

This manual applies only to the machine having the serial number shown below.

Please note that this number will be required should Denford Limited be contacted regarding this machine.

Machine Serial Number : _

Year of Manufacture :



Manufactured by Denford Limited, Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England. Telephone: +44 (0)1484 712264. Fax: +44 (0)1484 722160. Email: service@denford.co.uk

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INTRODUCTION.	This guide will describe how to transport, site setup your Denford Triac VMC CNC Milling Mac	e and chine.
	Any operational features, specific to the Triac	VMC,
	are also covered in this guide. General oper	ating
	Milling Manual" delivered with your machine	
	A Deutine Maintenance costion is also included	
	note the Electrical Diagrams for your machin	e are
	held in a folder fixed inside the electrical contro	l box.
	IF YOU HAVE ANY DOUBTS AND/OR QUEST	IONS
	REGARDING THE SPECIFICATION, SERVICIN	G OR
	FEATURES OF YOUR MACHINE, PLEASE CON	ТАСТ
	CUSTOMER SERVICES AT DENFORD.	
	The Warranty on this machine will be invalida	ted if
	any modifications, additional ancillary equipme	ent is
	fitted, or any adjustments made to the contr	olling
	devices without prior notification from De limited.	ntord
	Do not carry out any nortable appliance testing	

Do not carry out any portable appliance testing (PAT) on any of the supplied equipment.

EC DECLARATION OF CONFORMITY.

The responsible person :			
Business Name :	Denford Limited.		
Address :	Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England.		
Declares that the machinery described :			
Manufacturer :	Denford Limited.		
Model Name :	Triac VMC		
Serial Number :			
conforms to the following directives :	EC Machinery directive 89/392/EEC as amended by directive 91/368 EEC and directive 93/44/EEC, CE marking directive 93/ 68/EEC and low voltage directive 73/23/EEC		
and the following standards :	BS EN 60204 - 1 : 1993		
and complies with the relevant health and safety requirements.			
Signature :			
Position within company :			
Signed at :	Denford Limited, Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England.		

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Unpacking & Lifting the Machine.

Cut the top of the delivery box open and remove the styrofoam packaging carefully.

To obtain better access to the machine and the power supply box, remove all the sides from the delivery box, leaving the machine standing on its wooden delivery pallet.

Lift the power supply control box from the packaging. If possible, lift the power supply box using a porters trolley.

Lift the machine from the packaging. Denford recommends using a professional hoist and sling fitted to the eyebolt on the top of the machine column, arranged as shown in the diagram below. Ensure that the machine is secure before lifting. Always use sensible lifting precautions in accordance with Health and Safety Regulations in your establishment.

Weights (net) :



Levelling & Positioning the Machine.

Remember when positioning the machine in the room, space will be required for the electrical control box. Sufficient room should also be provided for effective maintenance to be carried out.

The Triac VMC is a bench mounted machine, so it should be sited on a bench of sturdy construction to take the weight of the machine, and of a height which enables comfortable operating and programming to take place.

The machine should rest level on the two hollow sections which run beneath the machine cabinet. The miller itself has been levelled to the machine cabinet prior to dispatch, so it is only necessary to level the machine to the table on which it is to be situated.

If the machine is not stable resting on these two hollow sections, insert four anti-vibration pads under the sections at each corner of the machine - as illustrated in the diagram below. Adjust the pads until the machine is stable and level. The pads will also help to reduce the amount of noise and vibration generated when the machine is operating.

Note - the pads are ONLY used to *help* stabilise the machine, the main weight of the machine should still be taken by the hollow sections (ie, these sections should ALWAYS be in direct contact with the table surface).



Electrical Diagrams, Control Box Connection and Seal.

Connecting the Mains Supply. The Electrical Diagrams for your machine are held in a folder fixed inside the electrical control box.



Warning! Do not connect cables between any electrical hardware with the mains power switched on, since this could damage the hardware.

The electrical control box is inspected then sealed with a yellow seal; if this seal is broken on delivery, inform the suppliers immediately. The seal should only be broken for the initial mains power connection.

The large flexible machine power cable, leading from the side of the electrical control box is connected to the fixing bracket on the junction box at the back of the milling machine. Check that the connector is inserted into the bracket in the correct orientation (see the diagram on page 7).



Warning! Do not insert the connector into the bracket the wrong way round; this could damage the connector pins. Check that the letters and numbers on the two halves of the connector and bracket match before closing the junction.

Ensure the two roller clips holding the male connector against the female bracket are fully closed. There should be no free movement at the junction.

The mains power supply is fed to the electrical control box, which in turn, is connected to the milling machine.

This electrical control box is delivered with the mains supply cable connected directly into the isolator with approximately 3 metres of cable. The cable should then be fitted with a standard 13 amp. plug suitable for the mains power supply.

The supply is 220/240volt Single Phase 50Hz.

Cable required:- 2 Core + Earth, 1.5mm per core.

Current Taken 11 Amps.

All electrical connections should only be made by a suitably qualified electrical engineer.

A schematic diagram illustrating these component connections is shown on page 7.



Removal of Protective Coatings.

Once the machine has been sited and connected electrically, the protective coatings must be removed to prepare the machine for running.

The protective coatings applied to the slideways and bright surfaces can be removed using a kerosene based solvent. The coatings must be removed from the slideways before any attempt to move them is made. Once these protective coatings have been removed, all untreated surfaces should be coated with a light covering of machine oil (eg BP: CS 68).

The protective plastic sheeting on the guard windows should be removed and the perspex cleaned with an anti-static cleaner.

TRIAC VMC -General Layout -Front View.



Triac VMC -General Layout Back View.



Air Pipe Connection.

The ATC (Automatic Tool Changer) and the Hydro/ Pneumatic Vice, when fitted, require an air compressor fitted with a SCHRADER quick release connector.

The connection fitted onto the machine air filter regulator and lubricator is SCHRADER part number SC 8051-11 1/8 BSP MALE (or Denford part number BI 01451S).

The female connector required on the 1/4" pipe leading to the air compressor is SCHRADER part number 9793C-12 1/4" BSP FEMALE (or Denford part number BI 01128S).

ATC OPERATION.

ATC - Automatic Tool Changer (when fitted). The ATC is controlled using M codes (see the separate "Generic CNC Milling Manual" - section 11.5 for M codes listing and section 4.1 for tool changing).

HYDRO/PNEUMATIC Hydro/Pneumatic Vice (when fitted).

VICE OPERATION.

LOCATION OF PRESSURE ADJUSTING

Rotary

adiusting

control for pressure

regulator.

cylinder.

View of back panel of machine.

Main hydro/ pneumatic

CONTROL FOR HYDRO/PNEUMATIC

JAWS.

The hydro/pneumatic vice jaws are opened and closed using M codes, M10 (Work Clamp Open) and M11 (work Clamp Close).

> running in *Jog Mode*, selected by pressing the [JOG] key. The M code is entered by pressing the [M] key, followed by the two digit number. When the [EOB] key is pressed, the M code will be performed.

To enter an M code, the machine must be

The pressure of the vice jaws can be adjusted using the rotary control on the regulator feeding air into the main cylinder. To adjust the pressure, pull up the rotary control to unlock it from its current position. Turn the control clockwise to increase pressure, or anticlockwise to decrease pressure. Push the rotary control down to relock it in its new position. The pressure cannot be adjusted higher than the operating pressure of the main air filter regulator (see page 18).

General Safety Precautions.

General Safety Precautions :

- Wear clothing suitable for operating the machine and follow the safe working procedures in place at your establishment.
- Do not place any objects so that they interfere with the guards or the operation of the machine.
- Never try to clean the machine if any part of it is rotating, or in motion.
- Always secure the work on the table or in a fixture or vice.
- Ensure that the correct cable for the power source is used.
- If power fails turn off the yellow isolator (found on the electrical control box) immediately.
- Ensure the power is switched off before starting any maintenance work on the machine or opening/ working on the electrical control box.
- Check the state of the slideway lubrication daily, to prevent the axes from becoming jammed. The machine is fitted with an auto-lubrication system, ensure the resovoir is topped up regularly.
- Further operational safety precautions are outlined in the separate "Generic CNC Milling Manual".

SAFETY FEATURES.

The following safety features apply to Triac VMC machines :

Key operated Emergency Stop button.

The red emergency stop button is fitted on the monitor housing (to the right of the main display screen). When depressed it has the effect of stopping all axis and spindle movement. To reset, push the button in and turn clockwise (a key may be required). The axes will then require homing individually. Further information can be found in the separate "Generic CNC Milling Manual" - section 7.9.

AXIS LIMIT SWITCHES.

Limit switches are fitted to all three axes to prevent overtravel. The X and Y limit switches are fixed, but the Z limit switch is adjustable using the sliding bar (see diagram below).

A square axis limit switch override button is fitted on the monitor housing (to the right of the main display screen). It should be used when the table or head has overtravelled and activated the limit switch. To reset, depress the button and simultaneously press the appropriate axis key to move away from the limit switch, then home each axis individually.



Diagram above - The Z axis limit switch is triggered when the base of the bar, A, fitted to the righthand side of the machine head, hits the switch, B.

Switching the Machine On/Off.

Control Box Layout. Switching the machine 'on'.

The machine controlling software is loaded directly off one floppy (3.5 inch) disk.

To load the machine controlling software insert the disk into the floppy (3.5 inch) disk drive, located on the side of the machine electrical control box (see the diagram below).

Power up the machine by turning the yellow rotary isolator switch on the electrical control box door to the 'on' position.

The machine controlling software and all necessary drivers will automatically load.

Switching the machine 'off'.

Exit the machine controlling software using the *Quit* command.

Select the *Main Menu* by pressing the [F10] key on the Desktop Tutor.

Press the [PAGE DOWN] key to highlight '*Quit*', then press the [EOB] key to close the software.

Power down the machine by turning the yellow rotary isolator switch on the electrical control box door to the 'off' position.

The machine must <u>not</u> be turned off if a milling program is running, or the machine is cutting work....



Machine Start-up - Automatic Search for Datum Point .

Keys Helpbox. The following keys are used in this section: [HOME], [TRVRS] [JOG], [+X]



On loading up the DENFORD FANUC MILLING software, the start-up screen will be displayed.



It is necessary to home the machine whenever it is switched on, to find the machine datum point - this is used as a zero reference for describing other co-ordinates on the machine.

To set the machine datum point automatically, first press the [HOME] key.

Next press the [TRVRS.] key. On a Triac VMC the table will move to the extreme lefthand front corner of the machine (when looking directly from the front).

The screen will display a set of coordinates, relating to the maximum limits of travel for each axis. In the example shown right, the Triac VMC has a maximum working area of 290mm in the X axis, 170mm in the Y axis and 235mm in the Z axis.

DENFORD FAMUC MILLING v2.95 X, Y and Z keys datum tha TRVRS key to datum Z, Y,	MACHINE DATUM MACHINE DATUM t axis. DB key for optional ' X and optional 4th axis.	c NONAMI 4th axis.
×	Feed 2500	Override 100%
Y	Tool 1	
z	Spindle Off	Spindle Forward Override 100%
		Coolant Off
	Tutorial———	

ENFORD FANUC MILLING √2.93	Metri	c NONAM	
X, Y and Z keys datum tha TRVRS key to datum Z, Y,	MACHINE DATUM t axis. DB key for optional X and optional 4th axis.	4th axis.	
× +290.000	Feed 900	Override 100%	
Y +170.000	Tool 1		
Z +235.000	Spindle Off	Spindle Forward Override 100%	
	JOG STEP 0.005	Coolant Off	
-Tutorial-			
F1 help F2 save F3 load F9 control menu F10 main menu			

Maintenance Schedule.

Daily	Clean and remove swarf. Check/top-up slide lubrication oil level in reservoir.	
Weekly	 Clean machine thoroughly. Check exposed screws and nuts for tightness. ATC models only - Check pull studs on the top of the tool shanks are tight and ATC slides are lubricated. Check/top-up Cutting Coolant level. 	
Monthly	 ATC/Hydro Pneumatic Vice models - Check/top-up Air Lubricator oil level. ATC/Hydro Pneumatic Vice models - Check condition of filter and drain any build-up of water in the filter bottle. 	
Biannually	 Check condition of electrical connections. Check and clean collet. Check all cables for kinks and breaks. Clean sensors and microswitches. Hydro Pneumatic Vice models - Check/top-up fluid level. 	
Annually	- Check slides for wear.	

LUBRICATION Chart.

Lubrication Point	Lubricating System	Frequency	Recommended Oil/Grease	Quantity
Slide ways and Ballscrews	Auto Pump Unit	Alarm Message on Control VDU	BP : CS 68 Shell : Vitrea 68 Castrol : Perfecto NN	0.5 litre
Milling Head	Grease Seal	On Maintenance of Milling Head	Kluber Isoflex NBU 15	4 cc/Bearing
Axis Bearings	Grease Seal	Once a year	BP : LS 3 Shell : Alvania No. 3	2 cc/Bearing
Coolant	Electric Pump	As required	Cincinnati Millacron Simcool C 60	14.75 litres

TRIAC VMC Maintenance.

SLIDE LUBRICATION SYSTEM (SEE DIAGRAM BELOW).

The slide lubrication system comprises of an oil resovoir tank and an automatic pump unit. Oil is automatically pumped to the required areas of the machine.

The slide lubrication system is located at back of the machine (see diagram on page 9).

The oil level can be topped-up by adding the required grade of lubrication oil into the resovoir through cap A.

The hand priming pump, B, should only be used if there is no oil in the resovoir, ie, the pump has run dry or the oil is being renewed.



TRIAC VMC MAINTENANCE.

CUTTING COOLANT SYSTEM (SEE DIAGRAM BELOW).

The coolant tank is positioned in the base of the machine.

The level sight glass and drain tap are located on the righthand side of the cabinet base, when the machine is viewed from the front.



TRIAC VMC Maintenance.

ATC - WHEN FITTED.

1 - SLIDES LUBRICATION (SEE DIAGRAM BELOW).

The slides on the Automatic Tool Changer are not supplied with lubricating oil automatically.

As part of the weekly maintenance schedule, the condition of the slides should be checked. Lubricating oil should be applied, when necessary, along the length of these slides using an oil can.





ATC - WHEN FITTED.

2 - Maintenance of Pull Studs (see Diagram Left).

The cutting tools, used with an ATC, are fitted in separate tool holders. Each tool holder shank has a pull stud which is used to clamp the tool holder firmly in the machine head.

These pull studs should be checked weekly and retightened if they are loose.

TRIAC VMC Maintenance.

AIR FILTER REGULATOR AND LUBRICATOR (SEE DIAGRAM BELOW). The ATC and hydro/pneumatic vice are supplied with compressed air, passing through an air filter regulator and lubricator, situated on the back panel of the machine.

AIR SUPPLY ISOLATOR.

Turn anticlockwise to allow air to flow (as shown in the diagram below).

Turn clockwise to cut air supply and drain air pressure from the system.

AIR FILTER REGULATOR.

Normal operating pressure (as supplied, preset on the machine) is 100 PSI (6.6 Bar).

Maximum pressure for the air regulator is 150 PSI (9.9 Bar).

Always check the main supply pressure before adjusting pressure at the regulator. To adjust the pressure, pull up the rotary control to unlock it from its current position. Turn the control clockwise to increase pressure, or anticlockwise to decrease pressure. Push the rotary control down to relock it in its new position.

Regularly drain any water collected in the filter bottle using the cap in the base of the bottle. The interval at which this operation is required will depend on the type and condition of the air compressor being used. AIR LUBRICATOR.

The air lubricator uses oil - ISOVG32.

Turn the front small adjusting screw clockwise to decrease the oil flow, or anticlockwise to increase the oil flow.

Oil can be added to the resovoir bottle by removing the black cap positioned behind the glass bell housing.



TRIAC VMC Specification.

MECHANICAL.

500mm x 160mm (19.5" x 6.25")
290mm (11.5")
170mm (7")
ATC 200mm (8") 235mm (9.25")
275mm (11")
170mm (6.75")
ISO30
BT30
10mm width 31.5mm centres
16mm dia. x 5mm Pitch
16mm dia. x 5mm Pitch
16mm dia. x 5mm Pitch
1285mm (50.625") / 1885mm (74.25")
890mm (35")
720mm (28.375") / 1170mm (46")
600mm (23.625")
360mm (14.125")
780mm (30.75")
240 Kilos (528 lbs)
320 Kilos (705 lbs)
70 Kilos (154 lbs)
0.01mm (0.0004")
0.005mm
Programmable 0-4000 rpm

ELECTRICAL.

Mains Supply 50/60 Hz - 1 phase 220/240 Volts 11 Amp Spindle Motor: Vari Speed 1 HP DC Axes Motor: Stepper Motors - 200 steps/rev DC

Denford Contacts, Products and Services.

If you require specific help regarding the specification, operation or maintenance of this machine, contact Denford on the phone/fax number below. Please have the machine serial number and year of manufacture (printed on the front of this guide) to hand, when you call.

Telephone: +44 (0)1484 712264.

Fax: (01484) 722160.

Denford Limited,

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Stuck for projects and ideas?

Denford produces a range of project based courseware material, especially designed for use with our range of CNC Milling Machines and software products. Denford Courseware is developed to encourage the use of CNC machines and software within Keystages 3 and 4 of the Design and Technology National Curriculum.

Products available include:

- Milling Courseware Introductory (a brief introduction to the milling machine and Denfords "MillCAM Designer" software).

- Keystage 3 Projects for Milling.

- Milling Courseware Intermediate (exploring how the machine works, basic G-code program writing and the use of CNC machines in Industry).

- Keystage 4 Projects for Milling.

Need further training?

The Denford PTDC (Professional Training and Development Centre) is a purpose built centre specialising in project guidance, CNC machine training and software development skills for Denford customers. Training packages can be tailored to suit your needs, with the help of our experienced Education Support team. The centre can cater for training sessions from the very basics of CNC machine operation, upto the complexities of G-code programming, then further into 'new' Technology areas such as video conferencing.

Denford Limited is committed to the development of its training guides and manuals. If you have found certain sections in this setup guide useful, or feel that particular sections could be further developed, or new sections added in future, we would welcome your suggestions and comments.