

HFC-227ea

Fire extinguishing system

using self-activated agent cylinders



SMS-DT Version 2.6
Effective from:03/2023

KEY FEATURES

- Automatically activated fire extinguisher in compliance with TCVN 12314-2:2022
- Automatic thermal activation at 68°C
- Cylinder pressure: 25 bar
- Rapid discharge time for effective fire suppression
- Simple system configuration – quick and easy installation
- Cost-effective solution, optimized for compact spaces
- Designed as an alternative to automatic gaseous fire suppression systems in accordance with Clause 5.1.3 of TCVN 3890:2023
- Cylinders are interconnected to enable simultaneous discharge during activation
- Pressure monitoring signals for both the storage cylinder and discharge line can be integrated with the fire alarm system
- Rechargeable after discharge
- UL Listed (EX28624, EX28181) and FM Approved for reliability and safety

DESCRIPTION

The SMS-227 system is developed and manufactured by S-TEC VINA Co., Ltd., a Vietnam–Korea joint venture specializing in total fire protection solutions.

This system is specifically designed for electrical rooms, electrical shafts, and compact technical areas where conventional automatic water, powder, or foam systems are not suitable. It is also an ideal choice for areas requiring automatic fire suppression, particularly those protected by clean agent systems.

Featuring a compact cylinder design, the SMS-227 system allows for easy installation, simple configuration, and offers a cost-effective solution while ensuring high reliability and compliance with fire safety standards.

LEGAL BASIS

Designed as a replacement for automatic gaseous fire suppression systems in unoccupied areas with a total floor area of $\leq 100 \text{ m}^2$, in accordance with TCVN 3890:2023 – Fire prevention and fighting equipment for buildings and constructions – Installation and arrangement requirements.

Details:

- Clause 4.10: Defines the areas within buildings required to be equipped with automatic fire suppression systems as specified in Annex A1 of TCVN 3890:2023.
- Clause 5.1.3: Specifies the areas where automatic fire extinguishers may be used as an alternative to automatic fire suppression systems (for unoccupied areas $\leq 100 \text{ m}^2$).

EXTINGUISHING AGENT

The SMS-227 system uses HFC-227ea (FM-200) as its extinguishing agent.

The agent is stored in the cylinder in a liquefied state, pressurized with nitrogen up to 25 bar.

HFC-227ea is a clean, colorless, odorless gas that is non-conductive, non-corrosive, and leaves no residue after discharge. It is safe for humans and harmless to sensitive equipment.

After discharge, the gas naturally disperses without causing damage to electrical or electronic devices, making it suitable for Class A, Class B, and electrical (Class C) fires.

The quantity of HFC-227ea (FM-200) is calculated in compliance with TCVN 7161-9.

ACTIVATION PRINCIPLE

Each cylinder valve is equipped with a quick-response glass bulb rated at 68°C.

The thermal bulb is integrated into a valve assembly with 360° impact protection, ensuring reliable operation and preventing mechanical damage during installation or use.

The system can be configured as either:

- A standalone single-cylinder unit for small enclosures, or
- An interconnected multi-cylinder setup (up to 5 cylinders) for larger protected volumes.

In multi-cylinder configurations, when any one cylinder is thermally activated, the remaining cylinders are simultaneously discharged through a DN6 copper pilot line, ensuring that the total extinguishing agent is released within 10 seconds, in compliance with applicable fire protection standards



The 180° gas discharge nozzle, with a protection radius of 5 meters, is mounted together with the cylinder valve. When the cylinder is activated, the nozzle releases the extinguishing agent evenly throughout the protected area.

CONNECTION TO FIRE ALARM SYSTEM

Each cylinder or cylinder set can be connected to the fire alarm system through two supervision signals using voltage-free (dry) contacts, providing real-time monitoring of system status.

	Fault Signal: When the cylinder pressure drops by $\geq 10\%$, the pressure switch activates and sends a low-pressure fault signal to the fire alarm system for monitoring purposes.
	Discharge Signal: When the cylinder discharges, the pressure switch sends a signal to the fire alarm control panel for fire notification and automatic control of related systems such as HVAC, ventilation, and power shutdown.

APPLICATION

The SMS-227 system is ideal for use in the following applications:

☐ Alternative to automatic gas suppression per Clause 5.1.3, TCVN 3890:2023	☐ Retrofit / additional installations
☐ Electrical shafts in buildings	☐ Local fire protection in electrical cabinets
☐ Generator rooms / Electrical rooms	☐ Vaults
☐ Telecommunication BTS stations	☐ Small isolated areas requiring automatic suppression
☐ Solar power plants	☐ Server rooms

CALCULATION OF FIRE FIGHTING AGENT

The extinguishant agent HFC-227ea (FM-200) is calculated according to TCVN 7161-9:2009 or other international standards

Table 1: Design calculated concentration with extinguishant HFC – 227ea (FM – 200)

(According to table 4, TCVN 7161-9:2009)

Fuel	Extinguishing % by volume	Minimum design % by volume
Class B Heptane (cup burner) Heptane (room test)	6.7 6.9	9.0
Surface Class A Wood Crib Polyme/PP/ABS	4.9 6.1	7.9
Higher Hazard Class A, such as electrical engineering rooms...		8.5

theo thể tích (tính cho khu vực có nhiệt độ tối thiểu 200C)

Fuel	Extinguishing agent /1m3 (kg/1m3)
Class B Heptane (cup burner) Heptane (room test)	0.722
Surface Class A Wood Crib Polyme/PP/ABS	0.626
Higher Hazard Class A, such as electrical engineering rooms...	0.678

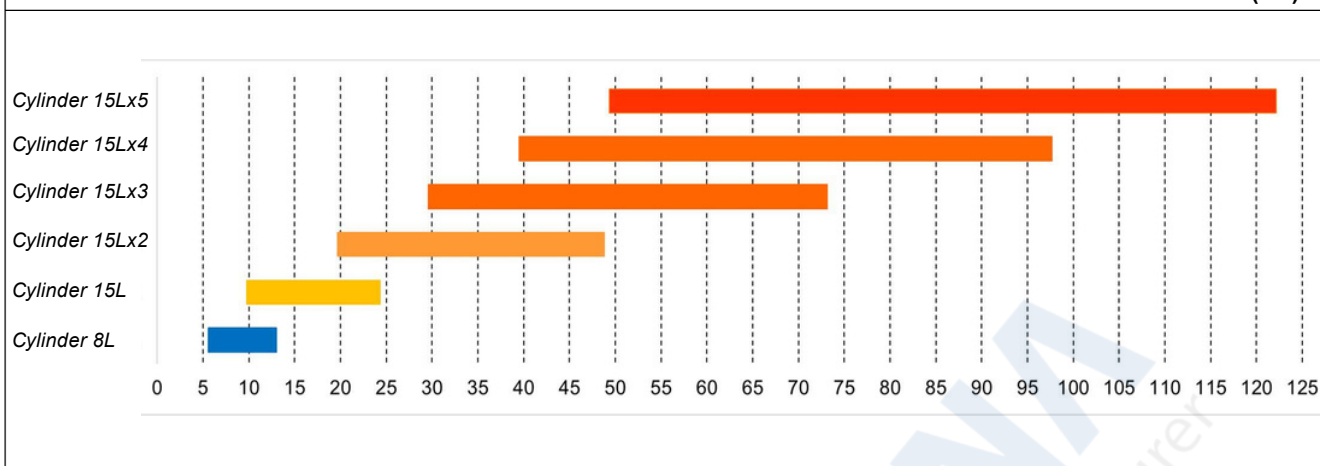
Table 3: Information on the toxicity of agent HFC-227ea (FM-200)

NOAEL (No observed adverse effect level)	9.0%
LOAEL (Lowest observed adverse effect level)	10.5%

FIRE FIGHTING VOLUME

SMS-227 automatic fire extinguishing system can be used in the form of single or multiple cylinders connected together to ensure the required amount of extinguishing agent for the room volume. The amount of air charged for each tank will be calculated according to the standard corresponding to the actual volume of each area to be protected. The concentration of extinguishant after discharge must not exceed the NOAEL level to avoid affecting people.

EFFECTIVE FIRE VOLUME COMPATIBLE WITH THE VOLUME CHARGED IN CYLINDER / GAS TANK ASSEMBLY. (m3)



PECIFICATIONS

Part Number	SMS-227 8L	SMS-227 15L
Internal Volume	10 Liters	15 Liters
Filled HFC-227ea(FM-200)	4 kg - 8 kg	7 kg - 15 kg
Air tank pressure	25 bar	
Discharge Time	≤ 10s	
Air discharge nozzle type	180°	
Activation form	Automatic by heat at 68°C	
Sensor protection mechanism	Full 360° anti-impact protection	
Connect multiple tanks	Allows connection of up to 5 cylinders	
Paint	Red powder-coated paint	

Agent Quality Standard	UL Listed (EX 28624)/ FM Approved (FM23FPUS0263)
Agent Cylinder pressure monitoring	Meter with monitoring contact connected to fire alarm system (NO)
Exhaust signal	Air release pressure switch, contact (NO) 3A / 24VDC.
Standard shell steel	JIS G3116 SG295
Standard agent cylinder	TCVN 8366
Applicable Standards	TCVN 12314-2
Quality Management System	BS EN ISO 9001:2015
ISO Certification	BS EN ISO 14001:2015 ISO 45001:2018
Certifications	Fire protection equipment inspection in accordance with ND105/2025/ND-CP
Manufacturing Plant	Complies with business operation requirements in accordance with ND79/ND-CP(ND136/2020/ND-CP)

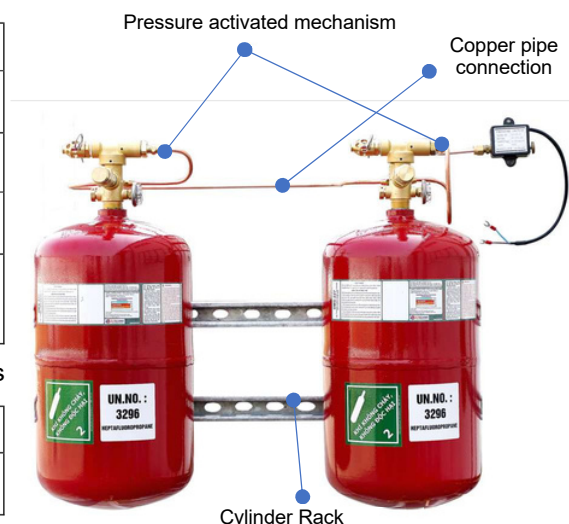
ORDER INFORMATION

SMS-227 fire suppression system ordering information is as follows :

P/N	Description
SMS-227-15L-xxx(1)	15L cylinder with cylinder valve and pressure gauge with integrated monitoring contact
SMS-227-8L-xxx(1)	8L cylinder with cylinder valve and pressure gauge with integrated monitoring contact
STV-PS	Discharge pressure switch
(1): Amount of fire extinguishing agent HFC-227ea (FM-200) charged according to the calculation for room volume (kg)	

System installation accessories (supplied with air tank) are as follows

P/N	Description
SMS-PK1	Accessory kit for 1 cylinder.





INSTALLATION DETAILS FOR CYLINDER WITH BRACKET

CALCULATION EXAMPLE FOR SPECIFIC APPLICATION

Steps to take		Example with specific application Equip the electric room with size 2.5m x 2.7m, height 3.2m						
Step 1: Review the application Consider the area to be installed to determine whether the fire hazard is class A, B or HA. See Table 1,2 for the required minimum design concentration		Electrical engineering room, select extinguishant concentration for hazardous area higher than class A (HA)						
Step 2: Determine the volume of the weighing area equipped with a agent fire extinguishing system.(with the exception of non-permeable fixed structures)		Area volume: $V = 2.5 \times 2.7 \times 3.2 = 21.6 \text{ m}^3$						
Step 3: Calculation of the required amount of extinguishing agent	Look up Table 2 to determine the amount of fire extinguishing agent HFC- 227ea (FM-200) to use, or calculate according to TCVN 7161-9:2009	Looking at Table 2, the amount of extinguishant by volume for hazardous areas higher than class A (HA) is 0.678kg/m ³ . The required amount of HFC - 227ea (FM-200) extinguishing agent is: $m = 21.6 \times 0.678 = 14.65 \text{ kg}$						
Step 4: Oder	Use 01 air cylinder	Order 01 agent cylinder SMS - 227 with 15kg load of HFC - 227ea (FM-200) <table border="1"> <tr> <td>MS-227-15L-15.0</td><td>01 cylinder</td><td>15L cylinder loaded with 15kg HFC-227ea (FM-200)</td></tr> <tr> <td>STV-PS</td><td>01 set</td><td>Exhaust pressure switch</td></tr> </table> Mounting bracket supplied with air cylinder	MS-227-15L-15.0	01 cylinder	15L cylinder loaded with 15kg HFC-227ea (FM-200)	STV-PS	01 set	Exhaust pressure switch
MS-227-15L-15.0	01 cylinder	15L cylinder loaded with 15kg HFC-227ea (FM-200)						
STV-PS	01 set	Exhaust pressure switch						

INSTALLATION

The SMS-227 system cylinders are supplied with an accessory kit for easy wall mounting or installation on suitable support frames.

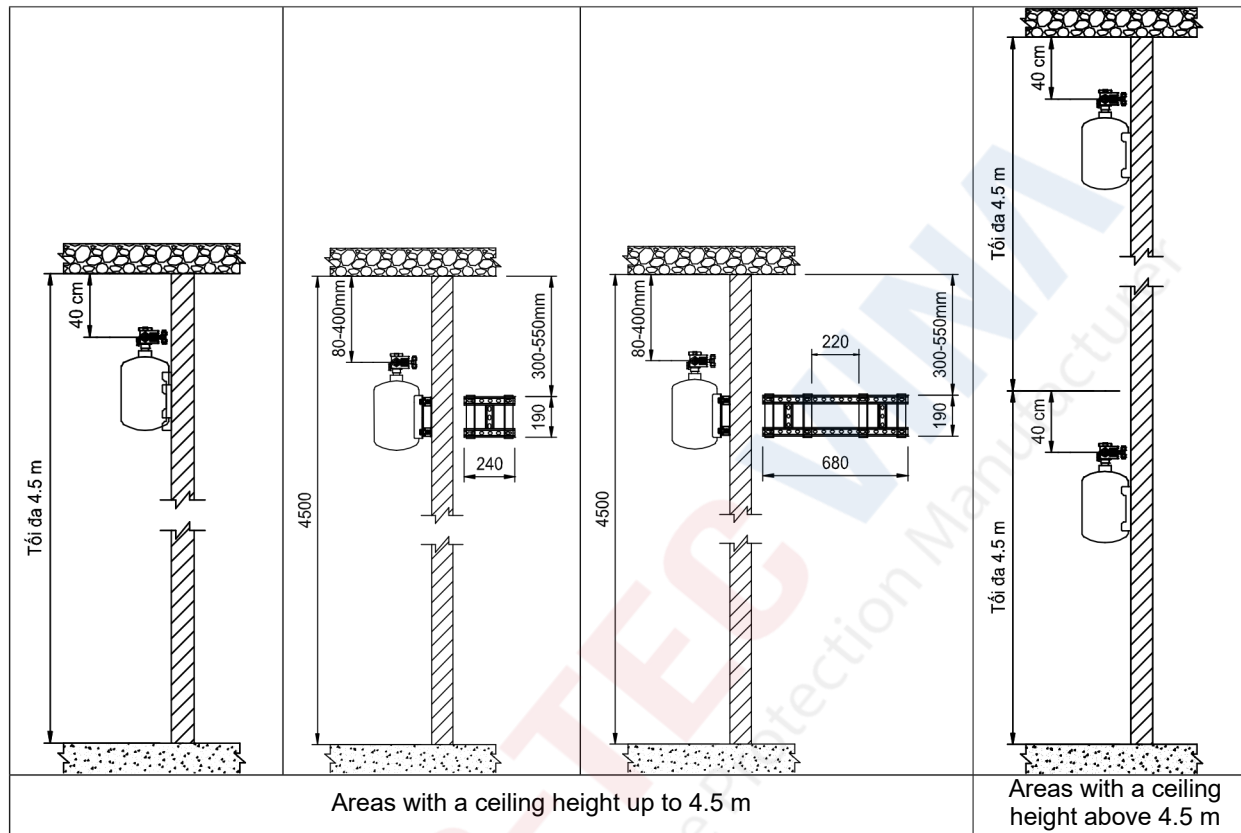
Maximum installation height, protected area, and coverage height are illustrated in reference images and detailed in the system design and installation manual.

Installation requirements – Clause 5, TCVN 12314-2:2022:

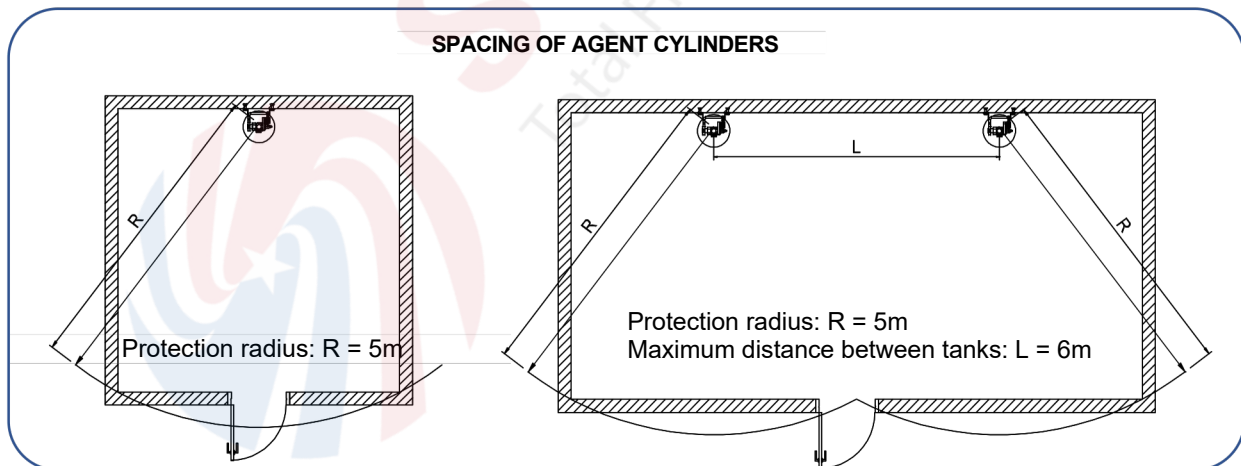
- Automatically activated fire suppression cylinders must be installed according to the manufacturer's specifications and tested in compliance with TCVN 12314-2 standards.
- Cylinders must be installed within the manufacturer's specified limits (height, coverage area, etc.).

Cylinder Mounting Details:

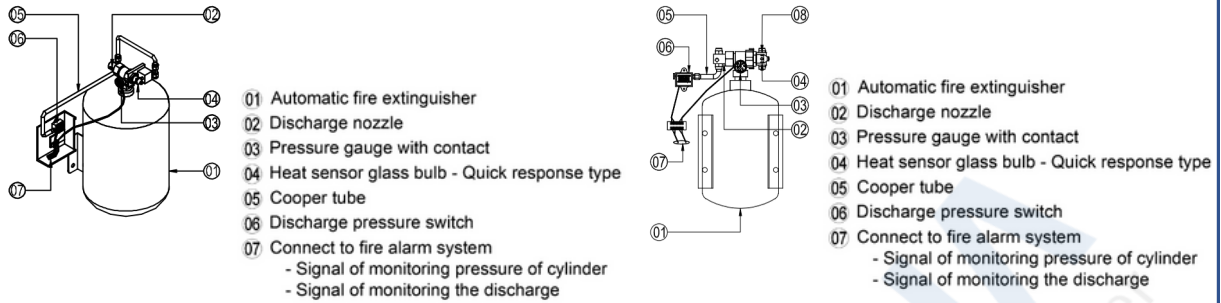
- The discharge nozzle can be mounted on the valve assembly or installed separately within approved limits.
- Distance from the discharge nozzle to the ceiling of the protected area must not exceed 300 mm.
- Maximum installation height of the thermal sensor must comply with the manufacturer's specifications but not exceed 9 m. The distance from the thermal sensor to the ceiling must be 0.08 – 0.4 m.



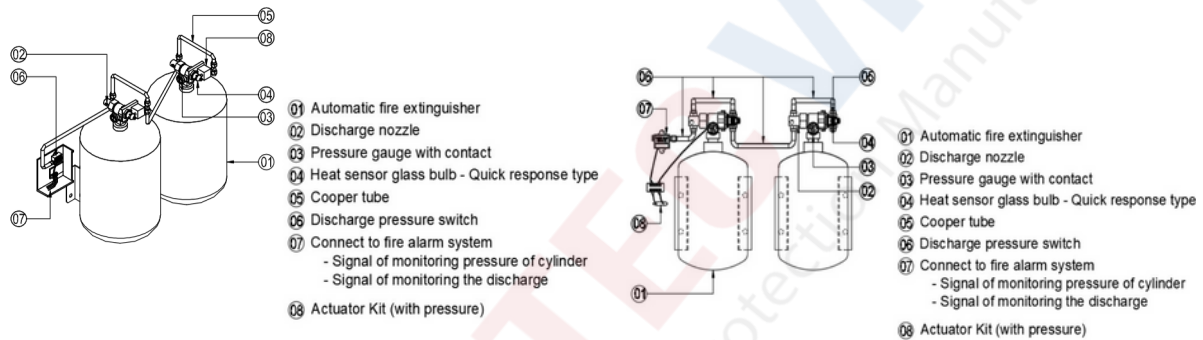
SPACING OF AGENT CYLINDERS



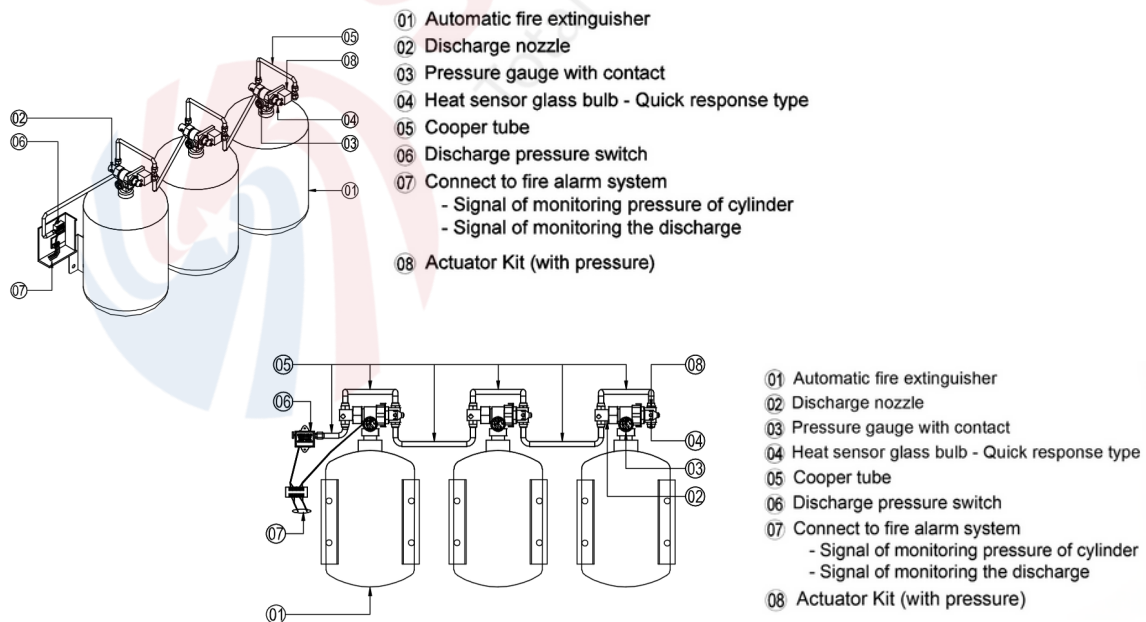
SYSTEM SCHEMATIC DIAGRAM 1 CYLINDER



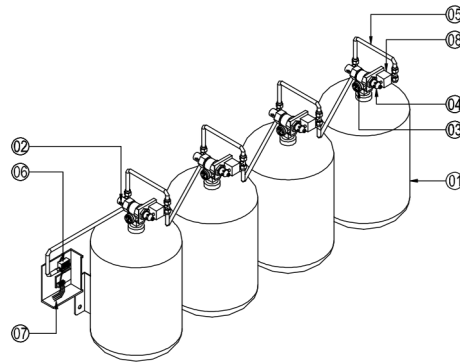
SYSTEM SCHEMATIC DIAGRAM 2 CYLINDER



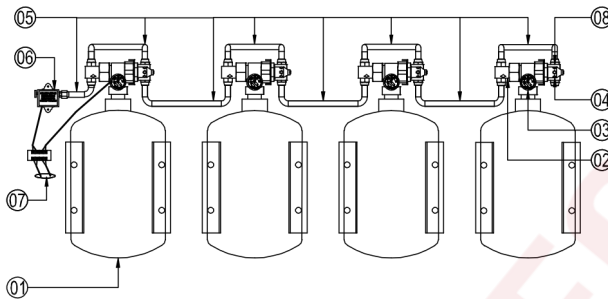
SYSTEM SCHEMATIC DIAGRAM 3 CYLINDER



SYSTEM SCHEMATIC DIAGRAM 4 CYLINDER

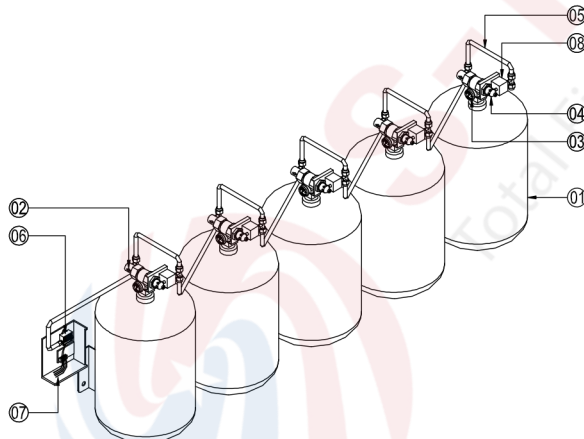


- 01 Automatic fire extinguisher
- 02 Discharge nozzle
- 03 Pressure gauge with contact
- 04 Heat sensor glass bulb - Quick response type
- 05 Cooper tube
- 06 Discharge pressure switch
- 07 Connect to fire alarm system
 - Signal of monitoring pressure of cylinder
 - Signal of monitoring the discharge
- 08 Actuator Kit (with pressure)

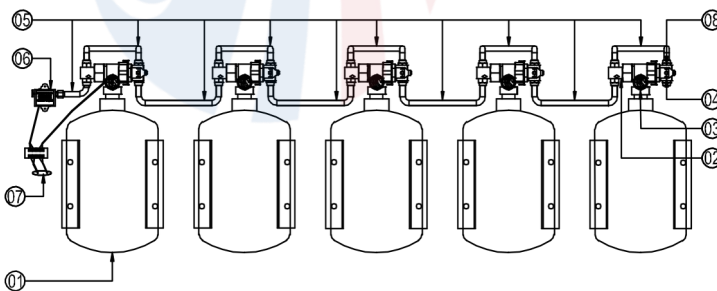


- 01 Automatic fire extinguisher
- 02 Discharge nozzle
- 03 Pressure gauge with contact
- 04 Heat sensor glass bulb - Quick response type
- 05 Cooper tube
- 06 Discharge pressure switch
- 07 Connect to fire alarm system
 - Signal of monitoring pressure of cylinder
 - Signal of monitoring the discharge
- 08 Actuator Kit (with pressure)

SYSTEM SCHEMATIC DIAGRAM 5 CYLINDER



- 01 Automatic fire extinguisher
- 02 Discharge nozzle
- 03 Pressure gauge with contact
- 04 Heat sensor glass bulb - Quick response type
- 05 Cooper tube
- 06 Discharge pressure switch
- 07 Connect to fire alarm system
 - Signal of monitoring pressure of cylinder
 - Signal of monitoring the discharge
- 08 Actuator Kit (with pressure)



- 01 Automatic fire extinguisher
- 02 Discharge nozzle
- 03 Pressure gauge with contact
- 04 Heat sensor glass bulb - Quick response type
- 05 Cooper tube
- 06 Discharge pressure switch
- 07 Connect to fire alarm system
 - Signal of monitoring pressure of cylinder
 - Signal of monitoring the discharge
- 08 Actuator Kit (with pressure)