Operating Instructions

Original Instructions

RoboTrex Compact | 62000

Item no.
62000

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Imprint

Note in advance

Read the installation and operating instructions completely. Observe all safety instructions listed in this chapter.
Handling of documentation: Always keep the instructions and other documentation related to the RoboTrex automation system within easy reach in the immediate vicinity of the operating unit of the machine in which the automation is used.

Product modifications: Modifications to the product by the customer void the warranty. No modifications may be made to the product without the manufacturer's consent.

Use only original spare parts. There is no guarantee that parts sourced from third parties are designed and produced to withstand the intended use and safety requirements.
The manufacturer provides full warranty coverage only and exclusively for spare parts ordered from him.

The manufacturer is continually working to improve his products and reserves the right to make modifications to them. The manufacturer is therefore under no obligation to make subsequent modifications to products already delivered.

General Terms and Conditions of Sale and Delivery:
Our General Terms and Conditions of Sale and Delivery generally apply. These terms and conditions are available to the operator upon the signing of the contract.

Warranty and liability claims for personal injury and property damage are excluded if they are due to one or more of the following:

- Improper use
- Incorrect installation, commissioning, operation and maintenance
- Operation of the product when it is defective
- Inadequate monitoring of parts that are subject to wear
- Failure to follow the instructions in the documentation
- Catastrophic events caused by external influences or force majeure

Contents

1.1 Unit

The RoboTrex Compact automation system is designed exclusively for automating the loading and unloading process of machine tools.
Only clamping devices from LANG Technik that have an integrated mount for the RoboTrex Compact gripper may be stored in the RoboTrex Compact. Clamping devices with workpieces weighing up to a maximum of 7 kg (9 kg when using the 48040 clamps), minus the weight of the clamping device, can be stored in the RoboTrex Compact automation system.

Heavier workpieces cannot be transported by the automation system. Unauthorized modifications and alterations to the machine are strictly prohibited for safety reasons. The operating and installation conditions specified in this operating manual must be strictly observed. No foreign parts may be used on the machine, as otherwise the required safety cannot be guaranteed.

1.2 Areas of application

The RoboTrex Compact automation system is a safety-compliant storage unit connected to an articulated arm robot for automating machine tool loading with automation clamping devices from LANG Technik GmbH. The RoboTrex Compact automation system is designed exclusively for holding LANG automation clamping devices in a machine tool or machining center and enabling automatic changing of the clamping device.
Any other use of the system is prohibited and will result in LANG Technik GmbH disclaiming all liability. The RoboTrex Compact automation system can load the machine tool in two ways:

- Front loading: Front loading requires an automated machine door.
- Side loading: Side loading is performed through a side loading window.

1.3 Accessories

The LANG RoboTrex Compact Automation consists of a two-sided storage magazine for holding automation clamping devices from LANG Technik GmbH, an articulated arm robot, a protective enclosure, and a central control system. The operator usually provides a machine tool or machining center to complete the system. The machine tool can be part of the protective barrier (fencing) or, if necessary, must completely enclose it using additional components.

All of the elements listed together form a complete system. A conformity assessment procedure, including a comprehensive risk assessment, must be carried out for this resulting machine assembly. The integrator is responsible for this. Unless otherwise agreed between the economic operators, the operator also assumes the role of integrator.

2.1 General data

Name	Item number	Dimensions Width x depth x height	Weight
RoboTrex Compact	62000	1100 x 2050 x 2200 mm	ca. 1200 kg

2.2 Technical data

Coloring (standard)	IGP smooth/matt 5803E71386A10
Compressed air	Working pressure pressure-stage 1 - 6 bar
Grade	ISO 8573-1 / 1 - Particles
Voltage	**RoboTrex Compact** 400 V / 16 Ah
Apparent power	**RoboTrex Compact** 2,2 kVA

2.3 Repair

The manufacturer of the RoboTrex automation system is LANG Technik GmbH. The customer for the automation project is the operator of the machine tool or a company commissioned by them. It is also possible to commission LANG Technik for implementation of the automation project.
A service technician from LANG Technik must be commissioned for repairs that affect the mechanics or electrics of the RoboTrex automation system. Such repairs include, but are not limited to:
- Replacement of defective assemblies
- Elimination of faults in the electrics, control system, pneumatics and mechanics
- Upgrade of assemblies to the latest version

In case of damage or errors, please contact LANG Technik GmbH directly.
LANG Technik GmbH - Albstrasse 1–6 - D-73271 Holzmaden, Germany - Phone: +49 7023 9585-0

3.1 Assembly

Before commissioning the LANG RoboTrex Compact Automation, the commissioning personnel must ensure that the LANG RoboTrex Compact Automation is in perfect condition by carrying out checks and an automatic run! Check the system before starting work by carrying out a visual and functional check.

- Wear tight-fitting clothing and safety shoes.
- Wear gloves when handling blanks with sharp edges.
- Switch off the system after use.
- Keep the space for moving around the system free from obstructions.
- Only operate the system if you are in a healthy physical and mental state.

Conditions for assembly and installation
Condition of the floor at the installation site:

- flat, without slope
- in solid state
- suitable for anchoring with dowels

Space requirements for operation and maintenance:
A clearance of at least 1 m should be maintained around the LANG RoboTrex Compact.

Permissible ambient conditions:
The LANG RoboTrex Compact is designed for operation in enclosed spaces.
The temperature should be between +5 °C and +40 °C.
The relative humidity should not exceed 50%.

Connection to the power supply:
The operating voltage of the LANG RoboTrex Compact is 400 V, 50 Hz (three-phase). The connection is hard-wired to a line fused with 16 Ah.
The LANG RoboTrex Compact can be disconnected from the power supply via the main switch Q0. Compressed air (min. 6 bar) is required to operate the LANG RoboTrex Compact.
The compressed air valve must be set to a minimum of 6 bar.
The connection is made using the quick coupling supplied.

3.2 Use

Interlinking with a machine tool

Note in advance:

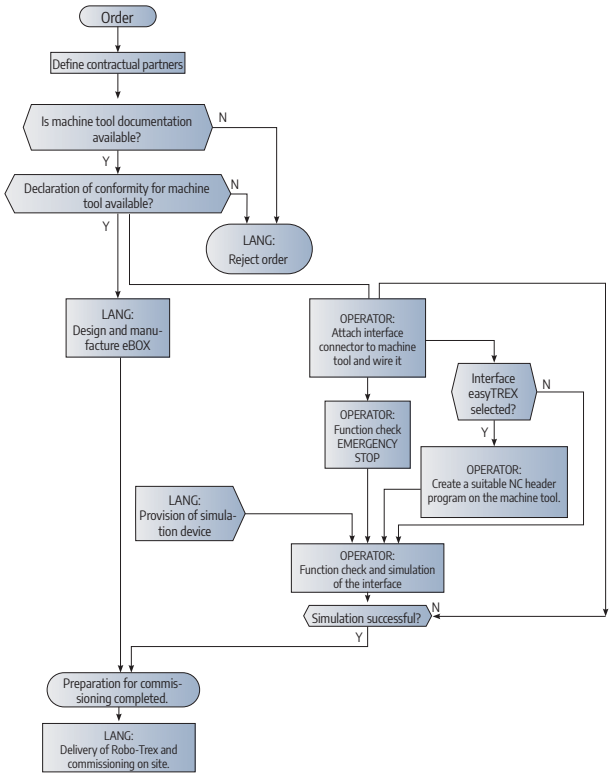
Machine is incomplete!
The following conditions must be met so that the incomplete machine can be properly assembled with other parts to form the complete machine without impairing the safety and health of persons:

Condition 1: The fixed, separating protective devices must be completely closed and meet the requirements of EN ISO 14120.

Condition 2: All access points to the system (also through/via the machine tool) must be equipped with movable protective devices in conjunction with interlocking devices in accordance with EN ISO 14119 and the requirements of EN ISO 13849-1 as per Performance Level d.

Condition 3: If a complete set of machines emerges, an overall emergency stop concept must be implemented in accordance with the requirements of EN ISO 13849-1 as per Performance Level d.

The RoboTrex Compact automation system from LANG Technik GmbH is designed for interlinking with a machine tool. Together, they form an interlinked automation system for unmanned loading of the machine tool with raw parts and removal of finished parts from the machine tool. Preparations must be made to enable the contracting parties to effectively implement the automation project. The following diagram summarizes the activities required to prepare for commissioning.



3.3 OPERATING ELEMENTS

There are minimum requirements for signal exchange between the LANG RoboTrex Compact Automation and the machine tool. All control cables that are to be connected to terminals in the machine tool's control cabinet are routed to a connector.
The connector specifications are as follows:

- Han 16B add-on housing with two cross brackets with an M25 screw connection, type HARTING 19300161231,
- Harting hinged frame plus, module a-d 09140160371,
- Harting socket module 12-pin 09140123101,
- Harting pin insert 12-pin 09140123001,
- Harting pin contact R 15-STI-C-0.5 09150006103,
- Harting socket contact R 15-BU-C-0.5 09150006203.

If the integrator prefers an add-on housing, it is important to ensure that it protrudes directly into the control cabinet space. The lower part of the housing is permanently connected to the machine tool.

4 COMMISSIONING

4.1 RESPONSIBILITIES OF THE INTEGRATOR

The integrator has the following tasks to perform:

- The aim of integration must be to eliminate any potential hazards that may arise from the interlinking of automation systems and machine tools.
- Hazards can arise if the enclosure of the interlinked system is not completely closed and it is possible to crawl into the system area, reach in with upper and lower extremities, reach over, or step over.
- Another hazard can arise from the improper coupling of electrical signals for EMERGENCY STOP.
- Proof must be provided in the form of documentation. The integrator confirms that the interlinking has been carried out in accordance with the standard.

4.2 ELECTRICAL EQUIPMENT ROBOTREX COMPACT

The electrical interface of the RoboTrex Compact automation system is described below. The interface for safety-related signals supports electrical installations up to Performance Level PLd, EN ISO 13849-1. It also shows which activities relating to the interlinking of electrical signals must be performed by the contracting parties.
The RoboTrex Compact automation system is characterized by:

- a permanently installed electrical feed to a low voltage 400 V, 3 AC, 50 Hz TN-S-Netz DIN VDE 0100 and
- compressed air connection 6...8 bar, ISO 8573-1:2010[7:4:4]

The operator is responsible for the power supply.
The transfer points are the terminals of the main switch or the power supply side of the pneumatic maintenance unit.
The electrical energy supplies an industrial robot and a PLC control system (operating resource identifier +ZTR). The controls for the robot and the PLC are located in the base of the robot pedestal. The control system is not visible to the observer during normal operation. The PLC control system is the central core of the automation system. This is where the safety-related signals and the signals for technological coupling are combined.

4.3 ROBOTREX COMPACT AUTOMATION

The RoboTrex Compact automation system is delivered fully assembled. Installation and alignment are carried out by LANG Technik GmbH employees in accordance with the installation plan specified by the integrator. If any changes/additions are necessary on site, these must be clarified with the integrator in advance. A hoist (forklift, crane, etc.) is recommended for installation.
Once all components have been assembled, the electrical and pneumatic installation can begin. All parts of the RoboTrex Compact automation system are ready to plug in. The operator is individually responsible for connecting the media (electrical, compressed air) in accordance with the floor plan.
For commissioning, all components of the RoboTrex Compact automation system and the machine tool with interface must be set up. In addition, sufficient suitable automation clamping devices must be available.
Commissioning is limited to teaching pre-prepared robot positions by LANG Technik employees.

4.4 MACHINE TOOL OPTIONS

The PLC software of RoboTrex Compact is designed for connection to machine tools with different configurations. Depending on the configuration and options selected, adjustments may be necessary.
This is done using an eBox, which acts as the transfer point for all signals from the machine tool to the standardized PLC control system. The eBox is part of the electrical equipment of the RoboTrex Compact. The contracting parties are equally responsible for ensuring that the equipment is properly configured.
Machine tool options that require detailed consultation between the partners are

- the loading point of the machine tool
- the clamping device
- the technological interface

4.5 LOADING POINT OF THE MACHINE TOOL: LOADING DOOR

The machine tool can be loaded by the robot through the cabin door itself. The cabin door of the machine tool itself is then located inside the working area of the interlinked system and cannot be accessed by the operator during automated operation.

If manual operation of the machine tool is desired, the shift or rotation unit option must be selected. The shift or rotation unit allows the automation system to be moved away from the cabin door as a complete unit. For automated operation, the automation system must be in the end position directly in front of the machine tool. This is monitored for safety reasons and is locked in position. When in the swiveled-away position, robot movement is impossible. It is assumed that the dangerous movements of the machine tool itself (spindle, axes) can only occur when the cabin door is closed.

4.6 LOADING POINT OF THE MACHINE TOOL: LOADING WINDOW

The machine tool is not loaded by the robot through the cabin door itself. There is a second opening in the machine tool's working area, which is usually located on another side of the working area housing. This opening is also called the loading window.

The loading window must have an active closing device, and the closed state of the loading window must be reliably monitored. Pneumatic drives are usually used as actuators for opening/closing the loading window. The machine tool can be set up in relation to RoboTrex Compact in such a way that the cabin door of the machine tool is no longer located in the working area.

This allows manual operation of the machine tool – in this case, care must be taken to ensure that the loading window is securely closed.

Automatic operation with RoboTrex Compact is only permitted if the cabin door is closed and securely monitored.

Note on expected signals at the eBox interface:
Safety monitoring of the loading window inside the machine tool. Provision of this signal at the coupling point to the eBox.

4.7 CLAMPING DEVICE

The handling process of the RoboTrex Compact system is based on the fact that all raw and finished parts are transported in Makro•Grip® 5-axis clamps, which are matched to the gripper design.

These 5-axis clamps are inserted into a zero-point clamping system that is permanently mounted on the machine table of the machine tool by means of a robot. Before machining begins, the 5-axis clamp must be locked in the zero-point clamping system. This can be done mechanically by a lever operated by the robot itself, or pneumatically. There are various zero-point clamping systems for the automation system, which are classified and used as follows.

RoboTrex Compact

- Item no. 66600 / Item no. 62500: Pneumatic zero-point clamping system, operated via the pneumatic interface of the gripper on the robot or controlled by the machine tool.

4.8 COMMON INTERFACE

RoboTrex Compact can be adapted to various interfaces. On the machine tool side, such interface signals are implemented by M functions. These M commands cause certain PLC outputs to be set in the CNC program of the machine tool and the CNC processing to be conditionally held. The HALT state in the NC program is canceled by a signal change at the corresponding PLC inputs. This allows a CNC program to run automatically.

ecoTower serves as the simplest interface. Only one M command pair is required on the machine tool side, consisting of a PLC output that is set at the end of part machining and stops NC machining, and a PLC input that resets the output and cancels the HALT state of the NC program. Part selection is not possible.

RoboTrex Compact ensures that at the end of part processing, the finished part is removed from the machine tool and replaced with a new raw part. RoboTrex Compact then signals that the handling cycle is complete and releases NC processing again. The process ends when there are no more raw parts available in RoboTrex Compact. The additions to be inserted into an existing CNC program can be implemented with minimal effort.

4.9 Miscellaneous interface EasyTrex_HD

EasyTrex_HD

In this multi-part interface, handling takes on the role of communication master.

A further prerequisite is the existence of at least two NC programs for the corresponding part machining on the NC control of the machine tool. Communication begins when the signal NC_End = TRUE is first received from the machine tool.
Handling begins with the loading of a raw part. It starts with the magazine side that is close to the robot and has been activated. The operator is responsible for activating a magazine side. A magazine side that has been started is processed completely. Each processed magazine side is deactivated by the handling control. If a magazine side is deactivated, it is ignored by the handling control.
This is illustrated by an example in which the operator initially only activated magazine side B and started the system. After the algorithm has started processing the raw parts on magazine page B, the operator subsequently activated magazine page A. This has no effect at first, as magazine page B has already been specified by the handling control as the magazine page to be processed. A redefinition of the magazine page is only possible at the end of the processing of magazine B.
After the raw part has been loaded into the machine tool, the corresponding magazine number is communicated to the machine tool in 1-out-of-N code or binary. This number must be mirrored by the machine tool control. If the handling control determines that the specified and mirrored magazine numbers match, the HD control issues the start command NC_Start = TRUE.
The machine tool now starts the NC part program specified by the magazine number. At the end of magazine page A, there is no further activated magazine page in the example. The handling system now initiates the end-of-work sequence: The robot moves to the home position and IDLE mode is activated. This status is displayed on the control panel and the EndOfWork = TRUE signal is set. Each time a magazine icon or the IDLE display is pressed, the IDLE state is exited (EndOfWork = FALSE). The operator can now reactivate the required magazine pages and start handling.

4.10 Bus interface

With an interface to industrial fieldbuses, the standard PLC signals are transmitted serially between the machine tool controllers and RoboTrex Compact. The RoboTrex Compact PLC controller supports the MOD-BUS and Ethernet/IP protocols as standard. Other protocols, such as ProfiBus, ProfiNet, InterBus, or CANopen, are available on request.

5.1 Interface testing

The functional test for the interface can be carried out in advance by means of a feasibility test at the customer's site. This involves checking the basic conditions and the intervention in the PLC control system. Small programming examples are carried out to test the control of the machine.

Automation interfaces that are already integrated can be checked using the interface description provided by the machine manufacturer from LANG Technik GmbH.

5.2 End plates

The RoboTrex Compact automation system is closed off at the enclosure opening by end plates. The end plates have threads for attaching a corresponding plate to the machine. The plates are prepared and attached by LANG Technik according to customer specifications and thus specific to the machine. The operator is responsible for checking the plates!
The graphic shows an example of the installation of a protective plate.
Each system can be configured differently according to the individual needs of the customer.

Potential points of intervention must be closed off with protective plates!
The operator must check that the plates prevent access and ensure that all hazardous areas are covered.

6.1 Protective devices

The following protective devices serve to protect the operator.

Protective devices must not be removed, bypassed, or modified!

EMERGENCY STOP SYSTEM

The entire RoboTrex Compact automation system is equipped with an emergency stop switch. The emergency stop button is located to the right or left of the loading doors. The automation system's emergency stop must be connected to the machine's emergency stop system.

After an emergency stop, the system cannot restart automatically!

- Unlocking: The system is unlocked again by pressing the emergency stop button on the housing. A message appears on the display.

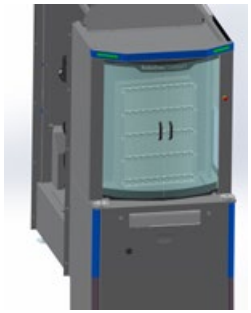
Separating protective devices

The RoboTrex Compact automation system is delivered with protective barriers. Here we differentiate between:

- Fixed, separating protective device in the form of a fence
- Movable protective barrier in the form of two loading doors and a service window.

Automatic mode only works when the service window is closed!

Loading doors open



Loading doors closed

Protection against unexpected start-up

The RoboTrex Compact automation system has protection against unexpected start-up when power is restored.

Grounding

The RoboTrex Compact automation system is grounded to prevent damage to the operator due to electrical interference.

6.2 Functionality of RoboTrex Compact automation system

The articulated arm robot is equipped with a gripper that is specially designed for the clamping devices used. This gripper is used to remove the clamping devices from the magazine one after the other and transfer them to the machine tool. They are then secured in the machine using a pneumatic zero-point clamping system.
Once the machine cycle is complete, the clamping device and the finished part are removed and returned to the free space in the magazine. Only one clamping device is processed at a time, so that only one magazine space remains unoccupied.
Access to the automation magazine is via the loading door and is possible at all times, except during the rotational movement of the magazine or when the service window is open. Depending on the system configuration, an access door may also be provided.
Loading doors and access doors are monitored and secured by safety switches.

6.3 Articulated-arm robot

The articulated arm robot is responsible for transporting an automation clamp with a raw part into the machine tool (loading the machine) and for transporting the automation clamp with the finished part out of the machine tool (unloading the machine). The removal position of the raw part and the storage position of the finished part on the magazine are identical.
The articulated arm robot is equipped with a pneumatic gripper for the automation clamps. The finished parts cannot be gripped directly.

Technical data of the articulated-arm robot

Articulated-arm robot	Max. handling weight of robot: 16 kg
Type FANUC M-10iD/16S	Max. workpiece weight (automation clamp + raw part) = 10 kg

The specifications for the maximum workpiece weight refer to raw parts with the maximum dimensions specified in the Fanuc robot manual. If workpieces with larger dimensions and/or higher weights are to be introduced, a load adjustment must be made in accordance with the Fanuc robot manual.
The robot is delivered with a safety area that is permanently programmed for the respective system. This is defined in accordance with the Fanuc manual and prevents the robot from leaving the safe working area. The articulated arm robot cannot be configured.

Maintenance intervals
The robot needs to be serviced. Please refer to the Fanuc manual for information on maintenance intervals!

6.4 Security fencing

The system is equipped with a fixed enclosure that meets the safety requirements for automated operation. The enclosure serves to demarcate the danger zone and is part of the overall safety concept.

A floor plan of the facility created by the integrator and binding for all economic operators involved must clearly show the perimeter fence line. This perimeter fence line marks the outer boundary of the facility area.
The enclosure consists of the following components as standard:

- The enclosure has two loading doors that provide access to the magazine. Each loading door can be opened and closed separately. Connection to internal transport routes must be ensured.
- Service window: The enclosure includes a separate service window, which is intended exclusively for the following purposes:

1. Performing gripper changes
2. Access to defined components for maintenance and repair work

Note: The service window is not an access door for operating personnel and is not suitable for entering the work area. The opening mechanism is designed so that it is only released when the system is in a safe state (e.g., robot in park position, release by control system).

6.5 MACHINE TOOL

The machine tool is not part of the RoboTrex Compact automation system. Together, the automation and machine tool form an automated system. This system is then a stand-alone machine within the meaning of the Machinery Directive.
The machine tool must be integrable for operation in the system. If this has not already been prepared by the manufacturer of the machine tool, this feature can often be added by means of a subsequent intervention. The machine tool communicates with the automation system via its interface. Unless otherwise agreed in writing, the integrator is responsible for implementing the appropriate interface.
The minimum requirements for this interface are:

- The machine tool's emergency stop command devices are dual-channel and potential-free.
- An external emergency stop signal, which is applied externally in a dual-channel and potential-free manner, triggers (simultaneous opening) a safe emergency stop of the machine tool.
- The machine tool signals the end of an NC block with a special M command. (this signal can include the automatic unlocking of the loading opening and its open position. If this is not the case, the commands must be controllable by the central control system).
- The NC block of the machine tool must be able to be started by an external signal (the signal can include the automatic closing and locking of the loading opening. If this is not the case, it must be possible to control the commands from the central control). Starting the NC block acknowledges the M command that was issued at the end of the NC block.
- The last two signals mentioned can each be an input or output signal from the machine tool control (PLC) or occur in a telegram of a suitable industrial fieldbus.

Depending on the make of the machine tool, there are various options for integrating it into the system.

LOADING THROUGH MACHINE DOOR (OPTION: LOADING DOOR)

When loading through the machine door, the articulated arm robot uses the same access as a machine operator during manual operation. The working area of the machine tool is part of the working area of the system.
The machine door must be installed completely within the enclosure line of the system. No other openings in the working area of the machine tool are permitted.
The machine door must be designed so that it can be securely locked when closed. The lock is monitored by the machine control system at all times during the execution of the NC program. After completion of the NC block, the operator can request the loading door to be unlocked, or it is unlocked automatically.

The loading door can be automated by Lang Technik. For heavy doors, the manufacturer may provide an actuator for opening/closing. The loading door is suitable for automated system operation if:

- it has an actuator for opening and closing. If necessary, this actuator must be retrofitted. A signal transmitter (sensor) is required for the open position.
- the lock can be released by a control signal after the NC block has been executed. Advantageously, this condition is fulfilled anyway if the machine control system does this automatically (automatic unlocking after the end of the block).
- The lock can be activated by a control signal before the NC block starts. Advantageously, this condition is fulfilled anyway if the machine control system does this automatically (automatic locking after the door is closed).

SIDE LOADING WINDOW

When loading through a side window, the machine tool has an additional opening to the work area in addition to its machine door. This option is advantageous if the operator wants to frequently operate the machine tool manually in addition to the option of automated system operation.
The loading window is suitable for automated system operation if:

- It has an actuator for opening and closing. A signal transmitter (sensor) is required for the open position. The actuator can already be controlled by the machine tool control system.
- Its closed position is reliably monitored for manual operation of the machine tool, and the loading door lock can only be released when the loading window is securely closed.
- A reliable signal is available to indicate that the loading door is closed. Since the working area of the machine tool is, by definition, part of the system, opening the loading door results in the opening of the system enclosure, which requires the articulated arm robot to be safely shut down.

Principle:
The robot must not enter through the loading window when the loading door of the machine tool is open! A safety signal transmitter for the loading door can be retrofitted if necessary. For qualified integration, you must determine who is responsible for controlling the sensors and actuators of the loading window: the control system of the machine tool or the central control system of the RoboTrex Compact automation system. This determination is usually made based on who the manufacturer of the loading window is.

Chapter 6

6.6 CENTRAL CONTROL

The central control unit is part of the RoboTrex Compact automation system.
It is permanently installed below the robot frame. It handles the safety-compliant coupling and distribution of emergency stop signals, as well as other external emergency stop command devices and the signal-related linking of all control units involved in plant operation and HMI functions.
The LANG eBox, which is located separately next to the central control unit, is used for the individual adaptation of the interface to the machine tool.

6.7 OPERATING THE AUTOMATION

The automation system is operated intuitively via a web display. Graphical controls and the use of colors and symbols make it easy to understand.

Legend Home screen:

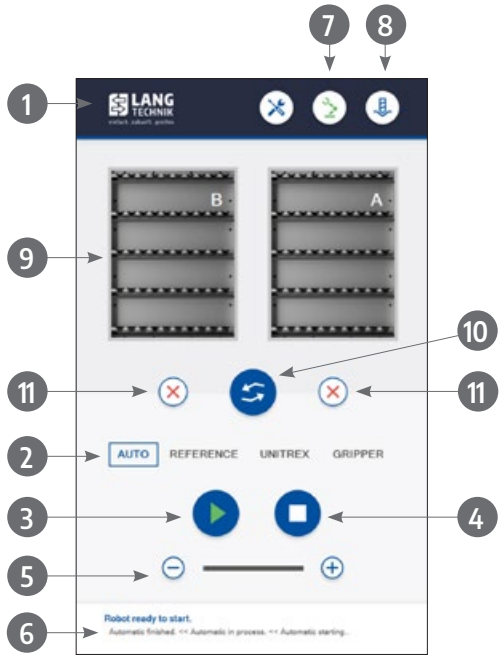
❶ LANG logo for language settings
Within 60 seconds of starting up the automation, you can set the language via the LANG logo. Tap on the logo and various country flags will display the different languages. Select a language and confirm your choice. After 60 seconds, it is no longer possible to change the language. You will need to restart the automation.

❷ Program selection
The program selection options are “AUTO,” “Reference,” “uniTrex,” and “Gripper.” System operation can only be started from a safe robot position. A safe position is the HOME POSITION, which can be approached using a special robot program, the reference run.

If only the reference run is to be performed, select the “Reference” program.
Select the “AUTO” program to start system operation.

- If the robot is not in HOME POSITION when the system is started, “Reference” is first processed automatically and work continues with “AUTO” without further operator prompts.

The “uniTrex” program will be explained later (section 6.7.9); this is an additional function. The gripper program is used for possible manual replacement of the gripper and its maintenance.



❸ Start button
Functions:

- to start system operation
- to resume system operation after an interruption requested by the operator

❹ Stop button
Functions:

- to interrupt system operation
- to cancel system operation

System operation can only be canceled if it has been interrupted beforehand. To cancel, press and hold the button briefly (>2s).
If system operation has only been interrupted, it can be resumed by pressing the start button.

❺ Robot speed
The robot speed must be selected depending on the part weight and the current moments of inertia with respect to the robot axes. The setting range is between 10-100% of a fixed reference value set in the robot program.

❻ Notification texts
This field displays texts that inform the operator about certain states of the system.
The first line contains the most recent message, followed by the messages sorted by date.

❼ RoboTrex Compact Overview
Pressing this icon displays the activation conditions for automatic mode. If the icon lights up green, all requirements are met; if it lights up red, details are displayed showing which condition is still missing.

❽ Machine tool
Commissioning support for the interface (optional)

❾ Illustration of magazin
The illustration shows the magazine page and any functions that may be set on this magazine page. By tapping on a deactivated magazine page, a wide variety of functions can be set.

❿ Rotate magazine
The magazine can be rotated by pressing the rotary arrow symbol. To do this, all fencing elements must be closed and locked, and the robot must be in a safe position.

⓫ Status display for the magazine and button for activation (here magazine A and magazine B)
Before system operation can be started, you must decide which magazine side is to be taken into account in system operation.
The symbols can have the following representations:

- Red cross: Magazine page is deactivated
- Green check mark: Magazine page is being processed
- Red check mark: Magazine page is active and on the loading door side

Activate one or both magazine sides. To do this, press the button for the respective magazine side. Activation is indicated by a red check mark when the magazine side faces the loading doors and by a green check mark when it faces the robot. Only an activated magazine side participates in system operation.
If both magazine sides have been selected, the activated magazine side facing the robot is processed first.

6.7.1 SPECIAL STATUS DISPLAY

Three special machine statuses are shown below, which trigger the inserted displays.

Case 1: When starting the program, a part is in the machine
The operator starts the automation program. The robot moves into the machine tool and scans the zero point system for the clamping devices. A part is left in the machine. This is detected by the optical sensor and the message shown appears. The operator is prompted to empty the loading area.

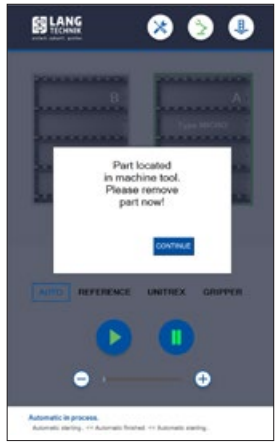


Figure 1: Part in the machine
The confirmation request allows the operator to verify that the zero-point system has been emptied successfully.

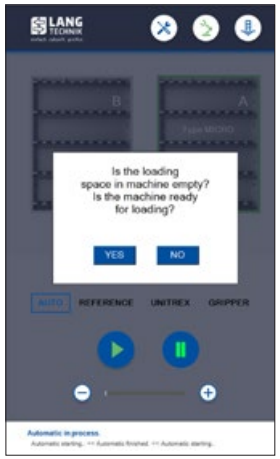


Figure 2: Confirmation request

Case 2: When starting the program, a part is in the gripper
The operator starts the automation program. A part has remained in the gripper. This is detected by the inductive sensor and the message shown appears. The part is deposited in the machine and must be removed manually by the operator as in case 1.

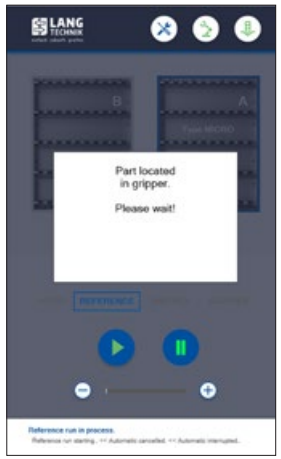


Figure 3: Part in the machine

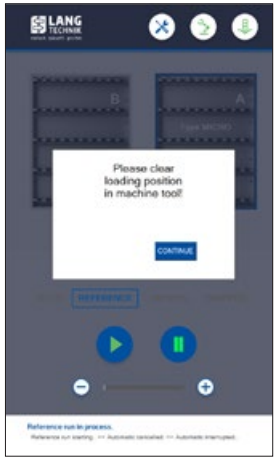


Figure 4: Empty the machine
The confirmation request allows the operator to verify that the zero-point system has been emptied successfully.

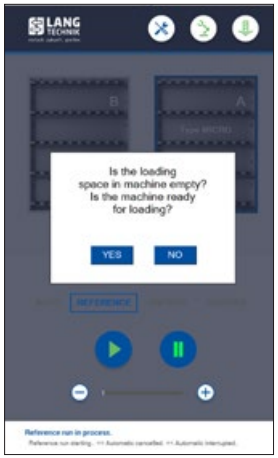
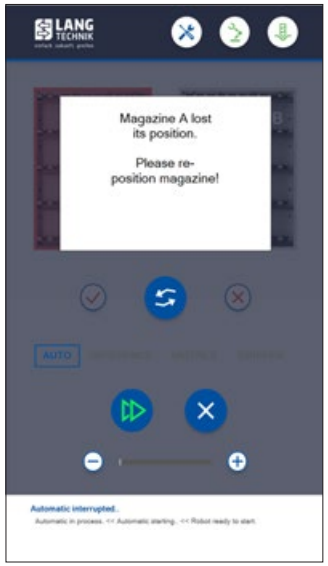


Figure 5: Confirmation request



Case 3: Magazine page currently being processed is rotated
If a magazine page that is being processed is rotated by the operator, it must be restored to its original state afterwards. It is important here that the magazine page remains unchanged when the work process is continued. If a position is unexpectedly occupied, a collision may occur, resulting in material damage!

Figure 6: Magazine page has lost its position

Figure 7: Magazin confirmation

6.7.2 REFERENCE RUN

The goal of the reference run is to move the robot to its reference point and empty the gripper. If there is an automation clamping device in the gripper when the reference run starts, it must first be removed. Since it is unclear from which location on the magazine side the clamping device originates, it is not returned to the magazine but placed on the loading area of the machine tool.

The status of the loading area in the machine tool is also undefined at this point; it could already be occupied, which would make it impossible to automatically deposit the clamping device. This conflict must be resolved manually. This means that the operator must ensure that the loading area of the machine tool is cleared and that it is ready for loading again.

Once both conditions are met, the operator can confirm this in the dialog box. The robot then moves to the machine tool and places the clamping device from its gripper there.

Recommendation for the operator: This procedure is not necessary if it is ensured that there are no longer any automated clamping devices in the gripper when the system is shut down.

6.7.3 AUTOMATIC GRIPPER EXCHANGE

Every RoboTrex Compact automation system offers the option of performing a manual gripper change. Whether the robot performs this change depends on the equipment purchased, as both gripper variants of the RoboTrex Compact must be available for this.
Thanks to the coding of the grippers, the system recognizes which gripper it should use to pick up the clamping devices from the respective magazine side.

Assume the following situation:
Magazine side A is fully loaded with 50 MakroGrip Micro 46 automation clamps, which are activated and currently being processed. Magazine side B is fully loaded with MakroGrip 77 automation clamps. Both sides have been configured in advance with the respective clamp size.

After magazine side A has been completely processed, the control system recognizes that there is a different clamp size on magazine side B.
The robot now starts the gripper change process by moving the adapted gripper in front of the service window and unlocking it. The gripper can now be changed and tightened to 15 Nm. Once the second gripper has been adapted and the appropriate clamping tower has been inserted into the machine tool, the robot loads the machine tool with the next clamps as usual. The second gripper remains adapted until the control system detects a different clamp size and the gripper needs to be changed again.

6.7.4 START OF SYSTEM OPERATION

Starting point:
After a successful reference run, the robot is in its HOME POSITION and the gripper is empty. When the system is started (program “AUTO”), an attempt is made to begin loading the first raw part into the machine tool. To do this, the loading area of the machine tool must be free.
To determine the current occupancy of the loading position of the machine tool, the robot moves to the loading position once and checks the occupancy situation using an optical sensor. If it is determined that the loading position is occupied, a procedure is started in which the operator is prompted to empty the machine tool (see 6.7.1 Display of special conditions).

Recommendation for the operator: This procedure can be omitted if it is certain that there are no automated clamping devices in the loading area of the machine tool when the program starts. In this case, the robot would still move into the machine tool for checking, but the result would be inconsequential.

6.7.5 CANCELLING SYSTEM OPERATION

The machine operation is interrupted by clicking the stop icon. A white “X” with a blue background appears, indicating that the operation has been canceled. Clicking this icon causes the machine to stop.
Consequences: The part currently in the machine tool is finished. The M command set at the end of the NC program is no longer received by the system.
The robot is switched off, regardless of whether it is in a non-critical position or not. If there is still an automation clamp in the gripper, it remains there.
The current magazine page and the other magazine page go into
‘passive’ status. The position counter for the part currently being processed is reset, and the information about the storage position on the current magazine page is lost.

In particular, the fact that the position counter for the current magazine page is reset means that the parts already processed on the current magazine page must be skipped with the “Start from” function before a restart, as they must not be fed into the system again.

6.7.6 SET START POSITION ON MAGAZINE SIDE

The start-from position of the machining procedure can be set manually.
If no specific start-from position is set manually, the machining procedure begins with start position 1-1, first row on the left.

Set start-from position manually:

Select a magazine by clicking on it on the start screen.
Note: the magazine must be deactivated = red cross.

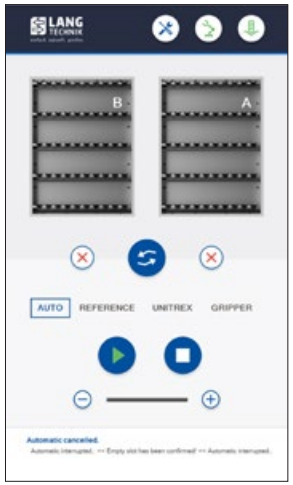


Figure 8: Start-from position

Selecting the magazine takes you to the screen for selecting the start-from position. Call up the "Start from" function in the function tab!

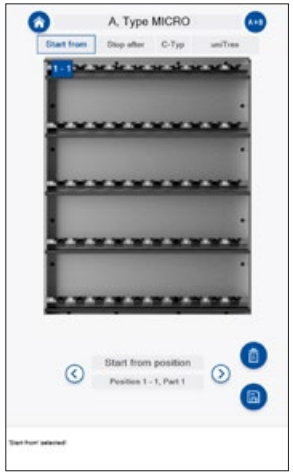


Figure 9: Start-from position
The selected magazine page and the clamping device type for which you are making the setting are displayed at the top of the screen. By clicking on the icon next to it, you can jump to the other magazine page. Use the arrows to select the start position on the magazine page.
You can also set the 'start' position by clicking directly on the magazine page displayed.

Figure 10: Start-from
Use the save icon to confirm your selection and save the starting position of the magazine page. Use the delete icon to delete your selection and reset the starting position to 1-1. Once you have successfully selected the starting position, return to the start screen. Your selected starting position will now be displayed on the corresponding magazine page, for example, "Start from 3-1."

Figure 11: Display of the start-from position

6.7.7 SET STOP-AFTER POSITION ON MAGAZINE SIDE

The stop-after position of the machining process can be set manually.
If no specific stop-after position is set manually, the machining process is executed normally from the first to the last row.
To set the stop-after position manually: Select a magazine page on the start screen.

Figure 12: Stop-after position
By selecting the magazine page, you will be taken to the screen for selecting the stop position. Call up the “Stop after” function in the function tab!

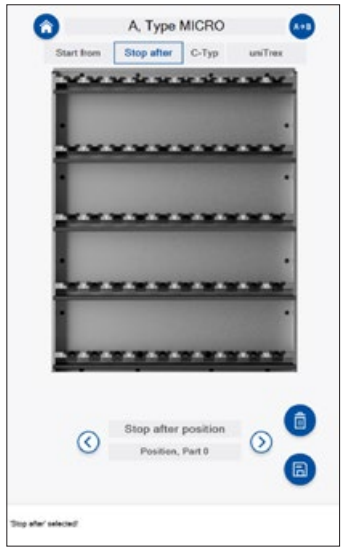


Figure 13: Stop-after position
The selected magazine page and the clamping device type for which you are making the setting are displayed at the top of the screen. By clicking on the icon next to it, you can jump to the other magazine page. Use the arrows to select the hold position on the magazine page. You can also set the ‘hold’ position by clicking directly on the magazine page displayed.

Figure 14: Stop-after position
Confirm your selection and save the stop position on the magazine page using the save icon. Delete your selection using the delete icon. Once you have successfully selected the stop position, return to the start screen. Your selected stop position will now be displayed on the corresponding magazine page, for example, “Stop after 3-1.”

Figure 15: Display of the stop-after position

Chapter 6

6.7.8 SET C-TYPE FUNCTION ON MAGAZINE SIDE

The C-type definition (customized definition) is a software option for use on RoboTrex Compact automation systems.
This option allows users to create and apply their own magazine grid definitions. This makes it possible, for example, to use extra-wide parts without running the risk of the gripper sensor accidentally detecting a component in an adjacent unoccupied position into which the raw part protrudes. The C-Type option instructs the robot controller to ignore positions specified by the user.

Set C-type function manually:
Select a magazine page on the start screen.
Note: the magazine page must be deactivated = red cross

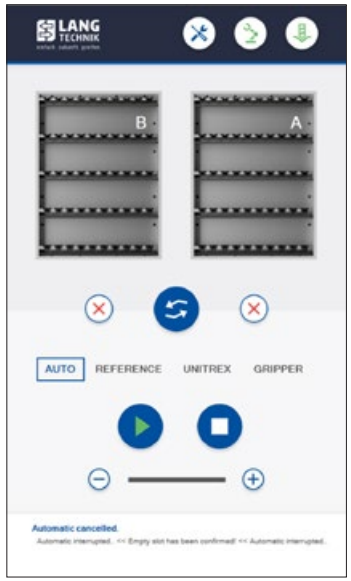


Figure 16: C-Typ
The C-type definition allows users to configure a magazine page themselves from an authorized standard by deselecting individual positions.
The resulting definition is saved on the RoboTrex Compact control and can also be used as a customer-specific magazine page. A maximum of one C-type definition can be assigned to each authorized automation clamp.
Selecting the magazine takes you to the screen for selecting the C-type function.

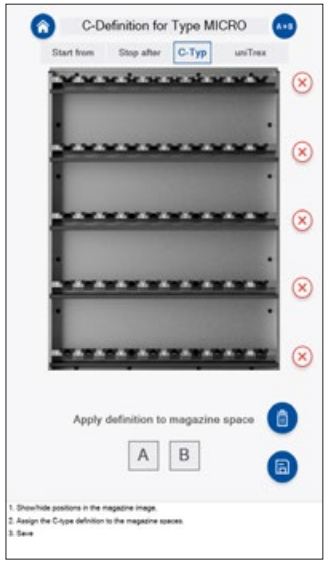


Figure 17: C-Typ
Call up the C-type function in the function tab! The system first checks whether a suitable C-type definition already exists. If so, it is loaded and displayed for further processing. If no C-type exists for the set magazine page, the magazine graphic appears without deselection marks. This is the initial state, which means that all positions in the magazine are permitted.

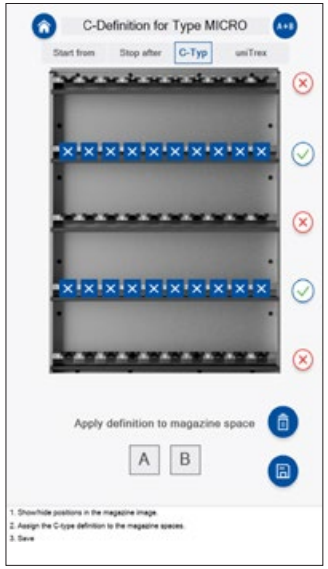


Figure 18: C-Typ
The deselection pattern is created directly in the magazine graphic. Each time a part position is touched on the graphic, its status changes. A white X in the blue box on the magazine position means that this position has been deselected. The robot controller will then ignore this position during runtime. By clicking on the red cross to the right of the magazine row, the entire row is deactivated and ignored during processing.

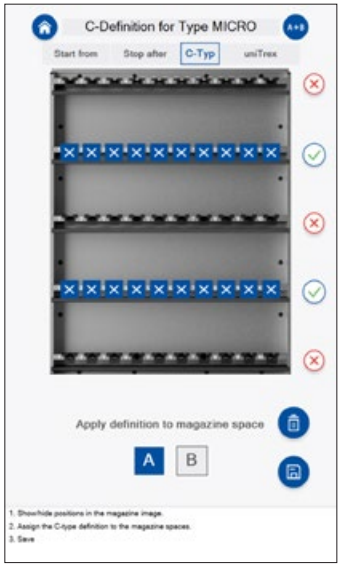


Figure 19: C-Typ
The next step is to specify which magazine page the C-type function is to be applied to. In this example, it is magazine page A.
Don't forget to finish the C-type definition by clicking the <SAVE> button!
If you only want to disable an existing C-type definition for a short time because you need the magazine grid in the standard version, i.e., with all part positions, simply deselect all magazine pages in this menu without deleting the deselection pattern. You can reactivate the magazine page later.

After successfully selecting the C-type function, return to the start screen.
Your selected C-type function will now be displayed on the corresponding magazine page, for example, “C-type Micro.”

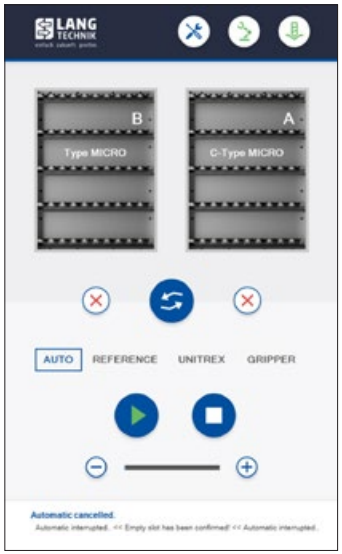


Figure 20: Display of C-type

Influencing the behavior of other operating functions!

The application of the C-type function may possibly have an influence on the “Start-from" and “Stop-after” functions, but shared use is formally allowed.

If the start-from mark is in a position that is to be hidden by the C-type definition, then the start-from position moves to the next possible position that it is possible to occupy in the direction of higher position numbers. In the magazine image display, however, the start mark remains at the position specified by the operator.

If the stop-after mark is located at a position that is to be hidden by the C-type definition, the stop-after function is not executed. If the corresponding magazine page has been completely processed and is automatically deactivated by the handling control, the stop-after mark is removed at the same time. If the stop after function is to be used, the stop after mark must be placed in a position that is enabled by the C-type definition.

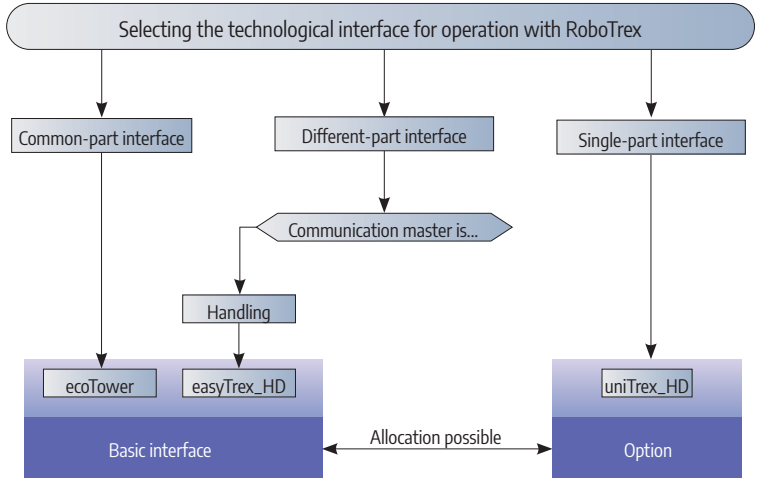
View C-Type in real time

The set C-type definition can be tracked during a running automation cycle.

Figure 21: C-Typ

6.7.9 SET UNITREX FUNCTION ON MAGAZIN SIDE

The uniTrex single-part interface (job manager) is an optional software extension for use on RoboTrex Compact automation system equipment.
With this extension, it is possible for the user to realize single-part production in a simple way. The raw parts are loaded into automation clamps as usual, which are then assigned to the magazine sides of a RoboTrex Compact. The job list is created directly on the system's operator display. No additional hardware is required.
The uniTrex single-part interface is a software option. It can be used if the RoboTrex Compact automation system is equipped with a suitable basic interface. In addition, the machine control interface must be able to exchange program numbers with a data width of at least 1 byte (= 8 bits) with the automation system. Communication between RoboTrex Compact and the machine control system takes place using the master/slave method (master = handling, slave = machine).



The illustration lists the suitable basic interfaces of the RoboTrex Compact control: The uniTrex_HD single-part interface is possible if the RoboTrex Compact system is equipped with one of the basic technological interfaces

- ecoTower common-part interface or
- EasyTrex_HD different-parts interface

and these are used.

Set uniTrex_HD function manually:

Select a magazine page on the start screen.
Note: The magazine page must be deactivated = red cross.

Since a magazine page must be assigned exclusively to a job list, this means that you can only create as many different job lists as the system has magazine pages.

Assumptions: The RoboTrex Compact automation system is equipped with the ecoTower base interface and the uniTrex_HD software module is activated. The example assumes a system on which both authorized automation clamps are available.

At the start, the operator has set the MakroGrip Micro automation clamping device on magazine side A, while the MakroGrip 77 automation clamping devices are assigned to magazine side B.
Task: A job list is to be generated for magazine side A. The job list should enable the machining of any raw parts with different CNC programs. The CNC programs are located in the machine's program folder and are suitable for machining the raw parts used. The raw parts are located next to each other and aligned to the right in the automation magazine.
They should have different priorities.

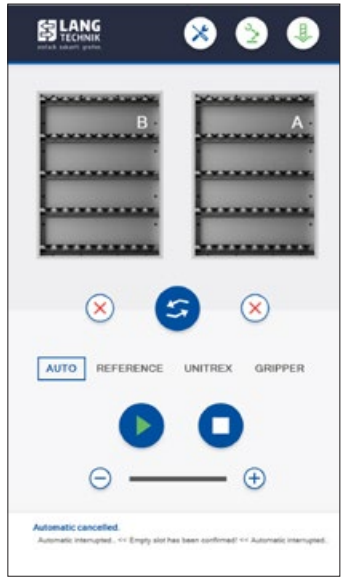


Figure 22: uniTrex_HD
First, select magazine page A to set the job manager procedure here as well.

Selecting the magazine page takes you to the screen for selecting the uniTrex function. The job list will be filled later by successively storing individual job “index cards.” The job list is not kept in the form of a table. Select uniTrex! in the function tab.

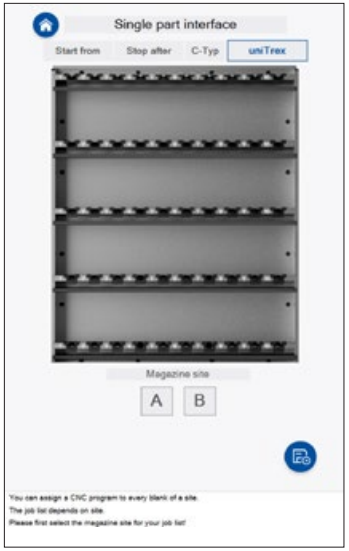


Figure 23: uniTrex
Now select the magazine page for your job list! Depending on the task, click on icon A in the Magazine Page data field.

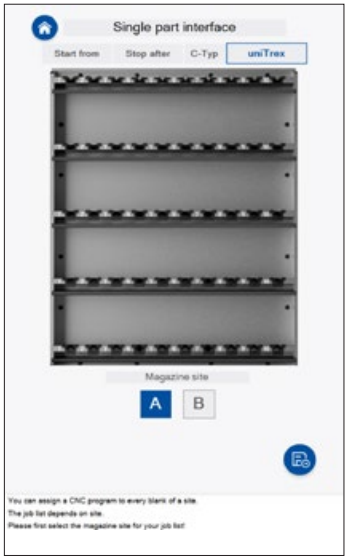


Figure 24: uniTrex

Figure 25: uniTrex
The next field already suggests the clamp type located on the magazine page. Confirm the suggestion by selecting the memory icon.
In the example, you confirm the suggestion!
The magazine page and
clamp type are now specified for the job list.

Figure 26: uniTrex
Since there is no job list for this magazine page yet, a blank field appears in the magazine graphic, with only a cursor field displayed.
In the data field below, you can see the current position of the cursor field. The first blank is located at part position 1, which is in the first row and first column.

Figure 27: uniTrex
In the next step, enter the CNC program assigned to this blank. The blank is to be manufactured using program number 22.
In the CNC program data field, you can open the direct input by tapping the field for the program number. Alternatively, you can use the right and left arrow keys.

Figure 28: uniTrex
Close the direct entry window by clicking OK! Use the same procedure to enter the production priority (0 = lowest priority, 50 = highest priority)!
For this example, set the priority to 1!

Figure 29: uniTrex
This defines the first job in the job list in the data field. Complete the entry for the first job by checking the box!

For improved visualization, a color effect is integrated when processing the job list. The current highest priority, and
thus the next part to be processed, is marked in light green. Parts with a lower priority, and thus to be processed later, are colored in darker green.

Figure 30: uniTrex

Figure 31: uniTrex

The first orders now appear in the correct part position. The order is highlighted in green, which means that there is a raw part at this position. If the background color were gray, it would indicate a finished part. If the orders are the same and follow one after the other, they are easy to enter. Since the cursor field has already advanced by one part position, all you need to do is click the check mark icon three times in a row. All raw parts must be the same; they are processed with the same CNC program. Since the priority is also the same, processing begins with the smallest position number. All orders have been entered; the job list just needs to be saved.
To do this, click on the save icon! The job list is now complete.
After successfully creating the uniTrex function, return to the start screen.

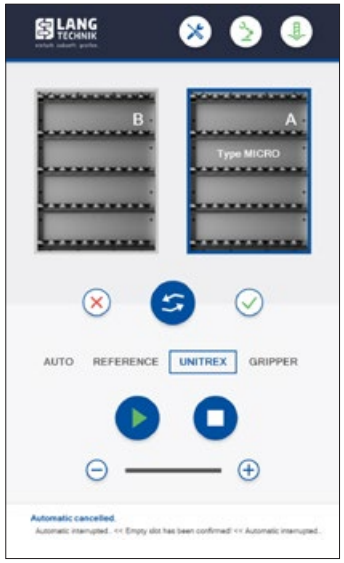


Figure 33: uniTrex

To have the created job list processed automatically, set uniTrex in the program selection field and activate the corresponding magazine page. Put the CNC machine in automation standby mode and start the automation system!
The order of processing is controlled by the priority assigned in the job list. Jobs with higher priority take precedence over jobs with lower priority. For jobs with the same priority, the position number is decisive:
Smaller position numbers take precedence.
The current automatic program may be interrupted or canceled by the operator.

Delete a job list!

Please note that the job list is permanently stored! This means, in particular, that switching the RoboTrex Compact automation system off and on again will not delete the job list. The job list also remains intact throughout the entire processing phase. Finished parts are stored internally, so that the processing of a job list can be interrupted. Resuming at a later point in time will result in processing continuing with the first available raw part.
In the magazine graphic, a finished part is highlighted in gray.
Even if the job list has been completely processed, it remains intact, even though there are no raw parts available. A job list can only be deleted by explicit operator action. To do this, it must first be called up by its identifier (magazine page and clamp type). Then click on the “trash can” symbol and the memory icon! The job list is now deleted.

UniTrex Jobmanager Relive - reactivate the last job list

For recurring individual item processing, it is possible to reactivate the last saved job list that was processed on the magazine page.

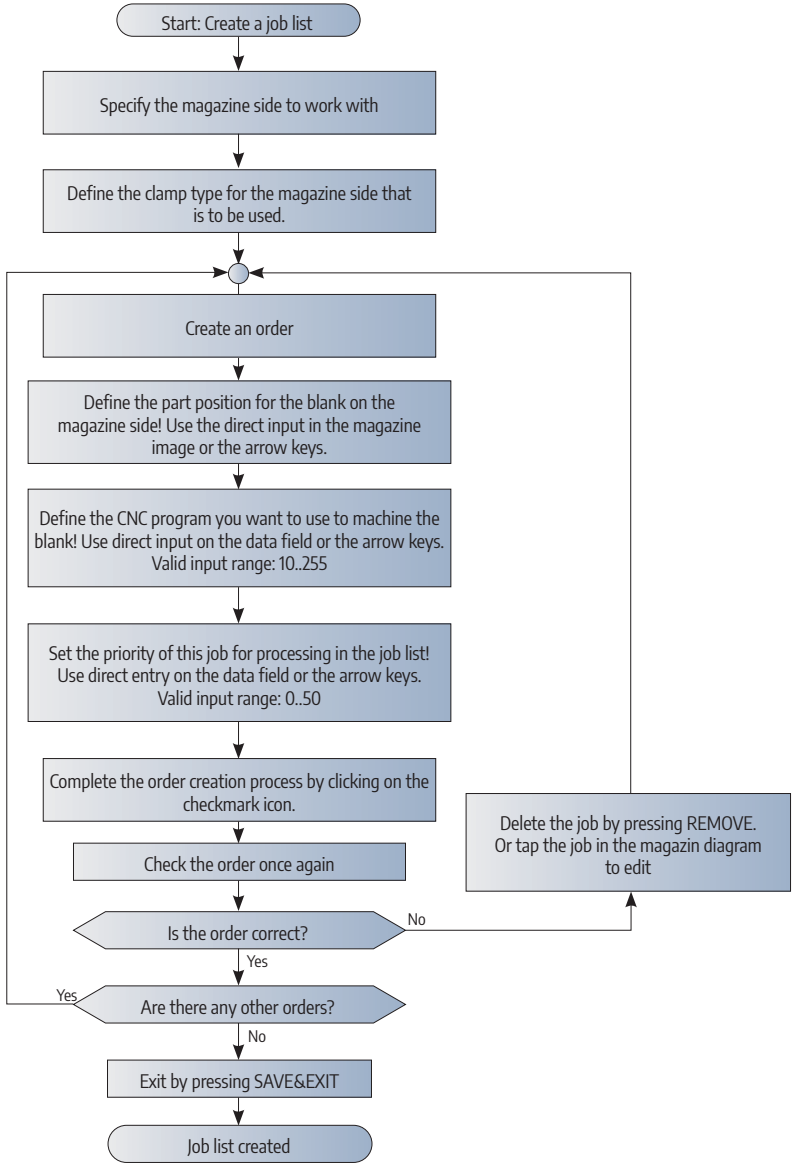
Figure 34: uniTrex Jobmanager Relive

Influencing the behavior of other operating functions!

The use of the uniTrex single-item interface is not compatible with the Start from function. If you want to process an automation cart with uniTrex, please note that any Start from mark that may be present will automatically be ignored and removed when the program starts. The use of the uniTrex single-part interface is compatible with the Stop After function. If you have used a Stop After mark and it is located at a position that will be affected by the processing of your job list, the RoboTrex Compact automation system will interrupt the automatic process after this part. The operator must then decide whether to continue or cancel the program run. However, if the Stop After mark is placed at a position that is not affected by the job list, it will be ignored and automatically removed at the end of the job list.
When using the uniTrex single-item interface, any existing C-type definition for the automation cart will be ignored.

6.7.10 THE FOLLOWING DIAGRAM SHOWS THE WORKFLOW

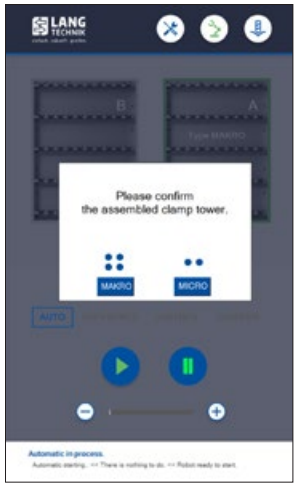
Appears in the overview again when creating a job list.



Manual set up of zero point clamping system:

Due to the manual gripper change, the appropriate automation zero-point clamping system must also be set up on the machine tool. The installed zero-point clamping system must be confirmed before each start.

Figure 35: Change clamping tower



AREA FOR YOUR OWN NOTES

7.1 MALFUNCTIONS/ERROR

The operator is obliged to shut down the machine immediately in case of faults that affect safety. The machine must not be put back into operation until the fault has been rectified. Troubleshooting must be carried out by qualified personnel.

Description of the actuators

Main switch: The main switch is used to turn the RoboTrex Compact automation system on and off. It is located on the rear of the system.

Emergency Stop: is located to the right or left of the loading doors, depending on the installation variant. In an emergency, pressing the push button disconnects the automation from the power supply. If connection to the machine tool is desired, this can also be disconnected from the power supply. To restart the system, the lock function of the emergency stop button must be released by turning the push button.

In case of emergency, shut down the system immediately! Rectify faults immediately! The emergency stop button is located to the right of the automation display.
In the event of the following electrical system malfunctions, additional attention should be paid:

Short circuit:

- Fuse out
- Have the fault in the system rectified by qualified personnel.

Cable fire:

The wiring of the system is sufficiently dimensioned to prevent cable fires.
If, contrary to expectations, a cable fire should occur, proceed as follows:

- Switch off the system via the main switch
- Disconnect the power plug from the mains
- Under no circumstances should a cable fire be extinguished with water
- Only extinguish with powder or CO2-extinguishers

Maintenance, repair, and servicing work may only be carried out when the machine is at a standstill. The machine must be secured against unexpected start-up.
The system is not designed to be entered. However, if you find yourself inside the automation system, please switch off the main switch. There is also an emergency release on the inside of the service window that can be used to release the door locking mechanism.

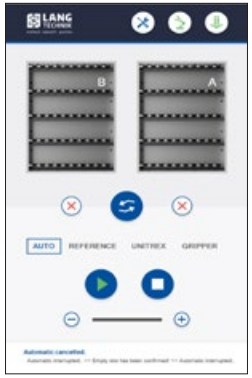
Service / Telephone support / Guide

1. **Contacting** (Customer, automation, project number, order number).
   Find out by email afterwards (customer, automation, project number, order number) if this is not known.
2. **Pass on the problem.**
   What happened? Can the customer describe what happened? How can you help? Ideally, the problem should always be recorded by email.
3. **Send photos, screenshots, or videos.**
   Photograph the robot teach pendant alarm list.

Picture

[MENU -> ALARM -> ALARM LOG ->ENTER]

[MENU -> ALARM -> ALARM LOG -> ENTER -> F3]



- Photograph the RoboTrex Compact HMI touch display.

- Press the tool icon on the touch display and take a photo.

- Press the icon with three lines on the touch display and take a photo.
- To better illustrate a process, videos can also be sent.

7.2 Servicing

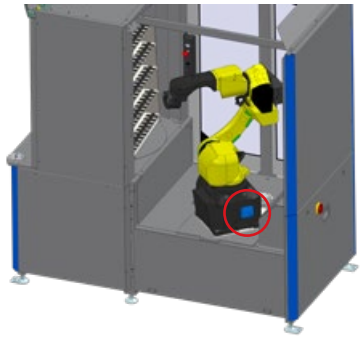
Intervall	Control points	Control elements
Daily	Entire system	Visual inspection for damage and cleanliness
	Pneumatic maintenance unit	Air pressure, oil level in maintenance unit
	Gripper	Gripper is only splash-proof and should not be too dirty or wet
Monthly	Loading flap/s RoboTrex	Guide rails should be covered with a light layer of grease
Yearly	Control unit cable	Check whether the connection cable to the pro-grammer is twisted unevenly.
	Control system fan	If the fans in the Fanuc robot control unit are dusty the voltage must be switched off and the respective unit cleaned
	Battery	Replace battery in the mechanical unit RT52: 4x Baby C
	Magazine recoil damping RoboTrex Compact	Small shock absorber for resistance and replace if necessary
Every 3 years	Reduction gear and gearbox / all axes	Replace reduction gear and gearbox, grease all axes Grease: Kyodo yushi VIGOGREASE RE 0 Specification: A98L-0040-0174 Amx. pressure of grease gun: 0.1 MPa

If you have any questions about RoboTrex Automation, please do not hesitate to contact us.
Phone: +49 7023/ 9585-177 - E-mail: automation@lang-technik.de

7.3 Battery replacement

Replacing the backup batteries
If the robot has been switched off for a long time, the batteries used to store the absolute position data on the robot may be empty or weak and need to be replaced. It is important to note that the robot must be switched ON (DO NOT switch it off) during replacement. The robot should be in its home position so that the backup for commissioning can be imported in an emergency.

The batteries are located in a compartment at the base of the robot.
(see illustration: cover marked in blue)
The battery compartment must be unscrewed and the old batteries removed. Make sure that the batteries are inserted correctly. After replacement, the system must be restarted once to reset any error messages that may have appeared on the Fanuc Teach Panel. If you are unsure about the procedure, please call us beforehand.



8.1 Intended use

The operator is obliged to use the product properly, carefully and under the appropriate conditions. No liability or reimbursement will be accepted in the event of improper use.

Following maintenance: Operation of the RoboTrex automation system may only begin once the operating personnel are satisfied that all maintenance work has been performed. If it is discovered during operation that pending maintenance measures have not been carried out, operation must be stopped immediately.
In the event of incorrect operation or misuse there is a risk:

- to life and limb of operators, third persons and animals who are in the vicinity of the machine tool in which the clamping system is inserted.
- to the machine, the clamping system itself and other material assets of the operator.
- to the efficient operation of the machine tool in which the clamping system is installed.

8.2 Personnel Requirements

Maintenance by operator:

- Check the gripper bolt for wear
- Sensors in the system should be regularly cleaned of any kind of contamination.

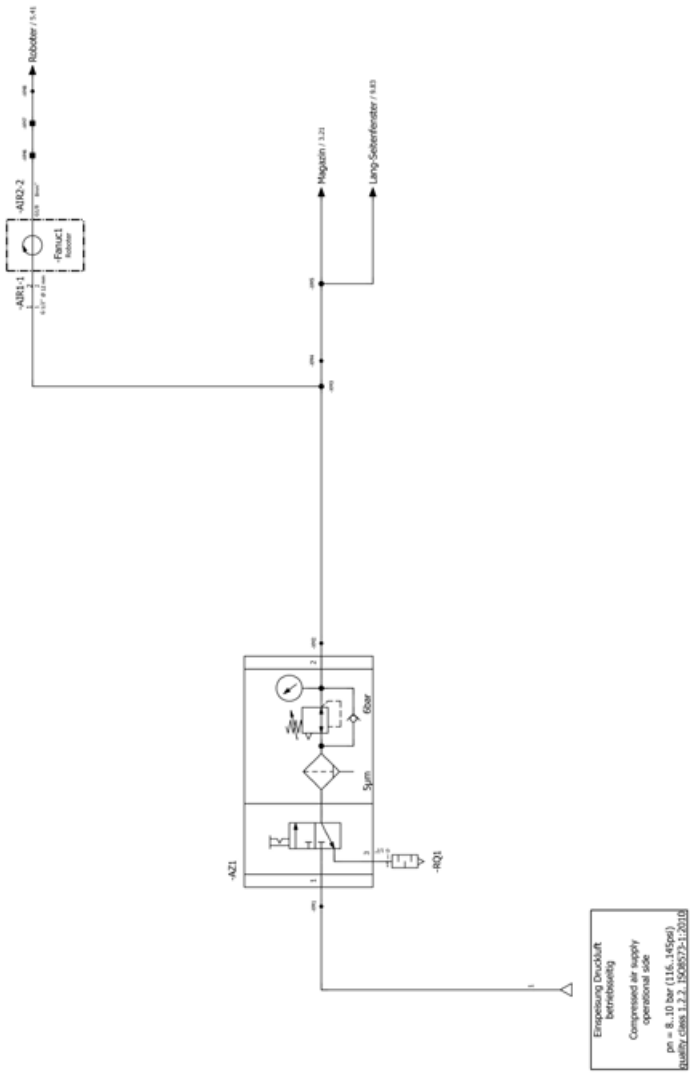
The operator undertakes to:

- Only allow fully-qualified, trained personnel (specialized in metal machining), e.g. CNC application engineer, to work with the product.
- Clearly define the responsibilities of personnel for installation, commissioning, operation, maintenance and repair.
- Only allow personnel to be trained to work with the product under the super-vision of an experienced specialist (metal machining specialist) or a CNC application engineer.

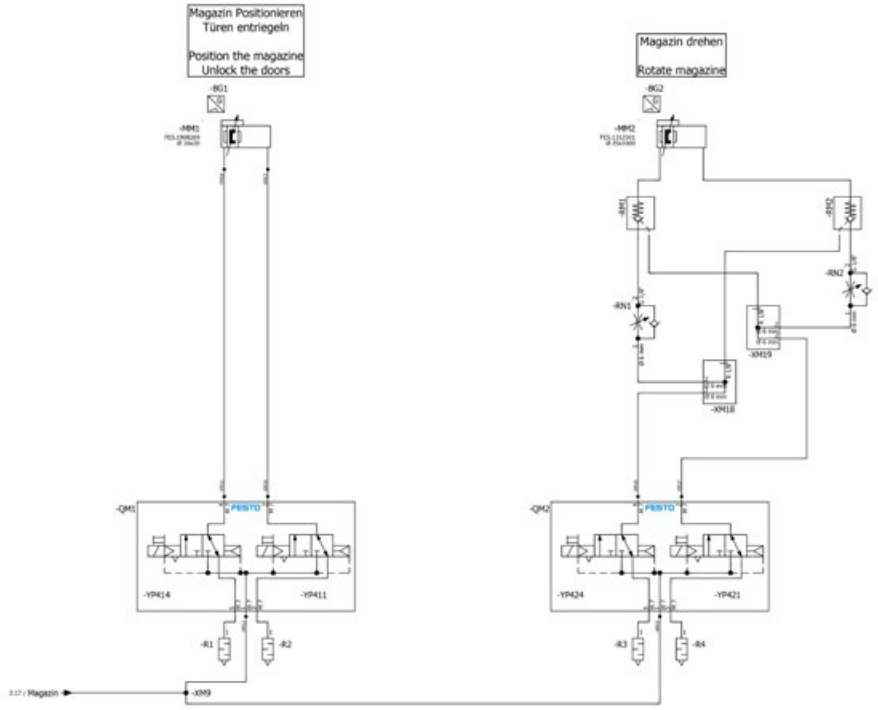
8.3 Personal Protective Equipment and Safety of Personnel

- Safety shoes and gloves are recommended while working with the RoboTrex automation system.

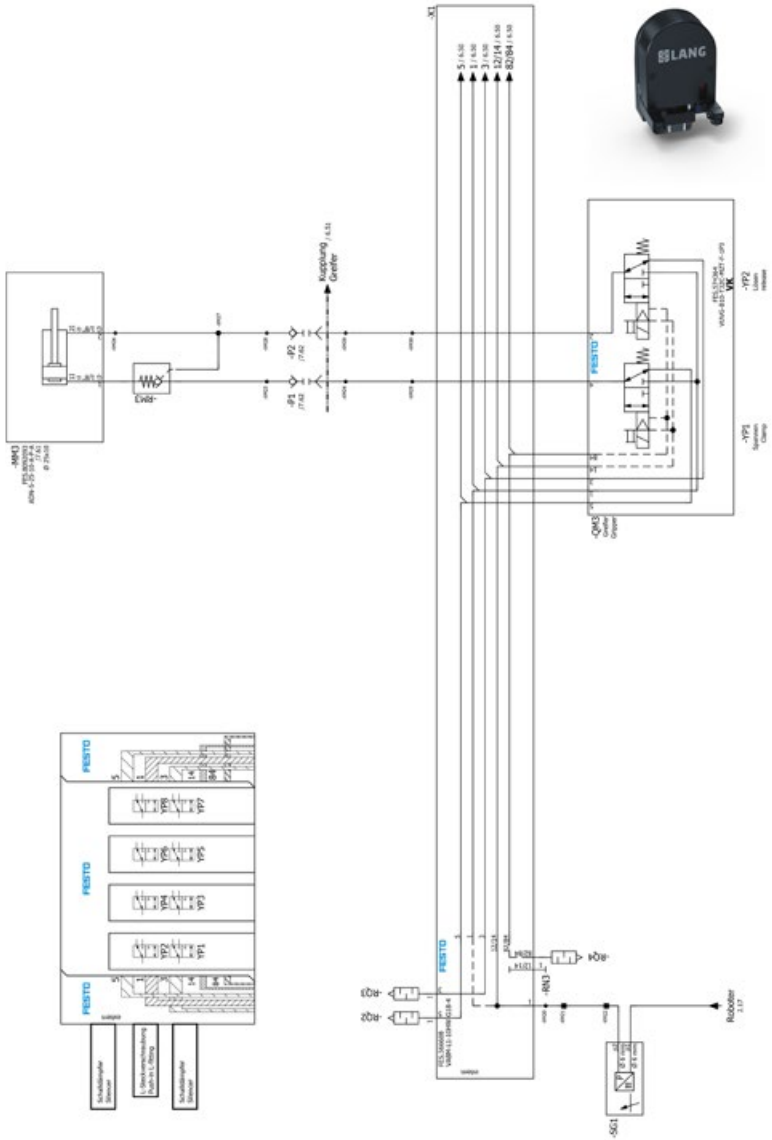
9.1 PNEUMATIC DIAGRAM: FLUID FEED OVERVIEW

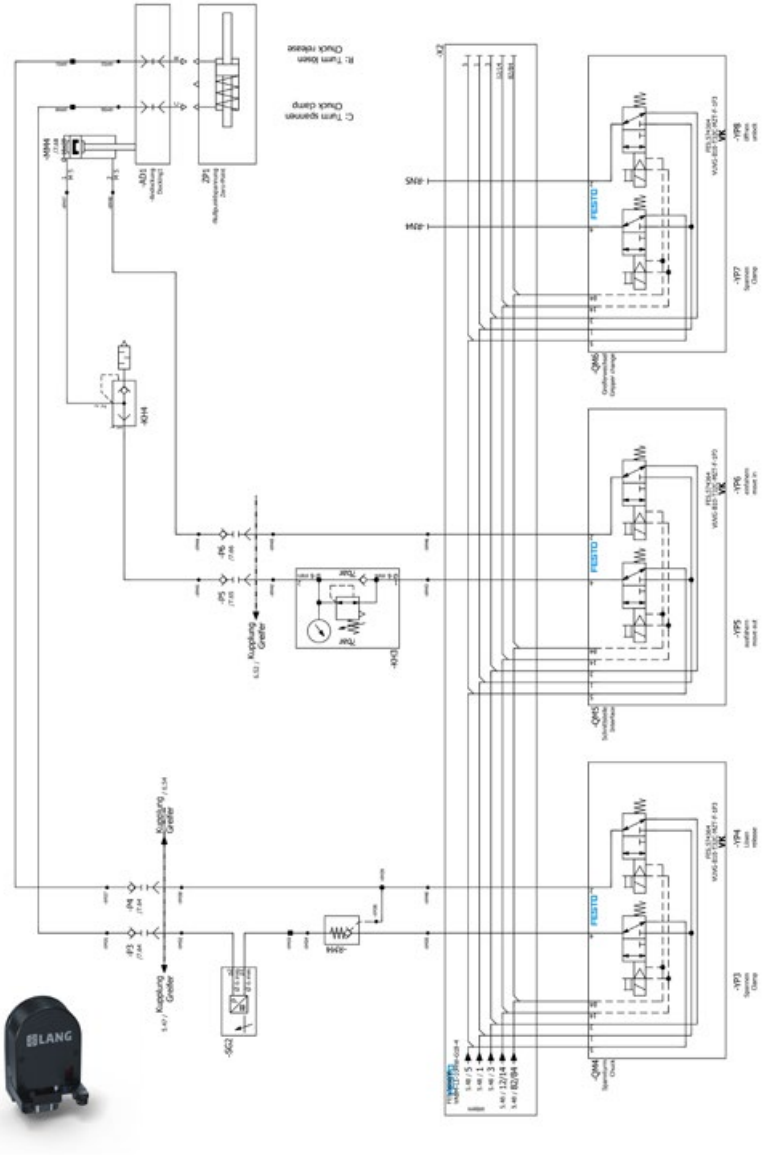


9.2 POSITIONING THE MAGAZINE



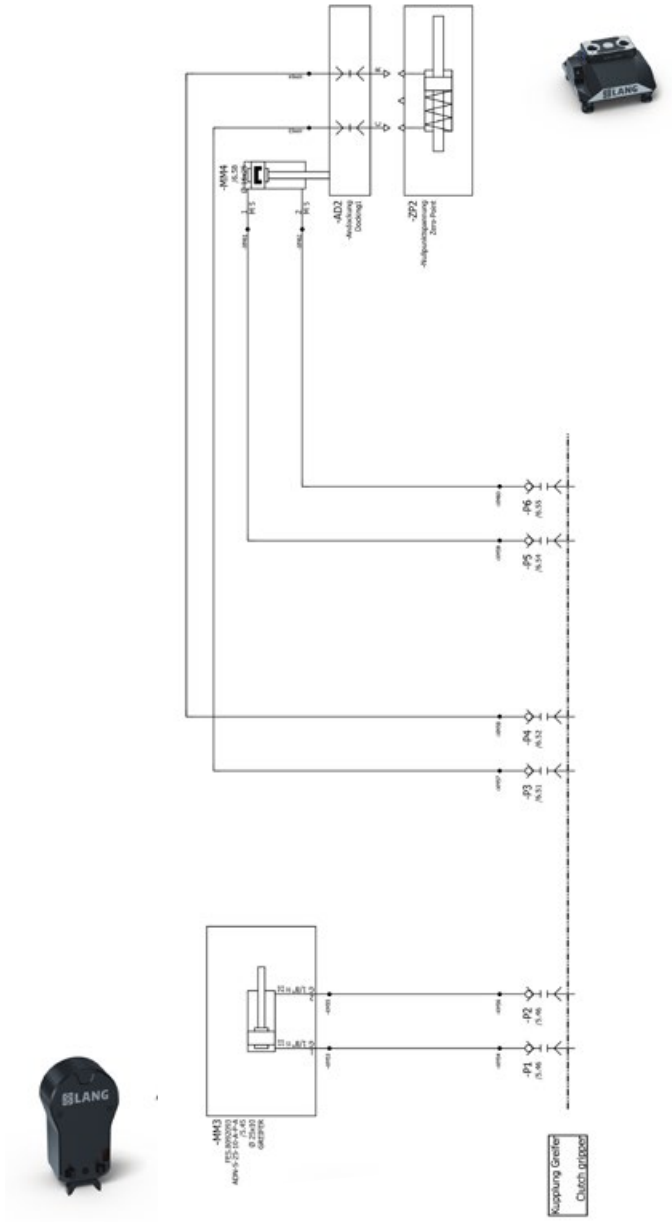
9.3 ROBOT GRIPPER 77



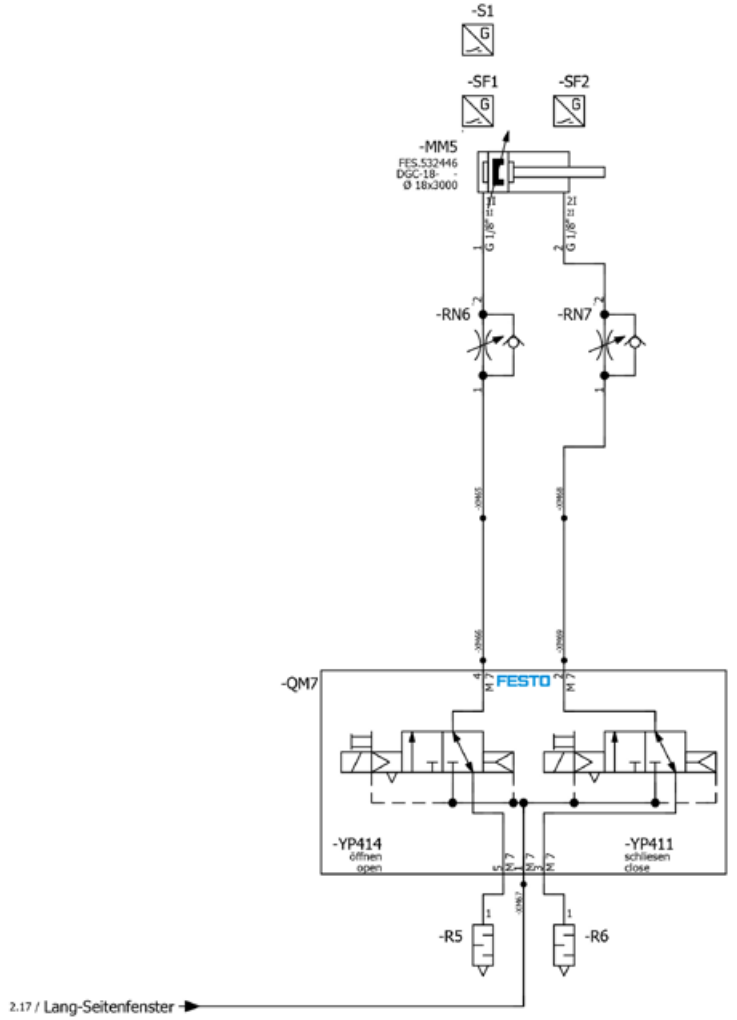


Chapter 9

9.4 GRIPPER 46



9.5 LANG SIDE WINDOW FOR LOADING THE MACHINE



Chapter 9

10.1 DECOMMISSIONING AND DISMANTLING

- Unload the RoboTrex Compact automation system.
- Switch off the RoboTrex Compact automation system at the main switch.
- Disconnect the RoboTrex Compact automation system from the power supply.
- Disconnect the RoboTrex Compact automation system from the pressure supply.
- Secure the machine tool against unexpected start-up.
- Disconnect the Harting plug from the machine tool and fit it with a dummy plug.

Dismantling:

- Removal by forklift or pallet truck.

The system may only be dismantled by an instructed person.
Please contact LANG Technik for this.

10.2 DISPOSAL AS SPECIFIED IN EU DIRECTIVE 2018/851

Comply with country-specific disposal regulations when disposing of equipment.

LANG Technik products are not considered household waste.
Failure to comply with disposal requirements is a regulatory offense.

Accessories and packaging are recycled in an environmentally friendly manner.

The individual parts of the RoboTrex automation system can be recycled if disposed of properly and are therefore environmentally compatible. Refer to the table for details on disposal and recyclability.

Product	Material	Disposal
Housing, screws, nuts etc.	Metal	Separation of materials Supplied for recycling by melting down
Protective screens, hoods, housings, covers	Plastic	Supplied for recycling
Hoses	Rubber, PVC, steel	Separation of materials Supplied for recycling
Cables, housings, connectors, etc.	Silicone, polychloro-phrene	Separation of materials Supplied for recycling
Electronic assemblies	Plastics, metals, electrolytes	Disposal in special landfills in compliance with local regulations
PE films	Plastic	Supplied for recycling
Packaging material	Pallet wood	Supplied for recycling
Hydraulic oil	Mineral oil	According to local regulations

Painted products are to be recycled according to the paint material or disposed of in special landfills in compliance with local, official regulations.

11.1 For documentation

This documentation is intended only for the operator and their personnel. It contains instructions and notes that may not be reproduced, distributed or transmitted by data technology methods, in whole or in part, or exploited for competitive purposes without authorization. Always keep these operating instructions and the other documentation (e.g. manufacturer's documents) within easy reach in the immediate vicinity of the machine. Always observe all information, notes, instructions and guidance contained therein. In this way, you avoid accidents due to incorrect operation, retain the full manufacturer's warranty and always have a fully functional automated system.
Errors or omissions in the documentation are excepted. All rights to this documentation remain with LANG Technik.

11.2 Changes to the product

You must not make any modifications, additions or conversions to RoboTrex automation system without the manufacturer's approval. All conversion measures require written confirmation from the manufacturer.
Only use original spare and wear parts. In the case of externally supplied parts, there is no guarantee that they have been designed and manufactured to withstand the stresses and to meet safety requirements.
The manufacturer assumes the complete warranty service only and exclusively for spare parts ordered from them.

Changes by the customer:
Changes to the product will void the warranty.
Changes by the manufacturer:
The manufacturer is always striving to improve its products. They reserve the right to make changes and improvements. However, this does not imply any obligation to retrofit RoboTrex automation systems that have already been delivered.

11.3 General Terms and Conditions of Sale and Delivery

In principle, our General Terms and Conditions of Sale and Delivery shall apply. These shall be available to the operator at the latest when the contract is concluded.
Warranty and liability claims for personal injury and property damage are excluded if resulting from one or more of the following causes:

- Improper use the RoboTrex automation system
- Improper installation, commissioning, operation, and maintenance of the RoboTrex automation system
- Operating the RoboTrex automation system with defective safety devices on the machine or safety and protective devices on the machine that are not properly attached or are not functional

Failure to follow the instructions in the documentation regarding:

- Storage
- Installation
- Operation
- Maintenance and care
- Troubleshooting and error correction
- Unauthorized structural modifications to the zero-point system and the machine tool's fixture
- Inadequate monitoring of parts subject to wear and tear
- Improperly performed repairs
- Catastrophic events due to foreign body impact and force majeure

12.1 Symbols

Please pay attention to the following warning symbols	
	*Read all the operating instructions carefully before commissioning for the first time and keep it in a safe place for future use*
	*Please read and follow the technical and safety instructions*
	*The use of protective gloves made of tough, resistant material is recommended*
	*A helmet and safety goggles are recommended for personal safety*
	*To reduce the risk of eye injuries, wearing protective goggles as specified in EN 166 is recommended*
	*Safety footwear are part of the protective equipment*
	*Materials are recycled in an environmentally friendly manner*
	*Do not dispose of the material in household waste*

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