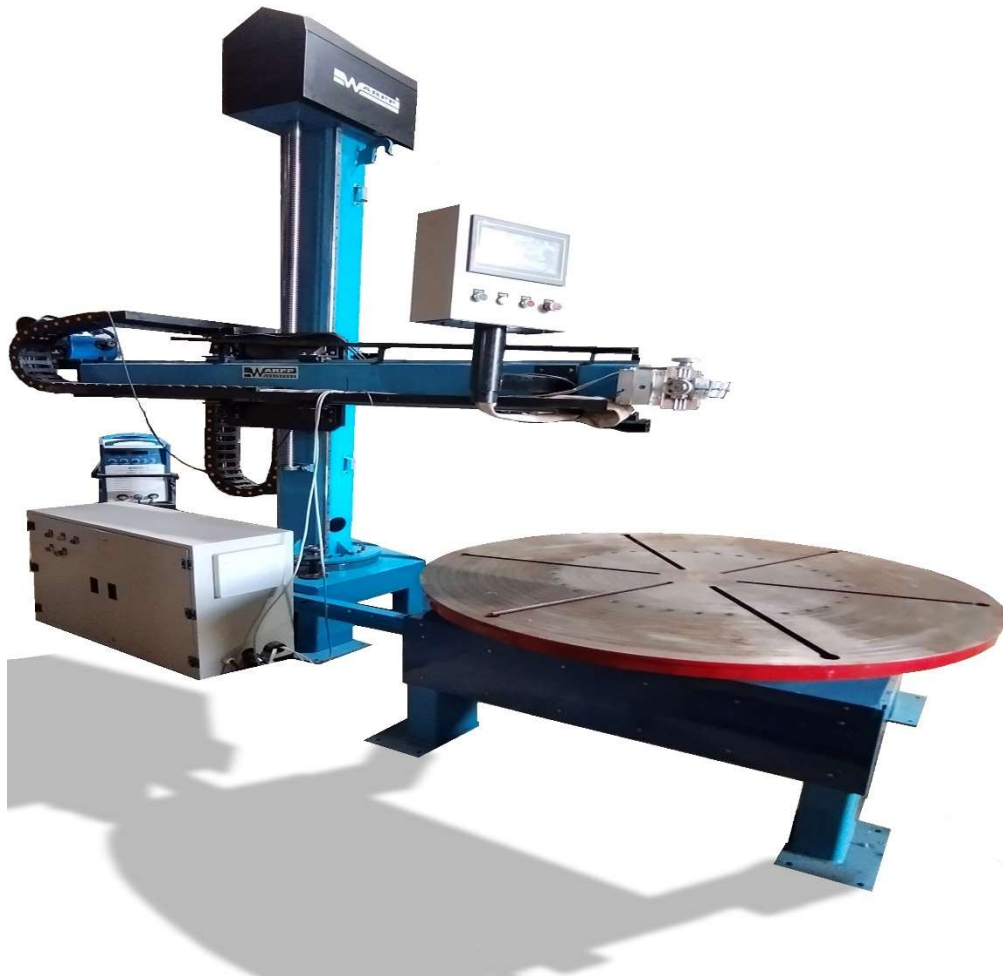# USER'S MANUAL

FOR AUTOMATIC WELD OVERLAY CLADDING SYSTEM

WARPP ENGINEERS PVT LTD

36/15,UNIQUE INDL.ESTATE, DHUMAL NAGAR,

WALIV PHATA , VASAI(EAST)

CUSTOMER CARE - 8080808734

EMAIL - service@warpp.co.in

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 CONTINUOS 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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1. <u>SAFETY</u>

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
- 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

2. <u>DESCRIPTION</u>
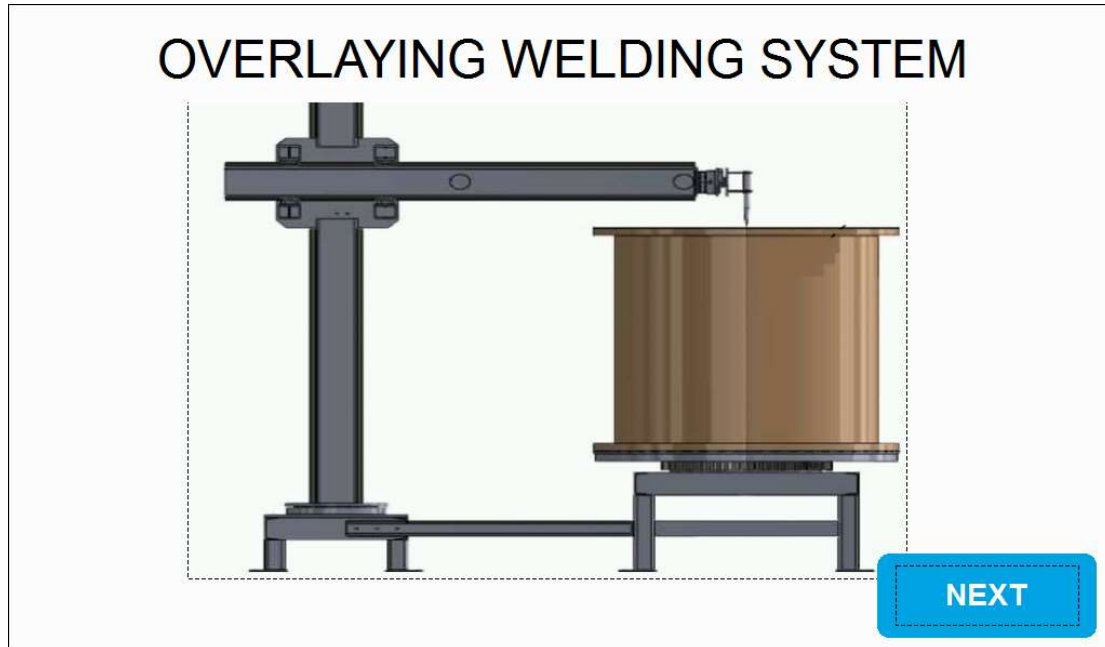
The 'WARPP' AUTOMATIC WELD OVERLAY CLADDING SYSTEM is designed to weld on the flanges to create a weld clad on the surface of the flange.

The system comprises a turn table with column & boom, INMIG 500I Power source, oscillator mounted on column and boom to achieve welding on jobs of different diameter.

Variable speed rotation of the face plate is achieved by AC servo motor with reduction gearbox.

Column & boom up, down, reverse & forward motion is controlled by AC geared motor.

The boom is equipped with the oscillator, which is designed to carry MIG torch.

The full system is controlled by PLC & touch screen HMI is provided for the operator.

3. <u>WORKING CONDITION & ENVIRONMENT</u>

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) Always keep the machines at lease with a gap of 300 mm around the machine as it is required for free circulation of air.

7) Keep the machine in a flat position.

8) 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).

9) When long cables are used you need to select higher cross-sectional area of conductors to avoid voltage drop during the usage

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)

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

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

Welding Cable selection chart					
Welding Current in Amps	Recommended Cable size (Sq mm) based on length (in Mtrs)				
	1 ~ 15 Mtrs	15 ~ 30 Mtrs	30 ~ 45 Mtrs	45 ~ 60 Mtrs	60 ~ 75 Mtrs
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		

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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

4. INSTALLATION

1. The SPM should be installed on a level concrete surface with access to all sides of the machine.

2. The SPM floor should be capable of withstanding the weight of the system.

3. Before you start the machine, please connect job earthing of MIG machine to the face plate.

4. Please make sure 3 phase supply is available near the Machine.

5. Please keep gas cylinder ready as per your requirement.

5.WORKING OPERATION FLOWCHART
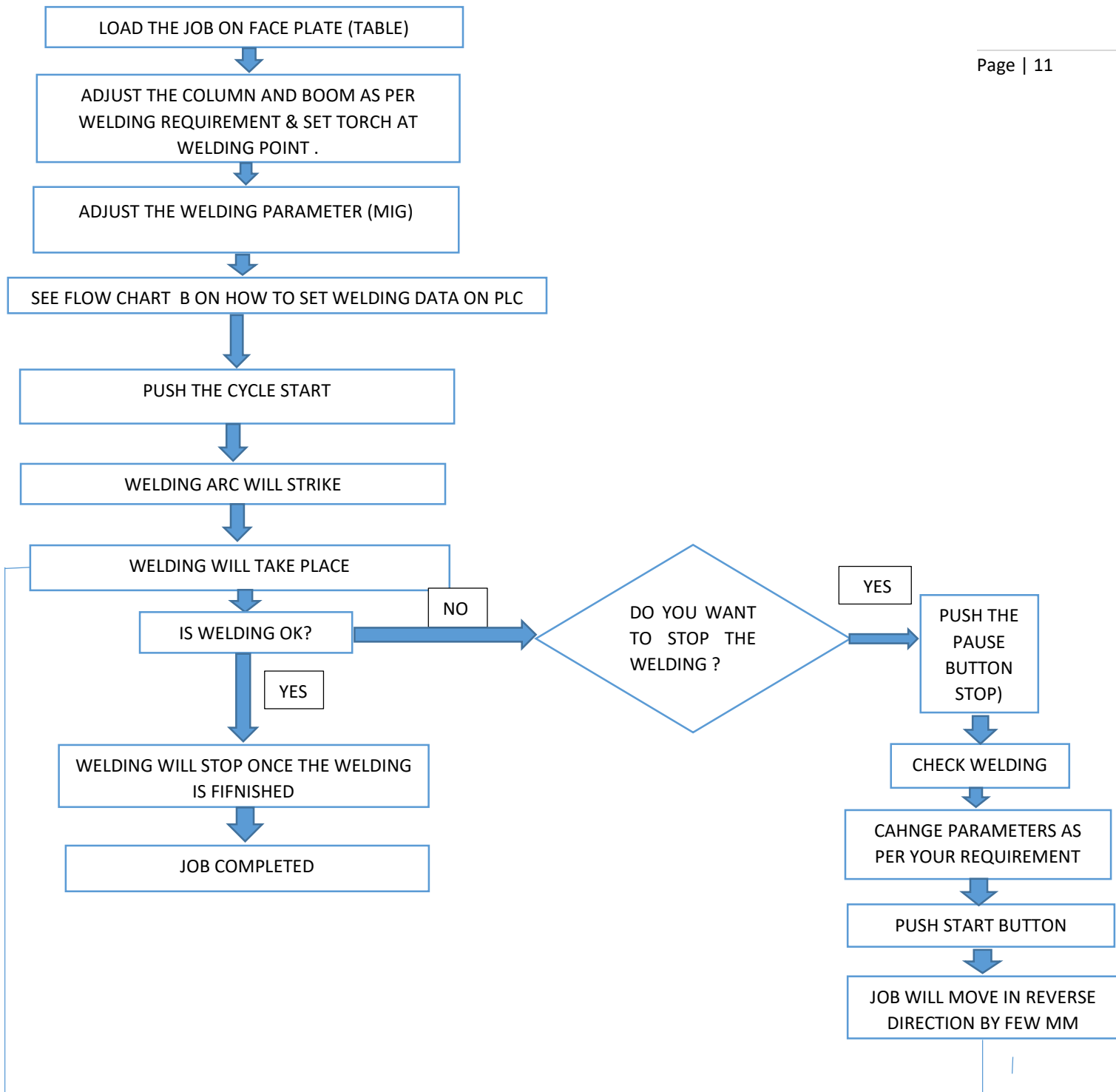
```
┌─────────────────────────────────────┐
│  LOAD THE JOB ON FACE PLATE (TABLE)  │
└─────────────────────────────────────┘
                 ↓
┌─────────────────────────────────────┐
│  ADJUST THE COLUMN AND BOOM AS PER   │
│  WELDING REQUIREMENT & SET TORCH AT  │
│  WELDING POINT .                     │
└─────────────────────────────────────┘
                 ↓
┌─────────────────────────────────────┐
│  ADJUST THE WELDING PARAMETER (MIG)  │
└─────────────────────────────────────┘
                 ↓
┌──────────────────────────────────────────┐
│ SEE FLOW CHART  B ON HOW TO SET WELDING   │
│ DATA ON PLC                               │
└──────────────────────────────────────────┘
                 ↓
┌─────────────────────────────────────┐
│        PUSH THE CYCLE START          │
└─────────────────────────────────────┘
                 ↓
┌─────────────────────────────────────┐
│       WELDING ARC WILL STRIKE        │
└─────────────────────────────────────┘
                 ↓
┌─────────────────────────────────────┐
│       WELDING WILL TAKE PLACE        │
└─────────────────────────────────────┘
                 ↓
       ┌──────────────────┐     NO      ◇ DO YOU WANT          YES    ┌──────────────┐
       │  IS WELDING OK?  │ ─────────→  TO STOP  THE ──────────────→  │  PUSH THE    │
       └──────────────────┘            WELDING ?                      │  PAUSE       │
                 │ YES                                                │  BUTTON      │
                 ↓                                                    │  STOP)       │
┌─────────────────────────────────────┐                              └──────────────┘
│  WELDING WILL STOP ONCE THE WELDING  │                                     ↓
│  IS FIFNISHED                        │                              ┌──────────────┐
└─────────────────────────────────────┘                              │ CHECK WELDING│
                 ↓                                                    └──────────────┘
┌─────────────────────────────────────┐                                     ↓
│           JOB COMPLETED              │                              ┌──────────────────┐
└─────────────────────────────────────┘                              │ CAHNGE PARAMETERS│
                                                                      │ AS PER YOUR      │
                                                                      │ REQUIREMENT      │
                                                                      └──────────────────┘
                                                                             ↓
                                                                      ┌──────────────────┐
                                                                      │ PUSH START BUTTON│
                                                                      └──────────────────┘
                                                                             ↓
                                                                      ┌──────────────────┐
                                                                      │ JOB WILL MOVE IN │
                                                                      │ REVERSE          │
                                                                      │ DIRECTION BY FEW │
                                                                      │ MM               │
                                                                      └──────────────────┘
```

FLOWCHART B.

HOW TO SET WELDING DATA ON PLC

```
┌─────────────────────────────────────┐
│          START THE PANEL             │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│   WELCOME SCREEN WILL BE DISPLAYED   │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│             CLICK NEXT               │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│            SELECT AUTO               │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│    SELECT ONE OF THE FOLLOWING       │
│                                      │
│           1)LINEAR                   │
│                                      │
│           2)SQUARE                   │
│                                      │
│          3) TRAPEZOIDAL              │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│   KEY IN THE DATA REQUIRED FOR       │
│        SELECTED MODE                 │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│        SETTING IS COMPELETED         │
└─────────────────────────────────────┘
```

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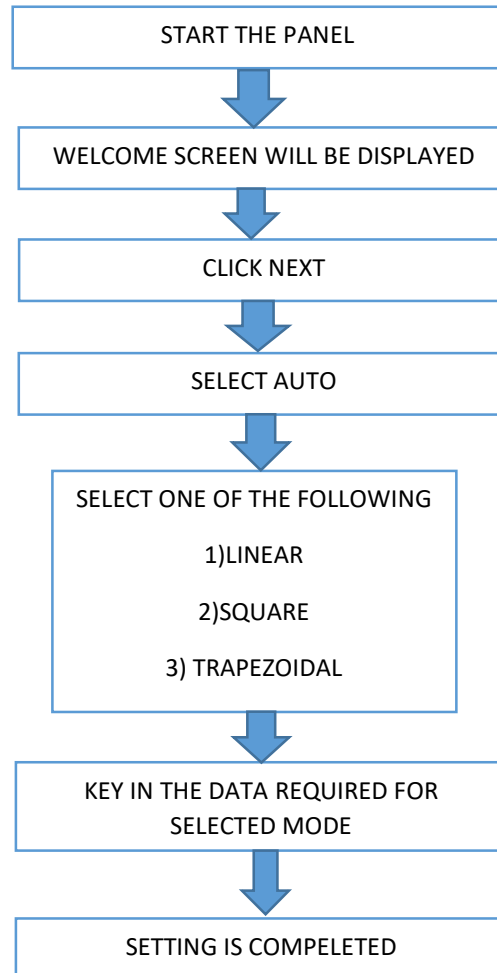
6. CONTROL PANEL INTRODUCTION
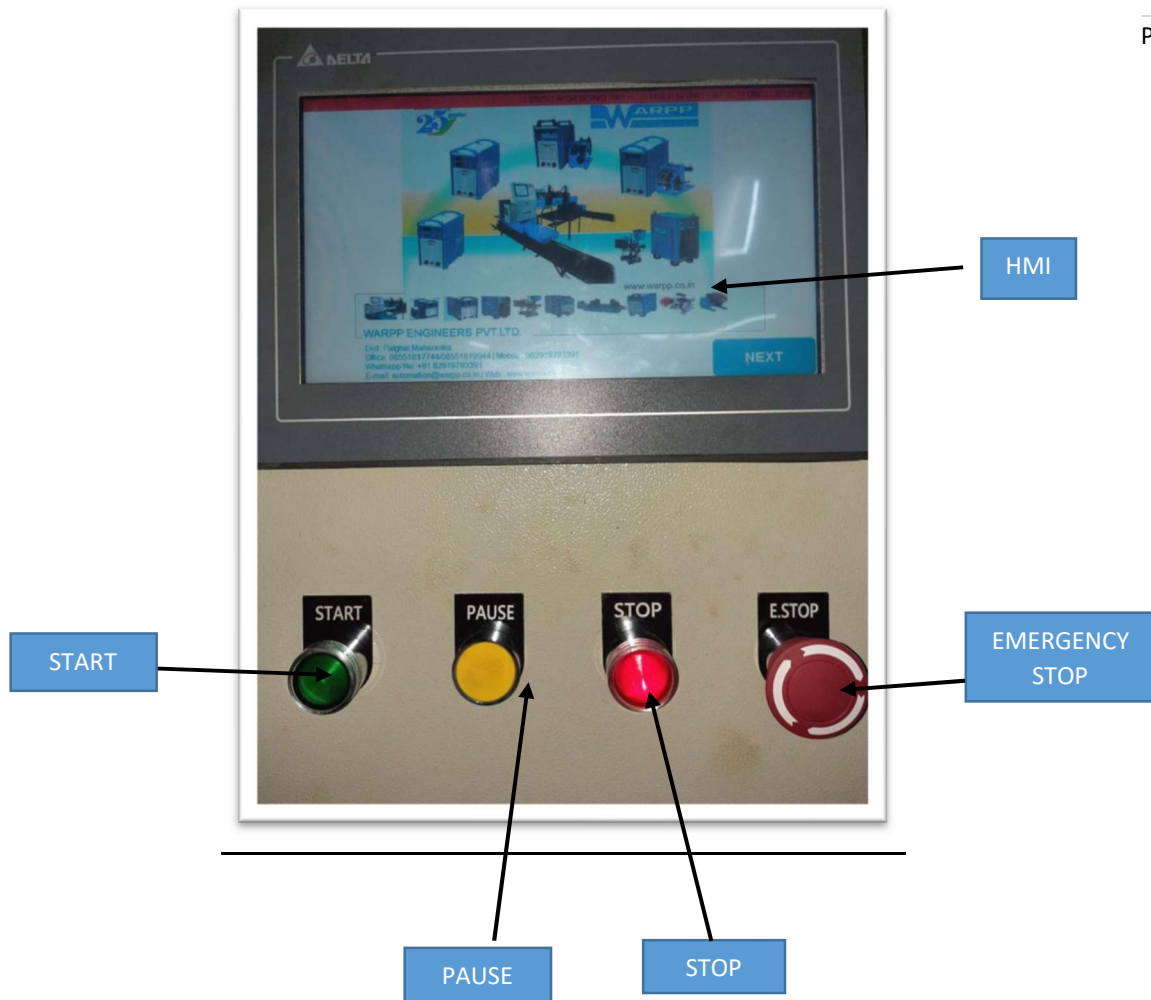
HMI - HMI stand for **Human Machine Interface**. An HMI is a software application that presents information to an operator or user about the state of a process, and to accept instructions.

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CYCLE START - when you press the start button operation cycle will start. The sequence of events will be as per the program written in PLC.

CYCLE PAUSE – when you press the pause button operation cycle will pause.

CYCLE STOP – When you press the stop button operation cycle will stop.

EMERGENCY STOP - **emergency power off** (**EPO**), is a safety mechanism used to shut off machinery in an emergency, when it cannot be shut down in the usual manner. Unlike a normal shut-down switch or shut-down procedure, which shuts down all systems for safety of machine & human.

7.PLC Control and Usage

PLC is used in the system to control all the sequence of events and a 10-inch LCD display is used as HMI (Human Machine Interface). This is a touch screen display. This screen is used for both display and control.

When we say display it means that it's just indication and when we say control it means some action is performed when the operators touch this icon (symbol).

Different screens along with the meaning and its operation is explained below.

Home Screen

Turn on The Machine & Wait for some time following screen will appear

This Screen is called welcome screen

When you press **NEXT**, following screen will appear

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GMAW   **TURN**   **TORCH**

OSC   **AUTO**   **LOAD**
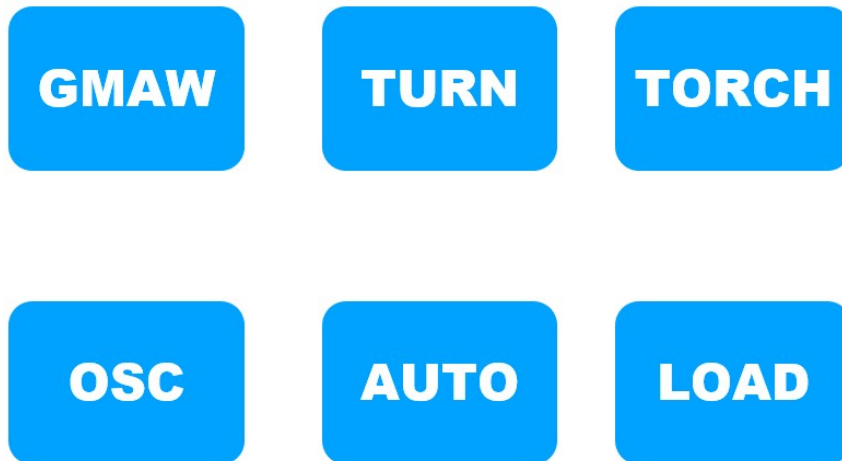
When you press **GMAW** it will take you to GMAW Screen

When you press **TURN** it will take you to TURN Screen where job can be rotated.

When you press **TORCH** it will take you to TORCH Screen in which torch movement in all directions can be controlled.

When you press **OSC** it will take you to OSCILLATOR Screen

When you press **AUTO** it will take you to AUTO MODE

When you press **LOAD** it will take you to LOAD SCREEN from where a saved program can be loaded & that all the parameters saved in that memory channel is loaded for use.
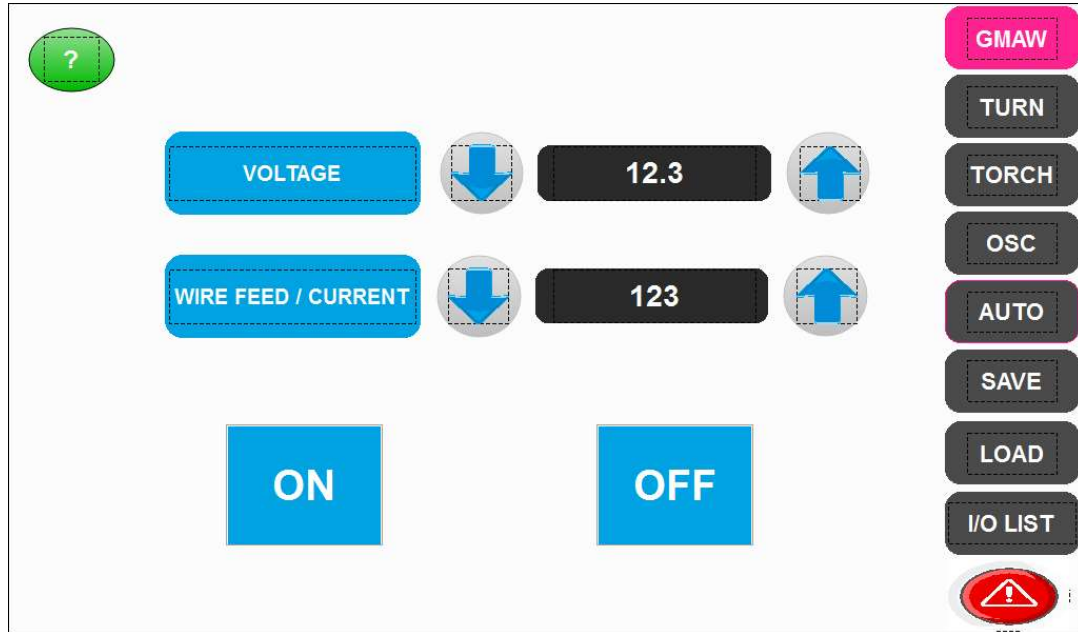
Above GMAW screen Allows you to Turn ON or OFF (Trigger) GMAW power source.

You can set Voltage & Current in this screen.
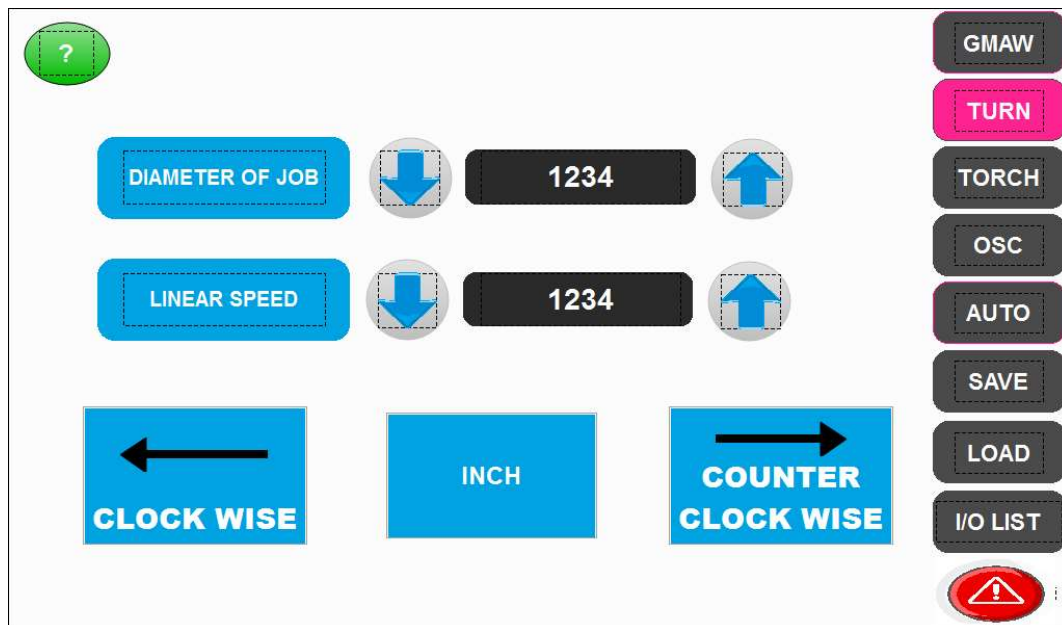
 Allows you to turn the face plate in clock wise or anti clock wise direction. Also, you can set the speed here.

You can set diameter of the job in MM & linear Speed MM/MIN as per your requirement.

When you select face plate will rotate as long you have selected the inch switch once you released the inch switch face plate will stop rotating.

If face plate is in continuous mode, then one press on the clockwise/counterclockwise button will turn the face plate continuous till inch button is pressed again.
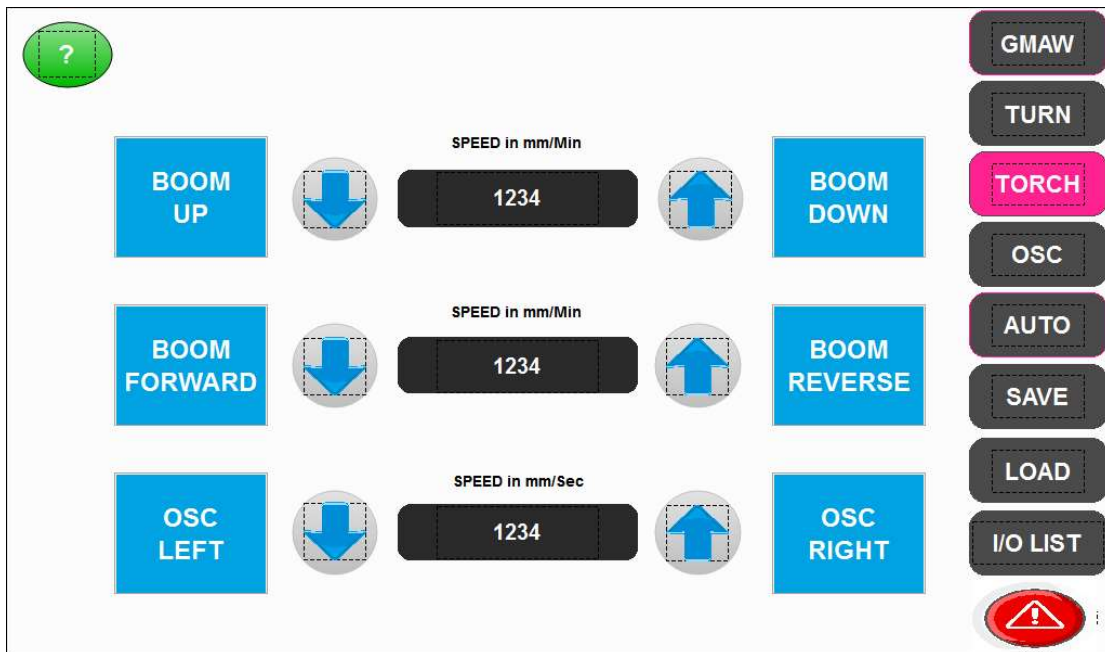
 will take you to the above shown screen.

In this screen you can control the boom movement (UP, DOWN, FORWARD, REVERSE) by putting the speed value in MM/MIN.

If you press , boom will start moving upside

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If you press **BOOM DOWN** , boom will start moving downside

If you press **BOOM REVERSE** , boom will start moving in reverse direction

If you press **BOOM FORWARD** , boom will start moving in forward direction

Also, you can control the oscillator left & Right Movement by putting speed value in MM/MIN.
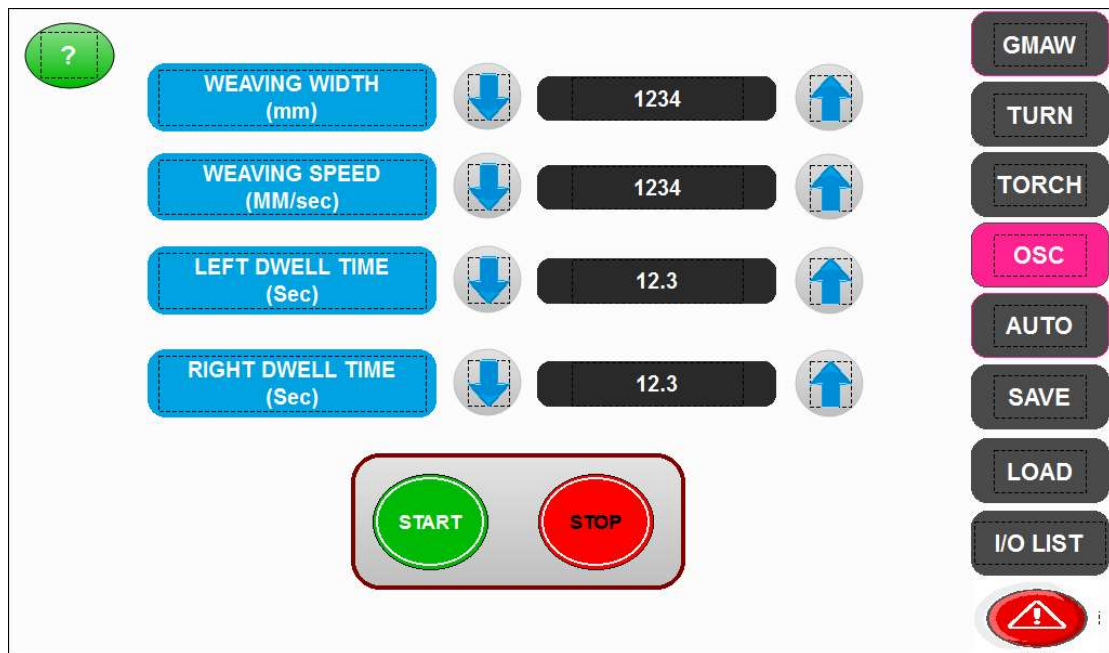
In this screen you have to feed the oscillator parameters as per your requirement .

 here weaving width data needs to be feed in MM.

 here weaving speed needs to be feed as per your requirement in MM/SEC.

 here left dwell time needs to be feed in SECOND.this is the time for which torch will stop at the left side.

 here right dwell time needs to be feed as per your requirement in SECOND.

 opeartor can Switch ON & OFF the oscillator from here .when start button is pressed the torch will start to oscillate as per data fed in . This is used to get the feeding of the torch . This helps operator a lot to make sure his setting are correct.
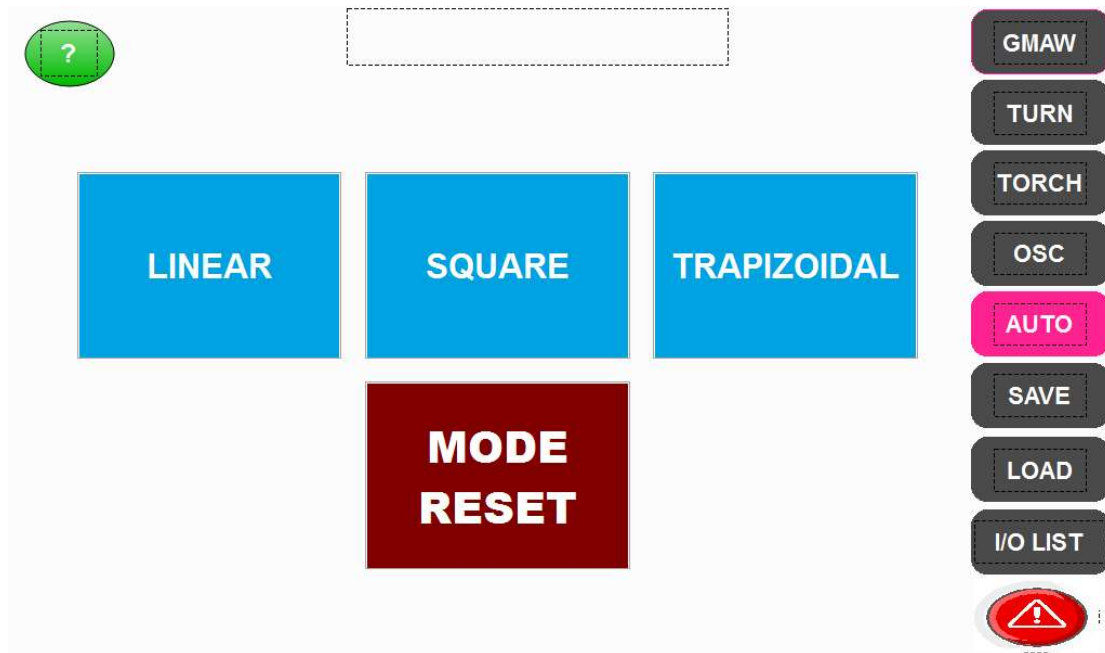
In this screen you can select welding modes as per your requirement.

LINEAR When this mode is selected there will be no oscillation of the torch. Torch will be stationary and the job will move.

SQUARE when this mode is selected torch movement will be in square wave form. This means that job & the torch will move alternatively resulting in square wave pattern.

TRAPIZOIDAL when this mode is selected both torch oscillation & Job rotation will happen together. During the left/Right dwell time the job rotation continues & hence the torch path will be trapezoidal.

By clicking **MODE RESET** , you can deselect the selected option and reset the welding mode. This process is required to set a new mode.
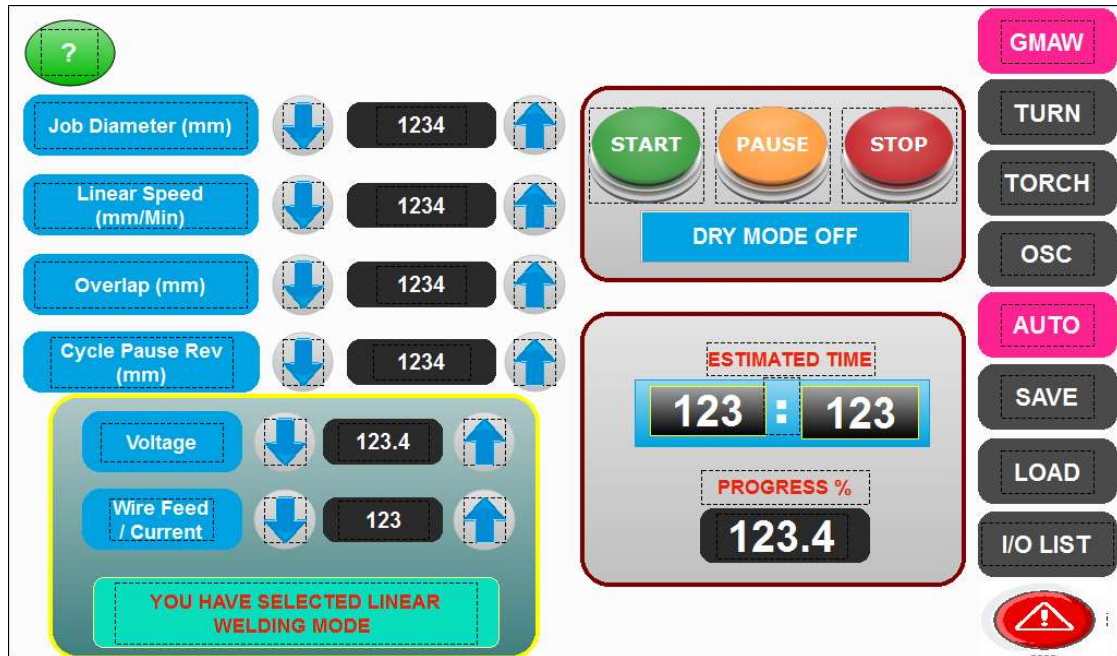
Once you select the linear welding mode you will be directed to the above screen.

 operator can key in job diameter here in MM.

Please note that he has to key in diameter at which welding is being done.

 operator can key in Linear Speed here in MM/MIN. the system will calculate the RPM automatically & set based on linear speed & diameter.

 here operator can set overlap value in MM.

whenever cycle is restarted after a PAUSE , then the job will move backwards by the value mentioned here & then start welding.

operator can set **VOLTAGE & WELDING CURRENT** from here.

When you give input to the system (parameters shown in screen) system will automatically show estimates time required for welding. this estimated time will be shown here .

Right below to Estimated time you can see
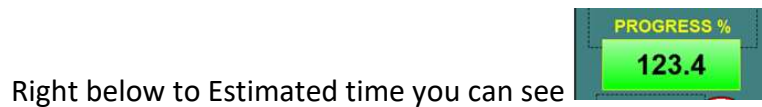
The progress of welding cycle.

You can control the welding cycle by these three options or you can use hard keys provided on the panel.
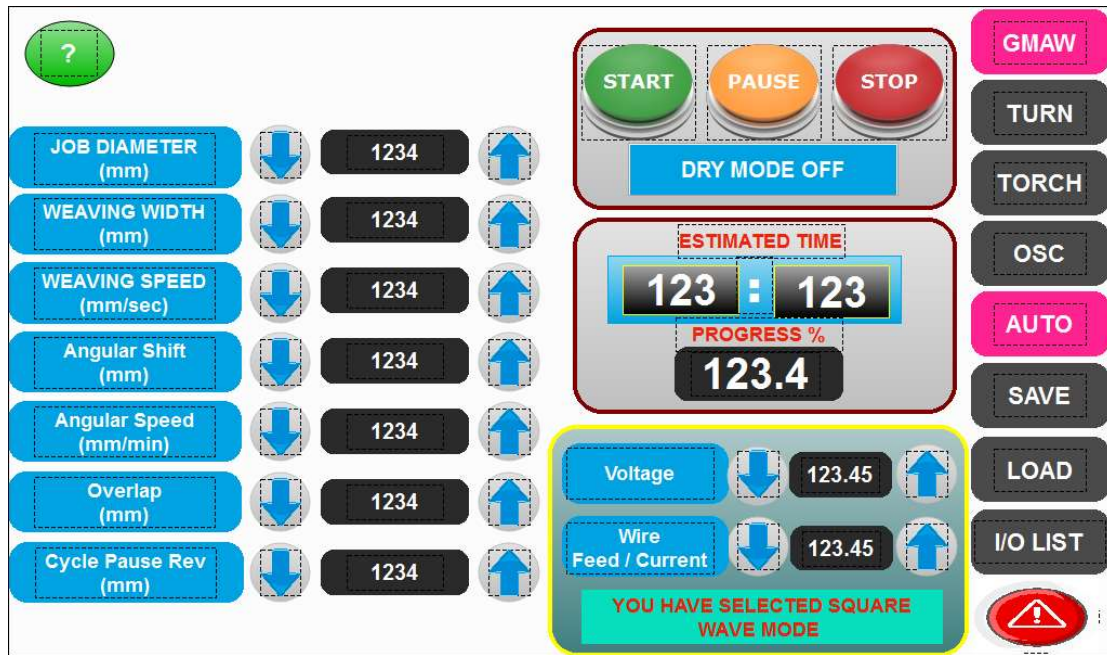
Once you select the **Square Wave Mode** you will be directed to the above screen.

 operator can key in job diameter here in MM.

Please note that he has to key in diameter at which welding is being done.

 it is the width of the welding.

PLEASE NOTE THAT THIS IS THE AMOUNT BY WHICH THE TORCH WILL MOVE THE ACTUAL WELDING WIDTH WILL BE SLIGHTLY MORE THAN THIS.

 operator can key in Linear Speed here in MM/MIN. the system will calculate the RPM automatically & set based on linear speed & diameter.

 here operator can set overlap value in MM. it is the overlap after 360 degrees.
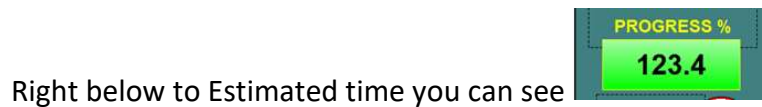
 whenever cycle is restarted after a PAUSE, then the job will move backwards by the amount mentioned here & then start welding.

 operator can set **VOLTAGE & WELDING CURRENT** from here.

When you give input to the system (parameters shown in screen) system will automatically show estimates time required for welding. this estimated time will be shown here .

Right below to Estimated time you can see

The progress of welding cycle.

Once you select the **Trapezoidal Wave Mode** you will be directed to the above screen.

 operator can key in job diameter here in MM.

Please note that he has to key in diameter at which welding is being done.

 it is the width of the welding.

PLEASE NOTE THAT THIS IS THE AMOUNT BY WHICH THE TORCH WILL MOVE THE ACTUAL WELDING WIDTH WILL BE SLIGHTLY MORE THAN THIS.

 operator can key in Linear Speed here in MM/MIN. the system will calculate the RPM automatically & set based on linear speed & diameter.

 here operator can set overlap value in MM. it is the overlap after 360 degrees.

 whenever cycle is restarted after a PAUSE, then the job will move backwards by the amount mentioned here & then start welding.
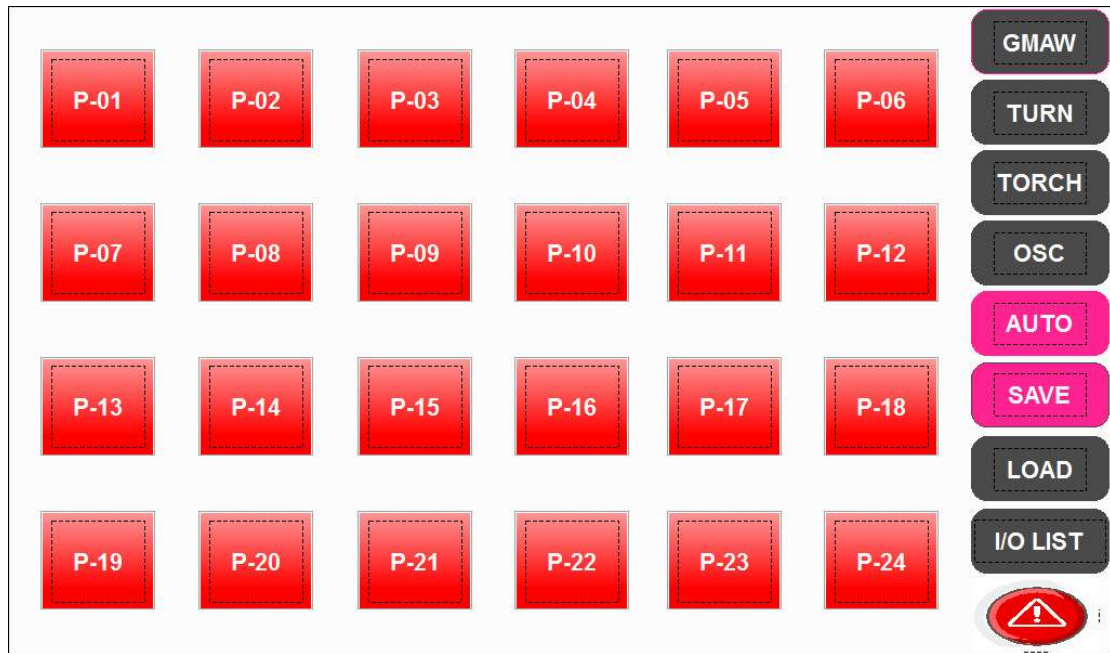
 operator can set **VOLTAGE & WELDING CURRENT** from here.

When you give input to the system (parameters shown in screen) system will automatically show estimates time required for welding. this estimated time will be shown here .

Right below to Estimated time you can see

The progress of welding cycle.

If you press , then you will see the below screen

There are 24 channels to store the data. These channels are marked from P-01 to P-24 channels which are illuminated with red color, indicates that some program is already stored. In that channel green one indicates free channel. If the operator selects the red channel and perform save operation, then old program will be replaced by new program.

To save the program data select on the program number, operator will be directed to the below shown screen.
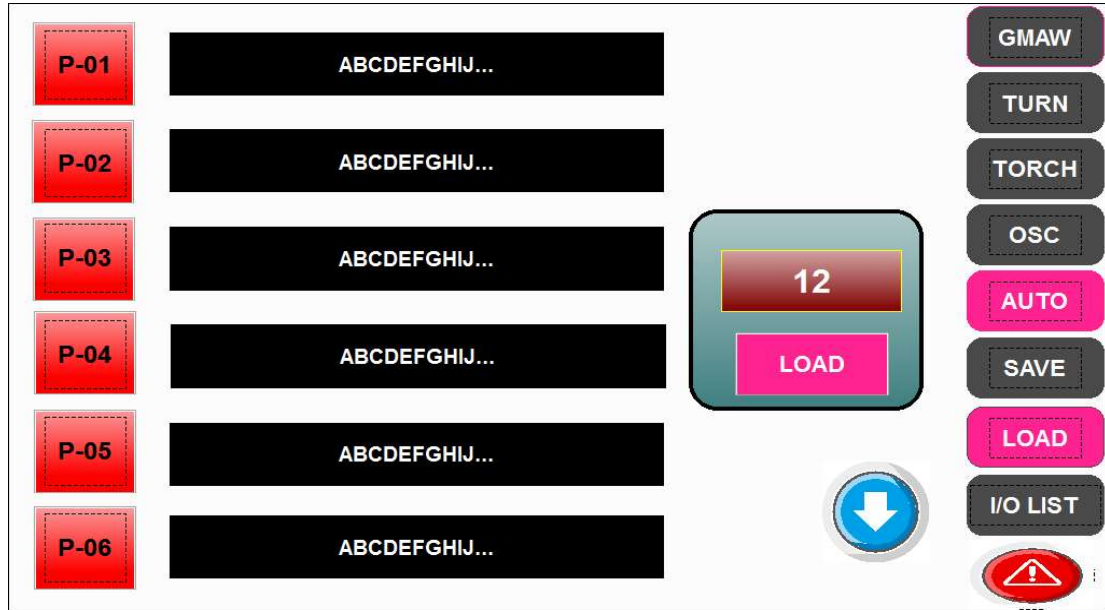
In this screen operator can name the program. And then by clicking on the

 program will be saved.

If by any reason operator do not wants to save the program then he can select on

Once the program is selected, operator needs to select on .

To load a saved program. Operator needs to press on Then

operator will be directed to the below screen.

Here green channels indicate that there is some program in.

If operator has to see which program he wants to load; For e.g., Operator wants to open the program no. 12 then; he has to enter 12 here and then press LOAD.

If you press I/O LIST , you will see the below screen.
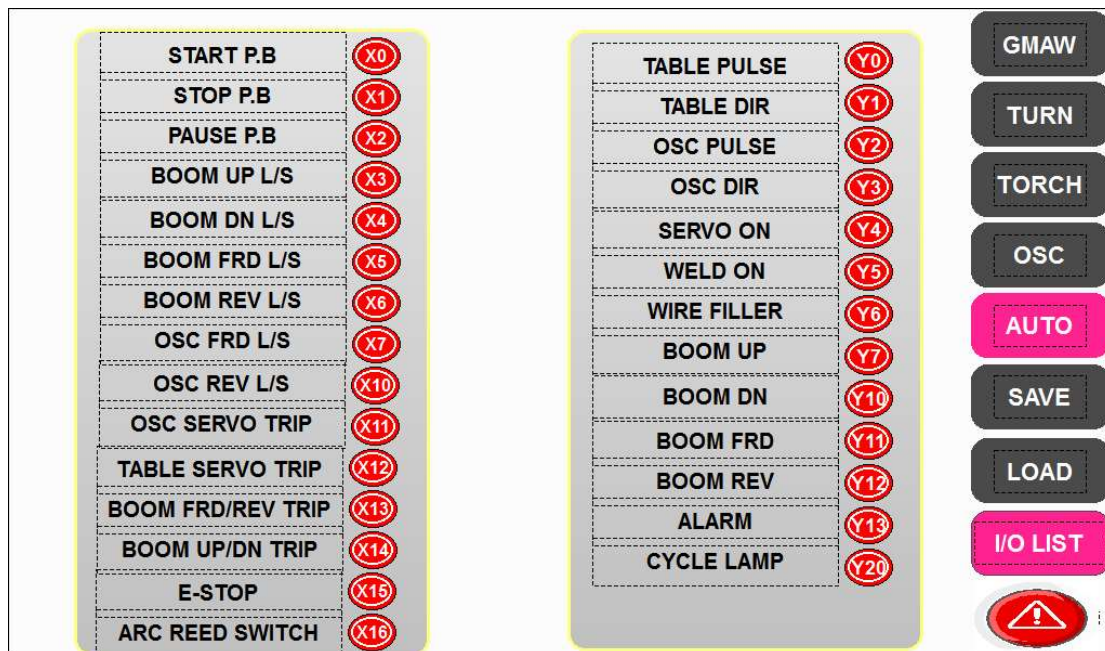
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8.How to operate the machine

1. Load the job on the face plate & center the job. Level the job using water level.

2. Adjust the column & boom with the help of control (Provided in HMI) accordingly adjust the torch.

3. Set all the parameters (MIG). (E.g., adjust the current and Voltage as per the requirement).

4. Adjust the welding station to the weld joint.

5. Feed the required data in HMI as per your welding requirement. (For e.g., job dia, weaving width, weaving speed, overlap as per your requirement.)

6. Switch on the welding machine.

9.MAINTENANCE

- LUBRICATE LM GUIDE RAIL ONCE IN A MONTH. GREASE LM RAIL BLOCK BEARING ONCE IN A MONTH.

Under normal operating condition, the grease should be replenished every 100km of travel.

The standard grease is lithium-based grease No.2. Moving the carriage back and forth with minimum stroke length of 3 carriages after the carriages been greased. To assure the grease is evenly distributed inside of carriage, the mentioned process should be repeated twice at least.

NOTE - LM RAIL BLOCK BEARING IS PROVIDED WITH GREASE NIPPLE FOR LUBRICATION.

- RACK AND PINION OILING SHOULD BE DONE ONCE IN A MONTH OR WHEN IT IS NECESSARY.

You can use Oil Lubrication of Normal SKF with the Grade of VR 68

10.WIRING DIAGRAM

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OSCILLATOR SERVO 400W

Terminal	Signal	Wire Color
SON	24-	WHITE
DIR	Y1	BROWN/GREEN
PULS	Y0	GREEN-BLACK-WHITE
+VE	24+	GREEN-BLACK-GREY-RED
COM	24-	GRAY-BLACK
ALM+	24V+	BROWN
ALM-	24V-	GRAY

P2 — R13

TABLE SERVO 1KW

Terminal	Signal	Wire Color
SON	24-	WHITE
DIR	Y1	BROWN/GREEN
PULS	Y0	GREEN-BLACK-WHITE
+VE	24+	GREEN-BLACK-GREY-RED
COM	24-	GRAY-BLACK
ALM+	24V+	BROWN
ALM-	24V-	GRAY

R1 — R14

Incoming Supply & Motor Terminals (left block)

INCOMING SUPPLY	BOOM MOTOR	COLUMN MOTOR	TABLE MOTOR	OSC MOTOR
R Y B N E	U1 V1 W1 E	U2 V2 W2 E	U3 V3 W3 E	U4 V4 W4 E

Terminal Block (1–30)

No.	Label
1	START
2	STOP
3	PAUSE
4	E.STOP
5	START LAMP
6	STOP LAMP
7	
8	24 VDC+
9	0VDC-
10	E
11	
12	BOOM UP L/S
13	BOOM DOWN L/S
14	24 VDC+
15	BOOM FOR L/S
16	BOOM REV L/S
17	24 VDC+
18	OSC FOR L/S
19	OSC REV L/S
20	24 VDC+
21	0VDC-
22	
23	ARC REED SW
24	24 VDC+
25	0VDC-
26	SPARE-1
27	0VDC-
28	SPARE-2
29	0VDC-
30	SPARE-3

Terminal Block (31–45)

No.	Label
31	
32	WELD ON +
33	WELD ON -
34	WIRE FILLER +
35	WIRE FILLER -
36	
37	230 VAC
38	N
39	E
40	
41	VOLT+
42	VOLT-
43	
44	AMP+
45	AMP-
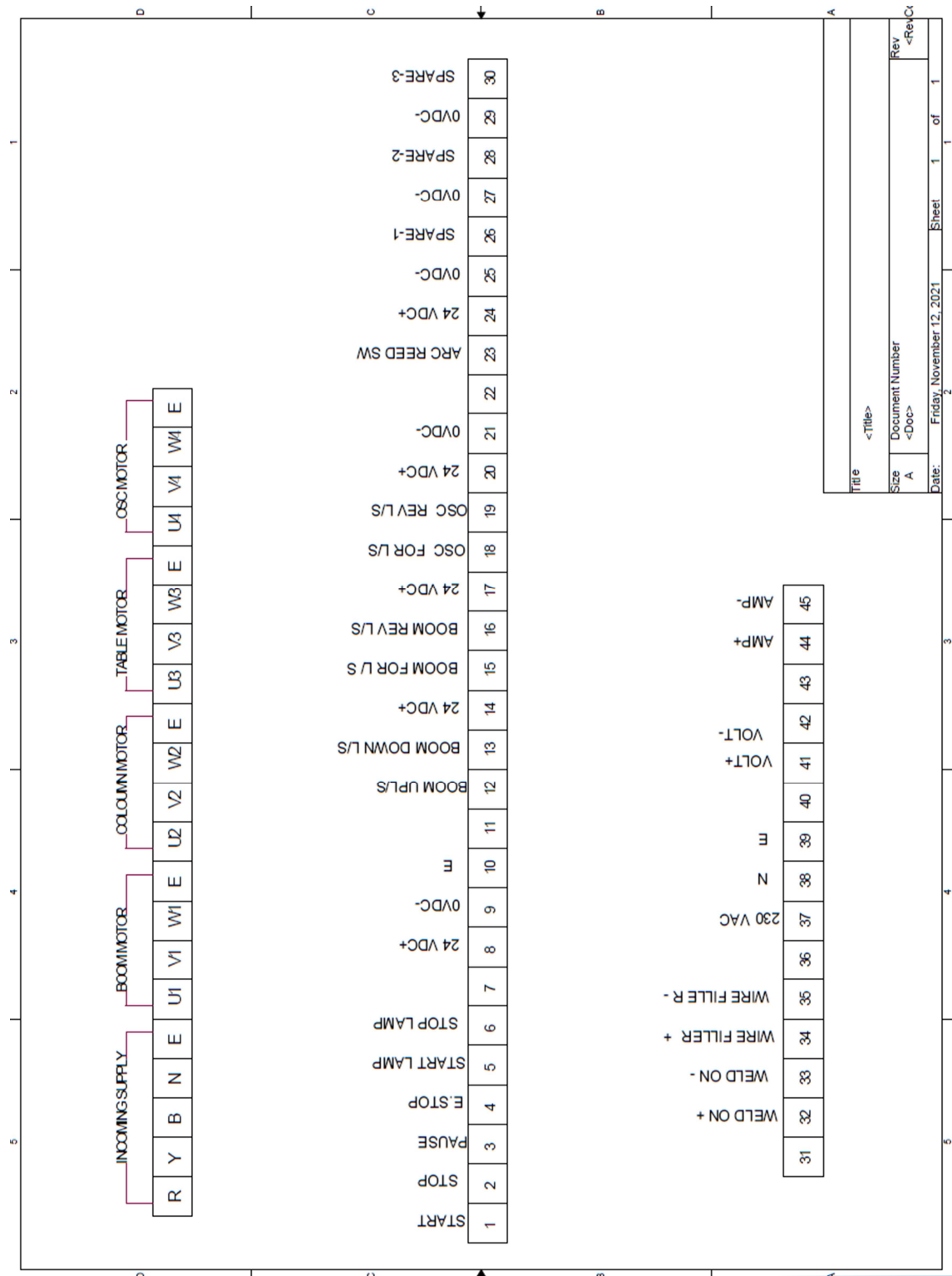
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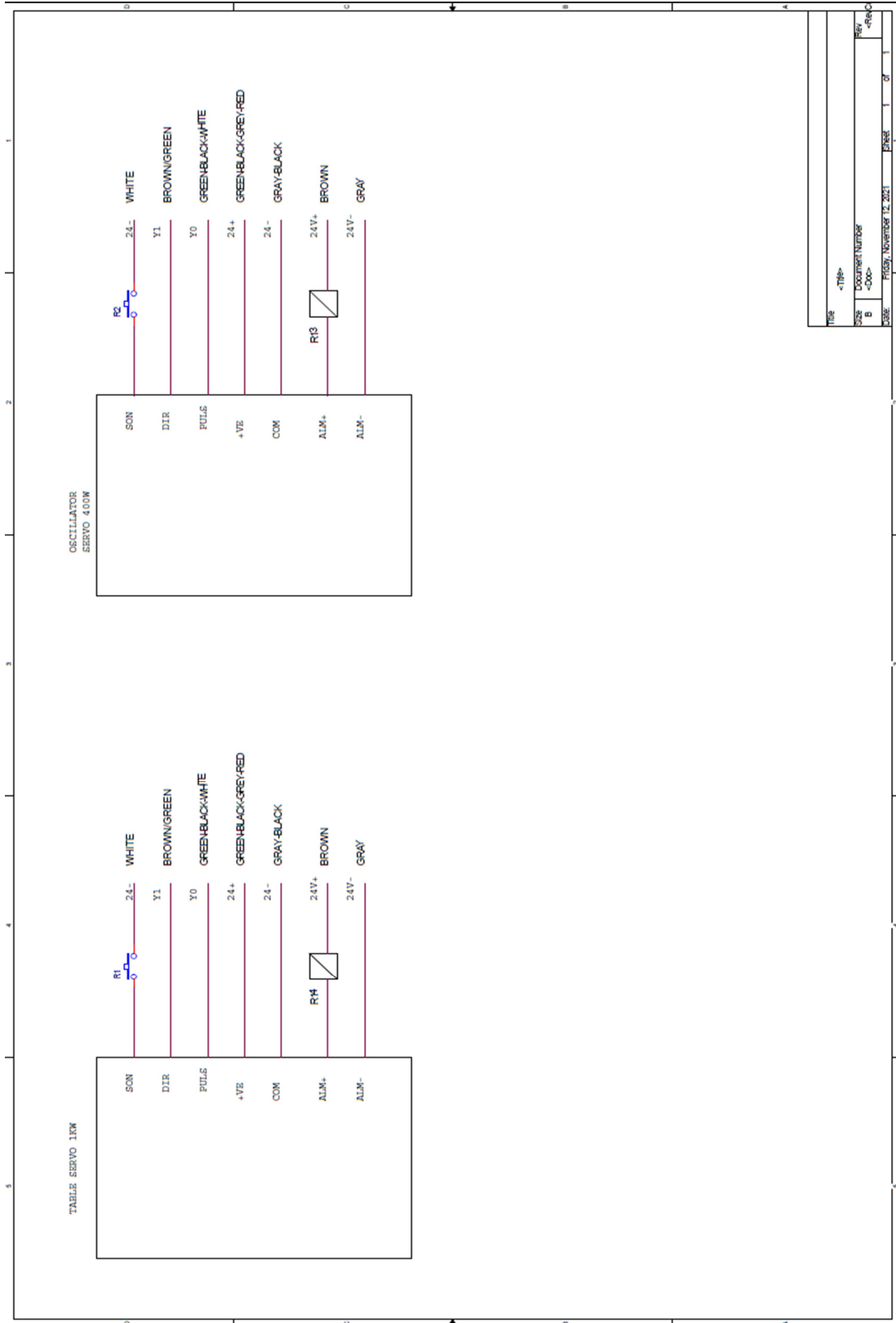WARPP ENGINEERS PVT LTD

36/15,UNIQUE INDL.ESTATE, DHUMAL NAGAR,
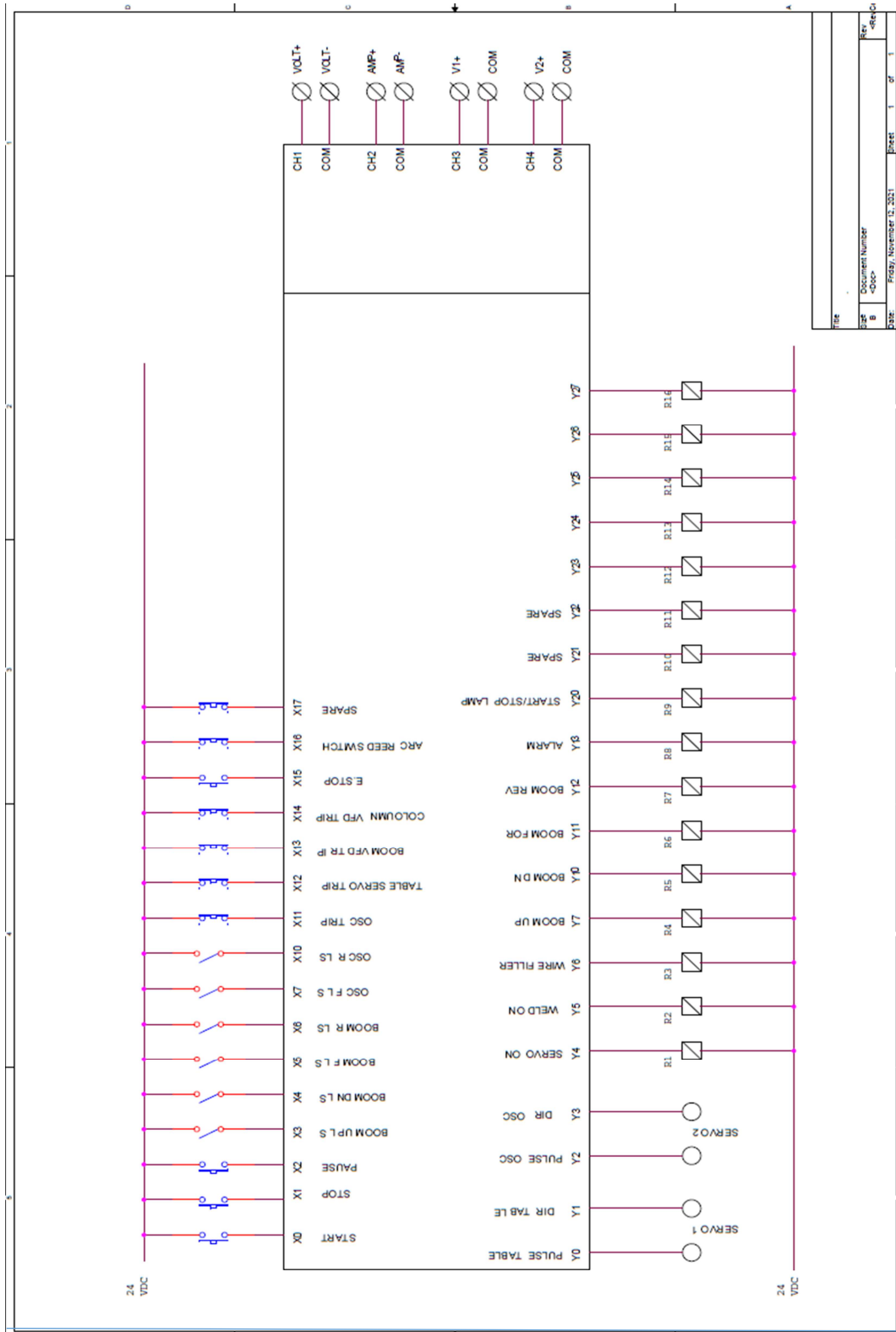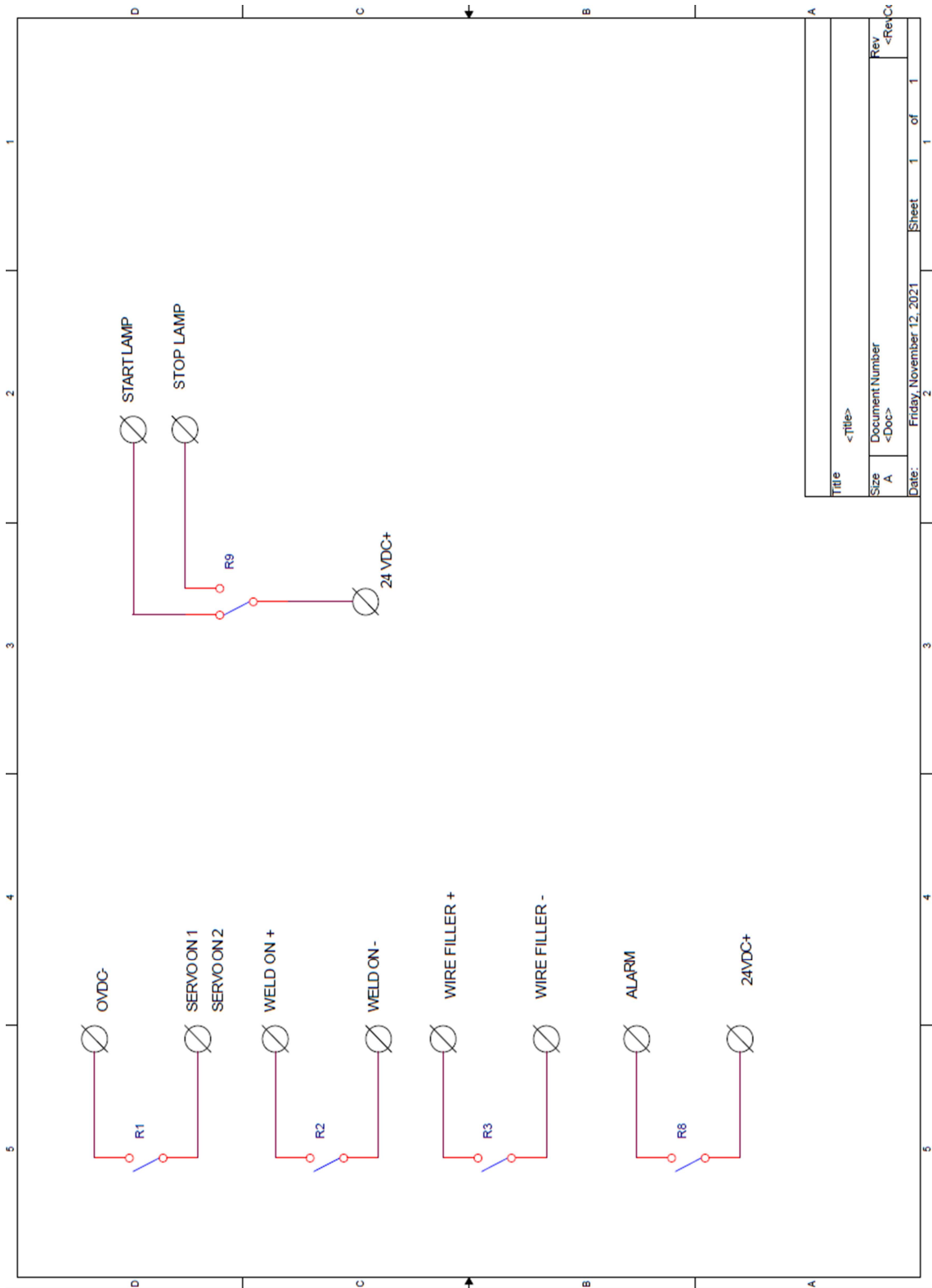
WALIV PHATA , VASAI(EAST)

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START LAMP
STOP LAMP
R9
24 VDC+

0VDC-
SERVO ON 1
SERVO ON 2
WELD ON +
WELD ON-
WIRE FILLER +
WIRE FILLER -
ALARM
24VDC+
R1
R2
R3
R8

11.SPARE PART LIST

Part number	Part Description
SP03325	ROTOMOTIVE MAKE 0.25HP 960 RPM MOTOR
SP08965	ROTOMOTIVE MAKE GB 40 RATIO-100:1 FRAME 71B5
SP09220	BONFIGLIOLI MAKE GB W63 RATIO- 64 FRAME-71B5
SP08966	BONFIGLIOLI MAKE 0.5 HP 1440 RPM MOTOR
SP02483	MCB 32 AMP 3 POLE
SP02487	MCB 20 AMPS 3 POLES
SP00031	MCB 10 AMPS 3 POLES
SP00030	MCB 10 AMPS 2 POLES
SP02470	MCB 6 AMPS 2 POLES
SP00581	BUZZER WITH LAMP 24 VDC
SP08548	POWER TRANSFORMER 1.5 KVA 3 PHASE INPUT-440V OUTPUT-220V (6.8 AMPS)
SP01992	LINEAR BLOCK BEARING (MSA25LA-SS-FCN)
SP08080	L.M RAIL 25 MM
SP01955	SLEW BEARING COLUMN & BOOM (112-20-0414-FF LAYOUT- L-15-261/3)
SP03537	SLEW BEARING FOR TURN TABLE (112-20-00744-FF LAYOUT- L-17-143/1)
SP08006	400W DELTA SERVO SET MOTOR & DRIVER
SP08930	1KW DELTA SERVO MOTOR & DRIVER
SP08815	DELTA MAKE DVPSP11T (EXP 8/8)
SP04613	10 INCH HMI
SP02790	DVP SV28 PLC/16/12
SP08929	PLC ANALOG 4 CH INPUT/2CH OUTPUT

SP04611	PLC ANALOG INPUT-4INCH
SP01080	DELTA MAKE VFD 0.5 HP
SP01078	DELTA MAKE VFD 1 HP
SP08533	RED PUSH BUTTON 24 V
SP08510	GREEN PUSH BUTTON 24 V
SP03032	RELAY CARD 24V 8CH (AS365-24V-S-OE)
SP01331	8" FAN
SP00199	AIRVENT
SP02025	LIMIT SWITCH FOR C&B
SP00613	CAM SWITCH 32A-3 POLE-61197
SP09244	TOWER LIGHT-24VDC (RED/YELLOW/GREEN)
SP08509	30A 12 WAY NEUTRALINK
SP08467	16A 6 WAY NEUTRALINK
SP04670	KUT4 FUSE TERMINAL
SP04960	E10 EARTH TERMINAL
SP04747	15 A COMBINED BOX (ANCHOR)
SP00597	CABLE GLAND PG-21
SP02785	CABLE GLAND PG-13.5
SP08422	COLUMN SCREW PEDESTAL BEARING
SP08651	OSCILATOR BALL SCREW
SP08650	OSCILLATOR NUT
SP01994	OSCILLATOR L.M. RAIL
SP04998	OSCILLATOR L.M. BLOCK BEARING
SP02076	LOVE JOY COUPLING GS-14
SP05060	BOOM PINION
SP09268	TABLE ROTATION PINION

SP08024	TURN TABLE ROTATION GEARBOX PRIMARY
SP08025	TURN TABLE ROTATION GEARBOX SECONDARY

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