



**TOOL CHANGER**  
**TOOL TOWER**  
**1610-112-CAT60/200/10-IM**

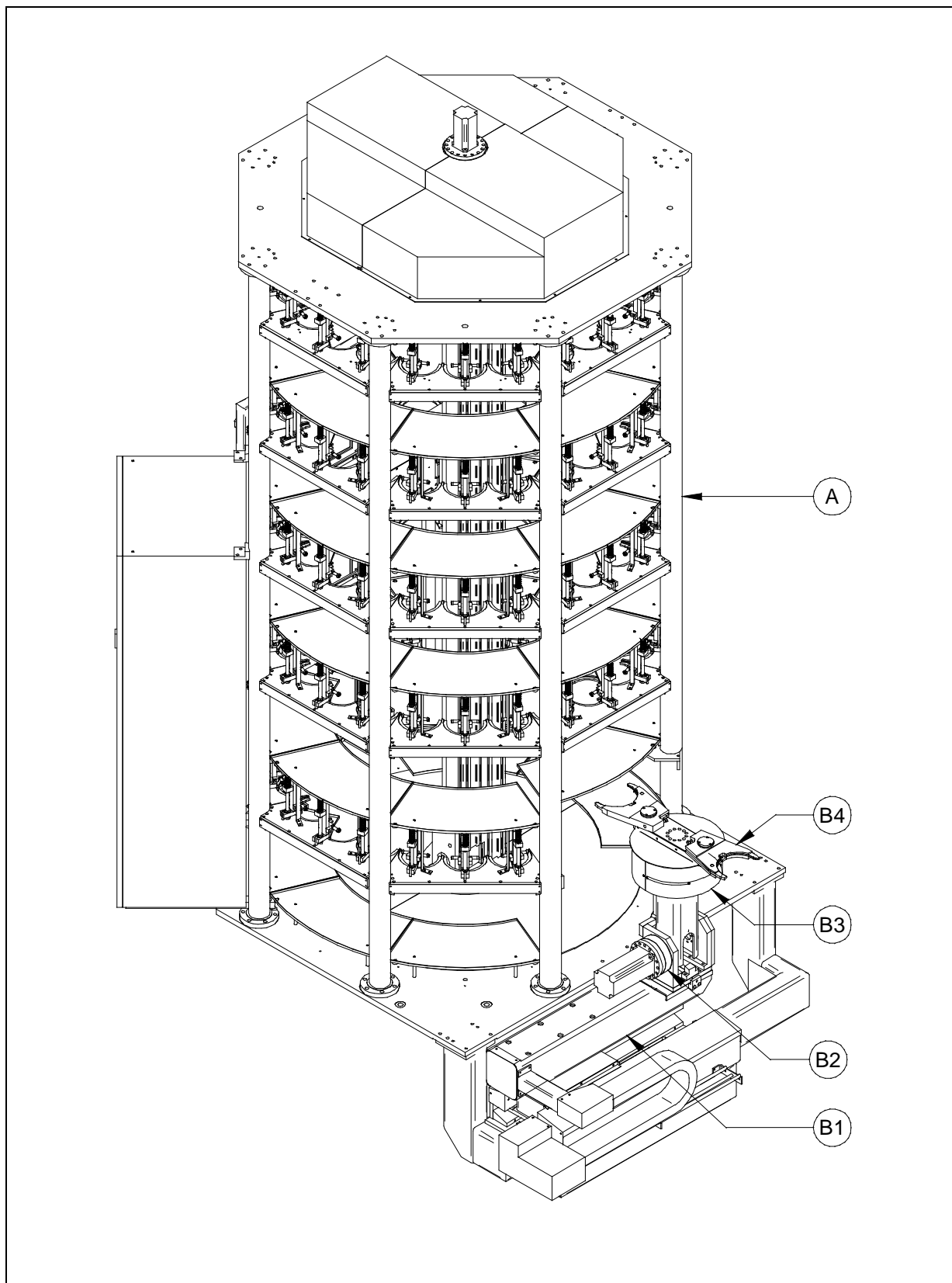
INSTRUCTIONS, MAINTENANCE AND SPARE PARTS HANDBOOK

TTM011  
VERSION 07/10

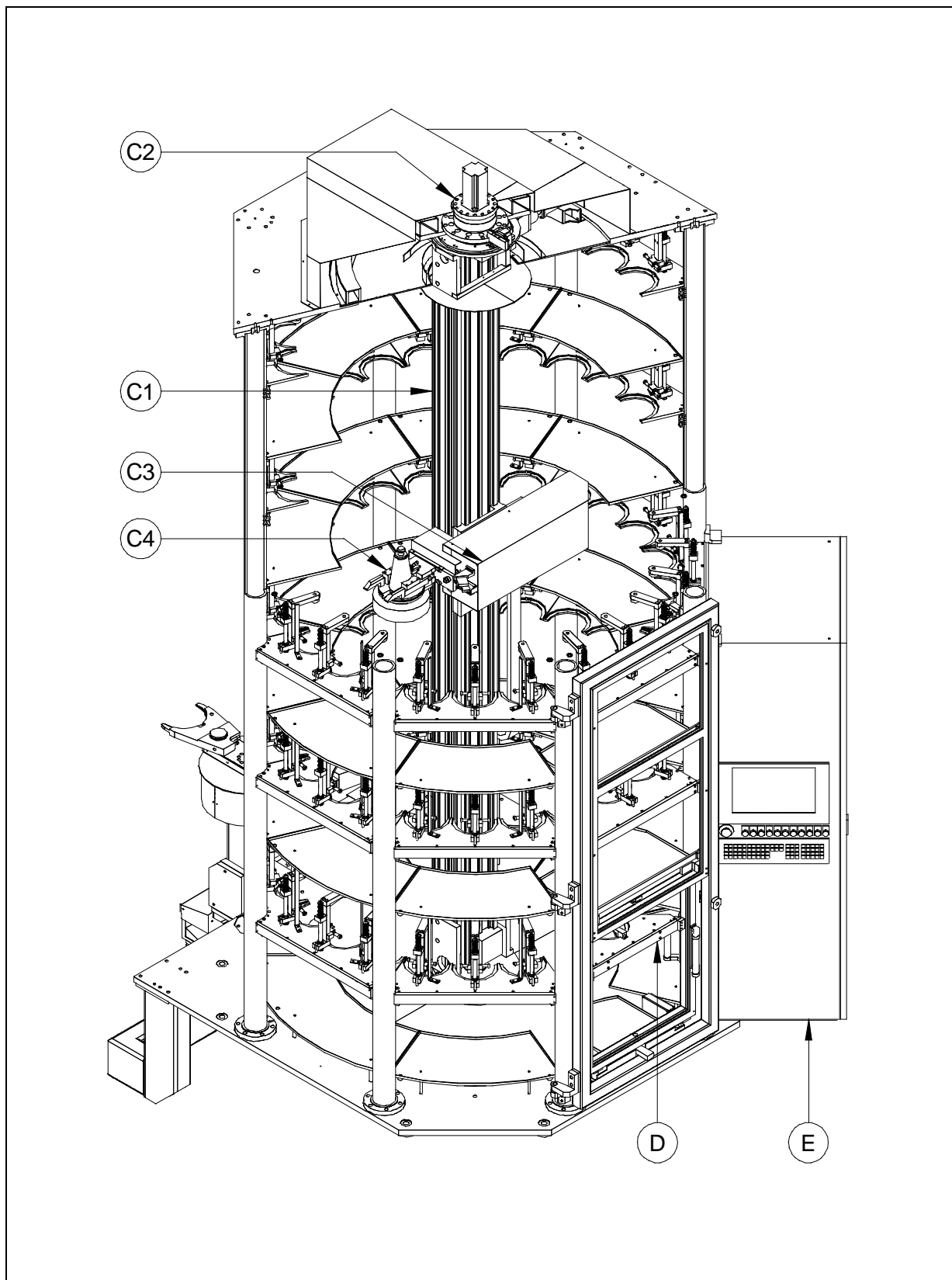
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## DESCRIPTION



## DESCRIPTION



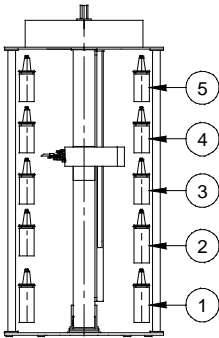
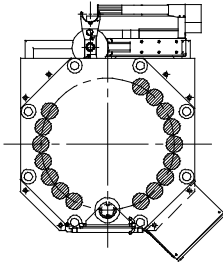
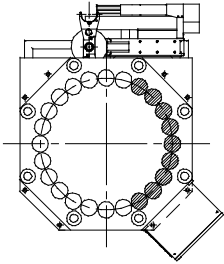
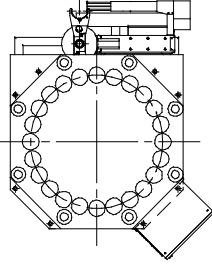
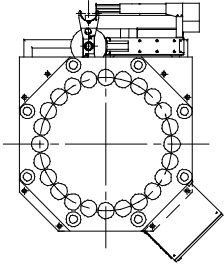
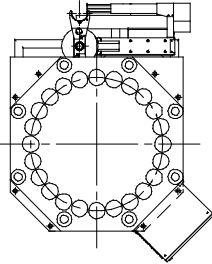
## DESCRIPTION

The TOOL TOWER tool changer is composed of:

- A. 5 level store for tools of CAT60 type with flange diameter 200 mm, for an overall capacity of 112 tools
- B. Exchange arm connected to the machine consisting of:
  - B1. Horizontal linear axis with re-circulating ball guides, controlled by an electric servomotor and re-circulating ball screw
  - B2. Overturning axis with precision reduction gear and electric servomotor
  - B3. Rotating joint axis with precision reduction gear and electric servomotor
  - B4. Tool grasping pliers with mechanical holding
- C. Mechanical hand for tool exchange between store and exchange arm, consisting of:
  - C1. Vertical linear axis with re-circulating ball guides operated by a positive drive belt with precision reduction gear and electric servomotor
  - C2. Rotating axis with precision reduction gear and electric servomotor
  - C3. Horizontal linear axis with re-circulating ball guides, operated by a pneumatic cylinder with limit switch shock absorbers
  - C4. Pneumatic controlled tool grasping pliers, with mechanical safety lock and pneumatic release
- D. Manual tool loading/unloading workstation with electric safety lock
- E. Programmable control box

## TECHNICAL DATA

Tool store		
Tool shank	CAT 60 - flange dia 200	
Tool storing levels	N°	5
Pocket capacity	N°	112
Max. tool diameter	mm	200
Max. tool diameter with adjacent pockets empty	mm	305
Max. tool length	mm	500
Max. tool weight	kg	40

	Level 1 – 16 tools L=500
	
Level 2 – 15 tools L=400 9 tools L=500	Level 3 – 24 tools L=400
	
Level 4 – 24 tools L=400	Level 5 – 24 tools L=400
	

## TECHNICAL DATA

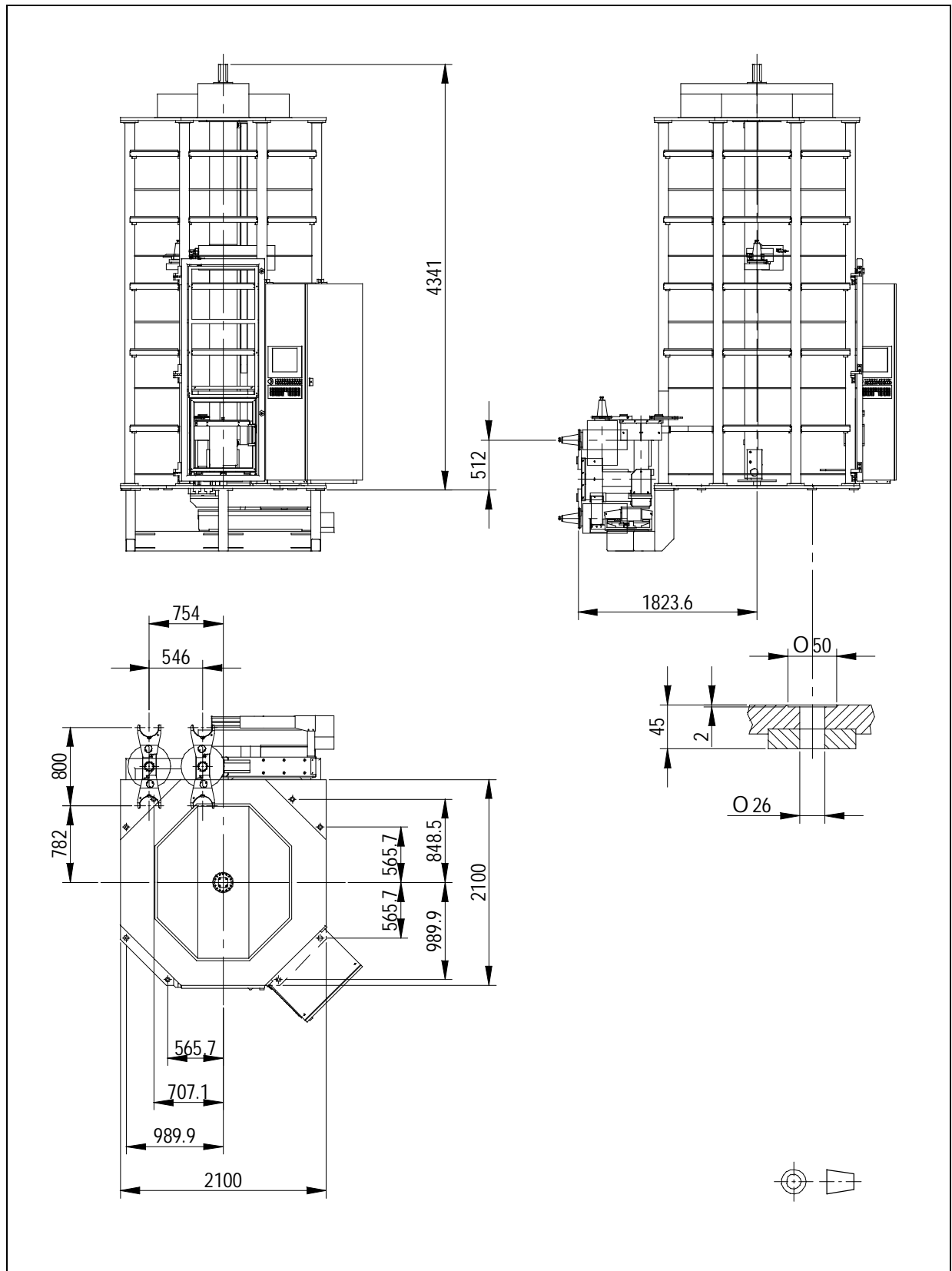
Exchange arm			
Linear axis	Max. stroke	mm	655
	Ball screw : diameter / pitch	mm	20 / 20
	Max. linear speed	m/min	20
	Max. motor speed	rpm	1000
	Motor	Siemens 1FK7042-5AF71-1GG0	
Overturning axis	Gear reduction drive ratio		119
	Time rotation on 90°	s	11
	Max. motor speed	rpm	165
	Motor	Siemens 1FK7063-5AF71-1GB0	
Rotating joint axis	Gear reduction drive ratio		119
	Time rotation on 180°	s	1.2
	Max. motor speed	rpm	2975
	Motor	Siemens 1FK7042-5AF71-1GH0	

## TECHNICAL DATA

Mechanic hand			
Vertical axis	Max. stroke	mm	3020
	Reduction gear stroke	mm/rev	240
	Gear reduction drive ratio		45
	Max. linear speed	m/min	16
	Max. motor speed	rpm	3000
	Motor	Siemens 1FK7042-5AF71-1GH0	
Rotating axis	Gear reduction drive ratio		119
	Max. rotating speed	degree/s	150
	Max. motor speed	rpm	2975
	Motor	Siemens 1FK7063-5AF71-1GA0	
Horizontal axis	Pneumatic cylinder : bore / rod	mm	50 / 16
	Stroke	mm	350
Weight (without tools)		kg	4600



## OVERALL DIMENSIONS

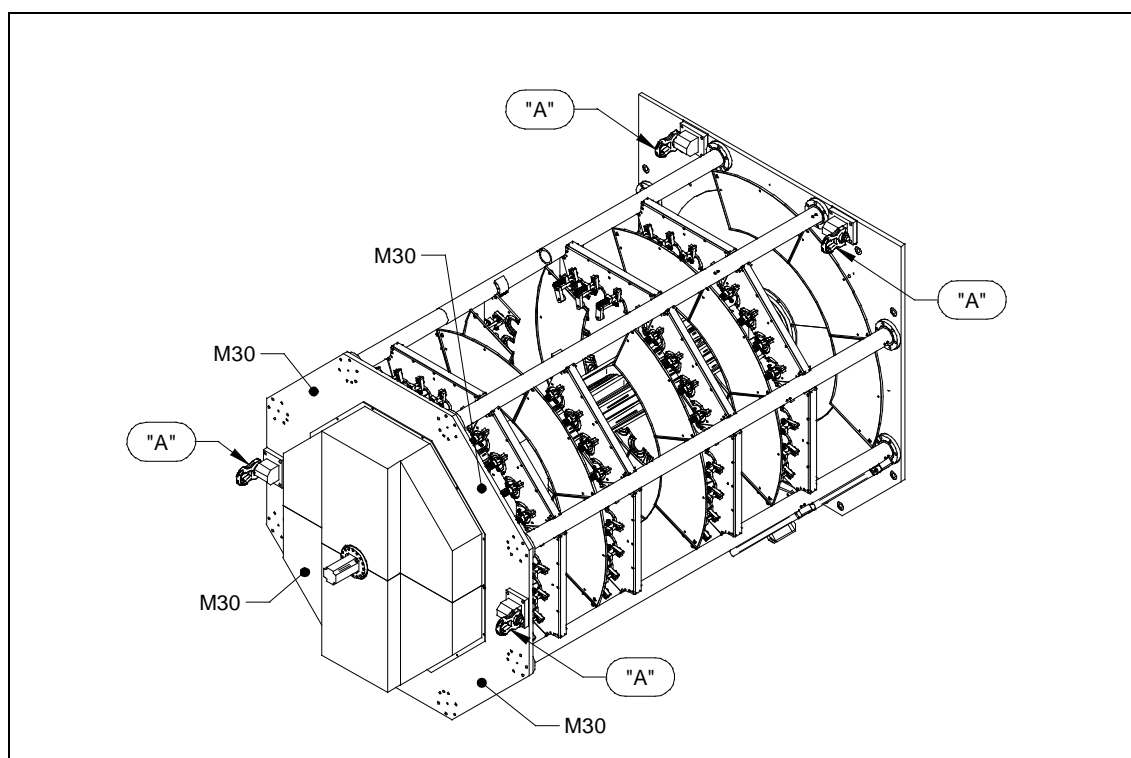


## TRANSPORT

For the transport the tool exchange store is divided into three units:

1) Tower tool store

The tool store upper and lower plates are equipped with no. 4 eyebolts "A" for lifting and overturning operations; the upper plate is also fitted with no. 4 holes M30

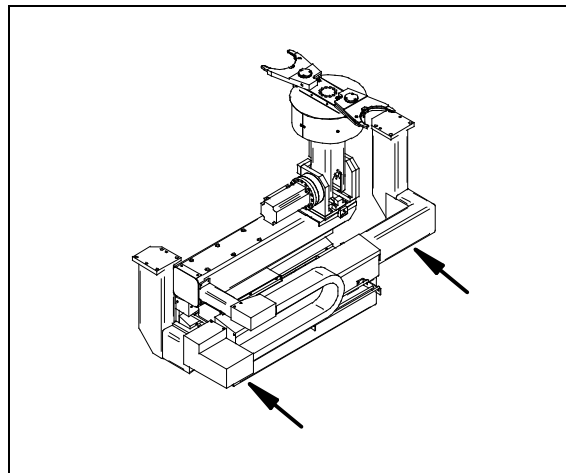


**For lifting and handling operations no other parts of the tool store must be used.**

Tool store weight : 3800 kg

## TRANSPORT

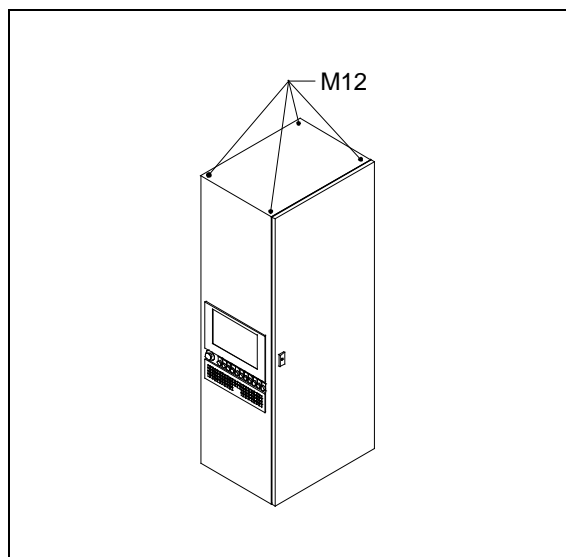
- 2) Tool exchange arm  
To transport the arm lift the supporting structure using a fork lift truck or suitable ropes



**Lift and handle the tool store exclusively from the supporting structure; for such activities no other parts of the store must be used.**

Tool exchange arm weight : 650 kg

- 3) Control box  
The top side is equipped with no. 4 holes M12



Box weight: 150 kg

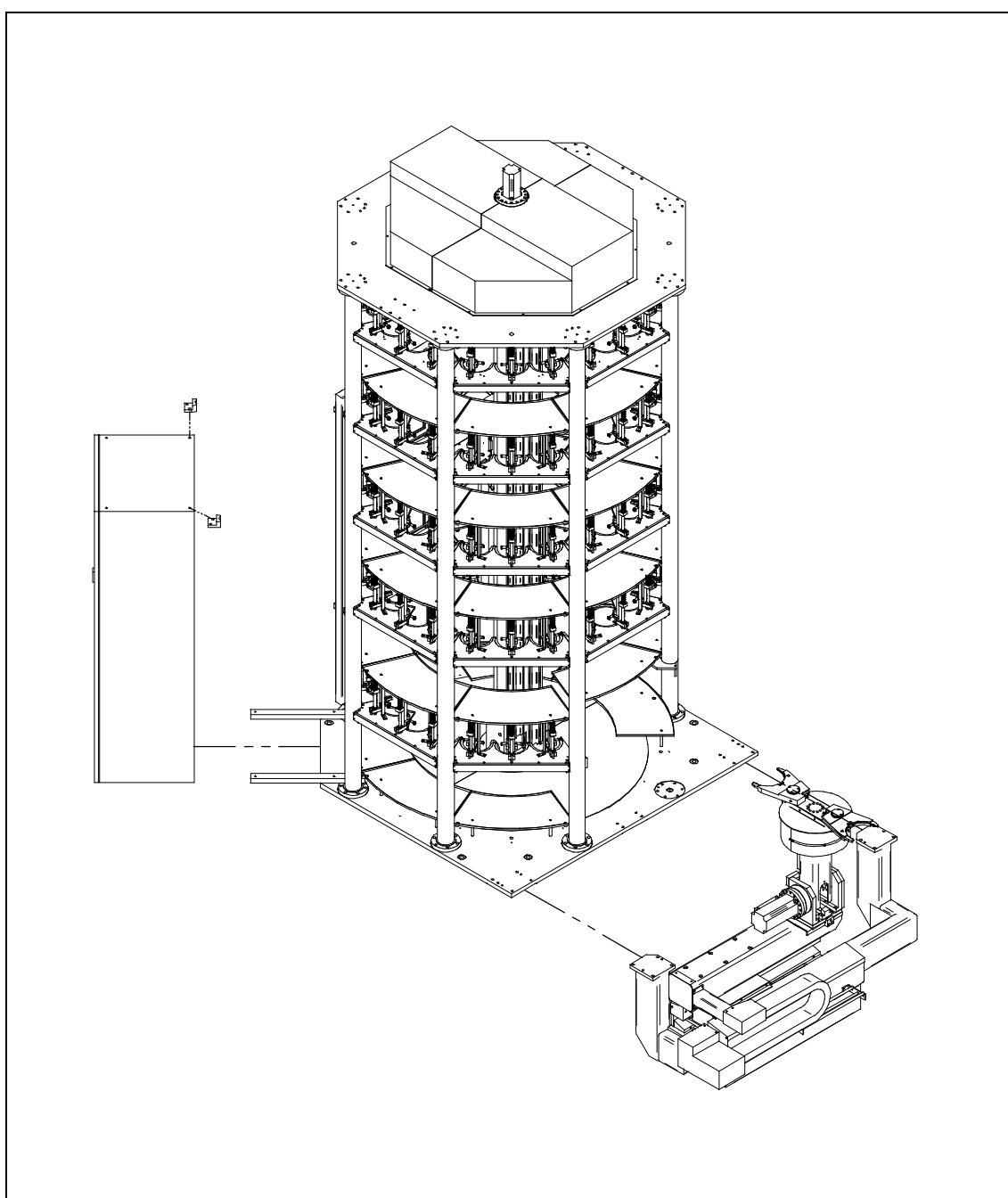
## INSTALLATION

### INSTALLATION OF THE TOOL EXCHANGE ARM

Remove the eyebolts from the lower plate of the tool store and connect the arm.

### INSTALLATION OF THE CONTROL BOX

Install the control box on the tool store using the brackets supplied.  
Connect the electric cables according to the schema.

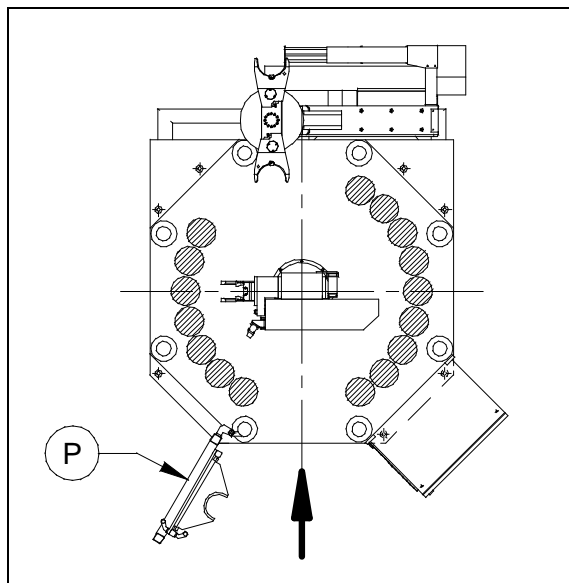


## MAINTENANCE

Periodically perform the checking and controlling program listed below.

**WARNING:** prior to performing any maintenance, disconnect the tool changer from the main power supply.

The door "P" allows access in the internal part of the tool store, to perform maintenance operations.



### REDUCTION GEAR MAINTENANCE

- The reduction gears of the rotating joint of the arm and the mechanic hand vertical and rotating axis are already lubricated with SHELL ALVANIA RA grease and do not require any maintenance.

### MONTHLY CLEANING

- Make sure that there is no dirt that may cause a malfunction of the inductive sensors and photoelectric sensors.

### YEARLY MAINTENANCE

- Visually check insert pliers conditions of mechanic hand; replace in case of damage.
- Lubricate the trolleys of the re-circulating ball linear guides of the exchange arm horizontal axis, of the horizontal and vertical axis of the mechanic hand by greasing in the specified points, see next pictures.

Suitable lubricant:

Agip	Longtime Grease 2	KPE 2 N-40
BP	Energrease LS EP 2	KP 2 K-20
Esso	Beacon EP 2	KP 2 N-20
Mobil	Mobilux EP 2	KP 2 K-20
Shell	Alvania G2	KP 2 N-20

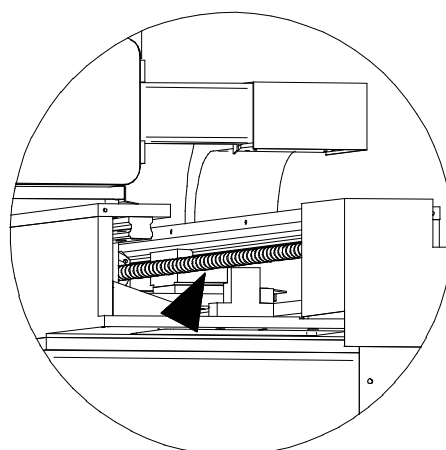
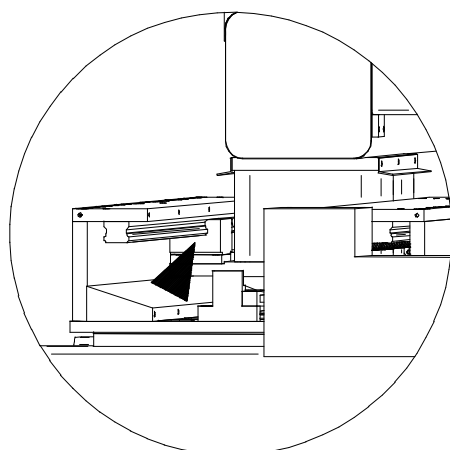
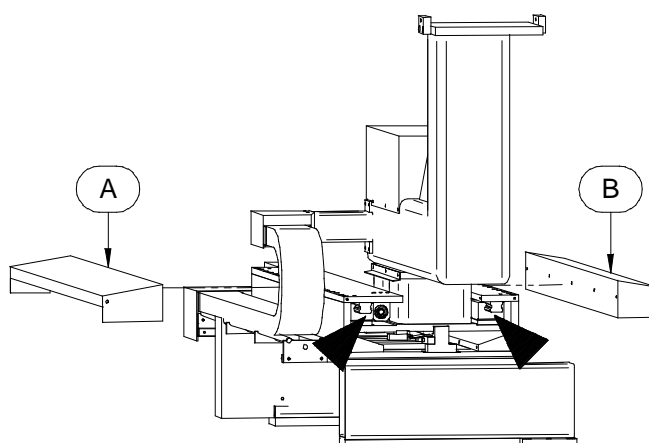
## MAINTENANCE

### EXCHANGE ARM – LINEAR AXIS

#### LUBRICATION

Remove covers “A” and “B”

Grease at the points indicated

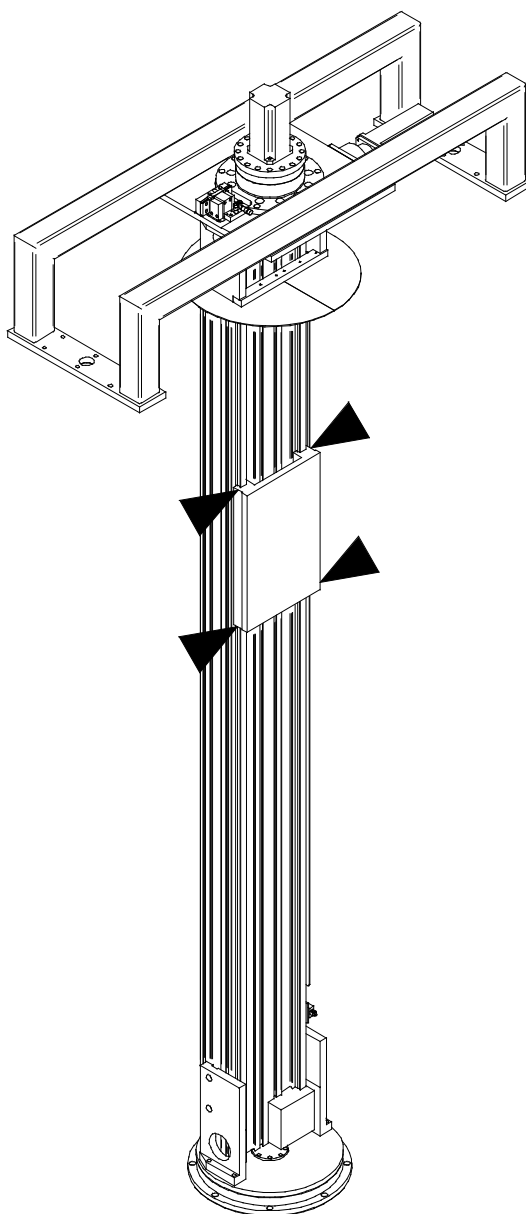


## MAINTENANCE

### MECHANIC HAND – VERTICAL AXIS

#### LUBRICATION

Grease at the points indicated



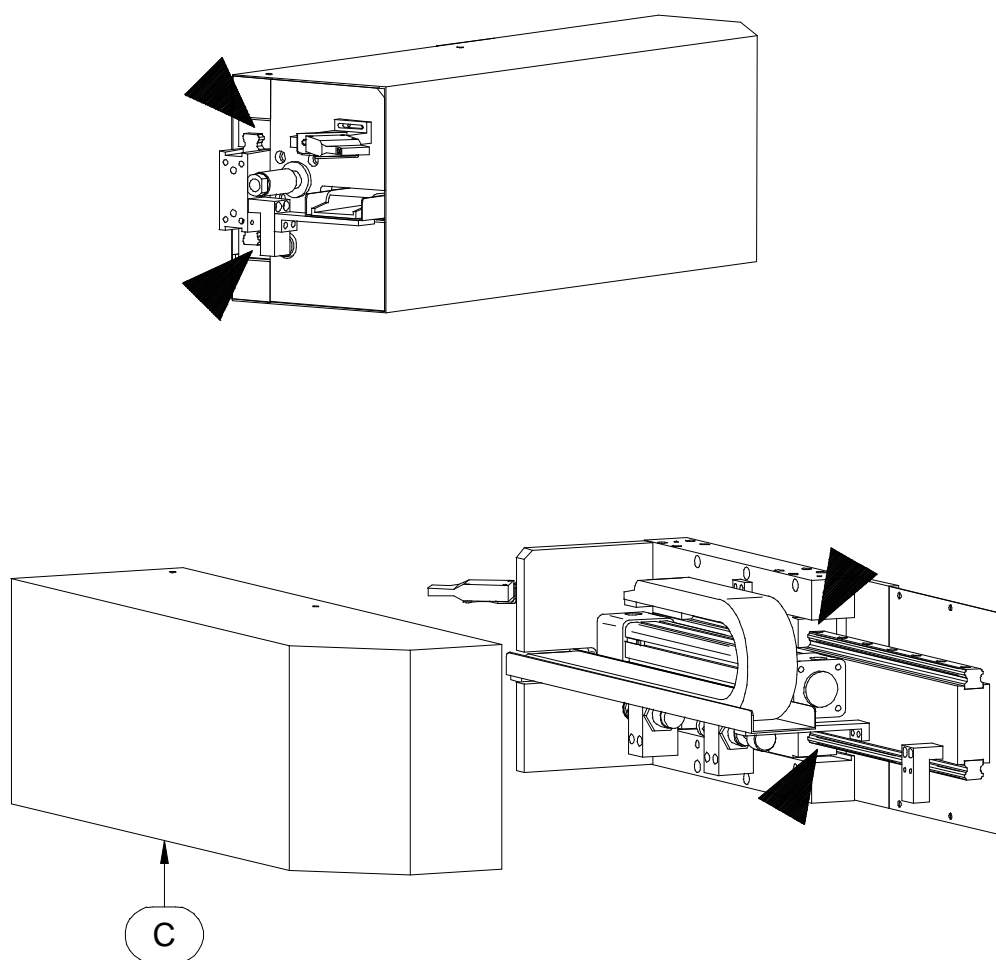
## MAINTENANCE

### MECHANIC HAND – HORIZONTAL AXIS

#### LUBRICATION

Remove cover "C"

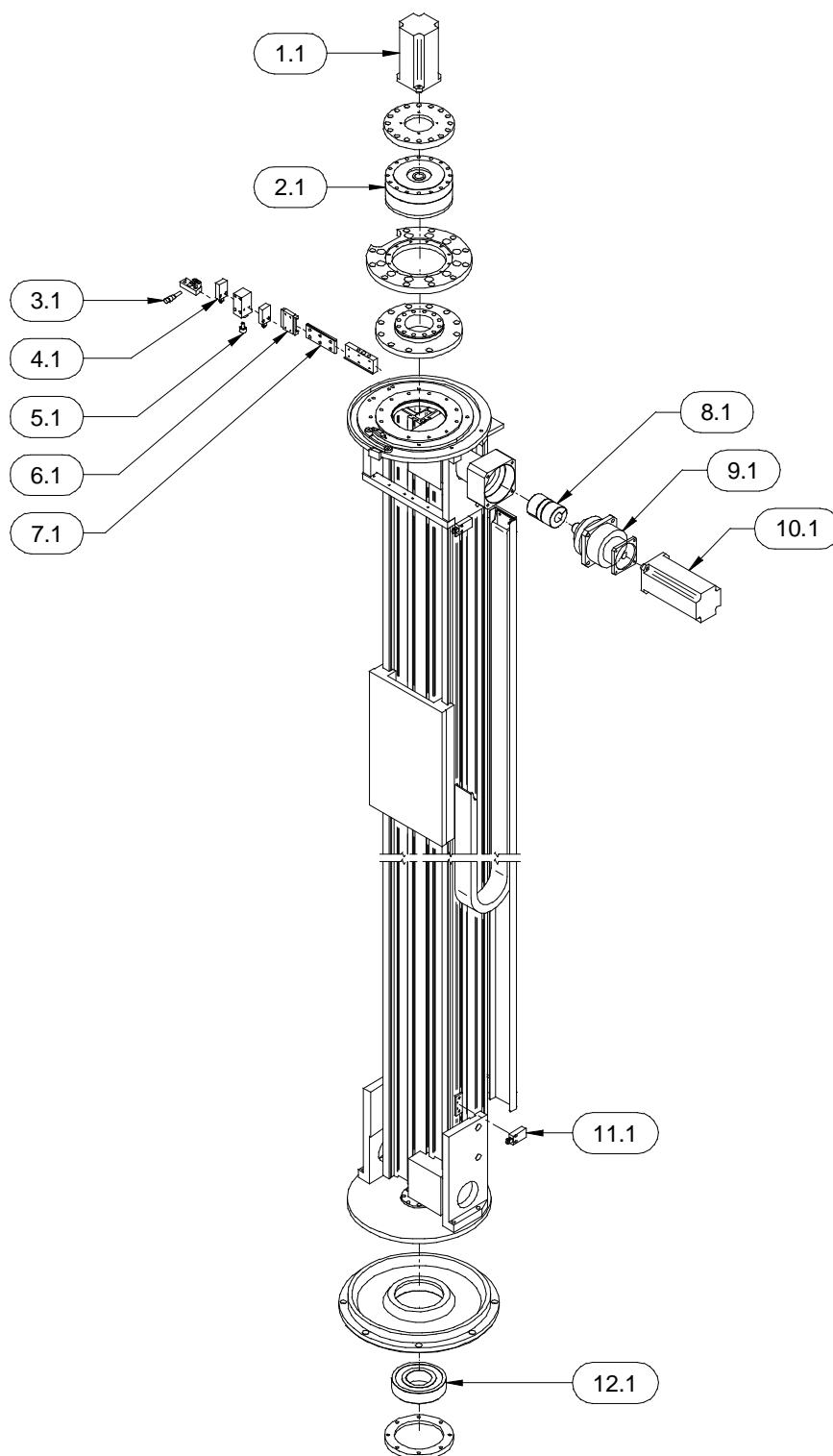
Grease at the points indicated





## SPARE PARTS

### 1 . MECHANIC HAND – VERTICAL AND ROTATING AXIS



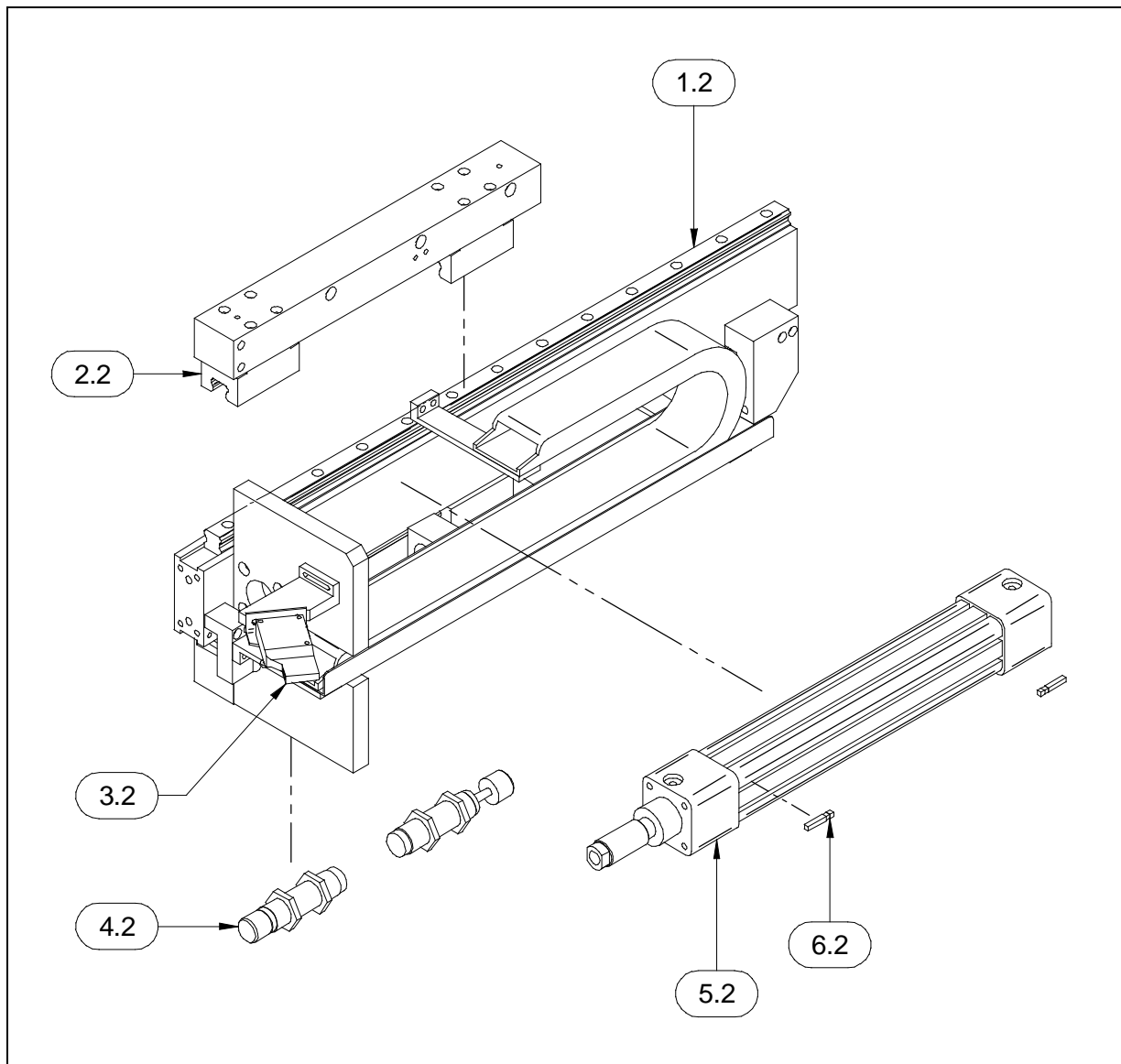
## SPARE PARTS

### 1 . MECHANIC HAND – VERTICAL AND ROTATING AXIS

Pos.	Component		Q.ty	Code
1.1	Synchronous servomotor	1FK7063-5AF71-1GA0 - SIEMENS	1	92-106
2.1	Reduction gear	F2CS-A35-119 - SUMITOMO	1	91-137
3.1	Inductive sensor	E2A-M08KS02-M1-B1 - OMRON	1	92-095
4.1	Micro-switch	FA 4115-2DN - PIZZATO	2	92-011
5.1	Idle pin		1	10-015
6.1	Re-circulating ball trolley	MGW 15 C - HIWIN	1	91-036
7.1	Re-circulating ball guide	MGW R 15 R 110 - HIWIN	1	91-209
8.1	Joint	ROTEX GS 28-98Sh A-GS 6.0-Ø30 6.0-Ø30	1	91-211
9.1	Reduction gear	ANFX P30F-L3-45 - SUMITOMO	1	91-059
10.1	Synchronous servomotor	1FK7042-5AF71-1GH0 - SIEMENS	1	92-105
11.1	Micro-switch	FA 4115-2DN - PIZZATO	2	92-011
12.1	Bearing	70x150x35 1314	1	91-253

## SPARE PARTS

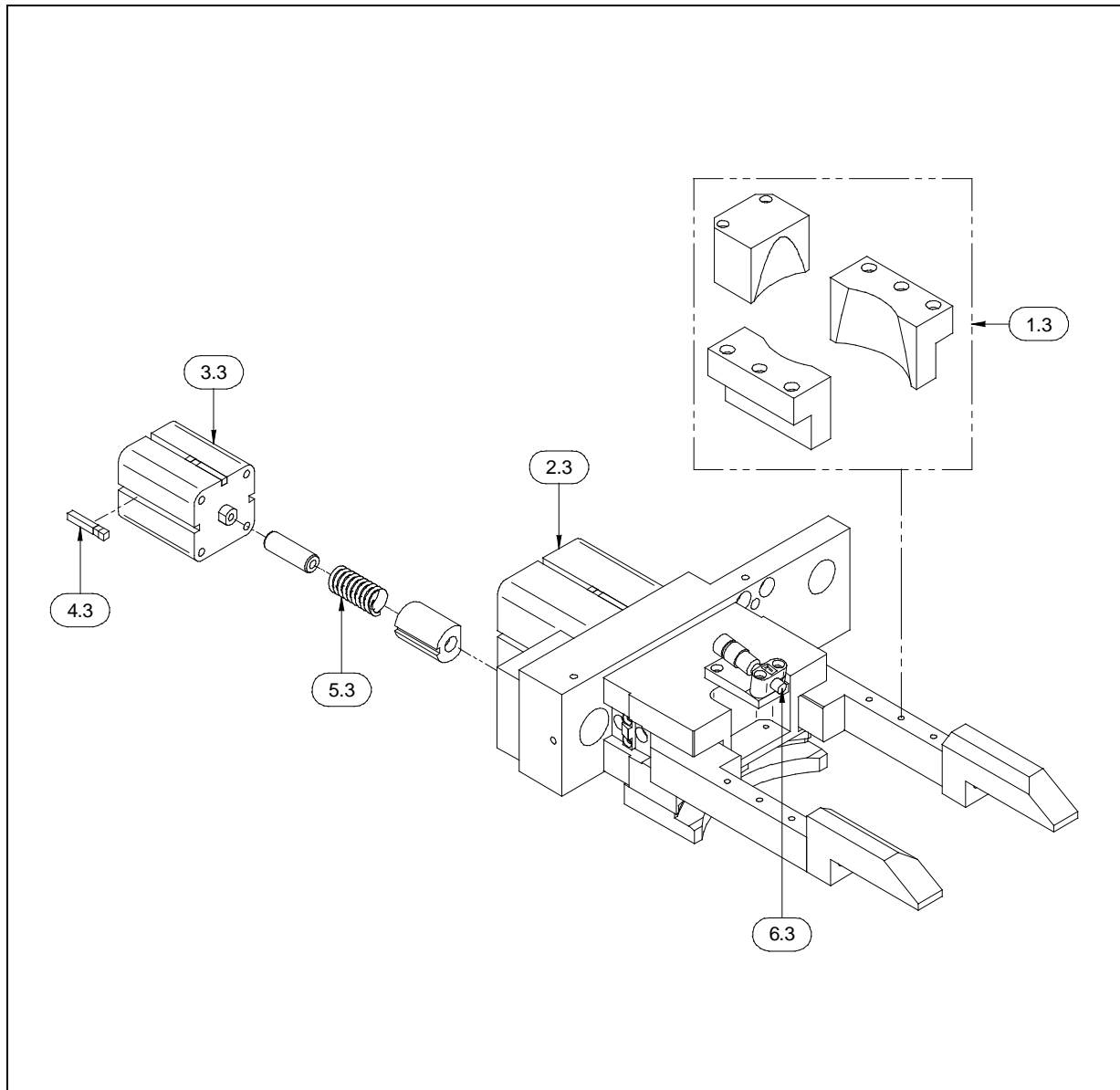
### 2 . MECHANIC HAND – HORIZONTAL AXIS



Pos.	Component		Q.ty	Code
1.2	Re-circulating ball guide	HG R 25 R 760 - HIWIN	2	91-132
2.2	Re-circulating ball trolley	HGH 25 CA H - HIWIN	4	91-131
3.2	Photoelectric sensor	F3C-AL44-M1J - OMRON	1	92-009
4.2	Shock absorber	AC2725S - METALWORK	2	93-174
5.2	Pneumatic cylinder	121-A50-0375-CP - METALWORK	1	93-161
6.2	Magnetic sensor	MK 5102 - IFM	2	92-088

## SPARE PARTS

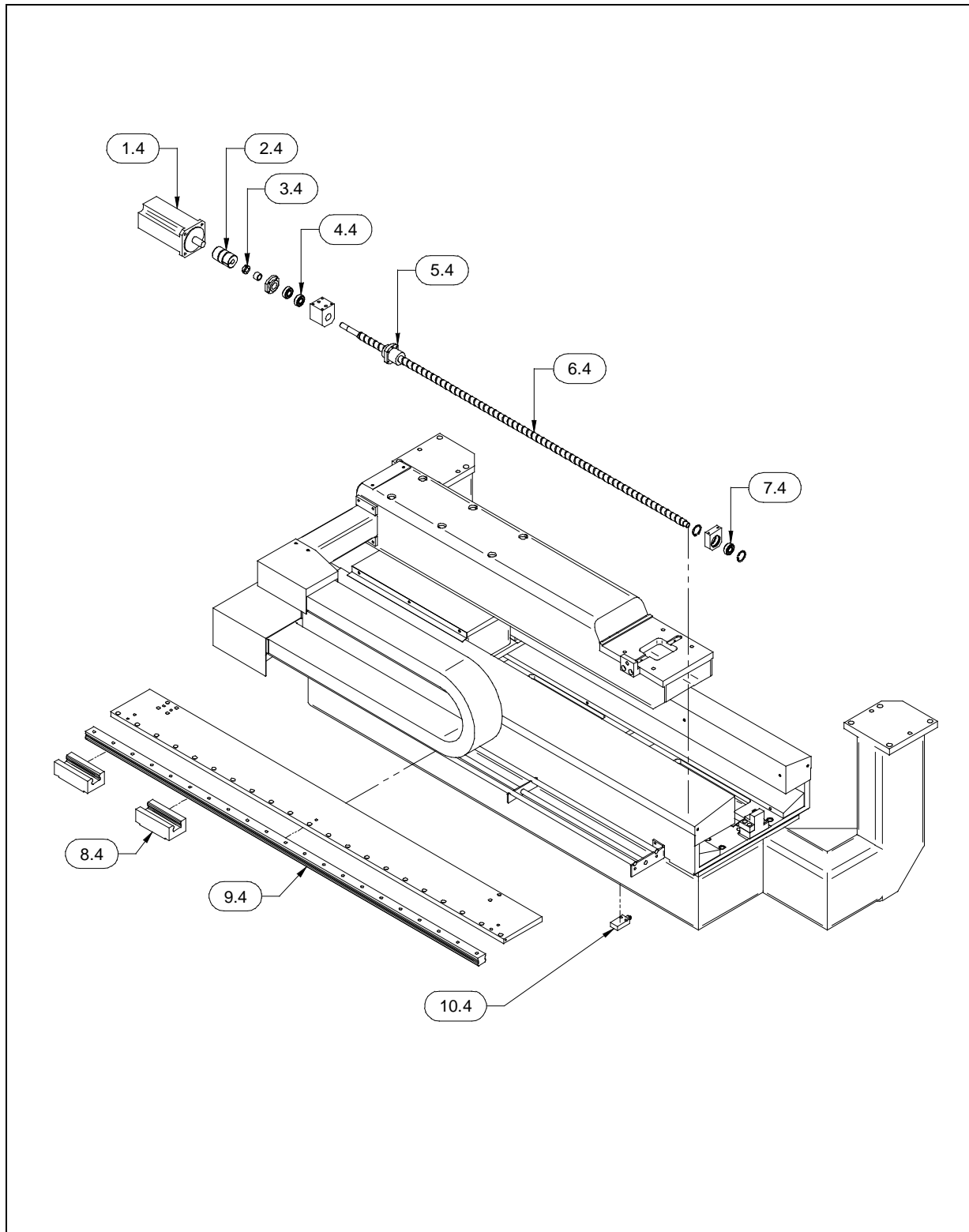
### 3 . MECHANIC HAND – GRIPPER



Pos.	Component	Q.ty	Code
1.3	Inserts of gripper CAT60 - MP	1	20-108
2.3	Pneumatic cylinder CMPC 24-0-0-63-0-030-CP - METALWORK	1	93-131
3.3	Pneumatic cylinder CMPC 24-4-0-40-0-025-CP - METALWORK	1	93-162
4.3	Magnetic sensor MK 5102 - IFM	4	92-088
5.3	Spring D13020 2.5x16x88 - DIM	1	91-227
6.3	Inductive sensor E2A-M08KS02-M1-B1 - OMRON	1	92-095

## SPARE PARTS

### 4 . EXCHANGE ARM – LINEAR AXIS



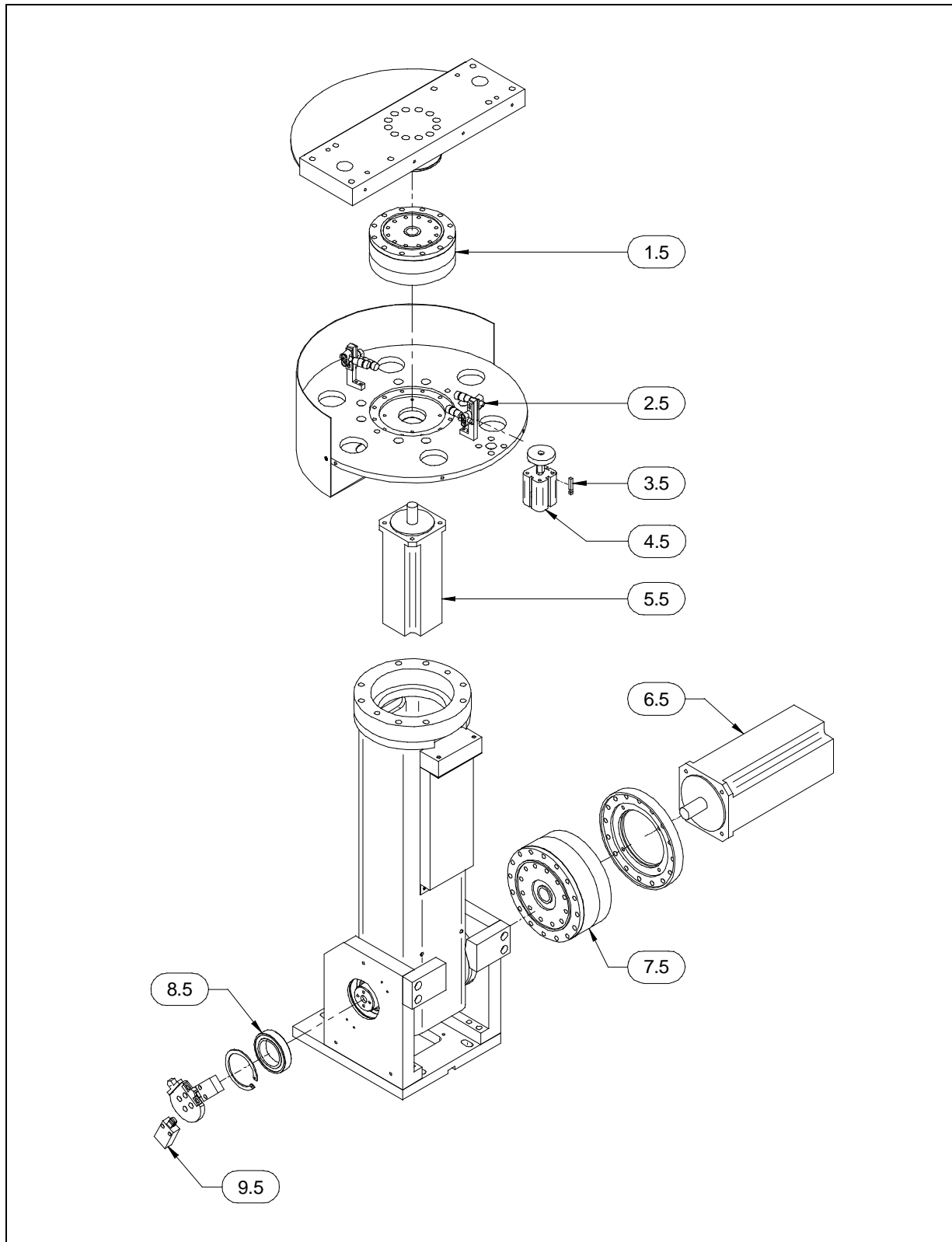
## SPARE PARTS

### 4 . EXCHANGE ARM – LINEAR AXIS

Pos.	Component	Q.ty	Code
1.4	Synchronous servomotor 1FK7042-5AF71-1GG0 - SIEMENS	1	92-104
2.4	Joint ROTEX GS 19-98Sh A-GS 2.0-Ø14 2.0-Ø19	1	91-076
3.4	Ring nut HIR M15x1	1	90-001
4.4	Bearing 15x35x11 6202-2RS	2	91-003
5.4	Re-circulating ball screw nut 4R20-20S2-DFSH-DIN B - HIWIN	1	91-174
6.4	Re-circulating ball screw 4R20-20-C7 - HIWIN	1	13-561
7.4	Bearing 15x35x11 6202-2RS	1	91-003
8.4	Re-circulating ball trolley HGH 35 HA - HIWIN	4	91-153
9.4	Re-circulating ball guide HG R 35 R 1160 - HIWIN	2	91-266
10.4	Micro-switch FA 4115-2DN - PIZZATO	2	92-011

## SPARE PARTS

### 5 . EXCHANGE ARM – OVERTURNING AND ROTATING JOINT AXIS



## SPARE PARTS

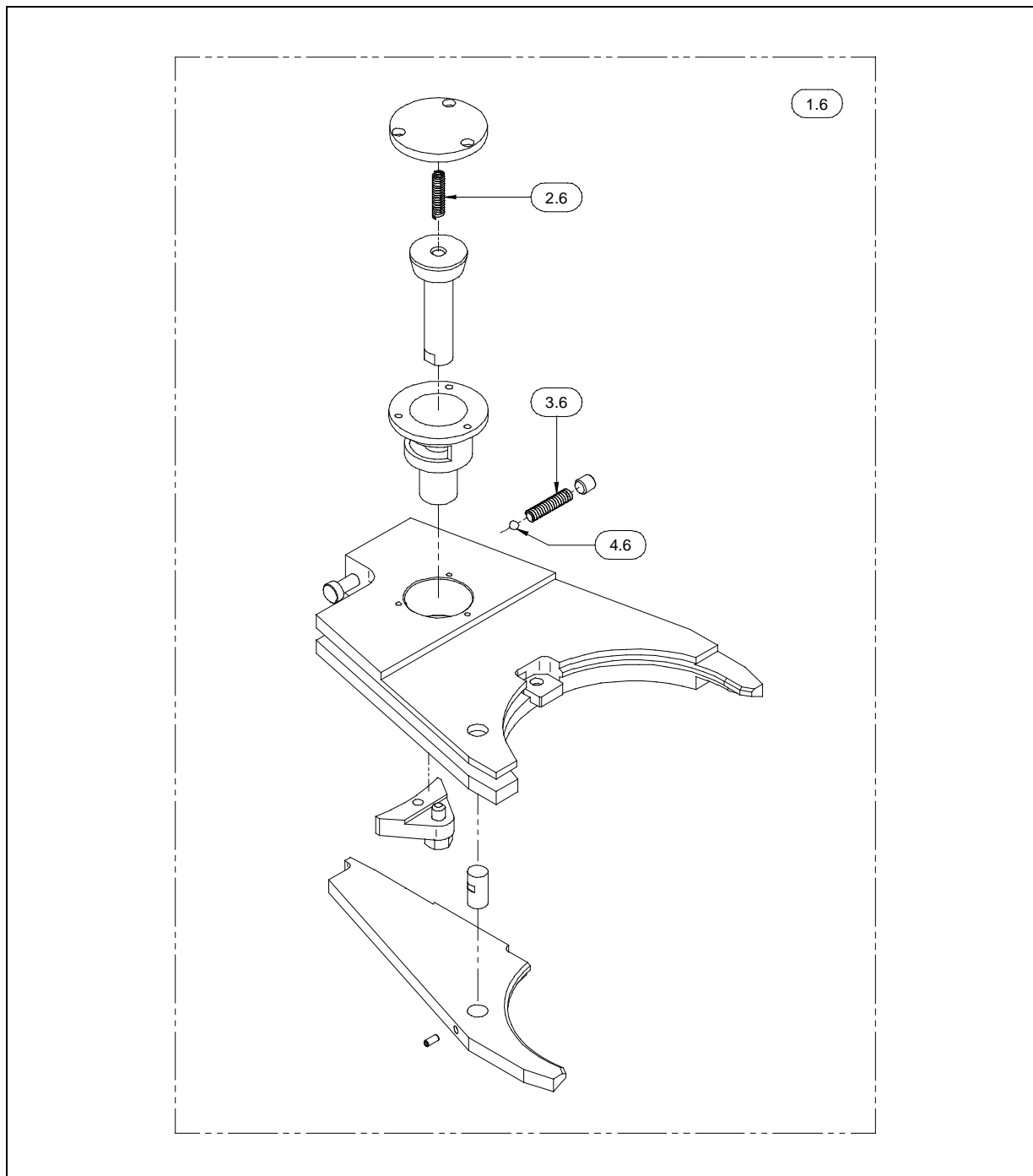
### 5 . EXCHANGE ARM – OVERTURNING AND ROTATING JOINT AXIS

Pos.	Component	Q.ty	Code
1.5	Reduction gear F2CS-A25-119 - SUMITOMO	1	91-060
2.5	Inductive sensor E2A-M08KS02-M1-B1 - OMRON	4	92-095
3.5	Magnetic sensor MK 5102 - IFM	2	92-088
4.5	Pneumatic cylinder CMPC 24-0-0-32-0-020-CP - METALWORK	1	93-164
5.5	Synchronous servomotor 1FK7042-5AF71-1GH0 - SIEMENS	1	92-105
6.5	Synchronous servomotor 1FK7063-5AF71-1GB0 - SIEMENS	1	92-107
7.5	Reduction gear F2CS-A35-119 - SUMITOMO	1	91-137
8.5	Bearing 50x80x16 6010-2Z	1	91-021
9.5	Micro-switch FA 4115-2DN - PIZZATO	2	92-011



## SPARE PARTS

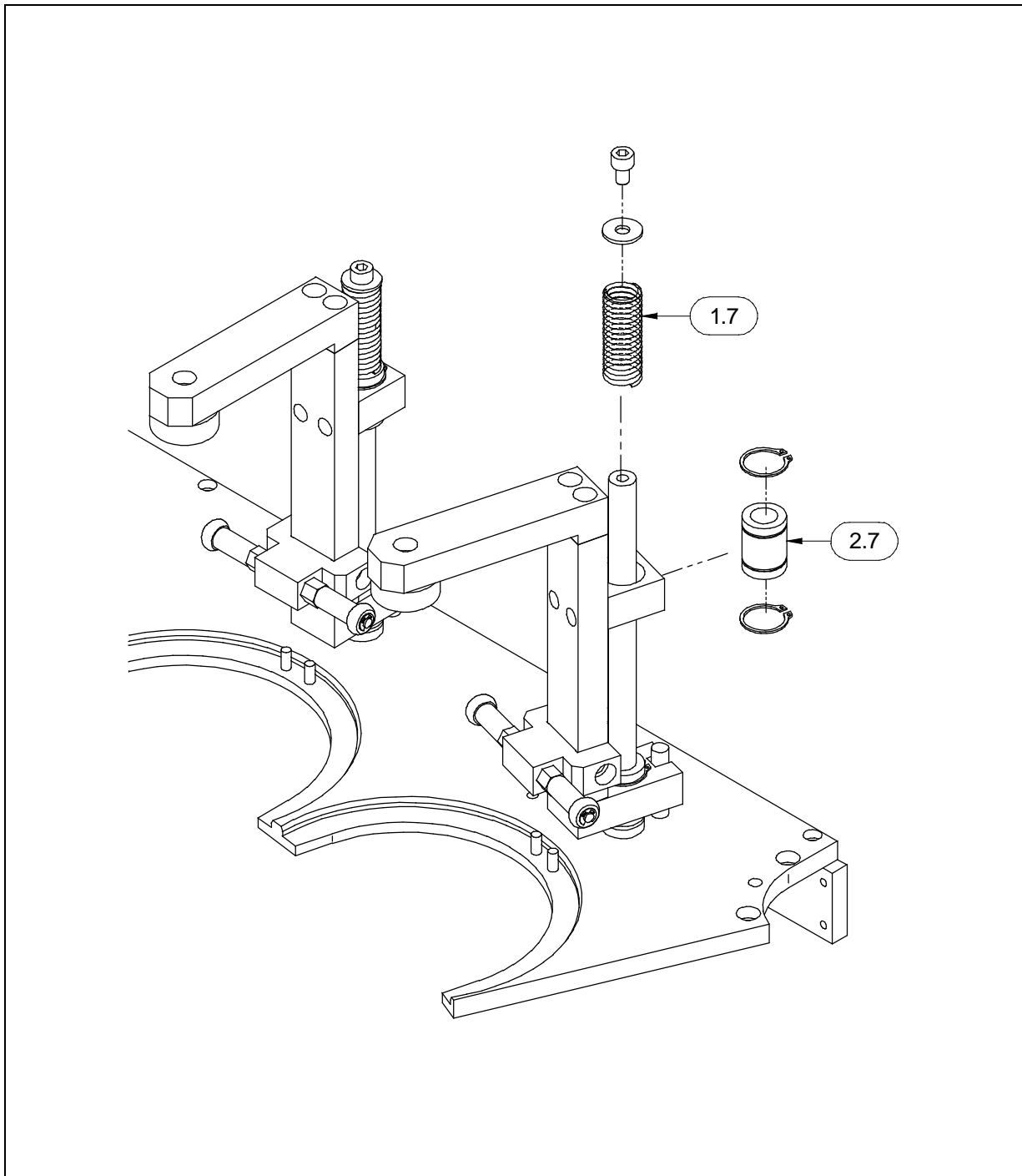
### 6 . EXCHANGE ARM – GRIPPER CAT60



Pos.	Component	Q.ty	Code
1.6	Gripper CAT60	2	20-102
2.6	Spring D12190 – DIM (for each gripper)	1	91-125
3.6	Spring D12390 – DIM (for each gripper)	1	91-126
4.6	Ball Ø7 (for each gripper)	1	90-009

## SPARE PARTS

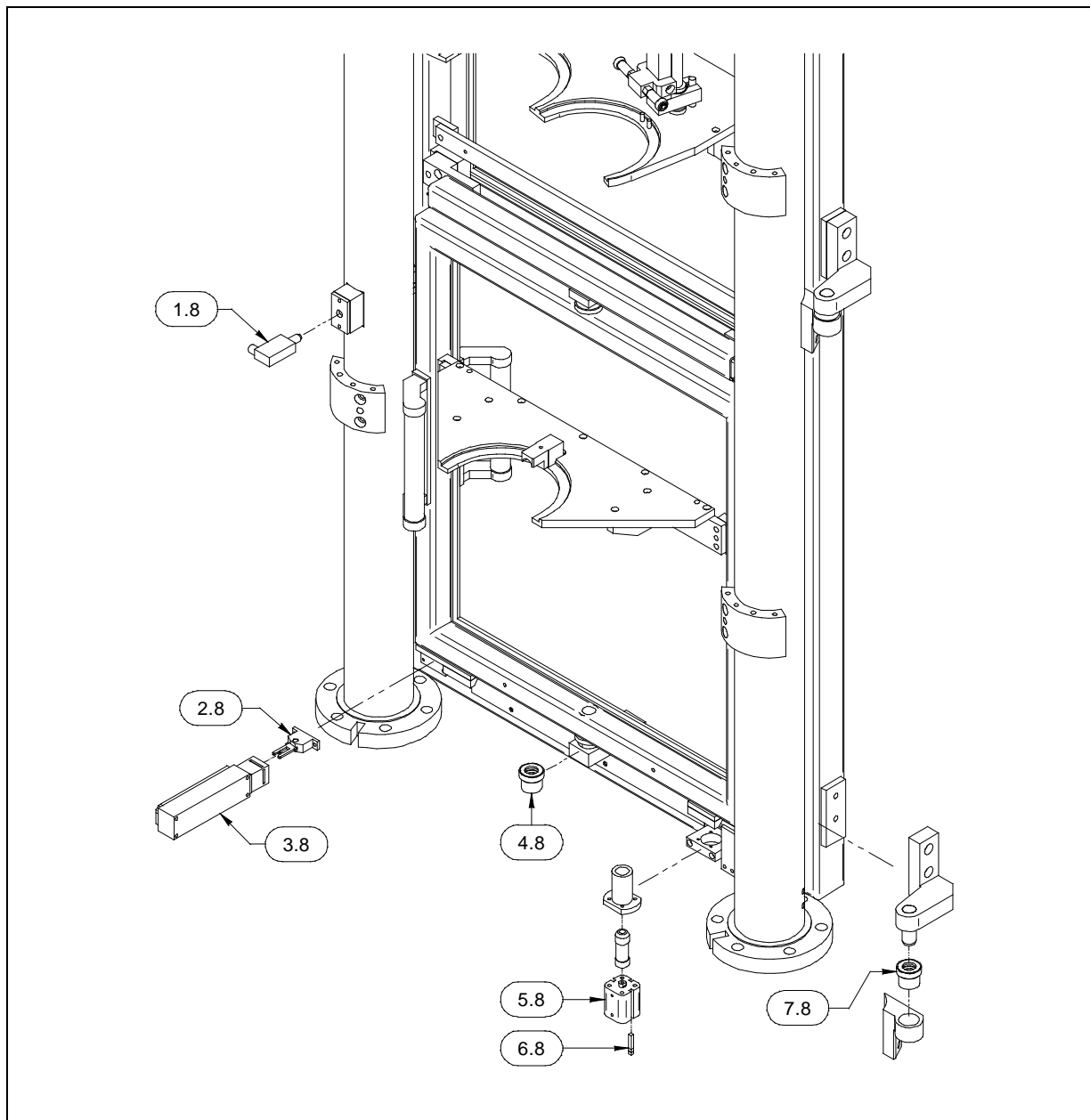
### 7 . STORE – TOOLS PLATE



Pos.	Component		Q.ty	Code
1.7	Spring	D13060 – DIM (for each pocket)	1	91-204
2.7	Ball sleeve	16x26x36 UB-16 (for each pocket)	2	91-203

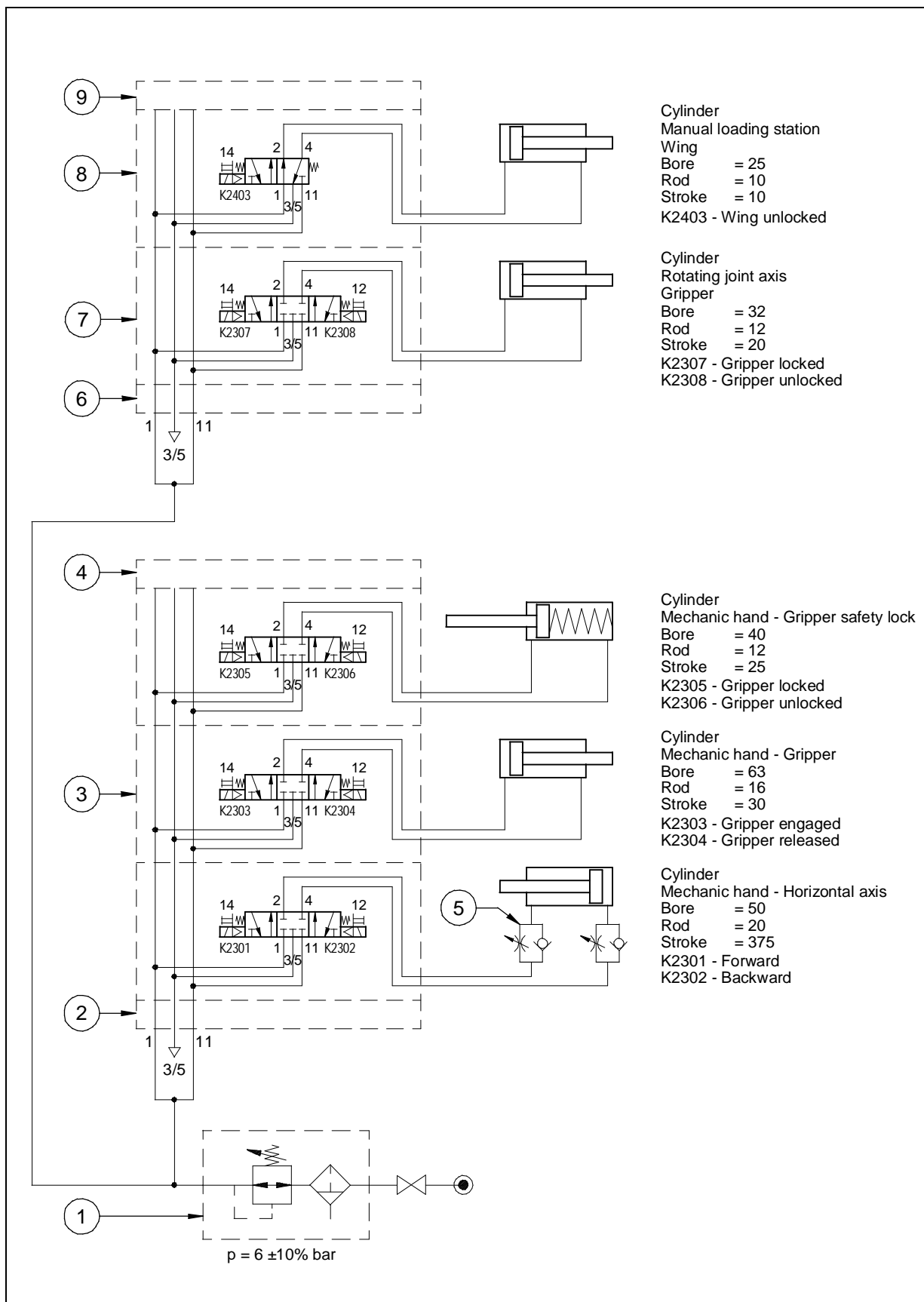
## SPARE PARTS

### 8 . MANUAL LOADING STATION



Pos.	Component		Q.ty	Code
1.8	Micro-switch	FA 4510-KDM - PIZZATO	2	92-097
2.8	Radius actuator	P-LR 059440 - EUCHNER	1	92-092
3.8	Safety electric lock	STP3A-2131024M - EUCHNER	1	92-091
4.8	Roller bearing radial-axial	NAXR20Z.TN - TORRINGTON	2	91-222
5.8	Pneumatic cylinder	CMPC 24-0-0-25-0-010-CP - METALWORK	1	93-171
6.8	Magnetic sensor	MK 5102 - IFM	2	92-088
7.8	Roller bearing radial-axial	NAXR20Z.TN - TORRINGTON	3	91-222

## PNEUMATIC DIAGRAM



## PNEUMATIC DIAGRAM

Pos.	Component			Q.ty	Code
1	Filter regulator	FR 200 3/8 5 08 RMSA	METALWORK	1	93-175
2	Kit terminal	HDM 1-25D	METALWORK	1	93-078
3	Valve	HDM O8	METALWORK	3	93-077
4	Bund end-plate	HDM	METALWORK	1	93-079
5	Flow regulator	MRF/C 8 1/4	METALWORK	2	93-169
6	Kit terminal	HDM 1-25D	METALWORK	1	93-078
7	Valve	HDM O8	METALWORK	1	93-077
8	Valve	HDM V8	METALWORK	1	93-196
9	Bund end-plate	HDM	METALWORK	1	93-079