V-STORE

INSTRUCTION MANUAL

(Electrical)

Upon receipt of the product and prior to initial operation, read these instructions Thoroughly, and retain for future reference.

Preface

This manual is designed to ensure correct and suitable Application of V-STORE . Read this manual before attempting to install, operate, maintain, or inspect and keep it in a safe, convenient location for future reference. Be sure you understand all precautions and safety information before attempting application.

General Precautions

• The diagrams in this manual may be indicated without covers or safety shields to show details. Be sure to restore covers or shields before operating the Units and run the Units according to the Instructions described in this manual.

• Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.

• The products and specifications described in this manual or the content and presentation of the Manual may be changed without notice to improve the product and/or the manual.

• When ordering a new copy of the manual due to damage or loss, contact your Tech-Mark representativesor the nearest sales office and provide the manual number shown on the front cover.

Contents

INTRODUCTION

We congratulate you as owner of '***V-STORE SYSTEM***. We assure you its best performance and all types of technical back up from us. We have worked hard to make our system versatile, easy to use & reliable.

V-STORE Constructional Features.

- The most modern and cost-efficient Storage and Retrieval system for today's industry.
- Use of the complete available height for storage.
- Works on a simple Paternoster principle.
- Works on a two vertical chain loop mechanism which is electrically driven.
- A sheet metal cladding ensures protection this assembly.
- A window is provided at ergonomic level for easy loading and unloading of material.
- Entire control using a PC based software with versions for inventory and documentmanagement, a PLC controller and an emergency manual mode.
- The system is available from 2 m to 20 m.
- Modular construction
- Specially designed trays to suit shape, dimensions and weight of the material to bestored.
- Low noise due to well-engineered guiding mechanism using high quality bearings.
- Fast retrieval due to higher speed and shortest path logic built in.
- Low power consumption due to energy efficient motor and other components.
- More compact design compared to other equivalent systems to save floor space.
- Higher up time due to proven design and reliable manufacturing.
- Ease of interface of the bundled software with existing systems, ERP, WarehouseManagement Systems.

V-STORE Control Features.

• Advanced PLC controller with HMI for numeric display.
• Quick material retrieval using the shelf number or even the part number.
• The system rotates in clockwise or anticlockwise direction to select the shortest possiblepath.
• Can be interfaced with computer and provision of RS232C serial port

V-STORE Advantages.

• **Smooth operation:** The system ensures jerk-free movement even at start – stop operations due to VFD (Variable Frequency Drive), avoiding damage to the stored material. Special technology for smooth engagement/ disengagement of moving partsensures noise level well below 70 db.

• **Safe and secure:** The curtain sensors at the material retrieval window stop the system incase the material is protruding outside the tray or if an operator tries to access the shelf while it is running. Locking provision for the entire system and emergency stop switch provide further safety.

• **Low power consumption:** The system operates on single phase or three phase supply of415V / 230 Volts and draws 10 Amp current. Specially developed energy-efficient power Management of Tech-Mark systems ensures further power saving.

• **Quick retrieval of material:** The automated system increases number of pick-ups per shift, effectively reducing manpower engagement. Typically, this system is nearly 80%more efficient than conventional storage.

• **Optimum space utilization:** Effective use of optimum height results in floor space saving up to 80%.

• **Manpower saving:** Less manpower engagement compared to conventional stores.

• **User-friendly:** Even an unskilled person with a little training can very effectively use the Carousel Storage Systems. In case of power failure, it can be operated manually. Routine Maintenance requires only oiling and greasing, which can be carried out easily by quickly Removing the side covers.

• **Power backup (optional):** Single phase UPS provision for operating the system in case of Power failure. Can also be operated manually.

• **Quick installation:** Our large manufacturing capacity allows shorter delivery periods. No Special provisions are required on site such as pits/foundation and hence, this modular systemCan also be installed quickly on site.

• **Operations @ a Click:** The bundled software ensures all parts; documents can be retrieved at the click of a mouse from anywhere. Easy interfacing functionality of our software with existing systems makes the systems really integrated.

INSTALLATION PROCEDURE - ELECTRICAL

This section describes wiring connections for the main circuit inputs and outputs.

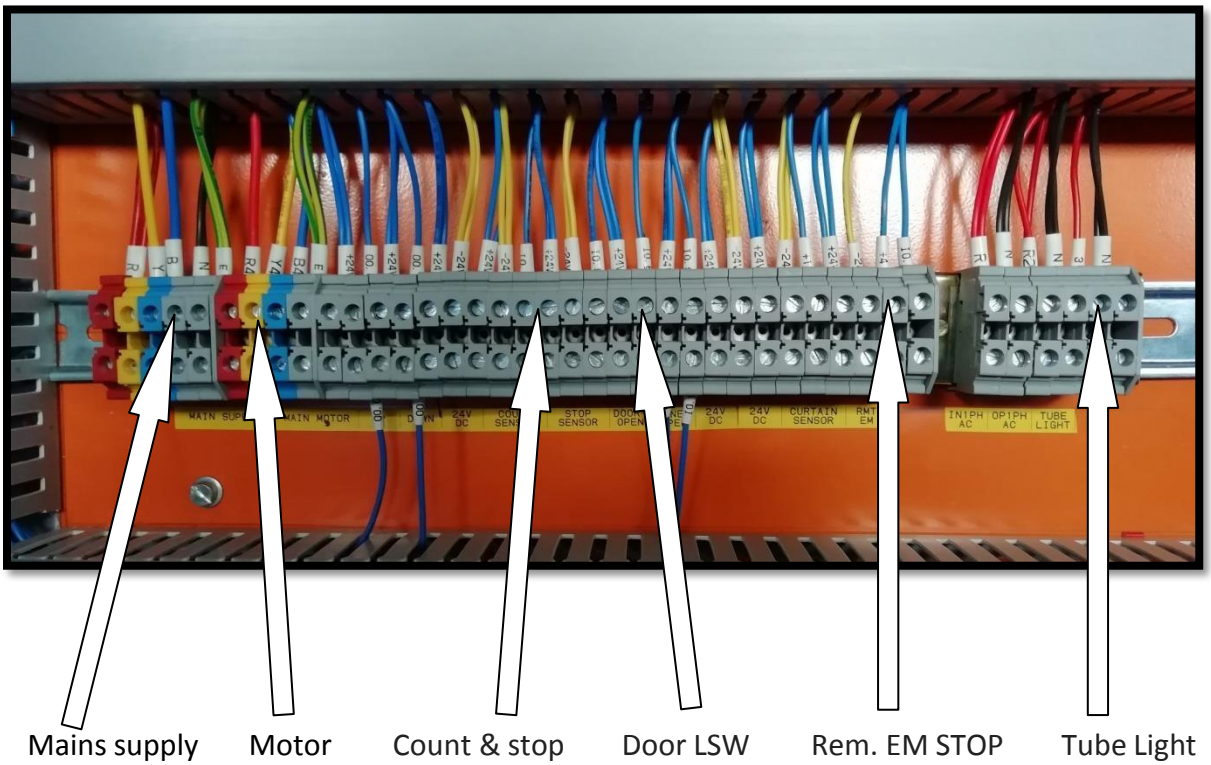
Electrical Supply Requirements **Input supply – 380 / 415 V, 50 Hz, AC, 3PHASE Wire** **Motor rating - 7.5KW 3 Phase, 15.2 Amp.**

Wiring Main Circuit Inputs to V-STORE

Observe the following precautions for wiring the main circuit power supply inputs.

Always connect the power input terminals (T1,T2,T3) and power supply via a Miniature circuit breaker (MCB) suitable for the V-STORE electrical load.
Choose an MCB with a capacity of 1.5 to 2 times of rated current.

Please refer electrical circuit diagram to all connections.



Always connect the power input terminals (T1, T2,T3) and power supply via a MINIATURECircuit breaker (MCB) suitable for the V-STORE load.

Connect V-STORE induction motor connection to output terminal of motor at control panel chassis

Please refer electrical circuit diagram to all above connections.

Control panel will be switch on after rotary switch operate in on position.

(MAIN SUPPLY MCB)

(VFD)

(PLC)

CONTROL STATION ON PANEL BOX

Power ON

Confirm all of the following items and then turn ON the power supply.

- Check that the power supply is of the correct voltage.380V Class: 3-phase 380 to 415 VAC 50/60 Hz
- Make sure that the motor output terminals (U, V, W) and the motor are connectedcorrectly.
- Make sure that the control circuit terminal and the control device are wired correctly.
- When using a PG speed control board, make sure that it is wired correctly.
- Make sure that the motor is connected to the mechanical system. (No-load condition)

SYSTEM OPERATION

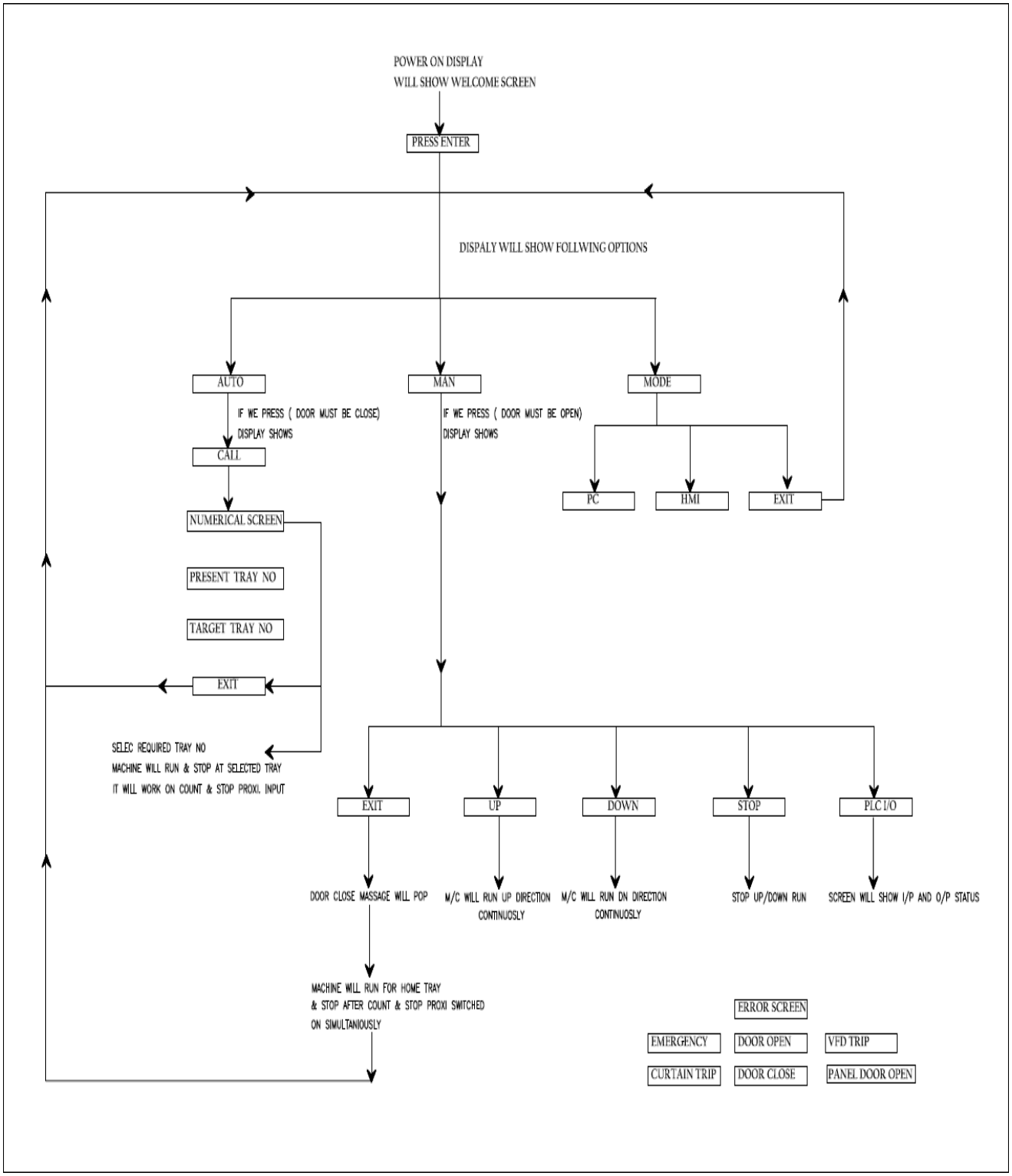
a) Manual Mode: -

This is the simplest mode of operation for operator. But it is recommended to use only in case of failure of PLC. In this case operator has to spring return selector switch up or down to select the up & down movement of system. From HMI Manual mode System keeps on moving up & down till the button is pressed & will stop when released.

b) Auto Mode: -

This is the most commonly recommended mode of operation when individual operator to control the operation of SYSTEM. In this mode again operator can select operation for touch screen or operation through the external computer. Auto operation for touch screen mode. Touch screen is provided to start the required tray no. & required bin no. Also operator can start / stop the SYSTEM from touch screen... Display will indicate required tray no., present tray no. If computer is connected to serial port then in this mode then monitor will also indicate present tray no., required tray no.

SYSTEM OPERATION FLOW CHART



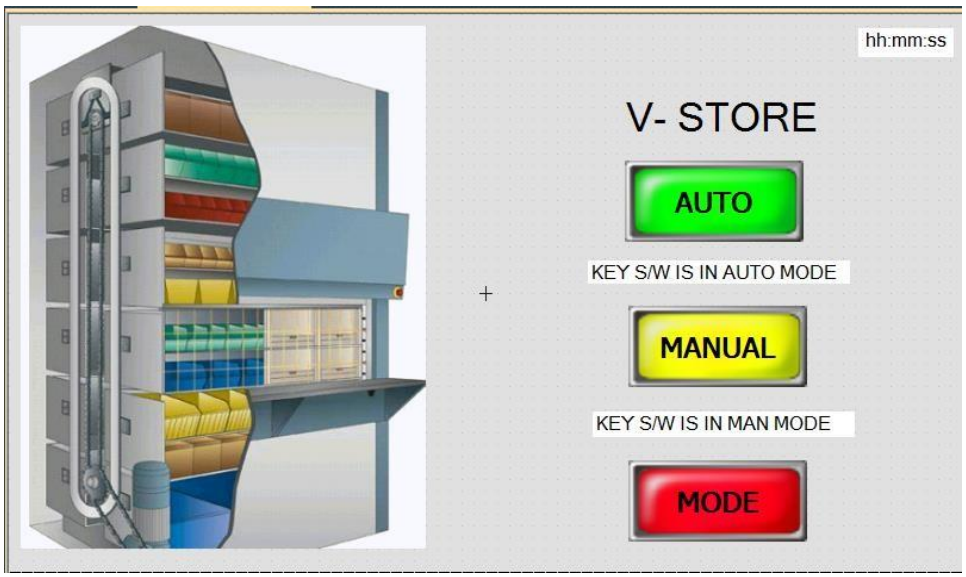
DETAIL SYSTEM OPERATION

A) POWER ON

Power on the V-STORE by turning the yellow rotary switch on the right hand side to ON position. Check for the indication lamp on the left hand side for three phase incoming.

Then Display will show following screen

Press ENTER then HMI display will show as following screen.



Please select required tag on HMI

i) **Manual-** using manual mode you can operate the system manually up down and alsoyou check PLC input and output.

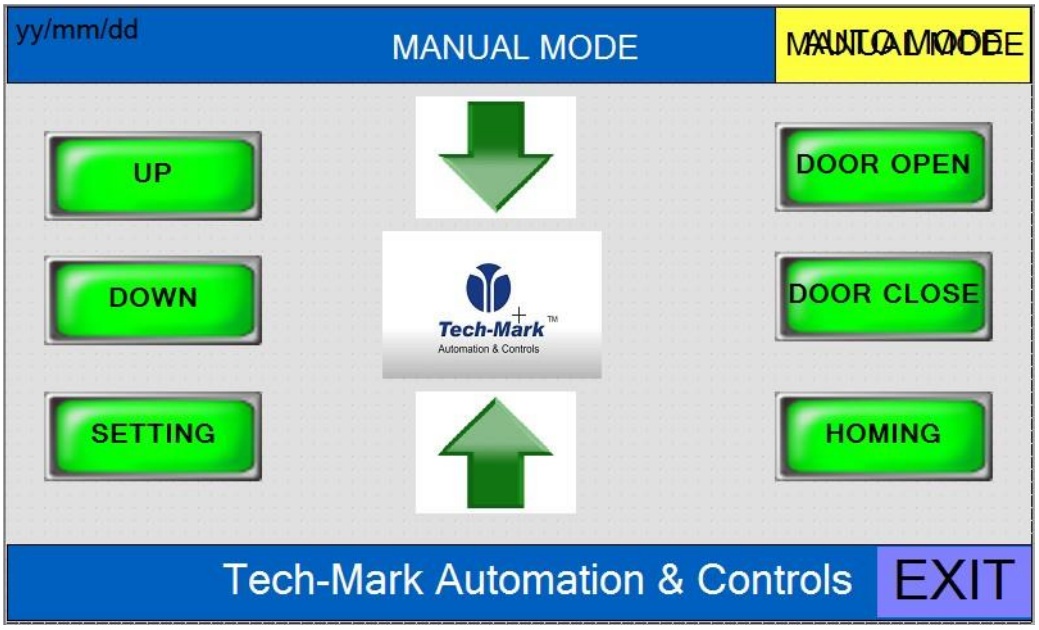
ii) **Mode –** In this mode you can select the way of operation it may be HMI or PC choose was per your requirement PC or HMI.

iii) **Auto** – For calling the tray in auto Mode.

Manual Mode

This mode is for authorized persons only.

The following screen will appear.



In manual Mode you can operate the system manually by Pressing the UP and Down keys from the HMI in this mode we have provided SIX options

i.e. UP, DOWN, DOOR OPEN, DOOR CLOSE, HOMING and SETTING.

***HMI Manual Mode will be work only after machine door is open*.**

UP:-

By Pressing The UP Keys From HMI The V-STORE Moves In **Up**-direction .Arrow up Blinked continuously.

DOWN:-

By Pressing The DOWN Keys From HMI The V-STORE Moves In **DOWN** direction. Arrowdown Blinked continuously.

DOOR OPEN:-

By Pressing The DOOR OPEN Keys From HMI then The V-STORE dooropen process will start.

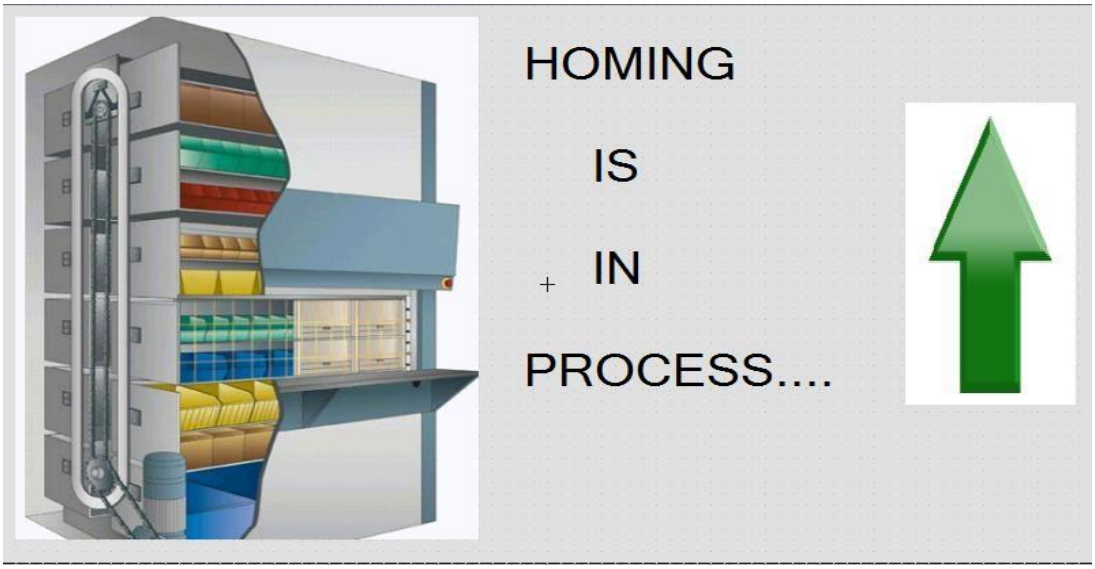
DOOR CLOSE:-

By Pressing The DOOR CLOSE Keys From HMI then The V-STORE door close process willstart.

HOMING:-

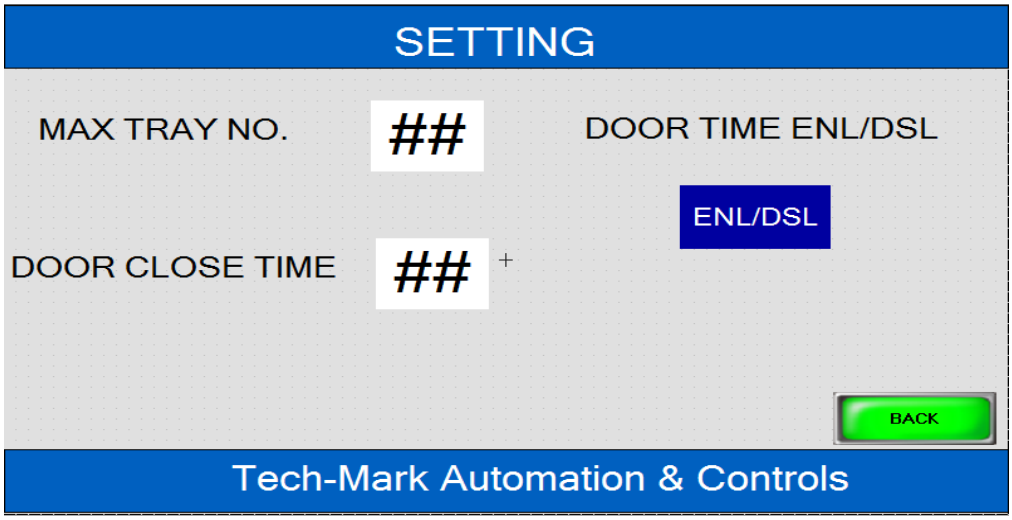
If we press Homing button machine will start in up direction till home tray i.e. tray no.1 will reach to working table. (This operation is used only at the time of tray mismatch)

Note- please do not operate manual mode regularly if machine is operating in regular operation in auto mode Otherwise machine will run for home condition every time.)



SETTING:-

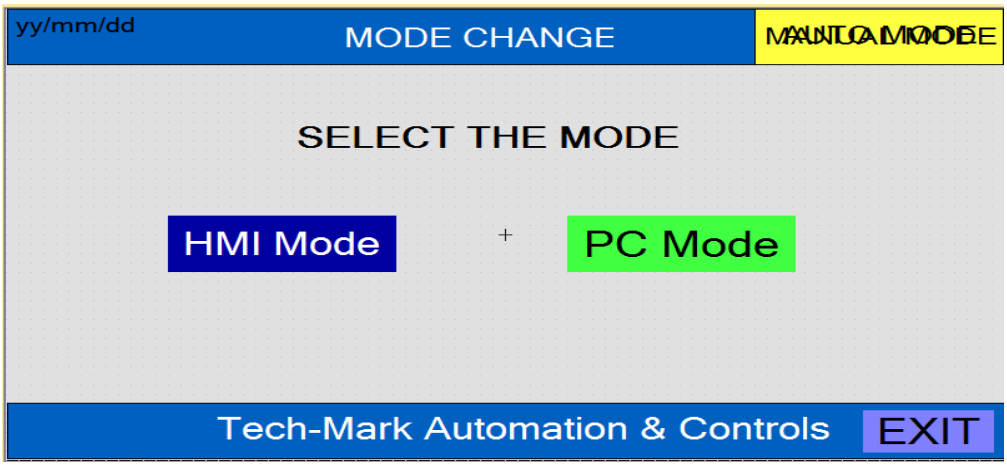
If we press Setting button then following screen will appear,



In this screen we can set maximum trays i.e total number of trays in the system, door closingtime while system is idol, door closing time enable/disable.

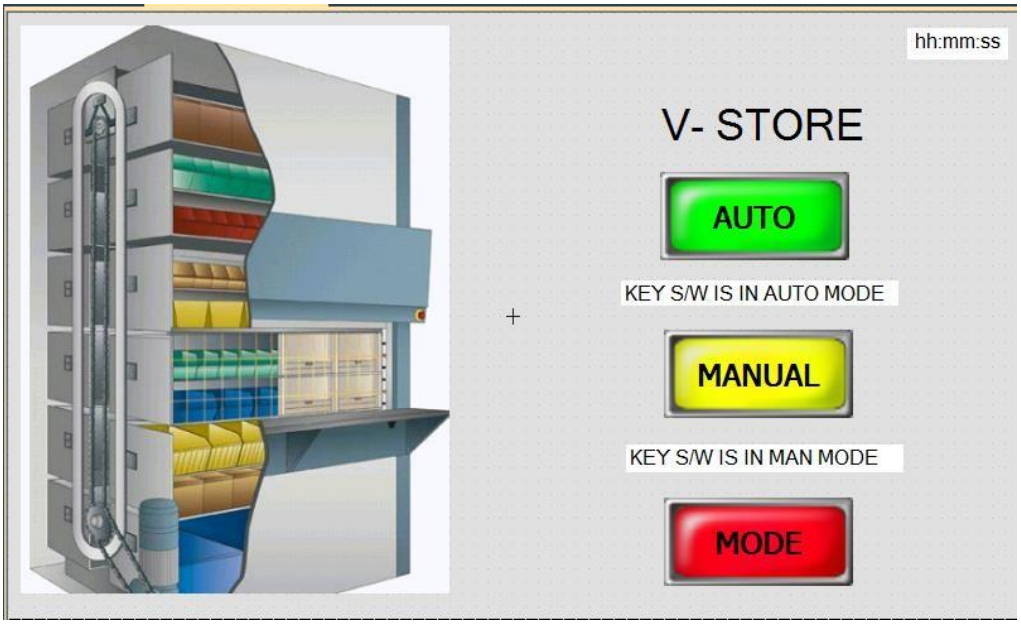
MODE KEY:

There are two ways for operating the V-STORE one is HMI MODE and another is PC MODE.



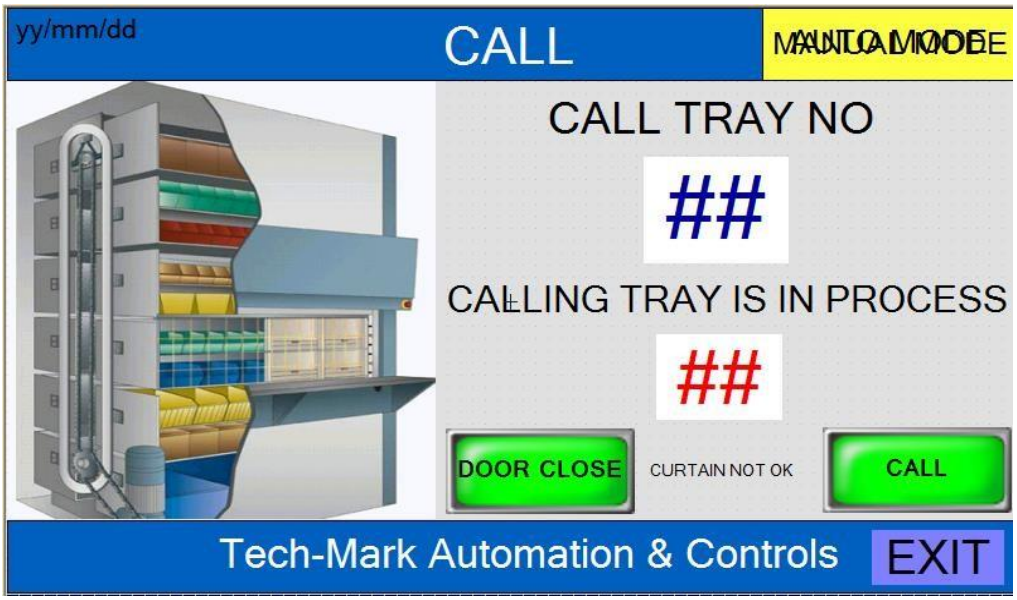
You Can select the PC or HMI From this screen, once you select PC then you cannot operate the system using HMI same as if you select HMI then you cannot operate using PC.

Auto Mode

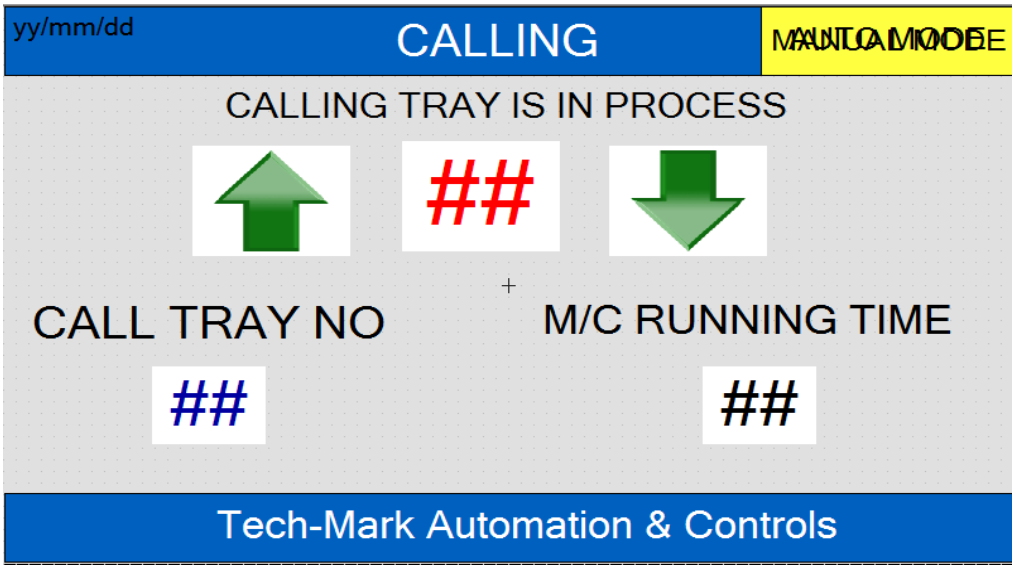


In Auto mode the following operation has been carried out.Call

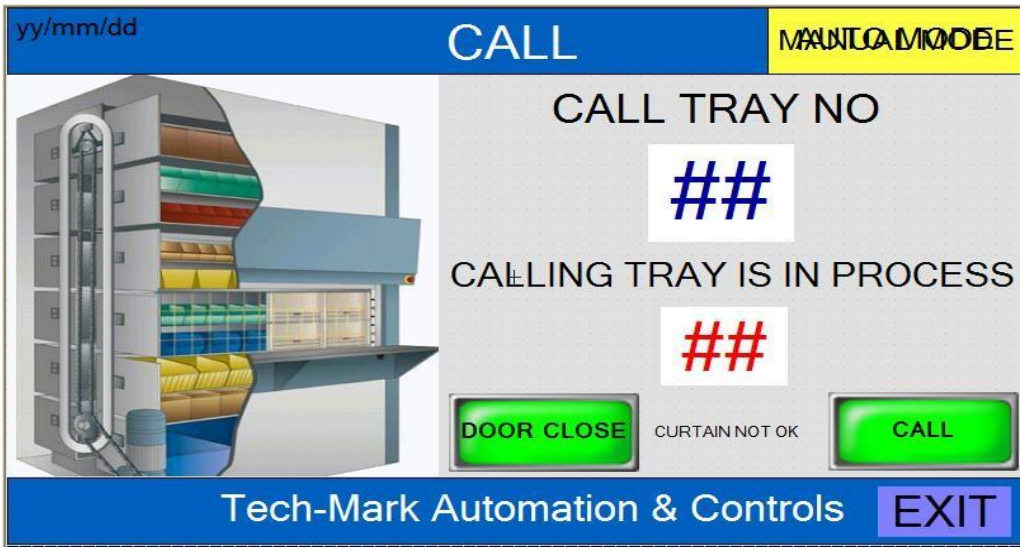
tray - For calling the tray which is loaded in the system.
Enter the required tray number in the tray number box .Then press CALL



On the middle of below screen it shows the present tray no. If the present tray no is greater than the called tray no. the it will move down and if the Present tray no. is less than called tray no it will move up. It will choose the nearest path.
When the present tray no is near to the table door it runs slow before one tray. When present tray no and called tray no are equal then it will stop.



After the completion of tray calling when the called tray and present is equal then againscreen appear like this



ERRORS

1) **EMERGENCY :-**

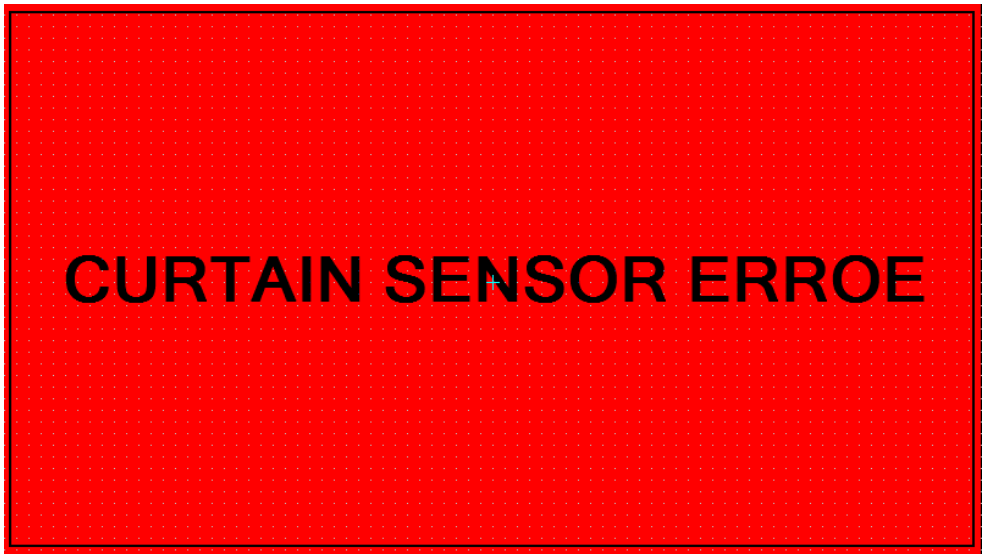
If emergency button is pressed then following screen will appear.

2) **VFD TRIP :-**

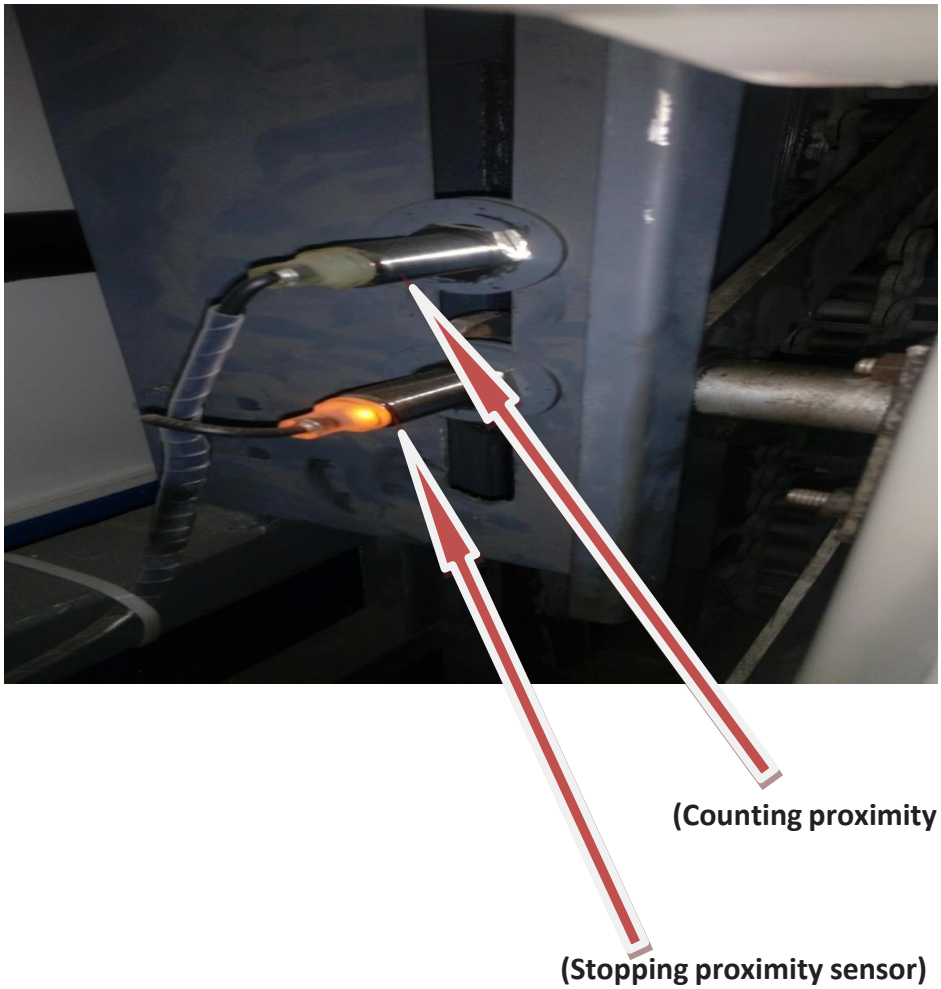
If motor vfd is triped then following screen will appear.

3)CURTAIN ERROR :-

While door closing curtain sensor become unhealthy then calling process stop and door get open and following screen will appear.



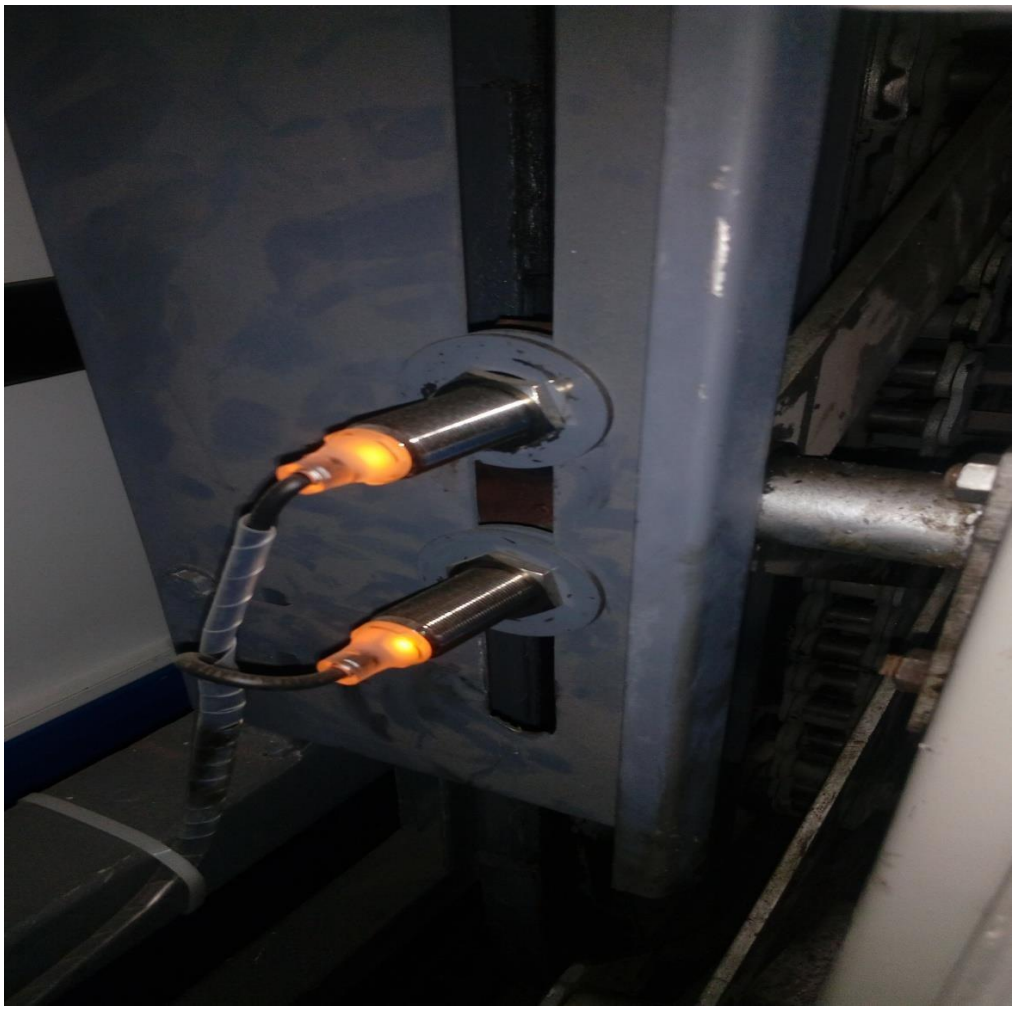
SENSOR POSITIONING



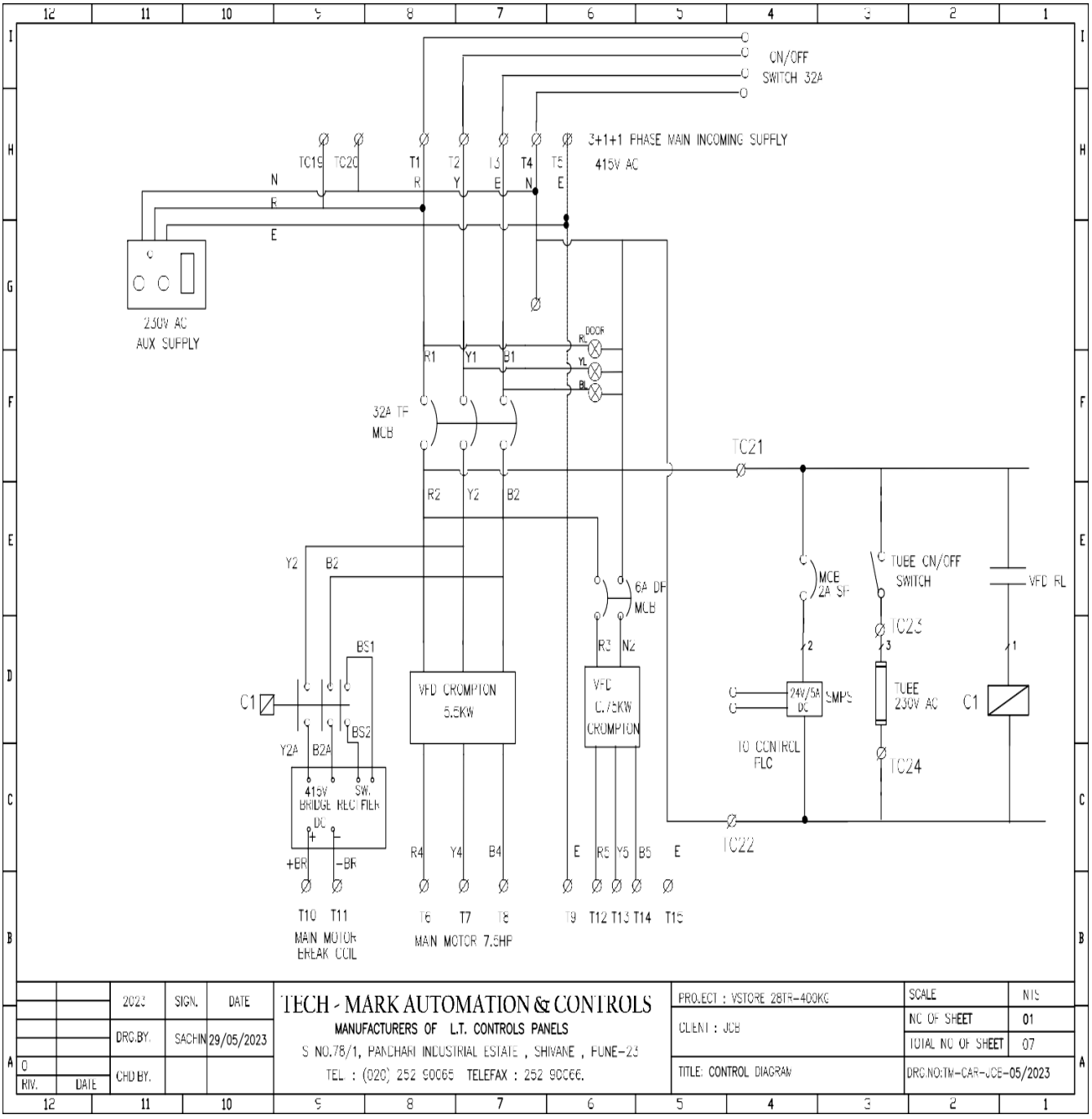
Above two number proximity sensors are very important role in auto mode. Upper proximity sensor is using for counting of tray number & down word proximity is used for stopping the up or down movement. The distance between these two sensors must be within 60 to 70 mm only & the position of these two sensors must be in center of the tray link. Also sensor front edge & link edge distance is 10 to 12 mm only. If we kept these distance less than 10 mm then it may be possibility to damage the proximity sensors**.**

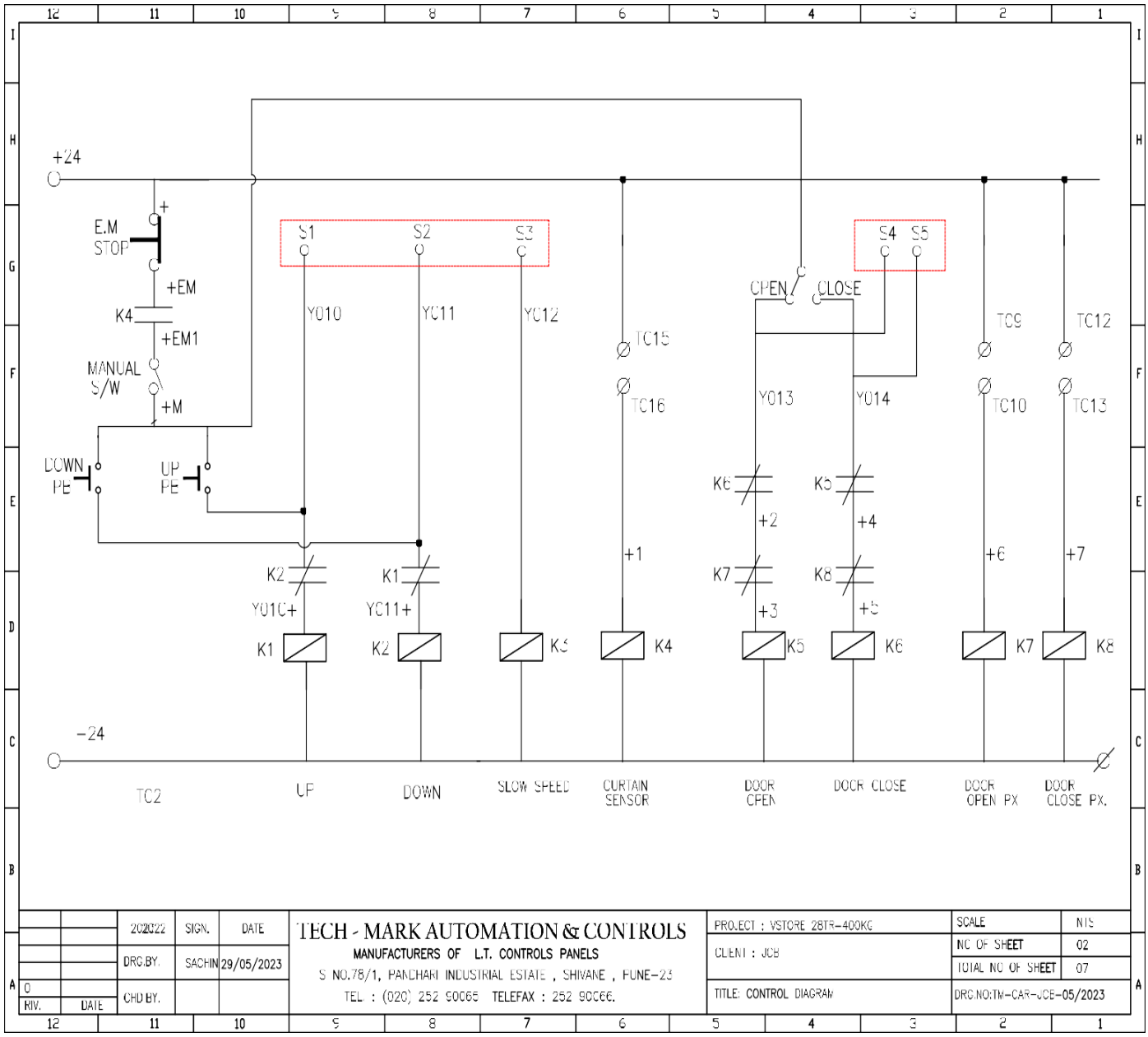
Home positioning

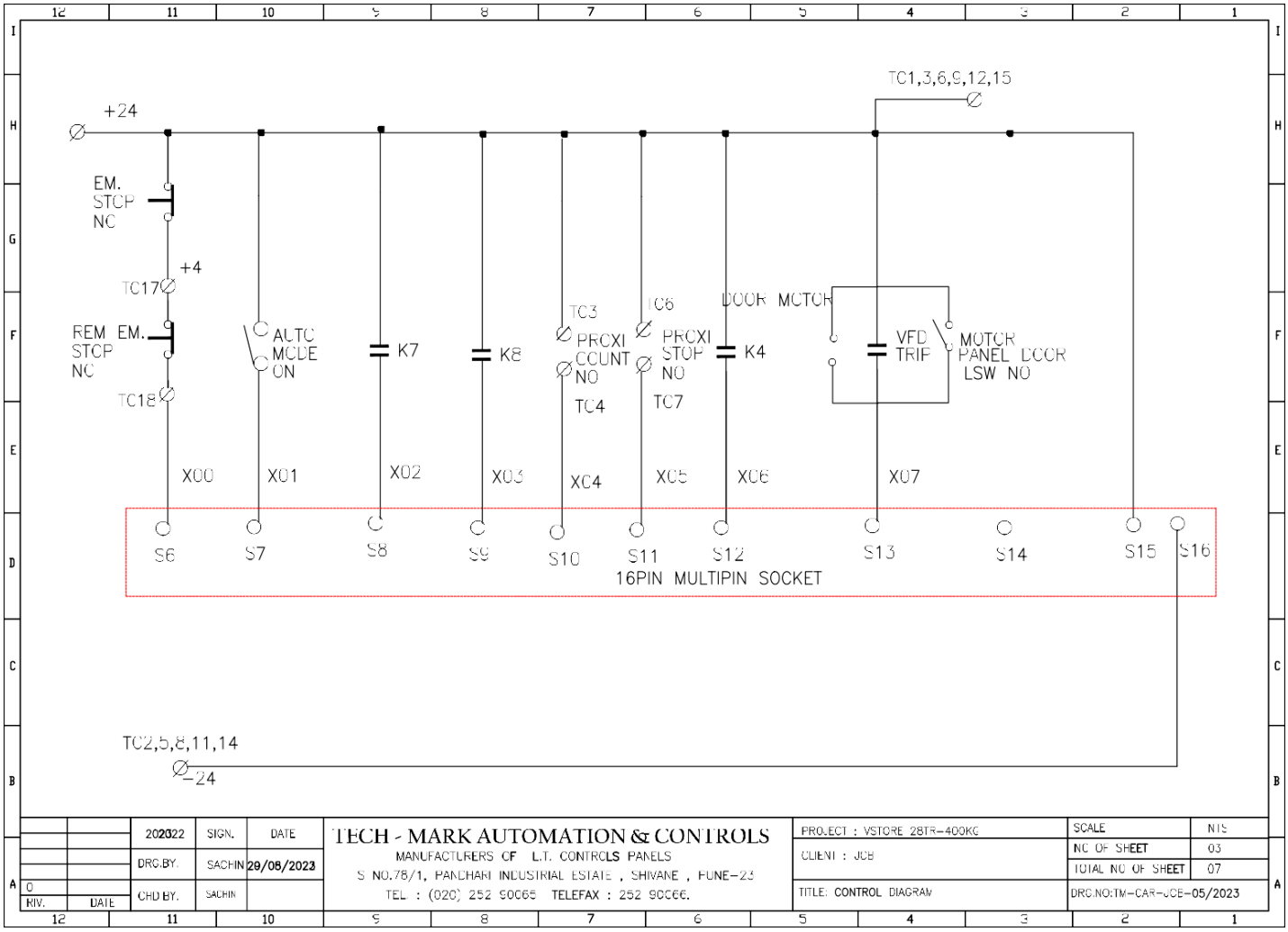
If both proximity sensors are switched on then it identifies home position of machine if sensor position is fixed as per tray position in front of working table. Now machine is readyto start in auto mode.



ELECTRICAL CIRCUIT DIAGRAM




+24
E.M STOP
+EM
K4
+EM1
MANUAL S/W
+M
DOWN PB
UP PB
S1
S2
S3
S4
S5
OPEN
CLOSE
Y010
YC11
YC12
TC15
TC16
Y013
Y014
TC9
TC12
TC10
TC13
K6
K5
+2
+4
K7
K8
+3
+5
+1
+6
+7
K2
K1
YC10+
YC11+
K1
K2
K3
K4
K5
K6
K7
K8
-24
TC2
UP
DOWN
SLOW SPEED
CURTAIN SENSOR
DOOR OPEN
DOOR CLOSE
DOOR OPEN PX
DOOR CLOSE PX.
TECH - MARK AUTOMATION & CONTROLS
MANUFACTURERS OF L.T. CONTROLS PANELS
S NO.78/1, PANCHARI INDUSTRIAL ESTATE , SHIVANE , PUNE-23
TEL : (020) 252 90065 TELEFAX : 252 90066.
PROJECT : VSTORE 28TR-400KG
CLIENT : JCB
TITLE: CONTROL DIAGRAM
SCALE NTS
NO OF SHEET 02
TOTAL NO OF SHEET 07
DRG.NO:TM-CAR-JCE-05/2023
DRG.BY. SACHIN 29/05/2023
CHD BY.
SIGN. DATE
REV. DATE
0


TC1,3,6,9,12,15
+24
EM. STOP NC
+4
TC17
REM EM. STOP NC
TC18
AUTO MODE ON
K7
K8
TC3
PROXI COUNT NO
TC4
TC6
PROXI STOP NO
TC7
K4
DOOR MOTOR
VFD TRIP
MOTOR PANEL DOOR LSW NO
X00
X01
X02
X03
XC4
X05
X06
X07
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
16PIN MULTIPIN SOCKET
TC2,5,8,11,14
-24
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202022
SIGN.
DATE
DRG.BY.
SACHIN
29/05/2023
CHD.BY.
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TOTAL NO OF SHEET
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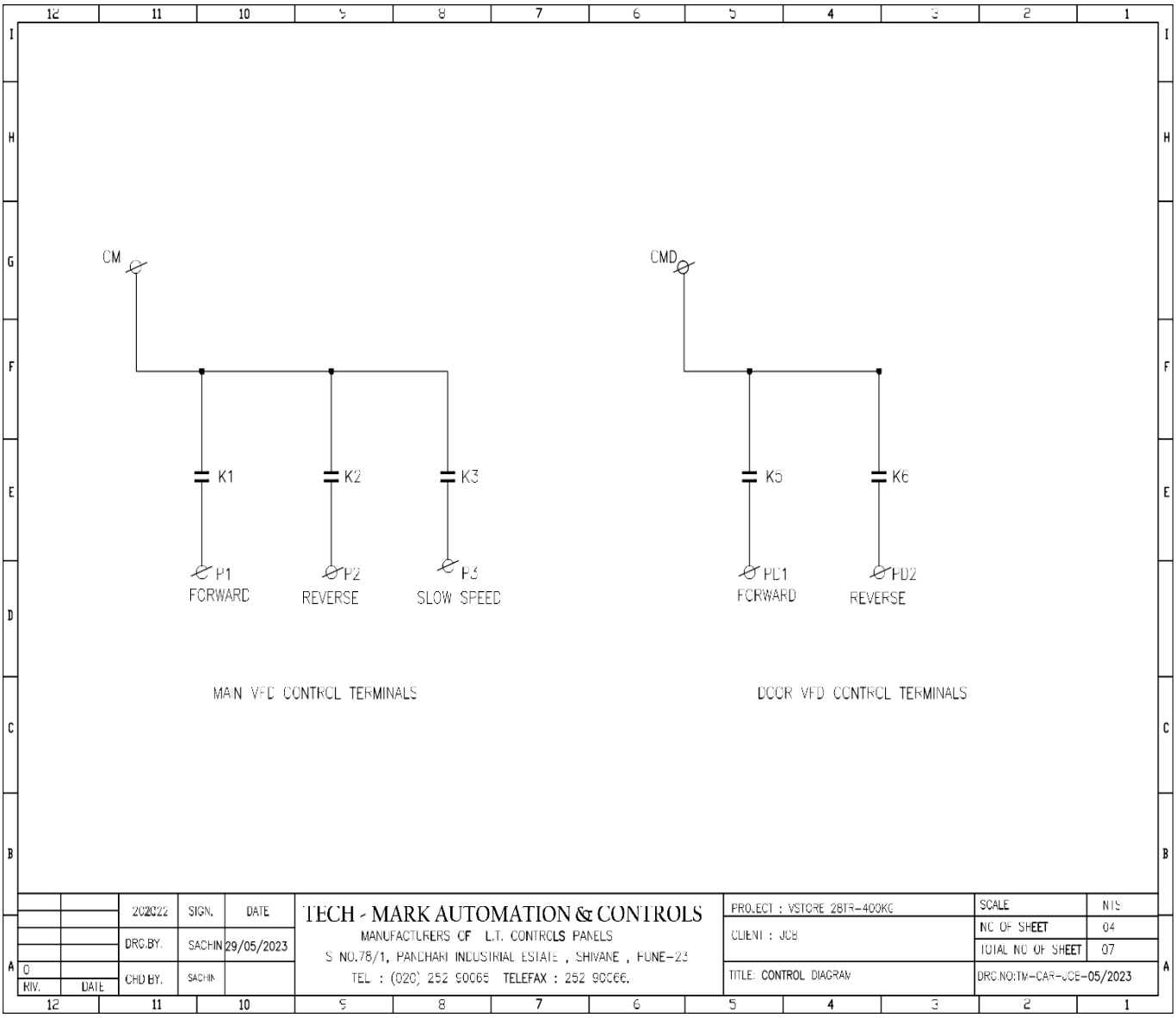
CM
K1
K2
K3
P1
FORWARD
P2
REVERSE
P3
SLOW SPEED
MAIN VFD CONTROL TERMINALS
CMD
K5
K6
PD1
FORWARD
PD2
REVERSE
DOOR VFD CONTROL TERMINALS
202022
SIGN.
DATE
DRG.BY.
SACHIN 29/05/2023
CHD BY.
SACHIN
0
RIV.
DATE
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TOTAL NO OF SHEET
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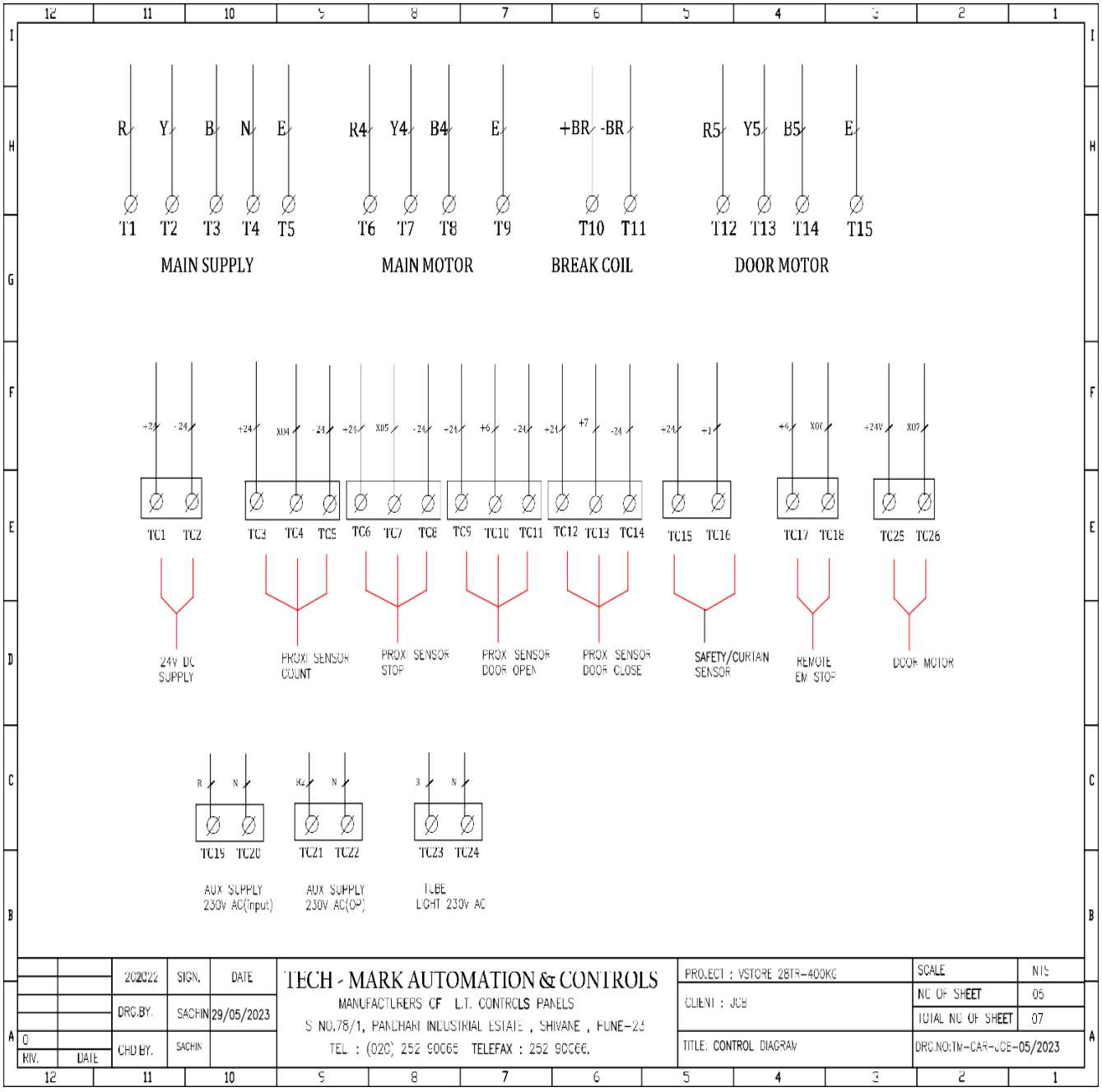
R Y B N E
T1 T2 T3 T4 T5
MAIN SUPPLY
R4 Y4 B4 E
T6 T7 T8 T9
MAIN MOTOR
+BR -BR
T10 T11
BREAK COIL
R5 Y5 B5 E
T12 T13 T14 T15
DOOR MOTOR
TC1 TC2
24V DC SUPPLY
TC3 TC4 TC5
PROXI SENSOR COUNT
TC6 TC7 TC8
PROX SENSOR STOP
TC9 TC10 TC11
PROX SENSOR DOOR OPEN
TC12 TC13 TC14
PROX SENSOR DOOR CLOSE
TC15 TC16
SAFETY/CURTAIN SENSOR
TC17 TC18
REMOTE EM STOP
TC25 TC26
DOOR MOTOR
TC19 TC20
AUX SUPPLY 230v AC(input)
TC21 TC22
AUX SUPPLY 230V AC(OP)
TC23 TC24
TUBE LIGHT 230v AC
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TOTAL NO OF SHEET 07
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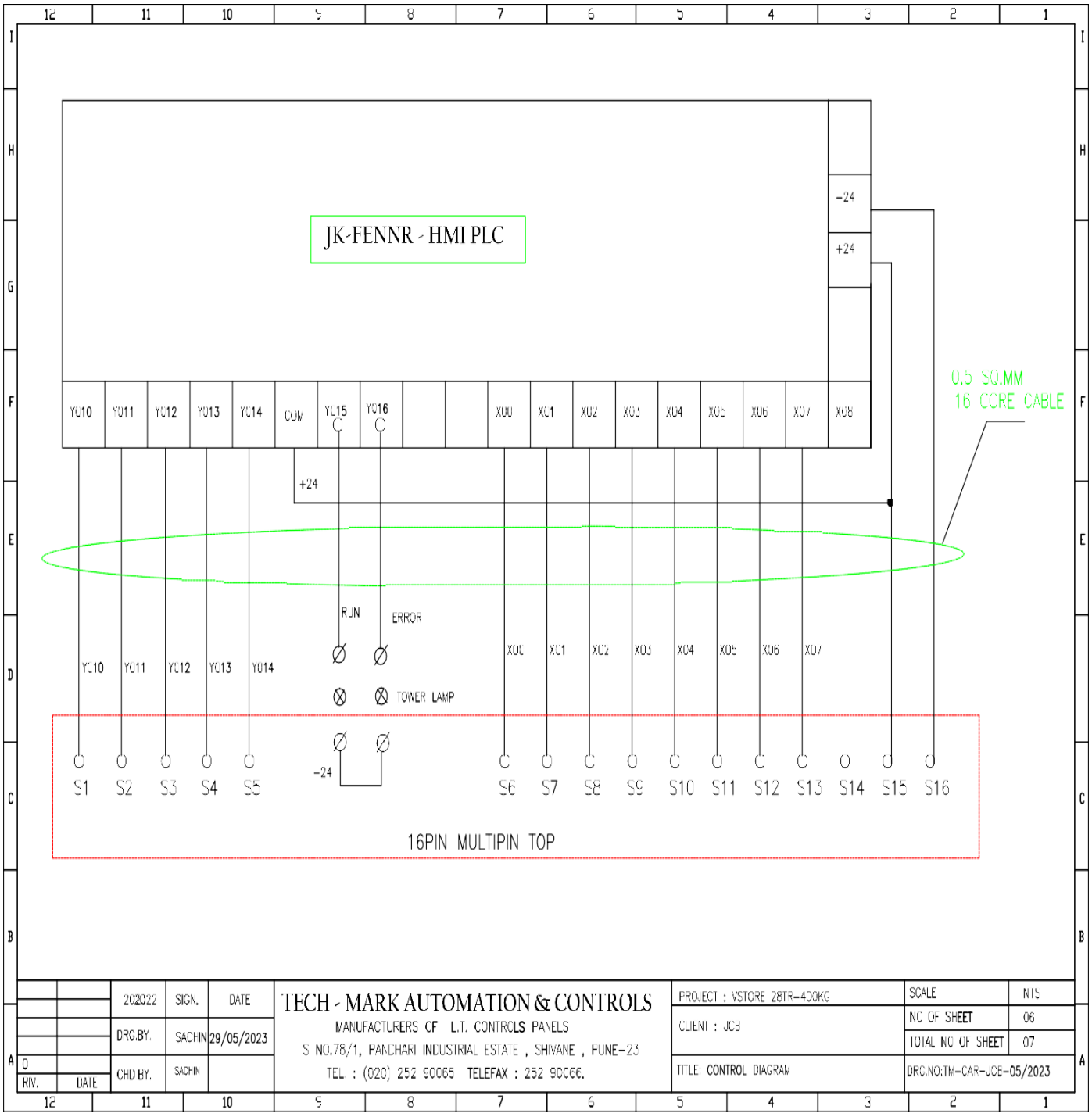
DRG.BY. SACHIN 29/05/2023
CHD BY. SACHIN


JK-FENNR - HMI PLC
-24
+24
0.5 SQ.MM
16 CORE CABLE
Y10
Y11
Y12
Y13
Y14
COM
Y15
Y16
X00
X01
X02
X03
X04
X05
X06
X07
X08
+24
RUN
ERROR
TOWER LAMP
-24
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
16PIN MULTIPIN TOP
TECH - MARK AUTOMATION & CONTROLS
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REV. DATE
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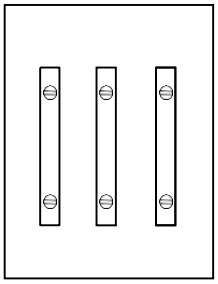
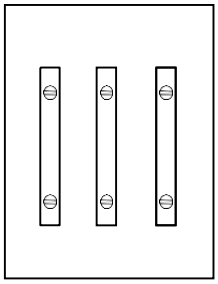


V-MOTOR-7.5HP
DELTA CONNECTION



DOOR MOTOR-0.5 HP
DELTA CONNECTION FOR 230V 3 WIRE

		2023	SIGN.	DATE	TECH - MARK AUTOMATION & CONTROLS MANUFACTURERS OF L.T. CONTROLS PANELS S NO.78/1, PANDHARI INDUSTRIAL ESTATE , SHIVANE , PUNE-23 TEL. : (020) 252 90065 TELEFAX : 252 90066.	PROJECT : VSTORE 28TR-400KG	SCALE	NTS
		DRG.BY.	SACHIN	29/05/2023		CLIENT : JCB	NO OF SHEET	07
							TOTAL NO OF SHEET	
0		CHD.BY.	SACHIN			TITLE: CONTROL DIAGRAM	DRG.NO:TM-CAR-JCB-05/2023	
RIV.	DATE							

ELECTRICAL BOM

SR. No	Description	Make	Quantity
1	VFD D700 3.7KW 7.5A	CROMPTON	1
2	VFD D700 0.75KW 1.5A	CROMPTON	1
3	PLC&HMI WVGA 800*400	JK FINNER	1
4	TUBE LIGHT 4FT	PHILIPS	2
5	SMPS 10 A 230VAC Input /output 24vdc 5A	NHP	1
6	04 channel Relay Board 2CO24 VDC	CONNECTWELL	1
7	32A On/off switch	SALZAR	1
8	KEY SWITCH	TEKNIK	1
9	ON/OFF switch	TEKNIK	2
10	NO,NC ELEMENT	TEKNIK	8
11	EM stop switch	TEKNIK	1
12	TP MCB 32A -5SL	SIEMENS	1
13	SP MCB 4 A – 5SL	SIEMENS	1
14	DP MCB 4 A – 5SL	SIEMENS	1
15	R,Y,B LAMP	TEKNIK	3
16	Proxy switch 18MM	P&F	4
17	CURTAIN SENSOR	SID	1
18	Limit switch	TEKNIK	1
19	10U Connector GRAY	CONNECTWEL	4
20	6U Connector GRAY	CONNECTWEL	35
21	WAGO CONNECTER	WAGO	4
22	PLC COMMUNICTION CABLE	TECH-MARK	1
23	End Clamp	SIBASS	4
24	16 pin plug socket	SIBASS	1
25	15 A Single Phase Socket With Box	ANCHOR	1
26	PVC Chanel 60x45,25x60	ROLLYTRAY	3
27	C,Z Channel	JOHNSON	1
28	4 CORE cable 2.5SQMM	POLYCAB	20
29	0.5sq mm Cable BLUE	POLYCAB	30
30	0.5sq mm Cable YELLOW	POLYCAB	30
31	1.0 sq mm cable YELLOW/GREEN	POLYCAB	10
32	1.0sq mm Cable RED	POLYCAB	10
33	2.5sq mm Cable R,B,Y	POLYCAB	20
34	Pin Fork type lugs	STANDARD	150
35	P.G GLAND	STANDARD	4
36	Hardware, Plate, sticker	STANDARD	1

MECHNICAL BOM

TECH - MARK AUTOMATIN & CONTROLS Dt 03/05/2023

Name Of Customer J C B 400Kg
Machine Type Vertical Carousel

S.No	Description	Measurements	Nos
1	Main Chain Simplex	2 "	10 Pkt Marne
2	Drive Chain Simplex	1.1/4"	1 Pkt
3	Sprocket 2 " Boss Q 200,Thk 60	25 Teeth	2 Marne
4	Sprocket 2 " Std	25 Teeth	2 Marne
5	Sprocket 1 1/4" Std	36.Teeth	1 Marne
6	Sprocket 1 .1/4" Std	17.Teeth	1 Marne
7	Pulley Duble Gruw B Type	8"	1 Marne
8	Pulley Duble Gruw B Type	4"	1 Marne
9	Motor 3Ph 1440 Rpm Foot Mouting	7. 5 Hp	1
10	Gear Box	Ratin 60.1 Fu 6''	1
11	UCT BRG NTN Block	2.1/2"	2
12	Ball BRG ZKL / SKF	6218 2Z	6
13	Channal	100 x 50 x18'	2
14	Angle	65 x 6	2
15	Pipe	120 x 60 x 4 mm	5
16	Pipe	100 x 50 x 3 mm	2
17	Pipe	50 x 50 x10Gx 20'	8
18	Pipe	40 x 40 x14Gx 20'	3
19	Profiles	500 X 150 x 16 Thk.	2 Nos
20	Profiles	490 X 140 x 16 Thk.	2 Nos
21	Profiles Templet	200 X 150 x 16 Thk.	8 Nos
22	Bright Bar	Q 42 MM	150 Kg Marne
23	Bright Bar	Q 30 MM	25 Kg Marne
24	Bar 20 MNCR5	Q 18 MM Bright	25 kg Marne
25	Main Shaft BRG Size	2.1/2 '' 1300mm	1 Nos
26	Pipe	ID 31 ".OD 42 "	4 Mtr Marne
27	Pipe	ID 2.1/2.'' OD 3. ''	3 Mtr
28	Bright Flat 63x8		320 Kg Marne
29	Sheet 1250 x 3100	14 g	30 Nos
30	Sheet 1250 x 3000	18g	30 Nos
31	Sheet 1250 x 2500	10g	7 Nos
32	Adler Shapt	Q140 x 200 Length	2 Marne
33	Nylon Rollar	Q72	1 Mtr = 7 Nos
34	Profiles plate	150X 345 X 12 Thk	2 Nos
35	Profiles plate	150X 125 X 12 Thk	4 Nos
36	Profiles	Q 200 x 50 m m Thk	2 Nos
37	Nylon Colar bush Link Assly		
38	Nyion plan bush ,		

39	Nylon Chain Bush		
40	Nylon Plan Washars , Link & Chain		

TECHNICAL SPECIFICATIONS

Technical Specifications of the proposed system: 1 Nos System

Sr. No.	Parameter	Specification
1	System Height	8100 (±100) mm
2	Required Room Height	NA
3	System Width	3900 (±100) mm
4	System Depth	1900 + 450 = 2350 (±100)mm
5	System Base	9.165 SQ. MTRS.
6	Tray Int. Size	450(H) x 3050(W) x 450(D)
7	Tray dead Weight	63 Kg (Approx.)
8	Per Tray weight Capacity	400 Kg
9	Tray Quantity	28 Nos.
10	Usable Net Load	11.2 Ton
11	Storage Surface Area Per Tray	1.37 SQ. MTRS.
12	Storage Surface Area Per System	38.36 SQ. MTRS.
13	DOOR	Automatic
14	Power Consumption	5.6 kW
15	Power Supply	440V, 50/60Hz. 3 phase
16	Motor 3 Ph 1440 rpm	Siemens Make or Equivalent
17	Chain	Diamond Make or Equivalent
18	Bearing	SKF / NTN Make or Equivalent
19	Type 1 Caret Size	400(W) x 600(D) x 400(H) mm
20	BINs Per Tray	05 Nos.
21	Total BIN Storage	140 Nos.

Please note that we reserve right to change the dimensions by 100 to 200 mm subject to design modifications

SAFETY INSTRUCTIONS

1. Emergency stop push button at down side of Display.
2. Optical light beam and mechanical safety sensor to stop the SYSTEM operation in case of improper storage or obstruction in the operator window either internal or external reasons like operator hand or material placed at edge of the tray.

CONTROL PANEL:-

- Control panel has the instructions written considering the inside operations of the controlpanel with care.
- Ensure that mains power is off while opening the control panel.


WARNING
Risk of Electric shock.
Operate carefully.


Schneider


emotron
VFD1
emotron
VFD2

INSPECTION DETAILS

Areas of wear and tear and other service checks after constant usage readily identified for the customers benefit. Components that have shown signs of wear in the course of time are to be promptly replaced to increase the life of the equipment.

FASTENERS:-

Check the fasteners, if found loose tighten to adequate rated torque. Guide tracks - clean the tracks with a jet of moisture free air. Use kerosene to clean. Slight lubrication of the tracks gives better performance.

GEAR BOX AND MOTOR:-

Note the sound of gearbox. Check oil level, flush old / used oil, refill with proper grade fresh oil.

Oil level of Gear box should be checked and filled in every six months.

Please contact Tech-Mark service engineers in case of any technical problems faced

EARLY WARNING SYSTEM CHECK:-

Check and ensure that all the limit switches / proximity switches and light beams placed at various points are in rightful operating condition by operating them during routine maintenance.

CONTROL STATION:-

A. LOW VOLTAGE SYSTEM ELECTRONICS PARTS.

1. Controller PLC (JK FINNER).
2. HMI 24 V DC (JK FINNER).
3. Proximity Switches (OMRON).
4. Curtain Sensor (OMRON).
5. 24 V DC Supply (NHP).

B. HIGH VOLTAGE ELECTRICAL SYSTEM PARTS

1. Drive. (CONTROL TECHNIQUES)
2. MCB.(SIEMENS)

MAINTENANCE SCHEDULE CHART

Lubrication being factor in any machinery's performance, its schedule should be met withclean equipments, pure good grade lubricants.

MAINTENANCE SCHEDULE		
Sr. No	**Part**	**Frequency**
1	Suspension chains	6 months / 1500 working hrs.
2	Gear box & motor	6 months / 1500 working hrs.
3	Electrical (early warn system)	1 month / 500 working hrs.

LUBRICATION SCHEDULE		
Part	**Lubrication Ref.**	**Lubrication Frequency**
Suspension chains	Grease	1000 working hrs./ 03 months
Transmission Chain	Grease	1000 working hrs./ 03 months
Gear box	Servo – 90 Oil	1500 working hrs./ 06 months