2 Maintenance work

Maintenance work must be carried out on the machine and the machine components at regular intervals. Information regarding maintenance work on the machine components is to be found in the respective instruction manuals.

Maintenance work on this machine is described in the Maintenance Plan chapter (see page 208: Maintenance schedule).



9.3 Securing the table when performing maintenance.

When performing maintenance on the machine, it may be necessary for the table to be in the vertical position. In order to be able to perform these tasks safely, it is necessary to additionally secure the table when performing maintenance.

Requirement:



- The table is in a vertical position.

Tools required:



- Two suitable and approved slings
- Two suitable and approved shackles
- A lifting beam if required
- A suitable crane or lifting device



WARNING

There is a risk of injury resulting from the table dropping unintentionally.

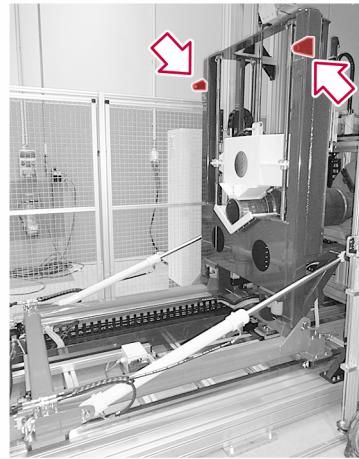
The table on the table device is swivelled with the aid of hydraulic cylinders. If the hydraulic system leaks, there is a risk of the upright rotary table swivelling back on its own. When in the upright position, the rotary table is not secured against dropping unintentionally if the hydraulic system is faulty. There is a risk of being crushed!

- If possible, perform maintenance and repair work on the rotary table only in the lowered condition.
- Using slings and a lifting device, secure the rotary table against dropping unintentionally.

Carry out the following steps:

1. Shut the machine down according to the Lockout/Tagout procedure (see page 30: Safety > Performing the lockout/tagout procedure).
2. Position the lifting device above the **ROTARY TABLE**.
! If necessary, use a lifting beam.

3. Secure the two shackles to the positions provided on the **ROTARY TABLE**.



4. Attach a sling to each shackle and the lifting device.
5. Lift the lifting device sufficiently so that there is no slack in the slings.

✓ Done.

9.4 Maintenance schedule

Measures to be taken after the first 100 hours of operation

Who	Machine part	Working steps
Mainte-nance personnel	Hydraulic system	Check all junctions lines and connections for leaks and inadequate sealing.

Measures to be taken at every 100 hours of operation

Who	Machine part	Working steps
Mainte-nance personnel	Hydraulic system	Check all junctions lines and connections for leaks and inadequate sealing.
Mainte-nance personnel	Complete machine	Lubricate all lubrication points of the machine. When lubricating, dispose of the resulting waste according to local regulations.

Measures to be taken at every 4 000 hours of operation

Who	Machine part	Working steps
Mainte-nance personnel	Hydraulic system	Change all the hydraulic fluid. Dispose of the old hydraulic fluid according to local regulations.



Measures to be taken at daily intervals

Who	Machine part	Working steps
Operator	Complete machine	Check the complete machine for damage. If there is any damage, inform your supervisor immediately.
Mainte-nance personnel	Hydraulic system	Check all junctions lines and connections for leaks and inadequate sealing.
Mainte-nance personnel	Valves and motors	Check the condition of all valves and motors.
Mainte-nance personnel	Complete machine	Check the machine for unusual noises and vibrations.
Mainte-nance personnel	Complete machine	Check all seals, covers, electrical connections, cables, sensors and reservoirs for damage.
Mainte-nance personnel	Machine earthing (PE)	Check the earthing of the machine for damage.
Mainte-nance personnel	Hydraulic system	Check the pressure and temperature of the hydraulic system.
Mainte-nance personnel	Heat exchanger	Check for correct functioning.
Mainte-nance personnel	Emergency stop function	Perform a function test . See Chapter "Safety" > "Triggering the emergency stop function" (Page 26).
Mainte-nance personnel	Complete machine	Clean all open surfaces of the machine. Aid: Vacuum cleaner, cleaning agent, cleaning devices
Mainte-nance personnel	Complete machine	Remove all material from the machine.

Measures to be taken at weekly intervals

Who	Machine part	Working steps
Mainte-nance personnel	Complete machine	Check that all mechanical connections are firmly seated.
Mainte-nance personnel	Hydraulic control unit	Check the locking of the hydraulic control unit.
Mainte-nance personnel	Hose and pipe systems	Check all junctions and connections for leaks.

Measures to be taken at weekly intervals (Cont.)

Who	Machine part	Working steps
Mainte-nance personnel	Oil circuit	Check the condition and integrity of the oil circuit.
Mainte-nance personnel	Tank-heating element	Check the condition and integrity of the tank-heating elements.

Measures to be taken at monthly intervals

Who	Machine part	Working steps
Mainte-nance personnel	Complete machine	Check the condition of the stickers and signs on the machine. Replace damaged or missing signs immediately.
Mainte-nance personnel	Complete machine	
Mainte-nance personnel	Complete machine	Check all electrical connections of the motors, sensors, electrical heating elements and the control box.

Measures to be taken at yearly intervals

Who	Machine part	Working steps
Mainte-nance personnel	Hydraulic system	Change all the hydraulic fluid. Dispose of the old hydraulic fluid according to local regulations.
Mainte-nance personnel	Machine	Calibrate the machine.

Measures to be taken at 3-yearly intervals

Who	Machine part	Working steps
Mainte-nance personnel	Hydraulic system	Exchange all hydraulic hoses. Dispose of the old hydraulic hoses according to local regulations.

9.5 Lubrication points

The machine has various lubrication points. Lubricate the machine regularly in accordance with the specifications in the maintenance schedule (see page 208: Maintenance schedule).



9.6 Safety data sheets

The safety data sheets of the operating and lubrication materials can be found in the supplier documentation.

9.7 Long-term tagout

Long-term tagout means that you wish to take the machine out of use for an extended period of time or that you wish to transfer it to another location. Before a long-term tagout, contact the manufacturer.

Carry out the following steps:

1. Perform the Daily tagout (see page 204: Operation > Daily tagout).
2. Disconnect all supply lines of the machine.

✓ Done.

9.8 Decommissioning

This chapter contains information regarding the decommissioning of the machine.

- Storage when not in use (Page 211)
- Disposal (Page 212)

9.8.1 Storage when not in use

Store the machine under the following conditions, if it is to be decommissioned for longer periods.

- The machine has been cleaned
- The machine has been preserved
- The machine must be stored in an upright and level position, to prevent warping of the components.
- a closed, well-ventilated room.
- the ambient air must be free of aggressive media and dust
- The ambient temperature must be between -25 °C to + 55 °C
- Great variations in temperature must be avoided.
- Low humidity, which causes no corrosion

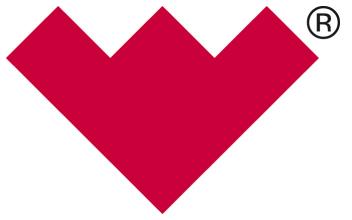
9.8.2 Disposal

For disposal, the following principles apply:

- Operating material may not be disposed of in household garbage.
- Individual parts of the machine can be collected separately as scrap metal and cleaned, as required.
- Cleaned metal can be disposed of as scrap.
- Cleaned cables can be disposed of as electrical scrap.
- Comply with the local disposal regulations during the disposal process.
- Dispose of all pieces according to the locally applicable statutory provisions.



PRELIMINARY



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