

Technical Manual

Installation and Service

BlazeCut Automatic Fire Suppression System

Indirect Clean Agent Systems



CEA10

CEA35

CFA10

CFA35

CNO10

CNO35

AUTOMATIC FIRE SUPPRESSION SYSTEMS



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1. INTRODUCTION

MANUFACTURER INFORMATION

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INSTRUCTIONS FOR USE OF THE MANUAL

This manual is intended to supply technical information for the trained and authorized BlazeCut Group. Any personnel performing installation, inspection, maintenance or replacement of components with the BlazeCut system shall have this manual available and proceed solely in accordance with it. Failure to follow the instructions in this manual and any other BlazeCut manuals may result in system malfunctioning, causing damage to the protected equipment and presents serious danger to the life and health of others.

SAFETY FIRST

Please read this manual in its entirety. Operation and installation instructions need to be fully understood before this BlazeCut product is installed. Failure to do so may void warranty. Your local governing regulations for safety and compliance must be followed.

In the figures the descriptions of the components are marked with numbers, the descriptions of steps are marked with a letter "S" and a number.

WARNINGS AND CAUTIONS



This symbol in the text represents warning of specific risk, danger, or warning of described procedure. Failure to follow the instructions in the text marked with this symbol may result in damage to property, loss of warranty, unforeseeable event or threat to safety, health or life of persons performing the operation on the system or persons in their vicinity. Do not proceed contrary to the instructions marked with such symbol.

FURTHER INFORMATION

BlazeCut® is a registered trademark of BlazeCut and is recorded in the Register of Community Trade Marks.

If any of the instructions in this manual are unclear or in case of further questions contact the BlazeCut Team.

WARNING

Please ensure that the safety instructions are fully understood before the equipment is put into service.

Do not modify any part of the BlazeCut components as this may cause serious injury or a failure of the system.

Always wear the appropriate protective equipment and clothing whilst installing or servicing.

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2. BASIC INFORMATION ABOUT THE SYSTEM

EXPLANATION OF TYPE NAME CAPTION

CEA¹XX²-XX³-X⁴V⁵⁶

↑ ↑ ↑ ↑ ↑ ↑

1. 2. 3. 4. 5. 6.

1. Part of caption stating the BlazeCut system series
C (cylinder) – type of system using cylinder
2. Part of caption stating extinguishing agent used
EA – extinguishing agent used HFC-227ea
FA – extinguishing agent used HFC-236fa
NO – extinguishing agent used Novec 1230 (FK-5-1-12)
3. Part of caption stating valve used
10 – Code name of the valve with the solenoid, optionally with one BlazeTube detection outlet (Ø 6 mm) or additional M10x1 adaptor
35 – Code name of the valve without the solenoid, one BlazeTube detection outlet, Ø 6 mm
4. Part of caption stating quantity of extinguishing agent
e.g. “2” means system with the 2 kg of extinguishing agent
5. Part of caption stating quantity of nozzles.
6. Part of caption stating Kit for vehicle or mobile application.

ASSOCIATED NAMES

In certain cases it is needed to state use of multiple systems. In these cases associated name is used.

Example:

CEA(FA)10 – includes all systems BlazeCut with the cylinder (C) with the extinguishing agent used HFC-227ea (EA) and HFC-236fa (FA) with the valve type “10” with integrated solenoid.

DESCRIPTION OF SYSTEM

Commercial name: BlazeCut

Characteristics: automatic fire suppression system

Type: Indirect Low Pressure (ILP)

Functionality: BlazeCut system is designed to protect closed spaces, from fire using volume fire suppression, e.g.:

- Engine compartments of mobile equipment and vehicles
- Electrical switchboards, fuse boxes, electrical supply sources, battery spaces,
- Network installations, voltage junctions,
- Server racks,
- Fume cabinets,
- Telecom tower shelters,
- Elevator engine rooms,
- CNC machines,
- AC devices, ventilation devices,

- Spray boxes for paint application,
- Mini power plants,
- Archives,
- Gas boilers, gas regulation stations,
- Windturbines,
- Other.

The fire suppression system operates by detecting fire using a pneumatic BlazeTube detection connected to the cylinder valve. The BlazeTube detection is placed in the protected enclosure and is under constant pressure whereby keeping the valve piston closed. In case of fire the BlazeTube detection degrades by the effect of fire or high temperature. When the BlazeTube detection is disrupted, the pressure in it decreases (LOP system - Loss of Pressure system) and the valve piston of the cylinder is open. The fire suppression system activates and the entire extinguishing agent is released. The detection system is independent of any electrical supply and operates solely on physical principles.

Alternatively the system can detect the fire using electronic devices like Linear Heat Detector (LHD) BlazeWire, smoke/heat detectors or other. These electronic devices must be used in connection with the integrated solenoid valve (valve type 10) or end of line solenoid valve in connection with the BlazeTube detection (valve type 35).

BlazeCut systems CEA(FA,NO)10 have integrated solenoid valve (valve type 10), which allows activation of the system by receiving signal from external device (alarm panel, fire panel, detector etc.).

BlazeCut systems BlazeCut CEA(FA,NO)35 have the valve without integrated solenoid (valve type 35) but the solenoid can be connected to end of BlazeTube detection as end of line device CSV001.

The system is referred to as indirect, which means that it is activated by BlazeTube detection or electronic detection and the agent is distributed via separate discharge line with distribution hoses/tubes, fittings and nozzles.

OPTIONAL COMPONENTS

Installation, use, function and service of selected optional components is described in annexes of the Installation and service manual or supplied as a separate manual. For more information contact the supplier.

List of BlazeCut optional components for ILP systems

Pressure Switch APS001 – simple mechanical switch with one switch point (fire alarm).

Pressure Transducer ATA100 – constant pressure monitoring with low/over pressure identification and output for communication.

Alarm Panel AAP200/CAP200 – IP65 small and simple alarm panel in robust aluminum body with LOP/LHD, manual fire button (AAP200 version), fault identification, universal in dash or external bracket installation.

Signaling Unit ASU001 - simple and cost-effective sound and light signaling unit.

Sounder ASR001 – multi tone red sounder, high base, IP65 rated.

Beacon ABR001 – red xenon beacon, high base, IP65 rated.

Signaling Unit ASU002 – red sounder and beacon, high base, IP44 rated.

Signaling Unit ASU003 – red sounder and beacon, high base, IP65 rated

Solenoid Valve CSV001 - The solenoid valve operates on the principle of automatic release of pressure from the BlazeTube detection after receiving signal from alarm panel, detector etc. This results in opening of the piston of the valve of the cylinder, activating the suppression system and completely releasing the extinguishing agent. This is the same process as during disruption of the BlazeTube detection by effect of fire or heat.

CSV001 is used only in connection with valve type 35 and serves as an end of line device of the BlazeTube detection. Any instruction in this manual regarding the ending of the BlazeTube detection apply to solenoid valve.

Remote actuator - The remote actuator manually releases the pressure from the BlazeTube detection, which results in opening the piston of the valve of the cylinder, activating the suppression system and completely

releasing the extinguishing agent. This is the same process as during disruption of the BlazeTube detection by effect of fire or heat.

CRA203 type: for bulthead mount

CRA204: on wall mount with additional M10x1 outlet.

It also serves as an end of line device of the BlazeTube detection. Any instruction in this manual regarding the ending of the BlazeTube detection apply to manual actuator.

LHD BlazeWire - LHD BlazeWire works only in connection with the Alarm Panel AAP200/CAP200 or fire panels and can be supplied with various activation temperatures depending on type of application.

Relay based smoke and heat detectors: ASD001 (smoke detector), AHD002 (heat and smoke detector), AHD001 (heat detector differential).

Remote electric actuators – CRA104 (yellow), CRA105 (blue), CRA106 (red).

INSTALLATION OF THE SYSTEM WITHOUT THE BLAZETUBE DETECTION (ONLY SYSTEMS CEA(FA,NO)10

Some applications require installation without the BlazeTube detection. In these cases the activation of the system has to be secured by different method e.g. manually by using electric signal from alarm panel, automatically by using the LHD BlazeWire, detectors etc. Due to these reasons it is possible to install the system without the BlazeTube detection only with the valve type 10 with integrated solenoid, systems CEA(FA,NO)10.

In this case the outlet of the BlazeTube detection and the ball valve of the valve of the cylinder is dismantled and opening on the valve is sealed by a sealing screw or the BlazeTube detection outlet is replaced with additional M10x1 adaptor.



Never dismantle a sealing screw closing the opening of the outlet of the BlazeTube detection. Its removal would cause immediate opening of the piston of the cylinder and release of the extinguishing agent.

If the BlazeTube detection is not installed, procedures to the BlazeTube detection and outlet of the BlazeTube detection mentioned in this manual are not applicable.

Without the BlazeTube detection it is not possible to install the system by using optional components: Remote actuator CRA203 and CRA204 and Solenoid valve CSV001 as these components require the BlazeTube detection for operation.

INSTALLATION OF THE SYSTEM WITH THE BLAZETUBE DETECTION OUTSIDE THE PROTECTED ENCLOSURE

In some cases use of the BlazeTube detection for fire detection is not suitable but can be useful to activate the system for example manually by using remote actuator or end of line solenoid valve (through alarm panel or detector).

In this case the BlazeTube detection is not installed in the protected enclosure and is not used for fire detection. It is only conducted from the valve to remote actuator CRA203 or CRA204 or solenoid valve CSV001 to place of operation of the system.

In harsh environment or high vibration installations the outlet of the BlazeTube detection on the valve, remote actuator and end of line solenoid valve can be factory adjusted to fit the LOP hose of same construction and material as feed hose or distribution hose. LOP hose has higher durability against mechanical damage compare to BlazeTube detection.

All instructions in regards to the BlazeTube detection, its installation and pressurization in this manual remain in reasonable force.

2.1. TECHNICAL SPECIFICATION AND TYPES

Types of BlazeCut system described in this manual

Model	Type of agent	Amount of agent (KG)	Operation Pressure at 20°C (bar)	Pneumatic Activation (BlazeTube)	Diameter of BlazeTube (mm)	BlazeTube outlets	Electrical Activation (Solenoid)	LOP Remote Activation	Maximum allowable pressure (bar)	Test pressure of pressure equipment (bar)	Operation temperature
CEA10	HFC-227ea	1 – 16	12	YES*	6	1*	YES	YES*	20	28	from -20°C to +55°C
CFA10	HFC-236fa	1 – 16	12	YES*	6	1*	YES	YES*	20	28	from -20°C to +60°C
CNO10	Novec 1230 (FK-5-1-12)	2 – 18	15	YES*	6	1*	YES	YES*	20	28	from -20°C to +60°C
CEA35	HFC-227ea	1 – 16	12	YES	6	1	YES**	YES	20	28	from -20°C to +55°C
CFA35	HFC-236fa	1 – 16	12	YES	6	1	YES**	YES	20	28	from -20°C to +60°C
CNO35	Novec 1230 (FK-5-1-12)	2 – 18	15	YES	6	1	YES**	YES	20	28	from -20°C to +60°C

*10 series valve version with the BlazeTube outlet connector

**Only with the end of line solenoid valve CSV001

2.2. USE OF THE SYSTEM

BlazeCut system is designed for protection of closed spaces from fire using volume or local fire suppression.

The fire suppressing properties depend on many factors, including the size of the protected enclosure, the properties of the flammable substances in the space, shape and degree of closure of the area, the possibility of placement of extinguishing nozzles, air circulation etc. In order to reach desired extinguishing concentration and effective use of BlazeCut system consult the choice of type, amount of agent and cylinders, type of extinguishing agent and installation method with the supplier of the system.

In order to achieve accurate design of the system it is necessary to be priorly informed of at least the following parameters:

- The dimensions of the protected area,
- Openness of the protected area and airflow in it,
- The nature of fire risk in the protected area (presence of flammable materials, their amount, location),
- Layout of the protected enclosure,
- Sites with the highest probability of fire (presence of possible ignition sources of fire),
- Placement options of the system within the protected area (especially the location of the cylinder, distribution tubes/hoses, nozzles, and BlazeTube),
- The presence of people in the protected area, method of operation of the protected equipment, etc.

It is always recommended to discuss the potential fire risk factors and factors in the protected enclosure with a local fire protection specialist who has knowledge about the protected enclosure and these information are provided to the supplier of the system.

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It is also necessary that the conditions in the protected area are in accordance with the permissible parameters of the system, especially the lowest and highest temperature in the protected area.

Remember that there are a lot of factors and variables that affect the extinguishing process in case of fire. Is not possible to guarantee total suppression of fire in the protected enclosure under all circumstances.

System BlazeCut is designed to protect of equipment in closed spaces. Use in partially or completely open spaces or spaces with strong air circulation may significantly decrease the efficiency of the system.

In case of forced ventilation in protected enclosure after activation of the system the ventilation shall be switched-off immediately to avoid venting of the agent from the protected area. In such case it is recommended to provide automatic cut-off of the ventilation when system BlazeCut is activated (e.g. with the Pressure Switch APS001).

Use of the system is also limited by the properties of extinguishing agent and its possible application. Detailed information are described in Chapters to each extinguishing agent.

BlazeCut system was designed and tested as a whole using original components with specific properties. Using other than components supplied by the manufacturer and spare parts is prohibited and may change the functionality of the system and causes loss of warranty. To order original spare parts and for further information contact the supplier of the BlazeCut system.

WARNINGS



Install and use system BlazeCut only with originally supplied components. Do not replace anything in the system, use only original components and spare parts. Use of components not approved by the manufacturer causes loss of warranty, may cause malfunction of the system and provides threat to safety and health of people.



System BlazeCut is designed as independently operating unit (also in case of multiple cylinder connection). It is not possible to connect several independent systems into one unit.



System BlazeCut is not compatible with other fire suppression systems, do not try to connect the system to any other equipment.



The system may be installed, maintained and repaired only by persons trained or authorized by the manufacturer and also holding relevant professional qualification depending on the procedure. Unprofessional interference with the system may cause malfunction of the system and provides threat to safety and health of people.

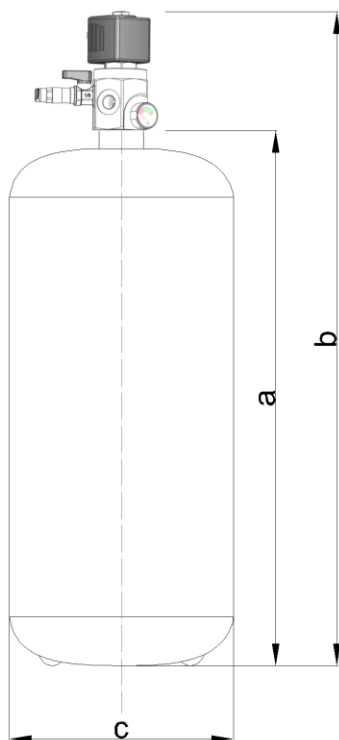


The system is not designed to be used as portable fire extinguisher. Do not try to suppress fire by holding the system in hands or sprinkling the extinguishing agent directly into the fire. Do not use the system in any other way than described in this manual.

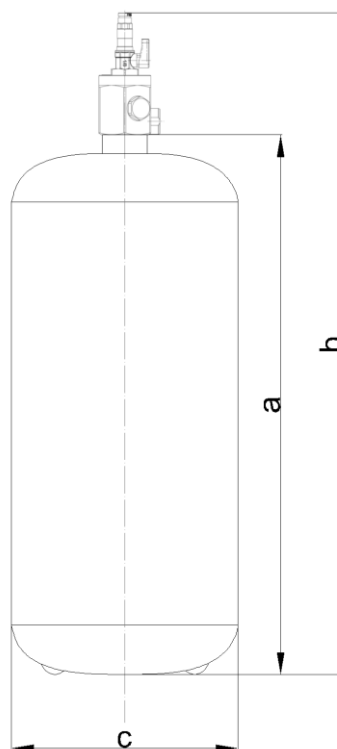
3. COMPONENTS OF THE SYSTEM AND THEIR DESCRIPTION

3.1. CYLINDER

Depending on the system configuration and the necessary amount of the extinguishing agent different size cylinders filled with the necessary amount of extinguishing agent may be used. The set size and selected parameters of normally used cylinders and valves are shown in picture and table below.



Cylinder with the valve 10
Systems C (EA,FA,NO)10



Cylinder with the valve 35
Systems C (EA,FA,NO)35

Cylinder dimensions

Parameters and dimensions of cylinders including valve

Volume of cylinder (liters)	Valve	a (mm)	b (mm)	c (mm)	M* (kg)	Volume of configuration** (l)	Agent	Max. amount of agent (kg)
2.4	10	319.5	424.5	110	2.61	2.53	HFC-227ea / HFC-236fa	2.5
							Novec 1230 (FK-5-1-12)	3
2.4	35	319.5	428.5	110	2.33	2.53	HFC-227ea / HFC-236fa	2.5
							Novec 1230 (FK-5-1-12)	3
5.0	10	348	453	150	3.50	5.13	HFC-227ea / HFC-236fa	5
							Novec 1230 (FK-5-1-12)	5
5.0	35	348	457	150	3.22	5.13	HFC-227ea / HFC-236fa	5
							Novec 1230 (FK-5-1-12)	5
7.8	10	460	565	160	4.15	7.93	HFC-227ea / HFC-236fa	8
							Novec 1230 (FK-5-1-12)	8
7.8	35	460	569	160	3.87	7.93	HFC-227ea / HFC-236fa	8
							Novec 1230 (FK-5-1-12)	8
13.0	10	533	638	190	6.17	13.13	HFC-227ea / HFC-236fa	14
							Novec 1230 (FK-5-1-12)	14
13.0	35	533	642	190	5.89	13.13	HFC-227ea / HFC-236fa	14
							Novec 1230 (FK-5-1-12)	14
16.0	10	645	750	190	8.28	16.13	HFC-227ea / HFC-236fa	16
							Novec 1230 (FK-5-1-12)	18
16.0	35	645	754	190	8.00	16.13	HFC-227ea / HFC-236fa	16
							Novec 1230 (FK-5-1-12)	18

*weight of the empty cylinder, dip tube, valve and without the extinguishing agent, sealing screws and pressure gauge, tolerance ± 0.05 kg

**volume at length of the BlazeTube detection 10 m

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Certification of cylinder according to 2014/68/EU

Material of cylinder: steel DC04 EN10130

Neck ring: stainless steel 316L AISI/EN 1.4435/1.4404

Inside surface: polymer coating

Max. Working pressure: PS 20 bar

Testing pressure: PT 30 bar

Cylinder label with model designation and production data



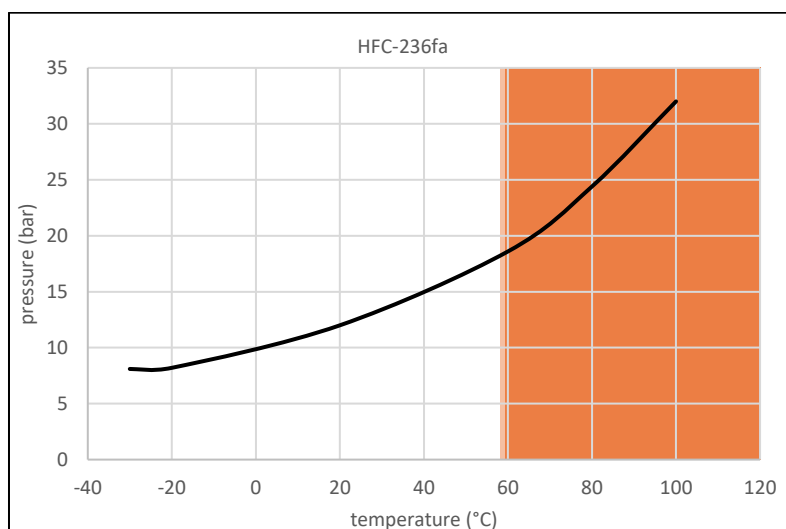
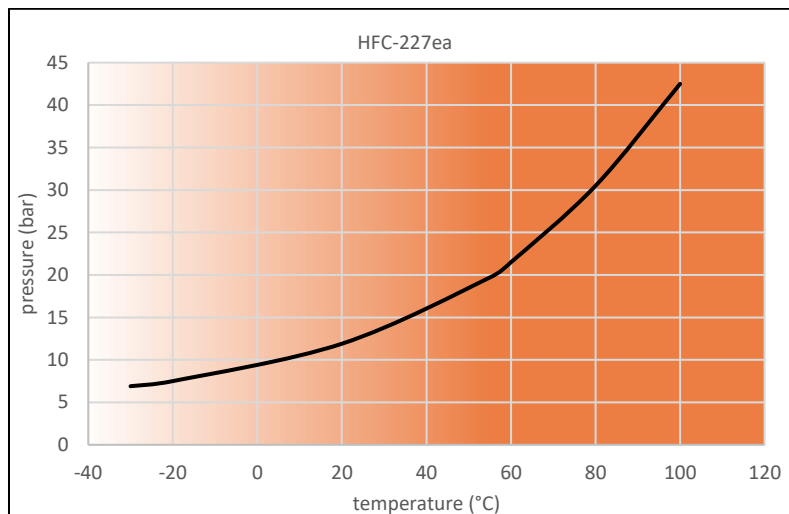
System Model: CEA10
System Kit: CEA10-2
Amount of Agent: 2 KG
Cylinder Volume: 2.4 L
Serial Number: 000001
Production Date: 01-2017

Steel cylinder is used for storage of extinguishing agent. In order to needed pressure for release of the agent and stabilization of pressure in the cylinder, the cylinder is pressurized with nitrogen gas under various pressures depending on extinguishing agent used. Pressure in the cylinder varies depending on the ambient temperature (see graph below). The amount of the extinguishing agent is indicated on the label of the cylinder.

SYSTEMS WITH EXTINGUISHING AGENT HFC-227ea and HFC-236fa USED - CEA(FA)10(35)

Extinguishing agent in the cylinder is in form of liquefied gas. The cylinder is pressurized with nitrogen gas under pressure of 12 bar at temperature 20° C.

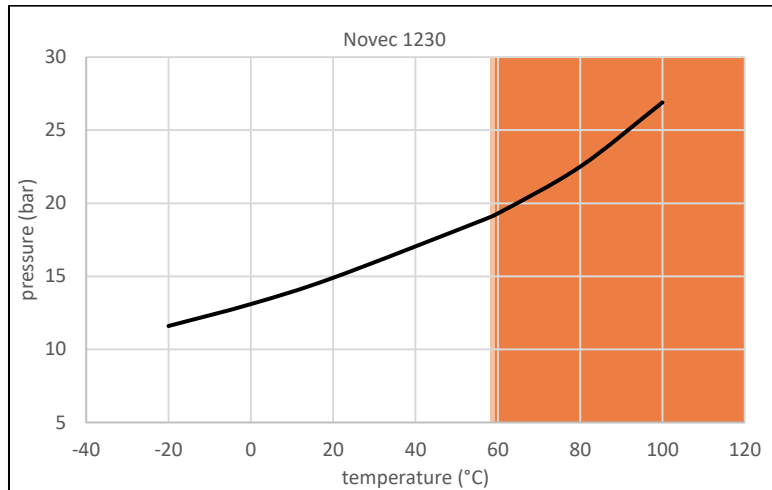
The relationship between temperature and pressure in the cylinder:



SYSTEMS WITH EXTINGUISHING AGENT NOVEC 1230 (FK-5-1-12) USED - CNO10(35)

Extinguishing agent in the cylinder is in liquid form. The cylinder is pressurized with nitrogen gas under pressure of 15 bar at temperature 20° C.

The relationship between temperature and pressure in the cylinder:



WARNINGS



In case of a significant difference between the actual pressure in the system with the data in the table, ensure inspection of the system.



Do not install the cylinder into the configuration, if incorrect pressure is detected in the cylinder during inspection (i.e. pressure is significantly different from the values stated above).



The cylinder of the system is under constant pressure. Do not damage the cylinder, do not puncture or throw. During transportation secure against tipping and movement. During transfer do not roll or rub against the ground. Do not mend or solder damaged cylinder. During storage separate empty cylinders from full ones and mark the storage place. Do not store or transportation in vicinity of strong sources of heat, aggressive chemical substances (caustic, corrosive substances), prevent contact with sharp objects, vibrations or loading with other objects. Store in dry and well ventilated rooms.



Do not expose the cylinder to direct sunlight. Heating the surface of the cylinder may significantly increase pressure in the cylinder.



Always handle the cylinder as if it were under pressure, unless it is directly verified that it is completely empty (e.g. by pressing the filling valve in the M10x1 pressure gauge outlet on the valve of the cylinder; the value of the pressure on the pressure gauge may be incorrect or the pressure gauge may be malfunctioning).



Transportation of equipment under pressure and equipment containing HFC gases by transportation vehicles is governed by specific legislation. Seek information and follow corresponding security requirements during transportation depending on the method of transport.

3.2. VALVE OF THE CYLINDER

Valve of the cylinder is part of the cylinder when system BlazeCut is supplied. The valve is closed by a piston, which keep the pressure in the system. The piston opens with rapid decrease of pressure or with electric activation using solenoid.

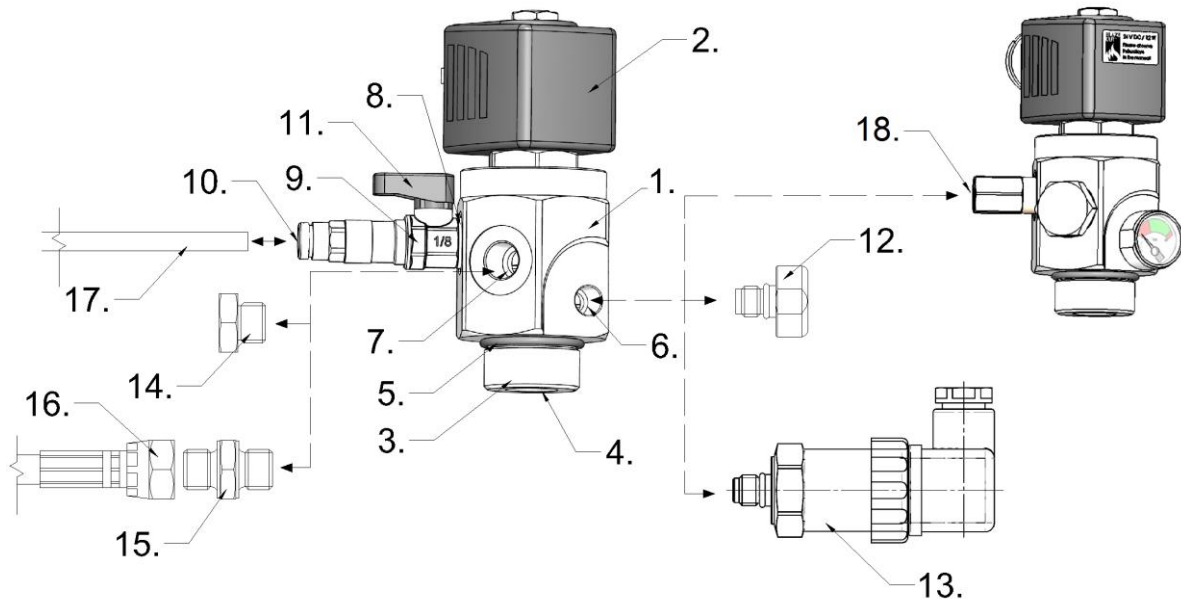


Do not try to remove the valve of the cylinder if the cylinder is under pressure. Prevent the valve of the cylinder from damage and impact. Do not lift the cylinder holding it by the valve of the cylinder or by other components of the system. Always store and transportation cylinders with valve facing upwards.



The valve is mounted on the cylinder by a specific tightening torque. Do not tighten or release the valve. If leak is detected on the connector of the valve and the cylinder, the configuration may not be used.

VALVE 10 WITH THE INTEGRATED SOLENOID – SYSTEMS CEA(FA,NO)10



Description of the valve and connecting components

1. Body of the valve
2. Solenoid
3. Cylinder thread M30x1.5
4. Outlet for dip tube M16x1.5 thread
5. O-ring seal of the valve
6. Outlet M10x1 for the pressure gauge (12.) or Pressure Switch APS001/Pressure Transducer ATA100 (13.)
7. 2 x G3/8" Discharge outlet (15.) for the feed hose or rigid tube (16.), sealed with screw when the system is supplied (14.)
8. Ball valve outlet G1/8" with gasket CFG018
9. Ball valve CBV001
10. BlazeTube detection outlet with the push in fitting CBTO006, Ø 6 mm (Optionally supplied with the LOP hose fitting)
11. Lever of the ball valve
12. Pressure gauge
13. Pressure Switch APS001/Pressure Transducer ATA100 (optional component)
14. Sealing screw
15. Discharge outlet connector to connect the feed hose or rigid tube
16. Feed hose or rigid tube
17. BlazeTube detection (Optionally LOP hose when the valve is supplied with the LOP hose fitting)
18. Additional M10x1 adaptor for pressure gauge or Pressure Switch APS001/Pressure Transducer ATA100. This adaptor can be supplied on the valve optionally to the ball valve with BlazeTube detection connection if the LOP line is not used on the system.

Parameters of the valve

Total height of the valve	Height of the valve without the cylinder thread	Cylinder thread	Dip tube thread	Distribution tube thread	Pressure gauge thread	BlazeTube detection outlet	Ball valve thread
120.5 mm	105 mm	M30x1.5	M16x1,5	2 x G3/8"	M10x1	Ø 6 mm	G1/8"

Type designation of spare 10 Series Valve

Part No.	Type of agent	Description
CVS010PH	HFC-227ea/HFC-236fa	ILP 10 Series Valve with push in fitting ("P") for BlazeTube detection. Type of agent determines type of pressure gauge supplied with the valve ("H,N,P,F")
CVS010PN	Novec 1230 (FK-5-1-12)	
CVS010PP	ABC Powder	
CVS010PF	Standard Foam/Antifreeze Premix	

Part No.	Type of agent	Description
CVS010LH	HFC-227ea/HFC-236fa	ILP 10 Series Valve with LOP hose fitting ("L") to connect LOP hose. Type of agent determines type of pressure gauge supplied with the valve ("H,N,P,F")
CVS010LN	Novec 1230 (FK-5-1-12)	
CVS010LP	ABC Powder	
CVS010LF	Standard Foam/Antifreeze Premix	

Note: WHEN ORDERING SPECIFY IF YOU REQUIRE BLAZETUBE DETECTION OUTLET OR ADDITIONAL M10X1 ADAPTOR

SOLENOID

Solenoid is electromagnetic coil. Electrical current is brought to the coil, which produces a magnetic field. The field transforms into mechanical energy, which secures release of pressure and opens the valve piston.

The system is supplied with a solenoid connector mounted on the solenoid. When fire is detected the solenoid allows to activate the system manually (e.g. alarm panel, electric actuator) or automatically using electrical detection such as smoke and/or heat detectors, LHD BlazeWire etc.

Technical specification:

Operation voltage: 24 V DC

Consumption: 12 W

IP rating: see table

Types of solenoid connectors

Part No.	IP rating	Description
ASC001	IP65 with ASS001	Solenoid connector for Electrics DIN EN175301-803 type A, IP65 with ASS001, no polarity
ASC101	IP67 with ASS101	Solenoid connector for Electrics with molded 30 cm electrical cable, 4 x 0.75 mm ² wires (see below a wiring diagram)
ASS001		Solenoid seal for electrical connector ASC001
ASS101		Solenoid seal silicone for electrical connector ASC101



ASC001



ASS001

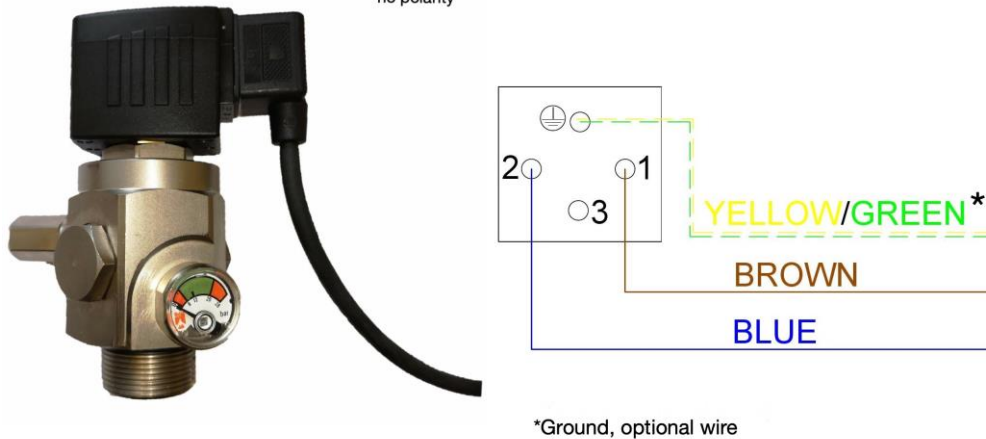


ASC101



ASS101

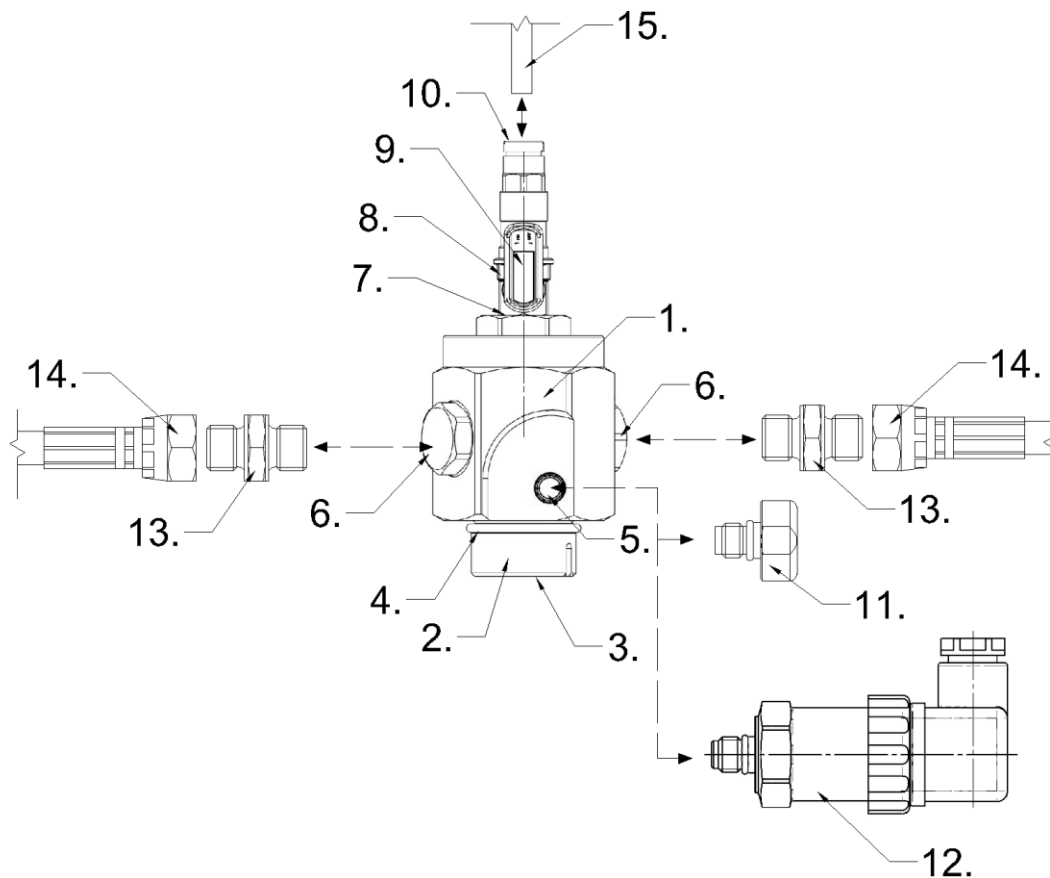
ASC101 wiring diagram
no polarity



Please refer to the ALARM PANEL MANUAL – APM200AC for full wiring detail.

VALVE 35 WITHOUT THE INTEGRATED SOLENOID – SYSTEMS CEA(FA,NO)35

Valve Series 35 is mostly used in LOP applications with the BlazeTube detection for fire detection. It is however possible to use end of line solenoid CSV001 if the system needs to be extended with electrical operations (e.g. manual actuation on the alarm panel or additional electrical detection).



Description of the valve and connecting components

1. Body of the valve
2. Cylinder thread M30x1.5
3. Outlet for dip tube M16x1.5 thread
4. O-ring seal of the valve

5. Outlet M10x1 for the pressure gauge (11.) or Pressure Switch APS001/Pressure Transducer ATA100 (12.)
6. 2 x G3/8" Discharge outlet (13.) for the feed hose or rigid tube (14.), sealed with screw when the system is supplied
7. Ball valve outlet G1/8" with gasket CFG018
8. Ball valve CBV001
9. Lever of the ball valve
10. BlazeTube detection outlet with the push in fitting CBTO006, \varnothing 6 mm
11. Pressure gauge
12. Pressure Switch APS001/Pressure Transducer ATA100 (optional component)
13. Discharge outlet connector to connect the feed hose or rigid tube
14. Feed hose or rigid tube
15. BlazeTube detection

Parameters of the valve

Total height of the valve	Height of the valve without the cylinder thread	Cylinder thread	Dip tube thread	Distribution on tube thread	Pressure gauge thread	BlazeTube detection outlet	Ball valve thread
124 mm	109 mm	M30x1.5	M16x1.5	2 x G3/8"	M10x1	\varnothing 6 mm	G1/8"

Type designation of spare 35 Series Valve

Part No.	Type of agent	Description
CVS035PH	HFC-227ea/HFC-236fa	ILP 35 Series Valve with push in fitting ("P") for BlazeTube detection. Type of agent determines type of pressure gauge supplied with the valve ("H,N,P,F")
CVS035PN	Novec 1230 (FK-5-1-12)	
CVS035PP	ABC Powder	
CVS035PF	Standard Foam/Antifreeze Premix	

PISTON OF THE VALVE

Piston of the valve is opening in case of drop of pressure in detection part of the valve by decrease of pressure in the BlazeTube detection, which normally keeps the piston in closed position. This principle is solely mechanical and independent of any external power supply. The piston can be also released by the solenoid.

BLAZETUBE DETECTION CONNECTOR

The BlazeTube detection connector with outlet \varnothing 6 mm is on the valve of the cylinder. Part of this connector is a small ball valve mounted in the valve outlet with thread G 1/8". The ball valve is closed when supplied. It will be open after pressurization of the BlazeTube detection.

For safety reasons cylinders under pressure must be protected against accidental activation by removal of the lever of the ball valve during transportation of the cylinder. Install the lever during installation of the BlazeTube detection. During installation and removal proceed as shown in the figures below.



Ball valve without lever



Use a screw driver for mounting and dismounting



Place the red cover of the lever



Remove the cover of the lever with a screw driver



Do not try to remove the BlazeTube detection connector from the valve of the cylinder if system is under pressure.



Always remove the lever of the ball valve during transportation of cylinders under pressure.

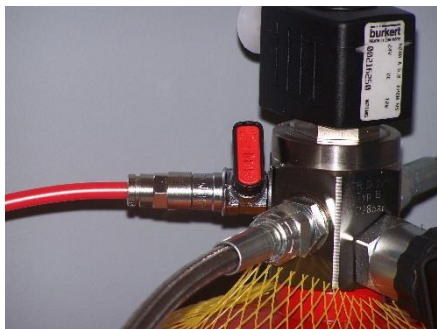


Do not open the ball valve of the BlazeTube detection connector before pressurization of the tube, the valve piston of the cylinder will open and the extinguishing agent will be released. Protect the ball valve from accidental opening during transportation and handling of the cylinder. Follow the instructions for transportation of the cylinder.



The ball valve of the BlazeTube detection connector may be open only after fulfilling the following criteria:

- The cylinder of the system is properly fastened,
- The system is completely installed,
- The BlazeTube detection is properly mounted on the valve and the end of line adapter is properly mounted on the BlazeTube detection,
- The BlazeTube detection is pressurized under correct pressure.



Ball valve is closed



Ball valve is open

DISCHARGE OUTLET

The valve of the cylinder contains two outlets for the discharge networks. They are closed by the valve piston of the cylinder. The outlets have thread G 3/8". These outlets are sealed with screws against accidental activation of the system when system BlazeCut is supplied.



The sealing screws of the outlets for discharge networks must always be mounted on the valve of the cylinder, except when discharge networks are installed. Remove the sealing screws right before installation of the discharge networks.

3.3. BLAZETUBE DETECTION

The BlazeTube detection is a linear indicator of fire and automatic activator of system BlazeCut.

The BlazeTube detection is proprietary detection tube manufactured by BlazeCut to fulfill highest market standards and combining key features like high chemical resistance, long lifetime, UV stability, flexibility and reliable fire detection.

The BlazeTube detection is connected to the valve of the cylinder into the connector for BlazeTube detection, it has end of line device at its end. The BlazeTube detection is placed in the protected enclosure. During installation the tube is pressurized by nitrogen gas and during operation of the system it is under constant pressure, whereby keeping the piston of the valve of the cylinder closed. Pressure in the tube and in the cylinder is the same during the operation of the system. During fire the tube degrades by direct effect of fire or high temperature at any place whereby disrupting the tube in the place of direct effect of fire or the highest temperature, decreasing pressure in the tube and opening the piston of the valve of the cylinder. This activates the fire suppression system and releases the extinguishing agent.



BlazeTube Detection ABT170

Time necessary for degrading of the BlazeTube detection by direct effect of fire or minimum temperature necessary for degrading the BlazeTube detection depends on the pressure in the tube, which is affected by

AUTOMATIC FIRE SUPPRESSION SYSTEMS



factors such as the level of pressurization of the system and ambient temperature. The higher the pressure in the BlazeTube detection, the sooner the BlazeTube detection degrades and the system activates.

BlazeTube Detection parameters

Material	Special heat sensitive plastic
Color	red
Outside diameter	6 mm
Activation temperature	About 170°C
Life span	Up to 10 years

Type of BlazeTube detection

Part No.	Description
ABT170	6 mm BlazeTube detection

STANDARD BLAZETUBE KITS

Part No.	Description
KABT170-005	6 mm BlazeTube Kit Standard, 5 meters with cable gland and cable ties
KABT170-010	6 mm BlazeTube Kit Standard, 10 meters with cable gland and cable ties
KABT170-015	6 mm BlazeTube Kit Standard, 15 meters with cable gland and cable ties
KABT170-020	6 mm BlazeTube Kit Standard, 20 meters with cable gland and cable ties
KABT170-030	6 mm BlazeTube Kit Standard, 30 meters with cable gland and cable ties
KABT170-040	6 mm BlazeTube Kit Standard, 40 meters with cable gland and cable ties



BlazeTube Standard Kit

HEAVY DUTY BLAZETUBE KITS

Part No.	Description
KABT170-005-HD	6 mm BlazeTube Kit Heavy Duty, 5 meters with cable gland, hose clamps and grommets
KABT170-010-HD	6 mm BlazeTube Kit Heavy Duty, 10 meters with cable gland, hose clamps and grommets
KABT170-015-HD	6 mm BlazeTube Kit Heavy Duty, 15 meters with cable gland, hose clamps and grommets
KABT170-020-HD	6 mm BlazeTube Kit Heavy Duty, 20 meters with cable gland, hose clamps and grommets
KABT170-030-HD	6 mm BlazeTube Kit Heavy Duty, 30 meters with cable gland, hose clamps and grommets
KABT170-040-HD	6 mm BlazeTube Kit Heavy Duty, 40 meters with cable gland, hose clamps and grommets



BlazeTube Heavy Duty Kit

Compatibility with selected common chemicals

Sodium Hydroxide, 35%	OK	Standard fuel with alcohol	OK
Ammonium Hydroxide, 10%	OK	Standard fuel without alcohol	OK
Isopropyl alcohol	OK	Sodium Carbonate, 20%	OK
Ethanol	OK	Sodium Hypochlorite, 10%	OK
Methanol	OK	Sodium Chloride, 10%	OK
Diethyl ether	OK	Zinc Chloride, 50%	OK
Acetone	OK	Citric Acid, 10%	OK
Toluene	OK	Acetic Acid, 5%	OK
Hexane	OK	Sulfuric Acid, 38%	OK
iso-Octane	OK	Lactic Acid, 10%	OK
Insulating Oil	OK	Ethylene Glycol in water, 50%	OK
Multi-grade motor oil	OK	Hydrogen peroxide	OK
Hypoid gear oil	OK	Ethyl Acetate	OK
Diesel fuel	OK	Water	OK

3.4. PRESSURE GAUGE

Actual pressure in the cylinder can be determined by reading the value on the pressure gauge, which is mounted on the system on the valve of the cylinder or end of line device. Green area scale of the pressure gauge indicates the permissible pressure in the system.

Types of pressure gauges



CPG001



CPG002

Part No.	Description	Thread
CPG001	Pressure gauge for HFC-227ea/HFC-236fa	M10x1 (12.5mm with filter and o-ring)
CPG002	Pressure gauge for Novec 1230 (FK-5-1-12)	M10x1 (12.5mm with filter and o-ring)

The pressure gauge is mounted on the valve of the cylinder in the outlet with thread M10x1 when the system is supplied. This outlet is closed by filling valve, which closes and opens automatically during removal or installation of the pressure gauge, which can be performed even when the system is under pressure. The same principle of sealing is also used on all end of line devices or additional M10x1 adaptor on the valve. For mounting and dismounting of the pressure gauge use spanner 22 mm. Do not overload the pressure gauge when tightening.



If the system is in operation and the BlazeTube detection under pressure, when mounting and dismounting the pressure gauge at the end of line device the ball valve on the valve of the cylinder must be always closed.

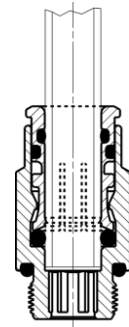
It is always recommended to keep the pressure gauge on the place as it was supplied on the system but in case of installation of the Pressure Switch/Transducer the pressure gauge can be removed from the valve of the cylinder and installed onto the end of line adapter of the BlazeTube detection or additional M10x1 adaptor on the valve. Remove the pressure gauge right before installation of the Pressure Switch/Transducer in order to prevent dirt from getting into the outlet and to detect the current pressure in the cylinder. In case the Pressure Switch/Transducer is not installed the pressure gauge remains on the valve of the cylinder and on the end of line adapter is mounted second pressure gauge.

Always place the pressure gauge so that the value of pressure can be read.

3.5. BLAZETUBE FITTINGS

BlazeCut double seal push in fittings provide a double tight on the tube, thus ensuring a highly reliable connection and avoiding possible leakage that may occur. Connection and disconnection of the tube can be repeated several times without the use of proper tools and without compromising the performance of the fitting or the sealing on the tube.

The BlazeTube detection can be connected through Tee, elbow or straight push in fittings. It is recommended to use as less connectors as possible especially in main fire risk areas with high operation temperature like engine compartments and connect the BlazeTube detection in the simplest manner.



Push in fitting with connecting tube

BlazeTube push in fittings

Part No.	Description
CBTF106	BlazeTube push in fitting Straight connector for BlazeTube \varnothing 6 mm
CBTF206	BlazeTube push in fitting Elbow connector for BlazeTube \varnothing 6 mm
CBTF306	BlazeTube push in fitting Tee connector for BlazeTube \varnothing 6 mm
CBTO006	BlazeTube outlet push in for BlazeTube \varnothing 6mm x G1/8"
CBTF216	BlazeTube fitting push in Elbow connector 360° turnable for BlazeTube \varnothing 6 mm x G1/8"
CBTF316	BlazeTube fitting push in Tee connector 360° turnable for BlazeTube \varnothing 6 mm x G1/8"



CBTF106



CBTF206



CBTF306



CBTO006



CBTF216



CBTF316

3.6. BLAZETUBE END OF LINE DEVICES

List of end of line devices

Part No.	Description
CEA006	End of line adapter \varnothing 6 mm with standard push in fitting for BlazeTube
CSV001	Solenoid valve end of line (see Annex for detail description)
CRA203	Remote actuator pneumatic, through panel, bulkhead mount (see Annex for detail description)
CRA204	Remote actuator pneumatic, on wall mount (see Annex for detail description)

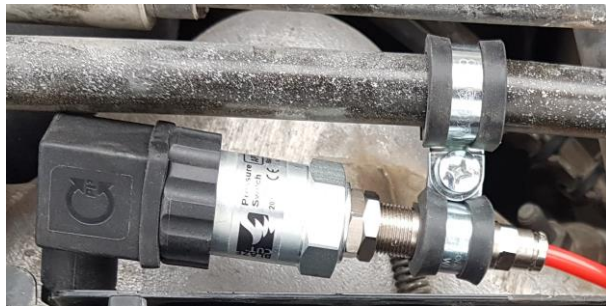
END OF LINE ADAPTER

BlazeTube end of line adapter is used for pressurization of the BlazeTube detection system when the system is installed (see Chapter 6.4.) and for pressurization of the system during inspection (see Chapter 6.5.).

Part No.	Description	Thread
CEA006	End of line adapter \varnothing 6 mm with push in fitting for BlazeTube	M10x1 to connect the pressure gauge or pressure switch/transducer



End of line adapter CEA006



Pressure Switch APS001 fitted on the End of line adapter CEA006

END OF LINE PLUG

End of line plugs are used to close one of the BlazeTube detection's when branching the BlazeTube.

Part No.	Description
CBTF006	Push in end of line plug \varnothing 6 mm

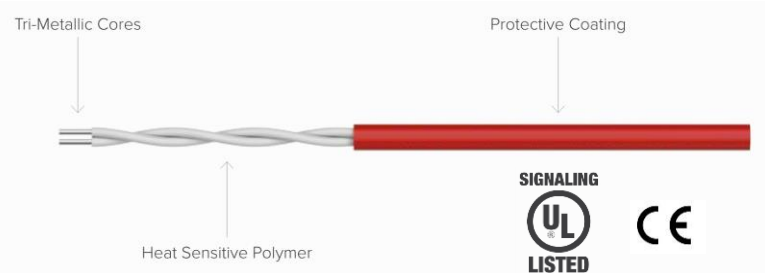


CBTF006

3.7. BLAZEWIRE

BlazeWire Overview

BlazeWire Linear Heat Detector is a cable constructed using two twisted and tensioned, tri-metallic conductors. Each of the conductive cables are coated in a heat sensitive polymer which, when heated to its rated temperature, melts, causing the two cables to touch. The resulting short sends a signal to the alarm panel, indicating that a fire (or excessive heat) has been detected. This action takes place at the first heated point anywhere along the BlazeWire's length, which can be up to 50 metres. It does not require that a specific length be heated in order to initiate an alarm nor is system calibration necessary to compensate for changes in the installed ambient temperature.



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BlazeWire is specifically designed for use in applications where extreme environmental and product performance must be met. It provides excellent abrasion resistance and excellent chemical and permeation resistance to a wide variety of acids, bases, organic solvents as well as simple gases. In addition, the jacket exhibits very little change in tensile properties upon outdoor exposure to sunlight and weather.

FEATURES

- Line coverage...continuous sensitivity up to 50 metres.
- 185°C (365°F) or 105°C (221°F) temperature rating. (Other temperatures available for special projects)
- Withstands severe environmental conditions.
- Approved for hazardous locations.
- Easy to install, test, and splice.
- Compatible with other initiation devices on same circuit. (Detectors, actuators)
- UL 521 Approved and compliant with the EN54:28 standard,
- complies with the CPR, EMC and the Low Voltage Directive (LVD)



5 m coil of BlazeWire ABW185

SPECIFICATIONS

Maximum Voltage Rating: 30 VAC, 42 VDC

Resistance: 100 Ω /km (29 Ω /kft) per leg

Min. Bend Radius: 50 mm (2 inches)

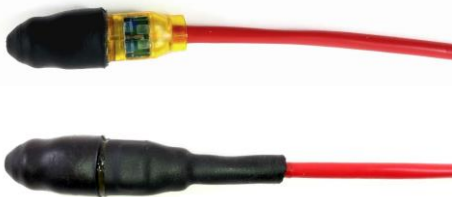
Diameter ABW180: 3.60 mm \pm 0.12 mm (0.142" \pm 0.005")

Diameter ABW105: 4.50 mm \pm 0.12 mm (0.177" \pm 0.005")

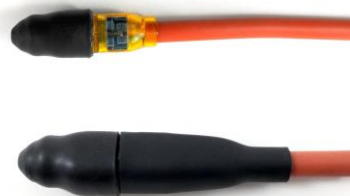
Minimum operation temperature: - 40°C (- 40°F)



End of line resistor AER001 with heat shrink



BlazeWire connected to AER001 and with heat shrink over AER001



Silicone cable connected to AER001 and with heat shrink over AER001

The BlazeWire must be installed above main fire risk areas. Make sure it is not in direct contact with parts of the protected device or in the immediate vicinity of the device parts that reach high temperatures during operation (e.g. Turbo in engine compartment).

Each BlazeWire circuit must be ended with the End of line resistor AER001. It is recommended to keep the End of line resistor away from main fire risk areas or heat sources so it is not exposed to risk of damage. The resistor is supplied with the glue heat shrink that is placed over the resistor and BlazeWire when spliced to the resistor connector to seal and hold firmly the BlazeWire.

It is recommended to use the Electrical Splice AES3550-2 with the heat shrink between the BlazeWire and electrical cable for firm hold and sealing. The Electrical Splice connectors are supplied in the BlazeWire kits. See below pictures for suggested installation of the Electrical Splice connector.



Electrical Splice AES3550-2

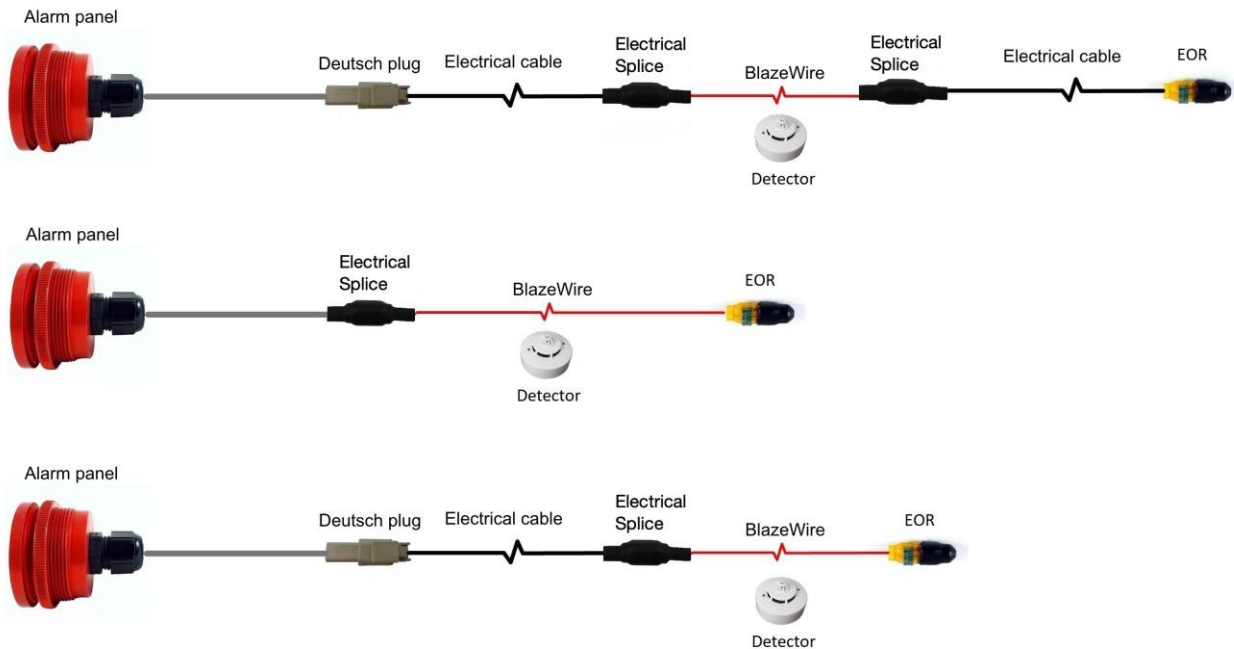


Silicone cable and BlazeWire spliced in the Electrical splice AES3550-2



Silicone cable and BlazeWire spliced in the Electrical splice AES3550-2 with the glue heat shrink placed over

It is not necessary to install the BlazeWire in whole length from the protected enclosure to the alarm panel. The BlazeWire can be used only in the main fire risk area and continue using standard or silicone cable to the alarm panel. See below figures for possible connection options.



Different connection options of BlazeWire/Detector and End of Line Resistor

BLAZE WIRE TYPES

Part No.	Description
ABW185	BlazeWire linear heat detection, 185°C signal temperature, maximum recommended ambient temperature up to 125°C (257°F), red color
ABW105	BlazeWire linear heat detection, 105°C signal temperature, maximum recommended ambient temperature up to 70°C (158°F), black color

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STANDARD BLAZEWIRE KITS

Part No.	Description
KABW185-005	5 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties
KABW185-010	10 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties
KABW185-015	15 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001
KABW185-020	20 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties
KABW105-005	5 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties
KABW105-010	10 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties
KABW105-015	15 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties
KABW105-020	20 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, cable ties



BlazeWire Standard Kit

HEAVY DUTY BLAZEWIRE KITS

Part No.	Description
KABW185-005-HD	5 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps
KABW185-010-HD	10 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps
KABW185-015-HD	15 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps
KABW185-020-HD	20 meters 185°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps
KABW105-005-HD	5 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps
KABW105-010-HD	10 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps



BlazeWire Heavy Duty Kit

KABW105-015-HD	15 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps
KABW105-020-HD	20 meters 105°C BlazeWire Kit with clamps, Electrical Splice connectors, heat shrink and End of Line Resistor AER001, silicone grommets and clamps

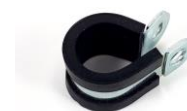
3.8. FASTENING MATERIAL

Linear parts of The BlazeCut system (BlazeTube detection, hoses, tubes, cables, LHD BlazeWire) must be tightly fastened and secured against movement. Use enclosed connecting material if necessary. It is possible to use other suitable fastening systems if they provide sufficient fixation of components, do not damage the fastening components and are suitable for the environment (high temperatures etc.). Follow this manual when fastening.

Hose (P) clamps

BlazeCut system kits are supplied with various P clamps suitable for firm fastening of many BlazeCut components.

Part No.	Description
AHC006	Hose clamp, 6 mm - suits 6 mm BlazeTube detection
AHC008	Hose clamp, 8 mm - suits 8 mm BlazeTube detection and LOP hose braid
AHC010	Hose clamp, 10 mm - suits spiral ABTS006G and ABTS006S, all push in BlazeTube fittings and end of line plug CBTF006, LOP hose crimped sleeve
AHC012	Hose clamp, 12 mm - suits distribution hose braid CHD050 - CHD500
AHC014	Hose clamp, 14 mm - suits end of line adapter CEA006, end of line resistor AER001
AHC016	Hose clamp, 16 mm - suits distribution hose crimped sleeve CHD050 - CHD500 and feed hose braid CHF050 - CHF300
AHC018	Hose clamp, 18 mm - suits feed hose crimped sleeve CHF050 - CHF300
AHC020	Hose clamp, 20 mm - suits BlazeWire and BlazeTube grommet, stainless steel



Hose clamp

BlazeWire and BlazeTube grommet

For installation of the BlazeWire and BlazeTube (ABT170 only) in harsh environments use silicone grommets and plastic-coated P clamps AHC020. Maximum recommended distance between the clamps should not be more than 500 mm. Clamps and silicone grommets are also supplied in a heavy duty BlazeWire and BlazeTube kits.

Part No.	Description
AGW003	Grommet silicone for BlazeWire, 3 mm
AGT005	Grommet silicone for BlazeTube, 5 mm



ABW185 BlazeWire in the AHC020 clamp and AGW003 grommet



ABT170 BlazeTube in the AHC020 clamp and AGT005 grommet

Tube clamps

Part No.	Description
ATC010	Tube clamp, 10 mm - suits 10mm rigid tube



Tube clamp ATC010

Cable ties

Two lengths of high temp cable ties are available for fastening of cables and BlazeTube in fixed installations.

Part No.	Description
ACT314	Cable tie, heat resistance up to +125°C, 3.6 x 140 mm, black color
ACT528	Cable tie, heat resistance up to +125°C, 5 x 280 mm, black color



Cable tie ACT314



Never use cable ties for installation of BlazeTube in engine compartment or other installations with high ambient temperature. Always use suitable hose (P) clamps.

3.9. LABELS

Various high quality UV stabilized labels are supplied with the BlazeCut system to ensure that the operator or people that may come in contact with the system are informed about its presence and operation.

Notification labels

Part No.	Description	Comment
ALA001	General Warning label	To notify there is a fire suppression system.
ALA002	"Shutdown Equipment" label	Label placed in the cabin near the alarm panel to notify the operator about delay time set to shutdown equipment. Includes peel-off numbers that are placed on label in accordance with delay time set on the panel.
ALA003	"Delay Discharge" Label	Label placed in the protected area to notify the operator or personnel about delay time set to discharge the system. Includes peel-off numbers that are placed on label in accordance with delay time set on the panel.
ALA004	"In the event of a fire" vehicle system label	Placed in the cabin to notify the operator about procedure in the event of a fire.

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ALA005	"In the event of a fire" gas system label, fixed installation	Placed in the protected area to notify the operator or personnel about procedure in the event of a fire.
ALA006	"Actuation arrow" label	Reflective label to highlight location of remote manual actuator.
ALA007	"Manual Actuator" label	Label placed next to remote actuator CRA203 or CRA204 to notify the operator or personnel how to manually actuate the system in the event of a fire.

Peel-off strip to cover 'and shutdown the equipment' if the function is not used



General warning label ALA001



ALA002



ALA003



ALA004



ALA005



ALA006



ALA007

Cylinder labels

Part No.	Description
CLA001	Label Cylinder - HFC-236fa
CLA002	Label Cylinder - HFC-227ea
CLA003	Label Cylinder - Novec 1230 (FK-5-1-12)

Cylinder labels identifying type of extinguishing agent and basic information and instructions about the system.

AUTOMATIC FIRE SUPPRESSION SYSTEM

This extinguishing agent may be used for the following classes of fire:

- Class A** flammable solids (including flammable liquids)
- Class B** flammable liquids
- Class C** flammable gases

System is suitable for fire suppression of electrical equipment under voltage.

Attention
Always consult suitability of use of the system and type of extinguishing agent in specific conditions with the manufacturer.

Technical specification
 Type of agent: HFC-227ea
 Allowed operation temperature: from -20°C up to +55°C
 Operation pressure at 20°C: 12 bar
 Pressure at maximum operation temperature: 20 bar
 Charged with: nitrogen (N₂)

Warning
 The system is under constant pressure, any mechanical interference is prohibited.
 Unprofessional interference with the system may cause malfunction of the system and presents danger to safety and health of people.
 Do not use the system as a portable fire extinguisher!
 Danger to the health of persons.

Instructions for installation, maintenance and inspection

- The system may be installed, maintained and inspected only by persons trained or authorized by the manufacturer.
- Installation, maintenance and inspection must be performed according to instructions in the manufacturer's Installation and Service Manual.
- Inspection of the fire suppression system must be performed at least once in 12 months.
- Inspection of the safety condition of the technical pressure equipment must be performed according to local legislation and statutory requirements.
- Install and use system BlazeCut only with originally supplied components. Do not replace anything in the system, use only original components and spare parts. Use of components not approved by the manufacturer will void the warranty, may cause malfunction of the system and provides threat to safety and health of people.

Contains fluorinated greenhouse gases.
 Chemical name: 1,1,1,2,3,3,3-Heptafluoropropane
 GWP: 3220

Warning
 Contains gas under pressure; may explode if heated.
 CAS: 431-89-0 | UN: 3296
 Liquefied gas | Extinguishing agent
 HFC-227ea (1,1,1,2,3,3,3-Heptafluoropropane)

Manufacturer: BlazeCut s.p.a.
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 Model Part n. CLA003

3.10. INSTALLATION OF DISTRIBUTION NETWORK



Use only original components in distribution networks. Do not extend the network with unoriginal components. Do not use unoriginal hoses/tubes, fittings and nozzles.

HOSES

Type of hose	Feed hose CHF050 – CHF300	Distribution hose CHD050 – CHD500	LOP hose CHP100 – CHP300
Thread size	M22x1.5	M16x1.5	G1/8"
Material - inside	Heat resistant tube		
Material - outside	Stainless steel wire braid		
Operating temperature	From -40°C to 230°C		

Feed hoses

Part No.	Length	Comment
CHF050	50 cm	Feed hose has higher inner diameter than distribution hose and is used as follows: <ol style="list-style-type: none"> From discharge outlet connector to first fitting connecting rigid tube in order to secure maximum flow rate and fast discharge. In between the nozzles if it is not possible to use a rigid tube due to obstructions in enclosure for example (depending on size of system). In whole installation e.g. in vehicle applications (depending on size of the system). Depending on type of installation only one feed hose is used or if required two feed hoses from both discharge outlets can be used.
CHF075	75 cm	
CHF100	100 cm	
CHF200	200 cm	
CHF300	300 cm	

Distribution hoses

Part No.	Length	Comment
CHD050	50 cm	Distribution hoses are used as follows:
CHD075	75 cm	

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CHD100	100 cm	<ol style="list-style-type: none"> 1. Connect in distribution network after feed hose when branching the distribution network and deliver the extinguishing agent to nozzles (depending on size of the system). 2. In between the nozzles if it is not possible to use a rigid tube due to obstructions in enclosure for example (depending on size of system).
CHD150	150 cm	
CHD200	200 cm	
CHD300	300 cm	
CHD400	400 cm	
CHD500	500 cm	

LOP hoses

Part No.	Length	Comment
CHP100	100 cm	LOP hoses are used in cases where the BlazeTube detection is not suitable e.g. due to risk of damage and loss of pressure (LOP) line is required to connect remote manual actuators CRA203 or CRA204.
CHP200	200 cm	
CHP300	300 cm	

Hose detail



TUBES

Part No.	Diameter (ODxID) and length	Thread of fitting	Comment
CTG010	10x1 mm, 100 cm	M16x1.5	Rigid tubes can be used in whole installation (fixed applications) or in part of installation where use of feed/distribution hoses is not possible e.g. due to high temperatures like in engine compartment above the turbo or exhaust manifold. Type of tube is used depending on size of the system.
CTG015	15x1.5 mm, 100 cm	M22x1.5	



Tube detail

Note: The feed hoses, distribution hoses and galvanized steel tubes use metric parallel thread fittings to connect between each other so it is possible to combine hoses and tubes at any place using same fittings.

Compatibility of hoses and tubes

Part No.	Description	Thread size
CHD050 – CHD500	Distribution hose	M16x1.5
CTG010	Galvanized steel tube 10 mm	

Part No.	Description	Thread size
CHF050 – CHF300	Feed hose	M22x1.5
CTG015	Galvanized steel tube 15 mm	



Never combine 15 mm tube with distribution hose or 10 mm tube with feed hose otherwise you restrict or alter flow rate in distribution network.

To achieve most effective use of system BlazeCut consult the type of hoses and tubes, method of creating the networks and their placement in the protected enclosure with the supplier of the system. In some cases it may be necessary to add further components to the distribution networks (e.g. extension if the cylinder with extinguishing agent is located far from the protected enclosure). Consult specific cases with the supplier of the system.



Sealing screws G 3/8" must be always mounted on the valve of the cylinder except when feed hose/tube is installed. Remove the sealing screws right before installation of the feed hose/tube.

The network should be as short, straight and simple as possible to achieve sufficient pressure and flow of the extinguishing agent through the nozzles. Emptying the cylinder and achieving the required extinguishing concentration in the protected area should be as fast as possible. When designing the distribution hose/tubes it is appropriate to use as few connections and fittings as possible. Especially avoid of using too many elbows in the distribution networks. Narrowing of the diameter in network is possible only in the direction of the flow of the extinguishing agent. If possible the hoses and tubes should be as symmetric as possible.

Other ways of streamlining the flow of extinguishing agent in the distribution hose/tubes, which can be used, if possible:

- When using two distribution networks, connect the ends to create a loop. This may increase the flow of extinguishing agent and accelerate the emptying of the cylinder.
- Avoid changes of direction of the distribution networks in the vicinity of the fittings within the distance of ten times the internal diameter of the tubes. Keep this distance between the fittings.

Bending radius

Type of hose/tube	Minimum bending radius (mm)
Feed hose	85
Distribution hose	65
LOP hose	45
Galvanized steel tube 10 mm	20
Galvanized steel tube 15 mm	30



Do not forcibly bend the hoses below minimum bending radius otherwise you risk damage to hose or decreased flow rate what may result to incomplete discharge of the extinguishing agent and reduce the extinguishing ability.

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Place the hoses/tubes through appropriate parts of the protected enclosure and gradually clamp with appropriate fastening material (see Chapter, Fastening material). Proper mounting of the hoses/tubes is important. When the system is activated and extinguishing agent released, the hoses/tubes are exposed to the forces of pressure and flow of extinguishing agent. During the fire suppression the hoses/tubes must not be displaced, as it may change the desired flow of extinguishing agent from the nozzles.



Always place clamps next to fittings connecting nozzles to make sure they will hold firmly in place at discharge of extinguishing agent.

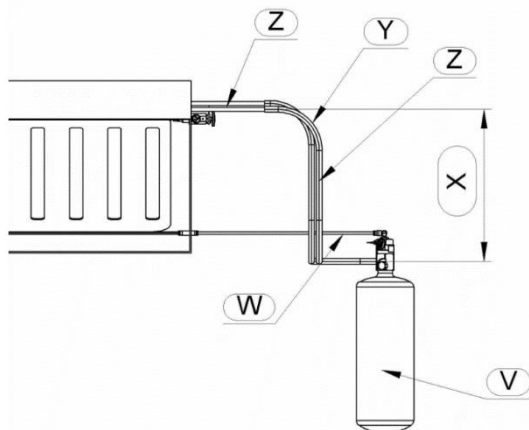
Maximum fastening distance

Type of hose/tube	Maximum fastening distance (mm)
LOP hose	500
Feed hose	500
Distribution hose	500
Galvanized steel tube 10 mm and 15 mm	750

Fasten hoses also in place of bending. Properly fasten the hoses just before the ending with the nozzle to prevent changing the direction of flow of the extinguishing agent. When using the tube the maximum distance between the last fastening and nozzle must not be more than 100 mm.

Limitations

	Type	Hose	Tube
V	Cylinder	Operating pressure at 20°C: 12 bar (HFC), 15 bar (Novec 1230 (FK-5-1-12)) Maximum operating pressure: 20 bar	
W	BlazeTube detection	See Chapter 6.4.	
X	Recommended maximum vertical distance between the cylinder and highest distribution hose/tube	1500 mm	1500 mm
Z	Recommended maximum total length of distribution network per one cylinder (including fittings etc.)	7000 mm (HFC) 5000 mm (Novec 1230 (FK-5-1-12))	8000 mm (HFC) 6000 mm (Novec 1230 (FK-5-1-12))
Y	Allowed bending radius	See bending radius	See bending radius



GASKET

Part No.	Description	Comment
CFG018	Gasket, 1/8"	Use between the body of the valve and ball valve, between the ball valve and straight fitting (when LOP hose is used instead of BlazeTube detection) and between straight fitting and remote actuator outlet.

Gasket



FITTINGS

All fittings are supplied in two versions:

1. SET: includes rings and nuts – suitable when connecting tubes CTG010 or CTG015
2. BODY: supplied without rings and nuts – suitable when connecting feed hoses or distribution hoses

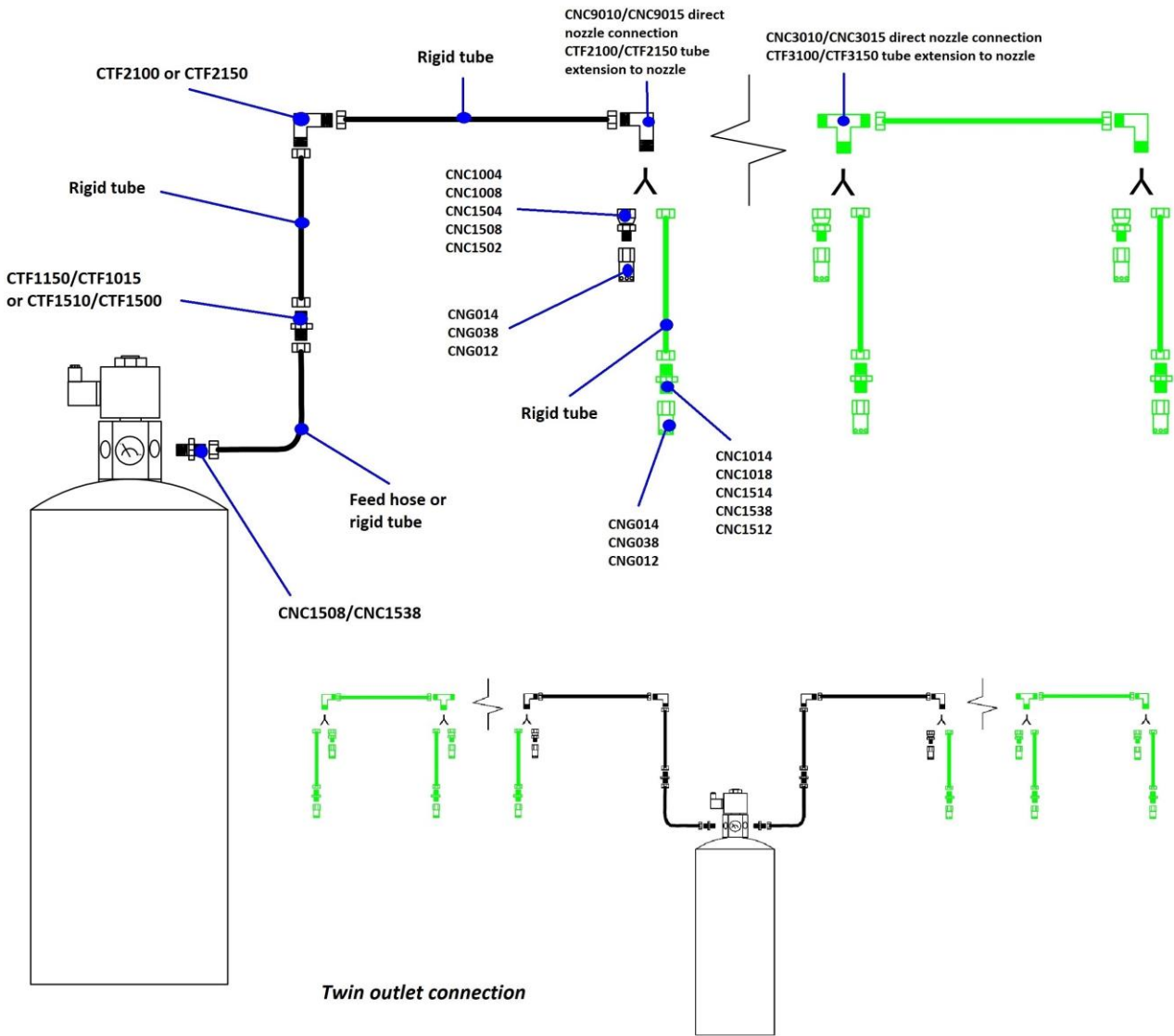
List of fittings used in gaseous systems

Part No.	Description	Comment
CTN010	Tube Nut for 10 mm cutting ring M16x1,5	Spare nut for tube fittings with 10 mm or 15 mm tubes.
CTN015	Tube Nut for 15 mm cutting ring M22x1,5	
CTR010	Tube ring compressing Ø 10mm	Spare ring for tube fittings with 10 mm or 15 mm tubes.
CTR015	Tube ring compressing Ø 15mm	
CTF1100	Tube fitting Straight coupling 10mm (M16x1,5) - SET	Straight coupling to extend 10 mm tube or distribution hose.
CTF1010	Tube fitting Straight coupling 10mm (M16x1,5) - BODY	
CTF1150	Tube fitting Straight coupling 15mm (M22x1,5) - SET	Straight coupling to extend 15 mm tube or feed hose.
CTF1015	Tube fitting Straight coupling 15mm (M22x1,5) - BODY	
CTF1510	Tube fitting Straight reduced coupling 15mm (M22x1,5) to 10mm (M16x1,5) - SET	Straight coupling reduced between feed hose and 10 mm tube or 15 mm tube and 10 mm tube.
CTF1500	Tube fitting Straight reduced coupling 15mm (M22x1,5) to 10mm (M16x1,5) - BODY	
CTF2100	Tube fitting Elbow equal 10mm, M16x1,5 - SET	Elbow fitting to change direction of 10 mm tube or distribution hose.
CTF2010	Tube fitting Elbow equal 10mm, M16x1,5 - BODY	
CTF2150	Tube fitting Elbow equal 15mm, M22x1,5 - SET	Elbow fitting to change direction of 15 mm tube or feed hose.
CTF2015	Tube fitting Elbow equal 15mm, M22x1,5 - BODY	
CTF3100	Tube fitting Tee equal 10mm, M16x1,5 - SET	Tee fitting to network 10 mm tube or distribution hose.
CTF3010	Tube fitting Tee equal 10mm, M16x1,5 - BODY	
CTF3150	Tube fitting Tee equal 15mm, M22x1,5 - SET	Tee fitting to network 15 mm tube or feed hose.
CTF3015	Tube fitting Tee equal 15mm, M22x1,5 - BODY	
CTF3110	Tube fitting Tee reduced 10 x 15 x 10 - SET	Tee reduced fitting to network feed hose/15mm tube to distribution hoses/10 mm tubes.
CTF3210	Tube fitting Tee reduced 10 x 15 x 10 - BODY	
CNC1014	Nozzle connector 10 mm (M16x1,5) x G1/4" - SET	Nozzle connector to connect the 1/4" nozzle from distribution hose or 10 mm tube.
CNC1004	Nozzle connector 10 mm (M16x1,5) x G1/4" - BODY	
CNC1038	Nozzle connector 10 mm (M16x1,5) x G3/8" - SET	Nozzle connector to connect the 3/8" nozzle from distribution hose or 10 mm tube.
CNC1008	Nozzle connector 10 mm (M16x1,5) x G3/8" - BODY	
CNC1514	Nozzle connector 15 mm (M22x1,5) x G1/4" - SET	Nozzle connector to connect the 1/4" nozzle from feed hose or 15 mm tube.
CNC1504	Nozzle connector 15 mm (M22x1,5) x G1/4" - BODY	

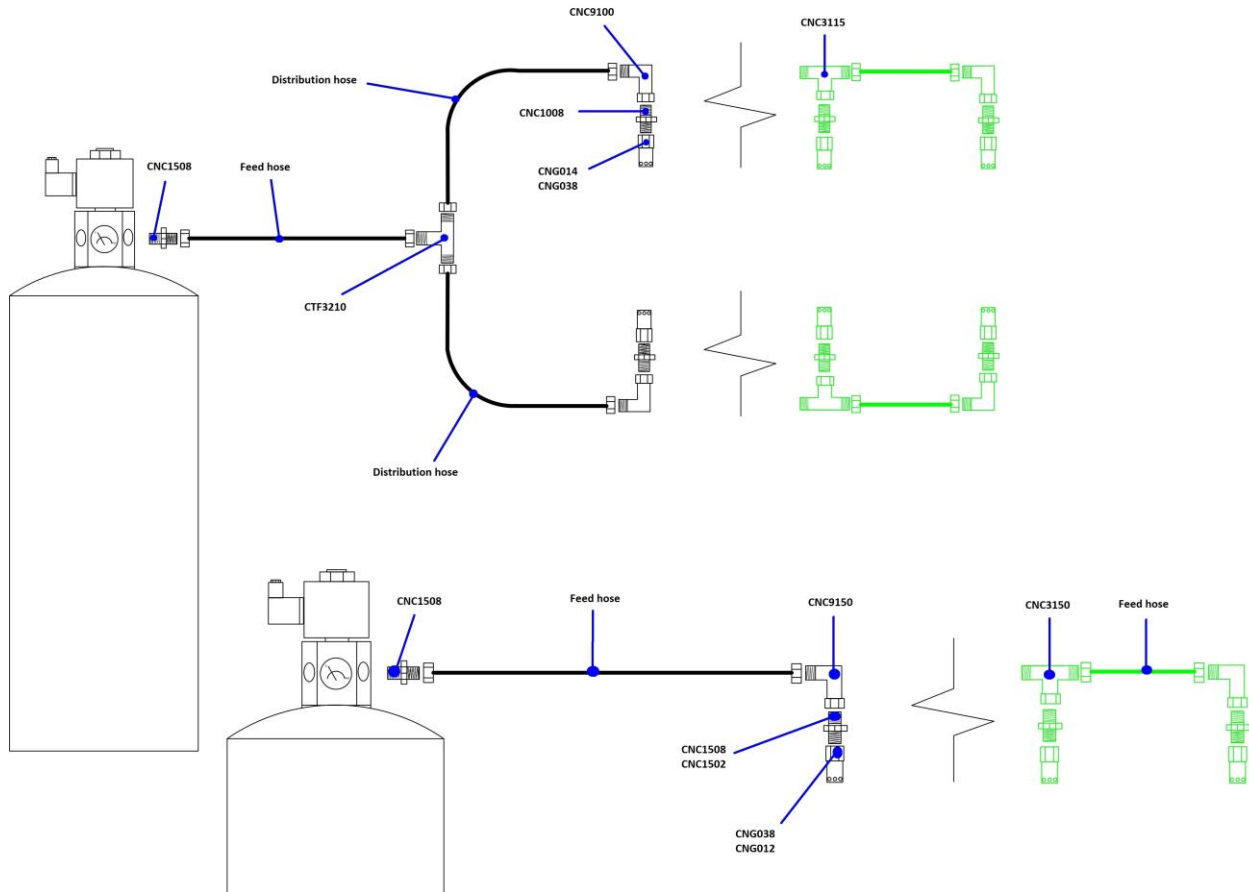
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CNC1538	Nozzle connector and discharge outlet for C series 15 mm (M22x1,5) x G3/8" - SET	Discharge outlet connector and nozzle connector to connect the 3/8" nozzle from feed hose or 15 mm tube.
CNC1508	Nozzle connector and discharge outlet for C series 15 mm (M22x1,5) x G3/8" - BODY	
CNC1512	Nozzle connector 15 mm (M22x1,5) x G1/2" - SET	Nozzle connector to connect the 1/2" nozzle from feed hose or 15 mm tube.
CNC1502	Nozzle connector 15 mm (M22x1,5) x G1/2" - BODY	
CNC9010	Elbow with rotary nut to nozzle connector 10mm (M16x1,5) - SET	Elbow fitting with rotary nut allows direct connection of nozzle connector. Suits to 10 mm tube or distribution hose.
CNC9100	Elbow with rotary nut to nozzle connector 10mm (M16x1,5) - BODY	
CNC9015	Elbow with rotary nut to nozzle connector 15mm (M22x1,5) - SET	Elbow fitting with rotary nut allows direct connection of nozzle connector. Suits to 15 mm tube or feed hose.
CNC9150	Elbow with rotary nut to nozzle connector 15mm (M22x1,5) - BODY	
CNC3010	Tee with rotary nut to nozzle connector 10mm (M16x1,5) - SET	Tee fitting with rotary nut allows direct connection of nozzle connector. Suits to 10 mm tube or distribution hose.
CNC3115	Tee with rotary nut to nozzle connector 10mm (M16x1,5) - BODY	
CNC3015	Tee with rotary nut to nozzle connector 15mm (M22x1,5) - SET	Tee fitting with rotary nut allows direct connection of nozzle connector. Suits to 15 mm tube or feed hose.
CNC3150	Tee with rotary nut to nozzle connector 15mm (M22x1,5) - BODY	
CBH1100	Bulkhead 10mm (M16x1,5) - SET	Bulkhead fitting for cross sections. Suits to 10 mm tube or distribution hose.
CBH1010	Bulkhead 10mm (M16x1,5) - BODY	
CBH2100	Bulkhead Elbow 10mm (M16x1,5) - SET	Bulkhead elbow fitting for cross sections. Suits to 10 mm tube or distribution hose.
CBH2010	Bulkhead Elbow 10mm (M16x1,5) - BODY	
CBH1150	Bulkhead 15mm (M22x1,5) - SET	Bulkhead fitting for cross sections. Suits to 15 mm tube or feed hose.
CBH1015	Bulkhead 15mm (M22x1,5) - BODY	
CBH2150	Bulkhead Elbow 15mm (M22x1,5) - SET	Bulkhead elbow fitting for cross sections. Suits to 15 mm tube or feed hose.
CBH2015	Bulkhead Elbow 15mm (M22x1,5) - BODY	
CHF1018	Hose fitting Straight coupling BSPP G1/8" - BODY	Straight coupling on outlet of the remote actuator CRA203/CRA204, solenoid valve CSV001 or to extend the LOP hose.
CHF2018	Hose fitting elbow equal BSPP G1/8" - BODY	Elbow equal to extend the LOP hose.



Example scheme of fixed application distribution network



NOZZLES

Example scheme of vehicle application distribution network

Plan ahead where to place the extinguishing nozzles. The nozzles on the distribution networks must be placed inside the protected enclosure and be above the most risky places of the enclosure.

For maximum efficiency and protection, do not place the nozzles of the system behind barriers that could restrict or reduce the fire suppression effect of the system by preventing direct penetration of extinguishing agent into the protected enclosure and forming desired concentration.

The distribution networks must always be ended by a nozzle. There may not be any free outlets in the distribution network e.g. connectors without nozzles.

Specification of gas nozzles

Part No.	Material	Thread size	Orifice quantity	Orifice size	Description
CNG014	Stainless steel	G 1/4"	8	1.5 mm	Nozzle Gas for HFC and Novec 1230 (FK-5-1-12)
CNG038		G 3/8"	8	2.6 mm	Nozzle Gas for HFC and Novec 1230 (FK-5-1-12)
CNG012		G 1/2"	8	4.5 mm	Nozzle Gas for HFC and Novec 1230 (FK-5-1-12)



CNG014



CNG038



CNG012

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Nozzles can be installed directly to fitting using Tee or Elbow fittings with rotary nut or through the tube extension. See below figures.



Direct nozzle connection on Elbow with rotary nut



Nozzle connection through Elbow equal and tube extension

Maximum amount of nozzles and type of nozzle in system configuration

Weight of HFC / Novec 1230 (FK-5-1-12)	1-Nozzle System	2-Nozzle System	3-Nozzle System	4-Nozzle System	5-Nozzle System
2 KG / 2.5 KG	1 x CNG038	2 x CNG014	3 x CNG014	x	x
4 KG / 5 KG	1 x CNG038	2 x CNG038	3 x CNG014	4 x CNG014	x
6 KG / 8 KG	1 x CNG012	2 x CNG038	3 x CNG038	4 x CNG014	x
9 KG / 12 KG	1 x CNG012	2 x CNG012	3 x CNG038	4 x CNG038	5 x CNG038
12 KG / 16 KG	1 x CNG012	2 x CNG012	3 x CNG038	4 x CNG038	5 x CNG038

4. DEFINITION OF LEGAL REQUIREMENTS



System BlazeCut - cylinder, valve and BlazeTube detection form a pressure configuration. It forms a system that is under constant pressure, after the system is installed. Installation of the pressure configuration of the system, its activation and inspection, maintenance and operation is governed by specific legislation and these activities may only be performed by persons with relevant professional qualification subject to applicable legislation. Activation and operation of the equipment under pressure is also governed by specific legislation and professional inspections and tests.



System BlazeCut CEA(FA)10(35) contains clean extinguishing agent HFC-227ea or HFC-236fa (depending on type). This is fluorinated greenhouse gas (hereinafter only HFC gas). Installation of the system, its activation, operation and repair and maintenance is governed by specific legislation and these activities may be performed only by persons with professional qualification. Operation of the system is also governed by specific legislation and is subject to inspections for gas leak.



Always observe local legislation and statutory requirements.

5. INFORMATION ON EXTINGUISHING AGENT USED

Systems BlazeCut CEA(15,20,25,30) use extinguishing agent:

- HFC-227ea; chemical name: 1,1,1,2,3,3,3-Heptafluoropropane. It is halogen derivative of hydrocarbons. It is liquefied hydrocarbon gas, colorless and odorless. GWP: 3220

Systems BlazeCut CFA(15,20,25,30) use extinguishing agent depending on the type:

- HFC-236fa; chemical name: 1,1,1,3,3,3-Hexafluoropropane. It is halogen derivative of hydrocarbons. It is liquefied hydrocarbon gas, colorless, slightly ethereal odor. GWP: 9810

Systems with HFC gases contain fluorinated greenhouse gases.

Systems BlazeCut CNO(15,20,25,30) use extinguishing agent:

- Novec 1230 (FK-5-1-12), chemical name: Perfluoro (2-Methyl-3-Pentanone). It is a fluorinated ketone, synthetically made agent. In normal conditions it is a non-conductive clear liquid, with a slight odor.

5.1. DESCRIPTION OF HFC GASES

Extinguishing agent is clean extinguishing medium, used in system BlazeCut for volume or local fire suppression. Extinguishing effects are due to cooling and anticatalyst effect. Extinguishing agent siphons heat from fire, enters the chain chemical reaction of burning, slows this reaction and stops it.

Extinguishing agent is not toxic or poisonous, it does not have carcinogenic or mutagenic effects and it is considered environmentally accepted substitute for halon extinguishing agents harmful to the environment used in the past.

With volume fire suppression the efficiency of the system depends mainly on extinguishing concentration, which should be reached in the area of fire. Desired extinguishing concentration with HFC-227ea or HFC-236fa is lower than concentration dangerous to people. This enables the use of extinguishing agent in areas where people are present.

MAIN ADVANTAGES OF EXTINGUISHING AGENT

- Electrically non-conductive
- Non-corrosive
- Resistant to temperature changes
- Safe for people when safety instructions are followed
- Leaves no residue
- Does not damage equipment, objects or sensitive devices
- Zero ozone depletion potential (ODP - Ozone Depletion Potential)

5.2. DESCRIPTION OF NOVEC 1230 (FK-5-1-12)

Extinguishing agent is clean extinguishing medium, used in system BlazeCut for volume fire suppression. Extinguishing effects are due to cooling and anticatalyst effect. Extinguishing agent siphons heat from fire, enters the chain chemical reaction of burning, slows this reaction and stops it.

Extinguishing agent is not toxic or poisonous, it does not have carcinogenic or mutagenic effects.

Novec 1230 (FK-5-1-12) is an ecological “green” alternative. It is considered to be a next generation substitution of halon agents used in past. Compare to chemical extinguishing substances used today (like HFC gases) Novec 1230 (FK-5-1-12) has at the moment lowest global warming potential (GWP = 1), lowest atmospheric lifetime (5 days) and zero ozone depletion potential (ODP = 0). This unique environmental features promise to Novec 1230 (FK-5-1-12) its long-term use in the future.

With volume fire suppression the efficiency of the system depends mainly on extinguishing concentration, which should be reached in the area of fire. Desired extinguishing concentration with Novec 1230 (FK-5-1-12) is lower than concentration dangerous to people. This enables the use of extinguishing agent in areas where people are present.

MAIN ADVANTAGES OF EXTINGUISHING AGENT

- Electrically non-conductive
- Non-corrosive
- Resistant to temperature changes
- Safe for people when safety instructions are followed
- Leaves no residue
- Does not damage equipment, objects or sensitive devices
- Zero ozone depletion potential (ODP - Ozone Depletion Potential)

- Almost zero global warming potential (GWP – Global Warming Potential)

5.3. PERMISSIBLE USES OF EXTINGUISHING AGENT

Both HFC gases and Novec 1230 (FK-5-1-12) may be used for the following classes of fire:



Class A - flammable combustibles (creating flames)



Class B - flammable liquids



Class C – flammable gaseous substances



System is suitable for fire suppression of electrical equipment under voltage.

Always consult suitability of use of the system and type of extinguishing agent in specific conditions with the supplier.

Although the extinguishing agent is not toxic or poisonous, unnecessary excessive exposure of persons to its influence should be avoided. Under no circumstances should persons be exposed to the extinguishing agent for more than 5 minutes even if an extinguishing concentration is not exceeding LOAEL level (see toxicity information in table below).

The BlazeCut system is primarily designed for small enclosed areas and equipment where people are not normally present (or only for a short time for inspection, maintenance, etc.), or in small rooms that can be vacated within 30 seconds of activation of the system. In this case, it is possible to design an extinguishing concentration exceeding the LOAEL level.).

If people are constantly present in the protected area, always consult the use of the system with the supplier. The system must be designed so that when the extinguishing agent is released the extinguishing concentration level which could be dangerous to people is not exceeded. It is also necessary to establish additional local measures to evacuate people from the protected area as soon as possible.

More information about HFC gases and Novec 1230 (FK-5-1-12) can be found in Safety data sheet supplied by the manufacturer or distributor.

5.4. VOLUME COVERAGE



System BlazeCut is designed to protect of equipment in closed spaces. Use in partially or completely open spaces or spaces with strong air circulation may significantly decrease the efficiency of the system. For more information about use of the system if people are constantly present in the protected area contact your supplier.

Maximum volume coverage depends on two major factors: Maximum ambient temperature in the protected enclosure and design concentration required. To guide which system to select below tables list the maximum volume coverage for each agent weight in certain design concentration. The design concentrations in tables are to cover most of standard applications for respective agent. For HFC-227ea and Novec 1230 (FK-5-1-12) the design concentration is to cover most of fixed applications with Class A and electrical fires. For HFC-236fa the design concentration covers typical vehicle applications with Class A, electrical fires and most common Class B and C fires.

Note: for applications with different design concentration required use the BlazeCut Tool Calculator or contact the supplier of the system.

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HFC-227ea

Temp (°C)	Maximum volume coverage in m ³ with 7.0% design concentration									
	1 KG	2 KG	4 KG	5 KG	6 KG	8 KG	9 KG	12 KG	14 KG	16 KG
-20	1.55	3.10	6.20	7.75	9.30	12.40	13.95	18.60	21.69	24.79
-15	1.58	3.17	6.33	7.92	9.50	12.67	14.25	19.00	22.17	25.34
-10	1.62	3.24	6.47	8.09	9.71	12.94	14.56	19.41	22.65	25.88
-5	1.65	3.30	6.61	8.26	9.91	13.21	14.87	19.82	23.13	26.43
0	1.69	3.37	6.74	8.43	10.12	13.49	15.17	20.23	23.60	26.98
5	1.72	3.44	6.88	8.60	10.32	13.76	15.48	20.64	24.08	27.52
10	1.75	3.51	7.02	8.77	10.52	14.03	15.79	21.05	24.56	28.07
15	1.79	3.58	7.15	8.94	10.73	14.31	16.09	21.46	25.03	28.61
20	1.82	3.64	7.29	9.11	10.93	14.58	16.40	21.87	25.51	29.16
25	1.86	3.71	7.43	9.28	11.14	14.85	16.71	22.28	25.99	29.70
30	1.89	3.78	7.56	9.45	11.34	15.12	17.01	22.69	26.47	30.25
35	1.92	3.85	7.70	9.62	11.55	15.40	17.32	23.09	26.94	30.79
40	1.96	3.92	7.83	9.79	11.75	15.67	17.63	23.50	27.42	31.34
45	1.99	3.99	7.97	9.96	11.96	15.94	17.93	23.91	27.90	31.88
50	2.03	4.05	8.11	10.13	12.16	16.21	18.24	24.32	28.38	32.43
55	2.06	4.12	8.24	10.30	12.37	16.49	18.55	24.73	28.85	32.97

Design Concentrations for HFC-227ea

Class A Fires		6.7*	
Electrical Fires		7.0*	
Class B and C Fires			
1-Propane	10.0	Isopropanol	9.8
2.butoxyethanol	9.0	JP 4	9.0
Acetone	10.0	JP 5	9.0
Acetonitrille	7.0	Kerosene	9.6
Benzene	9.5	Methane	7.2
Commercial Heptane	8.7	Methanol	15.2
Commercial Hexanes	9.0	Methyl Ethyl Ketone	9.6
Crude Oil	8.5	Methyl Isobutyl Ketone	9.1
Cyclohexane	9.4	Methyl Tert Butyl Ether	8.8
Cyclopentanone	9.6	n-Heptane	9.6
Denatured Alcohol	9.8	n-Pentane	8.8
Diesel fuel	8.7	Propane	8.7
Diethyl Ether	9.8	Pyrrolidine	9.5
Ethanol	12.6	Tetrahydrofuran	9.6
Ethyl Acetate	8.9	Toluene	7.6
Gasoline-87 Octane Unleaded	9.0	Transformer Oil	9.5
Hexene	7.6	1-Butane	8.6
Hydraulic Fluid	8.5	Xylene	7.8
Hydraulic Oils	7.7		

AUTOMATIC FIRE SUPPRESSION SYSTEMS



HFC-236fa

Temp (°C)	Maximum volume coverage in m ³ with 9.0 % design concentration									
	1 KG	2 KG	4 KG	5 KG	6 KG	8 KG	9 KG	12 KG	14 KG	16 KG
-20	1.31	2.61	5.23	6.54	7.84	10.46	11.77	15.69	18.30	20.92
-15	1.34	2.68	5.35	6.69	8.03	10.70	12.04	16.05	18.73	21.40
-10	1.37	2.74	5.47	6.84	8.21	10.94	12.31	16.42	19.15	21.89
-5	1.40	2.80	5.59	6.99	8.39	11.19	12.59	16.78	19.58	22.37
0	1.43	2.86	5.71	7.14	8.57	11.43	12.86	17.14	20.00	22.86
5	1.46	2.92	5.84	7.30	8.75	11.67	13.13	17.51	20.43	23.34
10	1.49	2.98	5.96	7.45	8.94	11.91	13.40	17.87	20.85	23.83
15	1.52	3.04	6.08	7.60	9.12	12.16	13.68	18.24	21.28	24.32
20	1.55	3.10	6.20	7.75	9.30	12.40	13.95	18.60	21.70	24.80
25	1.58	3.16	6.32	7.90	9.48	12.64	14.22	18.96	22.13	25.29
30	1.61	3.22	6.44	8.05	9.66	12.89	14.50	19.33	22.55	25.77
35	1.64	3.28	6.56	8.21	9.85	13.13	14.77	19.69	22.97	26.26
40	1.67	3.34	6.69	8.36	10.03	13.37	15.04	20.06	23.40	26.74
45	1.70	3.40	6.81	8.51	10.21	13.61	15.32	20.42	23.82	27.23
50	1.73	3.46	6.93	8.66	10.39	13.86	15.59	20.78	24.25	27.71
55	1.76	3.52	7.05	8.81	10.57	14.10	15.86	21.15	24.67	28.20
60	1.79	3.59	7.17	8.96	10.76	14.34	16.13	21.51	25.10	28.68

Design Concentrations for HFC-236fa

Class A Fires		6.3*	
Electrical Fires		7.0	
Class B and C Fires			
1-Propane	10.0	Isopropanol	9.8
2.butoxyethanol	9.0	JP 4	9.0
Acetone	10.0	JP 5	9.0
Acetonitrille	7.0	Kerosene	9.6
Benzene	9.5	Methane	7.2
Commercial Heptane	8.7	Methanol	15.2
Commercial Hexanes	9.0	Methyl Ethyl Ketone	9.6
Crude Oil	8.5	Methyl Isobutyl Ketone	9.1
Cyclohexane	9.4	Methyl Tert Butyl Ether	8.8
Cyclopentanone	9.6	n-Heptane	9.6
Denatured Alcohol	9.8	n-Pentane	8.8
Diesel fuel	8.7	Propane	8.7
Diethyl Ether	9.8	Pyrrolidine	9.5
Ethanol	12.6	Tetrahydrofuran	9.6
Ethyl Acetate	8.9	Toluene	7.6
Gasoline-87 Octane Unleaded	9.0	Transformer Oil	9.5
Hexene	7.6	1-Butane	8.6
Hydraulic Fluid	8.5	Xylene	7.8
Hydraulic Oils	7.7		

AUTOMATIC FIRE SUPPRESSION SYSTEMS



Novec 1230 (FK-5-1-12) (FK-5-1-12)

Temp (°C)	Maximum volume coverage in m ³ with 4.5 % design concentration							
	2 KG	3 KG	5 KG	8 KG	12 KG	14 KG	16 KG	18 KG
-20	2.59	3.88	6.46	10.34	15.51	18.10	20.69	23.27
-15	2.64	3.97	6.61	10.58	15.86	18.51	21.15	23.79
-10	2.70	4.05	6.75	10.81	16.21	18.91	21.62	24.32
-5	2.76	4.14	6.90	11.04	16.56	19.32	22.08	24.84
0	2.82	4.23	7.05	11.27	16.91	19.73	22.55	25.36
5	2.88	4.31	7.19	11.51	17.26	20.14	23.01	25.89
10	2.93	4.40	7.34	11.74	17.61	20.54	23.48	26.41
15	2.99	4.49	7.48	11.97	17.96	20.95	23.94	26.94
20	3.05	4.58	7.63	12.20	18.31	21.36	24.41	27.46
25	3.11	4.66	7.77	12.44	18.65	21.76	24.87	27.98
30	3.17	4.75	7.92	12.67	19.00	22.17	25.34	28.51
35	3.23	4.84	8.06	12.90	19.35	22.58	25.80	29.03
40	3.28	4.93	8.21	13.13	19.70	22.99	26.27	29.55
45	3.34	5.01	8.35	13.37	20.05	23.39	26.73	30.08
50	3.40	5.10	8.50	13.60	20.40	23.80	27.20	30.60
55	3.46	5.19	8.65	13.83	20.75	24.21	27.67	31.12
60	3.52	5.27	8.79	14.07	21.10	24.61	28.13	31.65

Design Concentrations for Novec 1230 (FK-5-1-12) (FK-5-1-12)

Class A Fires		4.5*	
Energized Electrical Fires		4.5*	
Class B and C Fires			
1-Butane	6.4	Isopropanol Alcohol	6.4
1-Propanol	7.0	Methane	7.3
2-butoxyethanol	6.8	Methanol	8.5
Acetone	5.6	Methyl Ethyl Ketone	5.9
Acetonitrile	4.2	Methyl Isobutyl Ketone	5.7
Commercial Heptane	5.7	Methyl Tert Butyl Ether	6.0
Commercial Hexanes	5.6	n-Heptane	5.9
Cyclohexane	5.9	n-Pentane	6.1
Cyclopentanone	6.0	Propane	7.5
Denatured Alcohol	6.9	Pyrrolidine	6.1
Diesel fuel	4.4	Tetrahydrofuran	6.5
Diethyl Ether	6.4	Toluene	4.6
Ethanol	7.2	Transformer Oil	5.9
Ethyl Acetate	6.1	2,2,4-trimethylpentane	6.1
Gasoline-87 Octane Unleaded	5.9	Isooctane	6.1
Hexene	6.0		

*Minimum design concentration according to NFPA 2001, 2018 Edition

5.5. SOME PHYSICAL AND CHEMICAL PROPERTIES

HFC-236fa

Name	HFC-236fa
Global warming potential	9810
Ozone depletion potential	0
Chemical name	1,1,1,3,3,3-Hexafluoropropane
Formula	CF ₃ CH ₂ CF ₃
CAS number	690-39-1
Extinguishing concentration* (% of volume)	6.3
Boiling point (at pressure of 1 bar) (°C)	-1.4
Freezing point (°C)	-94
Critical temperature (°C)	124.9
Critical pressure (kPa)	3200
Density in liquefied form (at 25°C) (kg/m ³)	1360
Pressure of saturated vapors (at 25°C) (kPa)	272.4
Dielectric Strength at 1 atm, 25°C (N ₂ =1)	1.0166
LC ₅₀ (4 h inh.)	457 000
Toxicity AEL (ppm)	1000
Toxicity NOAEL (ppm)	90 000
Toxicity LOAEL (ppm)	105 000
Flammability	nonflammable substance
Form	liquefied gases
Color	colorless substance
Odor	slightly ethereal

*Extinguishing concentration determined for reference substance n-Heptane

HFC-227ea

Name	HFC-227ea
Global warming potential	3220
Ozone depletion potential	0
Chemical name	1,1,1,2,3,3,3-Heptafluoropropane
Formula	CF ₃ CHF ₂ CF ₃
CAS number	431-8-90
Extinguishing concentration* (% of volume)	6.7
Boiling point (at pressure 1 bar) (°C)	-16.34
Freezing point (°C)	-131
Critical temperature (°C)	101.75
Critical pressure (kPa)	2925.0
Density in liquefied form (at 25° C) (kg/m ³)	1387.7
Pressure of saturated vapors (at 25° C) (kPa)	454.73
Dielectric Strength at 1 atm, 25°C (N ₂ =1)	2.0
Dielectric Strength in kV (vapor)	13.9
Toxicity LC50 (4 h inh.)	800 000
Toxicity AEL (ppm)	1000
Toxicity NOAEL (ppm)	100 000
Toxicity LOAEL (ppm)	150 000
Flammability	inflammable substance
Form	liquefied gas
Color	colorless substance
Odor	odorless

*Extinguishing concentration determined for reference substance n-Heptane

Novec 1230 (FK-5-1-12)

Name	Novec 1230 (FK-5-1-12)
Global warming potential	1
Ozone depletion potential	0
Chemical name	Perfluoro (2-Methyl-3-Pentanone)
Formula	CF ₃ CF ₂ C(O)CF(CF ₃) ₂ or C ₆ F ₁₂ O
CAS number	756-13-8
Extinguishing concentration* (% of volume)	4.5
Boiling point (at pressure of 1 bar) (°C)	49.2
Freezing point (°C)	-108
Critical temperature (°C)	168.7
Critical pressure (kPa)	1865
Density in liquid form (at 25° C) (kg/m ³)	1600
Pressure of saturated vapors (at 25° C) (kPa)	40.4
Dielectric Strength at 1 atm, 25°C (N ₂ =1)	2.3
Dielectric Strength in kV (vapor)	16
Dielectric Strength in kV (gaseous mixture 5% in air)	9.2
LC ₅₀ (4 h inh.)	100 000
Toxicity NOAEL (ppm)	100 000
Toxicity LOAEL (ppm)	100 000
Flammability	nonflammable substance
Form	liquid
Color	colorless substance
Odor	Slight odor

*Extinguishing concentration determined for reference substance n-Heptane

5.6. IMPROPER USES OF EXTINGUISHING AGENT

Extinguishing agent is not suitable for fire suppression in spaces with:

- Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air;
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium and plutonium;
- Metal hydrides;
- Chemicals capable of undergoing autothermal decomposition, such as certain organic peroxidase and hydrazine.

5.7. WARNINGS



During the system activation the extinguishing agent emerges from the nozzles under high pressure and at very low temperature. It is recommended that the automatic activation function of the system is deactivated during when working less than 1 meter from the nozzles (see Chapter "System Deactivation"). No permanent work place should be placed less than 1 meter from the nozzles.



Extinguishing agent under normal (atmospheric) pressure evaporates quickly. Do not breathe vapors. Exposure to high concentrations may cause health problems: a temporary loss of nerve activity, numbness, dizziness, confusion, loss of coordination, drowsiness, unconsciousness, irregular heartbeat, palpitations, depression, fainting, weakness. Exposure to extreme concentrations of extinguishing agent may cause death without warning.



Extinguishing agent is heavier than air in a gaseous state. Accumulation in enclosed or low area may cause lack of oxygen and suffocation. After use of the system use natural or forced ventilation and do not enter thereafter.



Extinguishing agent in liquid form may cause frostbite upon contact with eyes. Avoid contact of liquid extinguishing agent with eyes. For installation, inspection, maintenance and repair of the system always use eye protection - wear appropriate protective glasses with side-shields.



Extinguishing agent in liquid form may cause frostbite upon contact with skin. When leak of liquid extinguishing agent from the system is detected use appropriate protective impervious working gloves.

NOTE:



Extinguishing agent is subject to thermal decomposition and forms toxic products - hydrogen halides after long exposure to high temperatures in the fire area. Avoid prolonged exposure of extinguishing agent to high temperatures After fire is indicated take precautions to avoid prolonged exposure of extinguishing agent to high temperatures. After use of the system secure the area by natural or forced ventilation. Use the system only in permissible ways required by the manufacturer.

The most dangerous by-product of thermal decomposition of the extinguishing agent is hydrogen fluoride (HF). It is a gaseous substance, irritating and toxic, it is dissolved in water in mucous membrane creating hydrofluoric acid. Symptoms of HF exposure depend on the intensity and duration of exposure and are mainly as follows:

- Irritation of eyes and mucous membranes of the nose,
- Total respiratory irritation at a high concentrations,
- Irritation to the skin at high concentrations,
- Without medical assistance very high concentrations can cause death.

5.8. HANDLING HFC GASES

Systems BlazeCut CEA(FA)10(35) contain clean extinguishing agent HFC-227ea or HFC-236fa (depending on type). This is fluorinated greenhouse gas (hereinafter only HFC gases). Installation of the system, its activation and repair and maintenance is governed by specific legislation and may be performed only by persons with professional qualification.

Operation of the system is also governed by specific legislation and performing relevant gas leak inspections.

Operator of the system must prevent leak of HFC gases and as soon as possible repair any detected leak using all measures which are technically feasible and do not entail disproportionate costs.

Operator of the system is obliged to ensure recovery of the gases by a person with professional qualification in case of maintenance or expiration of containers holding HFC gases. This means gathering and storage of gases and ensuring their recycling, regeneration or destruction.



Do not open the valves of the cylinder and components before completing the system. Do not activate the system without reason.



Always have appropriate detection device for inspection of leak of HFC gases used in BlazeCut system during the installation, maintenance and inspection of the system. Always follow the manual of the detection device.



In case of suspected leak of extinguishing agent it is essential that the operator of the system shall take corresponding measures immediately to prevent leak of extinguishing agent and repair any detected leak as soon as possible.

NOTE:

For the purposes of this Chapter "Inspection for leak" means that the equipment or system is tested for leak using direct or indirect measuring methods, focusing on those parts of the equipment or system, which are most likely to leak.

6. INSTRUCTIONS FOR INSTALLATION OF THE SYSTEM

6.1. GENERAL RULES

All parts of the system must be placed into the protected enclosure so that they are not in direct contact with parts of the protected device or in the immediate vicinity of the device parts that reach high temperatures during operation (transformers, engine block, exhaust pipes, etc.).

Discharge networks, detection and electrical installation by fastening material with sufficiently firm parts of the protected enclosure and spaces, where installation is placed. Do not fasten to part, which are moving when the protected device is in operation.

Choose mountings so that fastening components are not damaged when the device is in operation. Accidental displacement of any part of system BlazeCut from the place of installation may result in reduction of the extinguishing effect of the system, its damage or device damage.

The system has to be positioned so that it is possible to perform maintenance of the system, replacement of its components, the inspection of the system and the inspection of safety of the pressurized equipment in the future.

Ensure that no part is damaged after closing of the protected enclosure (e.g., after closing the covers of installation, engine etc.) and that no part is affected by moving parts of the device (fans etc.).

Install the system so that it is not exposed to aggressive chemical substances (caustic, acids, solvents, corrosive substances etc.) and it is not exposed to direct atmospheric influences.

When fastening the system, make sure not to damage other parts of the device.

Do not overload the threads on the components, do not tighten or release the threads on the components forcibly, use the correct tightening torque. Make sure not to damage the components of the system by tools. Always check that the thread is clean and undamaged before installation.

During handling and installation of components of the system do not strain the components or handle forcibly.

In the event of subsequent changes in the protected enclosure during operation of system BlazeCut, always check whether changes are or not necessary in the installation of the system, relocation of hoses, tubes, nozzles etc. to secure the functionality and efficiency of the system.



System BlazeCut - cylinder, valve and BlazeTube detection form a pressure configuration. Installation of the system, its activation and repair and maintenance is governed by specific legislation and these activities may only be performed by persons with relevant professional qualification subject to applicable legislation.



After the installation of the system the configuration is under constant pressure. Never tamper with the system under pressure.



In the case of work in the vicinity of electrical equipment observe corresponding safety rules and instructions. Do not perform installation and maintenance of the system with running engine of a vehicle or machine or when the device is in operation. In the case of work in the vicinity of electrical equipment observe corresponding safety rules and instructions. Work on electrical installations may be performed only by qualified persons.



Install and use system BlazeCut only with original supplied components. Do not replace anything in the system; use only original component and spare components. Using components not approved by the manufacturer causes loss of warranty, may cause malfunction of the system and presents danger to life and health of persons.



Do not install the cylinder to configuration, if non-corresponding pressure is detected in the cylinder during inspection.



The system may be installed, maintained and repaired only by persons trained or authorized by the manufacturer and depending on procedure also with relevant professional qualification. Unprofessional interference with the system may cause malfunction of the system and provides danger to safety and health of people.



When handling parts of the system under pressure (cylinder, valves, pressure switch, BlazeTube detection) always wear appropriate protective glasses with side-shields. Eyes may be seriously damaged when coming into contact with extinguishing agent in case of sudden leak.



If leak of liquid extinguishing agent occurs, always prevent contact with skin. Use suitable impermeable protective work gloves.



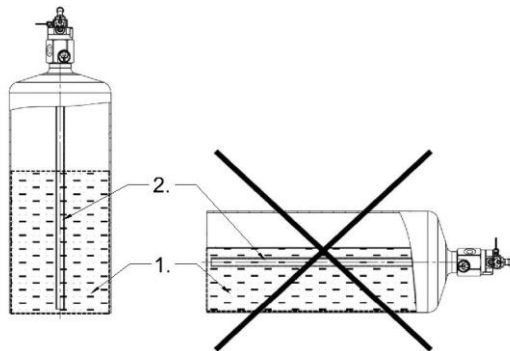
During installation and maintenance of systems with HFC gases have appropriate detection device for inspection of HFC gases used in system BlazeCut leak available at all times.



Refrain from handling the system, if it was exposed high temperature (as a result of operation of the protected device or after exposure to fire etc.). If the system is hot, temperature of extinguishing agent increases and pressure in the system increases. In this case the BlazeTube detection cannot be put under mechanical stress. Splashing of hot extinguishing agent under high pressure may cause serious injury. Wait until the system cools off naturally.

6.2. INSTALLATION AND PLACEMENT OF THE CYLINDER

In order to release the extinguishing agent by pressure, there is a dip tube in the cylinder. This is why the cylinder must be installed in vertical position. If the cylinder is leaning the extinguishing agent is not fully released as the level of extinguishing agent decreases under the end of the dip tube.



Cylinder positioning

1. Extinguishing agent
2. Dip tube

If the installation of the cylinder is necessary in other than vertical position due to shape of the protected enclosure, contact the supplier of the system before the purchase. In this case it is possible to customize the dip tube (customization however, is not possible after closing of the cylinder by the valve).

The cylinder should be placed as close to the protected area as possible, so that the distribution tubes and the BlazeTube detection can be as short as possible. If the cylinder is placed directly into the protected area, the cylinder should be protected if necessary.

The cylinder should be placed so that the cylinder label is visible and the current pressure can be read on the pressure gauge (if it is kept at the valve of the cylinder).

Use only undamaged cylinder filled with the correct extinguishing agent, properly labeled, with properly mounted valve of the cylinder. Cylinder is supplied pressurized to required pressure. Current pressure can be determined by reading the value on the pressure gauge, which is mounted on the valve of the cylinder when the system is supplied.

AUTOMATIC FIRE SUPPRESSION SYSTEMS



Do not install the cylinder into the configuration, if incorrect pressure in the cylinder is detected during inspection (significantly different pressure from values stated above).

The cylinder must be properly fastened in the bracket in the area. Fasten the cylinder bracket with screws to firm part of the protected area. If necessary create appropriate construction to mount the cylinder. Use screws for fastening with appropriate firmness to ensure firm fastening of the bracket. Fit the cylinder into bracket and fasten the clamps.

BlazeCut fire suppression systems are supplied with standard brackets that are suitable for fixed indoor applications or with heavy duty brackets for mobile equipment, vehicles or other harsh environment applications.

Note: Heavy duty brackets were tested for mechanical shock in accordance with EN 60068-2-27.

When installed in a vehicle, if the cylinder is situated in a horizontal position the valve must not be situated in a driving direction. Situate the bracket of the cylinder in a position so the cylinder will not eject from the bracket during a crash.

Standard brackets



CCB078



CCB013

Heavy duty brackets



CCB124



CCB150



CCB178



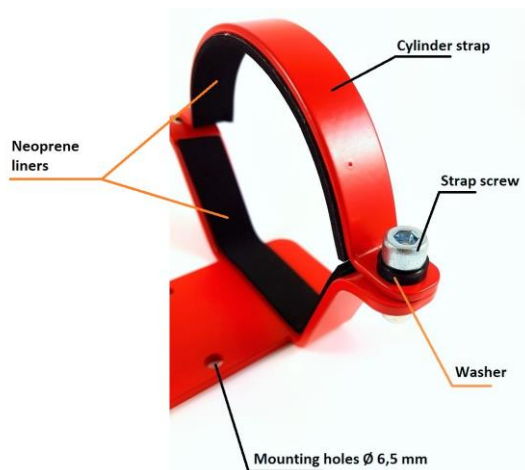
CCB130

Cylinder assembly dimensions and weights (cylinder with valve fitted in bracket)

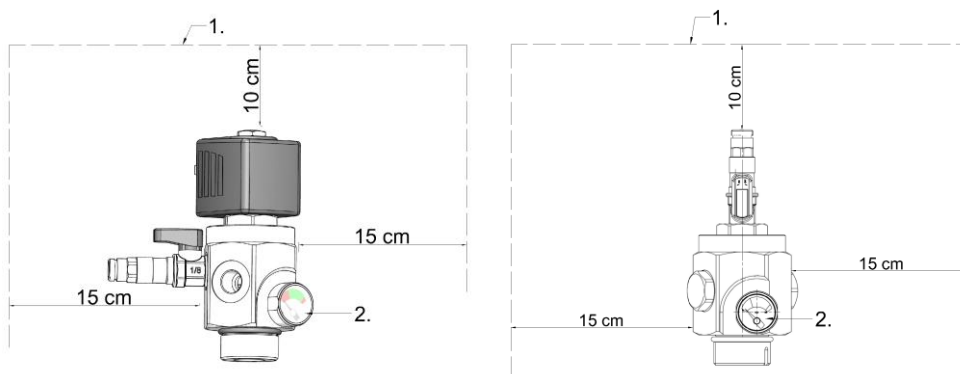
Cylinder Volume (Liters)	Valve Type	Total Height Light Bracket (mm)	Total Height Heavy Bracket (mm)	Total Weight Light Bracket (kg)*	Total Weight Heavy Bracket (kg)*
		CCB024	CCB124	CCB024	CCB124
2.40	10	428	441	3.02	3.96
2.40	35	433	446	2.71	3.65
		CCB050	CCB150	CCB050	CCB150
5.00	10	470	474	4.53	5.73
5.00	35	474	478	4.22	5.42
		CCB078	CCB178	CCB078	CCB178
7.80	10	584	585	5.36	6.90
7.80	35	559	560	5.05	6.59
		CCB013	CCB130	CCB013	CCB130
13.00	10	656	659	7.51	11.00
13.00	35	658	661	7.20	10.69
		CCB013	CCB130	CCB013	CCB130
16.00	10	768	769	9.57	13.06
16.00	35	772	773	9.26	12.75

*all weights do not include extinguishing agent

Detail of heavy duty bracket



When placing the cylinder leave free area around the valve of the cylinder of minimum of 15 cm on the sides and minimum of 10 cm above the valve, to install other components of the system and perform maintenance of the system in future.



1. Leave sufficient space around the valve
2. Read the value of pressure on the pressure gauge

6.3. MULTIPLE CYLINDERS CONNECTION

The BlazeCut system enables to simultaneously connect multiple cylinders to protect larger spaces.

The method of functioning and activating the system is the same when multiple cylinders are connected simultaneously. The BlazeTube detection must be connected to all the valves so that when the pressure in it decreases all the valve pistons on all the cylinders are opened simultaneously.

INSTALLATION

In case of simultaneous connection of multiple cylinders, the extinguishing agent in all cylinders must be the same and all cylinders must be under the same pressure before installation.

The amount of extinguishing agent in each cylinder is indicated on the label of the cylinder, the total amount of the extinguishing agent in the system kit is the sum of the quantities of extinguishing agent in individual cylinders. The cylinders are connected into one pressurized unit after installation of the system, the pressure in all cylinders at steady state is always equal.

When more cylinders are connected it is possible to combine systems with solenoid (10 series valve) and systems without solenoid (35 series valve). In order to simultaneously release the extinguishing agent from all the cylinders, one system (or two systems in case of maximum configuration) must be connected to the solenoid, which secures the venting of pressure and opening of pistons on valves of all cylinders.

Maximum number of cylinders that can be connected to one pressurized unit is six cylinders.

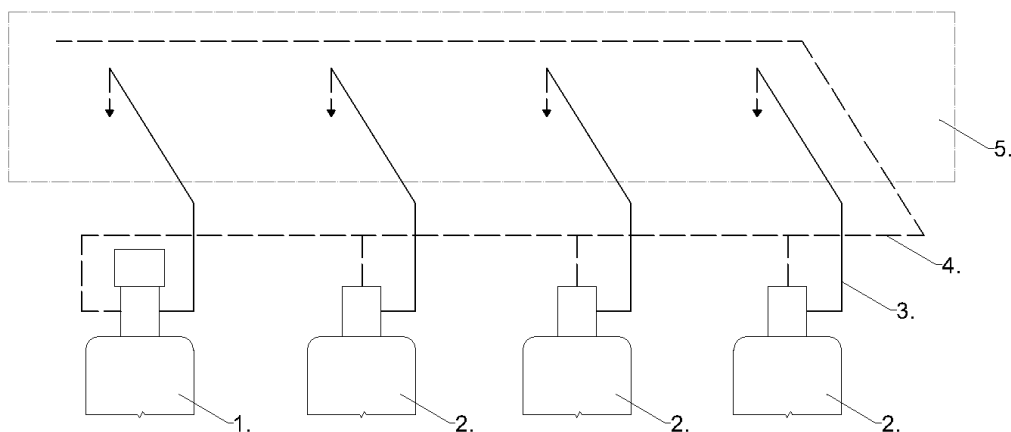
DISTRIBUTION NETWORK

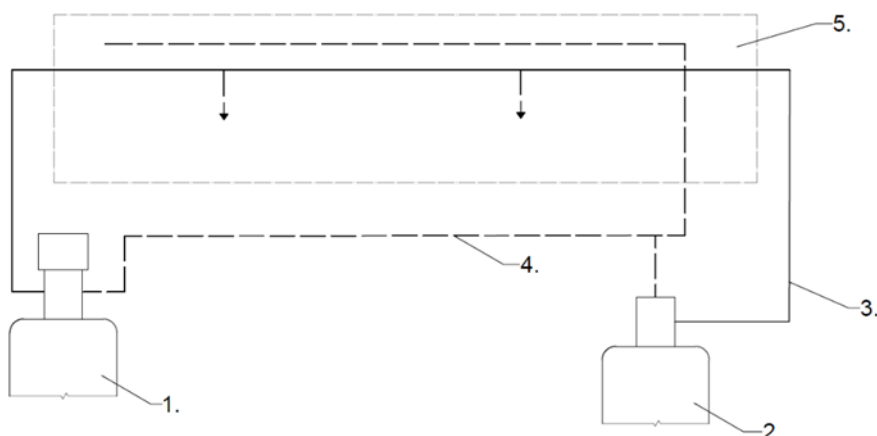
If multiple cylinders are connected, the distribution tubes must be connected to each cylinder, at least to one outlet of each valve. In order to secure a fast discharge of the cylinders it is necessary to use separate distribution tubes from each cylinder separately.



Never connect distribution tubes from several cylinders into joint distribution tubes otherwise you restrict the flow rate and extend the discharge time.

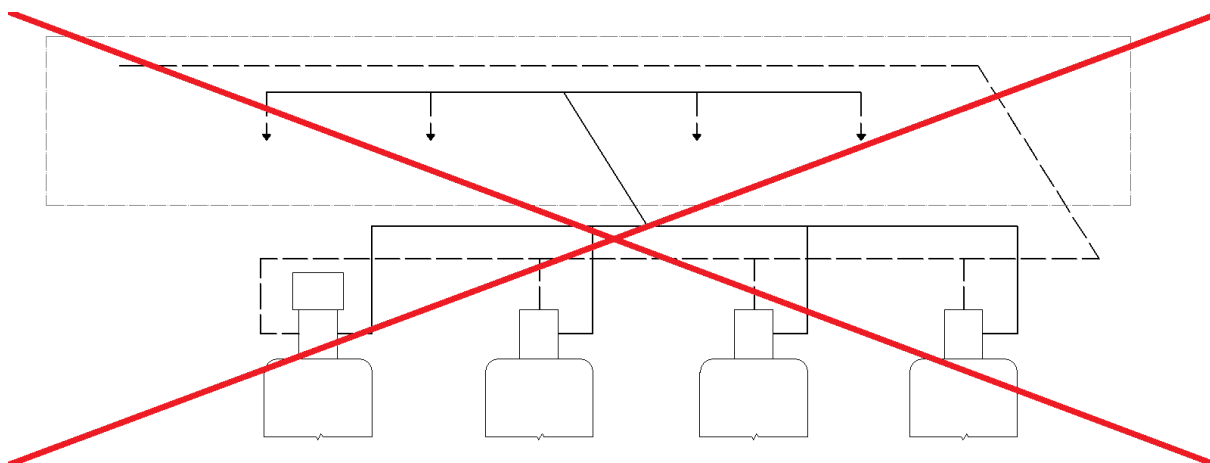
In case of multiple cylinder connection the cylinders must be placed on the same level and the tubes must be installed as symmetric as possible in order to prevent the extinguishing agent to extrusion from one cylinder to another and incomplete discharge of the extinguishing agent.





Recommended configurations of multiple cylinders connection

1. Cylinder with the 10 series valve to secure electronic activation of the system. If only LOP actuation is required all valves in multiple cylinders connection are 35 series valves.
2. Cylinder with the valve without the solenoid, 35 series valve
3. Distribution network
4. BlazeTube detection
5. Protected enclosure



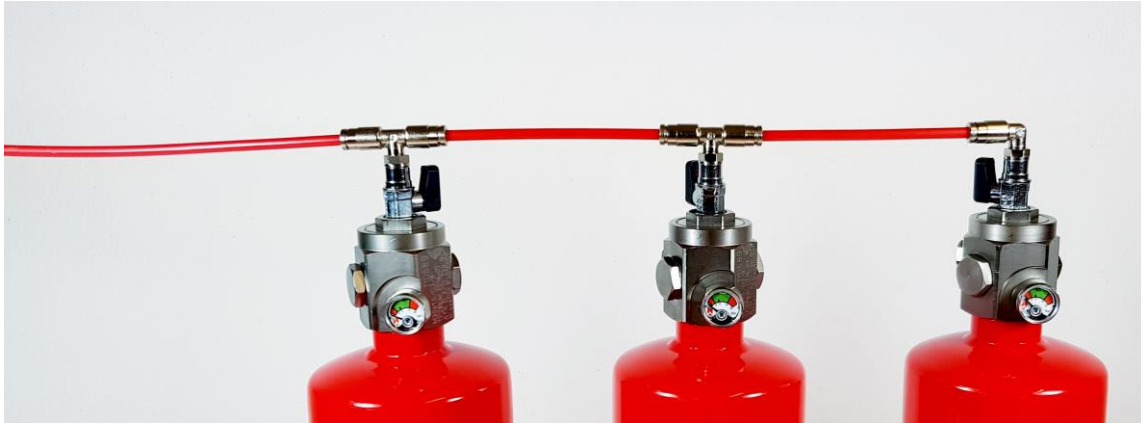
Not recommended configuration of multiple cylinders in joint distribution tubes

BLAZETUBE IN MULTIPLE CYLINDERS CONNECTION

The BlazeTube in multiple cylinders connection is used:

1. For a fire detection and also to connect the cylinders to secure simultaneous discharge of all cylinders, or
2. Only to connect the cylinders to secure simultaneous discharge of all cylinders e.g. in installations with an electronic detection (BlazeWire, detector).

If the BlazeTube is used also for detection any part of this manual related to installation and pressurization of the BlazeTube detection apply also to multiple cylinder connection.



Multiple cylinders connection of three 35 series valves with BlazeTube used for both detection and connection of the cylinders

In installations where the BlazeTube is used only to connect the valves, the BlazeTube is not pressurized through the end of line device but from the cylinders. Once the BlazeTube is installed slowly open ball valves on all cylinders one by one to pressurize the BlazeTube and connect all cylinders into one pressurized unit.



Multiple cylinders connection of one 10 series valve and two 35 series valves with BlazeTube used only for connection of the cylinders

Note: When using BlazeTube for connection of valves make sure the length of BlazeTube is as symmetric as possible to secure simultaneous opening of all pistons in the valves.

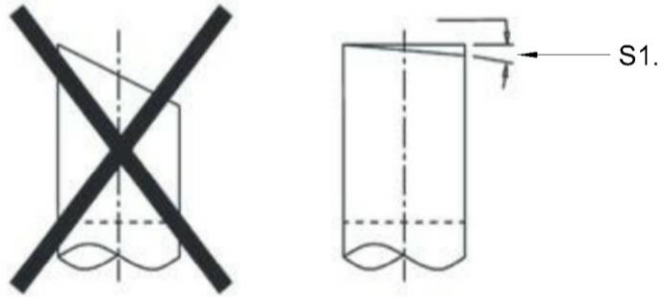
PRESSURE MONITORING

In case of multiple cylinder connection it is sufficient to connect only one Pressure Switch APS001 or the Transducer Assembly ATA100 to one of the valves since after completing installation the systems are connected into one pressurized unit.

6.4. INSTALLATION OF THE BLAZETUBE DETECTION

The efficiency of system BlazeCut significantly depends on correct placement of the BlazeTube detection. Follow the instructions below. The BlazeTube must be placed so that it is disrupted as soon as the fire starts before damaging other components of system BlazeCut and before the fire spreads outside of the protected enclosure.

System BlazeCut uses quick slotting system of mounting BlazeTube detections in connectors with double seal to prevent leak of extinguishing agent and of pressure. Use only the connectors supplied with the system. Ends of the BlazeTube detection must be properly adjusted. End of the BlazeTube detection must be straight before inserting, without cuttings and notches to avoid damaging the seals in the connectors.

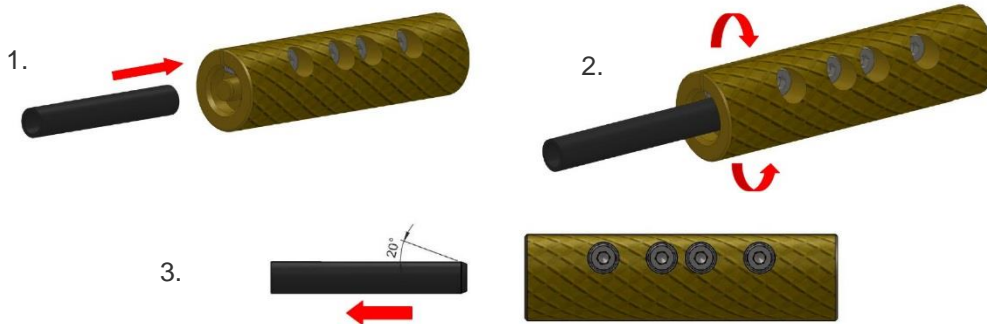


S1. Cut the BlazeTube detection straight, maximum degree of chamfer is 5°



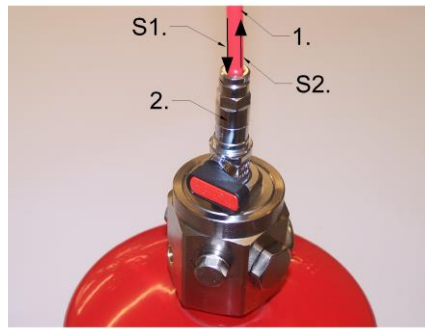
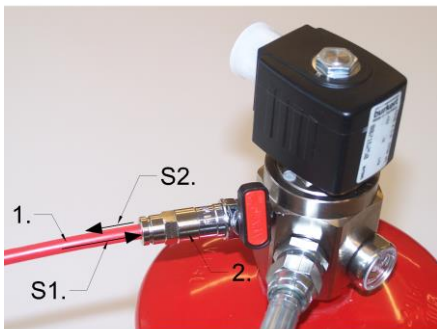
To cut the BlazeTube detection use special pliers ATP001 (on the left) or cutter (on the right) included in the Tool charging kit KATC001

To remove the roughness and sharp edges on the ends of the BlazeTube detection use alignment tool ATA001. Insert the tube all the way into the tool and slowly turn the tool around a few times. Eject the tube, there is a straight edge with 20° degree at its end.



Procedure for de buring the end of the BlazeTube detection

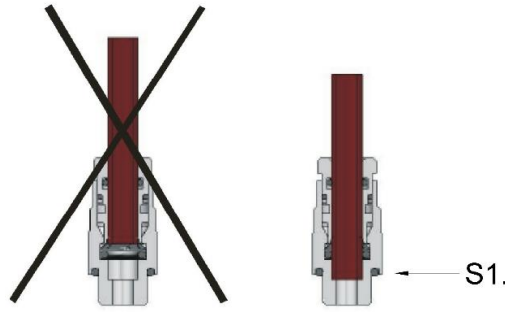
Fasten the BlazeTube detection firmly so that it is slotted into the BlazeTube outlet and pushed all the way by hand. After slotting always check if the BlazeTube is firmly fastened by gently pulling it. Do not open the ball valve of the connector for BlazeTube detection yet.



Scheme of connecting the BlazeTube detection to the connector on the valve of the cylinder (example: valve 10 on the left, valve 35 on the right)

- 1. BlazeTube Detection
- 2. BlazeTube Detection outlet connector CBTO006

- S1. Slot the BlazeTube detection firmly into the connector all the way
- S2. Pull the BlazeTube detection slightly and make sure that it is firmly fastened



Detail of slotting the BlazeTube detection to the end of line adapter

S1. Always slot the BlazeTube detection to the outlet all the way

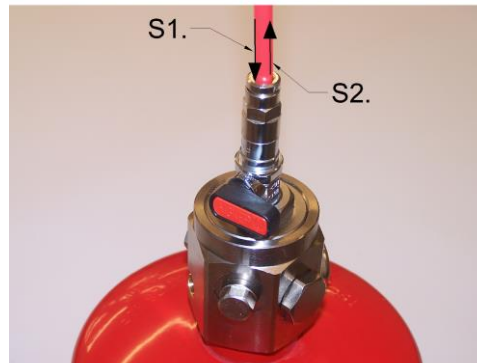
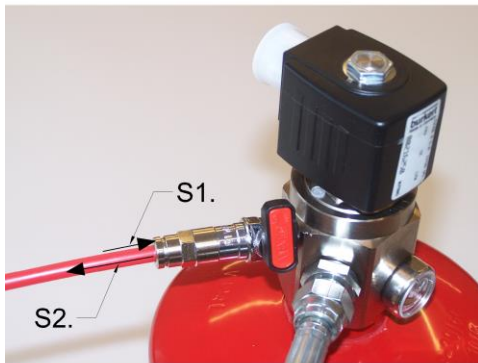


Do not open the ball valve before pressurizing the BlazeTube! This may open the valve piston of the cylinder and extinguishing agent will be released. Protect the ball valve before accidental opening during transportation and handling of the cylinder. Follow the instructions for transportation of the cylinder.



During normal operation of the system the pressure in the BlazeTube is the same as in the cylinder.

Disconnect the BlazeTube from connector by pushing the ring inside in the place of the connector (away from the BlazeTube) and pull the BlazeTube away from connector. Proceed accordingly when disconnecting the BlazeTube from the end of line adapter of the BlazeTube.

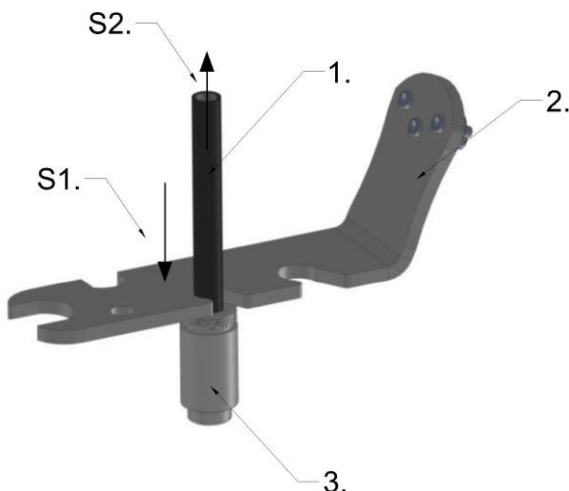


Disconnection of the BlazeTube detection from the valve (example: valve 10 on the left, valve 35 on the right)

S1. Push the ring of the BlazeTube detection outlet connector

S2. Pull the BlazeTube detection from the connector

To remove the BlazeTube detection from the connectors use Multipurpose tool ATM001, which may significantly help with the procedure.



Method of use of the Multipurpose tool ATM001

1. BlazeTube Detection

2. Multipurpose Tool ATM001

3. BlazeTube detection push in connector

S1. Push the ring of the connector using the tool

S2. Pull the BlazeTube detection from the connector



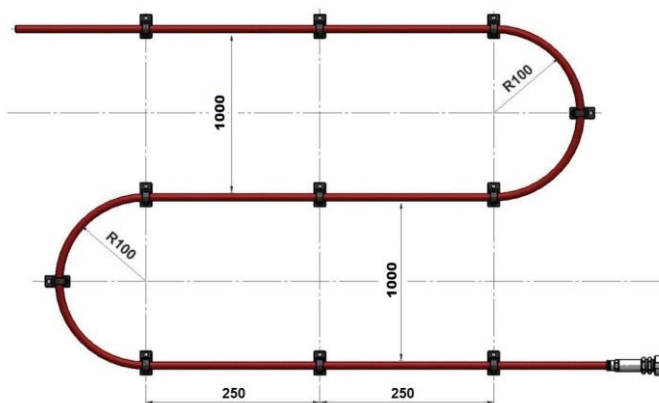
During disconnection of the BlazeTube detection under pressure a pressure is released and if the system was in operation also small amount of agent is released. In such case always wear appropriate protective glasses with side-shields and suitable protective gloves. Aim the BlazeTube detection always apart. Make sure not to interpose any other person.

If the BlazeTube detection is under pressure disconnection can be more difficult. The pressure can be released by pushing a small pin of the charging adapter inside the end of line device. Before this procedure dismantle the pressure gauge and make sure that the ball valve is closed.

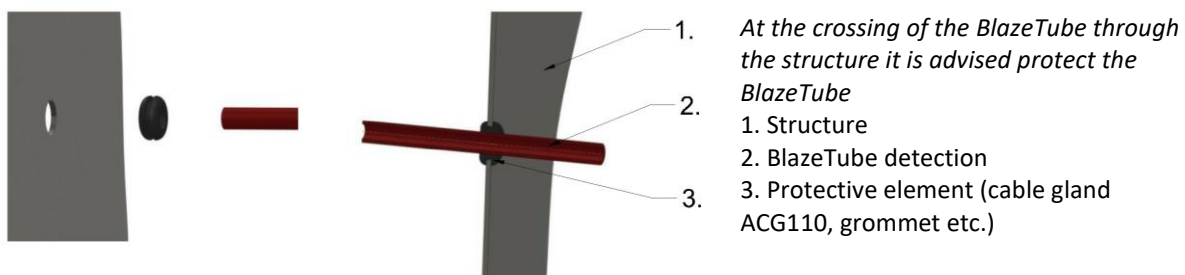
PROCEDURE OF INSTALLATION OF THE BLAZETUBE DETECTION IN THE PROTECTED ENCLOSURE

Place the BlazeTube detection in the protected enclosure and gradually fasten with clamps and fastening elements. Proper fastening of BlazeTube detection is important. In case of fire it is exposed to fast changes in pressure and forces of flowing gas. Maximum distance between fastenings of the tube cannot be more than 250 mm. Fastening must also be in place where the tube bends. The BlazeTube detection has minimum bend radius of 100 mm. Do not bend the tube more. To preserve sufficient flexibility of the BlazeTube detection, it is recommended to install it at ambient temperature of more than 10° C.

IMPORTANT! The BlazeTube detection must come out of each connection in direct position in order to avoid any leakage. If a redirection of the BlazeTube detection is needed the bend of the tube from the connection must be in a minimum distance of 50 mm.



Maximum distance between the fastenings, bending radius and layers. Data in millimetres.



Place the BlazeTube detection as close as possible above the places with greatest risk of fire. Do not place the tube horizontally next to places of possible fire, it may significantly delay activation of the system in case of fire.

The BlazeTube detection cannot be placed freely in the protected enclosure. It must be tightened to appropriate construction. If necessary, the BlazeTube detection can be installed in open space (e.g. above the protected device) by using steel wire, which is wired in suitable area of the protected enclosure and the BlazeTube detection can be tightened on a steel wire. Use a steel wire with appropriate strength and wire the steel wire firmly.

Proceed carefully during installation not to damage the BlazeTube with sharp objects. Do not refract the BlazeTube, do not bend forcibly.

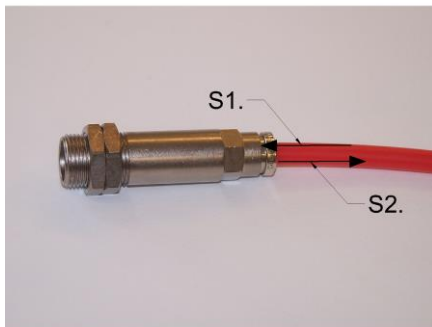
During installation of the BlazeTube detection specifically make sure that the tube will not be damaged during operation of the device by mechanical stress. After system activation, when the BlazeTube is damaged and the pressure decreases the system will always activate.

The tube cannot be in direct contact with hot parts of the protected device or in immediate proximity of parts of the device, which heat to high temperatures during operation (transformers etc.).

Depending on the size and shape of the protected enclosure use necessary length of the BlazeTube detection. If you do not use the whole tube, cut the ending; the ending must be adjusted, see figures above.

Place the loose ending of the BlazeTube detection into the area so that it is possible to pressurize the system using charging kit through end of line adapter of the tube, and also to enable in future to perform inspection of pressure in the system with pressure gauge on end of line adapter of the tube, if the pressure gauge will be installed at the end of line adapter.

Fasten the end of line adapter into the ending of the BlazeTube; proceed according to the figure below.



Connection of the BlazeTube detection on the end of line adapter

- S1. BlazeTube detection properly slotted to the end of line adapter all the way
- S2. After slotting always make sure that the BlazeTube is firmly fastened by gentle pulling

PROTECTIVE SPIRAL FOR THE BLAZETUBE DETECTION

In case of installation in the engine compartment or other enclosures with increased risk of mechanical damage the BlazeTube detection must be installed in the protective spiral (optional component). Slot the BlazeTube detection into the protective spiral before installation.

Part No.	Description
ABTS006G	BlazeTube spiral for BlazeTube Protection, galvanized steel Ø 6 mm
ABTS006S	BlazeTube spiral for BlazeTube Protection, stainless steel Ø 6 mm

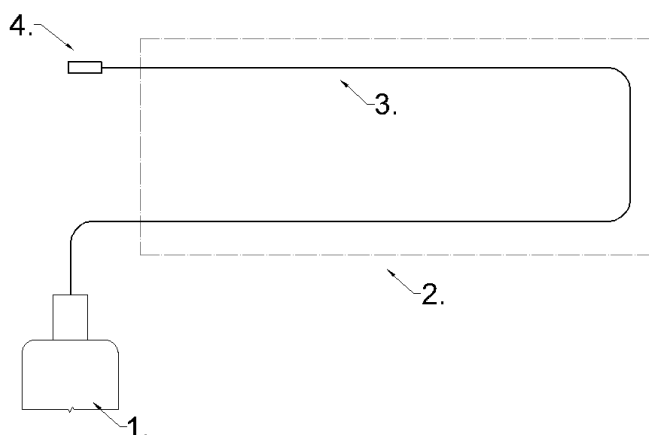


Protective spiral



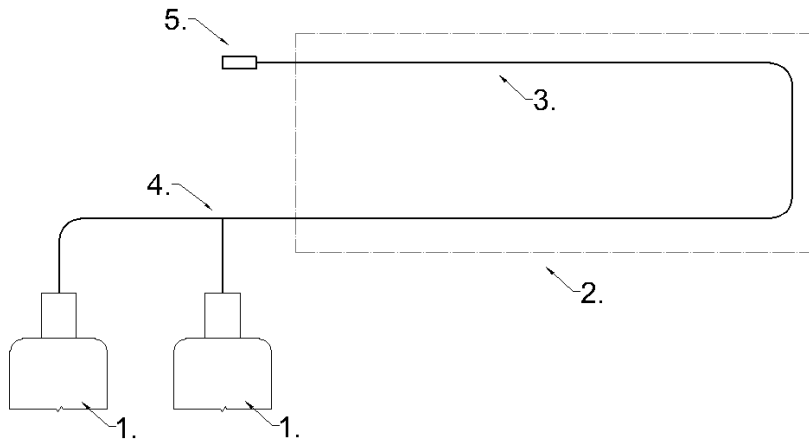
Important: Always ensure the cut ends of spiral do not turn inward towards the BlazeTube, this will avoid scratches and damage to the BlazeTube.

EXAMPLES OF INSTALLATION OF THE BLAZETUBE DETECTION



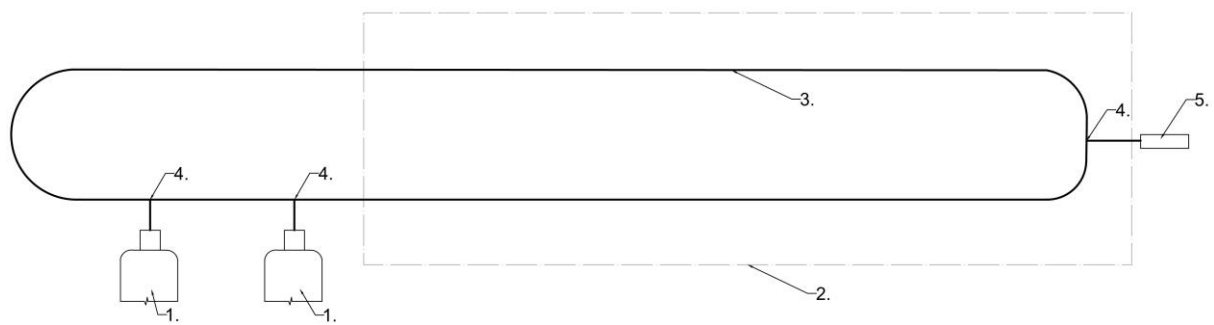
Simple installation with one cylinder

1. Cylinder with the valve
2. Protected enclosure
3. BlazeTube detection
4. End of line device of the BlazeTube detection



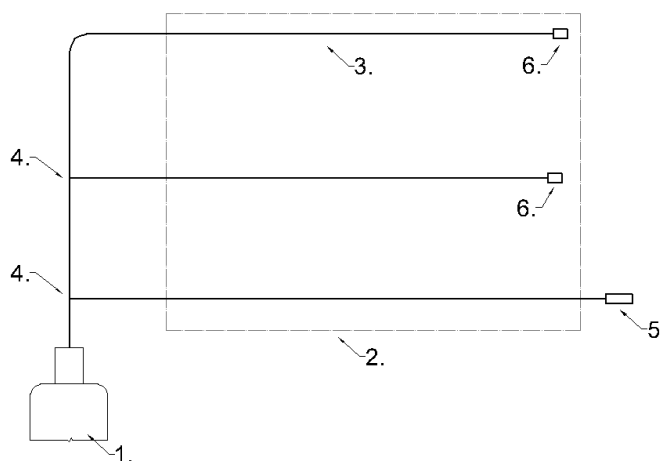
Simple installation of multiple cylinders. The BlazeTube detection must be connected to both cylinders by using Tee connector.

1. Cylinder with the valve
2. Protected enclosure
3. BlazeTube detection
4. Tee connection
5. End of line device



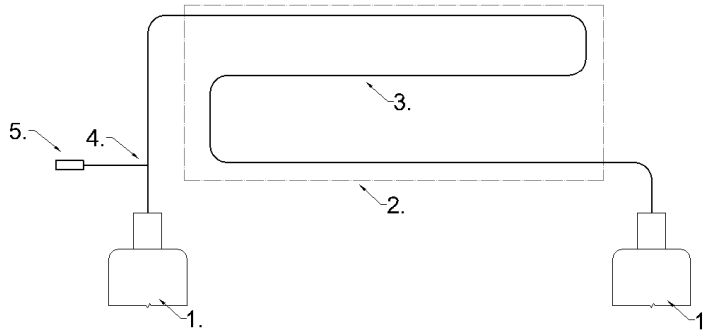
Multiple cylinders installation with the BlazeTube detection in loop. Recommended for applications where long BlazeTube detection is needed.

1. Cylinder with the valve
2. Protected enclosure
3. BlazeTube detection
4. Tee connection
5. End of line device



Installation with one cylinder, the BlazeTube detection is branched. This method reduces length of the BlazeTube detection. It is suitable for installations where large space has to be covered and the BlazeTube detection would have to be very long when using simple installation.

1. Cylinder with the valve
2. Protected enclosure
3. BlazeTube detection
4. Tee connection
5. End of line device (one end of line device is sufficient for one installation)
6. End of line plug



Cylinders are situated on opposite sides of the protected enclosure. This method is suitable when larger space needs to be protected, for example the protected enclosure is long (shafts etc.).

1. Cylinder with the valve
2. Protected enclosure
3. BlazeTube detection
4. Tee connection
5. End of line device

BlazeTube installation limits in single and multiple cylinders configurations

Single cylinder	
Type of valve	Maximum Length of BlazeTube (m)
10	40
35	40
Multiple cylinder / Electronic actuation and BlazeTube in protected enclosure	
Configuration of valves	Maximum Length of BlazeTube (m)
10 x 35	15
10 x 35 x 35	15
10 x 35 x 35 x 35	10
10 x 35 x 35 x 35 x 35	10
10 x 35 x 35 x 35 x 35 x 10*	10
Multiple cylinders / LOP actuation with BlazeTube in protected enclosure	
Configuration of valves	Maximum Length of BlazeTube (m)
35 x 35	40
35 x 35 x 35	40 in loop
35 x 35 x 35 x 35	40 in loop
35 x 35 x 35 x 35 x 35	40 in loop
35 x 35 x 35 x 35 x 35 x 35	40 in loop

*Note: Maximum multiple cylinders configuration using the solenoid require two 10 series valves situated as first and last valve in the multiple cylinders configuration.

6.5. PRESSURIZATION OF THE BLAZETUBE DETECTION SYSTEM

The BlazeTube detection must be pressurized with correct pressure by nitrogen gas (N₂) before the system is put into operation. Use appropriate source N₂ - cylinder with control valve. The tube must be pressurized with the same pressure as the pressure in the cylinder.



Tool charging adapter
ATC001

Pressurization is performed through the end of line device of the BlazeTube detection using charging adapter ATC001. The BlazeTube detection end of line devices have outlet with thread M10x1 and contains filling valve, which must be pushed and open with the charging adapter.

This valve closes and opens automatically during removal or installation of the charging adapter or the pressure gauge. It is possible to install and remove these components even when the tube is under pressure.



Before pressurization of the tube make sure that the ball valve is closed.



Due to risk of activation during pressurization of the system it is necessary to seal the outlets of the discharge networks on the valve. Remove the discharge networks and seal the outlets with the G3/8" sealing screws.

Procedure of pressurization using end of line adapters CEA006 is shown in figures below. If your system use other type of end of line device please see the Annex for corresponding end of line device and procedure of pressurization.



S1. Mount the charging adapter on the end of line adapter of the BlazeTube detection onto the outlet M10x1 by rotating to the right.



S2. Tighten the adapter properly



S3. Set control valve on the source N₂ to the desired value. Setting must be at least on the level of pressure in the cylinder increased by 1 bar (pressure was supposed to be read and written down when removing the pressure gauge from the valve of the cylinder). Graphs of relationship between temperature and pressure in the cylinder of various extinguishing agents are mentioned in the Chapter 3.1.



S4. Slowly open the valve of the charging adapter and pressurize the BlazeTube detection with N₂. During pressurization hissing can be heard. When the sound stops, pressurization is finished. Leave the valve open for at least 30 seconds to stabilize the pressure in the BlazeTube detection.



S5. After finishing pressurization close the ball valve of the charging adapter.



S6. Unscrew the charging adapter. Filling valve in the end of line adapter of the BlazeTube detection will close automatically.



S7. After pressurization disconnect the charging adapter and mount the pressure gauge.



S8. Tighten the pressure gauge with spanner 22 mm.



Pressurize the BlazeTube detection correctly. If the pressure it in is lower than in the cylinder, the valve piston of the cylinder could open and extinguishing agent could be released when opening the ball valve.

After pressurization observe the data on the pressure gauge. If pressure is decreasing, the BlazeTube detection is not tight. Disconnect it from the end of line adapter and from valve of the cylinder, check and connect properly again – repeat the procedure during installation of the tube. To determine exact place of leakage it is possible to use for example foaming solution.

If the pressure is not decreasing open the ball valve of the connector of the BlazeTube detection on the valve of the cylinder very slowly. Pressures in the tube and the cylinder will be equal. Wait approximately 30 seconds and then open the ball valve fully. In case of multiple cylinder connection open the ball valve on all valves of the cylinders.

Fasten the end of line adapter in the area so that it is possible to inspect the pressure in the system.

After pressurization mount on the valve of the cylinder discharge networks.



Since this moment the cylinder and the BlazeTube detection are connected in one pressure unit. Proceed carefully not to damage the BlazeTube detection. Its damage would cause activation of the system and release of extinguishing agent.



Fast and careless opening of the ball valve may activate the system and release extinguishing agent.



Do not try to remove the BlazeTube detection from the connector on the valve of the cylinder or remove the end of line adapter of the tube if the tube is under pressure and the ball valve is open.

6.6. FINAL INSPECTION OF THE SYSTEM INSTALLATION

Fill-out the Commissioning/Installation Report.

7. REGULAR INSPECTION AND MAINTENANCE OF THE FIRE SUPPRESSION SYSTEM



Pressure configuration of the system is reserved technical equipment under pressure. Its activation and operation is subject to professional inspections and tests performed by revision technician according to applicable legislation. Operator is obliged to have inspections of safety condition of the equipment performed and immediately remove defects detected.



Always follow local legislation and statutory requirements.



All inspections and repairs, whether during regular maintenance or in exceptional situation, must be performed by a person authorized and trained by the manufacturer and depending on the procedure with corresponding professional qualification to ensure correct operation of the fire suppression system.

Required system inspection and maintenance must be followed to ensure long term, reliable and safe operation of system BlazeCut.

Inspection of the fire suppression system must be performed at least 1 x 12 months. Inspection must be performed also after each exceptional circumstance (e.g. exposure to mechanical or excessive thermal stress for example in case of fire without activation of the system).

In case of performing exceptional inspection, the 12-month period to perform the next regular inspection starts only when exceptional inspection was performed in full scope.

Regular replacement of components subject to wear and tear (effects of temperature, pressure and environment) is also necessary in system BlazeCut.

If necessary inspection of leaks of HFC gases used in system BlazeCut (Chapter 5.8, only for systems CEA(FA)10(35) using HFC gases: HFC-227ea and HFC-236fa), pressurization of the system (Chapter 7.3) or inspection of weight of extinguishing agent in the system (Chapter 7.4) is performed. Inspection of weight of extinguishing agent in the system is also performed 1 x 3 years.

Proceed according to the instructions in table below.

Overview of inspections

	Period / interval	Obligatory scope
1.	1 x 12 months	1. Overall inspection of the system 2. Inspection of pressure in the system
2.	1 x 3 years	1. Overall inspection of the system 2. Inspection of pressure in the system 3. Inspection of weight of extinguishing agent in the system
3.	1 x 5 years	1. Overall inspection of the system 2. Inner inspection of the cylinder
4.	1 x 10 years	1. Overall inspection of the system 2. Pressure test of the cylinder 3. Service of valve 4. Replacement of BlazeTube detection
5.	In special incident	1. Overall inspection of the system 2. Inspection of pressure in the system
6.	In necessary	1. Inspection of weight of extinguishing agent in the system 2. Inspection with the detection device for the inspection of leaks of HFC gases* 3. Pressurization of the system 4. Replacement of wear and tear parts

*only for systems CEA(FA)(10,35) with HFC gases: HFC-227ea and HFC-236fa

Inspection and test intervals stated in the table are minimum intervals required by the manufacturer. If the legislation in place of installation require shorter intervals as stated in the table or additional inspections and tests, which are not stated in the table, it is necessary that these inspections are performed in accordance with this legislation. Additionally, if the environment where the system is installed is harsh, the system may require inspections every 3-6 months due to possible damage that may occur.

7.1. COMPREHENSIVE INSPECTION OF THE SYSTEM

Basic points of inspection of the system:

- Check completeness of the system,
- Clean surface of the cylinder and the valve of the cylinder, tubes, pressure gauge and of nozzles from major dirt,
- Check surface of the cylinder, focus on possible changes in shape of the cylinder, mechanical damage, signs of corrosion, signs of leak, etc.; in case of damage of the cylinder or the valve of the cylinder replace them immediately,
- Check firmness of the connection of the discharge network, check correct tightening of the fittings with spanner,
- Check firmness of the connection of the BlazeTube detection by gently pulling the tube,
- Check that the discharge network is not damaged, focus on possible change of shape, color, dents, damage caused by temperature or mechanical damage; in case of damage replace them,
- Check firmness of the fastening of the cylinder in the bracket, check the fastenings of the hoses/tubes, of the nozzles, firmness of the fastening of the electrical installation, check firmness of the mounting of the cable connectors depending on installed components (the solenoid, the pressure switch/transducer, the alarm panel etc.),
- Check cleanliness of the nozzle; the nozzles cannot be covered with dirt and grease; do not clean forcibly,
- Clean and check that all corresponding labeling of the system and warning labels marking the area protected by system BlazeCut are undamaged; if they are damaged, replace them.

Remove detected defects immediately. During replacement of components and reconnecting the tubes, the electrical installation and during pressurization of the system proceed in accordance with the procedures described in Chapter 11.

7.2. INSPECTION OF PRESSURE IN THE SYSTEM

The pressure of the system is inspected by control pressure gauge situated on the valve of the cylinder or on the end of line device. If both pressure gauges are installed use the most accessible pressure gauge.

During inspection of pressure the ball valve on the valve of the cylinder must be open to inspect pressure in the system correctly (like during regular operation of the system). During inspection the system cannot be heated (e.g. during operation of the protected enclosure) and exposed to a direct sunlight.



When mounting and unmounting the pressure gauge or control pressure gauge to the end of line device the ball valve of the outlet of the BlazeTube detection must be always closed.

During inspection proceed as follows:

- Read pressure on pressure gauge and remove it.
- Measure pressure by installing control pressure gauge (with adapter compatible with outlet M10x1) and compare detected value with data from the pressure gauge of the system. Values must be equal, permissible tolerance of pressure is maximum 1 bar. In case of discrepancy replace the pressure gauge of the system.

- If the control pressure gauge detects pressure in the system lower by more than 10% than the required value of pressure, taking into consideration temperature (see Chapter 3.1), perform the pressurization of the system and proceed according to Chapter 7.3.

If the control pressure gauge detects pressure in the system lower by more than 20% than the required value of pressure, taking into consideration temperature (see Chapter 3.1), it is possible that the system is not tight. Proceed as follows:

- Perform inspection for leak of extinguishing agent with detection device for the inspection of leaks of HFC gases used in system BlazeCut and proceed according to Chapter 5.8, only for systems CEA(FA)10(35) using HFC gases: HFC-227ea and HFC-236fa.
- Perform inspection of the amount of extinguishing agent in the system by weighting the cylinder, proceed according to Chapter 7.4.

7.3. PRESSURIZATION OF THE SYSTEM

During the operation of the system there is always a natural slight pressure leak in the system. The leak may occur on the connectors of the BlazeTube detection and through the BlazeTube detection itself due to permeability of the material. The operation conditions and the size of the cylinder also influence the pressure decrease. Therefore it is necessary to pressurize the system occasionally if the pressure decrease is more than 10%.

During pressurization of the system during maintenance the cylinder is also pressurized as opposed to pressurizing only the BlazeTube detection during installation.

Due to risk of accidental activation of the system in case of error during pressurization of the system it is necessary to seal the outlets for the discharge network on the valve. Disconnect the discharge networks and seal the outlets with the G3/8" sealing screws.

Nitrogen gas (N₂) is used during pressurization (N₂). Use appropriate source of N₂ – cylinder with regulation valve. The pressurized system must be pressurized to value corresponding to the operation pressure of the given temperature (see Chapter 3.1.).

Pressurization is performed through the end of line adapter of the BlazeTube detection or through the M10x1 pressure gauge outlet on the valve of the cylinder using charging adapter ATC001. The BlazeTube detection end of line adapter and pressure gauge outlet has outlet with thread M10x1 and it contains filling valve, which must be pushed and open with the charging adapter. This valve closes and opens automatically during removal or installation of the charging adapter (see Chapter 3.2).

PROCEDURE OF PRESSURIZATION

Use the charging adapter ATC001 with swivel neck (optional components).



Make sure that the ball valve of the output of the BlazeTube detection on the valve of the cylinder is closed before pressurizing the system.



Proceed carefully and strictly follow the following steps. Fasten the connectors of the tubes, charging adapter and BlazeTube detection firmly and inspect. Their accidental disconnecting during pressurization would release the extinguishing agent into the system.



Never connect or disconnect the charging adapter to the BlazeTube detection if the ball valve of the outlet of the BlazeTube detection on the valve of the cylinder is open.

Procedure of pressurization through the end of line adapter is shown in the figures below.



S1. Set control valve on the source N₂ to the desired value and open the regulation valve.



S2. Remove the pressure gauge (if installed) and mount the charging adapter on the end of line adapter of the BlazeTube detection onto the outlet M10x1 by rotating to the right.



S3. Tighten the adapter properly



S4. Open the valve of the charging adapter and pressurize the BlazeTube detection first.



Always open the regulation valve and ball valve of the charging adapter and pressurize the BlazeTube detection first.



S5. Open the ball valve on the cylinder valve and slowly pressurize the cylinder. Leave the valves open at least 30 seconds to stabilize the pressure in the system. Close the ball valve. N₂ is soluble in the extinguishing agent, for thorough absorption of the N₂ in the extinguishing agent shake the cylinder several times during pressurizing (absorption causes a slight pressure decrease). Then close the ball valve again. If several cylinders are used, repeat on all cylinders.



S6. Unscrew the charging adapter. Filling valve in the end of line adapter of the BlazeTube detection will close automatically.



S7. Mount the pressure gauge back. Check that the seals are correctly mounted on the connectors. Tighten the pressure gauge with spanner 22 mm.



S8. After disconnection of the charging adapter open the ball valve on the cylinder valve.

Procedure of pressurization through the M10x1 pressure gauge outlet on the valve of the cylinder is shown in the figures below.

Note: This pressurization procedure is used for systems without the BlazeTube.



S1. Set control valve on the source N₂ to the desired value and open the regulation valve.



S2. Remove the pressure gauge or pressure switch/transducer and mount the charging adapter to the outlet M10x1 by rotating to the right.



S3. Tighten the adapter properly.



S4. Open the valve of the charging adapter and pressurize the cylinder.



S6. Unscrew the charging adapter. Filling valve in M10x1 outlet will close automatically.



S7. Mount the pressure gauge or pressure switch/transducer back. Check that the seals are correctly mounted on the connectors. Tighten the pressure gauge with spanner 22 mm.

7.4. INSPECTION OF WEIGHT OF EXTINGUISHING AGENT IN SYSTEM

Inspection of weight of extinguishing agent in the system is performed:

- If the control pressure gauge detects pressure in the system lower by more than 20% than the required value of pressure, taking into consideration temperature (see Chapter 3.1.),
- If leak is detected by the detection device for the inspection of leaks of HFC gases used in system BlazeCut during operation of the system (if the inspection is performed, see Chapter 5.8, only for systems CEA(FA)10(35) using HFC gases: HFC-227ea and HFC-236fa),
- 1 x 3 years.

During inspection of the amount of extinguishing agent in the system by weighting the cylinder with the valve must be removed from of the system, proceed according to Chapter 11.2.

If decrease of weight of extinguishing agent by more than 5% is detected when weighting the cylinder, the cylinder must be replaced.

Decrease of weight of extinguishing agent can be calculated according to the formula:

$$P = ((M1 - M2) / M3) \times 100 \%$$

P – Decrease of weight of extinguishing agent in percent (%)

M1 – weight of the cylinder and valve including extinguishing agent* (kg), $M1 = M + M3$

M2 – weight of the cylinder and valve including extinguishing agent detected by weighing (kg)

M3 – amount of extinguishing agent (kg), amount of extinguishing agent is marked on label of the cylinder (see Chapter 3.1)

Systems CEA(FA,NO)10(35)

Volume of cylinder (l)	Valve	M* (kg)
2.4	10	2.61
2.4	35	2.33
5.0	10	3.50
5.0	35	3.22
7.8	10	4.15
7.8	35	3.87
13.0	10	6.17
13.0	35	5.89
16.0	10	8.28
16.0	35	8.00

*weight of cylinder, dip tube, valve without the extinguishing agent, pressure gauge, sealing screws and Pressure Switch/Transducer, tolerance ± 0.05 kg

If the detected decrease of weight is not more than 5 %, install the cylinder back, proceed according to Chapter 11.2.

If leak of extinguishing agent is detected by detection device for the inspection of leaks of HFC gases or other form of leakage, the leak must be removed before repeated installation of the cylinder.

7.5. REMOVAL OF THE SYSTEM FROM THE SERVICE

The system must be immediately put out of service in the following cases:

- The system has been used or emptied for other reason.
- The system has been exposed to direct flame or temperatures exceeding the limits of the system operation.

- The cylinder or valve shows signs of damage (deformation, cracks, leaks, severe corrosion, unusual phenomena that cannot be inspected or removed during operation of the system).
- If the pressure in the system is significantly higher with the respect to the ambient temperature or if it exceeds the highest permissible pressure level of the system.

Subsequent measures to ensure safety of the system and protection of persons must be taken by the persons trained and authorized by the manufacturer and, depending on the procedure, with corresponding professional qualification. If necessary, contact your supplier of the BlazeCut system.

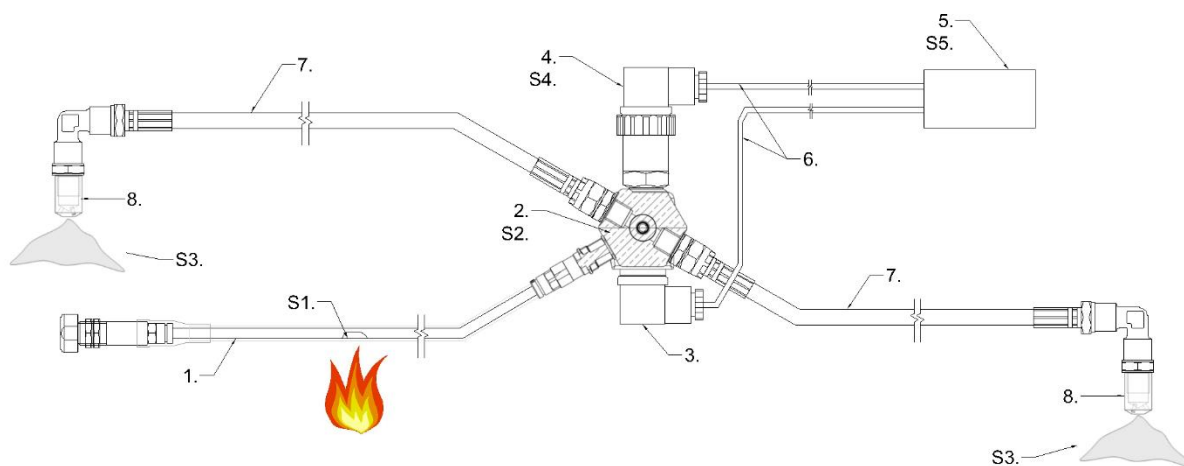
8. OPERATION OF SYSTEM BLAZECUT IN CASE OF FIRE

System BlazeCut is designed to protect closed spaces from fire using volume fire suppression applying clean extinguishing agent. System BlazeCut suppresses fire automatically without any external power source (LOP principle) or through electronic activation (LHD BlazeWire, detectors etc.).

Below is description of operating using BlazeTube detection but the principle of operation is the same also with electronic activation through LHD BlazeWire, detectors etc.

OPERATION OF SYSTEMS USING VALVE TYPE 10 WITH THE SOLENOID – CEA(FA,NO)10

Procedure during automatic activation of the system is described in figure below.



Procedure during automatic activation of the system

1. BlazeTube detection
 2. Valve of the cylinder (view from above)
 3. Solenoid with the cable connector (no activity)
 4. * Pressure Switch/Transducer with cable connector
 5. **External device (e.g. Alarm Panel AAP200)
 6. Electrical cables
 7. Distribution tube/hose
 8. Nozzles
- S1. Burning through the BlazeTube detection
 S2. Opening of the valve piston of the cylinder as a result of decrease of pressure in the BlazeTube detection
 S3. Release of extinguishing agent
 S4. * The Pressure Switch/Transducer sends signal to the external device after decrease of pressure in the system
 S5. ** External device makes the operation

*Applicable only when the Pressure Switch/Transducer is installed.

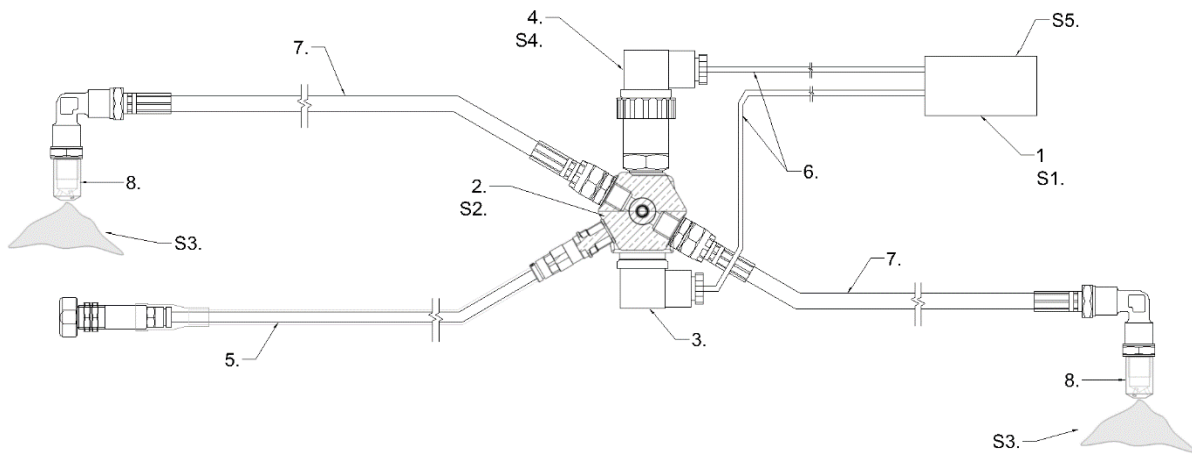
**External device described on the pictures above shall not be only one device but also separate independent devices.

AUTOMATIC FIRE SUPPRESSION SYSTEMS



The system can be activated using solenoid connected to the external device (e.g. Alarm Panel AAP200). When fire is detected the system can be activated also manually (e.g. Alarm Panel AAP200).

Procedure during manual activation of the system is described on figure below.



Procedure during manual activation of the system

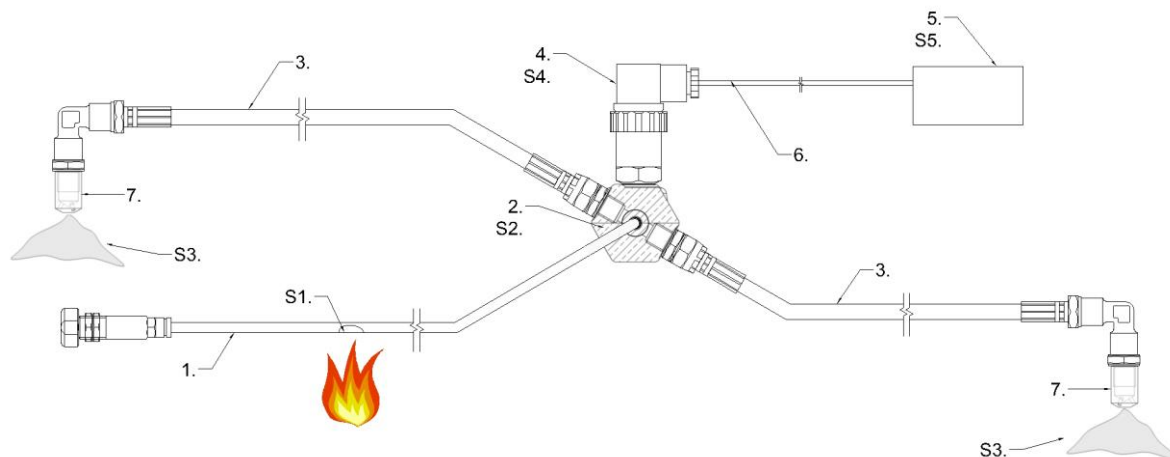
1. **External device (e.g. Alarm Panel AAP200)
 2. Valve of the cylinder (view from above)
 3. Solenoid with the cable connector
 4. *Pressure Switch/Transducer with cable connector
 5. BlazeTube detection (no activity)
 6. Electrical cables
 7. Distribution tube/hose
 8. Nozzles
- S1. **Activation of the system by external device (e.g. Alarm Panel AAP200), which sends signal to solenoid
- S2. Opening of the valve piston of the cylinder as a result of signal from the external device (e.g. Alarm Panel AAP200)
- S3. Release of extinguishing agent
- S4. * The Pressure Switch/Transducer sends signal to the external device after decrease of pressure in the system
- S5. ** External device makes the operation

*Applicable only when the Pressure Switch/Transducer is installed.

**External device described on the pictures above shall not be only one device but also separate independent devices.

OPERATION OF SYSTEMS USING VALVE TYPE 35 WITHOUT THE SOLENOID – CEA(FA,NO)35

Procedure during automatic activation of the system is described in figure below.



Procedure during automatic activation of the system

1. BlazeTube detection
 2. Valve of the cylinder (view from above)
 3. Distribution tube/hose
 4. *Pressure Switch/Transducer with cable connector
 5. *External device (e.g. Alarm Panel CAP200),
 6. *Electrical cables
 7. Nozzles
- S1. Burning through the BlazeTube detection
S2. Opening of the valve piston of the cylinder as a result of decrease of pressure in the BlazeTube detection
S3. Release of extinguishing agent
S4. *The Pressure Switch/Transducer sends signal to the external device after decrease of pressure in the system
S5. * External device makes the operation

WARNINGS



Do not manually activate the system without reason. Use manual activation only in case of reasonable suspicion of fire in the protected enclosure.



Do not manually activate the system if persons are present in the protected enclosures.



In case of fire the system activates automatically by burning the BlazeTube detection without previous warning. Do not come to immediate proximity of the nozzles of the system in case of fire, there is risk of being struck by extinguishing agent.



If the system is activated wait for its activity to finish. Do not enter the protected enclosures and do not open the covers of the protected enclosure during the activity of the system.



In case of fire in the vehicle the driver must immediately stop the vehicle, stop the engine of the vehicle and perform further measures according to operation instructions of the vehicle (for example cut-off the supply of gas/fuel) in order to protect the persons and property according to applicable legislation.

9. RESTORATION OF ACTIVITY OF SYSTEM BLAZECUT IN CASE OF FIRE



Install and use system BlazeCut only with original supplied components. Do not replace anything in the system; use only original component and spare components. Using components not approved by the manufacturer causes loss of warranty, may cause malfunction of the system and presents danger to life and health of persons.



The system may be installed, maintained and repaired only by persons trained or authorized by the manufacturer and depending on procedure also with relevant professional qualification. Unprofessional interference with the system may cause malfunction of the system and presents danger to safety and health of people.

After using the system in case of fire it is not necessary to clean the protected enclosure from extinguishing agent. Extinguishing agent does not leave residue. Ventilate the protected enclosure properly, do not interfere with or work in the area before ventilation.

After the fire extinguishing is finished, observe the following instructions:

- enter the protected area only after the system operation is finished,
- unless absolutely necessary, enter the protected area only after it has been properly ventilated and cooled off and make sure that entry is safe,
- if immediate entry is necessary, persons must be properly protected (using self-contained breathing apparatus, protective clothing, etc.).

If the system is automatically activated in case of fire in the protected enclosure, it is necessary to replace the cylinder with extinguishing agent, the BlazeTube detection and all clamps/ties of the system, which were damaged, or repair the discharge networks. Proceed as follows:

- Disconnect the cable connector from the Pressure Switch/Transducer or solenoid, if used in the system, and remove the Pressure Switch/Transducer from the valve of the cylinder. Check if electrical installation was not damaged, replace possible damaged parts,
- Disconnect the BlazeTube detection and the distribution tubes/hoses from the valve of the cylinder,
- Replace the cylinder with extinguishing agent,
- Replace BlazeTube detection; BlazeTube detection is replaced always in whole length; BlazeTube detection is replaced always after exposure to fire, also when the system was activated manually without burning through the tube,
- If the discharge networks and their connectors were not damaged, it is not necessary to replace them; check them at their whole length; if parts show signs of damage replace them; the distribution tubes/hoses are always replaced in whole length,
- Check if electrical installation was not damaged, replace possible damaged parts,
- Connect the cable connectors to the Pressure Switch/Transducer or solenoid and check correct functioning of the electrical installation.

During installation of new components or their replacement and during repeatedly connecting the tubes/hoses, electrical installation and pressurization of the system proceed according to instruction in respective Chapters.

Proceed likewise in case of manual activation of the system or accidental activation of the system for other reasons.

10. DISAMBLEMENT OF THE SYSTEM

If necessary system BlazeCut may be disabled without removing it from of the protected enclosure. Disablement is possible more components:

DISAMBLEMENT OF THE BLAZETUBE DETECTION (AUTOMATIC ACTIVATION):

Close the ball valve on the valve of the cylinder. In this case even after damaging the tube the valve of the cylinder does not open and extinguishing agent is not released. However, it remains possible to activate the system manually from the external device using solenoid.

DISAMBLEMENT OF ACTIVATION FROM EXTERNAL DEVICE – ONLY FOR SYSTEMS WITH THE VALVE TYPE 10 WITH SOLENOID: CEA(FA,NO)10

Disconnect the cable connector from the solenoid on the valve of the cylinder. Protect uncovered electrical connectors from dirt (e.g. by insulation tape). In this case automatic activation using the BlazeTube detection remain active.

TOTAL DISAMBLEMENT OF THE SYSTEM

Disable the BlazeTube detection and solenoid. The system cannot be activated.

11. MAINTENANCE OF THE SYSTEM, REPLACEMENT OF COMPONENTS

11.1. GENERAL RULES

Follow general rules stated in Chapter 6.1.

Fill-out the Maintenance/Inspection Report.

11.2. REPLACEMENT OF THE CYLINDER

During replacement use only undamaged cylinder filled with the correct extinguishing agent, properly labeled, with correctly mounted valve of the cylinder. Cylinder is supplied pressurized with required pressure. Detect the pressure in the cylinder with the pressure gauge mounted on the valve of the cylinder. Pressures corresponding to actual temperature are stated in Chapter 3.1.

If the pressure gauge is not mounted on the valve of the cylinder, external control pressure gauge with adapter compatible with outlet with thread M10x1 on the valve of the cylinder or the pressure gauge of system BlazeCut which is mounted on the end of line adaptor of the BlazeTube detection may be used. In such case, remove the pressure gauge from the end of line adaptor of the BlazeTube detection and mount it to the outlet on the valve of the cylinder with thread M10x1.

During replacement of the cylinder proceed as follows:

- Disconnect cable connectors on the Pressure Switch/Transducer or solenoid, if used in the system and remove the Pressure Switch/Transducer.
- Disconnect the BlazeTube detection and the distribution tubes/hoses.
- Loosen the clamps of the bracket of the cylinder and remove it from the bracket.
- Place new cylinder into the bracket and fasten properly with clamps.
- Connect the BlazeTube detection, the distribution tubes/hoses on the valve of the cylinder, install the Pressure Switch/Transducer and connect the cable connector, if used in the system and connect the cable connectors of the electrical components.
- If the removed cylinder is under pressure, seal both outlets of distribution tubes with thread G 3/8" with corresponding sealing screws.

After replacement of the cylinder have corresponding safety inspection of the pressure device performed according to Chapter 7.

After replacement of the cylinder with HFC gases have corresponding inspection and measures to prevent leak of HFC gases according to Chapter 5.8 performed.

During removal and installation of individual components proceed according to the instructions as stated in individual Chapters relating to components.

11.3. REPLACEMENT OF THE BLAZETUBE DETECTION



Do not try to remove the BlazeTube detection from the valve of the cylinder, when the tube is under pressure and the ball valve on the valve of the cylinder is open.



Before handling the BlazeTube detection during removal, replacement or adjustment fastening in the protected enclosure always close the ball valve on the valve of the cylinder where the tube is fastened. If the BlazeTube detection is connected to the valve of the cylinder and the ball valve is open, if the tube is damaged and the pressure decreases, the fire suppression system is always activated and the extinguishing agent is released completely.



During disconnection of the BlazeTube detection under pressure a pressure is released and if the system was in operation also small amount of agent is released. In such case always wear appropriate protective glasses with side-shields and suitable protective gloves. Aim the BlazeTube detection always apart. Make sure not to interpose any other person.

Close the ball valve on the valve of the cylinder, position of the lever as shown on figure below.



The ball valve is closed



Disconnect the BlazeTube detection from connector of the valve of the cylinder. Disconnect the tube by pushing the ring inwards in the place of entry of the tube to the connector (toward the connector) and remove the tube. Proceed accordingly when disconnecting the end of line adapter of the BlazeTube detection. Proceed according to the instructions in Chapter 6.4. Be careful, if the tube was under pressure, the pressure will leak from the BlazeTube detection.

Fasten the new BlazeTube detection properly to the connector of the valve of the cylinder. Fasten the BlazeTube detection so that the tube is slotted to the outlet of the connector and pushed by hand all the way. After slotting always make sure by pulling that the tube is firmly gripped.

Place the BlazeTube detection in the protected enclosure and gradually fasten with clamps.

During installation proceed further according to Chapter 6.4.

Pressurize the BlazeTube detection, proceed according to Chapter 6.5.

When using systems with HFC gases after replacement of the BlazeTube detection have inspection performed and take measures against leak of HFC gases according to Chapter 5.8.

11.4. RELEASE OF THE PISTON OF THE VALVE IN CASE OF ACCIDENTAL OPENING

In case the sealing screws are installed in outlets for the distribution tubes/hoses and the piston of the valve open accidentally (during transport, accidental opening of the ball valve, pressurization of the system) it is necessary to release the piston back into closed position.

This operation is possible through the outlet for the BlazeTube detection by using pressure of gas (nitrogen). Close the ball valve on the valve of the cylinder (if it's open), connect the source of gas to the outlet for the BlazeTube detection by using charging adapter and release the gas under pressure into the outlet. Slowly open the ball valve of the outlet. Piston of the valve will move into closed position, this will be indicated by an audible click. Close the ball valve again.



Never remove the sealing screws before you release the piston back into closed position.

11.5. CLEANING THE SYSTEM

During maintenance of system BlazeCut clean the surface of the cylinder and the valve of the cylinder and the tubes from major dirt with appropriate cleaning textiles or cloths and nonaggressive cleaning products.

Do not use aggressive cleaning products such as solvents and caustic to clean the system.

Do not expose the system and especially its electronic parts to direct effect of water pressure during cleaning of the protected enclosure with high-pressure water.

11.6. DECLARATION OF CONFORMITY

Upon installation of each piece of the system the Commissioning/Installation Report must be prepared. Send the original of the Report to the manufacturer of the system. Keep the copy of the original.

Records on the maintenance and inspection of the system indicating the scope of service must be kept. Keep the maintenance records.

Declaration of conformity is issued by the manufacturer for each of the systems separately. The basis and requirement to issue the declaration of conformity is the Report issued by the authorized qualified person with relevant professional qualification in accordance with the relevant legislation and delivered to the manufacturer, whereby the authorized person certifies correct installation of the system pursuant to the technical documentation.

In the declaration of conformity, the manufacturer declares that the equipment under pressure is in conformity with the certificate of the type of the equipment under pressure no. 3511/4/2018-1 (issued in accordance with the requirements of Directive no. 97/23/EC and European directive 2014/68/EU, Module B) issued by notified body:

Technická inšpekcia, a.s., Trnavská cesta 56, 821 01 Bratislava, Slovak Republic (NB 1354).

The manufacturer further declares that measures have been taken to ensure conformity of the abovementioned products with the technical documentation and with the basic requirements of the European directive 2014/68/EU. The manufacturer has implemented a system of ensuring quality of products pursuant to the European directive 2014/68/EU, Module E confirmed by certificate no. 4332/4/2017 issued by notified body:

Technická inšpekcia, a.s., Trnavská cesta 56, 821 01 Bratislava, Slovak Republic (NB 1354).

Supervising the implementation of the obligations arising out of the approved quality assurance system is ensured by notified body:

Technická inšpekcia, a.s., Trnavská cesta 56, 821 01 Bratislava, Slovak Republic (NB 1354).

Pursuant to the abovementioned, the equipment under pressure is labelled with CE conformity mark and identification code of notified body: 1354.

The products are safe when the terms of use and technical requirements are observed.

A copy of the current certificates can be requested by emailing technical@blazecut.com

12. LIST OF ANNEXES

Annex no.1: Pressure monitoring

Annex no.2: Solenoid Valve CSV001

Annex no.3: Remote actuator CRA203

Annex no.4: Remote actuator CRA204

Pressure Monitoring

1.1. PRESSURE SWITCH APS001

Pressure Switch APS001 is a mechanical switch with one preset pressure value (switch point). When the pressure in the system drops below the switch point the pressure switch sends a signal to an Alarm Panel or an external device to perform the operation. The pressure switch is supplied with the cable connector.

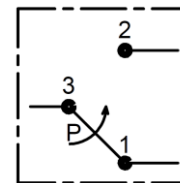
Pressure Switch APS001 will send a signal when the pressure in the system decreases regardless of the cause, in case of fire or accidental activation and rapid decrease of pressure in the system which is below the preset value.

Specifications

Material of body	galvanized steel		
Switch point	set to 5 bar		
Hysteresis	min. 0.5 bar / max. 1.5 bar		
Switching frequency	Max. 100 / min		
Power rating	Angular connector	All	Current
Resistive load AC-12, DC12	AC 250V	DC 24V	4A
Inductive load AC-14, DC14	AC 250V	DC 24V	2A
IP rating	IP65 with cable connector and seal		
Electrical outlet	DIN EN 175301-803 A		
Operation temperature	from - 30°C up to 100°C		
Thread	M10x1 (12.5 mm with O-ring and filter)		



Pressure Switch APS001

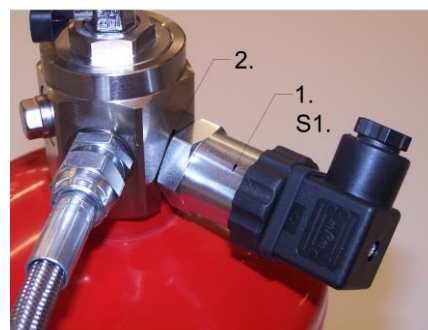


Method of closing the electrical circuit with the Pressure Switch APS001 on connectors

1.2. INSTALLATION OF THE PRESSURE SWITCH

Pressure switch cannot be in direct contact or be in immediate proximity with parts which heat to temperature of more than 80° C (e.g. engine block, engine turbocharger, exhaust pipe, heated parts of inductors etc.).

Install the pressure switch so that it is not exposed to aggressive chemical substances (caustic, acids, solvents, corrosive substances etc.) and to direct influence of weather conditions.



Example of installation of the Pressure Switch onto the valve of the cylinder to the pressure gauge outlet (on the left valve type 10, on the right valve type 35)

1. Pressure Switch APS001
2. Outlet for the pressure gauge with thread M10x1
- S1. Mount the Pressure Switch onto the outlet M10x1 by turning right, tighten the Pressure Switch properly

Depending on type of installation the Pressure Switch APS001 is installed on the valve of the cylinder to the pressure gauge outlet or to additional M10x1 adaptor or on the end of line adapter into the outlet with thread M10x1. The outlet has a check valve, which automatically opens and closes during mounting and dismantling of the Switch even when the system is under pressure.

In case the pressure gauge is still mounted on the valve of the cylinder in place of installation, remove it. Read the pressure from pressure gauge before removal and write it down, the data will be necessary for pressurization of the BlazeTube detection later.

For special applications where additional signal from the pressure switch is needed (e.g. to switch-off the ventilation) and there is no remaining M10x1 outlet on the system the Pressure Switch APS001 can be installed on the discharge outlet using straight coupling reduced CSC3818 and adaptor CAD1810.

1.3. PRESSURE TRANSDUCER ATA100

Pressure Transducer ATA100 provides full range constant pressure monitoring in the system. It can identify a low pressure or over pressure in the system and notify the operator through an Alarm Panel or other external device.

Specifications

Material of body	brass
Pressure range	0 – 20 bar
Accuracy	0.5% of range
Maximum overpressure	30 bar
Operation voltage	5 – 40 V DC
Output signal	RS 485
Power consumption	0.7 – 3.9 mA
IP rating	IP67 when supplied complete with cable
Operation temperature	from - 30°C up to 80°C
Thread	M10x1 (12.5 mm with o-ring and filter)
Electrical cable	30 cm length, 4 x 0.75 mm ²



Transducer Assembly ATA100

Depending on type of installation the Pressure Transducer ATA100 is installed on the valve of the cylinder to the pressure gauge outlet or to additional M10x1 adaptor or on the end of line adapter into the outlet with thread M10x1. The outlet has a check valve, which automatically opens and closes during mounting and dismantling of the Switch even when the system is under pressure.

In case the pressure gauge is still mounted on the valve of the cylinder in place of installation, remove it. Read the pressure from pressure gauge before removal and write it down, the data will be necessary for pressurization of the BlazeTube detection later.

1.4. ELECTRICAL CABLES AND CONDUITS

For installation of electrical components: solenoid, Pressure Switch APS001 or Pressure Transducer ATA100 use a two core electrical cable supplied as optional components.



Cable silicone ACS102



Cable standard ACS002

Part No.	Description	Comment
ACS002	Standard cable up to 80°C, 2x0.5mm ² , UV stabilized	For standard installations.
ACS102	Silicone cable up to 180°C, 2x0.75mm ² , UV stabilized	For installations with high temperatures like in engine compartments.

In case of installation in spaces with increased risk of damage due to mechanical interference use the cable conduit with conduit connector to protect the electrical cables.



Cable conduit ACC060



Conduit connector ACC001

Part No.	Description
ACC060	Cable conduit, Ø 18mm, -5°C to 60°C
ACC150	Cable conduit, Ø 18mm, -45°C to 150°C
ACC001	Conduit Connector between cable conduit and cable connector (suits only with APS001)



Electrical connector with the cable conduit and conduit connector

NOTE

In case of malfunction or disconnection of the pressure monitoring components (Pressure Switch APS001, Pressure Transducer ATA100) the system remains functional, these components are not necessary for its automatic activation in case of fire.

Solenoid Valve CSV001

2. BASIC INFORMATION ABOUT THE COMPONENTS

It operates on the principle of automatic release of pressure from the BlazeTube detection or LOP hose after receiving signal from external device (e.g. Alarm Panel AAP200). This results in opening of the piston of the valve of the cylinder, activating the suppression system and completely releasing the extinguishing agent. This is the same process as during disruption of the BlazeTube detection by effect of fire or heat.

When it is used it also serves as an end of line device. It can also be used to pressurize the BlazeTube detection as with the standard end of line adapter of the BlazeTube detection or LOP hose.

Any instruction in this manual regarding the end of line adapter apply to solenoid valve.

Valve material: nickel-plated brass; stainless steel, rubber seals

Operation voltage: 24 V DC

Consumption: 12 W

IP rating: IP65

Connecting terminals: DIN EN175301-803 type A



Solenoid Valve CSV001P with the push in fitting connection



Solenoid Valve CSV001L with the LOP hose connection

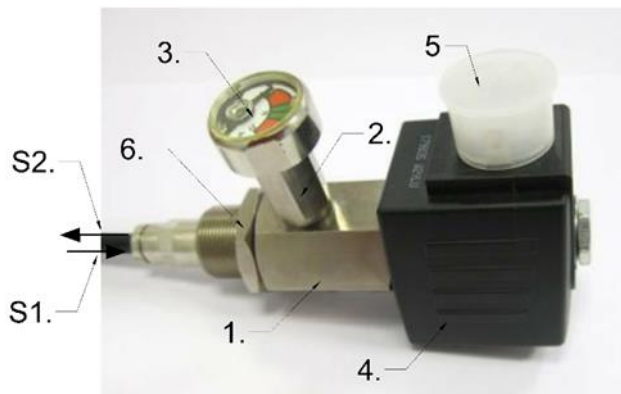
2.1. INSTALLATION OF THE SOLENOID VALVE

Solenoid valve is installed into the ending of the BlazeTube detection or LOP hose. Solenoid valve uses fast slotting system of fastening the BlazeTube detection with double seal in order to prevent leak of gas in maximum or alternatively G1/8" straight coupling to connect the LOP hose.

The BlazeTube detection is mounted onto the outlet so that it is slotted into the outlet and pushed by hand all the way. Always make sure after slotting that the tube is firmly fastened by pulling it gently.

Follow all further instructions in Chapter 6.4.

Description of the Solenoid valve and installation using BlazeTube detection



1. Body of the solenoid valve
 2. Charging port
 3. Pressure gauge
 4. Solenoid
 5. Solenoid connector
 6. Mounting nut
- S1. The BlazeTube detection is slotted into the outlet all the way
S2. The BlazeTube detector is gently pulled to make sure it is firmly fastened

2.2. PRESSURIZATION OF THE DETECTION SYSTEM

Charging port of the solenoid valve is an outlet with thread M10x1. It contains filling valve which must be pushed and opened by the charging adapter.

This valve closes and opens automatically when removing or installing the charging adapter or the pressure gauge. These components can be installed and removed even when the tube is pressurized. (see Chapter 3.2).



If the system is in operation and the BlazeTube detection is pressurized, when mounting and dismantling the pressure gauge on the solenoid valve the BlazeTube detection outlet must be closed.



Before pressurization of the tube make sure, that the ball valve on the valve of the cylinder is closed.



Due to risk of activation during pressurization of the system it is necessary to seal the outlets of the discharge networks on the valve. Remove the discharge networks and seal the outlets with the G3/8" sealing screws.

The charging process is shown in the figures below. The same procedure is followed also when LOP hose is used. Follow all further instructions and provisions in Chapter 6.5.



S1. Remove the pressure gauge from the charging port of the solenoid valve if it is installed.



S2. Mount the charging adapter by turning right onto the charging port of the solenoid valve into the outlet M10x1, tighten the adapter.



S3. Set the regulation valve on the N₂ source for desired value. The setting must be at least to the level of pressure in the cylinder increased by 1 bar (the pressure should have been read and noted while removing the pressure gauge of the valve of the cylinder). Graphs of relationship between temperature and pressure in the cylinder of various extinguishing agents are mentioned in the Chapter 3.1.



S4. Slowly open the valve of the charging adapter and pressurize the BlazeTube detection with N₂. Hissing can be heard during pressurization. When the sound is finished, so does the pressurization. Keep the valve open for at least 30 seconds to level the pressure in the BlazeTube detection.



S5. After the pressurization is finished close the valve of the charging adapter. Remove the charging adapter. The filling valve in the charging port of the solenoid valve will close automatically.



S6. Mount the pressure gauge onto the charging port of the manual switch. Make sure that the seals are correctly mounted on the connectors. Fasten the pressure gauge with spanner 22 mm.

Pressurization of the BlazeTube detection with charging adapter



Pressurize the BlazeTube detection or LOP hose correctly. If the pressure in it is lower than the pressure in the cylinder, the valve piston of the cylinder could open and the extinguishing agent could be released when opening the ball valve of the BlazeTube detection or LOP hose.

After pressurization observe the data on the pressure gauge. If the pressure is decreasing, the BlazeTube detection or LOP hose is leaking. Disconnect it from the solenoid valve and the valve of the cylinder, inspect it again and connect properly again – repeat the procedure as during installation. To determine exact place of leakage it is possible to use for example foaming solution.

If the pressure does not decrease, very slowly start opening the ball valve of the valve of the cylinder. The pressures in the tube and in the cylinder will equalize. Wait approximately 30 seconds and open the ball valve fully. In case of multiple cylinder connection open the ball valve of each cylinder one by one.

The solenoid valve can be installed with mounting nut onto suitable constructions, covers, etc.



From this moment the cylinder and the BlazeTube detection or LOP hose are connected into one pressure unit. Proceed further carefully not to damage the BlazeTube detection or LOP hose. Its accidental damaging would activate the system and release extinguishing agent.

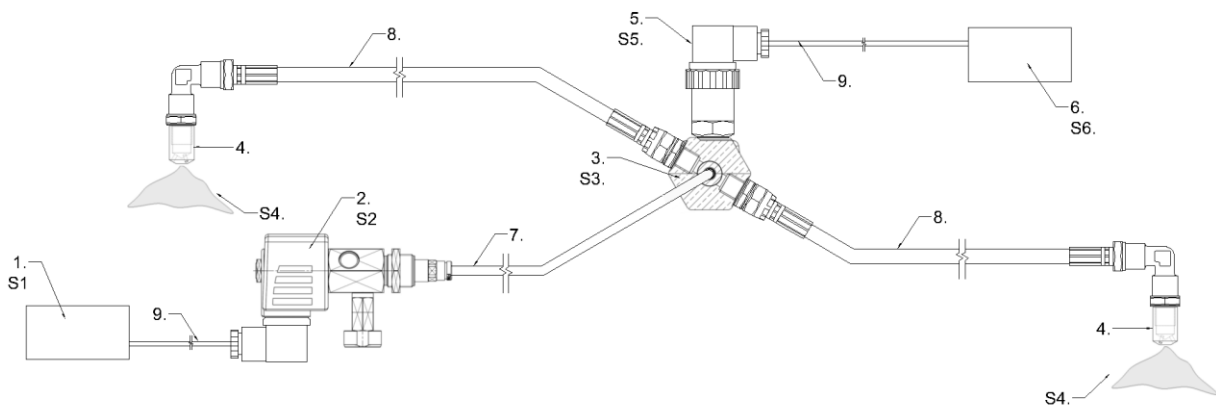


Fast and careless opening of the ball valve of the outlet of the BlazeTube detection or LOP hose may activate the system and release extinguishing agent.



Do not try to remove the BlazeTube detection or LOP hose from the outlet of the valve of the cylinder or remove the ending of the tube if the tube is under pressure and the ball valve of the outlet of the BlazeTube detection or LOP hose of the valve of the cylinder is open.

2.3. FUNCTION OF THE SOLENOID VALVE



Manual activation of the system

1. External device
2. Solenoid valve
3. Valve of the cylinder (view from above)
4. Nozzles
5. * Pressure switch/transducer with cable connector
6. * External device
7. BlazeTube detection/LOP hose
8. Discharge networks
9. Electrical cables
- S1. External device sends signal
- S2. Solenoid valve releases pressure from the BlazeTube detection or LOP hose
- S3. Opening of the valve piston of the cylinder due to decrease of pressure in the BlazeTube detection or LOP hose
- S4. Releasing of extinguishing agent
- S5. * Pressure switch/transducer sends signal to the external device after the pressure decrease in the system
- S6. * External device makes the operation

*only in case the pressure switch/transducer is installed



If the system is activated wait for its activity to finish. Do not enter the protected enclosures and do not open the covers of the protected enclosure during the activity of the system.



Do not manually activate the system without reason. Use manual activation only in case of reasonable suspicion of fire in the protected enclosure.



Do not manually activate the system if persons are present in the protected enclosures.

2.4. PRESSURIZATION OF THE SYSTEM

Pressurization of the system through the solenoid valve is similar to the pressurization through standard end of line adapter. During pressurization follow the instructions in the Chapter 7.3.

REMOTE ACTUATOR CRA203

3. BASIC INFORMATION ABOUT THE COMPONENTS

The remote actuator of the system is optional component of the system BlazeCut. It operates on the principle of manual release of pressure from the LOP line after breaking through the membrane maintaining pressure in the LOP line when pressing the button of the actuator. This results in opening of the piston of the valve of the cylinder, activating the suppression system and completely releasing the extinguishing agent. This is the same process as during disruption of the BlazeTube detection by effect of fire or heat.

It also serves as an end of line device. If it is suitable, the actuator can have pressure gauge of the system mounted on it. It can also be used to pressurize the LOP line.

Any instructions in this manual regarding the end of line adapter apply to remote actuator of the system.

Valve material: nickel-plated brass; stainless steel, rubber seals.



*Remote actuator CRA203P(H,N)
with the push in fitting connection*



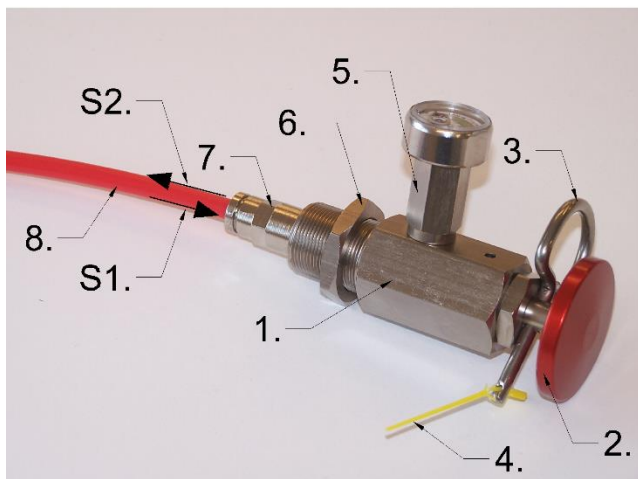
*Remote actuator CRA203L(H,N)
with the LOP hose connection*

3.1. INSTALLATION OF THE REMOTE ACTUATOR

The remote actuator is installed into the ending of the BlazeTube detection or LOP hose. Remote actuator uses fast slotting system of fastening the BlazeTube detection with double seal in order to prevent leak of extinguishing agent in maximum or alternatively G1/8" straight coupling to connect LOP hose.

The BlazeTube detection is mounted onto the outlet (of the connector) of the remote actuator with \varnothing 6 mm so that it is slotted into the outlet and pushed by hand all the way. Always make sure after slotting that the tube is firmly fastened by pulling it gently.

Follow all the following provisions and instructions in Chapter 6.5.



Description remote actuator of the installation procedure.

1. Body of the remote actuator
 2. Red knob
 3. Safety pin
 4. Fuse
 5. Charging port
 6. Mounting nut
 7. Outlet of the remote actuator for the BlazeTube detection or LOP hose
 8. BlazeTube detection alternatively LOP hose
- S1. Slot the BlazeTube detection firmly into the outlet all the way
S2. Pull the BlazeTube detection gently and make sure that it is properly fastened

3.2. PRESSURIZATION OF THE LOP LINE

Charging port of the Remote actuator is an outlet with thread M10x1. It contains charging valve which must be pushed and opened by the charging adapter.

This valve closes and opens automatically when removing or installing the charging adapter or the pressure gauge. These components can be installed and removed even when the tube is pressurized. (see Chapter 3.2).



If the system is in operation and the LOP line is pressurized, when mounting and dismantling the pressure gauge on the remote actuator the ball valve must be closed.



Before pressurization make sure, that the ball valve on the valve of the cylinder is closed.



Due to risk of activation during pressurization of the system it is necessary to seal the outlets of the distribution networks on the valve. Remove the distribution networks and seal the outlets with the G3/8" sealing screws.

The charging process is shown in the following figures. The same charging process is for the version using BlazeTube detection and LOP hose. Follow all further instructions and provisions in Chapter 6.5.



S1. Remove the pressure gauge from the charging port of gauge of the remote actuator if it is installed



S2. Mount the charging adapter onto the charging port of the remote actuator into the outlet M10x1 by turning right, tighten the adapter



S3. Set the regulation valve on the source of N₂ to required value. The setting must be at least to the level of pressure in the cylinder increased by 1 bar (the pressure should have been read and noted while removing the pressure gauge of the valve of the cylinder). Graphs of relationship between temperature and pressure in the cylinder of various extinguishing agents are mentioned in the Chapter 3.1.



S4. Slowly open the valve of the charging adapter and pressurize the LOP line with N₂. Hissing can be heard during pressurization. When the sound is finished, so does the pressurization. Keep the valve open for at least 30 seconds to level the pressure in LOP line.



S5. After finishing the pressurization close the valve of the charging adapter. Remove the charging adapter. The charging valve in the charging port of the remote actuator will automatically close.



S6. Mount the pressure gauge onto the charging port of the manual actuator. Make sure that the seals are correctly mounted on the connectors. Fasten the pressure gauge with spanner 22 mm.

Pressurization of the LOP line with charging adapter



Pressurize the LOP line correctly. If the pressure in it is lower than the pressure in the cylinder, the valve piston of the cylinder could open and the extinguishing agent could be released when opening the ball valve of the LOP line.

After pressurization observe the data on the pressure gauge. If the pressure is decreasing, the LOP line is leaking. Disconnect it from the remote actuator and the valve of the cylinder, inspect it again and connect properly again – repeat the procedure as during installation. To determine exact place of leakage it is possible to use for example foaming solution.

If the pressure does not decrease, very slowly start opening the ball valve of the valve of the cylinder. The pressures in the LOP line and in the cylinder will equalize. Wait approximately 30 seconds and open the ball valve fully. In case of multiple cylinder connection open the ball valve on all valves of the cylinders.



From this moment the cylinder and the LOP line are connected into one pressure unit. Proceed further carefully not to damage the BlazeTube detection. Its accidental damaging would activate the system and release extinguishing agent.



Fast and careless opening of the ball valve may activate the system and release extinguishing agent.

Always place the remote actuator in the proximity of the protected enclosure so that it is easily accessible when necessary. Do not place it in the area of expected fire, where manual activation after the fire has started is not possible.

Label the remote actuator visibly with corresponding label ALA007.

The remote actuator can be installed with a mounting nut onto suitable constructions, cover, etc.



Do not manually activate the system without reason. Use manual activation only in case of reasonable suspicion of fire in the protected enclosure.



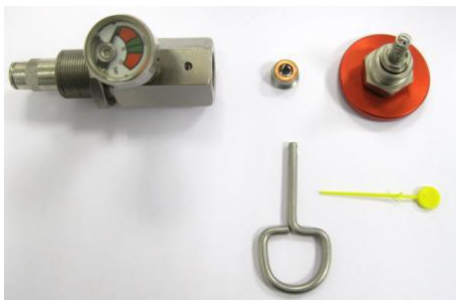
Do not manually activate the system if persons are present in the protected enclosures.

3.3. REPLACEMENT OF THE MEMBRANE OF THE REMOTE ACTUATOR

After each use of the remote actuator the membrane of the remote actuator must be replaced as it is always damaged during use. The replacement of the membrane is shown in the figures below:



S1. Disconnect the remote actuator from the LOP line and pull the pin.



S2. Remove the red knob, use spanner 19 mm



S3. Replace the membrane, use hex wrench 6 mm, torque of the membrane is 12 ± 1 Nm.



S4. Mount the red knob back, use torque 8 ± 1 Nm.

To avoid damaging the membrane take care that the strike knob is not actuated while screwing it in! Just lift the strike knob slightly.

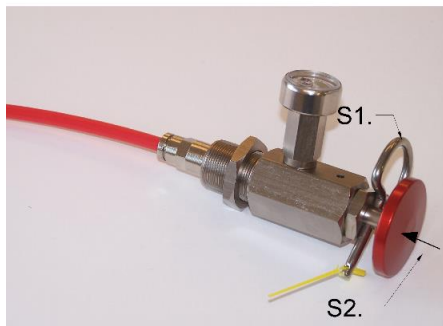


S5. Slot the pin of the actuator back, replace fuse

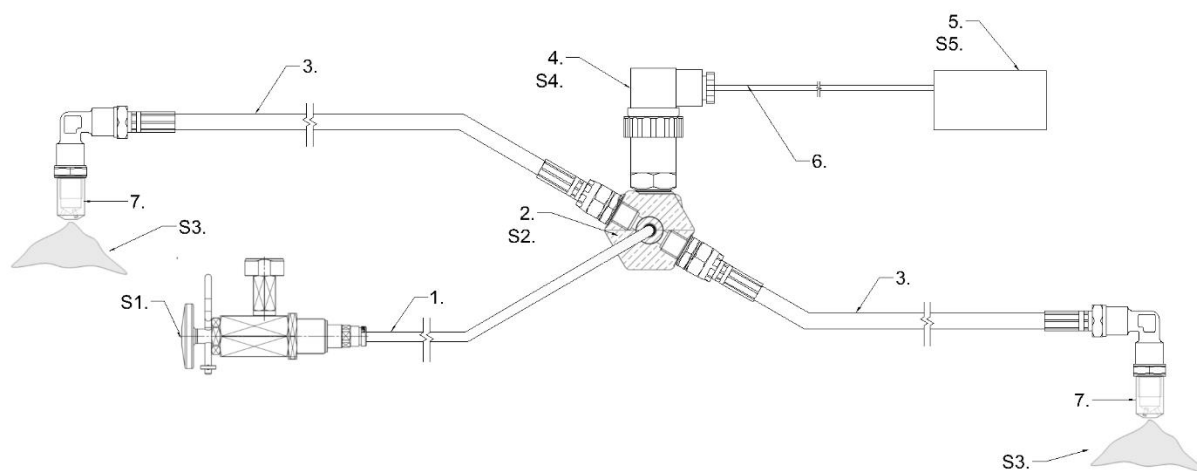
Replacement of the membrane

3.4. FUNCTION OF THE REMOTE ACTUATOR

The remote actuator activates the system by releasing pressure from the BlazeTube detection by breaking through the membrane maintaining the pressure in the BlazeTube detection when pressing the button of the switch. Description of the activation is shown on the figure below.



Use of the manual switch
 S1. Pull the fuse of the actuator
 S2. Firmly press the red button



Manual activation of the system

1. Manual actuator
 2. Valve of the cylinder (view from above)
 3. Discharge networks
 4. * Pressure switch/transducer with cable connector
 5. * External device
 6. * Electrical cables
 7. Nozzles
- S1. Manual activation of the system
 S2. Opening the valve piston of the cylinder due to pressure decrease in the BlazeTube detection or Lop hose
 S3. Release of extinguishing agent
 S4. * Pressure switch/transducer send signal to the external device after the pressure decreases
 S5. * External device performs the operation

*in case the pressure switch/transducer is installed



If the system is activated wait for its activity to finish. Do not enter the protected enclosures and do not open the covers of the protected enclosure during the activity of the system.

3.5. PRESSURIZATION OF THE SYSTEM

Pressurization of the system through the remote actuator is similar to the pressurization through standard end of line adapter. During pressurization follow the instructions in the Chapter 7.3.

REMOTE ACTUATOR CRA204

4. BASIC INFORMATION ABOUT THE COMPONENTS

The remote actuator of the system is optional component of the system BlazeCut. It operates on the principle of manual release of pressure from the LOP line after breaking through the membrane maintaining pressure in the LOP line when pressing the button of the actuator. This results in opening of the piston of the valve of the cylinder, activating the suppression system and completely releasing the extinguishing agent. This is the same process as during disruption of the BlazeTube detection by effect of fire or heat.

It also serves as an end of line device.

Valve material: nickel-plated brass; stainless steel, rubber seals.



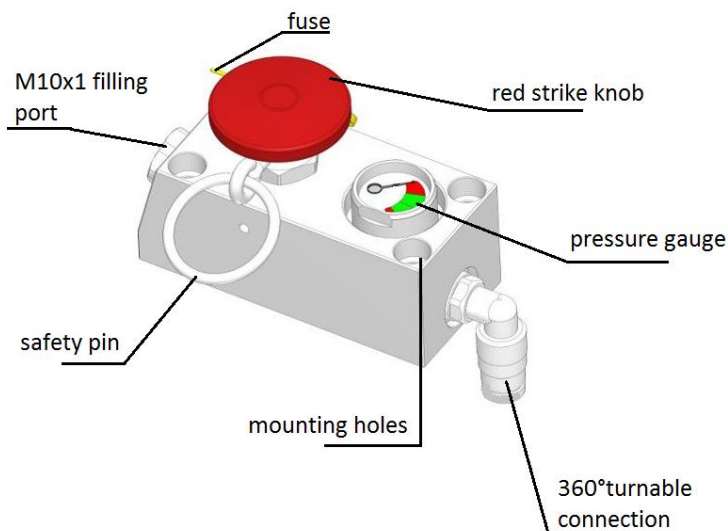
Remote actuator CRA204P with the push in fitting connection



Remote actuator Valve CRA204L with the LOP hose connection

4.1. INSTALLATION OF THE REMOTE ACTUATOR

The remote actuator is installed into the ending of the BlazeTube detection or LOP hose. Remote actuator uses fast slotting system of fastening the BlazeTube detection with double seal through 360° turnable connection in order to prevent leak of extinguishing agent in maximum. Alternatively the remote actuator can be supplied with the G1/8" straight coupling to connect the LOP hose.



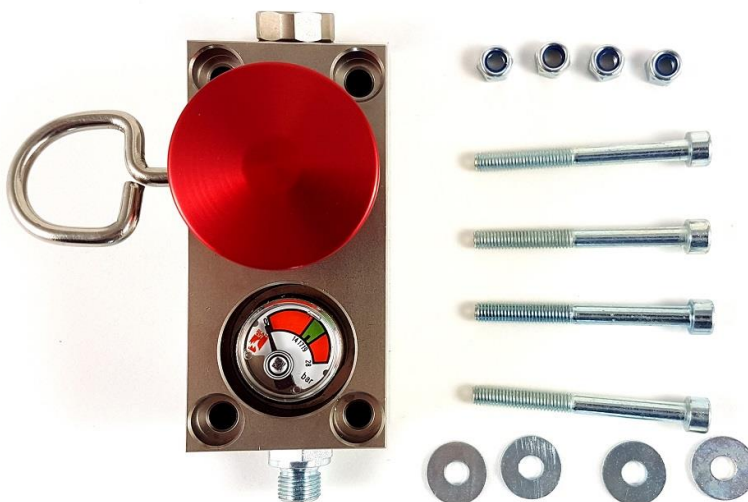
Description of remote manual actuator with push in fitting for BlazeTube connection

The BlazeTube detection is mounted onto the outlet (of the connector) of the remote actuator with \varnothing 6 mm so that it is slotted into the outlet and pushed by hand all the way. Always make sure after slotting that the tube is firmly fastened by pulling it gently.



Remote actuator with straight connector to connect the LOP hose

The remote actuator is suited to wall mounting through mounting holes. Use similar screws as on figure below or other suitable and durable screws to firmly secure the manual actuator.



Remote actuator with screws for mounting

4.2. PRESSURIZATION OF THE LOP LINE

The charging process is shown in the following figures. The same charging process is for the version using BlazeTube detection and LOP hose.



Before pressurization make sure, that the ball valve on the valve of the cylinder is closed.



Due to risk of activation during pressurization of the system it is necessary to seal the outlets of the distribution networks on the valve. Remove the distribution networks and seal the outlets with the G3/8" sealing screws.



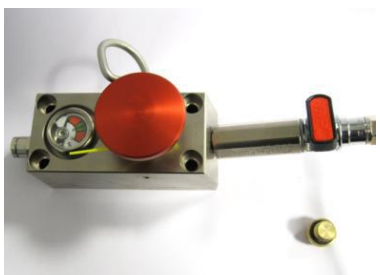
Remote actuator with closed filling port



Dismount the plug screw



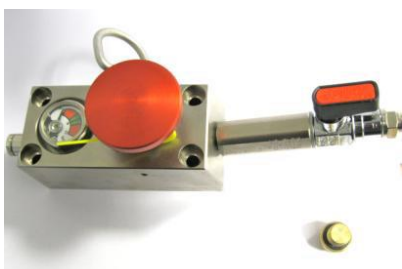
Never dismount the pressure gauge - risk of unintentional release of the fire suppression system!



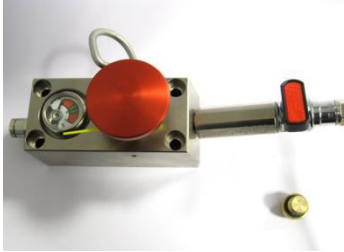
Mount the closed charging adapter to the filling port



Set the regulation valve on the source of N₂ to required value. The setting must be at least to the level of pressure in the cylinder increased by 1 bar (the pressure should have been read and noted while removing the pressure gauge of the valve of the cylinder). Graphs of relationship between temperature and pressure in the cylinder of various extinguishing agents are mentioned in the Chapter 3.1.



Slowly open the valve of the charging adapter and pressurize the LOP line with N₂. Hissing can be heard during pressurization. When the sound is finished, so does the pressurization. Keep the valve open for at least 30 seconds to level the pressure in LOP line



After finishing the pressurization close the valve of the charging adapter.



Remove the charging adapter and close the filling port. The charging valve in the charging port of the remote actuator will automatically close.

Pressurization of the LOP line with charging adapter



Pressurize the LOP line correctly. If the pressure in it is lower than the pressure in the cylinder, the valve piston of the cylinder could open and the extinguishing agent could be released when opening the ball valve of the LOP line.

After pressurization observe the data on the pressure gauge.

If the pressure does not decrease, very slowly start opening the ball valve of the valve of the cylinder. The pressures in the LOP line and in the cylinder will equalize. Wait approximately 30 seconds and open the ball valve fully. In case of multiple cylinder connection open the ball valve on all valves of the cylinders.



From this moment the cylinder and the LOP line are connected into one pressure unit. Proceed further carefully not to damage the BlazeTube detection. Its accidental damaging would activate the system and release extinguishing agent.



Fast and careless opening of the ball valve may activate the system and release extinguishing agent.

Always place the remote actuator in the proximity of the protected enclosure so that it is easily accessible when necessary. Do not place it in the area of expected fire, where manual activation after the fire has started is not possible.

Label the remote actuator visibly with corresponding label ALA007.



Do not manually activate the system without reason. Use manual activation only in case of reasonable suspicion of fire in the protected enclosure.



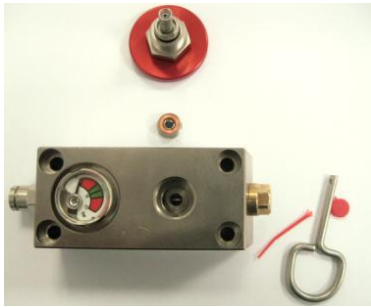
Do not manually activate the system if persons are present in the protected enclosures.

4.3. REPLACEMENT OF THE MEMBRANE OF THE REMOTE ACTUATOR

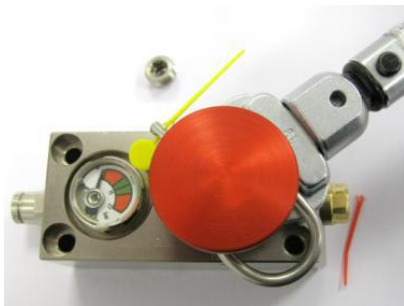
After each use of the remote actuator the membrane of the remote actuator must be replaced as it is always damaged during use. The replacement of the membrane is shown in the figures below:



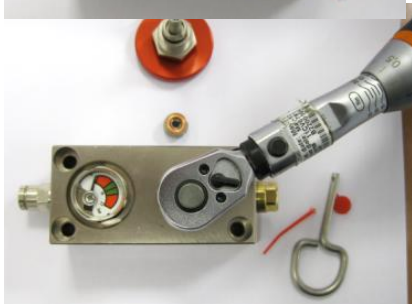
S1. Disconnect the remote actuator from the LOP line and pull the pin.



S2. Remove the red knob and punctured membrane, use spanner 19 mm



S3. Screw in the new puncture membrane by using a torque wrench adjusted to 12 ± 1 Nm.



S4. Screw in the strike knob by using a torque wrench adjusted to 8 ± 1 Nm.

To avoid damaging the membrane take care that the strike knob is not actuated while screwing it in! Just lift the strike knob slightly.



S5. Slot the pin of the actuator back, replace fuse

Replacement of the membrane

4.4. PRESSURIZATION OF THE SYSTEM

Pressurization of the system through the remote actuator is similar to the pressurization through standard end of line adapter. During pressurization follow the instructions in the Chapter 7.3.

