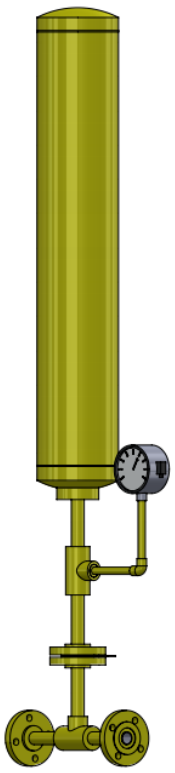
Ex.T 05

ChloroMaster

ECS Co. Ltd

Expansion tube with rupture disc

(For Cl2 and So2)



INSTRUCTION MANUAL

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1. Intended Use

This device is designed for use in chlorine (Cl_2) and Sulphur dioxide (SO_2) systems as a safety and protection unit.

Its primary purpose is to:

- Protect the system from overpressure using an integrated rupture disc.
- Provide continuous pressure monitoring via the installed pressure gauge.
- Transmit a signal to the changeover system, enabling the actuator valve to shut off the gas flow from the source (cylinders) when abnormal pressure is detected.

The device must only be used in chlorine or Sulphur dioxide installations under the operating and environmental conditions specified in this manual.

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.

3. Description

3.1 Scope of Supply

The unit is supplied with the following main components:

- Expansion Tube (Steel, Schedule 80)
- Diaphragm Pressure Gauge with Electrical Contact (Range: 0 – 25 bar) ,Diaphragm (chlorine- and SO_2-resistant materials)
- Rupture Disk (Burst Pressure: 18 bar)
- Standard gaskets and seals

3.2 Principle of Operation

This device functions as a **safety and protection unit** in chlorine and Sulphur dioxide systems. It remains in standby mode during normal operation and only intervenes when the system pressure exceeds the defined operating limits.

1. **Normal Operation**

- Under normal operating conditions (approximately 7 bar in chlorine systems), the device does not perform any active function.
- It remains ready to intervene only if an abnormal pressure increase occurs.

2. **Device Response to Overpressure**

- If the pressure in the system rises either due to introducing a cylinder with a higher pressure than the operating level, or because of a malfunction in the evaporator (leading to increased pressure caused by heat in the case of liquid chlorine) the device intervenes to protect the system.
- When the pressure reaches 18 bar, the rupture disk bursts, immediately relieving the excess pressure and preventing damage to downstream components.
- At the same time, the diaphragm pressure gauge with electrical contact sends a signal to the control panel of the automatic changeover unit.
- After verifying the signal, the actuator valve is activated to isolate the cylinders from the system, thereby preventing further gas flow and ensuring system safety.

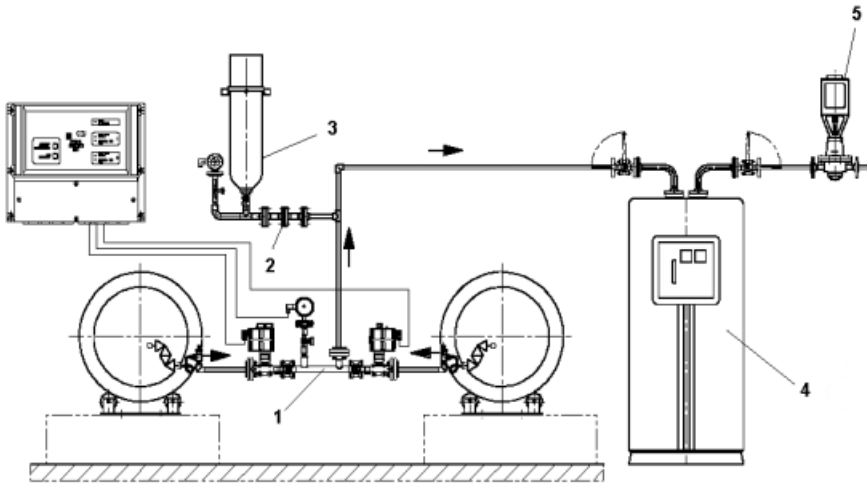
hrough this mechanism, the device provides immediate intervention in the event of overpressure by combining emergency pressure relief with automatic source isolation, ensuring maximum safety and reliability for chlorination systems.

3.3 Technical Data

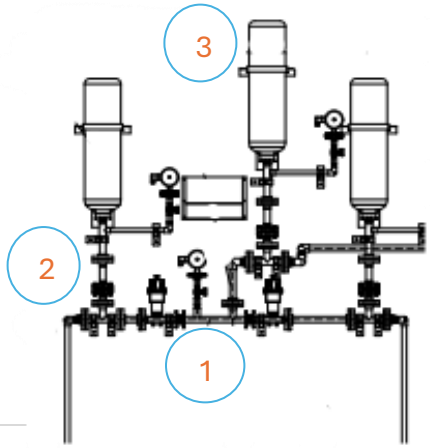
Component	Specification	Operating Conditions
Expansion Tube & Piping	Material: Seamless Steel, Schedule 80 Design: Heavy-duty piping for chlorine/SO_2 systems	Compatible with Cl_2 and SO_2 gases Operating pressure: up to system design pressure
Diaphragm Pressure Gauge with Contact	Measuring Range: 0 – 25 bar Accuracy: ±1.6% (indication), ±4% (setting) Contact Type: 1 contact (NO/NC) Safety Glass: Explosion-proof Dial: Black lettering on white background	For use with Cl_2 and SO_2 Ambient temperature: -10°C to +50°C Non-condensing humidity
Diaphragm (for Pressure Gauge)	Corrosion-resistant materials: Monel, Titanium, PTFE (Teflon) Function: Isolates the gauge mechanism from aggressive media	Specifically designed for Cl_2 and SO_2 service Ensures long-term reliability under corrosive conditions
Rupture Disk	Material: Monel 400 Burst Pressure: 18 bar Function: Immediate pressure relief at overpressure	Designed for Cl_2 and SO_2 Set to burst at 18 bar under operating conditions
Connection Details	Flanges: DIN PN16, 1 inch	Suitable for chlorine and SO_2 system integration

4. Installation

4.1 Liquid gas discharge



Change-over unit	1
Rupture disk	2
Expansion chamber	3
Evaporator	4
Pressure reducing valve	5
Vacuum regulating	6
To gas control units	7



4.2 Installation & Leak Test

Step	Description	Notes / Warnings
1	Ensure all system valves (including actuator valve) are closed before installation.	⚠ Work must only be carried out by trained personnel.
2	Connect the unit to the pipeline using the DIN PN16, 1-inch flanges. Use new gaskets for sealing.	–
3	Verify that the pressure gauge is properly mounted and diaphragm materials are suitable for chlorine/SO_2.	–
4	Slowly open the cylinder main valve slightly to allow a small amount of gas into the system.	–
5	Apply ammonia solution (NH_3) carefully around all joints, flanges, and connections to check for leaks.	⚠ Ammonia vapors form a white mist when reacting with Cl_2 or SO_2. Avoid direct inhalation.
6	If no leaks are detected, fully open the cylinder main valve and place the system into standby mode.	–
7	If a leak is detected: immediately close the cylinder valve, isolate the system, and repair the leakage before resuming operation.	⚠ Always keep a gas mask and emergency equipment at hand.

4.2.1 Key Warnings

Type	Details
⚠ Gas Hazard	Chlorine/SO_2 leaks are extremely dangerous.
⚠ Chemical Hazard	Do not inhale ammonia during leak testing.
ℹ Note	Leaks appear as a **white mist** when using ammonia.

5. Regular Maintenance

5.1 Regular maintenance

Interval	Task
Daily	Check the unit and surrounding piping for any chlorine/SO_2 leaks using ammonia solution (white mist test). Ensure the pressure gauge is functioning properly.
Monthly	Inspect the pressure gauge contacts and verify proper signal transmission to the control panel (Changeover Unit). Check actuator response to test signals.
Quarterly	Visually inspect the rupture disk housing and confirm no signs of corrosion or damage. Ensure expansion tube and flanges are free from leaks.
Yearly	Replace all gaskets and seals. Inspect the diaphragm for wear or chemical attack and replace if necessary. Perform a full functional test of the unit.

5.2 Testing the pressure gauge

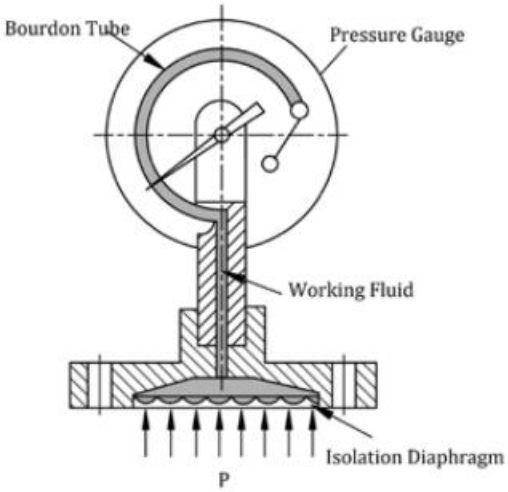
Step	Description
1	Remove the protection cap.
2	Connect the test device.
3	Test the pressure gauge (Pmax = 25 bar).
4	Disconnect the test device.
5	Replace and tighten the protection cap.
6	Check for leaks.

❖ 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	2.5 Mpa

❖ Diaphragm Pressure Gauge

Item	Description
Material	Stainless steel material
Diaphragm Seals	Diaphragm Seals with thread connection
Diaphragm Material	• Monel • Tantalum • PTFE
Range	2.5 Mpa



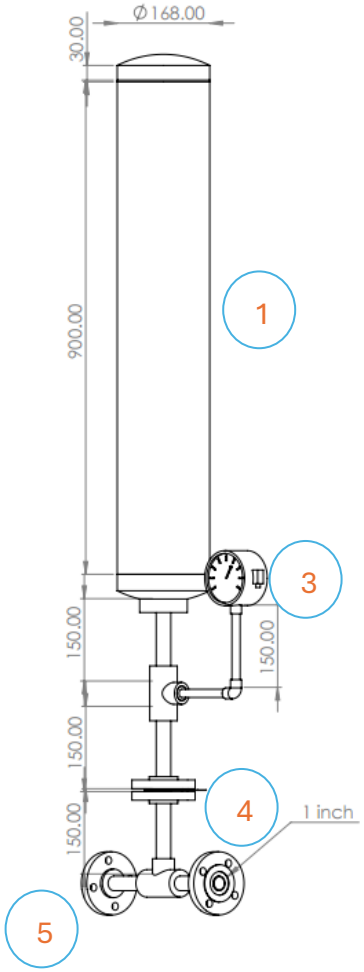
5.3 The Rupture Disk

Item	Description
Type	Forward Acting
Features	High Pressure. Fragmented
Application	Steam, Gas, Liquid
Burst Pressure	18 Bar
Max. Operating Pressure	70 %
Temperature	- 251 ~ 538 C
Size	1"
Materials	SS 316, Monel

6. Drawings and parts lists

6.1 Expansion tube with rupture disc

Pos	Qty.	Description
1	1	Steel cylinder Sch 80 _ 20 liters
2	1	Cylinder bracket
3	1	Contact pressure gauge
4	1	Rupture disc arrangement chlorine, 18 bar ± 10%
5	2	Flanges: DIN PN16, 1 inch



6.2 Spare Parts & Replacement

The following spare parts should be kept in stock to ensure reliable operation and timely replacement when required:

Item	Description	Replacement Interval / Notes
Rupture Disk	Safety element, Monel 400, burst pressure 18 bar	Replace **immediately** after any overpressure event (disk burst). Keep at least **2 spare units** in stock.
Diaphragm (for Pressure Gauge)	Corrosion-resistant materials (Monel, Titanium, PTFE)	Inspect annually. Replace if signs of wear, corrosion, or leakage are detected.
Gaskets & Seals	PTFE or equivalent chlorine/SO_2 resistant material	Replace during yearly maintenance or whenever disassembled.
Pressure Gauge with Contact (optional spare)	0 – 25 bar range, explosion-proof glass, electrical contacts	Recommended keeping **1 spare unit** available for emergency replacement.

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].