

COLUMN & BOOM OPERATING MANUAL

WARPP ENGINEERS PVT LTD

36/15,UNIQUE INDUSTRIAL ESTATE , DHUMAL NAGAR , WALIV PHATA , VASAI(EAST) PALGHAR- 401208

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PREFACE

Thanks for purchasing our product & looking forward to your precious advice for improvement of our product. We will dedicate to produce the best products and offer the best services.

The machine has been carefully inspected both mechanically and electrically before it left the factory.

The machine should be initially inspected upon receipt, if any damage which may have occurred in transit inform “WARPP ENGINEERS PVT.LTD. OR It’s Dealer immediately. Check for the accessories supplied against those listed in packing slip.

Caution: Before attempting to connect the equipment to any Power source, read instructions carefully.

In case any defect or deficiency, contact “WARPP ENGINEERS PVT.LTD.” or its authorized Agent. Make sure to quote model number and serial number of the equipment in all correspondence.

THE DESIGN OF THIS EQUIPMENT IS SUBJECT TO CONTINUOUS DEVELOPMENT AND IMPROVEMENTS, CONSEQUENTLY “WARPP ENGINEERS PVT.LTD.” RESERVES THE RIGHT TO INCORPORATE MINOR CHANGES FROM THE INFORMATION CONTAINED IN THIS MANUAL.

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NOTE - THIS IS GENERALISED MANUAL FOR DIFFERENT CONFIGURATION OF C&B. SOME DESCRIPTIONS /EXPLANATIONS MAY NOT BE RELEVANT FOR THE C&B PURCHASED BY YOU. FOLLOWING ARE THE DIFFERENT CONFIGURATIONS.

- 1) FIXED C&B**
- 2) WITH MANUAL 360° SWIVEL**
- 3) MOTORISED 360° SWIVEL**
- 4) WITH CARRIAGE TO MOVE ON THE TRACK**
- 5) WITH MOTORISED CARRIAGE TO MOVE ON THE TRACK**

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1.SAFETY

Our machines are designed and built with ample safety considerations. However, proper installation & operation of the machine will increase your safety.

**DO NOT INSTALL, OPEARTE OR REPAIR THIS
EQIPMENT WITHOUT READING THIS MANUAL**

Following points to be taken care while installing the machine

- Ensure that children or animal do not have access to the machinery
- Ensure that the machine is placed properly so that it has enough ventilation and also stability so that it does not fall
- Any safety items fitted, must not be bypassed, or removed. if they have to be removed then the equipment must be put out of operation, until a repair is completed
- Always keep the workplace clean & free from obstacles
- Make sure that the work area is well lit.
- Ensure that the machine is regularly maintained to ensure that it remains safe.
- Electric shock can kill. Please make sure that you follow the below guidelines

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- All electrical supply terminals shall be well covered and insulated
- Do not touch both the output terminals with bare hand as it may lead to electric shock
- Always use proper hand gloves and other safety equipment while operating the machine
- Use proper shaded welding screen as the arc has ultra violet rays which can damage the eye sight
- Do not obstruct any moving parts as it may cause harm
- Ensure that the clothing is fire resistant to protect your skin from burns and arc rays
- When compressed gas to be used, then special precautions to be taken to prevent explosion
- Please make sure that no inflammable items are there in the weld area
- Spatters can cause burns ensure that you use all personnel protective equipment
- Newly supplied machines, which is packed in either corrugated box or wooden box shall be shifted using forklift
- Proper care shall be taken while shifting or relocating the machines. Use lifting hooks / mechanism provided on the machine

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2. DESCRIPTION & FEATURE

The WARPP Heavy duty series column & boom manipulators are specially designed and built to withstand the harsh & rugged environments expected in the fabrication facility. It includes the following features:

- A slewing ring for column and boom mounting, thereby providing a smooth 360-degree lockable rotation.
- All vertical and horizontal rails are precisely machined in single runs giving unsurpassed smooth and steady level.
- Worm gearbox for vertical travel via AC motor.
- High tensile roller chain used for vertical travel with the addition of a counter balance system provides smooth effortless vertical travel.
- Standard safety feature includes anti-fall device where-ever necessary & limit switches for all functions.
- Internally trunk-ed cabling

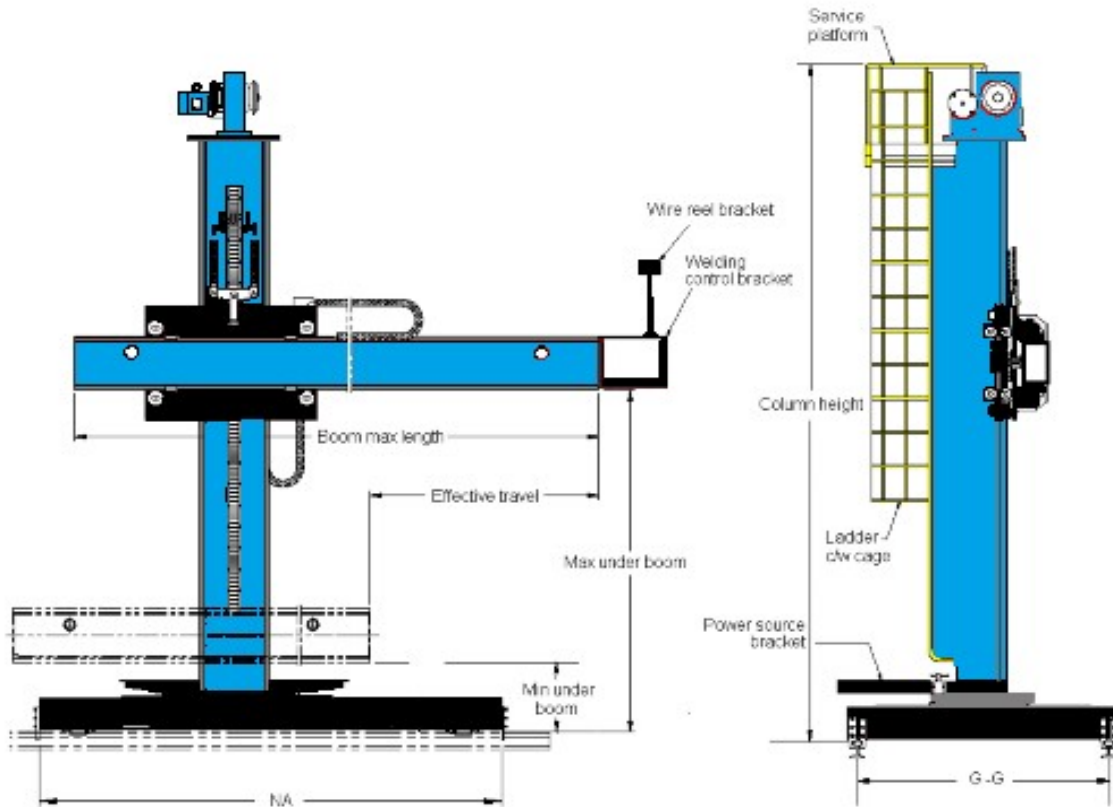
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STRUCTURAL PRINCIPLE:

The column is made from either fabricated or tabular structure depending on size. Column can either fixed, with manual swivel or motorized swivel.

In case of fixed column, it is fixed to the base plate.

In case of manual swivel there is a slew bearing between the column & bottom plate. The column can be rotated by

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360degree and can be fixed at any angle by means of locking system provided.

In case of motorized swivel, the arrangement is similar to manual swivel but a gear motor is coupled achieve motorized swivel of the column.

A cross-head saddle is connected to the column; lifted & lowered by means of AC motor with reduction gearbox of proper size of the column & boom. The cross saddle is either lifted by sprocket and chain mechanism or by lead screw.

Lead screw is used for only smaller columns of less than 2meters. for column & boom of less than 4 meters size, linear motion bearings are used for guiding the cross-head saddle. For higher size column & booms roller guide mechanism is used. Counter weight is connected to the cross-head saddle by means of rope.

Column & boom of size 3 meters and above (from 3x3 onwards) has anti-fall mechanism. Ladder is also provided for maintenance for column & boom above 3 meters size. Welder platform is available for all column and boom above the size of 4x4.

Base plate of proper thickness and size with grouting holes are proved at the bottom of the column.

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Based on the other configuration there may be under carriage below the base plate which may have free wheels or driven wheels. In case of driven trolley, the wheels are coupled to reduction gearbox of proper size coupled with AC induction motor.

Different possible configuration for column and boom as under

- 1) Fixed column & boom
- 2) Column and boom with manual swivel
- 3) Column & boom with motorized swivel
- 4) Fixed column & boom with manual under carriage
- 5) Fixed column & boom with motorized under carriage
- 6) Column & Boom with manual swivel & manual under carriage
- 7) Column & boom with manual swivel and motorized under carriage
- 8) Column & boom with motorized swivel and manual under carriage
- 9) Column & boom with motorized swivel & motorized under carriage

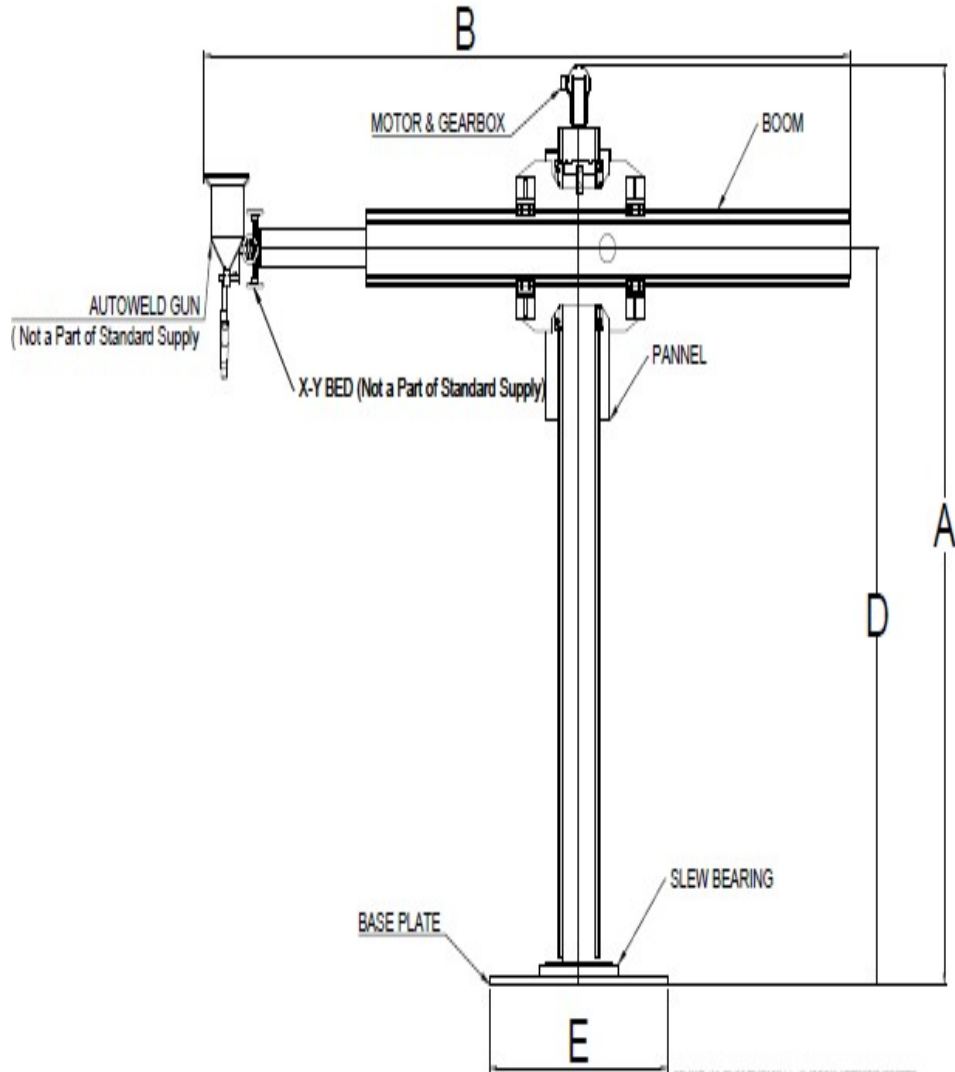
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REMOVE ALL SHARP EDGES BY 1.0mm, UNLESS OTHERWISE SPECIFIED

				WARPP ENGINEERS PVT.LTD. <small>INDIA'S FIRST 100% INDIGENOUS MANUFACTURED AUTOMATIC WELDING SYSTEM</small>	
DATE: 11/01/2018 DRAWN BY: [Signature] CHECKED BY: [Signature]	TITLE: COLUMN & BOOM	SCALE: 1:1	SHEET NO: 01	TOTAL SHEETS: 01	PROJECT NO: 2018010101
MATERIAL: [Blank]		FINISH: [Blank]		TOLERANCE: [Blank]	
G.A. DRAWING					
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MODEL	A TOTAL COLUMN LENGTH	B TOTAL BOOM LENGTH	C MIN HEIGHT FROM GROUND WHEN BOOM IS AT LOWEST POINT	D MAX HEIGHT FROM GROUND WHEN BOOM IS AT HIGHEST POINT	E FOUNDATION PLATE SIZE (MM)	VERTICAL COLUMN MOVEMENT (MM)	HORIZONTAL BOOM LENGTH (MM)
2X2	3300	3500	550	2250	700X700	2000	2000
3X3	4400	4600	600	3600	1000X1000	3000	3000
4X4	5700	5900	750	4750	1000X1000	4000	4000
5X5	6900	7100	850	5850	1050X1050	5000	5000

Note - Specification may subject to change without any prior notice.

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3. WORKING CONDITION & ENVIRONMENT REQUIRED

- 1) Please note that this equipment to be installed in a clean place free from dirt, moisture.
- 2) Avoid direct exposure to sunlight.
- 3) Care should be taken to see that it is not exposed to rain.
- 4) Whenever the machine to be used at a site make sure proper shade is provided for the machine.
- 5) Do not keep the machine near oven, furnace where temperature may be higher and it can affect the performance of the machine.
- 6) Keep the machine in a flat position.
- 7) Use cables with proper cross section based on the input power requirement of the machine (Please refer to technical specification page for input power of the machine).
- 8) When long cables are used you need to select higher cross-sectional area of conductors to avoid voltage drop during the usage.

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Selection guide for type of MCB

MCB Type	Tripping Current	Application
B Type	3 to 5 times the rated current	Purely resistive load like lighting and general-purpose outlets
C Type	5 to 10 times the rated current	Moderate inductive load like air conditioners, residential / commercial pumps
D Type	10 to 20 times the rated current	Heavy inductive loads like heavy induction motor and welding machines

Selection of cable size for input supply

Please note that the cable size required for input supply depends on following

- 1) Whether the machine is single phase or three phases
- 2) Input KVA of the machine
- 3) Distance from electrical supply point

First calculate the current the machine will draw based on the input KVA given (refer to technical specification page for this)

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If the machine is a single-phase machine then each KVA would require around 4.6 Amps of current. That means if input KVA of the machine is 5 KVA, then it would draw 23 Amps at full load.

If the machine is a three-phase machine then each KVA would require around 1.4 Amps of current. That means if the input KVA of the machine is 5 KVA, then it would draw around 7 amps of current at full load.

Cable capacity for copper cable can be taken as 5 Amps / Sq mm when cable length is less than 10 meters. That means 1 sq mm cable can carry a current of 6 Amps of current.

Now you have

input current of the machine based on its input KVA

You can calculate the conductor size by this formula

Input current / capacity of conductor

Example

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From the above for a single-phase machine of 5 KVA you would need $23/6=3.8$ Sq mm cable. (You can choose 4 sq mm cable)

From the above for a three-phase machine of 5 KVA you would need $7/6=1.16$ Sq mm cable. (You can choose 1.5 sq mm core cable for each phase)

Note:

When the length of the cable is short the required cross section for input cable will come down

Below table will help you in selecting the right size of welding cable based on the length and current to be used

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Welding Cable selection chart					
Welding Current in Amps	Recommended Cable size (Sq mm) based on length (in Meters)				
	1 ~ 15 Meters	15 ~ 30 Meters	30 ~ 45 Meters	45 ~ 60 Meters	60 ~ 75 Meters
100	16	25	25	35	50
150	16	25	35	50	50
200	35	35	50	50	70
300	50	50	70	70	95
400	70	70	70	95	120
600	95	95	95		
800	140	140			
1000	140	190			
1200	190	240			
1500	240	285			

Note:

Table given is just for reference and the actual result may vary depending on the quality of conductor

Multiple cables can be used where every single cable of that capacity is not available

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4. TECHNICAL SPECIFICATION

	2X2	3X3	4X4	5x5	6X6
COLUMN HEIGHT (MM)	3500	4500	5400	7000	8000
BOOM LENGTH (MM)	4000	5000	6000	7000	8200
EFFECTIVE VERTICAL BOOM TRAVEL (MM)	2000	3000	4000	5000	6000
EFFECTIVE HORIZONTAL BOOM TRAVEL (MM)	2000	3000	4000	5000	6000
LIFTING SPEED OF BOOM (M/MIN)	1	1	1	1	1

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TRAVEL SPEED OF BOOM (MM/MIN)	100-1200	100-1200	100-1200	100-1200	100-1200
FOUNDATION PLATE(M M)	700X700	1000X1000	1200X1200	1050X1050	1200X1200
BOOM LIFTING MOTOR (KW)	0.5	0.75	0.75	1.1	1.5
BOOM TRAVEL MOTOR (HP)	0.25	0.5	0.5	0.75	0.75
INPUT SUPPLY					
3 PHASE, 440 V AC					

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5. WORKING PRINCIPLE

Welding column & boom is composed of column, welding arm, elevating mechanism, boom movement mechanism and electrical control panel. It can achieve multi-directional welding requirements. The elevating of welding arm adapted the way of worm gear transmission & chain drive elevating or lead screw mechanism.

Horizontal movement of the boom is achieved by rack and pinion arrangement. LM guide ways or roller mechanism is used for precision movement of the boom. The boom is driven by an AC induction motor & its speed is controlled by variable frequency drive (VFD). Remote controller is provided for ease of operation which has a digital display to show the speed of the boom.

The remote control has an emergency switch & controls for UP/DOWN movement of boom & FORAWRD/REVERSE movement of boom.

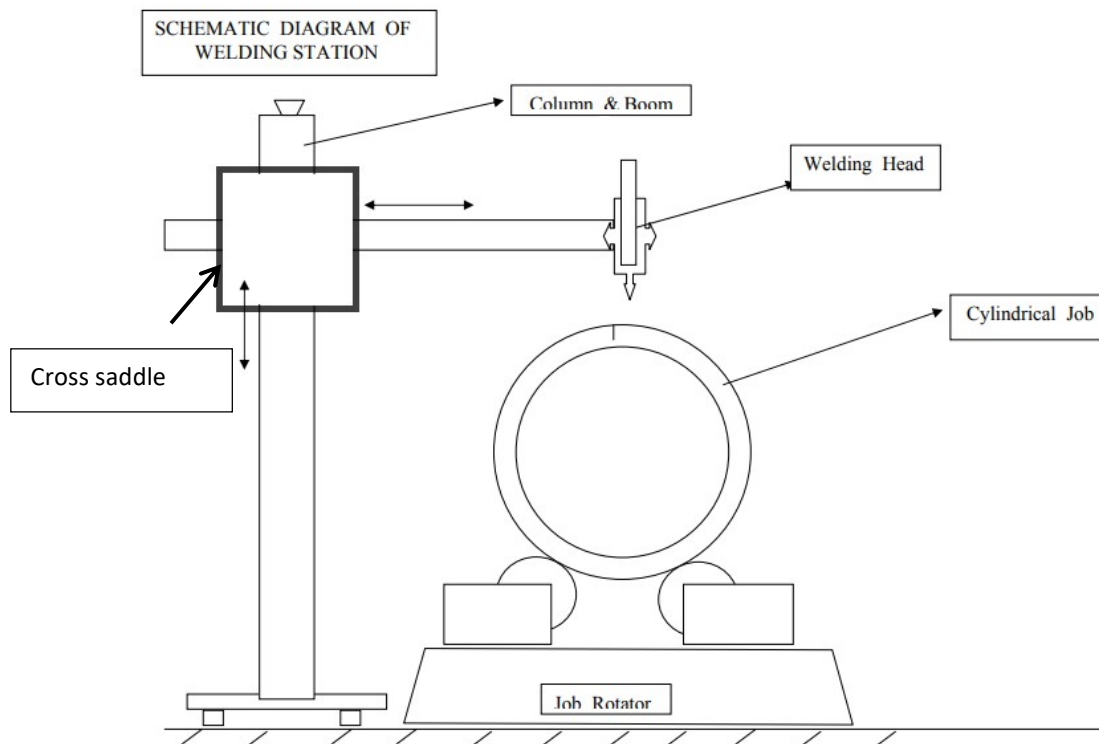
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Note - diagram is for representation only & all the parts shown here are not the part of the standard supply.

Above Diagram shows the circumferential welding on tank using column and boom. Tank is mounted on tank Rotator and is rotated by AC geared motor.

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6. INSTALLATION

The following stages of assembly must be followed in order to ensure that the machine is correctly commissioned.

Column & Booms are dismantled prior to shipment with the base, column and boom being forwarded with adequate protection or packing for overseas shipments. Furthermore, the machine is dismantled in such a way as to minimize the assembly work at site.

- 1) Locate the base on perfectly flat floor area and check with spirit level on rotating or fixed center.
- 2) Fix the Foundation Plate as per the foundation drawing.
- 3) Light oil may be applied to these slide-ways to prevent rusting.
- 4) Check all the material is as per the packing list.
- 5) If the gearbox and motor has been removed to ensure safe transportation to site then this should now be mounted on the column & Boom
- 6) The Column may now be raised by overhead or mobile crane
- 7) Care should be taken when raising the Column to avoid the Column swinging and becoming a hazard and possibly causing

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injury to persons in the vicinity or other items of infrastructure or the machine itself.

8) Raise the Boom by crane and fit on the middle plate of column and boom.

9) If the main control panel has been removed, to ensure safe transportation to site then this should now be mounted at the rear of the Column. (In addition, the cable carrier bracket should also be fitted at the rear of the Column nut, above the main control panel.)

10) The machine is now fully assembled and may be wired in accordance with the schematic diagram provided. The required mains power may now be connected to the column.

11) When commissioning the machine, the remote-control speed potentiometer should be turned to a low speed setting i.e. turns anticlockwise.

12) The forward or reverse push button may now be pressed to start the boom or bogie traverse motion at a slow speed. The boom limits should be checked at low speed to ensure that they are capable of stopping the motor at maximum forward or reverse traverse.

VERY IMPORTANT

Please ensure that the phases are wired correctly. This means that when the up button is pressed on the pendant and control box the carriage moves up. If the carriage moves down when the up button is pressed it means that the phases are wired

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incorrectly. Turn off the power supply and swap over any of the 2 phases to ensure that the carriage moves in the same direction as the pendant indicates.

When the Column is working in this condition the limit will not stop the motor. The elevation limit switches should be checked by hand while the motor is being energized.

Failure to comply with this will result in extreme damage to both the limit switches and the machine.

The Column and Boom should now function correctly and give satisfactory performance over long periods. It is recommended that gearbox oil levels are checked before being put into operation.

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7. CONTROLS



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8. PARAMETERS & ITS OPERATIONAL MEANING

FORWARD - This Button is for forward movement of boom.

REVERSE - This switch is for reverse movement of boom.

UP - This button is for UP movement of Boom.

DOWN - This button is for Down Movement of boom.

TRIP - This indicator will glow when the VFD Trips due to some over load.

CONTROL ON- this indicator glows when the C&B is powered on.

VFD DISPLAY - VFD Display shows frequency in HERTZ. /
Travel speed in mm/min.

EMERGENCY STOP - this switch will stop functioning of the entire column & boom by a simple press. This is used in case of emergency.

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MAIN SWITCH - Main Switch allows the input supply to run through machine.

AUTO/MANUAL - This switch is use to choose the mode of operation.

9. HOW TO OPERATE THE MACHINE

Ensure that there is nothing in the path of the column & boom when moving.

The operator can use the UP and Down button on either the control panel or the pendant to set the correct height for the boom.

The operator should then set the speed potentiometer knob to the desired speed of the boom horizontal travel.

Depending on the type of weld long seam & circular seam the C&B is used either to index the torch or to move the torch.

In case of Circular seam operator needs to bring the torch to required position & the job is rotated either by Rotator or

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Positioner. In this case torch is stationery and job is moving.

In case of long seam welding, first the operator needs to bring the torch to starting point from where welding needs to be done.

Now once the weld is stated operator can turn on the boom movement to move the torch. Care should be taken to check the direction and movement.

STOPPING THE COLUMN & BOOM

To stop the boom, press the RED stop button on the hand pendant. This will stop boom travel, which will not restart until a direction button is pressed.

If necessary, the column & boom can be stopped using the Emergency Stop Button on either the panel or hand pendant. This should only be used in an emergency.

COMMON MISTAKES WHEN USING COLUMN & BOOMS

1. Parts of the vessel come into contact with the boom in the vicinity during rotation. This can cause damage to the column & boom and welding heads.
2. Emergency Stop button is depressed. If a switch is pressed in, the operator must find out who pressed it in and for what

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reason, before restarting the machine. There may be a hazard that someone else has seen and stopped the machine for.

3. The phases of the electrical supply are incorrect for the operation of the machine. It must be checked for both up and down travel of the boom and horizontal travel of the boom, that the limit switch for the direction that the boom is travelling in stops the boom. If it does not then the phases will need swapping over

10. DO'S & DON'TS

	DO'S	DON'TS
1	Clean LM rail & oil it before every operation.	Don't place any material on LM rail.
2	Use Compressed air to clean dust particles on LM rail & C & B.	Do not climb on staircase of boom during welding process.
3	Lock slew bearing during welding process.	

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11. TROUBLE SHOOTING

SR NO	TROUBLE	CAUSE	REMEDY
1	Speed Adjustment of Boom is not working.	1. Faulty Potentiometer 2. VFD Fault	1. Check Potentiometer & Replace it if required. 2. Check & Repair VFD.
2	Forward/Reverse action not taking place	1. Fault in Forward/Reverse Switch.	1. Check The switch or Replaced.
3	Motor not running.	4. Check Input Connection to Motor 5. Check Potentiometer. 6. Check VFD.	1. Rectify any connection issue. 2. Replace potentiometer. 3. Replace VFD.

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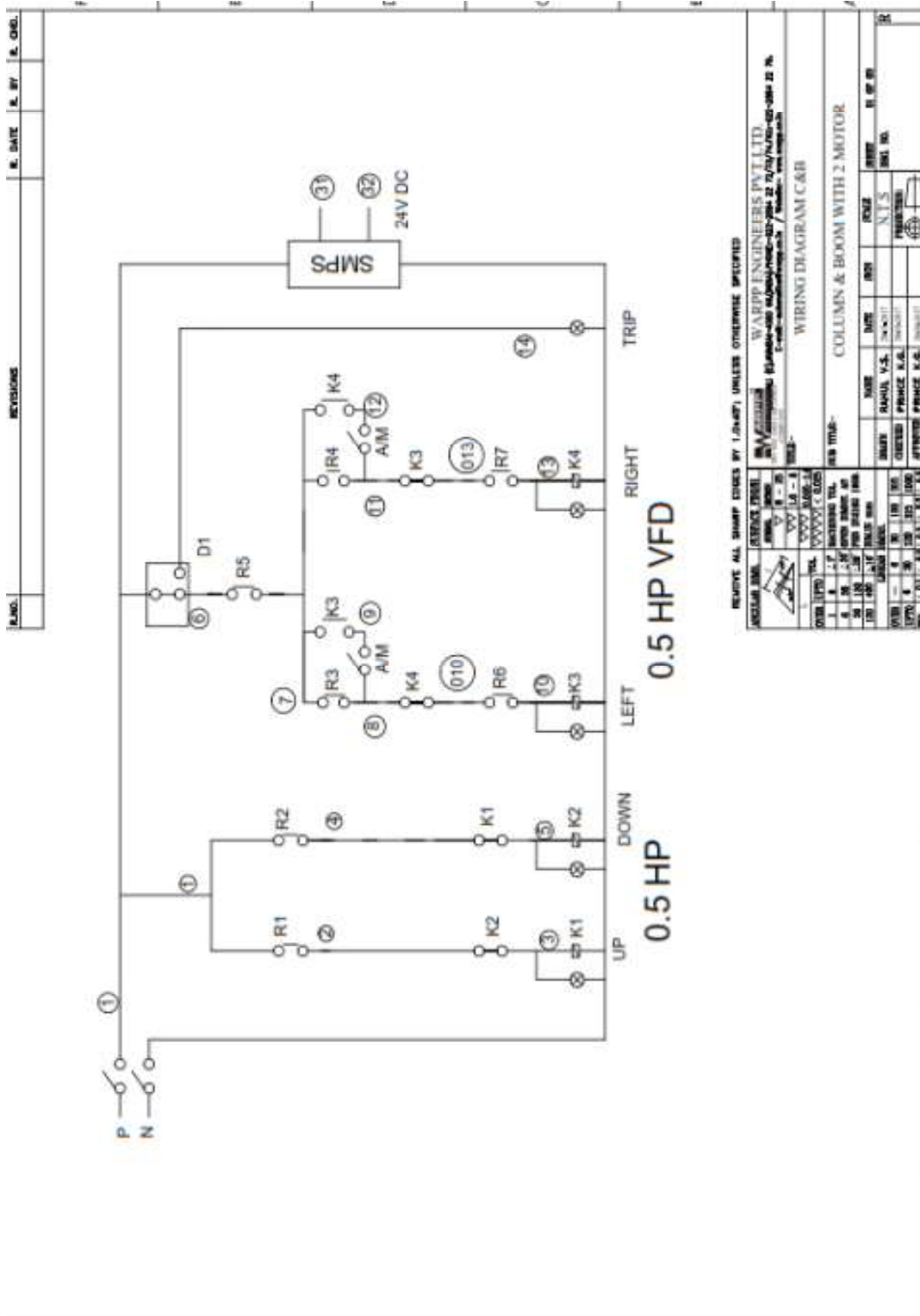
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12. WIRING DIAGRAM



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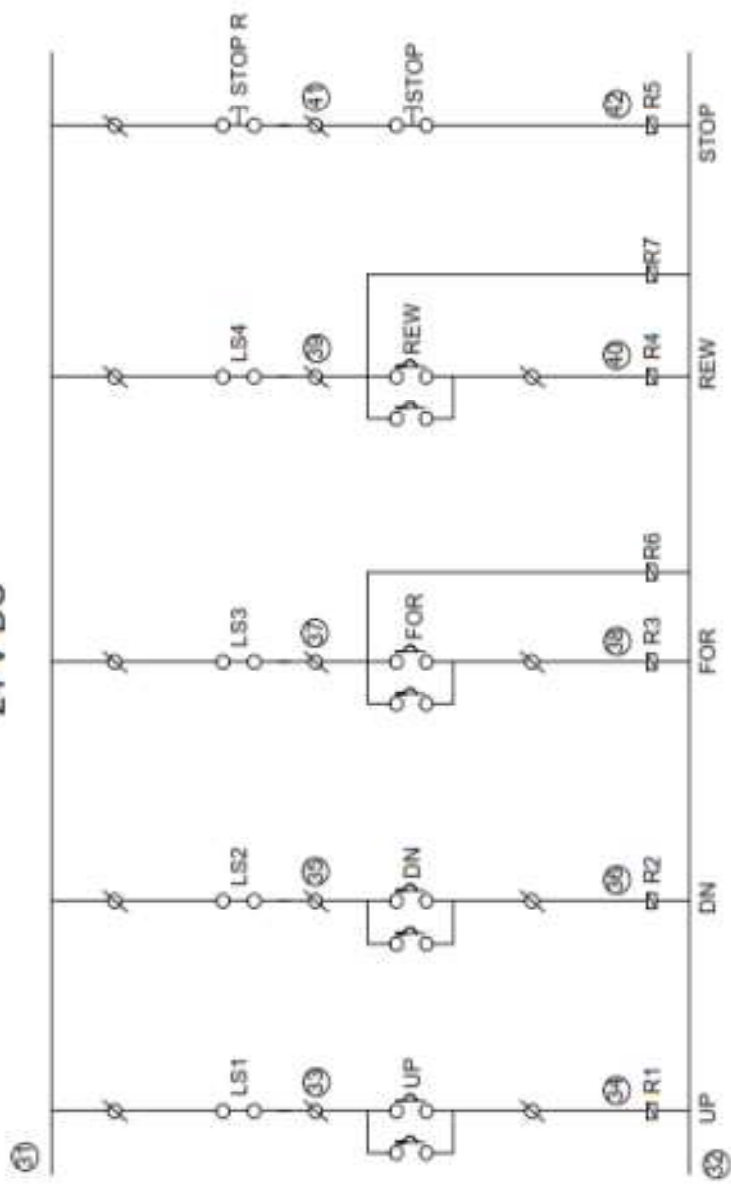
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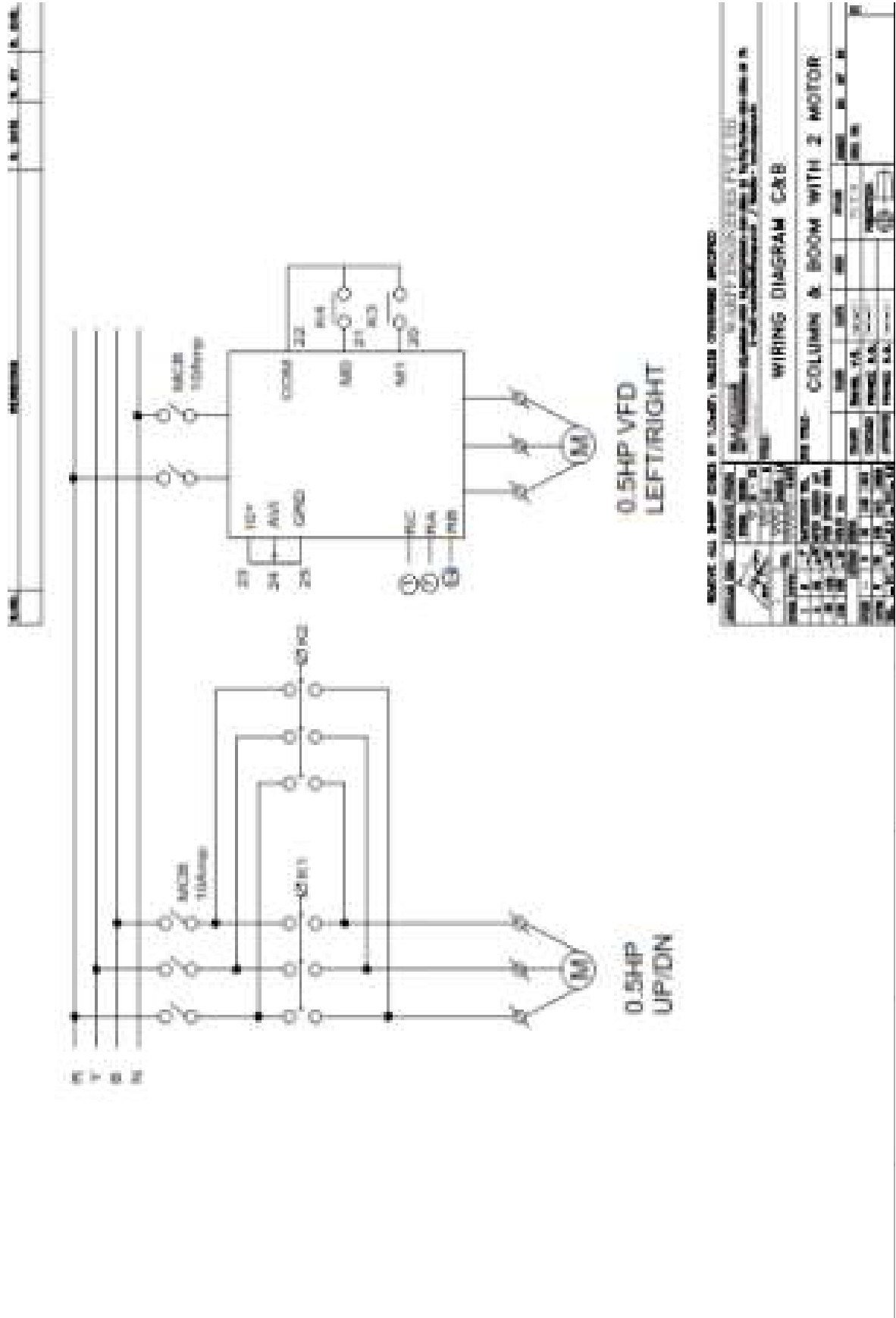
REV. NO.	REV. DATE	REV. BY	REV. CHK.

24 V DC



REMOVE ALL SHARP EDGES BY 1.5MM, UNLESS OTHERWISE SPECIFIED

	WARPP ENGINEERS PVT. LTD. 10/10, Sector 10, Gurgaon, Haryana Phone: 01299-420000 / 01299-420001 Fax: 01299-420002 / 01299-420003 Email: info@warpp.co.in
WIRING DIAGRAM C&B	
JOB TITLE- COLUMN & BOOM WITH 2 MOTOR	
DRAWN BY: SAHIL V.S. (200001) CHECKED BY: PRINCE K.A. (200001) APPROVED BY: PRINCE K.A. (200001)	SHEET NO. N.T.5 OF 05



13. MAINTNANCE

Power supply

- Switch off the power supply and remove the key, if any, before periodical maintenance or any kind of repair.

Daily

- Clean the machine of dust and slag
- Inspect all cables.
- Check all electrical connections
- Check that all bolted joints are tight.
- Empty the slag filter in the flux recovery unit.

Emergency stop

The function of all emergency and safety devices is to be checked daily, as well as after any work has been carried out on the machine.

In the event of any abnormal function or signal, the underlying cause must be found and corrective action to be taken before the machine is put in normal use.

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1. Press the emergency stop button.
2. Make sure that the emergency stops will interrupt all functions.
3. Reset the emergency stop.

Interval - 1 month

Pneumatic system

1. Inspect tubes and hoses, valves and cylinders with regard to leaks. (if there are any Pneumatic cylinders used)

Welding cables

1. Check that the insulating covering of the cables is intact and cable lug is proper.
2. Check that the welding cables and their connections are firm and have not been burnt due to loose connection.

Limit switches

1. Inspect the limit switches with regard to mechanical damage on switch, actuator and cable connection.

3. Interval -- 6 months

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Column and Boom

Pillow block housing - Grease using type 2 grease for the housing and type for the bearing, once a year or every 2000 hours.

Chain and sprocket -SAE 30 oil, clean and lubricate as required.

Guide roller - Grease once a year with type 3 grease.

Column Roller chains- Clean as necessary, lubricate with type

1. Tracks- Clean as necessary.
2. Boom Rack and pinion- Moabitic oil or equivalent, cleaning and lubricating is necessary for proper functioning.
3. Tracks -Clean as necessary.

Drive Saddle

4. All rollers- Clean tracks as necessary.
5. Safety brake -Lubricate twice a year.

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At least once per year the whole installation should be inspected with particular attention paid to the following;

- Poor electrical contacts
 - Switches and controls
 - Loose mechanical parts, ensure all fixings are correctly tightened
 - Check smooth running of boom both up/down and horizontal travel i.e. no vibrations
 - Metal corrosion
 - Frame damage
 - Check for signs of damage to the roller bearings.
 - Check all cables for damage (mains, pendant and also any visible cable running from the panel to the motors).
 - Check the emergency stops and also the correct functioning of the panel door isolator.
 - Remove guards and check the condition of the spur gear and pinion on the boom and column drives.
-
- If there is any excessive damage then the parts should be removed and replaced with new.

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14. Spare Part List

PART NUMBER	DESCRIPTION
SP00090	3 Phase 1.00Hp/1400Rpm, Flange Mounted Motor.
SP03325	Rotomotive Make 0.25Hp / 960 Rpm Flange Mounted Motor
SP01080	Delta Make Variable Frequency Drive For 0.50Hp Model No-004M21A
SP04961	EMRV Worm Gearbox-63,30/1 Ratio 80 Frame S.F.1.4, Output Torque 112 Nm* Without Output Flange Output Shaft
SP04628	EMRV Worm Gearbox-090-20-90/1 Ratio Hino
SP01534	Gearbox-50, Ratio-100:1, Frame Size-71B5.
SP004296	Moulded Plastic Cable Drag Chain: -Type-0625(Plastic Links & Aluminium Stays), Length of Chain: -3000Mm, Bending Radius: -150MM, Width of Chain: -115Mm 46 (H) X 85 (W)
SP04317	L.M. RAIL MSA 25R-4000L
SP04306	S-02 2424 Rack Module-2.0 Straight Teeth(24X24X1000L)
SP05060	Spur Gear 2 Module 23Teeth Cf-25mm
SP02025	Limit Switch: -BlS-01
SP02834	Potentiometer-10K Ohn,10 Turn (3590S-2-103L)
SP03556	Smps 2.5A(Cat.No. G31-60-24) Make-Shavison
SP00867	Contactora-Mnx 31E(3No+1Nc)240V(Cs94019)
SP03303	Rotary Cam Switch-32 Amp (P-513)
SP01983	Knob: -Modle-Ak46
SP02083	Lt Contactor Mnx-18
SP00030	10A 1 Pole Mcb (Schneider)
SP00031	10A 3 Pole Mcb (Schneider)
SP02961	Push Button Yellow
SP02960	Push Button Red
SP04971	Push Button Black
SP01887	Indicator II12-230Vc Red/Yellow/Blue

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SP01285	Emergency Stop
SP01103	Digital Panel Meter Current
SP03436	Selector Switch On/Off
SP00830	Connector 16 Pin Male/. Female
SP02529	Mnx-A2 Add on Block (1No+1Nc)
SP00891	Control Panel Box Set for Column & Boom
SP03054	Remote Box Set for Column & Boom
SP02962	Push Button-Green, Size-Dia 22.5 Mm
SP01955	'Kavitsu Make Slew Ring Bearing Model 111-20-0414-FfLayout No. L-15-261/3(Bearing Ungeared).
SP03931	Tube Exhaust Fan-Fp-108-1, Size-119X119X38 ,230 Vac 50/60 Hz 19/16W For In arc 200 Dsi/Ws-200
SP03032	Relay Card-As365 24Vs-Oe-8Ch 1Co (MODEL-AS365-24V-S-OE) (Make Shavision)
SP01992	L.M. Block Bearing-Msa25LA-SS-FCN

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