



Manufactured at:



TORNADO TT6

TORNADO

TT6

Machine Serial Number	<input type="text"/>	Year of Manufacture	<input type="text"/>
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This manual applies only to the machine having the serial number shown: this is engraved on the identification plate fixed to the right hand end guard of the machine and **MUST** be quoted in all communications.





Colchester-Harrison

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Colchester-Harrison is a Trading name of 600 UK Limited

Registered in England & Wales No. 14479

The Responsible Person

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Address Union Street
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Declares that the machinery described :

- 1. Make Colchester-Harrison
- 2. Model **TORNADO TT6**
- 3. Serial Number

Conforms to the following Directives : SAFETY OF MACHINERY DIRECTIVE 98/37/EC
PREVIOUSLY 89/392/EEC, 91/368/EEC, 93/44/EEC.
CE MARKING DIRECTIVE 93/68/EEC.
ELECTROMAGNETIC COMPATIBILITY DIRECTIVE
89/336/EEC AS AMENDED BY DIRECTIVE 91/263/EEC.
LOW VOLTAGE DIRECTIVE 72/23/EEC AS AMENDED BY
DIRECTIVE 93/68/EEC.

and complies with The relevant essential health and safety requirements of the Machinery Directive, the protection requirements of council directive 89/336/EEC (as amended) on the approximation of the laws of member states relating to electromagnetic compatibility and the specifications and safety provisions of harmonised standard EN60204:1:1997 - *Safety of machinery. Electrical equipment of machines.*

Signature

(If not signed by the responsible person, State here the name and position of the person signing the declaration.)

Position

Signed at 600 LATHES
UNION STREET
HECKMONDWIKE
WEST YORKSHIRE
WF16 0HN
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Date _____

TORNADO TT6

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MACHINE SPECIFICATION 0

INTRODUCTION

LATHE SAFETY 1

SECTION: ONE

OPERATION 2

SECTION: TWO

PROGRAMMING 3

SECTION: THREE

APPLICATION NOTES 4

SECTION: FOUR

INSTALLATION 5

SECTION: FIVE

MAINTENANCE 6

SECTION: SIX

SPARE PARTS 7

SECTION: SEVEN

ACCESSORIES 8

SECTION: EIGHT

ELECTRICAL 9

SECTION: NINE

APPENDIX 10

SECTION: TEN

CONTENTS



TORNADO TT6

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Contents

General Description and Machine Functions	0.3
Machine Specifications	0.4
Standard and Optional Accessories	0.8
Fanuc Control Specifications	0.9
Machine Capacity Diagram	0.12
Noise Level	0.14

MACHINE SPECIFICATION

INTRODUCTION

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General Description and Machine Functions

The Tornado TT6 is a high performance, 45° slant, CNC lathe with a suitably low floor to spindle height, excellent operator access, a comfortable workpiece loading position and optimum sight of the cutting process. The operator controls are ergonomically positioned for easy and efficient operation. The unique overall machine configuration minimises on floor space.

Soft Limits

Slideway movement extremes are monitored by software “soft limits” to limit any attempted move towards a point outside the machine working stroke, this applies to M.P.G. (manual pulse generator) input, M.D.I. (manual data input) and part program moves.

Sliding Door Interlock

The main door sliding guard is provided with a “shot-bolt” interlock switch to prevent access during a machining cycle. When the door is open only limited machine functions are permitted (for set-up purposes) and independent self checking spindle drive monitoring circuitry protects against spindle movement.

Headstock Access Door Interlock

If this door is opened during a machining cycle, emergency stop conditions will be applied.

Workholding Stroke Limit Detection

A sensor is fitted to detect “end of stroke reached” (bottoming condition) on the chucking actuator system.

Lubrication

The lathe features ‘sealed for life’ headstock and ballscrew support bearings units. A centralised oil system is used for ballscrew, linearway and turret lubrication.

Machine Specification

Machine capacities

Swing Ø (tool tip swing over covers)	606mm
Maximum turned Ø	170mm
X1 axis travel	195mm soft stop (205mm hard stop)
Z1 axis travel (Max turning length)	583mm (500mm)
Y1 axis travel	80mm (+/-40mm)
X2 axis travel	153mm soft stop (163mm hard stop)
Z2 axis travel	583mm
Z3 axis travel	583mm

Construction (Cast iron)

Carriage inclination	45°
Spindle centre height from floor	1150mm
Cross-slide X1 width	300mm
Cross-slide X1 type	Roller Guide
Cross-slide X1 width over linear guides	230mm
Z1-axis type	Roller Guide
Z1 Upper Bed width over linear guide ways	386mm
Y1 axis type	Roller Guide
Y1 Width over linear guides	230mm
Cross-slide X2 width	386mm
Cross-slide X2 type	Roller Guide
Cross-slide X2 width over linear guides	230mm
Z2-axis type	Roller Guide
Z2 Lower Bed width over linear guide ways	386mm
Sub-Spindle Z3 axis type	Roller Guide
Z3 Width over linear guide ways	386mm

Spindle 1 (Left)

Spindle bore	Ø64mm
Spindle nose	A2-5
Standard power chuck size	Ø175mm 3-Jaw
Drawtube capacity	56mm
Spindle front bearing type and Ø	Angular contact ball bearings Ø110mm
Spindle speed	6000rpm
Spindle base speed	1000 rpm (@ 11kW S1)
Spindle motor type	Kessler SMS100.50.6.FOS(Built-In Synchronous)
Spindle motor power S1 (S3-15%)	11 kW (15 kW)
Constant power range	1000 rpm to 6000 rpm (@ 11kW S1)
Maximum spindle torque	100Nm
C1-axis resolution	0.001°

Spindle 2 (Right)

Spindle bore	Ø64mm
Spindle nose	A2-5
Standard power chuck size	Ø170mm 3-Jaw
Drawtube capacity	56mm
Spindle front bearing type and Ø	Angular contact ball bearings Ø110mm
Spindle speed	6000rpm
Spindle base speed	1000 rpm (@ 11kW S1)
Spindle motor type	Kessler SMS100.50.6.FOS(Built-In Synchronous)
Spindle motor power S1 (S3-15%)	11 kW (15 kW)
Constant power range	1000 rpm to 6000 rpm (@ 11kW S1)
Maximum spindle torque	100Nm
C2-axis resolution	0.001°

Machine Specification - continued

Upper Tool Turret

Turret type and model	Sauter 0.5.450.416 ('Red-Series')
Total number of tool stations	12
Number of driven tool stations	12
Tooling type	30 VDI
Turning tool shank size	20 x 20mm
Turret disc A/F	A/F 340mm
Max Ø boring bar	32mm
Travel past centre line	22mm soft stop (30mm hard stop)

Live Tooling Upper Turret (Spindle 3)

Driven tool speed	5000rpm
Driven tool base speed	1500rpm
Spindle motor type	Fanuc Alpha il 2/8000 (IP65)
Spindle motor power S1 (S3-40%)	1.5 kW (3.7 kW)
Constant power range	1500 rpm to 5000 rpm (@1.5kW S1)
Maximum spindle torque	23.5Nm

Lower Tool Turret - Option 1 Driven

Turret type and model	Sauter 0.5.450.416 ('Red-Series')
Total number of tool stations	12
Number of driven tool stations	12
Tooling type	30 VDI
Turning tool shank size	20 x 20mm
Turret disc A/F	A/F 340mm
Max Ø boring bar	32mm
Travel past centre line	22mm soft stop (30mm hard stop)

Live Tooling Lower Turret (Spindle 4)

Driven tool speed	5000rpm
Driven tool base speed	1500rpm
Spindle motor type	Fanuc Alpha il 2/8000 (IP65)
Spindle motor power S1 (S3-40%)	1.5 kW (3.7 kW)
Constant power range	1500 rpm to 5000 rpm (@1.5kW S1)
Maximum spindle torque	23.5Nm

Lower Tool Turret - Option 2 Static

Turret type and model	N/A
Total number of tool stations	N/A
Tooling type	N/A
Turning tool shank size	N/A
Turret disc Ø	N/A
Max Ø boring bar	N/A
Travel past centre line	N/A

X1 Axes

Axis motor type	Fanuc HViS 8/4000 + Brake
Axis motor stall torque	8Nm (32Nm max)
Axis motor max speed	4000rpm
Measuring system	Heidenhain Distance coded Incremental linear scale
Ballscrew (Ø x pitch)	Ø32mm x 10mm
Pulley ratio	N/A - Direct coupled
Thrust (continuous)	4.8kN
G0 rapid traverse rate	30mm/min

Machine Specification - continued

Z1 Axes

Axis motor type	Fanuc HViS 12/4000
Axis motor stall torque	12Nm (46Nm max)
Axis motor max speed	4000rpm
Measuring system	Absolute Motor Encoder
Ballscrew (Ø x pitch)	Ø40mm x 10mm
Pulley ratio	N/A - Direct coupled
Thrust (continuous)	7.2kN
G0 rapid traverse rate	30mm/min (40m/min limit)

Y1 Axes

Axis motor type	Fanuc HViS 8/4000 + Brake
Axis motor stall torque	8Nm (32Nm max)
Axis motor max speed	4000rpm
Measuring system	Heidenhain Distance coded Incremental linear scale
Ballscrew (Ø x pitch)	Ø32mm x 10mm
Pulley ratio	N/A - Direct coupled
Thrust (continuous)	4.8kN
G0 rapid traverse rate	30mm/min

X2 Axes

Axis motor type	Fanuc HViS 8/4000
Axis motor stall torque	8Nm (32Nm max)
Axis motor max speed	4000rpm
Measuring system	Heidenhain Distance coded Incremental linear scale
Ballscrew (Ø x pitch)	Ø32mm x 10mm
Pulley ratio	01:01
Thrust (continuous)	4.8kN
G0 rapid traverse rate	30mm/min

Z2 Axes

Axis motor type	Fanuc HViS 12/4000
Axis motor stall torque	12Nm (46Nm max)
Axis motor max speed	4000rpm
Measuring system	Absolute Motor Encoder
Ballscrew (Ø x pitch)	Ø40mm x 10mm
Pulley ratio	N/A - Direct coupled
Thrust (continuous)	7.2kN
G0 rapid traverse rate	30mm/min (40m/min limit)

Z3 Axes

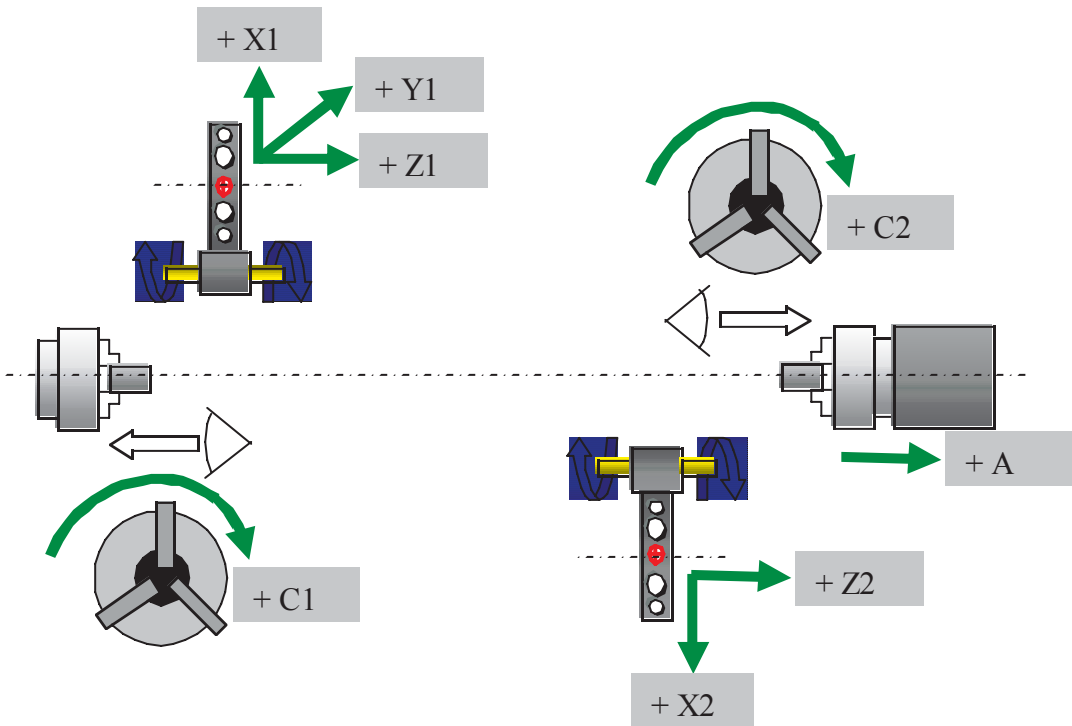
Axis motor type	Fanuc HViS 12/4000
Axis motor stall torque	12Nm (46Nm max)
Axis motor max speed	4000rpm
Measuring system	Absolute Motor Encoder
Ballscrew (Ø x pitch)	Ø40mm x 10mm
Pulley ratio	N/A - Direct coupled
Thrust (continuous)	7.2kN
G0 rapid traverse rate	30mm/min (40m/min limit)

Miscellaneous

Machine dimensions	L3m x D2m x H2m
Machine weight	.6 Tonne
KVA rating	
Electrical supply	400v -15%/+10% - 3 Ø - 50/60Hz
Safety standards	BS EN 12415:2001

Machine Specification - continued

Axis configuration



Standard and Optional Accessories

Standard features

Spindle lubrication	Grease (Maintenance free)
Slideway and ballscrew lubrication	Automatic electric oil pump system
Hydraulic system working pressure	50 bar (Stand-alone tank)
Coolant (capacity & pressure)	10 Ltr & 5 bar
Machine light	Standard
Air blast Spindle 1 & 2	Standard
Swarf flushing system	Standard

Optional equipment

Collet chuck main spindle	
Collet chuck sub spindle	
Incremental linear scale	.Z1, Z2
Absolute linear scale	.X1, X2, Z1, Z2
Tool setting probe	Renishaw HPRA, HPPA or HPMA
Component probe	Renishaw LT02T
Hydraulic steady	
Hydraulic tailstock	N/A
Programmable tailstock	N/A
High pressure coolant (capacity & pressure)	20 bar
Ultra high pressure coolant (capacity & pressure)	70 bar
Swarf conveyor (inc integrated coolant tank)	
Barfeed unit	MBF1000 or 3rd party interface
Robot loader unit	3rd party interface
Gantry loader unit	3rd party interface
Beacon signal tower	
Coolant oil skimmer system	

CNC control

CNC type	31i-TA
Screen size & type	10.4" colour (non-touch)
Operating modes	Fanuc CNC / Manual Guide i
ETHERNET communication	Standard (Embedded)

Standard Software

Tool set-up screen aids
Manual Guide I custom cycles
CADCAM software (ColCAM)

Software options

Maintenance schedule
Help files
Tool life / sister tooling

Fanuc Control Specification

CNC control standard features

Axis name expansion
HRV2 control
Interlock (All/axis/direction/block)
Machine lock
Over travel
Stored stroke check 1
Chamfering on/off
DNC operation with memory card
Program number search
Sequence number search
Wrong operation prevention
Dry run
Single block
Incremental feed (x1, x10, x100)
Exact stop mode G61
Tapping mode G63
Cutting mode G64
Exact stop G09
Linear & Circular interpolation
Dwell
Thread cutting, synchronous cutting
Multi threading
Continuous threading
Skip G31
Torque limit skip
Reference position return G28
Reference position return check G27
2nd reference position return
Feed per minute / Feed per rev.
Cutting feedrate clamp
Rapid traverse acc/dec: Linear / Bell-shaped
Cutting feed acc/dec: Linear / Exponential
Linear acc/dec after cutting feed interpolation
Optional block skip: 1
Max. Programmable dimension: +/- 9 digit
Program file name: 32 char
Sequence number N8 digit
Absolute/incremental programming
Decimal point programming
Input unit x 10 multiply
Diameter/Radius programming
G-code system A
Programmable data input G10
Sub program call - 10 nested
Canned cycles
Circular interpolation by R prog' 12 digits
Auxiliary function - M8 digit
High speed M/S/T/B interface

Fanuc Control Specification - continued

CNC control standard features - continued

Waiting function for ≥ 2 path
32 tool offset pairs.
Direct input of measured tool offset
64kB part program storage
63 registered programs
Program protect
Extended part program edit
Memory card prog edit & operation
Help function
Periodic maintenance screen
Memory card input / Output
Embedded Ethernet
Help files
Tool life / sister tooling

CNC control standard Fanuc options

Manual Guide I (multi path)
pmc 12,000 steps
Linear scale i/f with abs' address reference markers
Disturbance torque detection
Custom software capacity 3Mb
Straightness compensation
Simple spindle synchronous control
Controllable axes expansion
Designation number of axes = 8
Simult' axes control expansion
Polar coordinate interpolation
Cylindrical interpolation
Helical interpolation
Rigid tapping
MPG 1-unit
Interference check for each path
Pitch error compensation
Spindle serial output
CS contouring control
Spindle orientation
CSS control
Spindle synchronous control
Multi spindle control
Extended spindle orientation (6-spindle)
Direct drawing programming
G-code system B/C
Inch metric conversion
Multi repetitive cycles
Macro executor
Multi repetitive cycles II
Canned cycles for drilling
Workpiece coordinate system
Reader / Puncher interface

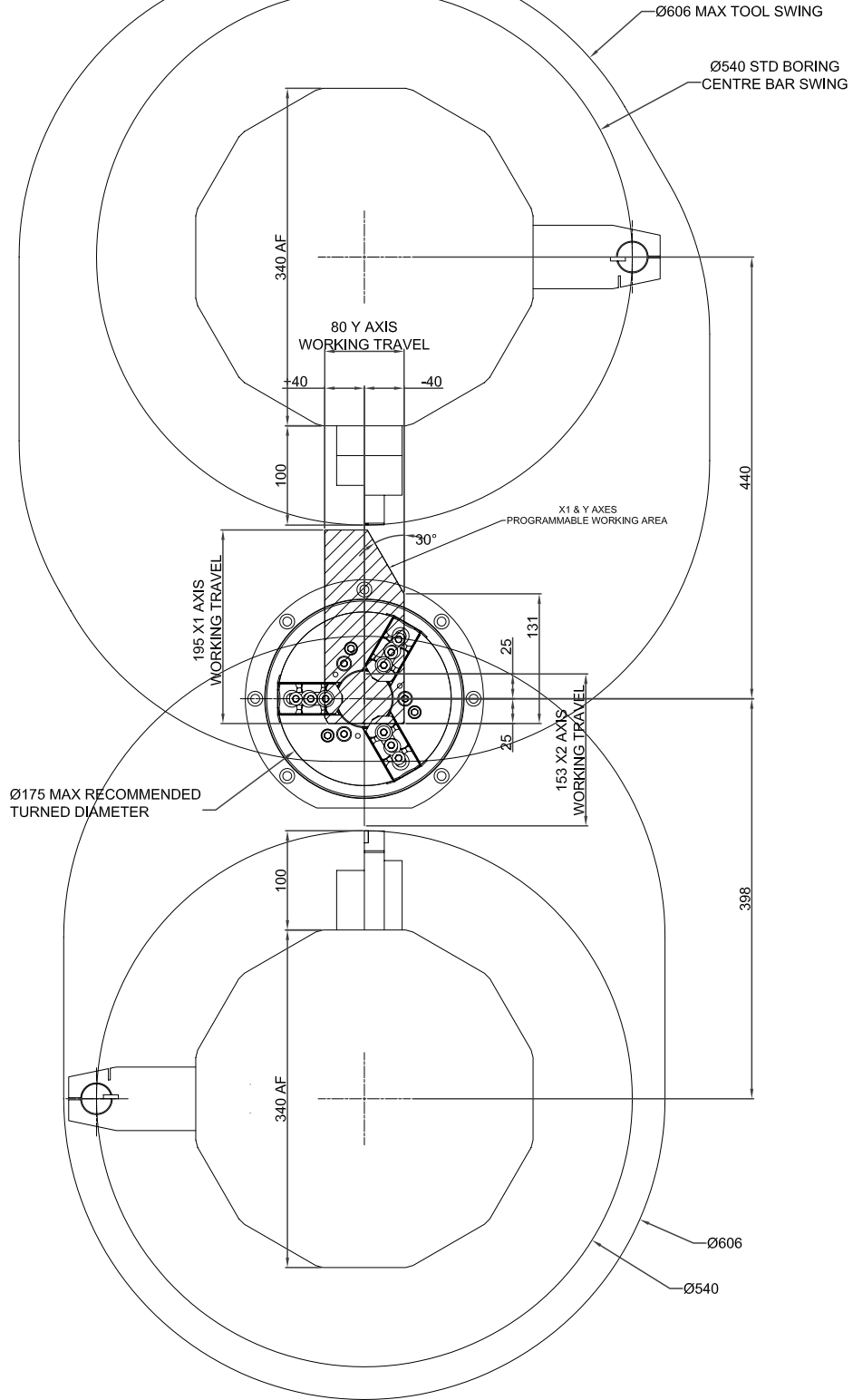
Fanuc Control Specification - continued

External message
Arbitrary angular axis control
Tool offset 64 pairs
Tool nose radius compensation
Tool geometry/wear compensation

CNC control standard Fanuc options - continued

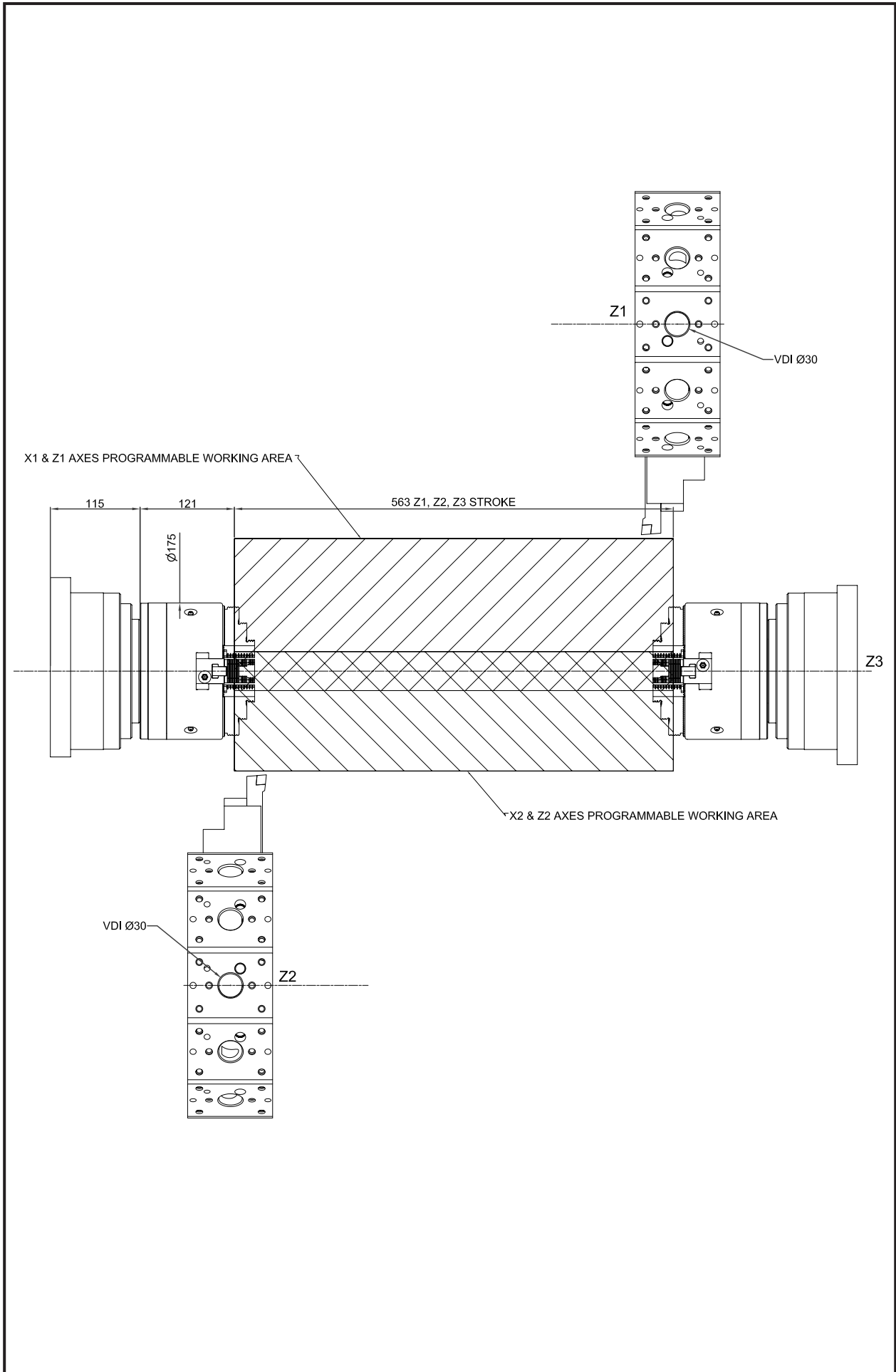
Y-axis offset
Part program memory storage = 128Kb
Background edit
Run hour & parts count display
Graphic display
Interpolation type straightness compensation
Interpolation type pitch error compensation
Designation of control path - 2 path
Designation of machine groups - 2 groups
Designation of spindle axes - 4 spindles
Designation of machine control - Lathe
Fanuc picture

Capacity Diagram



SK3542

Capacity Diagram



Noise Level

The maximum noise level at the operator's position is within 83 dB and the maximum mean noise level is within 83 dB.

The airborne noise emission has been determined in accordance with the methods given in Annex A of EN 12415 or EN 12840 dependant on the class of machine.

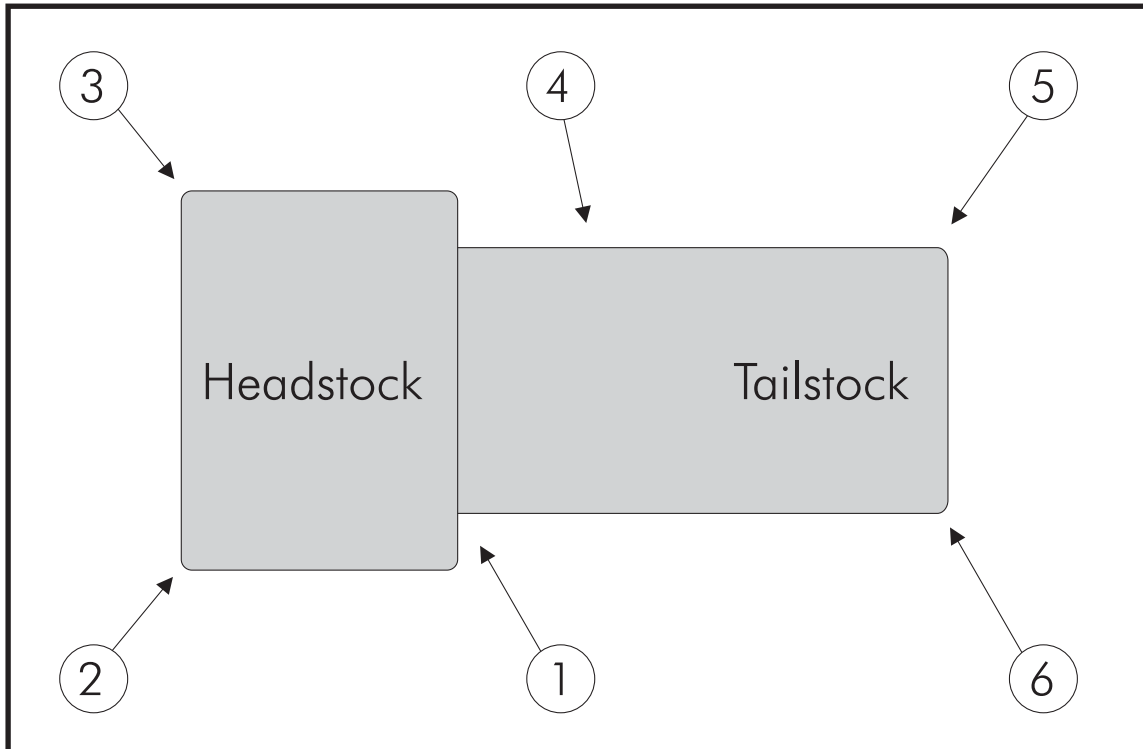


Figure 0.1 - Noise Level Diagram

The measuring method used and the operating conditions applied during the test and values for constant K as follows:-

4 dB when using EN ISO 3746: 1995

2 dB when using EN ISO 3744: 1995

Constant K = 4 dB measured in accordance with EN ISO 3746:1995.

The figures quoted are emission levels and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of the work force include the characteristics of the work room, the other sources of noise, etc. i.e. the number of machines and other adjacent processes. Also the permissible exposure level can vary from country to country. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk.