

## **Ch.U 05**

**ChloroMaster**

### **GAS CONTAINER CHANGE-OVER UNIT (FOR C12 AND SO2)**



#### **INSTRUCTION MANUAL**



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## 1. Intended Use

The gasses container change-over unit described in this manual is designed to ensure a **continuous gas supply** to gas control units. It is intended for use with **gaseous or liquid chlorine** and **Sulphur dioxide** only.

Operational safety is guaranteed **only when the unit is used as specified** in this manual and under the defined installation, operating, and environmental conditions. The use of any substances other than those stated in this manual is strictly prohibited.

All inspection and maintenance must be performed **at the prescribed intervals**. Compliance with these instructions requires reading this manual thoroughly and following all guidelines.

The **owner/operator bears full responsibility** for any consequences resulting from improper or unauthorized use.

## 2. General Safety Instructions

Safety is a top priority. The system is designed with built-in safety features, but **safe operation depends on following all instructions** in this manual. Additional company or industry safety rules must also be observed.

- **Read and follow all safety instructions and labels on the system.**
- The system meets modern safety standards, but incorrect use can cause **injury or damage**.
- Work not described in this manual should only be done by **authorized personnel**.

### Who Should Work on the System

- **Installation:** Trained technicians
- **Electrical Work:** Qualified electricians
- **Commissioning & Major Maintenance:** Authorized service technicians
- **Operation & Basic Maintenance:** Trained personnel

Anyone in contact with the system must be **warned about safety hazards**.

### Parts and Modifications

- Use **only original spare parts** as described in this manual.
- Do **not modify** or extend the system without written approval from the manufacturer.

## Electrical Safety

- Keep the electric drive **closed during operation.**
- Before maintenance or repair:
  - Turn **OFF** the system using the main stop switch.
  - Lock the switch to prevent restart.
- Connect all cables as per the **wiring diagram.**

## Disposal

Dispose of replaced parts **safely and in an environmentally friendly way.**

### 3. Description

#### 3.1 Scope of Supply

The system includes the following main components.

- Two motorized ball valves for alternating use of connected gas containers
- Two manual ball valves
- One Diaphragm pressure gauge with two contacts

The **pressure gauge** is used to set the change-over pressure.

The motorized valves are controlled by a **Control panel**, which includes:

- A push button for manual change-over
- Indicator lamps showing operating status

#### 3.2 Principle of Operation

The system connects two chlorine containers to the change-over unit, and the outlet pipe leads to the evaporator (for liquid) or vacuum regulator (for gas) and then to the gas feeder unit.

#### Automatic Operation:

##### Before Startup:

- Valve 1: Closed
- Valve 2: Closed

##### Startup:

- Valve 1: Open
- Valve 2: Closed

- Both Exhausted indicators OFF

**When Source 1 is Empty:**

- Pressure drops to the preset level.
- Valve 1 closes, Valve 2 opens.
- Exhausted Indicator 1 turns ON.
- Gas flows from Source 2.

**When Source 2 is Empty:**

- Pressure drops to the preset level.
- Exhausted Indicator 2 turns ON.
- Both valves remain closed, both indicators ON.

**Automatic retry sequence when both sources are empty:**

- After detecting that both sources are empty, the controller first opens Valve 1 for 60 seconds and monitors the line pressure.
- If no sufficient pressure is detected within 60 seconds, Valve 1 is closed and Valve 2 is opened for another 60 seconds to check the pressure.
- If still no pressure is detected (both sources are empty), the controller closes Valve 2 again and the panel indicates that Valve 1 and Valve 2 are closed.

**After Replacing One or Both Sources:**

- Press RESET.
- Valve 1 opens, both indicators turn OFF.

**Remote Shutdown:**

- Both valves close.
- Exhausted indicators blink (ON/OFF every 5 seconds).

**Manual Operation:**

- Motorized valves can be opened or closed manually if needed.

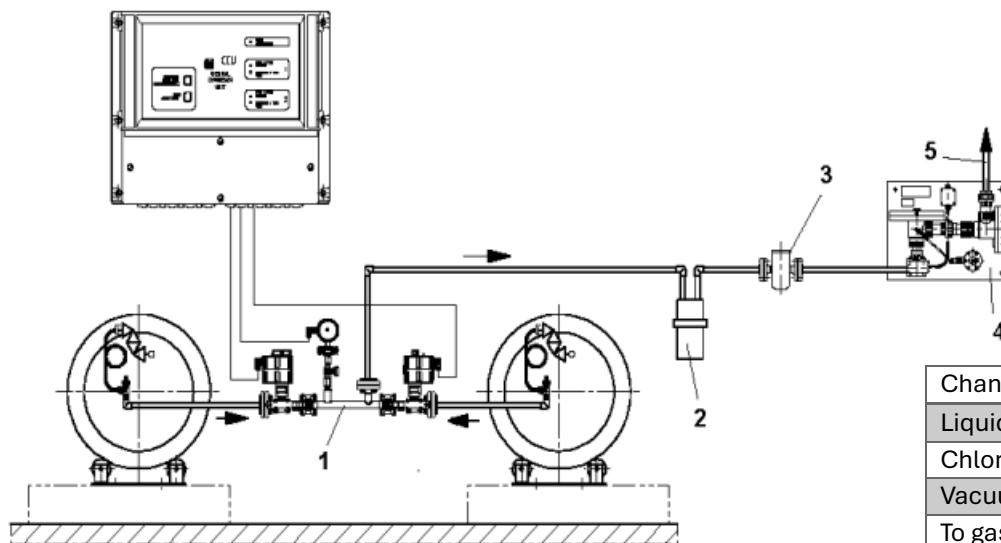
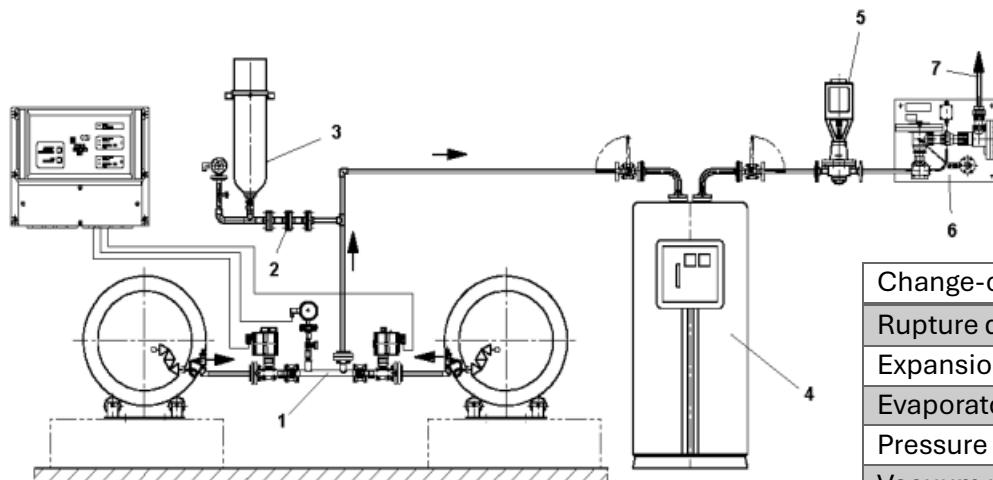
### 3.3 Technical Data

#### Mechanical Specifications

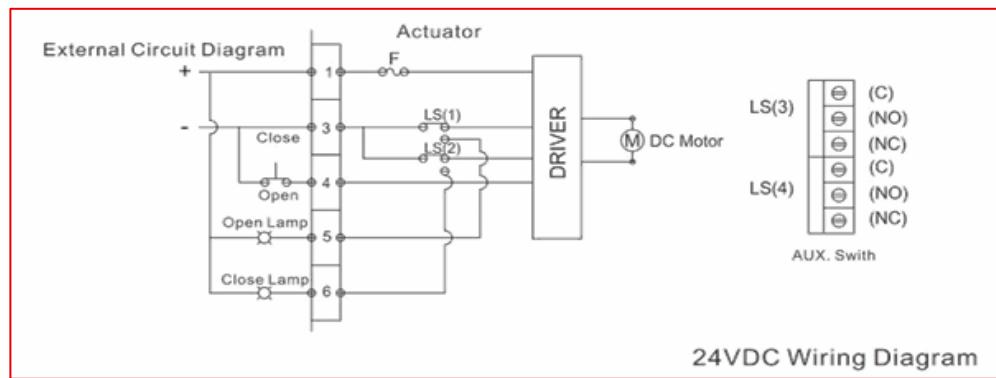
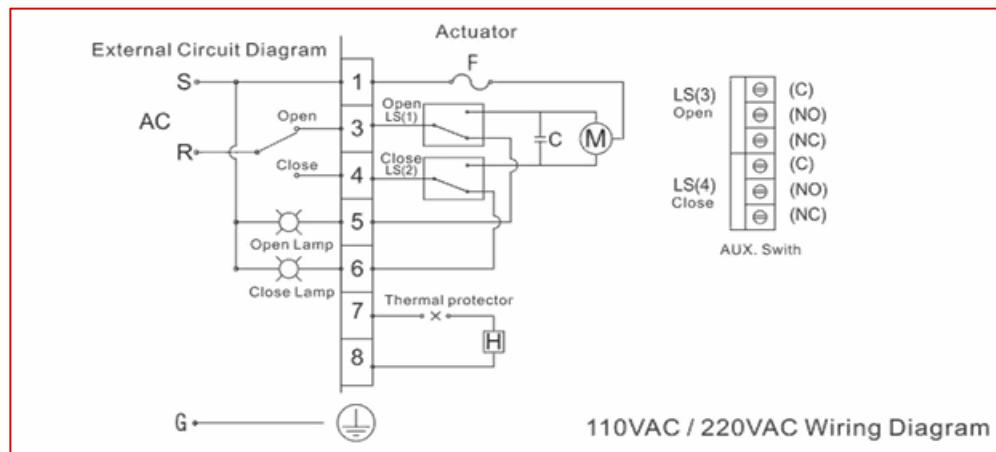
Max. operating pressure	16 bar (g) _ option 25 bar
Pressure resistance	Up to 40 bar (g)
Switching pressure	1 bar (factory setting)
Pressure gauge range	0 – 16 bar (g) _ option 0 – 25 bar
Ambient temperature	-12°C to +50°C
Humidity	Non-condensing
Protection class	IP 55

**Electrical Specifications**

Voltage	220 V AC (50–60 Hz)
Power consumption	Max. 70 VA
Running time (90°)	10 seconds
Limit switches	AC 220 V or DC 24 V

**4. Installation****4.1 Gas discharge****4.2 Liquid gas discharge**

### 4.3 Electrical connections



### 4.4 Installation & Leak Test

Step	Description	Notes / Warnings
1	Turn the test valve knob fully counterclockwise.	-
2	Set the minimum limit on the pressure gauge to 1 bar.	-
3	Connect the piping between the unit and the gas containers.	-
4	Close auxiliary valves and all unit valves.	-
5	Briefly open the container valve to check for leaks. If tight, reopen it.	Repeat for both containers.
6	If a leak is detected: close all valves immediately, turn on process water, vent gas, and repair the leak.	⚠ Always keep a gas mask nearby.

#### 4.4.1 Key Warnings

Type	Details
⚠ Gas Hazard	Chlorine/SO <sub>2</sub> leaks are extremely dangerous.
⚠ Chemical Hazard	Do not inhale ammonia during leak testing.
ℹ Note	Leaks appear as a <b>white mist</b> when using ammonia.

### 5. Regular Maintenance

#### 5.1 Regular maintenance

Interval	Task
Daily	Check the system for leaks (refer to control unit manual).
Monthly	Check the function and smooth movement of the positioner and valves.
Yearly	Replace all gaskets.

#### 5.2 Testing the pressure gauge

Step	Description
1	Remove the protection cap.
2	Connect the test device.
3	Test the pressure gauge ( <b>Pmax = 16 bar</b> ).
4	Disconnect the test device.
5	Replace and tighten the protection cap.
6	Open the stop valve to restore container pressure reading.
7	Check for leaks.

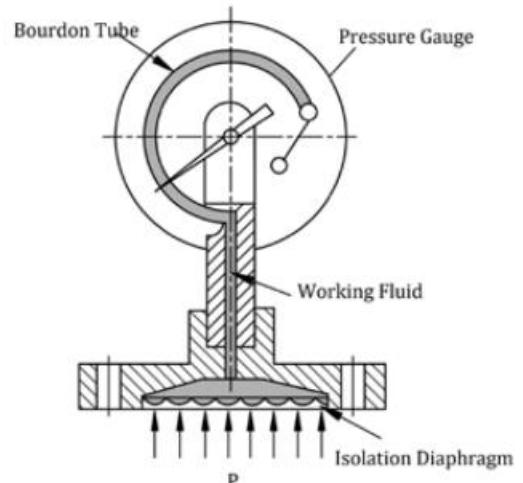
#### ❖ Electric Contact Pressure Gauge

Parameter	Value
Indicating Accuracy	±1.6%
Set Accuracy	±4%
Electric Contacts Quantity	1
Max Working Voltage	AC 380 V or DC 220 V
Max Current	1 A
Contact Power	30 VA
Electric Contact Type	2 NO, 2 NC, 1 NO + 1 NC
Connection Options	M20 × 1.5, 1/8 NPT, 1/4 NPT, 1/2 NPT, etc.
Glass	Safety explosion-proof glass
Temperature Effect	≤ 0.6% per 10°C (reference: 20 ± 5°C)
Range	1.6 Mpa _ option 2.5 Mpa

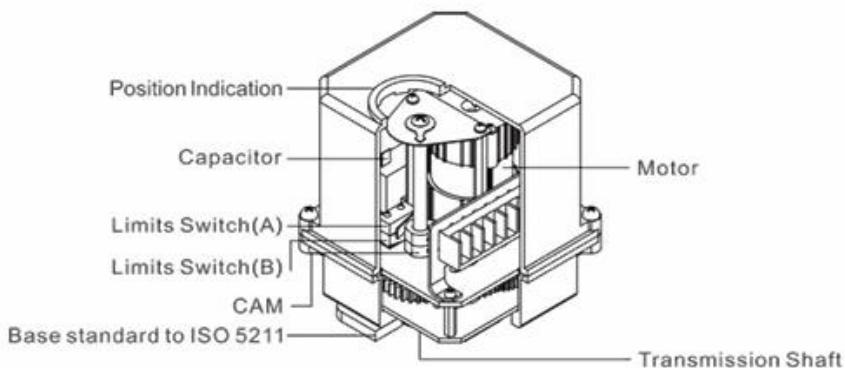


❖ **Diaphragm Pressure Gauge**

Item	Description
<b>Material</b>	Stainless steel material
<b>Diaphragm Seals</b>	Diaphragm Seals with thread connection
<b>Diaphragm Material</b>	<ul style="list-style-type: none"> <li>• Monel</li> <li>• Tantalum</li> <li>• PTFE</li> </ul>
<b>Range</b>	1.6 Mpa _ option 2.5 Mpa



### 5.3 The ELECTRIC ACTUATOR



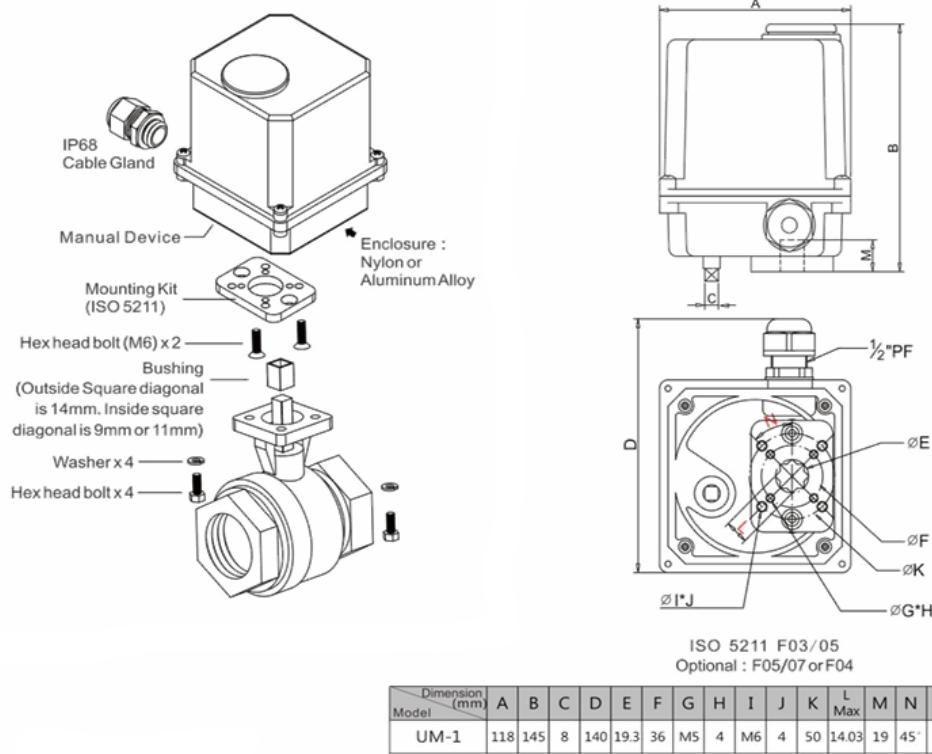
\*The following values are subject to begin with 60Hz:

Specification				Speed (sec)		Output Torque Kgf-cm		
Power	AC110V	AC220V	DC24V	AC	DC	AC110V	AC220V	DC24V
10W	0.6A	0.3A	0.1A	10	15	350	362	400
15W	0.7A	0.4A	N/A	10	N/A	410	432	N/A

Valve Size		
Screw End	Flange End	3-Way Valve
1/4" ~ 1 1/2"	1/2" ~ 1"	1/2" ~ 1 1/2"

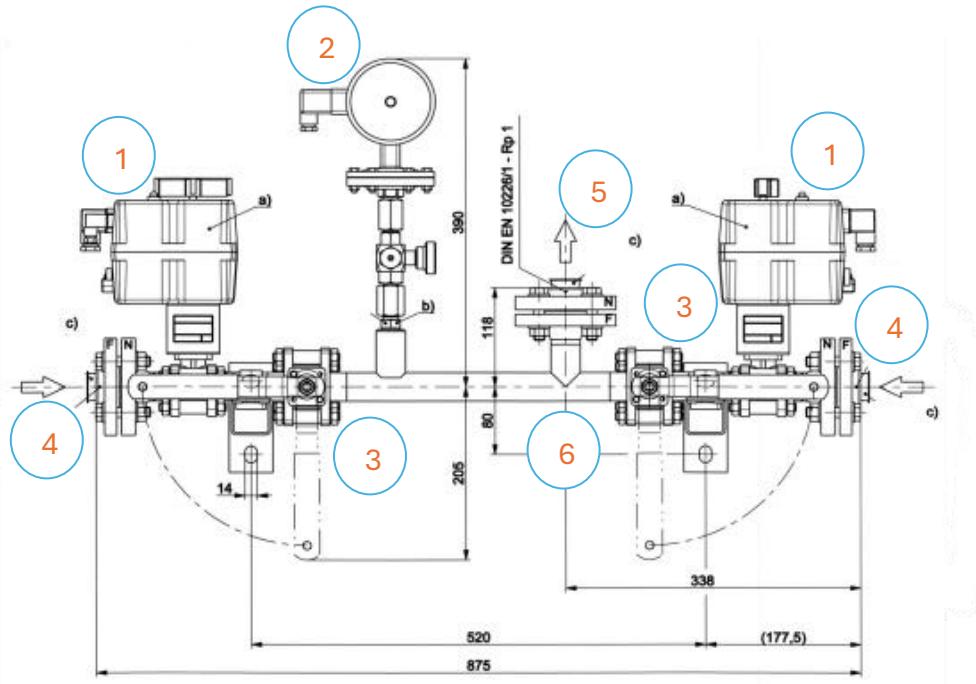


Weight : 1.6 kg



## 6. Drawings and parts lists

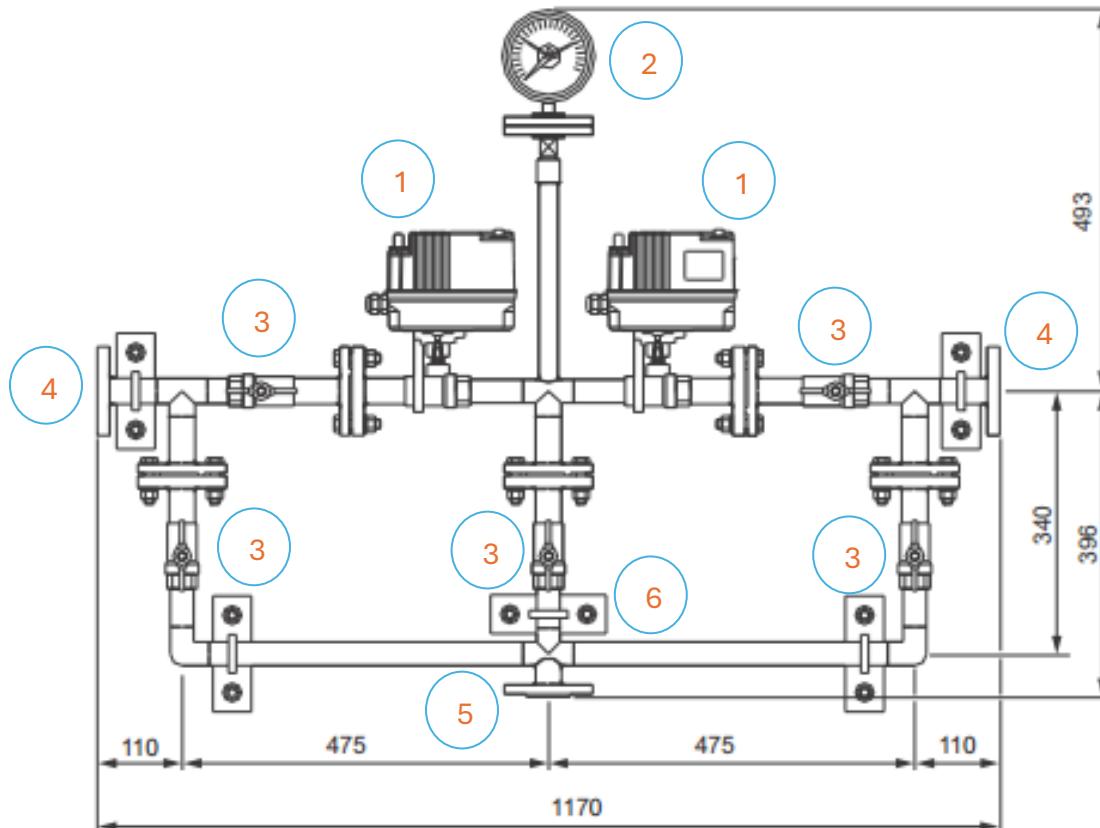
### 6.1 Change over unit



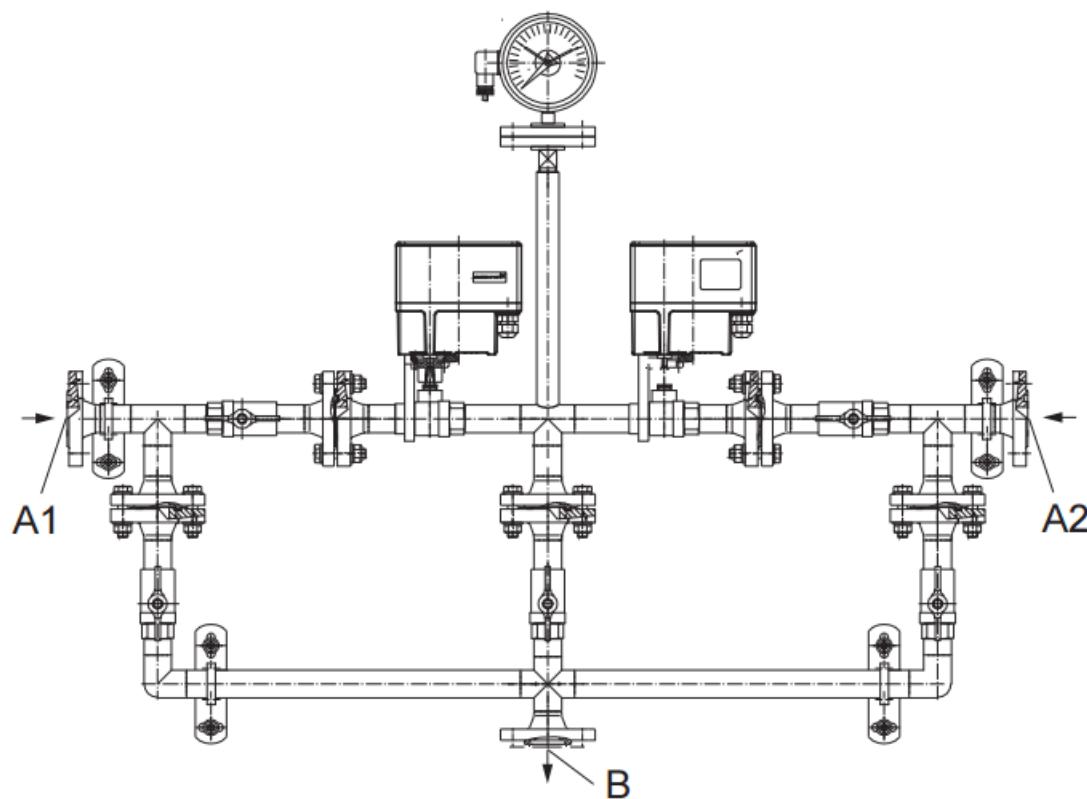
Pos	Qty.	Description
1	2	Electric actuator with ball valve 1 inch
2	1	Diaphragm pressure gauge with Contact
3	2	S.S 316 Line ball valve 3PCS 1 inch
4	2	Flange - 1" - Class 150 - Bore for Sch 80 pipe - (inlet)
5	1	Flange - 1" - Class 150 - Bore for Sch 80 pipe - (outlet)
6	Lot	Seamless Pipe 1 inch – Sch 80

## 6.2 Change over unit with bypass

The change-over device with bypass allows manual operation during maintenance of the electric actuator, the pressure gauge with contact, and the control panel. The motor valves can be opened and closed manually using the electrical pushbuttons.



Pos	Qty.	Description
1	2	Electric actuator with ball valve 1 inch
2	1	Diaphragm pressure gauge with Contact
3	5	S.S 316 Line ball valve 3PCS 1 inch
4	2	Flange - 1" - Class 150 - Bore for Sch 80 pipe - (inlet)
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6	Lot	Seamless Pipe 1 inch – Sch 80

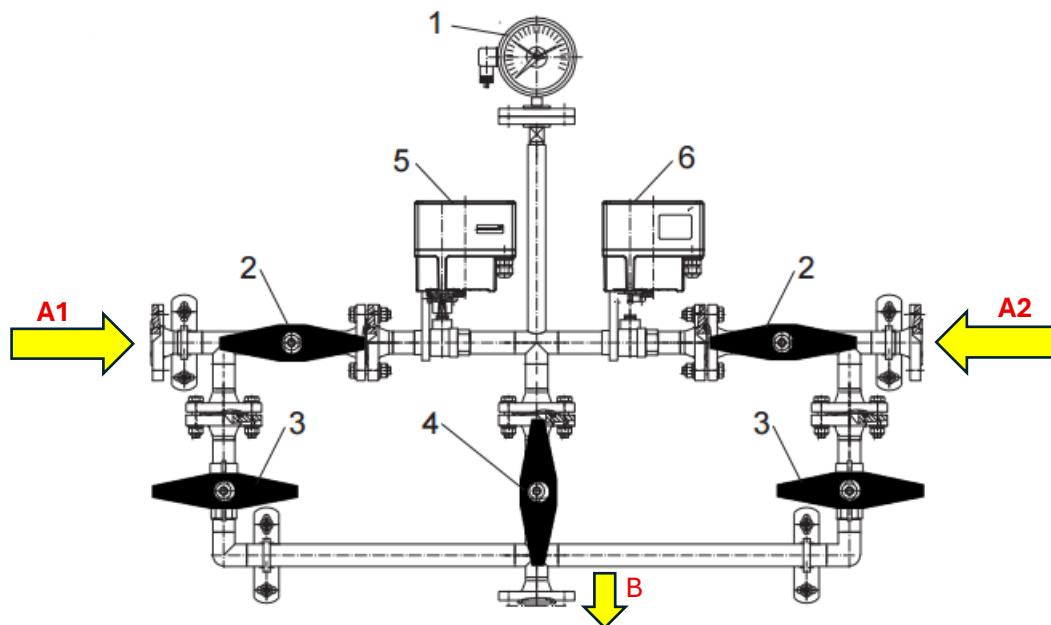
*Position of gas connections*

Pos.	Description
A1	Connection for container battery 1
A2	Connection for container battery 2
B	Connection to outlet line

1. Connect the line from the first container battery to connection (A1).
2. Connect the line from the second container battery to connection (A2).
3. Connect the outlet line to connection (B).

❖ **Automatic Operation**

In automatic mode, the system automatically selects the gas source with sufficient pressure to ensure continuous chlorine supply without manual intervention.



**Operating Logic:**

**1. Gas Supply Monitoring**

- The system receives chlorine gas from two sources:
  - A1
  - A2
- Each line is monitored through a dedicated **pressure switch (1)**.

**2. Automatic Source Selection**

- The system automatically identifies which source contains adequate gas pressure.
- The **actuator valve of the source containing gas opens automatically**.
- Simultaneously, the actuator valve of the depleted or low-pressure source is **closed** to prevent gas leakage from an empty line.

**3. Stable Gas Flow to Outlet B**

- Once the active source is selected, gas flows directly to **Outlet B**, supplying the downstream system.

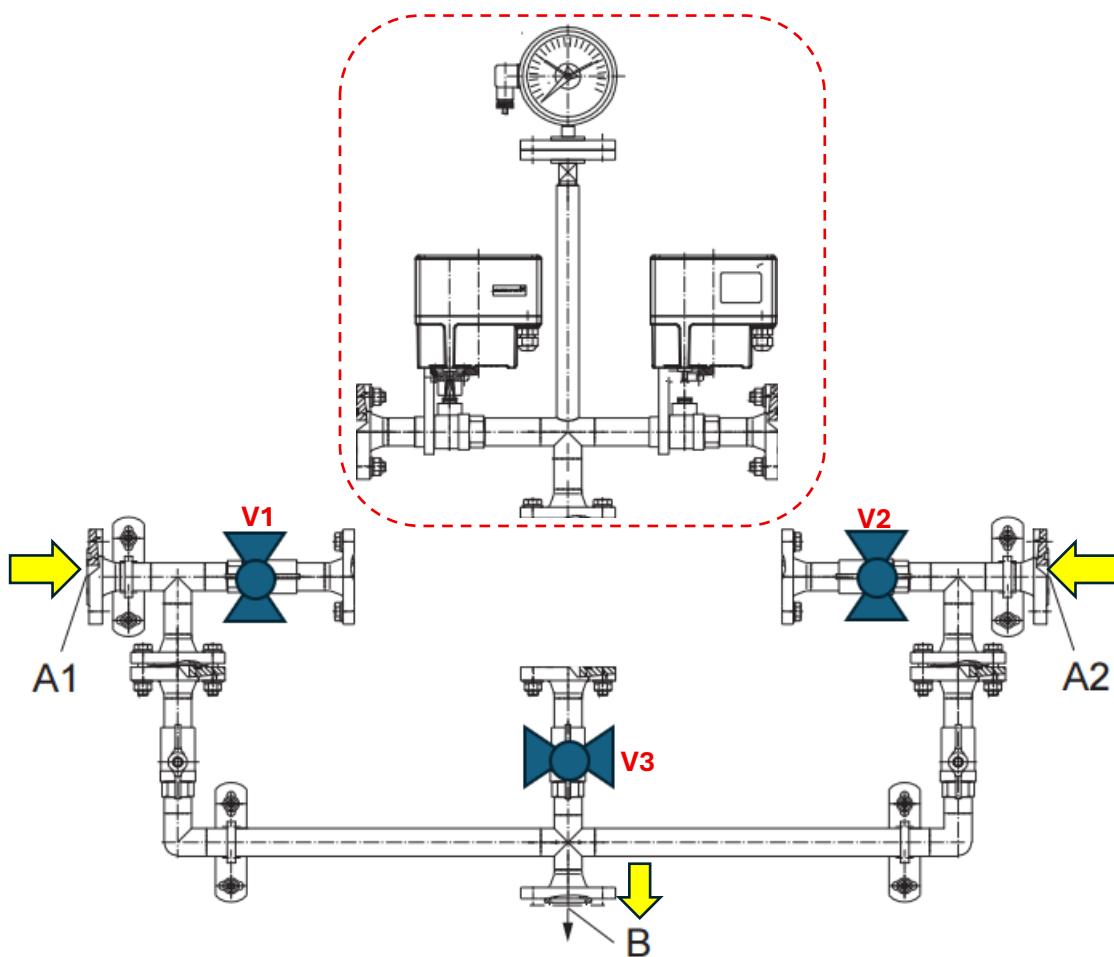
**4. Source Depletion Detection**

- When the operating source (e.g., A1) reaches the depletion pressure level:

- The system automatically **closes the A1 valve.**
- The system simultaneously **opens the A2 valve.**
- An indicator on the control panel displays “**A1 Exhausted.**”

❖ **Manual Operation – Maintenance Using the Bypass Line**

If maintenance is required on the **Actuator Valves** or the **Pressure Gauge with Contact**—such as malfunction, calibration, or component replacement—the system can continue operating normally by using the **bypass line**.



**Operating Logic:**

1. **Isolate the Changeover Unit Components**

To safely perform maintenance, close the following isolation valves:

- **Line Ball Valve V1**
- **Line Ball Valve V2**

- Line Ball Valve V3

Closing these valves ensures that no chlorine gas enters the actuator valves or the pressure gauge area during maintenance.

## 2. Remove the Component for Maintenance

- Loosen and remove the **flange connections** around the faulty Actuator Valve or Pressure Gauge with Contact.
- Carefully extract the component that requires service or replacement.

## 3. Maintain Continuous Chlorine Supply via Bypass

While the main valves and components are isolated, chlorine continues to flow from both sources **A1** and **A2** directly to outlet **B** through the **bypass system**.

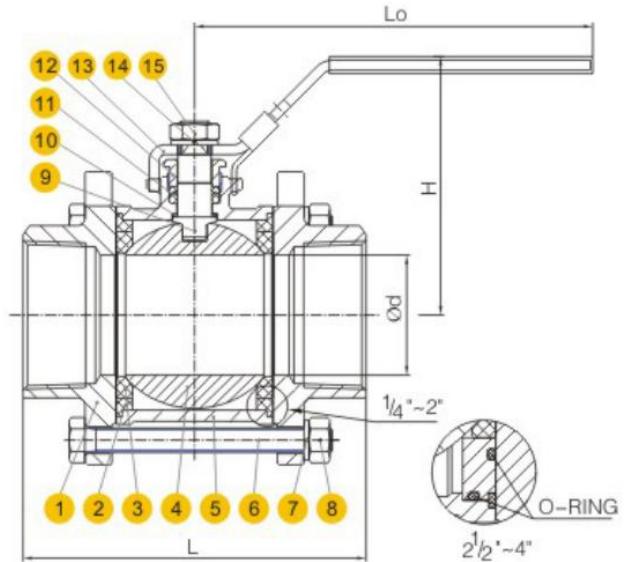
This design ensures:

- **No interruption** in chlorine gas delivery to the chlorination injection system.
- **Uninterrupted plant operation** during maintenance.
- **Safe isolation** of the defective part without depressurizing or shutting down the entire dosing system.

## 4. Restoring Normal Operation

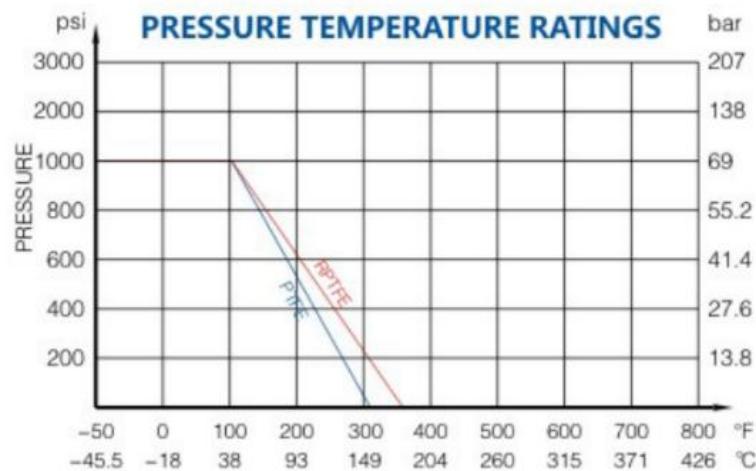
- After completing maintenance, reinstall the serviced component and re-secure the flange connections.
- Reopen isolation valves **V1**, **V2**, and **V3**.
- Switch the system back to **Automatic Mode** to resume normal changeover functionality.

### 6.3 The line ball valve



**DIMENSIONS-1000Psi**

SIZE	L	d	Lo	H	Weight(lb)	Torque(lbf · in)
1/4"	2.56	0.43	3.74	1.91	0.86	31
3/8"	2.56	0.45	3.74	1.91	0.82	31
1/2"	2.95	0.59	4.13	2.13	1.12	44
3/4"	3.15	0.77	4.72	2.58	1.43	62
1"	3.54	0.98	5.51	2.84	1.92	88
1 1/4"	4.33	1.26	5.91	3.19	3.53	133
1 1/2"	4.73	1.5	6.69	3.78	4.28	195
2"	5.51	1.93	7.28	4.13	6.55	265
2 1/2"	6.3	2.52	8.66	4.72	12.24	460
3"	7.09	3.03	10.63	5.3	17.2	761
4"	8.46	3.9	12.4	6.18	28.59	1097



### MATERIALS LIST

No.	DESCRIPTION	Q'TY	MATERIAL	
15	NUT	1	A194 8	A194 8
14	SPRING WASHER	1	304	304
13	HANDEL	1	Steel	Steel
12	GLAND	1	304	304
11	PACKING	1	PTFE	RPTFE
10	STEM WASHER	1	PTFE	RPTFE
9	STEM	1	A276 316	A276 316
8	NUT	-	A194 8	A194 8
7	SPRING WASHER	-	304	304
6	BOLT	-	A193 B8	A193 B8
5	BODY	1	A351 CF8M	A351 CF8M
4	BALL	1	SS316	SS316
3	SEAT	2	PTFE	RPTFE
2	GASKET	2	PTFE	RPTFE
1	BONNET	2	A351 CF8M	A351 CF8M
No. DESCRIPTION Q'TY MATERIAL				

### WORKING CONDITIONS

- Working Pressure: 1000Psi
- Temperature Range:  
-20° to 302°F - PTFE  
-20° to 356°F - RPTFE
- Applicable medium: Water, Oil, Gas

## 7. Control panel

### 7.1 Application

The control panel is designed to **automatically switch between two chemical supplies** to maintain continuous operation.

#### How it works:

- Uses either:
  - A 3-port motorized valve
  - Two 2-port motorized valves
  - Two solenoid valves (with end-of-travel switches)
- Changeover happens when **pressure drops to a preset level**, detected by one or two pressure switches or a pressure gauge.
- Compatible with **different valve setups** for various chemicals in **both pressure and vacuum systems**.

## 7.2 Function (Operating Sequence)

- **Normal Operation:**
  - Valve **1 is open**, and both Exhausted LEDs are off.
- **When Chemical Supply 1 is Empty:**
  - Pressure drops to the preset level → Valve 1 closes, Valve 2 opens.
  - **Exhausted LED 1** lights up, and Alarm 1 is triggered (relay de-energized).
  - Replace Chemical Supply 1 and press **Reset** to clear alarms and turn off LEDs.
- **When Chemical Supply 2 is Empty:**
  - The system automatically switches back to Supply 1 by closing Valve 2 and opening Valve 1.
- **When Both Supplies are Empty:**
  - Both valves are closed, both alarms are active, and both Exhausted LEDs are on.
  - Press **Reset** to clear alarms, turn off LEDs, and open Valve 1.

## 7.3 Technical Data

### Electrical Specifications

Parameter	Value
Power Supply	230 V AC ( $\pm 10\%$ ), 47–63 Hz
External MCB	Max. 6 A
Power Consumption	70 VA + external load (valves) Max. load at 230 V: 70 VA
Relay Contacts for potential free signal / alarm	Max. Voltage 250 V AC Max. Current 10 A AC/ DC Max. Power 500 VA AC
Digital Inputs	For potential-free contacts only; control panel supplies 220 V AC

**General Specifications**

Parameter	Value
Operating Temperature	0°C to +50°C
Storage Temperature	-20°C to +50°C
IP Rating	IP 65
Dimensions (W x D x H)	300 x 400 x 190 mm
Weight	Approx. 2.4 kg
Electrical Safety	EN 61010-1, Safety Class II

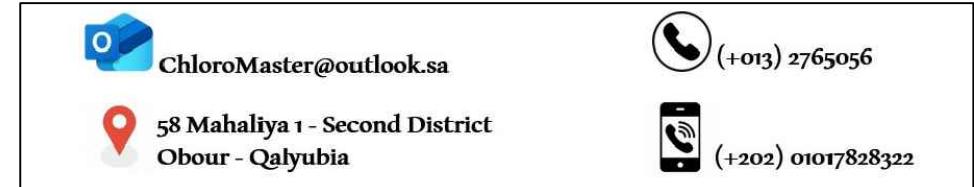
**Final Notes**

This manual provides the necessary information for the safe installation, operation, and maintenance of the unit. The operator must ensure that all safety instructions are followed and that only authorized personnel carry out work on the system. For spare parts, service, or further technical assistance, please contact [ChloroMaster].

# Control Panel For Change Over Unit

## GENERAL NOTE :

- SERVICE VOLTAGE : 220V - 50HZ - 3PH
- PANEL TYPE : WALL MOUNTED ENCLOSURE - IP66
- INSULATION LEVEL : 2.5KV FOR 1 MIN. ( FOR POWER CIRCUIT )
- PANEL COAT : EPOXY COLOR RAL7035
- PANEL ACCESS : FRONT ONLY
- MAN CABLE ENTRY : BOTTOM



PANEL NAME : Control Panel For Change Over Unit

Drawn By : E . S / M. Nazmy

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ChloroMaster Engineering, Contracting & Supplies Co. Ltd

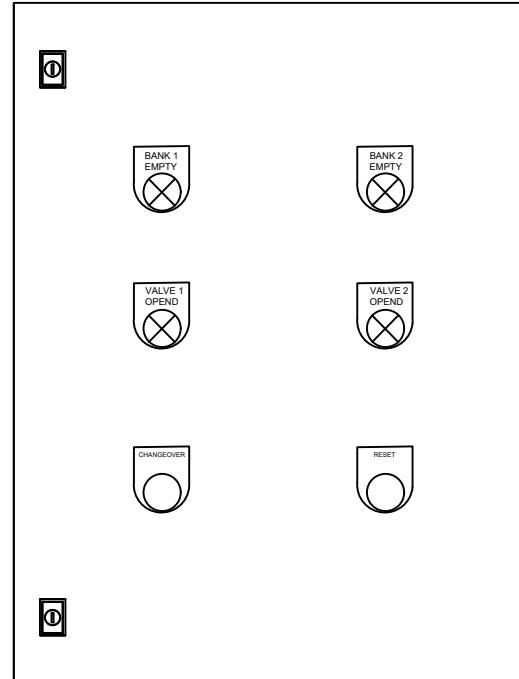
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ECS Co. Ltd

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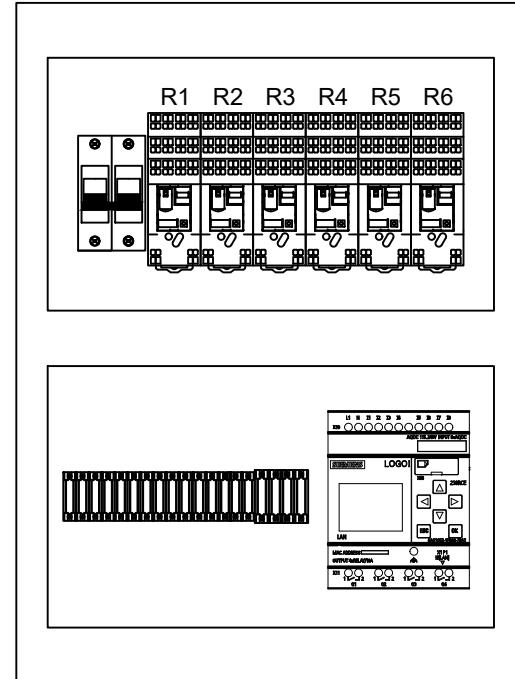
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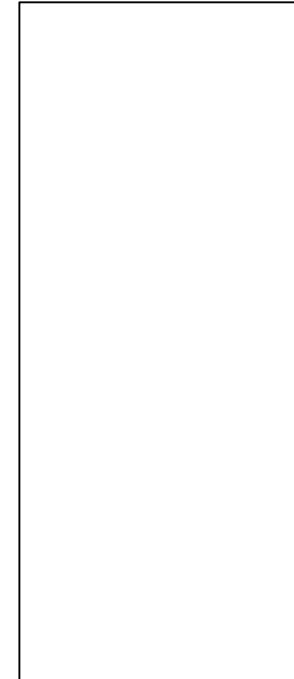
SHEET 1  
OF 3



External  
Front View



Internal  
View



Side View

PANEL NAME : Control Panel For Change Over Unit

Drawn By : E . S / M. Nazmy

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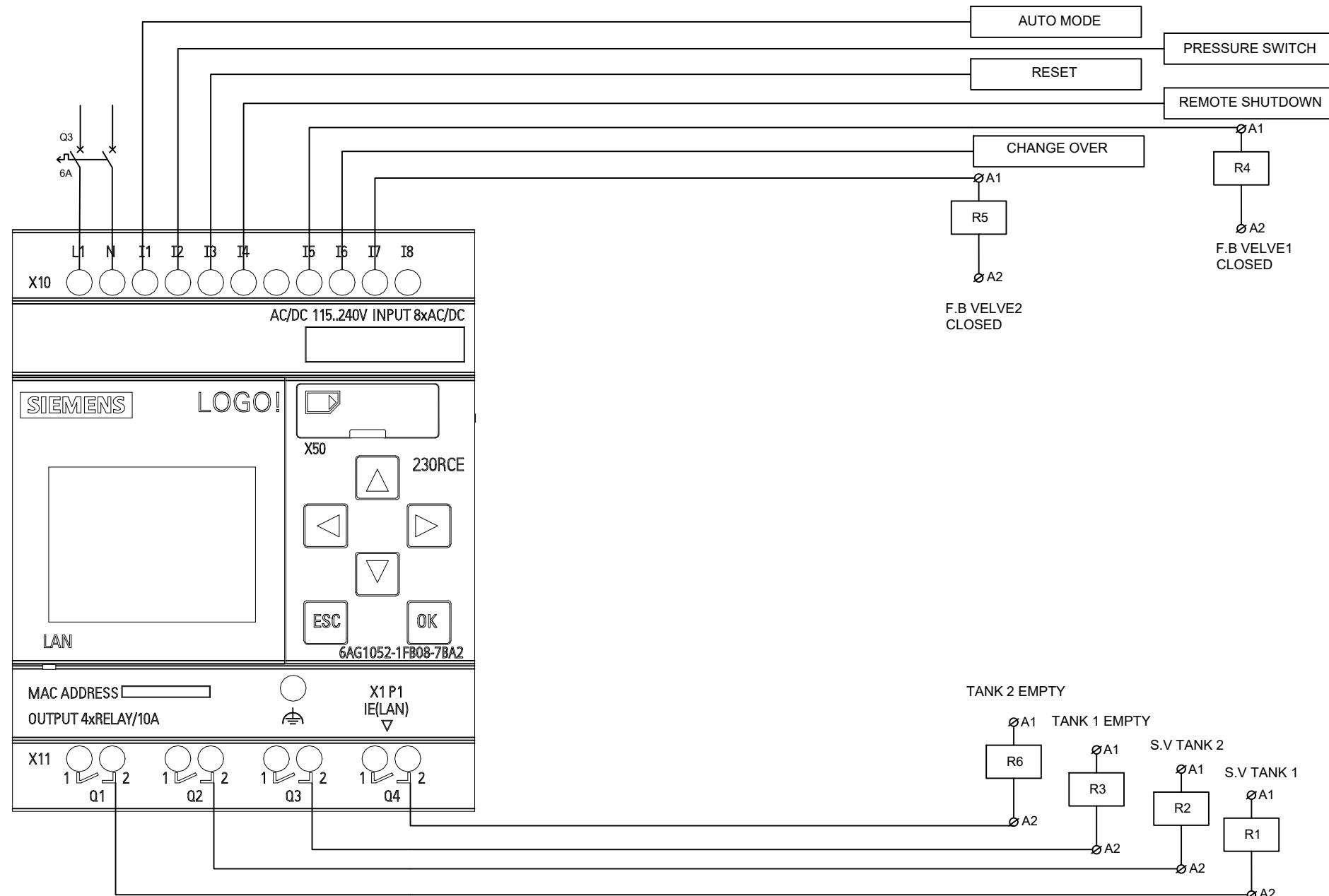
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SHEET 2  
OF 3



PANEL NAME : Control Panel For Change Over Unit

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OF 3