



**SUPERIOR ELECTRIC
NEDERLAND B.V.**

**SERIES C
SLO-SYN[®]
NUMERICAL
CONTROLS**

AUXILIARY EQUIPMENT

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WARRANTY

Superior Electric Nederland B.V., The Hague, Netherlands warrants its apparatus to be free from defects in material and workmanship under normal use and service for a period of one year from date of shipment by Superior Electric Nederland B.V. The obligation under this warranty is limited to repair or replacement of the apparatus or parts thereof at Superior Electric Nederland B.V., The Hague, Netherlands. This warranty is in lieu of all other warranties, expressed or implied, and no other representative or person is authorized to assume for us any other liability. This warranty does not apply to any apparatus which has been tampered with or altered in any way or which has been subjected to misuse, neglect or accident.

Before returning any apparatus or parts thereof under the terms of this warranty, written authorization must be obtained from Superior Electric Nederland B.V., otherwise the shipment cannot be accepted.

The sender is responsible for all transportation charges to and from Superior Electric Nederland B.V., The Hague, Netherlands.

SUPERIOR ELECTRIC NEDERLAND B.V., The Hague, Netherlands

series C **slo-syn**[®] NUMERICAL CONTROLS

Series C SLO-SYN Numerical Controls offer higher performance and greater flexibility per dollar than other numerical controls in their price range. Options such as plug-in computer interface, independent third axis and others add more benefits than ever before. Feature for feature, SLO-SYN NC has consistently provided the best value for the investment.



ENC TYPES

Economical two-axis point-to-point and straight-line milling numerical controls offering high performance at a low price. Ideally suited for retrofitting small milling and drilling machines, assembly and test equipment and similar manufacturing operations. Standard features include push button keyboard for manual data input and control, automatic backlash compensation, data register examination at any time and durable, compact construction utilizing TTL integrated circuits and silicon power drive. Standard options include ASCII tape codes and computer interface.



PNC TYPES

Low-cost two-axis or three-axis point-to-point and straight-line milling controls which have greater speed and control flexibility than ENC types. A number of options are available to provide increased versatility such as: independent third axis, full feed range, QUILTROL Actuator interface, ASCII tape codes, 4mm lead screw control, backlash compensation and encoder operated position readout. All PNC controls are prewired to allow field installation of the plug-in computer interface.



MNC TYPES

Two-axis and three-axis contouring controls for milling machines, cutting and welding machines and other production equipment which require high speed contouring capabilities. MNC controls provide linear and circular interpolation over the entire feed range and are hardwired at the factory to permit plug-in addition of the optional computer interface. Standard features also include tape control of feed rate and keyboard manual data input. Available options include ASCII tape codes, position readout, 4mm lead screw control, QUILTROL Actuator Interface and independent third axis.

SERIES



slo-syn® NUMERICAL CONTROLS

DRIVE MOTORS AND MOTOR MOUNTING KITS

DRIVE MOTORS

The basic motor types for use with specific NC models are listed in the chart. Normally, standard motors should be ordered. Encoder motors should be specified if an encoder operated position display option is ordered on the NC or, in the case of an ENC type, if a separate display is ordered. Motor dimensions are given on page 5.



BASIC NC TYPE	MOTORS REQUIRED	
	STANDARD MOTORS	ENCODER MOTORS
ENC252	M093-FD-301	M093-FD-306
ENC251 PNC254, PNC354 MNC264, MNC364	M112-FJ25	M112-FJ25C2
PNC253, PNC353 MNC263, MNC363	M113-FJ40	M113-FJ40C2
PNC252, PNC352 MNC262, MNC362	M172-FD-301	M172-FD-302

MOTOR MOUNTING KITS

Kits are available which contain all the parts necessary for mounting motors on the x and y axes of most popular milling machines. The z axis drive kits are offered for mounting motors to the knee of milling machines. The x and y axes kits are direct drive while the z axis unit operates through a 5:1 ratio geared speed reduction assembly. Refer to the chart for specific mounting kit and z axis drive part numbers. Kits for many machines not listed are available on special order. Consult the factory for complete details.

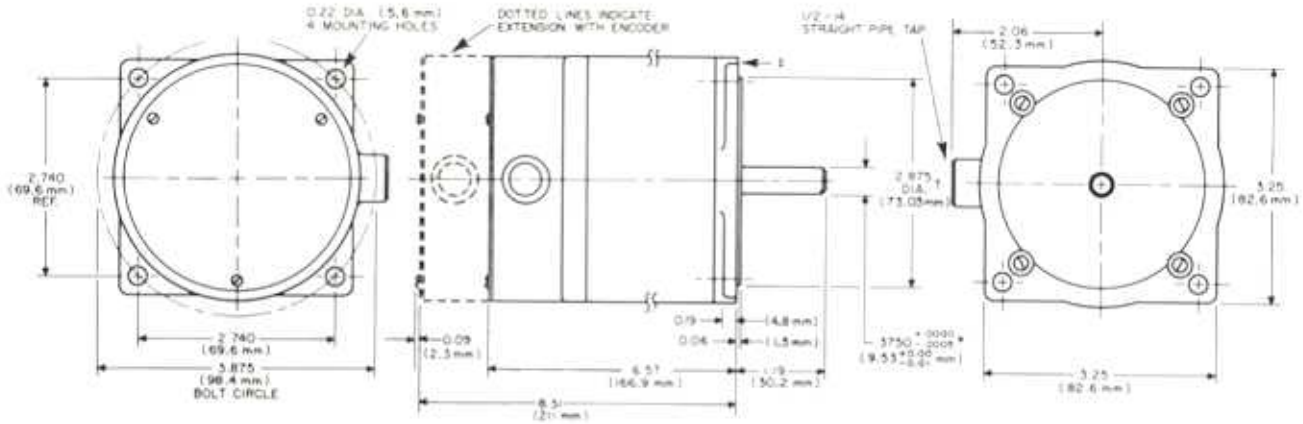
MOTOR MOUNTING AND Z AXIS DRIVE KITS

MAKE	MODEL	M112 & M113 MOTORS		M172 MOTORS X & Y AXIS KIT ONLY
		X & Y AXIS KIT	Z AXIS DRIVE	
BEAVER	MARK II, PAL (std. or ball screws)	GM101755-G1	—	—
BRIDGEPORT	Series I (std. or ball screws)	GM101757-G1	GM101758-G1	—
EX-CELL-O	602 (std. screws)	GM101761-G1	GM101762-G1	—
	602 (Ball Screws)	C203930-G1	GM101762-G1	—
GORTON	1-22, 2-28 (std. or ball screws)	—	—	GM101728-G1
INDEX	847, 857, 747 (std. screws)	GM101771-G1	—	—
LAGUN	FT-1 (std. or ball screws)	GM101792-G1	GM101793-G1	—
SHIZUOKA	AN-S (std. or ball screws)	GM101796-G1	—	—

AUXILIARY EQUIPMENT

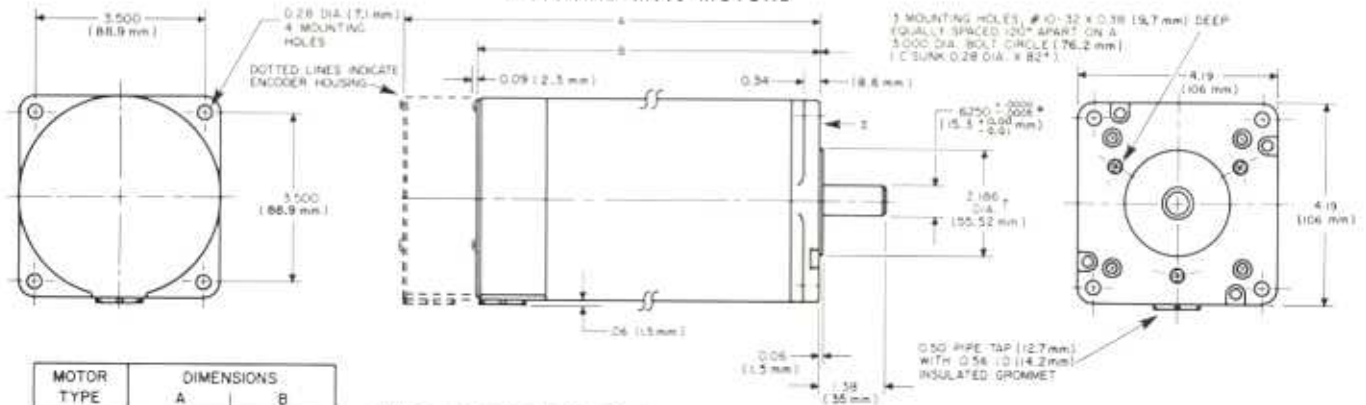
MOTOR DIMENSIONS

M093 MOTORS



T DIAMETER TOLERANCE ± 0.002 (0.05 mm)
 DIAMETER CONCENTRIC TO MOTOR AXIS WITHIN .003 T.I.R. (0.08 mm) S SURFACE SQUARE TO MOTOR AXIS WITHIN .003 T.I.R. (0.08 mm) * SHAFT RUNOUT .002 MAX (0.05 mm)

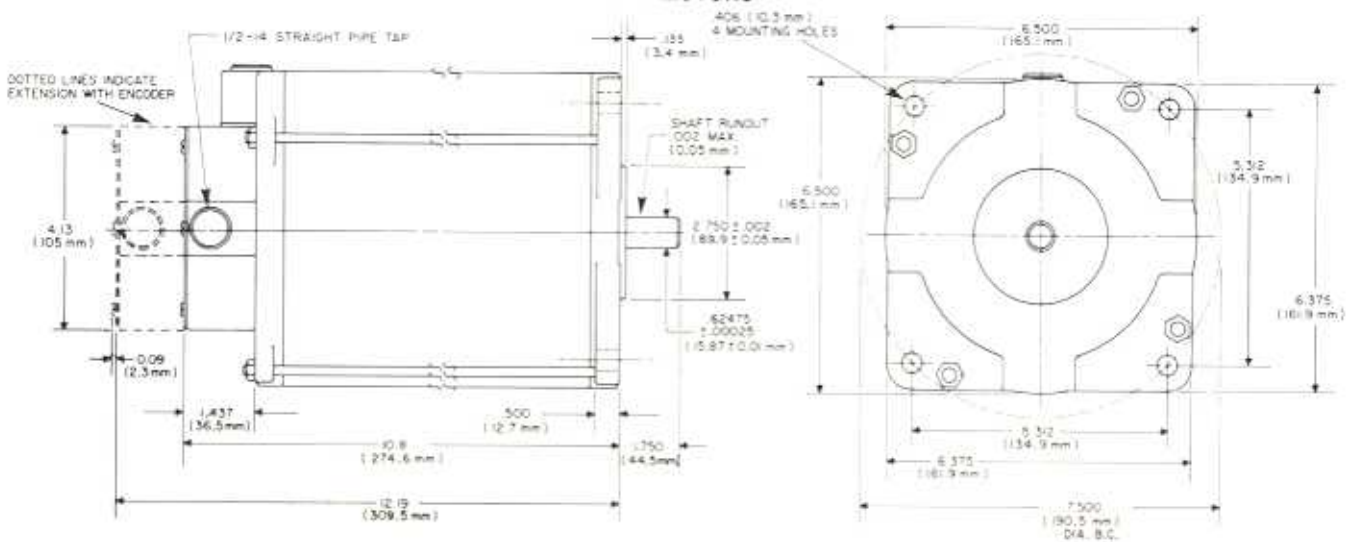
M112 AND M113 MOTORS



MOTOR TYPE	DIMENSIONS	
	A	B
M112	8.54 (217 mm)	7.18 (182 mm)
M113	10.67 (271 mm)	9.29 (236 mm)

T DIAMETER TOLERANCE ± 0.002 (0.05 mm)
 DIAMETER CONCENTRIC TO MOTOR AXIS WITHIN .003 T.I.R. (0.08 mm)
 S SURFACE SQUARE TO MOTOR AXIS WITHIN .003 T.I.R. (0.08 mm) * SHAFT RUNOUT .002 MAX (0.05 mm)

M172 MOTORS



SERIES



slo-syn® NUMERICAL CONTROLS

QUILTROL ACTUATORS

QUILTROL Actuators have all the operating features needed to handle virtual operation. Each actuator includes a control head, automatic 10-station depth filter and regulator. All components of the spindle feed are fully enclosed for safe from dust and chips. The quill can be manually operated without disengaging the setting up.

ADAPTER KITS

Kits are available to facilitate mounting the QUILTROL Actuators on most milling machines. These kits are listed in the chart on page 7. Be sure to select the correct kit for the specific model milling machine.

10-STATION TURRET

The tape actuated turret has ten stations with individually adjustable feed engagement controls and depth stops at each station. The turret can be easily detached with the feed and depth stop adjustments in place, allowing the entire setup to be retained for future production of the same part.

PECKING FOR DEEP HOLE DRILLING

In the pecking mode, the unit will periodically raise the tool from the work to clear all chips and allow coolant to flow into the hole. The tool will retract just beyond the original feed engagement point and will return at rapid speed to approximately 1/32" (7.94mm) from the previous depth, then change to slow feed.

TAPPING MODE

When operating in the tapping mode, the unit will feed and retract the quill at the same rate, eliminating the need for synchronizing separate feed and retract settings.

EMERGENCY STOP

An Emergency Stop button located on the panel will stop all table motion, retract the tool, turn off the spindle motor and coolant and apply the spindle brake.

SLIDE HOLD

Table motion can be interrupted at any time by pressing the Slide Hold button on the actuator panel or on the NC. A lamp on the NC panel will indicate when the Slide Hold is activated.

TAPE START

The Tape Start function can be initiated from the actuator control panel or from the NC.



DWELL TIME

When operating in the Drill/Mill mode a Dwell Timer controls tool dwell interval. During drilling operations, the tool will stay down for this preset interval before retracting. For milling, the tool must remain at the bottom of its stroke for this interval before table motion will begin. A No-Dwell mode can also be selected.

OPTIONAL FEATURES

MOTOR CONTROL

The motor control allows starting and stopping of the spindle motor and coolant pump from tape or from the actuator control panel. Contacts are also available to operate a lubricant pump for the machine lead screws and ways. Motor control part numbers for specific spindle horsepower ranges are listed in the chart.

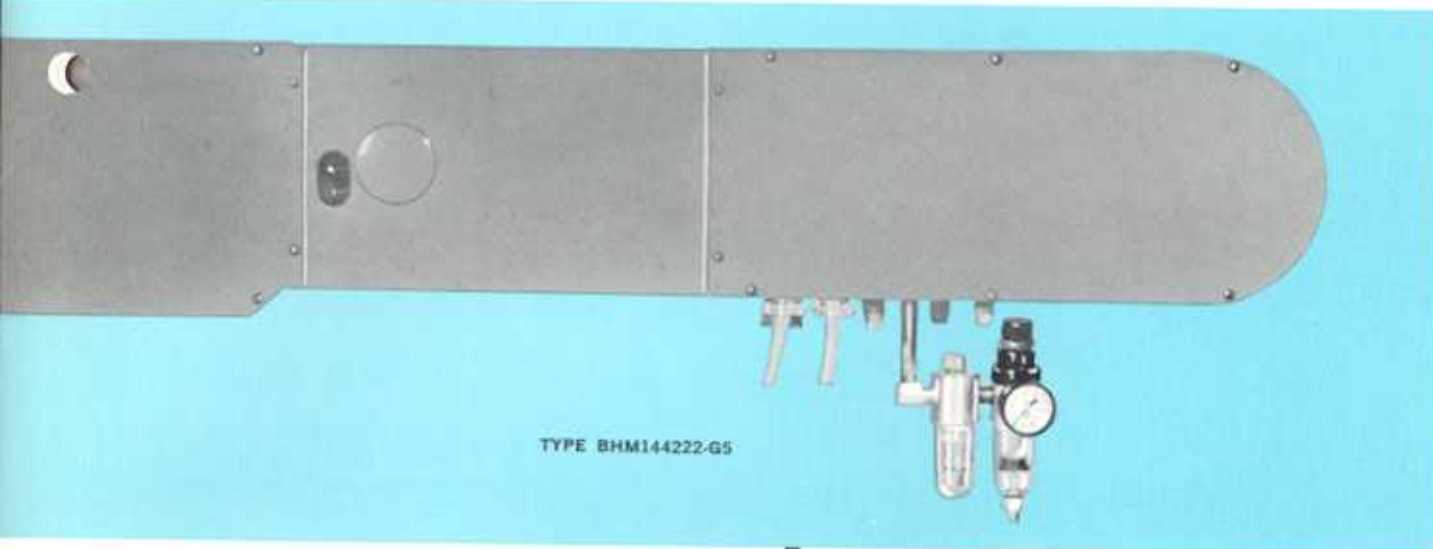
SPINDLE HORSE POWER	MOTOR CONTROL TYPE
less than 3 hp	BHM144214-G1
3 hp or more	BHM144214-G2

BRAKE CONTROL

The brake control kit is used in conjunction with the motor control. It consists of an air cylinder and the

AUXILIARY EQUIPMENT

any machining
stop turret, air
and protection
e actuator when



TYPE BHM144222-G5

machine parts needed to power the existing manually operated brake. The brake can be actuated and held on by the motor control. Be sure to select the correct brake control kit for your machine.

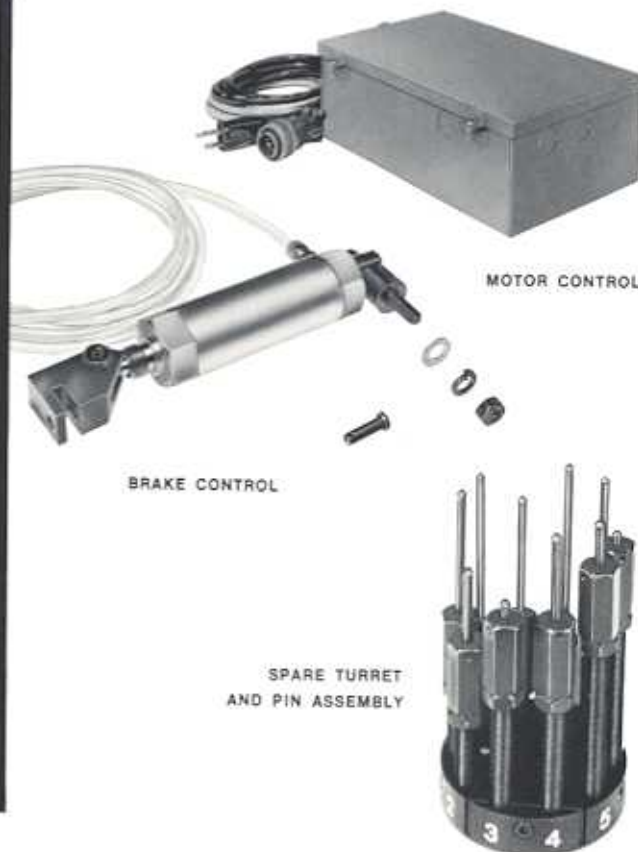
SPARE TURRET AND PIN ASSEMBLY (PART NO. DHM144249-G1)

Spare turret and pin assemblies are offered for use where it is desirable to retain feed and depth stop adjustments for specific part requirements. The assembly includes ten depth stops and feed engagement pins and a mounting drum.

ACCESSORIES FOR BHM144222-G5 QUILTRON® ACTUATOR

MACHINE		ADAPTER KIT	BRAKE KIT*
MAKE	MODEL		
BEAVER	MARK II	BHM144220-G1	—
BRIDGEPORT	9BRJ, 12BRJ	BHM144220-G2	BHM144221-G5
	9BR2J, 12BR2J	BHM144220-G2	BRM144221-G1
EX-CELL-O	602	BHM244220-G4	BHM144221-G2
INDEX	745, 747	BHM144220-G9	†
	847, 857, 845	BHM144220-G11	†
KONDIA	FV-1	BHM144220-G13	BHM144221-G13
LAGUN	FT-1		

*Can only be used when motor control is provided.
†Available from machine manufacturer.



MOTOR CONTROL

BRAKE CONTROL

SPARE TURRET
AND PIN ASSEMBLY

SERIES



slo-syn® NUMERICAL CONTROLS

POSITIONING TABLES (Two-Axis)

SLO-SYN Positioning Tables are two-axis numerically controlled positioning devices which can be used to automate existing manually operated machines to perform machining, assembly and test operations. The tables are available with all Series C numerical control types and are offered in a wide range of models for adaptation to virtually any requirement.

POSITIONING TABLES

The 1218S and 3618 tables are suitable for assembly, test and inspection applications and for light duty drilling. The tables have precision ball lead screws for elimination of lost motion and are durably constructed for lasting accuracy. The 1218S table is rigidly mounted on a ribbed steel base and support stand and is designed for convenient access in applications having heads or spindles aligned in a row above it. The 3618 table provides a large area of motion in a rigid, but relatively compact and lightweight configuration.

POSITIONING AND LIGHT DUTY MILLING TABLES

The 0909 and 1809 tables are offered for light machining, drilling, assembly, inspection and test operations and similar use. The tables are designed and constructed to assure long service and sustained accuracy in numerical control applications. The tables move on ball bushings which travel on rods which have been hardened and ground. Lead screws are ball-nut type to achieve low friction, negligible backlash and high accuracy.

MODELS

All tables can be supplied with ENC, PNC or MNC controls and provide positioning resolution of 0.001 inch (0.025mm). Metric models which provide resolution of 0.01mm (0.0004 inch) are also available.

Part numbers for the tables equipped with the desired NC should be selected from the following chart. Maximum feed rates with each control are also listed.

TABLE MODELS

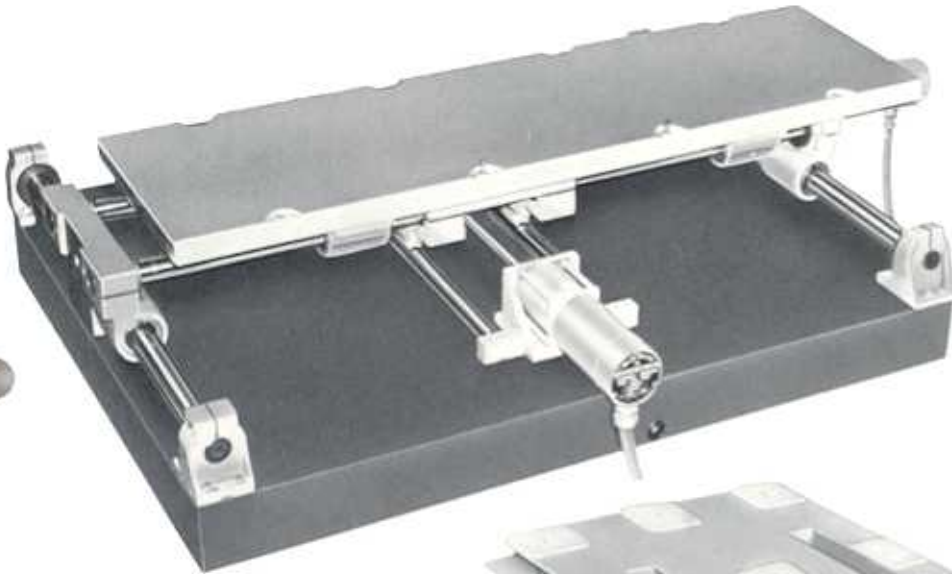
BASIC TABLE TYPE	POINT-TO-POINT CONTROL				CONTOURING CONTROL — MNC TYPE	
	ENC TYPE		PNC TYPE		TABLE MODEL	MAX. FEED RATE ipm (mm/min.)
	TABLE MODEL	MAX. FEED RATE ipm (mm/min.)	TABLE MODEL	MAX. FEED RATE ipm (mm/min.)		
1218S	ENC1218S	100 (2540)	PNC1218S	300 (7620)	MNC1218S	300 (7620)
3618	ENC3618	100 (2540)	PNC3618	300* (7620†)	MNC3618	300* (7620†)
0909	ENC0909	100 (2540)	PNC0909	300 (7620)	MNC0909	300 (7620)
1809	ENC1809	100 (2540)	PNC1809	300 (7620)	MNC1809	300 (7620)

*240 ipm for loads from 200 to 500 lbs., 180 ipm for loads greater than 500 lbs.
 †6096mm/min. for loads from 91 to 227 kg., 4572mm/min. for loads greater than 227 kg.

TABLE SPECIFICATIONS

BASIC TABLE TYPE	TABLE TRAVEL	TABLE SIZE	ACCURACY	REPEATABILITY	LOAD LIMIT (evenly distr.)	TYPE OF SERVICE
1218S	12" x 18" (305mm x 457mm)	50" x 14" (1270mm x 356mm)	±0.001" per foot (±0.01mm per 0.12m)	0.0005" (0.01mm)	500 lbs. (227 kg)	Positioning
3618	36" x 18" (914mm x 457mm)	40" x 20" (1016mm x 508mm)	±0.001" per foot (±0.01mm per 0.12m)	0.0005" (0.01mm)	1000 lbs. (454 kg)	
0909	9" x 9" (229mm x 229mm)	10" x 12" (254mm x 305mm)	±0.0005" per foot (±0.005mm per 0.12m)	0.0005" (0.01mm)	300 lbs. (136 kg)	Positioning Light Milling
1809	18" x 9" (457mm x 229mm)	20" x 10" (508mm x 254mm)	±0.0005" per foot (±0.005mm per 0.12m)	0.0005" (0.01mm)	300 lbs. (136 kg)	

AUXILIARY EQUIPMENT

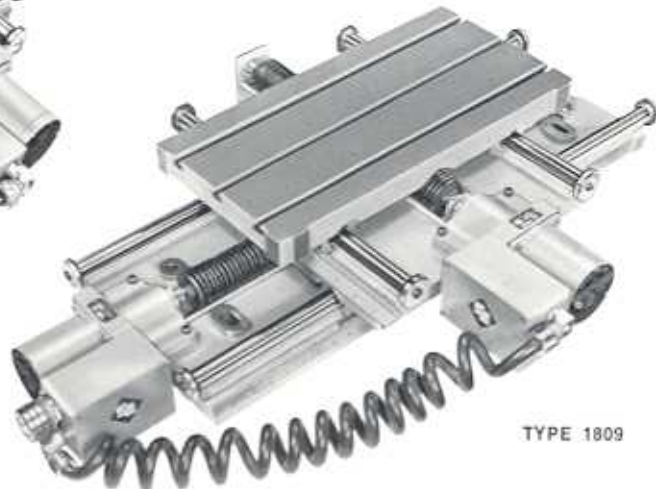


TYPE 1218S

TYPE 3618



TYPE 0909



TYPE 1809

SERIES



slo-syn® NUMERICAL CONTROLS

ROTARY TABLES

SLO-SYN Rotary Tables are valuable accessories for controlling angular location in automated operations. The tables are driven by SLO-SYN Stepping Motors and can be used as the third axis on three-axis model series C SLO-SYN Numerical Controls. Positioning resolution is 0.01°. The tables can be mounted either horizontally or vertically. Applications include drilling, reaming, tapping, milling, shaping, grinding, assembling, packaging, inspection and other applications where precise angular location of the work is necessary.

ROTARY TABLE MODELS

The specific rotary table model which must be selected for each NC type is listed in the Application Data chart. An encoder motor model should be ordered if an encoder operated position readout will be used to indicate table position.



TYPE 12TC2B

ROTARY TABLE APPLICATION DATA

ROTARY TABLE MODEL		FOR NC TYPES	MAXIMUM POSITIONING RATE	APPROX. WEIGHT
STANDARD MOTOR	ENCODER MOTOR			
12TC2B	12TC2BE	PNC252, PNC352, MNC262, MNC362	20° per second	250 lbs. (113 kg)
12TC3B	12TC3BE	PNC253, PNC353, MNC263, MNC363	30° per second	230 lbs. (104 kg)
12TC4B	12TC4BE	ENC 251	12.5° per second	225 lbs. (102 kg)
		PNC254, PNC354, MNC264, MNC364	40° per second	

ROTARY TABLE SPECIFICATIONS ALL MODELS

Table Diameter	12 inches (305mm)
Table Positioning Accuracy	within 30 seconds noncumulative
Rotating and Static Flatness	within 0.0005 inch (0.0127mm)
Centerbore Runout	0.0008 inch (0.020mm)
Squareness of Table Surface	
With Vertical Mounting Surface	within 0.0015 inch (0.038mm)
Maximum Static Load (Centrally Located)	
Horizontal Mounting	1000 lbs. (454 kg)
Vertical Mounting	400 in-lbs (4.6 kg-m) (load times distance from load center to table face)
Ratio	180:1
Maximum Backlash at 6" Inch (152mm) Radius	0.002 inch (0.051mm)

AUXILIARY EQUIPMENT

POSITION DISPLAY

The type DR26BE Position Display is offered for use with an ENC control and encoder motors to provide a visual indication of table position. Pulses from the encoders operate the x & y axis displays. The display provides a 6-digit readout for each axis and is mounted in a cabinet which can be placed on top of the ENC control or at any other convenient location.

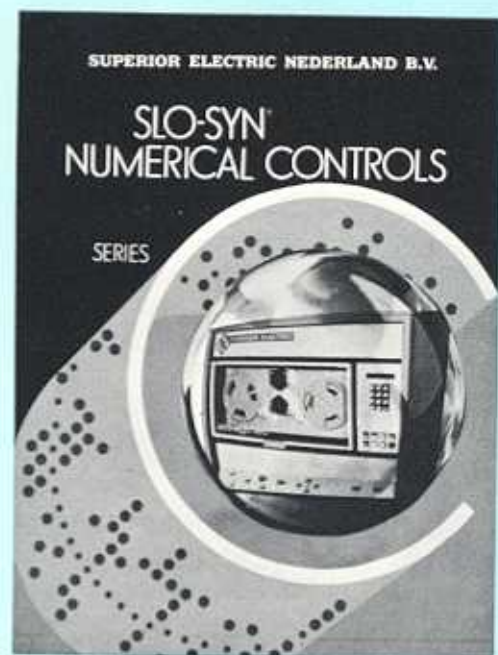
Cables and plug-in connectors are provided for connecting the encoders to the display and a cord and plug assembly is supplied for the a-c input. Controls on the readout are an on-off power switch and clear buttons for each axis. The display can be set to read correct position with a wide range of lead screw and gearing combinations.



SPECIFICATIONS, TYPE DR26BE

POWER INPUT	105 to 130 volts, 50/60 hertz, 0.5 ampere
COUNTING RANGE	0 to 999,999
TEMPERATURE RANGE	Operating: 0 to + 50°C Storage: 0 to + 85°C
APPROXIMATE WEIGHT	15 lbs (6,8 kg)

Series C
SLO-SYN Numerical Controls
are offered in two- and three-axis models for
point-to-point positioning and straight-
line milling or for contouring.
Complete details, ratings and specifications
are given in catalog NC874E





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