

PRE-ENGINEERED CLEAN AGENT SYSTEMS

**DLP/ILP FIRE SUPPRESSION
SOLUTIONS**



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DIRECT LOW PRESSURE RELEASE SYSTEM (DLP)

System Overview

The Orbis® DLP (Direct Low Pressure) system is a self-contained, pre-engineered fire suppression solution designed to automatically detect and extinguish fires at their source, directly inside enclosed electrical or mechanical compartments.

The system uses a flexible heat-sensitive detection tube, which serves both as the detection and discharge mechanism. When exposed to flame or high temperature, the tube ruptures at the hottest point, instantly releasing the extinguishing agent to suppress the fire.

Operating entirely without external power or electronics, the DLP system provides 24/7 autonomous protection for critical equipment, reducing downtime and minimizing fire damage in compact, high-risk environments.

System Functionality

1. Detection Through Heat Exposure

The system is always pressurized and active. The flexible detection tube is routed throughout the protected enclosure - around circuit breakers, contactors, busbars, or other heat-prone components.

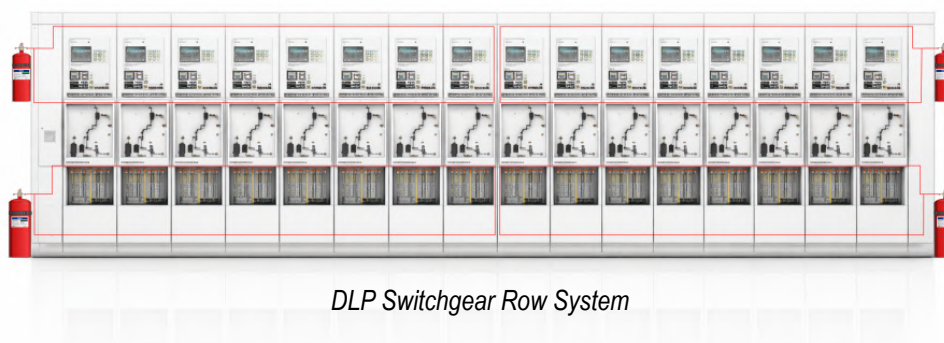
When a fire starts inside the enclosure, the heat produced by flames or arcing rapidly increases the local air temperature. The detection tube is made of a special polymer designed to soften and rupture at a precise temperature (typically between 110°C and 150°C).

This means the system physically senses the fire right where it begins. No sensors, no electronics, no delay.

2. Tube Rupture and Activation

As the tube wall reaches its rupture temperature, it splits open at the hottest point, usually within seconds of ignition. Because the tube is pressurized, the rupture causes an immediate pressure drop within the system. This opening acts as a nozzle, releasing the stored suppression agent directly into the fire zone.

This behavior ensures that the agent is discharged exactly where the heat source is, maximizing efficiency and minimizing agent use.



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3. Fire Suppression

The extinguishing agent, whether it's FK-5-1-12, HFC-227ea, IG-01 (Nitrogen), or IG-100 (Argon), is released rapidly through the ruptured section of the tube.

Depending on the agent type:

- Clean agents (FK-5-1-12, HFC-227ea) absorb heat and disrupt the combustion reaction, extinguishing the flame without residue.
- Inert gases (IG-01, IG-100) displace oxygen locally, reducing it below the level required for combustion while remaining safe for equipment.

This discharge happens within seconds, cooling and suppressing the fire before it can spread or cause structural damage.

4. System Reset and Recharge

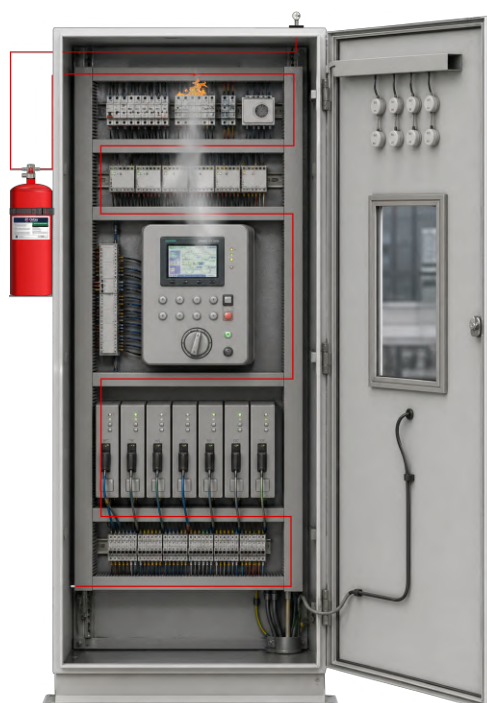
After activation, the ruptured tube is replaced with a new one, and the cylinder is refilled or exchanged. The entire system can be serviced and returned to operation on-site after an inspection from Orbis.

Why This Design Works

The Orbis DLP system is inherently simple yet technically robust:

- The detection tube continuously monitors the enclosure through pressure.
- Fire creates localized heat, which triggers physical rupture (not dependent on electronics or power).
- The rupture provides instant release of agent at the exact ignition point.
- The fire is extinguished before external spread, limiting downtime and equipment damage.

This closed-loop design makes the DLP system ideal for remote, compact, or unmanned enclosures where traditional detection and suppression methods are impractical.



*DLP Electrical Cabinet w/ EOL
Pressure Gauge*

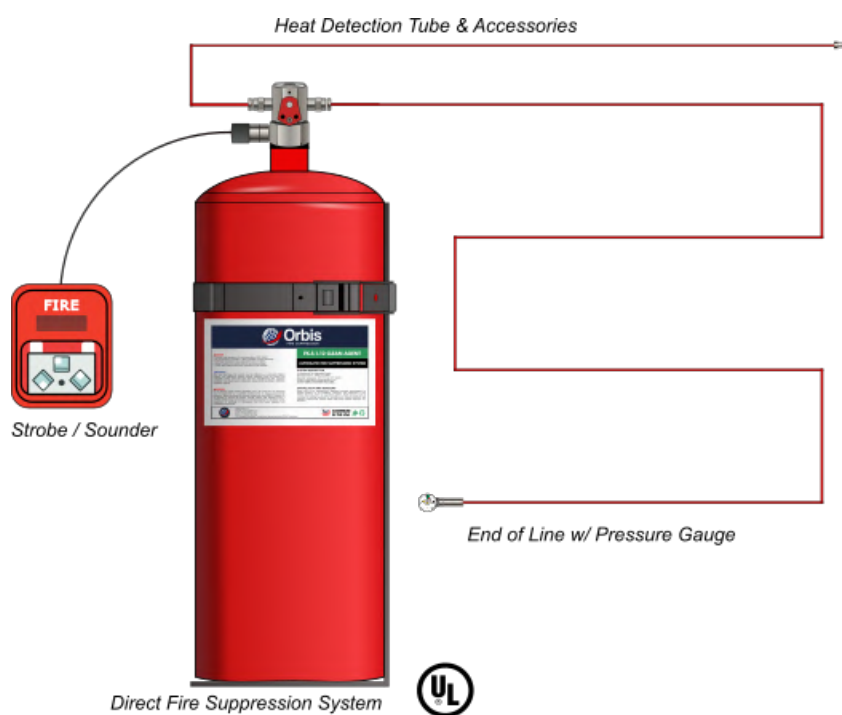
DIRECT LOW PRESSURE RELEASE SYSTEM (DLP)

Available Agents

The DLP system supports multiple clean and inert agents, selected based on the application type and environmental conditions:

Available Agents		
Agents	Type	Pressure
FK-5-1-12 (Novec™ 1230)	Clean Agent	13.4 bar (195 psi)
HFC-227ea (FM-200®)	Clean Agent	13.4 bar (195 psi)
IG-01 (Nitrogen)	Inert Gas	13.4 bar (195 psi)
IG-100 (Argon)	Inert Gas	13.4 bar (195 psi)

System Components	
Component	Description
Cylinder Assembly	Stainless steel or carbon steel cylinders, pre-filled and pressurized with the selected agent (13.4 bar @ 21°C).
Valve Assembly	Low-pressure valve with integrated pressure gauge and optional pressure switch for system monitoring.
Detection Tube	Specially formulated polyamide tube rated for 25 bar, UV and vibration resistant; available in lengths up to 100 m.
Fittings & Connectors	Brass or stainless-steel compression fittings for secure connection between valve and tube.
Mounting Bracket	Powder-coated steel or stainless steel bracket for vertical cylinder installation.
Optional Accessories	Manual release unit, control interface module, low-pressure switch, refilling adapter.

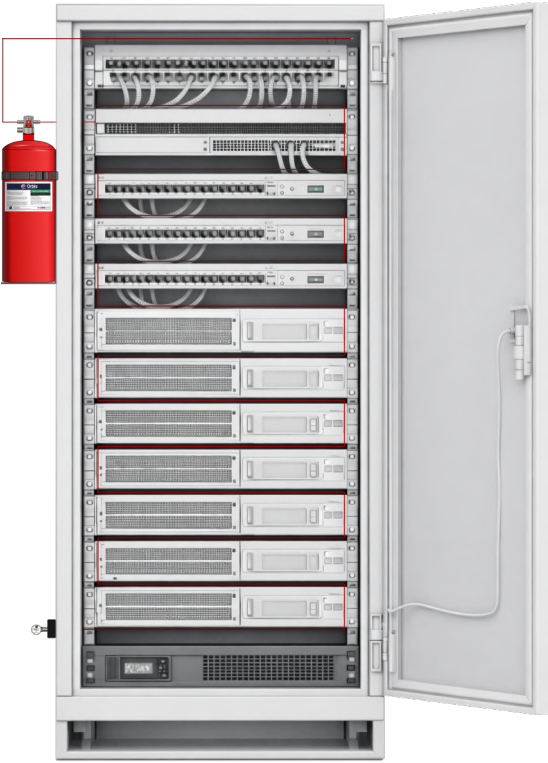


DIRECT LOW PRESSURE RELEASE SYSTEM (DLP)

Key Features

- Fully automatic operation. No external power or control panel required
- Localized suppression directly at the ignition source
- Simple installation, minimal components
- Environmentally responsible agents (FK-5-1-12, HFC-227ea, IG-01, IG-100)
- Fast and easy reset and recharge
- Resistant to vibration, dust, and temperature fluctuations
- Custom configurations available for OEM and enclosure manufacturers

Technical Specifications	
Parameter	Specification
System Type	Pre-Engineered, Direct Release
Operating Pressure	13.4 bar (±10%)
Discharge Time	< 10 seconds (typical)
Activation Temperature	110°C – 150°C (depending on tube type)
Cylinder Sizes	3 lb, 4lb, 7 lb, 11 lb, 12lb, 14 lb, 22 lb, 50 lb
Materials	Cylinder: Carbon or stainless steel / Valve: Nickel-plated brass / Tube: Polyamide
Temperature Range	–20°C to +60°C
Mounting Orientation	Vertical
System Monitoring (optional)	Pressure switch (NC/NO), 24 V DC
Design Standard	NFPA 2001 / ISO 14520 / EN 15004



DLP Server Rack System
w/ Dual Port Tubing

IN-DIRECT LOW PRESSURE RELEASE SYSTEM (ILP)

System Overview

The Orbis® ILP (Indirect Low Pressure) fire suppression system is a pre-engineered, automatic gaseous suppression system designed to protect enclosed hazards such as electrical cabinets, control panels, machinery enclosures, and energy infrastructure.

Unlike direct discharge systems, the ILP configuration separates fire detection from agent discharge, allowing controlled and uniform distribution of extinguishing agent through fixed nozzles. This architecture makes the ILP system suitable for larger enclosures, complex layouts, and applications requiring predictable agent coverage.

The system operates autonomously and can function with or without external power, depending on configuration.

System Functionality

1. Continuous Detection

A flexible heat-sensing polymer detection tube is installed throughout the protected enclosure, routed near high-risk components such as busbars, contactors, power electronics, or converters.

The tube is pressurized and continuously monitored by the system valve or actuator.

2. Fire Event & Tube Rupture

When a fire occurs, localized heat raises the temperature inside the enclosure. At approximately 110°C–150°C, the detection tube softens and ruptures at the hottest point, providing precise fire location detection.

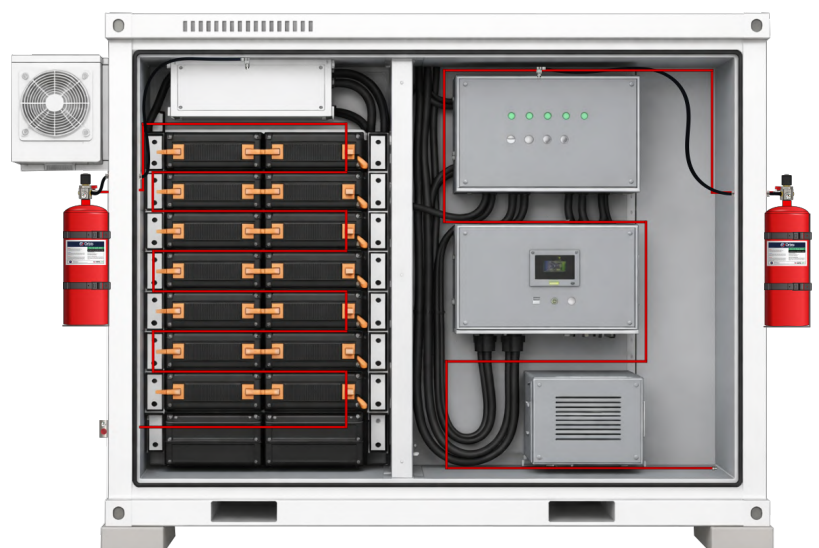
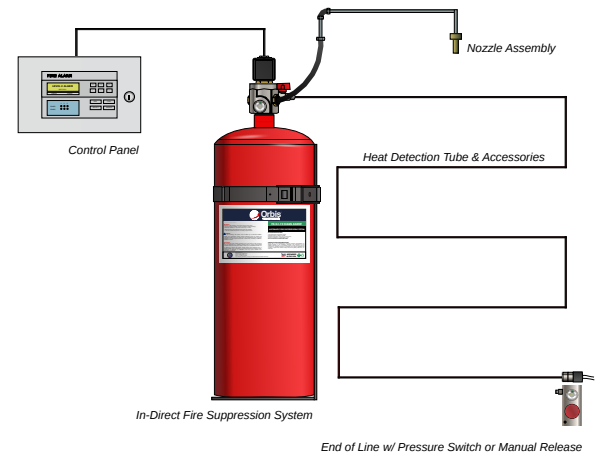
This rupture causes an instant pressure drop in the detection circuit.

3. Valve Actuation

The pressure drop activates the ILP discharge valve via:

- Pneumatic actuation (standard), or
- Electric solenoid actuation (optional)

Once actuated, the valve opens fully.



ILP System in BESS Station
w/ Electric Solenoid

IN-DIRECT LOW PRESSURE RELEASE SYSTEM (ILP)

4. Agent Discharge via Nozzles

The extinguishing agent is released from the cylinder and distributed through fixed discharge piping and nozzles, ensuring uniform agent concentration throughout the protected enclosure.

This indirect discharge method allows:

- Predictable coverage
- Multiple nozzle placement
- Protection of larger or irregular volumes

5. Fire Suppression

Depending on the extinguishing agent selected, the system operates through one of the following mechanisms:

- Clean agents (FK-5-1-12, HFC-227ea) absorb heat and interrupt the combustion process without leaving residue
- Inert gases (IG-01, IG-100) reduce oxygen concentration below combustion thresholds
- Carbon dioxide (CO₂) displaces oxygen and suppresses combustion in enclosed or unoccupied spaces
- Dry chemical agents interrupt the chemical chain reaction and provide rapid flame knockdown

The system is designed to suppress fire at its point of origin, typically within seconds of activation, limiting escalation and reducing damage to protected equipment.

Available Agents		
Agents	Type	Pressure
FK-5-1-12 (Novec™ 1230)	Clean Agent	13.4 bar (195 psi)
HFC-227ea (FM-200®)	Clean Agent	13.4 bar (195 psi)
IG-01 (Nitrogen)	Inert Gas	13.4 bar (195 psi)*
IG-100 (Argon)	Inert Gas	13.4 bar (195 psi)*
CO2	Inert Gas	Varies (High Pressure)
ABC Dry Chemical	Chemical Agent	Varies (Cartridge / stored pressure)**

* Inert gases are typically stored at higher pressures; system design pressure may vary based on configuration

** CO₂ and dry chemical systems operate at different pressures depending on cylinder type and discharge configuration Inert gases are typically stored at higher pressures; system design pressure may vary based on configuration



ILP System in CNC Machine
w/ Manual Release & Strobe

IN-DIRECT LOW PRESSURE RELEASE SYSTEM (ILP)

System Components	
Component	Description
Cylinder Assembly	Stainless steel or carbon steel cylinders, pre-filled and pressurized with the selected agent (13.4 bar @ 21°C).
Valve Assembly	Low-pressure valve with pneumatic or electric actuation, pressure gauge, and optional pressure switch.
Detection Tube	Specially formulated polyamide tube rated for 25 bar, UV and vibration resistant; available in lengths up to 25 m.
Fittings & Connectors	Brass or stainless-steel compression fittings for secure connection between valve and tube.
Mounting Bracket	Powder-coated steel or stainless steel bracket for vertical cylinder installation.
Optional Accessories	Manual release unit, control interface module, low-pressure switch, refilling adapter.
Discharge Piping & Nozzles	Fixed piping network with calibrated nozzles for uniform agent distribution.



Technical Specifications	
Parameter	Specification
System Type	Pre-Engineered, Indirect Discharge
Operating Pressure	13.4 bar (±10%)
Discharge Time	< 15 seconds (typical)
Activation Temperature	110°C – 150°C (depending on tube type)
Cylinder Sizes	3 lb, 4lb, 7 lb, 11 lb, 12lb, 14 lb, 22 lb, 50 lb
Materials	Cylinder: Carbon or stainless steel / Valve: Nickel-plated brass / Tube: Polyamide
Temperature Range	–20°C to +60°C
Mounting Orientation	Vertical
System Monitoring (optional)	Pressure switch (NC/NO), 24 V DC, H2 Sensor, CO Sensor, Control Panel
Design Standard	NFPA 2001 / ISO 14520 / EN 15004



ILP System in Engine Bay
w/ Multiple Nozzle Config.

PRE-ENGINEERED SYSTEM APPLICATIONS

Electrical & Power Systems

Electrical Cabinets / Control Panels

Provides localized fire suppression within enclosed electrical assemblies where faults and overheating may occur.

Switchgear & Distribution Boards

Protects critical power distribution equipment by suppressing internal arc faults and thermal events at the source.

Motor Control Centers (MCCs)

Mitigates fire risk within motor starters and control compartments, reducing downtime and equipment damage.

Uninterruptible Power Supply (UPS) Systems

Safeguards power continuity systems by rapidly suppressing internal faults and battery-related fire risks.

Data & IT Infrastructure

Server Racks

Delivers targeted suppression within high-density IT racks, preventing fire propagation across critical data infrastructure.

Data Centers (Cabinet-Level Protection)

Provides localized protection at the equipment level, complementing room-based suppression strategies.

Telecommunications Cabinets

Ensures protection of remote and unmanned communication enclosures exposed to electrical and environmental risks.

Energy Storage & Renewable Systems

Battery Energy Storage Systems (BESS)

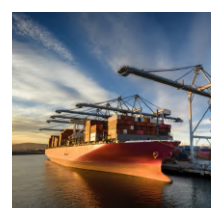
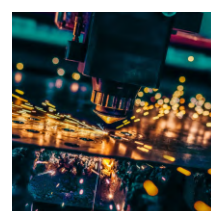
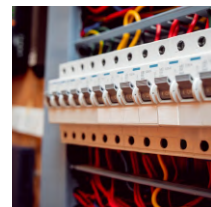
Suppresses incipient fires within battery enclosures and electrical components to reduce escalation risk.

Solar Inverter Cabinets

Protects inverter and control systems subject to high electrical loads and thermal stress.

Wind Turbine Nacelles & Control Cabinets

Provides localized suppression for electrical and mechanical components located within confined nacelle spaces.



PRE-ENGINEERED SYSTEM APPLICATIONS

Industrial Equipment

CNC Machines & Machine Tools

Suppresses fires caused by friction, overheating, or flammable materials within enclosed machining environments.

Industrial Control Enclosures

Protects automated production systems and control units from internal fire events.

Dust Collection Systems

Mitigates fire risk from combustible dust accumulation within collectors and associated equipment.

Hydraulic Power Units

Suppresses fires resulting from hydraulic fluid leaks contacting hot surfaces or ignition sources.



Transportation & Mobile Equipment

Heavy Vehicles (Engine Compartments)

Provides automatic suppression in high-risk engine bays exposed to heat, fuel, and mechanical failure.

Mining Equipment

Protects critical machinery operating in harsh environments where fire risk is elevated.

Marine Engine Rooms & Electrical Panels

Ensures suppression within confined onboard systems where manual intervention may be limited.



Infrastructure & Facilities

Generator Enclosures / Generator Rooms

Suppresses fires originating from fuel systems, electrical faults, or overheating components.

Commercial Kitchen Equipment (Enclosed Systems)

Provides localized suppression for enclosed electrical or mechanical kitchen equipment (non-hood applications).



Elevator Control Rooms

Protects control systems and electrical components critical to vertical transportation infrastructure.



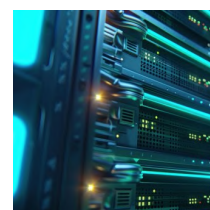
Specialized / High-Risk Applications

Fuel Transfer & Pump Systems

Suppresses fires in enclosed pump systems handling flammable liquids.

Laboratory Equipment Enclosures

Provides protection for specialized equipment handling volatile or reactive materials.



Rail & Transit Electrical Cabinets

Protects signaling and control systems critical to transportation infrastructure.



FIRE PROTECTION FOR EQUIPMENT AND INFRASTRUCTURE



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