



Puspresnas
Pusat Prestasi Nasional

KISI-KISI DAN SOAL-SOAL

**LOMBA KOMPETISI SISWA (LKS)
TINGKAT NASIONAL XXIX
TAHUN 2021**



BIDANG LOMBA

Sistim Kendali Industri
Industrial Control

CIRCUIT DESIGN INDUSTRIAL CONTROL

Worldskills_Indonesia_2021_Circuit_Design_Pre

Submitted by :
Name : Reza Julias
Member Country or region : ID

Nama : _____
Provinsi : _____



Modul A - Circuit Design

Waktu Pengerjaan : 1 Jam

Software : Fluidsim MecLab V4.5 Pneumatics

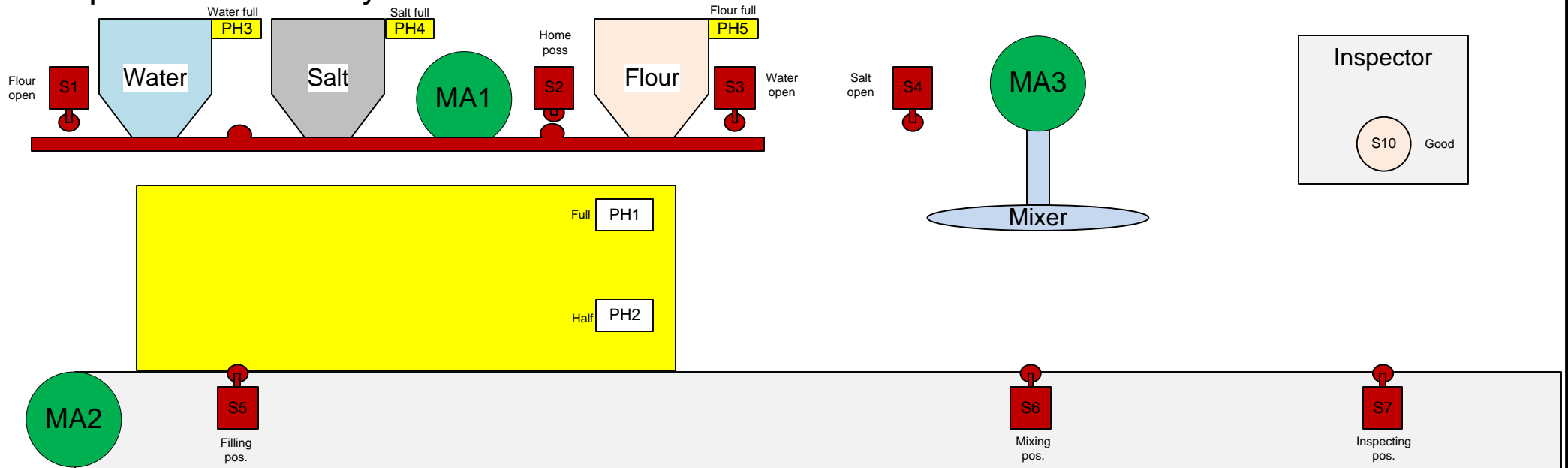
Buatlah rangkaian pengendali dan rangkaian utama menggunakan software Fluidsim sesuai dengan deskripsi mesin dan flowchart.

Simpan file dengan format Circuit Design_nomor peserta

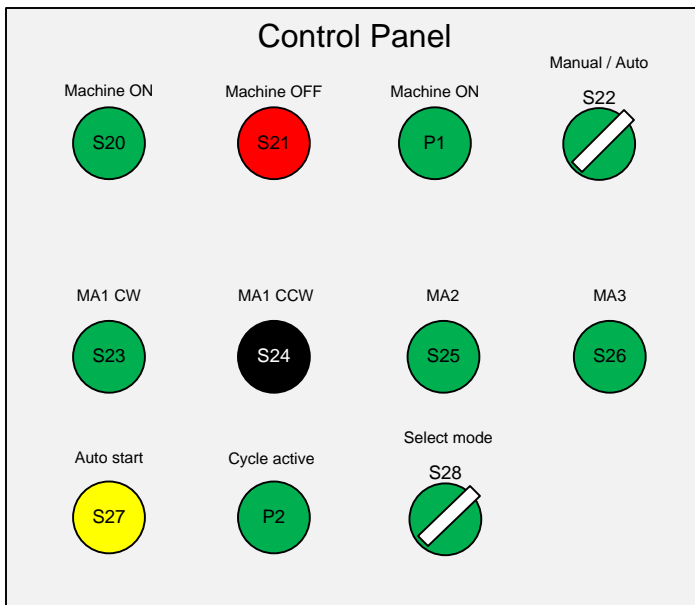
Contoh : Circuit Design_01

Kirim file sesuai instruksi juri

Representation of System



Control Panel & Switches

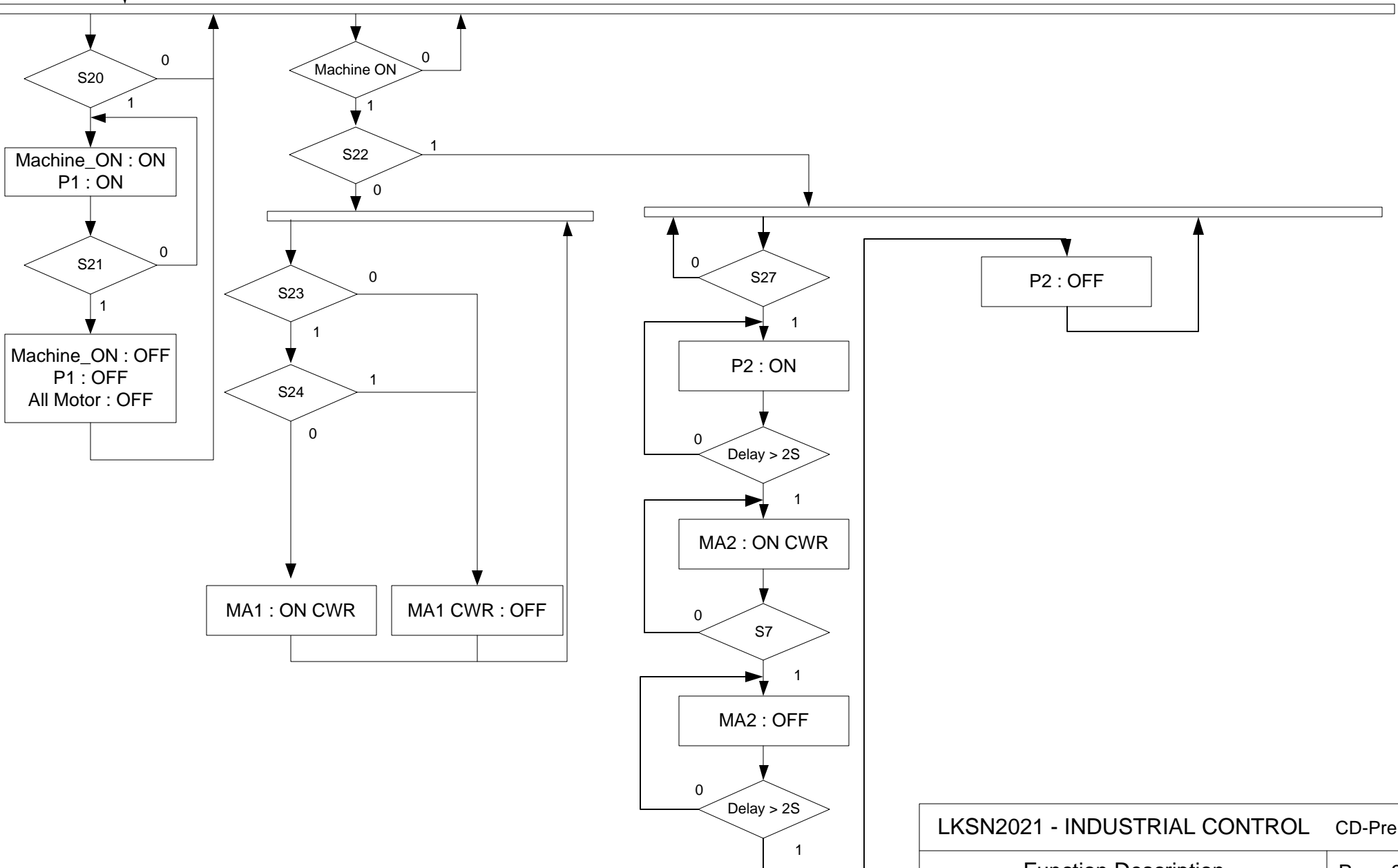


- S1 : Detent switch NO
- S2 : Detent switch NO
- S3 : Detent switch NO
- S4 : Detent switch NO
- S5 : Detent switch NO
- S6 : Detent switch NO
- S7 : Detent switch NO
- S10 : Push button NO
- S20 : Push button NO
- S21 : Push button NC
- S22 : Detent switch NO
- S23 : Detent switch NO
- S24 : Detent switch NO
- S25 : Detent switch NO
- S26 : Detent switch NO
- S27 : Push button NO
- S28 : Detent switch NO

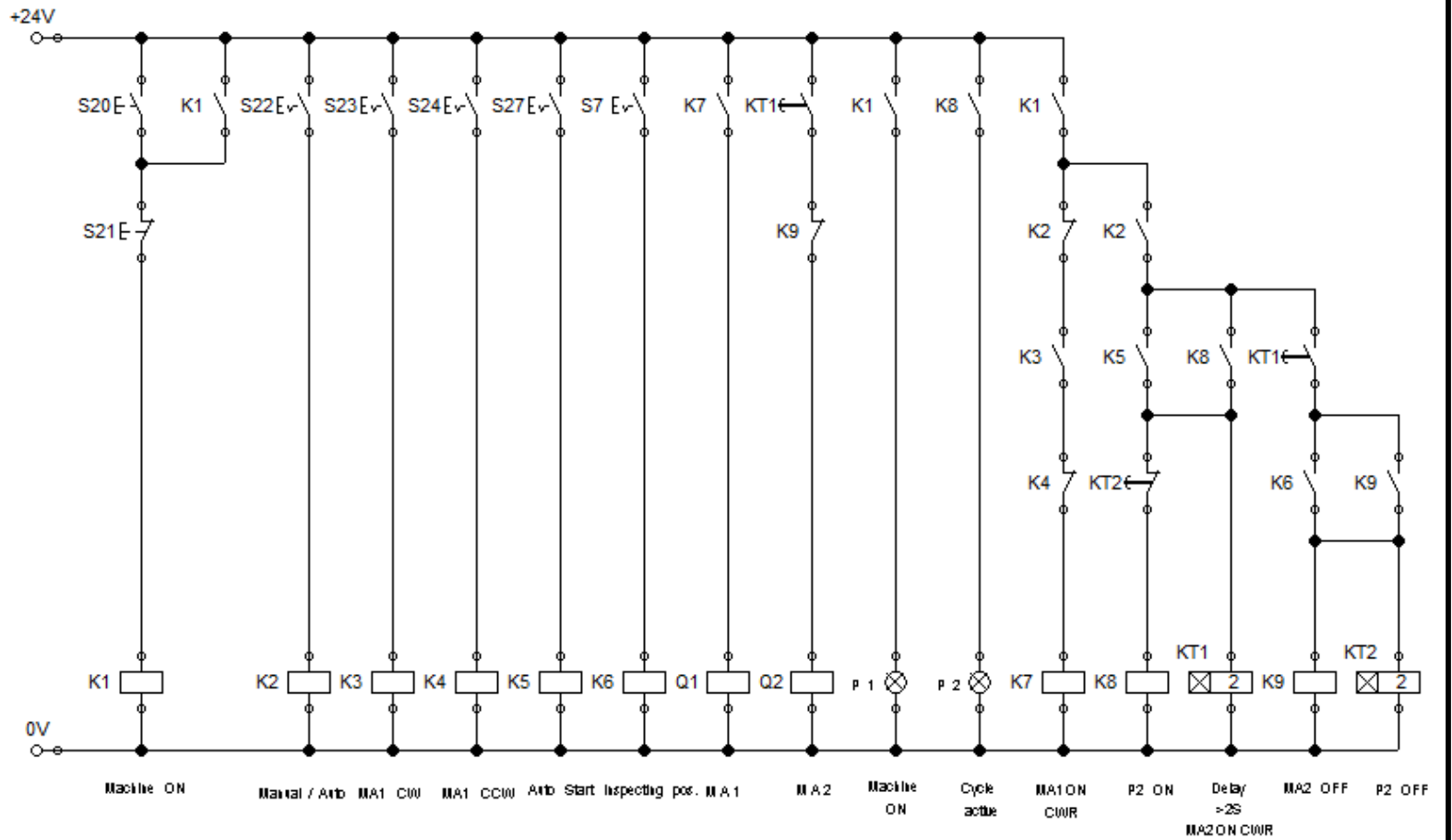
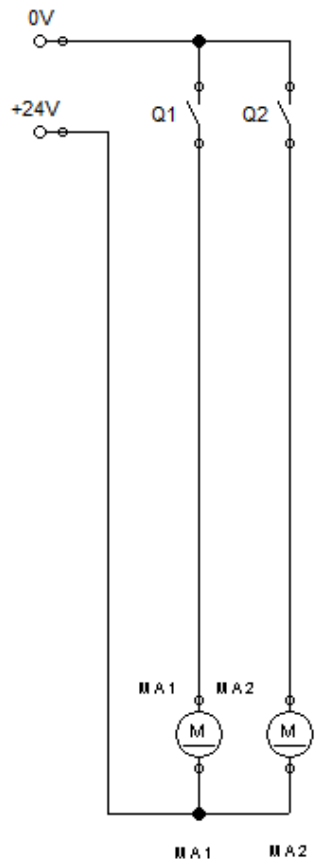
- PH1 : Detent switch NO
- PH2 : Detent switch NO
- PH3 : Detent switch NO
- PH4 : Detent switch NO
- PH5 : Detent switch NO
- P1 : Green Light
- P2 : Green Light
- MA1 : DC Motor
- MA2 : DC Motor
- MA3 : DC Motor

Simulation Start

Note : 0 = not actuated, not true
1 = actuated, true
CWR = Clockwise Rotation
CCWR = Counter Clockwise Rotation



Contoh Rangkaian Fluidsim sesuai dengan deskripsi mesin dan flowchart pada soal kisi-kisi





SKILL 19 - PROFESSIONAL PRACTICE

MODULE: CIRCUIT DESIGN AND/OR MODIFICATION

GUIDANCE

PP-Nr	DESCRIPTION	OK	NOT OK
1	straight vertical connecting lines		
2	straight horizontal connecting lines and devices		
3	straight horizontal drawing of devices		



<p>4</p> <p>vertical distances between contacts or devices</p>			
<p>5</p> <p>horizontal distances between contacts or devices</p>			
<p>6</p> <p>device labelling control circuit</p> <p>Button = S Relay = K Timer = KT</p>			



<p>7</p> <p>device labelling main circuit</p> <p>Kontaktor = Q Motor = MA Solenoid = MB</p>			
<p>8</p> <p>provision of legend for each path</p>		<p>legend for this path</p>	
<p>9</p> <p>Branch circuit on the right</p>			

FAULT FINDING INDUSTRIAL CONTROL

Worldskills_Indonesia_2021_Fault Finding

Submitted by :

Name : Reza Julias

Member Country or region : ID

Nama : _____

Provinsi : _____



Modul B – Fault Finding

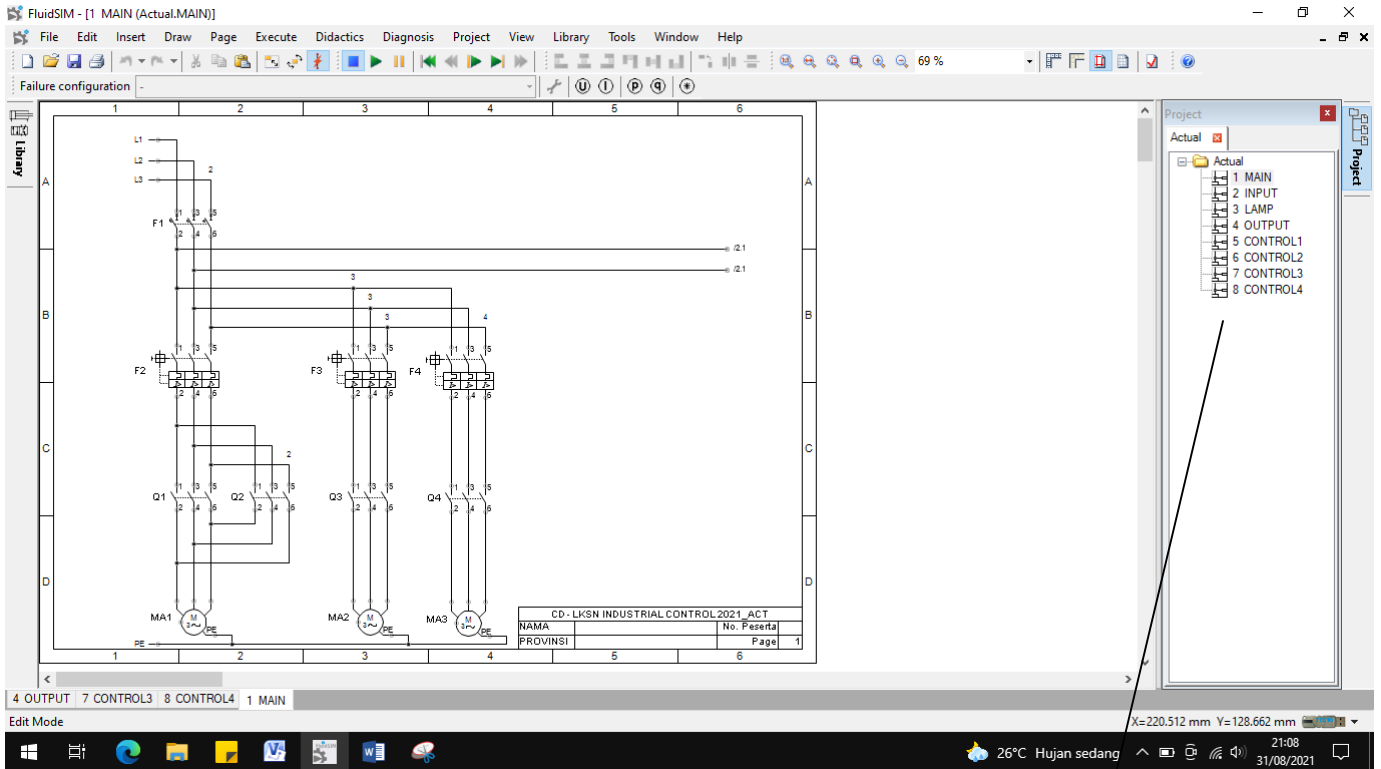
Waktu Pengerjaan : 30 Menit
Software : Google chrome remote desktop & Fluidsim V5.7a untuk simulasi mesin
Jumlah Fault : 5 Fault

Instruksi :

1. Peserta akan mulai dengan fault no.1
2. Hanya ada 1 fault dalam satu waktu
3. Peserta mensimulasikan mesin dan menganalisa fault yang ada sesuai dengan rangkaian yang diberikan
4. Peserta hanya diperbolehkan mensimulasikan dan melihat rangkaian main, input, lampu, output
5. Peserta dilarang untuk membuka rangkaian kendali (control) karena semua fault terdapat pada rangkaian kendali
6. Sanksi pengurangan nilai akan diberikan jika membuka rangkaian kendali
7. Jika fault sudah diketahui, peserta diperbolehkan mengisi jenis fault dan posisinya pada lembar yang disediakan
8. Setiap fault, peserta diizinkan untuk menjawab 3 kemungkinan posisi fault, dikarenakan proses analisa hanya menggunakan logika, tidak menggunakan multimeter / tester namun jika peserta yakin dengan 1 posisi, peserta tidak diwajibkan untuk mengisi 2 kemungkinan posisi lainnya
9. Jika ingin pindah ke fault berikutnya, peserta harus memberitahu juri. Setelah itu juri akan menonaktifkan fault saat ini dan mengaktifkan fault selanjutnya
10. Peserta tidak dapat kembali ke fault sebelumnya

Penjelasan Rangkaian

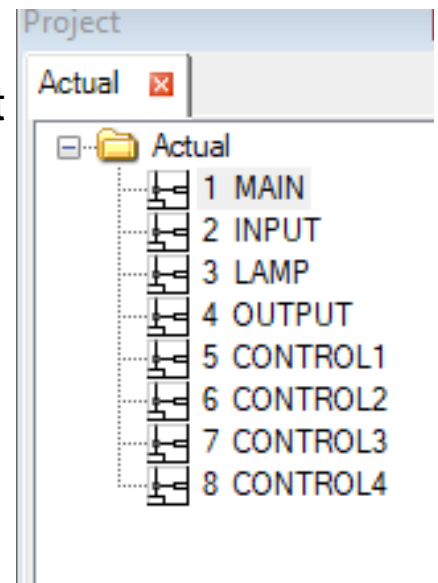
Tampilan rangkaian main :



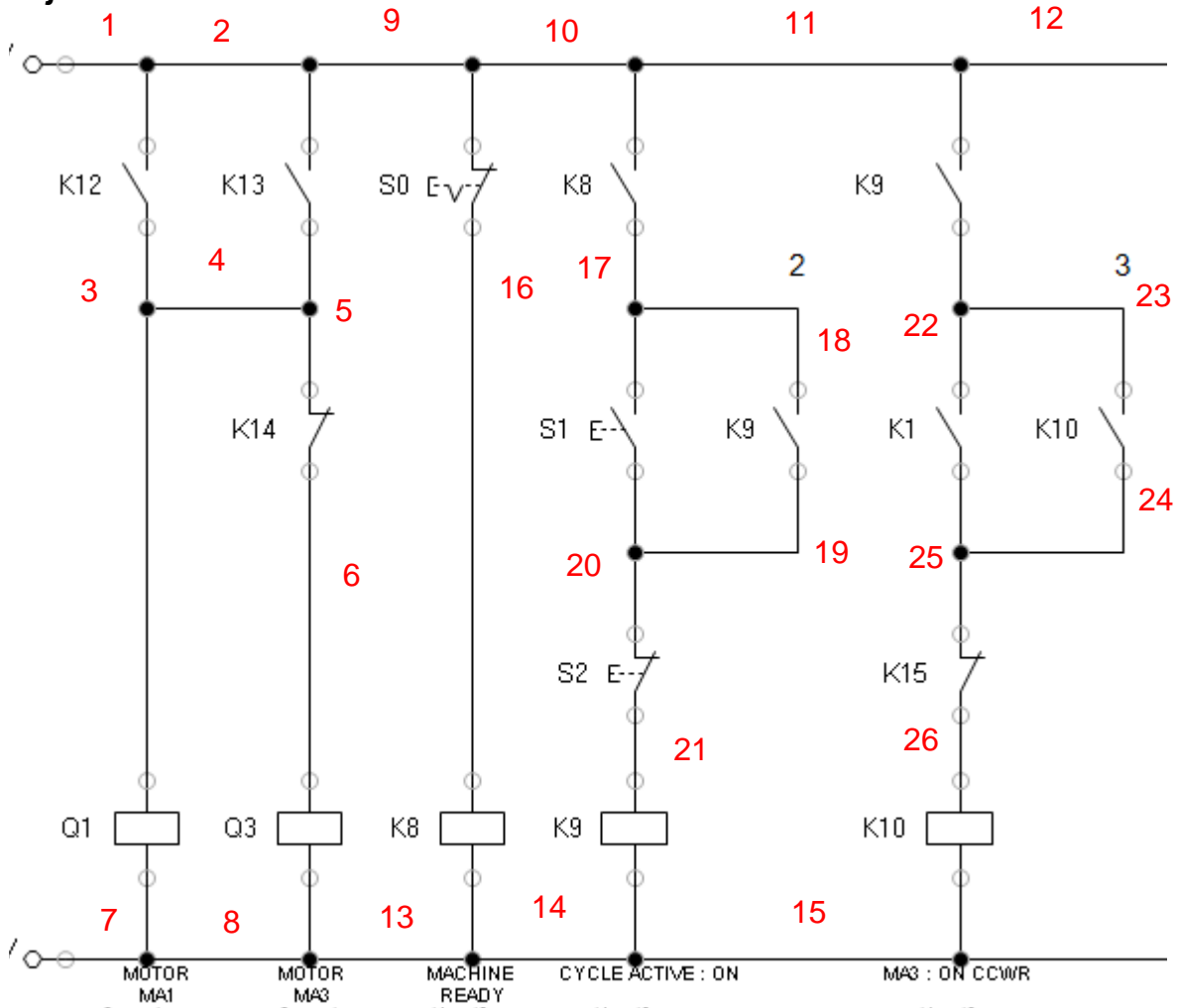
Peserta hanya diperbolehkan membuka rangkaian main, input, lamp dan output saat waktu tes / simulasi

Untuk membuka halaman rangkaian yang diinginkan, klik tombol kiri mouse 2x,

Fault hanya terdapat pada halaman control 1-4, sehingga peserta dilarang membuka halaman tersebut. Namun peserta akan mendapat gambar rangkaian control 1-4 versi tanpa faultnya



Penjelasan Fault



Nomor berwarna merah = nomor kabel / posisi fault

Jenis Fault :

Open circuit (OC) = kabel putus

Short circuit (SC) = kabel terhubung / jumper

Contoh Kasus :

Fault No. 1

Setelah peserta melakukan simulasi mesin dan analisa, ternyata kemungkinan fault terjadi karena K10 tidak mengunci (holding). Maka kemungkinan faultnya yaitu open circuit pada nomor kabel 23 atau nomor kabel 24

Fault No. 2

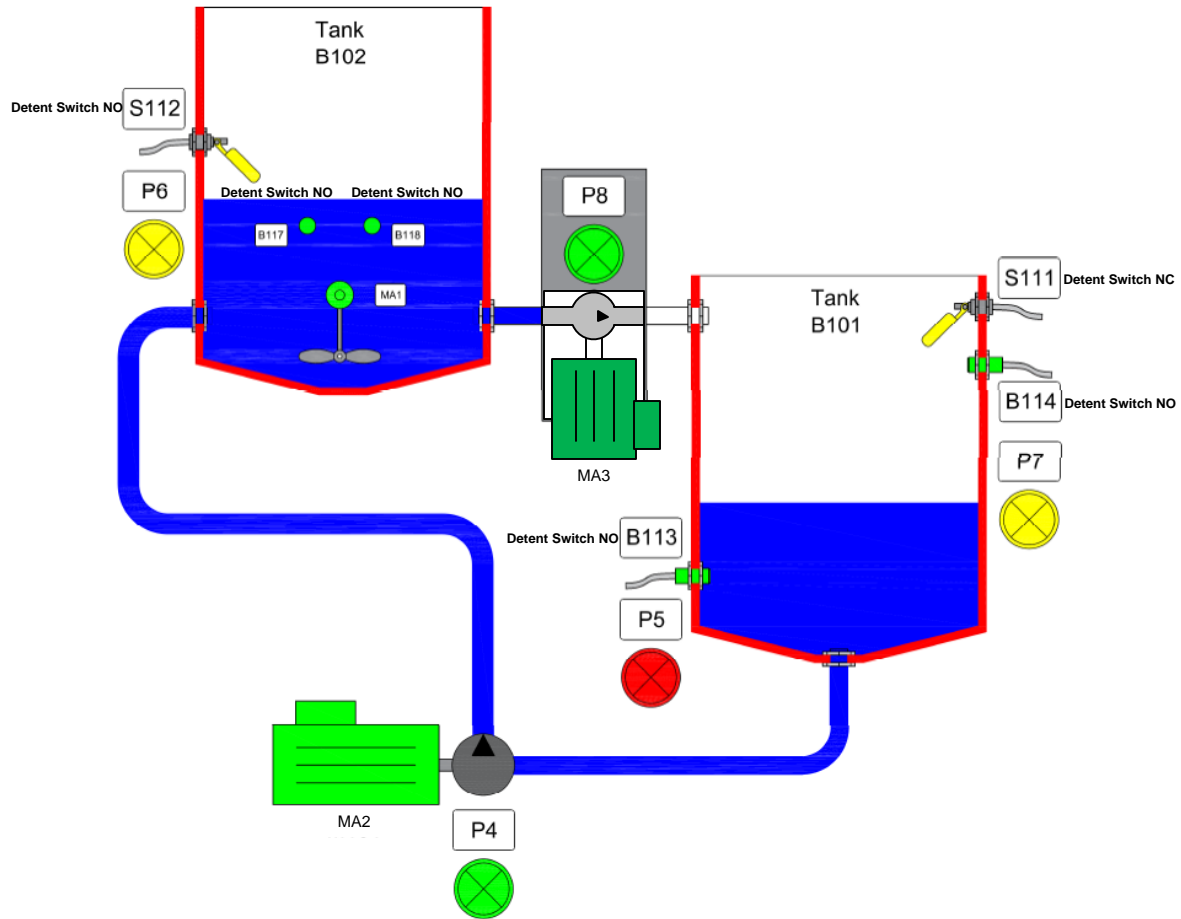
Setelah peserta melakukan simulasi mesin dan analisa, ternyata kemungkinan fault terjadi karena Q1 ON terus menerus . Maka kemungkinan faultnya yaitu short circuit pada nomor kabel 1-3, atau nomor kabel 2-5

Berdasarkan contoh kasus diatas, maka cara pengisian lembar jawaban yang benar seperti berikut

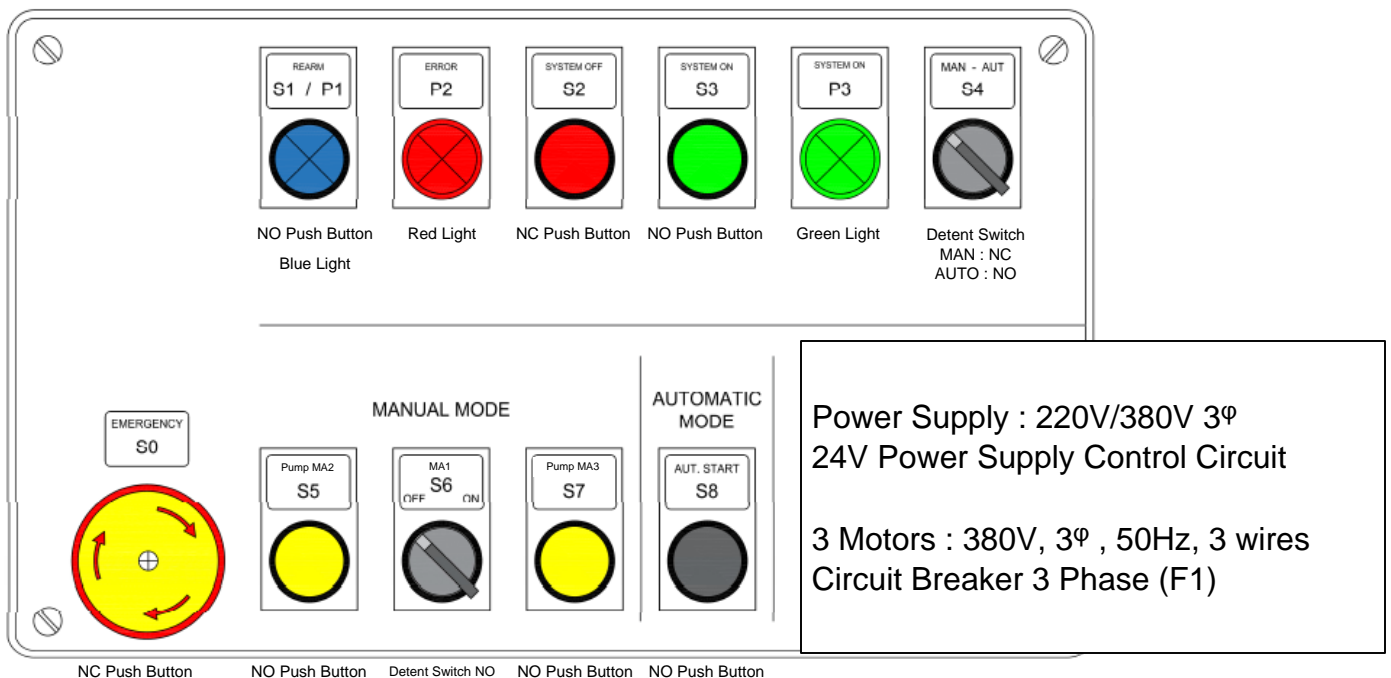
Fault No.	Type	Posisi 1	Posisi 2	Posisi 3
1	OC	23	24	
2	SC	1-3	2-5	
3				
4				
5				

Lembar jawaban berupa excel sheet yang terdapat pada komputer juri

Representation of System



Control Panel & Switches



Simulation Start

Note : 0 = not actuated, not true
1 = actuated, true

F1

Machine ON : ON

Machine ON : OFF
P1 : OFF
P2 : OFF
P3 : OFF
P4 : OFF
P5 : OFF
P6 : OFF
P7 : OFF
P8 : OFF
MA1 : OFF
MA2 : OFF
MA3 : OFF
Cycle_active : OFF

Machine ON

Ready

P1 : ON

P1 : OFF

A

S1

Ready : ON

S0

Ready : OFF

S111

Ready

S2

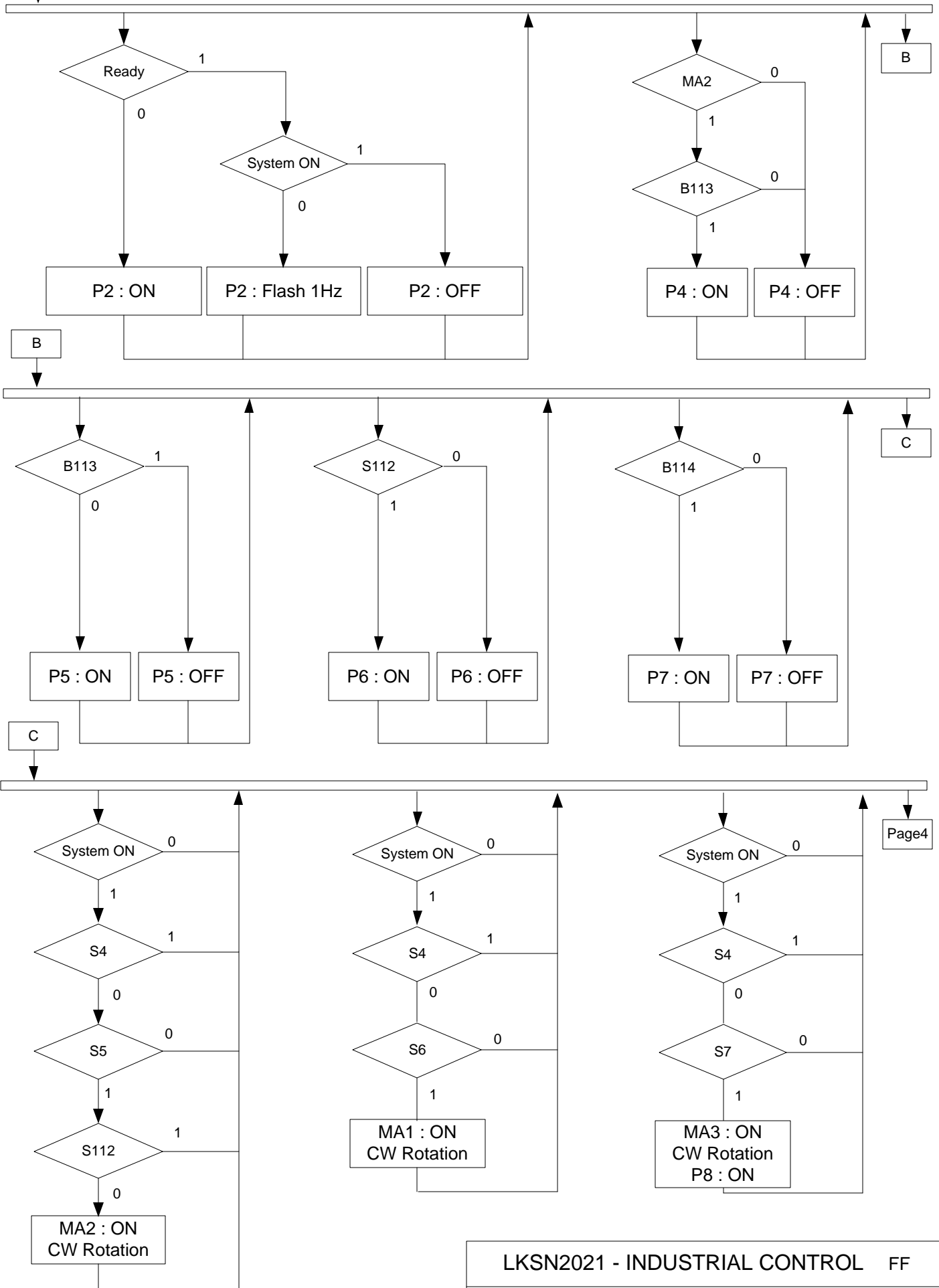
S3

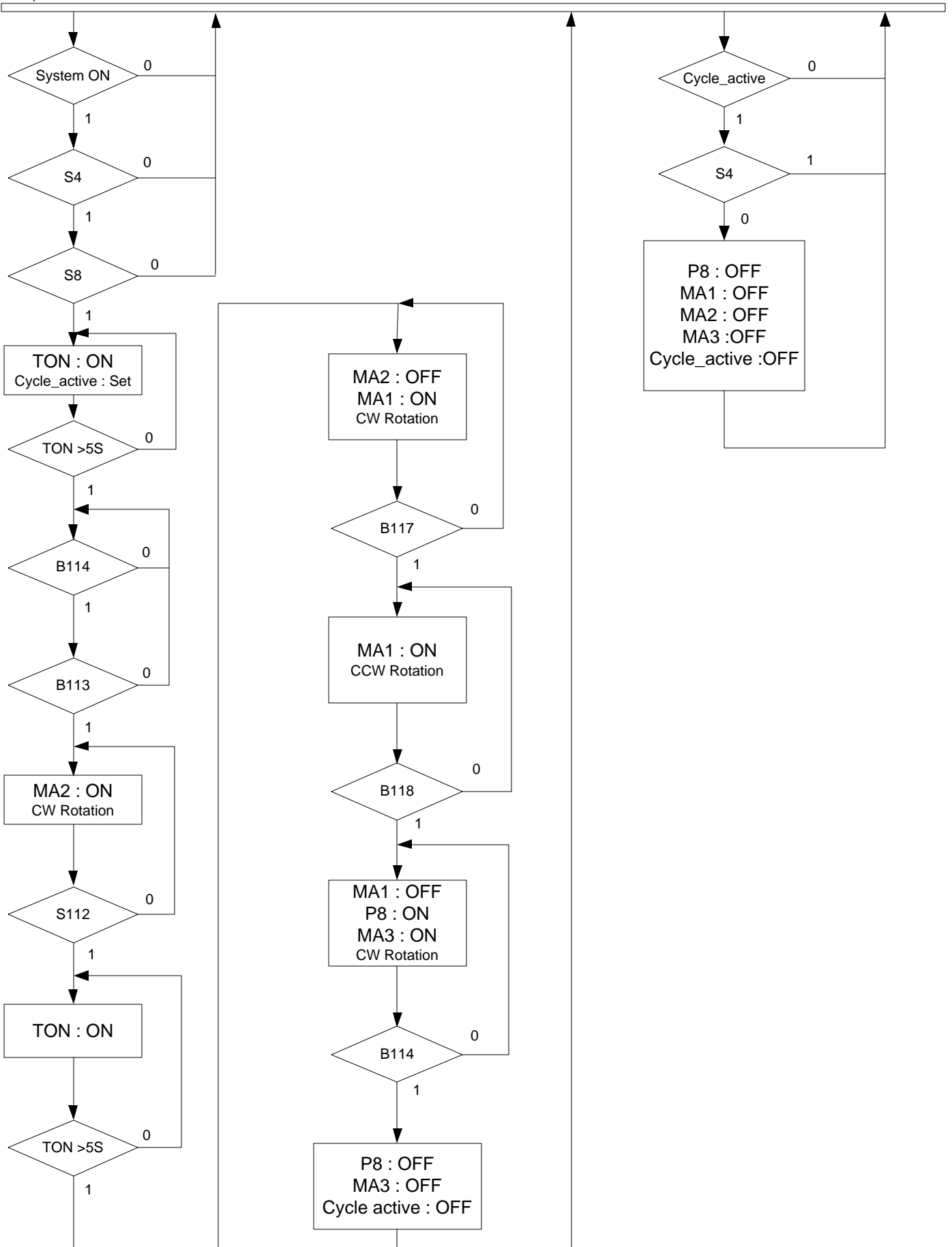
System ON

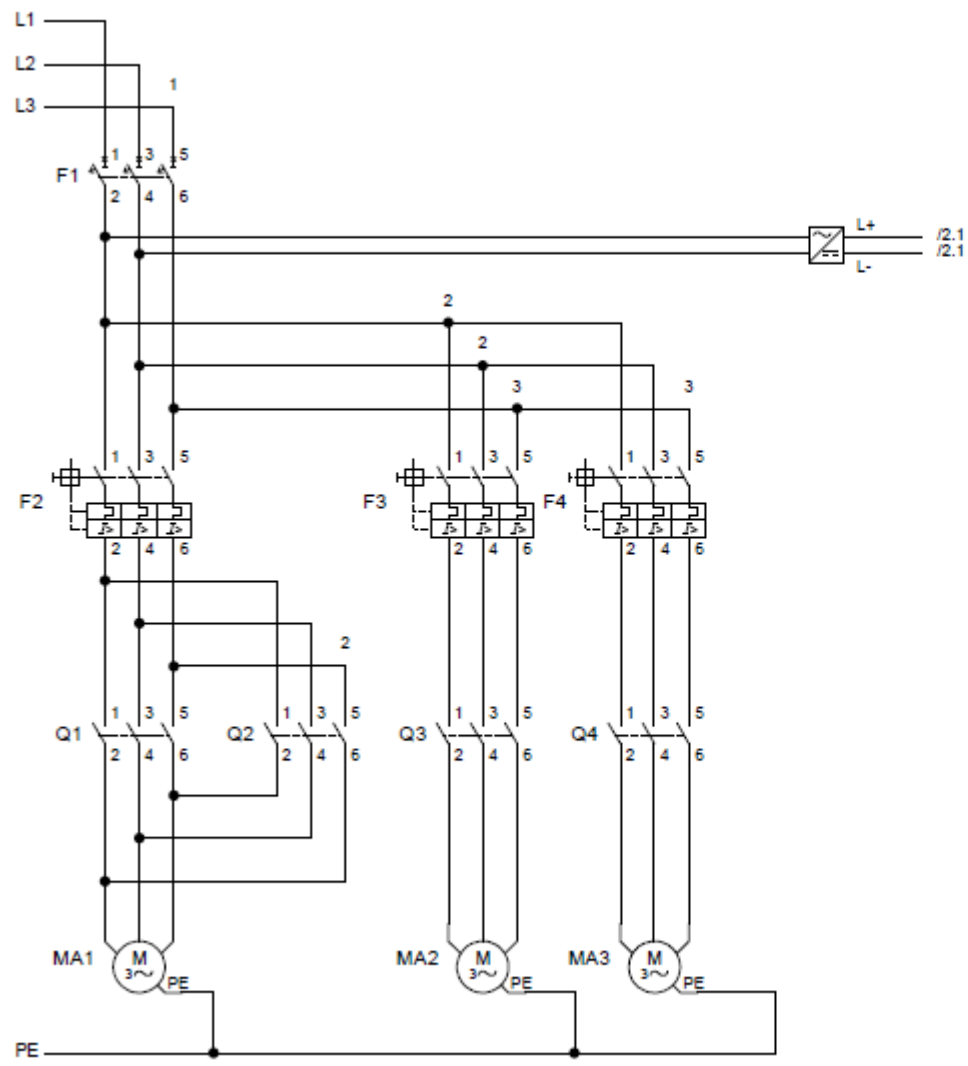
System ON: ON
P3 : ON

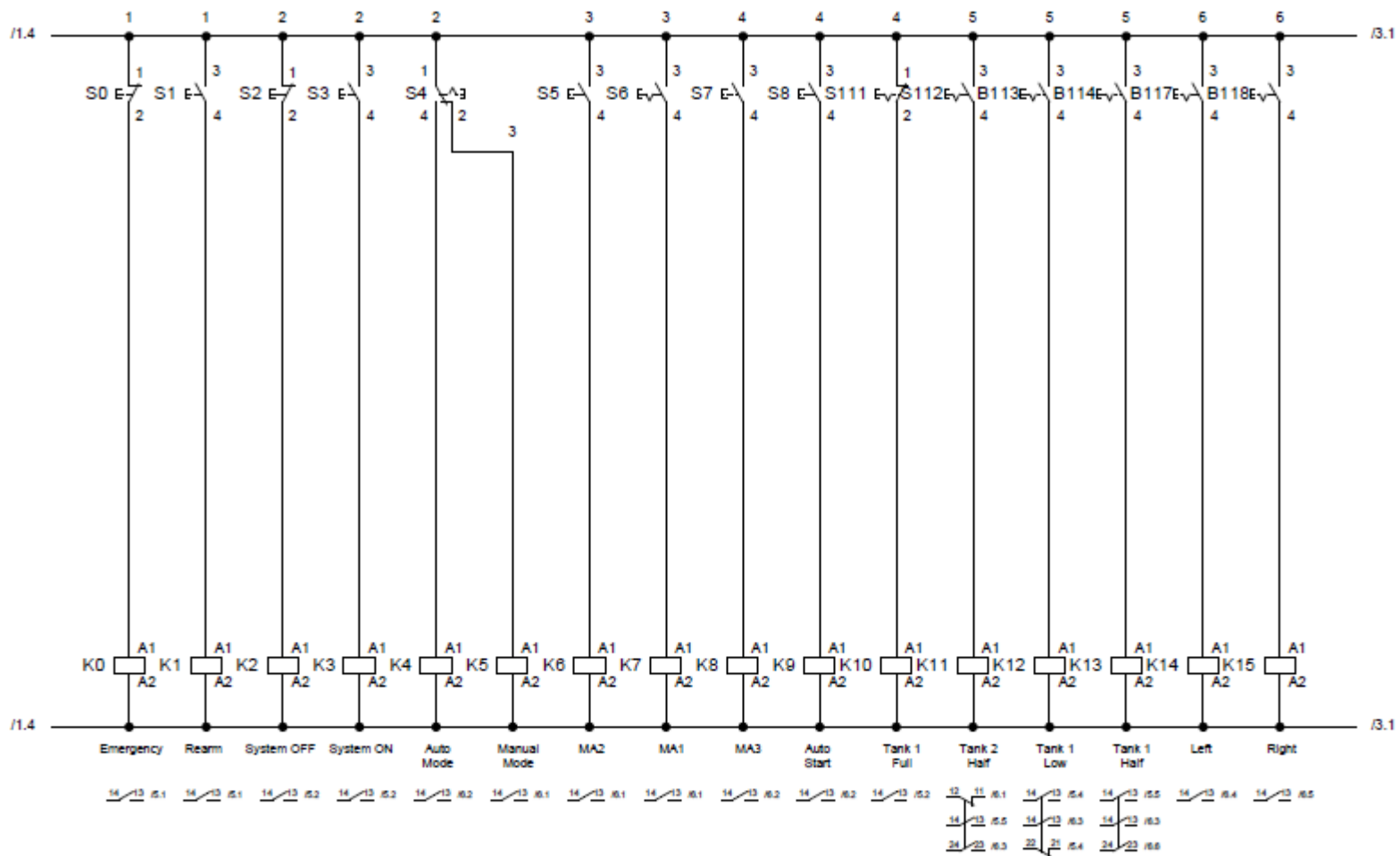
System ON: OFF
P3 : OFF
P8 : OFF
MA1 : OFF
MA2 : OFF
MA3 : OFF
Cycle_active : OFF

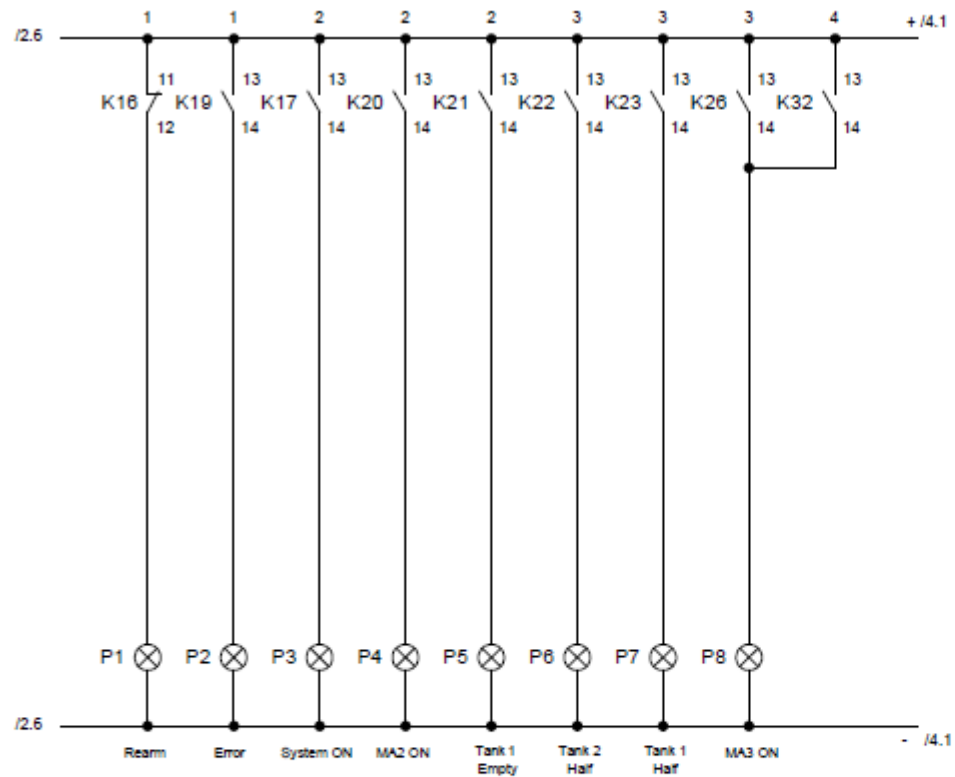
Page3

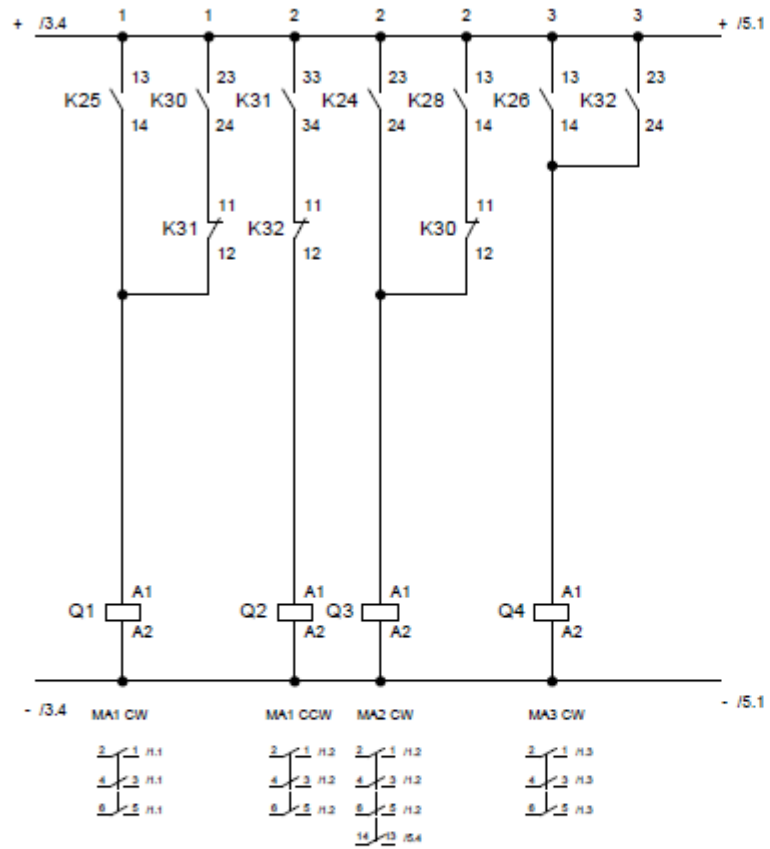


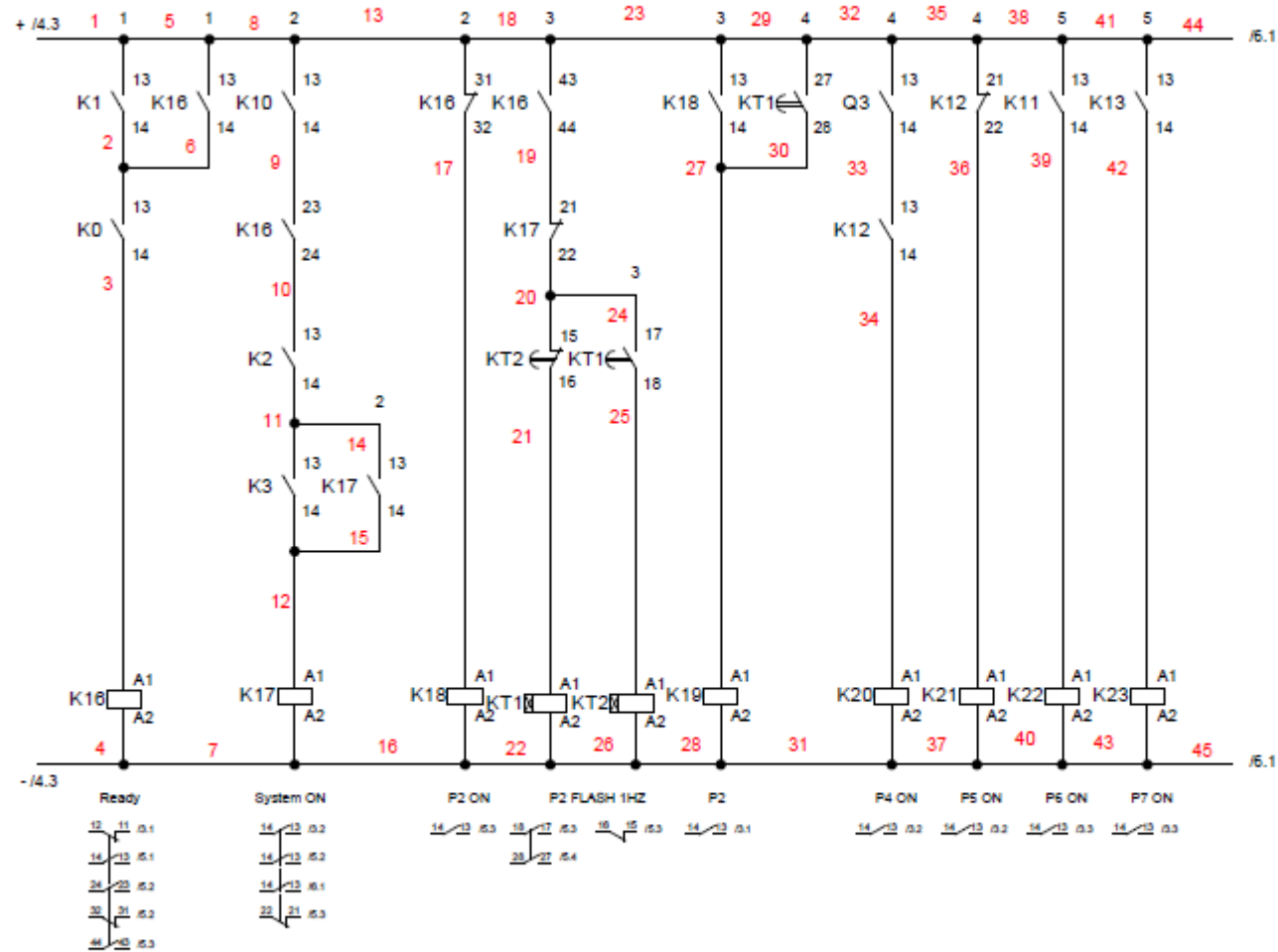


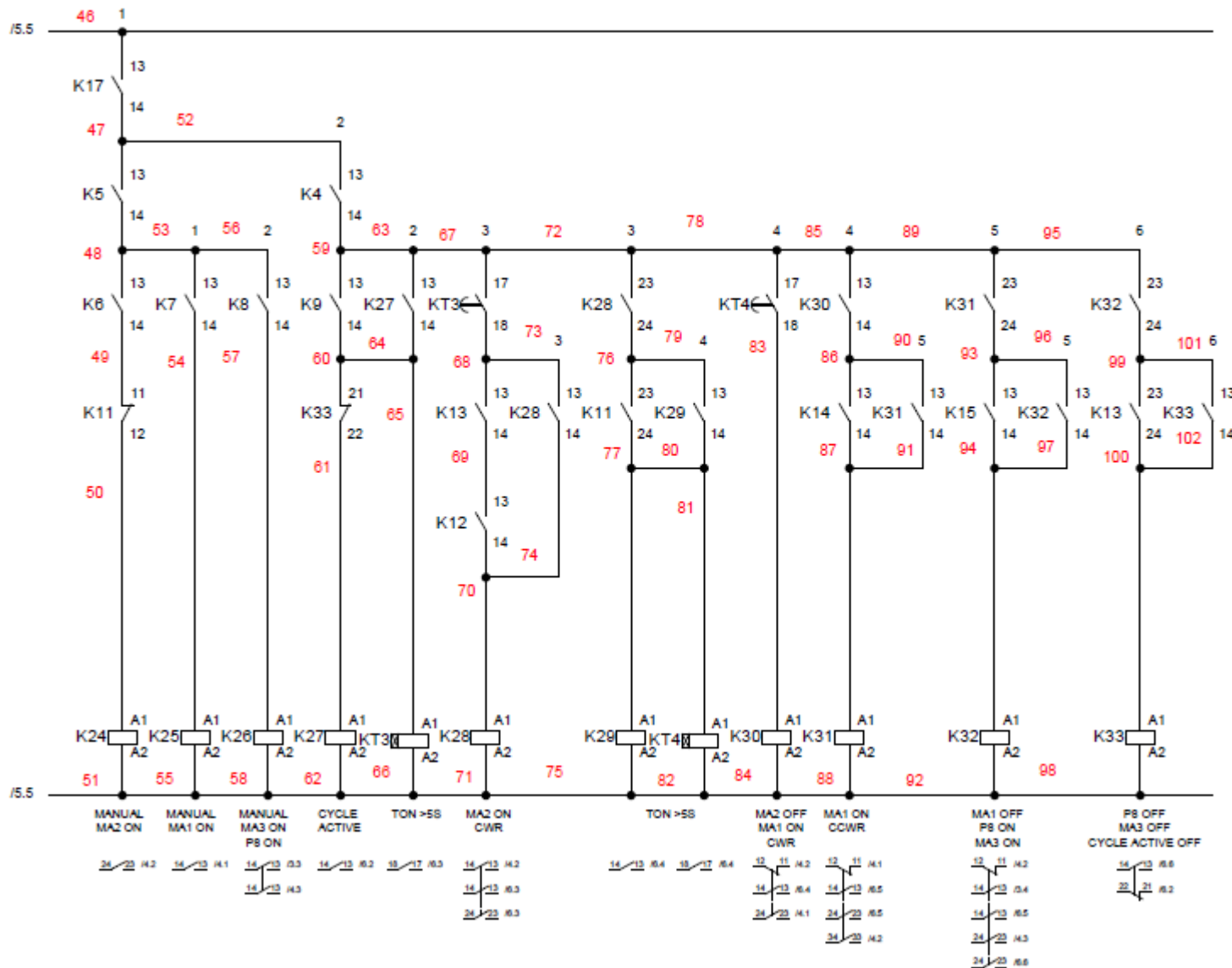












TEST PROJECT

MODULE C (MAIN_PROJECT)

INDUSTRIAL CONTROL

WORLDSKILLS_INDONESIA_2021_MP_PRE

Submitted by:

Name: Reza Julias

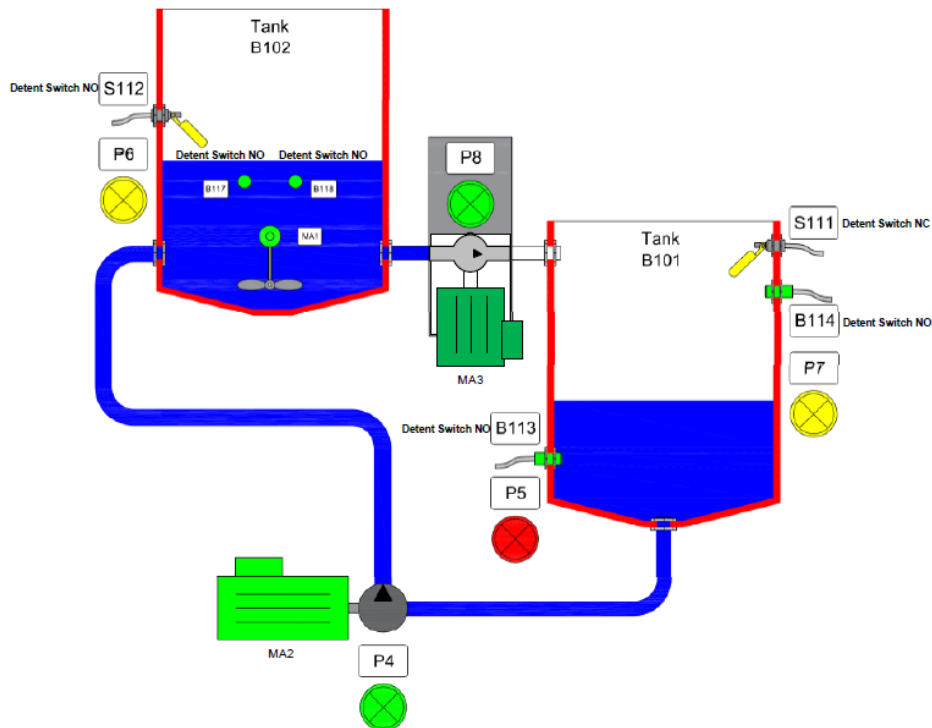
Member country or region: ID





Module 1 – Main project

With the attached mounting layout and its electrical diagrams it is intended to simulate the operation of the following **Water Control System**.



Legend :

MA1: Mixing motor

MA2: Motor pump 1

MA3: Motor pump 2

B113 : Tank B101 Empty

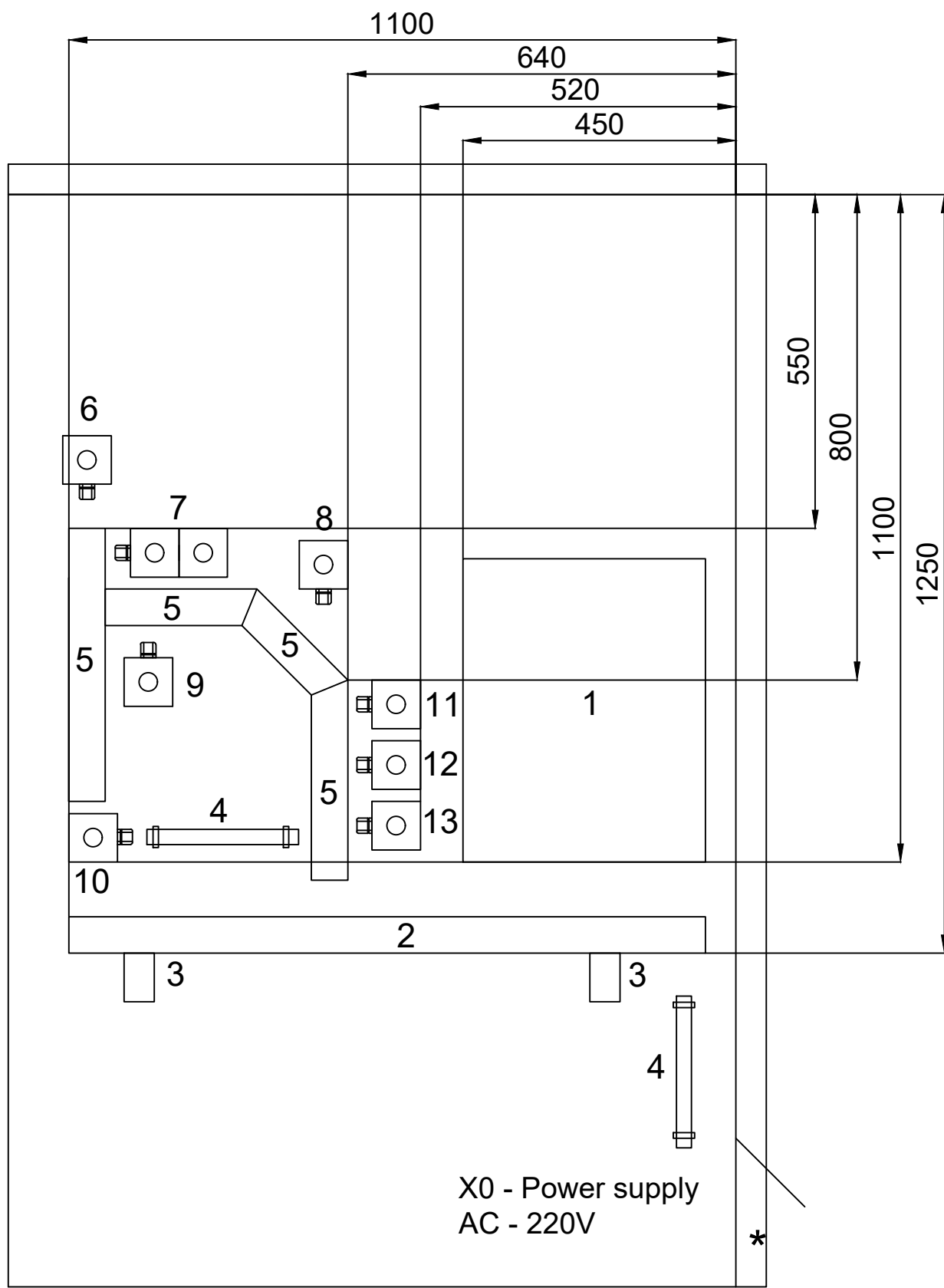
B114 : Tank B101 Half

S111 : Tank B101 Full

B117 : MA1 Left

B118 : MA1 Right

S112 : Tank B102 Half



1. Control Box (400x500mm)
2. Cable tray (100x60mm)
3. Bracket cable tray
4. PVC tube 20mm
5. Wall duct (60x40mm)
6. Housing MA1
7. Housing (B117 & B118)
8. Housing MA3
9. Housing S112
10. Housing MA2
11. Housing S111
12. Housing B114
13. Housing B113

X0 - Power supply
AC - 220V

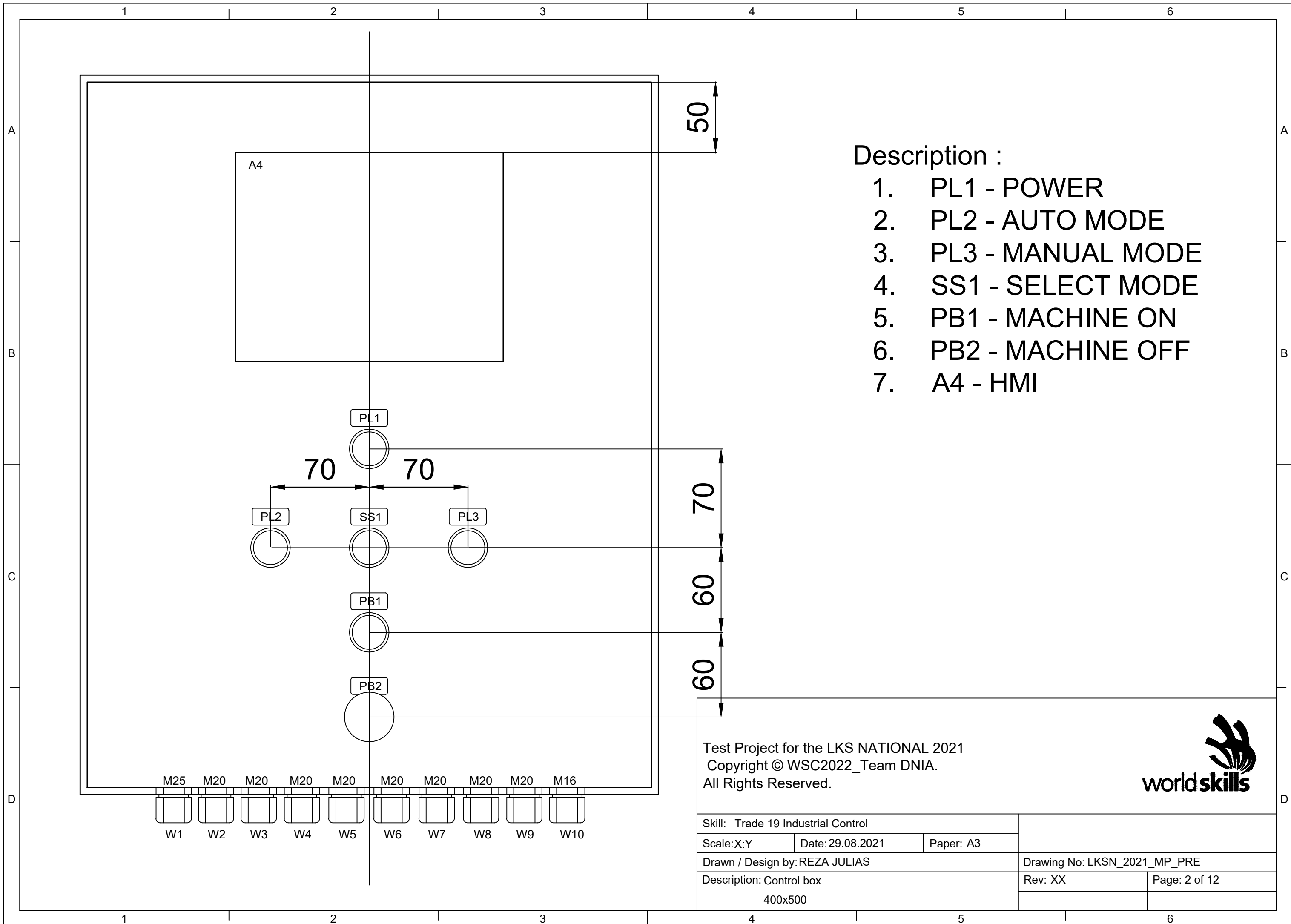
WALL INSTALLATION NOT IN SCALE
* All measurements from a horizontal and vertical line
ap 10 - 30mm from the end of the booth.

All devices, which are not in the mesuarements,
the mounting is up to the competitor

Test Project for the LKS NATIONAL 2021
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Skill: Industrial Control 19					
Scale: X:Y	Date: 29.08.2021	Paper: A3			
Drawn / Design by: REZA JULIAS			Drawing No: LKSN_2021_MP_PRE		
Description: Wall layout			Rev:	Page: 1 of 12	



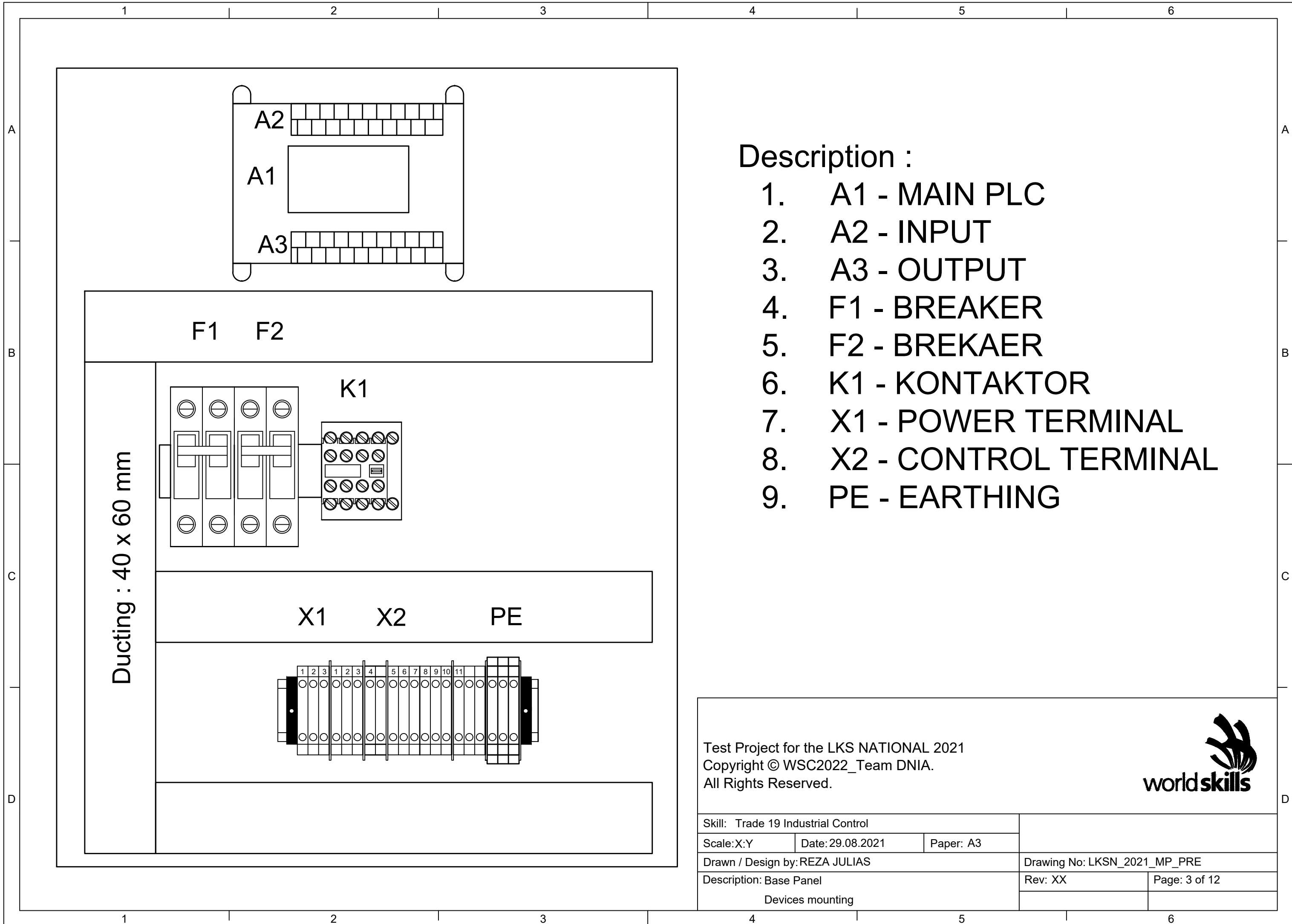
Description :

1. PL1 - POWER
2. PL2 - AUTO MODE
3. PL3 - MANUAL MODE
4. SS1 - SELECT MODE
5. PB1 - MACHINE ON
6. PB2 - MACHINE OFF
7. A4 - HMI

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Skill: Trade 19 Industrial Control			Drawing No: LKSN_2021_MP_PRE
Scale: X:Y	Date: 29.08.2021	Paper: A3	
Drawn / Design by: REZA JULIAS			Rev: XX
Description: Control box 400x500			Page: 2 of 12



Description :

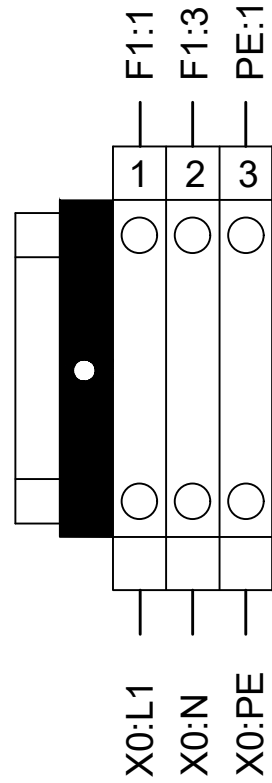
- 1. A1 - MAIN PLC
- 2. A2 - INPUT
- 3. A3 - OUTPUT
- 4. F1 - BREAKER
- 5. F2 - BREKAER
- 6. K1 - KONTAKTOR
- 7. X1 - POWER TERMINAL
- 8. X2 - CONTROL TERMINAL
- 9. PE - EARTHING

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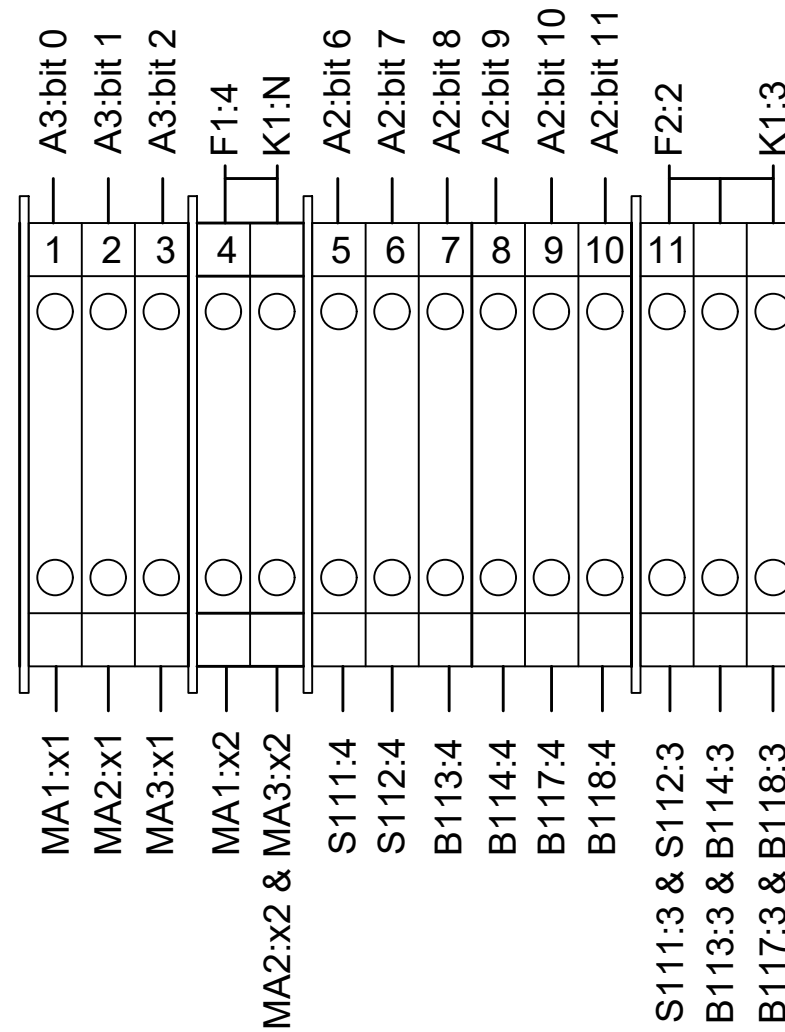


Skill: Trade 19 Industrial Control					
Scale: X:Y	Date: 29.08.2021	Paper: A3			
Drawn / Design by: REZA JULIAS			Drawing No: LKSN_2021_MP_PRE		
Description: Base Panel			Rev: XX	Page: 3 of 12	
Devices mounting					

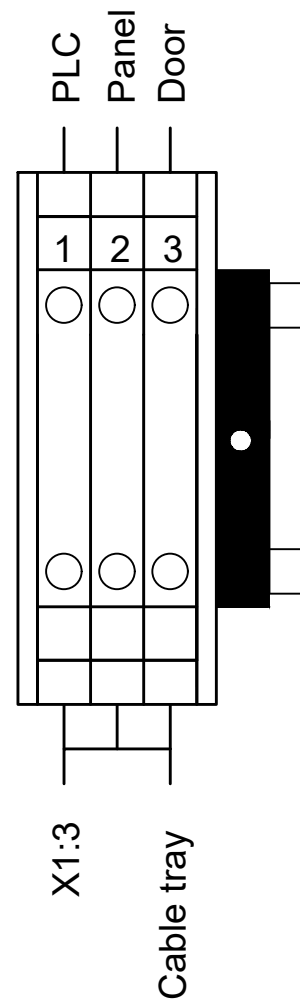
X1



X2



PE



Note :

1. PE use Terminal size 30
2. X1, X2 use Terminal size 10

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Skill: Trade 19 Industrial Control			Drawing No: LKSN_2021_MP_PRE
Scale: X:Y	Date: 29.08.2021	Paper: A3	
Drawn / Design by: REZA JULIAS			Rev: Page: 4 of 12
Description: Termination			

1

2

3

4

5

6

A

B

C

D

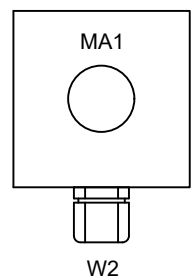
A

B

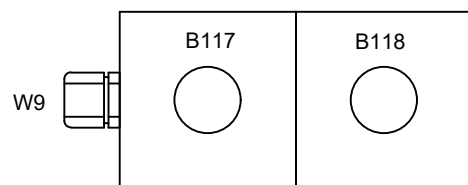
C

D

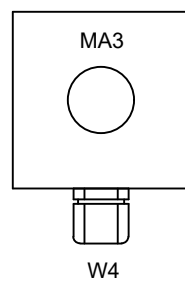
6



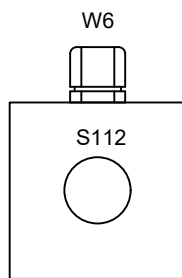
7



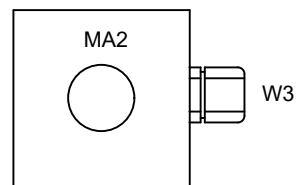
8



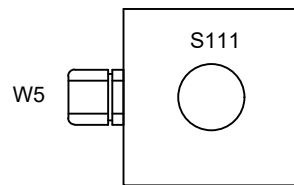
9



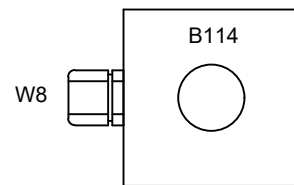
10



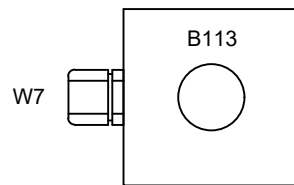
11



12



13



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Skill: Trade 19 Industrial Control					
Scale: X:Y	Date: 29.08.2021	Paper: A3			
Drawn / Design by: REZA JULIAS			Drawing No: LKSN_2021_MP_PRE		
Description: Detail - Cable Number			Rev:	Page: 5 of 12	

1

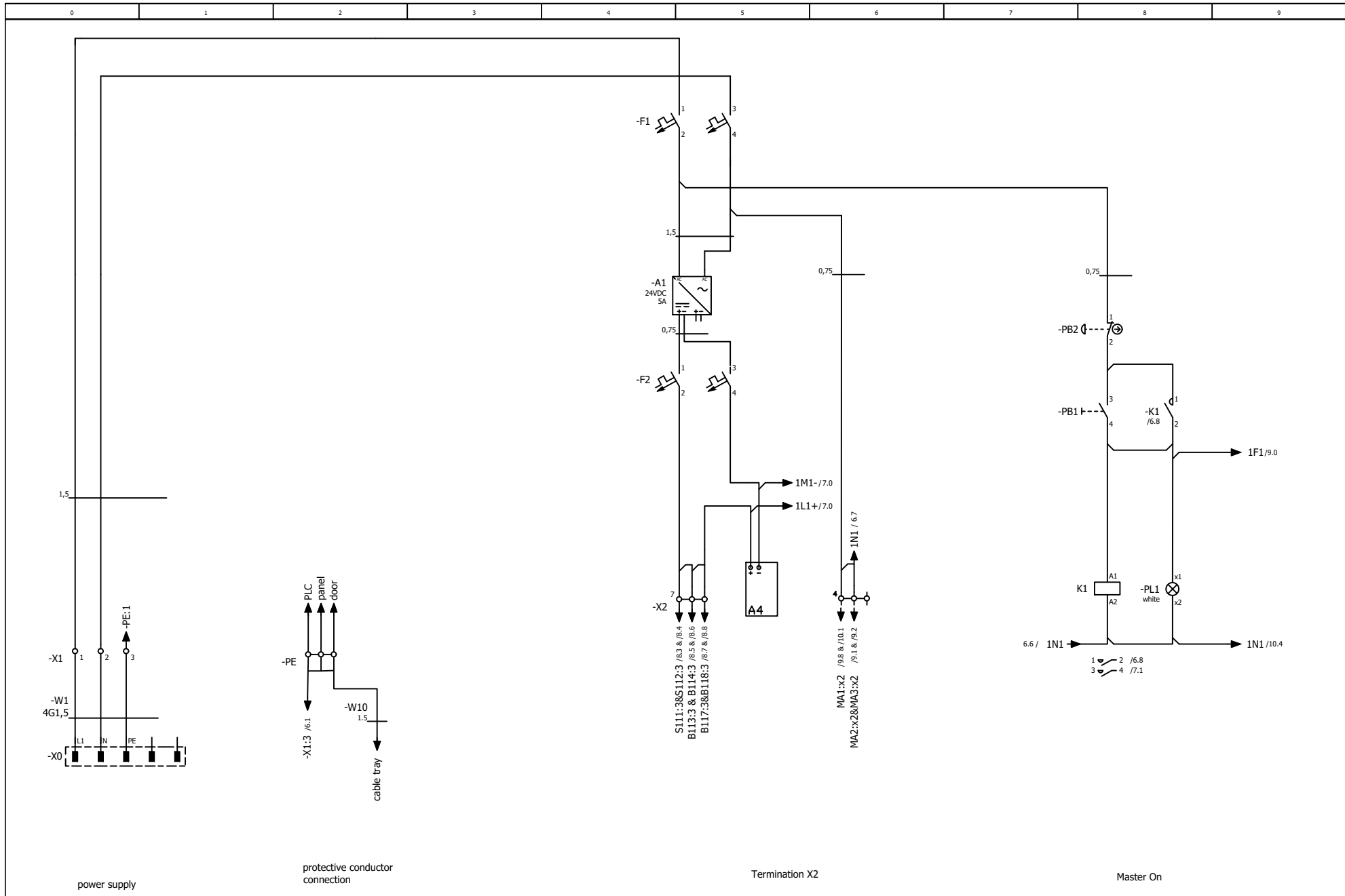
2

3

4

5

6



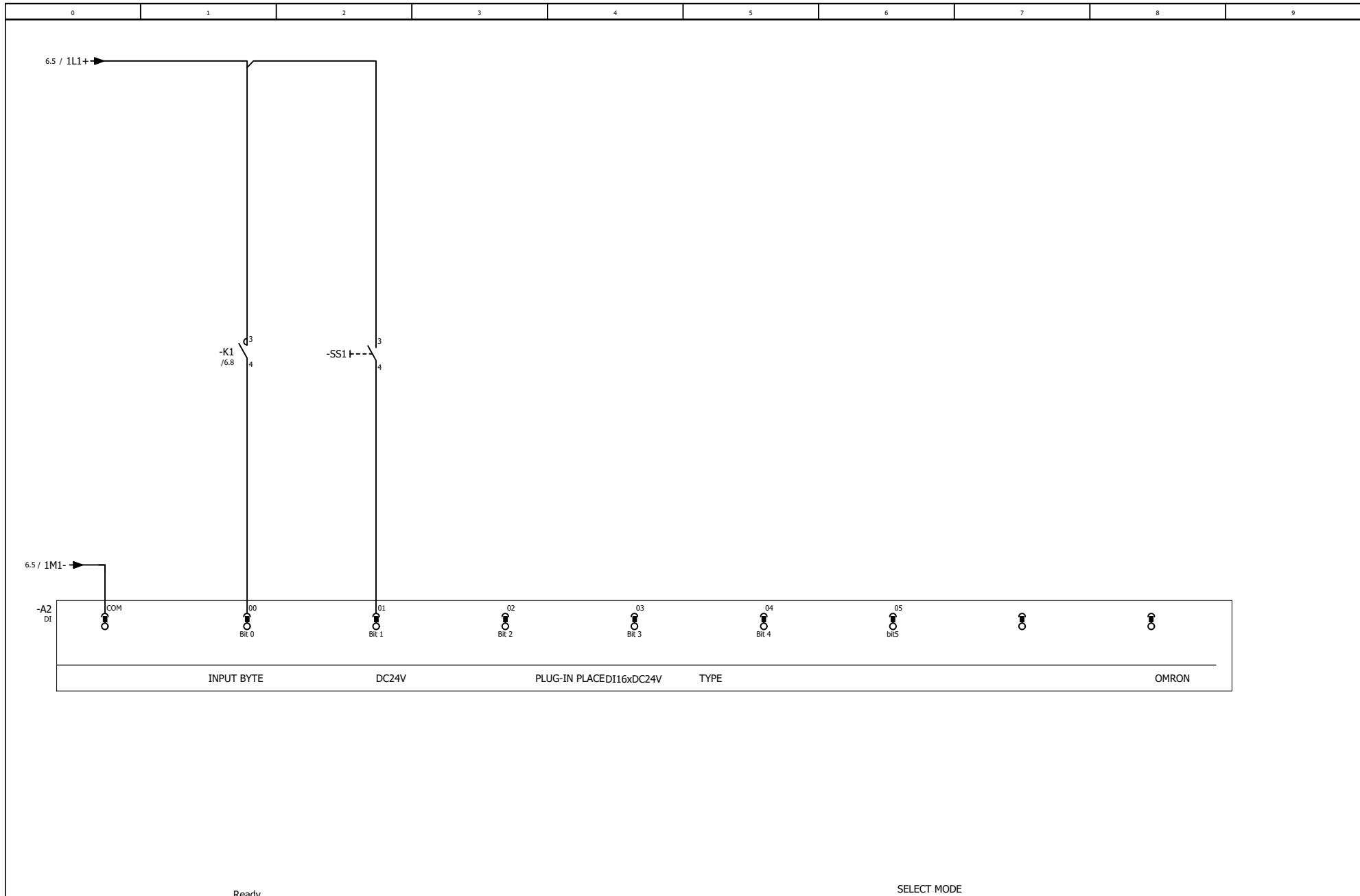
power supply

protective conductor connection

Termination X2

Master On

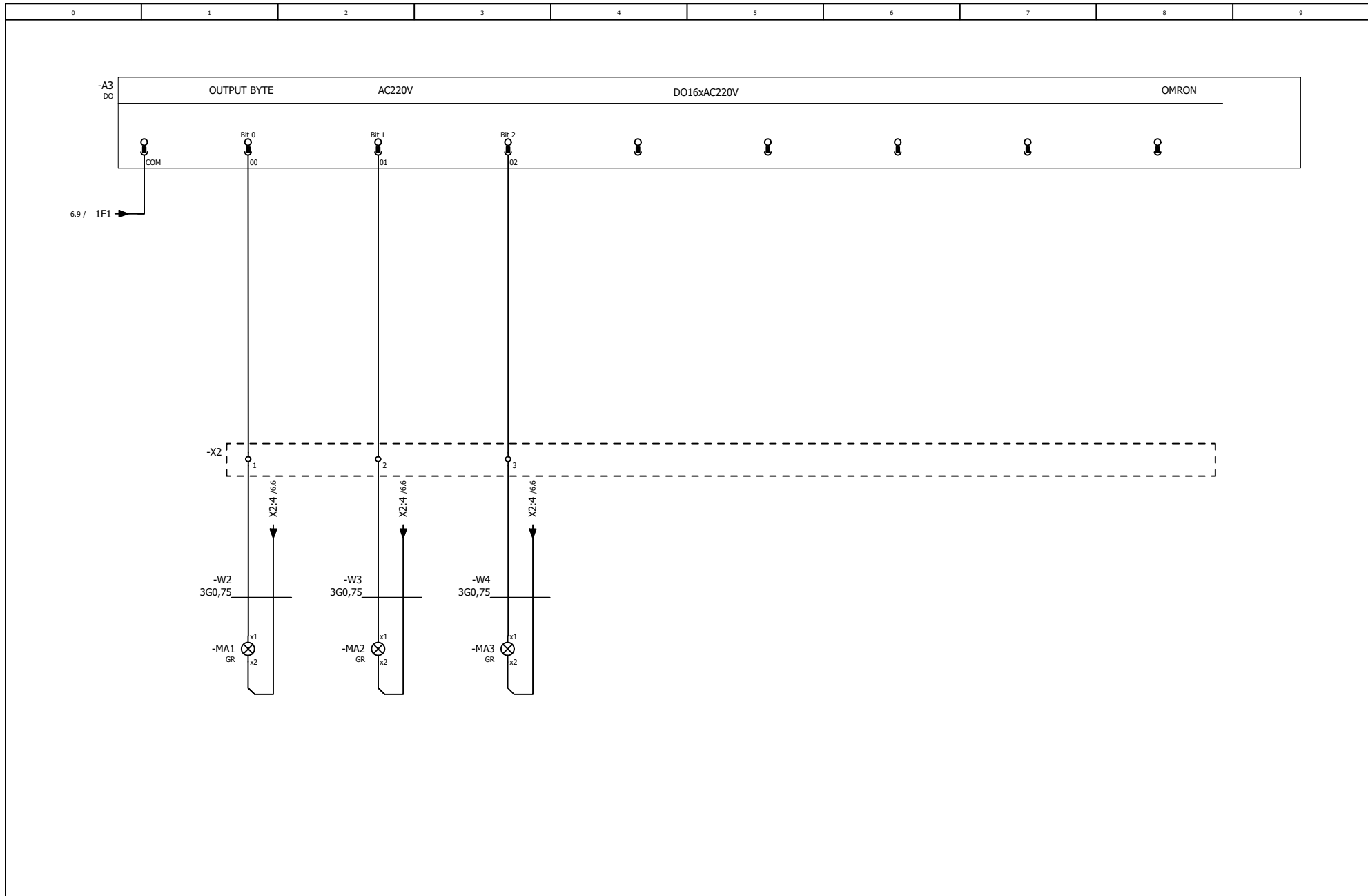
		Datum	29.08.2021						
		Bearb.	REZA JULIAS						
		Gepr		LKS NATIONAL2021 Industrial Control					
Änderung	Datum	Name	Urspr	Ersatz von	Ersetzt durch				
							LKS_N_2021_MP_PRE		Blatt 6
									Blatt 12



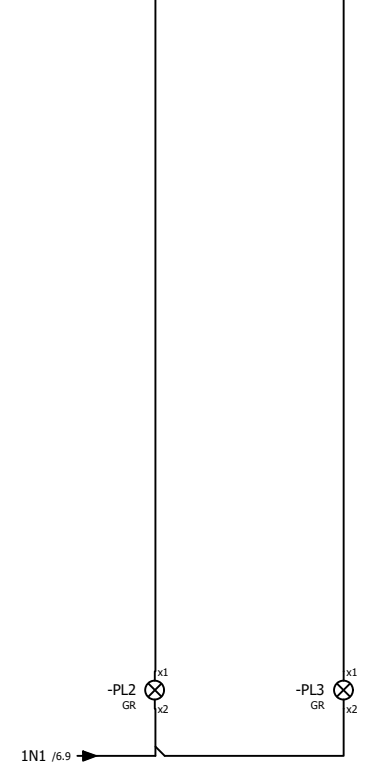
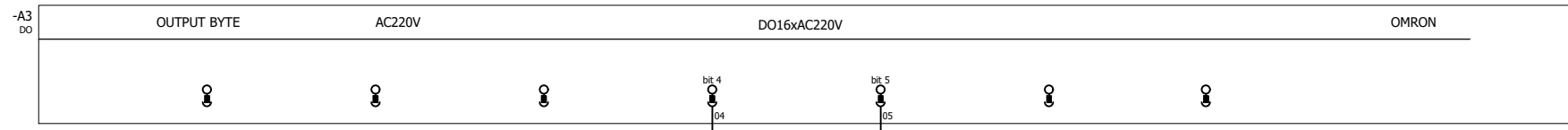
Ready

SELECT MODE

		Datum 29.08.2021				Wiring Input			
		Bearb. REZA JULIAS							
		Gepr.		LKSNATIONAL2021 Industrial Control					
Änderung		Datum		Name		Urspr		Ersatz von	
								Ersetzt durch	
								LKSN_2021_MP_PRE	
								Blatt 7	
								Blatt 12	



2		MIXING MOTOR		MOTOR PUMP 1		MOTOR PUMP 2			
		Datum	29.08.2021			Wiring Output			
		Bearb.	REZA JULIAS						
		Gepr.		LKS NATIONAL2021 Industrial Control					
Änderung		Datum	Name	Urspr	Ersatz von	Ersetzt durch	LKS_N_2021_MP_PRE		Blatt 9
									Blatt 12



AUTO MODE MANUAL MODE

		Datum 29.08.2021																			
		Bearb. REZA JULIAS																			
		Gepr		LKSNATIONAL2021 Industrial Control																	
Änderung		Datum		Name		Urspr		Ersatz von		Ersetzt durch						LKSN_2021_MP_PRE		Blatt 10		Blatt 12	

PLC - INPUTS



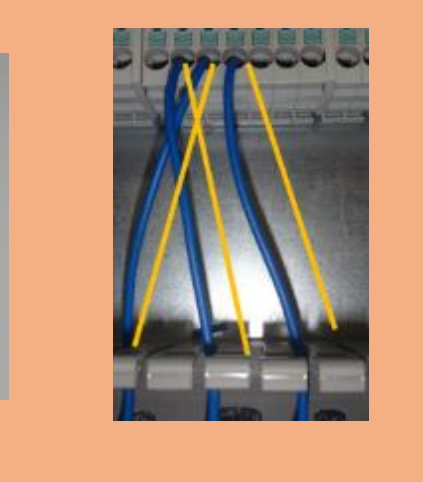
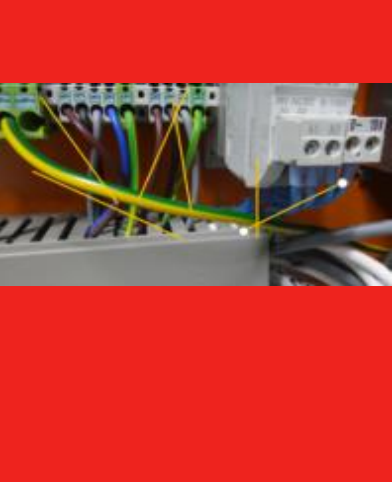
<u>INPUT</u>	<u>ADDRESS</u>	<u>SYMBOL</u>	<u>FUNCTION</u>
I 0	K1	READY
I 1	SS1	SELECT MODE
I 2		
I 3		
I 4		
I 5		
I 6	S111	TANK B101 FULL
I 7	S112	TANK B102 HALF
I 8	B113	TANK B101 EMPTY
I 9	B114	TANK B101 HALF
I 10	B117	MA1 LEFT
I 11	B118	MA1 RIGHT
I 12		
I 13		
I 14		
I 15		

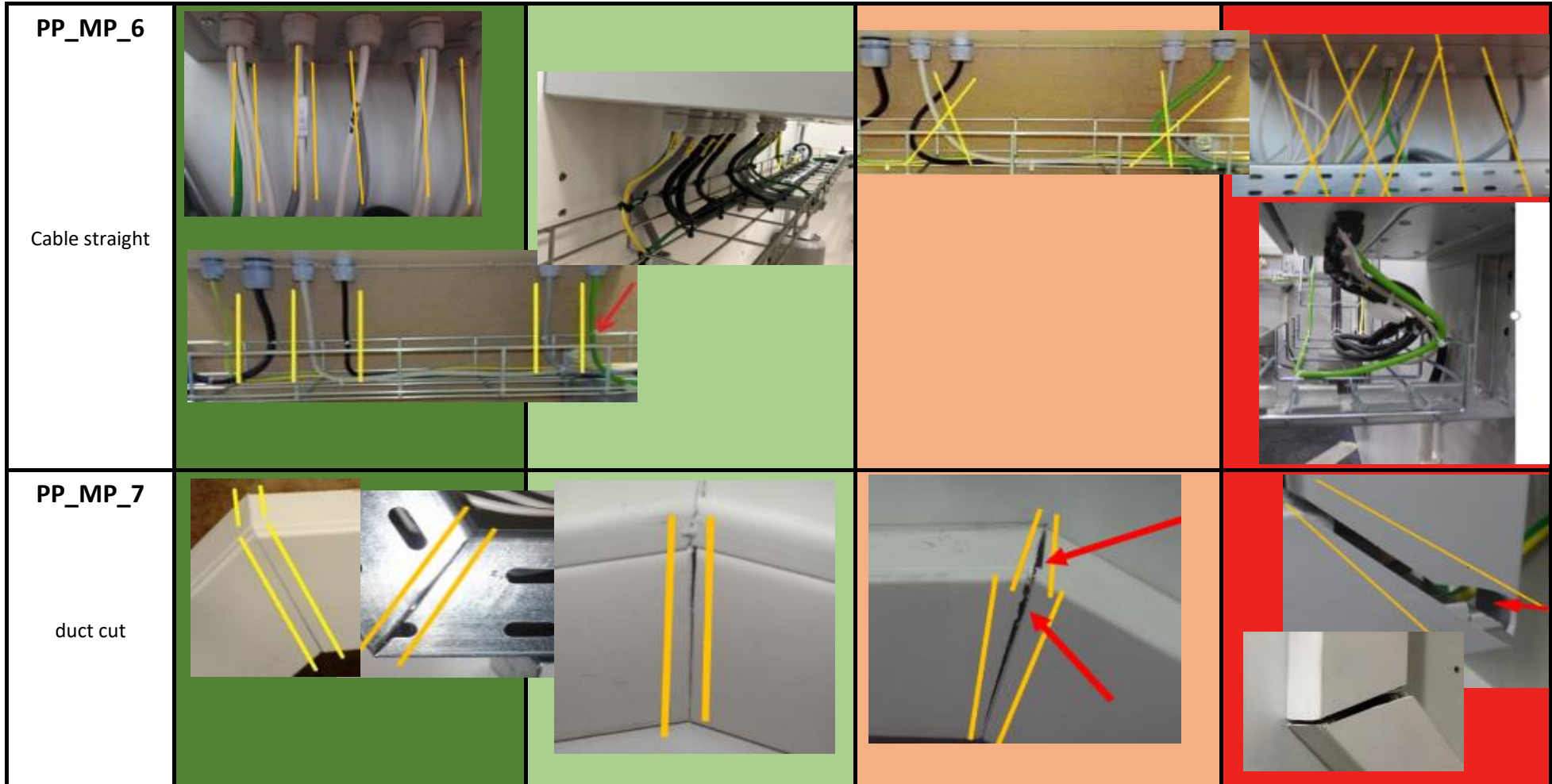
PLC - OUTPUTS

<u>OUTPUT</u>	<u>ADDRESS</u>	<u>COLOR</u>	<u>SYMBOL</u>	<u>FUNCTION</u>
Q 0	GREEN	MA1	MIXING MOTOR
Q 1	GREEN	MA2	MOTOR PUMP 1
Q 2	GREEN	MA3	MOTOR PUMP 2
Q 3	WHITE	PL2	AUTO MODE
Q 4	WHITE	PL3	MANUAL MODE
Q 5			
Q 6			
Q 7			
Q 8			
Q 9			
Q 10			
Q 11			
Q 12			
Q 13			
Q 14			
Q 15			

Topic/ Criteria	excellent (3)	professional (2)	amateur (1)	bad (0)
PP_MP_1 Level control	 		  <p data-bbox="1102 727 1470 755">Air bubble can't touch on the line</p>	

<p>PP_MP_2</p> <p>Device Wire length</p>			<p>more than $y+x$</p>	
<p>PP_MP_3</p> <p>Device Cable sheath (2 - 8 mm)</p>				
<p>PP_MP_4</p> <p>control box cable sheath</p>				<p>too short sheath</p>

<p>PP_MP_5</p> <p>wiring control box</p>				

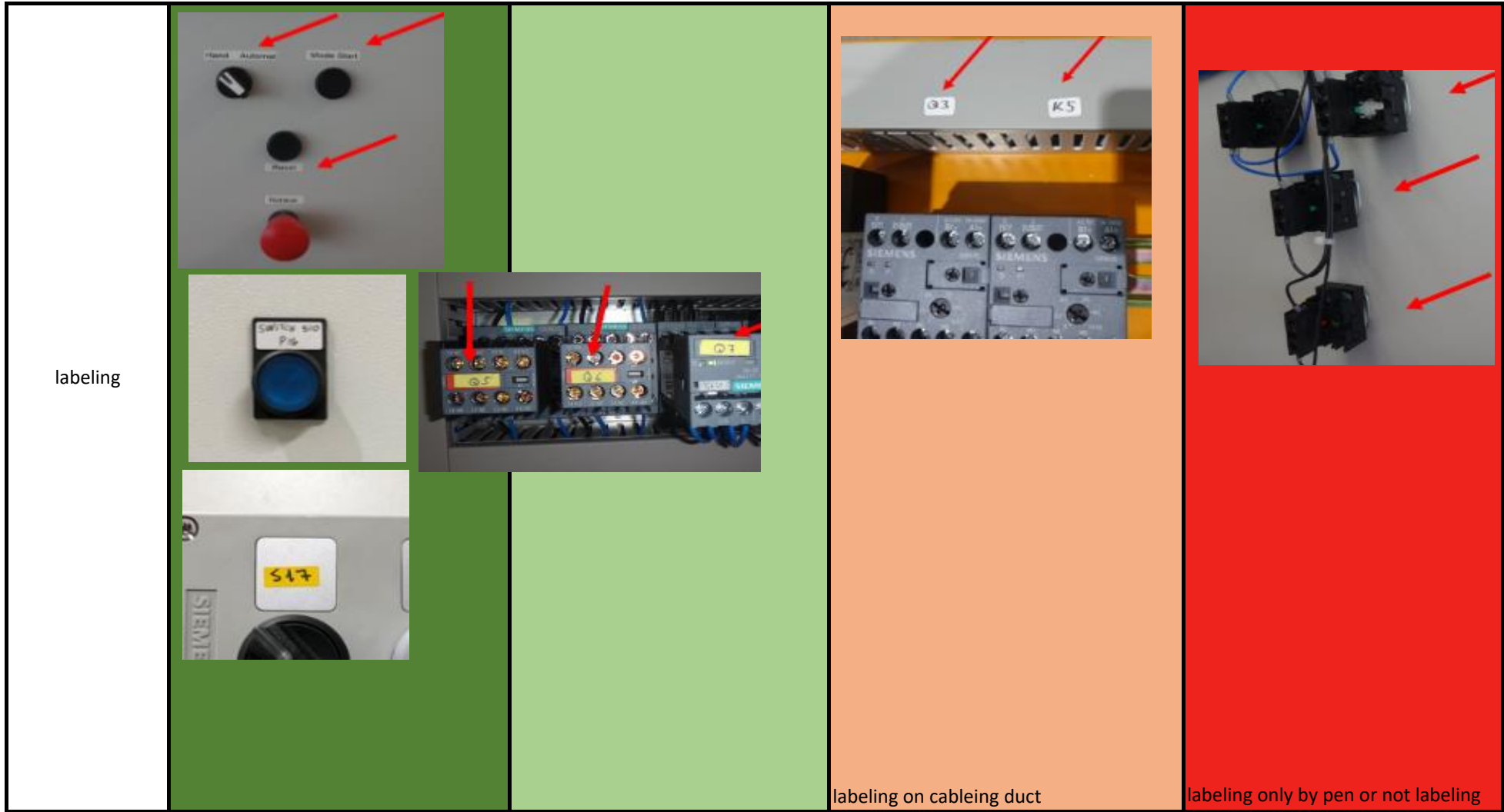




PP_MP_9

labeling





labeling

labeling on cableing duct

labeling only by pen or not labeling

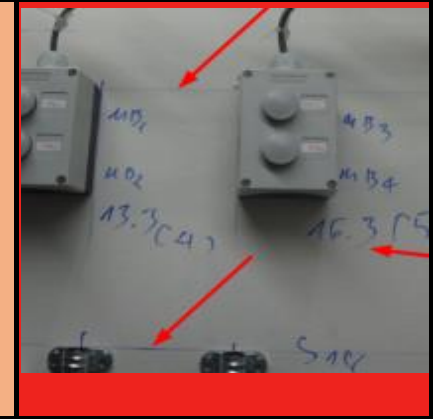
<p>PP_MP_10</p> <p>Cabinet</p>			 <p>scratch</p>	 <p>extra hole</p>
<p>PP_MP_11</p> <p>Cabinet wiring</p>				

PP_MP_12

wall clean (line
max 10mm)



lines, scratch, extra holes



PROGRAMMING INDUSTRIAL CONTROL

LKSNATIONAL_2021_Programming_PRE

Submitted by :
Name : Reza Julias
Member country or region : ID

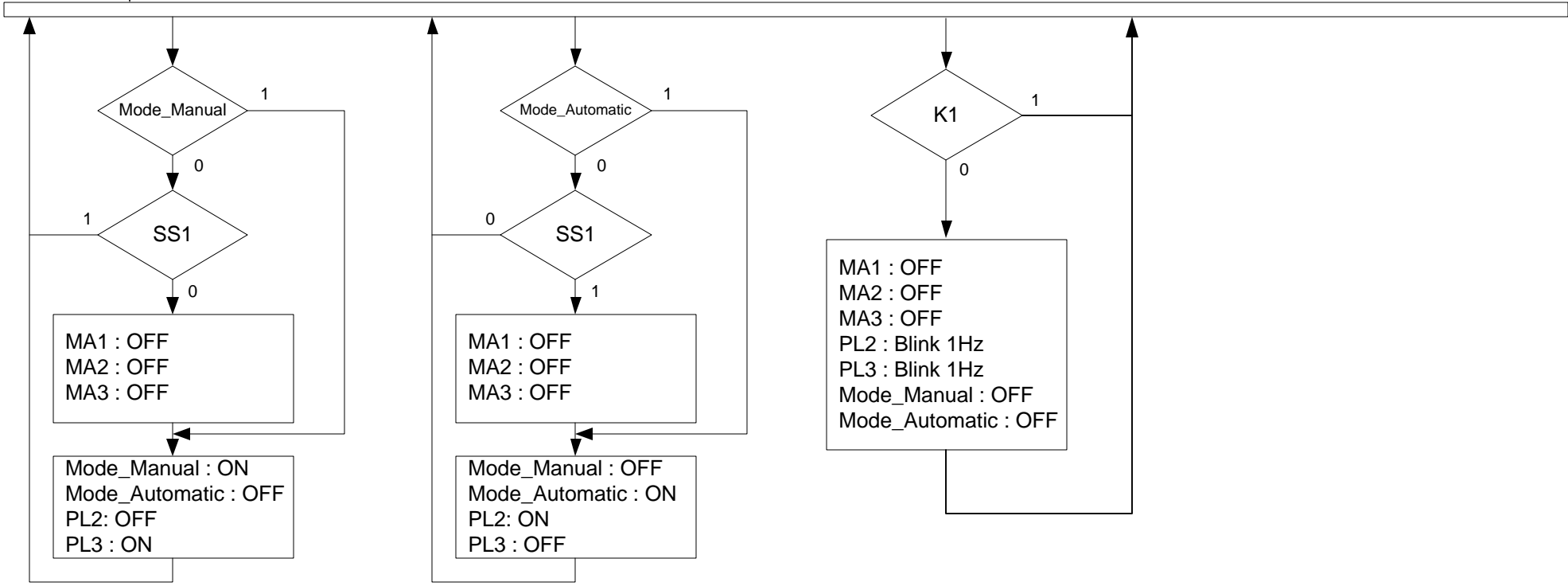
Nama : _____
Provinsi : _____



Power On

All actuators : OFF

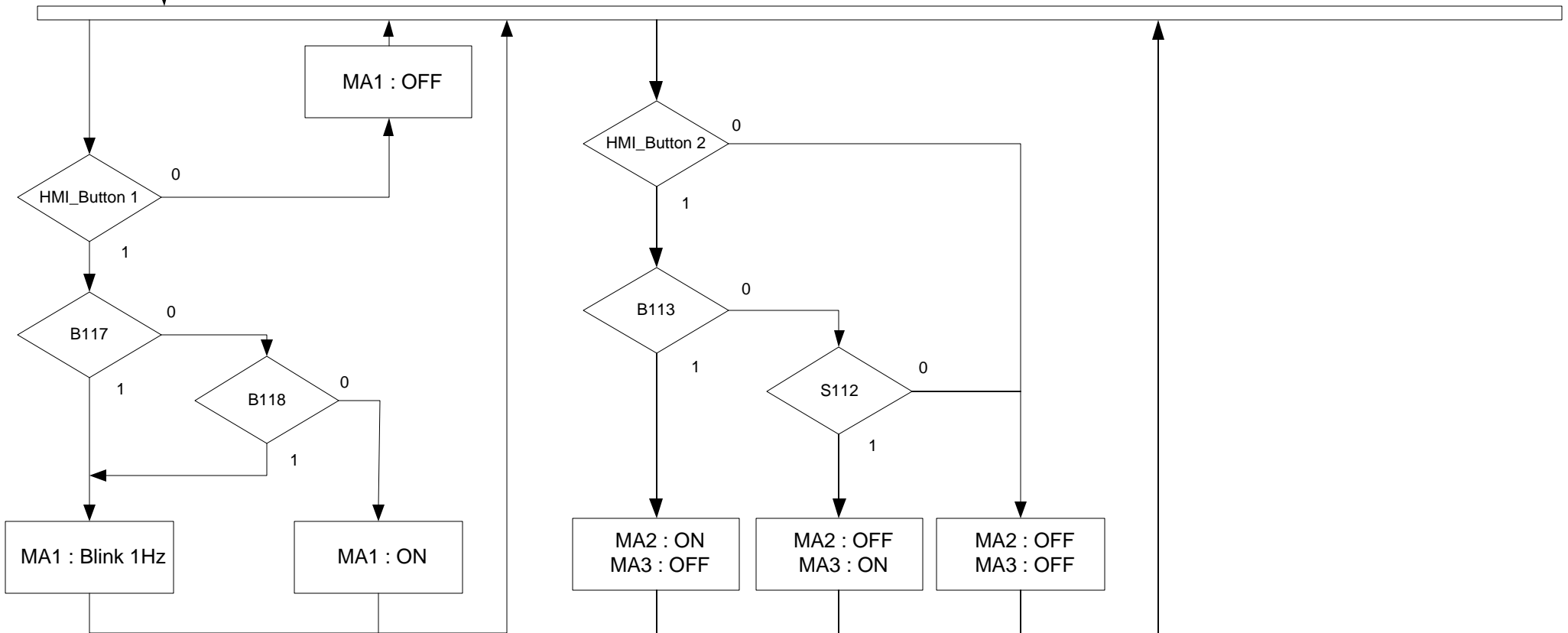
Note :
Switches, push buttons or other devices actuated / true = state "1" on the function diagram
Switches, push buttons or other devices not actuated / false = state "0" on the function diagram



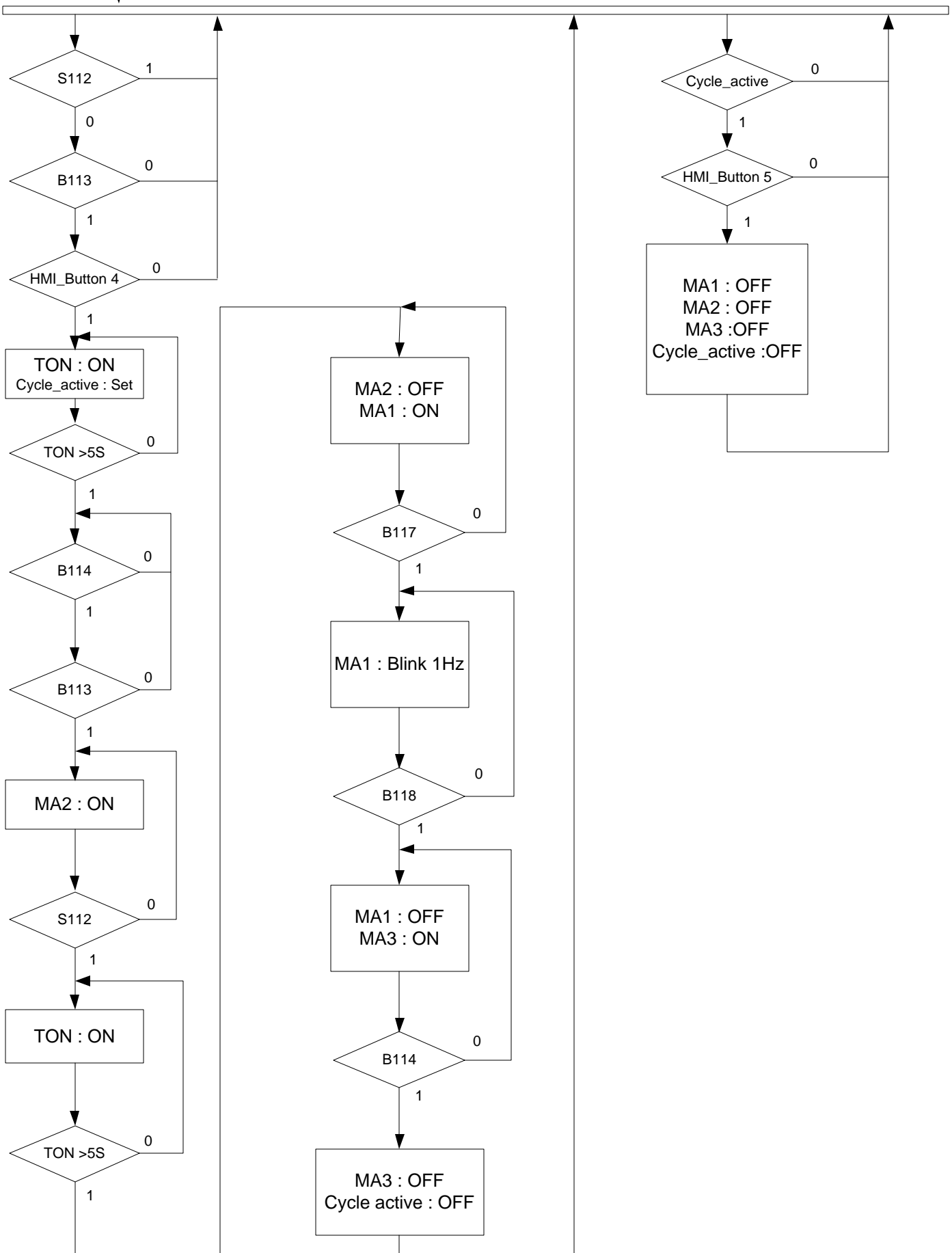
Mode_Manual

Mode_Automatic

Mode_Manual



Mode_Automatic





KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI
PUSAT PRESTASI NASIONAL

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