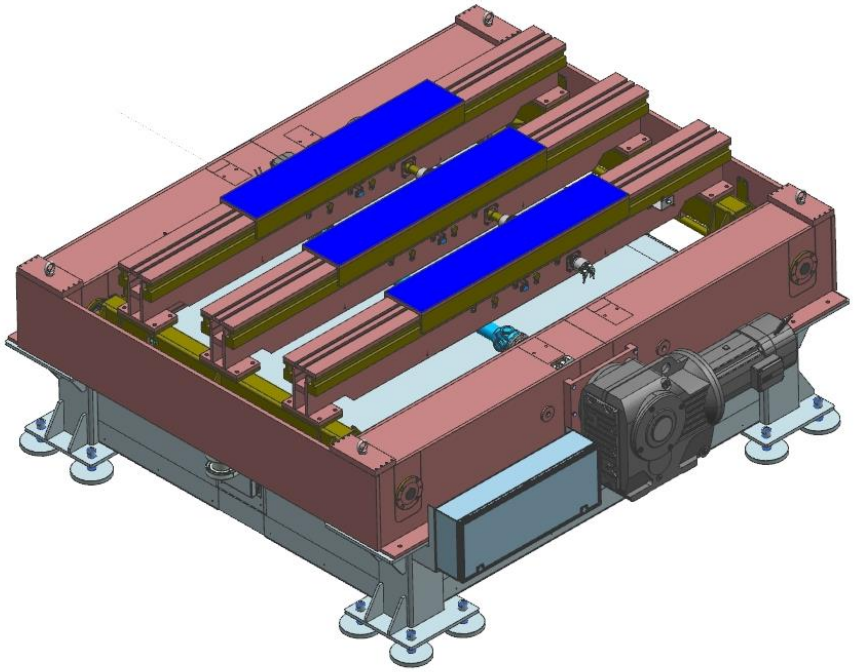
Operating manual



Customer:	SAGE Electrochromics Inc., (Faribault) 2 Sage Way, Faribault, MN 55021 USA
Customer order No.:	Order from 25th of July 2018
Contract-Number:	88440
OLBRICHT Automation Machine Name:	Telescopic Fork
OLBRICHT Automation Project-No.:	801.01 - 150
Year of manufacturing:	2019
Manufacturer:	-Brünen Phone: +49(0)2856 / 9099960 E-Mail: info@olbricht.de

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1 Important basic information

1.1 Intended use

The Telescopic Fork constructed in accordance with its intended use and may be used exclusively for the points listed below.

- Moving loads
- Lifting loads
- Replacing loads.

Any use outside these specifications is considered as contrary to the intended use. The manufacturer is not liable for any damage resulting from this. The operator bears the entire risk.

Intended use also includes observing the operating, maintenance and service conditions as prescribed by the manufacturer. Only genuine spare parts from the manufacturer may be used as replacements.

The Telescopic Fork may only be used, serviced and repaired by persons who are acquainted with the characteristics of the machine and who have been advised of the dangers involved.

The instructions concerning the operation, service and safe handling of the machine, as described in this operator's manual and stipulated by the manufacturer in the form of warning signs and warning symbols on the machine, must be observed when using the machine.

The relevant accident prevention regulations and the other generally recognized safety-related must be observed when using the machine.

Unauthorized modifications to the Telescopic Fork are not permitted. They will exclude the manufacturer's liability for any resulting damage.

1.2 Reasonably foreseeable misuse

A reasonably foreseeable misuse according to the Machinery Directive is defined as the use of the machine in a way not described in these instructions.

1.3 Legal Notes

1.3.1 Warranty instructions

The warranty period for the equipment supplied by the Seller shall be 12 (twelve) months, starting from the date of FAT. The warranty is limited to proprietary parts and manufacturing parts, made by Olbricht Automation GmbH.

In case of defects of equipment, being found during the inspection on site, test-run, or demonstration, the defect will be checked by both parties. If the Seller is responsible for the defect, the Seller shall repair or re-supply the equipment at his own expense. If the Buyer is responsible for the defect, then the Seller will give his assistance to repair or re-supply the equipment to the plant site. Costs thus incurred must be paid by the Buyer.

1.3.2 Copyright

Unless otherwise agreed, we own the copyrights of all of us delivered drawings, programs and documentations.

Drawings, programs and documentations will only be used by our customers and end-customers in accordance with the contract.

It isn't allowed to give drawings, programs and documentations on third parties without permission from the Olbricht Automation GmbH.

1.3.3 EC Declaration of Conformity

Extract of EC Declaration of Conformity:

Olbricht Automation GmbH

Hamminkelner Straße 30, D-46499 Hamminkeln

declare under our sole responsibility that the machine:

Telescopic Fork

complies with the following provisions in its delivered version:

Machinery Directive 2006/42/EC

➔ See full „EC Declaration of Conformity“ on CD Rom

2 User instructions

2.1 About this operator's manual

The operator's manual contains important information for safe use and correct use and maintenance of the Telescopic Fork. Your attention will help to prevent angers, reduce repair costs and downtime and will increase the reliability and service life of the machine.

The entire documentation, which consists of this operator's manual and all documentation provided by the supplier, must be used when working at the machine.

When the machine is sold, the operator's manual must be transferred with it. The operator's manual is intended for the operator of the Telescopic Fork and anyone involved in operating and maintaining it. It must be read, understood and applied by every person who is entrusted with the following work on the machine:

- Operation
- Maintenance
- Repairing faults
- Safety

The operator's manual does not replace your personal responsibility as the owner and operator of the Telescopic Fork.

2.2 Structure of the operator's manual

The operator's manual is divided into 6 key areas in terms of content:

- user instructions,
- safety instructions,
- machine details,
- instructions for operating the Telescopic Fork,
- maintenance

2.3 Instructions and procedures

Steps that the operator must carry out are shown as a numbered list.

1. Instruction for action step 1

2. Instruction for action step 2

Instructions that only have one step are not numbered. The same applies for action steps that do not have a specific sequence. A bullet is placed in front on these instructions:

- Handling instruction

2.4 Abbreviations

CE (dt.: EG, engl.: EC)	Communauté Européen (dt.: Europäische Gemeinschaft, engl.: European Community)
DIN	German Industry Standard
EN	European Standard
PLC (dt.: SPS)	Programmable Logic Controller
EMC	Electromagnetic Compatibility Directive
LVD	Low Voltage Directive
UVV	accident prevention regulation
max.	Maximum
min.	Minimum
ca.	circa
e.g.	for example
etc.	et cetera
VDC	Direct current
VAC	Alternating current
Hz	Hertz (frequency)
N	Neutral conductor
PE	ground
V	voltage
h	hour
min	minute
s	second
d	diameter
L	length
mm	millimeter
m	meter
Type	Kind of object or definition
No.	number
Qty	Quantity

3 Safety

3.1 General Information

The chapter on safety contains basic safety instructions and safety regulations for working and operating when using the Telescopic Fork.

All instructions in this chapter must be observed to ensure safe handling and trouble-free operation of the Telescopic Fork.

There are also additional warnings in the other chapters of this operator's manual, which must also be observed. The warning instructions are given before the respective actions.

Warning instructions with regard to OEM components are contained in the applicable supplier documentation. These warning instructions must also be observed.

3.2 Meaning of warnings

The warnings in the operator's manual are classified according to how serious the anger is and the probability of its occurrence. The danger signs and symbols are provided to advise the user of other unavoidable dangers that may be encountered when operating the Telescopic Fork.

The warning instructions used are structured as follows:

DANGER

Type and source of danger

This warning advice warns of a danger posing an immediate threat to the health and life of persons.

Ignoring this warning will result in very serious injury or death.

- Read this operating instruction carefully and follow the warning advice.

WARNING

Type and source of danger

This warning advice warns of a possible dangerous situation for the health of persons.

Non adherence to this warning advice leads to serious injury.

- Read this operating instruction carefully and follow the warning advice.

CAUTION

Type and source of danger

This warning advice warns of a potentially dangerous situation for personal health or of material and environmental damage.

Ignoring this warning will result in very serious injury or death.

- Read this operating instruction carefully and follow the warning advice.

NOTICE

General instructions include tips for usage and useful information but not warning of dangers.

3.3 General information on the safety of the machine

The Telescopic Fork is designed and manufactured to the state of the art in technology and the generally accepted rules of engineering. However, operation and maintenance of the machine may involve danger to the health of the user or other persons or may adversely affect the machine and other property.

Therefore, operate the Telescopic Fork:

- when it is in good condition and safe to operate in traffic,
- with safety and danger awareness.

This requires that you be familiar with the content of this operating manual, the applicable accident protection regulations and the generally recognized rules of safety and apply these rules as required.

3.4 Instructions for the owner

The owner is responsible for the designated use of the Telescopic Fork.

3.4.1 Qualification of personnel

Persons who are responsible for the operation, maintenance or repair of the Telescopic Fork must have read and understood these operating instructions, particularly the chapter on safety and warning notices on the corresponding activities, before starting work.

- Representatives of Olbricht Automation GmbH will instruct the operator in the operation and maintenance of the Telescopic Fork.
- The operator must ensure that new operating and maintenance personnel are instructed with the same care and to the same extent in operating and maintaining the machine, taking these operating instructions into consideration.
- The machine may only be operated by trained personnel authorized by the owner.
- Persons who are apprentices, in training or under instruction may only work on the machine under the supervision of an experienced person.
- Maintenance and repair work must be carried out by appropriately qualified persons.

3.4.2 Accident prevention

The owner of the machine is responsible for observing the regulations applicable in the country of operation.

The following instructions must also be observed:

- Do not climb up or sit on the machine.
- When working below the machine, protect your head by a helmet, because of the extended roller bars.
- Long hair must be tied back or otherwise secured and garments must be close-fitting. Jewelry, like chains, is not allowed.

3.5 Information on operating safety

To avoid dangerous situations, the Telescopic Fork must only be used in an operationally safe condition.

3.5.1 Checks before putting the machine into operation

Before the first and every subsequent operation, check the Telescopic Fork to make sure that it is safe to operate.

- Is all safety equipment on the Telescopic Fork installed and functional?

3.5.2 Operation

- If the Telescopic Fork malfunctions, stop the machine immediately and lock it. Have the fault repaired immediately by qualified technicians.
- Make sure that there is no one in front of the machine during the bilateral movement.

3.5.3 Maintenance and repair

Maintenance and repair work involves additional hazards that do not occur during operation of the machine.

- Take particular care when carrying out maintenance and repair work. Work very carefully and with awareness of danger.

3.5.4 Spare parts

- Observe the maintenance and repair intervals specified in this operator's manual exactly.
- Also observe the maintenance and repair intervals for the supplied components. See the supplier documentation for the relevant intervals
- Spare parts must at least comply with the technical standards specified by the manufacturer. This is assured with original spare parts.

3.5.5 Maintenance and repair work

- Disconnect the power supply before all cleaning, maintenance and repair work and when troubleshooting. Wait until all moving parts of the machine have stopped moving.
- Disconnect the power supply before working on the electrical system.
- Make sure that no unauthorized person can switch on the Telescopic Fork.

3.6 Safety

3.6.1 Safety Instructions

Read the instructions below and follow them for your safety.

- ✓ Stay away from the machine's working area when the main switch is on.
- ✓ Learn in advance about the general operating conditions of the machine.
- ✓ Learn about the machine’s movements. This kind of machines can cause unexpected dangerous consequences due to its movement during operation.
- ✓ Make sure that the **EMERGENCY STOP** button is within reach of the machine.
- ✓ Do not stand under the transported product during transport.
- ✓ Train your personnel extensively on machine handling, system construction and safety.
- ✓ Do not remove, destroy or cover the **CAUTION** and **WARNING** labels on the machine controller and the main body.
- ✓ Always ensure that the workplace safety conditions are fully met.
- ✓ **DO NOT** disassemble, relocate and cover the warning signs on the machine body and control unit**.**
- ✓ If the signs are too damaged or contaminated to read, replace them immediately.

WARNING

Safety devices

It is forbidden to bypass/tamper with the safety devices provided on the machinery.

- The Manufacturer declines any liability on the safety of the Partly-completed machinery in case of failure to comply with the prohibition.

Risks may occur on the machine mostly during automatic cycle operation, manual cycle operation (adjustment and setting up), maintenance and cleaning.

3.6.2 Warning stickers

Sticker	Designation
	**Read operator's manual and safety instructions** Before placing the machine in operation, read and observe the operator's manual and warning instructions. The operator's manual explains in detail how to operate the machine and contains information on safety, operation and maintenance.
	Wear safety gloves!
	Wear safety-work-shoes!
	Wear protective clothes!
	Wear safety glasses!
	Warning! Crushing of hands. ➔ To warn of a closing motion of mechanical parts of equipment

CAUTION

Stickers

It is forbidden to remove the existing warning signs. Replace the stickers that have damage or do not exist. The Manufacturer declines any liability regarding the safety of the Partly-completed machinery in case of failure to comply with this prohibition.

4 Technical Data

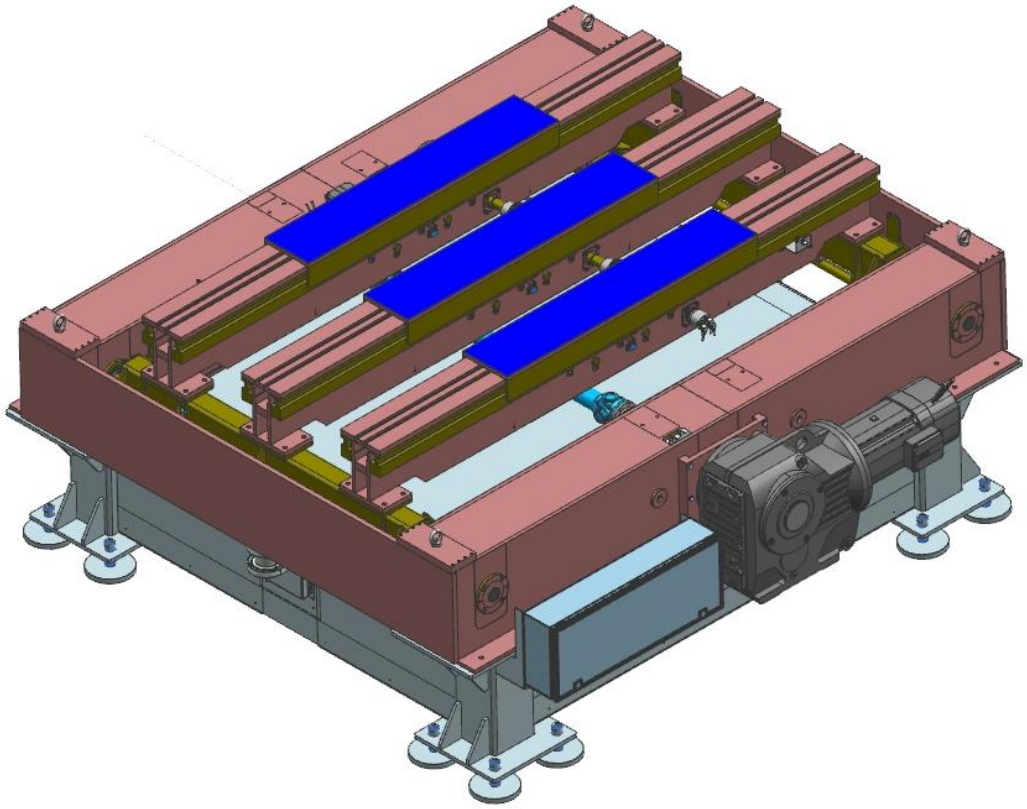
4.1 Functional Description

This machine is used particularly in automated warehouses and industrial automation. In automated warehouses, it allows you moving the loads from the center of the hallway to the shelving cells and vice versa. In industrial automation this type of equipment is used in various applications:

The Telescopic Fork has two moving parts with respect to the fixed body. This machine performs a bilateral movement that is capable of handling the loads stored on shelves in a single line.

The movement is transmitted from the gear motor to the first mobile part; the second slide will move at a speed twice as the first thanks to a series of gears, chains or straps tied to the fixed body. Wheels are used to achieve the sliding between the slides, while the side guide is achieved thanks to shoes made in polyzene, bronze, sustamid, etc.

The Telescopic Fork's lifting equipment composed of a fixed body and a mobile part, vertically handled by a cam lever system with sliding wheels that the Telescopic is installed on. This system makes it possible to lift the Telescopic Fork offering greater versatility and possibility of application and use. With this Lift motion is transmitted from the central gear motor to the eccentric pins through a chain system housed inside the load bearing structure. This system makes it possible to install the gear motor either inside or outside the load bearing structure, depending on the installation requirements.



4.2 Product description

WARNING

Malfunction of machine

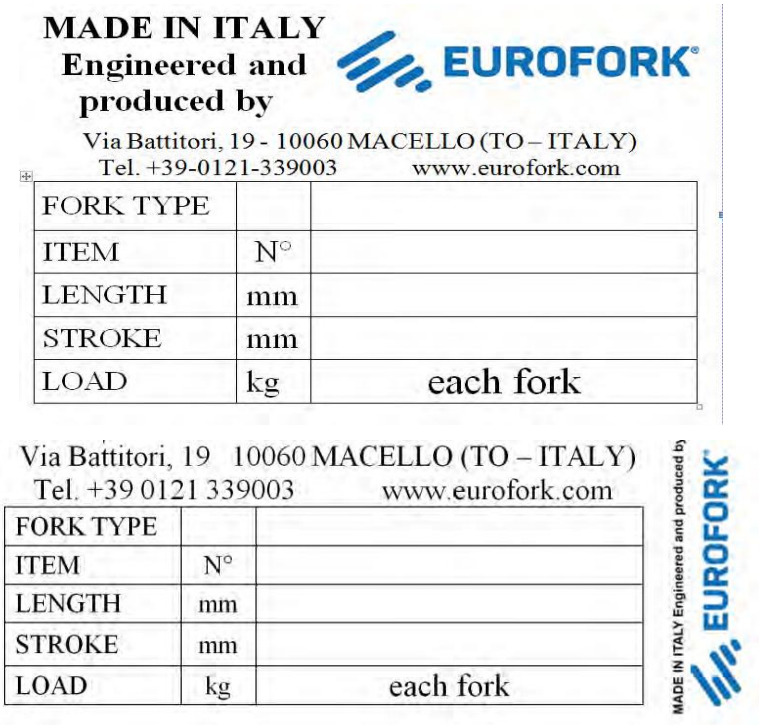
Any use outside these specifications is considered as contrary to the intended use. The manufacturer is not liable for any damage resulting from this. The operator bears the entire risk.

The Telescopic Fork can lift and carry products up to 1070 kg.

4.3 Dimensions and weight

Detail	Value
Length	2400 mm
Stroke	2800+25 mm
Load	1070 kg / each

4.4 Identification plates



(Examples of identification plates)

5 Transport

5.1 Transport

The machine is transported on vehicles secured to the deck and with normal protective packaging. Depending on the dimensions, the transport packages can be:

- ✓ Secured to the vehicle's bed
- ✓ Secured to a specific platform
- ✓ Packed in wooden cages with flat bottom
- ✓ Covered with special protective tarps.

During transportation, care must be taken not to damage the pneumatic elements, motor and bearing systems on the system and to ensure that they should not be transported from these points.

- ✓ The rope suitable for the dimensions of the transport pack should be used.
- ✓ Transport should be carried out by fixing it close to the center of gravity of the pack.
- ✓ Do not forget any tools on the pack during transportation.

CAUTION

Packaging

- Before packaging, remove all tools, equipment or objects possibly contained in the Partly-completed machinery and block the mobile slides with safety catches to prevent damage and unbalancing of the load during transportation.

During lifting:

- ✓ Check the condition and correct fastening of the lifting devices and use adequate slings and equipment.
- ✓ The installation area of the machine must, as far as possible, be clear of materials that prevent or limit visibility, create obstruction or hindrance
- ✓ The Telescopic Fork and any accessories must only be handled from the points marked with specific identification plates.
- ✓ When lifting the packages, make sure that the lifting ropes/chains do not damage parts of the fork.

CAUTION

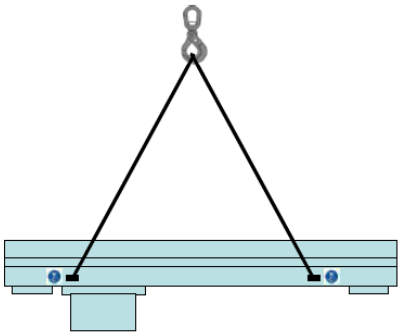
Handling the machine

- The Telescopic Fork and any accessories must only be handled from the points marked with specific identification plates.

5.1.1 Lifting and handling procedures

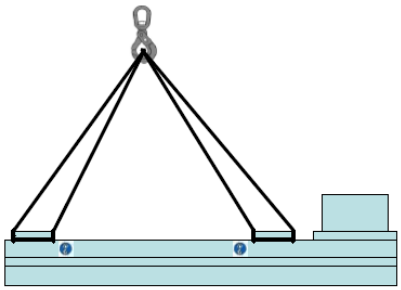
Handling fork without connections for lifting hooks:

Due to its shape, this type of fork does not allow lifting hooks to be inserted in the holes for eyebolts. Therefore, it must be handled using slings, the slots in the fixed structure and marked with adhesives that identify the correct “hooking point”.



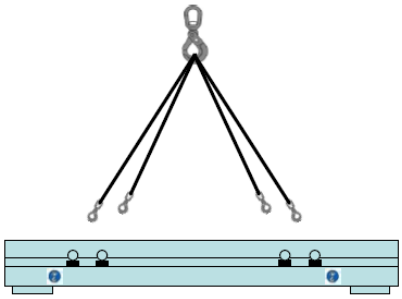
Fork handling with misaligned feet:

Due to its shape, this type of fork does not allow lifting hooks to be inserted in the holes for eyebolts. Therefore, it must be handled using slings, the fastening plates of the fixed structure and marked with specific plates that identify the correct “hooking point”.



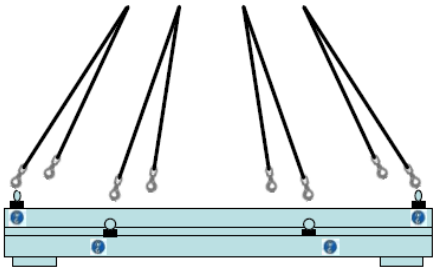
Fork handling with the help of lifting eyebolts:

This type of fork must be lifted and handled using only the lifting kit supplied. It must be handled using independent hooks attached to the four lifting eyebolts placed at the corners of the equipment. These hooking points are marked with specific plates.



Fork handling with the help of lifting hooks:

This type of fork must be lifted and handled using only the lifting kit supplied. It must be handled using independent hooks attached to the eight points in the center and at the corners of the fork. These hooking points are marked with specific plates.



The correct procedure for lifting for all types of fork is:

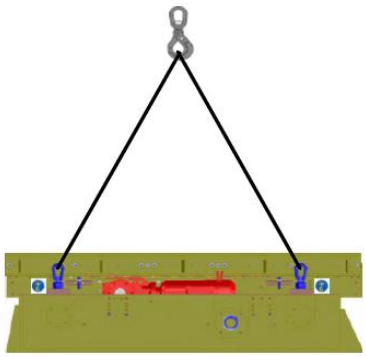
- ✓ Choose lifting ropes or chains appropriate for the load being lifted.
- ✓ The four hooking points are evenly distributed on the equipment so as not to create any imbalance of the load, it is imperative to use ropes or chains of equal length.
- ✓ Assemble the lifting kit on the equipment to be handled.
- ✓ Hook the ropes/chains to the eyebolts and proceed to handle the fork.

NOTICE

If the length of the fork being handled does not to allow the ropes to reach a common hook, use a rocker arm for lifting.

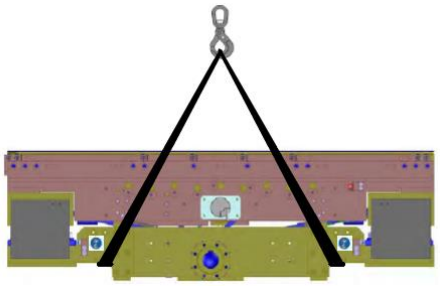
Handling the lift system with side chains:

This type of lift system must only be lifted and handled by the four eyebolts on it. It must be handled using independent hooks attached to the four lifting eyebolts placed at the corners of the accessory. These hooking points are marked with specific plates.



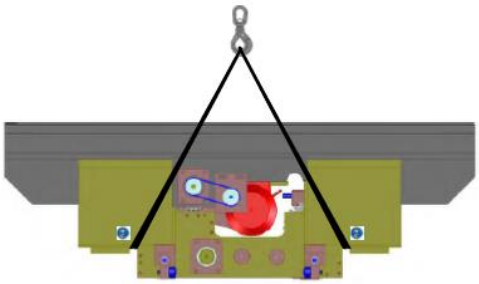
Handling the lift system with central chains:

Due to its shape, this type of lift does not allow lifting hooks to be inserted in the holes for eyebolts. It must, therefore, be handled with slings, aided by the shape of the fixed structure. The slots for the straps are marked with specific plates.



Handling the lift system with central gears:

Due to its shape, this type of lift does not allow lifting hooks to be inserted in the holes for eyebolts. It must, therefore, be handled with slings, aided by the shape of the fixed structure. The slots for the straps are marked with specific plates.



5.2 Storage

The facility chosen for installation must:

- ✓ Have a smooth floor, levelled, perfectly flat and able to withstand the required weight specifications.
- ✓ Be equipped according to the safety regulations in force in the user country and ensure proper ventilation of the equipment.
- ✓ Be equipped with its own fire-fighting system.
- ✓ Ensure easy access, providing adequate free space around the machine that allows its correct management and maintenance.
- ✓ Observe the specific environmental conditions agreed with Olbricht in the offer phase and indicated on the purchase order and/or supply specifications.
- ✓ Environmental conditions below must be ensured:
- ✓ Ambient temperature must be in the interval of -5 – 40 °C, relative humidity must be less than 90% and altitude must be less than 1000 m.
- ✓ For the premises around machine, a good general lighting of the work environment with standard values of 400 ÷ 600 Lux is deemed sufficient to comply with the relevant regulations in force in the user country and with the EU Directives.

6 Installing and commissioning

6.1 Safety

CAUTION

Damaging of machine and of hurting people

- The machine may only be assembled and disassembled by qualified technicians. These persons must be familiar with relevant regulations relating to the prevention of accidents and industrial safety.
- Work on the electrical and pneumatic systems must be carried out by qualified technicians only.

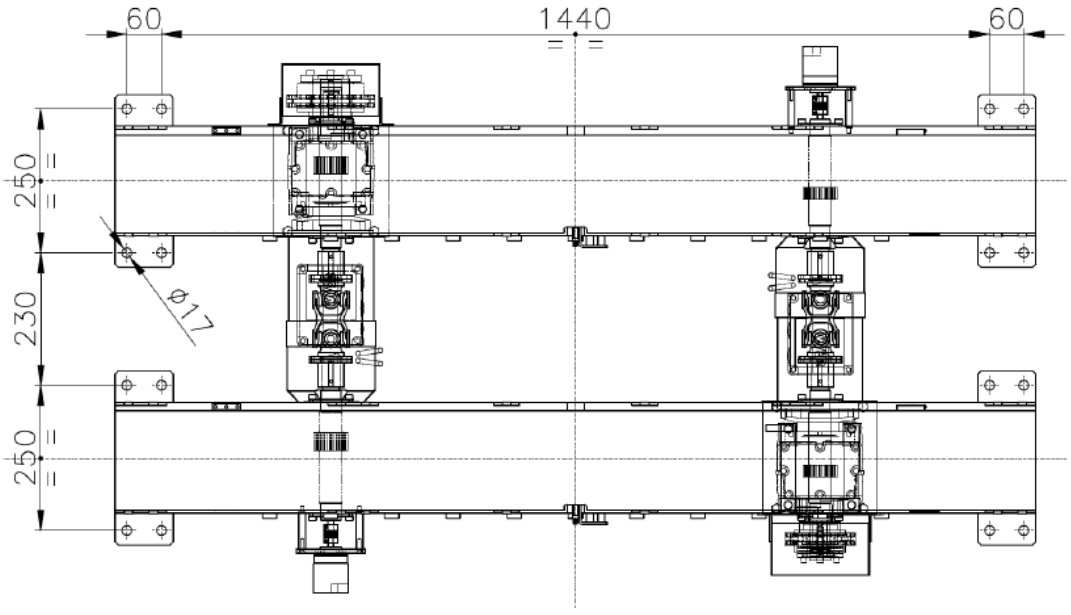
- The working area should be neat, tidy and hazard free.
- Only appropriate, tested and calibrated tools may be used.

6.2 Assembly and disassembly

6.2.1 Assembly

Below is a set of information and instructions to correctly install the Telescopic Fork:

- ✓ The support surfaces for fastening the telescopic fork (or any Addition) must be coplanar with each other, observing a tolerance of +/-0.5 mm.
- ✓ The fastening holes of the telescopic fork (or any Addition) agreed with the Customer in document M.COM-3 Drawing and/or M.TEC-13 Definitive Scheme must observe a linear tolerance of +/-1 mm. See the following sample image:



- ✓ Fasten the telescopic forks in their special housing and then check that the parallelism between the forks observes a tolerance of +/-0.5 mm with fork closed (centered). If the forks have been delivered already assembled, this requirement will not be taken into consideration.

- ✓ The structure that the product will be installed on must be designed and built in accordance with the stiffness and weight of the product itself, as well as with the applied load to be handled. The Customer agrees, under its own responsibility, to build a structure suitable for the application, which avoids deformation during the work phases and use of the product.

- ✓ The load to be handled applied on the product must be consistent with the information transmitted in the offer phase, especially with regard to the distribution of the forces. The weight of the load agreed to be handled cannot exceed the value indicated during quotation offer phase.

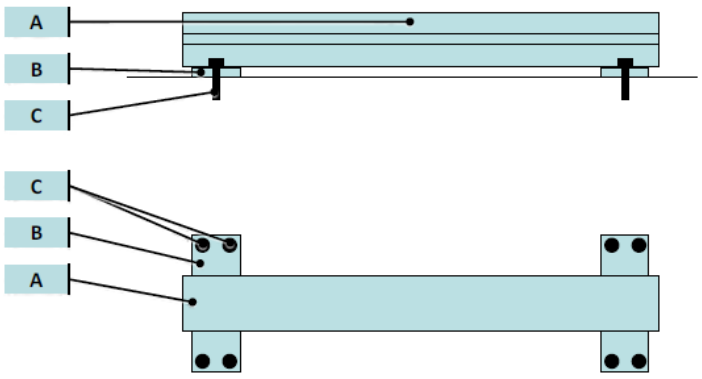
NOTICE

For power supply from network; star connection for 400V 50 Hz and delta connection 230V 50Hz. For power supply from inverter; star connection.

The installation procedure:

The installation procedure of a single fork is as follows:

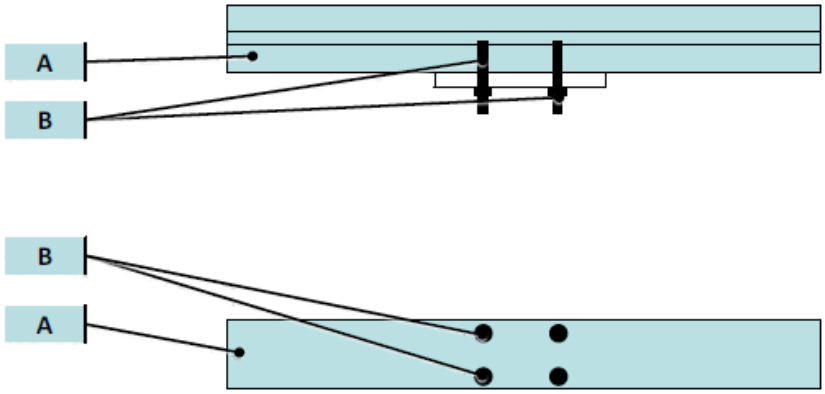
- ✓ Place the fork on the machine.
- ✓ Lower the fork smoothly and without jolts, avoiding impact.
- ✓ Block the fork with the fastening screws using the holes on the support feet of the fork. Tighten the screws to the correct tightening torque
- ✓ If there is a lifting kit, remove it from the fork.
- ✓ Remove the safety catches from the ends of the fork and store them.
- ✓ Electrically connect the motor according to the instructions on the wiring diagram.
- ✓ Electrically connect the fork position control photocells/sensors, if any.



(A: Telescopic Fork body, B: Fork support feet, C: Fastening screws)

Installation of telescopic fork with central fastening:

The installation procedure of a fork with central fastening is the same as for the single fork, except for the holes which are located near the center of the fork.



(A: Telescopic Fork body, B: Fastening screws)

6.2.2 Disassembly

• Before start disassembling, make sure that no load is placed on the machine and that the power supply (air and electric power) for the complete system has been switched off!

6.3 Electrical Installation

- Motors and other electrical components are pre-installed
- Limit switches have to be wired

6.4 Commissioning

6.4.1 Preconditions

NOTICE

Before the system is released, a qualified person must carry out a visual and functional test.
This is to make sure that the machines are in a safe condition and there are no defects or damages due to improper installation.

- Mechanical equipment installed.
- Transport securing devices dismounted.
- Electrical equipment installed and connected.
- Safety and monitoring equipment installed and functioning.
- The function test checks all processes occurring without goods during operation of the machines

7 Operation manual

➔ See document „Operation manual of M2S Load-Unload-System“ on CD Rom

8 Service and maintenance

8.1 Safety

WARNING

Moving parts

For cleaning and lubrication all drives of the machine and adjacent machines must be switched off from the power supply. The maintenance work may only be started when the entire machine system has come to a standstill.

CAUTION

Working with chemicals

The safety data sheets and the specific regulations of all chemicals and cleaning agents used for the operation and maintenance of the machine, must be observed.

8.2 Maintenance

- Excess oil and grease must be removed immediately. After completion of the maintenance work, it must be checked whether all protection and safety devices are correctly installed again.
- The machine must be cleaned regularly to ensure a long life of the machine and its production. A weekly cleaning is recommended. Some parts need special care.
- Geared motors, electric drives and other purchased machine parts are to be maintained in accordance with the operating instructions of the manufacturers.
- All fasteners on moving machine parts must be checked for their correct fastening and securing at intervals of 3 months.

8.2.1 Precautions for maintenance

Operations before starting the maintenance:

- ✓ Cut-off and padlock all energy sources and discharge the fluidic systems.
- ✓ Put up signs indicating that the machine is being serviced.
- ✓ Before accessing the area protected by guards, ascertain the status of the machine that the fork is installed on and take extra precautions in case the machine is not in its cycle start position.
- ✓ Observe the established maintenance intervals.

Important points before starting:

- ✓ Always use tools in perfect conditions and specifically intended for the operation to be performed; the use of unsuitable and inefficient equipment can cause serious damage.
- ✓ Before starting the control and maintenance operations, it is appropriate to remove dust and residues from the work area through suction and cleaning with appropriate washing liquids.
- ✓ Perform repairs in clean environments and, as far as possible, free of dust; carefully cover all machined surfaces of the disassembled pieces until they are assembled on the Partly-completed machinery.
- ✓ Depending on the type of activity to be performed, use appropriate personal protective equipment and clothing (e.g. shoes, goggles and protective gloves, etc.) during the maintenance operations.

Tightening torques of the screws:

Rule	New →		4.6		5.6		6.8		8.8		10.9		12.9	
VDI 2230:2003	Old →		4S		5S		6S		8G		10K		12K	
Ø Screw ↓	Pitch		Pitch		Pitch		Pitch		Pitch		Pitch		Pitch	
	Large mm	Thin mm	Large Nm	Thin Nm	Large Nm	Thin Nm	Large Nm	Thin Nm	Large Nm	Thin Nm	Large Nm	Thin Nm	Large Nm	Thin Nm
M3	0,5	-	0,4 0,5	- -	0,5 0,7	- -	0,8 1,1	- -	1,1 1,4	- -	1,6 2,0	- -	1,9 2,4	- -
M4	0,7	-	1,0 1,2	- -	1,2 1,5	- -	1,9 2,4	- -	2,6 3,3	- -	3,9 4,8	- -	4,5 5,6	- -
M5	0,8	-	1,9 2,4	- -	2,4 3,0	- -	3,8 4,8	- -	5,2 6,5	- -	7,6 9,5	- -	8,9 11.2	- -
M6	1,0	-	3,3 4,1	- -	4,1 5,2	- -	6,6 8,3	- -	9,0 11,3	- -	13,2 16,5	- -	15,4 19,3	- -
M8	1,25	1,0	8 10,1	- -	10 12,6	- -	16,1 20,1	- -	21,6 27,3	22.8 29,2	31,8 40,1	33,5 42,8	37,2 46,9	39,2 50,1
M10	1,5	1,25	16,1 20,3	- -	20,1 25,3	- -	32,3 40,6	- -	43 54	44 57	63 79	65 83	73 93	76 98
M12	1,75	1,25	27 34	- -	34 43	- -	55 69	- -	73 93	79 101	108 137	116 149	126 160	135 174
M14	2,0	1,5	44 55	- -	55 69	- -	88 111	- -	117 148	124 159	172 218	182 234	201 255	213 274
M16	2,0	1,5	67 85	- -	84 107	- -	134 171	- -	180 230	189 244	264 338	278 359	309 395	325 420
M18	2,5	1,5	93 118	- -	117 148	- -	187 236	- -	259 329	283 368	369 469	403 523	432 549	472 613
M20	2,5	1,5	131 167	- -	164 209	- -	262 334	- -	363 464	392 511	517 661	558 728	605 773	653 852
M22	2,5	1,5	176 225	- -	220 284	- -	353 454	- -	495 634	529 692	704 904	754 985	824 1057	882 1153
M24	3,0	-	222 287	- -	280 359	- -	450 574	- -	625 798	666 865	890 1136	949 1232	1041 1329	1110 1442
M27	3,0	-	331 424	- -	414 530	- -	662 848	- -	915 1176	- -	1304 1674	- -	1526 1959	- -
M30	3,5	-	450 575	- -	563 719	- -	901 1151	- -	1246 1597	- -	1775 2274	- -	2077 2662	- -
M33	3,5	-	608 780	- -	760 975	- -	1216 1560	- -	1679 2161	- -	2392 3078	- -	2799 3601	- -
M36	4,0	-	783 1002	- -	979 1253	- -	1566 2005	- -	2164 2778	- -	3082 3957	- -	3607 4631	- -
M39	4,0	-	1011 1299	- -	1264 1624	- -	2022 2598	- -	2791 3597	- -	3975 5123	- -	4652 5994	- -

* If a knurled safety washer (Schnorr type) is used, it is necessary to increase by 10% the torques stated on the below table

** If the joint is made with self-locking nuts or rings the torque value must be increased by 15%

Tightening torques of the wheels:

Tightening torque for wheels				
Wheel diameter	Threaded pin	Tightening torque Ma (Nm) Threaded pin	Threaded hole	Tightening torque Ma (Nm) Threaded hole
Ø 13	M5x0.8	10 ÷ 12	--	--
Ø 16	M6x1	15 ÷ 18	--	--
Ø 19	M8x1.25	20 ÷ 25	--	--
Ø 22	M10x1	35 ÷ 40	M6	15
Ø 26	M10x1	35 ÷ 40	M6	15
Ø 30	M10x1	35 ÷ 40	--	--
Ø 30	M12x1.5	45 ÷ 50	M6	15
Ø 32	M12x1.5	45 ÷ 50	M6	15
Ø 35	M16x1.5	100 ÷ 110	M6	15
Ø 40	M15x1	90 ÷ 100	--	--
Ø 40	M18x1.5	120 ÷ 130	--	--
Ø 47	M20x1.5	160 ÷ 180	--	--
Ø 52	M20x1.5	160 ÷ 180	--	--
Ø 62	M24x1.5	220 ÷ 250	--	--
Ø 72	M24x1.5	220 ÷ 250	--	--
Ø 80	M30x1.5	450 ÷ 500	--	--
Ø 90	M30x1.5	450 ÷ 500	--	--

If needed, during maintenance operations, it is necessary to use adhesives and glues.

NOTICE

Use LOCTITE 638 Medium to screw stem for fastening all wheels and LOCTITE 270 Strong for nut thread for fastening all wheels.

8.2.2 Maintenance

Parts	Activity / Remark	Time interval*
Sliding wheels	Check for lubrication and tightness	3-monthly
Bearings	Check for lubrication	3-monthly
Bauer springs pack	Check for adjustment and tensioning	3-monthly
Cogwheels	Check for lubrication	6-monthly
Rack	Check for lubrication and tightness	6-monthly
Chain return unit	Check for lubrication	6-monthly
Side guide shoes	Check for lubrication and tensioning	6-monthly
Fleyer chain	Check for lubrication and tightness	6-monthly
Fleyer chain fastening	Check for tightness and wear	6-monthly
Chain guide	Check for tightness and wear	6-monthly
Pulley	Check for wear	6-monthly
Transmission belt	Check for tensioning and wear	6-monthly
Motor shaft	Check for lubrication	6-monthly
Torque limiter	Check for integrity	6-monthly
Shrink disk	Check for malfunction	6-monthly
Cardan joint / counter-flange	Check for lubrication and tightness	6-monthly

Joint	Check for lubrication and tightness	6-monthly
Pinion / ring / idler wheel	Check for wear	6-monthly
Embossed rubber / non-skid strips	Check for integrity	6-monthly
Sensors and reflectors	Check for integrity and wear	Yearly
Cams	Check for integrity	Yearly
Gear motor	Check for integrity and tightness	Yearly
Encoder	Check for integrity and tightness	Yearly
Slides and fixed body	Check for lubrication and tightness	Yearly
Compression spring	Check for integrity	Yearly

**Time intervals are valid by considering 16 hours a day, for every day including holidays.*

8.3 Service Address

OLBRICHT Automation GmbH
Hamminkelner Str. 30
D-46499 Hamminkeln-Brünen

T:+49 (0) 28 56 / 9 09 96-0
F:+49 (0) 28 56 / 9 09 96-60
info@olbricht.de
www.olbricht.de

9 Disposal

9.1 Safety

WARNING

Pollution of the environment due to unsuitable disposal of gear oil.

Gear oil is not fully biodegradable. Therefore oil must not be disposed of in the environment in an uncontrolled manner.

- The proper disposal of used oil must only be undertaken by the authorized maintenance personnel.
- Soak up or dam up oil that has run out of equipment with sand, soil or absorbent material.
- Collect gear oil in a suitable container provided for the purpose and dispose of it in accordance with the local statutory requirements.
- Draining and penetration of oil into the sewerage system.
- Penetration of oil into the water drain by setting up barriers of sand or earth or other appropriate barrier methods.

WARNING

Environmental pollution due to the unsuitable disposal of packaging material

Packaging material contains chemical compounds, which must be dealt with appropriately.

The specialized disposal of packaging material takes place via an appropriately authorized disposal company with adherence to the national regulations.

Do not burn packaging materials or dispose of it as household refuse.

Disposal only by authorized companies.

9.2 Disposal

The following points apply without restriction. The precautions laid down as a result of national regulations are to be carried out implicitly.

1. Make sure that any products lie on the Telescopic Fork.
2. Switch off the supply of air and electric power.
3. Wear personal protection equipment.
4. Dismantling of machine.
5. All parts, auxiliary and operating substances are to be removed from the Telescopic Fork by specialist personnel. In so doing these parts are to be sorted into specific categories.
6. All waste products are then to be disposed of in accordance with local regulations and directives for recycling or special refuse categories by authorized companies.

10 Spare parts

10.1 Assembly parts

Qty	Code	Designation	Group
1	GSI11730	LOWER MOBILE ELEMENT L=2400	Fork
1	20.7092.03	HORIZONTAL PLATE UPPER MOBILE ELEMENT	Fork
2	20.7092.04	VERTICAL PLATE UPPER MOBILE ELEMENT L=1200	Fork
1	20.7092.05	CONTROL RACK M=4 L=2400	Fork
2	20.5489.30	TIE ROD	Fork
16	SSG.15	WHEEL KRV32PP	Fork
3	SSG.16	GEAR M=4 Z=35	Fork
1	20.7092.23	GEAR M=4 Z=21	Fork
2	SSG.18	GEAR M=4 Z=28	Fork
1	Scg001-220x1200	RUBBER 220x1200	Fork
3	Scl001-10x40	REFLECTOR DG-K DIMOND GRANEED 10x40	Sensor
4	20.7095.09-10	SPROCKET Z=23 P=1" 1/2 D., SPROCKET Z=16 P=1" 1/2 D.	Lift
1	20.7095.21-22, 20.7093.05	COUNTERFLANGE	Lift
24	SCI011	WHEEL NUTR17-X	Fork
2	SCD012.3238.50	FLEYER CHAIN TSUBAKI AL-422 L=3238,50	Fork
10,2	Sca008, SCA010	BEARING 6006 2RS1, BEARING 6008 2RS1	Fork
4	Sca007	WHEEL NATV12PPX	UCW200
1	SCEN048	ENCODER AFM60A-BDIB 018X12	Transmission
3	SCSE040	SENSOR WL8-P2231	Sensor
2	SCSE036	MICRO XS612B1PAM12	Sensor
1	SCTR222	SHAFT HUB CONNECTION RCK 11 55/85	Lift
4,12,4	SCA193	BEARING 22214-E, BEARING 6018 2RS, BEARING 6010 2RS1, BEARING 22211E	Lift
2*	SCD039.3009.90, SCD039.3162.30	P=1" 1/2 D. CHAIN L=3009,90, P=1" 1/2 D. CHAIN L=3162,30	Lift
8*	SCI034, SCI007	WHEEL NATV40PPX, WHEEL NATV12PPX, WHEEL NATV30PPX	Lift
4*	SCTR096	SHAFT HUB CONNECTION RCK 11 70/110	Lift

*quantity for each part.

10.2 Spare parts

10.2.1 Classification of spare parts

The parts lists of the assembly drawings have a column “Spares” (see figure below). It shows where the spare parts are located. The spare parts are labeled with **I, II, III**.

	Classification of spare parts according the need to keep them available
Classification	**Explanations:**
I	Spare parts that should be available at start-up, because they can fail at any time.
II	Spare parts to be expected for replacement within a two-year operation life-time, depending on normal wear and stress.
III	Spare parts, to be expected for replacement after more than a two-year operation life-time, depending on normal wear and stress, it is recommended to have them on stock.

OLBRICHT
Glass Processing & Handling Technologies

Olbricht Automation GmbH

PART LIST

Project No / Machine ID:	801.01
Customer name:	SAGE
Owner:	Ahmet ALGUR
Edit by:	HS,AA,AT,RE
Rev. date & No:	19/12/2019

#	Part / Component No.	Part / Component Name		Unit	Qty	Brand		CLASS.
1	WHEEL KRV32PP	Cam followers		Pcs	24	SKF		I
2	WHEEL NUTR17-X	Support rollers with flange rings, with an inner ring		Pcs	36	SKF		I
3	AL-422 (L=3238.5mm)	Flyer chain		Pcs	1	TSUBAKI		I
4	6006 2RS1	Deep groove ball bearings		Pcs	15	SKF		I
5	6008 2RS1	Deep groove ball bearings		Pcs	3	SKF		I
6	KAZ77DRN100LM4BE5HR/TF	Gear motor		Pcs	1	SEW		I
7	AFM60A-BDIB 018X12	Encoder		Pcs	1	SICK		I
8	KAZ107DRN132S4BE11HR/TF	Gear motor		Pcs	1	SEW		I
9	22214-E	Spherical roller bearings		Pcs	6	SKF		I
10	6018 2RS	Deep groove ball bearings		Pcs	6	SKF		I
11	6010 2RS1	Deep groove ball bearings		Pcs	18	SKF		I
12	NATV40PPX	Support roller		Pcs	4	INA		I
13	NATV12PPX	Cam yoke roller bearings		Pcs	12	INA		I
14	22211E	Spherical roller bearings		Pcs	6	SKF		I
15	NATV30PPX	Cam yoke roller		Pcs	12	INA		I
16	MICRO XS612B1PAM12	Inductive sensor-NO- XS6 M12 - L62mm - brass - Sn4mm - 12..48VDC - M12		Pcs	8	TELEMECANIQUE		I
17	REF-DG-K	"Diamond grade" reflective tape, self-adhesive, can be assembled from the sheet		Pcs	3	SICK		I
18	WL8-P2231	Photoelectric retro-reflective sensor, autocollimation		Pcs	6	SICK		I

10.2.2 Instruction for the use of spare parts

- Only use original-manufactured-equipment (OEM)-spare parts.
- When ordering spare parts, please refer always to Olbricht Automation assembly-drawing-number and part-number. Proprietary spare-parts have to be identified with:
  a) Name of supplier/manufacturer
  b) Component designation
  c) Component identification-number
- The part-number in the part list is identical with the part-number on the associated assembly drawing.
- Some spare parts need special assembly instructions, operating manuals or data sheets.
  ➔ See folder „Assembly drawings” on CD ROM.

NOTICE

By using other spare parts, the safety and function of the machine are not guaranteed any longer. In this case Olbricht Automation assumes no responsibility.

10.2.3 Spare parts lists

➔ See folder „Spare parts list” on CD ROM.

11 Applicable Documents

11.1 Assembly Drawings

➔ See folder „ Assembly drawings” on CD ROM.

11.2 OEM Parts Documentation

➔ See folder „ OEM Parts Documentation” on CD ROM.

11.3 Wiring diagrams

➔ See folder „Wiring diagrams” on CD ROM.

11.4 Spare parts list

➔ See folder „Spare parts list” on CD ROM.

12 Preventive Maintenance

Intervention:		**CHECK**	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Bearings and bearing supports	1440 (3 months considering 16 hours a day every day including holidays)	• Noise level anomalies • Integrity ✓ Lubrication	Grease (if required).
Recommended grease:	Normal: ATOMIC RH (NILS)	Cold: ATOMIC T4938 (NILS)	Hot: BARRIERTA L55/2 (KLÜBER)
			
Pictures are only for illustration purpose.			

Intervention:		**CHECK**	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Shrink disk	2880 (6 months considering 16 hours a day every day including holidays)	• Integrity • Malfunction ✓ No maintenance	Replace if necessary.
			
Pictures are only for illustration purpose.			

<table>
<tr><td colspan="2">Intervention:</td><td colspan="2">CHECK</td></tr>
<tr><td colspan="2">Maintenance:</td><td colspan="2">Preventive</td></tr>
<tr><td>Components</td><td>Frequency (hours)</td><td>• Check
✓ Maintenance</td><td>Warnings</td></tr>
<tr><td>Sliding wheels</td><td>1440 (3 months considering 16 hours a day every day including holidays)</td><td>• Damage
• Noise level
• Fluidity
• Fixings
✓ Lubrication
✓ Sliding
✓ Tightening nuts, screws, ring nuts</td><td>If wheel is dry, lubricate using special grease nipple on the wheel. After greasing, remove any grease leakage with a cloth.</td></tr>
<tr><td colspan="2" rowspan="4"> 
Pictures are only for illustration purpose.</td><td colspan="2">Recommended grease:</td></tr>
<tr><td colspan="2">ATOMIC RH(NILS)</td></tr>
<tr><td colspan="2">ATOMIC T4938(NILS)</td></tr>
<tr><td colspan="2">BARRIERTA L55/2(KLÜBER)</td></tr>
</table>

<table>
<tr><td colspan="2">Intervention:</td><td colspan="2">CHECK</td></tr>
<tr><td colspan="2">Maintenance:</td><td colspan="2">Preventive</td></tr>
<tr><td>Components</td><td>Frequency (hours)</td><td>• Check
✓ Maintenance</td><td>Warnings</td></tr>
<tr><td>Cogwheels</td><td>2880 (6 months considering 16 hours a day every day including holidays)</td><td>• Wear
• Damage
• Noise level anomalies
• Anomalous backlash between adjacent gears
✓ Lubrication
✓ Cleaning</td><td>Replace in the event of excessive wear</td></tr>
<tr><td colspan="2" rowspan="4"> 
Pictures are only for illustration purpose.</td><td colspan="2">Recommended grease:</td></tr>
<tr><td colspan="2">ATOMIC RH(NILS)</td></tr>
<tr><td colspan="2">POLYSYNT SPRAY (NILS)</td></tr>
<tr><td colspan="2">BARRIERTA L55/2(KLÜBER)</td></tr>
</table>

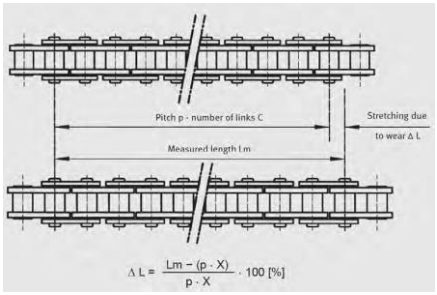
Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Cardan joint / Counterflange	2880 (6 months considering 16 hours a day every day including holidays)	✓ Lubrication ✓ Screws tightness • İntegrity • Fixings	Lubrication (only if fitted with special grease nipples)
Recommended grease:		Optitemp PU 035/4 (CASTROL)	

Pictures are only for illustration purpose.

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Sensors	5760 (12 months considering 16 hours a day every day including holidays)	• Check correct operation • Integrity ✓ Cleaning	In case of failure or malfunction, replace. Clean using a dry and clean cloth. If necessary, use suitable detergents.

Pictures are only for illustration purpose.

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Structure	5760 (12 months considering 16 hours a day every day including holidays)	• Integrity • Fixings ✓ Cleaning ✓ Lubrication ✓ Screws tightness	Replace in the event of excessive wear. Lubricate the sliding tracks (if any).
 Pictures are only for illustration purpose.		**Recommended grease:** GLEITIOL 68(NILS) PTFE SPECIAL OIL SPRAY (NILS) GLEITIOL 68(NILS)	

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Fleyer chain and Roller chain	2880 (6 months considering 16 hours a day every day including holidays)	• Wear • Tensioning ✓ Cleaning ✓ Tensioning ✓ Lubrication	Replace in the event of excessive wear. To tension the fleyer chains, see the fleyer chains return unit replacement sheet. Chain elongation check. If deformation is greater than **3%**, proceed with replacement.
 Pictures are only for illustration purpose.		**Recommended grease:** KETTOLUB SPRAY(NILS) SINTHERM SPRAY (NILS) KETTOLUB SPRAY(NILS)	

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Bauer springs pack	1440 (3 months considering 16 hours a day every day including holidays)	• Integrity • Yielding ✓ Adjustment and tensioning	Check the correct tensioning. For the correct adjustment parameter of the spring pack refer to the image below. If the detected measurement is greater, turn the adjustment nuts and readjust the spring length to the correct value. If necessary, you can remove one or more chain links (Firstly check that the elongation of the chain does not exceed 3%.)

The value "xxx,x" is stated on official Test Card (you can find in on Charapter 6 "Attachment" of our use and maintenance manual)

Pictures are only for illustration purpose.

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Rack	2880 (6 months considering 16 hours a day every day including holidays)	• Wear • Damage • Fastening ✓ Cleaning ✓ Lubrication ✓ Screws tightness	Replace in the event of excessive wear.

Pictures are only for illustration purpose.

Recommended grease:

KETTOLUB SPRAY(NILS)

SINTHERM SPRAY (NILS)

KETTOLUB SPRAY(NILS)

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Chain return unit	2880 (6 months considering 16 hours a day every day including holidays)	• Wear • Damage • Fixing • Fluidity ✓ Screws tightness ✓ Greasing	Replace in the event of excessive wear. Grease (if fitted with special grease nipples).
 Pictures are only for illustration purpose.		**Recommended grease:** ATOMIC RH SPRAY(NILS) ATOMIC T4938(NILS) BARRIERTA L55/2(KLÜBER)	

Intervention:		CHECK	
Maintenance:		Preventive	
Components	**Frequency (hours)**	• **Check** ✓ **Maintenance**	**Warnings**
Side guide shoes	2880 (6 months considering 16 hours a day every day including holidays)	• Wear • Backlash between the shoes and their sliding tracks ✓ Cleaning (no solvents) ✓ Lubrication	In case of excessive wear, calibrate.
 Pictures are only for illustration purpose.		**Recommended grease:** GLEITIOL 68(NILS) PTFE SPECIAL OIL SPRAY(NILS) GLEITIOL 68(NILS)	