EL 380 series
Machine Manual

For Mitsubishi Meldas Magic 64 PC/NC

Made By
ECOCA INDUSTRIAL CO., LTD

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Manufacturer : Ecoca Industrial Company Limited

Address : No.401, 28th Road, Taichung Industrial Park, Taichung City,
Taiwan, R.O.C.

Machinery Type : Electronic Centre Lathe.

Model Range : EL 380 Series

Differences The difference between the EL 3807 and EL 3812 machines is the bed length.
All other factory fitted options available, are common to both series.

Date Prepared : 27 March 1999

Responsible Persons
Signature
Date : 10 June, 1999

Position

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Documentation

The following, is a list of machine documentation covering the EL 380 series of machines.

Ecoca Manuals

Technical File - reference number : CE501E01

EMC Test & Technical Construction File : C0101E01

Ecoca Machine Manual - reference number : CE701E01
Including :-

Part One, - Machine And Operator Safety.
Part Three, - Installation.
Part Four, - Maintenance.

Ecoca Spare Parts Manual. - reference number : CE801E01

Ecoca Operation Manual - reference number : CEB01E01

Ecoca Electrical Manual - reference number : CEC01E01

Ecoca Parameter Manual - reference number : CE201E01

Mitsubishi Programming And Instruction Manuals

Mitsubishi CNC, Meldas Magic 64
Programming Manual (L/G), reference number : B/UP-B2181*ENG

Mitsubishi CNC, Meldas Meldas 64
MAGIC PRO – HI/L, reference number : BDD-A02Q002-A0(ENG)
Part One

Machine & Operator Safety
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1.1 Introduction to Operating Safety

The EL 380 range of machines are NC turning machines with machining facilities under manual control, they are also fast and powerful machines that can be dangerous if used in a manner not intended.

It is assumed that the operator has been properly trained, has the required skill and is authorised to operate this machine. It is also stressed that any operator under going training, is under the close supervision of a skilled and authorised person.

Operator training should be given by Ecoca or by one of its authorised distributors.

1.2 CE Marking & Manufacturer Information

In accordance with regulations, the following labels are attached and contain the information listed.

- Name and address of manufacturer.
- CE mark.
- Year of construction.
- Machine series type.
- Machine serial number.
1.3 Intended Use

General turning applications, that may be carried out on a variety of materials including, Carbon Steels, Cast Irons, Aluminium Alloys and Copper Alloys.

The following is a list of turning processes possible on this machine:

- External Parallel Turning
- Internal Parallel Turning, Drilling And Reaming
- External Taper Turning
- Internal Taper Turning
- External Radius Turning
- Internal Radius Turning
- External Thread Cutting
- Internal Thread Cutting
- Parting Off Process
- Grooving
- Knurling
- Only Use Recommended Cutting Fluids

1.4 Unintended Use,

The machine must never be used with the fixed covers removed, or safety interlock switches deactivated or disconnected.

Under no circumstances must the machine be used to cut the following materials as the process may generate highly toxic fumes or dusts and potentially inflammable waste :-

- Carbon Bar
- Magnesium Alloys
- Plastics
- Wood
- Low Flash Point Cutting Fluids

1.4. Hazard Analysis

The EL380 series Technical File No. CE501E01, section 12 contains a comprehensive hazard analysis for this machine range.

1.4.1 Location of Hazard Warning Labels

Diagram (Figure 1) shows the content and location of warning plates fitted to the machine. Never remove these labels from their location.
1.4.4 Description Of Safety Devices

The location of all safety devices are identified on diagram (figure 2)

1. Emergency Stop push-button (at Control Station)
2. X & Z axis Electronic Handwheels
3. Interlock Switch
4. Grab Handle For Sliding Guard
5. Interlocked And Latched Main Lifting Guard
6. Safety Window
7. Interlocked Chuck Guard
8. Mains Isolator Switch & Electrical Cabinet Key Locks
9. Tailstock, Anti-Collision Switch

1.4.5 Routine Maintenance Checks For Safety Critical Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Inspection Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Stop Circuit Integrity</td>
<td>Monthly</td>
</tr>
<tr>
<td>Electrical Cabinet Interlocks</td>
<td>Monthly</td>
</tr>
<tr>
<td>Guard Interlocks</td>
<td>Monthly</td>
</tr>
<tr>
<td>Clean Machine Window</td>
<td>Start Of Shift</td>
</tr>
<tr>
<td>Clean Machine Light</td>
<td>Start Of Shift</td>
</tr>
<tr>
<td>Check Guards Are In Place And Secured By Their Fixings Or Locks</td>
<td>Start Of Shift</td>
</tr>
<tr>
<td>Check Lifting Guard Rises Smoothly And With Ease</td>
<td>Monthly</td>
</tr>
</tbody>
</table>
1.5 Machine Light

The machine is equipped with a high intensity strip light for good overall illumination of the working area. The relative light level measured at one chuck diameter in front of the chuck is 750 lux. The light is protected to IP67.

1.6 Operating Hazards In The Machine

The machine is designed to allow fast and easy change of spindle speed and slideway direction and rate of traverse. The following precautions must be taken:

- The work pieces must be securely gripped in the work holding devices and adequate work support must be used for long components.
- The maximum safe speeds for work pieces must not be exceeded for any operation.
- The saddle and crosslide movements should be checked to clear the tailstock before enabling a machining cycle.
- The tooling should be checked to clear the tailstock and / or workholding devices.
- Avoid direct contact with swarf when loading and unloading workpieces.

1.7 Metal Cutting Fluids

- Never use low flash point cutting fluids

Skin cancers may be caused by continuous contact with oils, particularly with straight cutting oils and also soluble oils. The following precautions should be observed:

- Avoid unnecessary contact with oil.
- Wear protective clothing.
- Never wear oil soaked or contaminated clothing.
- Thoroughly wash all parts of the body which have come into contact with oil at the end of every shift.
- Avoid mixing different types of oils.
- Change oils regularly.
- Dispose of oils in accordance with statutory regulations.

1.8 Operating Hazards Outside The Machine

Because of the possibility of whipping, especially with small diameter bars, bar stock must not be allowed to extend beyond the end of the headstock spindle without the use of special guarding and adequate bar supports.

Any spilt coolants on the floor must be cleaned immediately to prevent slipping hazards.
1.9 Cutting Conditions For Machine Noise And Vibration Tests

As specified in pr EN- CEN/TC143 WG3 N71, December 1994 Annex C and C1
The following table summarises the machine settings :

<table>
<thead>
<tr>
<th>Machine Rated Power kw</th>
<th>Workpiece Diameter mm</th>
<th>Length Of Cut mm</th>
<th>Spindle Speed rpm</th>
<th>Cutting Speed m/min.</th>
<th>Depth Of Cut mm</th>
<th>Feedrate mm/rev</th>
<th>Metal Removal Rate cm³/min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>63</td>
<td>50</td>
<td>1000</td>
<td>198</td>
<td>2</td>
<td>0.2</td>
<td>79.2</td>
</tr>
<tr>
<td>7.5</td>
<td>63</td>
<td>50</td>
<td>1000</td>
<td>201</td>
<td>2</td>
<td>0.25</td>
<td>101</td>
</tr>
</tbody>
</table>

1.9.1 Vibration Effect - Test Results

- Test Instrument :- Digital Vibration Meter, type 3148 by ACO Japan.
- Readings in :- Acc. = m/sec², vel = cm/sec, Disp. = mm
- Readings taken on the outer face of the machine guards with machine under cutting load.
  1metre horizontally from guards and 1.6metres vertically from ground level.
- Position B is the normal operator position and shown on airborne noise diagram.

<table>
<thead>
<tr>
<th>SPINDLE SPEED</th>
<th>1000 RPM</th>
<th>1000 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACHINE RATED POWER</td>
<td>5.5 kw</td>
<td>7.5 kw</td>
</tr>
<tr>
<td>Position 'A'</td>
<td>NO LOAD</td>
<td>LOAD</td>
</tr>
<tr>
<td>Position 'B'</td>
<td>NO LOAD</td>
<td>LOAD</td>
</tr>
<tr>
<td>Position 'C'</td>
<td>NO LOAD</td>
<td>LOAD</td>
</tr>
<tr>
<td>Position 'D'</td>
<td>NO LOAD</td>
<td>LOAD</td>
</tr>
</tbody>
</table>

NO LOAD = spindle rotation only.
LOAD = with cutting load applied as specified above in 1.9
1.9.2 Airborne Noise Levels - Test Results

- Test Instrument: TES 1350A
- Maximum noise levels at positions shown.
- Readings taken at 1.6 metre above ground level and 1 metre horizontally away from machine outer faces.
- All readings in: dBA

<table>
<thead>
<tr>
<th>SPINDLE SPEED</th>
<th>1000 RPM</th>
<th>1000 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACHINE RATED POWER</td>
<td>5.5 kw</td>
<td>7.5 kw</td>
</tr>
<tr>
<td>LOAD</td>
<td>NO LOAD</td>
<td>LOAD</td>
</tr>
<tr>
<td>Position 'A'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position 'B'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position 'C'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position 'D'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Position 'D'

Position 'A'

Position 'B'

Position 'C'
1.9.3 Spindle Stopping Times - Test Results

- All times are in seconds

<table>
<thead>
<tr>
<th>SPINDLE SPEED</th>
<th>1000 - 0 RPM</th>
<th>2000 - 0 RPM</th>
<th>3000 - 0 RPM</th>
<th>4000 - 0 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACHINE RATED POWER (Kw)</td>
<td>5.5</td>
<td>7.5</td>
<td>5.5</td>
<td>7.5</td>
</tr>
<tr>
<td>165 dia. 3 jaw manual chuck</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.9.4 Emergency Stopping Distances - Test Results

- All distances are in mm.
- Z Axis Servo Motor - Mitsubishi HA40NT-A40, (fitted to all machines in the range).
- X Axis Servo Motor - Mitsubishi HA33NT-A33, (fitted to all machines in the range).

<table>
<thead>
<tr>
<th>AXIS / SLIDE VELOCITY</th>
<th>2.5 m/min (50%)</th>
<th>5 m/min (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Axis Stopping Distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z Axis Stopping Distance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.10 Safe Operation Of Lathe Chucks

- Always check the chuck area is clear of chuck keys before starting the spindle.
- Never attempt to grip components with grease or oil on it.
- Grip all components firmly.
- Never attempt to hold awkward shaped components without special purpose workholding fixtures.
- Never attempt to hold work that exceeds the weight limit for the machine.
- Always use suitable lifting equipment when loading and unloading heavy or long workpieces.
- Never attempt to stop the chuck rotation by hand whilst the machine is under power.

1.10.1 Grip Forces And Permissible Speeds For Lathe Chucks.

Specific data cannot be given for every application as this is not known by the manufacturer in advance and outside his control. When details of safe operating speeds are supplied, these are intended only for guidance and are based on the following conditions :-

1. Chucks in sound condition.
2. The gripping power being known .
3. Standard top jaws being used.

Careful consideration must be given to providing the correct gripping conditions. The possibility of the workpiece becoming loose in its mounting can occur for the following reasons :-

1. The spindle speed too high for the application.
2. The radius at which the jaw mass is concentrated.
3. Out of balance state.
4. The gripping force applied at the static state.
5. Internally or externally gripped workpiece.
6. The condition of the chuck.
7. The magnitude of the cutting forces.
8. Weight and type of soft jaw used, if this is non-standard

Refer to ISO/TR 13618 for guidance on safe loading and operating speeds.
### 1.10.2 Chucks Details

<table>
<thead>
<tr>
<th></th>
<th>Mass</th>
<th>Gripping Diameter of Jaw</th>
<th>Maximum Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Internal</td>
<td>External</td>
</tr>
<tr>
<td>Size</td>
<td></td>
<td>Max.</td>
<td>Max.</td>
</tr>
<tr>
<td>3 Jaw Chuck, 165 mm Dia. Self-Centering With Solid Half Jaws, SC-7</td>
<td>14.2 Kg</td>
<td>180</td>
<td>170</td>
</tr>
<tr>
<td>3 Jaw Chuck, 192 mm Dia. Self-Centering With Interchangable Jaws, SK-7</td>
<td>13.8 Kg</td>
<td>180</td>
<td>170</td>
</tr>
<tr>
<td>3 Jaw Chuck, 232 mm Dia. Self-Centering With Solid Half Jaws, SC-9</td>
<td>22.7 Kg</td>
<td>220</td>
<td>210</td>
</tr>
</tbody>
</table>

**WARNING:**

Ensure all work and faceplate tooling is correctly balanced. Refer to ISO/TR13618 for guidance on loading and safe loaded speeds.

### 1.10.3 Steady Rests

<table>
<thead>
<tr>
<th>Steady</th>
<th>Mass</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL380 Stationary Steady with Rollers</td>
<td>22Kg</td>
<td>12mm (1/2&quot;) - 150mm (6&quot;)</td>
</tr>
<tr>
<td>EL380 Stationary Steady with Pads</td>
<td>22Kg</td>
<td>16mm (5/8&quot;) - 160mm (6-3/8&quot;)</td>
</tr>
<tr>
<td>Stationary Steady Open Half</td>
<td>7 Kg</td>
<td></td>
</tr>
<tr>
<td>Load to Open Steady = 5Kgf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EL380 Travelling Steady with Rollers</td>
<td>10Kg</td>
<td>10mm (3/8&quot;) - 60mm (2-3/8&quot;)</td>
</tr>
<tr>
<td>EL380 Travelling Steady with Pads</td>
<td>10Kg</td>
<td>10mm (3/8&quot;) - 90mm (3-1/2&quot;)</td>
</tr>
</tbody>
</table>
1.11 Operating Safety Precautions

- Know how to stop the machine before starting it.
- Stop the machine as soon as anything unexpected happens.
- Never take depths of cut beyond the machines capacity.
- Never use excessive feedrates.
- Never attempt to polish the workpiece with abrasive paper.
- Do not interchange chucks without checking for the correct locking.
- Do not use workholding devices without checking their compatibility with Ecoca.
- Check the load capacity of revolving centres for each application.
- Do not use the machine in excess of its rated load capacity.
- Keep the machine and work area clean and tidy.
- Keep all guards and covers in place and ensure cabinet doors are closed.
- Do not reach over moving or rotating parts of the machine.
- Do not wear rings, watches or loose clothing when operating the machine.
- Isolate the machine when leaving it unattended.

1.11.1 Safety Clothing and Protection

- Use ear protectors if noise level exceeds 85db forusr applications.
- Always wear approved safety glasses, Optical if required.
- Always wear approved safety footwear.
- Use approved skin barrier creams.
- Use suitable safety gloves when clearing swarf. eg. leather gloves.
1.11.2 Use Of The Machine

- Never use the machine without adequate lighting or if the machine light is broken.
- Do not use broken or chipped turning tools.
- Select the correct turning tool for the machining process.
- Beware of large burrs and sharp edges on finished work.
- Beware of sharp swarf and metal chips from the cutting process.
- Clean the machine slides of swarf and cutting chip build up regularly.
- Clear the swarf bin regularly.
- Ensure chuck keys and hand tools are not left in the chuck or on the slideways after work loading or tool changing processes.
- Never use abrasive paper or clothe to clean the workpiece, with the spindle is running.
- Never rush your work.
- Do not remove fixed guards whilst the machine is under power.
- Do not place hands or body in the path of moving objects.
- Beware of moving heavy parts which can fall. Use lifting equipment.
- Beware of accidentally moving levers and depressing buttons or turning the power on.
- Know the function of every control.
- Never place hand on the workpiece whilst it is rotating.
- Never lean against the machine or its moving parts.
- Do not allow distractions to interfere with the operation of the machine.
- Always isolate the machine when leaving it unattended.

1.11.3 Use Of Hand Tools

- Clean all handles and levers of grease and oil.
- Never use hand tools without the handle fitted.
- Always use the correct hand tool for the job.
- Grip hand tools firmly and at their intended position.
- Never apply excessive force with hand tools.
- Always locate the tool correctly in the socket or screw slots.
- Beware of obstructions which prevent bolts and screws being fully tightened.
- Always use a hand tool to remove swarf from the machining area and/or swarf bin.
Part Two

Machine Specification
2 Contents

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# Machine Specification

## 2.1 Machine Specifications – EL380 series

<table>
<thead>
<tr>
<th>Feature</th>
<th>EL3807</th>
<th>EL 3812</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swing Over Bed</td>
<td>380mm (15°)</td>
<td>240mm (9-7/16&quot;)</td>
</tr>
<tr>
<td>Swing Over Crossslide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centre Height</td>
<td>190 mm (7-15/32&quot;)</td>
<td>300 mm (11-13/16&quot;)</td>
</tr>
<tr>
<td>Distance Between Centres</td>
<td>750 mm (30&quot;)</td>
<td>1250 mm (50&quot;)</td>
</tr>
<tr>
<td>Width Of Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle Drive Rating</td>
<td>Variable Speed A/C Drive, 5.5/7.5kW (7.5/10Hp) or 7.5/11kW (10/14.5 Hp) Option</td>
<td></td>
</tr>
<tr>
<td>Direct Drive Spindle Speed</td>
<td>20 - 4000 rpm</td>
<td></td>
</tr>
<tr>
<td>Spindle Nose</td>
<td>ASA D1-5&quot; or A2-5&quot;</td>
<td></td>
</tr>
<tr>
<td>Spindle Bore</td>
<td>48mm (1-13/16&quot;)</td>
<td></td>
</tr>
<tr>
<td>Spindle Front Bearing Bore</td>
<td>70mm (2-3/4&quot;)</td>
<td></td>
</tr>
<tr>
<td>**Longitudinal Working Stroke</td>
<td>680 mm (26-3/4&quot;)</td>
<td>1180 mm (46&quot;)</td>
</tr>
<tr>
<td>Transverse Working Stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed Force – Longitudinal</td>
<td>174 mm (6-27/32&quot;)</td>
<td></td>
</tr>
<tr>
<td>Feed Force – Transverse</td>
<td>5000 N (1110 lbf)</td>
<td>2400 N (540 lbf)</td>
</tr>
<tr>
<td>Rapid Traverse</td>
<td>continuous</td>
<td>continuous</td>
</tr>
<tr>
<td>Range Of Feeds</td>
<td>5 m/min (16ft/min) max.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.01 to 500mm/rev (0.0004' to 19.66'/rev)</td>
<td></td>
</tr>
<tr>
<td>Tailstock Barrel Diameter</td>
<td>58mm (2-9/32&quot;)</td>
<td></td>
</tr>
<tr>
<td>Tailstock Barrel Stroke</td>
<td>127 mm (5&quot;)</td>
<td></td>
</tr>
<tr>
<td>Morse Taper In Barrel</td>
<td>4 MT</td>
<td></td>
</tr>
<tr>
<td>4-Way Toolpost</td>
<td>100 x 100 Square</td>
<td></td>
</tr>
<tr>
<td>External Turning Tools</td>
<td>20 x 20 Square Shank</td>
<td></td>
</tr>
<tr>
<td>Max. Boring Bar</td>
<td>20 Diameter</td>
<td></td>
</tr>
</tbody>
</table>

### Load Capacity Between Centres

<table>
<thead>
<tr>
<th></th>
<th>275 kg</th>
<th>450 kg</th>
</tr>
</thead>
</table>

### Machine Rating KVA

<table>
<thead>
<tr>
<th></th>
<th>5.5 / 7.5 kW (Standard)</th>
<th>7 / 11 kW (Option)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 KVA</td>
<td>26 KVA</td>
</tr>
</tbody>
</table>

### Machine Dimensions

<table>
<thead>
<tr>
<th></th>
<th>2135 x 1215 x 1886 (84&quot; x 48&quot; x 74&quot;)</th>
<th>2635 x 1215 x 1886 (104&quot; x 48&quot; x 74&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. Machine Net Weight</td>
<td>2200 kg (4840 lbs)</td>
<td>2800 kg (6160 lbs)</td>
</tr>
</tbody>
</table>
MACHINE SPECIFICATION

Machine Capacity...... Cont.


Steady Capacities.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Stationary Steady with Rollers</td>
<td>12mm (1/2&quot;) - 150mm (6&quot;)</td>
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<tr>
<td>Stationary Steady with Pads</td>
<td>16mm (5/8&quot;) - 160mm (6-3/8&quot;)</td>
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<td>Travelling Steady</td>
<td>10mm (3/8&quot;) - 60mm (2-3/8&quot;)</td>
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<tr>
<td>Travelling Steady</td>
<td>10mm (3/8&quot;) - 90mm (3-1/2&quot;)</td>
</tr>
</tbody>
</table>

* Top speed of machine maybe limited by the permissible speed of workholding equipment fitted.
** Actual working strokes maybe reduced by workholding equipment, certain cutting tools and chuck guards.
*** Machine dimensions with electrical cabinet door closed.
**** Always check the limiting load capacity of revolving centres and work holding devices first.

Machine specifications are subject to change without prior notice.
### 2.2 CNC Control Specification – Mitsubishi Magic 64 (PC/NC control)

<table>
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<tr>
<th>Controlled Axes</th>
<th>Standard Number Of Controlled Axes</th>
<th>Number Of Controlled Axes</th>
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<td>Others: Pre-Read Buffer, Input Buffer</td>
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<td>Cutting Feedrate</td>
<td>m/min Or mm/Rev</td>
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<tr>
<td></td>
<td>Rapid Feedrate</td>
<td>m/min Or mm/Rev</td>
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<tr>
<td></td>
<td>Rapid Feed Override</td>
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<td></td>
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<tr>
<td></td>
<td>Cutting Feed Overide</td>
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<tr>
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<td>Manual Feed - Rapid Jog Feed</td>
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<td></td>
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<tr>
<td></td>
<td>Incremental Feed Dewell</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Dewell</td>
<td>Time Based Revolution Based</td>
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<tr>
<td>Program Memory Editing</td>
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<td>Memory Capacity: (Programs Stored)</td>
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<td>Program Editing</td>
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<td>Display Panel</td>
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<td>Display Method</td>
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<td>RS-232C Interface CH2 (Upto 9600bps)</td>
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<td>Spindle Functions: S - Code Output 2-Bit Bcd, T2-Digit BCD Output, M3-Digit BCD Output Independent M Output, Finish Functions</td>
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<td>Tool Offset</td>
<td>Tool Offset Compensation: Nose Radius Compensation, Automatic Selection, Nose Radius Compensation, Number Of Tool Offsets, System Common Offset</td>
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<td>Tool Length</td>
<td>Tool Length Compensation</td>
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<td>Tool Diameter</td>
<td>Nose Radius Compensation</td>
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<td>Operation And Support Functions</td>
<td>Program Control</td>
<td>Program Control: Label Skip, Optional Block Skip</td>
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<td>Program Test</td>
<td>Program Test: Dry Run, Machine Lock All Axes, Misc. Function Lock</td>
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<td></td>
<td>Program Call, Start, Step</td>
<td>Program Call, Start, Step: Program Number Search, Sequence Number Search, Automatic Operation Start, NC Reset 1 / NC Reset 2, Reset And Rewind, Single Block, Feedhold</td>
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<td>Interrupt Operation</td>
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<td>Manual / Absolute ON/OFF</td>
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<th>Programming Support Functions</th>
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<th>Sub-Program Control</th>
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<td>Mirror Image Parameter Setting</td>
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<td>Linear Angle Command</td>
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<th>Functions For Machine Accuracy</th>
<th>Exact Stop Check</th>
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<td>Data Input / Output</td>
<td>Exact Stop Check</td>
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<td>Machine Program Input / Output</td>
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<tr>
<td></td>
<td>Tool Offset Input / Output</td>
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<tr>
<td></td>
<td>Parameter Input / Output</td>
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<td>Common Variable Input / Output</td>
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<td>History Data Output</td>
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| Dynamic Accuracy Compensation | Lost Motion Compensation  |

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<th>Safety And Maintenance</th>
<th>Safety Functions</th>
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<td>Displays For Safety</td>
<td>Emergency Stop</td>
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<tr>
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<td>Data Protection Key Interface</td>
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<td>Operation Error Display</td>
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<td>Servo Error Display</td>
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<td></td>
<td>Cause Of Operation Stop Display</td>
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<td></td>
<td>Cause Of Emergency Stop Display</td>
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<td></td>
<td>Temperature Rise Detection</td>
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<td>DC Supply Voltage Detection</td>
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<table>
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<th>Operations For Safety</th>
<th>Stroke End</th>
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<td>Stored Stroke Limit I</td>
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<tr>
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<td>Stored Stroke Limit II</td>
</tr>
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<td></td>
<td>Cutting Feed Clamp</td>
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<td>Edit Lock BIC</td>
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<th>Maintenance And Trouble Shooting</th>
<th>Servo Monitor Display</th>
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<tr>
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<td>Input / Output Monitor Display</td>
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<td>Key Operation History Monitor</td>
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<td>Software Composition Display</td>
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<td>Hardware / Servo Composition Display</td>
</tr>
<tr>
<td></td>
<td>AC Input Power Trouble Detection Monitor</td>
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<td></td>
<td>Memory Save Function</td>
</tr>
<tr>
<td></td>
<td>Specifications Table Display</td>
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</tbody>
</table>

### 2.2.1 COMPUTER VIRUS WARNING

- The NC / PC maybe corrupted by computer viruses if due care is not taken.
- Make sure all floppy disks are checked and are virus clean before loading into the machine A: drive.
- Ecoca cannot accept responsibility for any damage caused to the machine due to the effects of computer viruses or any unauthorised 3rd party software applications which maybe installed.
2.3 Torque / Power Capacity At Spindle

Spindles are driven by Mitsubishi AC spindle motors via a direct belt drive. Two versions are available.

- Mitsubishi SJ7.5-A :- 5.5kW / 7.5kW (standard)
- Mitsubishi SJ11-AP :- 7kW / 11kW (option)

Speed Range Data :- Standard EL380 machines fitted with high speed manual chucks, 165mm diameter.

<table>
<thead>
<tr>
<th></th>
<th>5.5kW / 7.5kW (standard)</th>
<th>7kW / 11kW (option)</th>
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<tbody>
<tr>
<td>Spindle Speed Range</td>
<td>18 – 4000 RPM</td>
<td>23 – 4000 RPM</td>
</tr>
<tr>
<td>Constant Torque Range</td>
<td>18 – 750 RPM</td>
<td>23 – 4000 RPM</td>
</tr>
<tr>
<td>Constant Power Range</td>
<td>750 – 4000 RPM</td>
<td>1000 – 4000 RPM</td>
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</tbody>
</table>
2.3.1 Power Capacity At Spindle - 5.5 / 7.5 kw Motor

EL380 fitted with Mitsubishi SJ-7.5A

2.3.2 Torque Capacity At Spindle - 5.5 / 7.5 kw Motor

EL380 fitted with Mitsubishi SJ-7.5A
2.3.3 Power Capacity At Spindle - 7 / 11 kw Motor

EL380 fitted with Mitsubishi SJ-11AP

Continuous Torque = 108.1Nm

2.3.4 Torque Capacity At Spindle - 7 / 11 kw Motor

EL380 fitted with Mitsubishi SJ-11AP
Part Three

Installation
3 Chapter 3

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3.1 Electrical Installation Hazard

Lethal voltages are present in the electrical equipment of this machine. Only suitably qualified personnel should be permitted to install, test, adjust or repair any part of this machine or its optional equipment.

3.2 Site Location - Environmental Considerations

- Normal operating ambient temperature range of \(+10 \, ^\circ\text{C} \text{ to } +35 \, ^\circ\text{C}\)
- Relative Humidity level \(30\% \text{ to } 95\%\)
- Do not site close to gas, chemical or explosive stores.
- Do not site close to sources of electromagnetic interference

3.3 Cleaning

- The machine has been coated with an anti corrosion protector on it slideways and bright machined faces. This must be cleaned thoroughly before attempting to use the machine.
- When power is connected to the machine the slideway lubrication pump, (located at the tailend of the machine), may be operated by pressing the priming button on the front of the unit. This will clear any remaining anti-corrosion coating from under the bed wipers.
- Use only white spirit or paraffin for cleaning down the machine protective coating.
- Do Not use cellulose solvents or petrol, these may damage the painted surfaces.
- Remove all moisture absorbent silica gel bags from the machine and inside the electrical cabinet.

3.4 Foundation Location

- Locate the machine on a flat, level and solid foundation, allowing working space all round for routine maintenance and service access. Refer to the machine floor plan and overall machine dimension diagrams.
- Consider the entry points for the electrical supply at the headend of the machine.
- Allow for future work loading of long bar stock from the rear of the spindle. Setting the machine at an angle to existing machinery may be useful.
- The lathe may be levelled and used free standing, however to obtain the best performance it is recommended that the machine should be bolted to a 250mm thick concrete foundation slab.

Ecoca, cannot be responsible for foundation and fixing difficulties, but will always offer advise if requested.

3.4.1 Foundation Plates

Whether the machine is to be installed free standing or bolted down, the jacking bolts should be laid onto steel foundation plates, approximately 80mm x 80mm x 20mm thick or those supplied in the tool kit.
3.5  Lifting The Machine

Do Not attempt to lift the machine by any other method than that described in the following section.
Do Not attempt to lift the machine with underrated lifting equipment.
Do Not allow the main lift up guard to be closed until power is connected to the machine. The sliding guards are electrically interlocked and mechanically latched when closed.

CRUSHING HAZARD :-
The Main Lift Up Guard is very heavy (20kg) without the gas springs attached. Take precaution to prevent the guard from falling forward when installing the machine.

3.5.1  Rules For Safe Lifting

Study the lifting diagram (Figure 5) fully.
1. Position the lifting equipment as shown on the lifting diagram.
2. Ensure the tailstock is clamped firmly to the machine bed.
3. Ensure the swarf bin and coolant tank are removed from between the machine base before lifting.
4. Begin the lift gently, if required lower the machine and adjust the sling lengths to gain a balanced lift.
5. Never overload the lifting equipment.
6. Never try to drag the machine.

If the machine is to be off-loaded and awaiting site placement for long periods of time, prevent induced stresses in the structure by adjusting all the jacking bolts to take equal loading, all round.
2200 Kg - EL3807
2800 Kg - EL3812

CRUSHING HAZARD
The main lift up guard is very heavy without the gas springs attached. Take precautions to prevent the guard from falling forward when installing the machine.

Use bed clamp lifting device set between saddle and headstock

Place some material packing here to prevent damage to paintwork

Fix gas spring to this hole.

Release Hinged door gas springs from there rear mounting and lay door fully backwards

Ecoca EL380 series - Lifting Instructions
3.8 Jogging The Axes

It is essential that you have the ability to jog the axes before commencing the levelling procedure.

3.8.1 Procedure

1. Power up the machine (refer to section 3.16.3)
2. Check the tailstock is at the extreme tailend of the machine bed.
3. Select manual mode on the operator panel.
4. Press Z minus or Z plus pushbuttons or use the joystick on the operator control panel to move the saddle in the desired direction.
5. Power off the machine

3.9 Levelling The Machine

Refer to levelling diagram (Figure 7)

The aim of levelling the machine is to eliminate twist in the bed slideways and to straighten the machine bed, eliminating any sag whilst introducing a small amount of convex shape from end to end.

A convex condition allows for the combined mass of the saddle, crossslide and tooling, plus cutting downward forces.

To check the level of the machine at both ends and at the centre of the machine, the ability to traverse the saddle is necessary. Power should be connected to the machine before commencing the levelling process.

3.9.1 Levelling Procedure

1. Move the saddle to the tailend of the machine.
2. If bolting down bolts are used these should not be tightened at this stage.
3. Using engineers precision blocks and a precision level (sensitivity 0.05 mm/m) as shown, level the machine from end to end, then front to back.
4. Adjust the four inner jacking bolts ‘A’ at the headend and tailend of the machine base to take all the machine load. Back off the remaining jacking bolts B’ at this stage. Note the readings at the headend.
5. Move the saddle to the mid position, adjust jacking bolts ‘A’ to achieve level headend to tailend. Adjust jacking bolts ‘B’ at the Headend to adjust the twist and find the mean position.
6. When the twist is eliminated, touch down the jacking bolts ‘B’, to stabilise the structure and pinch down the bolt down nuts, evenly. Re-check the bed twist readings.
7. Adjusting jacking bolts ‘B’ at the headend will affect the beds convex shape and allow this limit to be set.
8. Pinch down the bolt down nuts at the headend and re-check the bed level readings.
9. Tighten the bolt down nuts fully.
10. Take final readings for level and twist.
(B) With Foundation Bolt

Foundation plate
steel plate set in concrete

Concrete Base

250 concrete base

M12xP1.75 Nut and M12 Heavy Washer

(A) Without Foundation Bolt

Jacking Bolt
Lock nut
Machine base
Jacking plate

102
115
120

M24xP2.0

Jacking Bolt Detail

Engineers Precision Levels
(Sensitivity 0.02mm/1000mm)

Precision Blocks

Levelling Diagram & Bolting Down Arrangement

EL 380 series

Figure 7
TWIST 0.04mm/1000mm max.

CONVEX FORM 0.025mm/1000mm

Schematic Of Bed Form

Figure 8
3.10 Lubrication Checks

Machines are normally despatched with the necessary lubrication oil. Before operating the machine it is vital these oil levels are verified and checked for operation.

WARNING !!
Isolate the machine before removing any covers and making adjustments.

3.10.1 Headstock Lubrication (figure 9)
The spindle is mounted on Gamet Super Precision Taper Roller Bearings, grease packed for life. The configuration provides a sprung pre-loaded arrangement to ensure constant spindle stiffness is maintained over the full speed range. The bearings are pre-run prior to despatch to ensure a stable temperature condition over the full speed range.
- Typical stable temperature rise at 4000rpm = 12 degrees Celcius after 30 minutes continuous running
- Maximum permissible temperature rise should not exceed 20 degrees Celcius

3.10.2 Centralised Ballscrew And Slideway Lubrication System.

Refer to Diagram (Figure 10 & 10A).
The X-axis and Z-axis ballscrews and slideway surfaces are automatically lubricated by a self contained motorised pump unit located at the rear of the machine and adjacent to the electrical cabinet.
The system oil level can be seen easily through the clear plastic sump and a level indicator shows the maximum and minimum levels required. The system can be filled by removing the orange filler cap on the top of the sump. Use a funnel when filling to prevent spillage. Any overspill should be cleared immediately as this is a hazard.
The system must be primed by pressing the push-button on the front of the pump set. Oil will be seen exiting the bleed hole on the saddle when the system is primed. Jogging the axes a few times will spread the oil film across the sliding faces.
The frequency of system priming can be set by the user depending on his application.
The system is a total loss system to prevent air locks and the oil level will require checking on a regular basis. A level switch in the sump will detect low oil level and give an audible alarm when it is low level. This should not be relied on to determine the top up frequency.
WARNING !!
Under no circumstances should the machine be used without lubrication to the ballscrews and slideways.

3.10.3 Tailstock Lubrication (Figure 11)
Oilers are provided on the top face of the tailstock body and the handwheel shaft mounting plate between the handwheel and the tailstock gearbox.
Gomel Super Precision Taper Roller Bearings
Accuracy class P2

Front Bearing: G130070/130120C

Rear Bearing: G130060/130120P+8 springs

Pre-greased with OPTIMOL – Optitool HS1
set interval between discharges
off time - minutes
range (0 - 99) x 2
eg. setting (10) x 2 = 20 mins

set discharge time
on time - seconds
range (0 - 99) x 2
eg. setting (10) x 2 = 20 secs

Interval Time Preset Display
Discharge Time Preset Display
Pressure Gauge
Oil Filler Cap
Oil Level Sight

Interval Time Push Button
Discharge Time Push Button

Manual Override Push Button

0.9 ltr
Reset

Slideway Lubrication Saddle Pipework
And Flow Adjusters

Saddle Vee
Crosslide LH Flat
X-Ballnut

Saddle Flat
Crosslide RH Flat

To Pump
4mm Nylon Tube

Part Number
1 = 2 in. Ballnut
2 = Saddle Front Toe LH Crossslide
3 = Saddle Toe RH Crossslide

Ballscrew & Slideway Lubrication
EL 380 series

Figure 10
Slideway Lubrication Saddle Pipework
And Flow Adjusters

Figure 10A
### 3.11 Recommended Oil Lubricants

<table>
<thead>
<tr>
<th>Feature</th>
<th>Capacity</th>
<th>Kluber</th>
<th>Esso</th>
<th>Shell</th>
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<td>Tonna T68</td>
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<td>Tailstock</td>
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<td>Febis K220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuck Jaws</td>
<td></td>
<td></td>
<td>Isoflex</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WARNING !!**
- Isolate the machine before removing any covers and making adjustments.
- Under no circumstances should lubricants other than those specified above be used. Any queries please refer to Ecoca.

### 3.12 Coolant System

Coolant is supplied via a pump mounted on the coolant tank and located at the rear of the machine. The manually operated coolant tap is mounted to the front of the toolpost base, and has a flexible stork to direct the coolant at the cutting tip. Coolant will always move with the toolpost.

#### 3.12.1 Coolant System Filling

**WARNING !!**
Isolate the machine before removing any covers and making adjustments.

1. The coolant tank is a separate tank which sits on the floor between the headend and tailend base castings. It can be accessed at any time for filling.
2. Remove the cover adjacent to the coolant pump.
3. With a suitable container to assist filling, fill the tank to within 1cm (3/8") of the top. Coolant maybe poured directly into the coolant tank.
4. Clean any overspill on the floor immediately.

#### 3.12.2 Coolant Capacities and Recommended Types

<table>
<thead>
<tr>
<th>Machine</th>
<th>Capacity</th>
<th>Esso</th>
<th>Shell</th>
<th>Mobil</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL3807</td>
<td>85 litres</td>
<td>Cutwell 30</td>
<td>Dromus oil B</td>
<td>MET 50</td>
</tr>
<tr>
<td>EL3812</td>
<td>160 litres</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.13 Chucks And Chuck Mounting

Chucks and workholding devices are heavy items and suitable lifting equipment must be used when changing them. As a guide a 6", 3-jaw manual chuck weighs approximately 15kg.

**WARNING !!**
Isolate the machine before removing any covers and making adjustments.

When fitting chucks or faceplates to the machine, the spindle nose taper and the internal location taper in the rear of the chuck body or its adapter plate must be clean.

**D1-5" Spindles**
- A suitably sized piece of timber with a vee notch is ideal to protect the bed ways under the spindle nose and allows the chuck body to be rested on it at the correct spindle height. With the chuck camlock studs approximately lined with the bores in the spindle nose, the chuck may be slid onto its mounting.
- Check the chuck mounting on its taper. There should be a small gap between the back face of the chuck and the spindle nose face. This ensures the location is on the spindle nose taper.
- Check the camlock secure at the correct position. If necessary, adjust the camlock.

**A2-5" Spindles**
- These are bolted directly to the spindle nose on the outer bolt holes.

3.13.1 Camlock Adjustment Procedure

Refer to Diagram ( Figure 13 )

1. Remove cap head screws ‘B’
2. Turn the camlock stud ‘A’ until the ID. mark aligns flush with the rear face of the chuck. One turn of the camlock stud adjusts the locking position approximately 90 degrees.
3. Re-fit cap head screws ‘B’

Re-mount the chuck to the spindle nose and lock the six camlocks in the periphery of the spindle nose with the square shanked tool provided. Re-check for the correct cam positions.

**WARNING !!**
- Only use high speed chucks within this machine.
- Take note of the limiting speeds when attaching chucking equipment.
- Refer to section (1.10) for further details regarding chuck safety.
THREE PHASE IS DANGEROUS
Always Ensure The Supply Is Dead When Wiring To The Machine.
Always Ensure The Earthing Is Good At The Source And At The Lathe
The Machine Earth Must Be Connected To The Site Earth
If Phase Changing Is Necessary, Switch Off Power At The Source First.
Cabinet Door Should Only Be Opened By Qualified People and Only
In The Event That Service Maintenance is Required.

Connecting Mains Supply
Figure 14
### 3.15.1 Isolator Specifications (QS1)

<table>
<thead>
<tr>
<th>Voltage (3-phase AC)</th>
<th>Rated Capacity (A)</th>
<th>Wire Diameter (mm²)</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>220V</td>
<td>80A</td>
<td>14mm²</td>
<td>194E-A80-1753 B</td>
</tr>
</tbody>
</table>

### 3.15.2 Breaker Specifications (QF1)

#### For SJ-PF7.5-01 Spindle Motor

<table>
<thead>
<tr>
<th>Voltage (3-phase AC)</th>
<th>Rated Capacity (A)</th>
<th>Wire Diameter (mm²)</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>220V</td>
<td>60A</td>
<td>14mm²</td>
<td>MG, C45N 3P60A</td>
</tr>
<tr>
<td>380V</td>
<td>32A</td>
<td>8mm²</td>
<td>TE, GV2-RS32</td>
</tr>
<tr>
<td>415V</td>
<td>30A</td>
<td>8mm²</td>
<td>TE, GV2-RS32</td>
</tr>
<tr>
<td>440V</td>
<td>28A</td>
<td>8mm²</td>
<td>TE, GV2-RS32</td>
</tr>
<tr>
<td>575V</td>
<td>24A</td>
<td>8mm²</td>
<td>TE, GV2-RS32</td>
</tr>
</tbody>
</table>

#### For SJ-PF11-01 Spindle Motor

<table>
<thead>
<tr>
<th>Voltage (3-phase AC)</th>
<th>Rated Capacity (A)</th>
<th>Wire Diameter (mm²)</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>220V</td>
<td>80A</td>
<td>22mm²</td>
<td>MG, NC100HC3P80A</td>
</tr>
<tr>
<td>380V</td>
<td>40A</td>
<td>14mm²</td>
<td>MG, C45N 3P60A</td>
</tr>
<tr>
<td>415V</td>
<td>40A</td>
<td>14mm²</td>
<td>MG, C45N 3P60A</td>
</tr>
<tr>
<td>440V</td>
<td>40A</td>
<td>14mm²</td>
<td>MG, C45N 3P60A</td>
</tr>
<tr>
<td>575V</td>
<td>28A</td>
<td>14mm²</td>
<td>TE, GV2-RS32</td>
</tr>
</tbody>
</table>

### 3.15.3 Breaker Specifications (QF2)

<table>
<thead>
<tr>
<th>Voltage (3-phase AC)</th>
<th>Rated Capacity (A)</th>
<th>Wire Diameter (mm²)</th>
<th>Option Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>220V</td>
<td>4A</td>
<td>3.5mm²</td>
<td>Without Options or With Chip Conveyor Only</td>
</tr>
<tr>
<td>220V</td>
<td>8A</td>
<td>3.5mm²</td>
<td>With Hydraulic Chucking</td>
</tr>
<tr>
<td>220V</td>
<td>8A</td>
<td>3.5mm²</td>
<td>With Turret</td>
</tr>
<tr>
<td>220V</td>
<td>10A</td>
<td>3.5mm²</td>
<td>With Hydraulic Chucking &amp; Electric Turret</td>
</tr>
</tbody>
</table>
3.15.4 Magnetic Contactor Specifications

<table>
<thead>
<tr>
<th>Contactor Ref. Symbol</th>
<th>Voltage (3Ø AC)</th>
<th>Rated Capacity (A)</th>
<th>Wire Dia. (mm²)</th>
<th>Range</th>
<th>Setting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM2</td>
<td>220V</td>
<td>12A</td>
<td>1.25mm²</td>
<td>TE</td>
<td>LR2-D1310</td>
</tr>
<tr>
<td>KM3</td>
<td>220V</td>
<td>12A</td>
<td>1.25mm²</td>
<td>FR2</td>
<td>4 - 6A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4A</td>
</tr>
<tr>
<td>KM41</td>
<td>220V</td>
<td>12A</td>
<td>1.25mm²</td>
<td>FR3</td>
<td>0.4 - 0.83A</td>
</tr>
<tr>
<td>KM42</td>
<td>220V</td>
<td>12A</td>
<td>1.25mm²</td>
<td>FR4</td>
<td>0.83 - 1A</td>
</tr>
<tr>
<td>KM51</td>
<td>220V</td>
<td>12A</td>
<td>1.25mm²</td>
<td></td>
<td>0.9A</td>
</tr>
<tr>
<td>KM52</td>
<td>220V</td>
<td>12A</td>
<td>1.25mm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM101</td>
<td>220V</td>
<td>50A</td>
<td>14mm²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.15.5 Fuse Ratings

<table>
<thead>
<tr>
<th>Fuse Number</th>
<th>Current Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU1</td>
<td>2A</td>
</tr>
<tr>
<td>FU2</td>
<td>2A</td>
</tr>
<tr>
<td>FU3</td>
<td>2A</td>
</tr>
<tr>
<td>FU4</td>
<td>2A</td>
</tr>
<tr>
<td>FU5</td>
<td>2A</td>
</tr>
</tbody>
</table>
3.15.6 **Power Check and Start Up**

1. Close and lock cabinet doors.
2. Connect to factory mains supply.
3. Turn isolator switch to ‘ON’ position.
4. Note: The machine worklight will come on.
5. Ensure that the ‘Emergency stop’ button is pressed ‘IN’.
6. Turn The Control Switch ‘ON’ (Located under the flap adjacent to the IPC display)
7. Release the ‘Emergency Stop’ button.
8. Press ‘Reset’ on the operator panel.

   Note: The CRT screen display will be active after a short delay.

3.15.7 **Phase Check**

Fill in the coolant tank with coolant. Press the “COOLANT ON” button on the control panel by manual. The phase connections are correct if coolant comes out from the coolant pipe.

3.15.8 **Changing the Phase**

**Warning**, !!

Isolate the factory power supply to the machine.

1. Turn isolator switch on cabinet door to the off position. Unlock and open the cabinet doors.
2. Reverse any **two** mains supply wires at the isolator terminals.
3. Power up machine and re-check.

3.15.9 **Power Down Procedure - Switching Off**

1. Press the ‘Emergency Stop’ button.
2. Exit WINDOWS operating system.
3. Turn The Control Switch ‘OFF’ (Located under the flap adjacent to the IPC display) Turn off the isolator switch.

   Note: After 5 seconds, any stored charge in the electrical system will be completely dissipated.

3.15.10 **Power Up Procedure - Switching On**

1. Turn on the mains supply switch.
2. Turn The Control Switch ‘ON’ (Located under the flap adjacent to the IPC display) Wait for WINDOWS operating system to load.
3. Release the ‘Emergency Stop’ button.
4. Press the ‘Reset’ button.
3.15.11 Power Consumption For The Machine

<table>
<thead>
<tr>
<th>Spindle Motor</th>
<th>Machine Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitsubishi SJ-PF7.5 - 01 (5.5/7.5kw)</td>
<td>20KVA</td>
</tr>
<tr>
<td>Mitsubishi SJ-PF11 - 01 (7/11kw)</td>
<td>26KVA</td>
</tr>
</tbody>
</table>

3.16 Re-siting and Decommissioning

The installation procedures maybe used in reverse order ensure coolant tanks are emptied, swarf bins are removed from machine, and external electrical supply is totally disconnected.
Any user fitted accessories such as air and fume extractors mush also be disconnected.
Clamp tailstock & steadies and provide retaining scraps to the lift up guard.
Part Four

Maintenance
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### End User Notes

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4.1 Lathe Alignment Checks

The machines are fully accuracy tested at the factory prior to despatch. However, movement caused by transportation and site placement it is advisable to carry out a simple turning tests before commencing productive work.

4.1.1 Test For Headstock Alignment

Take a light cut on a piece of steel bar approximately 50mm diameter and 150mm long. Measure the diameters at each end of the cut length. No variation should exist between the readings. (reference to the machine accuracy chart will show the accuracy set at the factory.)

Correct any difference by adjusting the headstock alignment.

4.1.2 Test For Tailstock Alignment

Mount a precision ground steel test bar (350mm long) between headstock and tailstock centres. Mount a dial test indicator clock to the crossslide and traverse the centre line of the test bar from headstock to tailstock over a 300mm length. The maximum runout should not exceed 0.02mm at the tailstock end pointing towards the operator. (reference to the machine accuracy chart will show the accuracy set at the factory.)

4.1.3 Headstock Alignment - Adjustment

Diagram (Figure 15) refers

**WARNING !!**

Isolate the machine before removing any covers and making adjustments.

The headstock is secured to the bed by four bolts, two at the spindle nose end and two at the opposite end of the headstock.

Access to the front two directly under the spindle nose.

The rear bolts are accessed from the headend of the machine by removing the fixed end panel. Alignment is corrected by adjusting the jacking bolts on the front of the headstock in the lower left corner. This pivots the headstock.

4.1.4 Tailstock Alignment - Adjustment

Diagram (Figure 16) refers

**WARNING !!**

Isolate the machine before removing any covers and making adjustments.

To adjust the tailstock setover, release the tailstock body clamp lever and body to base clamp nut. Adjust the setover screws and re-check the reading on the test bar. Continue with the adjustment and re-check the readings until the tailstock is set within the permissible limits.
4.2 Belt Tensions
It is essential that the correct belt tensions are maintained. Excessive belt tension will reduce belt and bearing life and generate higher noise levels.

4.2.1 Spindle Motor Drive Belt Tension - Adjustment
Diagram (Figure 17) refers

WARNING !!
Isolate the machine before removing any covers and making adjustments.

Correct belt tension is vital to reliably transmit the full motor power over the complete speed range of the machine. Too much tension will affect the life of the motor shaft and headstock input shaft bearings. The braking effect of the motor also depends on belt tension.

Access to the drive belts is gained by removing the fixed panels at the headend of the machine.

Access to the spindle motor belt adjustment bolts is gained directly behind the electrical cabinet or from the headend of the machine. Two adjusters are located in front of the spindle motor and are attached to the motor mounting plate.

Adjust the bolt nearest the motor shaft to give the correct belt tension. Adjust the bolt at the motor fan end to level the motor plate and even the tension across the belt.

4.2.2 Spindle Drive Belt Tensions

<table>
<thead>
<tr>
<th>Mitsubishi AC Spindle Drive</th>
<th>Specification And Number Of Belts</th>
<th>Deflection Force (F) Newtons At Mid Span</th>
<th>Deflection Distance (S) mm At Mid Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5/7.5 KW</td>
<td>Poly 'V', J-section, 18 ribs</td>
<td>35 N (8 lbf )</td>
<td>12 mm (1/2&quot; )</td>
</tr>
<tr>
<td>7/11 KW</td>
<td>Poly 'V', J-section, 18 ribs</td>
<td>35 N (8 lbf )</td>
<td>12 mm (1/2&quot; )</td>
</tr>
</tbody>
</table>

4.2.3 Spindle Encoder Drive Belt Tension
The spindle encoder drive is mounted on a swing frame adjacent the the rear of the spindle. Access is the same as the spindle drive belt.

<table>
<thead>
<tr>
<th>Specification Of Belt</th>
<th>Deflection Force (F) Newtons At Mid Span</th>
<th>Deflection Distance (S) mm At Mid Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle Encoder</td>
<td>8 N</td>
<td>3 mm</td>
</tr>
</tbody>
</table>

4.2.4 Axis Drive Belt Tensions

<table>
<thead>
<tr>
<th>AC Servo Motor Drive</th>
<th>Specification Of Belts</th>
<th>Deflection Force (F) Newtons At Mid Span</th>
<th>Deflection Distance (S) mm At Mid Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>HTD 5M, 15 wide, 385 lg</td>
<td>7 N</td>
<td>2 mm</td>
</tr>
<tr>
<td>Z-axis</td>
<td>HTD 5M, 15 wide, 500 lg</td>
<td>8 N</td>
<td>3 mm</td>
</tr>
</tbody>
</table>
Spindle Drive Belt Adjustment

Figure 17

Motor Cover Plate

Pivot Plate

Adjusting Nuts

Headend Cover

Swivel Clamp Bolt

Pivot Bolt

Spindle Drive Belt Adjustment

Figure 18

Adjust on Motor Plate screws

Z - Axis Drive, Belt Adjustment

Figure 19
4.2.8 Axis Drive Belt Tensions

It is essential that the timing belts are well maintained and this will require periodic inspection of the belt tension and general quality of the belt. HTD section timing belts are used to transmit the motor torque to the ballscrews. The motors are fitted with absolute position coders and positional accuracy will be lost if the drive belt becomes loose and jumps teeth on the driving and/or driven pulleys.

4.2.9 Z-Axis Drive Belt Tension - Adjustment

WARNING !!
Isolate the machine before removing any covers and making adjustments.
Diagram (Figure 19) refers

1. Remove access cover at headend, of the machine.
2. Release the four cap head screws retaining the motor. These are in slots and the drive belt tension may now be set.
3. Lightly pinch the four motor bolts and rotate the motor shaft two or three revolutions to even out the belt tension.
4. Test the belt tension with a spring balance or suitable tension testing tool.
5. Re-adjust as necessary and tighten fully the motor bolts.
6. Make a final check of the motor belt tension.
7. Re-fit covers.

4.2.10 X-Axis Drive, Belt Tension - Adjustment

WARNING !!
Isolate the machine before removing any covers and making adjustments.

Diagram (Figures 20) refers

1. Isolate the machine.
2. Remove the rear splash guard. 3 screws at headend and 3 screws at tailend.
3. Remove the drive belt fixed cover.
4. Release the four cap head screws retaining the motor. These are in slots and the drive belt tension may now be set. (note the self weight of the motor provides an approximate load to tension the belt.)
5. Lightly pinch the four motor bolts and rotate the motor shaft two or three revolutions to even out the belt tension.
6. Test the belt tension with a spring balance or suitable tension testing tool.
7. Re-adjust as necessary and tighten fully the motor bolts.
8. Make a final check of the motor belt tension.
9. Re-fit the covers.
Access to X-axis Remove rear cover
6 fixing screws

X - Axis Drive, Belt Adjustment

Saddle Taper Strip Adjustment

Figure 20

Saddle Taper Strips
4 Adjusting Screws

Figure 21
4.3 Slideway Bedding And Wear Adjustment

The slideway accuracy is pre-set at the factory. However, due to the cutting pressures exerted on the slideways further bedding will occur once the machine is used in production. This will vary with every application.

It is recommended that an initial inspection and if necessary, adjustment be carried out after one month, to allow for the bedding process of the slides.

4.3.1 Saddle - Gib Adjustment

Diagram (Figure 21) refers

There are 2 taper strips fitted to the under side of the saddle and run under the bed way at the bed vee and bed flat. The gib adjusting screws are located at each end of the saddle gib carriers.

The rear gib adjusting screws can be accessed from the rear of the machine by removing the rear splash guard.

WARNING !!
Isolate the machine before removing any covers and making adjustments.

4.3.2 Crosslide - Taper Gib Adjustment

There is one long taper gib strip spanning the full length of the crosslide and mounted against the dovetail nearest the tailstock. There are two adjusting screws, one at each end of the crosslide.

WARNING !!
Isolate the machine before removing any covers and making adjustments.

4.3.3 Procedure

Diagram (Figure 22) refers

1. Traverse the crosslide toward the operator until it reaches its soft limit for maximum working position.
2. Isolate the machine
3. Remove the front wiper and the top cover fitted to the rear of the crosslide.
4. Reach over and using a flat ended screwdriver, back off the gib screw at the rear of the crosslide
5. Turning in the front gib screw will take up any clearance in the dovetail slide. Do not over tighten the slide.
6. Re-fit the cover and wiper
4.4 Coolant System

Coolant is supplied via a gear pump mounted to the coolant tank and located at the tailend of the machine base. The manually operated coolant tap is mounted to the rear of the saddle casting, and has a flexible stork to direct the coolant at the cutting tip.

The coolant pipe work is set internally and protected from hot swarf chips.

The coolant system has two modes of operation, manually controlled by ON / OFF push-buttons at the operators control panel and automatic control by program 'M' code.

4.4.1 Coolant System Cleaning

WARNING !!

1. Using the machine coolant pump, the coolant can be pumped out into a suitable container.
2. Close the tap at the standpipe and power down the machine.
3. Remove the wheeled swarf bin from its location.
4. Remove the coolant pipe from the pump.
5. The electrical cable attached to the pump should have excess length which will allow the coolant tank to slide to the rear of the machine exposing the tank fully for cleaning.
6. The plate adjacent to the coolant pump maybe removed to assist access.
7. The remaining liquid can be removed and the bottom of the tank wiped clean. Push the tank back into position.
8. Clean any overspill on the floor immediately.
9. Re-fit the coolant pipe to the pump, and fill to within 2cm (3/4") from the top of tank. Re-fit plate adjacent to pump.
10. Re-fit the wheeled swarf bin.
11. Power up the machine, open the coolant tap and run coolant pump to prime the system.
4.5 **Routine Maintenance Program**

A regular program of preventative maintenance is recommended to keep the machine in good working order. This will reduce service calls and cost to you.

### 4.5.1 Weekly Checks

<table>
<thead>
<tr>
<th>Area</th>
<th>Attachment</th>
<th>Item Check</th>
<th>Method Of Check</th>
<th>Permissible Condition</th>
<th>Action If Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailstock</td>
<td>Lubrication</td>
<td>Lubricate Weekly</td>
<td>See Lubrication Checks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant</td>
<td>Level</td>
<td>Visual</td>
<td>20mm Below Top Of Tank</td>
<td>Top Up. See Coolant Filling</td>
<td></td>
</tr>
</tbody>
</table>

### 4.5.2 Monthly Checks

<table>
<thead>
<tr>
<th>Headstock</th>
<th>Spindle drive belts</th>
<th>Tension tool</th>
<th>Tension test tool</th>
<th>See belt tensioning tables</th>
<th>See belt tensioning section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saddle</td>
<td>Z-axis drive belt</td>
<td>Tension</td>
<td>Tension test tool</td>
<td>See belt tensioning tables</td>
<td>See belt tensioning section</td>
</tr>
<tr>
<td>Taper gibs</td>
<td>Sideway clearance</td>
<td>Dial test indicator</td>
<td>See Accuracy Chart</td>
<td>See gibs adjustment Section</td>
<td></td>
</tr>
<tr>
<td>Crossslide</td>
<td>X-axis drive belt</td>
<td>Tension</td>
<td>Tension test tool</td>
<td>See belt tensioning tables</td>
<td>See gibs adjustment Section</td>
</tr>
<tr>
<td>Taper gibs strip</td>
<td>Sideway clearance</td>
<td>Dial test indicator</td>
<td>See Accuracy Chart</td>
<td>See gibs adjustment Section</td>
<td></td>
</tr>
<tr>
<td>Headstock</td>
<td>Spindle Coolant Catcher</td>
<td>Cleaning</td>
<td>Visual</td>
<td>Clean Coolant Catcher at Rear of spindle</td>
<td></td>
</tr>
</tbody>
</table>

### 4.5.3 Annual Checks

<table>
<thead>
<tr>
<th>Headstock</th>
<th>Body setover</th>
<th>Test bar and test indicator</th>
<th>See accuracy chart</th>
<th>Re-align</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailstock</td>
<td>.</td>
<td>Test bar and test indicator</td>
<td>See accuracy chart</td>
<td>Re-align</td>
</tr>
<tr>
<td>Headstock</td>
<td>Spindle</td>
<td>Alignment</td>
<td>See accuracy chart</td>
<td>Re-align by service engineer</td>
</tr>
<tr>
<td>Headstock</td>
<td>Spindle</td>
<td>Runout</td>
<td>Dial test indicator</td>
<td>Check by service engineer</td>
</tr>
</tbody>
</table>

IF IN DOUBT GET ADVISE BEFORE MAKING ANY ALTERATIONS.
End User Notes.