

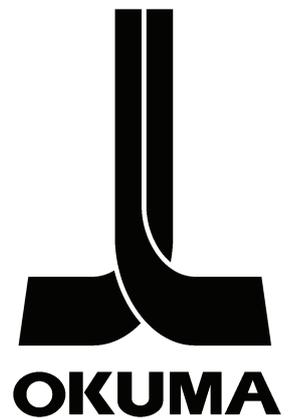
HORIZONTAL MACHINING CENTER

MB-5000H

TECHNICAL SHEET

(4th Edition)

Pub No. 5965-E-R3 (ME13-024-R4) Nov. 2015



INTRODUCTION

Thank you for purchasing this Okuma machine.

This manual contains machine data supplementing the Series OPERATION & MAINTENANCE manual, which is a separate volume. It is intended to be used in conjunction with the series manual.

Please refer to the separate controller manual for information on the controller.

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SECTION 1 OUTLINE

1-1. Machine Specifications

1-1-1. Specification Table

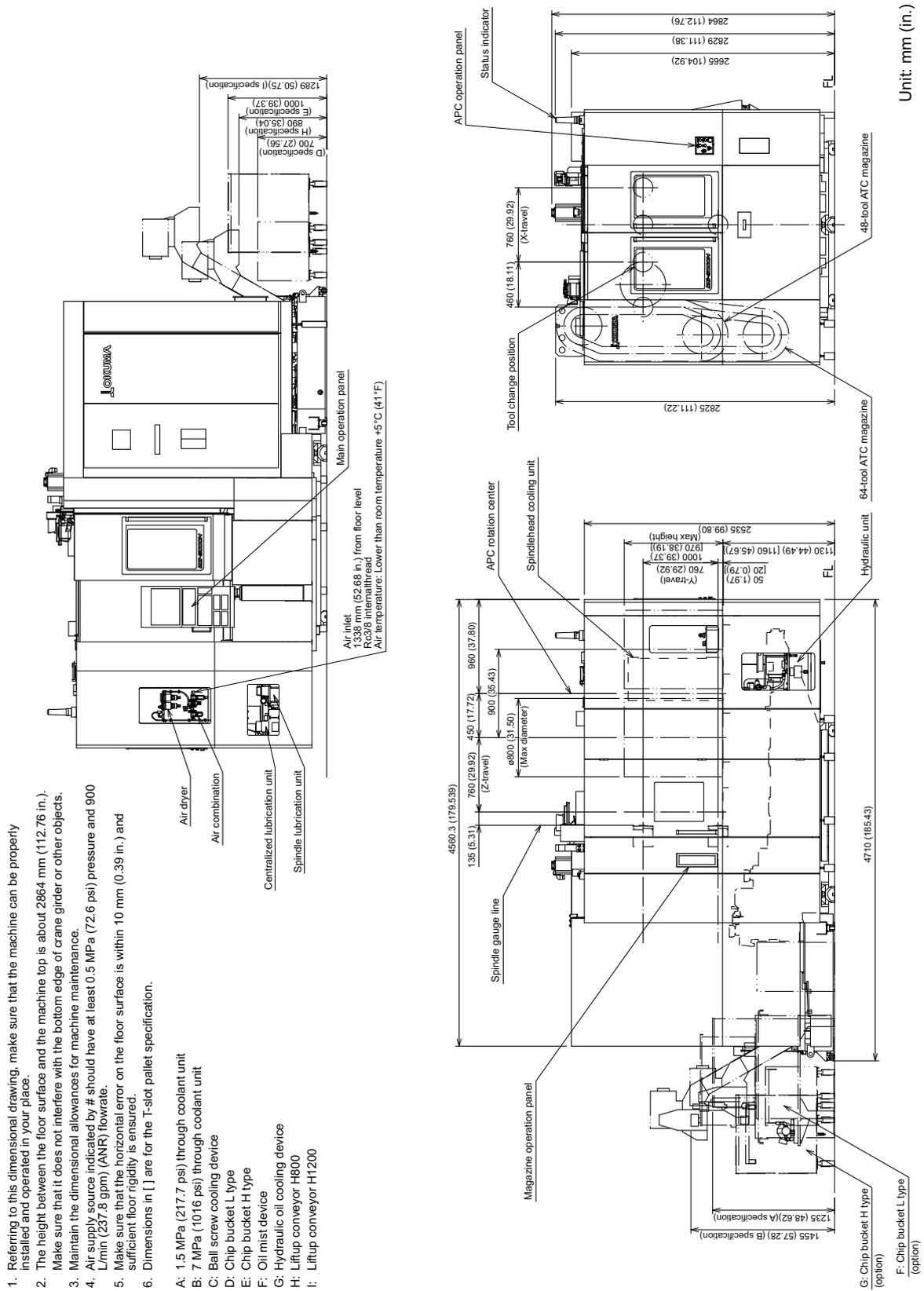
| | Item | Unit | Description |
|-----------|---|-------------------|--|
| | MAX. MACHINING CAPACITY | mm (in.) | 760 × 760 × 760 (29.92 × 29.92 × 29.92) |
| TRAVEL | X-axis (column right/left) | mm (in.) | 760 (29.92) |
| | Y-axis (spindle up/down) | mm (in.) | 760 (29.92) |
| | Z-axis (table front/back) | mm (in.) | 760 (29.92) |
| | Spindle center to table (pallet) upper surface | mm (in.) | 50 to 810 (1.97 to 31.89) |
| | Spindle end to table (pallet) center | mm (in.) | 135 to 895 (5.31 to 35.24) |
| TABLE | Table (pallet) size | mm (in.) | 500 × 500 (19.69 × 19.69) |
| | Max. load capacity | kg (lb) | 500 (1100) |
| | Index positions [angles] | | Standard: 360 positions (increments, direct command) Optional: 360000 positions (0.001° increments, direct command) |
| SPINDLE | Spindle speed range [standard (wide range)] | min ⁻¹ | 50 to 15,000 |
| | Number of spindle speed ranges | | Infinitely variable |
| | Taper hole | | NT No. 40 |
| | Spindle diameter (at front bearing) [standard (wide range, high speed)] | mm (in.) | φ70 (2.76) |
| FEED RATE | Rapid feedrate (X-/Y-/Z-axis) | mm/min (ipm) | 60,000 (2362.20) |
| | Jog feedrates (X-/Y-/Z-axis) | mm/min (ipm) | 1 to 60,000 (0.04 to 2362.20) |
| ATC | Tool shank | | Standard: MAS BT40 Optional: CAT No.40, DIN No.40, JIS BT40, HSK A63 |
| | Retention knob | | Standard: MAS2 Optional: MAS1, CAT, Special CAT, DIN, JIS |
| | Tool magazine capacity | | Standard: 48 tools Optional: 64/110/146/182/218/328 tools *1 |
| | Max. tool diameter | mm (in.) | With adjacent tools: φ70 (2.76) Without adjacent tools: φ150 (5.91) |
| | Max. tool length | mm (in.) | Standard: 300 (11.81) Optional: 450 (17.72) |
| | Max. tool weight | kg (lb) | 10 (22) |
| | Tool selection | | Memory random *2 |

| | Item | Unit | Description |
|--------------|---------------------------------------|----------|--|
| APC | No. of pallets | Pallet | Standard: 2 Optional: 6, 10, 12 |
| | Pallet change system | | Standard: 2-pallet rotary-shuttle Optional: 2-pallet rotary-shuttle with transfer carrier |
| MOTOR | Spindle drive [standard (wide range)] | kW (hp) | 26/18.5 (34.7/24.67) |
| | X-axis feed | kW (hp) | AC 4.6 (6.13) servomotor |
| | Y-axis feed | kW (hp) | AC 4.6 (6.13) servomotor |
| | Z-axis feed | kW (hp) | AC 4.6 (6.13) servomotor |
| | Hydraulic power unit | kW (hp) | AC 2.2 (3) |
| | Table indexing | kW (hp) | Standard: AC 3.0 (4.00) (1°) Optional: AC 3.0 (4.00) (0.001°) |
| | Magazine indexing (48-tool ATC) | kW (hp) | AC 2.2 (3) servomotor |
| | Tool change arm motor | kW (hp) | AC 2.2 (3) servomotor |
| | APC drive (rotary type 2-pallet) | kW (hp) | AC 1.7 (2.27) servomotor |
| MACHINE SPEC | MACHINE HEIGHT | mm (in.) | 2,864 (112.76) |
| | FLOOR SPACE | mm (in.) | 2,700 × 4,725 (106.30 × 186.02) |
| | MACHINE WEIGHT | kg (lb) | 11,500 (25,300) |
| REMARKS | Power Requirements | kVA | 43 (15,000) |
| | Voltage | V | 200 VAC ± 10% |
| | Frequency | Hz | 50/60 |
| | Protection level of control panel | | IP 54 |

Table 1-1

*1, 2 The ATC with 110, 146, 182, 218 or 328 tools is equipped with the matrix magazine that stores the tools at fixed addresses.

1-1-2. Dimensional Drawings

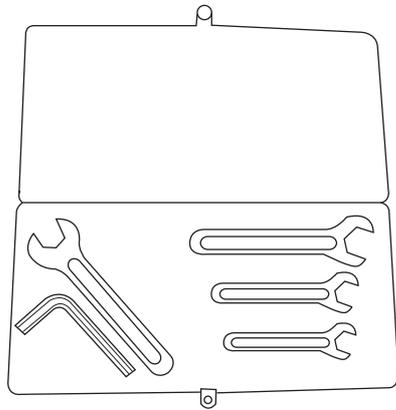


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Fig. 1-1

1-3. Standard Accessories

Hand tools for operation (Refer to the accessory table for the sizes and the numbers of tool.)



Single ended wrenches

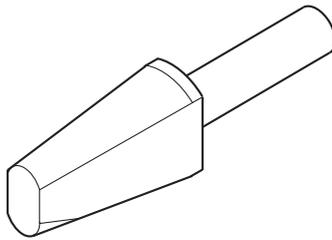
Hexagon bar wrench

Tool box

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Fig. 1-3

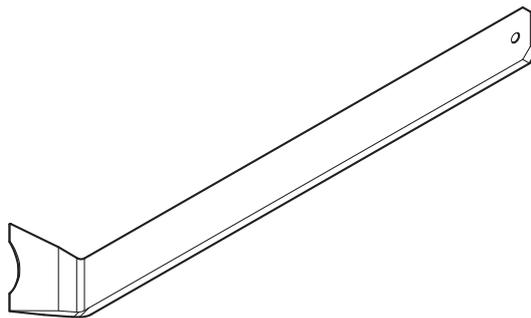
Cleaning bar



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Fig. 1-4

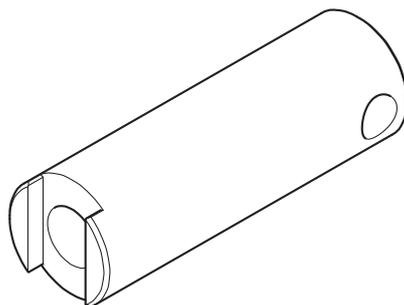
Tool release lever



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Fig. 1-5

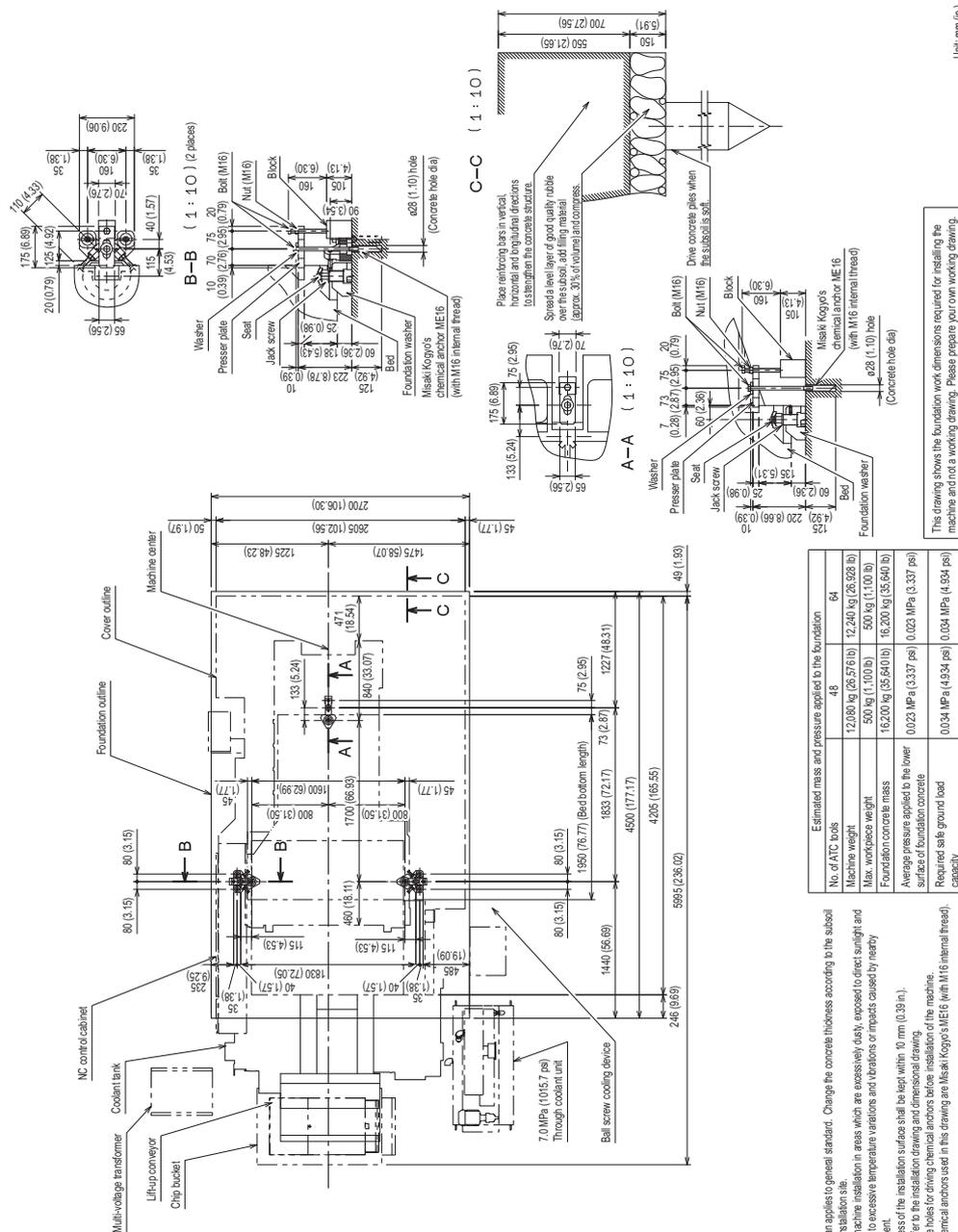
Wrench (Lever for removing retention knob for clamping pallet)



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Fig. 1-6

1-4. Foundation Plan



Note 1. This plan applies to general standard. Change the concrete thickness according to the subsoil of the installation site.
 2. Avoid machine installation in areas which are excessively dry, exposed to direct sunlight and subject to excessive temperature variations and vibrations caused by nearby heavy machinery.
 3. Levelness of the installation surface shall be best within 0 mm (0.39 in.).
 4. Also refer to the installation drawing and dimensional drawing.
 5. Prepare holes for driving chemical anchors before installation of the machine.
 6. The chemical anchors used in this drawing are Masaki Kogyo's ME16 (with M16 internal thread).

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Fig. 1-7

1-5. Foundation Block and Jack Screw

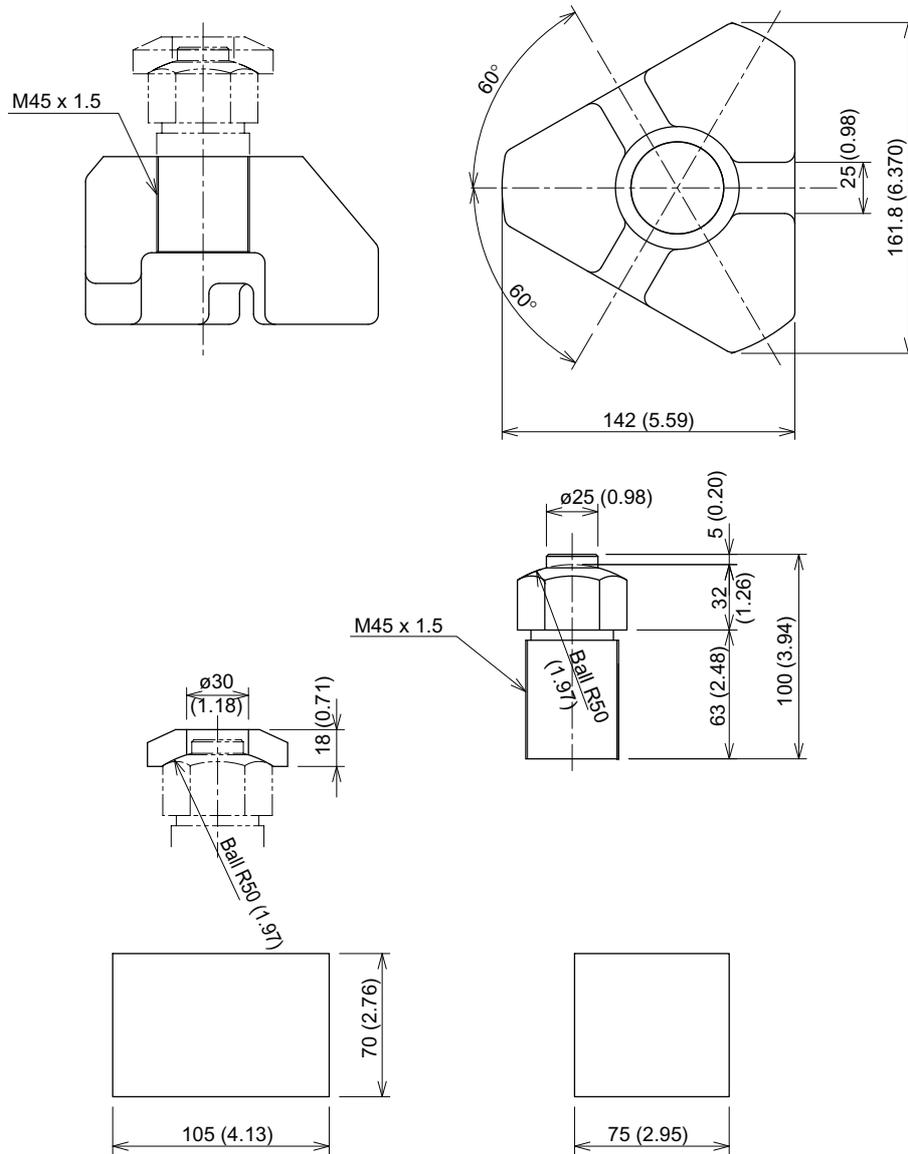


Fig. 1-8

SAFETY INSTRUCTIONS

Indicates general instructions for safe operation.

- 1) Three foundation blocks are necessary.
- 2) Ensure that the floor where the foundation washers are placed is flat.
- 3) Note that the standard clearance from floor to bed bottom is 60 mm (2.36 in.), and should not exceed a maximum of 70 mm (2.76 in.). If the bed bottom is excessively high, the jack screw screwing length becomes short, which may cause damage to the threads.
- 4) When turning the jack screws, insert a key or similar tool into the retention recess in the foundation block.
- 5) After adjusting the level with jack screws, firmly fix the screws with the lock nut.
- 6) Foundation washer, jack screw, base, foundation plate are standard accessories.

1-6. Reference Data (Safety Door Lock Switch)

1-6-1. D4BL

OMRON

Model D4BL
Safety Door Lock Switch

Instruction Sheet

Please read all instructions before using to ensure proper use and application of the switch. Save this instruction sheet for future reference.

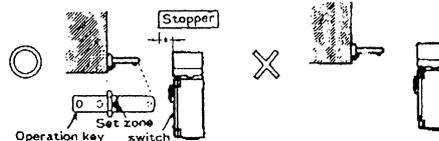
OMRON Corporation 0685903-2D

- Keep the electrical load below the rated value.
- Never wire to a wrong terminal.
- Be sure to evaluate the switch under actual working conditions after installation.
- If the force exceeding holding force is imposed on the operation key, the lock mechanism may break and the equipment in the machine room will start operating.
- Do not drop the switch. Excessive shock and vibration can cause malfunction or other damage to switch characteristics. Do not disassemble the internal switch, there are no user serviceable parts inside.



- Release key
 - * The release key is used to unlock the switch in case of emergency or if the power supply to the switch fails.
 - * In the case of mechanical lock type, use an appropriate tool (like a driver) to rotate the release key to "Unlock" from "Lock" so that locking will be released and the door can be open. When release key is set to "Unlock", the door will not be locked and no power will be supplied to machine even if the door is closed. The safety of operator working in machine room is ensured.
 - * Do not use the release key to start or stop the machine.
 - * Only authorized person must use release key.
 - * To prevent the easy access to the release key by unauthorized person, set the release key to "Lock" in normal condition and seal the release key with seal wax.
 - * Confirm position of the release key is under "LOCK" when assembling the cover in the main body.

- Stopper
 - Do not use the switch as a stopper. Be sure to install a stopper as shown in the following illustration to prevent edge of operation key from hitting the switch directly.



CAUTION Not following a precaution given as a "Caution" can result in injury to people or damage to the product or system.

CAUTION Do not dismount the operation key from the door intentionally and insert it to the switch with the door open. Do not operate with the shock damper, which is installed into the switch head when the switch is shipped. Machine may start operating and injury or death may be caused.

NOTICE

- Do not disassemble or touch inside under power-on. Electrical shock hazard may be caused.
- Install the operation key so that it will not hit the operator when the door open. Injury may be caused.
- When operating limit switch as a part of a safety circuit or an emergency stop circuit to prevent injury, operate the NC contacts that have positive-opening function in positive mode. For a safety, tighten the switch body or operation key with one-way screws or equivalents. Or install a switch protection cover and warning label for safety to prevent easy removal of the switch or operation key.
- Connect the fuse to the switch in series to prevent it from short circuit damage. The value of the breaking current of the fuse must be calculated by multiplying rated current by 150 to 200%. When using the switch with EN rating, use 10A fuse, type gI or gG that complies with IEC269.
- Do not put the electric power when wiring.
- To prevent the burning of solenoid due to the overvoltage, put the protective fuse into the solenoid circuit.
- Do not use the switch where explosive gas, ignitable gas, or any other harmful gasses may be present.

- Solenoid lock type
 - The solenoid lock type locks the door only when power is supplied to the solenoid. The door will be unlocked if the power supply to the solenoid fails. Do not use solenoid lock type for machines that continue to move for a while even after the machine power is off.

- Environment
 1. Make sure to check influence of the environment when using the switch under the ambient condition of oil and chemicals. Certain kinds of oil and chemicals may adversely affect sealing properties, which may cause faulty contacts, faulty insulation, electric shock hazard or fire.
 2. Do not use the switch under any of the conditions mentioned below.
 - Frequent temperature changes.
 - High humidity or where dew condensation may be generated.
 - Where the switch is subjected to severe vibration.
 - Where the processing trash or dust is directly sprayed.

- The life expectancy of the switch is seriously affected by the number of electrical and mechanical actuations. Evaluate the switch under actual working conditions before permanent installation. Be sure to keep the frequency of operations within specifications.

- Mounting
 - Tightening torque
 - Adequate tightening torque are as follows and tighten within the range.

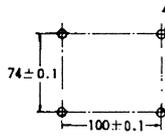
| | | |
|-------------------------------|-----------------|------------|
| Switch mounting hole | 4.90 to 5.88N·m | M5 screw |
| Switch cover screw | 1.18 to 1.37N·m | M4 screw |
| Connector at conduit opening | 1.77 to 2.16N·m | |
| Black cap for conduit opening | 1.27 to 1.67N·m | |
| Head screw | 0.78 to 0.98N·m | M3.5 screw |
| Operation key mounting hole | 2.35 to 2.75N·m | M5 screw |
| Terminal screw | 0.59 to 0.78N·m | M3 screw |

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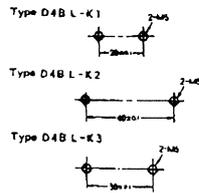
Fig. 1-9

- Mounting of the switch and operation key
Four pieces of M5 allen-head bolt and spring washer are used for mounting the switch body.
When operation key mounted, two pieces of M5 allen-head bolt are used.

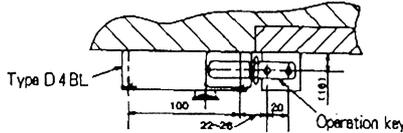
Switch mounting hole
Process dimension



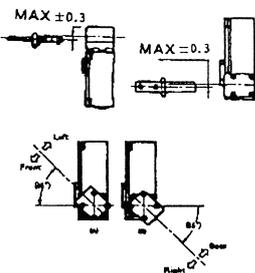
Operation key mounting hole
process dimension



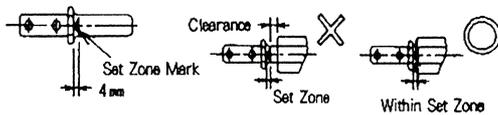
Example of mounting



- Mounting of operation key
• Operation key must be mounted onto the door such that it and entrance of switch head may match each other with the tolerance of ± 0.3 mm.
• Do not use Model D4BS operation key for D4BL. It is not compatible.
- Head direction change
As shown right in (A) and (B), the head can be mounted and dismounted by rotating the head by 45°.
Make sure that the mechanical lock and solenoid release work properly in mounting the head.

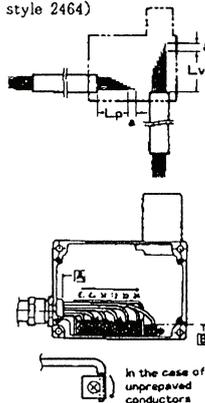


- Fixation of the Door
When the door is closed (Operation key is inserted), the door (Operation key) may return back beyond the set zone mark by the weight of a door, bumper rubber of a door, etc.
The door must be fixed by a hook or the like in order to stay in the set zone mark.



- Connection of cable
• Cable and conductor
Adequate cable outer diameter: 5.5~14mm
Adequate conductor : AWG 18 (UL style 2464)
• Stripped dimension

| Terminal No. | Lp (mm) | Lv (mm) | a (mm) |
|----------------|---------|---------|--------|
| E ₁ | 36 ± 2 | 80 ± 2 | 8 ± 1 |
| E ₂ | 35 ± 2 | 75 ± 2 | |
| 31 | 45 ± 2 | 60 ± 2 | |
| 12 | 55 ± 2 | 50 ± 2 | |
| 23 (21) | 65 ± 2 | 45 ± 2 | |
| 24 (22) | 70 ± 2 | 35 ± 2 | |
| Earth | 90 ± 2 | 50 ± 2 | |



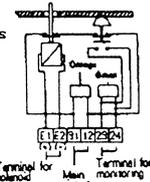
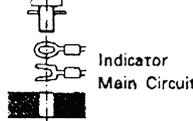
- Connection of conductors
• As shown in the illustration, insert the cable to the conduit opening, edge of the external insulation sheath reaching the line A or B, which is inner surface of metal enclosure.
• As shown in the illustration, for easy wiring, conductors should be connected in sequence beginning with the terminal nearest to the conduit opening.
• In the case of wiring unprepared stranded conductors, firstly twist the wires a few times, secondly wrap them around screws clockwise.

- Indicators
Lighting of Indicators

| Build-in switch | Condition | Operation mode | | |
|-----------------|-----------------------------|----------------|--------|--------|
| | | I | II | III |
| 1NC/1NO+1NC | Door condition | Open | Closed | Closed |
| | Solenoid | ON | OFF | ON |
| 2NC+1NC | Indicator/wiring | ○ | × | ○ |
| | Orange/31-12 Green/23-24 | × | ○ | ○ |
| 2NC+2NC | Indicator/wiring | ○ | × | ○ |
| | Orange/31-12 Green/21-22 | ○ | × | × |
| | Indicator/wiring | ○ | × | ○ |
| | Orange/31-12 Green/41-22 | ○ | × | ○ |

Note : ○ Lighted
× off

Indicators must be wired to designated terminals with main circuit as illustration.



- Handling of conduit opening
To assure IP67 protection, use the OMRON type SC□M series for connectors. As alternatives for PG13.5 conduit size, type ABS-08PG13.5 or ABS-12PG13.5 manufactured by Niporex may be used.
Apply sealing tape between connector and conduit opening so that the enclosure will conform to IP67.
Use a cable with a diameter suitable for the connector.
For unused conduit opening, apply a conduit cap provided and tighten it to the specified torque.
- Others
Do not touch the solenoid when the power is supplied, or else solenoid will radiate heat.
- TECHNICAL SPECIFICATIONS
Conformity : Machine Directive, LowVoltage Directive, EN1088
Approval : EN60947-5-1, GS-ET-19, SUVA, UL508, CSA C22.2 No.14.
Utilization category : AC-15
Rating voltage : 250VAC (without indicator), 115VAC (with LED), 250VAC (with neon lamp)
Rating current : 3A (without indicator), 6A (with LED), 3A (with neon lamp)

- Positive opening travel : 20mm min.
- Positive opening minimum force : 19.6N
- Enclosure rating : IP67 (EN60947-5-1), TYPD5P, 13 (UL, CSA)
- Minimum actuator travel : 23mm
- Maximum speed of actuation : 0.5m/sec
- Minimum speed of actuation : 0.05m/sec
- Maximum frequency of actuation : 30 operation/min.
- Short circuit protective device : Use 10A fuse, type gI or gG, (IEC269)
- Minimum locking force : 700N
- Enclosure rating : IP67
- Maintenance and Repairs
Please mention in machine manufacturer's instruction Manual that the user must not repair nor maintain the switch and must contact machine manufacturer for them.

Precautions In Using the Product

- Always use this product within its rating and specifications and apply appropriate safety measures. For assistance with any of applications listed below, please consult an Omron sales office.
- ① Condition and circumstances which are not mentioned in the instruction sheet.
- ② Control of nuclear power, trains, air planes, automobiles, incinerators, medical devices, game machines, or safety devices.
- ③ When used in safety applications to prevent injury or property damage.

Contact the following sales offices about product information.

| North America | |
|------------------|--|
| U.S.A. | OMRON ELECTRONICS INC. Phone : 1-800-55-OMRON |
| Canada | OMRON CANADA INC. Phone : 1-416-286-6465 1-514-636-6676 (French) |
| Europe | |
| Headquarter | OMRON EUROPE B.V. Phone : 31-2356-81-300 Fax : 31-2356-81-388 |
| Asia and Pacific | |
| 大韓民國 | 韓國 OMRON 株式会社 Phone : 82-2-549-2766 |
| 中國 | 歐姆龍(中國)有限公司 Phone : 86-10-6516-5778 |
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| 台灣 | 台灣歐姆龍有限公司 Phone : 886-2-2715-3331 |
| Australia | OMRON ELECTRONICS PTY. LTD. Phone : 61-2-9878-6377 |
| Singapore | OMRON ASIA PACIFIC PTE. LTD. Phone : 65-835-3011 |

Fig. 1-10

1-6-2. D4NL

OMRON

Guard Lock Safety-door Switch

D4NL **Sti**

Instruction Sheet

1618225-1E

SAFETY PRECAUTION

● Definition of Precautionary Information

**DANGER**

Indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or may result in death. Additionally there may be severe property damage.

**CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

● Precautionary Information

DANGER

Always verify the operation of the safety functions before starting the system. Not doing so may result in the safety functions not performing as expected if the wiring or settings are incorrect or the switches have failed.
The system being controlled may continue to operate and possibly cause injury or death.



Always ensure that the release key is set to the "LOCK" position before starting the system. If the release key remains set to "UNLOCK", the electromagnetic lock function will not operate and the system may continue to operate, possibly causing injury or death. Always monitor the solenoid NC contact (Terminal 41-42) in your safety circuit.
Do not connect indicator devices (like LED) to safety circuit connected to terminal 41-42.



Before changing the head direction always ensure that the release key is set to "UNLOCK", or that the operation key is inserted. Not doing so may damage the switch and the system may continue to operate, possibly causing injury or death. (Refer to Fig.1 of the Instruction Sheet.)



Do not apply force exceeding the specified maximum holding force. Doing so may damage the switch lock mechanism and the system may continue to operate, possibly causing injury or death. Either install another locking component (e.g., a stopper) in addition to the switch, or use a warning method or indicator to show that the controlled system is locked to avoid overloading the holding force in lock mode.

 **CAUTION**

Do not dismount the operation key from the door intentionally and insert it to the switch with the door open. Machine may start operating and injury or death may be caused.



Do not use metal connector or conduit with the switch. The broken conduit hole may cause electrical shock hazard.



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Fig. 1-11

Precautions for Safe Use

1. Environment
 - 1) Do not use the switch where explosive gas, ignitable gas, or any other harmful gasses may be present.
 - 2) Do not use the switch in the oil and in the water. IP67(EN60947-5-1)
 - 3) Though the switch body is protected from the ingress of dust or water, avoid the ingress of foreign substance through the key hole on the head. Otherwise, wear in short time or break may be caused.
2. Wiring
 - 1) Connect the fuse to the switch in series to prevent it from short circuit damage.
The value of the breaking current of the fuse must be increased to cover the rated current by 150 to 200%. When using the switch with EN rating, use 10A fuse, type gI or gG that complies with IEC 60269.
 - 2) On the switching of general loads (250VAC/3A), do not operate two circuits or more at the same time. Otherwise, insulation performance may be degraded.
 - 3) Keep the electrical load below the rated value.
 - 4) Be sure to install a cover after the wiring. Do not put the electric power when opening a cover.
3. Mounting
 - 1) Be careful not to drop the switch, or the switch will not fully exhibit its ability.
 - 2) This may cause a risk of personal injury.
Extra care must be taken not to drop this product during installation.
 - 3) Install operation key so that it will not hit the operator when the door is open. Injury may be caused.
 - 4) Do not use the switch as a stopper. Be sure to install a stopper as Fig.2 to prevent the edge of the operation key from inadvertently hitting the switch directly.
 - 5) Do not apply shock over the shock resistance 1000m/s^2 on the switch.
4. Others
 - 1) Do not disassemble or remodel this switch in any case, or the switch will not operate normally.
 - 2) The durability of the switch is seriously affected by operating conditions.
Evaluate the switch under actual working conditions before permanent installation.
 - 3) Please mention in machine manufacturer's Instruction Manual that the user must not repair nor maintain the switch and must contact machine manufacturer for them.

Precautions for Correct Use

1. Environment
 - 1) The switch is intended for indoor use only.
Do not use the outdoor, or the switch will malfunction.
 - 2) Do not use the switch in the atmosphere of hazardous gases (H_2S , SO_2 , NH_3 , HNO_3 , Cl_2 , etc.) or high temperature and humidity, or it will cause the imperfect closing of the contacts or the breakage thereof stemming from corrosion.
 - 3) Do not use the switch under any of the conditions mentioned below.
 - Frequent temperature range.
 - High humidity or dew condensation may be generated.
 - Where the switch is subject to severe vibration.
 - Where the metal dust, oil, or chemical is sprayed inside the door.
 - Where thinner is applied.
2. Storage

Do not keep the switch in dusty, humid place and any place where gas may be present for example H_2S , SO_2 , NH_3 , HNO_3 , Cl_2 .
3. About the Solenoid Lock Type

In the solenoid lock type, a lock is closed only when the solenoids are energized. A lock may be opened when the passage of an electric current to the solenoids is stopped due to sudden power failure.
Do not use the solenoid lock type for the machine in which the inside of the door remains dangerous even after shutdown of the machine.

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Fig. 1-12

4. Head direction
- 1) The rotation of the switch head may be adjusted to any of the four directions by loosening the head clamping screws at the four corners of the head.
 - 2) Attach cap heads to any operation key holes that are not being used.
 - 3) Do not remove the screw of the head while energizing. Otherwise the machine might mis-operate.
 - 4) Do not change the head direction with the cover removed.
 - 5) Do not insert or pull the operation key with the switch head removed, or the operation key may become impossible to be inserted after mounting the switch head.
5. Using the Release Key (See Fig.1)
- 1) The release key is used to open a lock in the case of power failure or emergency.
 - 2) Turn the release key from the LOCK position to the UNLOCK position to release the lock.
This can open the safety door. (For the mechanical lock type only)
 - 3) The set position of the release key at the shipping of the switch is as noted below;
* D4NL-□□□A/B/C : Unlock position * D4NL-□□□G/H/J : Lock position
 - 4) Do not use the release key when starting or stopping the machine.
 - 5) The releasing of the auxiliary lock must be handle by an authorized person.
 - 6) Do not apply an excessive force (of 1N·m or more) to the threaded portion of the release key.
The release key may be damaged to the extent that it no longer becomes operational.
6. Installing the Cover
- 1) Confirm that the seal rubber has no abnormality and then use it.
If the seal rubber is displaced or floated, or if foreign matters adhere to the seal rubber, the seal rubber will lose its sealing capability.
 - 2) Turn the release key to the LOCK position when closing the door.
Otherwise the switch may be damaged.
 - 3) Do not use any screw other than correct one, or the sealing capability of the seal rubber will deteriorate.
7. About the Hinge Type Door
- A door is mounted near a hinge, excessive load may be imposed beyond a force acting on the lock position of this equipment. This may result in damage to the lock mechanism.
Mount it to a position near a handle.
8. Mounting method
- 1) Mounting screw tightening torque
Mounting screw tightening torque loose mounting may result in malfunction.
Fasten the screws to the specified torque.
 - 2) When loosen the screw, do not continue rotating the screw with the groove and the ridge removed. Otherwise the screw may be slipped.

| | |
|------------------------------|-----------------------------------|
| Terminal screw | 0.59 to 0.78 N·m |
| Cover clamping screw | 0.49 to 0.69 N·m |
| Head clamping screw | 0.49 to 0.59 N·m |
| Operation key clamping screw | 2.35 to 2.75 N·m |
| Body clamping screw | 0.49 to 0.69 N·m |
| Conduit mounting connection | 1.77 to 2.16 N·m(Pg13.5,G1/2,M20) |
| | 1.37 to 1.77 N·m(1/2-14NPT) |
| Cap screw | 1.27 to 1.67 N·m |

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Fig. 1-13

9. Switch, operation key (See Fig.3)

- 1) The switch and operation key will be fastened to specified torque in item 8 with M4 screws and washers.

For a safety, tighten the switch body or operation key with one-way screws or equivalents.

- 2) Do not use the operation key other than dedicated Omron's. Otherwise switch may be damaged.
- 3) Be sure that the operation key can be inserted properly to key hole with a tolerance of ± 1 mm.
- 4) Insert the operation key into the key hole according to the specified "operation key insertion radius in horizontal direction."
- 5) Do not impose excessive force on the key top while the operation key is inserted into the switch body or drop the switch with the operation key inserted to avoid the deformation of the key or the breakage of the switch body.

10. Securing the door (See Fig.4)

If the operation key is pulled in the opening direction due to a force caused by vibration, by the door weight, or by a cushion attached to the door.

The closed door must be secured with a hook or by similar means.

11. Solenoid

- 1) Do not touch the solenoid when the power is supplied. Solenoid radiates heat.
- 2) The DC solenoid has a polarity. (E1: Positive (+) polarity, E2: Negative (-) polarity)

12. About Wiring

Example of Circuit Connections (for D4NL-□P□□-B) (See Fig.5)

- 1) The direct-opening contact which is used as input to safety circuit, is indicated with arrow mark. Terminal No. 11-42 and 21-22 are direct-opening contacts.
- 2) To keep the redundancy of the safety circuit, input to the terminal No. 11 and 42 without removal of the metal plate that is connected with the terminal No. 12 and 41.
- 3) On the terminal No. 21-22 and 51-52, in case of use them for input to safety circuit (redundancy circuit for terminal No. 11-12 and 41-42), connect terminal No. 21-22 and 51-52 in series. In case of use as input to auxiliary circuit (e.g., observation of open and close of a protective door: terminal No. 21-22, observation of lock condition: terminal No. 51-52), connect them individually.
- 4) Fig.5 noted circuit is an example in case of use terminal No. 21-22 and 51-52 as input to auxiliary circuit.
- 5) Connect indicator with auxiliary circuit or terminal No. E1-E2 (in case of D4NL-□□□□ A/B/G/H-B) in parallel. In case of the connection with direct-opening contact in parallel, short circuit current flows when the indicator broken, and equipment may be miss-operated.

13. Wiring

- 1) Do not put the electric power when wiring.
- 2) Do not let particles such as small piece of lead wire in the switch body when wiring.
- 3) Install the wiring through a crimp-style terminal for an insulating tube M3.5 so that the wires do not run over the case or cover. (See Fig.6)
- 4) Adequate conductor size is AWG 20 to 18 (0.5 to 0.75mm²). Wire leads with the proper length. Otherwise, the switch cover does not fit.
- 5) Do not pull on lead wires with excessive force. The wires may break.
- 6) Do not push the ring connector and the likes into the opening between the parts in order to prevent the case from being broken and deformed.
- 7) Use crimp terminals with the shape to avoid the contact with the switch case inside.

(Reference) The below listed terminals have thickness of 0.5mm or less. (See Fig.7)

| Manufacturer | Type |
|--------------|--|
| J.S.T | FN0.5-3.7 (F type) N0.5-3.7 (Straight type) |

14. Conduit opening

- 1) Use the connectors recommended in item 15 and tighten the connector with specified torque in item 8. An excessive torque will bring a case breakage.
- 2) In case of connector of 1/2-14NPT, apply sealing tape between connector and conduit opening so that the enclosure will conform to IP67.
- 3) Use a cable with a suitable diameter for the connector.
- 4) For unused conduit opening, apply a cap screw provided and tighten it to specified torque in item 8.

15. Recommendation of connector

- 1) Use the connector with thread section of 11mm long or less. In the case of the connector with longer thread section, protruded part may interfere with the other parts inside the body. Use below listed connector to secure IP67.

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Fig. 1-14

| Size | Manufacturer | Type | | Adequate cable Diameter |
|-----------|--------------|------------|-----------|-------------------------|
| G1/2 | LAPP | ST-PF1/2 | 5380-1002 | 6.0 to 12.0mm |
| | | OA-W1609 | | 7.0 to 9.0mm |
| | Ohm Denki | OA-W1611 | | 9.0 to 11.0mm |
| PG13.5 | LAPP | ST-13.5 | 5301-5030 | 6.0 to 12.0mm |
| M20 | LAPP | ST-M20×1.5 | 5311-1020 | 7.0 to 13.0mm |
| 1/2-14NPT | LAPP | ST-NPT1/2 | 5301-6030 | 6.0 to 12.0mm |

Use together with a seal packing which is sold separately (Type names JPK-16, GP-13.5, or GPM20) and tighten with proper tightening torque.

LAPP is a German manufacturer. Ohm Denki is a Japanese manufacturer.

- 2) Before a connector of 1/2-14NPT sizes is used, install a supplied conversion adapter on the switch and wrap it in seal tape.

16. Others

Please do a regular check in premeditation for this switch.

17. Technical specification

| | |
|---|---|
| Conformity : Machine Directive, Low Voltage Directive, EN1088, EN60204-1, GS-ET-19 Approval: EN60947-5-1, UL508, CSA C22.2 No. 14, GB14048.5 | |
| EN electrical rating Utilization category: AC-15 DC-13 Rated Voltage : 240VAC 250VDC Rated Current : 3A 0.27A | UL, CSA electrical rating: A300, Q300 Voltage: 240, 120VAC Volt Amp: Make 7,200VA Break 720VA |
| Direct opening travel (min.) : 10 mm | |
| Direct opening force (min.) : 60 N | |
| Pulling strength when locked (min.) : 1,300 N (GS-ET-19) | |
| Adequate operating speed: 0.05 to 0.5 m/s | |
| Maximum operating frequency : 30 cycles/min | |
| Conditional short-circuit current : 100A | |
| Short circuit protective device: Use 10 A fuse, type gI or gG, in accordance with IEC 60269 | |
| Enclosure rating: IP67 (EN60947-5-1) (Operation key insertion face: IP00) : TYPE 4X INDOOR USE ONLY | |
| Minimum permissible load: DC5V, 1mA resistive load (N level: reference value) | |
| Ambient temperature range: -10 to +55°C (Protect against frost) | |
| Ambient humidity (max.): 95%RH | |
| Mechanical durability (min.): 1,000,000 operations | |
| Electrical durability (min.): 500,000 operations (250VAC, 3A resistive load) : 300,000 operations (250VAC, 10A resistive load) | |

- 1) There is no equality between the ON/OFF motions of a contact. Check it against your service conditions.

- 2) The switch contacts are common use for general load and micro load but, after switching a general load, it is impossible to switch a micro load with the same contacts. The contact reliability would decrease due to the rough contact surface.

Suitability for Use

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

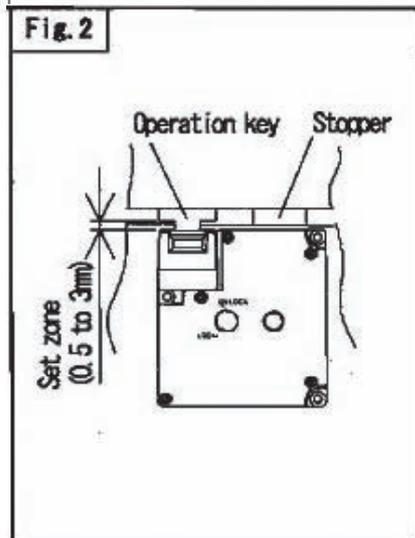
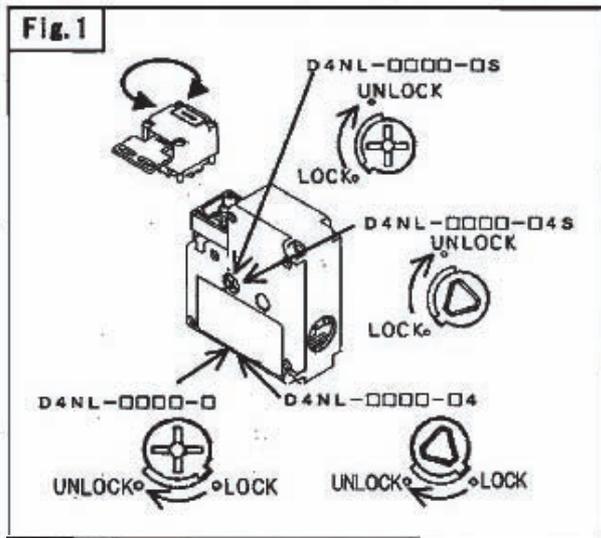
See also Product catalog for Warranty and Limitation of Liability.

Local support office:
.....

Contact the following sales offices about product information.

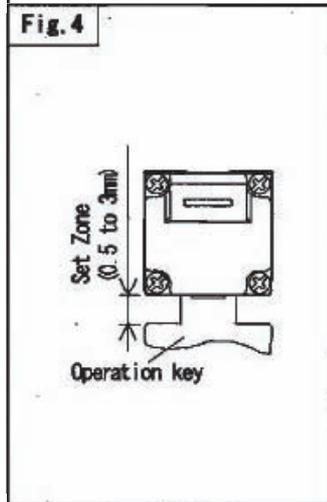
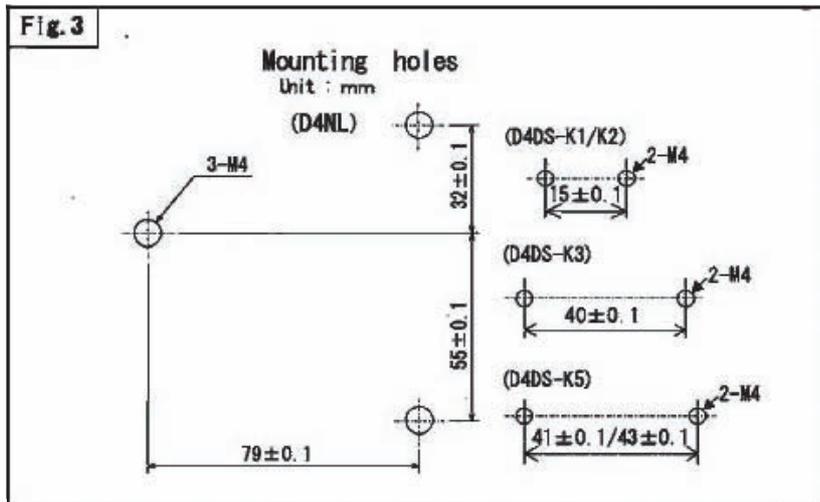
| | |
|---------------------------------------|---|
| <u>North America</u> | |
| U.S.A. OMRON ELECTRONICS LLC. | Phone: 1-800-55-OMRON Fax: 1-847-843-7787 |
| Canada OMRON CANADA INC. | Phone: 1-416-286-6465 Fax: 1-416-286-6648 Phone: 1-514-636-6676 (French) Fax: 1-514-636-2959 |
| <u>Europe</u> | |
| Headquarter OMRON EUROPE B.V. | Phone: 31-23-56-81-300 Fax: 31-23-56-81-388 |
| <u>Asia and Pacific</u> | |
| 大韓民國 韓國 OMRON 株式会社 | Phone: 82-2-3218-5700 |
| 中國 歐姆龍(中國)有限公司 | Phone: 86-10-5869-3030 |
| 香港 歐姆龍亞洲有限公司 | Phone: 852-2375-3827 |
| 台灣 台灣歐姆龍股份有限公司 總公司 | Phone: 886-2-2715-3331 |
| Australia OMRON ELECTRONICS PTY.LTD. | Phone: 61-02-9878-6377 |
| Singapore OMRON ASIA PACIFIC PTE.LTD. | Phone: 65-6835-3011 |

Fig. 1-15



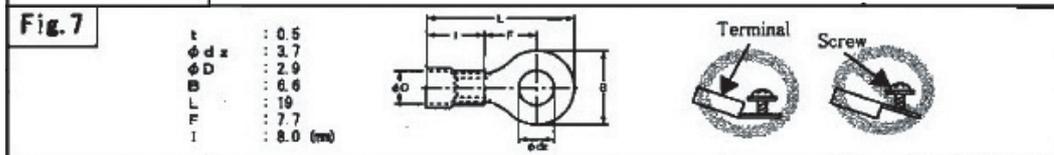
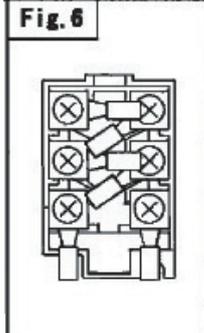
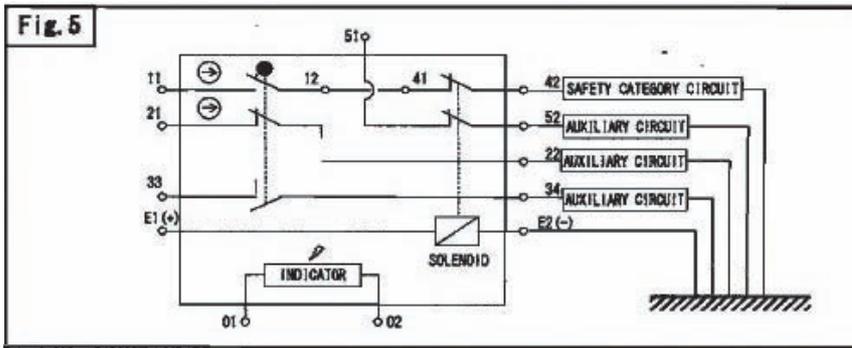
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Fig. 1-16



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Fig. 1-17



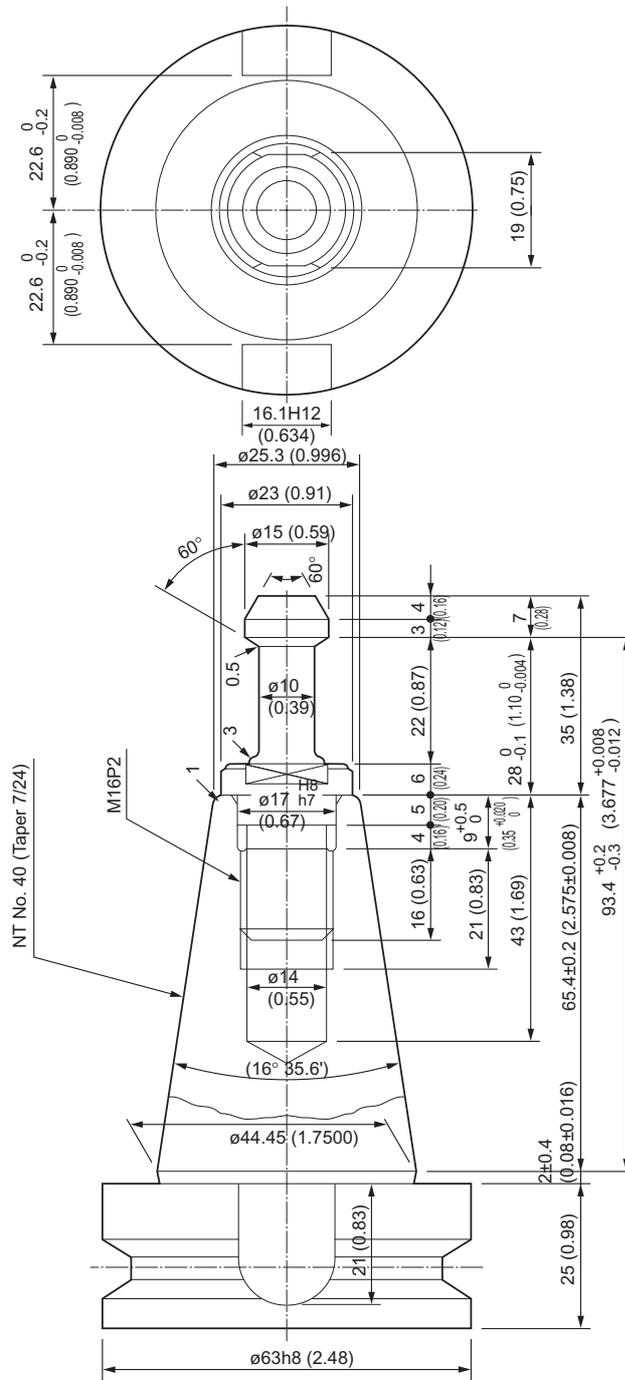
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Fig. 1-18

SECTION 2 TECHNICAL DATA

2-1. Dimensions of Tool Shank and Pull Stud (MAS2)

2-1-1. Tool Shank and Pull Stud



Unit: mm (in.)

Unit: mm (in.)

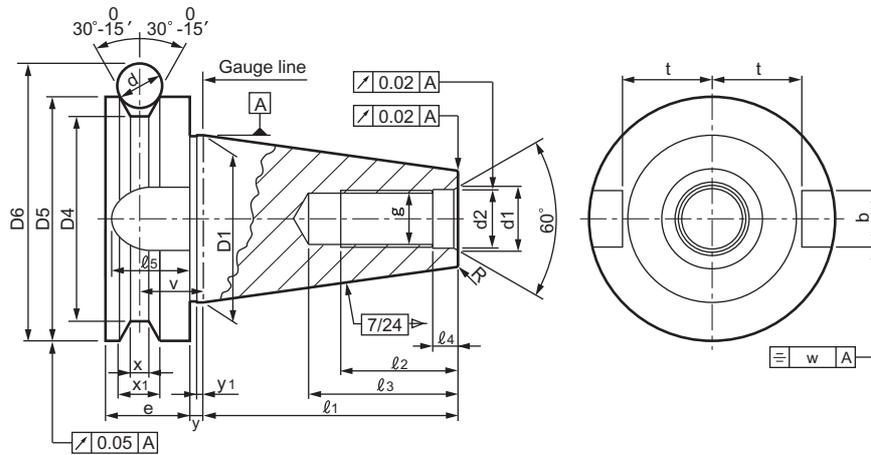
Fig. 2-1

[Supplement]

- 1) Tool shank shape and dimensions comply with MAS Standard BT 40 (403-1982).
- 2) Pull Stud shape and dimensions comply to MAS Standard P40T2 (403-1982).

2-1-2. Tool Shank Dimensions

Bottle Grip Taper Shank (MAS 403-1982)



Unit: mm

| Nominal No. | Shank | | | Thread | | | | | | Slot on Flange | | | |
|-------------|--------|---------------|----------|--------|-------|------|--------------|--------------|-----------------|----------------|--------------|------------|------|
| | D1 | $l_1 \pm 0.2$ | R (Max.) | d1 | d2 H8 | g 6H | l_2 (Min.) | l_3 (Min.) | $l_4 +0.5$ 0 | b H12 | l_5 (Min.) | $t_0 -0.2$ | W |
| BT30 | 31.75 | 48.4 | 0.5 | 14 | 12.5 | M12 | 24 | 34 | 7.0 | 16.1 | 17 | 16.3 | 0.12 |
| BT35 | 38.10 | 56.4 | 0.5 | 14 | 12.5 | M12 | 24 | 34 | 7.0 | 16.1 | 20 | 19.6 | 0.12 |
| ➔ BT40 | 44.45 | 65.4 | 1 | 19 | 17 | M16 | 30 | 43 | 9.0 | 16.1 | 21 | 22.6 | 0.12 |
| BT45 | 57.15 | 82.8 | 1 | 23 | 21 | M20 | 38 | 53 | 11.0 | 19.3 | 26 | 29.1 | 0.12 |
| BT50 | 69.85 | 101.8 | 1 | 27 | 25 | M24 | 45 | 62 | 13.0 | 25.7 | 31 | 35.4 | 0.2 |
| BT55 | 88.90 | 126.8 | 1 | 33 | 31 | M30 | 56 | 76 | 16.0 | 25.7 | 31 | 45.1 | 0.2 |
| BT60 | 107.95 | 161.8 | 1 | 33 | 31 | M30 | 56 | 76 | 16.0 | 25.7 | 34 | 60.1 | 0.2 |

| Nominal No. | Flange | | | | | | | | | Allowance of 7/24 Taper* ATD | Reference | | |
|-------------|--------|-------|----|-------------|----|-----------------|-------------|-----------------|----------------------|---------------------------------|-----------|---------|--|
| | D4 | D5 h8 | e | v ± 0.1 | x | $x_1 +0.1$ 0 | y ± 0.4 | $y_1 0$ -0.4 | Smaller end Diameter | | d | D6 | |
| BT30 | 38 | 46 | 20 | 13.6 | 4 | 8 | 2 | 2 | +0.0039 0 | 17.633 | 8 | 56.144 | |
| BT35 | 43 | 53 | 22 | 14.6 | 5 | 10 | 2 | 2 | +0.0045 0 | 21.650 | 10 | 65.680 | |
| ➔ BT40 | 53 | 63 | 25 | 16.6 | 5 | 10 | 2 | 2 | +0.0041 0 | 25.375 | 10 | 75.679 | |
| BT45 | 73 | 85 | 30 | 21.2 | 6 | 12 | 3 | 3 | +0.0052 0 | 33.000 | 12 | 100.216 | |
| BT50 | 85 | 100 | 35 | 23.2 | 7 | 15 | 3 | 3 | +0.0051 0 | 40.158 | 15 | 119.019 | |
| BT55 | 107 | 125 | 40 | 26.2 | 9 | 18 | 3 | 3 | +0.0063 0 | 51.917 | 18 | 147.823 | |
| BT60 | 135 | 155 | 45 | 28.2 | 11 | 20 | 3 | 3 | +0.0065 0 | 60.758 | 20 | 180.359 | |

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Fig. 2-2

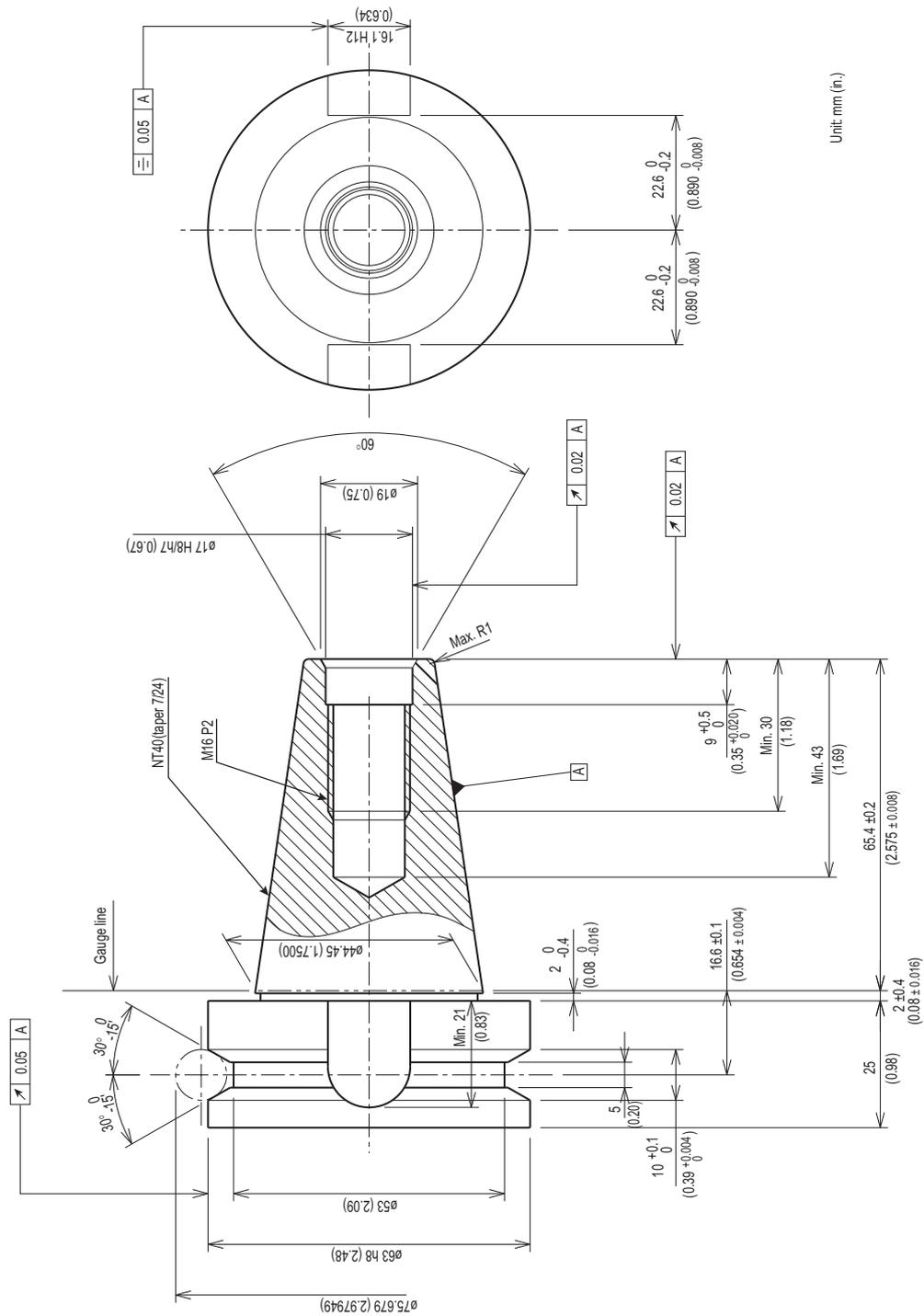
[Supplement]

Angular allowance of 7/24 taper shall be plus AT4, minus 0, which is specified in JIS B0614, class AT4.

Note

- 1) Allowance shall be middle class stipulated in JIS B0405, unless otherwise specified.
- 2) A relief may be provided at "d2" portion for finish grinding on mating recess.

MAS-compliant Tool Shank



Unit: mm (in.)

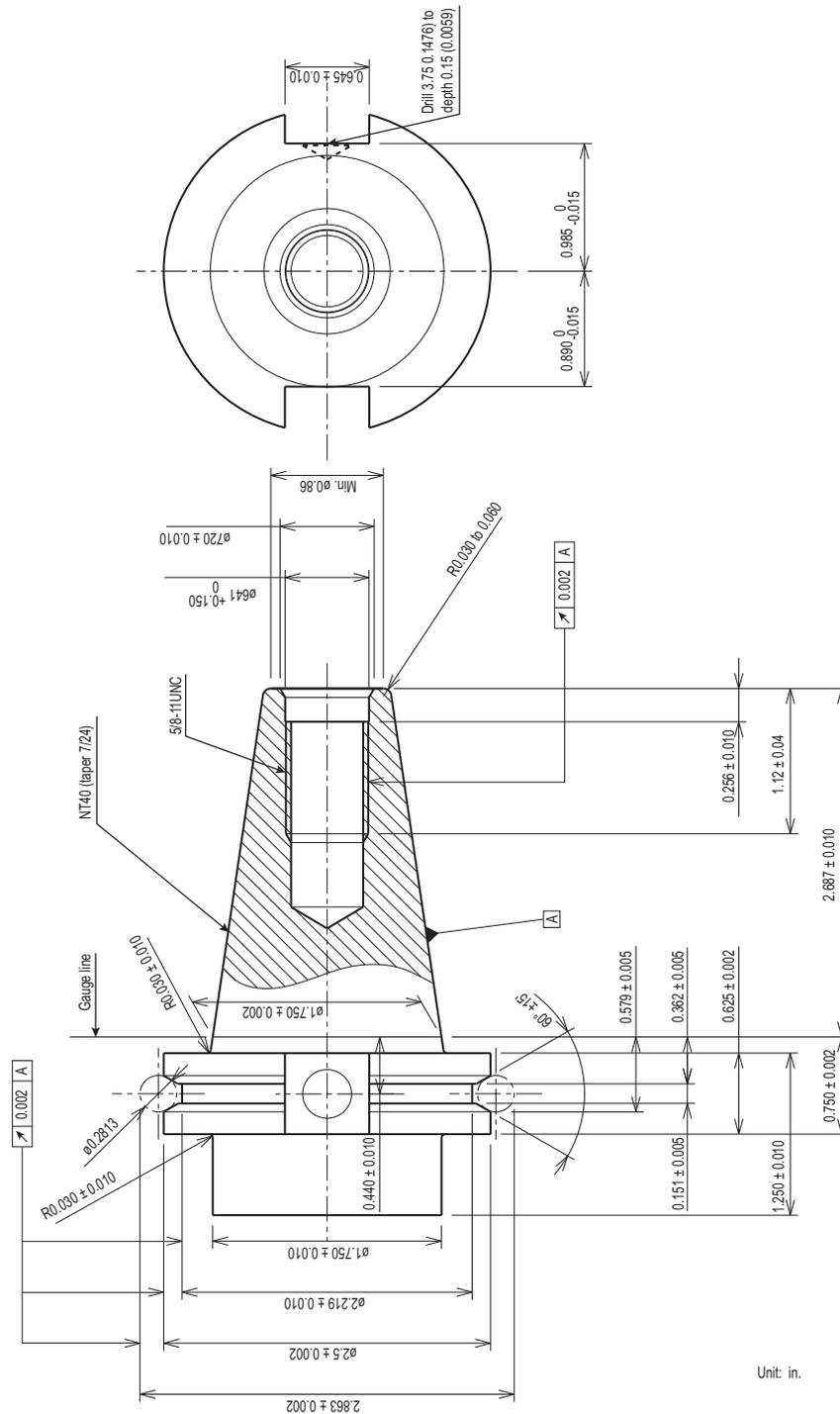
Fig. 2-3

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[Supplement]

- 1) For more information on the tool shank shape, refer to MAS (403-1982) BT 40.
- 2) The above drawing is based on MAS Standard. Prepare the ATC tools by referring to MB-H Series OPERATION & MAINTENANCE.

CAT-compliant Tool Shank



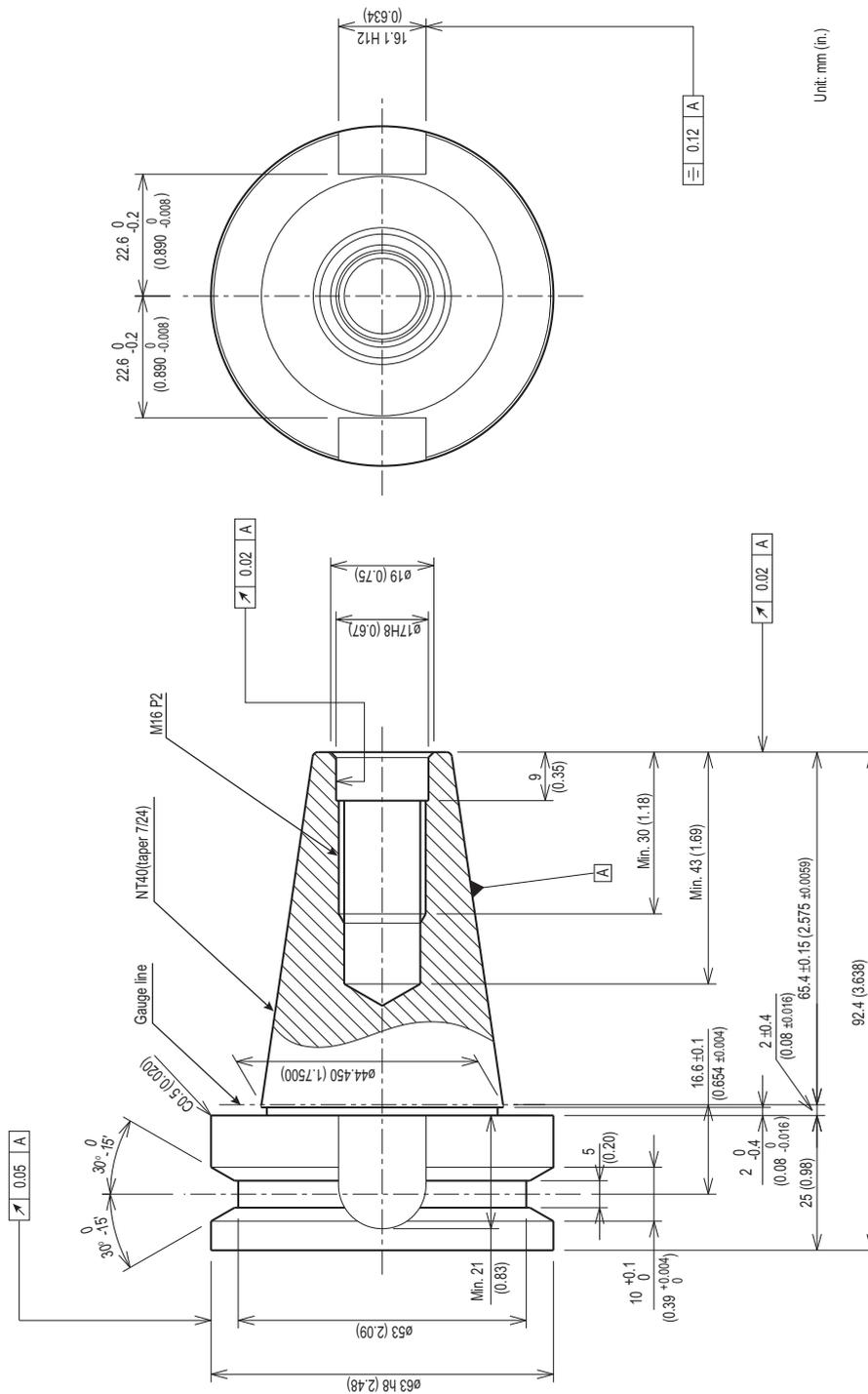
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Fig. 2-4

[Supplement]

- 1) For more information on the tool shank shape, refer to CAT (MF5311) No. 40.
- 2) The above drawing is based on JIS. Prepare the ATC tools by referring to MB-H Series OPERATION & MAINTENANCE.

JIS-compliant Tool Shank



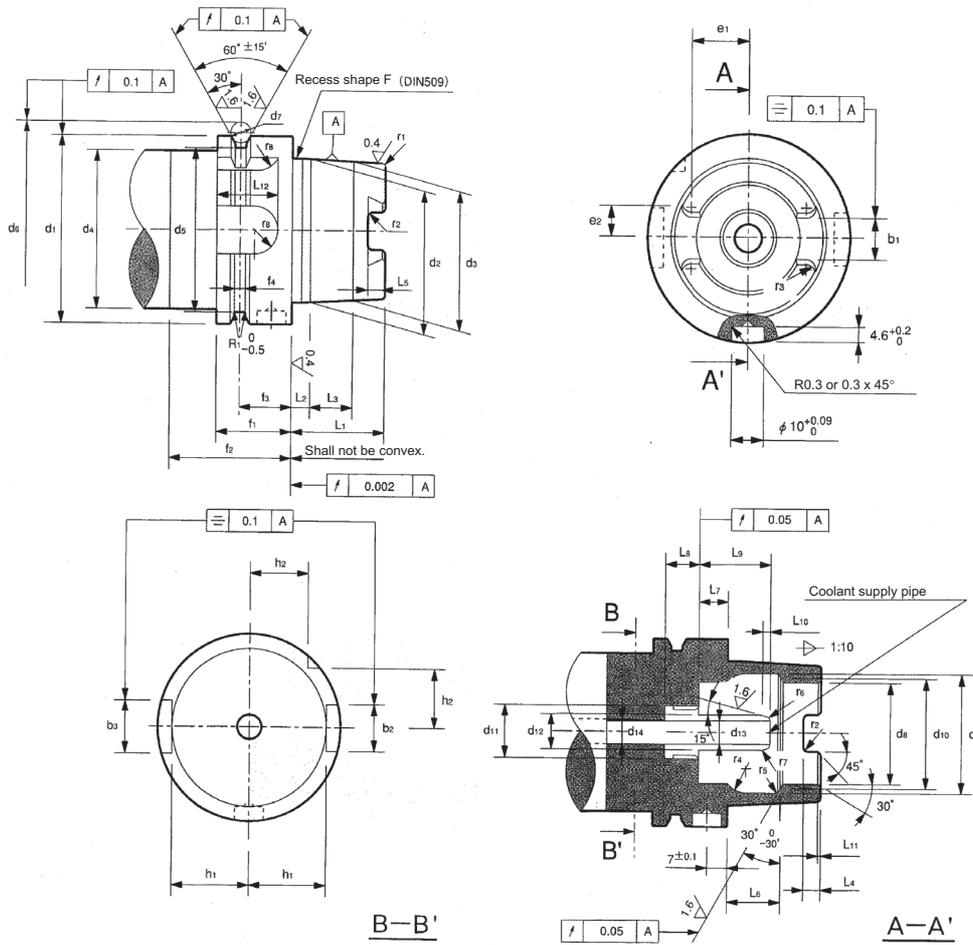
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Fig. 2-6

[Supplement]

- 1) For more information on the tool shank shape, refer to JIS (B6339-1992) BT40.
- 2) The above drawing is based on DIN Standard. Prepare the ATC tools by referring to MB-H Series OPERATION & MAINTENANCE.

HSK Tool Shank Dimensions



ME13024R0400400070001

Fig. 2-7

| | Code | b1 H10 | b2 H10 | b3 H10 | d1 h10 | d2 (Limit) | d3 (Limit) | d4 (Max) | d5 _{±0.1} | d6 _{±0.1} | d7 | d8 H10 | d9 H11 | d10 | d11 |
|---------------------|-------|-----------|-----------|-----------|-----------|----------------------------|-------------------------------|-------------|--------------------|--------------------|----|-----------|-----------|-----|---------|
| ➔ #40 or equivalent | A-63 | 12.5 | 16 | 18 | 63 | 48 (+0.011) (+0.007) | 46.53 (+0.007) (+0.003) | 53 | 55 | 72.3 | 7 | 34 | 40 | 37 | M18x1 |
| ➔ #50 or equivalent | A-100 | 20 | 20 | 22 | 100 | 75 (+0.015) (+0.009) | 72.60 (+0.009) (+0.003) | 85 | 92 | 109.75 | 7 | 53 | 63 | 58 | M24x1.5 |

| | Code | d12 h8 | d13 | d14 (Max) | e1 | e2 | f1 _{±0.1} | f2 (Min) | f3 _{±0.1} | f4 _{±0.15} | h1 _{±0.2} | h2 _{±0.3} | L1 _{±0.2} | L2 | L3 | L4 _{±0.2} | L5 _{±0.2} |
|---------------------|-------|-----------|-----|--------------|--------|-------|--------------------|-------------|--------------------|---------------------|--------------------|--------------------|--------------------|-----|------|--------------------|--------------------|
| ➔ #40 or equivalent | A-63 | 12 | 8 | 8.4 | 17.862 | 9.25 | 26 | 42 | 18 | 3.75 | 26.5 | 20 | 32 | 6.3 | 14.7 | 10 | 6 |
| ➔ #50 or equivalent | A-100 | 16 | 12 | 12 | 27.329 | 15.00 | 29 | 45 | 20 | 3.75 | 44 | 31.5 | 50 | 10 | 24 | 15 | 10 |

| | Code | L6 JS10 | L7 _{±0.1} | L8 _{±0.3} | L9 | L10 | L11 _{±0.3} | L12 | r1 | r2 (Max) | r3 | r4 | r5 | r6 | r7 | r8 | DIN509 Recess shape F |
|---------------------|-------|------------|--------------------|--------------------|------|-----|---------------------|-----|-----|-------------|----|----|-----|-----|----|----|--------------------------|
| ➔ #40 or equivalent | A-63 | 18.13 | 10 | 12 | 24.5 | 3 | 1 | 21 | 1.2 | 1.5 | 3 | 8 | 0.6 | 1.5 | 3 | 8 | 0.6x0.2 |
| ➔ #50 or equivalent | A-100 | 28.56 | 12.5 | 16 | 28 | 3 | 1.5 | 24 | 2 | 2 | 5 | 12 | 1 | 1.5 | 3 | 10 | 1 x0.2 |

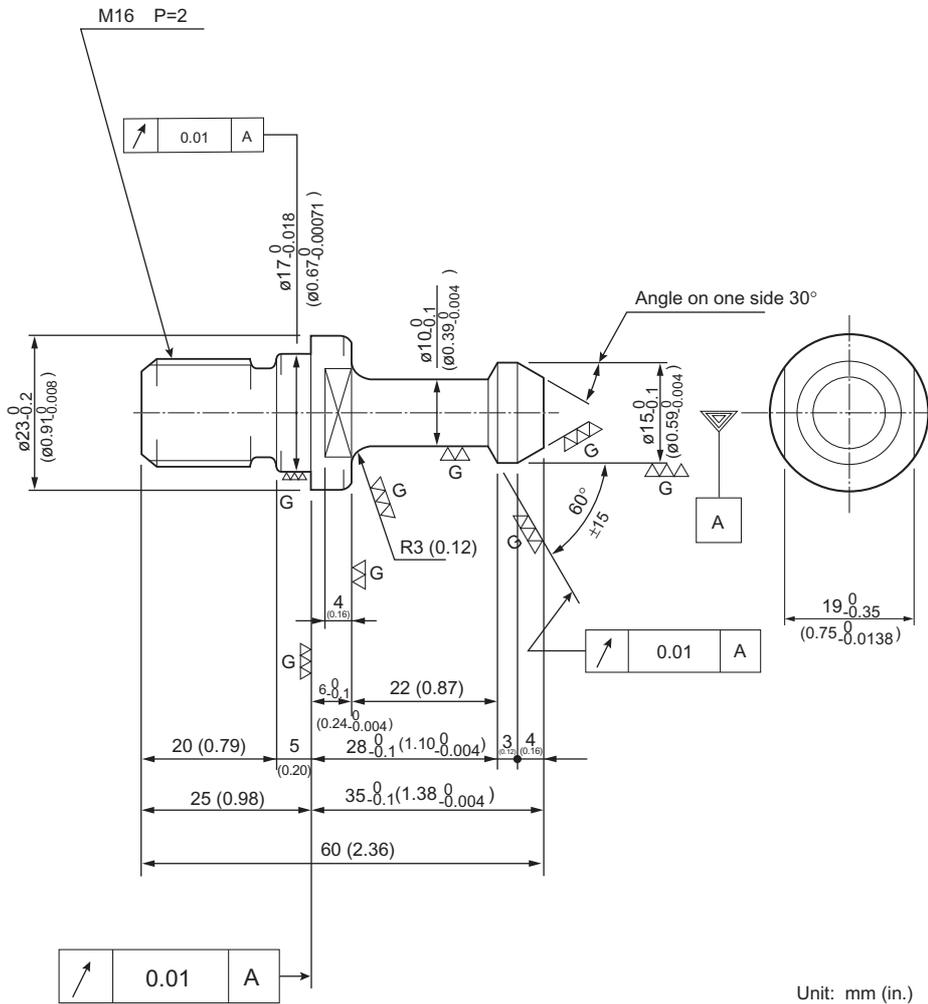
ME13024R0400400070002

Fig. 2-8

| | |
|---|--|
| CAUTION | Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property. |
| Be sure to use the toolholders having a coolant pipe. | |

2-1-3. Pull Stud Dimensions

MAS2 (#40)



Unit: mm (in.)

Material : SNCM420

Heat treatment: Carburizing (HRC 60 or higher)

This pull stud is not usable for the tool with coolant hole.

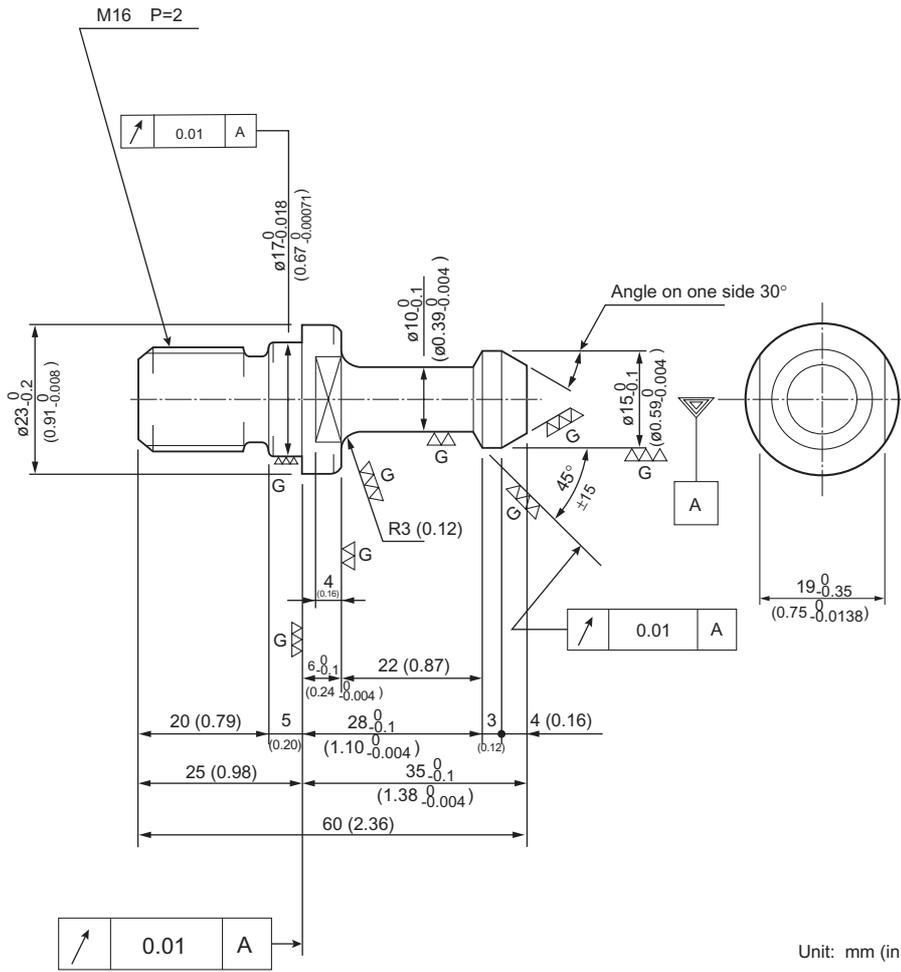
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Fig. 2-9

[Supplement]

For further information on the tool Pull Stud shape, refer to the standard dimensions specified in MAS (403-1982) P40T.

MAS1 (#40)



Material : SNCM420
 Heat treatment: Carburizing (HRC 60 or higher)

This pull stud is not usable for the tool with coolant hole.

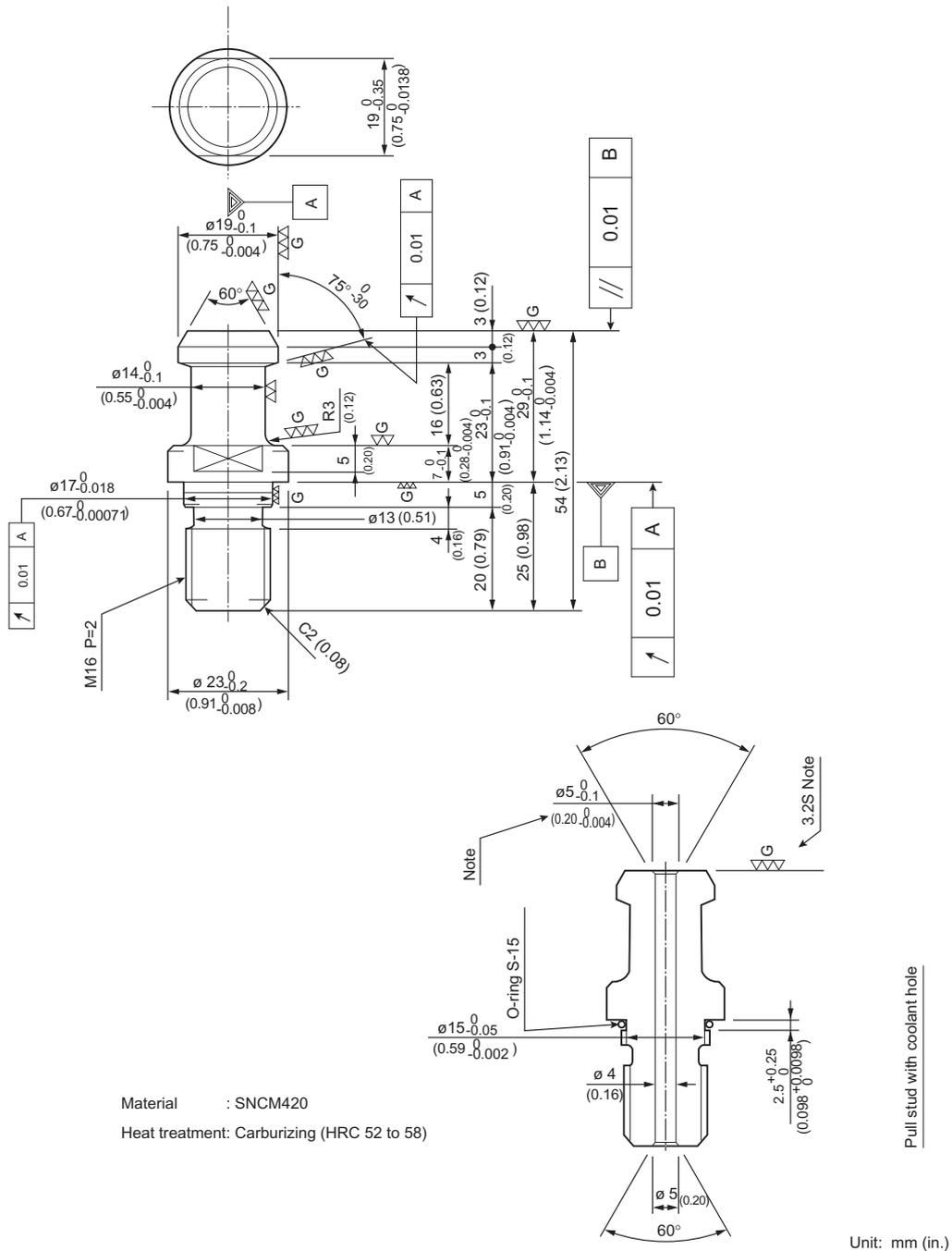
ME13024R0400400090001

Fig. 2-10

[Supplement]

For further information on the tool pull Stud shape, refer to the standard dimensions specified in MAS (403-1982) P40T.

JIS (#40)



ME13024R0400400100001

Fig. 2-11

[Supplement]

For further information on the tool pull stud shape, refer to the standard dimensions specified in JIS (6339-1992) 40P.

CAT (#40)

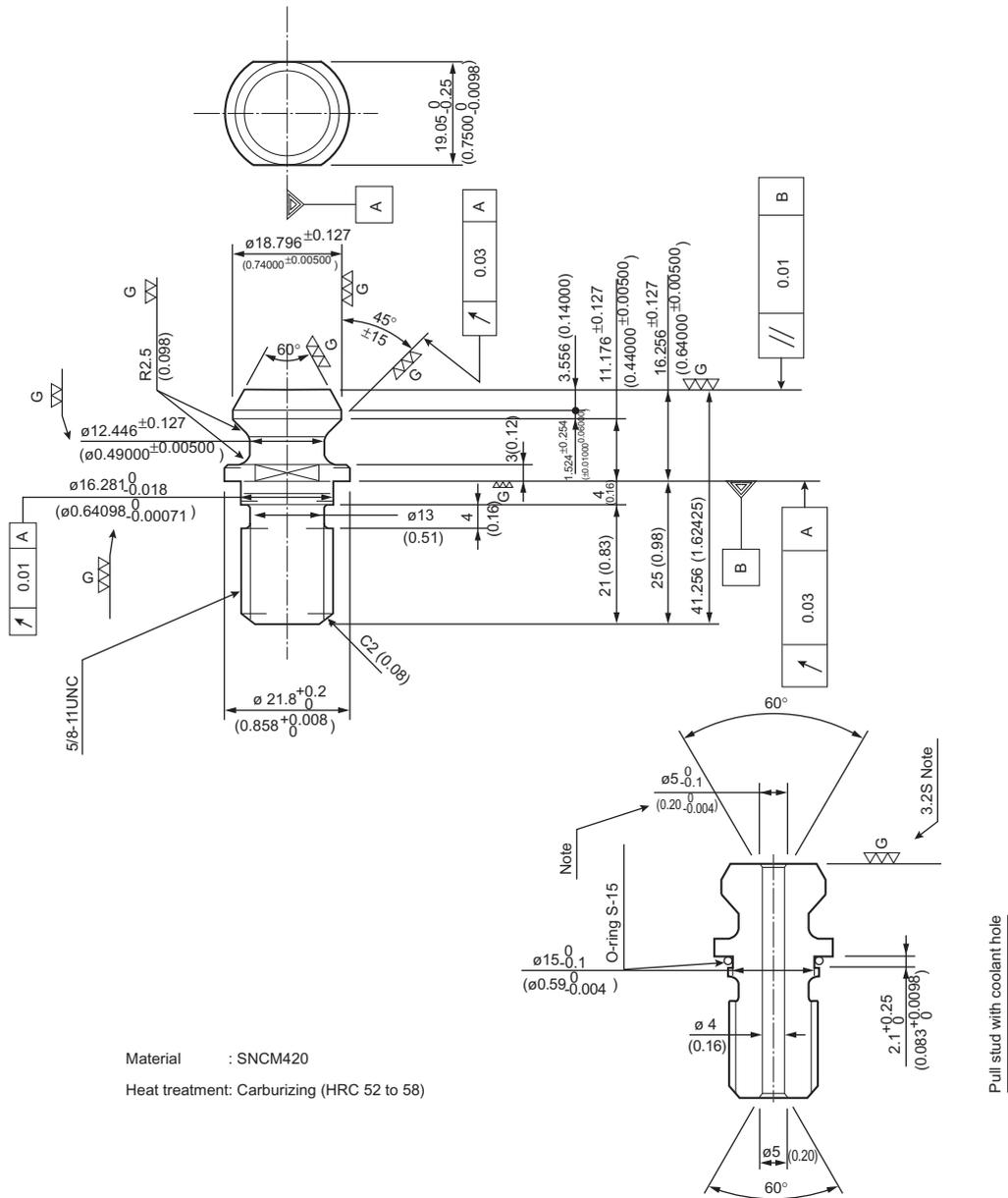
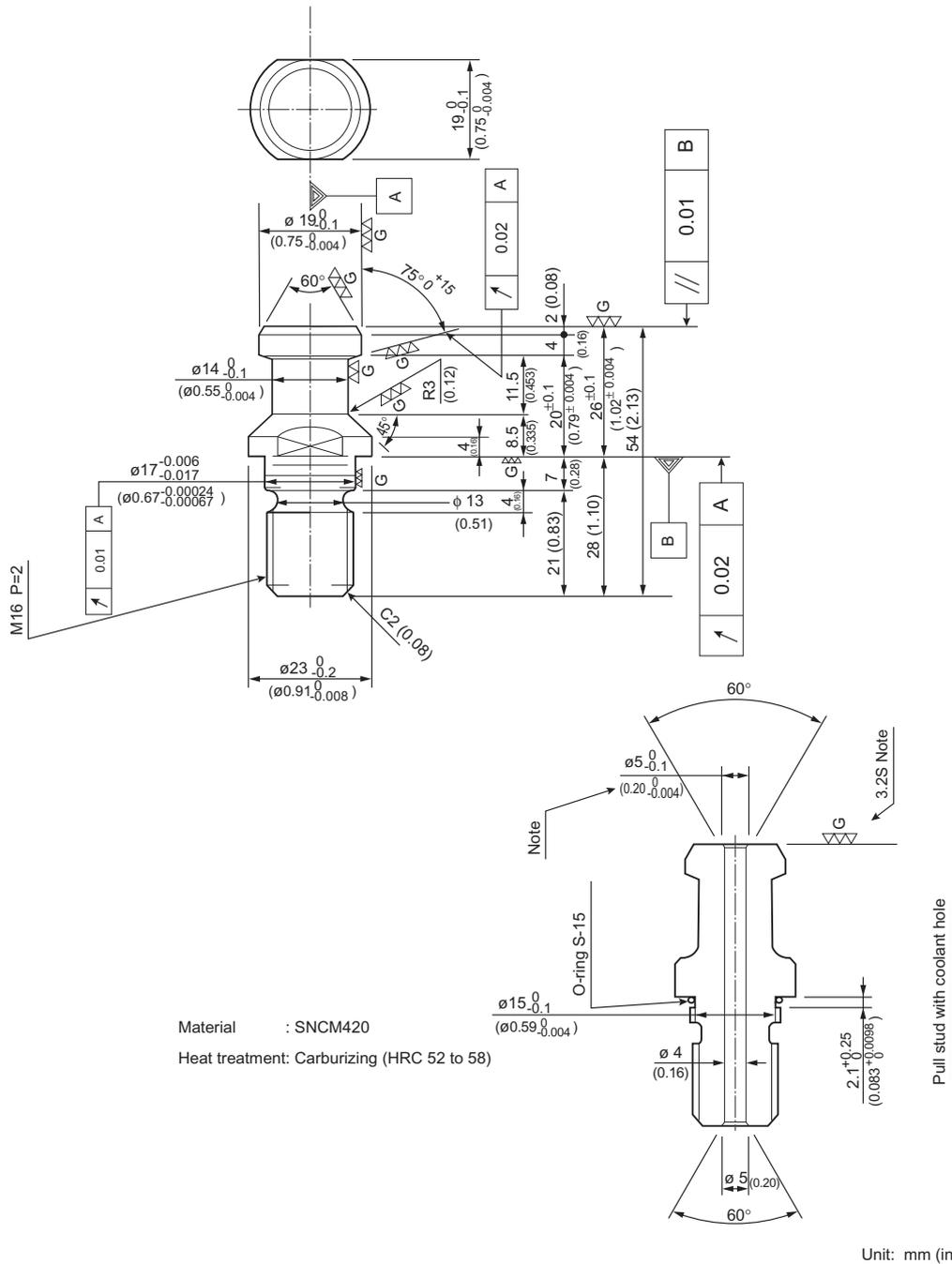


Fig. 2-12

[Supplement]

For further information on the tool pull stud shape, refer to the standard dimensions specified in CAT (MF2560) No. 40.

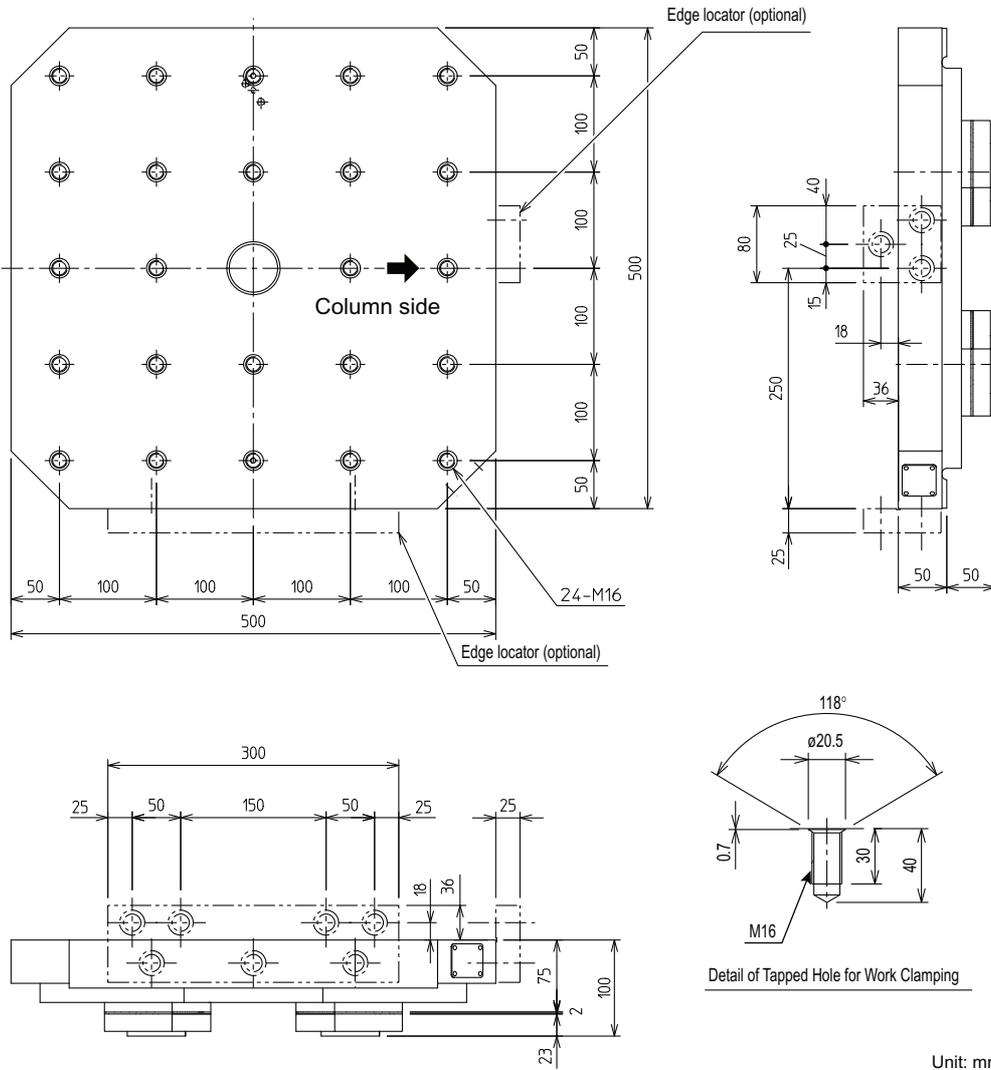
DIN (#40)



2-2. Pallet Dimensions

2-2-1. Pallet with Tapped Holes (Metric System)

(1) Pallet dimensions (1/2)



Unit: mm

ME13024R0400400140001

Fig. 2-15

(2) Pallet dimensions (2/2)

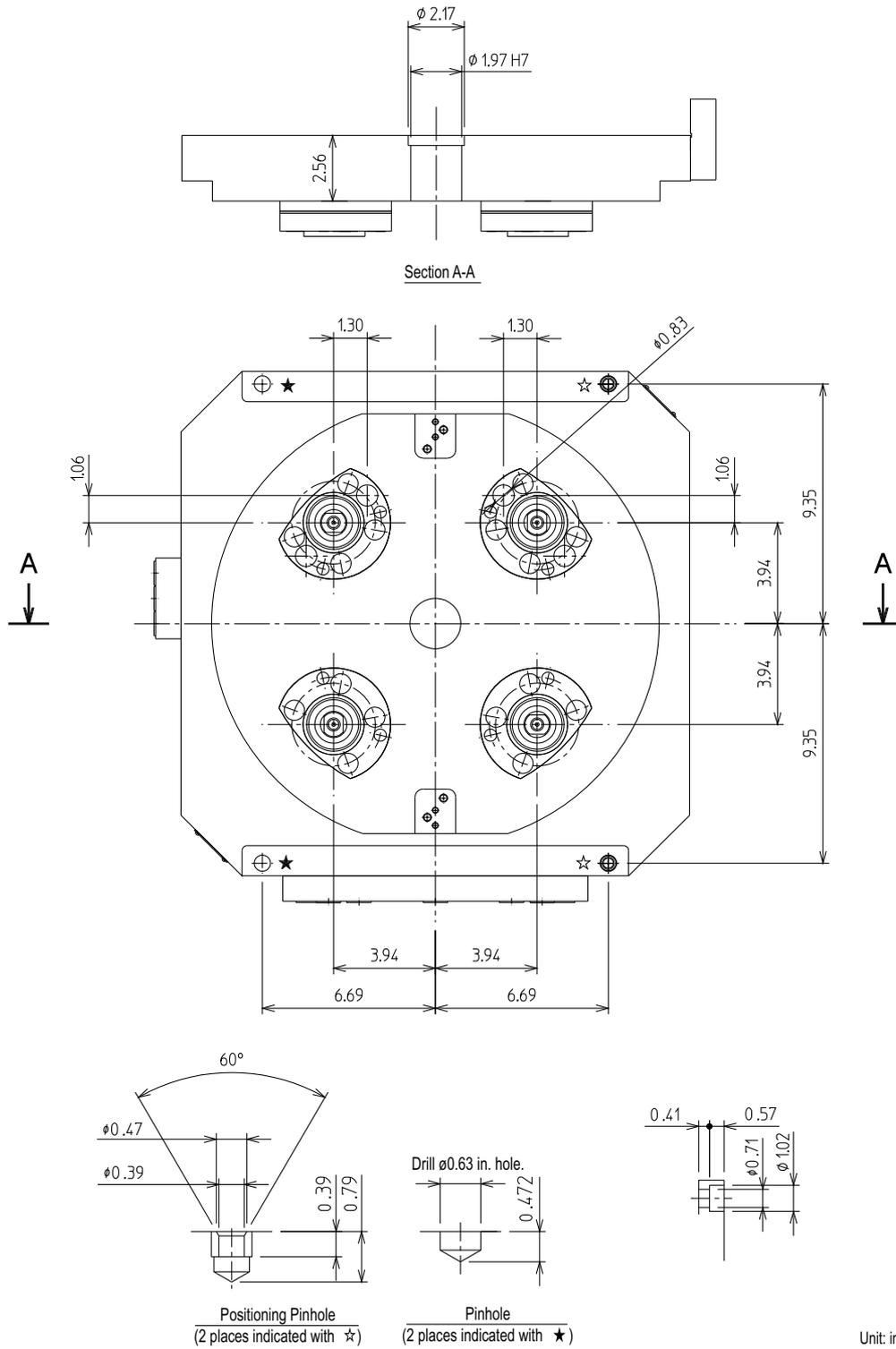
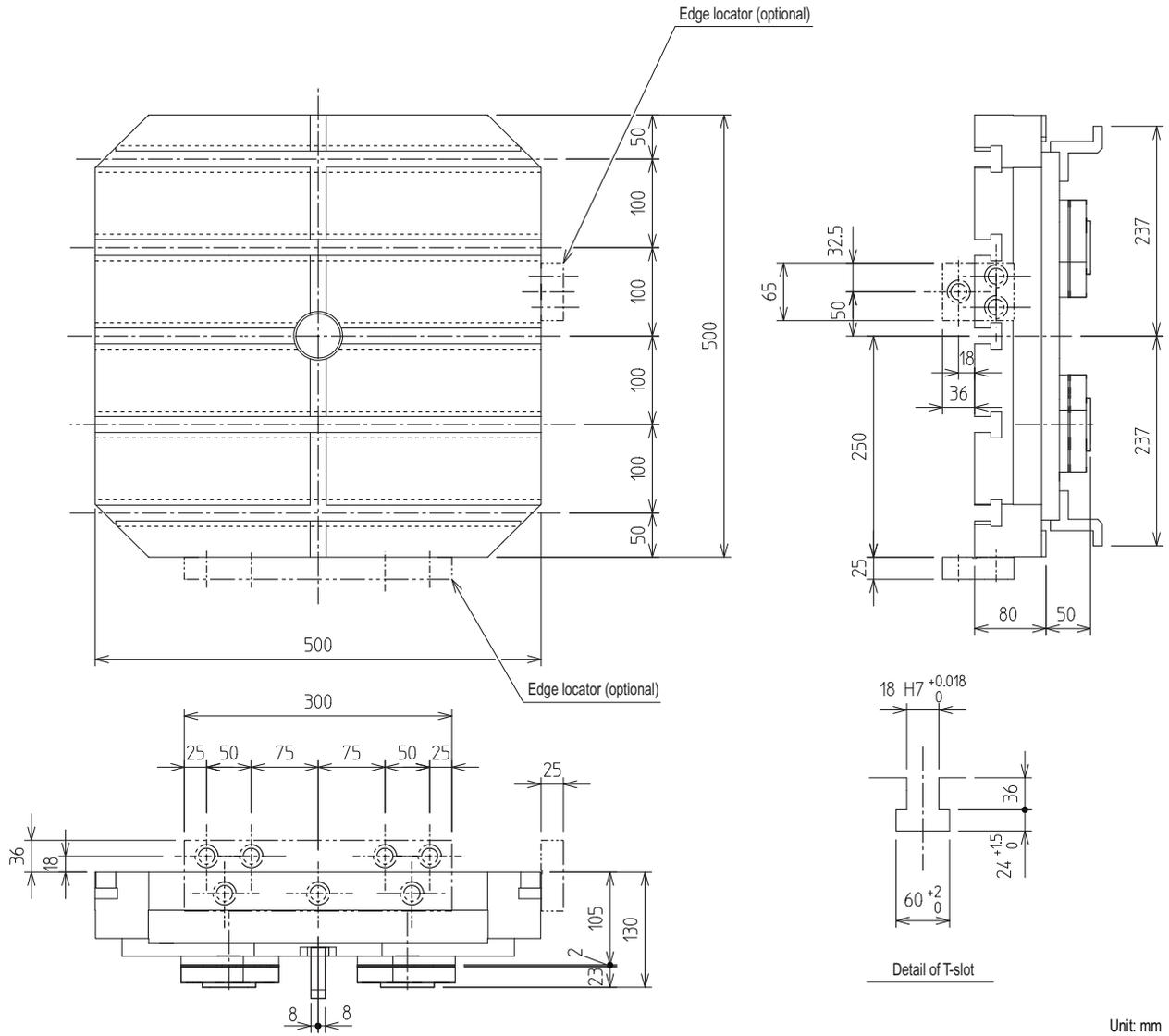


Fig. 2-18

2-2-3. Pallet with T-slots (Metric System)

(1) Pallet dimensions (1/2)

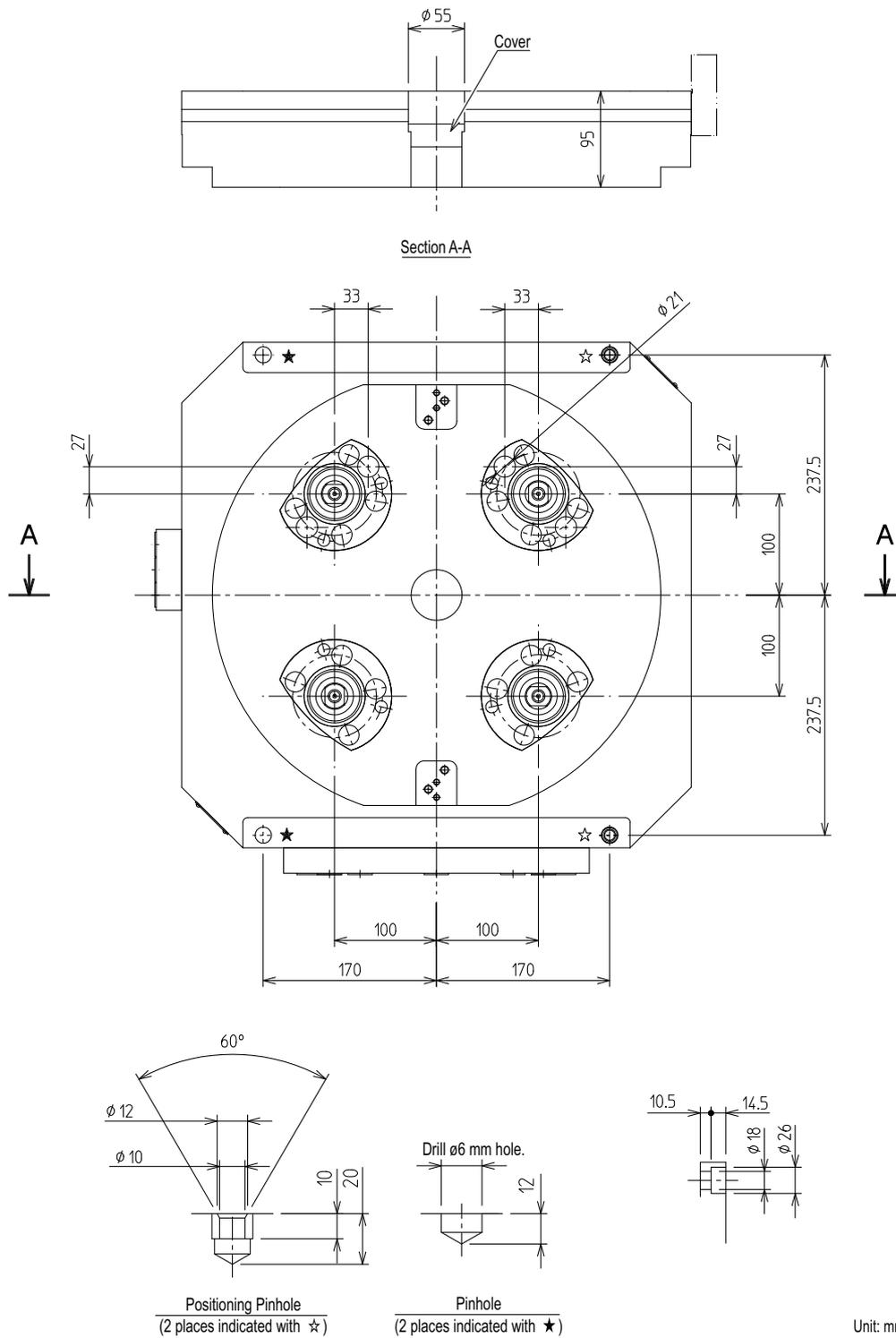


Unit: mm

ME13024R0400400160001

Fig. 2-19

(2) Pallet dimensions (2/2)



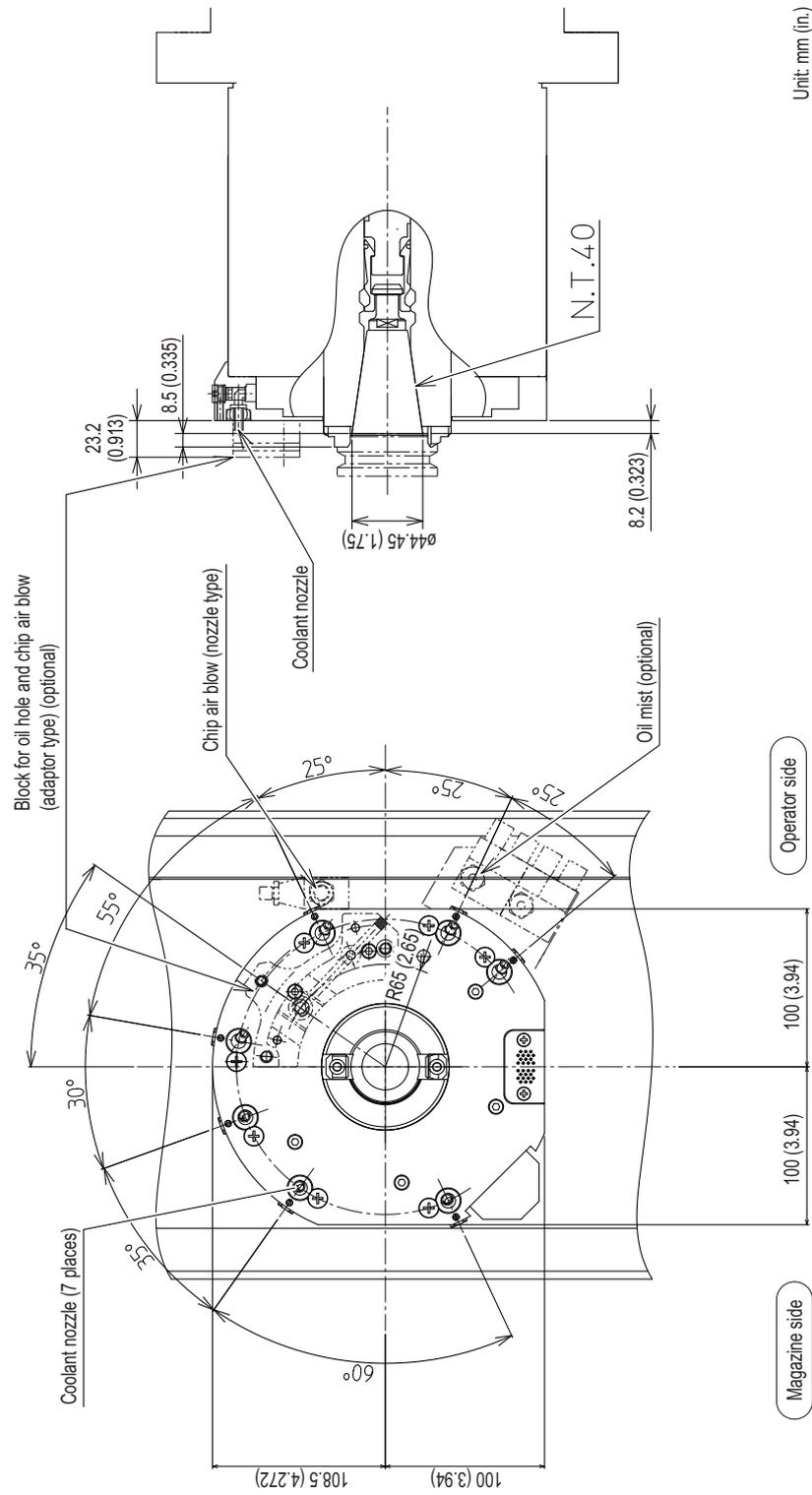
Unit: mm

ME13024R0400400160002

Fig. 2-20

2-3. Spindle Nose Dimensions

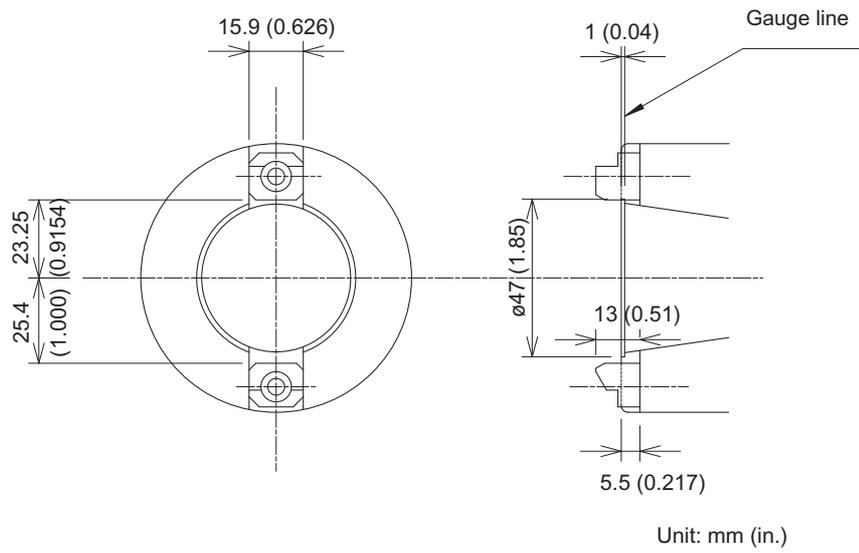
2-3-1. MB-5000H (15,000 min⁻¹)



ME13024R0400400180001

Fig. 2-21

Detail of Spindle End (MAS, CAT and DIN Standard)



ME13024R0400400180002

Fig. 2-22

2-4. Hydraulic Circuit Diagram

2-4-1. Machine with 1°/0.001° Index Table (15,000 min⁻¹ Spindle)

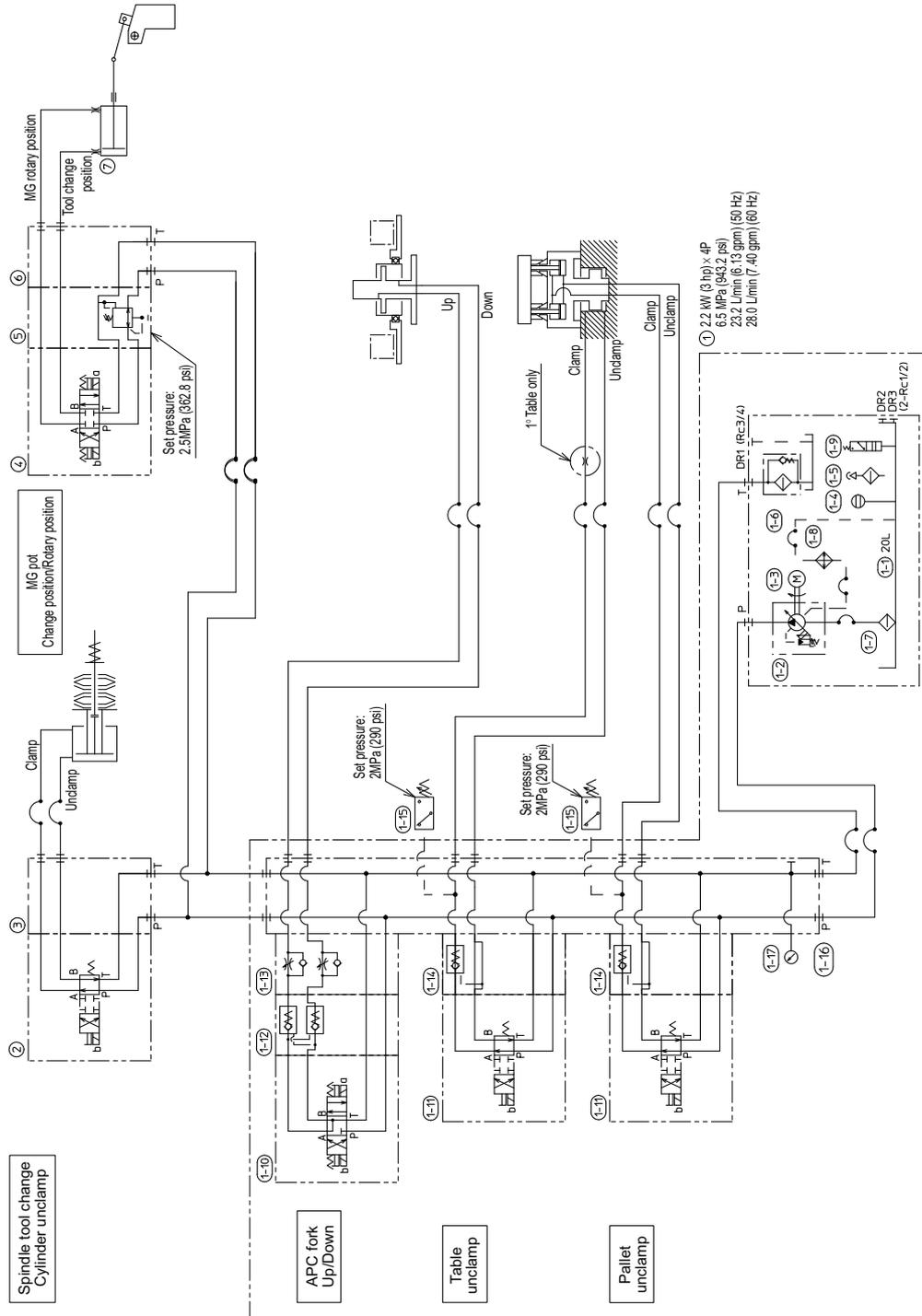


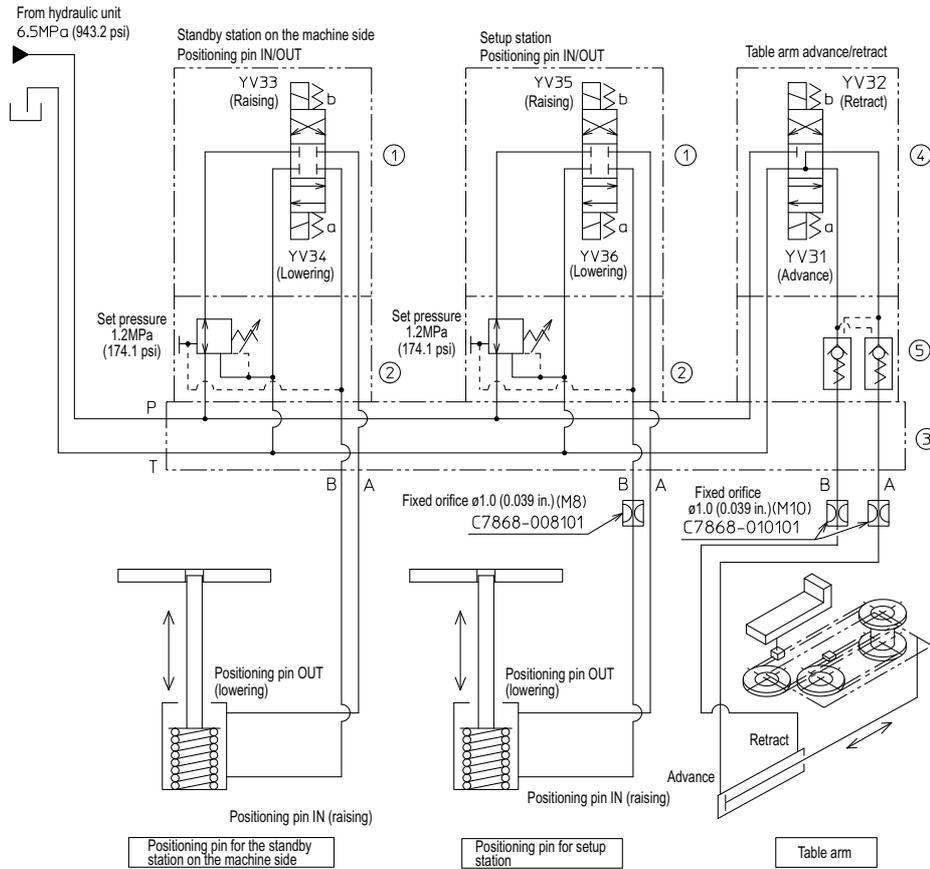
Fig. 2-23

SECTION 2 TECHNICAL DATA

| No. | Part Name | Type | Maker | Qty | Okuma Part No. | Used for |
|-----|----------------------------------|--|-----------------|-----|------------------|------------------------|
| 1 | Hydraulic unit | | | | | |
| 1 | Tank | 20 L (Tank's total capacity: 27 L) | TOKYO KEIKI | (1) | | |
| 2 | Vane pump | VV16-R-Y-B-10 | TOKYO KEIKI | (1) | F0100-73-000-34 | |
| 3 | DC motor | 2.2kW4P200/220 V50/60Hz-C19L-T02 | TOKYO KEIKI | (1) | E1003-519-006 | |
| 4 | Oil level gauge | OLG2-60K-M8-S1 | Kinoshita | (1) | H0039-0009-05 | |
| 5 | Oil filler port and air breather | MSA-V22 | Masuda | (1) | H0032-0009-90 | |
| 6 | Filter | Y-443800 (10µm) | YAMASHIN-FILTER | (1) | H0032-0015-32 | |
| 7 | Filter | SF06-100 (100µm) | YAMASHIN-FILTER | (1) | H0032-0013-76 | |
| 8 | Radiator | RA-4 | Taisei Kogyo | (1) | | |
| 9 | Level switch | LSN-105L-B-11 | ASK | (1) | E3041-215-001 | |
| 10 | Solenoid valve | DG4V-3-6C-U-H-100 | TOKYO KEIKI | (1) | F0001-445-000-04 | |
| 11 | Solenoid valve | DG4V-3-2A-U-H-100 | TOKYO KEIKI | (2) | F0001-432-000-96 | |
| 12 | Pilot check valve | TGMPC-3-ABM-BAM-51 | TOKYO KEIKI | (1) | F0040-980-000-03 | |
| 13 | Flow regulator | TGMFN-3-Y-A2W-B2W-50J | TOKYO KEIKI | (1) | F0030-601-000-31 | |
| 14 | Pilot check valve | TGMPC-3-ABK-51J | TOKYO KEIKI | (2) | F0040-980-000-25 | |
| 15 | Pressure switch | SPS-8T-PC23-T07 | SANWA ELECTRIC | (2) | E3040-299-025 | |
| 16 | Manifold block | MB0K-3-3R-02 | TOKYO KEIKI | (1) | | |
| 17 | Pressure gauge | PAGT-PT1/4-60X16 Indicated in both MPA/PSI-SB | YODOGAWA KEIKI | (1) | T019-400-009-84 | Overseas market specs. |
| 17 | Pressure gauge | PAGT-PT1/4-60X16MPA-SB | YODOGAWA KEIKI | (1) | T019-400-009-83 | Japan market specs. |
| 2 | Solenoid valve | DG4V-3-2A-M-U1-H-7-52 | TOKYO KEIKI | 1 | F0001-431-001-15 | Spindle clamp/unclamp |
| 3 | Sub plate | DGMS-3-1E-10-T-JA-J | TOKYO KEIKI | 1 | H0013-0001-53 | Spindle clamp/unclamp |
| 4 | Solenoid valve | DG4V-3-2C-M-U1-H-7-52 | TOKYO KEIKI | 1 | F0000-442-001-50 | Pot rotation |
| 5 | Pressure reducing valve | TGMX2-3-PP-BW-G-50J | TOKYO KEIKI | 1 | F0011-730-000-13 | Pot rotation |
| 6 | Sub plate | DGMS-3-1E-10-T-JA-J | TOKYO KEIKI | 1 | H0013-0001-53 | Pot rotation |
| 7 | Hydraulic cylinder | OCJ70-TA32B60B | Ogaki | 1 | H0000-0014-50 | Pot rotation |

Table 2-1

2-4-2. Multi-pallet APC (6, 10, 12 Pallets)

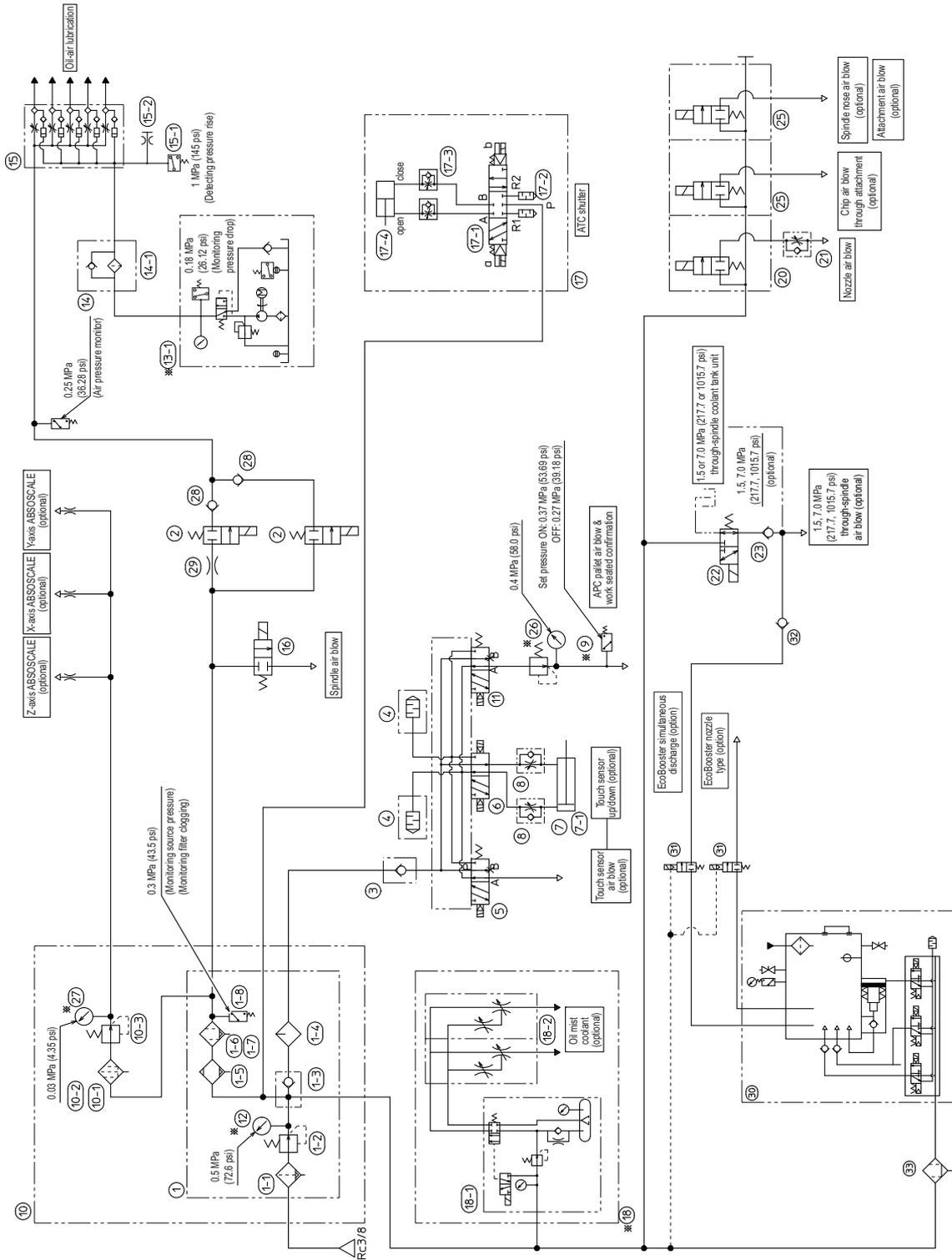


| NO. | Part name | Type | Maker | Qty | Okuma Part No. | Remarks |
|-----|-------------------|-----------------------|-------------|-----|------------------|---|
| 1 | D-SOL valve | DG4V-3-2C-M-U1-H-7-52 | Tokyo Keiki | 2 | F0000-442-001-50 | FA arrange the parts beyond the DIN terminal and connector. |
| 2 | Reducing valve | TGMX2-3-PB-BW-G-50 | Tokyo Keiki | 2 | F0011-730-000-21 | Set pressure: 1.2MPa (174.1 psi) |
| 3 | Manifold block | DGMS-3-3EX-10-T-JA-J | Tokyo Keiki | 1 | H0013-0008-12 | |
| 4 | D-SOL valve | DG4V-3-6C-M-U1-H-7-52 | Tokyo Keiki | 1 | F0000-445-000-98 | FA arrange the parts beyond the DIN terminal and connector. |
| 5 | Pilot check valve | DGMPC-3-ABK-BAK-50 | Tokyo Keiki | 1 | F0040-980-000-22 | |

ME13024R0400400200001

Fig. 2-24

2-5. Pneumatic Circuit Diagram



ME13024R0400400210001

Fig. 2-25

SECTION 2 TECHNICAL DATA

| No. | Part Name | Type | Maker | Qty | | Okuma Part No. | Used for |
|-----|---|--|-------|-----|-----|-------------------|--|
| | | | | STD | OP | | |
| 1 | Standard air panel | | SMC | 1 | | H0140-0030-03 | Source air pressure control |
| | 1 Filter | AF30-03D-R-A | SMC | (1) | | H0032-0020-38 | Source air pressure control |
| | 2 Regulator | AR30-03-R-B | SMC | (1) | | F0015-0410-002-29 | Source air pressure control |
| | 3 Check valve | AKM3000-02-A | SMC | (1) | | F0040-581-000-54 | Source air pressure control |
| | 4 Lubricator | AL30-03-R-A | SMC | (1) | | H0040-0001-34 | Source air pressure control |
| | 5 Drain catcher | AMG250-02BD-R | SMC | (1) | | H0032-0010-73 | Source air pressure control |
| | 6 Micro mist separator | AMD250-02D-RT | SMC | (1) | | H0032-0010-94 | Source air pressure control |
| | 7 Element assembly | AMD-EL250 | SMC | (1) | | H0032-0008-87 | Source air pressure control |
| | 8 Pressure switch | ISE2-01-15L | SMC | (1) | | E3040-321-034 | Source air pressure control |
| 2 | S-SOL valve | VCA31-5DL-4-02-F | SMC | 2 | | F0001-400-005-33 | Oil air switching |
| 3 | Check valve | AK2000-01 | SMC | | 1 | F0040-581-000-14 | Touch sensor |
| 4 | Silencer | AN110-01 | SMC | | 2 | H0036-0000-68 | Touch sensor |
| 5 | S-SOL valve | SY5140-5DOS-X321 | SMC | | 1 | F0001-451-001-51 | Touch sensor air blow |
| 6 | D-SOL valve | SY5240-5DOS | SMC | | 1 | F0000-451-001-04 | Touch sensor up/down |
| 7 | Air cylinder | SSD-KT2L-20-60-T2YLH5-D | CKD | | 1 | H0002-0031-56 | Touch sensor up/down |
| | 1 Cylinder switch | T2YLH | CKD | | (2) | | Stroke (55 & 60 mm)/down |
| 8 | Speed controller | AS2201F-01-06SA | SMC | | 2 | F0031-580-000-36 | Touch sensor up/down |
| *9 | Pressure switch | ISE40A-C6-22R-M | SMC | 1 | | E3040-321-074-1 | Pallet seating (Japan market specs.) |
| | Pressure switch | ISE40A-C6-22R w/ unit switching function | SMC | | 1 | E3040-321-080-1 | Pallet seating (Overseas market specs.) |
| 10 | Air panel for ABSOSCALE | | SMC | | 1 | H0140-0030-04 | ABSOSCALE |
| | 1 Super mist separator | AME250-02B-R | SMC | | (1) | H0032-0013-74 | ABSOSCALE |
| | 2 Element assembly | AME-EL250 | SMC | | (1) | H0032-0014-43 | ABSOSCALE |
| | 3 Regulator | AR-25-02-1R-B | SMC | | (1) | F0015-210-000-13 | ABSOSCALE |
| 11 | S-SOL valve | SS5Y5-X1116 | SMC | 1 | | F0001-451-001-57 | Pallet seating |
| 12 | Pressure gauge | G36-10-01 | SMC | 1 | | T019-400-002-77 | Source air pressure control (Japan market specs.) |
| | Pressure gauge | G36-P10-01-X30 | SMC | | 1 | T019-400-006-20 | Source air pressure control (Overseas market specs.) |
| *13 | Oil air unit | MRJ010211D-K0004 | Daido | 1 | | H0120-0009-88-1 | Oil air (Japan market specs.) |
| | Oil air unit | MRJ010211D-K0005 | Daido | | 1 | H0120-0009-89-1 | Oil air (Overseas market specs.) |
| 14 | Oil line filter | F01-2 | Daido | 1 | | H0120-0007-63-1 | Oil air |
| | 1 Replaceable filter | F01-410-010 | Daido | | (1) | H0120-0007-76 | Oil air |
| 15 | Mixing valve | BFA0105BBBBB | Daido | 1 | | H0120-0011-53 | Oil air |
| | 1 Pressure switch (for pressure rise detection) | ACB-MA07-P | Daido | | (1) | H0120-0008-17 | Oil air |
| | 2 Air release valve | 000-V01-0200 | Daido | | (1) | H0120-0007-74 | Oil air |
| 16 | S-SOL valve | VCA31-5DL-4-02-F | SMC | 1 | | F0001-400-005-33 | Spindle air blow |
| 17 | Pneumatic parts | MB-5000H for STD tool length 300 | CKD | 1 | | H0140-0024-82-1 | ATC shutter |
| | 1 D-SOL valve | 4GB230-08-B-3 | CKD | (1) | | F0000-452-001-10 | ATC shutter |
| | 2 Silencer | SLW-8A | CKD | (1) | | H0036-0000-49 | ATC shutter |
| | 3 Speed controller | SC1-8 | CKD | (1) | | F0031-581-000-10 | ATC shutter |
| | 4 Air cylinder | SCM-T2G300-25D-455 | CKD | (1) | | H0002-0034-20 | ATC shutter |
| 18 | Mist spray unit | | SMC | | 1 | H0120-1007-62-1 | Oil mist |
| | 1* Mixing valve | LMU200-50-X202 | SMC | | 1 | H0120-0007-32 | Oil mist |
| | Mist spray unit | | SMC | | 1 | H0120-1009-25 | Oil mist |
| | Mixing valve | LMU200-50-X217 | SMC | | 1 | H0120-0007-33 | Oil mist |
| | 2 Mixing valve | LMV110-15-X201 | SMC | | (2) | H0120-0003-87 | Oil mist |
| 20 | S-SOL valve | VV2CA3-01-X25 | SMC | 1 | | F0001-400-006-01 | Nozzle air blow |
| 21 | Speed controller | AS2000-02 | SMC | | 1 | F0031-581-000-15 | Nozzle air blow |
| 22 | S-SOL valve | VT317-5DZ-02 | SMC | | 1 | F0001-411-000-68 | Thru-spindle |
| 23 | Check valve | KZU00-013E | IHARA | | 1 | F0040-981-000-40 | Thru-spindle |
| 25 | S-SOL valve | VCA35-5DL-4-03-X5 | SMC | | 1 | F0001-400-005-48 | Spindle nose air blow, attachment air blow |

SECTION 2 TECHNICAL DATA

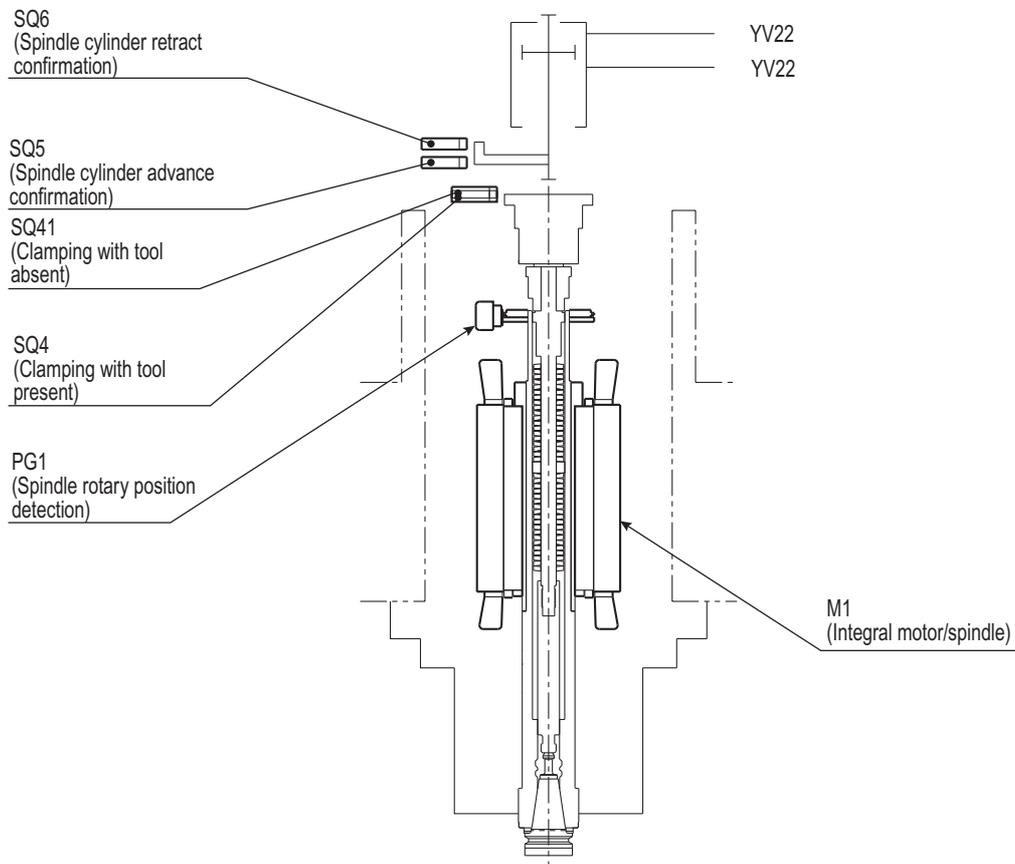
| No. | Part Name | Type | Maker | Qty | | Okuma Part No. | Used for |
|-----|-------------------|--------------------|---------|-----|----|------------------|---|
| | | | | STD | OP | | |
| *26 | Regulator | AR20K-02BE | SMC | 1 | | F0015-410-001-13 | Pallet seating (Japan market specs.) |
| | Regulator | AR20K-02B-X2033 | SMC | | 1 | F0015-410-001-46 | Pallet seating (Overseas market specs.) |
| 27* | Pressure gauge | G36-2-01 | SMC | | 1 | T019-400-006-21 | ABSOSCALE (Japan market specs.) |
| | Pressure gauge | G36-P2-01-X30 | SMC | | 1 | T019-400-006-18 | ABSOSCALE (Overseas market specs.) |
| 28 | Check valve | AKH08A-02S | SMC | 1 | | H0016-0006-30 | Oil air |
| 29 | Orifice | M8 × 0.9 | Gosho | 1 | | C7868-008091 | Oil air |
| 30 | Bluebe EcoBooster | EB3EP-LA20-OKM-66b | FUJI BC | | 1 | H0120-0009-31 | Bluebe EcoBooster |
| 31 | S-SOL valve | SVB2A-10-02HS | CKD | | 2 | F0001-400-007-08 | Bluebe EcoBooster |
| 32 | Check valve | KZU00-013E | IHARA | | 1 | F0040-981-000-40 | Bluebe EcoBooster |
| 33 | Mist separator | AM250-03BD | SMC | | 1 | H0032-0011-45 | Bluebe EcoBooster |

Table 2-2

*: These parts have different part numbers between the Japan market spec and the overseas market spec.

2-6. Skeleton Drawing

2-6-1. Spindle Drive Mechanism (15,000 min⁻¹)

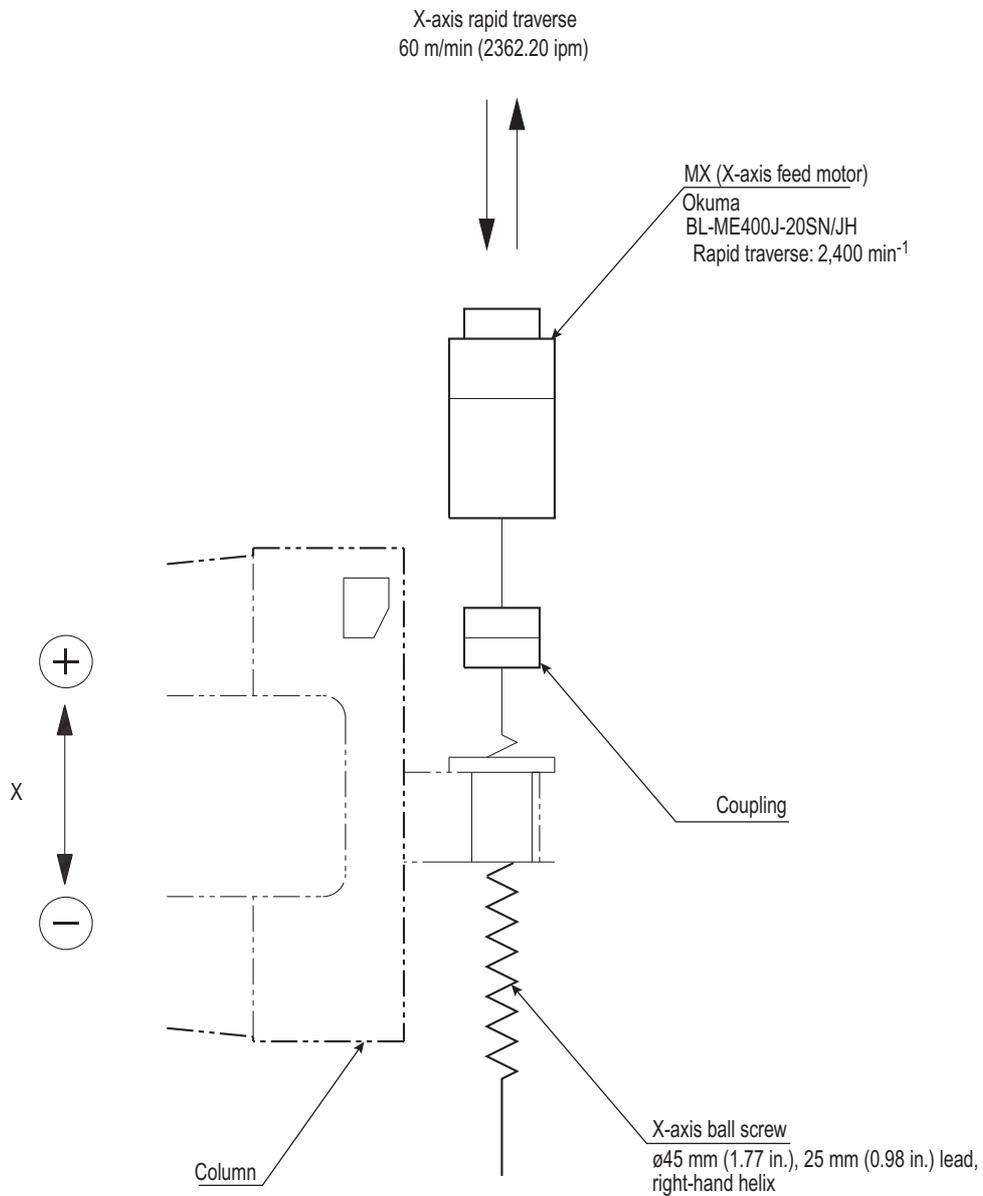


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Fig. 2-26

2-6-2. X-, Y- and Z-axis Drive Mechanism

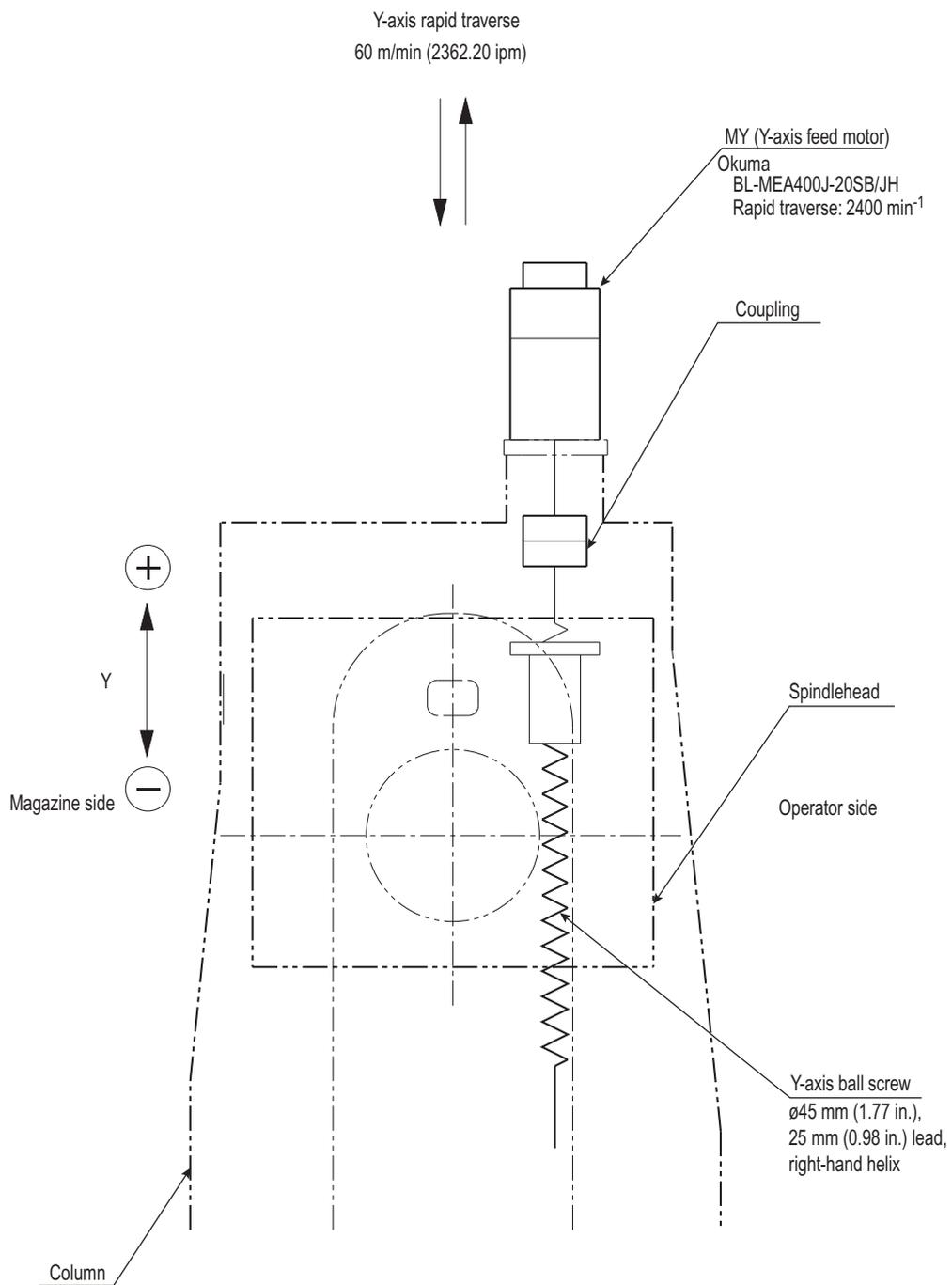
(1) X-axis Drive Mechanism



ME13024R0400400230001

Fig. 2-27

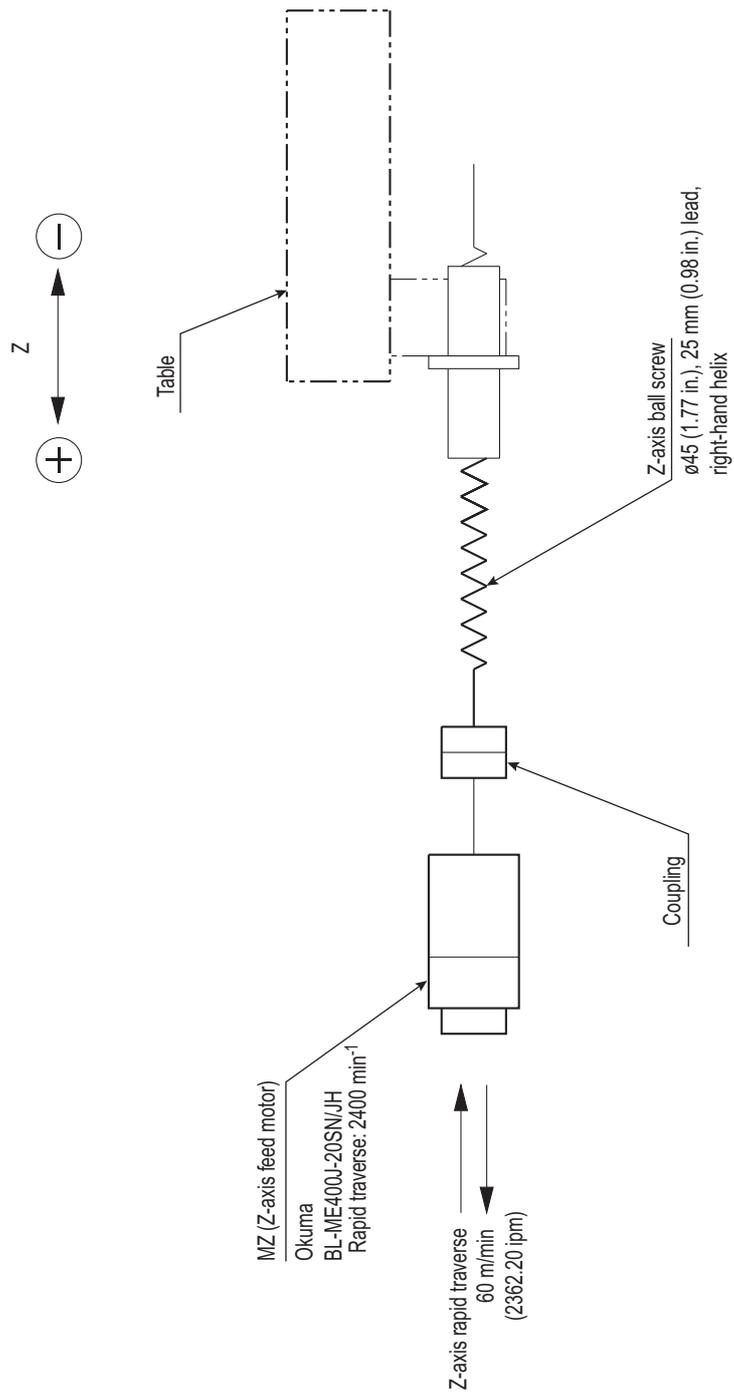
(2) Y-axis Drive Mechanism



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Fig. 2-28

(3) Z-axis Drive Mechanism

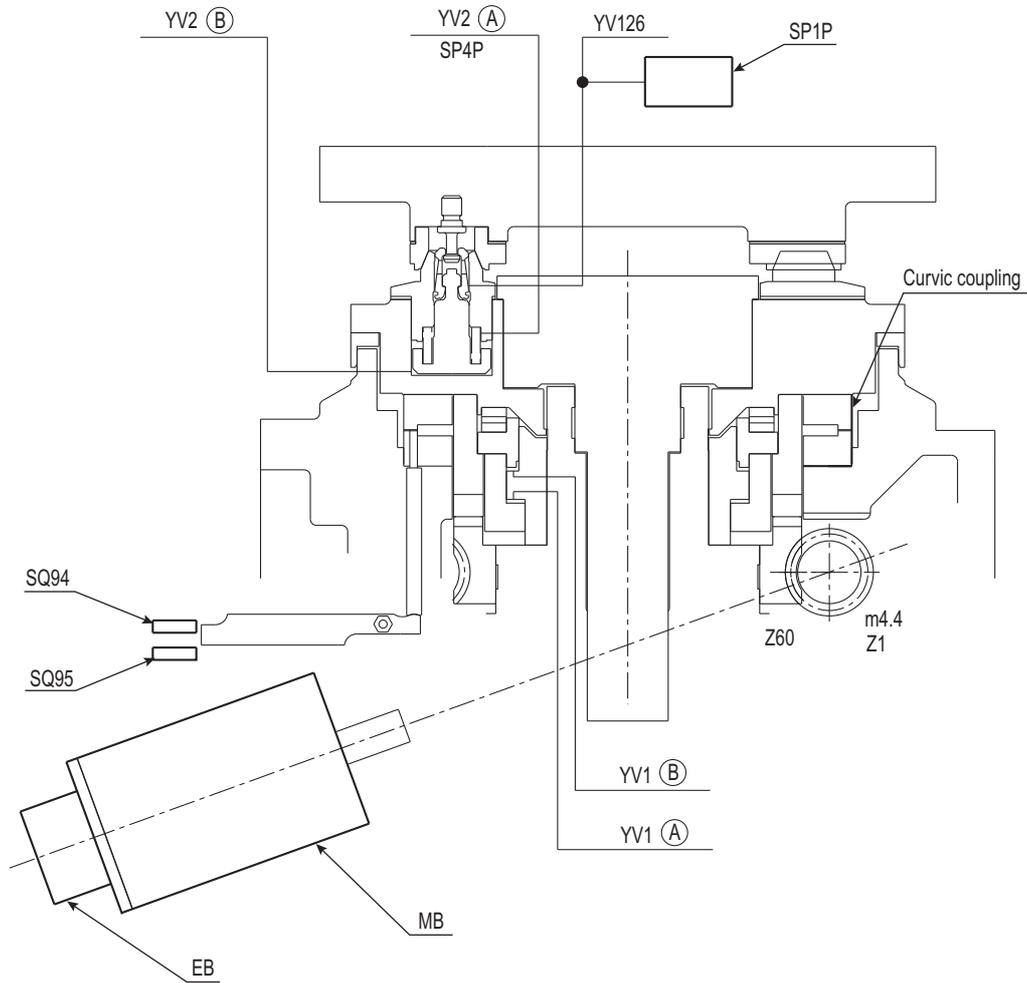


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Fig. 2-29

(4) Table rotating mechanisms

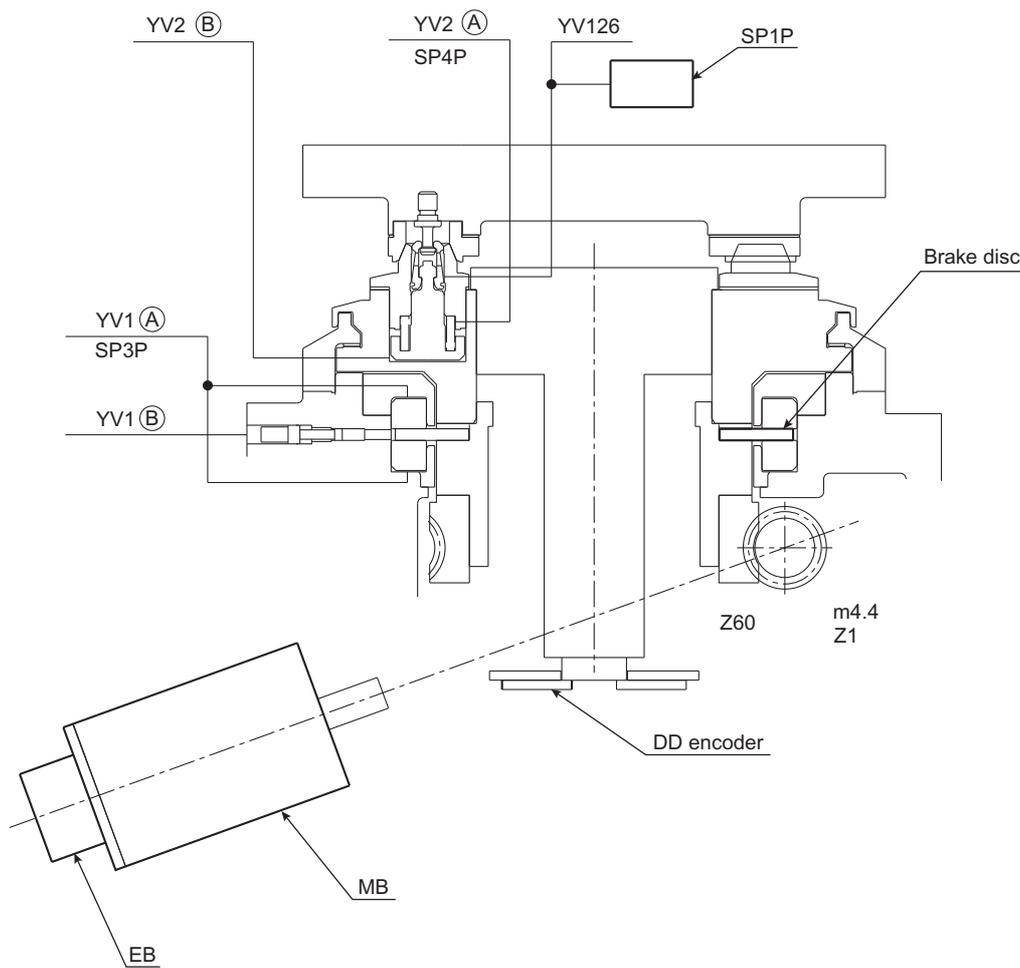
a. 1° index table



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Fig. 2-30

b. 0.001° index table

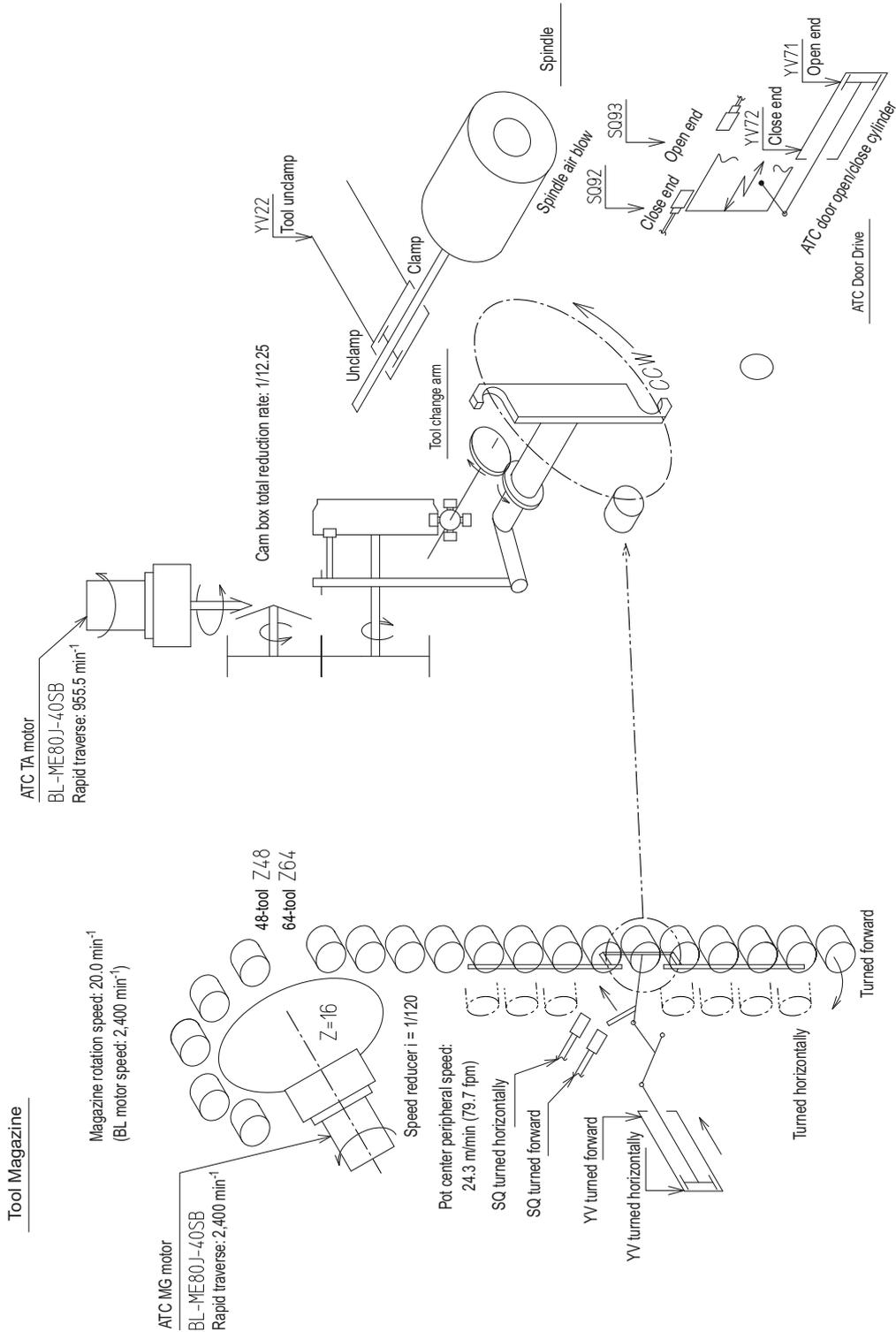


ME13024R0400400230005

Fig. 2-31

2-6-3. ATC Skeleton Diagram

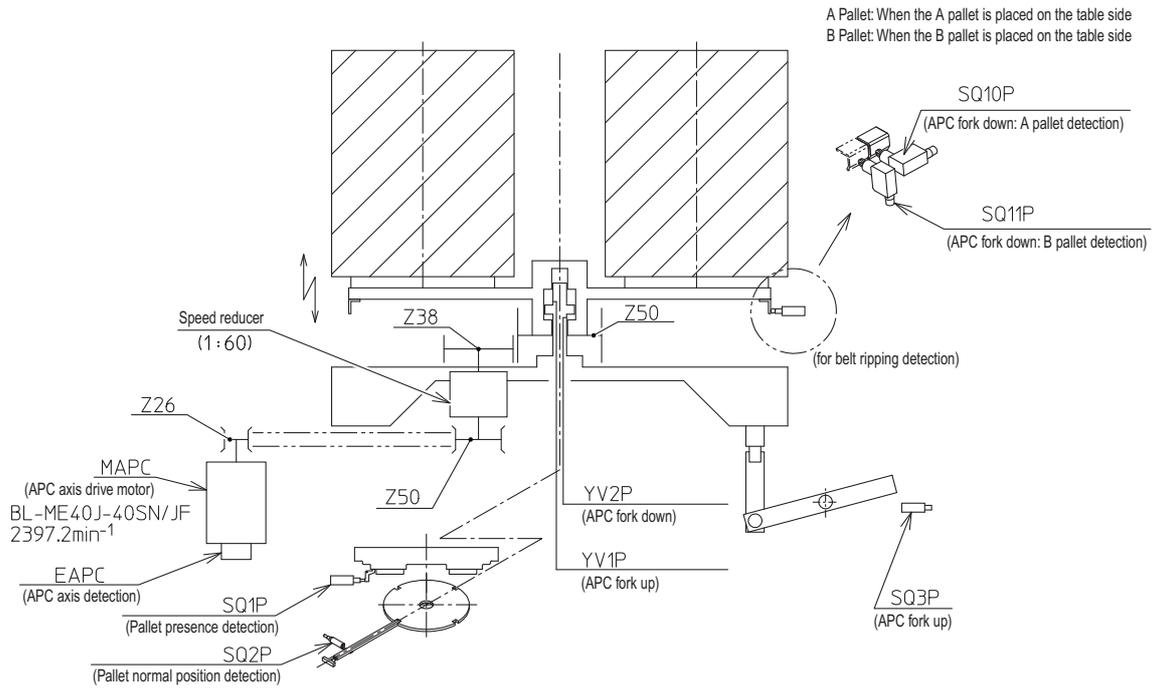
40/48/64-tool magazine, 15,000 min⁻¹ spindle



ME13024R0400400240001

Fig. 2-32

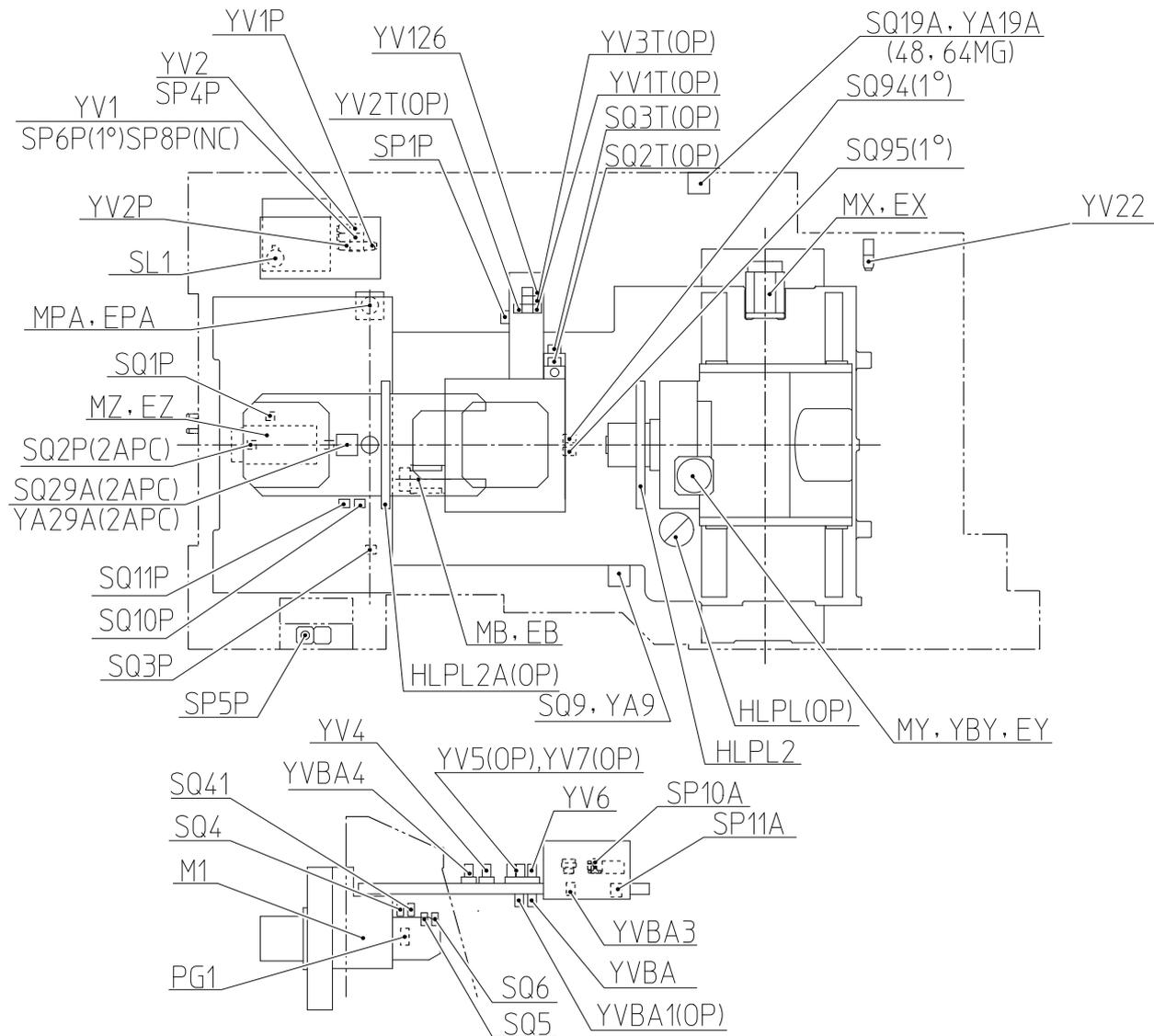
2-6-4. Drive mechanism of two-pallet rotary shuttle APC



ME13024R0400400250001

Fig. 2-33

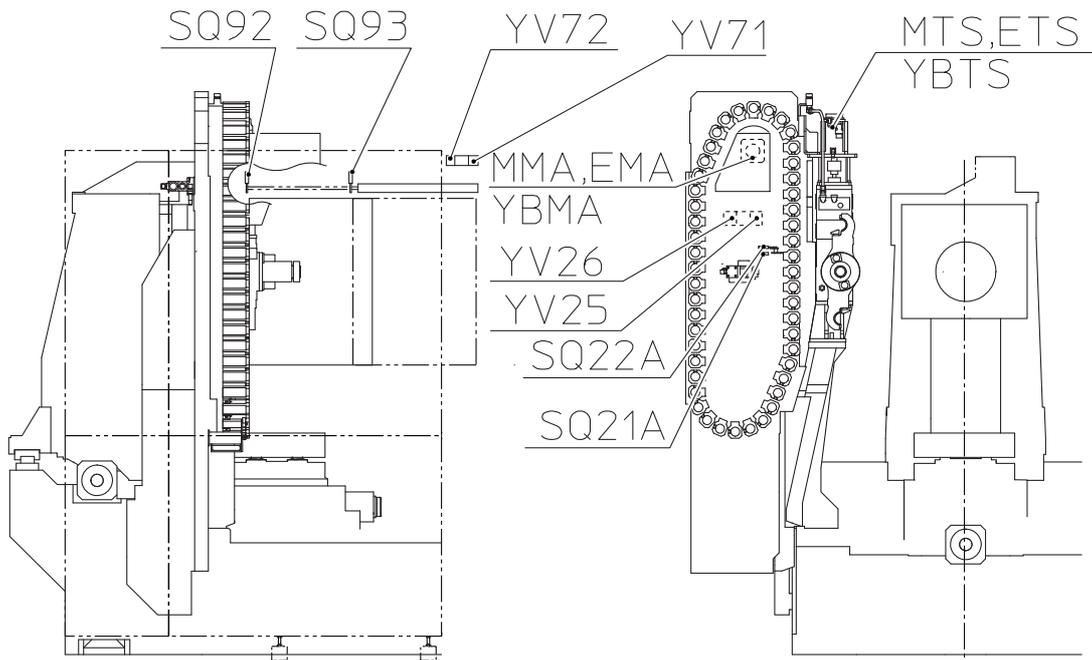
2-7. Arrangement of Machine Limit Switches and Solenoid Valves



ME13024R0400400260001

Fig. 2-34

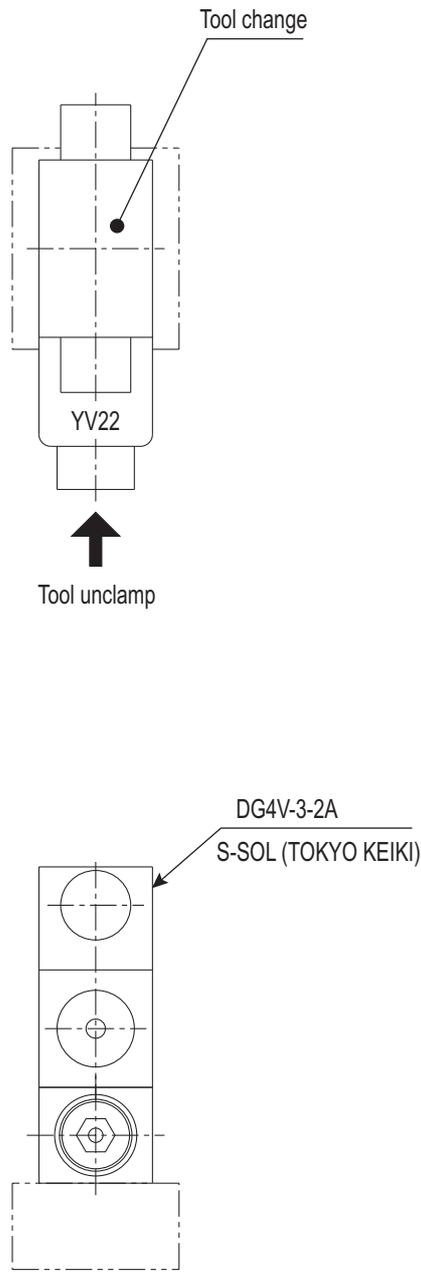
2-8. Arrangement of ATC Limit Switches and Solenoid Valves



ME13024R0400400270001

Fig. 2-35

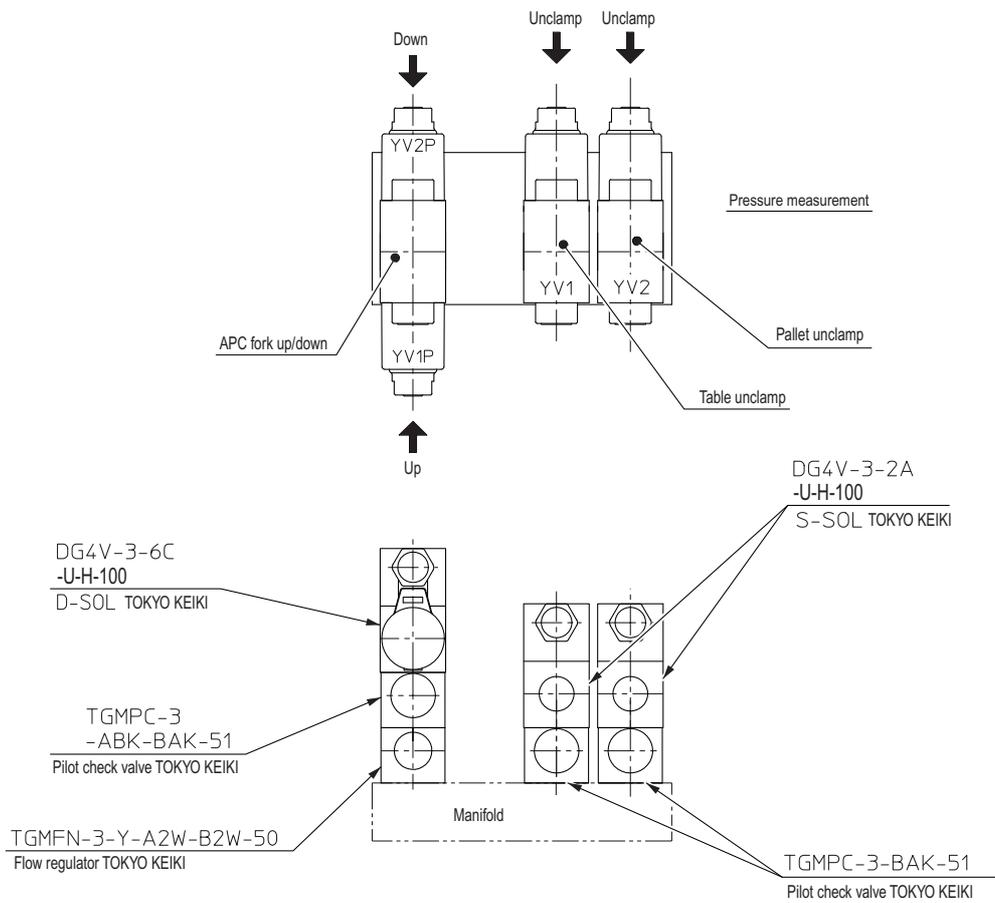
2-9. Arrangement of Hydraulic Valves for Spindlehead



ME13024R0400400280001

Fig. 2-36

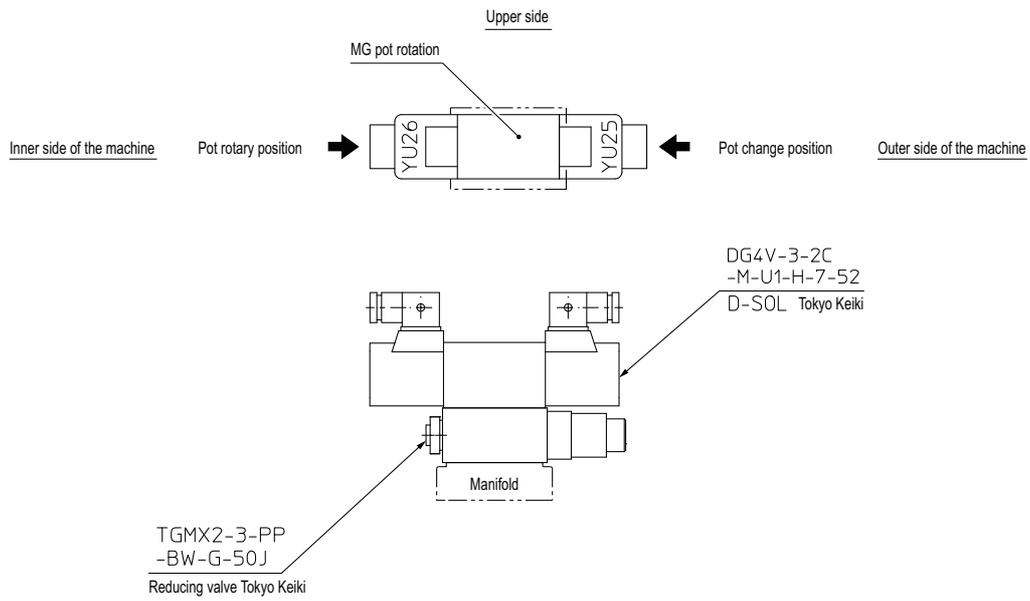
2-10. Arrangement of Hydraulic Valves for Table and APC



ME13024R0400400290001

Fig. 2-37

2-11. Arrangement of Hydraulic Valves for ATC and Magazine



ME13024R0400400300001

Fig. 2-38

2-12. MB-5000H Electrical Devices

| Device No. | Name | Maker | Type | Remarks |
|------------|---|-------------------|---|----------------|
| M1 | Spindle drive motor | Okuma | VAC-YMB20/18.5-40/150 | |
| MPA | PA axis motor | Okuma | BL-MEA40J-40SN/JH | |
| MB | B-axis motor | Okuma | BL-ME120J-40SN/JH | |
| MMA | MA axis motor | Okuma | BL-MEA80J-40SBA/JH | |
| MTS | TS axis motor | Okuma | BL-MEA80J-40SBA/JH | |
| MX | X-axis motor | Okuma | BL-MEA400J-20SN/JH | |
| MY | Y-axis motor | Okuma | BL-MEA400J-20SB/JH | |
| MZ | Z-axis motor | Okuma | BL-MEA400J-20SN/JH | |
| YBY | Y-axis brake | Okuma | | |
| YBMA | MG axis brake | Okuma | | |
| YBTS | TS axis brake | Okuma | | |
| EB | B-axis position encoder | Okuma | Position encoder JH | |
| EMA | MA axis position encoder | Okuma | Position encoder JH | |
| ETS | TS axis position encoder | Okuma | Position encoder JH | |
| EX | X-axis position encoder | Okuma | Position encoder JH | |
| EY | Y-axis position encoder | Okuma | Position encoder JH | |
| EZ | Z-axis position encoder | Okuma | Position encoder JH | |
| EPA | PA axis position encoder | Okuma | Position encoder JH | |
| HLPL | Spotlight | IDEC | LF1D-FH2F-2W-350-03 | |
| HLPL2 | LED work lamp | IDEC | LF1D-EH2F-2W-350 | |
| HLPL2A | LED work lamp | IDEC | LF1D-EH2F-2W-350 | |
| PG1 | Spindle pulse generator | | TS5270N56 magnetic encoder, small I-type | |
| SP1P | Pallet seating confirmation | SMC | ISE40A-C6-R-M | |
| SP4P | Pallet unclamp confirmation | Sanwa Electric | SPS-8T-PC23-T07 | |
| SP6P | Table clamp confirmation (1°) | Sanwa Electric | SPS-8T-PC23-T07 | |
| SP8P | Table clamp confirmation (NC) | Sanwa Electric | SPS-8T-PC23-T07 | |
| SP5P | Dry air filter normal | SMC | ISE2-01-15L | |
| SP10A | Oil-air high pressure confirmation | Daido | ACB-MA07-P | |
| SP11A | Spindle oil-air lubrication, air pressure normal | SMC | ISE40A-C6-R-M | |
| SL1 | Level switch | ASK | T-LSN-105-B | Hydraulic unit |
| SQ1P | Pallet detection | Omron | D4E-1D10N-M | |
| SQ2P | Pallet in-position | Omron | E2E-X3D1-M1G | |
| SQ3P | APC fork upper end | Omron | E2E-X3D1-M1G | |
| SQ2T | Touch sensor rising | Omron | | |
| SQ3T | Touch sensor lowering | Omron | | |
| SQ4 | Spindle tool clamp confirmation | Omron | E2E-X2D1-M3G | |

SECTION 2 TECHNICAL DATA

| Device No. | Name | Maker | Type | Remarks |
|------------|---|-------------|---------------------------------------|----------------|
| SQ5 | Cylinder unclamp confirmation | Omron | E2E-X2D1-M3G | |
| SQ6 | Cylinder retract confirmation | Omron | E2E-X2D1-M3G | |
| SQ9 | Operator door interlock switch | Omron | D4BL-2DRA | |
| SQ10P | APC fork lowering (A pallet) | Omron | DE-1D10N-M | |
| SQ11P | APC fork lowering (B pallet) | Omron | DE-1E10N-M | |
| SQ19A | Magazine door interlock switch | Omron | D4NL-2FFG-B | |
| SQ21A | Magazine pot ATC position (side-facing) | Omron | E2E-X3D1-M1G | |
| SQ22A | Magazine pot rotating position (front facing) | Omron | E2E-X3D1-M1G | |
| SQ29A | APC door interlock switch | Omron | D4NL-2FFG-B | |
| SQ41 | No spindle tool | Omron | E2E-X2D2-M3G | |
| SQ92 | ATC shutter close | Omron | E2E-X3D1-N | |
| SQ93 | ATC shutter open | Omron | E2E-X3D1-N | |
| SQ94 | Table down confirmation | Omron | E2E-X2D1-N | |
| SQ95 | Table up confirmation | Omron | E2E-X2D1-N | |
| YA9 | Operator door interlock switch | Omron | D4BL-2DRA | |
| YA19A | Magazine door interlock switch | Omron | D4NL-2FFG-B | |
| YA29A | APC door interlock switch | Omron | D4NL-2FFG-B | |
| YV1 | Table unclamp | Tokyo Keiki | DG4-3-2A-U-H-100 | Hydraulic unit |
| YV2 | Pallet unclamp | Tokyo Keiki | DG4-3-2A-U-H-100 | Hydraulic unit |
| YV1P | APC fork rising | Tokyo Keiki | DG4-3-6C-U-H-100 | Hydraulic unit |
| YV2P | APC fork lowering | Tokyo Keiki | DG4-3-6C-U-H-100 | Hydraulic unit |
| YV1T | Touch sensor lowering | SMC | SY5240-5DOS | |
| YV2T | Touch sensor rising | SMC | SY5240-5DOS | |
| YV3T | Touch sensor air blow | SMC | SY5140-5DOS | |
| YV4 | Spindle air blow | SMC | VCA31-5DL-4-02-F | |
| YV5 | Attachment air blow | SMC | VCA35-5DL-4-03-X5 | |
| YV6 | Nozzle air blow | SMC | VV2CA3-01-X25 | |
| YV7 | Chip air blow | SMC | VCA35-5DL-4-03-X5 | |
| YV25 | Magazine pot ATC position (side-facing) | Tokyo Keiki | DG4V-3-2C-M-U1-H-7-52 | |
| YV26 | Magazine pot rotating position (front-facing) | Tokyo Keiki | DG4V-3-2C-M-U1-H-7-52 | |
| YV22 | Tool unclamp | Tokyo Keiki | DG4V-3-2A-M-U1-H-7-52 | |
| YV71 | ATC shutter close | CKD | 4GB230-08-B-3 | |
| YV72 | ATC shutter open | CKD | 4GB230-08-B-3 | |
| YV126 | Air blow for pallet seating | SMC | 3-valve manifold block SS5Y5-X1116 | |
| YVBA1 | Thru-spindle air blow | SMC | VT317-5DZ-02 | |
| YVBA | Oil-air low pressure | SMC | VCA31-5DL-4-02-F | |

Table 2-3

2-13. Arrangement of Electric Devices

2-13-1.6-pallet APC

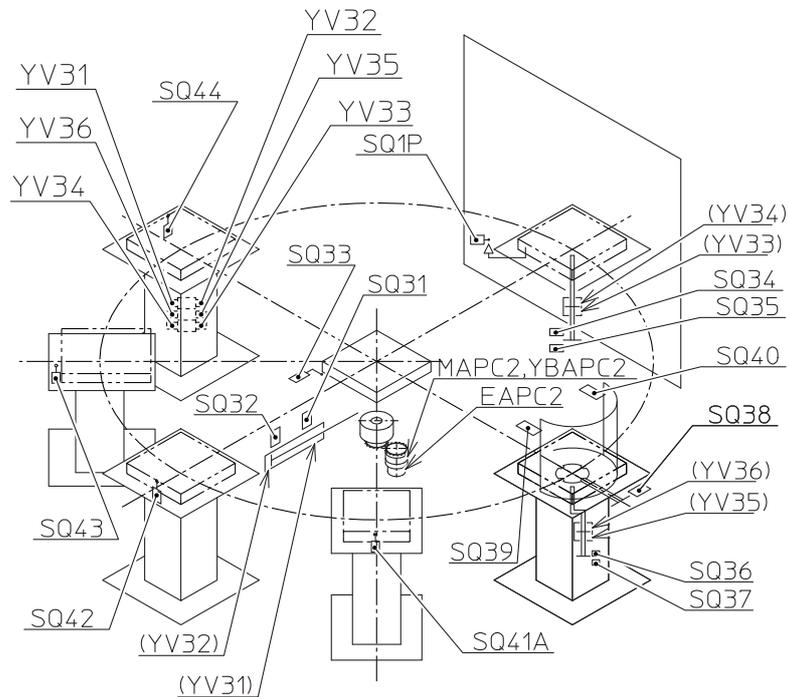
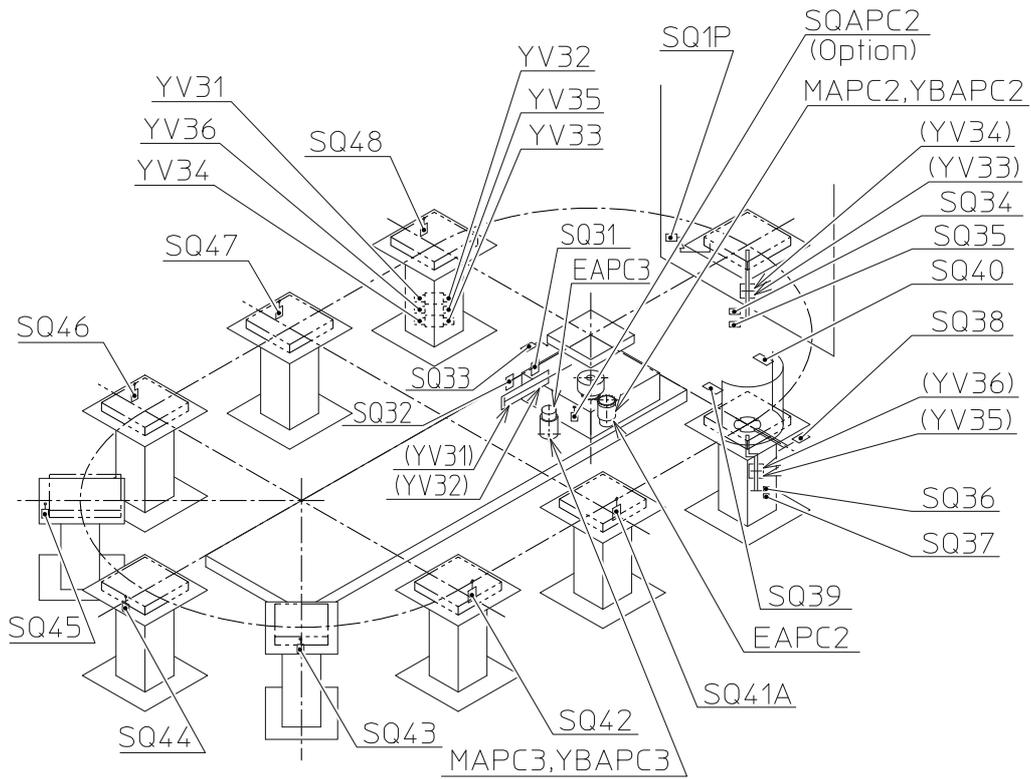


Fig. 2-39

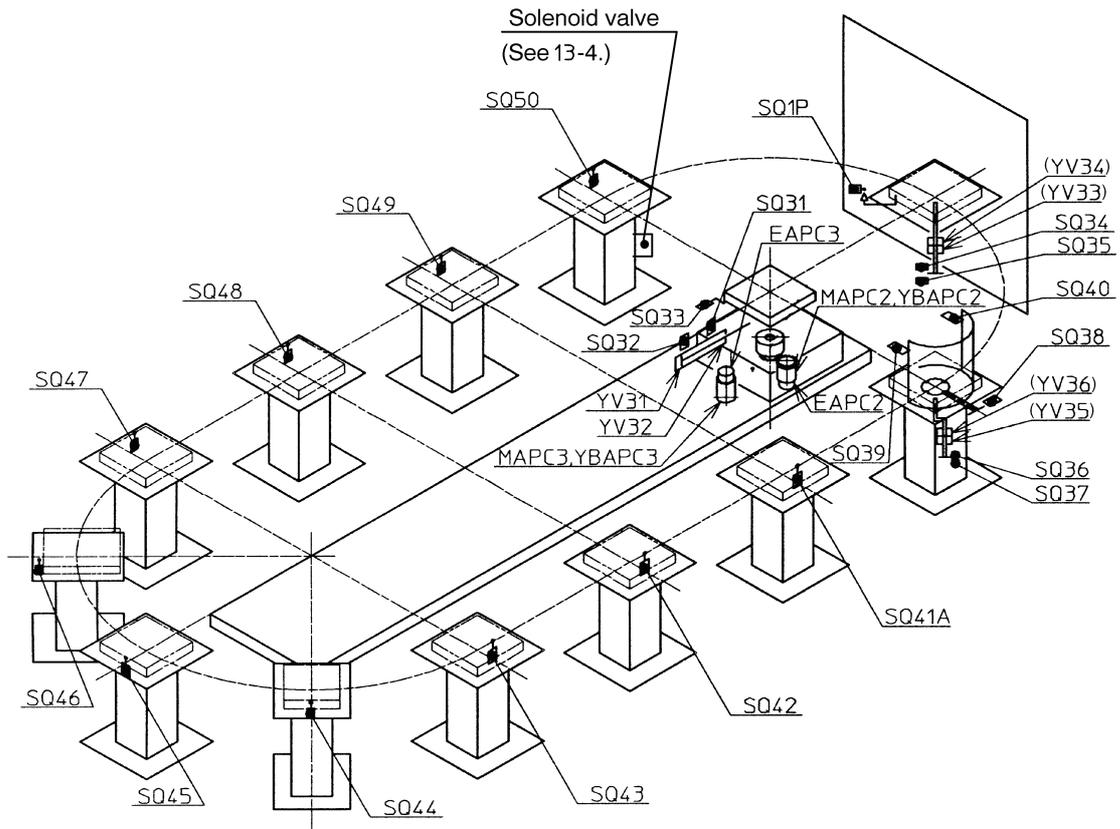
2-13-2.10-pallet APC



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Fig. 2-40

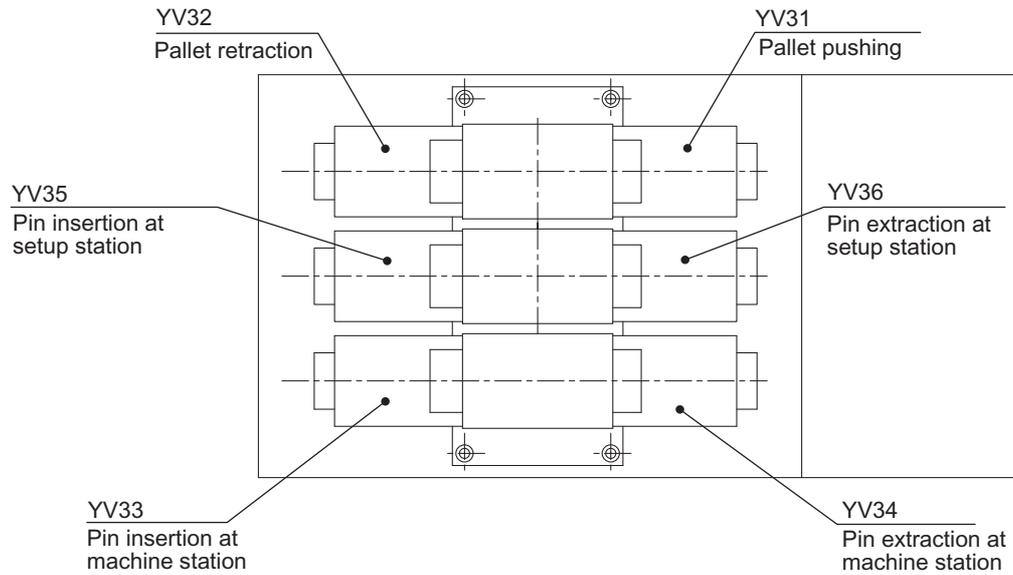
2-13-3.12-pallet APC



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Fig. 2-41

2-13-4.Solenoid Valves (Common to 6-, 10-, and 12-pallet APCs)



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Fig. 2-42

2-13-5. Electric Parts List

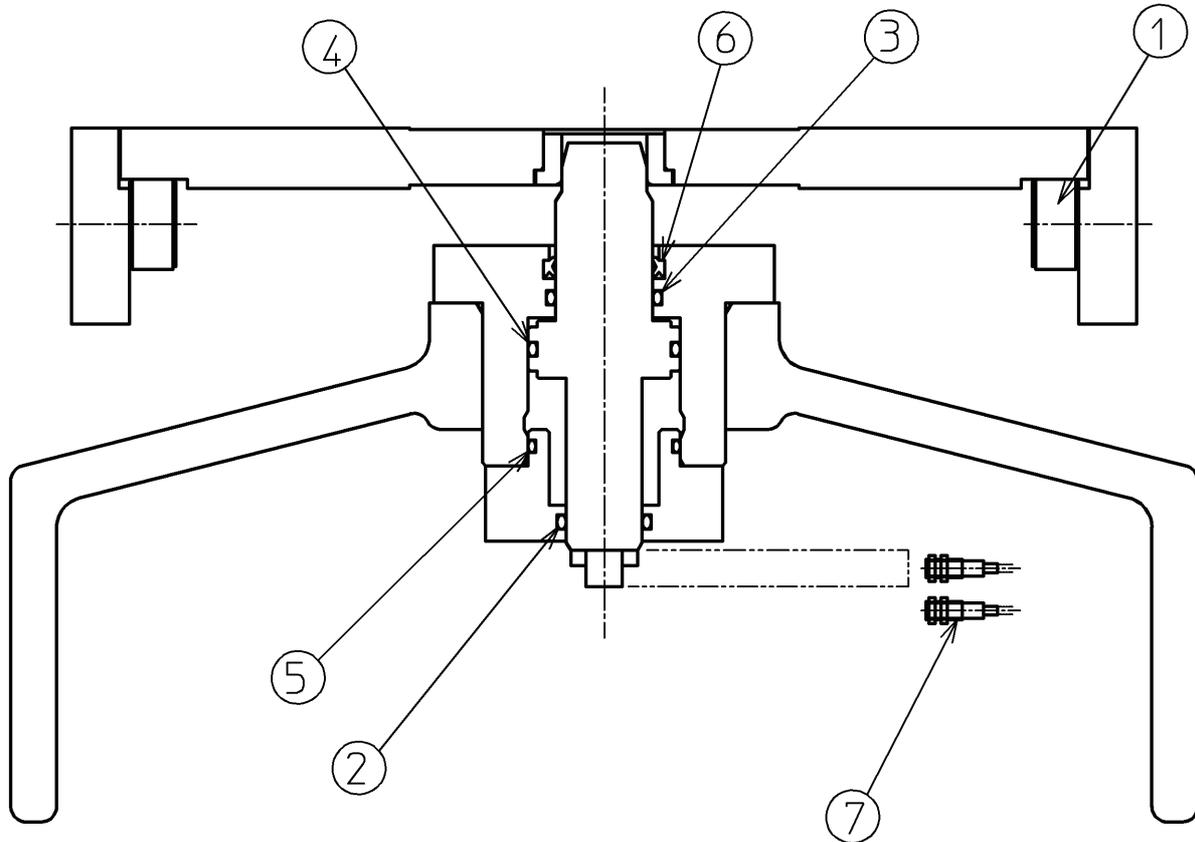
| Part No. | Part Name | Maker | Type | Remarks |
|----------|---------------------------------------|----------------|-----------------------|--------------------|
| MAPC2 | Swivel base drive motor | Okuma | BL-ME80-40TB/JF | |
| MAPC3 | Carrier base drive motor | Okuma | BL-ME40J-40SBA/JF | |
| EAPC2 | Swivel base position encoder | Okuma | | |
| EAPC3 | Carrier base position encoder | Okuma | | |
| YBAPC2 | Swivel base motor brake | Okuma | | |
| YBAPC3 | Carrier base motor brake | Okuma | | |
| YV31 | Pallet pushing SOL | Tokyo Keiki | DG4V-3-6C-M-U1-H-7-52 | |
| YV32 | Pallet pulling SOL | Tokyo Keiki | DG4V-3-6C-M-U1-H-7-52 | |
| YV33 | Pin inserting SOL at machine ST | Tokyo Keiki | DG4V-3-2C-M-U1-H-7-52 | |
| YV34 | Pin extracting SOL at machine ST | Tokyo Keiki | DG4V-3-2C-M-U1-H-7-52 | |
| YV35 | Pin inserting SOL at setup ST | Tokyo Keiki | DG4V-3-2C-M-U1-H-7-52 | |
| YV36 | Pin extracting SOL at setup ST | Tokyo Keiki | DG4V-3-2C-M-U1-H-7-52 | |
| SQ1P | Machine ST pallet detecting LS | Omron | D4E-1D10N-M | |
| SQ31 | Swivel base cylinder push-side PS | Horiuchi Kikai | RO-3 with 3-m cord | |
| SQ32 | Swivel base cylinder pull-side PS | Horiuchi Kikai | RO-3 with 3-m cord | |
| SQ33 | Swivel base pallet detecting LS | Omron | D4B-2111N | |
| SQ34 | Pin insertion check PS at machine ST | Omron | E2E-X3D1-M1G | |
| SQ35 | Pin extraction check PS at machine ST | Omron | E2E-X3D1-M1G | |
| SQ36 | Pin insertion check PS at setup ST | Omron | E2E-X3D1-M1G | |
| SQ37 | Pin extraction check PS at setup ST | Omron | E2E-X3D1-M1G | |
| SQ38 | Pallet in-position check PS | Omron | E2E-X3D1-M1G | |
| SQ39 | Setup ST door open interlock switch | Omron | D4NL-2FFG-B | |
| SQ40 | Setup ST door close interlock switch | Omron | D4NL-2FFG-B | |
| SQ41A | ST3 pallet detecting LS | Omron | WLCA2 | |
| SQ42 | ST4 pallet detecting LS | Omron | WLCA2 | |
| SQ43 | ST5 pallet detecting LS | Omron | WLCA2 | |
| SQ44 | ST6 pallet detecting LS | Omron | WLCA2 | 10-, 12-pallet APC |
| SQ45 | ST7 pallet detecting LS | Omron | WLCA2 | 10-, 12-pallet APC |
| SQ46 | ST8 pallet detecting LS | Omron | WLCA2 | 10-, 12-pallet APC |
| SQ47 | ST9 pallet detecting LS | Omron | WLCA2 | 10-, 12-pallet APC |
| SQ48 | ST10 pallet detecting LS | Omron | WLCA2 | 10-, 12-pallet APC |
| SQ49 | ST11 pallet detecting LS | Omron | WLCA2 | 12-pallet APC |
| SQ50 | ST12 pallet detecting LS | Omron | WLCA2 | 12-pallet APC |

Table 2-4

The electric parts related with the carrier base are used for 10- and 12-pallet APC and not used for 6-pallet APC.

2-14. Structural Drawings

2-14-1. Machine Inside Station



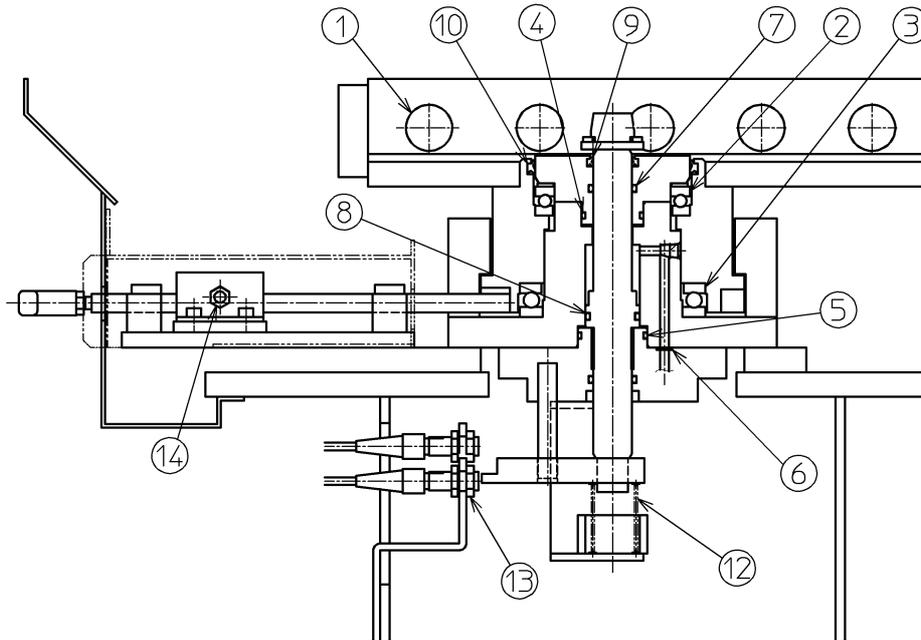
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Fig. 2-43

| No. | Part Name | Part Type | Maker | Qty. |
|-----|------------------|--------------|-------|------|
| 1 | Cam follower | CF-SFU-12B | IKO | 18 |
| 2 | O ring | P25 | NOK | 1 |
| 3 | O ring | P32 | NOK | 1 |
| 4 | O ring | P44 | NOK | 1 |
| 5 | O ring | G45 | NOK | 1 |
| 6 | Dust seal | LBH-32 | NOK | 1 |
| 7 | Proximity switch | E2E-X3D1-M1G | Omron | 2 |

Table 2-5

2-14-2.Setup Station



ME13024R0400400380001

Fig. 2-44

| No. | Part Name | Part Type | Maker | Qty. |
|-----|--------------------|--------------|----------|------|
| 1 | Cam follower | CF-SFU-12 | IKO | 16 |
| 2 | Bearing | 51115 | NTN | 1 |
| 3 | Bearing | 51118 | NTN | 1 |
| 4 | O ring | G35 | NOK | 1 |
| 5 | O ring | G45 | NOK | 1 |
| 6 | O ring | P7 | NOK | 1 |
| 7 | O ring | P25 | NOK | 2 |
| 8 | O ring | P29 | NOK | 1 |
| 9 | Dust seal | SDR-25 | Sakagami | 1 |
| 10 | Dust seal | SDR-100 | Sakagami | 1 |
| 12 | Compression spring | 2×32×110×8 | | 1 |
| 13 | Proximity switch | E2E-X3D1-M1G | Omron | 2 |
| 14 | Proximity switch | E2E-X3D1-M1G | Omron | 1 |

Table 2-6

2-15. Piping Drawings

2-15-1. HEAD STOCK HYDRAULIC PIPING

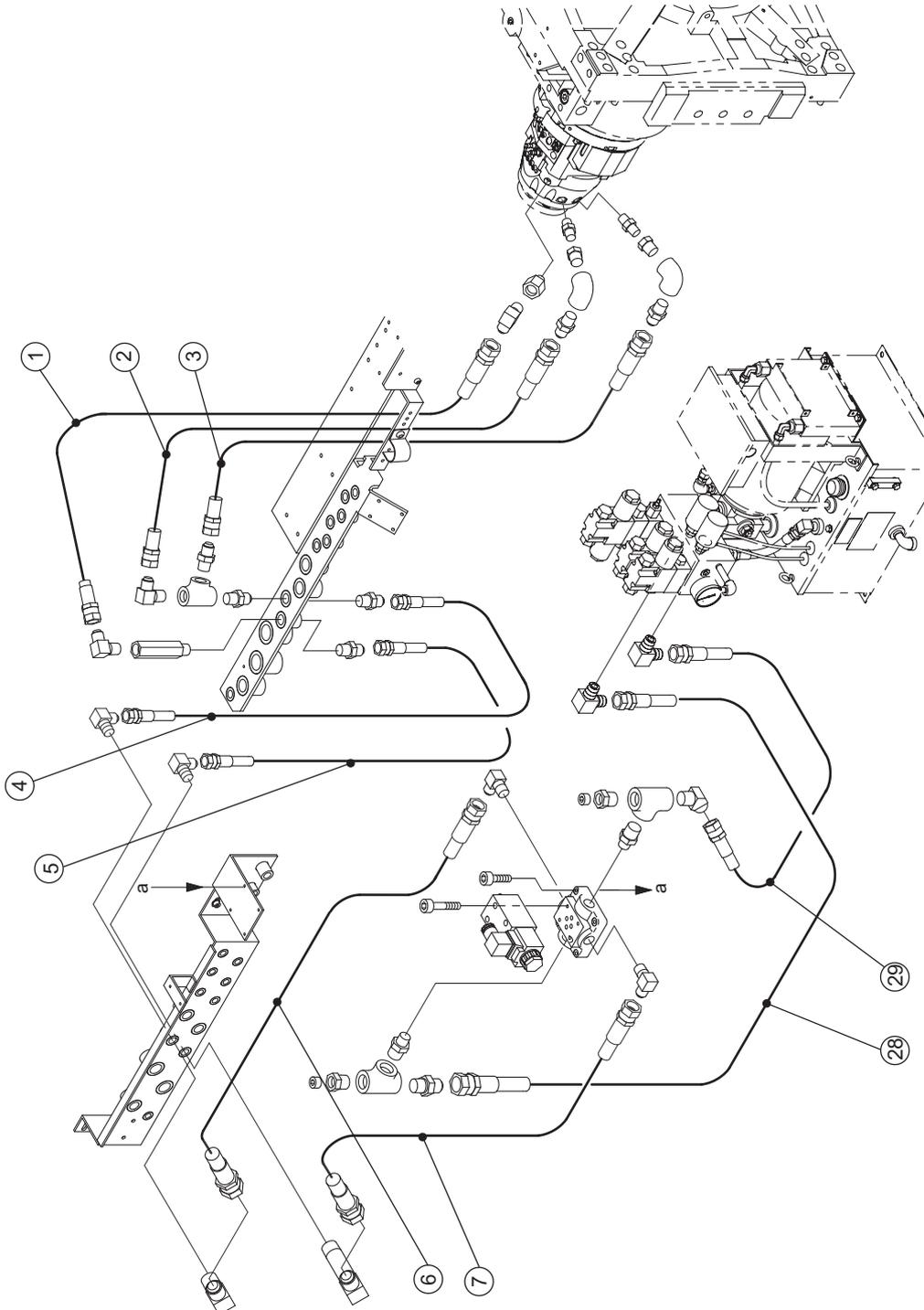
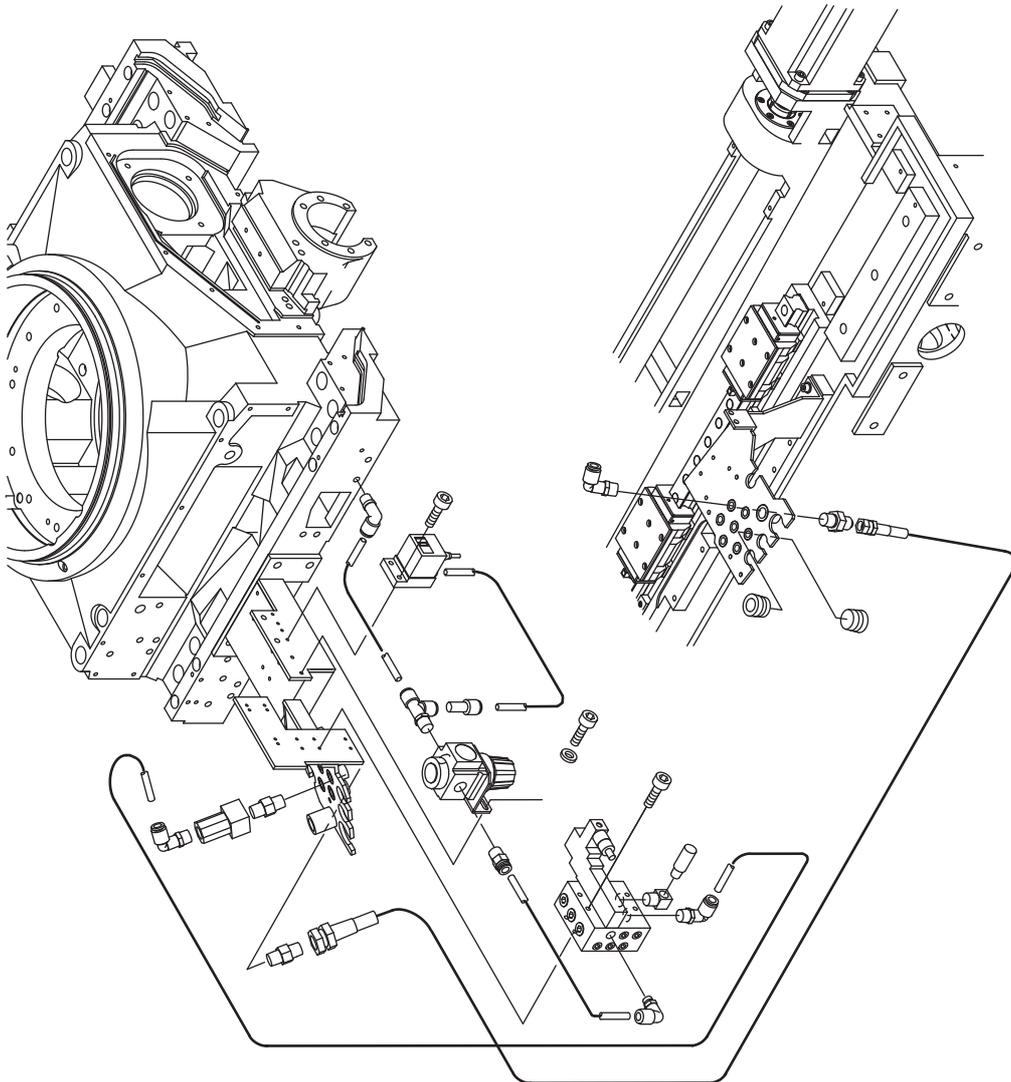


Fig. 2-45

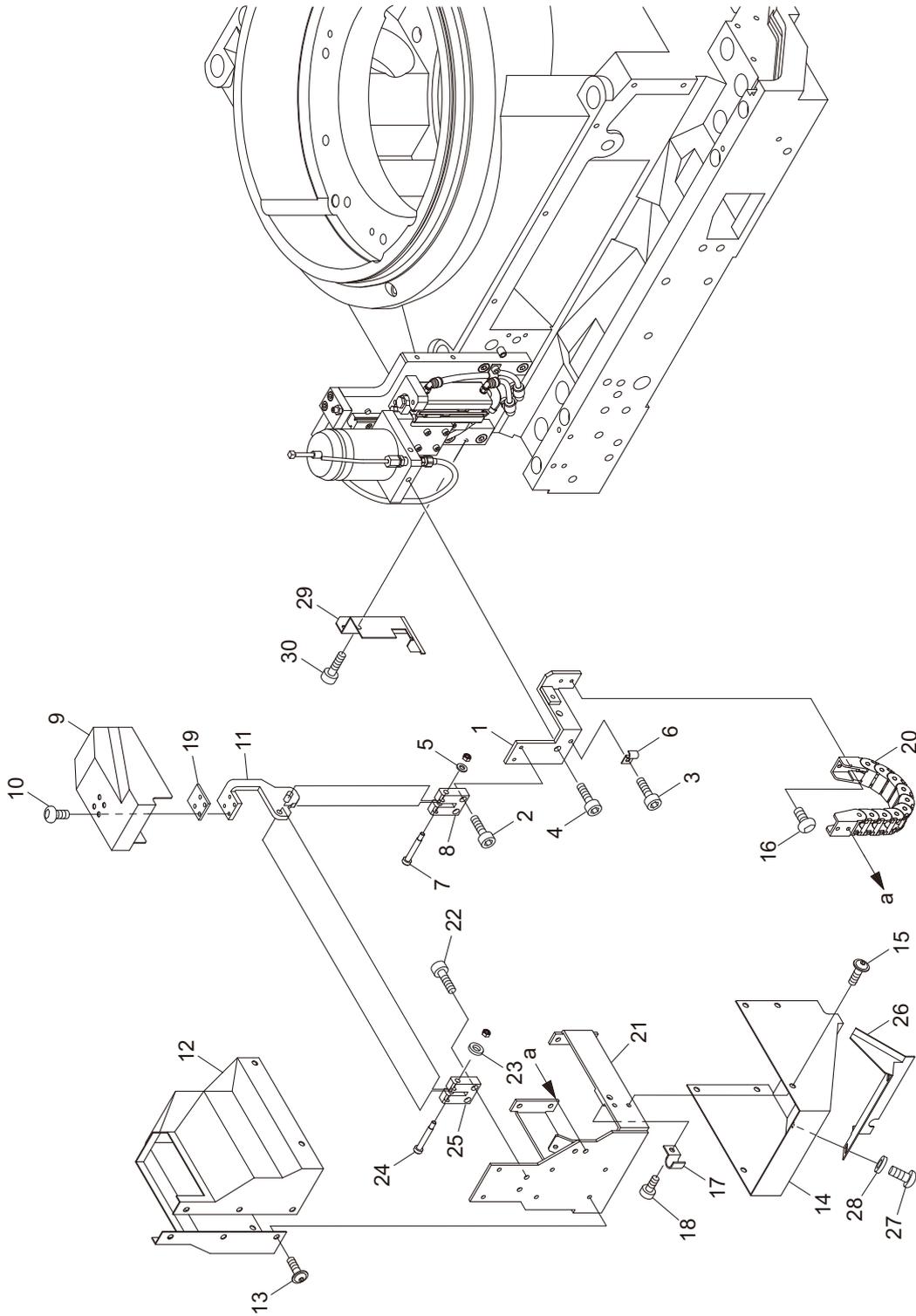
2-15-2.TOUCH SENSOR 1



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Fig. 2-46

2-15-3.TOUCH SENSOR 2



ME13024R0400400410001

Fig. 2-47

2-15-4.TOUCH SENSOR 3

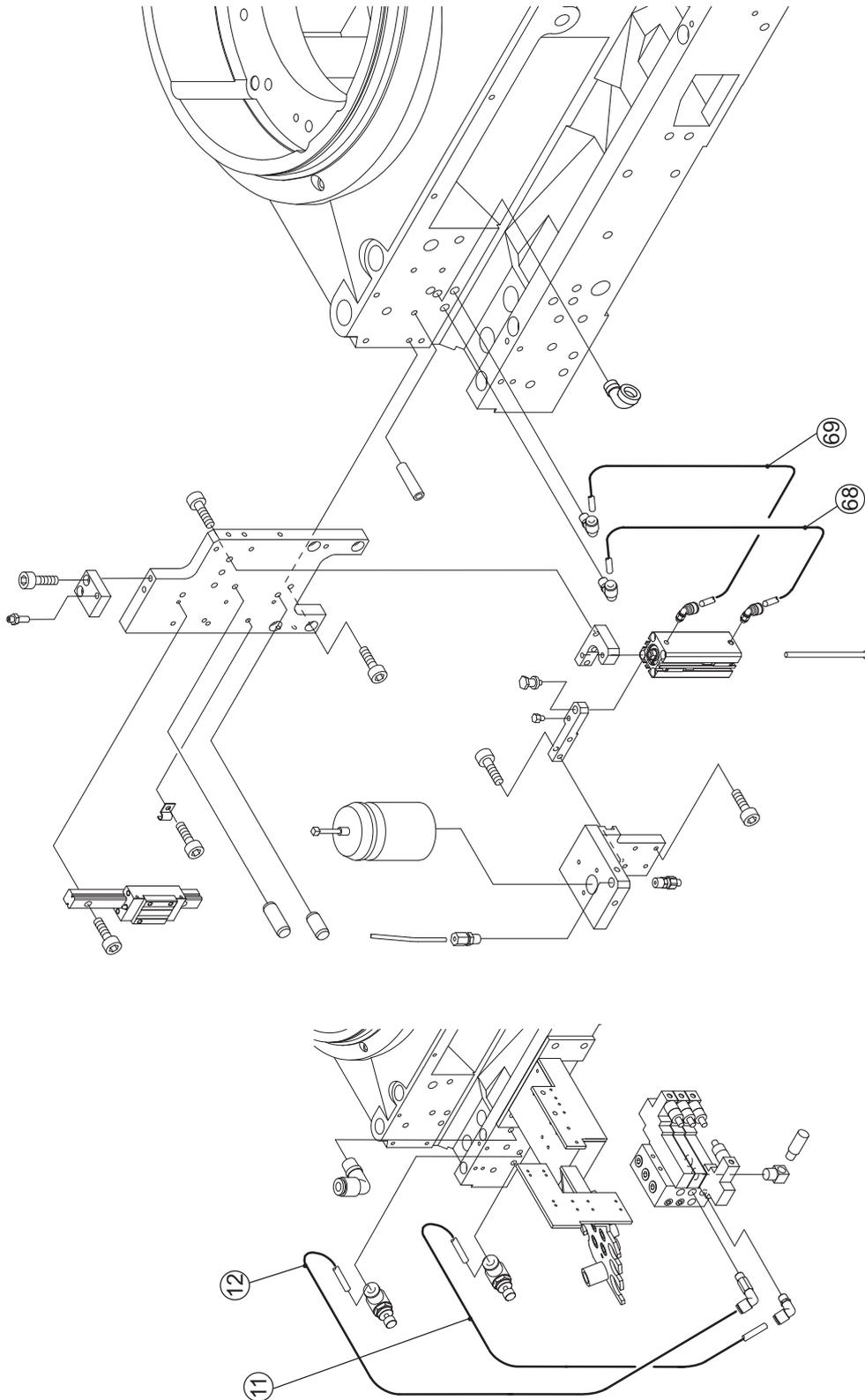
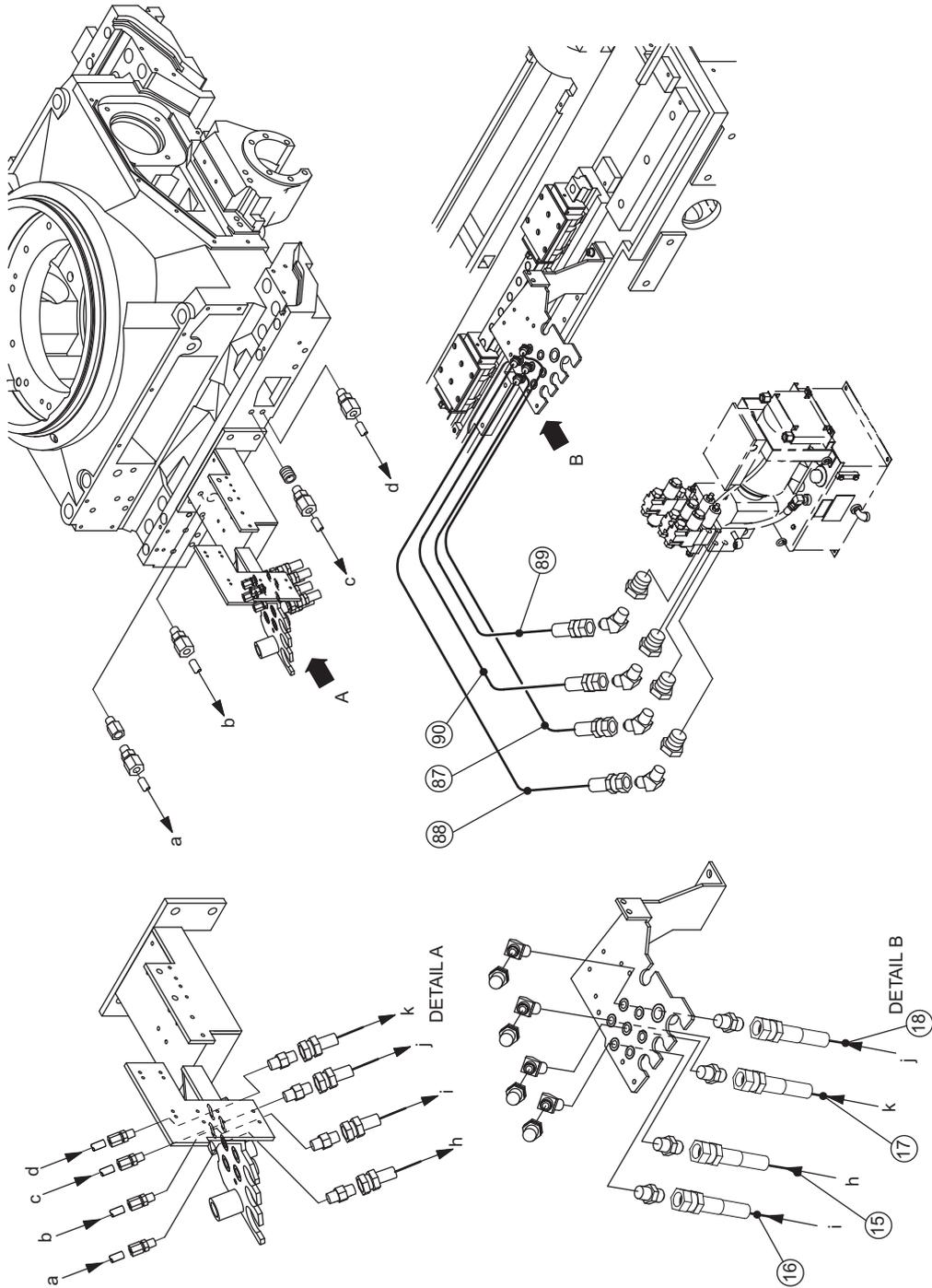


Fig. 2-48

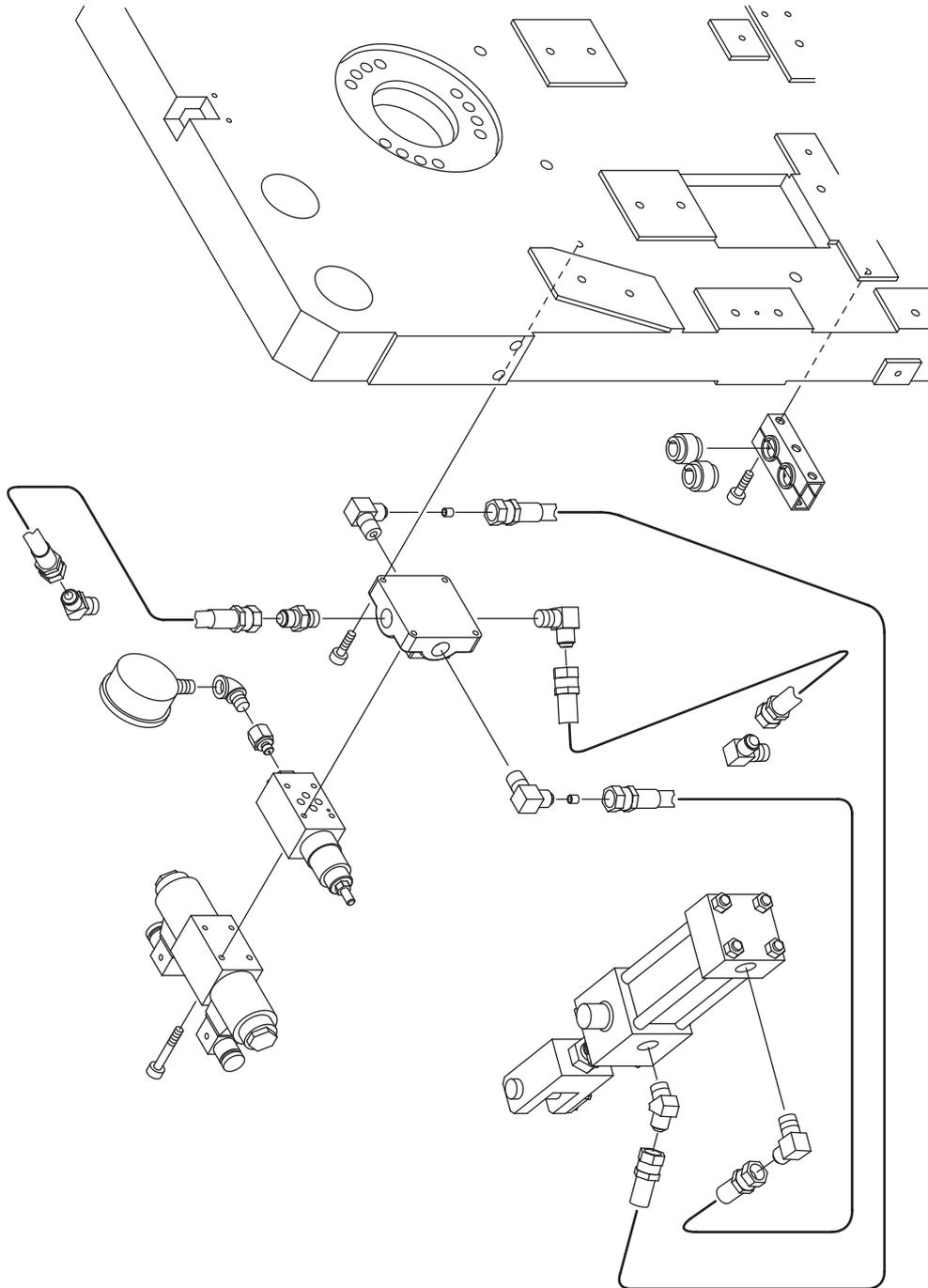
2-15-5.TABLE HYDRAULIC



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Fig. 2-49

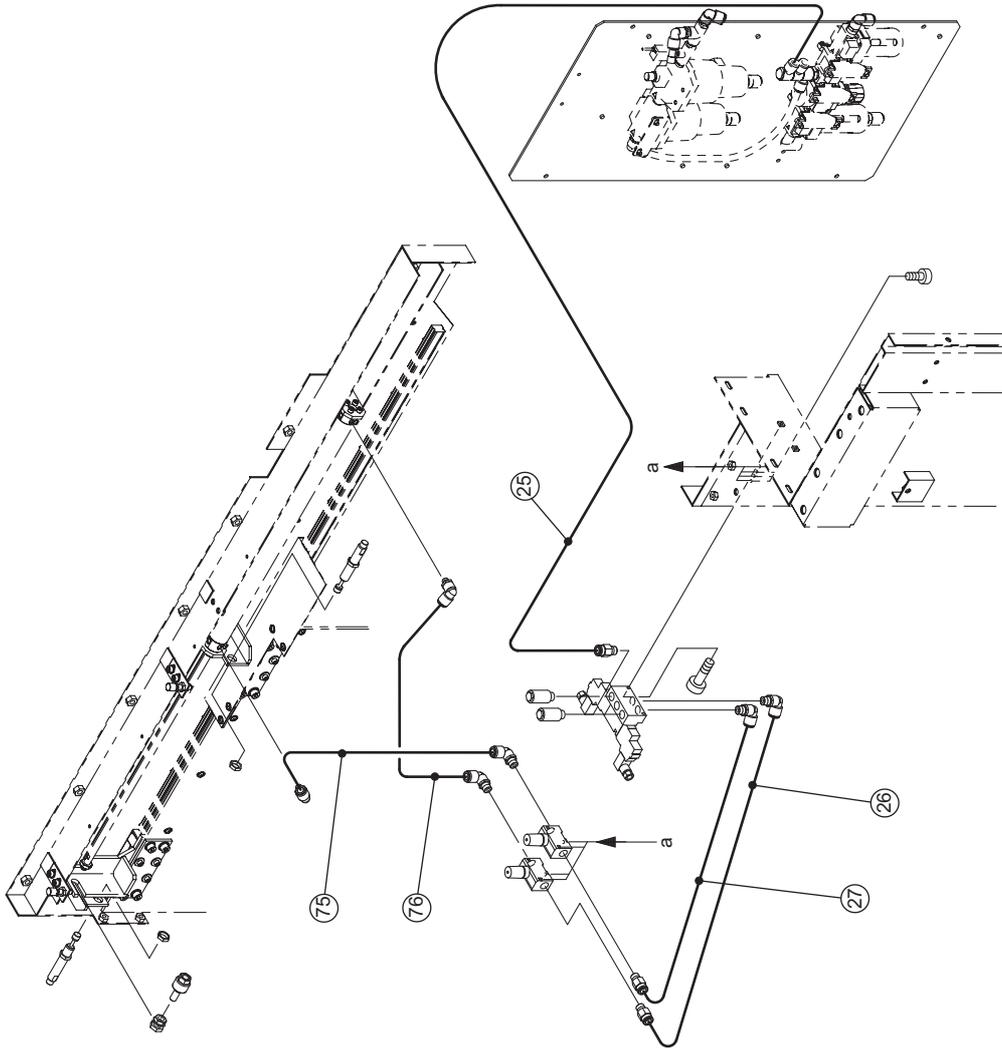
2-15-6.MG HYDRAULIC



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Fig. 2-50

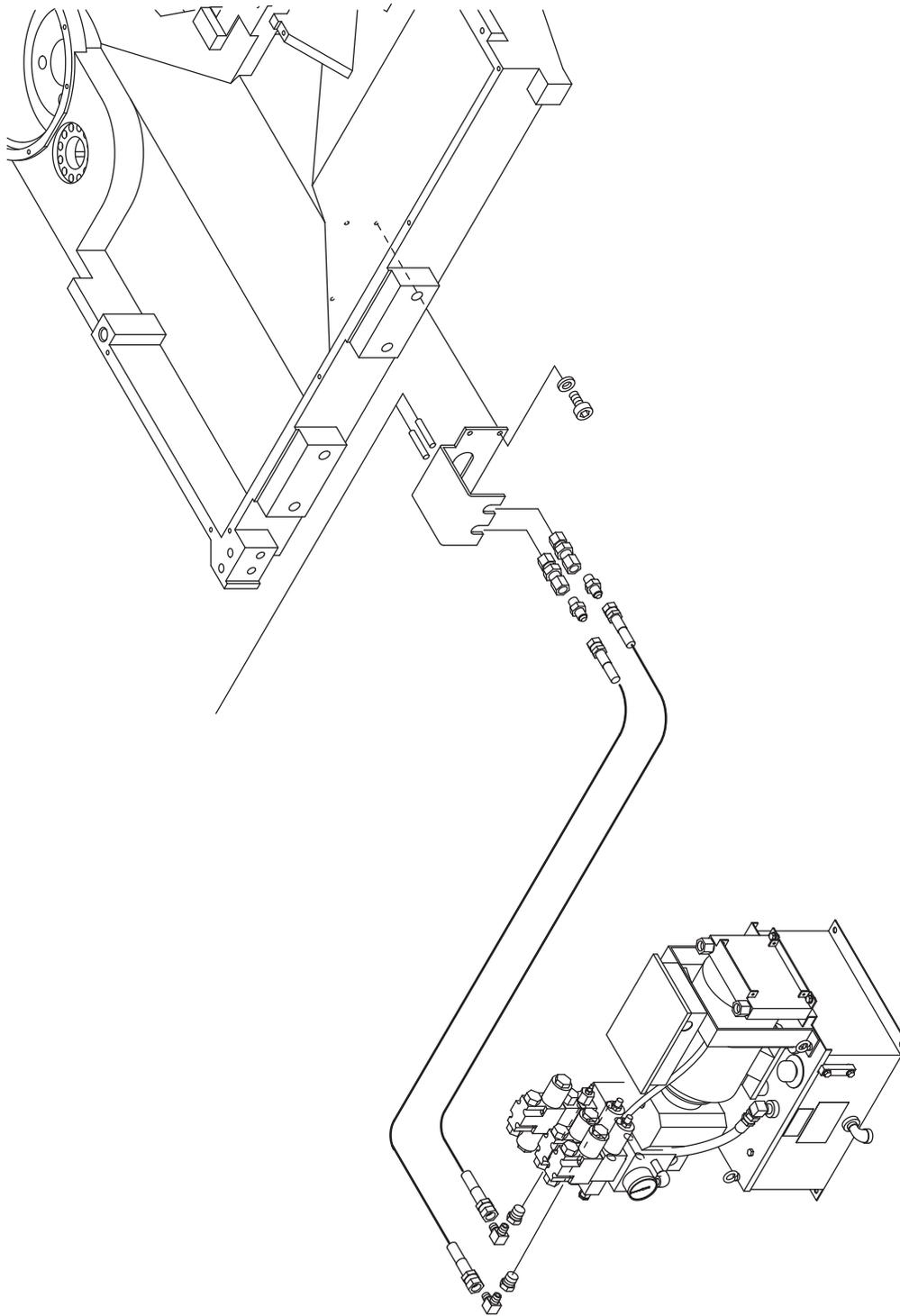
2-15-7.ATC SHUTTER



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Fig. 2-51

2-15-8.2-pallet APC



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Fig. 2-52

2-15-9.ATC HYDRAULIC

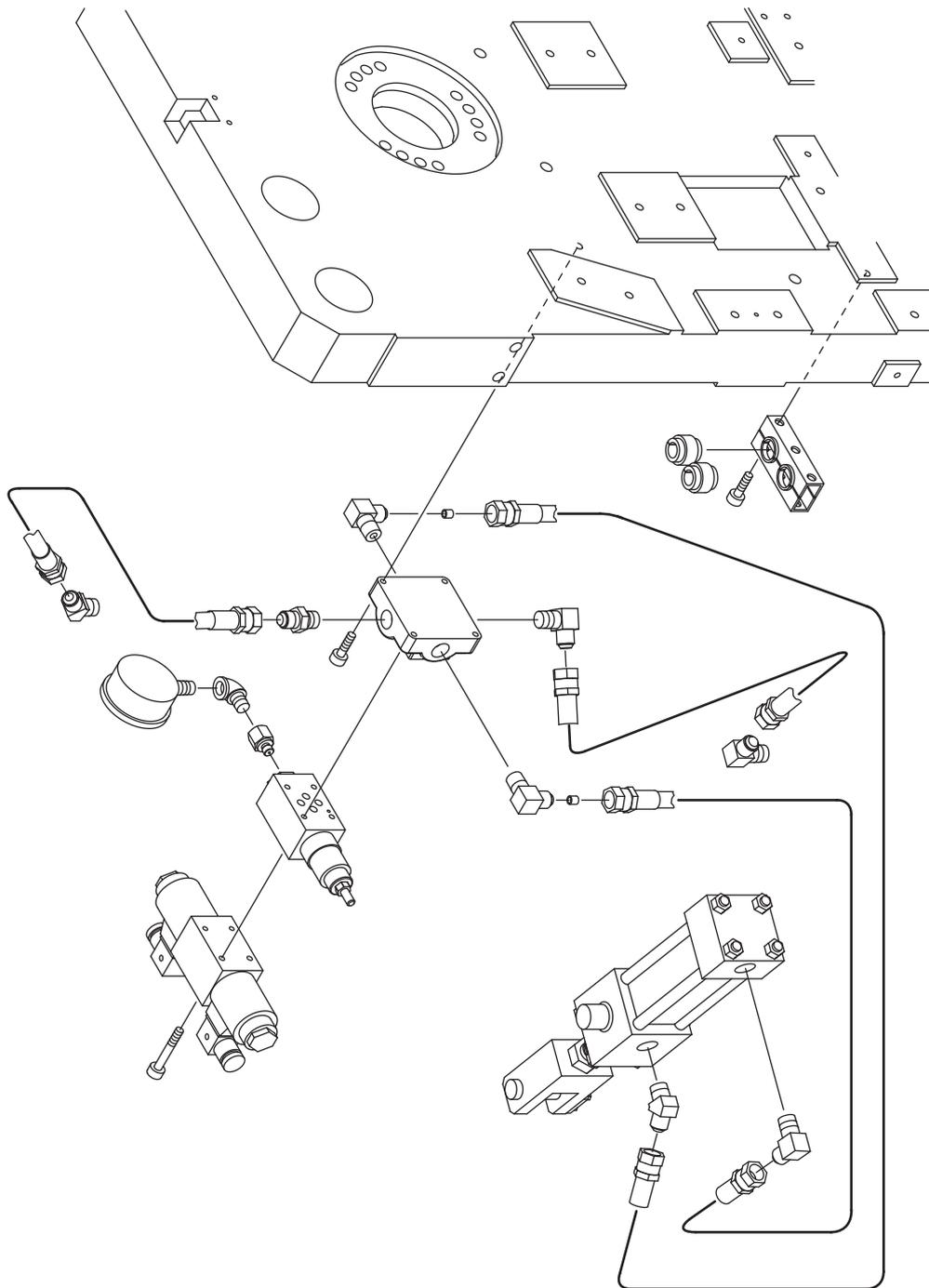
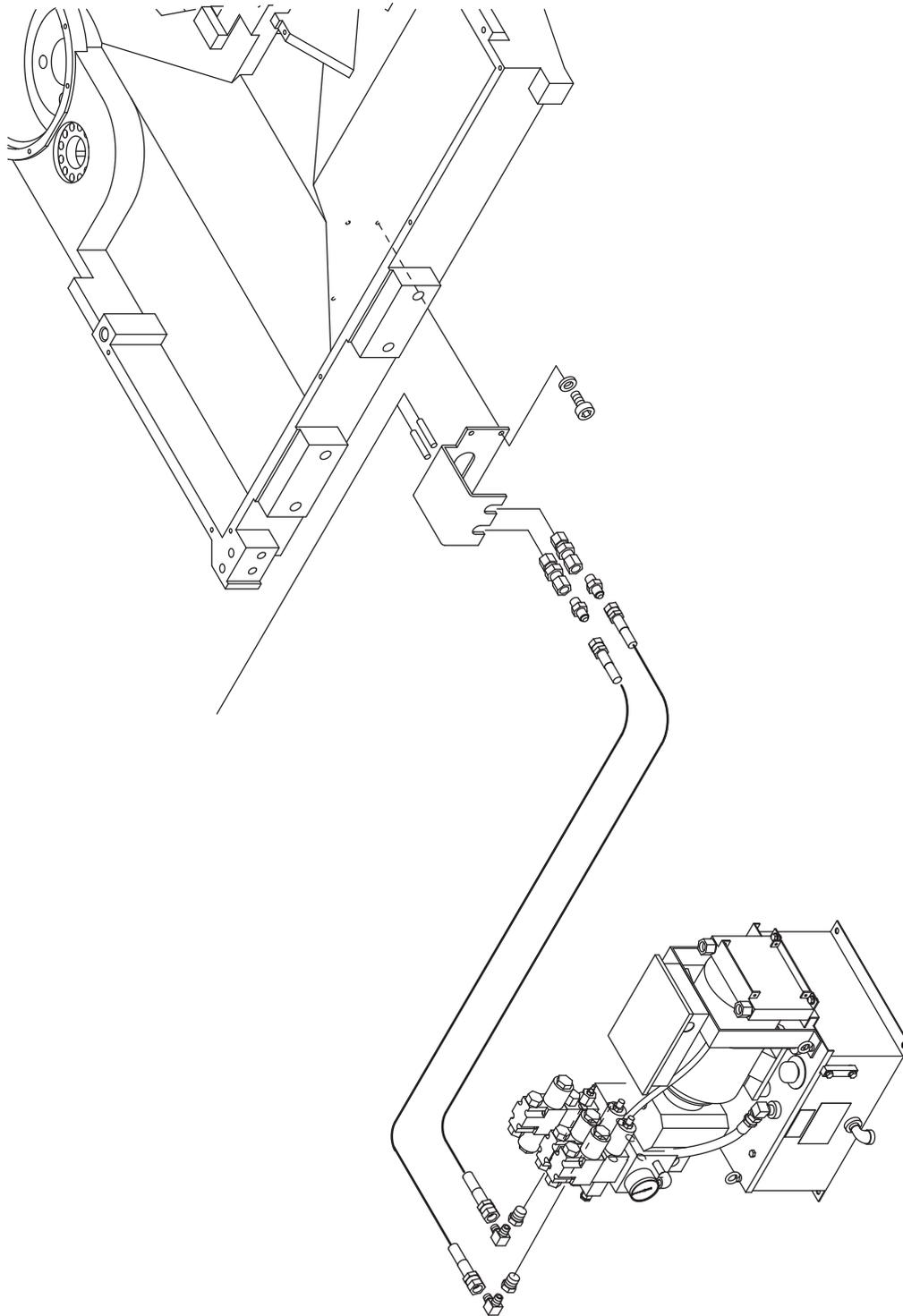


Fig. 2-53

2-15-10.APC HYDRAULIC

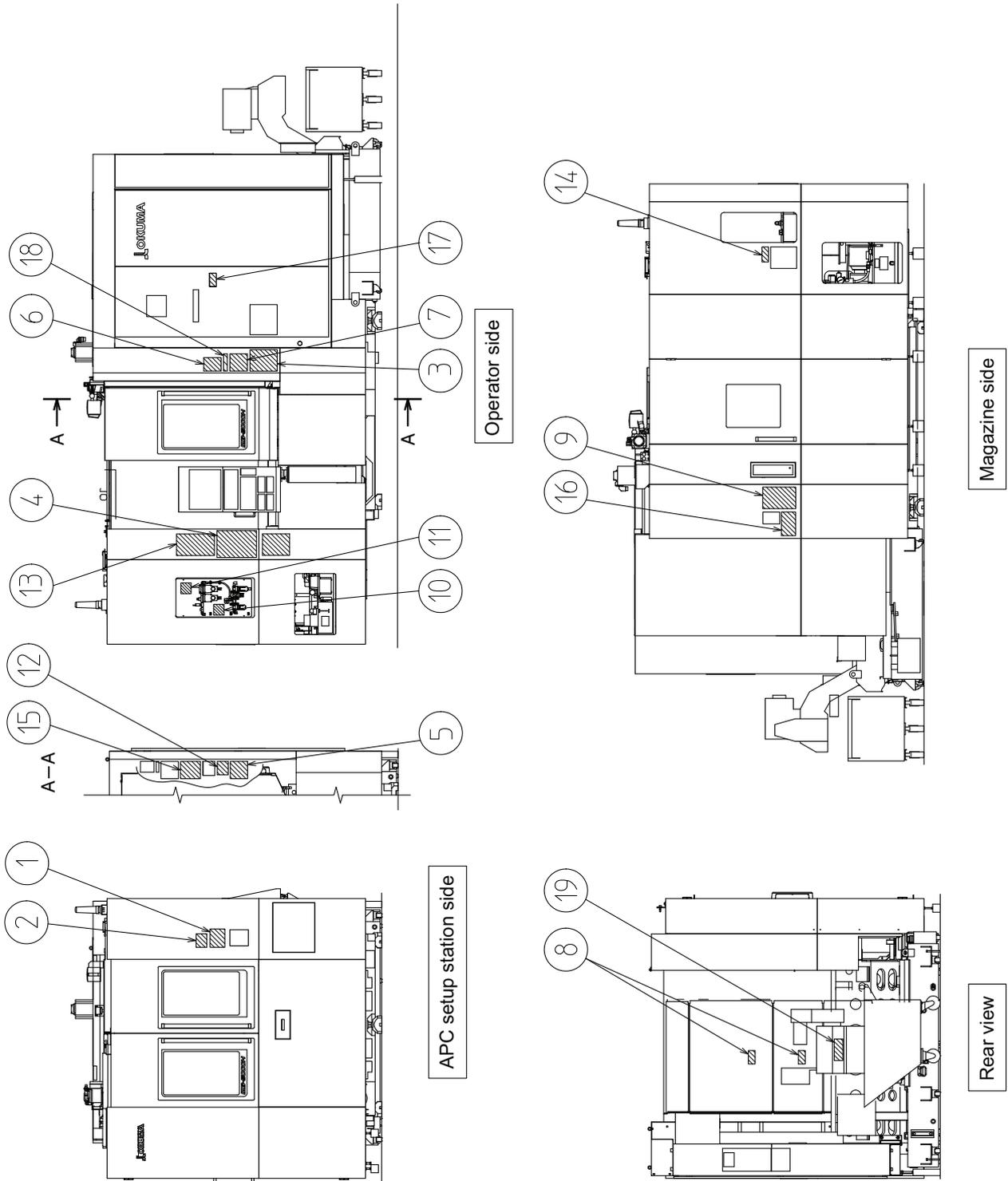


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Fig. 2-54

SECTION 3 CAUTION PLATE

3-1. Caution Plate Positions



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Fig. 3-1

3-2. Caution Plate List

| No. | Item | Japanese | English | German | Swedish | Dutch |
|------|---|-----------------|-----------------|-----------------|-----------------|-----------------|
| (1) | Precautions for APC operation | H1090-1026-48-1 | H1090-1026-53-1 | H1090-1026-66-1 | H1090-1026-75-2 | H1090-1026-85-1 |
| (2) | Warning about handling of pallet positioning lever | H1090-1026-49-1 | H1090-1026-58-1 | H1090-1026-67-2 | H1090-1026-76-2 | H1090-1026-86-1 |
| (3) | Warning about handling of highspeed spindle | H1090-1050-57-5 | H1090-1050-58-5 | H1090-1050-59-6 | H1090-1050-64-5 | H1090-1050-62-6 |
| (4) | Handle with care | H1090-1026-43-4 | H1090-1026-57-5 | H1090-1026-64-5 | H1090-1026-73-5 | H1090-1026-82-5 |
| (5) | Items to be observed when opening/closing the operator door | H1090-1026-44-2 | H1090-1026-55-2 | H1090-1026-62-2 | H1090-1026-71-2 | H1090-1026-80-2 |
| (6) | Warning about handling of spindle and ATC arm | H1090-1026-45 | H1090-1026-54 | H1090-1026-61 | H1090-1026-70 | H1090-1026-79 |
| (7) | Items to be observed in manual tool change | H1090-1026-46 | H1090-1026-56 | H1090-1026-63 | H1090-1026-72 | H1090-1026-81-1 |
| (8) | Items to be observed when removing the maintenance cover | H1090-1020-35 | H1090-1018-33 | H1090-1020-36-1 | H1090-1020-37-2 | H1090-1020-38-3 |
| (9) | Warning about handling of 48 to 64-tool magazine (MAS) | H1090-1151-37-2 | H1090-1147-45 | H1090-1149-27 | H1090-1160-73 | |
| (10) | Air 3-piece set | H1090-1106-48 | H1090-1106-49-1 | H1090-1106-50 | H1090-1106-51 | H1090-1106-52 |
| (11) | Set air pressure for ABSOSCALE | H1090-1106-60 | H1090-1106-61 | H1090-1106-62 | H1090-1106-63 | H1090-1106-64 |
| (12) | Cautions on door lock | H1090-1050-06 | H1090-1050-26 | H1090-1057-69 | H1090-1057-70 | H1090-1057-71 |
| (13) | Instructions on through-pin | H1090-1233-10 | H1090-1233-11 | H1090-1233-12 | H1090-1233-13 | H1090-1233-14 |
| (14) | Maintenance of cooling oil | H1090-1022-21-1 | H1090-1022-32-1 | H1090-1022-43-1 | H1090-1022-98-2 | H1090-1022-76-1 |
| (15) | Items to be observed when handling MG tools | H1090-1147-56 | H1090-1147-57-1 | H1090-1163-01 | | |
| (16) | Cautions specified by CAT, DIN | | H1090-1042-79-4 | H1090-1043-96-3 | H1090-1044-04-3 | H1090-1044-01-3 |
| (17) | Control panel plate | E5421-019-001 | E5421-019-002 | E5415-183-068 | E5415-183-070 | E5415-183-073 |
| (18) | Caution for spindle cleaning | H1090-1081-56-2 | H1090-1082-67-2 | H1090-1090-36-1 | H1090-1090-41-1 | H1090-1090-39-1 |
| (19) | Warnings regarding integrated conveyor | H1090-1147-61 | H1090-1147-61 | H1090-1171-78 | H1090-1171-79 | |

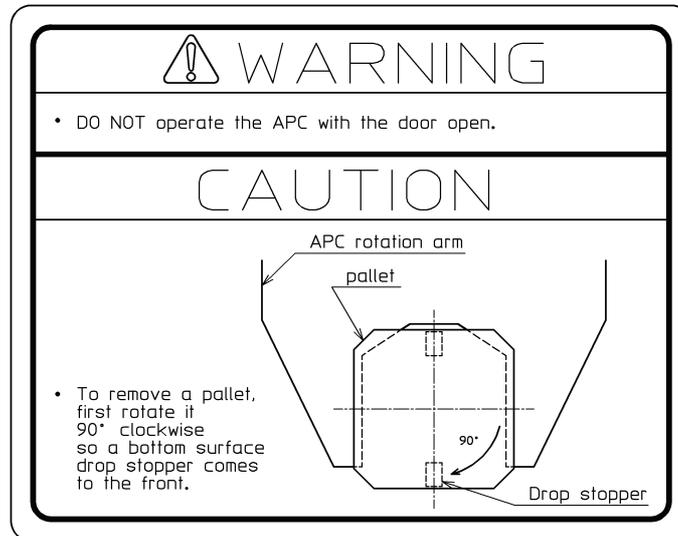
| No. | Item | Finnish | Danish | French | Italian | Spanish |
|------|---|-----------------|-----------------|-----------------|-----------------|-----------------|
| (1) | Precautions for APC operation | H1090-1060-78-1 | H1090-1060-91-2 | H1090-1027-14-2 | H1090-1027-23-2 | H1090-1032-45-1 |
| (2) | Warning about handling of pallet positioning lever | H1090-1026-95-1 | H1090-1060-93-2 | H1090-1027-15-2 | H1090-1027-24-1 | H1090-1032-53-1 |
| (3) | Warning about handling of highspeed spindle | H1090-1050-65-6 | H1090-1050-63-6 | H1090-1050-61-5 | H1090-1050-60-6 | H1090-1050-66-5 |
| (4) | Handle with care | H1090-1026-92-5 | H1090-1060-88-4 | H1090-1027-12-4 | H1090-1027-18-6 | H1090-1032-48-4 |
| (5) | Items to be observed when opening/closing the operator door | H1090-1026-90-2 | H1090-1027-01-2 | H1090-1027-10-2 | H1090-1027-19-3 | H1090-1032-50-2 |
| (6) | Warning about handling of spindle and ATC arm | H1090-1026-89 | H1090-1027-02 | H1090-1027-09 | H1090-1027-20-1 | H1090-1032-51 |
| (7) | Items to be observed in manual tool change | H1090-1026-91-1 | H1090-1060-89 | H1090-1027-11 | H1090-1027-21 | H1090-1032-49-1 |
| (8) | Items to be observed when removing the maintenance cover | H1090-1020-39-1 | H1090-1020-40-2 | H1090-1018-34-2 | H1090-1020-41 | H1090-1032-46-1 |
| (9) | Warning about handling of 48 to 64-tool magazine (MAS) | | | H1090-1188-50 | H1090-1149-33 | H1090-1195-18 |
| (10) | Air 3-piece set | H1090-1106-53 | H1090-1106-54 | H1090-1106-55 | H1090-1106-56 | H1090-1106-57 |
| (11) | Set air pressure for ABSOSCALE | H1090-1106-65 | H1090-1106-66 | H1090-1106-67 | H1090-1106-68 | H1090-1106-69 |
| (12) | Cautions on door lock | H1090-1057-72 | H1090-1057-73 | H1090-1057-74 | H1090-1057-75-1 | H1090-1057-76 |
| (13) | Instructions on through-pin | H1090-1233-15 | H1090-1233-16 | H1090-1233-17 | H1090-1233-18 | H1090-1233-19 |
| (14) | Maintenance of cooling oil | H1090-1023-10-1 | H1090-1060-95-2 | H1090-1022-65-1 | H1090-1022-54-1 | H1090-1025-72-1 |
| (15) | Items to be observed when handling MG tools | | | H1090-1184-48 | | |
| (16) | Cautions specified by CAT, DIN | H1090-1044-03-3 | H1090-1044-02-3 | H1090-1043-98-3 | H1090-1043-97-4 | H1090-1043-99-3 |
| (17) | Control panel plate | E5415-183-071 | E5415-183-072 | E5415-183-069 | E5415-183-074 | E5481-090-019 |
| (18) | Caution for spindle cleaning | H1090-1090-42-1 | H1090-1090-40-1 | H1090-1090-38-1 | H1090-1090-37-1 | H1090-1090-43-1 |
| (19) | Warnings regarding integrated conveyor | | | | H1090-1171-84 | H1090-1171-85 |

| No. | Item | Chinese | Turkish |
|------|---|-----------------|-----------------|
| (1) | Precautions for APC operation | H1090-1058-19-2 | H1090-1038-77-1 |
| (2) | Warning about handling of pallet positioning lever | H1090-1058-22-2 | H1090-1038-82-1 |
| (3) | Warning about handling of highspeed spindle | H1090-1058-21-5 | H1090-1076-84-2 |
| (4) | Handle with care | H1090-1058-09-5 | H1090-1038-81-5 |
| (5) | Items to be observed when opening/closing the operator door | H1090-1052-46-3 | H1090-1038-79-2 |
| (6) | Warning about handling of spindle and ATC arm | H1090-1058-14-1 | H1090-1038-78-1 |
| (7) | Items to be observed in manual tool change | H1090-1058-13-2 | H1090-1038-80-1 |
| (8) | Items to be observed when removing the maintenance cover | H1090-1055-94-3 | H1090-1038-75-2 |
| (9) | Warning about handling of 48 to 64-tool magazine (MAS) | H1090-1147-46-1 | H1090-1160-53 |
| (10) | Air 3-piece set | H1090-1106-58 | H1090-1106-59 |
| (11) | Set air pressure for ABSOSCALE | H1090-1106-70 | H1090-1106-71 |
| (12) | Cautions on door lock | H1090-1058-26-1 | H1090-1057-41-1 |
| (13) | Instructions on through-pin | H1090-1233-20 | H1090-1233-21 |
| (14) | Maintenance of cooling oil | H1090-1058-27-2 | H1090-1068-93-1 |
| (15) | Items to be observed when handling MG tools | H1090-1151-36 | |
| (16) | Cautions specified by CAT, DIN | H1090-1058-29-4 | H1090-1183-75 |
| (17) | Control panel plate | E5413-183-331 | |
| (18) | Caution for spindle cleaning | H1090-1082-24-3 | H1090-1090-42-1 |
| (19) | Warnings regarding integrated conveyor | | |

Table 3-1

3-3. Caution Plates and Okuma Part Numbers

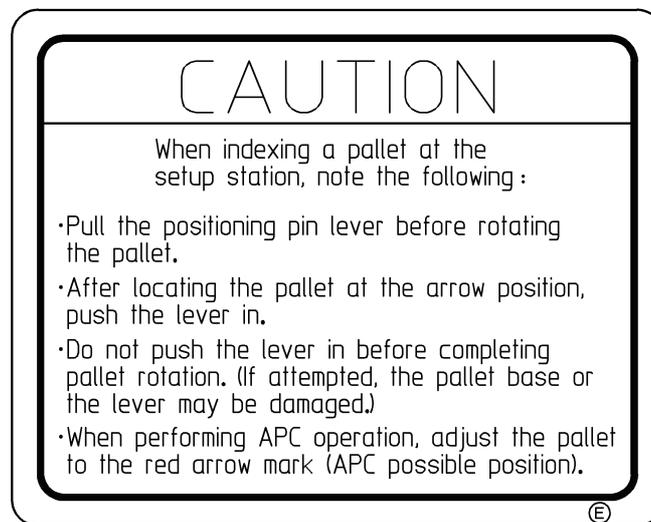
- (1) Precautions for APC operation
Okuma Part No. H1090-1026-53-1



ME13024R0400500030001

Fig. 3-2

- (2) Warning about handling of pallet positioning lever
Okuma Part No. H1090-1026-58-1



ME13024R0400500030002

Fig. 3-3

- (3) Warning about handling of high-speed spindle
Okuma Part No. H1090-1050-58-5



WARNING

1. Do not rotate tools above their maximum speed limits.
Failure to follow this instruction may result in serious personal injury.
* Refer to tool manufacturer specifications for allowable speed limits.
Especially when using the tool with throw-away tips, be careful not to exceed the allowable rotation speed to prevent the tips from coming off.

2. Use dynamically balanced tools.
* If excess vibration occurs during high-speed rotation, stop rotation immediately.

3. When using HSK shanks
* Always ensure that manually clamped HSK tools are securely fastened to the spindle nose before rotation.
* Do not rotate the spindle without tools attached.

Failure to observe these precautions may result in a serious accident.

CAUTION

Starting spindle rotation

1. After turning on the power, regularly check the air pressure and the oil level of the oil-air lubrication unit.

2. Follow the warm-up sequences in the chart below.

| 10000min ⁻¹ 12000min ⁻¹ SPINDLE | 20000min ⁻¹ SPINDLE | 25000min ⁻¹ SPINDLE | 35000min ⁻¹ SPINDLE |
|--|--|---|--|
| 3000min ⁻¹ 10min 6000min ⁻¹ 10min | 5000min ⁻¹ 4min 10000min ⁻¹ 10min 15000min ⁻¹ 10min | 5000min ⁻¹ 20min 20000min ⁻¹ 15min | 2000min ⁻¹ 5min 5000min ⁻¹ 5min 10000min ⁻¹ 5min 15000min ⁻¹ 5min 20000min ⁻¹ 5min 25000min ⁻¹ 5min 30000min ⁻¹ 5min 35000min ⁻¹ 5min |
| 15000min ⁻¹ SPINDLE | | | |
| 4000min ⁻¹ 10min 9000min ⁻¹ 10min | | | |

ME13024R0400500030003

Fig. 3-4

- (4) Handle with care
Okuma Part No. H1090-1026-57-5

|  WARNING | |
|---|---|
| <ol style="list-style-type: none"> 1. DURING AUTOMATIC OPERATION, DO NOT ENTER THE MACHINE'S AREA OF MOVEMENT. 2. TURN OFF THE POWER AND ENSURE SAFETY WHENEVER REMOVING PROTECTIVE COVERS OR ENTERING THE MACHINE WORKING RANGE FOR CLEANING, INSPECTION, ADJUSTMENT, SETUP CHANGE, ETC. 3. DO NOT REMOVE PROTECTIVE COVERS, INTERLOCKS (MECHANICAL OR ELECTRICAL), OR OTHER SAFETY DEVICES WHEN USING THIS MACHINE. OKUMA CORPORATION WILL NOT BE RESPONSIBLE FOR ACCIDENTS RESULTING FROM UNAUTHORIZED MODIFICATION OF THE MACHINE'S ORIGINAL SAFETY DEVICES. 4. NEVER TOUCH A ROTATING OR MOVING SPINDLE, CUTTING TOOL, OR WORKPIECE WITH YOUR HAND (OR SOME MAKESHIFT DEVICE). 5. ALWAYS STOP THE SPINDLE BEFORE ATTEMPTING TO REMOVE CHIPS ENTANGLED ON THE CUTTING TOOL. 6. STAY CLEAR OF THE CUTTING AREA DURING MACHINING. COOLANT, CHIPS, OR BROKEN TOOLS MAY FLY OFF AND MAY RESULT IN DEATH OR SERIOUS PERSONAL INJURY. 7. DO NOT PERFORM MACHINING WITH THE OPERATION DOOR OPEN. 8. NEVER ROTATE THE SPINDLE OR MOVE A MACHINE COMPONENT WITH PERSONNEL ON THE MACHINE TABLE. 9. ATC AND APC OPERATIONS ARE ESPECIALLY DANGEROUS. ALL PERSONNEL SHOULD STAY AWAY FROM THESE MOVING COMPONENTS. 10. FOR SOME REASON WHEN AN ATC OR APC OPERATION MUST BE STOPPED IN MID-CYCLE, DO NOT ENTER THE PATH OF A MOVING COMPONENT. SUDDEN AND UNEXPECTED MOVEMENT MAY OCCUR. 11. OBSERVE THE FOLLOWING RULES TO PREVENT FIRE DURING UNTENDED OPERATION. <ul style="list-style-type: none"> -USE NONFLAMMABLE COOLANT. -DO NOT LEAVE ANY FLAMMABLES AROUND THE MACHINE. -DO NOT HEAP UP CHIPS. -CHECK THE TOOL CUTTING EDGE, CUTTING CONDITIONS, AND TOOL LIFE. 12. IF THE TOP FACE OF THE STEP IS WET WITH WATER OR OIL, WIPE IT OFF IMMEDIATELY. PAY ATTENTION TO GETTING ON/OFF THE STEP SO THAT YOU WILL NOT SLIP. 13. THE WINDOWS OF OPERATION DOORS ARE CONSUMABLE PARTS. REPLACE THEM EVERY 2 YEARS. | <p>FAILURE TO OBSERVE THESE PRECAUTIONS MAY RESULT IN A SERIOUS ACCIDENT.</p> |
|  CAUTION | |
| <ol style="list-style-type: none"> 1. OPERATOR AND MAINTENANCE PERSONNEL MUST CAREFULLY READ, UNDERSTAND, AND FULLY COMPLY WITH THE INSTRUCTIONS AND SAFETY PRECAUTIONS GIVEN IN ALL MACHINE RELATED MANUALS AND MACHINE ATTACHED WARNING SIGNS --- BEFORE INSTALLING, OPERATING, OR PERFORMING MAINTENANCE ON THIS MACHINE. 2. ONLY QUALIFIED PERSONNEL SHOULD BE ALLOWED TO OPERATE THIS MACHINE. 3. ALWAYS WEAR EYE PROTECTORS, HELMETS, AND SAFETY SHOES WHEN WORKING WITH THIS MACHINE. 4. IF TWO OR MORE PERSONNEL MUST WORK TOGETHER, USE CONSTANT COMMUNICATION SIGNALS. 5. ALWAYS MAKE SURE WORKPIECES AND CUTTING TOOLS ARE MOUNTED SECURELY. DO NOT ROTATE THE SPINDLE WITH TOOLS OR OTHER ITEMS SO LOOSELY ATTACHED, THEY MAY FLY OFF WHEN ROTATED. 6. WHEN CHANGING OR INSPECTING TOOLS IN THE ATC MAGAZINE, ALWAYS TURN ON THE [MANUAL INTERRUPT] SWITCH ON THE MANUAL OPERATION PANEL, AND MAKE SURE EACH TOOL IS SECURELY INSERTED IN EACH MAGAZINE TOOL POT. 7. UNAUTHORIZED MODIFICATION OF THE ORIGINAL PARAMETERS IN THE MACHINE'S NUMERICAL CONTROL SYSTEM IS PROHIBITED. 8. DO NOT STAND ON THE TELESCOPIC COVER. 9. DO NOT REMOVE OR DEFACE THE WARNING SIGNS ATTACHED TO THIS MACHINE. 10. ENSURE SAFETY BEFORE PRESSING THE START BUTTON. | |

ME13024R0400500030004

Fig. 3-5

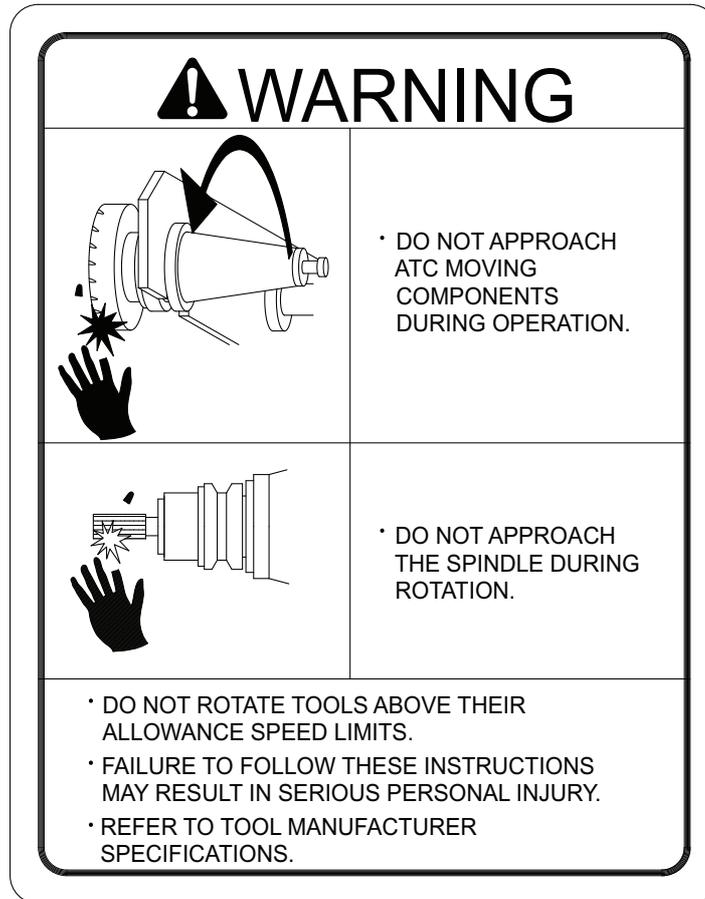
- (5) Items to be observed when opening/closing the operator door
Okuma Part No. H1090-1026-55-2



ME13024R0400500030005

Fig. 3-6

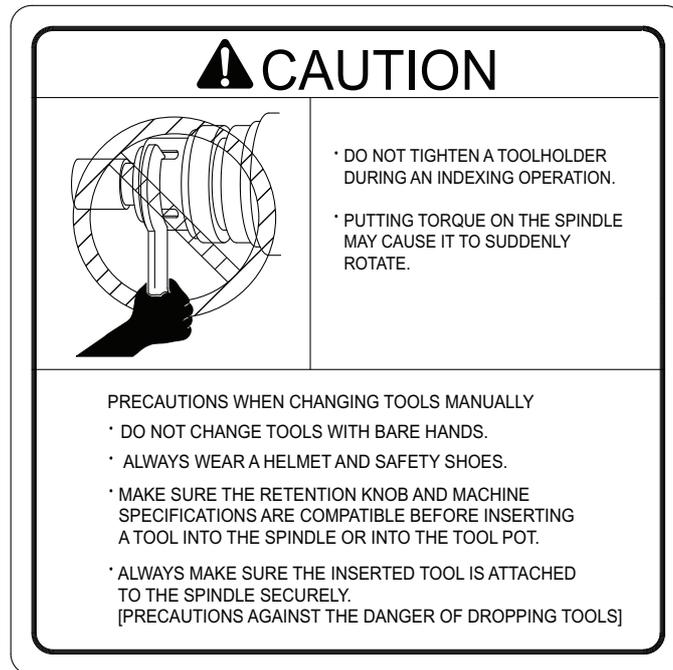
- (6) Warning about handling of spindle and ATC arm
Okuma Part No. H1090-1026-54



ME13024R0400500030006

Fig. 3-7

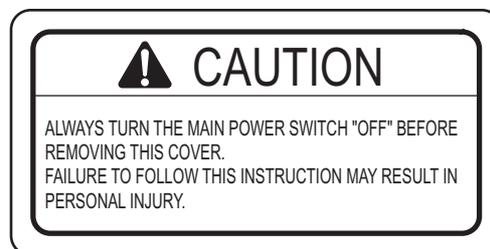
- (7) Items to be observed in manual tool change
Okuma Part No. H1090-1026-56



ME13024R0400500030007

Fig. 3-8

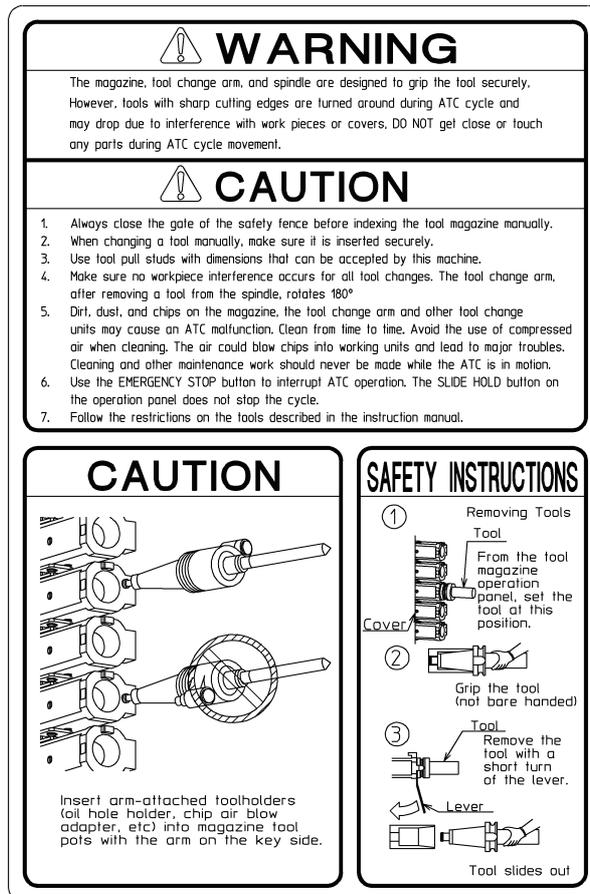
- (8) Items to be observed when removing the maintenance cover
Okuma Part No. H1090-1018-33



ME13024R0400500030008

Fig. 3-9

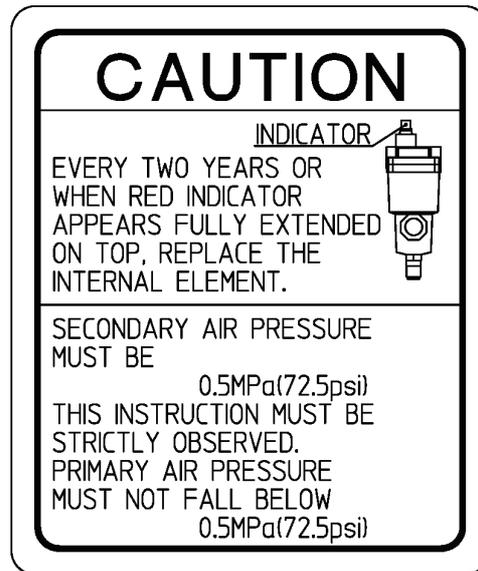
- (9) Warning about handling of 48 to 64-tool magazine (MAS)
Okuma Part No. H1090-1147-45



ME13024R0400500030009

Fig. 3-10

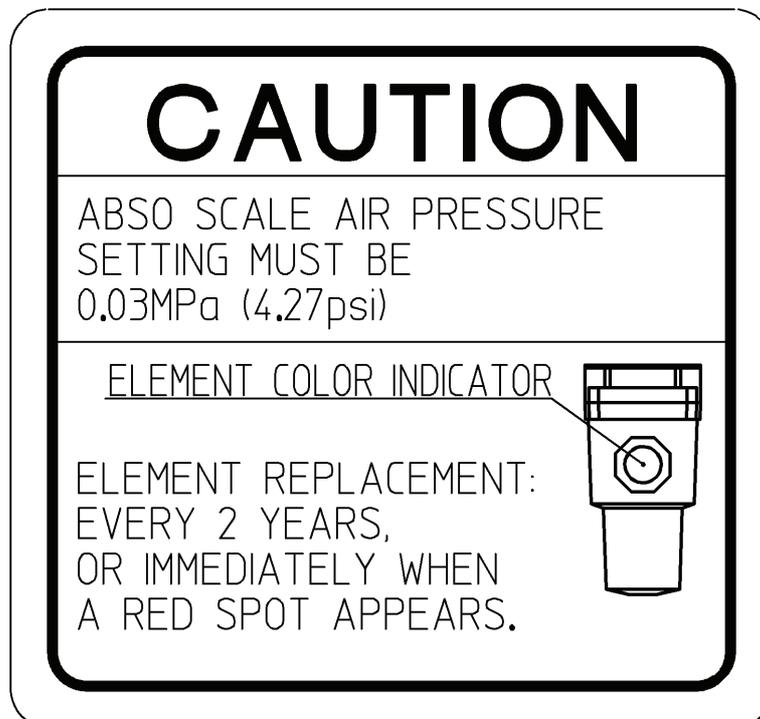
- (10) Air 3-piece set
Okuma Part No. H1090-1106-49-1



ME13024R0400500030010

Fig. 3-11

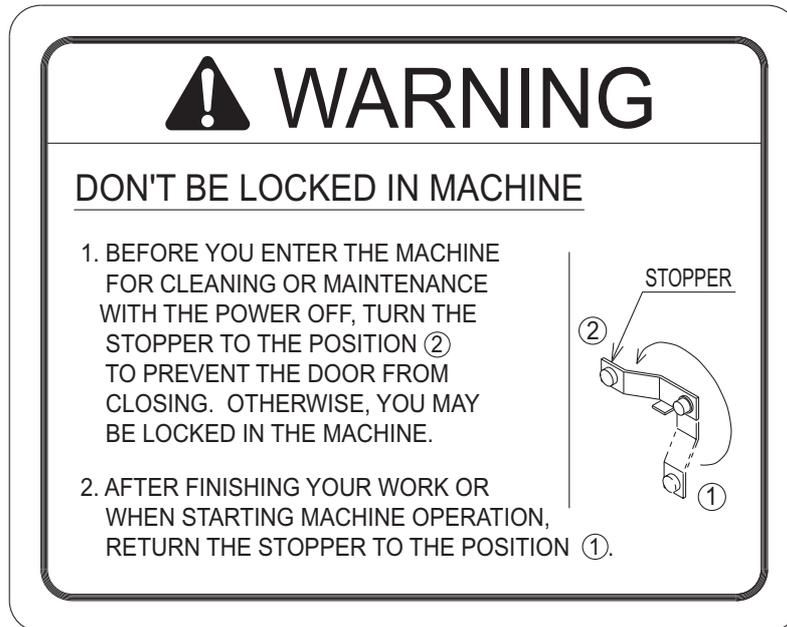
- (11) Set air pressure for ABSOSCALE
Okuma Part No. H1090-1106-61



ME13024R0400500030011

Fig. 3-12

- (12) Cautions on door lock
Okuma Part No. H1090-1050-26



ME13024R0400500030012

Fig. 3-13

- (13) Instructions on through-pin
Okuma Part No. H1090-1233-11

CAUTION

Periodical replacement of thru-pin for thru-spindle coolant function

1. The thru-pin in the tool pull-up shaft used for thru-spindle coolant is a consumable part. Replace the thru-pin every 10 months (or 180,000 times of ATC operation, whichever comes earlier).
If the seal at the tip of thru-pin develops wear, coolant will leak, causing a trouble.
2. The seal life varies depending on the machining conditions, coolant type, etc. If the coolant leaks before the above time limit is reached, stop using the thru-spindle coolant and replace the thru-pin.
3. Thru-pin No. and O-ring (for #50 spindle only) No.

| | Specification | Thru-pin part No. |
|-------------|-------------------|-------------------|
| #40 spindle | JS/DIN | U9800-0614-013-01 |
| | CAT | U9800-0614-014-01 |
| #50 spindle | MAS/JS/DIN/CAT(*) | U9800-0616-017-01 |

*† Includes the specs based on the special CAT.

Procedure for changing thru-pin in the tool pull-up shaft

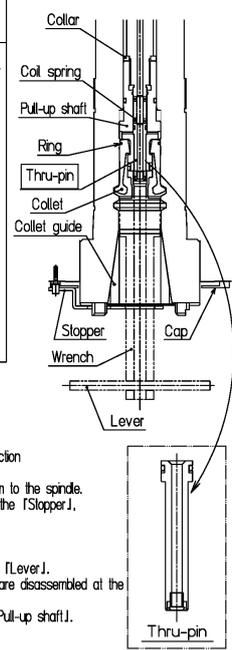
Note: Before replacing the thru-pin, be sure to read the instruction manual together with this caution plate.

1. Attach the [Collet guide] to the [Slapper] and install them to the spindle. Then, insert the [Wrench] into the spindle. When installing the [Slapper], remove the [Cap] fixing bolts.
(2 bolts for #40 and 3 bolts for #50)
2. Uncamp the spindle tool.
3. Remove the [Pull-up shaft] unit using the [Wrench] and [Lever]. [Collet], [Ring], [Thru-pin], [Coil spring], and [Collar] are disassembled at the same time together with the [Pull-up shaft].
4. Remove the [Coil spring] and the [Thru-pin] from the [Pull-up shaft].
5. Assemble a new [Thru-pin] in the [Pull-up shaft].
Fit the finally disassembled [Coil spring].

Note: The inside of [Pull-up shaft] is threaded. So, your finger will be injured if inserted into it.
Apply grease to the O-ring around the [Thru-pin] using care not to damage the ring.

6. Install the assembled [Pull-up shaft] and [Collar] to the spindle.
Note: Completely tighten the [Pull-up shaft] using only the [Wrench] and [Lever]. Never attempt to retighten by inserting a lever into a pipe or the like. Doing so will damage the spindle.
Moreover, be careful not to damage the O-ring when fitting it.
7. After confirming that the [Pull-up shaft] has been completely tightened, perform the ATC operation to check for normal operation.
Note: Make sure that the [Slapper] is removed during ATC operation.
8. Mount a thru-spindle tool and discharge coolant to check that no coolant leaks from inside of the spindle.

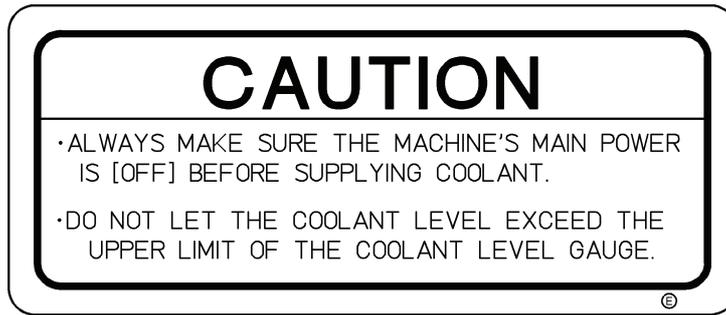
— End of replacement —



ME13024R0400500030013

Fig. 3-14

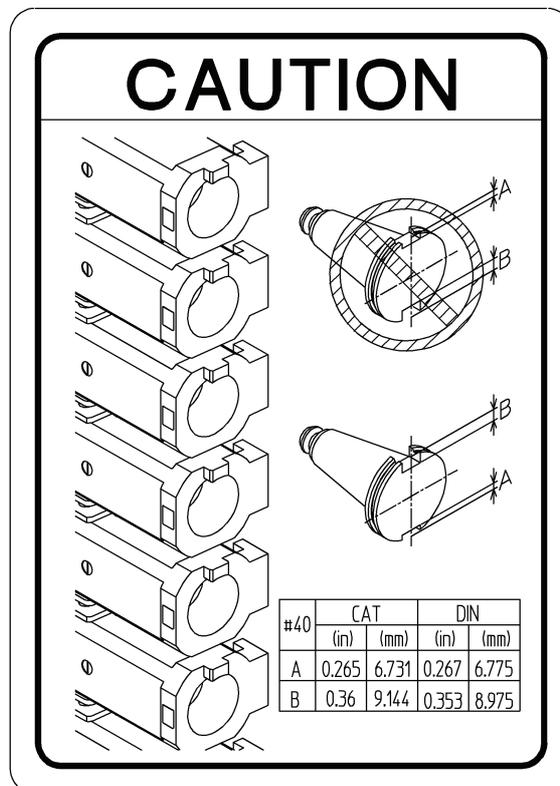
- (14) Maintenance of cooling oil
Okuma Part No. H1090-1022-32-1



ME13024R0400500030014

Fig. 3-15

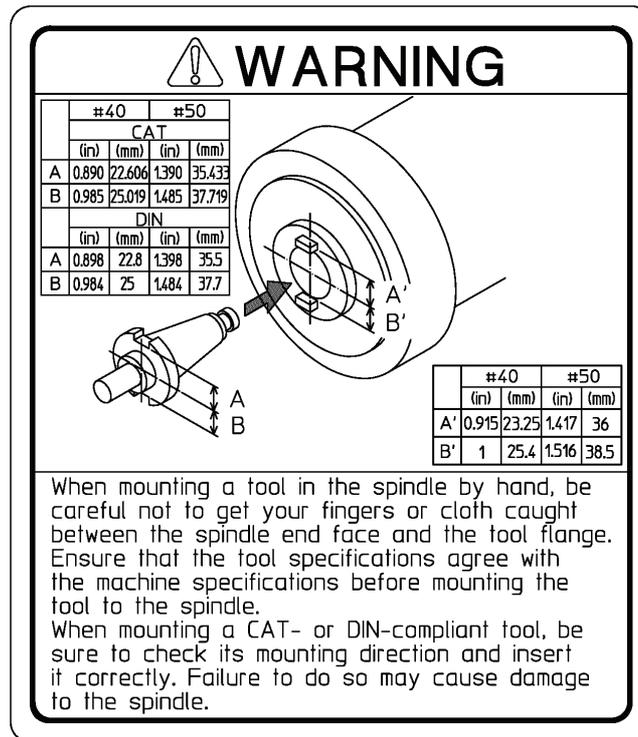
- (15) Items to be observed when handling MG tools
Okuma Part No. H1090-1147-57-1



ME13024R0400500030015

Fig. 3-16

- (16) Cautions specified by CAT, DIN
Okuma Part No. H1090-1042-79-4



ME13024R0400500030016

Fig. 3-17

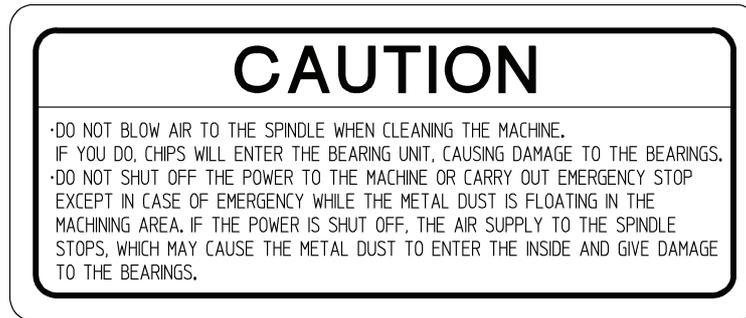
- (17) Control panel plate
Okuma Part No. E5421-019-002



ME13024R0400500030017

Fig. 3-18

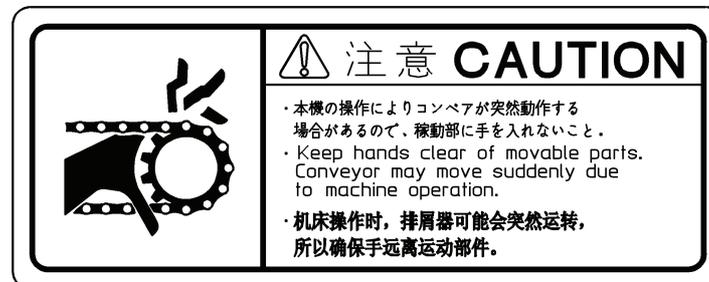
- (18) Caution for spindle cleaning
Okuma Part No. H1090-1082-67-2



ME13024R0400500030018

Fig. 3-19

- (19) Warnings regarding integrated conveyor
Okuma Part No. H1090-1147-61

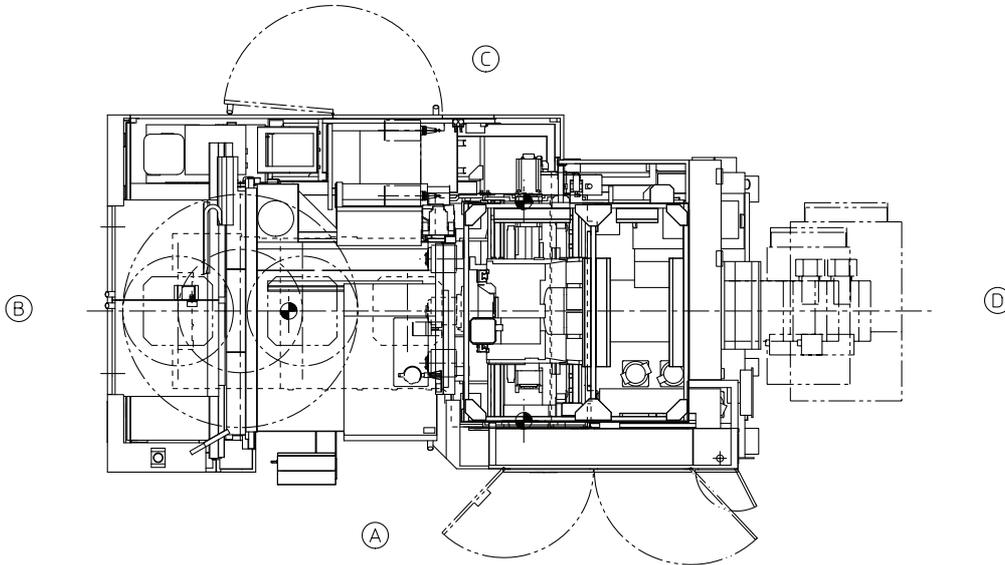


ME13024R0400500030019

Fig. 3-20

SECTION 4 NOISE LEVEL

4-1. Measuring Position (Top View)



ME13024R0400600010001

Fig. 4-1

4-2. Noise

The table below shows the equivalent continuous sound pressure of weight A.

| Place of measurement | (A) | (B) | (C) | (D) |
|------------------------|-----|-----|-----|-----|
| Sound pressure dB (A)* | 76 | 76 | 77 | 77 |

Table 4-1

* Based on JIS Z8731 and JIS C1502.

4-3. Measuring Conditions

- a. Measured in 4 places; (A), (B), (C), and (D)
- b. Measured at a position 1 m (3 ft.) away from the machine and 1.2 m (3.9 ft.) high from the floor
- c. Machine operating conditions
 - The spindle is rotating (at max speed).
 - The X, Y, and Z-axes are fed at rapid traverse.
 - The full-enclosure shielding door is closed.

SECTION 5 SPARE PARTS LIST

<Classification of listed parts>

- (1) Spindlehead Frame and Piping (15,000 min⁻¹)
- (2) #40 Spindle Unit (15,000 min⁻¹)
- (3) XYZ-axis Ball Screw
- (4) XYZ-axis Drive
- (5) XYZ-axis Guides
- (6) Machine
- (7) ATC Magazine Common Parts
- (8) 48-tool ATC
- (9) 64-tool ATC (Optional)
- (10) ATC with Tool Change Arm
- (11) Table with 1° Indexing
- (12) Table with 0.001° Indexing (Optional)
- (13) 2-pallet APC
- (14) Full-enclosure Shielding
- (15) Coolant System
- (16) Lamps
- (17) Thru-spindle Coolant System 1.5MPa (217.7 psi)/7.0 MPa (1015.7 psi) (Optional)
- (18) Auto Tool Length Offset (Touch Sensor: Optional)
- (19) Auto Zero Offset (Touch Probe: Optional)
- (20) Multi-pallet APC (Optional)

<Rank>

- A: Standard accessories
- C: Consumable parts that should be replaced after operation for 8000 hours or three years.
- D: Consumable parts that should be stocked at the overseas distributors and dealers for maintenance of the exported machines

<When ordering parts>

- Please let us know the number and the delivery date of your machine for our easy identification because the machines are always remodeled for improvement.
- Also refer to the attached parts book.

5-1. Spindlehead Frame and Piping (15,000 min⁻¹)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|--------------------|--|------|--------------------------------------|------------------|-------------------|------|
| 1 | O-ring | P14 | 2 | Spindlehead frame | C6110-000P14 | S0011-0645-002A03 | C |
| 2 | O-ring | P7 | 1 | Spindlehead frame | C6110-000P7 | S0011-0645-002A03 | C |
| 3 | O-ring | P10 | 8 | Spindlehead accessories | C6110-000P10 | S0011-0614-004A02 | C |
| 4 | O-ring | JIS-B2401 4 type D P16 | 1 | Spindlehead coolant piping | J9824-0150-P16 | S0091-0644-008A01 | C |
| 5 | Connector | Nitta C4N8X6-PT1/8 | 2 | Spindlehead 15000 piping accessories | H0015-0000-50 | S0091-0644-012A01 | D |
| 6 | Elbow union | SMC KQL08-01S | 5 | Spindlehead 15000 piping accessories | H0016-0006-40 | S0091-0644-012A01 | D |
| 7 | Half union | SMC KQH08-01S | 2 | Spindlehead 15000 piping accessories | H0016-0007-64 | S0091-0644-012A01 | D |
| 8 | Nylon tube | SMC T0806B L800 | 1 | Spindlehead 15000 piping accessories | H0026-0017-92 | S0091-0644-012A01 | C |
| 9 | Half union | SMC KQH08-01S | 1 | Chip air blast block new | H0016-0007-64 | S5532-0645-004A01 | D |
| 10 | S solenoid valve | SMC VCA31-5DL-4-02-F | 1 | Spindlehead piping support | F0001-400-005-33 | S0091-0644-001A05 | D |
| 11 | S solenoid valve | SMC VV2CA3-01-X25 1-pc DIN connector ordered by Okuma FA, spec. sheet provided | 1 | Spindlehead piping support | F0001-400-006-01 | S0091-0644-001A05 | D |
| 12 | Union Y | SMC KQU08-00 | 1 | Spindlehead piping support | H0016-0000-28 | S0091-0644-001A05 | D |
| 13 | Elbow union | SMC KQL08-03S | 1 | Spindlehead piping support | H0016-0000-30 | S0091-0644-001A05 | D |
| 14 | Elbow union | SMC KQL10-02S | 2 | Spindlehead piping support | H0016-0008-84 | S0091-0644-001A05 | D |
| 15 | Elbow union | SMC KQL08-02S | 2 | Spindlehead piping support | H0016-0009-23 | S0091-0644-001A05 | D |
| 16 | Nylon tube | SMC T0806B 2 m | 1 | Spindlehead piping support | H0026-0001-25 | S0091-0644-001A05 | C |
| 17 | Tube | SMC T1075B 1 m | 1 | Spindlehead piping support | H0026-0005-02 | S0091-0644-001A05 | C |
| 18 | Rubber hose | Tokai Rubber IB35X52-19NX1400L hose only | 1 | Spindlehead piping support | H0027-0043-55 | S0091-0644-001A05 | C |
| 19 | Lubrication parts | Showa Lubrication parts 1 set | 1 | Spindlehead piping support | H0120-1017-32 | S0091-0644-001A05 | D |
| 20 | Pipe | Ihara Science MB-4000H/5000H Y-axis lubrication piping, spec. sheet provided | 1 | Spindlehead piping support | H0024-0005-50 | S0091-0644-001A05 | D |
| 21 | S solenoid valve | SMC VCA31-5DL-4-02-F | 2 | Spindlehead oil-air piping | F0001-400-005-33 | S0091-0645-012A01 | D |
| 22 | Line filter | Daido Metal F01-2 Dwg. No. 000-UF1-0200 delivery spec. provided | 1 | Spindlehead oil-air piping | H0120-0007-63-1 | S0091-0645-012A01 | C |
| 23 | Mixing valve | Daido Metal MB-5000H for new standard spindle | 1 | Spindlehead oil-air piping | H0120-0011-53 | S0091-0645-012A01 | D |
| 24 | Lubrication parts | Showa Lubrication parts 1 set MB-5000H | 1 | Spindlehead oil-air piping | H0120-1017-09 | S0091-0645-012A01 | D |
| 25 | Orifice | M8X0.9 | 1 | Spindlehead oil-air piping | C7868-008091 | S0091-0645-012A01 | D |
| 26 | Elbow union | SMC KQL08-02S M8 tap, delivery spec. provided | 1 | Spindlehead oil-air piping | H0016-0003-51 | S0091-0645-012A01 | D |
| 27 | Check valve | SMC AKH08A-02S | 2 | Spindlehead oil-air piping | H0016-0006-30 | S0091-0645-012A01 | D |
| 28 | Triple universal | SMC KQ2VT08-03S | 1 | Spindlehead oil-air piping | H0016-0008-05 | S0091-0645-012A01 | D |
| 29 | Elbow union | SMC KQL08-02S | 1 | Spindlehead oil-air piping | H0016-0009-23 | S0091-0645-012A01 | D |
| 30 | Branch universal L | SMC KQ2Z08-01S | 1 | Spindlehead oil-air piping | H0016-0010-05 | S0091-0645-012A01 | D |
| 31 | Soft nylon tube | SMC TS0806B L3000 | 1 | Spindlehead oil-air piping | H0026-0013-32 | S0091-0645-012A01 | D |
| 32 | S solenoid valve | SMC VT317-5DZ-02 | 1 | Spindlehead through piping | F0001-411-000-68 | S0091-0644-003A03 | D |
| 33 | Double universal L | SMC KQVD10-02S | 1 | Spindlehead through piping | H0016-0002-54 | S0091-0644-003A03 | D |
| 34 | Elbow union | SMC KQL10-02S | 2 | Spindlehead through piping | H0016-0008-84 | S0091-0644-003A03 | D |
| 35 | Joint | SMC KQ2Z10-02S | 1 | Spindlehead through piping | H0016-0013-35 | S0091-0644-003A03 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------|--|------|------------------------------------|------------------|-------------------|------|
| 36 | Nylon tube | SMC T1075B 2 m | 1 | Spindlehead through piping | H0026-0017-51 | S0091-0644-003A03 | C |
| 37 | Hose V | Tokai Rubber C2804-12 hose, 1 set, w/ metal parts on both ends | 1 | Spindlehead through piping | H0027-1099-50-1 | S0091-0644-003A03 | C |
| 38 | Connector | Nitta C4N8X6-PT1/4 | 2 | Spindlehead coolant piping 15000 | H0015-0004-14 | S0091-0645-013A01 | D |
| 39 | Syn-flex tube | Nitta N2-4-8X6 L2000 black | 1 | Spindlehead coolant piping 15000 | F1262-2000-0 | S0091-0645-013A01 | C |
| 40 | Hose V | Hose, 1 set, w/ metal parts on both ends | 1 | Spindlehead coolant piping 15000 | H0027-1100-51-1 | S0091-0645-013A01 | C |
| 41 | 1.5MPA Hose | No metal parts 12X850 | 1 | Spindlehead coolant piping 15000 | C2788-120850 | S0091-0645-013A01 | C |
| 42 | Hose | Tokai Rubber C2803-09 hose, 1 set, w/ metal parts on both ends, 2-pc set | 1 | Spindlehead hydraulic piping 15000 | H0027-1099-48 | S0091-0644-010A01 | C |
| 43 | S solenoid valve | SMC VCA35-5DL-4-03-X5 spec. sheet provided | 1 | End face air blast piping | F0001-400-005-48 | S0091-0644-011A01 | D |
| 44 | Elbow union | SMC KQL08-03S | 1 | End face air blast piping | H0016-0000-30 | S0091-0644-011A01 | D |
| 45 | Elbow union | SMC KQL08-01S | 1 | End face air blast piping | H0016-0006-40 | S0091-0644-011A01 | D |
| 46 | Nylon tube | SMC T0806B 2 m | 1 | End face air blast piping | H0026-0001-25 | S0091-0644-011A01 | C |
| 47 | O-ring | Morisei Fluoro-rubber S165 | 2 | Coolant nozzle ring 8/15/20 | F109-0005-05 | S0091-0614-017A02 | C |
| 48 | O-ring | Eiwa Shoji 1 type A (Nitrile rubber) Cross-section dia. M3, internal dia. M190, external dia. M196 | 1 | Coolant nozzle ring 8/15/20 | F109-0005-17 | S0091-0614-017A02 | C |
| 49 | Lubricating nozzle | IKO PBA4E05 Dwg. No. 85805-002 | 4 | Coolant nozzle ring 8/15/20 | H0023-0001-39 | S0091-0614-017A02 | D |
| 50 | Swiveling nozzle | IKO PBA6E01 | 3 | Coolant nozzle ring 8/15/20 | H0023-0003-18 | S0091-0614-017A02 | D |
| 51 | O-ring | JIS-B2401 4 type D P10 | 2 | Coolant nozzle ring 8/15/20 | J9824-0150-P10 | S0091-0614-017A02 | C |
| 52 | O-ring | JIS-B2401 4 type D P18 | 2 | Coolant nozzle ring 8/15/20 | J9824-0150-P18 | S0091-0614-017A02 | C |
| 53 | O-ring | Fluoro-rubber P5 | 7 | Coolant nozzle ring 8/15/20 | F109-0001-06 | S0091-0614-017A02 | C |
| 54 | Speed control valve | SMC AS2000-02 | 1 | Chip air blast nozzle | F0031-581-000-15 | S5532-0645-002A01 | D |
| 55 | Hose | Nikki (Dealer: Nadex) Adjustable coolant system 3-pc set | 1 | Chip air blast nozzle | H0023-1002-71 | S5532-0645-002A01 | C |

Table 5-1

5-2. #40 Spindle Unit (15,000 min⁻¹)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------------|---|------|---------------------------------------|------------------|-------------------|------|
| 1 | Detection gear_300_MC-STD | | 1 | Detection gear_300_MC-STD (7 teeth) | A091-0313-93-01 | U0102-0091-013-02 | D |
| 2 | Magnetic encoder 2M | | 1 | MA400H spindle PG | A005-8024-01-011 | U7760-0614-001-00 | D |
| 3 | O-ring | NOK S50 | 1 | #40 new standard BIG15000 | F100-200-04950 | S0010-063A-004A01 | C |
| 4 | O-ring | NOK S55 | 1 | #40 new standard BIG15000 | F100-200-05450 | S0010-063A-004A01 | C |
| 5 | O-ring | P10 | 6 | #40 new standard outer sleeve B | C6110-000P10 | S0011-063A-009A02 | C |
| 6 | O-ring | G200 | 2 | #40 new standard outer sleeve B | C6110-00G200 | S0011-063A-009A02 | C |
| 7 | O-ring | Morisei S185 | 2 | #40 new standard outer sleeve B | F109-0003-31 | S0011-063A-009A02 | C |
| 8 | O-ring | P5 | 1 | #40 new standard inner sleeve B | C6110-0000P5 | S0011-063A-010A01 | C |
| 9 | O-ring | G140 | 2 | #40 new standard inner sleeve B | C6110-00G140 | S0011-063A-010A01 | C |
| 10 | O-ring | NOK S132 | 1 | #40 new standard inner sleeve B | F100-200-13150 | S0011-063A-010A01 | C |
| 11 | Bearing V | Daido Metal Thermalloy T type Finished product, materials 144SB12P-2MOW 103X67X44 | 1 | #40 new standard spindle unit front B | M009-0050-71-1 | S0011-063A-011A01 | D |
| 12 | O-ring | P8 | 7 | #40 new standard spindle unit front B | C6110-0000P8 | S0011-063A-011A01 | C |
| 13 | O-ring | NOK S120 | 1 | #40 new standard spindle unit rear | F100-200-11950 | S0011-063A-004A05 | C |
| 14 | O-ring | NOK S110 | 1 | #40 new standard spindle unit rear | F100-200-10950 | S0011-063A-004A05 | C |
| 15 | O-ring | G85 | 1 | #40 new standard spindle unit rear | C6110-000G85 | S0011-063A-004A05 | C |
| 16 | Lubrication parts | Showa Yuki Lubrication parts 1 set, 6-piece set | 1 | #40 new standard oil-air nozzle B | H0120-1010-76-1 | S0011-063A-012A01 | D |
| 17 | Nipple KH | Showa Yuki KH-1 | 1 | #40 new standard oil-air nozzle B | H0012-0004-01 | S0011-063A-012A01 | D |
| 18 | Sleeve | Showa Yuki PB4 | 4 | #40 new standard oil-air nozzle B | H0015-0009-48 | S0011-063A-012A01 | D |
| 19 | Nipple KH | Showa Yuki KH-1 | 4 | #40 new standard oil-air nozzle B | H0012-0004-01 | S0011-063A-012A01 | D |
| 20 | Plug | Showa Yuki PA4 | 4 | #40 new standard oil-air nozzle B | H0015-0009-47 | S0011-063A-012A01 | D |
| 21 | O-ring | P6 | 2 | #40 new standard oil-air nozzle B | C6110-0000P6 | S0011-063A-012A01 | C |
| 22 | O-ring | P6 | 2 | #40 new standard oil-air nozzle B | C6110-0000P6 | S0011-063A-012A01 | C |
| 23 | O-ring | P6 | 1 | #40 new standard oil-air nozzle B | C6110-0000P6 | S0011-063A-012A01 | C |
| 24 | Plug | Showa Yuki PA4 | 1 | #40 new standard oil-air nozzle B | H0015-0009-47 | S0011-063A-012A01 | D |
| 25 | Sleeve | Showa Yuki PB4 | 1 | #40 new standard oil-air nozzle B | H0015-0009-48 | S0011-063A-012A01 | D |
| 26 | O-ring | P8 | 2 | #40 new standard rearhousing 15000 B | C6110-0000P8 | S0013-063A-002A02 | C |
| 27 | Collar | SUS304 M42XM20X0.5 | 1 | #40 new standard pulling shaft B | H1009-1000-86 | S0015-063A-013A01 | C |
| 28 | Collar | SUS304 M42XM20X0.1 | 5 | #40 new standard pulling shaft B | H1009-1000-87 | S0015-063A-013A01 | C |
| 29 | Steel ball | THK 5.556+-0.000 standard ball (for ball cage) | 36 | #40 new standard pulling shaft B | H1082-0002-31 | S0015-063A-013A01 | D |
| 30 | O-ring | NOK P10A 4 type D CO0008I | 1 | #40 new standard pulling shaft B | F109-0006-81 | S0015-063A-013A01 | C |
| 31 | O-ring | JIS-B2401 4 type D P16 | 1 | #40 new standard pulling shaft B | J9824-0150-P16 | S0015-063A-013A01 | C |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|----------------------------|---|------|--|------------------|-------------------|------|
| 32 | O-ring | JIS-B2401 4 type D P36 | 1 | #40 new standard pulling shaft B | J9824-0150-P36 | S0015-063A-013A01 | C |
| 33 | Belleville spring | NHK Compact Belleville spring BT40 20.4X40X3X4.2 1X40 pcs. spec. sheet provided | 1 | #40 new standard Belleville spring B | M109-0026-74 | S0015-063A-014A01 | C |
| 34 | Elbow union | SMC KQL08-01S | 2 | #40 new standard cylinder circumference B | H0016-0006-40 | S0016-063A-007A03 | D |
| 35 | Connector | Nitta C4N8X6-PT1/8 | 2 | #40 new standard cylinder circumference B | H0015-0000-50 | S0016-063A-007A03 | D |
| 36 | Proximity switch sensor | Omron E2E-X2D1-M3G M8 NO shield type | 1 | #40 new standard cylinder circumference B | E3020-397-295 | S0016-063A-007A03 | C |
| 37 | Proximity switch sensor | Omron E2E-X2D2-M3G | 1 | #40 new standard cylinder circumference B | E3020-397-302 | S0016-063A-007A03 | C |
| 38 | 3-phase induction motor V | Yasukawa spec. sheet provided | 1 | #40 rotor common parts | E1005-892-208-1 | S0100-0631-002A02 | D |
| 39 | O-ring | NOK S60 | 1 | #40 rotor common parts | F100-200-05950 | S0100-0631-002A02 | C |
| 40 | Compression spring | Ihara Kogyo SUS304 0.4X4.8X20X13 | 2 | #40 taper air blow block | M109-0022-32 | S0110-0631-009A02 | C |
| 41 | Bearing | NSK N1011RT42CCG5P4YU10 for 8000 and 15000 speed, delivery spec. | 1 | #40 bearing 15000 | M009-0045-61 | S0121-0631-001A01 | D |
| 42 | Bearing V | NSK 70BNR10XTYNDBBCA10P4YU10 for 15000 speed, spec. sheet provided | 1 | #40 bearing 15000 | M009-0045-62-1 | S0121-0631-001A01 | D |
| 43 | 3-phase induction motor | Built-in stator VAC-YMB26/18.5-40/150-B Yasukawa type UAASID-37HOK31 | 1 | #40 motor 15000 | E1006-892-122 | S0121-0631-002A01 | D |
| 44 | Piston seal | 80 | 1 | #40 new standard cylinder ASSY | C6113-000800 | S0016-063A-002A05 | C |
| 45 | O-ring | P80 | 1 | #40 new standard cylinder ASSY | C6110-000P80 | S0016-063A-002A05 | C |
| 46 | Proximity switch sensor | Omron E2E-X2D1-M3G M8 NO shield type | 2 | #40 new standard cylinder ASSY | E3020-397-295 | S0016-063A-002A05 | C |
| 47 | O-ring | G85 | 1 | #40 new standard cylinder ASSY | C6110-000G85 | S0016-063A-002A05 | C |
| 48 | Piston seal | 60 | 1 | #40 new standard cylinder ASSY | C6113-000600 | S0016-063A-002A05 | C |
| 49 | Ring | Ihara Kogyo SUS304-WPB 0.4X2X60X150 NO.40 spindle collet spec. sheet required | 1 | #40 new standard JIS/DIN through | M109-0019-23 | S0015-063A-003A03 | C |
| 50 | Shaft | S45C. Fluoro-rubber M13X50 | 3 | #40 new standard JIS/DIN through | H1023-1049-67 | S0015-063A-003A03 | C |
| 51 | O-ring | JIS-B2401 4 type D P10 | 3 | #40 new standard JIS/DIN through | J9824-0150-P10 | S0015-063A-003A03 | C |
| 52 | Backup ring | JIS-B2407 T2 P10 | 3 | #40 new standard JIS/DIN through | J9824-0710-P10 | S0015-063A-003A03 | C |
| 53 | O-ring | JIS-B2401 4 type D P15 | 1 | #40 new standard JIS/DIN through | J9824-0150-P15 | S0015-063A-003A03 | C |
| 54 | O-ring | NOK P22A CO-0019I 4 type D | 1 | #40 new standard JIS/DIN through | F109-0004-61 | S0015-063A-003A03 | C |
| 55 | Thermistor | S9 thermistor sensor shield cable, 5m, Sibaura Electronics | 4 | #40 thermal deviation compensation accessories | E4433-326-009 | S0110-0631-015A01 | D |
| 56 | Compression spring setting | 1.6X11.6X100X35 | 1 | #40 new standard w/ through common parts | M101-16116-10035 | S0016-063A-003A05 | C |
| 57 | O-ring | JIS-B2401 4 type D P36 | 1 | #40 new standard w/ through common parts | J9824-0150-P36 | S0016-063A-003A05 | C |
| 58 | Rotary joint | RIX ESX20Y w/ sleeve, dry air supported, spec. sheet provided | 1 | #40 new standard w/ through common parts | H0019-0008-28 | S0016-063A-003A05 | D |
| 59 | O-ring | P5 | 1 | #40 new standard w/ through common parts | C6110-0000P5 | S0016-063A-003A05 | C |

Table 5-2

5-3. XYZ-axis Ball Screw

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|--------------|---|------|--------------------|-----------------|-------------------|------|
| 1 | Ball screw | NSK.HIWIN 645H X-axis spec. sheet provided | 1 | XZ-axis ball screw | H1014-0027-02-1 | S1121-0645-008A01 | D |
| 2 | Ball screw | NSK.HIWIN 645H Z-axis spec. sheet provided | 1 | XZ-axis ball screw | H1014-0027-04-1 | S1121-0645-008A01 | D |
| 3 | Ball screw X | Ball screw NSK.HIWIN 645H Y-axis spec. sheet provided | 1 | Y-axis ball screw | H1014-0027-03-1 | S1021-0645-001A01 | D |

Table 5-3

5-4. XYZ-axis Drive

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-----------------------|--|------|------------------------------|-----------------|-------------------|------|
| 1 | O-ring | G75 | 1 | X-axis drive | C6110-000G75 | S1121-0645-001A02 | C |
| 2 | O-ring | G80 | 1 | X-axis drive | C6110-000G80 | S1121-0645-001A02 | C |
| 3 | V Ring | Fukuda Koeki V-45A | 2 | X-axis drive | H0031-0011-31 | S1121-0645-001A02 | D |
| 4 | Locking nut | Fukuda Koeki GZ precision lock nut ZM40 | 2 | X-axis drive | H1005-0001-74 | S1121-0645-001A02 | D |
| 5 | O-ring | G75 | 1 | Z-axis drive | C6110-000G75 | S1121-0645-002A02 | C |
| 6 | O-ring | G80 | 1 | Z-axis drive | C6110-000G80 | S1121-0645-002A02 | C |
| 7 | V Ring | Fukuda Koeki V-45A | 2 | Z-axis drive | H0031-0011-31 | S1121-0645-002A02 | D |
| 8 | Locking nut | Fukuda Koeki GZ precision lock nut ZM40 | 2 | Z-axis drive | H1005-0001-74 | S1121-0645-002A02 | D |
| 9 | Bearing | NSK WPHL 40TAC90BDDGSUC10PN7B | 5 | X-axis support bearing 40×90 | M009-0050-66 | S1121-0645-003A01 | D |
| 10 | Bearing | NSK WPHL 40TAC72BDDGSUC10PN7B | 5 | Z-axis support bearing 40×72 | M009-0052-27 | S1121-0645-004A01 | D |
| 11 | O-ring | G75 | 1 | Y-axis drive | C6110-000G75 | S1021-0645-003A03 | C |
| 12 | O-ring | G80 | 1 | Y-axis drive | C6110-000G80 | S1021-0645-003A03 | C |
| 13 | V Ring | Fukuda Koeki V-45A | 1 | Y-axis drive | H0031-0011-31 | S1021-0645-003A03 | D |
| 14 | Locking nut | Fukuda Koeki GZ precision lock nut ZM40 | 2 | Y-axis drive | H1005-0001-74 | S1021-0645-003A03 | D |
| 15 | Bearing | NSK WPHL 40TAC90BDDGSUC10PN7B | 3 | Y-axis support bearing | M009-0050-66 | S1021-0645-005A01 | D |
| 16 | Bearing | NSK WPHL 40TAC72BDDGSUC10PN7B | 2 | Y-axis support bearing | M009-0052-27 | S1021-0645-005A01 | D |
| 17 | Rigid coupling ring W | Mikipulley SRG-060AS-35K-35K air vent hole added, spec. sheet provided | 1 | Coupling | H1012-0006-55-2 | S1121-0645-009A01 | D |
| 18 | Rigid coupling ring W | Mikipulley SRG-060AS-35K-35K air vent hole added, spec. sheet provided | 1 | Coupling | H1012-0006-55-2 | S1121-0645-009A01 | D |

Table 5-4

5-5. XYZ-axis Guides

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|----------------|---|------|----------------------|-----------------|-------------------|------|
| 1 | Linear guide W | THK THK LM guide 645H X-axis spec. sheet provided | 1 | XZ-axis linear guide | H1016-0008-68-1 | S1121-0645-005A01 | D |
| 2 | Linear guide W | THK THK LM guide 645H Z-axis spec. sheet provided | 1 | XZ-axis linear guide | H1016-0008-70-1 | S1121-0645-005A01 | D |
| 3 | Linear guide W | THK THK LM guide 645H Y-axis spec. sheet provided | 1 | Y-axis linear guide | H1016-0008-69-1 | S1021-0645-002A01 | D |

Table 5-5

5-6. Machine

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-------------------|---|------|--|------------------|-------------------|------|
| 1 | Bearing | Misumi EBB 20 | 1 | Chute under APC | M000-EBB20 | S4011-0645-002A01 | D |
| 2 | Bearing | Misumi EBB 20 | 1 | Chute under APC | M000-EBB20 | S4011-0645-002A01 | D |
| 3 | U bolt | Misumi UB 6 | 2 | Wiring/piping gutters around bed | H1001-0027-01 | S4081-0645-006A02 | D |
| 4 | Chip conveyor V | Tokyo Hatsujyo 45H H162-0045-97-2.98-2LR set, spec. sheet provided | 1 | Coil conveyor under APC | H0162-0045-96-2 | S5501-0645-002A02 | D |
| 5 | Plate | Nitrile rubber SPHC 50X450X3.3 | 1 | Coil conveyor installation | H1020-1283-24 | S5501-0645-003A02 | D |
| 6 | Pipe | Ihara Science Y-axis lubrication steel pipe, delivery spec. provided | 1 | Y-axis lubrication piping | H0024-0005-53 | S1091-0645-001A02 | D |
| 7 | Insert | Showa Yuki AL-4 | 1 | Y-axis lubrication piping | H0010-0011-04 | S1091-0645-001A02 | D |
| 8 | Elbow PH | Showa Yuki PH-4 | 1 | Y-axis lubrication piping | H0012-0000-90 | S1091-0645-001A02 | D |
| 9 | Plug | Showa Yuki PA4 | 7 | Y-axis lubrication piping | H0015-0009-47 | S1091-0645-001A02 | D |
| 10 | Sleeve | Showa Yuki PB4 | 7 | Y-axis lubrication piping | H0015-0009-48 | S1091-0645-001A02 | D |
| 11 | Elbow | Showa Yuki PL4 | 2 | Y-axis lubrication piping | H0015-0010-72 | S1091-0645-001A02 | D |
| 12 | Plate | Mach Rubber PE light L-3 195X80X10 195X80-1 w/ contact adhesive | 2 | Column wiring/piping support | H1022-0026-77 | S1091-0645-003A03 | D |
| 13 | Holding member | Inoac Rubber sponge NBR-4413 70X165X30 Dealer: Mach Rubber | 1 | Column wiring/piping support | H1022-1212-36 | S1091-0645-003A03 | D |
| 14 | Lubrication parts | Showa 614H 11-piece set | 1 | X-axis lubrication piping | H0120-1010-89-1 | S1091-0645-004A02 | D |
| 15 | Pipe | Ihara Science X-axis lubrication steel pipe, delivery spec. provided | 1 | X-axis lubrication piping | H0024-0005-52 | S1091-0645-004A02 | D |
| 16 | Pipe | Ihara Science MB-5000H thru piping steel pipe, spec. sheet provided | 1 | Spindlehead through piping accessories | H0024-0005-13 | S0091-0644-005A02 | D |
| 17 | Check valve | Ihara Science KZU00-013E RC1/4 delivery spec. provided | 1 | Spindlehead through piping accessories | F0040-981-000-40 | S0091-0644-005A02 | D |
| 18 | Reducer | SMC KQR08-10 | 1 | Spindlehead through piping accessories | H0016-0000-19 | S0091-0644-005A02 | D |
| 19 | Elbow union | SMC KQL08-01S | 1 | Spindlehead through piping accessories | H0016-0006-40 | S0091-0644-005A02 | D |
| 20 | Elbow union | SMC KQL10-02S | 1 | Spindlehead through piping accessories | H0016-0008-84 | S0091-0644-005A02 | D |
| 21 | Nylon tube | SMC T0806B 0.5 m | 1 | Spindlehead through piping accessories | H0026-0001-82 | S0091-0644-005A02 | C |
| 22 | Nylon tube | SMC T1075B L500 | 1 | Spindlehead through piping accessories | H0026-0003-30 | S0091-0644-005A02 | C |
| 23 | Plate | Mach Rubber PE light L-3 590X60X10 | 2 | Rear frame | H1022-0017-56 | S4081-0645-007A03 | D |
| 24 | Plate | Mach Rubber PE light L-3 310X600X15 310X600 w/ contact adhesive on one side | 2 | Rear frame | H1022-0026-78 | S4081-0645-007A03 | D |
| 25 | 1.5MPA Hose | W/o clasp 25X1650 | 1 | Piping - permanent | C2788-251650 | S1785-0645-006A03 | C |
| 26 | 1.5MPA Hose | W/o clasp 25X3600 | 1 | Piping - permanent | C2788-253600 | S1785-0645-006A03 | C |
| 27 | S solenoid valve | Tokyo Keiki DG4V-3-2A-M-U1-H-7-52 | 1 | Piping - permanent | F0001-431-001-15 | S1785-0645-006A03 | D |
| 28 | Sub plate | Tokyo Keiki DGMS-3-1E-10-T-JA-J | 1 | Piping - permanent | H0013-0001-53 | S1785-0645-006A03 | D |
| 29 | HoseJoint | Male long 90-deg elbow 9033-06 R3/8XG3/8 | 1 | Piping - permanent | H0014-0021-55 | S1785-0645-006A03 | D |
| 30 | Elbow union | SMC KQL10-03S | 2 | Piping - permanent | H0016-0009-24 | S1785-0645-006A03 | D |
| 31 | Gas pipe | INOC NL 8A (1/4B) L 75 stainless | 1 | Piping - permanent | H0024-0002-92 | S1785-0645-006A03 | D |
| 32 | Nylon tube | SMC T1075BU blue 8.5 m | 1 | Piping - permanent | H0026-0020-20 | S1785-0645-006A03 | C |
| 33 | Nylon tube | SMC T1075Y yellow 8.5 m | 1 | Piping - permanent | H0026-0020-21 | S1785-0645-006A03 | C |
| 34 | Hose | Tokai Rubber IB35X52-32N2450 | 1 | Piping - permanent | H0027-0044-38 | S1785-0645-006A03 | C |
| 35 | Rubber hose | Tokai Rubber IB35X52-32N-1750L hose only | 1 | Piping - permanent | H0027-0048-94 | S1785-0645-006A03 | C |
| 36 | Hose V | Tokai Rubber COS hose 1 set w/ metal parts on both ends, 14-pc set | 1 | Piping - permanent | H0027-1100-04-1 | S1785-0645-006A03 | C |
| 37 | Hose | Tokai Rubber COS hose 1 set w/ metal parts on both ends | 1 | Piping - permanent | H0027-1100-05 | S1785-0645-006A03 | C |
| 38 | Holding member | SPHC Nitrile rubber 55X382X30 | 1 | Piping - permanent | H1020-1247-13 | S1785-0645-006A03 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-----------------------|---|------|---|------------------|-------------------|------|
| 39 | Holding member | SPHC Nitrile rubber 30X105X55 | 1 | Piping - permanent | H1020-1280-39 | S1785-0645-006A03 | D |
| 40 | Rubber hose | Tokai Rubber IB35X52-32NX2300 hose only | 1 | Shower washing piping | H0027-0023-49 | S5641-0645-001A02 | C |
| 41 | Rubber hose | Tokai Rubber IB35X52-32N-1880L hose only | 2 | Shower washing piping | H0027-0048-92 | S5641-0645-001A02 | C |
| 42 | Hose | Tokai Rubber COS hose 1 set w/ metal parts on both ends | 1 | 1.5-7.0 MPa thru machine piping | H0027-1100-06 | S9900-0645-003A02 | C |
| 43 | 1.5MPA Hose | W/o clasp 25X1700 | 1 | Piping - pump connection CP2K - Permanent | C2788-251700 | S1785-0645-004A01 | C |
| 44 | Rubber hose | Tokai Rubber IB35X52-38N-1650L hose only | 1 | Piping - pump connection CP2K - Permanent | H0027-0048-93 | S1785-0645-004A01 | C |
| 45 | Rubber hose | Tokai Rubber IB35X52-32N-1650L hose only | 1 | Piping - pump connection CP2K - Shower | H0027-0048-91 | S1785-0645-005A01 | C |
| 46 | Air panel W | SMC MA-400H/500H/600H w/ ABSO, spec. sheet provided | 1 | Air panel w/ ABSO | H0140-0022-22-1 | S1783-0645-004A01 | D |
| 47 | Pressure gauge | SMC G36-P10-01-X30 MPa/PSI indicated | 1 | Air pressure gauge 1.0 MPa (PSI indicated) | T019-400-006-20 | S1783-0645-002A01 | D |
| 48 | Lubrication unit V | Showa Lubrication unit LCB4-8210-1 w/o pressure gauge, spec. sheet provided | 1 | Lubrication U | H0120-0007-54-2 | S1783-0645-003A01 | D |
| 49 | Lubrication unit V | Daido Metal Oil/air unit MPa/PSI MRJ010211D-K0005 Made in China, spec. sheet provided | 1 | Oil-air (for overseas) | H0120-0009-89-1 | S1783-0645-009A01 | D |
| 50 | Hose elbow | Yokohama Rubber 1033-02-04 PT1/8-PF1/4 | 1 | 6L lubrication support | H0014-0016-81 | S4084-0645-003A04 | D |
| 51 | Anti-vibration rubber | Kurashiki Kako KB-50 | 4 | Oil controller/hydraulic unit pedestal | H1023-0015-64 | S4084-0645-001A02 | D |
| 52 | Plate | Meiki Rubber Polyurethane 50X165X20 | 1 | Oil controller/hydraulic unit pedestal | H1023-1061-18 | S4084-0645-001A02 | D |
| 53 | Seat | Nitrile rubber M11XM30X5.0 molded | 8 | Oil controller/hydraulic unit pedestal | M1310-01103050 | S4084-0645-001A02 | D |
| 54 | Hydraulic unit V | Tokyo Keiki MB-4000/5000H standard QV1624-20-C40551CE spec. sheet provided | 1 | Hydraulic unit | H0130-0030-75-2 | S1781-0645-005A03 | D |
| 55 | Pressure gauge | Yodogawa Keiki PAGT-PT1/4-60X16 MPa/PSI indicated - SB | 1 | Pressure gauge 16 MPa (PSI indicated) | T019-400-009-84 | S1781-0645-006A01 | D |
| 56 | Oil controller | Daikin AKZ438-CX-L02A+AKZ8-OP-K10+ tank MB-4000H spec. sheet provided | 1 | Cooling unit | H0110-0013-69 | S1781-0645-007A01 | D |
| 57 | 1.5MPA Hose | W/o clasp 19X2300 | 1 | Piping around pedestal | C2788-192300 | S5611-0645-009A01 | C |
| 58 | Male/female socket | Ihara Science PT3/4(M)XPF1/2(F) M/F socket (Dealer: Nakanishi Shoji) | 1 | Piping around pedestal | H0014-0009-07 | S5611-0645-009A01 | D |
| 59 | Nylon tube | SMC T1075G green 5 m | 1 | Piping around pedestal | H0026-0020-03 | S5611-0645-009A01 | C |
| 60 | Hose | COS hose 1 set w/ metal parts on both ends, 7-pc set | 1 | Piping around pedestal | H0027-1099-93 | S5611-0645-009A01 | C |
| 61 | Sight glass | Kyowa KIM 4 1/2 | 1 | Piping around pedestal | H0039-0003-34 | S5611-0645-009A01 | D |
| 62 | Elbow union | SMC KQL10-02S | 1 | Z-axis wiring/piping on fixed side | H0016-0008-84 | S4084-0645-007A01 | D |
| 63 | Hose V | Tokai Rubber COS hose 1 set w/ metal parts on both ends, 7-pc set | 1 | Z-axis moveable piping | H0027-1099-94-1 | S4084-0645-005A02 | C |
| 64 | 1.5MPA Hose | Ono Kogyo W/o clasp 19X270 | 1 | PSI indicated on Z-axis wiring/piping moveable side | C2788-190270 | S4084-0645-008A02 | C |
| 65 | Pressure switch X | SMC ISE40A-C6-R-X501 unit switchable | 1 | PSI indicated on Z-axis wiring/piping moveable side | E3040-321-080-1 | S4084-0645-008A02 | D |
| 66 | S solenoid valve | SMC 3-pc manifold block for pallet seated air blast SS5Y5-X1116 spec. sheet provided | 1 | PSI indicated on Z-axis wiring/piping moveable side | F0001-451-001-57 | S4084-0645-008A02 | D |
| 67 | Regulator | SMC AR20K-02B-X2033 MPa/PSI indicated | 1 | PSI indicated on Z-axis wiring/piping moveable side | F0015-410-001-46 | S4084-0645-008A02 | D |
| 68 | Check valve | SMC AK2000-02 | 1 | PSI indicated on Z-axis wiring/piping moveable side | F0040-581-000-14 | S4084-0645-008A02 | D |
| 69 | PT elbow | SMC DAV-02-01 | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0014-0008-76 | S4084-0645-008A02 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------|---|------|---|----------------|-------------------|------|
| 70 | 90° long male elbow | Yokohama Rubber 9033-04 (R1/4XG1/4) | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0014-0021-77 | S4084-0645-008A02 | D |
| 71 | Service tee union | SMC KQY08-02S | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0016-0002-59 | S4084-0645-008A02 | D |
| 72 | Elbow union | SMC KQL08-01S | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0016-0006-40 | S4084-0645-008A02 | D |
| 73 | Half union | SMC KQH08-02S | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0016-0009-09 | S4084-0645-008A02 | D |
| 74 | Elbow union | SMC KQL08-02S | 2 | PSI indicated on Z-axis wiring/piping moveable side | H0016-0009-23 | S4084-0645-008A02 | D |
| 75 | Reducer | SMC KQR06-08 | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0016-0009-61 | S4084-0645-008A02 | D |
| 76 | Soft nylon tube | SMC TS0604-1M | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0026-0006-89 | S4084-0645-008A02 | D |
| 77 | Soft nylon tube | SMC TS0604B-1 | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0026-0016-60 | S4084-0645-008A02 | D |
| 78 | Soft nylon tube | SMC TS0604B-1 | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0026-0016-60 | S4084-0645-008A02 | D |
| 79 | Soft nylon tube | SMC TS0604B-1 | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0026-0016-60 | S4084-0645-008A02 | D |
| 80 | Muffler | SMC AN110-01 | 1 | PSI indicated on Z-axis wiring/piping moveable side | H0036-0000-68 | S4084-0645-008A02 | D |
| 81 | Holding member | Mach Rubber Inoac rubber sponge NBR-4413 60X278X30 | 1 | XY wiring flexible conduit | H1022-1215-16 | S1781-0645-008A02 | D |
| 82 | Holding member | Inoac Rubber sponge NBR-4413 70X165X30 Dealer: Mach Rubber | 1 | XY wiring flexible conduit | H1022-1212-36 | S1781-0645-008A02 | D |
| 83 | Plate | Mach Rubber PE light L-3 500X150X10 500X150 w/ contact adhesive on one side | 1 | XY wiring flexible conduit | H1022-0027-04 | S1781-0645-008A02 | D |

Table 5-6

5-7. ATC Magazine Common Parts

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-------------------------|---|------|------------------------------|------------------|-------------------|------|
| 1 | Bearing | Daido Metal MB2016DU | 1 | Magazine pot rotating part | M004-MB2016DU | S2310-0645-010A03 | D |
| 2 | Bearing | Daido Metal MB2016DU | 1 | Magazine pot rotating part | M004-MB2016DU | S2310-0645-010A03 | D |
| 3 | Bearing | Daido Metal MB1625DU | 2 | Magazine pot rotating part | M004-MB1625DU | S2310-0645-010A03 | D |
| 4 | Bearing | Daido Metal MB2025DU | 1 | Magazine pot rotating part | M004-MB2025DU | S2310-0645-010A03 | D |
| 5 | Bearing | Daido Metal MB1625DU | 1 | Magazine pot rotating part | M004-MB1625DU | S2310-0645-010A03 | D |
| 6 | Cam follower | IKO CF8UU | 2 | Magazine pot rotating part | M001-CF8UU | S2310-0645-010A03 | D |
| 7 | Cam follower | IKO CFE8UU | 2 | Magazine pot rotating part | M009-0013-92 | S2310-0645-010A03 | D |
| 8 | Cam follower | IKO CF8UU | 2 | Magazine pot rotating part | M001-CF8UU | S2310-0645-010A03 | D |
| 9 | Cam follower | IKO CFE8UU | 2 | Magazine pot rotating part | M009-0013-92 | S2310-0645-010A03 | D |
| 10 | Proximity switch sensor | Omron E2E-X3D1-M1G | 2 | Magazine pot rotating part | E3020-397-265 | S2310-0645-010A03 | C |
| 11 | Cam follower | IKO CF8BUUR | 2 | Magazine pot rotating part | M001-CF8BUUR | S2310-0645-010A03 | D |
| 12 | Cam follower | IKO CF8BUUR | 1 | Magazine pot rotating part | M001-CF8BUUR | S2310-0645-010A03 | D |
| 13 | Hydraulic cylinder | Ogaki Tekko OCJ70-TA32B60B spec. sheet provided | 1 | Magazine pot rotating part | H0000-0014-50 | S2310-0645-010A03 | D |
| 14 | Guide V | Meiki Rubber Daiba - UE770 123.9X270X15 | 1 | 48-tool magazine part | H1022-1211-90-1 | S2310-0645-008A05 | D |
| 15 | Guide V | Meiki Rubber Daiba - UE770 165X420X15 | 1 | 48-tool magazine part | H1022-1211-91-2 | S2310-0645-008A05 | D |
| 16 | Tool pot | COYO MB-4/5000H 40 JIS 48-tool 1 set, spec. sheet provided | 1 | 48 #40JIS/DIN tool pot | H0190-0123-37 | S2310-0645-016A01 | D |
| 17 | Nilos ring | ZILLER 7008AVG | 2 | Magazine drive part | H0041-0001-29 | S2310-0645-013A01 | D |
| 18 | Nut | Fuji Seimitsu FU08SC M40XP1.5 | 1 | Magazine drive part | H1005-0004-20 | S2310-0645-013A01 | D |
| 19 | Bearing | 7008DB | 1 | Magazine drive part | M000-7008DB | S2310-0645-013A01 | D |
| 20 | Nut | Misumi NTFL8-18 | 1 | Magazine drive part | H1005-0008-67 | S2310-0645-013A01 | D |
| 21 | Coupling | Mikipulley SFC-060DA2-28B-28B | 1 | Magazine drive part | H1012-0006-86 | S2310-0645-013A01 | D |
| 22 | Reducer | Nabtesco RH-80 MB-500H MG spec. sheet provided | 1 | Magazine drive part | H1013-0004-26 | S2310-0645-013A01 | D |
| 23 | Orifice | M8X2.0 | 2 | Hydraulic/lubrication piping | C7868-008201 | S2380-0645-003A04 | D |
| 24 | 7MPA Hose | Anti-wear 9X650 | 1 | Hydraulic/lubrication piping | C2803-090652 | S2380-0645-003A04 | C |
| 25 | 7MPA Hose | Anti-wear 9X750 | 1 | Hydraulic/lubrication piping | C2803-090752 | S2380-0645-003A04 | C |
| 26 | D solenoid valve | Tokyo Keiki DG4V-3-2C-M-U1-H-7-52 | 1 | Hydraulic/lubrication piping | F0000-442-001-50 | S2380-0645-003A04 | D |
| 27 | Reducing valve | Tokyo Keiki TGMX2-3-PP-BW-G-50J | 1 | Hydraulic/lubrication piping | F0011-730-000-13 | S2380-0645-003A04 | D |
| 28 | Sub plate | Tokyo Keiki DGMS-3-1E-10-T-JA-J | 1 | Hydraulic/lubrication piping | H0013-0001-53 | S2380-0645-003A04 | D |
| 29 | Joint | Tokyo Keiki 40015224 | 1 | Hydraulic/lubrication piping | H0014-0007-72 | S2380-0645-003A04 | D |
| 30 | Rubber bush | NHK RB38-15 | 2 | Hydraulic/lubrication piping | H1009-0002-62 | S2380-0645-003A04 | D |
| 31 | Multi-clamp | NHK MC38-2 | 1 | Hydraulic/lubrication piping | H1009-0004-96 | S2380-0645-003A04 | D |
| 32 | Pressure gauge | Yodogawa Keiki PAGT-R1/4X60X10M MPa/PSI indicated, w/ safety mark | 1 | Hydraulic/lubrication piping | T019-400-008-42 | S2380-0645-003A04 | D |
| 33 | Dester plunger | Showa Yuki DPB15 0.03X5 | 1 | Hydraulic/lubrication piping | H0015-0005-06 | S2380-0645-003A04 | D |
| 34 | Lubrication parts X | Showa Yuki MB-500H magazine lubrication, 1 set | 1 | Hydraulic/lubrication piping | H0120-1017-14-1 | S2380-0645-003A04 | D |
| 35 | Hose V | Tokai Rubber COS hose 1 set w/ metal parts on both ends, 4-pc set | 1 | Hydraulic/lubrication piping | H0027-1093-16-2 | S2380-0645-003A04 | C |

Table 5-7

5-8. 48-tool ATC

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-----------|--|------|------------------------|-----------------|-------------------|------|
| 1 | Guide V | Meiki Rubber Daiba -UE770 123.9X270X15 | 1 | 48-tool magazine part | H1022-1211-90-1 | S2310-0645-008A05 | D |
| 2 | Guide V | Meiki Rubber Daiba -UE770 165X420X15 | 1 | 48-tool magazine part | H1022-1211-91-2 | S2310-0645-008A05 | D |
| 3 | Tool pot | COYO MB-4/5000H 40 JIS 48-tool, 1 set, spec. sheet provided | 1 | 48 #40JIS/DIN tool pot | H0190-0123-37 | S2310-0645-016A01 | D |
| 4 | Tool pot | | | | | | D |
| 5 | Tool pot | | | | | | D |

Table 5-8

5-9. 64-tool ATC (Optional)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-----------|--|------|------------------------|-----------------|-------------------|------|
| 1 | Guide V | Meiki Rubber Daiba -UE770 123.9X270X15 | 1 | 64-tool magazine part | H1022-1211-90-1 | S2410-0645-003A04 | D |
| 2 | Guide V | Meiki Rubber Daiba -UE770 165X420X15 | 1 | 64-tool magazine part | H1022-1211-91-2 | S2410-0645-003A04 | D |
| 3 | Tool pot | COYO MB-4/5000H 40 JIS 48-tool, 1 set, spec. sheet provided | 1 | 64 #40JIS/DIN tool pot | H0190-0123-37 | S2410-0644-003A01 | D |
| 4 | Tool pot | COYO MB-4/5000H 40 JIS/DIN 1 set (49 to 64-tool), spec. sheet provided | 1 | 64 #40JIS/DIN tool pot | H0190-0132-58 | S2410-0644-003A01 | D |
| 5 | Tool pot | | | | | | D |
| 6 | Tool pot | | | | | | D |
| 7 | Tool pot | | | | | | D |
| 8 | Tool pot | | | | | | D |

Table 5-9

5-10. ATC with Tool Change Arm

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------------|---|------|--|-----------------|-------------------|------|
| 1 | Plate X | Nitrile rubber 78X93X1 | 1 | ATC cam box - box | H1020-1279-91-1 | S2010-0645-001A03 | D |
| 2 | Oil seal | SC35X52X7 | 1 | ATC cam box - box | C6114-350520 | S2010-0645-001A03 | C |
| 3 | Bearing | NTN HK4016 | 1 | ATC cam box - box | M001-HK4016 | S2010-0645-001A03 | D |
| 4 | Parallel pin with step | Misumi MSY8-25 | 2 | ATC cam box - lid | H1002-0002-99 | S2010-0645-002A01 | D |
| 5 | Gas pipe | INOC NL 8A (1/4B) L 75 stainless | 1 | Cam box drain piping | H0024-0002-92 | S2010-0645-003A01 | D |
| 6 | Proximity switch sensor | Omron E2E-X2D2-M1G NC type M12 connector | 1 | Belt breakage sensor | E3020-397-313 | S2010-0645-004A02 | C |
| 7 | Reducer | Sumitomo Heavy Industries F2CS-A25-59 spec. sheet provided | 1 | ATC gear drive part | H1013-0003-39 | S2020-0645-001A01 | D |
| 8 | Bearing | 6905ZZ | 4 | ATC gear drive part | M000-6905ZZ | S2020-0645-001A01 | D |
| 9 | Bearing | NTN 6815ZZ | 1 | ATC gear drive part | M000-6815ZZ | S2020-0645-001A01 | D |
| 10 | Bearing | 6912ZZ M60X85X13 | 1 | ATC gear drive part | M000-6912ZZ | S2020-0645-001A01 | D |
| 11 | Ultra PX belt | Tsubakimoto Chain BG752UP8M15-HA | 1 | ATC belt drive part | M119-0022-44 | S2020-0645-002A02 | D |
| 12 | Pulley | Tsubakimoto Chain PT22P8M15 special specification, spec. sheet provided | 1 | ATC belt drive part | H1019-0017-33 | S2020-0645-002A02 | D |
| 13 | Pulley | Tsubakimoto Chain PT28P8M15 special specification, spec. sheet provided | 1 | ATC belt drive part | H1019-0017-35 | S2020-0645-002A02 | D |
| 14 | Power lock | Tsubakimoto PL060X068E | 1 | ATC swivel extraction/ insertion part | H1012-0003-99 | S2021-0645-001A02 | D |
| 15 | Bearing | NTN AS1108 | 3 | ATC swivel extraction/ insertion part | M001-AS1108 | S2021-0645-001A02 | D |
| 16 | Bearing | NTN AXK1108 | 2 | ATC swivel extraction/ insertion part | M001-AXK1108 | S2021-0645-001A02 | D |
| 17 | Bearing | NTN K45X40X13 | 1 | ATC swivel extraction/ insertion part | M001-K45X40X13 | S2021-0645-001A02 | D |
| 18 | Bearing | Daido Metal MB2015DU | 2 | ATC swivel extraction/ insertion part | M004-MB2015DU | S2021-0645-001A02 | D |
| 19 | Bearing | 7004DB | 1 | ATC swivel extraction/ insertion part | M000-7004DB | S2021-0645-001A02 | D |
| 20 | O-ring | P60 | 1 | ATC swivel extraction/ insertion part | C6110-000P60 | S2021-0645-001A02 | C |
| 21 | Parallel pin with step | Misumi MSY8-20 | 2 | ATC swivel extraction/ insertion part | H1002-0002-98 | S2021-0645-001A02 | D |
| 22 | Thrust washer | NTN AS1118 90X120X1 | 2 | ATC swivel extraction/ insertion part | H1004-0003-66 | S2021-0645-001A02 | D |
| 23 | Bearing | NTN AXK1118 | 1 | ATC swivel extraction/ insertion part | M001-AXK1118 | S2021-0645-001A02 | D |
| 24 | Bearing | Daido Metal MB6025DU | 1 | ATC swivel extraction/ insertion part | M004-MB6025DU | S2021-0645-001A02 | D |
| 25 | Linear bush | THK LM20+200L spec. sheet provided | 1 | ATC swivel extraction/ insertion part | M009-0035-61-1 | S2021-0645-001A02 | D |
| 26 | Bearing | THK RNAS6R | 2 | ATC swivel extraction/ insertion part | M001-RNAS6R | S2021-0645-001A02 | D |
| 27 | Bearing | NTN ET-32006X | 2 | ATC swivel extraction/ insertion part | M000-ET-32006X | S2021-0645-001A02 | D |
| 28 | Liner | SUS304 M91XM120X0.1 | 1 | ATC swivel extraction/ insertion part | H1082-1006-21 | S2021-0645-001A02 | D |
| 29 | Spacer V | SUS304 M102XM131X0.05 | 1 | ATC swivel extraction/ insertion part | H1082-1006-30-1 | S2021-0645-001A02 | D |
| 30 | Liner | SUS304 M76XM89.5X0.1 | 1 | ATC swivel extraction/ insertion part | H1082-1006-34 | S2021-0645-001A02 | D |
| 31 | Ball spline | IKO LSA30C2R385E179 MA-400H ATCT A-axis, spec. sheet provided | 1 | ATC swivel extraction/ insertion part | M009-0039-19-2 | S2021-0645-001A02 | D |
| 32 | Swivel joint | Showa Yuki SJL 101 | 1 | ATC swivel extraction/ insertion part | H0019-0003-71 | S2021-0645-001A02 | D |
| 33 | Retaining ring (for hole) | INA-NTN WR35 | 1 | ATC swivel extraction/ insertion part | H1000-0000-50 | S2021-0645-001A02 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-------------------------------|--|------|--|-----------------------|-------------------|------|
| 34 | Fine U nut | Fuji Seimitsu FU06SS M30P1.5 | 1 | ATC swivel extraction/ insertion part | H1005-0004-29 | S2021-0645-001A02 | D |
| 35 | Bearing | NTN ET-32006X | 2 | ATC swivel extraction/ insertion part | M000-ET-32006X | S2021-0645-001A02 | D |
| 36 | Bearing | IR35X40X20.5 | 1 | ATC swivel extraction/ insertion part | M001- IR35X40X205 | S2021-0645-001A02 | D |
| 37 | Retaining ring (for hole) | INA-NTN WR30 | 1 | ATC cam shaft | H1000-0000-39 | S2021-0645-002A01 | D |
| 38 | Fine U nut | Fuji Seimitsu FU06SS M30P1.5 | 1 | ATC cam shaft | H1005-0004-29 | S2021-0645-002A01 | D |
| 39 | Coupling | Mikipulley PSL-G-35 (old type ETP- G-35) | 1 | ATC cam shaft | H1012-0005-05 | S2021-0645-002A01 | D |
| 40 | Bearing | NU1006 | 1 | ATC cam shaft | M000-NU1006 | S2021-0645-002A01 | D |
| 41 | Composite worm cam | Okubo Gear MA-40HA ATC cam | 1 | ATC cam shaft | H1019-0011-89-5 | S2021-0645-002A01 | D |
| 42 | Bearing | NTN ET-32006X | 2 | ATC cam shaft | M000-ET-32006X | S2021-0645-002A01 | D |
| 43 | Spacer V | SUS304 M184XM226X0.1 | 1 | ATC cam shaft | H1082-1006-27-1 | S2021-0645-002A01 | D |
| 44 | Bearing | Daido Metal MB1510DU | 2 | ATC arm (std) | M004-MB1510DU | S2021-0645-003A01 | D |
| 45 | Bearing | Daido Metal MB2020DU | 2 | ATC arm (std) | M004-MB2020DU | S2021-0645-003A01 | D |
| 46 | Bearing | Daido Metal MB2220DU | 2 | ATC arm (std) | M004-MB2220DU | S2021-0645-003A01 | D |
| 47 | Compression spring setting | 2.0X19.5X46X7.5 | 2 | ATC arm (std) | M109-0018-43 | S2021-0645-003A01 | C |
| 48 | Compression spring setting | 1.2X7.0X87X47 left-wound | 2 | ATC arm (std) | M101-12070- 08747L | S2021-0645-003A01 | C |
| 49 | Compression spring setting | 2.0X11.5X83X28 | 2 | ATC arm (std) | M101-20115-08328 | S2021-0645-003A01 | C |
| 50 | E type retaining ring | 7 | 2 | ATC arm (std) | H1000-0901-52 | S2021-0645-003A01 | D |
| 51 | Packing | NOK SPGO 19X25X3 | 2 | Arm #40 MAS/JIS | H0031-0019-15 | S2021-0645-004A01 | C |
| 52 | Lubrication parts V | Showa Yuki MB-4/5000H ATC lubrication 10-pc set | 1 | ATC lubrication device | H0120-1017-33-1 | S2021-0645-005A02 | D |
| 53 | Nylon pipe | Showa Yuki M4X6000 | 1 | ATC lubrication device | H0026-0006-57 | S2021-0645-005A02 | C |

Table 5-10

5-11. Table with 1° Indexing

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------------|--|------|--------------------------------------|-------------------|-------------------|------|
| 1 | O-ring | NOK S30 Fluoro-rubber | 1 | 1° table frame | F109-0007-40 | S1311-0645-001A01 | C |
| 2 | Sight glass | V20 | 1 | 1° table frame | C2936-000200 | S1311-0645-001A01 | D |
| 3 | Rubber rope | 2X400 | 1 | 1° table frame | C6101-204000 | S1311-0645-001A01 | C |
| 4 | Piston seal | NOK SPGR 426.85X435X3.8 delivery spec. provided | 1 | 1° table frame | H0031-0019-80 | S1311-0645-001A01 | C |
| 5 | Set screw socket bar | JIS-B1177 M8X35-6G 10.9 black oxide finish | 4 | 1° table frame | J9811-7720-080035 | S1311-0645-001A01 | D |
| 6 | O-ring | P8 | 1 | 1° table B-axis drive | C6110-0000P8 | S1311-0645-003A01 | C |
| 7 | Taper pin | ITP 13X40 | 2 | 1° table curvic coupling | H1002-0002-65 | S1311-0645-004A01 | D |
| 8 | Taper pin | ITP 13X40 | 2 | 1° table curvic coupling | H1002-0002-65 | S1311-0645-004A01 | D |
| 9 | Bearing | NTN ARX 195X235X12.5 delivery spec. provided | 1 | 1° table thrust bearing | M009-0049-16 | S1311-0645-005A01 | D |
| 10 | Bearing | Daido MB13030DU | 1 | 1° table pallet lower base | M004-MB13030DU | S1311-0645-006A02 | D |
| 11 | O-ring | P10 | 8 | 1° table center sleeve | C6110-000P10 | S1311-0645-007A01 | C |
| 12 | O-ring | G200 | 1 | 1° table center sleeve | C6110-00G200 | S1311-0645-007A01 | C |
| 13 | Dust seal | NOK DSI FQ0066D0 85X95X6X8 | 2 | 1° table center sleeve | H0031-0008-82 | S1311-0645-007A01 | C |
| 14 | Rod seal | NOK SPNR85X95X3.8 Fluoro-rubber, delivery spec. provided | 2 | 1° table center sleeve | H0031-0022-04 | S1311-0645-007A01 | C |
| 15 | Bearing | Daido Metal K5B6507 spec. sheet provided | 1 | 1° table center sleeve | M004-K5B6507 | S1311-0645-007A01 | D |
| 16 | O-ring | NOK C0 7324A 190X3.55 | 4 | 1° table center sleeve | F109-0004-13 | S1311-0645-007A01 | C |
| 17 | Piston seal | NOK SPGR 55X65X4 delivery spec. provided | 4 | 1° table center sleeve | H0031-0021-91 | S1311-0645-007A01 | C |
| 18 | Bearing | Daido Metal MB1220DU | 2 | 1° table clamp/unclamp confirmation | M004-MB1220DU | S1311-0645-008A01 | D |
| 19 | Extension spring single | Misumi BWS10-35 | 1 | 1° table clamp/unclamp confirmation | M109-0019-41 | S1311-0645-008A01 | C |
| 20 | Proximity switch sensor | Omron E2E-X2D1-M3G M8 NO shield type | 1 | 1° table clamp/unclamp confirmation | E3020-397-295 | S1311-0645-008A01 | C |
| 21 | Proximity switch sensor | Omron E2E-X2D1-M3G M8 NO shield type | 1 | 1° table clamp/unclamp confirmation | E3020-397-295 | S1311-0645-008A01 | C |
| 22 | Oil seal | NOK TC284811 | 1 | B-axis drive 1-deg - NC common parts | F1103-028-04811 | S1321-0645-001A02 | C |
| 23 | Clamp nut | Sanki SCN28X1.5 | 1 | B-axis drive 1-deg - NC common parts | H1005-0006-59 | S1321-0645-001A02 | D |
| 24 | Coupling | Mikipulley SFC-080DA-28B-28B delivery spec. provided | 1 | B-axis drive 1-deg - NC common parts | H1012-0006-56 | S1321-0645-001A02 | D |
| 25 | O-ring | G50 | 1 | B-axis drive 1-deg - NC common parts | C6110-000G50 | S1321-0645-001A02 | C |
| 26 | Retaining ring (for hole) | INA-NTN BR50 | 1 | B-axis drive 1-deg - NC common parts | H1000-0001-53 | S1321-0645-001A02 | D |
| 27 | Bearing | NTN NK40/20R | 1 | B-axis drive 1-deg - NC common parts | M001-NK40/20R | S1321-0645-001A02 | D |
| 28 | O-ring | P53 | 1 | B-axis drive 1-deg - NC common parts | C6110-000P53 | S1321-0645-001A02 | C |
| 29 | O-ring | G85 | 1 | Worm shaft backlash adjustment | C6110-000G85 | S1321-0645-002A02 | C |
| 30 | Bearing | NTN 4T-32007X | 2 | Worm shaft backlash adjustment | M000-4T-32007X | S1321-0645-002A02 | D |
| 31 | O-ring | P8 | 2 | 1° table clamp | C6110-0000P8 | S1323-0645-001A01 | C |
| 32 | O-ring | P180 | 1 | 1° table clamp | C6110-00P180 | S1323-0645-001A01 | C |
| 33 | Packing | Sakagami SKY-165 | 1 | 1° table clamp | H0031-0015-21 | S1323-0645-001A01 | C |
| 34 | O-ring | NOK C 1850G(CO 7323A) | 1 | 1° table clamp | F109-0004-14 | S1323-0645-001A01 | C |
| 35 | Packing | Sakagami SKY-175 | 1 | 1° table clamp | H0031-0009-82 | S1323-0645-001A01 | C |
| 36 | Oil seal | NOK SB15257 | 4 | Pallet clamp 1-deg - NC common parts | F1100-015-02507 | S1325-0645-001A01 | C |
| 37 | O-ring | G60 | 4 | Pallet clamp 1-deg - NC common parts | C6110-000G60 | S1325-0645-001A01 | C |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-------------------|---|------|--------------------------------------|----------------|-------------------|------|
| 38 | Packing | NOK MUNI 28G | 4 | Pallet clamp 1-deg - NC common parts | H0031-0021-52 | S1325-0645-001A01 | C |
| 39 | Dust seal | NOK MDSI 28 | 4 | Pallet clamp 1-deg - NC common parts | H0031-0021-53 | S1325-0645-001A01 | C |
| 40 | Soft seal | Sakagami BIH-33X27.6X3 | 4 | Pallet clamp 1-deg - NC common parts | H0031-0022-80 | S1325-0645-001A01 | C |
| 41 | O-ring | JIS-B2401 1 type B P53 | 4 | Pallet clamp 1-deg - NC common parts | F109-0006-09 | S1325-0645-001A01 | C |
| 42 | Strong spring | Tokyo Hatsujyo TY46X50 | 4 | Pallet clamp 1-deg - NC common parts | M109-0020-10 | S1325-0645-001A01 | C |
| 43 | O-ring | NOK AS568-142+BRT2. T=1.0 | 4 | Pallet clamp 1-deg - NC common parts | F109-0006-63 | S1325-0645-001A01 | C |
| 44 | Orifice | M8X1.5 | 1 | 1° table wiring/piping | C7868-008151 | S1381-0645-001A01 | D |
| 45 | Elbow union | SMC KQL08-01S | 1 | 1° table wiring/piping | H0016-0006-40 | S1381-0645-001A01 | D |
| 46 | 3MPa Hose | Ono Kogyo C2802-061102 equivalent 100 marked (3MPa-1/4-L1100) | 1 | 1° table wiring/piping | H0027-0049-96 | S1381-0645-001A01 | C |
| 47 | Lubrication parts | Showa Lubrication parts, 1 set | 1 | 1° table wiring/piping | H0120-1017-45 | S1381-0645-001A01 | D |
| 48 | Pipe | Ihara Science MB-5000H hydraulic piping for table | 1 | Table steel pipe piping | H0024-0005-12 | S9900-0645-010A02 | D |

Table 5-11

5-12. Table with 0.001° Indexing (Optional)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------------|---|------|--------------------------------------|-----------------|-------------------|------|
| 1 | Oil seal | NOK TC284811 | 1 | B-axis drive 1-deg - NC common parts | F1103-028-04811 | S1321-0645-001A02 | C |
| 2 | Clamp nut | Sanki SCN28X1.5 | 1 | B-axis drive 1-deg - NC common parts | H1005-0006-59 | S1321-0645-001A02 | D |
| 3 | Coupling | Mikipulley SFC-080DA-28B-28B delivery spec. provided | 1 | B-axis drive 1-deg - NC common parts | H1012-0006-56 | S1321-0645-001A02 | D |
| 4 | O-ring | G50 | 1 | B-axis drive 1-deg - NC common parts | C6110-000G50 | S1321-0645-001A02 | C |
| 5 | Retaining ring (for hole) | INA-NTN BR50 | 1 | B-axis drive 1-deg - NC common parts | H1000-0001-53 | S1321-0645-001A02 | D |
| 6 | Bearing | NTN NK40/20R | 1 | B-axis drive 1-deg - NC common parts | M001-NK40/20R | S1321-0645-001A02 | D |
| 7 | O-ring | P53 | 1 | B-axis drive 1-deg - NC common parts | C6110-000P53 | S1321-0645-001A02 | C |
| 8 | O-ring | G85 | 1 | Worm shaft backlash adjustment | C6110-000G85 | S1321-0645-002A02 | C |
| 9 | Bearing | NTN 4T-32007X | 2 | Worm shaft backlash adjustment | M000-4T-32007X | S1321-0645-002A02 | D |
| 10 | Oil seal | NOK SB15257 | 4 | Pallet clamp 1-deg - NC common parts | F1100-015-02507 | S1325-0645-001A01 | C |
| 11 | O-ring | G60 | 4 | Pallet clamp 1-deg - NC common parts | C6110-000G60 | S1325-0645-001A01 | C |
| 12 | Packing | NOK MUNI 28G | 4 | Pallet clamp 1-deg - NC common parts | H0031-0021-52 | S1325-0645-001A01 | C |
| 13 | Dust seal | NOK MDSI 28 | 4 | Pallet clamp 1-deg - NC common parts | H0031-0021-53 | S1325-0645-001A01 | C |
| 14 | Soft seal | Sakagami BIH-33X27.6X3 | 4 | Pallet clamp 1-deg - NC common parts | H0031-0022-80 | S1325-0645-001A01 | C |
| 15 | O-ring | JIS-B2401 1 type B P53 | 4 | Pallet clamp 1-deg - NC common parts | F109-0006-09 | S1325-0645-001A01 | C |
| 16 | Strong spring | Tokyo Hatsujyo TY46X50 | 4 | Pallet clamp 1-deg - NC common parts | M109-0020-10 | S1325-0645-001A01 | C |
| 17 | O-ring | NOK AS568-142+BRT2. T=1.0 | 4 | Pallet clamp 1-deg - NC common parts | F109-0006-63 | S1325-0645-001A01 | C |
| 18 | O-ring | NOK S30 Fluoro-rubber | 1 | NC table frame | F109-0007-40 | S1511-0645-001A02 | C |
| 19 | Sight glass | V20 | 1 | NC table frame | C2936-000200 | S1511-0645-001A02 | D |
| 20 | O-ring | P24 | 1 | NC table frame | C6110-000P24 | S1511-0645-001A02 | C |
| 21 | Rubber rope | 2X400 | 1 | NC table frame | C6101-204000 | S1511-0645-001A02 | C |
| 22 | Air vent | Tokyo Keiki VCJ0760A-01 1/8 | 1 | NC table frame | H0039-0005-06 | S1511-0645-001A02 | D |
| 23 | O-ring | NOK G285 5.7X284.3 | 1 | NC table frame | F109-0005-18 | S1511-0645-001A02 | C |
| 24 | O-ring | P10 | 2 | NC table frame | C6110-000P10 | S1511-0645-001A02 | C |
| 25 | Piston seal | NOK SPGR 426.85X435X3.8 delivery spec. provided | 1 | NC table frame | H0031-0019-80 | S1511-0645-001A02 | C |
| 26 | O-ring | P10 | 4 | NC table center sleeve | C6110-000P10 | S1511-0645-002A02 | C |
| 27 | O-ring | NOK C07326A (ISO C2000G) | 1 | NC table center sleeve | F109-0003-49 | S1511-0645-002A02 | C |
| 28 | Dust seal | NOK DSI FQ0066D0 85X95X6X8 | 2 | NC table center sleeve | H0031-0008-82 | S1511-0645-002A02 | C |
| 29 | Rod seal | NOK SPNR85X95X3.8 Fluoro-rubber delivery spec. provided | 2 | NC table center sleeve | H0031-0022-04 | S1511-0645-002A02 | C |
| 30 | O-ring | JIS-B2401 4 type D P10 | 1 | NC table center sleeve | J9824-0150-P10 | S1511-0645-002A02 | C |
| 31 | O-ring | G80 | 1 | NC table center sleeve | C6110-000G80 | S1511-0645-002A02 | C |
| 32 | O-ring | NOK C0 7324A 190X3.55 | 4 | NC table center sleeve | F109-0004-13 | S1511-0645-002A02 | C |
| 33 | Piston seal | NOK SPGR 55X65X4 delivery spec. provided | 4 | NC table center sleeve | H0031-0021-91 | S1511-0645-002A02 | C |
| 34 | O-ring | JIS-B2401 4 type D P10 | 2 | NC table center sleeve | J9824-0150-P10 | S1511-0645-002A02 | C |
| 35 | O-ring | G40 | 1 | NC table center sleeve | C6110-000G40 | S1511-0645-002A02 | C |
| 36 | Plate | SUP3 17X64X0.3 | 4 | NC table pallet lower base | M109-1046-50 | S1511-0645-003A03 | D |
| 37 | Plate | SUP3 17X64X0.3 | 4 | NC table pallet lower base | M109-1046-51 | S1511-0645-003A03 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------------|---|------|-------------------------------|------------------|-------------------|------|
| 38 | O-ring | P21 | 12 | NC table pallet lower base | C6110-000P21 | S1511-0645-003A03 | C |
| 39 | Bearing | Daido Metal SS250DUN | 1 | NC table anti-lift | M004-SS250DUN | S1511-0645-004A01 | D |
| 40 | Bearing | NTN 32926DB+60PX4V1 delivery spec. provided | 1 | NC table taper roller bearing | M009-0046-49-1 | S1521-0645-001A02 | D |
| 41 | Locking nut | SKF KMT26 M130X2 | 1 | NC table taper roller bearing | H1005-0006-14 | S1521-0645-001A02 | D |
| 42 | O-ring | NOK C0 7324A 190X3.55 | 1 | NC table B-axis drive | F109-0004-13 | S1521-0645-003A01 | C |
| 43 | O-ring | NOK C0 7321A 175X3.55 | 1 | NC table B-axis drive | F109-0003-99 | S1521-0645-003A01 | C |
| 44 | Rod seal | NOK SPNR 150X160X4 spec. sheet required | 1 | NC table B-axis drive | H0031-0024-10 | S1521-0645-003A01 | C |
| 45 | O-ring | NOK C0 7324A 190X3.55 | 1 | NC table B-axis drive | F109-0004-13 | S1521-0645-003A01 | C |
| 46 | Plate | Nylon 6 M4X1.5 | 1 | NC table clamp | H1022-1080-63 | S1523-0645-001A01 | D |
| 47 | O-ring | NOK G285 5.7X284.3 | 1 | NC table clamp | F109-0005-18 | S1523-0645-001A01 | C |
| 48 | O-ring | Morisei 1AGS-340 | 1 | NC table clamp | F109-0005-14 | S1523-0645-001A01 | C |
| 49 | Plate | Ihara Kogyo SUS304-CSP M335X1 | 2 | NC table clamp | H1082-1022-45 | S1523-0645-001A01 | D |
| 50 | O-ring | P7 | 1 | NC table clamp | C6110-0000P7 | S1523-0645-001A01 | C |
| 51 | O-ring | P12 | 1 | NC table clamp | C6110-000P12 | S1523-0645-001A01 | C |
| 52 | O-ring | P8 | 1 | NC table clamp | C6110-0000P8 | S1523-0645-001A01 | C |
| 53 | O-ring | Morisei 1AGS-340 | 1 | NC table clamp | F109-0005-14 | S1523-0645-001A01 | C |
| 54 | O-ring | P26 | 3 | NC table clamp | C6110-000P26 | S1523-0645-001A01 | C |
| 55 | Lubrication parts | Showa Lubrication parts, 1 set | 1 | NC table piping part | H0120-1017-45 | S1581-0645-001A03 | D |
| 56 | Nylon pipe | Showa Yuki M4X3000 | 1 | NC table piping part | H0026-0011-20 | S1581-0645-001A03 | C |
| 57 | 3MPa Hose | Ono Kogyo C2802-061102 equivalent 100 marked (3MPa-1/4-L1100) | 1 | NC table piping part | H0027-0049-96 | S1581-0645-001A03 | C |
| 58 | Elbow union | SMC KQL08-01S | 1 | NC table piping part | H0016-0006-40 | S1581-0645-001A03 | D |
| 59 | Fine U nut | Fuji Seimitsu FU00SC | 1 | DD encoder Z276 installation | H1005-0002-52 | S5417-0645-001A02 | D |
| 60 | Power lock | Tsubakimoto Chain PL014X018E | 1 | DD encoder Z276 installation | H1012-0004-12 | S5417-0645-001A02 | D |
| 61 | Nipple | Showa Yuki PD610 | 2 | DD encoder Z276 installation | H0012-0005-45 | S5417-0645-001A02 | D |
| 62 | Copper gasket | Showa Yuki Copper gasket 311-0406 | 2 | DD encoder Z276 installation | H1004-0009-23 | S5417-0645-001A02 | D |
| 63 | Retaining ring (for hole) | NTN NR1030 | 1 | DD encoder Z276 installation | H1000-0006-35 | S5417-0645-001A02 | D |
| 64 | Bearing | NTN 6806LLUP5C2 | 1 | DD encoder Z276 installation | M000-6806LLUP5C2 | S5417-0645-001A02 | D |
| 65 | Shim | SUS304 25X58 T0.01 T0.02 T0.05 3 types, 2 of each, total 6 | 2 | DD encoder Z276 installation | H1082-1029-30 | S5417-0645-001A02 | D |
| 66 | Shim | SUS304 25X58X0.1 | 2 | DD encoder Z276 installation | H1082-1029-63 | S5417-0645-001A02 | D |
| 67 | Pipe | Ihara Science MB-5000H hydraulic piping for table | 1 | Table steel pipe piping | H0024-0005-12 | S9900-0645-010A02 | D |

Table 5-12

5-13. 2-pallet APC

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|----------------------------|--|------|------------------------|----------------------|-------------------|------|
| 1 | O-ring | G230 | 1 | APC frame body | C6110-00G230 | S3011-0645-001A02 | C |
| 2 | Bulkhead socket | Ihara Science KSS10-020E (10X1/4) | 2 | APC frame body | H0014-0012-09 | S3011-0645-001A02 | D |
| 3 | Shaft | Misumi SFAQ-12-80-B15 | 1 | APC frame body | H1002-0008-28 | S3011-0645-001A02 | D |
| 4 | Dust seal | NOK DKH AR5336E5 240X265X12X17 | 1 | APC arm | H0031-0021-69 | S3011-0645-002A02 | C |
| 5 | Reducer | Sumitomo Heavy Industries M3X-H APC, F2CS-A15-59 delivery spec. provided | 1 | APC rotary drive | H1013-0002-97 | S3011-0645-003A01 | D |
| 6 | O-ring | G145 | 1 | APC rotary drive | C6110-00G145 | S3011-0645-003A01 | C |
| 7 | O-ring | G220 | 1 | APC rotary drive | C6110-00G220 | S3011-0645-003A01 | C |
| 8 | Pulley | Bando STS pulley (Bando) 50 S8M 0250 A M127.32X34 | 1 | APC rotary drive | H1019-1011-09 | S3011-0645-003A01 | D |
| 9 | Power lock | Tsubakimoto PL020X025E | 1 | APC rotary drive | H1012-0004-04 | S3011-0645-003A01 | D |
| 10 | Pulley | Bando STS pulley (Bando) 26 S8M 0250 A M66.21X34 | 1 | APC rotary drive | H1019-1011-10 | S3011-0645-003A01 | D |
| 11 | Power lock | Tsubakimoto Chain PL022X026E | 1 | APC rotary drive | H1012-0002-36 | S3011-0645-003A01 | D |
| 12 | STS belt | Bando 250S8M1280 | 1 | APC rotary drive | M119-0019-36 | S3011-0645-003A01 | D |
| 13 | O-ring | G60 | 1 | APC raise cylinder | C6110-000G60 | S3011-0645-004A02 | C |
| 14 | Fine U nut | Fuji Seimitsu FU13SS M65P2.0 | 1 | APC raise cylinder | H1005-0004-34 | S3011-0645-004A02 | D |
| 15 | O-ring | P95 | 1 | APC raise cylinder | C6110-000P95 | S3011-0645-004A02 | C |
| 16 | O-ring | G100 | 1 | APC raise cylinder | C6110-00G100 | S3011-0645-004A02 | C |
| 17 | Packing | NOK MUNI 80G | 1 | APC raise cylinder | H0031-0027-64 | S3011-0645-004A02 | C |
| 18 | Dust seal | NOK MDSI 80 | 1 | APC raise cylinder | H0031-0018-79 | S3011-0645-004A02 | C |
| 19 | Packing | NOK MUNI 60G | 1 | APC raise cylinder | H0031-0019-88 | S3011-0645-004A02 | C |
| 20 | Dust seal | NOK MDSI 60 | 1 | APC raise cylinder | H0031-0027-65 | S3011-0645-004A02 | C |
| 21 | Circlip | IKO WR145 | 4 | APC raise cylinder | H1000-0006-30 | S3011-0645-004A02 | D |
| 22 | Bearing | NTN AXK1122 | 1 | APC raise cylinder | M001-AXK1122 | S3011-0645-004A02 | D |
| 23 | Bearing | NTN K145X153X36 | 2 | APC raise cylinder | M001- K145X153X36 | S3011-0645-004A02 | D |
| 24 | Spring | Misumi AWS16-80 | 2 | APC raise confirmation | M109-0027-25 | S3011-0645-006A01 | C |
| 25 | Proximity switch sensor | Omron E2E-X3D1-M1G | 1 | APC raise confirmation | E3020-397-265 | S3011-0645-006A01 | C |
| 26 | Proximity switch sensor | Omron E2E-X3D1-M1G | 1 | APC raise confirmation | E3020-397-265 | S3011-0645-006A01 | C |
| 27 | Retaining ring | Misumi NETWS 5 | 1 | APC raise confirmation | H1000-0005-26 | S3011-0645-006A01 | D |
| 28 | Roller follower pin | Misumi RFS6-22 | 1 | APC raise confirmation | H1002-0004-10 | S3011-0645-006A01 | D |
| 29 | Hinge pin | Misumi HCDGH8-16 w/ retaining ring | 1 | APC raise confirmation | H1002-0008-27 | S3011-0645-006A01 | D |
| 30 | Bearing | THK NAST6ZZUUR | 1 | APC raise confirmation | M001- NAST6ZZUUR | S3011-0645-006A01 | D |
| 31 | Bearing | Daido Metal MB0806DU | 1 | APC raise confirmation | M004-MB0806DU | S3011-0645-006A01 | D |
| 32 | O-ring | G35 | 1 | APC raise confirmation | C6110-000G35 | S3011-0645-006A01 | C |
| 33 | Dust seal | 25 | 1 | APC raise confirmation | C6112-000250 | S3011-0645-006A01 | C |
| 34 | Bearing | Daido Metal MB2535DU | 1 | APC raise confirmation | M004-MB2535DU | S3011-0645-006A01 | D |
| 35 | Limit switch | Omron D4E-1E10N-M w/ enhanced water-proofing | 1 | APC raise confirmation | E3019-397-402 | S3011-0645-006A01 | C |
| 36 | Extension spring single | Showa Hatsujyo H13-15 1.8X12.5X82.6 | 1 | APC setup station | M109-0018-69 | S3011-0645-005A04 | C |
| 37 | Proximity switch sensor | Omron E2E-X3D1-M1G | 1 | APC setup station | E3020-397-265 | S3011-0645-005A04 | C |
| 38 | Extension spring single | Showa Hatsujyo H10-09 1.4X10X38.9 | 1 | APC setup station | M109-0017-99 | S3011-0645-005A04 | C |
| 39 | O-ring | G45 | 1 | APC setup station | C6110-000G45 | S3011-0645-005A04 | C |
| 40 | O-ring | G75 | 1 | APC setup station | C6110-000G75 | S3011-0645-005A04 | C |
| 41 | Bearing | AS1117 | 1 | APC setup station | M001-AS1117 | S3011-0645-005A04 | D |
| 42 | Bearing | NTN AXK1117 | 1 | APC setup station | M001-AXK1117 | S3011-0645-005A04 | D |
| 43 | Bearing | NTN WS81117 | 1 | APC setup station | M001-WS81117 | S3011-0645-005A04 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|--------------|----------------------|------|-------------------|----------------|-------------------|------|
| 44 | Bearing | Daido Metal MB5060DU | 1 | APC setup station | M004-MB5060DU | S3011-0645-005A04 | D |
| 45 | Knob | Imao TH67N | 1 | APC setup station | H1060-0002-97 | S3011-0645-005A04 | D |
| 46 | Limit switch | Omron D4E-1D10N-M | 1 | APC setup station | E3019-397-331 | S3011-0645-005A04 | C |

Table 5-13

5-14. Full-enclosure Shielding

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|--------------------------|--|------|---|-----------------|-------------------|------|
| 1 | Telescoping cover X | Tokyo Hatsujyo 645H XY telescoping cover XY set H1090-0035-15 X.-16 Y spec. sheet provided | 1 | XY telescoping cover (std) | H1090-0034-84-1 | S4041-0645-001A01 | D |
| 2 | Telescoping cover X | Tokyo Hatsujyo MB-5000H Z telescoping cover LR set, spec. sheet provided | 1 | Z telescoping cover | H1090-0035-08-1 | S4045-0645-002A01 | D |
| 3 | Bearing | NTN NATR6LL | 2 | Cover around table | M001-NATR6LL | S1371-0645-001A02 | D |
| 4 | Bearing | NTN NATR6LL | 2 | Cover around table | M001-NATR6LL | S1371-0645-001A02 | D |
| 5 | Support | Meiki Rubber Daiba -UE770 27X27X20 | 2 | Cover around table | H1022-1164-05 | S1371-0645-001A02 | D |
| 6 | Wiper | SUP.SPCC.NBR 31.5X140 Z-axis cover MG side | 1 | Cover around table | H1023-1080-13 | S1371-0645-001A02 | C |
| 7 | Wiper | SUP.SPCC.NBR 31.5X140 Z-axis cover operator side | 1 | Cover around table | H1023-1080-14 | S1371-0645-001A02 | C |
| 8 | Plate | Meiki Rubber Daiba -UE770 37X539X5 | 2 | Table side cover (std) | H1022-1212-42 | S1371-0645-002A01 | D |
| 9 | Plate | Meiki Rubber Daiba -UE770 20X539X10 | 2 | Table side cover (std) | H1022-1212-43 | S1371-0645-002A01 | D |
| 10 | Wiper | SUP SPCC NBR 2-pc set | 1 | Z bed cover | H1023-1081-53 | S4045-0645-003A02 | C |
| 11 | Nozzle | Nikki Adjustable coolant, 2-pc set MA-5/600H | 2 | Parts around X telescoping cover (saleable) | H0023-1003-34 | S4041-0645-002A02 | D |
| 12 | Bearing | THK NART8UUR | 1 | APC swivel door | M001-NART8UUR | S3061-0645-013A01 | D |
| 13 | Bearing | THK NART8UUR | 1 | APC swivel door | M001-NART8UUR | S3061-0645-013A01 | D |
| 14 | Cushion rubber | Takigen C-30-CS-2 | 4 | APC full-enclosure shielding unit accessories | H1023-0014-10 | S4011-0645-021A01 | D |
| 15 | Bearing | 6001ZZ | 4 | 2-pallet APC operator door | M000-6001ZZ | S3061-0645-002A02 | D |
| 16 | Plate | Peteck, colorless and transparent,597X912X3 | 1 | 2-pallet APC operator door | H1022-1230-11 | S3061-0645-041A02 | D |
| 17 | Plate | Peteck, colorless and transparent,597X912X3 | 1 | 2-pallet APC operator door | H1022-1230-12 | S3061-0645-041A02 | D |
| 18 | Seal washer | NOK WF-8 15 1.6 | 2 | 2-pallet APC operator door | H1004-0001-08 | S3061-0645-041A02 | D |
| 19 | Cushion rubber | Takigen C-30-CS-2 | 3 | 2-pallet APC operator door | H1023-0014-10 | S3061-0645-041A02 | D |
| 20 | Knob | Nabeya Bi-tech UVF-36X800-BK-SP | 1 | 2-pallet APC operator door | H1062-0005-41 | S3061-0645-041A02 | D |
| 21 | Seal washer | NOK WF-8 15 1.6 | 2 | 2-pallet APC operator door | H1004-0001-08 | S3061-0645-041A02 | D |
| 22 | Knob | Nabeya Bi-tech UVF-36X800-BK-SP | 1 | 2-pallet APC operator door | H1062-0005-41 | S3061-0645-041A02 | D |
| 23 | Magnet catch | Tochigiya TL-273-2 | 1 | 2-pallet APC operator door | H1069-0000-01 | S3061-0645-041A02 | D |
| 24 | Clip | HEYCO 3334 (7/8) A-21.9 | 1 | 2-pallet APC operator door rail | E5535-648-013 | S3061-0645-003A01 | D |
| 25 | Bearing | NTN #6201ZZ | 12 | 2-pallet APC operator door rail | M000-6201ZZ | S3061-0645-003A01 | D |
| 26 | Bearing | NTN #6201ZZ | 8 | 2-pallet APC operator door rail | M000-6201ZZ | S3061-0645-003A01 | D |
| 27 | Cable bearing | Tsubakimoto Chain TKP0320-1BR50 18 L + PIA + PKA | 1 | 2-pallet APC operator door rail | M019-0022-16 | S3061-0645-003A01 | D |
| 28 | Key for door lock switch | Omron D4DS-K2 | 1 | APC door lock switch | E3049-397-039 | S3061-0645-005A01 | D |
| 29 | Door lock switch | Omron D4NL-2FFG-B | 1 | APC door lock switch | E3049-397-066 | S3061-0645-005A01 | C |
| 30 | Bearing | 6001ZZ | 2 | Operator door common parts | M000-6001ZZ | S4011-0645-030A03 | D |
| 31 | Seal washer | NOK WF-8 15 1.6 | 2 | Operator door common parts | H1004-0001-08 | S4011-0645-030A03 | D |
| 32 | Cushion rubber | Takigen C-30-CS-2 | 2 | Operator door common parts | H1023-0014-10 | S4011-0645-030A03 | D |
| 33 | Knob | Nabeya Bi-tech UVF-36X800-BK-SP | 1 | Operator door common parts | H1062-0005-41 | S4011-0645-030A03 | D |
| 34 | Linear guide | HIWIN MB-5000H door upper EGH25SA2R1120Z0C+DD spec. sheet provided | 1 | Operator door common parts | H1016-0009-04 | S4011-0645-030A03 | D |
| 35 | Plate | Ono Kogyo Foam nitrile 441X736X3 | 2 | Operator door standard | H1020-1280-34 | S4011-0645-031A01 | D |
| 36 | Plate | 734X439X17 glass 3MM polycarbonate 12MM silicon 2MM | 1 | Operator door standard | H1022-0018-54 | S4011-0645-031A01 | D |
| 37 | Plate X | Ono Kogyo Foam nitrile 280X520X4 | 1 | Operator door skylight standard | H1020-1280-73-1 | S4011-0645-036A01 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-------------------------|---|------|---|-----------------|-------------------|------|
| 38 | Plate | Polycarbonate 278X518X12 clear | 1 | Operator door skylight standard | H1022-0026-93-1 | S4011-0645-036A01 | D |
| 39 | Plate | Nitrile rubber 425X665X1 | 1 | Full-enclosure shielding unit accessories | H1020-1280-41 | S4011-0645-007A02 | D |
| 40 | Plate | Nitrile rubber 35X106X2 | 1 | Full-enclosure shielding unit accessories | H1020-1280-42 | S4011-0645-007A02 | D |
| 41 | Plate X | Nitrile rubber NBR 5-pc set | 1 | Full-enclosure shielding unit accessories | H1020-1280-44-1 | S4011-0645-007A02 | D |
| 42 | Wiper X | Nitta Lip seal LP-22ST 28.5X387.4X3 | 1 | Full-enclosure shielding unit accessories | H1023-1086-18-1 | S4011-0645-007A02 | C |
| 43 | Proximity switch sensor | Omron E2E-X2D1-M1G NO type M12 connector | 2 | ATC shutter standard | E3020-397-286 | S4021-0645-001A01 | C |
| 44 | Nut | CKD M1-NR-30 M10X1.25 rod nut (NR) | 1 | ATC shutter standard | H0009-0001-69 | S4021-0645-001A01 | D |
| 45 | Linear guide | NSK TS201260ANV2-01KLS w/ protector, spec. sheet provided, length changed, DWG | 1 | ATC shutter standard | H1016-0007-31-2 | S4021-0645-001A01 | D |
| 46 | Linear guide | IKO LWH15C2R820BT1H/F delivery spec. provided | 1 | ATC shutter standard | M009-0049-21 | S4021-0645-001A01 | D |
| 47 | Elbow union | SMC KQL10-01S | 2 | ATC shutter pneumatic part L300 | H0016-0001-04 | S4021-0645-002A01 | D |
| 48 | Elbow union | SMC KQL10-02S | 4 | ATC shutter pneumatic part L300 | H0016-0008-84 | S4021-0645-002A01 | D |
| 49 | Half union | SMC KQH10-02S | 3 | ATC shutter pneumatic part L300 | H0016-0009-10 | S4021-0645-002A01 | D |
| 50 | Floating joint | SMC JA30-10-125 | 1 | ATC shutter pneumatic part L300 | H0039-0005-44 | S4021-0645-002A01 | D |
| 51 | Shock absorber | Enidine PM25MC-1B | 2 | ATC shutter pneumatic part L300 | H0090-0010-14 | S4021-0645-002A01 | D |
| 52 | Pneumatic parts | CKD MB-5000H STD shutter, tool length 300 Fluoro-rubber seal, spec. sheet provided | 1 | ATC shutter pneumatic part L300 | H0140-0024-82 | S4021-0645-002A01 | D |
| 53 | Nylon tube | Sintered Metal T1209B 20 m black | 1 | ATC shutter pneumatic part L300 | H0021-0001-09 | S4021-0645-002A01 | C |
| 54 | Pipe | SMC T1075B-20 | 1 | ATC shutter pneumatic part L300 | H0026-0012-85 | S4021-0645-002A01 | D |
| 55 | 1.5MPA Hose | W/o clasp 19X400 | 1 | Washing inside cover | C2788-190400 | S5641-0645-003A01 | C |
| 56 | Pipe | Ihara Science MB-5000H pipe for washing inside machine, 1 set, spec. sheet provided | 1 | Washing inside cover | H0023-0008-77 | S5641-0645-003A01 | D |
| 57 | Detector switch | Omron Key for D4BL K1 type | 1 | MA-600H door lock switch K1 | E3049-397-009 | S4012-0616-009A01 | D |
| 58 | Detector switch | Omron D4BL-2DRA | 1 | MA-600H door lock switch K1 | E3049-397-032 | S4012-0616-009A01 | D |
| 59 | Plate X | Rubber plate, chloroprene rubber, white 50X988X5 | 2 | Wiper on side of APC swivel door | H1022-1212-19-1 | S3061-0645-007A01 | D |
| 60 | Cushion rubber | Takigen C-30-CS-2 | 1 | Connecting parts for machine installation | H1023-0014-10 | S4011-0645-008A02 | D |
| 61 | Plate | PE light LS-3 3X25X280 w/ contact adhesive on one side, white | 2 | Connecting parts for machine installation | H1022-0026-49 | S4011-0645-008A02 | D |
| 62 | White rubber seat | Misumi RBCWF2H10-60-30-F35-G15-Z4 | 1 | SMG cover | H1020-0017-87 | S2361-0645-007A03 | D |
| 63 | Magnet catch | Tochigiya TL-272-2 | 3 | Magazine cover ASSY (door hinge changed) | H1009-0000-90 | S2361-0645-008A01 | D |
| 64 | Packing | 15BX3TX30ML type V-710 Nihon Norton packing, Yamasei | 1 | Magazine cover ASSY (door hinge changed) | E5586-894-075 | S2361-0645-008A01 | C |
| 65 | Plate | Eiwa Shoji Petech 441X541X3, clear, colorless | 1 | Magazine cover ASSY (door hinge changed) | H1022-0026-90 | S2361-0645-008A01 | D |
| 66 | Seal washer | NOK WF-8 15 1.6 | 1 | Magazine cover ASSY (door hinge changed) | H1004-0001-08 | S2361-0645-008A01 | D |
| 67 | Knob | Nichiden Nabeya Bi-tech UVF-36X350-AL-SP | 1 | Magazine cover ASSY (door hinge changed) | H1062-0004-99 | S2361-0645-008A01 | D |
| 68 | Magnet catch | Tochigiya TL-272-2 | 1 | Rear exterior cover | H1009-0000-90 | S4081-0645-009A01 | D |

Table 5-14

5-15. Coolant System

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-----------------|--|------|------------------------------------|------------------|-------------------|------|
| 1 | Pipe | Ihara Science MA-600H shower pipe, 1 set, spec. sheet provided | 1 | Shower washing | H0023-0008-17 | S5641-0645-002A01 | D |
| 2 | Coolant pump | Grundfos MTA4-250 0.25KW 200V 50/60HZ delivery spec. provided | 1 | 250W pump - std (wash gun) | F0130-03-001-23 | A611-1950-91 | D |
| 3 | Coolant pump | Grundfos MTA4-250 0.25KW 200V 50/60HZ delivery spec. provided | 1 | 250W pump - std (for thru suction) | F0130-03-001-23 | S5611-0645-029A01 | D |
| 4 | Coolant pump | Grundfos MTH4-60/2 0.62KW 200V 60HZ | 1 | Pump MTH4-60/2 0.39KW 200V | F0130-05-000-59 | S5611-0645-003A01 | D |
| 5 | Coolant pump | Grundfos SPK8-3/2 50/60HZ 0.55KW delivery spec. provided | 1 | Pump SPK8-3/2 0.55KW STD | F0130-05-000-29 | S5611-0614-027A01 | D |
| 6 | Pump | Grundfos MTH4-60/4 60HZ 1.21KW spec. sheet provided | 1 | Pump MTH4-60/4 200V 0.73KW | F0130-06-000-98 | S5611-0645-007A01 | D |
| 7 | Coolant pump | Grundfos MTH4-60/3 (changed from F0130-06-000-34) spec. sheet provided | 1 | Pump MTA4-60/3 | F0130-06-000-96 | S5611-0645-006A01 | D |
| 8 | Level switch | Willy Vogel WS32-2/250-N | 1 | 5000H tank common parts | E3041-070-007 | S5611-0645-001A01 | D |
| 9 | Cable joint | Asia Kogyo 898210022-01 male PG-11 & female PS1/2 | 1 | 5000H tank common parts | H1001-0007-19 | S5611-0645-001A01 | D |
| 10 | Oil gauge | AP-1-180 | 1 | MB5000H rear discharge tank (DF) | C2938-101801 | S5615-0645-013A01 | D |
| 11 | Castor | Murata HJ-50-U-YN max. allowable load 300 kg | 7 | MB5000H rear discharge tank (DF) | H1080-0001-93 | S5615-0645-013A01 | D |
| 12 | Check valve | KITZ R-125 type nominal dia. 3/4 | 1 | Coolant piping CP | F0040-484-000-02 | S5615-0645-019A01 | D |
| 13 | Gas pipe | INOC NL 20A (3/4B) L150 stainless | 1 | Coolant piping CP | H0024-0003-14 | S5615-0645-019A01 | D |
| 14 | Barrel nipple | 3/4 | 1 | Table washing piping CP | C7782-000042 | S5615-0645-020A01 | D |
| 15 | Gas pipe | INOC NL 32A (1.1/4B) L150 stainless | 1 | Table washing piping CP | H0024-0003-30 | S5615-0645-020A01 | D |
| 16 | Globe valve | Toyo Valve 100N BG-N 1.1/4 bronze globe valve | 1 | Shower washing piping CP | F0044-486-000-03 | S5615-0645-021A01 | D |
| 17 | Vinyl hose | Tetron braided 25X700 | 1 | Mayfran backwash pump piping | C7793-250700 | S5611-0614-032A01 | C |
| 18 | Oil gauge | AP-1-180 | 1 | Tank body (MA spec.) | C2938-101801 | S5611-0645-021A01 | D |
| 19 | Castor | Murata HJ-50-U-YN max. allowable load 300 kg | 5 | Tank body (MA spec.) | H1080-0001-93 | S5611-0645-021A01 | D |
| 20 | Plate X | Nitrile rubber 127X520X2 | 1 | Chip pan (MA spec.) | H1020-1234-88-1 | S5621-0645-001A01 | D |
| 21 | Plate | Nitrile rubber Chip pan rubber plate | 1 | Chip pan (MA spec.) | H1020-1285-11 | S5621-0645-001A01 | D |
| 22 | Plate | Takiron Tafutomei, clear (TS601HI) 274X546X5 | 1 | Chip pan (MA spec.) | H1022-1130-14 | S5621-0645-001A01 | D |
| 23 | Knob | Takigen AP-3-1 black | 1 | Chip pan (MA spec.) | H1062-0001-56 | S5621-0645-001A01 | D |
| 24 | Chip conveyor X | Enomoto MB-5000H built-in floor type, spec. sheet provided | 1 | Built-in conveyor floor type | H0162-0047-79-1 | S5511-0645-001A01 | D |
| 25 | Plate | Mach Rubber Nitrile rubber 60X1326X2 | 1 | Built-in conveyor drop opening | H1020-1234-91 | S5511-0645-002A01 | D |
| 26 | Knob | Takigen A-175-3 | 2 | Only for raising tank (MA spec.) | H1062-0003-28 | S5611-0645-022A02 | D |
| 27 | Plate X | Nitrile rubber 112X530.5X2 | 1 | Only for raising tank (MA spec.) | H1020-1234-90-2 | S5611-0645-022A02 | D |

Table 5-15

5-16. Lamps

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|----------------------|---|------|--------------------------------|-----------------|-------------------|------|
| 1 | Fluorescent lamp | Daido Okuma JF-W18DB (glass) 18W FPL-18EXN support JF-115, spec. sheet provided | 1 | Built-in fluorescent lamp body | E9919-431-004-3 | A611-2311-04 | C |
| 2 | Incandescent lamp | Nikki 60W halogen lamp Dwg. No. NH95700 lead wire 7 m Nikki Co., Ltd. | 1 | Lamp | E3525-905-001-1 | A611-2300-02 | C |
| 3 | Incandescent lamp AT | OSRAM H3 24V/60W halogen lamp Nikki Co., Ltd. | 2 | Spare bulb for spotlight | E3528-905-001 | S5010-0616-002A01 | C |

Table 5-16

5-17. Thru-spindle Coolant System 1.5MPa (217.7 psi)/7.0 MPa (1015.7 psi) (Optional)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------|--|------|--|-------------------|-------------------|------|
| 1 | Hose | Tokai Rubber hose 1 set w/ metal parts on both ends, 2-pc set | 1 | 1.5 MPa thru piping, LU rear discharge | H0027-1102-16 | S9900-0645-008A01 | C |
| 2 | Vinyl hose | W/ spring 50X2500 | 1 | 1.5 MPa thru piping, LU rear discharge | C7792-502500 | S9900-0645-008A01 | C |
| 3 | Thru tank unit V | Ogura Clutch 1.5 MPa coolant device OJ15B2-A spec. sheet provided | 1 | 1.5 MPa thru unit standard | H0109-0003-83-2 | S8432-0631-014A01 | D |
| 4 | Suction line filter | Masuda S/S F-VLFE06-100S06T Dwg. No. 0506-058 | 1 | Thru 7 MPa unit | H0032-0009-22 | A601-1296-91-05 | C |
| 5 | 1MPAHose | W/ clasp 12X1400 | 1 | Thru 7 MPa unit | C2795-121402 | A601-1296-91-05 | C |
| 6 | Line filter | Masuda S/S F-FPME06-20S-036-X-C delivery spec. provided | 1 | Thru 7 MPa unit | H0032-0011-22-2 | A601-1296-91-05 | C |
| 7 | O-ring | P24 | 2 | Thru 7 MPa unit | C6110-000P24 | A601-1296-91-05 | C |
| 8 | Oil gauge | KL-150 | 1 | Thru 7 MPa unit | C2937-001501 | A601-1296-91-05 | D |
| 9 | Coolant separator | Sanesu-K w/ case (SUS304) micro separator L-300 type | 1 | Thru 7 MPa unit | H0100-0001-81 | A601-1296-91-05 | D |
| 10 | Multi-clamp | NHK MC38-1 | 1 | Thru 7 MPa unit | H1009-0001-15 | A601-1296-91-05 | D |
| 11 | Rubber bush | NHK RB38-16 | 1 | Thru 7 MPa unit | H0035-0004-02 | A601-1296-91-05 | D |
| 12 | Cock | Toyo Valve 400 type ball valve RC3/4 (Dealer: Okaya Kohki) | 3 | Thru 7 MPa unit | F0041-684-000-04 | A601-1296-91-05 | D |
| 13 | Float switch | Toho Separator H0101-0000-44 (Nohken FP-1A) | 1 | Thru 7 MPa unit | H0090-0003-10 | A601-1296-91-05 | D |
| 14 | Level switch | Willy Vogel WS32-2/340 | 1 | Thru 7 MPa unit | E3041-070-037 | A601-1296-91-05 | D |
| 15 | Level switch | Nohken-K FS-2S L430 (micro switch changed) delivery spec. provided | 1 | Thru 7 MPa unit | E3041-592-019-1 | A601-1296-91-05 | D |
| 16 | Cable joint | Asia Kogyo 898210022-01 male PG-11 & female PS1/2 | 1 | Thru 7 MPa unit | H1001-0007-19 | A601-1296-91-05 | D |
| 17 | Vinyl hose | W/ tetron braid 19X300 | 1 | Thru 7 MPa unit | C7793-190300 | A601-1296-91-05 | C |
| 18 | Vinyl hose | W/ tetron braid 19X600 | 1 | Thru 7 MPa unit | C7793-190600 | A601-1296-91-05 | C |
| 19 | Cock | Toyo Valve 400 type ball valve RC1/2 (Dealer: Okaya Kohki) | 1 | Thru 7 MPa unit | F0041-683-000-06 | A601-1296-91-05 | D |
| 20 | Plate | Nitrile rubber M50X10 | 1 | Thru 7 MPa unit | H1020-1236-47 | A601-1296-91-05 | D |
| 21 | Terminal | Misumi BTLF3 | 1 | Thru 7 MPa unit | H0014-0014-48 | A601-1296-91-05 | D |
| 22 | 10MPAHose | W/ clasp 9X1600 | 1 | High pressure pump 70K | C2798-091602 | A601-1905-91 | C |
| 23 | Coolant pump | Kiso PK-6 5/60HZ 7M 14L/MIN 2.2KW IEC unload valve redesigned | 1 | High pressure pump 70K | F0130-07-000-35-4 | A601-1905-91 | D |
| 24 | Pressure gauge | Yodogawa Keiki PAGT-R1/4X60X16 MPa/PSI indicated (Dealer: Showa) | 1 | Pressure gauge for overseas | T019-400-008-13 | A601-1298-91 | D |
| 25 | MS filter | Yamasei MS70 embossed 20 Ép | 4 | MS filter for thru 1.5 MPa | H0032-0012-77 | A601-1295-08 | A |
| 26 | MS filter | Yamasei MS100 embossed 5 Ép | 6 | MS filter for thru 7 MPa | H0032-0012-75 | A601-1296-08 | A |

Table 5-17

5-18. Auto Tool Length Offset (Touch Sensor: Optional)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|---------------------|--|------|-----------------------------|------------------|-------------------|------|
| 1 | Soft nylon tube | SMC TS0604B-1 | 1 | Touch sensor unit part | H0026-0016-60 | S5213-0645-003A03 | D |
| 2 | Half union | SMC KFH06B-01S brass sleeve | 1 | Touch sensor unit part | H0015-0014-33 | S5213-0645-003A03 | D |
| 3 | Soft nylon tube | SMC TS0604B-1 | 1 | Touch sensor unit part | H0026-0016-60 | S5213-0645-003A03 | D |
| 4 | Cable bearing | Tsubakimoto Chain TKP0180W15R37 9 L PIA 1-pc PKA 1-pc | 1 | Touch sensor unit part | M019-0028-28 | S5213-0645-003A03 | D |
| 5 | D solenoid valve | SMC SY5240-5DOS | 1 | Touch sensor air device | F0000-451-001-04 | S5213-0645-006A01 | D |
| 6 | S solenoid valve | SMC SY5140-5DOS | 1 | Touch sensor air device | F0001-451-001-51 | S5213-0645-006A01 | D |
| 7 | PTElbow | SMC DAV-02-01 | 1 | Touch sensor air device | H0014-0008-76 | S5213-0645-006A01 | D |
| 8 | Elbow union | SMC KQL06-01S | 1 | Touch sensor air device | H0016-0005-63 | S5213-0645-006A01 | D |
| 9 | Long elbow union | SMC KQW06-01S | 2 | Touch sensor air device | H0016-0009-37 | S5213-0645-006A01 | D |
| 10 | Soft nylon tube | SMC TS0604B-1 | 1 | Touch sensor air device | H0026-0016-60 | S5213-0645-006A01 | D |
| 11 | Soft nylon tube | SMC TS0604B-1 | 1 | Touch sensor air device | H0026-0016-60 | S5213-0645-006A01 | D |
| 12 | Soft nylon tube | SMC TS0604B-1 | 1 | Touch sensor air device | H0026-0016-60 | S5213-0645-006A01 | D |
| 13 | Muffler | SMC AN110-01 | 1 | Touch sensor air device | H0036-0000-68 | S5213-0645-006A01 | D |
| 14 | Half union | SMC KFH06B-01S brass sleeve | 1 | Touch sensor installation | H0015-0014-33 | S5213-0645-004A01 | D |
| 15 | Elbow union | SMC KQL06-01S | 2 | Touch sensor installation | H0016-0005-63 | S5213-0645-004A01 | D |
| 16 | Knock pin | Misumi THS8-20 | 3 | Touch sensor installation | H1002-0008-13 | S5213-0645-004A01 | D |
| 17 | Speed control valve | SMC AS2201F-01-06S | 2 | Table coupling touch sensor | F0031-580-000-36 | S5213-0645-007A01 | D |
| 18 | Elbow union | SMC KQL06-01S | 1 | Table coupling touch sensor | H0016-0005-63 | S5213-0645-007A01 | D |

Table 5-18

5-19. Auto Zero Offset (Touch Probe: Optional)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-----------|--|------|------------------------------|-----------------|-------------------|------|
| 1 | Gauges | Renishaw OMP60/OMI-2 spec. sheet provided | 1 | Touch probe #40 MAS OMP60 | T019-590-008-57 | S5213-0614-016A01 | D |

Table 5-19

5-20. Multi-pallet APC (Optional)

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|----------------------------|--|------|---------------------------------------|-------------------|-------------------|------|
| 1 | O-ring | P32 | 1 | Multi-pallet setup station | C6110-000P32 | S3011-0645-007A02 | C |
| 2 | Dust seal | NOK CL0363C0 LBH-32F 32X40X5X6.5 | 1 | Multi-pallet setup station | H0031-0028-18 | S3011-0645-007A02 | C |
| 3 | O-ring | G45 | 1 | Multi-pallet setup station | C6110-000G45 | S3011-0645-007A02 | C |
| 4 | O-ring | P25 | 1 | Multi-pallet setup station | C6110-000P25 | S3011-0645-007A02 | C |
| 5 | Compression spring setting | 2.6X32.6X50X5 | 1 | Multi-pallet setup station | M101-26326-05005 | S3011-0645-007A02 | C |
| 6 | O-ring | P44 | 1 | Multi-pallet setup station | C6110-000P44 | S3011-0645-007A02 | C |
| 7 | Proximity switch sensor | Omron E2E-X3D1-M1G | 2 | Multi-pallet setup station | E3020-397-265 | S3011-0645-007A02 | C |
| 8 | Limit switch | Omron D4E-1D10N-M | 1 | Multi-pallet setup station | E3019-397-331 | S3011-0645-007A02 | C |
| 9 | Cam follower | IKO CF-SFU-12B | 18 | Multi-pallet setup station | M001-CF-SFU-12 | S3011-0645-007A02 | D |
| 10 | Pipe | Ihara Science MB-5000H Multi-pallet APC setup station hydraulic piping, spec. sheet provided | 1 | Multi-pallet setup station | H0024-0005-31 | S3011-0645-007A02 | D |
| 11 | Dust seal | NOK DKI FD0995A0 20X32X6X9 | 1 | Multi-pallet setup station | H0031-0006-67 | S3011-0645-007A02 | C |
| 12 | Bearing | Daido Metal MB2015DU | 2 | Multi-pallet setup station | M004-MB2015DU | S3011-0645-007A02 | D |
| 13 | Compression spring setting | 1.3X10X45X15 (left) | 1 | Multi-pallet setup station | M101-13100-04515L | S3011-0645-007A02 | C |
| 14 | Compression spring setting | 2.0X15.0X48X12 | 1 | Pallet pedestal | M101-20150-04812 | S3313-0645-001A03 | C |
| 15 | Compression spring setting | 1.2X10.2X55X18 left-wound | 1 | Pallet pedestal | M101-12102-05518L | S3313-0645-001A03 | C |
| 16 | Hexagon bolt | Misumi ANHN20-120 | 4 | Pallet pedestal | H1001-0024-88-1 | S3313-0645-001A03 | D |
| 17 | Cam follower | IKO CF-SFU-12B | 18 | Pallet pedestal | M001-CF-SFU-12 | S3313-0645-001A03 | D |
| 18 | Limit switch | Omron WLCA2 | 1 | Pallet pedestal | E3019-397-181 | S3313-0645-001A03 | C |
| 19 | Stopper X | Nitrile rubber 20X50X20 | 2 | Pallet pedestal | H1020-1184-65-1 | S3313-0645-001A03 | D |
| 20 | Bearing | IKO NAST17ZZUU | 5 | Swivel base | M001-NAST17ZZUU | S3311-0645-001A02 | D |
| 21 | Limit switch | Omron D4B-2111N | 1 | Swivel base | E3019-397-211 | S3311-0645-001A02 | C |
| 22 | Hydraulic cylinder | Horiuchi Machinery F8R-SA-1LA40B70B458-DBA-2YB-N delivery spec. provided | 1 | Swivel base | H0000-0008-66 | S3311-0645-001A02 | D |
| 23 | Cam follower | IKO CF12BUU | 20 | Swivel base | M001-CF12BUU | S3311-0645-001A02 | D |
| 24 | Linear guide | THK 2HR2042TUU+820L | 1 | Swivel base | M009-0038-51 | S3311-0645-001A02 | D |
| 25 | Bearing | 6009ZZ | 1 | Swivel base rapid feed section | M000-6009ZZ | S3311-0645-002A06 | D |
| 26 | Bearing | 6009ZZ | 1 | Swivel base rapid feed section | M000-6009ZZ | S3311-0645-002A06 | D |
| 27 | Bearing | 6009ZZ | 1 | Swivel base rapid feed section | M000-6009ZZ | S3311-0645-002A06 | D |
| 28 | Linear guide | THK SHW27CA2UUE+820L w/ retainer, spec. sheet provided | 1 | Swivel base rapid feed section | M009-0038-50-1 | S3311-0645-002A06 | D |
| 29 | Sprocket | Tsubakimoto Chain RS80-1 Z18B M159X40 | 2 | Swivel base rapid feed section | H1019-1009-72-1 | S3311-0645-002A06 | D |
| 30 | Roller chain | Tsubakimoto RS80 1-pc, 54 L split-pin couplings | 1 | Swivel base rapid feed section | M010-0801-0541 | S3311-0645-002A06 | D |
| 31 | Bearing | 6011ZZ | 2 | Swivel base rapid feed section | M000-6011ZZ | S3311-0645-002A06 | D |
| 32 | Sprocket | Tsubakimoto Chain RS80-1 Z12B M108X40 | 1 | Swivel base rapid feed section | H1019-1009-73-1 | S3311-0645-002A06 | D |
| 33 | Sprocket | Tsubakimoto Chain RS80-1 Z12B M108X40 | 1 | Swivel base rapid feed section | H1019-1009-74-1 | S3311-0645-002A06 | D |
| 34 | Bearing | 6011ZZ | 1 | Swivel base rapid feed section | M000-6011ZZ | S3311-0645-002A06 | D |
| 35 | Roller chain | RS80-1 62 L | 1 | Swivel base rapid feed section | M019-1007-99 | S3311-0645-002A06 | D |
| 36 | Reducer V | Teijin Seiki RV-50C-32.54 w/ input gear Dwg. No. 31L026-0, spec. sheet provided | 1 | Swivel base fixed section (10-pallet) | H1013-0002-70-2 | S3312-0645-003A01 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|----------------------------|--|------|---------------------------------------|------------------|-------------------|------|
| 37 | Swivel joint | Bridgestone JL06GC (PT 3/8) | 2 | Swivel base fixed section (10-pallet) | H0010-0011-99 | S3312-0645-003A01 | D |
| 38 | Reducer | IS Seiki RKZ-10-G w/ linkage parts BL-MC25E-20SB delivery spec. provided | 1 | Transfer unit common parts | H1013-0002-79 | S3315-0645-001A01 | D |
| 39 | Rubber bush | NHK RB50-25 | 3 | Transfer unit common parts | H0035-0004-04 | S3315-0645-001A01 | D |
| 40 | Multi-clamp | NHK MC50-5 | 1 | Transfer unit common parts | H0035-0004-94 | S3315-0645-001A01 | D |
| 41 | Rubber bush | NHK RB50-15 | 2 | Transfer unit common parts | H1009-0002-07 | S3315-0645-001A01 | D |
| 42 | Hose | Tokai Rubber EXC70-9 hose 1 set w/ metal parts on both ends, 2-pc set | 1 | Transfer unit common parts | H0027-1103-47 | S3315-0645-001A01 | C |
| 43 | Multi-clamp body | NHK MC50-2 | 1 | Transfer unit common parts | H0035-0004-16 | S3315-0645-001A01 | D |
| 44 | Rubber bush | NHK RB50-16 | 2 | Transfer unit common parts | H0035-0005-34 | S3315-0645-001A01 | D |
| 45 | Linear guide | HIWIN EGH30CA2R2580Z0C2 joint LF-86 left/right 2-pc set | 1 | 10-pallet APC transfer rail | H1016-0010-49 | S3323-0645-001A02 | D |
| 46 | Plastic cable bearing | Tsubakimoto Chain TKP0625W200 R=125 24 L | 1 | 10-pallet APC transfer rail | M019-1016-27 | S3323-0645-001A02 | D |
| 47 | Hexagon bolt | Misumi ANHN20-100+LBNR20 | 8 | 10-pallet APC transfer rail | H1001-0024-87 | S3323-0645-001A02 | D |
| 48 | Washer | Shinamoto 5° taper washer, square 20 (3/4) | 8 | 10-pallet APC transfer rail | H1004-0003-74 | S3323-0645-001A02 | D |
| 49 | Washer | Shinamoto 5° taper washer, square 22 (7/8) | 4 | 10-pallet APC transfer rail | H1004-0003-75 | S3323-0645-001A02 | D |
| 50 | Lubrication parts | Showa Yuki MA-500/600H 6-pc set | 1 | Transfer unit lubrication | H0120-1012-06 | S3315-0645-002A01 | D |
| 51 | Grease nipple | 1/8 | 4 | Transfer unit lubrication | C2922-000002 | S3315-0645-002A01 | D |
| 52 | Extension spring single | Showa Hatsujyo H13-15 1.8X12.5X82.6 | 1 | Multi-pallet setup station body | M109-0018-69 | S3314-0645-001A03 | C |
| 53 | Proximity switch sensor | Omron E2E-X3D1-M1G | 1 | Multi-pallet setup station body | E3020-397-265 | S3314-0645-001A03 | C |
| 54 | Cam follower | IKO CF-SFU-12B | 10 | Multi-pallet setup station body | M001-CF-SFU-12 | S3314-0645-001A03 | D |
| 55 | O-ring | G35 | 1 | Multi-pallet setup station body | C6110-000G35 | S3314-0645-001A03 | C |
| 56 | O-ring | P25 | 1 | Multi-pallet setup station body | C6110-000P25 | S3314-0645-001A03 | C |
| 57 | Dust seal | 25 | 1 | Multi-pallet setup station body | C6112-000250 | S3314-0645-001A03 | C |
| 58 | O-ring | P7 | 1 | Multi-pallet setup station body | C6110-0000P7 | S3314-0645-001A03 | C |
| 59 | O-ring | G45 | 1 | Multi-pallet setup station body | C6110-000G45 | S3314-0645-001A03 | C |
| 60 | O-ring | P25 | 1 | Multi-pallet setup station body | C6110-000P25 | S3314-0645-001A03 | C |
| 61 | O-ring | P29 | 1 | Multi-pallet setup station body | C6110-000P29 | S3314-0645-001A03 | C |
| 62 | Ring | Meiki Rubber Daiba -UE770 M38X3 | 1 | Multi-pallet setup station body | H1022-1136-40 | S3314-0645-001A03 | C |
| 63 | Dust seal | 100 | 1 | Multi-pallet setup station body | C6112-001000 | S3314-0645-001A03 | C |
| 64 | Bearing | 51115 | 1 | Multi-pallet setup station body | M000-51115 | S3314-0645-001A03 | D |
| 65 | Bearing | NTN 51118 | 1 | Multi-pallet setup station body | M000-51118 | S3314-0645-001A03 | D |
| 66 | Proximity switch sensor | Omron E2E-X3D1-M1G | 2 | Multi-pallet setup station body | E3020-397-265 | S3314-0645-001A03 | C |
| 67 | Compression spring setting | 2.0X32.0X110X8 | 1 | Multi-pallet setup station body | M101-20320-11008 | S3314-0645-001A03 | C |
| 68 | Hexagon bolt | Misumi ANHN20-120 | 4 | Multi-pallet setup station body | H1001-0024-88-1 | S3314-0645-001A03 | D |
| 69 | Cam follower | IKO CF-SFU-12B | 6 | Multi-pallet setup station body | M001-CF-SFU-12 | S3314-0645-001A03 | D |
| 70 | Knob | Imao TH67N | 1 | Multi-pallet setup station body | H1060-0002-97 | S3314-0645-001A03 | D |

SECTION 5 SPARE PARTS LIST

| No. | Part Name | Type | Qty. | Used for | Okuma Part No. | Unit | Rank |
|-----|-------------------------|---|------|-----------------------------------|-------------------|-------------------|------|
| 71 | Hexagon nut | JIS-B1181 3 type high-quality M10X1.25-6H S45C black oxide finish | 4 | Multi-pallet setup station cover | J9811-8131-000100 | S3314-0645-002A03 | D |
| 72 | Cam follower | IKO CF10-1BUU | 4 | Multi-pallet setup station cover | M001-CF10-1BUU | S3314-0645-002A03 | D |
| 73 | Hexagon nut | JIS-B1181 3 type high-quality M10X1.25-6H S45C black oxide finish | 1 | Multi-pallet setup station cover | J9811-8131-000100 | S3314-0645-002A03 | D |
| 74 | Cam follower | IKO CF10-1BUU | 1 | Multi-pallet setup station cover | M001-CF10-1BUU | S3314-0645-002A03 | D |
| 75 | Hexagon nut | JIS-B1181 3 type high-quality M10X1.25-6H S45C black oxide finish | 12 | Multi-pallet setup station cover | J9811-8131-000100 | S3314-0645-002A03 | D |
| 76 | Cam follower | IKO CF10-1BUU | 6 | Multi-pallet setup station cover | M001-CF10-1BUU | S3314-0645-002A03 | D |
| 77 | Cushion rubber | Takigen C-30-CS-2 | 4 | Multi-pallet setup station cover | H1023-0014-10 | S3314-0645-002A03 | D |
| 78 | Knob | Nichiden Nabeya Bi-tech UVF-36X350-AL-SP | 1 | Multi-pallet setup station cover | H1062-0004-99 | S3314-0645-002A03 | D |
| 79 | Plate | Polycarbonate 264X724X3 clear | 2 | Multi-pallet setup station cover | H1022-0027-09 | S3314-0645-002A03 | D |
| 80 | Plate | Polycarbonate 229X724X3 clear | 1 | Multi-pallet setup station cover | H1022-0027-10 | S3314-0645-002A03 | D |
| 81 | Door lock switch | Omron D4NL-2FFG-B | 1 | Multi-pallet APC door lock switch | E3049-397-066 | S3314-0645-003A01 | C |
| 82 | Detector switch | Omron D4DS-K3 | 1 | Multi-pallet APC door lock switch | E3049-397-028 | S3314-0645-003A01 | D |
| 83 | Bearing | Daido Metal MB0605DU | 2 | Pallet transportation plate | M004-MB0605DU | S3310-0645-001A03 | D |
| 84 | Coil spring | Misumi SWU10.5-15 | 1 | Pallet transportation plate | M109-0021-92 | S3310-0645-001A03 | D |
| 85 | D solenoid valve | Tokyo Keiki DG4V-3-2C-M-U1-H-7-52 | 2 | Hydraulic SOL-CE for multi-pallet | F0000-442-001-50 | S3371-0614-005A03 | D |
| 86 | D solenoid valve | Tokyo Keiki DG4V-3-6C-M-U1-H-7-52 | 1 | Hydraulic SOL-CE for multi-pallet | F0000-445-000-98 | S3371-0614-005A03 | D |
| 87 | Reducing valve | Tokyo Keiki TGMX2-3-PB-BW-G-50J | 2 | Hydraulic SOL-CE for multi-pallet | F0011-730-000-21 | S3371-0614-005A03 | D |
| 88 | Check valve | Tokyo Keiki DGMPC-3-ABK-BAK-51J | 1 | Hydraulic SOL-CE for multi-pallet | F0040-980-000-22 | S3371-0614-005A03 | D |
| 89 | Sub plate | Tokyo Keiki DGMS-3-3EX-10-J-JA-J PT w/o plug on each side of pot | 1 | Hydraulic SOL-CE for multi-pallet | H0013-0008-12 | S3371-0614-005A03 | D |
| 90 | Hose | C2803 hose, 1 set, w/ metal parts on both ends, 2-pc set | 1 | Hydraulic hose for 10-pallet APC | H0027-1101-24 | S3371-0645-004A01 | C |
| 91 | Hose | Tokai Rubber hose 1 set w/ metal parts on both ends, 6-pc set | 1 | Hydraulic hose for 10-pallet APC | H0027-1103-46 | S3371-0645-004A01 | C |
| 92 | Pipe band | Showa Yuki PZB216 | 1 | Hydraulic hose for 10-pallet APC | H0035-0002-69 | S3371-0645-004A01 | D |
| 93 | Orifice | M8X1.0 | 1 | Hydraulic hose for 10-pallet APC | C7868-008101 | S3371-0645-004A01 | D |
| 94 | Orifice | M10X1.0 | 2 | Hydraulic hose for 10-pallet APC | C7868-010101 | S3371-0645-004A01 | D |
| 95 | Nameplate | Alphoto M16X0.5 2 set (NO.41 to 50) | 2 | Hydraulic hose for 10-pallet APC | H1040-1077-95 | S3371-0645-004A01 | D |
| 96 | Nameplate | Alphoto M16X0.5 2 set (NO.51 to 60) | 2 | Hydraulic hose for 10-pallet APC | H1040-1077-96 | S3371-0645-004A01 | D |
| 97 | Collar truss head screw | Shinatomo M6X16 galvanized 2.5Y9/1 baking finish | 4 | Safety fence for 10-pallet APC | H1001-0021-82 | S3363-0645-001A01 | D |
| 98 | Knob | Tochigiya THA-241-1A-1.6 | 2 | Safety fence for 10-pallet APC | H1062-0002-63 | S3363-0645-001A01 | D |

Table 5-20

LIST OF PUBLICATIONS

| Publication No. | Date | Edition |
|-----------------|---------------|---------|
| 5965-E | December 2011 | 1st |
| 5965-E-R1 | October 2012 | 2nd |
| 5965-E-R2 | December 2012 | 3rd |
| 5965-E-R3 | November 2015 | 4th |

Original Instruction Manual

This manual may be at variance with the actual product due to specification or design changes.

Please also note that specifications are subject to change without notice.
If you require clarification or further explanation of any point in this manual,
please contact your OKUMA representative.