FirePro

CONDENSED AEROSOL FIRE EXTINGUISHING SYSTEMS

INSTALLATION AND USER MANUAL

MANUAL NO. EX 6960

VERSION 1.0, REV.8

March 2022

Please read this operating manual carefully before installing **FirePro** condensed aerosol generators

LIST OF ILLUSTRATIONS

LIST OF TABLES

FOREWORD

This manual is intended for anyone involved with the design, implementation, installation and use of **FirePro** condensed aerosol fire extinguishing systems for total flooding applications.

FirePro assumes no responsibility for the application of any system other than those addressed in this manual.

The technical data contained in this manual are strictly limited for information only, FireProbelieves this data to be accurate, but they are published and presented without any warranty or guarantee whatsoever; FirePro disclaims any liability for any use that may be made of the data and information contained herein by any and all other parties.

IMPORTANT NOTICES

Product Disclaimer

FirePro Systems Limited ("FirePro Systems") makes no representations or warranties of any kind, whether express or implied, statutory or otherwise for the FirePro Condensed Aerosol Fire Extinguishing units and systems, including but not limited to warranties of merchantability, fitness for a particular purpose, of title, or of non-infringement of third party rights, including the intellectual property rights of others.

Limitation of Liability

In no event, regardless of cause, shall FirePro Systems be liable for any indirect, special, incidental, punitive or consequential damages of any kind, whether arising under breach of contract, tort (including negligence), strict liability or otherwise, even if advised of the possibility of such damages.

General

FirePro Systems is constantly updating its products and systems to the state of the art and therefore reserves the right to make changes in design, equipment and technology. You cannot therefore base any claims on the data, illustrations or descriptions contained in this literature.
If any part of this disclaimer is determined to be invalid, void, unenforceable or illegal, including, but not limited to the warranty disclaimers and liability disclaimers and liability limitations set forth above, then the invalid or unenforceable provision will be deemed superseded by a valid, enforceable provision that most closely matches the intend of the original provision and the remainder of the agreement shall remain in full force and effects. This disclaimer statement is governed by the laws of Cyprus. You hereby consent to the exclusive jurisdiction and venue of the Courts of Cyprus, in all disputes arising out of or relating to the use of this product.

Any question concerning the information presented in this manual should be addressed to:

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Cyprus Registered Company, Certificate of Incorporation no. HE 137692
8 Faleas Str, Agios Athanasios Industrial Area,
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E-mail: mail@firepro.com

1. Administration

1.1. SCOPE.

This manual is a comprehensive guide that contains all the necessary information to design, install, operate and maintain the FirePro condensed aerosol fire extinguishing systems for total flooding applications.

However the manual does not address information related to fire detection.

1.2. PURPOSE.

This manual is prepared for the use by competent fire engineers as a basic knowledge of FirePro systems and guidance of those charged with purchasing, designing, installing, operating, and maintaining FirePro condensed aerosol fire extinguishing systems, so that FirePro system will function as intended throughout its life.

The provisions of this manual are considered necessary to provide a sufficient level of protection from loss of life and property from fire. The manual reflects the state of the art at the time the manual was issued.

1.3. TRADE MARKS AND PATENT

FirePro condensed aerosol fire extinguishing systems for total flooding applications is a registered trade mark of:
Celanova Limited, Cyprus Registered Company, Certificate of Incorporation no. HE 142136

FirePro condensed aerosol fire extinguishing systems for total flooding applications is a proprietary patent of:

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Phone: +357 25 379999, Fax: +357 25 354432
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1.4. UNITS AND FORMULAS.

Metric units of measurement in this manual are in accordance with the modernized metric system known as the International System of Units (SI). See IEEE/ASTM SI 10, Standard for Use of the International System of Units (SI): The Modern Metric System.

The values in this manual are given in SI, if followed by an equivalent value in other units, the first stated in SI is to be considered as the requirement, the equivalent value in other units could be approximate.

1.5. REFERENCED PUBLICATIONS

Referenced Publications as per NFPA 2010 shall apply to this manual.

See Appendix "E"

1.6. DEFINITIONS

Definitions as per NFPA 2010 shall apply to this manual.

See Appendix "F"

2. ENVIRONMENTAL SUMMARY

2.1. SIGNIFICANT NEW ALTERNATIVES POLICY (SNAP LIST)

Submission to the U.S. Environmental Protection Agency's (EPA) SNAP Program. The SNAP Program was originally outlined in 59 FR 13044.

Significant New Alternative Policy

SNAP List Listed

Protection of Stratospheric Ozone: Listing of Substitutes for Ozone-Depleting Substances--Fire Suppression and Explosion Protection

Direct Final Rule – Acceptable Substitute:

Powdered Aerosol E (FirePro)

The official EPA documents, published in the Federal Register are available at:

Vol. 83, No. 193/ Thursday, October 4, 2018/ Rules and Regulations.
Under paragraph I, Listing Decisions: C. Fire Suppression and Explosion Protection – Total Flooding, at pages 50031/50032.
C.1. Powdered Aerosol E (FirePro) – EPA is adding Powdered Aerosol E to the list of acceptable substitutes for total flooding uses, which would include both occupied and unoccupied spaces

Vol. 86, No. 86/ Thursday, May 6, 2021/Rules and Regulations
Under paragraph II, C Page 24469
C. Total Flooding: Removal of Powdered Aerosol E (FirePro) from the List of Substitutes Acceptable Subject to Use Conditions

2.2. FIREPRO CONDENSED AEROSOL ENVIRONMENTAL PARAMETERS

Environmental parameters	FirePro
ODP (Ozone Depletion Potential)	**Zero**
GWP (Global Warming Potential)	**Zero**
ALT (Atmospheric Life Time)	**Negligible**
Toxicity for human life	**Accepted for Normally Occupied Areas by EPA**
Electrical conductivity	**Non-conductive Tested up to 75 KV**
Corrosion	**Negligible within the parameters for use**
Extinguishing efficacy	**High**
Oxygen depletion after agent discharge	**Negligible within the parameters for use**

3. SAFETY SUMMARY

3.1. GENERAL.

For Material Safety Data Sheet refers to Appendix A

The discharge of a FirePro aerosol extinguishing systems could potentially create a hazard to personnel due to the nature of the aerosol.

Unnecessary exposure of personnel to either the FirePro agent or to the by-products generated by the fire or the fire to be extinguished or extinguished should be avoided.

3.1.1. Health Effects.

The **FirePro** potential adverse health effects are minimal as:

Hazard for humans related to the FPC (**FirePro** solid aerosol forming compound) has not been found.

Hazard to humans related to the aerosol released by the reaction of the solid compound (FPC) have not been established because the TLV's are not applicable, however it is reputed that hazard to humans are not present when the **FirePro** aerosol is applied as guided by this manual.

Signs and symptoms related to the aerosol phase are only referred to acute exposure and /or chronic overexposures. In a real life the exposure to the generated aerosol will occur accidentally only and will be very short, like in the event of an accidental or unexpected discharge when occupant of the protected space has not evacuated previously. The **FirePro** aerosol extinguishing system may be installed in either, normally occupied spaces and /or in normally unoccupied spaces.

EPA's risk screen indicates that the use of the Powdered Aerosol E (FirePro) is not expected to pose a significant toxicity risk to personnel, end-users, or the general population.

3.2. HAZARDS TO PERSONNEL.

3.2.1. Potential Hazards.

Potential hazards to be considered for individual **FirePro** systems in the protected space and other areas where the aerosol agent can migrate are the following:

1. **Noise:**
   The discharge of a **FirePro** system or aerosol generator may cause noise loud enough to be startling but insufficient to cause traumatic injury.
2. **Turbulence:**
   The high-velocity discharge from **FirePro** generators' outlets may dislodge light objects directly involved or impinged by the generated aerosol stream. The **FirePro** system discharge may cause turbulence inside the protected enclosures to move unsecured paper and light objects.
3. **Reduced Visibility**
   When activated, the **FirePro** condensed aerosol generators reduce visibility both during and after discharge period.
4. **Thermal hazard:**
   The **FirePro** condensed aerosol is discharged at elevated temperatures. Depending on the intended application(s) of the **FirePro** aerosol system, the temperature and minimum clearance from the discharge outlet are specified by the **FirePro** generators' data sheets (see Appendix C). Immediately after discharge, the **FirePro** aerosol generators can be hot; protective gloves should be worn by personnel handling generators after discharge.
5. **Eye irritation:**
   Direct contact with the aerosol solid particles being discharged by the **FirePro** system can result in irritation of the eyes. Exposure of the FirePro condensed aerosol to the eyes should be avoided.

3.2.2. Pre-discharge Alarms and Time Delays.

A human exposure to the **FirePro** condensed aerosol agents shall be prevented by providing a warning of a pending discharge and a delay in the discharge to allow personnel to exit the protected space. Suitable egress shall be provided to assure a safe egress of personnel, in case of failure of the pre-discharge alarm and the time delay.

3.2.2.1. Egress.

Suitable egress shall be provided to allow the personnel to exit the protected space within the time delay.

The effect of reduced visibility on egress time shall be considered.

3.2.3. Reduced Visibility.

The discharged **FirePro** condensed aerosol will cause occupants to evacuate the protected space under conditions of low visibility, appropriate safety measures shall be used such that occupants can evacuate safely. The safety measures shall include, but not limited to:

- personnel training,
- goggles,
- audio devices,
- floor mounted directional lighting,
- evacuation plans and exit drills.

3.2.4. Toxicity.

See the Material Safety Data Sheet contained in Appendix A and chapters 3.1 and 3.1.1 of this manual.

3.2.5. Thermal Hazards

FirePro condensed aerosol generators shall not be employed at less than the minimum safe distance from personnel and combustible materials as specified in chapter 5.1.2 and inside the **FirePro** Condensed Aerosol Generators data sheets contained in Appendix “C” of this manual.

Protective gloves shall be worn by personnel removing discharged **FirePro** condensed aerosol generators.

4. *FirePro Condensed Aerosol Fire Extinguishing Action*

4.1. FIREPRO CONDENSED AEROSOL FIRE EXTINGUISHING ACTION:

Traditionally, there were three distinct elements assumed as necessary for combustion: heat, fuel, and oxygen, popularly known as the “fire triangle”.

Typical fire extinguishment involves either removing the fuel from the fire, limiting oxygen to the fire (smothering), or removing the heat (quenching).

This physical theory had to be modified as halons became more widely used and better understood.

The halons, as well as other agents like the **FirePro** condensed aerosol do not extinguish fire in any of these ways, but instead break up the uninhibited chain reaction of the combustion process.

The **FirePro** condensed aerosol extinguishing mechanism works by removing the active chemical species involved in the flame chain reaction.

Upon activation, the FPC (patented solid compound contained in the **FirePro** condensed aerosol generators), immediately starts a chemical reaction that in few seconds produces condensed dry aerosol in the discharge density defined by the system designer (i.e. potassium compounds K_2CO_3, H_2O, N_2, CO_2 and other gas particles in small quantities).

The **FirePro** condensed aerosol thus generated consists of micro-sized particles of potassium compounds suspended in inert gases in an extremely high ratio between the exposed surface and their reaction mass.

The **FirePro** condensed aerosol then remains in suspension for a relatively long time into the protected volume allowing its active inhibitor to flow into the combustion core transported by its own naturalconvection currents and breaking the chain reaction upon flame contact with extremely high efficiency.

Potassium is an alkaline metal and requires the least amount of energy for ionization because of its very low ionization potential. Therefore a certain amount of energy is removed from the combustion itself to eliminate the atoms’ electrons during this ionization process. This is the physical action of the extinguishing process of **FirePro** condensed aerosol.

The chemical process of the **FirePro** condensed aerosol fire extinguishment is characterized by certain reactions in rapid sequence taking place between atoms and fragments of unstable molecules, which is called “chain reactions of radicals”.

Since the radicals are unstable, they tend to reach a final stable condition. The stable final products, among others, are carbon dioxide (CO_2) and water (H_2O).

The potassium atoms derived by the disassociation of the potassium compounds contained in the **FirePro** condensed aerosol, reacts during combustion with the free radicals of unstable hydroxides forming potassium hydroxide (KOH), which is a very stable compound.

At this stage the chain reaction of the free radicals is halted, and the flame is extinguished.

The reactions’ sequence is shown in the following page.

FirePro Condensed aerosol fire extinguishing reaction sequence

Oxidation of hydrogen in the flames:

$H_2 + O_2 \rightarrow 2\ OH^-$

$OH^- + H_2 \rightarrow H_2O + H^+$

$H^+ + O_2 \rightarrow OH^- + H^+$

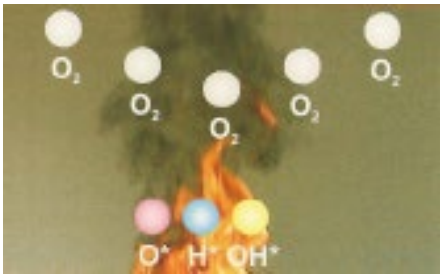
$O^{--} + H_2 \rightarrow OH^- + H^+$

Oxidation of carbon monoxide in the flame:

$H_2 + O_2 \rightarrow 2\ OH^-$

$OH^- + CO^{++} \rightarrow CO_2 + H^+$

$H^+ + O_2 \rightarrow OH^- + O^{--}$



Therefore, in the flame, during combustion, further to water and carbon dioxide (stable), only unstable hydroxyl radicals are formed which allow the reaction to continue (phenomenon of auto catalysis).

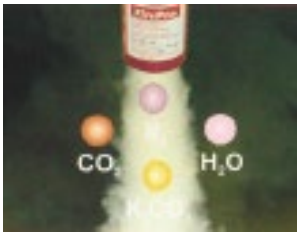
The chain reaction is interrupted by the Potassium atoms, which react with the unstable hydroxyl as follows:

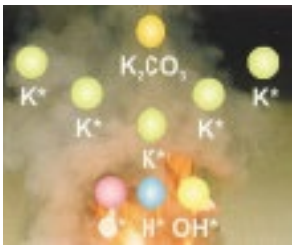
$OH^- + K^+ \rightarrow KOH$ (and flames are thus extinguished)

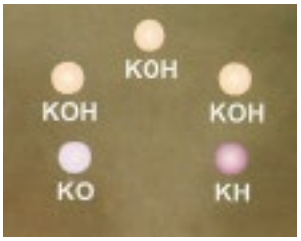
Notice that the potassium hydroxide (KOH) is formed in quantities smaller than micrograms.

The KOH reacts further in the presence of CO_2 and form K_2CO_3.

During this process we can verify that the extinguishing action of potassium compounds is not achieved either through smothering or quenching but through a reaction in presence of flame with consequent termination of the chain reaction.







Legend:

H_2	hydrogen stable
O_2	oxygen stable
OH^-	hydroxyl radicals unstable
H_2O	water stable
H^+	hydrogen atoms unstable
$O^{—}$	Oxygen atoms unstable
CO^{++}	carbon monoxide unstable
CO_2	carbon dioxide stable

4.2. PARTICLES DISTRIBUTION IN THE FIREPRO AEROSOL PHASE

The **FirePro** condensed aerosol phase consists of a gas phase with micro sized solid particles in suspension.

Laser beam diffraction tests analyses have shown the correlation between solid and gaseous components of 52% solid and 48% gas.

The percentage distribution of the solid compounds as per their diameter's size expressed in microns is as follows

Particle's size (dia. μm)	Percent %
< 1	52
1 ÷ 2	19
2 ÷ 5	17
> 5	12

5. FirePro Condensed Aerosol Use and Limitations

5.1. USE AND LIMITATIONS.

5.1.1. Systems.

The **FirePro** condensed aerosol systems shall be installed to protect hazards within the limitations that have been established by the present manual.

5.1.2. Use and application

FirePro condensed aerosol extinguishing systems are effective in extinguishing Class A, B, and C fires.

FirePro condensed aerosol extinguishing systems provide an efficient and effective means to extinguish gas and liquid fires and burning solid substances, substances derived from hydrocarbons (natural gas, oil products, inflammable lubricants, etc.), as well as fires in electrical equipment.

FirePro condensed aerosol extinguishing systems shall not be used to protect areas or hazards or spaces containing flammable liquids vapors or dusts that may form an explosive air/fuel mixture unless they have been tested to the satisfaction of the authority having jurisdiction and/or proven by experimental test carried out by a third party laboratory.

FirePro condensed aerosol extinguishing systems shall not be used on metal fires and substances generating self sustaining combustion and on the following substances unless they have been tested to the satisfaction of the authority having jurisdiction and/or proven by experimental test carried out by a third party laboratory..

- **Deep seated fires in Class A materials**
- **Class D fires:**
- **D1 - light metals (aluminum - Al; magnesium - Mg Titanium ...)**
- **D2 - alkali metals (potassium - K; natrium - Na; lithium - Li ...);**
- **D3 - organic-metallic compounds (methyl magnesium chloride - CH3MgCl; methyl magnesium iodide - CH3MgJ; triethyl aluminum - (C2H5)3Al...)**
- **Metal hydrides (aluminum hydride - AlH3) lithium hydride - LiH ...).**
- **Reactive metals such as, lithium, sodium, potassium, magnesium, titanium, zirconium, uranium, and plutonium.**
- **Chemical compounds containing oxidizers such as sodium chlorate or sodium nitrate.**
- **Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air**
- **Chemicals capable of undergoing auto-thermal decomposition, such as certain organic peroxides and hydrazine**

The above list may not be exhaustive. Contact the **FirePro** and or the local **FirePro** dealer for more information

The **FirePro** condensed aerosol generators shall not be employed at less than the minimum safe distances specified in the present manual (see the Aerosol generators Data Sheets in Appendix C).

The minimum safe distance between the **FirePro** condensed aerosol generators discharge ports and personnel shall be based on an aerosol agent discharge temperature, at that distance, not exceeding 75°C (167° F).

The minimum safe distance between the **FirePro** condensed aerosol generators discharge ports and combustible materials shall be based on an aerosol agent discharge temperature, at that distance, not exceeding 200°C (392° F).

The total flooding **FirePro** condensed aerosol extinguishing systems shall be installed within enclosures which would allow the specific agent design application density to be achieved and maintained for the specified period of time.

Where the **FirePro** condensed aerosol extinguishing agents are used in spaces containing sensitive equipment the potential adverse effects of **FirePro** condensed aerosol particulate residue shall be considered.

5.2. ENVIRONMENTAL FACTORS

Despite that **FirePro** condensed aerosol extinguishing systems do not represent any significant environmental concern the unnecessary emission of aerosol extinguishing systems shall be avoided.

All phases of design, installation, testing, and maintenance of **FirePro** condensed aerosol extinguishing systems shall be performed with the goal of no emission to the environment.

5.3. COMPATIBILITY WITH OTHER AGENTS.

Unless specifically approved, systems employing the simultaneous discharge of different agents to protect the same enclosed space shall not be permitted.

Where unrelated extinguishing or suppression systems are provided, and can operate prior to, or during the hold time of the **FirePro** condensed aerosol extinguishing systems, the other agent shall not adversely affect the aerosol.

6. FirePro Condensed Aerosol Generators Description

6.1. GENERAL DESCRIPTION OF THE FIREPRO CONDENSED AEROSOL GENERATORS

The range of **FirePro** condensed aerosol generators is shown in the Appendix B

The **FirePro** condensed aerosol generator is formed by the following main components:

6.1.1. The solid aerosol-forming compound FPC;

The solid aerosol-forming compound FPC is the originator of the condensed extinguishing aerosol (generated by the FPC activation):

Upon actuation the solid aerosol-forming compound FPC will undergo a combustion reaction generating the fire extinguishing condensed aerosol.

Solid Aerosol-forming compound composition

	Wt%	CAS No.	EINECS
Potassium Nitrate	77	7757-79-1	231-818-8
Potassium Carbonate	4	584-08-7	209-529-3
Magnesium	<1	7439-95-4	231-104-6
Epoxy Resin Polymer	18	25068-38-6	Any “polymerizate, polycondensate, or polyadduct” is exempted by 81/437/EEG

6.1.2. The Activation device (initiator);

FirePro condensed aerosol generators are initiated by applying the appropriate electrical pulse across the electrical terminals of the aerosol generator, so that the solid aerosol forming compound FPC will be activated and transformed into condensed aerosol (the fire extinguishing/suppression agent).

6.1.3. The cooling mechanism;

FirePro condensed aerosol generators are equipped with a physical heat-absorbing mechanism (the cooling mechanism). The generated aerosol will exit the generator via the cooling mechanism and it will be cooled down before flooding the protected volume.

6.1.4. The housing (external steel casing);

The **FirePro** condensed aerosol generator casing is formed by a non-pressurized container. The aerosol is generated by an exothermic reaction of the solid aerosol-forming compound FPC, and the condensed aerosol is carried by gases generated by the reaction.

6.1.5. The mounting brackets;

Mounting brackets are provided for each **FirePro** condensed aerosol generator, allowing the generator appropriate orientation. The mounting brackets are either zinc plated or stainless steel of suitable shape and strength to hold the **FirePro** condensed aerosol generators.

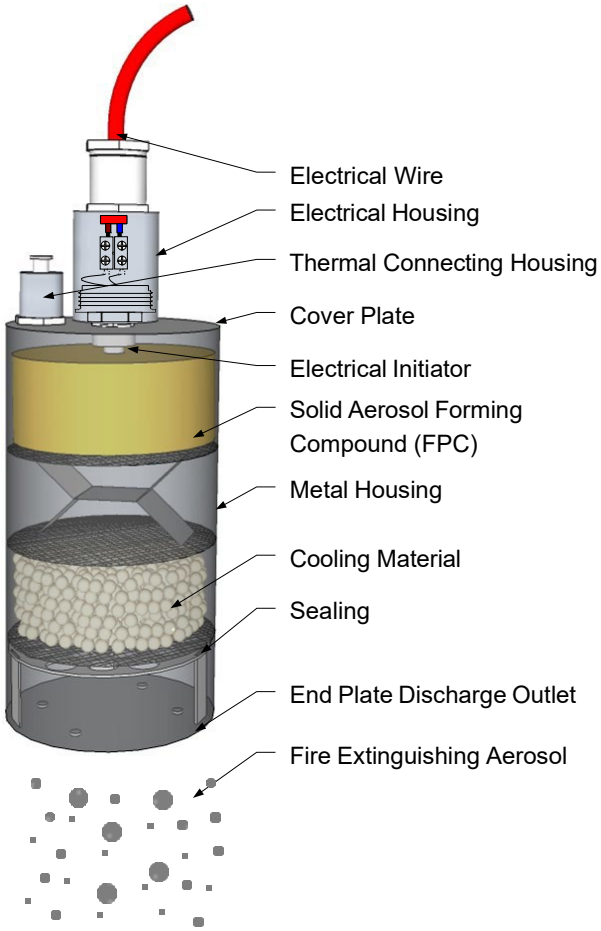
6.1.6. The end plate discharge outlets;

A specially designed outlet with holes, which ensures a smooth and fast discharge of the condensed aerosol

6.1.7. The sealing

A special membrane of adhesive polymer sheet is applied internally the discharge outlets protecting them from the entering of moisture, dirt or anything undesirable. The membrane will be broken by the generated aerosol upon the **FirePro** condensed aerosol generator actuation.

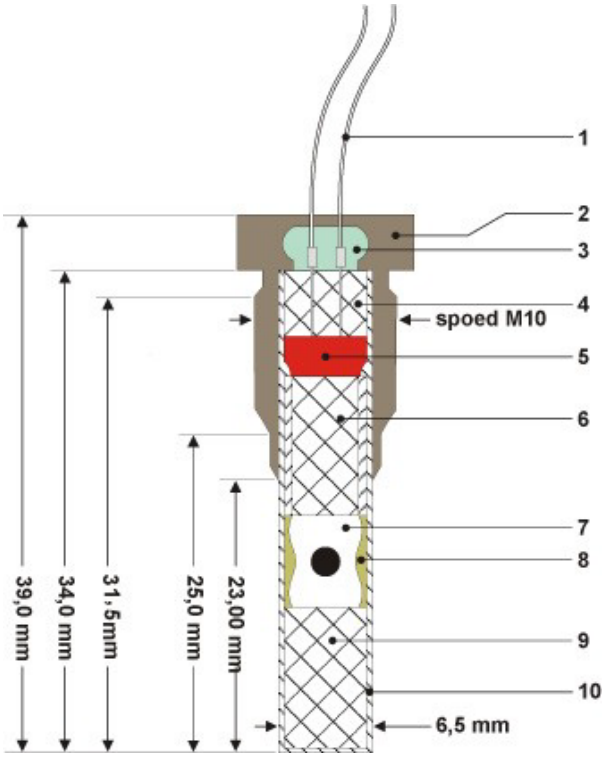
FirePro Condensed Aerosol Generator designations



6.2. FIREPRO INITIATOR (ELECTRICAL ACTIVATOR)

The initiator is connected to the activation power circuit through heat resistant wires. The applied power will activate the electrical coil (4) which will heat up the FPC Solid Compound thermal booster (5) initiating an exothermic reaction The heat developed will transfer thorough the cylinder outlets (7) starting the exothermic reaction of the FPC Solid Compound (9) thus the thermal energy will be sufficient to start the reaction of the whole mass of FPC Compound contained inside the aerosol generator, transforming the FPC into a particulate (microsized particles) and carrier gases.

Initiator cut-off view



Legend	
1	heat resistant wires (feed)
2	steel housing
3	polymeric resin
4	electric coil
5	FPC (solid compound-thermal booster)
6	chemical stabilizer
7	cylinder with 2 outlets
8	sealing
9	FPC (solid compound)
10	lacquered surface

Electrical values	
Bridge resistance	1.6-3.0 Ohms (Ω)
Minimum Pulse Energy	0.8 mWs/Ω
Minimum Pulse Voltage (V)	1.5 Vdc
Minimum Pulse Current (A)	0.8 A
Minimum Pulse Duration	0.5 s
No Fire Current (A)	0.02 A
Duration of Heat Emission	3 - 4 s

Working temperature (not to be exceeded)	
Deployment temperature	-54° C to 100° C
Storage temperature	-54° C to 54° C

The initiator is a standard component of all the FirePro aerosol generators

7. FirePro TOTAL FLOODING SYSTEMS DESIGN

7.1. INTRODUCTION

7.1.1. Working documents

The design of **FirePro** condensed aerosol total flooding fire extinguishing systems shall be prepared only by a person qualified and experienced in designing extinguishing systems, in accordance with the advice of the authority having jurisdiction (AHJ).

Deviation from the working documents shall require the permission and the agreements of the authority having jurisdiction.

The working documents shall include, as minimum requirement, the following:

7.1.1.1. Specifications.

- Designation of the authority having jurisdiction,
- Variances from the standard to be permitted by the authority having jurisdiction,
- Design criteria,
- System sequence of operations,
- Functional testing to be performed after installation of the system,
- System's owner/user training requirements.

7.1.1.2. Working plans:

- Point of compass and symbol legend.
- Name of owner and identification of the occupant/user.
- Location of building, including street and address.
- Location and construction characteristics of protected enclosure walls and partitions; location of fire walls.
- Enclosure cross-section, full height or schematic diagram, including raised access floor and suspended ceiling.
- Description of occupancies and hazards to be protected; identification of enclosures normally occupied.
- Description of enclosures/facilities/exposures surrounding the enclosure.
- Plan view of protected area showing enclosure partitions (full and partial height); detection, alarm, and control system including all devices and schematic of wiring interconnection; end-of-line device locations; location of controlled devices such as dampers and shutters; location of instructional signage.
- Type of **FirePro** condensed aerosol generators used; including nominal capacity expressed as agent solid aerosol-forming compound (FPC) mass.
- **FirePro** condensed aerosol design application density.
- Drawings indicating the location and distribution of **FirePro** condensed aerosol generators.
- Equipment list of materials showing device identification, model or part number, quantity and description.
- Description of fire detection, actuation and control systems.
- Enclosure pressurization report and venting calculations where applicable.
- Description of wire or cable used including classification, gauge [American Wire Gauge (AWG)], shielding, number of strands in conductor, conductor material, and color coding schedule, with the segregation requirements of various system conductors clearly indicated and the required method of making wire terminations detailed.
- Description of the detector mounting.
- Scale drawing showing the layout of the annunciator panel graphics if required by the authority having jurisdiction.
- Complete step-by-step description of the system sequence of operations including functioning of abort and maintenance disconnect switches, delay timers, and emergency power shutdown.
- Point-to-point wiring schematic diagrams showing all circuit connections to the system control panel, to the graphic annunciator panel and to external or add-on relays.

- Complete calculations to determine the size of backup batteries and method used to determine number and location of audible and visual indicating devices and number and location of detectors.
- Minimum clearances to combustible materials and the means of egress.
- Details of any special features.

Information shall be submitted for approval to the authority having jurisdiction pertaining to the location and function of:

- Detection devices.
- Operating devices.
- Auxiliary equipment.
- Electrical circuitry, if used.

All the apparatus and devices used shall be identified.

Any special features shall be explained.

The as-built installation drawings and the instruction and maintenance User Manual that includes a full sequence of operations.

A full set of drawings and calculations shall be maintained on site.

7.1.1.3. Approval of Plans.

Plans and calculations shall be approved prior to installation.

Where field conditions necessitate any change from approved plans, the change shall be approved prior to implementation.

When such changes from approved plans are made, the working plans shall be updated to accurately represent the system as installed.

7.1.2. Enclosure.

In the design of a **FirePro** condensed aerosol total flooding fire extinguishing system, the integrity of the protected enclosure shall be considered.

The area of non closable openings in the protected enclosure shall be kept to a minimum.

7.1.2.1. Loss of Agent.

To prevent loss of agent through openings to adjacent hazards or work areas, openings shall be permanently sealed or equipped with automatic closures.

Where reasonable confinement of agent is not practicable, protection shall be expanded to include the adjacent connected hazards or work areas or additional agent shall be introduced into the protected enclosure using an extended discharge configuration.

Forced-air ventilating systems shall be shut down or closed automatically where their continued operation would adversely affect the performance of the fire extinguishing system or result in propagation of the fire.

Completely self-contained recirculation ventilation systems shall not be required to be shut down.

The volume of the ventilation system and associated ductwork shall be considered as part of the total hazard volume when determining the quantity of agent.

The protected enclosure shall have the structural strength and integrity necessary to contain the agent discharge.

If the developed pressures present a threat to the structural strength of the enclosure, venting shall be provided to prevent excessive pressures.

7.1.3. Condensed Aerosol System Agent Supply.

7.1.3.1. Quantity.

- **Primary FirePro condensed aerosol Agent Supply.**
  The primary **FirePro** condensed aerosol agent supply shall be determined by calculating the required mass of the solid aerosol forming compound needed to meet the design application density.
- **Reserve FirePro condensed aerosol Agent Supply.**
  Where required, a reserve **FirePro** condensed aerosol agent supply shall consist of as many multiples of the primary agent supply as the authority having jurisdiction considers necessary.

7.1.4. Design Application Density.

7.1.4.1. Determining Design Application Density.

The **FirePro** condensed aerosol extinguishing application density shall be used in determining the agent design application density for a particular fuel.

For combinations of fuels, the extinguishment value for the fuel requiring the greatest **FirePro** condensed aerosol design application density shall be used, unless specifics tests are made on the actual mixture.

7.1.4.2. Extinguishment.

- **Class B Fuels:**
  The **extinguishing application density** of **FirePro** condensed aerosol for **Class B fuels** has been determined by test as per UL 2775.
  The **minimum design application density for a Class B fuel hazard** is the extinguishing application density multiplied by a safety factor of 1.3.
- **Class A Fuels:**
  The **extinguishing application density** of **FirePro** condensed aerosol for **Class A fuels** has been determined by test as per UL 2775.
  The **minimum design application density for a Class A Fuels** fire hazard is the extinguishing application density multiplied by a safety factor of 1.3.
- **Class C Fuel:**
  The **minimum design application density** of **FirePro** condensed aerosol for **Class C hazards** shall be at least that for the Class of fire hazard being protected .
- **Fuel combination:**
  For combinations of Class A and B fuels the design application density shall be the value for the fuel requiring the greatest design application density.

Table 7.1.4.2

Class of Fire	Extinguishing application density	Minimum design application density
Class B Fuels:	84 g/m^3	109.20 g/m^3
Class A Fuels:	84 g/m^3	109.20 g/m^3
Class C Fuel:	84 g/m^3	109.20 g/m^3
Fuel combination:	84 g/m^3	109.20 g/m^3

7.1.5. Total Flooding Quantity.

7.1.5.1. Quantity calculation.

The mass of **FirePro** condensed aerosol forming compound required shall be calculated from the following formula:

$$m = d_a \times f_a \times V$$

where

- m = total flooding quantity, in [g(lb)]
- d_a = design application density, in [g/m^3 (lb/ft^3)]
- fa = additional design factors (see 7.1.5.2)
- V = protected volume, [m^3 (ft^3)]

7.1.5.2. Additional Design Factors.

In addition to the **FirePro** condensed aerosol agent quantity determined by the design application density, additional quantities of agent are required through the use of additional design factors to compensate for any special conditions that would affect the extinguishing efficiency.

The designer shall assign and document other design factors for each of the following:

1. No closable openings and their effects on design application density
2. Height of protected volume (As per maximum height related to each generator)
3. Re-ignition from heated surfaces
4. Fuel type, configurations, scenarios not fully accounted for in the extinguishing application density, enclosure geometry, and obstructions and their effects on distribution.

7.1.6. Duration of Protection

The **FirePro** condensed aerosol agent design application density shall be maintained for the specified period of time to prevent re-ignition of the fire before effective emergency action can be taken by trained personnel.

7.1.7. Discharge time

For the **FirePro** condensed aerosol generators discharge time see the Data Sheets in Appendix C

7.1.8. Extended Discharge.

When an extended discharge is necessary to maintain the design application density for the specified period of time, additional **FirePro** condensed aerosol agent quantities shall be applied.

When an extended discharge is necessary, the rate shall be sufficient to maintain the desired factor for the required hold time. In such applications the condensed aerosol generators may be activated in sequence.

7.1.9. Safety vents

When **FirePro** condensed aerosol is discharged into a closed volume, a certain overpressure may be developed due to the amount of gases generated and the effects of increased temperature of the atmosphere.

Later, the combined volume of aerosol and air will become greater than the initial room volume; the final result will increase the pressure or will exhaust the excess volume through vent openings. The air temperature is increased during the discharge but will return to normal levels as heat is adsorbed from solids surfaces in the room.

The designer/installer shall provide reliable calculations for venting requirements for each system if applicable, since experience has shown that most ordinary rooms have a sufficient leakage through openiings around doors and windows and general porosity to prevent noticeable pressure build up.

In rooms that may be sealed or close to be sealed a safe vent area for low-strength structures can be estimated on the basis of the discharge flow rate.

7.1.10. Condensed Aerosol Generator Selection and Location.

The **FirePro** condensed aerosol generators shall be suitable for the intended purpose and shall be placed within the protected enclosure in compliance with the instruction and limitations contained on this manual with regard to spacing, floor coverage, thermal clearances and alignment.

The type of **FirePro** condensed aerosol generators selected, their number, and their placement shall be such that the design application density will be established in all parts of the hazard enclosure

8. *FirePro Condensed Aerosol Fire Extinguishing System Arrangement*

8.1. LOCATION OF INSTALLATION AND POSITIONING

8.1.1. FirePro Condensed Aerosol Fire Extinguishing System Arrangement.

The **FirePro** condensed aerosol generators and ancillaries' system components shall be arranged to allow easy inspection and maintenance activities, minimizing the interruption of protection.

FirePro condensed aerosol generators shall not be located where they can be mechanically damaged or exposed to chemicals or to adverse weather conditions, that may render them inoperative. Suitable protective provisions shall be adopted, if necessary.

FirePro condensed aerosol generators shall be securely installed following the guidance given by this manual.

8.1.2. Minimum safe distances:

Minimum safe distances:

- **FirePro** condensed aerosol generators shall not be installed at less than the minimum safe distances as specified in the **FirePro** condensed aerosol generators data sheet contained in Appendix C.
- The minimum safe distance between the **FirePro** condensed aerosol generator discharge ports and personnel shall be based on an aerosol agent discharge temperature, at that distance, not exceeding 75°C (167°F).
- The minimum safe distance between the **FirePro** condensed aerosol generator discharge ports and combustible materials shall be based on an aerosol agent discharge temperature, at that distance, not exceeding 200°C (392°F).

8.1.3. Safety Requirements.

Personnel shall not enter a protected space during or after the **FirePro** agent discharge.

Safeguards shall be provided to ensure prompt evacuation of and prevent entry or re-entry into the protected enclosure post **FirePro** system discharge.

Means for prompt rescue of any trapped personnel shall be provided, including the following:

1. Provision of adequate aisle ways/routes of exit, and procedures to keep them clear at all times
2. Provision of emergency lighting and directional signs if necessary to ensure quick, safe evacuation.
3. Provision of alarms in such areas that will operate immediately on detection of the fire.
4. Provision of only outward-swinging, self-closing doors at exits from hazardous areas and, where such doors are latched provision of panic hardware.
5. Provision of continuous alarms at entrances to such areas until the atmosphere has been restored to normal.
6. Provision of warning and instruction signs at entrances to and inside such areas. These signs should inform persons in or entering the protected area that a **FirePro** aerosol system is installed and shall contain additional instructions pertinent to the conditions of the hazard.
7. Provision for the prompt discovery and rescue of persons rendered unconscious in such areas. This should be accomplished by having such areas searched immediately by trained personnel equipped with proper breathing equipment. Self-contained breathing equipment and personnel trained in its use and in rescue practices, including cardiopulmonary resuscitation, should be readily available.
8. Provision of instruction and drills for all personnel in or in the vicinity of such areas, including maintenance or construction people, to ensure their correct action when a **FirePro** condensed aerosol system operates.

9. Provision of means for prompt ventilation of such areas, including forced ventilation if necessary. Atmospheres containing **FirePro** condensed aerosol shall be readily dissipate taking care not to move them to another location.
10. Prohibition of smoking until the atmosphere has been determined to be free from the **FirePro** condensed aerosol.
11. Removal of **FirePro** condensed aerosol generators after discharge shall be done according the instruction given by this User Manual. Protective clothing, gloves and goggles should be worn, including a respirator or mask if necessary.
12. Any further provision or safeguards shall be adopted if a particular situation indicates as necessary to prevent injury or death.
13. Specific attention shall be given to the possibility of the **FirePro** condensed aerosol may potentially migrating to adjacent areas, outside of the protected space.

8.2. ELECTRICAL CLEARANCES.

All **FirePro** system components shall be positioned to maintain the minimum clearances from energized electrical parts as per:

1. ANSI C2
2. NFPA 70
3. 29 *CFR* 1910, Subpart S
4. Canadian Electrical Code, CSA C22.1

Where the design basic insulation level (BIL) is not available, and where nominal voltage is used for the design criteria, the highest minimum clearance listed for this group shall be used.

The selected clearance to ground shall satisfy the greater of the switching surge or BIL duty, rather than being based on nominal voltage.

The clearance between non insulated, energized parts of the electrical system equipment and any portion of the **FirePro** condensed aerosol extinguishing system shall not be less than the minimum clearance provided elsewhere for electrical system insulations on any individual component

8.3. HANDLING PRECAUTIONS

When handling the **FirePro**l Condensed Aerosol Generators do not:

- Disassemble the **FirePro** condensed aerosol generators;
- Exert force of impact or carry out other actions to the **FirePro** condensed aerosol generators which may cause distortion and physical or other mechanical damage to the casing.
- Carry out any welding work in the vicinity of the **FirePro** condensed aerosol generators and /or **FirePro** condensed aerosol fire extinguishing system components.
- Smoke in the vicinity of the **FirePro** condensed aerosol generators and /or **FirePro** condensed aerosol fire extinguishing system components.

Where a **FirePro** condensed aerosol generator, during handling or installation, is dropped or subjected to an impacshall ensure that the electric circuit of the ignition and the other **FirePro** condensed aerosol generator components have not been damaged.

Where a **FirePro** condensed aerosol generator shows external damages to the casing it shall not be installed.

8.4. STORAGE AND TRANSPORT

The **FirePro** condensed aerosol generators are classified as Hazard Class Division 9.

The **FirePro** Condensed Aerosol Generators shall be transported by ships and by airfreight in accordance with the regulations and requirements applicable to the above category of cargo.

Transport by road of the **FirePro** condensed aerosol generators is permitted utilizing all types of transport vehicles without any restrictions.

The containers carrying the **FirePro** condensed aerosol generators shall be firmly secured on the vehicle and be protected against dirt, moisture and shocks.

Do not drop **FirePro** Aerosol Generators or the containers carrying them during vehicles loading/unloading operations.

The **FirePro** Aerosol Generators shall be stored in their own packaging on racks in warehouses (either heated, or unheated with natural ventilation, at a distance of at least one meter from heating appliances).

The **FirePro** condensed aerosol generators comply with the requirements of the U.S. Department of Transportation (DOT) or the Canadian Transport Commission and are classified IAW 49 CFR 172.101, Subpart B or the Canadian equivalent.

8.5. STORAGE CONDITIONS:

- Temperature : between –54 and +54°C
- Humidity : maximum 98% RH

8.6. REPLACEMENT / REMOVAL FROM SERVICE

Service life: 15 years (date of manufacture appears on each generator)

9. Detection, Actuation, Alarm, and Control Systems.

This manual does not address information related to fire detection; however the following general information shall be considered.

9.1. DETECTION, ACTUATION, ALARM, AND CONTROL SYSTEMS.

9.1.1. General.

Detection, actuation, alarm, and control systems shall be installed, tested, and maintained in accordance with NFPA 70 ,NFPA 72 and as per **FirePro** supplementary recommendations.

In Canada the equipment shall be certified to the requirements of CAN/ULC S524-01 and CAN/ULC-S 529-02.

Automatic detection and automatic actuation shall be used unless a manual-only actuation is approved by the authority having jurisdiction.

9.1.2. Raceways.

FirePro system initiating circuits and auxiliary equipment releasing circuits shall be installed in raceways.

Unless shielded and grounded, alternating current (AC) and direct current (DC) wiring shall not be combined in a common conduit or raceway.

9.1.3. Automatic Detection.

Automatic detection shall be by a listed system capable of detecting and indicating heat, flame, smoke, combustible vapors, or an abnormal condition in the hazard, such as process trouble, that is likely to produce fire.

Reliable primary and 24-hour minimum standby sources of energy shall be used to provide for operation of the detection, signaling, control, and actuation requirements of the system.

9.1.4. Operating Devices.

Operating devices shall include **FirePro** system actuation devices, discharge controls, disconnect switch and shutdown equipment.

The **FirePro** system actuation shall cause simultaneous operation of **FirePro** condensed aerosol generators.

All devices/components shall be designed suitable for the specific intended service and working conditions; all devices shall not be susceptible to being rendered inoperative or to accidental operation.

All devices/components shall be installed in appropriate locations or adequately protected, to avoid being subject to mechanical, chemical, or any damages that would render them inoperative.

FirePro system manual actuation/release shall be accomplished by an electrical manual release; the arrangement shall include the control equipment monitoring the battery condition, including a low battery signal/alarm.

FirePro system manual control(s) for actuation shall be located for easy accessibility at all times, including at the time of a fire:

The **FirePro** system manual control(s) shall be of distinct appearance and clearly recognizable for the purpose intended.

Operation of any control station shall cause the complete **FirePro** system to operate.

Manual controls shall not require a pull of more than l78 N (40 lb) nor a movement of more than 356 mm (14 in.) to secure operation.

At least one **FirePro** system manual control station for activation shall be located not more than 1.2 m (4 ft) above the floor.

A disconnect switch shall interrupt the releasing circuit to the aerosol system.

All devices for shutting down auxiliary/supplementary equipment shall be considered integral parts of the **FirePro** system and shall function with the **FirePro** system operation.

All the manual operating devices shall be identified as to the hazard they protect.

9.1.5. Control Equipment.

Electric Control Equipment.

The control equipment shall supervise the actuating devices and associated wiring and, as required, cause the **FirePro** system actuation.

The control equipment shall be specifically listed for the number and type of actuating devices utilized, and their compatibility shall be listed.

9.1.6. Operating Alarms and Indicators.

Alarms or indicators or both shall be used to indicate the operation of the **FirePro** system, hazards to personnel, or failure of any supervised device.

The type (audible, visual), number, and location of the devices shall be such that their purpose is satisfactorily accomplished.

The extent and type of alarms or indicator equipment or both shall be approved.

Warning Devices:

Audible and visual pre-discharge alarms shall be provided within the protected area to give positive warning of the **FirePro** system impending discharge.

The operation of the warning devices shall continue after **FirePro** condensed aerosol discharge, until positive action has been taken to acknowledge the alarm and proceed with appropriate action.

9.1.7. Abort Switches.

Where provided, the **FirePro** system abort switches shall be located within the protected area and shall be located near the means of egress for the area.

A telephone should be located near the abort switch.

An abort switch shall not be operated unless the cause for the condition is known and corrective action can be taken.

The abort switch shall be of a type that requires constant manual pressure to cause abort.

The abort switch shall not be of a type that would allow the system to be left in an aborted mode without personnel present. In all cases the manual emergency control shall override the abort function.

Operation of the abort function shall result in both audible and distinct visual indication of system impairment.

The abort switch shall be clearly recognizable.

9.1.8. Alarms indicating failure of supervised devices / equipment

Alarms indicating failure of supervised devices or equipment shall give prompt and positive indication of any failure and shall be distinctive from alarms indicating operation or hazardous conditions.

9.1.9. Warning and instruction signs

Warning and instruction signs at entrances to and inside protected areas shall be provided.

9.1.10. Pre-discharge Alarms and Time Delays.

For the **FirePro** aerosol extinguishing systems, a pre-discharge alarm and time delay, sufficient to allow personnel evacuation prior to discharge, shall be provided.

For hazard areas subject to fast growth fires, where the provision of a time delay would seriously increase the threat to life and property, a time delay shall be permitted to be eliminated.

Time delays shall be used only for personnel evacuation or to prepare the hazard area for discharge.

Time delays shall not be used as a means of confirming operation of a detection device before automatic actuation occurs.

9.1.11. Unwanted System Operation.

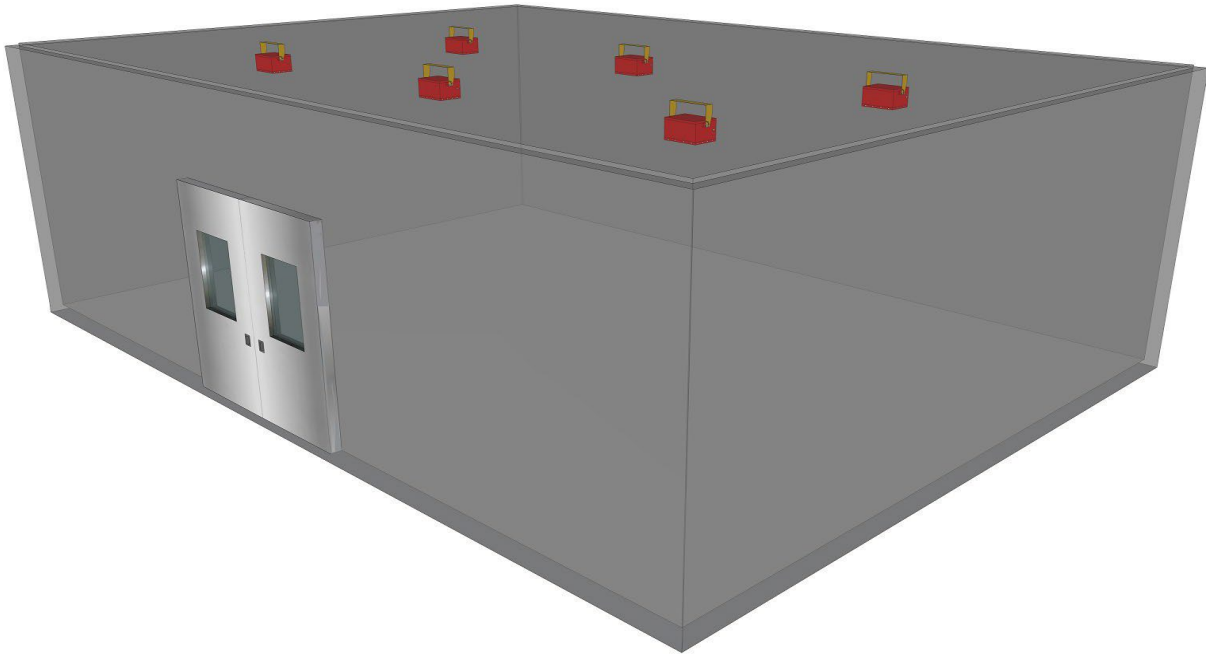
Care shall be taken to thoroughly evaluate and correct any factors that could result in unwanted discharge of the **FirePro** system.

To avoid unwanted discharge of a **FirePro** aerosol system during maintenance, a supervised disconnect switch shall be provided.

The disconnect switch shall interrupt the releasing circuit to the **FirePro** condensed aerosol system

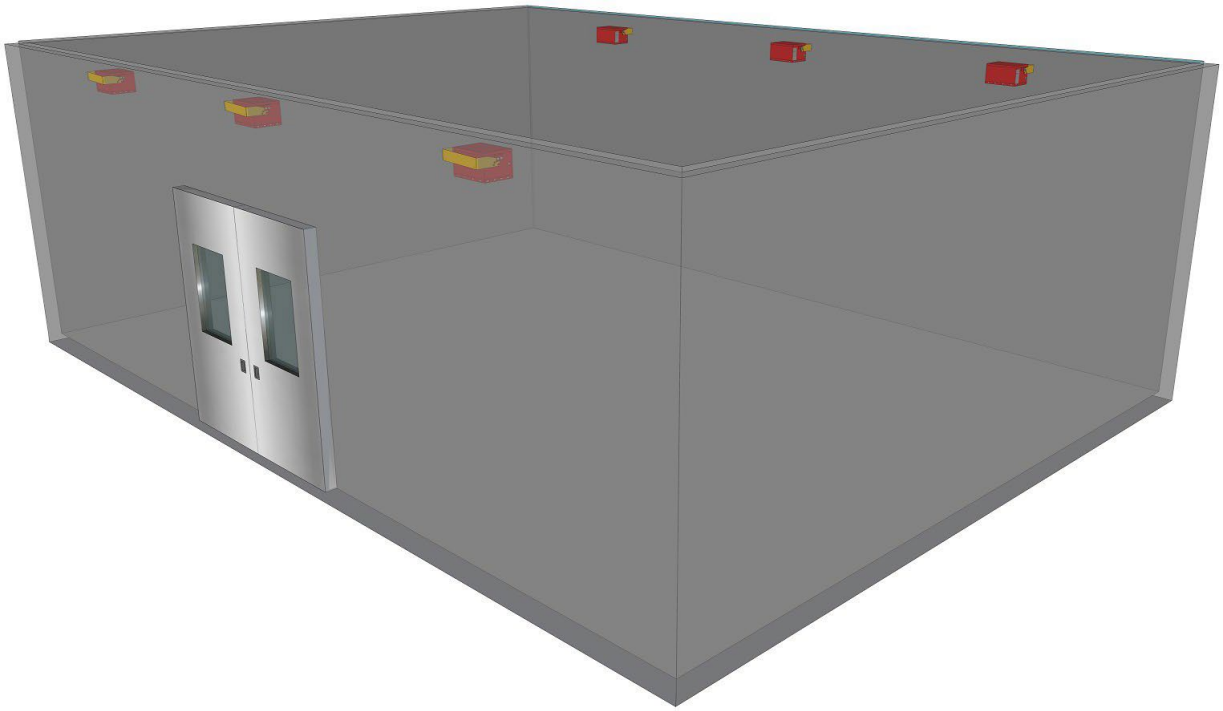
10. *FirePro TOTAL FLOODING SYSTEMS INSTALLATION*

ILLUSTRATION 10a:
RECOMMENDED FirePro condensed aerosol arrangement



Ceiling

ILLUSTRATION 10b:
RECOMMENDED FirePro condensed aerosol arrangement



Top of side walls

ILLUSTRATION 10c:
WRONG FirePro condensed aerosol arrangement

The location of **FirePro** generators shown above is incorrect. The generators aerosol outlets are pointing the aerosol stream in the direction of the opening (a door).

If the door is left open at the time of the **FirePro** generators activation the generated aerosol will escape from the protected volume. Thus depleting the aerosol design factor that may result in failure to extinguish the fire.

ILLUSTRATION 10d:
ALLOWED FirePro condensed aerosol arrangement

The location of **FirePro** generators shown above is correct

10.1. GENERAL

Do not install **FirePro** condensed aerosol generators close to openings.

The recommended optimal distance between the floor of the safeguarded volume and the **FirePro** condensed aerosol generators are reported inside the **FirePro** condensed aerosol generators data sheets, see Appendix C.

The discharge outlets of the **FirePro** condensed aerosol generators shall not be obstructed.

Minimum safe distances:

- **FirePro** condensed aerosol generators shall not be installed at less than the minimum safe distances as specified in the **FirePro** condensed aerosol generators data sheet contained in Appendix C.
- The minimum safe distance between the **FirePro** condensed aerosol generators generator casing and personnel shall be the distance from the generator casing to where the temperature does not exceed 75°C (167°F) during and after discharge.
- The minimum safe distance between the **FirePro** condensed aerosol generators casing and combustible materials shall be the distance from the generator casing to where the temperature does not exceed 200°C (392°F) during and after discharge.

The **FirePro** condensed aerosol generators shall be positioned in the protected space/volume so that the aerosol flow does not obstruct/impede the evacuation of personnel.

10.2. FIREPRO CONDENSED AEROSOL GENERATORS INSTALLATION PROCEDURE

The **FirePro** condensed aerosol generators are installed utilizing the brackets provided inside the package.

Attention: Before proceeding ensure that the **FirePro** condensed aerosol generator is firmly secured.

Installation procedure:

A. Fix firmly the brackets to the enclosure walls or ceiling, according the system design and the generators location.
B. Check the resistance of the electric activation element.
C. Secure firmly the Condensed Aerosol Generator on the bracket
D. Connect the wires to the terminals of the **FirePro** condensed aerosol generator.
E. Connect the wires to the fire detection / fire system control panel,
F. Connect the wires to the power supply.

On completion ensure that the **FirePro** condensed aerosol generators have been installed in the correct manner, i.e. that all requirements contained in this manual have been accomplished, and note the installation on the installation certificate or on the technical documentation of the protected premises.

Warning:

Before installing the **FirePro** condensed aerosol system read carefully this manual as well as the manuals related to the technical instructions for installation and management of the fire detection system and the fire control panel.

10.3. FIREPRO CONDENSED AEROSOL GENERATOR HEIGHT LIMITATIONS

The height limitations for each specific **FirePro** condensed aerosol generator are reported by the **FirePro** condensed aerosol generator data sheets, see Appendix C.

The “Stream Length” value of each generator should be considered as the maximum height at which it should be installed above the floor or object to protect, whenever the aerosol stream from the generator’s outlet is vertical (at 90 degrees). Whenever a different angle is applied, then the height should be reduced accordingly.

In multiple **FirePro** condensed aerosol generator installations, they shall be distributed throughout the protected enclosure in accordance with the height limitation (coverage) of each **FirePro** condensed aerosol generator.

11. FirePro Condensed Aerosol Generators Installation

11.1. FIREPRO CONDENSED AEROSOL GENERATOR INITIATION (ACTIVATION)

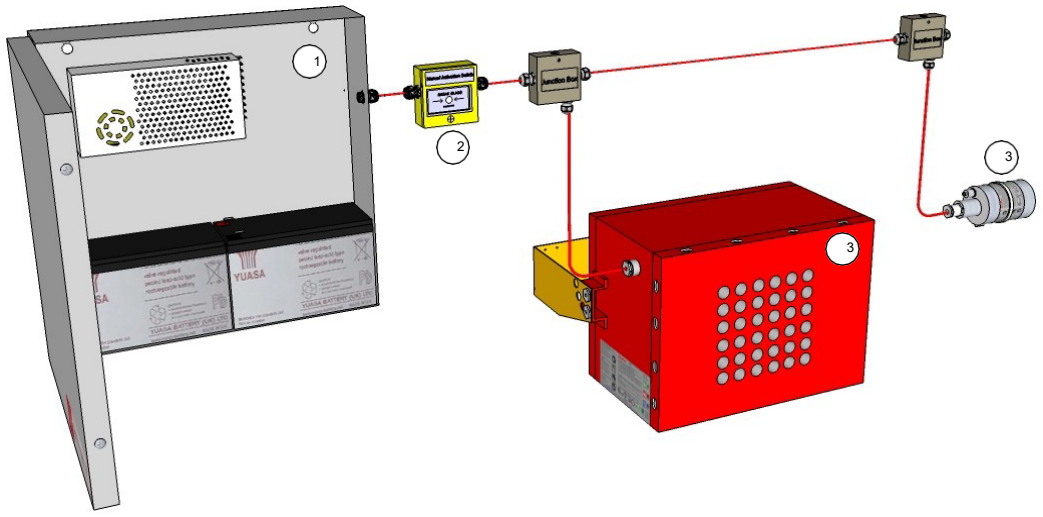
The **FirePro** condensed aerosol generators are initiated (activated) by means of an electric impulse of: minimum 1.5 Volts direct-current (DC).

The required current shall be delivered through the connector to the initiator of the **FirePro** condensed aerosol generator (see Illustration 11.1a).

The **FirePro** condensed aerosol generators are equipped with the Initiator described in Chapter 6.1.2.

Manual activation mode (illustration 11.1).

ILLUSTRATION 11.1:



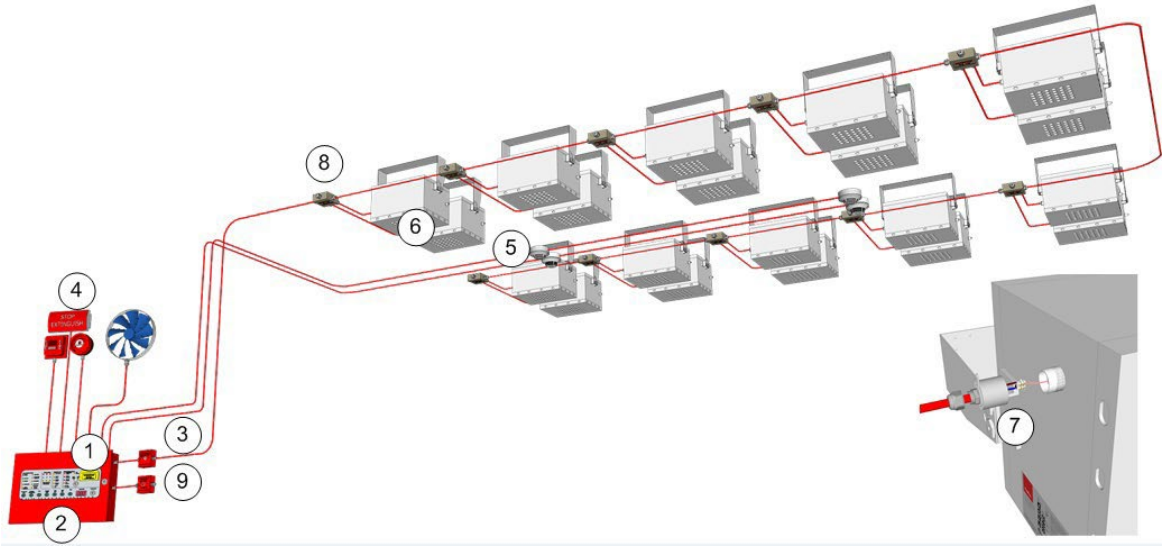
LEGEND	
1	Power supply with outlet min 1.5 V DC
2	Manual Release Button (Hand-operated switch)
3	**FirePro** condensed aerosol generators

FirePro condensed aerosol generators require a minimum pulse current of 0.6A each to initiate their activation, with a minimum pulse voltage of 1.5Vdc. Care shall be taken in observing the maximum current required as well as the voltage drop from the power supply to the last condensed aerosol generator.

11.1.1. Automatic activation mode by means of a Fire Detection System (heat, smoke or gas detectors).

Automatically by means of heat, smoke or gas detectors, which are connected to a Fire Detection and Control Panel, for the sequence of activation see Illustration 11.1.1.

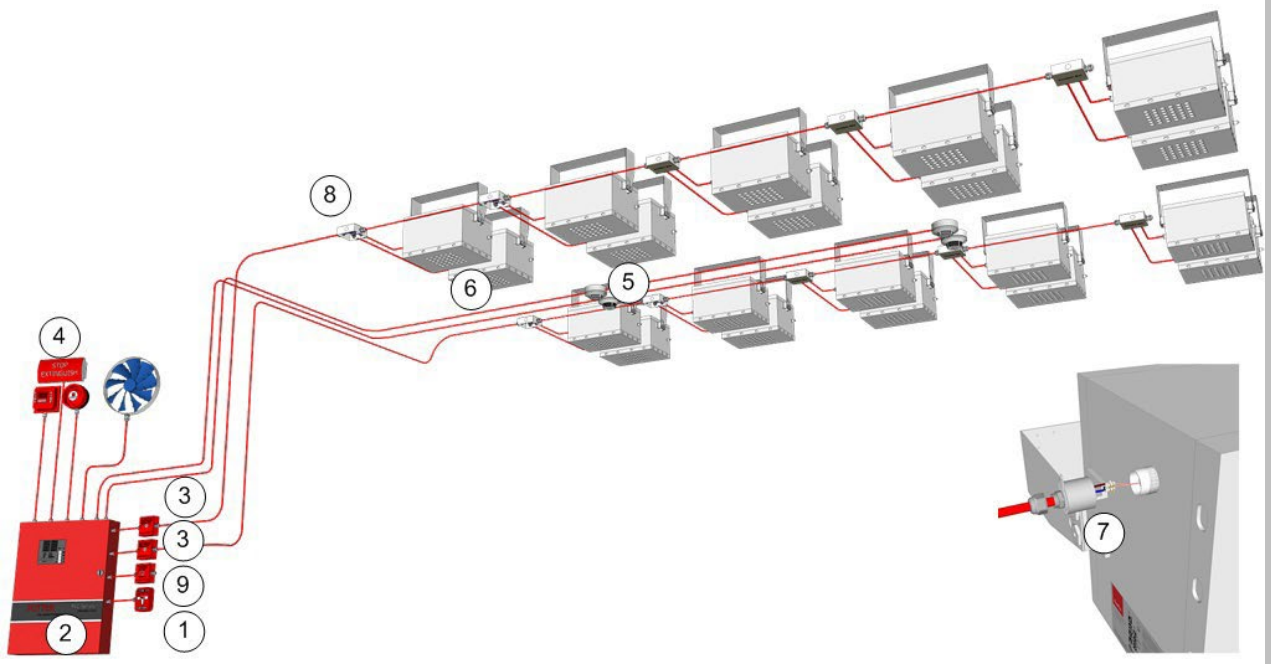
ILLUSTRATION11.1.1a: Typical Condensed Aerosol Fire Suppression System



LEGEND			
1	Manual Release Button (Hand Operated Switch)	2	Extinguishing Control Panel
3	Disconnect Switch	4	Bell, Siren
5	Automatic fire alarm detectors	6	**FirePro** condensed aerosol generators
7	Electrical cable connection to **FirePro** initiator	8	Sequential Activator
9	Abort Button		

Aerosol Generators are activated two by two in sequence through the sequential activators array. Low power consumption from panel during activation of the aerosol generators.

ILLUSTRATION11.1.1b: Typical Condensed Aerosol Fire Suppression System with two extinguishing outputs



LEGEND			
1	Manual Release Button (Hand Operated Switch)	2	Extinguishing Control Panel
3	Disconnect Switch	4	Bell, Siren
5	Automatic fire alarm detectors	6	**FirePro** condensed aerosol generators
7	Electrical cable connection to **FirePro** initiator	8	Junction Box
9	Abort Button		

Control panel back-up batteries at 100% capacity: 16 Aerosol Generators can be used in series connection.
Control panel back-up batteries at 65% capacity: 4 Aerosol Generators can be used in series connection.

Layout of a **FirePro** condensed aerosol system, in addressable system configuration

ILLUSTRATION 11.1.1c: Interfacing Fire Suppression System with an Addressable Fire Alarm Panel

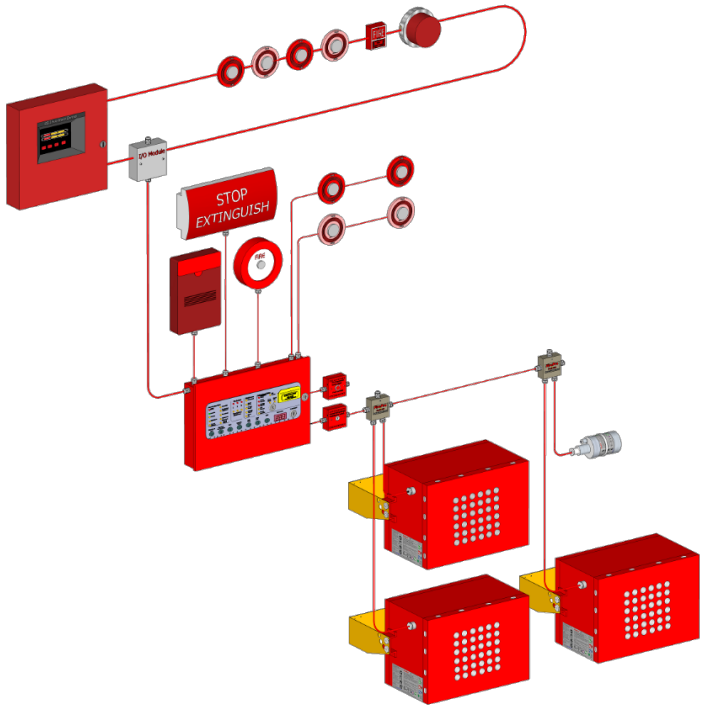
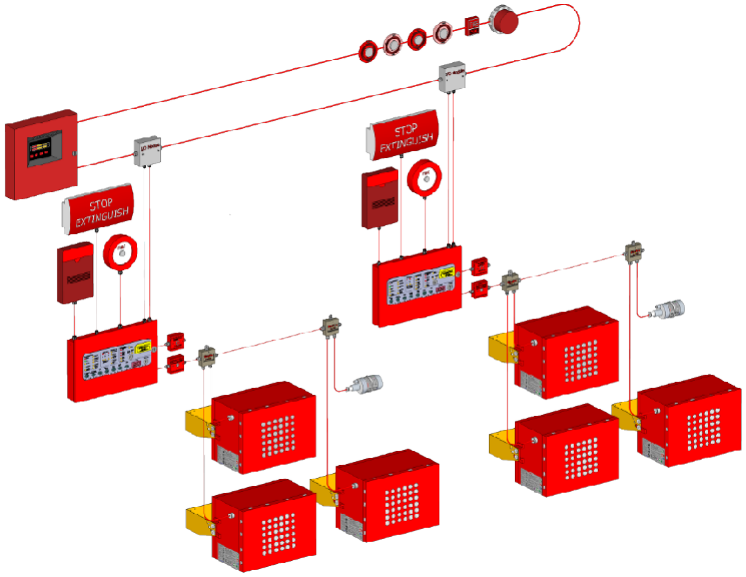


ILLUSTRATION 11.1.1d: Multi-configuration system with an Addressable Fire Alarm Panel



12. FirePro TOTAL FLOODING SYSTEMS COMMISSIONING

12.1. GENERAL.

The completed **FirePro** condensed aerosol system shall be reviewed and verified by qualified personnel to meet the approval of the authority having jurisdiction.

All the **FirePro** condensed aerosol system components and auxiliary devices used shall be UL/ULC listed type only.

12.2. INSTALLATION ACCEPTANCE.

12.2.1. General.

First It shall be determined that the protected enclosure is in conformance with the construction documents.

12.2.1.1. Basic checks.

The **FirePro** condensed aerosol generators shall be securely fastened to prevent unacceptable vertical or lateral movement during discharge.

The **FirePro** condensed aerosol shall be oriented in such a manner that optimum agent dispersal can be effected.

The **FirePro** condensed aerosol generators stream shall not directly impinge on areas where personnel could be found in the work area.

The **FirePro** condensed aerosol stream shall not directly impinge on any loose objects or shelves, cabinet tops, or similar surfaces where loose objects could be present and become missiles.

Adequate number/quantity of **FirePro** condensed aerosol generators to produce the desired specified design application density shall be provided.

The actual room volumes shall be checked against those indicated on the system drawings to ensure the proper quantity of **FirePro** condensed aerosol agent.

Fan coast down (inertia) and damper closure time shall be taken into consideration.

12.2.2. Review Enclosure Integrity.

All **FirePro** condensed aerosol total flooding systems shall have the enclosure examined and tested to locate and then effectively seal any air leaks that could result in a failure of the enclosure to hold the specified **FirePro** condensed aerosol design application density for the specified holding period.

12.2.3. Review Electrical Components.

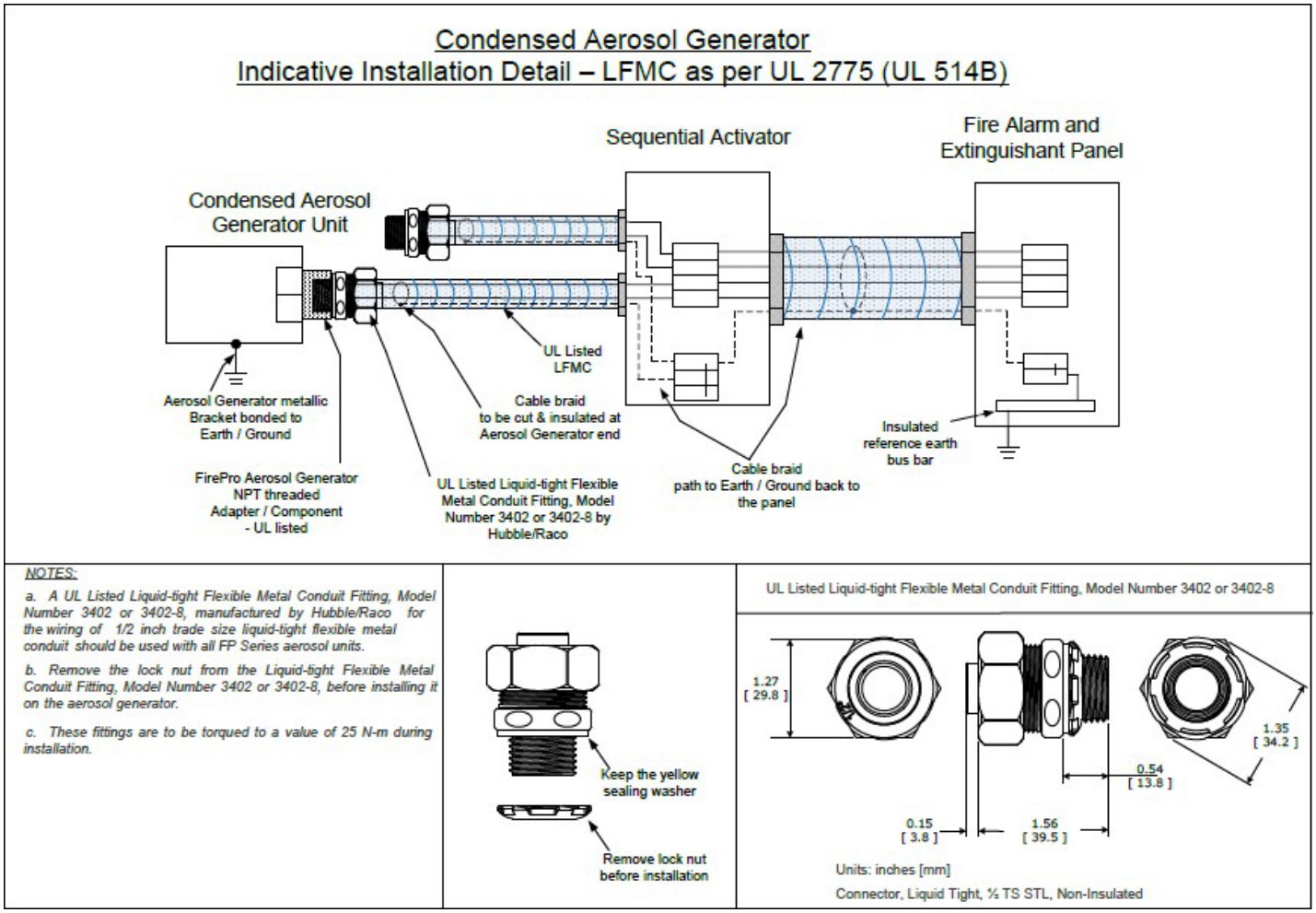
12.2.3.1. Wiring.

All wiring systems shall be installed in compliance with local codes and the system drawings.

A UL Listed Liquid-tight Flexible Metal Conduit Fitting, Model Number 3402-8 or 3402, manufactured by Raco/Hubble is to be used by the installer for the wiring of 1/2 inch trade size liquid-tight flexible metal conduit for all FP Series condensed aerosol generators.

These fittings may be obtained by FirePro – Part No. 11053 *Liquid-tight Flexible Metal Conduit Fitting (3402)* **or sourced locally or directly from manufacturers**. These fittings are to be torqued to a value of 25 N-m during installation.

An indicative installation diagram is shown below



12.2.3.2.Field circuits

All field circuits shall be free of ground faults and short circuits.

Where field circuitry is being measured, all electronic components, such as smoke and flame detectors or special electronic equipment for other detectors or their mounting bases, shall be removed and jumpers shall be installed to prevent the possibility of damage within these devices.

Components shall be replaced after measuring.

12.2.3.3.Power Supply

Power shall be supplied to the control unit from a separate dedicated source that will not be shut down on system operation.

Reliable primary and 24-hour minimum standby sources of energy shall be used to provide for operation of the detection, signaling, control, and actuation requirements of the system.

12.2.3.4.Auxiliary Functions.

All auxiliary functions such as alarm-sounding or alarm-displaying devices, remote annunciator, air- handling shutdown, and power shutdown shall be checked for operation in accordance with system requirements and design specifications.

If possible, all air-handling and power-cutoff controls shall be of the type that, once interrupted, requires manual restart to restore power.

Silencing of alarms, if desirable, shall not affect other auxiliary functions such as air handling or power cutoff if required in the design specification.

The detection devices shall be checked for proper type and location as specified on the system drawings.

Location:

- Detectors shall not be located near obstructions or air ventilation and cooling equipment that would appreciably affect their response characteristics.
- Where applicable, air changes for the protected area shall be taken into consideration.

The detectors shall be installed in a professional manner and in accordance with technical data regarding their installation.

Manual pull stations shall be installed, readily accessible, accurately identified, and protected to prevent damage.

All manual stations used to release agents shall require two separate and distinct actions for operation.

- All manual stations used to release **FirePro** condensed aerosol system shall be identified.
- Particular care shall be taken where manual release devices for more than one **FirePro** condensed aerosol system are in close proximity and could be confused or the wrong system actuated.
- Manual stations in this instance shall be clearly identified as to which zone or suppression area they affect.

For systems using abort switches, the switches shall be of the dead man type requiring constant manual pressure, installed, readily accessible within the hazard area, and clearly identified.

- Switches that remain in the abort position when released shall not be used for this purpose.
- Manual pull stations shall always override abort switches.

The control unit shall be installed and readily accessible.

12.2.4. Functional Testing.

12.2.4.1. Preliminary Functional Tests.

The following preliminary functional tests shall be provided:

1. If the system is connected to an alarm receiving office, notify the alarm receiving office that the fire system test is to be conducted and that an emergency response by the fire department or alarm station personnel is not desired.
2. Notify all concerned personnel at the end-user's facility that a test is to be conducted and instruct personnel as to the sequence of operation.
3. Disable the **FirePro** condensed aerosol system actuation mechanism so that activation of the release circuit will not actuate the **FirePro** condensed aerosol generators.
4. Reconnect the system actuation mechanism/ circuit with a functional device in lieu of the **FirePro** condensed aerosol generators.
5. Check each detector for response.
6. Check that polarity has been observed on all polarized alarm devices and auxiliary relays.
7. Check that all end-of-line resistors have been installed across the detection and alarm bell circuits where required.
8. Check all supervised circuits for trouble response.

12.2.4.2. System Functional Operational Test.

The following system functional operational tests shall be performed:

1. Operate detection initiating circuit(s).
2. Verify that all alarm functions and time delay occur according to design specification.
3. Operate the necessary circuit to initiate a second alarm circuit if present.
4. Verify that all second alarm functions occur according to design specifications.
5. Operate manual release.
6. Verify that manual release functions occur according to design specifications.
7. Operate abort switch circuit if supplied.

8. Verify that abort functions occur according to design specifications.
9. Confirm that visual and audible supervisory signals are received at the control panel.

12.2.4.3. Remote Monitoring Operations.

The following testing of remote monitoring operations, if applicable, shall be performed:

1. Operate one of each type of input device while on standby power.
2. Verify that an alarm signal is received at remote panel after device is operated.
3. Reconnect primary power supply.
4. Operate each type of alarm condition on each signal circuit and verify receipt of trouble condition at the remote station.

12.2.4.4. Control Panel Primary Power Source.

The following testing of the control panel primary power source shall be performed:

1. Verify that the control panel is connected to a dedicated circuit and labeled
2. Test a primary power failure in accordance with the manufacturer's specification with the system fully operated on standby power.

The control panel shall be readily accessible, yet restricted from unauthorized personnel.

12.2.4.5. Return of FirePro condensed aerosol System to Operational Condition.

When all pre discharge work is completed, the **FirePro** condensed aerosol generators shall be reconnected so that activation of the release circuit will actuate the **FirePro** condensed aerosol generators, releasing the **FirePro** condensed aerosol agent.

The **FirePro** condensed aerosol system shall be returned to its fully operational design condition.

The alarm-receiving office and all concerned personnel at the end-user's facility shall be notified that the **FirePro** condensed aerosol fire system test is complete and that the system has been returned to full service condition.

13. FirePro TOTAL FLOODING SYSTEMS DESIGN INSPECTION, AND MAINTENANCE

13.1. INSPECTION.

At least semiannually, a visual inspection shall be conducted to assess the **FirePro** condensed aerosol fire suppression system's operational condition.

13.1.1. Enclosure Inspection.

At least every 12 months, the enclosure protected by the **FirePro** condensed aerosol fire suppression system shall be thoroughly inspected to determine if penetrations or other changes have occurred that could adversely affect agent leakage or change volume of hazard or both.

- Where the inspection indicates conditions that could result in inability to maintain the **FirePro** condensed aerosol design application density, they shall be corrected.
- If uncertainty still exists, the enclosures shall be retested for integrity.

13.2. MAINTENANCE.

- At least annually, all **FirePro** condensed aerosol systems shall be subjected to the manufacturer's test and maintenance procedures by competent personnel.

A periodic inspection of the aerosol fire extinguishers and fire extinguishing systems to check the following components:

- Electrical wiring of the Electrical ignition Terminals
- Electrical contacts
- Fixing bolts
- The maintenance report with recommendations shall be furnished to the owner or an authorized representative.
- Replace condensed aerosol generators after 15 years

13.2.1. Penetrations:

- Any penetrations made through the enclosure protected by the **FirePro** condensed aerosol fire system shall be sealed immediately.
- The method of sealing shall restore the original fire resistance rating of the enclosure.

13.2.2. FirePro condensed aerosol generators inspection

Inspections to **FirePro** condensed aerosol generators shall be executed by a competent personnel only and the results recorded on both of the following:

1. A record tag permanently attached to each **FirePro** condensed aerosol generator.
2. An inspection report

A completed copy of the inspection report shall be delivered to the owner of the system or to the Authority Having Jurisdiction; the records shall be retained by the owner/user for the life of the **FirePro** condensed aerosol system.

Where external visual inspection indicates that the **FirePro** condensed aerosol generator casing or the generator has been damaged, it shall be replaced.

13.3. TRAINING.

All persons who could be expected to inspect, test, maintain, or operate the **FirePro** condensed aerosol fire extinguishing systems shall be thoroughly trained and kept thoroughly trained in the functions they are expected to perform.

Personnel working in an enclosure protected by a **FirePro** condensed aerosol fire system shall receive training regarding agent safety issues.

13.4. SAFETY.

Safe procedures shall be observed during installation, servicing, maintenance, testing, managing the **FirePro** condensed aerosol fire system.

14. SERVER/IT ROOMS – DATA CENTRES APPLICATION GUIDELINES AND ACCIDENTAL ACTIVATION CONSIDERATIONS

Introduction

The aerosol extinguishing medium consists of minute solid particles suspended in a gaseous atmosphere (N2, water vapor, CO2 and others), thus referred to as 'aerosol'. After discharge, the particles which are based on potassium compounds, as they are at the beginning free from moisture, settle as 'dust', which can easily be removed from the contact surfaces using basic cleaning means.

Warranty Disclaimer

FIREPRO MAKES NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF THE FIREPRO PRODUCTS FOR THEIR FITNESS FOR A PARTICULAR PURPOSE.
FIREPRO CAN NOT BE HELD RESPONSIBLE FOR ANY COLLATERAL DAMAGES AFTER A FALSE OR ACCIDENTAL ACTIVATION OF THE SYSTEM DUE TO HUMAN ERROR OR OTHERWISE.

Residue, Removal of Condensed Aerosol Generators, Waste and Environment

14.1. RESIDUE

During the activation process the FirePro Compound (FPC) is transformed into a condensed aerosol, consisting of solid particles that are suspended in a gaseous atmosphere phase. The size of these particles is of a few micrometres/nanometres.
The FirePro aerosol-forming compound is not based on halogen compounds to react with the fire. It does not produce any corrosive halogen acid by-products in its reaction with the fire.

The concentration of solid particles suspended in the aerosol phase is measured in grams per m^3. The particles are free from water and moisture and after a given period of time settle as dust in the protected room. The dust can easily be removed during cleaning before it absorbs moisture.

Following the fire extinguishing process, particles mainly consist of KOH in a very low concentration (which again reacts with CO2 and rapidly change into K2CO3) and are also free from water and/or moisture.

If the aerosol particles are removed by cleaning shortly before they absorb moisture and they mix with combustion residues present in the air after the fire, they do not react to electronic components, metal etc. Where the dust particles remain for a lengthy period of time, they can absorb moisture, meaning that the moisture will react with metal (especially unpainted) so that oxidation could occur.

Important

When extinguishing gases liquefied under pressure are sprayed in the room cooling takes place. In the case of Condensed Aerosol the temperature can rise. Both processes affect the humidity. Itis therefore important to be aware of the humidity present beforehand. Following fire and/or activation of the extinguishing system the humidity in the room must be reduced as soon as possible.

Considerations:

The experience gained in the last few years indicates that if the electrical power is cut off from the room and if the residues are removed shortly after the discharge time, minimum damage is incurred on the equipment.

The condensed aerosol however, is hygroscopic in nature, that is, after being exposed for a length of time (depending on surrounding temperature and humidity), it can absorb moisture. Therefore if the aerosol particles are removed shortly after discharge, and before they absorb moisture, they will have no effect on the contact surface of electronic/electrical components, or affect their operation. If the aerosol particles are not removed, and remain for a prolonged length of time, they may absorb moisture, and it is the moisture that will react with any metal, possibly causing oxidation. The moisture, when in contact with live circuitry/electricity, may cause a short circuit, and likely cause damage.

Extensive corrosion tests on electronic boards have been carried out at NLR – National Aerospace Laboratory of the Netherlands; the electronic boards were exposed to the aerosol at design density (100 gr/m3) and then subjected to temperature/humidity cycles at +25ºC / +55ºC and 90 % humidity. No damage was incurred on the electronic boards (Please refer to the NLR Report).

The fact that in Server Rooms/Data Centers the operating temperature is below 25ºC (lowest temperature at which NLR assessed the aerosol agent impact on electronics) may cause a faster condensation of the aerosol on cold surfaces and accelerate the absorption of moisture.Therefore, this mixture of moisture, aerosol, dust (always present in data rooms) and combustiondebris (if a fire is present) in the form of a dark oily residue can cause problems on electronics,if not removed prior re-energizing the system.

If there is discharge, say due to human error, the difference between following procedures and not following procedures can be enormous. Therefore, please ensure that the guidelines in section 14.1.1 are strictly followed.

14.1.1. Guidelines for the Removal of the Residue

- Remove the residue shortly after activation.
- Use a damp cloth or brush to mop up the dry residue from the floor and/or metals.
- Use a fan to remove the residues from electrical components.
- Use special sprays that are suitable for removing/cleaning the residues from electronic components.
- The use of Cryogenic Equipment should also be considered.
- Important: following a genuine and/or an accidental activation of the FirePro Condensed Aerosol Generators, you must always contact your dealer who can help you with a new survey of the room concerned and the correct reconditioning or cleaning methodologies.

14.2. POWER CUT OFF

- As part of the installation procedure you should isolate power to the Air conditioning, forced ventilation and any other equipment in the room. The FirePro Extinguishing Control System must be integrated to automatically isolate the power to the equipment before condensed aerosol discharge.
- Shutdown of Energy Supply and Computers
- The activation system of the FirePro Condensed Aerosol Generators is to be planned so that the following expectations/conditions are met:
  - The ventilation system of the room to be protected must be shut down before the FirePro system is activated. The power supply to the equipment/installation must also be shut down so that the ventilation and/or blowing function of the equipment is stopped. In this situation the fire cannot spread by means of extra oxygen and the extinguishing agent can reach the fire with guaranteed swiftness and in the desired concentration and extinguish it efficiently.
  - The shutdown system for the power supply also guarantees that there is no short-circuiting following activation. Any additional fire risk is prevented by the shutdown system.
  - The shutdown system for the power supply and ventilation is connected to the fire detection and fire alarm system and/or fire alarm panel.
  - Ventilate the room soon after discharge by extracting the discharged aerosol. This also reduces the aerosol condensation rate and humidity.
  - As soon as practically possible, clean equipment using cloths, special moisture removing fluid/sprays, blower/vacuum cleaner or cryogenic cleaning process as may be necessary, before putting the equipment in operation.

Additional Points to be Considered.

The areas where the aerosol settles most is the cooling fan and power supply (which is placed behind the fan) and equipment cold surfaces. This happens because the cooling fan is working continuously and is blowing a large quantity of aerosol inside the equipment (more quantity than the design application density used volumetrically).
Soon after discharge, the aerosol starts to absorb moisture; in cold (air conditioned) environments

and high humidity this physical process is accelerated.

If some damage is incurred mainly in the power supply, this component can be easily replaced, and the whole equipment will function properly.
Only the damaged component needs to be replaced and not the entire equipment.

14.3. ADDITIONAL INFORMATION ON HOW TO CLEAN THE ELECTRONIC COMPONENTS:

Aerosol Spray Cleaners

These aerosols sprays have been specially made to remove dust, condensation, grease, oil, flux, grime, and other particulate matter from delicate electronic circuitry. Their quick dissolving formula acts effectively leaving no residue. In addition to cleaning circuit boards, precision instruments, and electrical motors it also does an excellent job in cleaning switches, contacts, wire terminals, circuit breakers, relays, potentiometers, tuners, control panels, cable ends and receptacles, and other electronic equipment.

Electra XL	Safety Wash Liquid 4050	Maplin N64AN	Typhoon Blast All-Way	Pow-R-Wash CZ	Electro-Wash QD Degreaser
					

General Instructions how to Clean an Electronic Circuit Board

14.3.1. Instructions

- Unplug the electronic device immediately after the spill. Any sort of liquid can potentially cause a shock when combined with electric current. Protect yourself by removing any source of power to a wet device.

- Disassemble the device to expose the circuit board. Take the device apart carefully, according to its directions. You want to put it back together afterward, so the outer parts should stay intact.

- Soak up any remaining liquid with a lint-free cloth. Do not use paper products, since these could leave lint or scratch the board. Do not rub any cloth on the circuit board, since this could scratch or dislodge the parts. Place the cloth over the board and press gently. This will soak up the liquid.

- Remove the worst of any remaining particles by brushing with a toothbrush. This includes any globs of dried liquid. It does not need to be perfect at this stage. Remove any dust or loose pieces of dried liquid by spraying compressed air. Spray in one direction in quick bursts,since the canister can become extremely cold if used for longer sprays.

- Pat the board gently with a cloth to remove the majority of the moisture and allow it to dry completely. Reassemble the device and test it. Many devices, from cellphones to computer keyboards, can survive a brief spill or dunking by drying and cleaning them, and they will continue to work after you put them back together.

- In case of severe contamination of electronics, we suggest the use of Cryogenic Cleaning.

14.4. PLEASE NOTE AND REMEMBER THESE SIMPLE STEPS:

14.4.1. WHEN THERE IS A FIRE

SWITCH OFF POWER TO EQUIPMENT BEFORE AEROSOL DISCHARGE (the fire extinguishing control panel will automatically isolate power)

VENTILATE ROOM (after extinguishing fire and no risk of re-ignition)
ADOPT CLEANING PROCEDURE (immediately after it is safe to do so)

14.4.2. WHEN THERE IS AN ACCIDENTAL ACTIVATION (NO FIRE) - AFTER CONDENSED AEROSOL DISCHARGE

SWITCH OFF POWER TO EQUIPMENT MANUALLY ASAP (unless the system is integrated to automatically isolate power)
VENTILATE/ADOPT CLEANING PROCEDURE

14.5. VERY IMPORTANT:

14.5.1. TECHNICAL WORK IN A ROOM / ENCLOSURE PROTECTED BY FIREPRO

To avoid/reduce the possibility of false condensed aerosol discharge, as this is possible to occur as a result of human error/intervention, it is imperative that the FirePro System is physically/electrically isolated prior performing any work on the system. This is done by interrupting the releasing circuit through the Disconnect Switch (Isolation Switch / Manual Extinguishant Disablement Switch).Once the work on the system has been completed and system functionality is confirmed to be healthy, then the releasing circuit can be put back in service.

FirePro will not be responsible or liable for any damages caused by accidental discharge!

14.5.2. CORRECT DESIGN CONSIDERATIONS ACCORDING TO FIREPRO USER MANUAL

FirePro strongly recommends that Smoke Detectors are used in conjunction with Rate of Rise Heat

Detectors; this is to avoid false discharge as a result of dust, etc.

FirePro will not be responsible or liable for any damages caused by accidental discharge!

14.5.3. SYSTEM HAND OVER TO CLIENT

On System Hand Over, ensure the client has been given a copy of the FirePro User Manual and FirePro Logbook, has read and understood these, and is fully aware of the above VERY IMPORTANT considerations. Ensure the client has signed acceptance of the system and documents received.

14.6. REMOVING FIREPRO CONDENSED AEROSOL GENERATORS

When the **FirePro** condensed aerosol generators have to be removed, the following steps shall be accomplished:


- Disassemble or switch off the drive from the fire detection system and ensure that it cannot be switched on;


- Disconnect the power wires from the **FirePro** condensed aerosol generators and ensure that they cannot be connected;


- Ensure that you are standing firmly and comply with the rules for working at height (Working Conditions Act);


- Remove the **FirePro** condensed aerosol generators by unscrewing the bolts and nuts fixing them;


- Carefully remove the **FirePro** condensed aerosol generators from the brackets and place it on a stable surface;


- After removing the **FirePro** condensed aerosol generators, put the fire detection and alarm installation back into operation in accordance with the guidance of the Authority Having Jurisdiction.


- If the **FirePro** condensed aerosol generators are still warm (after activation), wear heat-resistant gloves.

14.7. WASTE AND ENVIRONMENT

After activation the **FirePro** condensed aerosol generators can be disposed of as normal waste after removal.

If the **FirePro** condensed aerosol generators removed has not been activated and the solid aerosol forming compound FPC is still inside the generators they shall be returned to the local **FirePro** Distributor / Dealer.

15. APPENDIX "A" (MATERIAL SAFETY DATASHEETS)

FIREPRO SYSTEMS LTD. FirePro

SAFETY DATA SHEET - SDS

Issue date: 26/11/2018

1.	**Identification of the Substance/Company**		
1.1	Trade Name	**FirePro**	
1.2	Manufacturer/Supplier	FirePro Systems Ltd	
		8 Faleas Str., Agios Athanasios Industrial Area CY4101 Limassol CYPRUS	
		Phone: + 357 25 379999	Fax: + 357 25 354432
		Email: mail@firepro.com	Website: www.firepro.com
1.3	Telephone number in case of emergency: +357 25 376146		

2.	**Hazards Identification**			
	- Hazards for humans related to the FPC Solid Compound have not been found - Hazards for humans related to the aerosol released by the solid compound have not been established because TLV's are not applicable. Signs and symptoms related to the aerosol phase are only referred to acute exposure and/or chronic overexposures, while in real life the exposure will be very short (i.e. in the event of an accidental discharge when people were not evacuated on time)			
2.1	For humans			
	Threshold Limit Values	None established		
	Signs and Symptoms by acute exposure			
	Eye Contact	At normal contact no injury		
	Inhalation	Not a likely route of entry		
	Skin Contact	At normal contact no injury		
	Ingestion	At normal contact no injury		
	Chronic Overexposure	At normal contact no injury		
	Medical Conditions generally aggrevated by Exposure	None known		
	The EU Classification and Hazard and Precautionary Statements as per CLP 1272/2008 referring to the components of the FPC Compound are related only to the single components considered as separate chemical entities. Once mixed in the production of the FPC Compound , the statements of the single components are not applicable being the FPC Compound a separate chemical entity.			
	Product			
	Potassium Nitrate	EU Classification	Oxidizer	-
		Hazard Statements	H270	Contact with combustible material may cause or intensify fire
		Precautionary Statements	P210	Keep away from sources of ignition – No Smoking
			P370+P260	In case of fire and/or explosion, do not breathe fumes
	Potassium Carbonate	EU Classification	Irritant	-
		Hazard Statements	H302	Harmful if swallowed
			H320+H335+H315	Irritating to eyes, respiratory system and skin
		Precautionary Statements	P305+P351+H338	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
			P282	Wear suitable gloves and eye/face protection

2.1	Magnesium	EU Classification	Flammable	-
		Hazard Statements	H260	Contact with water liberates highly flammable gases
			H250	Spontaneously flammable in air.
		Precautionary Statements	P102	Keep out of reach of children
			P223	In case of fire never use water
			P402+P404	Keep container tightly closed and dry
	Epoxy Resin Polymer	EU Classification	Irritant	-
		Hazard Statements	H317	May cause sensitization by skin contact
			H413	May cause long-term adverse effects in the aquatic environment
		Precautionary Statements	P302+P352	In case of contact with skin , rinse with water
			P282	Wear suitable gloves and eye/face protection
			P273	Avoid release to the environment. Refer to special instructions/Safety Data Sheets

3.	**Composition/Information on Ingredients**			
3.1	**Component**	**Wt %**	**CAS No.**	**EINECS**
	Potassium Nitrate	77	7757-79-1	231-818-8
	Potassium Carbonate	4	584-08-7	209-529-3
	Magnesium	<1	7439-95-4	231-104-6
	Epoxy Resin Polymer	18	25068-38-6	Any “polymerizate, polycondensate, or polyadduct” is exempted by 81/437/EEG

4.	**First-Aid Measures**	
	First-Aid measures are referred to accute exposure and/or chronic over exposure	
4.1	Inhalation	Remove from exposure area to fresh air.
	Eye Contact	If necessary wash eyes.
	Skin Contact	Change clothing and shoes. Wash skin with soap.
	Ingestion	Not likely.

5.	**Fire fighting Measures**	
5.1	Extinguishing Media	This is an Extinguishing Agent
5.2	Unusual Fire and Explosion Hazards	The material does not present an explosion danger. It can be ignited by means of a fire. Hot aerosol is present in the close up area of the outlets.
5.3	Special Procedures	In places where there is a fire always wear personal protecting equipment and clothing

6.	**Accidental Release Measures**	
6.1	Personal Precautions	
	Respiratory Protection	at normal contact not needed
	Hand Protection	at normal contact not needed
	Eye Protection	at normal contact not needed
	Skin and Body Protection	at normal contact not needed
6.2	Environmental Precautions	
	Waste Disposal Methods	See section 13
6.3	Clean up Precautions	Sweep up

7.	**Handling and Storage**	
7.1	Handling Precautions	Avoid contact with combustible materials
7.2	Storage Precautions	Should be stored in original container. Keep dry.
	Storage Class	9 Miscellaneous , solid

8.	**Exposure Controls and Personal Protection**	
8.1	Exposure	Before entering a room with the material in aerosol phase vent properly to avoid unnecessary exposure.
8.2	Personal Protection	
	Respiratory Protection	at normal contact not needed
	Hand Protection	at normal contact not needed
	Eye Protection	at normal contact not needed
	Skin and Body Protection	at normal contact not needed

9.	**Physical and Chemical Characteristics**	
	Appearance	Solid
	Colour	Off white
	Odour	None
	Relative Density	Not applicable
	Solubility in water	Insoluble
	Ph (if in water, % Conc.)	Not determined
	Boiling Point	Not applicable
	Vapour Pressure (mm Hg)	Not applicable
	Vapour Density	Not applicable
	Flash Point	Not applicable
	Flammability Limits in Air (% by Volume)	Not applicable
	Auto Flammability	Not applicable
	Explosive Properties	Not applicable
	Oxidizing Properties	Not determined

10.	**Stability and Reactivity**	
10.1	Stability	Stable
	Conditions to avoid	None Known
10.2	Hazardous Reactions	Will not occur
	Conditions to avoid	None known
10.3	Materials to avoid	None known
10.4	Hazardous Decompositions Products	None ascertained

11.	**Toxicological Information**		
	The TLV's (Threshold Limit Values) of the chemicals released in the aerosol phase are applicable only in case of long , as long as a complete professional life, exposure. This is not the case of a real life situation.		
11.1	Product		
	The potential damage is not caused by the product mixture composition, but by the fact that it is respirable. The TLV's apply in case of long exposure , sometimes exposure during a complete professional life , whilst in this case is once only and short (in case of accidental discharge when evacuation does not take place on time) In case of fire the toxicity is caused by the fire itself and the products involved in the fire		
11.2	Components		
	Potassium Nitrate	Toxicity	Oral LD_{50} (rat) 3750 mg/Kg
		Target Organs	Blood, central nervous system
	Potassium Carbonate	Toxicity	Oral LD_{50} (rat) 1870 mg/Kg ,
			Oral LD_{50} (mouse) 2570 mg/Kg
		Target Organs	Respiratory system
	Magnesium	Toxicity	Oral LD_{50} (dog) 230 mg/Kg
		Target Organs	Central nervous system, liver, kidneys
11.2	Epoxy Resin Polymer	Toxicity	Oral LD_{50} (rat) 11.4 g/Kg
		Irritation Data	Skin (guinea pig) 2750 mg/55 days Inert
			Eye (rabbit) 100 mg Mild

12.	**Ecological Information**	
12.1	Mobility	as per available data no effect
	Absorption/Desorption	as per available data no effect
12.2	Degradability	as per available data no effect
	Biotic and Abiotic Degradation	as per available data no effect
	Aerobic and Anaerobic Degradation	as per available data no effect
	Persistence	as per available data no effect
12.3	Accumulation	as per available data no effect
	Bioaccumulation Potential	as per available data no effect
	Biomagnification	as per available data no effect
12.4	Short and Long Term Effects on	
	Ecotoxicity	as per available data no effect
	Aquatic Organisms	as per available data no effect
	Soil Organisms	as per available data no effect
	Plants and Terrestrial animals	as per available data no effect
12.5	Other Adverse Effects	
	Ozone Depleting Potential (ODP)	none
	Photochemical Ozone Creation Potential	none
	Global Warming Potential (GWP)	none
	Effects on Waste Water Treatment Plants	as per available data no effect

13.	**Disposal Considerations**
13.1	Dispose of in Compliance with local, state and national regulations

14.	**Transport Information**			
14.1	**Air Transport (ICAO-IATA / DGR)**			
	UN Number	3335		
	UN proper shipping name	Aviation regulated solid,n.o.s.* (contains potassium nitrate)		
	Transport Hazard class	ICAO / IATA Class	9	
		ICAO / IATA Subrisk	Not Applicable	
	Environmental hazard	Not Applicable		
	Special Precautions for user	Cargo Only Packing Instructions	956	
		Cargo Only Maximum Qty/Pack	400 kg	
		Passengers and Cargo Packing Instructions	956	
		Passenger and Cargo Maximum Qty / Pack	400 kg	
		Passenger and Cargo Limitited Quantity Packing Instructions	Y956	
		Passenger and Cargo Limited Maximum Qty / Pack	30 kg G	
14.2	**Sea Transport (IMDG – Code)**			
	UN Number	Not Applicable		
	Packing Group	Not Applicable		
	UN proper shipping name	Not Applicable		
	Environmental hazard	Not Applicable		
	Transport hazard (classes)	IMDG Class	Not Applicable	
		IMDG Subrisk	Not Applicable	
	Special precautions for user	EMS Number	Not Applicable	
		Special provisions	960 (Not Subject to the provisions of this Code but may be subject to provisions governing the transport of dangerous goods by other modes).	
		Limited Quantities	Not Applicable	
14.3	**Land transport (ADR)**			
	UN Number	Not Applicable		
	Packing Group	Not Applicable		
	UN proper shipping name	Not Applicable		
	Environmental hazard	Not Applicable		
	Transport hazard class(es)	Class	Not Applicable	
		Subrisk	Not Applicable	
	Special precautions for user	Special provisions	106 (Not Subject to ADR)	
		Limited quantity	Not Applicable	

15.	**Regulatory Information**	
	Limit Values for exposure	None listed
	EINECS Status	All components are included in EINECS inventories
	Restrictions on Marketing and Use	None (Refer to any other national measures that may be relevant

16.		**Other Information**
16.1		None Known

Disclaimer

The data in the above safety data sheet reflect the current state of knowledge of our product and shall be used only as a guideline. No binding statements as to the contractually agreed product characteristics may be inferred there from.

16. APPENDIX "B" FirePro Aerosol Generators

16.1. GENERATORS OVERVIEW

FP-20SE / FP-20T

FP-40S / FP-40T

FP-80S / FP-80T

FP-100S

FP-100T

FP-200S

FP-200T

FP-500S

FP-500T

FP-1200S
FP-1200TS

FP-2000S
FP-2000TS

FP-3000S
FP-3000TS

FP-4200S
FP-4200TS

FP-5700S
FP-5700TS

FP-1200
FP-1200T

FP-2000
FP-2000T

FP-3000
FP-3000T

FP-4200
FP-4200T

FP-5700
FP-5700T

17. APPENDIX "C": FirePro Generators Datasheets

18. APPENDIX "D": FirePro Generators Drawings

19. APPENDIX "E": Referenced publication Excerpt from NFPA 2010

THE FOLLOWING REFERENCED PUBLICATIONS ARE EXCERPT FROM NFPA 2010 STANDARD FOR FIXED AEROSOL FIRE-EXTINGUISHING SYSTEMS - 2020 EDITION.

THEY ARE ADOPTED IN THIS USER MANUAL AS A CONSISTENT REFERENCE WITH THE CODE.

19.1. GENERAL.

The documents or portion thereof listed in this chapter are referenced within this manual and shall be considered part of the guidance of this manual.

19.2. NFPA PUBLICATION.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471

- NFPA 2010 Standard for Fixed Aerosol Fire-Extinguishing Systems – 2020 Edition
- NFPA 70 *National Electrical Code® , 2020 Edition*
- NFPA 72 *National Fire Alarm Code® , 2019 Edition*

19.3. ANSI PUBLICATION.

American National Standard Institute, Inc., 25 West 43rd Street, 4th Floor; New York, NY10036

- ANSI/IEEE C2, National Electrical Safety Code, 2017

19.4. IMO PUBLICATION.

International Maritime Organization, 4 Albert Embankments, London, SE1 7SR, United Kingdom.

- IMO MSC/Circ.1270, Guidelines for the Approval of Fixed Aerosol Fire-Extinguishing Systems Equivalent to Fixed Gas Fire-Extinguishing Systems, as Referred to in SOLAS 74, for Machinery Spaces; 2008 Edition

19.5. ISO PUBLICATION.

International Organization for Standardization, 1, Rue de Varembe, Case postale 56, CH-1211 Geneve 20, Switzerland.

- ISO /IEC 17007:2009, Guidance for drafting normative documents suitable for use for conformity assessment

19.6. U.S. GOVERNMENT PUBLICATIONS.

U.S. Government Printing Office, Washington, DC 20402.

- Title 29, Code of Federal Regulations, Part 1910, Subpart S. Title 46, Code of Federal Regulations, Subchapter C, Parts 24-28.
- Title 46, Code of Federal Regulations, Subchapter J, "Electrical Engineering."
- Title 49, Code of Federal Regulations, Parts 171-190.
- Title 49, Code of Federal Regulations, Part 172.101, Subpart B.
- Title 49, Code of Federal Regulations, Part 173.34(e) (01). Title 49, Code of Federal Regulations, Parts 178.36 and 178.37.

19.7. OTHER PUBLICATION.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

19.8. REFERENCES FOR EXTRACTS IN MANDATORY SECTIONS.

- NFPA 10, Standard for portable Fire Extinguishers, 2018 edition.
- NFPA 13, Standard for the Installation of Sprinkler Systems, 2019 edition.
- NFPA 51B, Standard for Fire Prevention during Welding, Cutting, and Other Hot Work, 2019 edition.
- NFPA 68, Standard on Explosion Protection by Deflagration Venting, 2018 edition
- NFPA 72®, National Fire Alarm Code®, 2019 edition.
- NFPA 101®, Life Safety Code®, 2018 edition.
- NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities, 2020 edition.

20. APPENDIX "F": Definition Excerpt from NFPA 2010

THE FOLLOWING DEFINITIONS ARE EXCERPT FROM NFPA 2010 STANDARD FOR FIXED AEROSOL FIRE-EXTINGUISHING SYSTEMS 2020 EDITION.

THEY ARE ADOPTED IN THIS MANUAL AS A CONSISTENT REFERENCE WITH THE CODE.

The definitions contained in this chapter shall apply to the terms used in this manual. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinary accepted meanings within the context in which they are used.

Merriam-Webster's Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

20.1. NFPA OFFICIAL DEFINITIONS

20.1.1. Approved.

Acceptable to the authority having jurisdiction.

20.1.2. Authority Having Jurisdiction (AHJ).

An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

20.1.3. Listed.

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or hasbeen tested and found suitable for a specified purpose.

20.1.4. Shall.

Indicates a mandatory requirement.

20.1.5. Should.

Indicates a recommendation or that which is advised but not required.

20.1.6. Standard.

A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Non-mandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

20.2. GENERAL DEFINITIONS.

20.2.1. Actuating mechanism.

A mechanism whose automatic or manual operation leads to the discharge of extinguishing agent.

20.2.2. Condensed Aerosol.

An extinguishing medium consisting of finely divided solid particles, generally less than 10 microns in diameter, and gaseous matter, generated by a combustion process of a solid aerosol-forming compound.

20.2.3. Agent Quantity.

Mass of solid aerosol-forming compound required to achieve the design application density within the protected volume within the specified discharge time.

20.2.4. Automatic.

That which provides a function without the necessity of human intervention. [101, 2006]

20.2.5. Automatic/manual switch.

Means of converting the system from automatic to manual actuation.

20.2.6. Classification for Fires

- **Class A Fire.**
  Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics. [10, 2002]
- **Class B Fire.**
  Fires in flammable liquids, petroleum greases, tars, oil, oil-based paints, solvents, lacquers, alcohols, and flammable gases. [10, 2002]
- **Class C Fire.**
  Fires that involve energized electrical equipment. [10, 2002]

20.2.7. Clearance.

- **Electrical Clearance.**
  The unobstructed air distance between extinguishing system equipment, including piping and nozzles, and unenclosed or uninsulated live electrical components not at ground potential.
- **Thermal Clearance.**
  The air distance between a condensed aerosol generator and any structure or components sensitive to the temperature developed by the generator.

20.2.8. Coolant.

A heat-absorbing medium or process.

20.2.9. Density.

Design Application Density (g/m^3). Extinguishing application density, increased by a safety factor, required for system design purposes.

Extinguishing Application Density (g/m^3). Minimum mass of a specific aerosol-forming compound per m^3 of enclosure volume required to extinguish fire involving particular fuel under defined experimental conditions excluding any safety factor.

Particulate Density. The density of solid particulate in g/m^3 after discharge of the aerosol system at the design application density. This information is used to assess the degrees of visibility obscuration and the potential health effects of accidental exposure to the agent.

20.2.10. Discharge Port.

A passage such as nozzles or openings on an aerosol generator where aerosol is released when the generator is actuated.

20.2.11. Disconnect Switch.

A manually operated switch, electrically supervised and secured from unauthorized use, that prevents the automatic or manual electrical activation of the aerosol generators during maintenance by electrically opening the releasing circuit.

20.2.12. Generator.

A device for creating a fire-extinguishing medium by pyrotechnical means.

20.2.13. Generator Casing.

The surface of the generator, excluding the surface containing the discharge ports.

20.2.14. Hold Time.

Period of time during which an extinguishant is required to maintain an even distribution throughout the protected volume in an amount at least at the extinguishing application density.

20.2.15. Hot work.

Work involving burning, welding, or similar operation that is capable of initiating fire or explosion. [51B, 2003]

20.2.16. Inspection.

A visual examination of a system or portion thereof to verify that it appears to be in operating condition and free of physical damage. [820, 2003]

20.2.17. Maintenance.

Work performed to ensure that equipment operates as directed by the manufacturer.

20.2.18. Manual.

Requiring intentional intervention to accomplish a function.

20.2.19. Normally Occupied.

An area or space where, under normal circumstances, persons are present.

20.2.20. Normally Unoccupied.

An area or space not normally occupied by people but that can be entered occasionally for brief periods.

20.2.21. Protected Volume.

Volume enclosed by the building elements around the protected enclosure, minus the volume of any permanent impermeable building elements within the enclosure.

20.2.22. Release.

The physical discharge or emission of aerosol as a consequence of the condensed aerosol generator's actuation or operation of the dispersed aerosol agent container.

20.2.23. Solid Aerosol-Forming Compound.

A solid mixture of oxidant, combustible component and technical admixtures that produces a condensed aerosol upon actuation.

20.2.24. Total Flooding Extinguishing System.

A system arranged to discharge an extinguishant into an enclosed space to achieve a uniform distribution of that extinguishant, at or above the design application density, throughout the space.

20.2.25. Unoccupiable.

An area or space which cannot be occupied due to dimensional or other physical constraints.

FirePro

CONDENSED AEROSOL FIRE EXTINGUISHING SYSTEMS

APPENDIX "C"

DATA SHEETS

MANUAL NO. EX 6960

VERSION 1.0, REV. 8

March 2022

Condensed Aerosol generators: Legend of symbol

Activation Mode		Max volume protected	
	Electrical activation		Max volume protected for Class “A” Fire
			Max volume protected for Class “B” Fire
			Max volume protected for Class “C” Fire

Classification of fires

Europe: CEN Standard EN2 * International: ISO Standard 3941			NFPA 10		
Following the **EN 2 Classification of Fire** the fire classification identify the combustible material originating the fire:			Following the **NFPA 10 Standard for portable fire extinguisher** the fire classification identify the combustible material originating the fire:		
	CLASS “A”	Fire involving **solid materials**, usually of an organic nature (such as paper, wood, plastics and so on), in which combustion normally takes place with the formation of glowing embers.	Fire in ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.	CLASS “A”	
	CLASS “B”	Fires involving **flammable liquids** or liquefiable solids such as paraffin, petrol, oil and so on	Fires in flammable liquids, oil, greases, tars, oil base paints, lacquers and flammable gases.	CLASS “B”	
	CLASS “C”	Fire involving **flammable gases** such as propane, butane, methane and so on.			
	CLASS “D” [1]	Fire involving **metals** such as aluminium, magnesium, titanium and so on.	Fires in combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.	CLASS “D” [1]	
E	CLASS “E” [2]	Fires involving **electrical apparatus**	Fire which involve energized electrical, non-conductivity of the extinguishing medium is of importance. (When electrical equipment is de-energized, extinguishers for Class “A” or “B” fires may be used safely).	CLASS “C”	
	CLASS “F”	Fire involving cooking **oils** and **fat** and such like.	Fire involving cooking grease, fats and oils.	CLASS “K” [3]	K

Note:

(*) Comite Europeen de Normalisation (CEN standard EN2) closely follows ISO standard 3941
([1]) FirePro ® is not suitable to extinguish Class D fires (see technical manual)
([2]) Code of practice definition, not included inside EN2
([3]) Not tested to Class K fires

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		FirePro®

FirePro Condensed Aerosol generators: Technical information summary

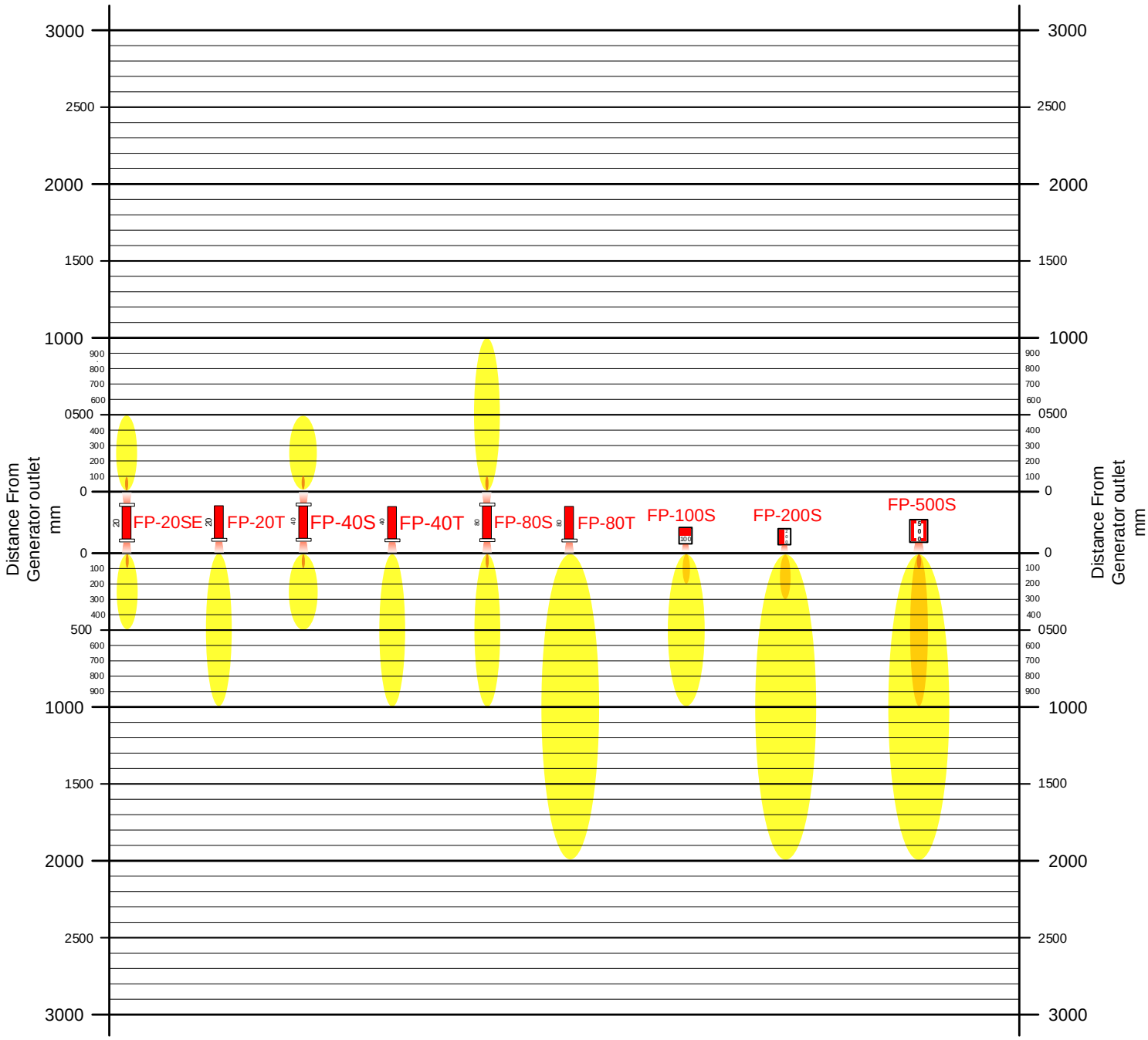
Model	Weight (g)		Dimensions (mm)				Activation mode (1)	Distance from generator' soutlet at TN temperature (m)			Aerosol discharge time (s)		Stream length - (m)	Number of discharge outlet	
	Gross	Net	Height	Diameter			Electrical	T_1	T_2	T_3	Min	Max		1	2
			Height	Width	Length										
FP-20SE	310	20	165	-	32		√	0	0.1	-	3	6	1		√
FP-20T	310	20	165	-	32		√	0	0.0	-	3	6	1	√	
FP-40S	610	40	140	-	51		√	0	0.1	-	5	10	1		√
FP-40T	585	40	140	-	51		√	0	0.0	-	5	10	1	√	
FP-80S	870	80	185	-	51		√	0	0.1	-	5	10	2		√
FP-80T	840	80	185	-	51		√	0	0.0	-	5	10	2	√	
FP-100S/T	1370/1540	100	155/157	-	84		√	0	0.0	0.2	5	10	1	√	
FP-200S/T	1840/2010	200	185/187	-	84		√	0	0.0	0.3	5	10	2	√	
FP-500S/T	3340/3440	500	295/297	-	84		√	0	0.1	1.0	5	10	2	√	
FP-1200/S/T/TS	10900	1200	167	216	300		√	0	0.0	1.5	15	20	3.5	√	
FP-2000/S/T/TS	15500	2000	185	300	300		√	0	0.0	1.5	15	20	3.5	√	
FP-3000/S/T/TS	16300	3000	185	300	300		√	0	0.6	2.0	15	20	3.5	√	
FP-4200/S/T/TS	23600	4200	300	300	300		√	0	0.99	2.3	15	20	5.0	√	
FP-5700/S/T/TS	26400	5700	300	300	300		√	0	0.6	2.0	15	20	8.4	√	

Note and Legend

Symbol	
T_1	Aerosol stream temperature from generator discharge outlet equal or less than 400° C
T_2	Aerosol stream temperature from generator discharge outlet equal or less than 200° C
T_3	Aerosol stream temperature from generator discharge outlet equal or less than 75° C
(1)	In case of generator's system activation failure the **FPC** (FirePro. solid compound) will start by itself the aerosol forming reaction when reaching the temperature of 300° C.

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		**FirePro**

FirePro. Condensed Aerosol generators: Height of installation and minimum clearance

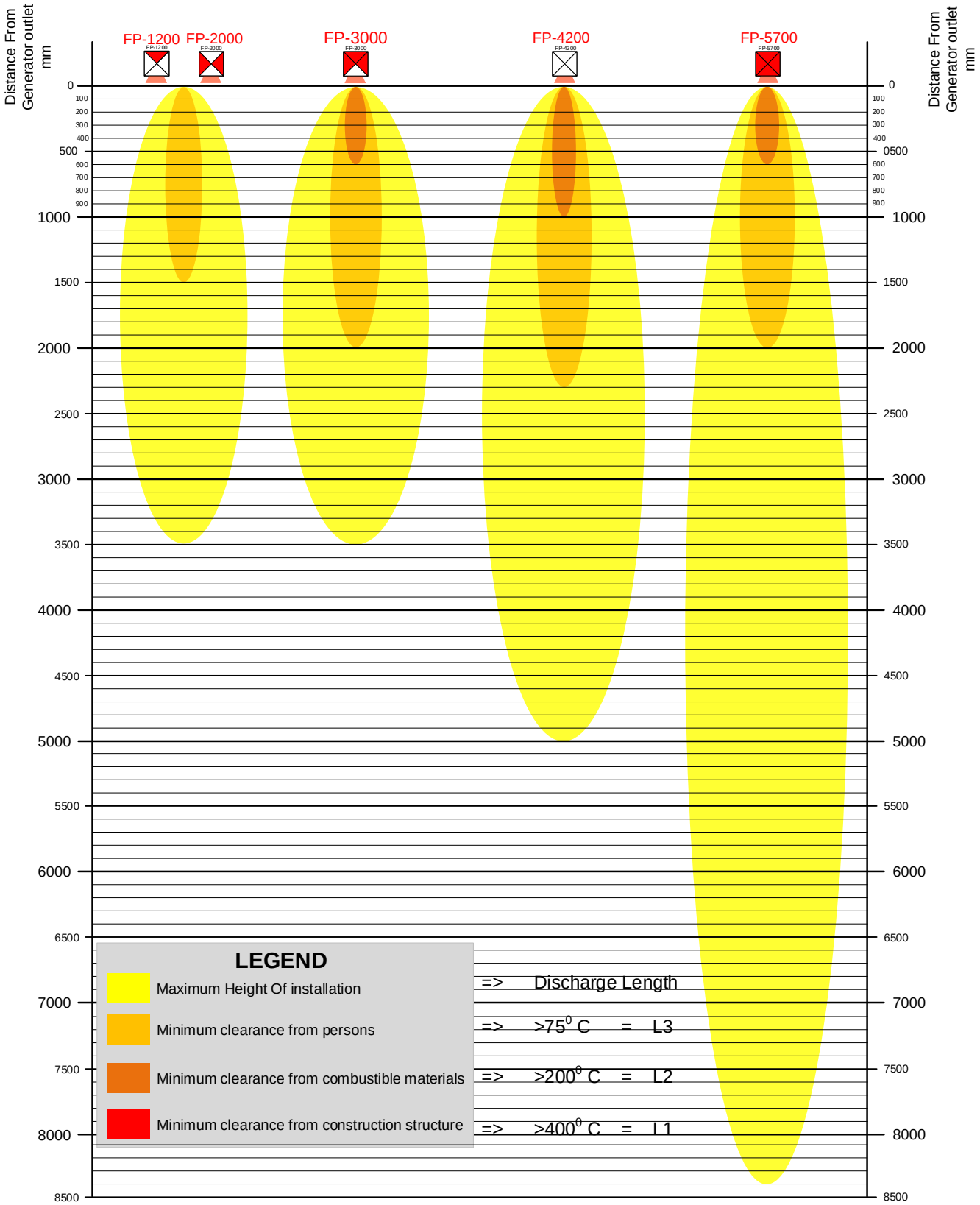


LEGEND

- Maximum Height Of installation => Discharge Length
- Minimum clearance from persons => >75^0 C = L3
- Minimum clearance from combustible materials => >200^0 C = L2
- Minimum clearance from construction structure => >400^0 C = L1

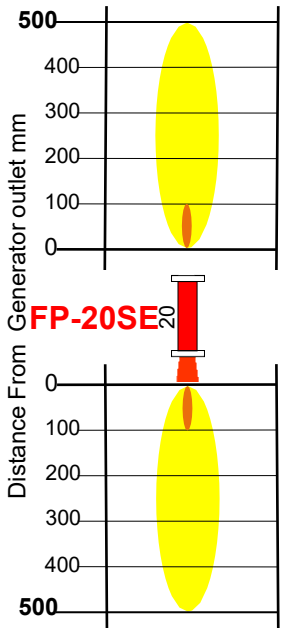
Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

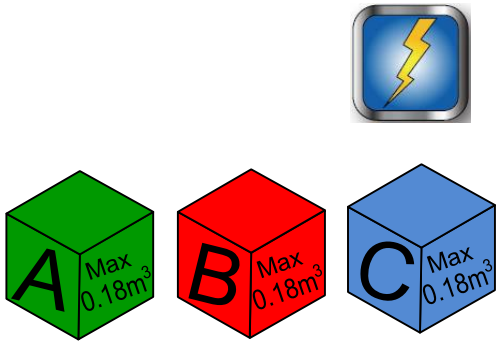
FirePro. Condensed Aerosol generators: Height of installation and minimum clearance



Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-20SE





LEGEND

- Maximum Height Of installation
- Minimum clearance from persons
- Minimum clearance from combustible materials
- Minimum clearance from construction structure

Technical Data

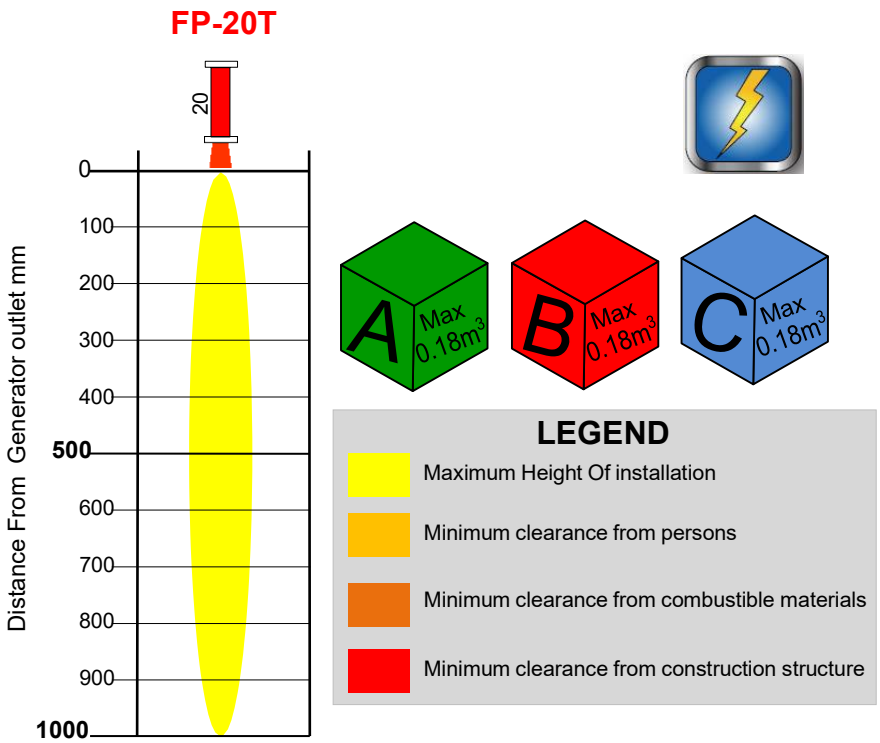
Mass of FPC (Aerosol Generating Solid Compound)	20 g				
Generators gross weight	**Weight**		**Tolerance**		
	310 g		± 5%		
Activation mode/s	**Electrically**				
Minimum Pulse Voltage / Current	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	3 seconds		6 seconds		
Number of discharge outlet	2				
Generator dimension	**Height**		**Diameter**		
	165 mm		32 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 0.55 m^2		Max throw: 0.27 m
Maximum height of installation	1.0 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	100 mm		100 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note

1	ODP: Ozone Depletion Potential	3	ALT: Atmospheric Life Time
2	GWP: Global Warming Potential	4	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-20T



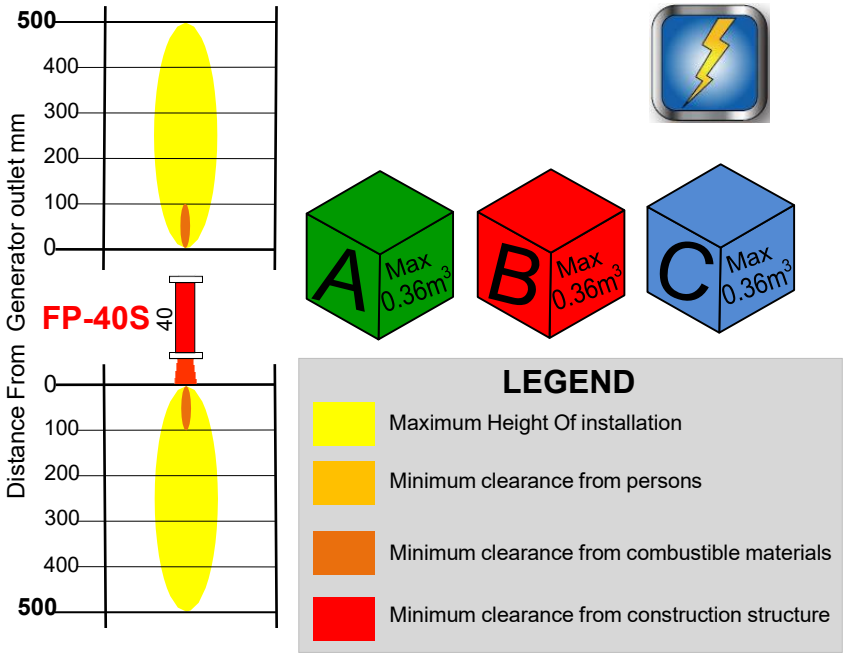
Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	20 g				
Generators gross weight	**Weight**		**Tolerance**		
	310 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	3 seconds		6 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**		**Diameter**		
	165 mm		32 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 0.55 m²		Max throw: 1.14 m
Maximum height of installation	1.0 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	0 mm		0 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note					
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time	
	2	GWP: Global Warming Potential	**4**	Within the parameters for use	

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-40S



Technical Data

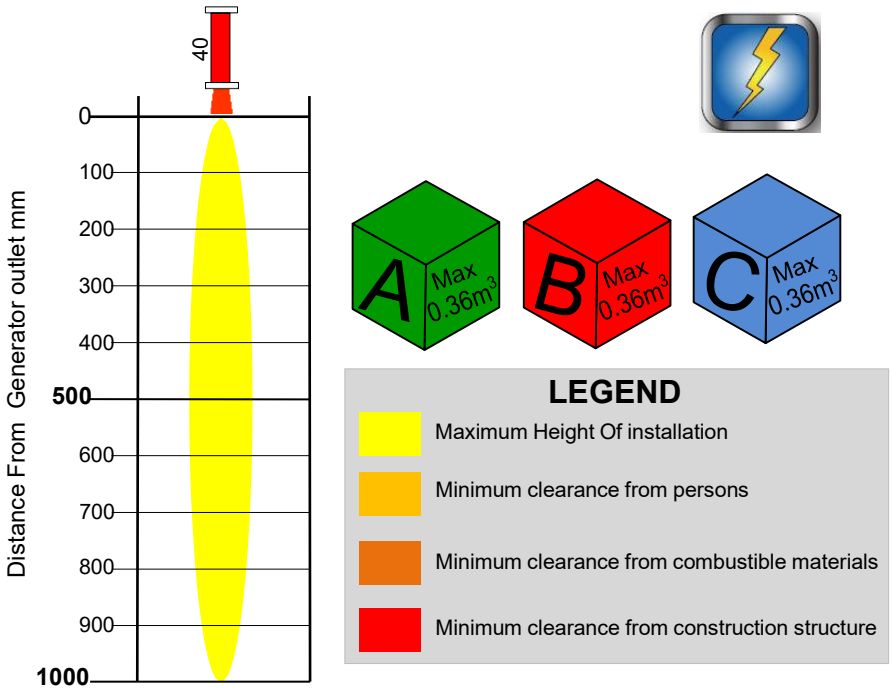
Mass of FPC (Aerosol Generating Solid Compound)	40 g				
Generators gross weight	**Weight**		**Tolerance**		
	610 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	2				
Generator dimension	**Height**		**Diameter**		
	140 mm		51 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 1.08 m^2		Max throw: 0.54 m
Maximum height of installation	1 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	100 mm		0 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note

1	ODP: Ozone Depletion Potential	3	ALT: Atmospheric Life Time
2	GWP: Global Warming Potential	4	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-40T



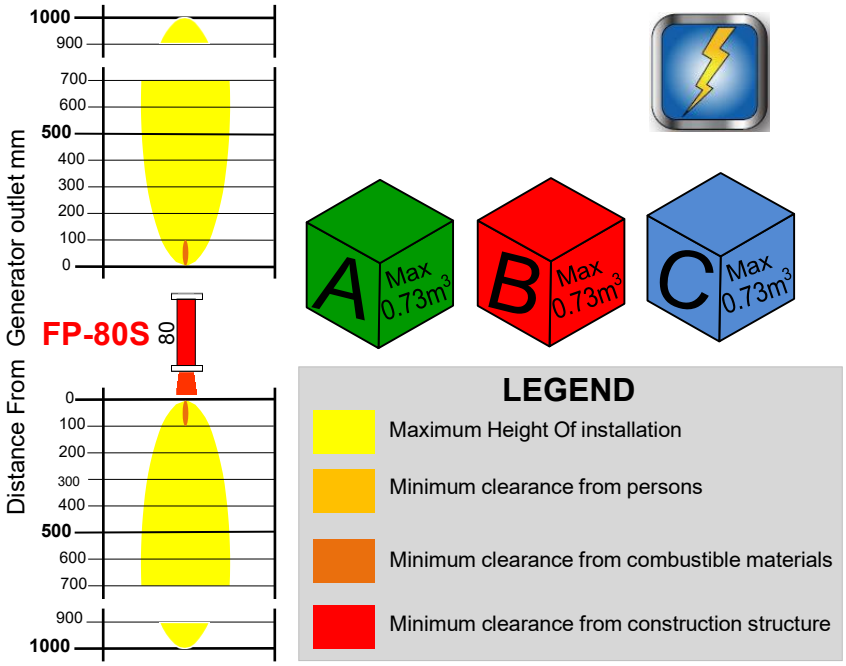
Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	40 g				
Generators gross weight	**Weight**		**Tolerance**		
	585 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**		**Diameter**		
	140 mm		51 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 1.08 m^2		Max throw: 1.47 m
Maximum height of installation	1 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	0 mm		0 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-80S



Technical Data

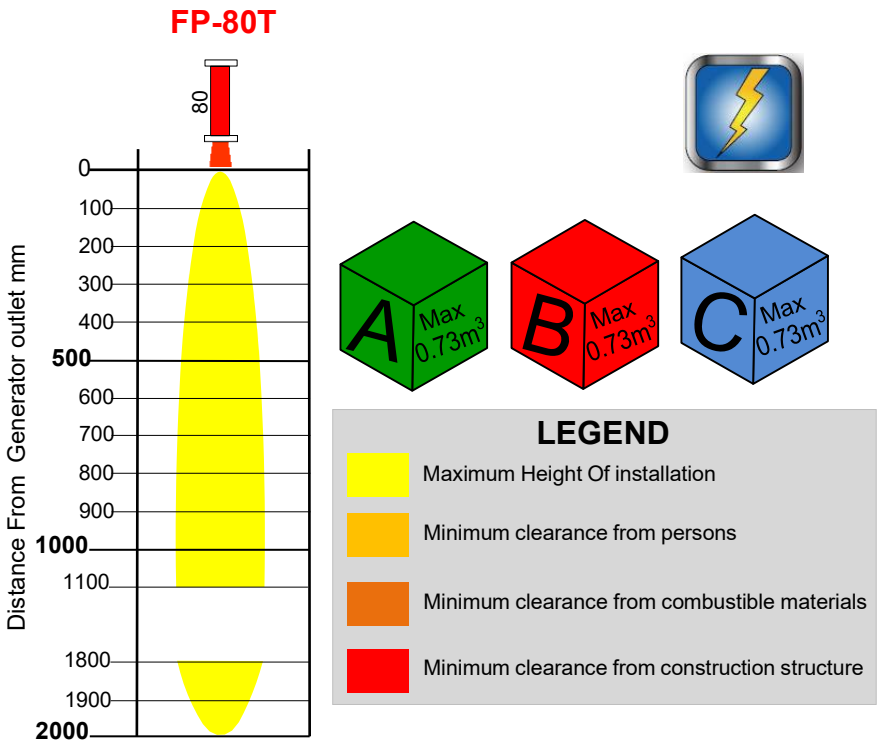
Mass of FPC (Aerosol Generating Solid Compound)	80 g				
Generators gross weight	**Weight**		**Tolerance**		
	870 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	2				
Generator dimension	**Height**		**Diameter**		
	185 mm		51 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 2.12 m²		Max throw: 1.06 m
Maximum height of installation	2 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	100 mm		100 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note

1	ODP: Ozone Depletion Potential	3	ALT: Atmospheric Life Time
2	GWP: Global Warming Potential	4	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-80T



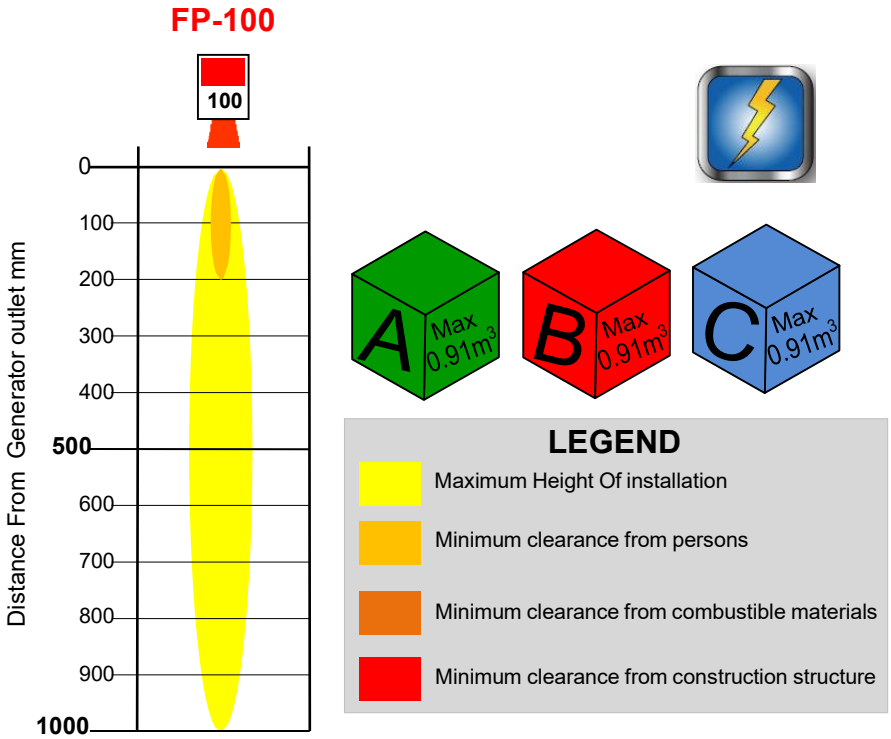
Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	80 g				
Generators gross weight	**Weight**		**Tolerance**		
	840 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**		**Diameter**		
	185 mm		51 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 2.12 m²		Max throw: 2.34 m
Maximum height of installation	2 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	0 mm		0 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note				
	1	ODP: Ozone Depletion Potential	3	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	4	Within the parameters for use

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		**FirePro.**

FirePro. Condensed Aerosol generators: FP-100S/T



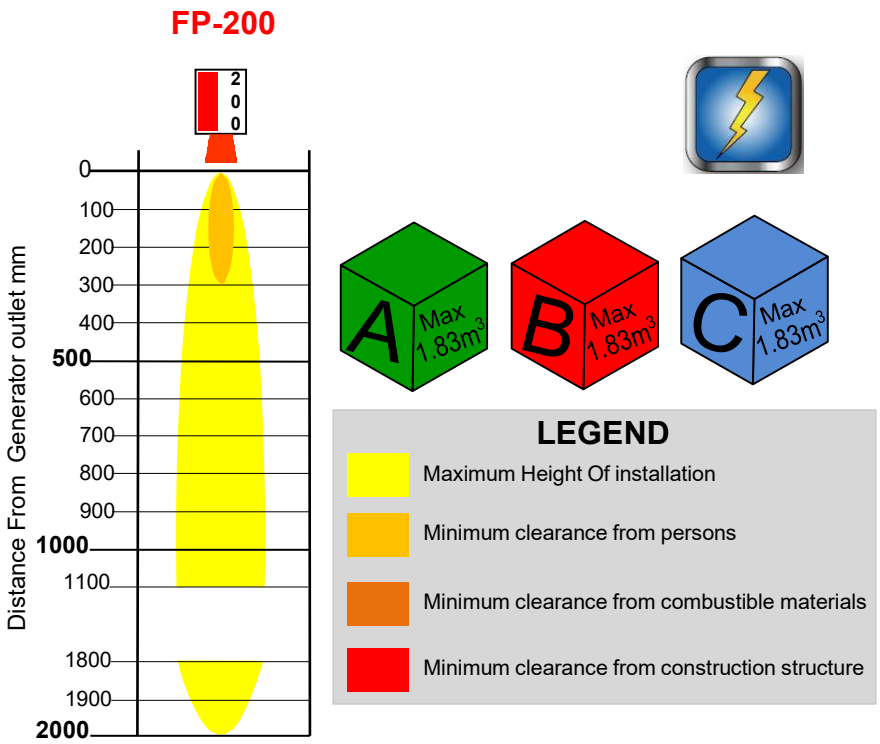
Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	100 g				
Generators gross weight	**Weight**		**Tolerance**		
	1370/1540 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**		**Diameter**		
	155/157 mm		84 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 2.65 m²		Max throw: 1.82 m
Maximum height of installation	1 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	200 mm		0 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		**FirePro.**

FirePro. Condensed Aerosol generators: FP-200S/T



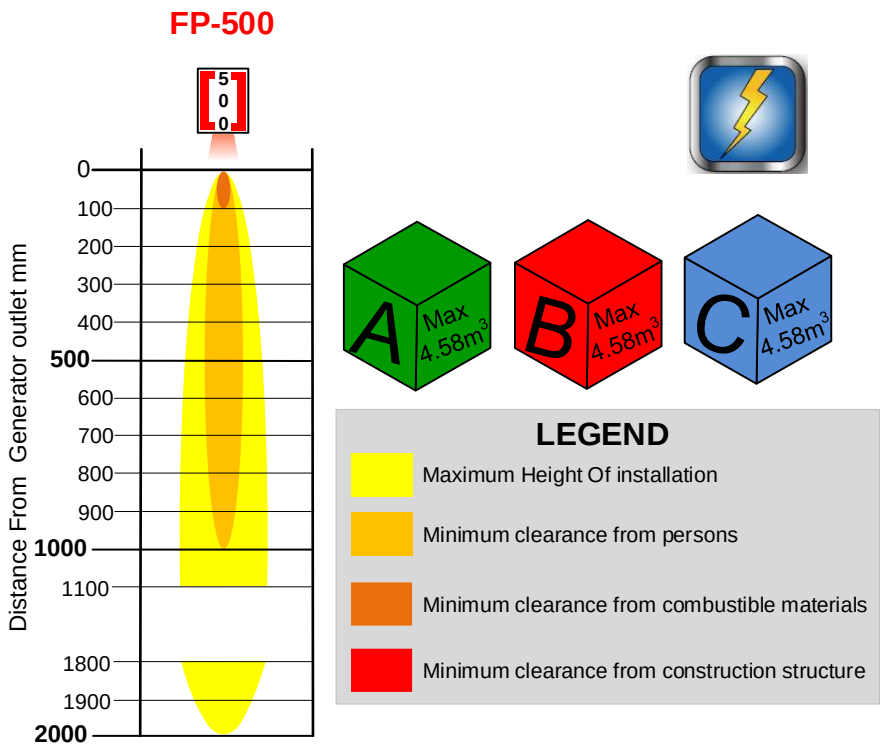
Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	200 g				
Generators gross weight	**Weight**		**Tolerance**		
	1840/2010 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**		**Diameter**		
	185/187 mm		84 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 5.29 m²		Max throw: 2.57 m
Maximum height of installation	2 m				
Minimum clearance (mm)	**From persons**		**From combustible material**		**From Generator's Casing**
	300 mm		0 mm		6.4 mm
Environmental parameters	**ODP[1]**		**GWP[2]**		**ALT[3]**
	Zero		Zero		Negligible[4]
Technical Parameters	**Electrical conductivity**		**Corrosion**		**Oxygen depletion After discharge**
	Nil up to 75KV		Negligible[4]		Negligible[4]

Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-500S/T



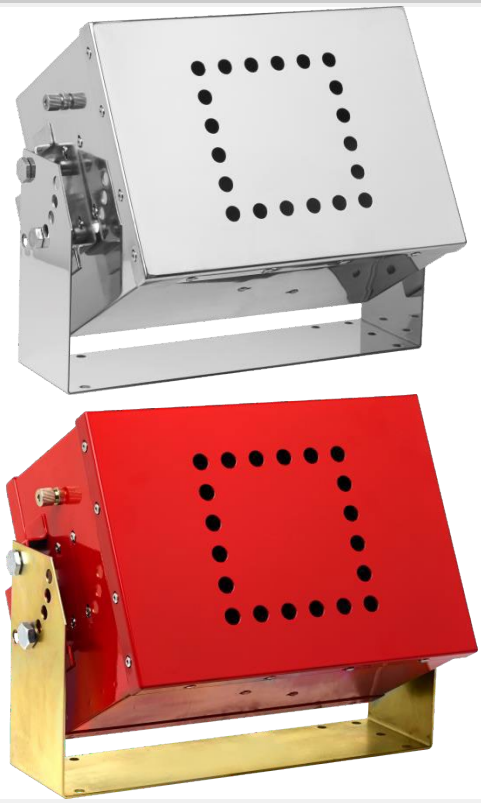
Technical Data

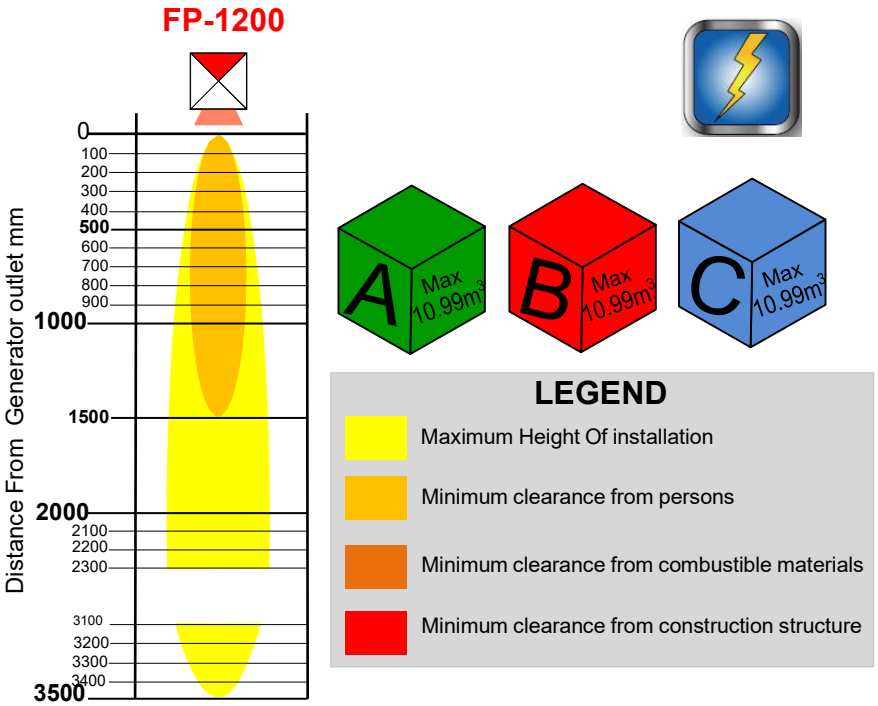
Mass of FPC (Aerosol Generating Solid Compound)	500 g				
Generators gross weight	**Weight**		**Tolerance**		
	3340/3440 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC, 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	5 seconds		10 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**		**Diameter**		
	295/297 mm		84 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 5.29 m^2		
Maximum height of installation	2 m				
Minimum clearance (mm)	**From persons**	**From combustible material**	**From Generator's Casing**		
	1000 mm	100 mm	6.4 mm		
Environmental parameters	**ODP[1]**	**GWP[2]**	**ALT[3]**		
	Zero	Zero	Negligible[4]		
Technical Parameters	**Electrical conductivity**	**Corrosion**	**Oxygen depletion After discharge**		
	Nil up to 75KV	Negligible[4]	Negligible[4]		

Note				
	1	ODP: Ozone Depletion Potential	3	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	4	Within the parameters for use

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-1200/S/T/TS





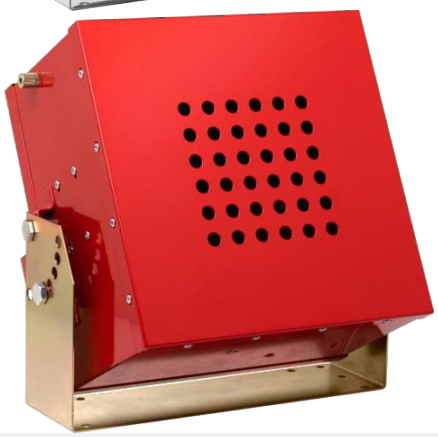
Technical Data

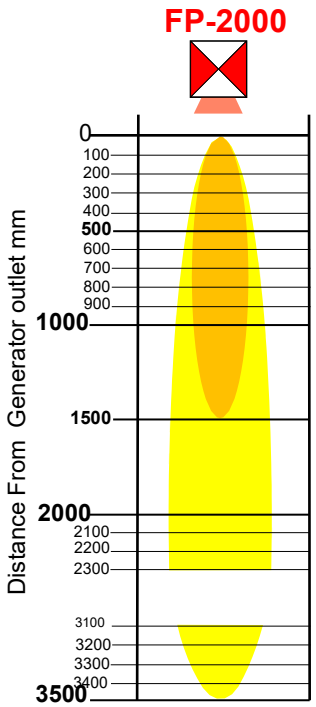
Mass of FPC (Aerosol Generating Solid Compound)	1200 g				
Generators gross weight	**Weight**		**Tolerance**		
	10900 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	15 seconds		20 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**	**Width**	**Length**		
	167 mm	216 mm	300 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 32 m^2		
Maximum height of installation	3.5 m				
Minimum clearance (mm)	**From persons**	**From combustible material**	**From Generator's Casing**		
	1500 mm	0 mm	6.4 mm		
Environmental parameters	**ODP[1]**	**GWP[2]**	**ALT[3]**		
	Zero	Zero	Negligible[4]		
Technical Parameters	**Electrical conductivity**	**Corrosion**	**Oxygen depletion After discharge**		
	Nil up to 75KV	Negligible[4]	Negligible[4]		

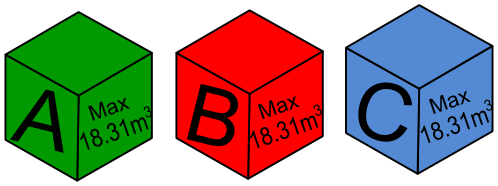
Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		**FirePro**

FirePro. Condensed Aerosol generators: FP-2000/S/T/TS







LEGEND

- Maximum Height Of installation
- Minimum clearance from persons
- Minimum clearance from combustible materials
- Minimum clearance from construction structure

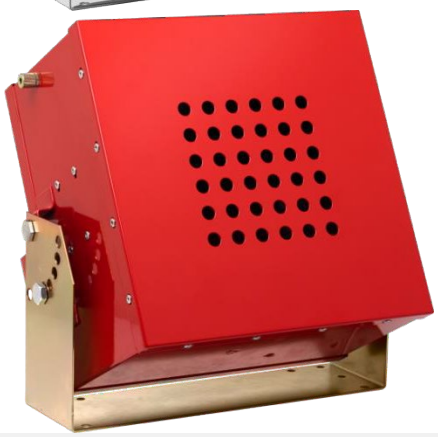
Technical Data

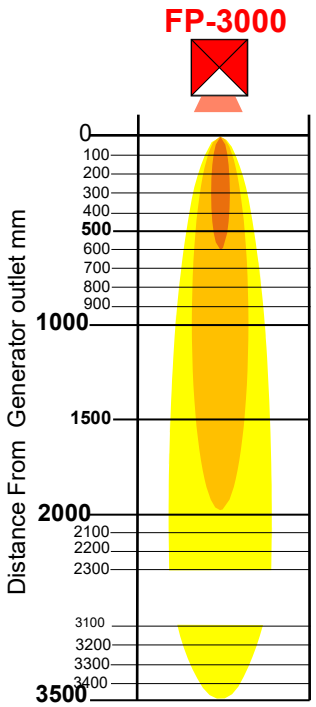
Mass of FPC (Aerosol Generating Solid Compound)	2000 g				
Generators gross weight	**Weight**		**Tolerance**		
	15500 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	15 seconds		20 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**	**Width**	**Length**		
	185 mm	300 mm	300 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 32.03 m²		
Maximum height of installation	3.5 m				
Minimum clearance (mm)	**From persons**	**From combustible material**	**From Generator's Casing**		
	1500 mm	0 mm	6.4 mm		
Environmental parameters	**ODP[1]**	**GWP[2]**	**ALT[3]**		
	Zero	Zero	Negligible[4]		
Technical Parameters	**Electrical conductivity**	**Corrosion**	**Oxygen depletion After discharge**		
	Nil up to 75KV	Negligible[4]	Negligible[4]		

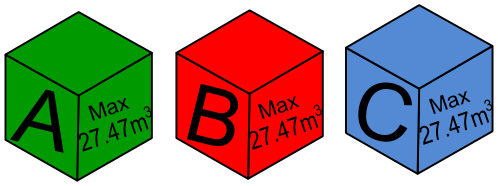
Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-3000/S/T/TS







LEGEND

- Maximum Height Of installation
- Minimum clearance from persons
- Minimum clearance from combustible materials
- Minimum clearance from construction structure

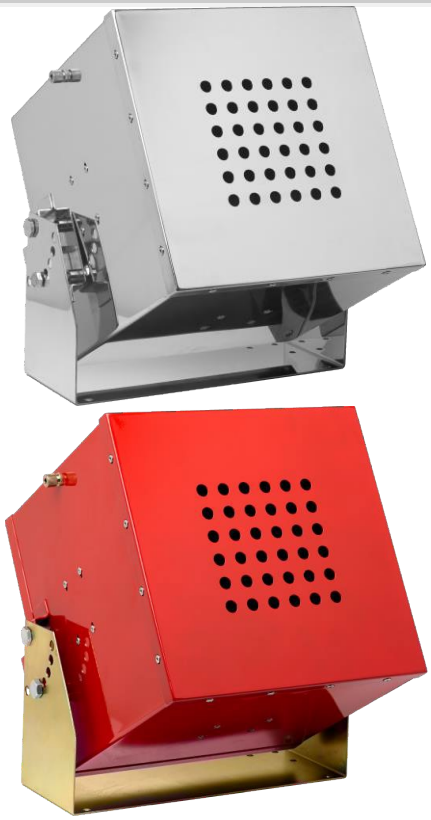
Technical Data

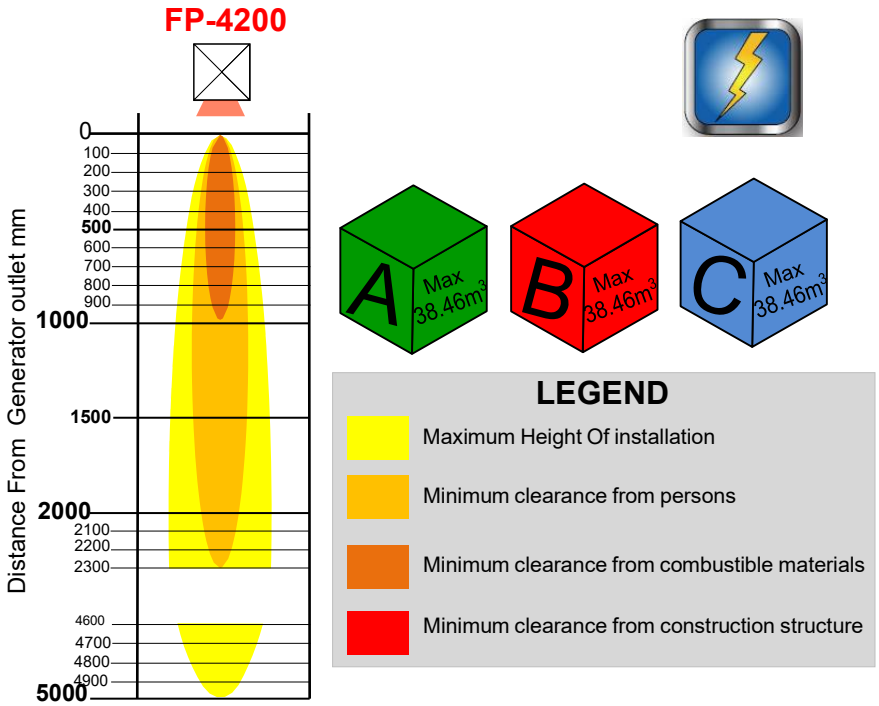
Mass of FPC (Aerosol Generating Solid Compound)	3000 g				
Generators gross weight	**Weight**		**Tolerance**		
	16300 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	15 seconds		20 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**	**Width**	**Length**		
	185 mm	300 mm	300 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 32.03 m²		
Maximum height of installation	3.5 m				
Minimum clearance (mm)	**From persons**	**From combustible material**	**From Generator's Casing**		
	2000 mm	600 mm	6.4 mm		
Environmental parameters	**ODP[1]**	**GWP[2]**	**ALT[3]**		
	Zero	Zero	Negligible[4]		
Technical Parameters	**Electrical conductivity**	**Corrosion**	**Oxygen depletion After discharge**		
	Nil up to 75KV	Negligible[4]	Negligible[4]		

Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro. Condensed Aerosol generators: FP-4200/S/T/TS





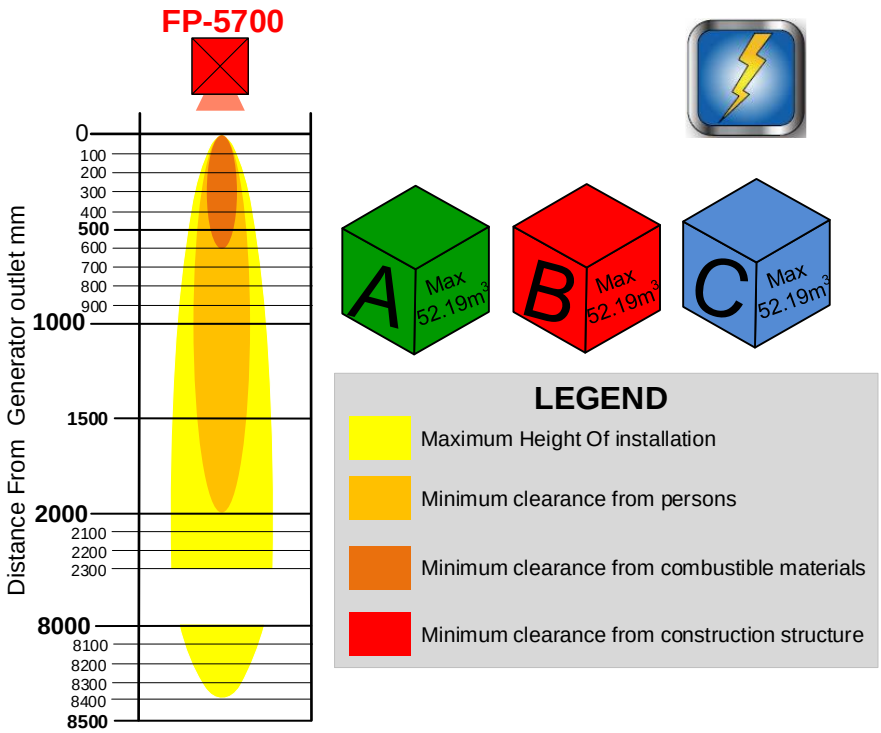
Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	4200 g				
Generators gross weight	**Weight**		**Tolerance**		
	23600 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 V DC , 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	15 seconds		20 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**	**Width**	**Length**		
	300 mm	300 mm	300 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 32 m²		
Maximum height of installation	5 m				
Minimum clearance (mm)	**From persons**	**From combustible material**	**From Generator's Casing**		
	2300 mm	990 mm	6.4 mm		
Environmental parameters	**ODP[1]**	**GWP[2]**	**ALT[3]**		
	Zero	Zero	Negligible[4]		
Technical Parameters	**Electrical conductivity**	**Corrosion**	**Oxygen depletion After discharge**		
	Nil up to 75KV	Negligible[4]	Negligible[4]		

Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	Master dealers / Distributor	Trade Mark
FirePro Systems Ltd.		FirePro.

FirePro® Condensed Aerosol generators: FP-5700/S/T/TS



Technical Data

Mass of FPC (Aerosol Generating Solid Compound)	5700 g				
Generators gross weight	**Weight**		**Tolerance**		
	26400 g		± 5%		
Activation mode/s	**Electrically**				
Value of activation	1.5 VDC, 0.8 A				
FPC activation device	Heating elements with 1.6-3.6 Ω Resistance				
Activation line supervision current (Max)	5 mA				
Aerosol discharge time	**Min.**		**Max**		
	15 seconds		20 seconds		
Number of discharge outlet	1				
Generator dimension	**Height**	**Width**	**Length**		
	300 mm	300 mm	300 mm		
Self-activation temperature of FPC	300° C				
Classes of Fire (NFPA 2010)	**A**	**B**	**C**	**D**	**K**
	√	√	√	**NO**	**NO**
Generator Coverage Constraints	Min ht: 0.45 m		Max area: 32 m²		
Maximum height of installation	8.4 m				
Minimum clearance (mm)	**From persons**	**From combustible material**	**From Generator's Casing**		
	2000 mm	600 mm	6.4 mm		
Environmental parameters	**ODP[1]**	**GWP[2]**	**ALT[3]**		
	Zero	Zero	Negligible[4]		
Technical Parameters	**Electrical conductivity**	**Corrosion**	**Oxygen depletion After discharge**		
	Nil up to 75KV	Negligible[4]	Negligible[4]		

Note				
	1	ODP: Ozone Depletion Potential	**3**	ALT: Atmospheric Life Time
	2	GWP: Global Warming Potential	**4**	Within the parameters for use

Manufactured by	*Master dealers / Distributor*	*Trade Mark*
FirePro Systems Ltd.		FirePro.

FirePro

CONDENSED AEROSOL FIRE EXTINGUISHING SYSTEMS

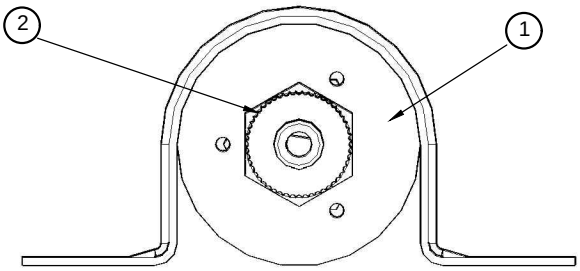
APPENDIX "D"

INSTALLATION DRAWINGS

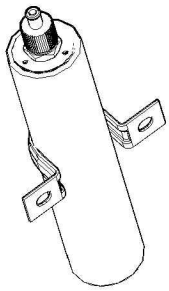
MANUAL NO. EX 6960

VERSION 1.0, REV. 8

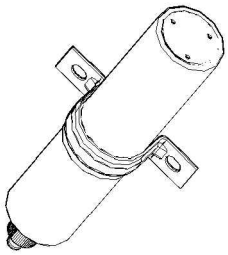
March 2022



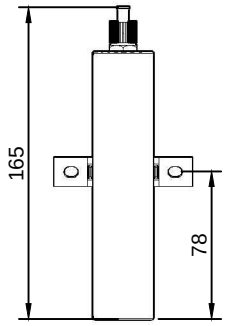
Top View



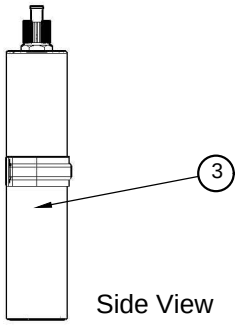
Iso View (Top)



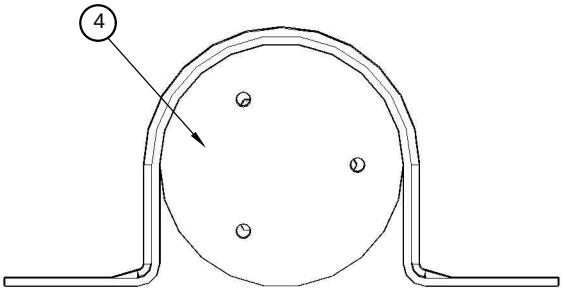
Iso View(Bottom)



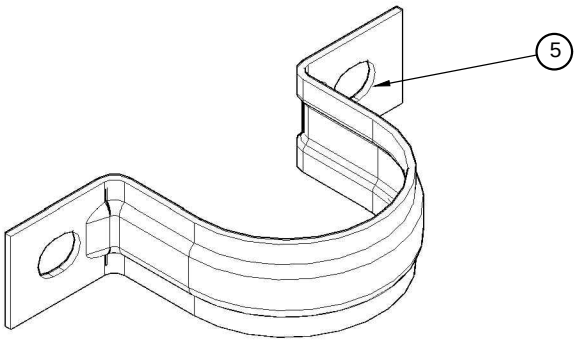
Front View



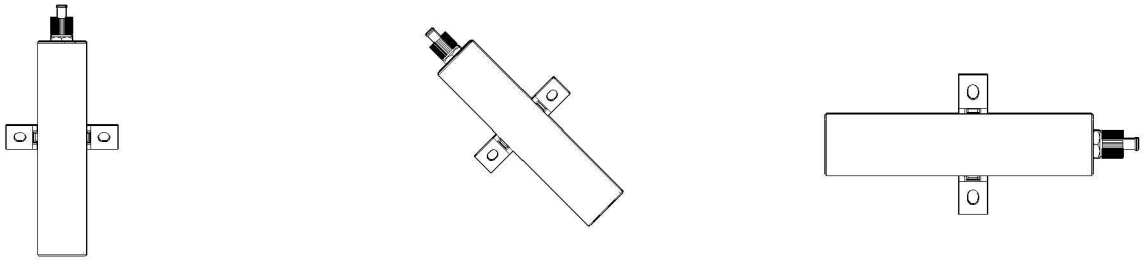
Side View



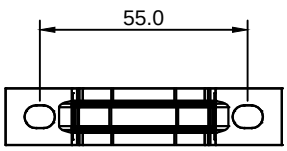
Bottom View



Isometric View of Bracket



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	C20BR
4	1	BOTTOM OUTLET COVER PLATE	C20BOCS
3	1	HOUSING TUBE	C20HTS
2	1	THERMOCONNECTOR	C1-2-5THC
1	1	TOP OUTLET COVER PLATE	C20TOCS

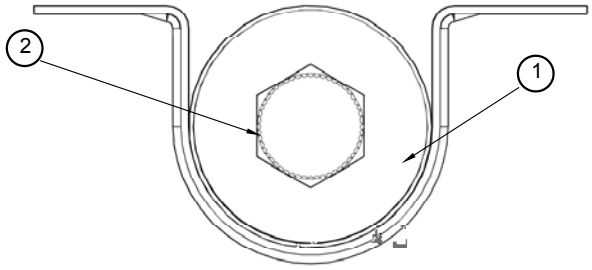
PART LIST

FirePro Systems Ltd

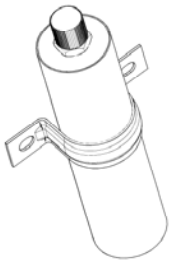
FirePro. Condensed aerosol generator FP-20SE

DRAWING NUMBER: ID-20SE
DATE: 15/04/10

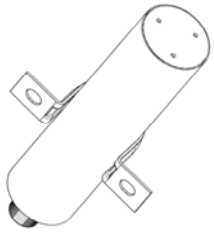
TITLE:
INSTALLATION DRAWING



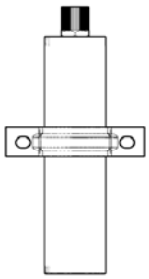
Top View



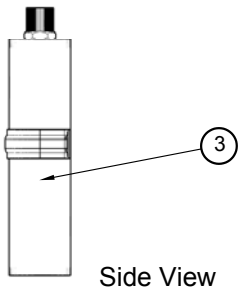
Iso View (Top)



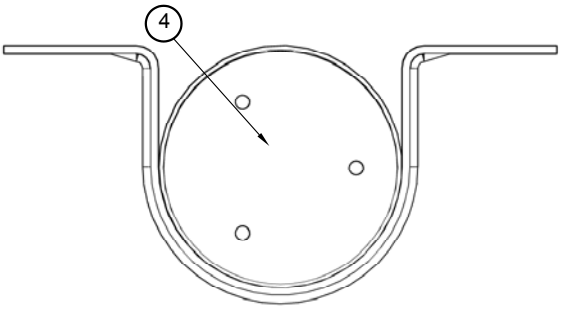
Iso View(Bottom)



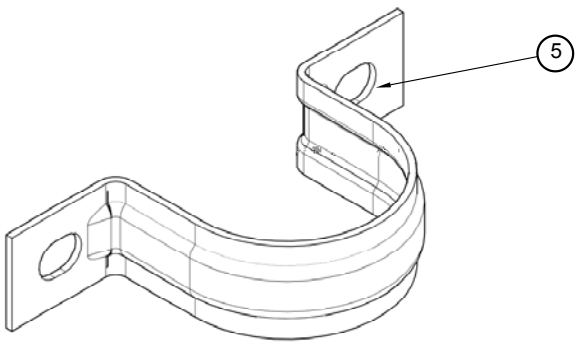
Front View



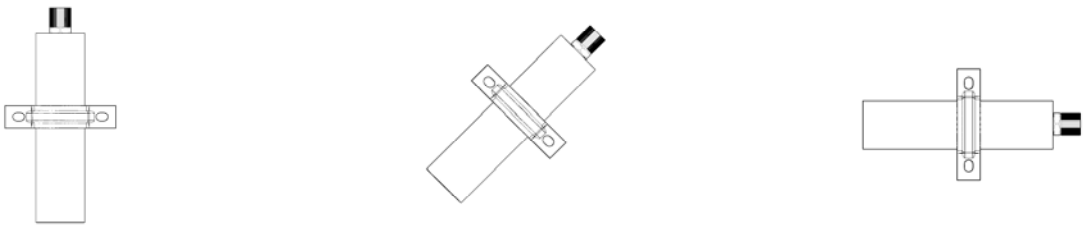
Side View



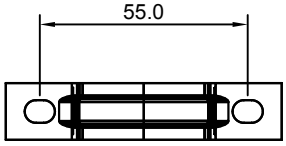
Bottom View



Isometric View of Bracket



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	C20BR
4	1	BOTTOM OUTLET COVER PLATE	C20BOCS
3	1	HOUSING TUBE	C20THT
2	1	BTA BLISTER ASSEMBLY	BTABLASS
1	1	TOP COVER PLATE	C2TTCP

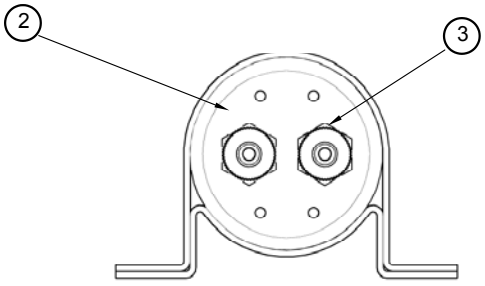
PART LIST

FirePro Systems Ltd

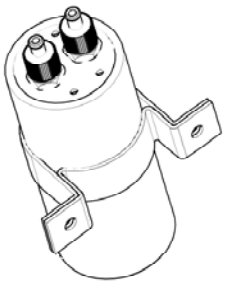
FirePro® Condenced aerosol generator FP-20T

DRAWING NUMBER: ID-20T
DATE: 02/10/14

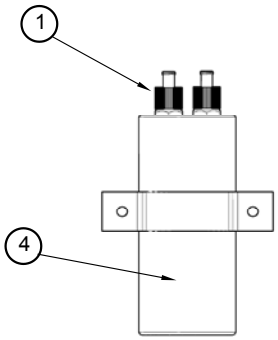
TITLE:
INSTALLATION DRAWING



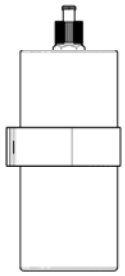
Top View



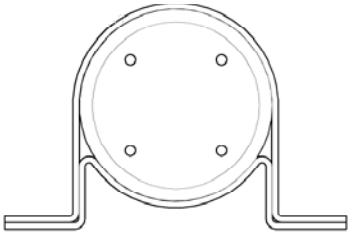
Iso View (Top)



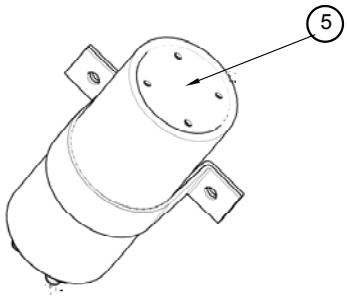
Front View



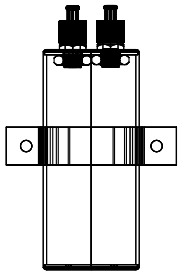
Side View

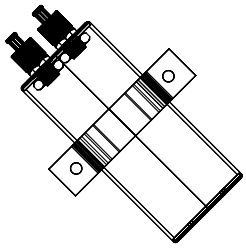


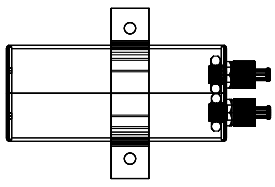
Bottom View



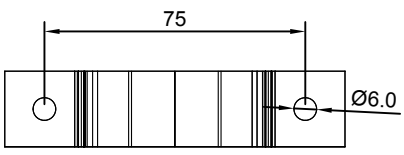
Iso View(Bottom)







Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	BOTTOM OUTLET COVER PLATE	C40BOCPS
4	1	HOUSING TUBE	C40HTS
3	2	THERMOCONECTOR NUT	
2	1	TOP OUTLET COVER PLATE	C40TOCPS
1	2	THERMOCONECTOR	C1-2-5THC

PART LIST

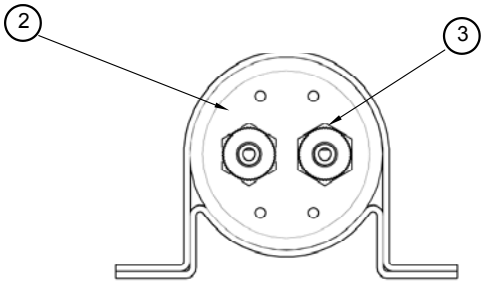
FirePro Systems Ltd

FirePro® Condenced aerosol generator FP-40S

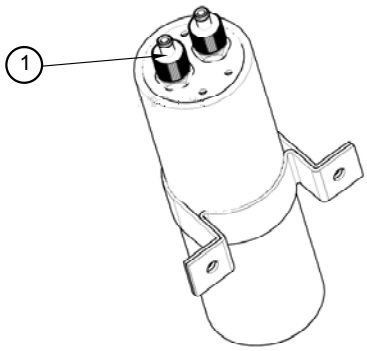
DRAWING NUMBER: ID-40S

DATE: 15/04/10

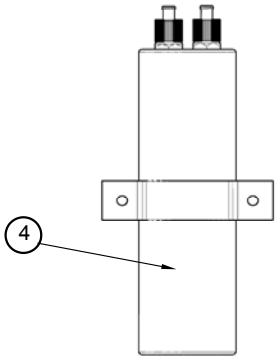
TITLE: INSTALLATION DRAWING



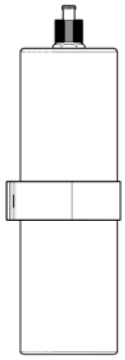
Top View



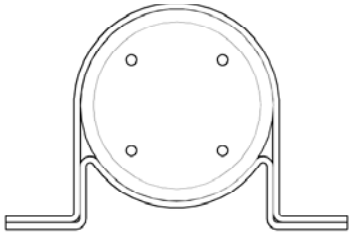
Iso View (Top)



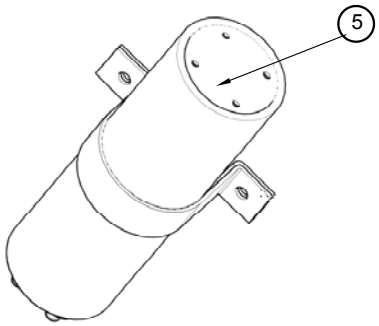
Front View



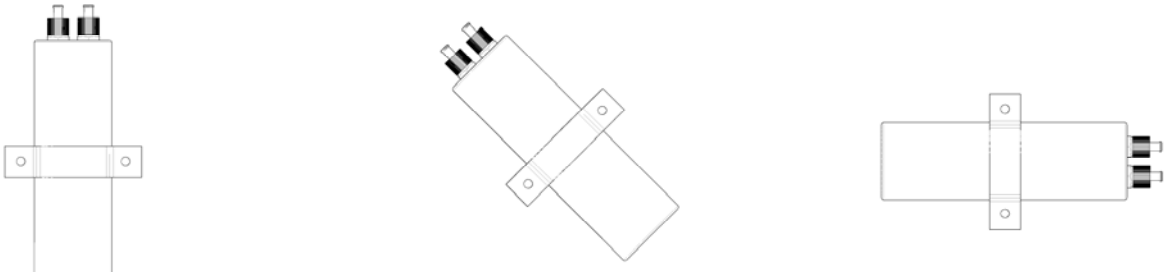
Side View



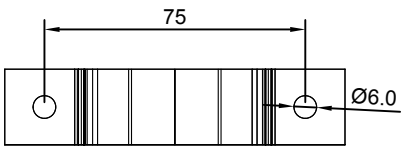
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	BOTTOM OUTLET COVER PLATE	C80BOCPS
4	1	HOUSING TUBE	C80HTS
3	2	THERMOCONECTOR NUT	
2	1	TOP OUTLET COVER PLATE	C80TOCPS
1	2	THERMOCONECTOR	C1-2-5THC

PART LIST

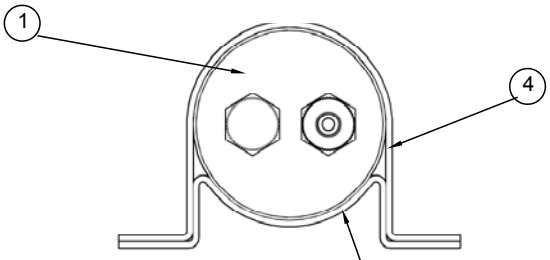
FirePro Systems Ltd

FirePro® Condenced aerosol generator FP-80S

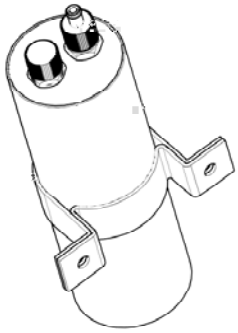
DRAWING NUMBER: ID-80S

DATE: 15/04/10

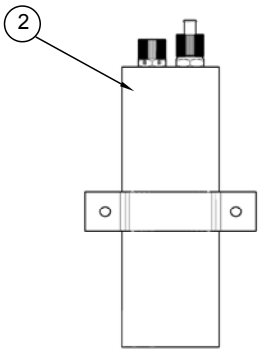
TITLE: INSTALLATION DRAWING



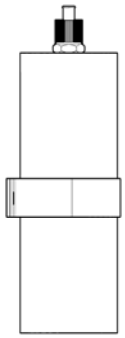
Top View



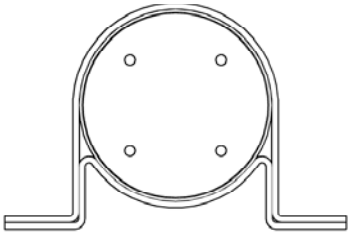
Iso View (Top)



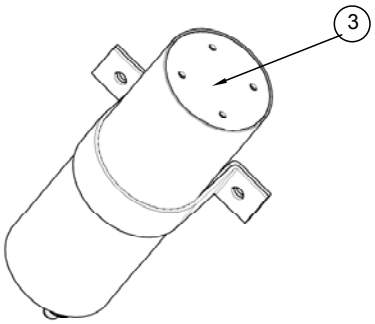
Front View



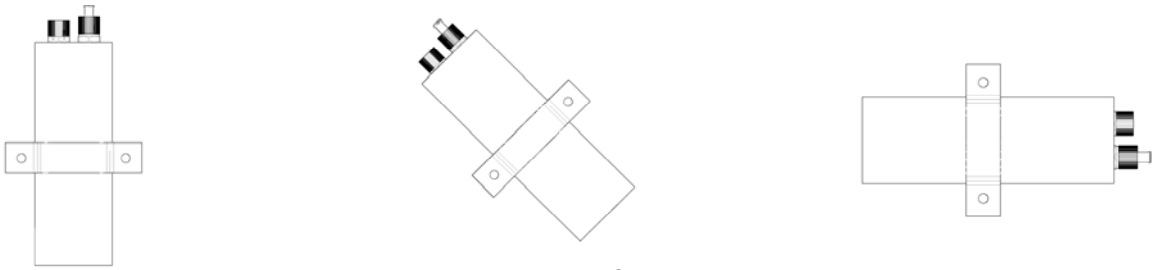
Side View



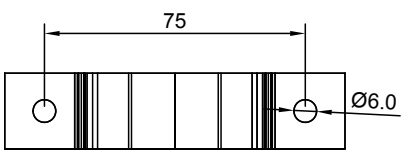
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET PART2	C4080BRS2
4	1	BRACKET PART1	C4080BRS1
3	1	BOTTOM COVER PLATE	C40TBCPS C80TBCPS
2	1	HOUSING TUBE	C40THT C80THT
1	1	TOP COVER ASSEMBLY	C48TTCASS

PART LIST

FirePro Systems Ltd

FirePro®

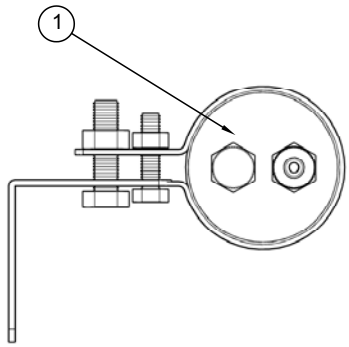
Condenced aerosol generator

FP-40T
FP-80T

DRAWING NUMBER: ID-40T,80T

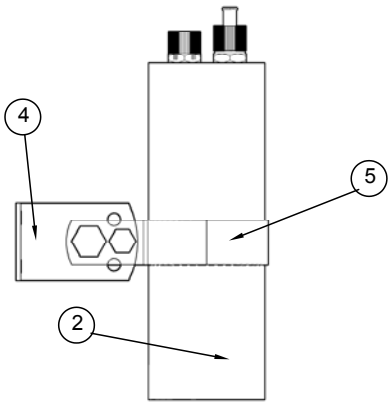
DATE: 02/10/14

TITLE:
INSTALLATION DRAWING(Option 1)

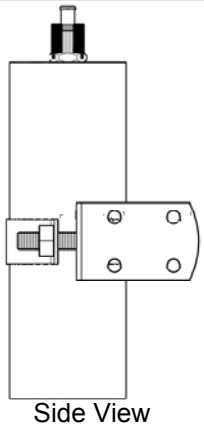


Top View

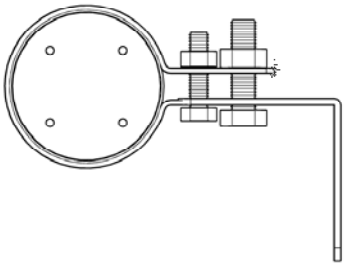
Iso View (Top)



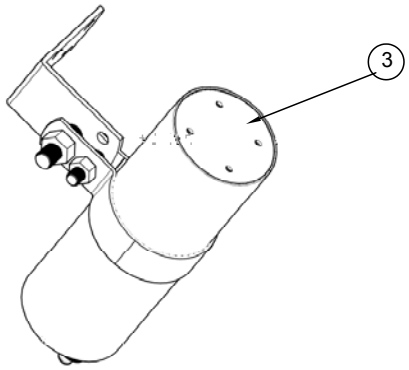
Front View



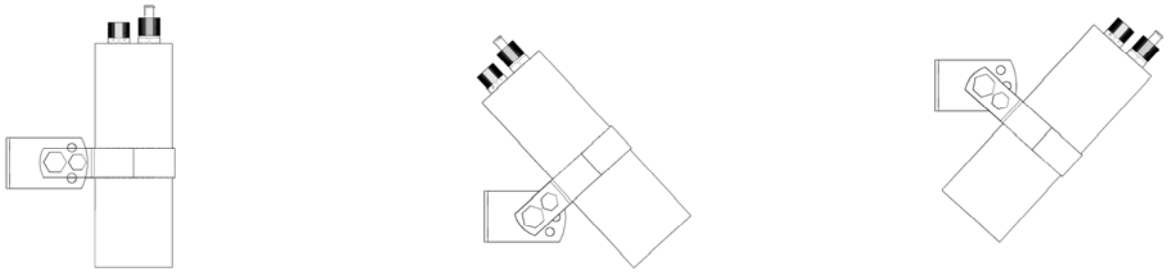
Side View



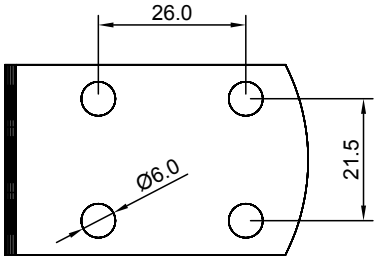
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	ROUND BRACKET "A"	C4-8RBR
4	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
3	1	BOTTOM COVER PLATE	C40TBCPS C80TBCPS
2	1	HOUSING TUBE	C40THT C80THT
1	1	TOP COVER ASSEMBLY	C48TTCASS

PART LIST

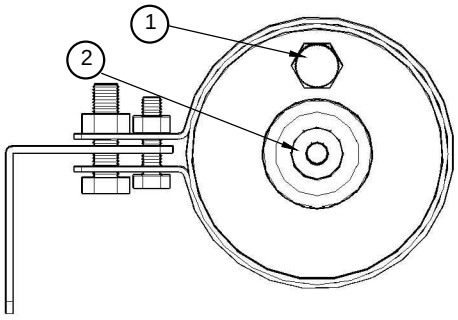
FirePro Systems Ltd FP-40T FP-80T

FirePro® Condenced aerosol generator

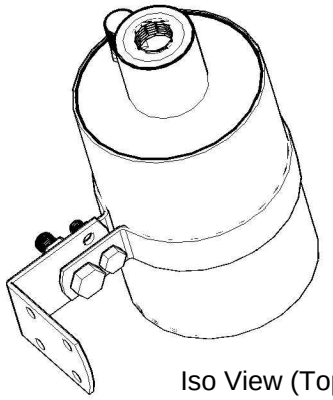
DRAWING NUMBER: ID-40T,80T

DATE: 02/10/14

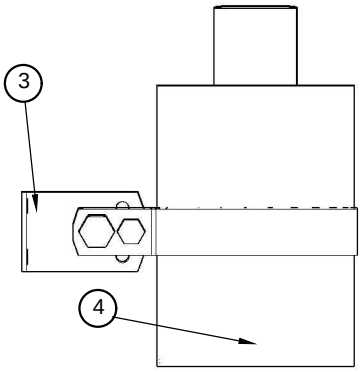
TITLE: INSTALLATION DRAWING(Option 2)



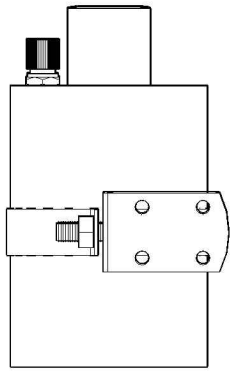
Top View



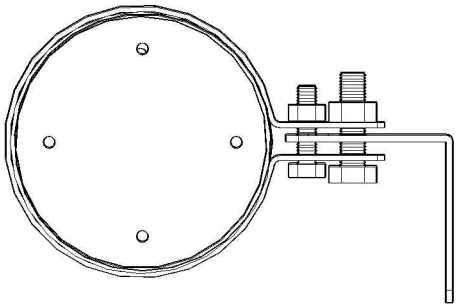
Iso View (Top)



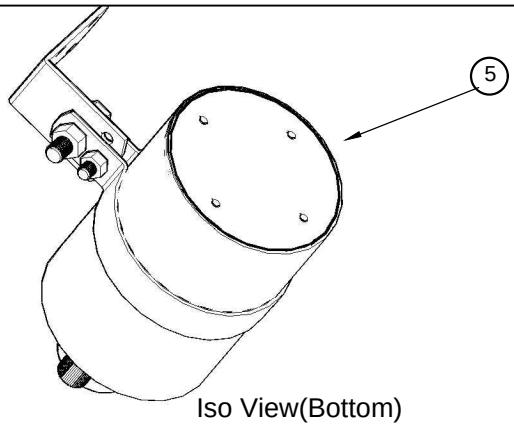
Front View



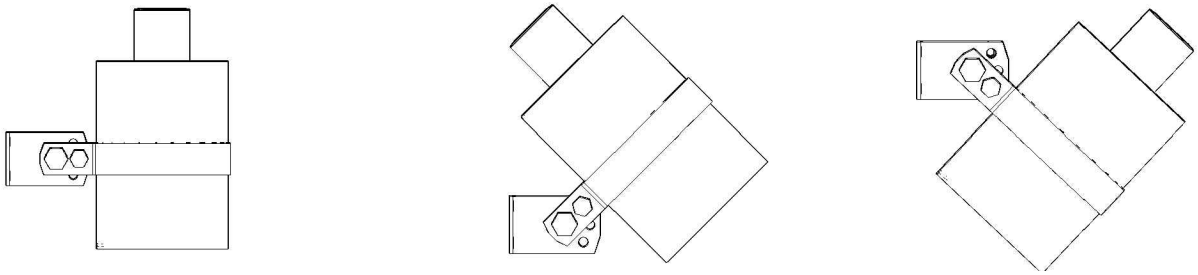
Side View



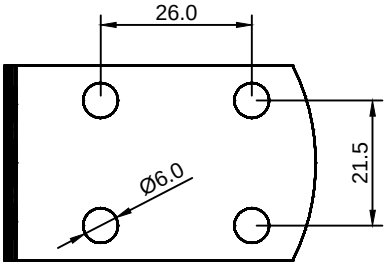
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

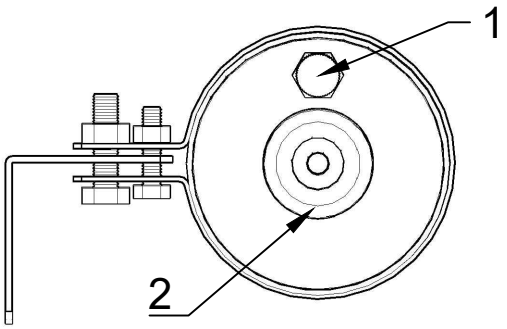
Position	Quantity	Denomination	Type / DWG. Number
5	1	HOUSING EXIT COVER	C1HEC
4	1	HOUSING TUBE	C1HT
3	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
2	1	IGNITER	C1-2-5IGN
1	1	BTA BLISTER PART 2	BTABLP2

PART LIST

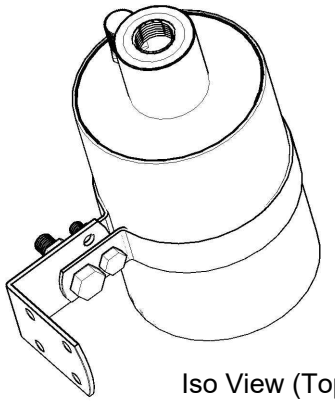
FirePro. ***FirePro Systems Ltd***
Condensed aerosol generator FP-100S

DRAWING NUMBER: ID-100S
DATE: 05/01/16

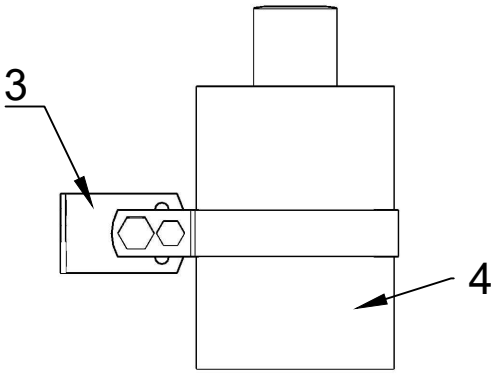
TITLE:
INSTALLATION DRAWING



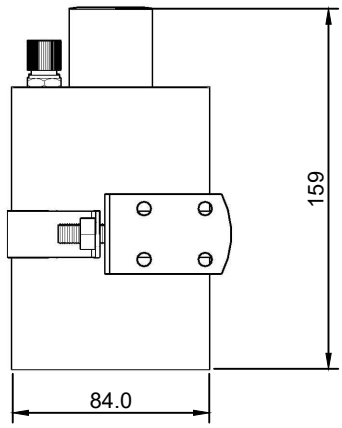
Top View



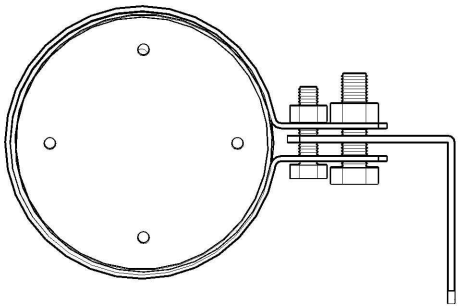
Iso View (Top)



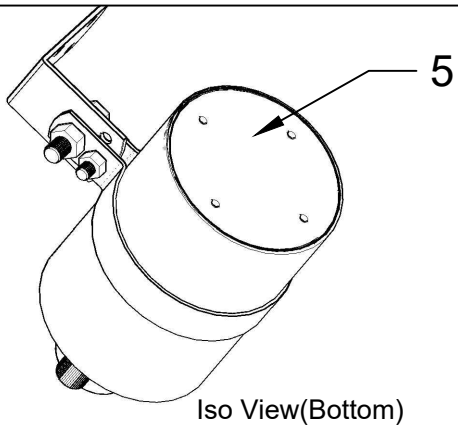
Front View



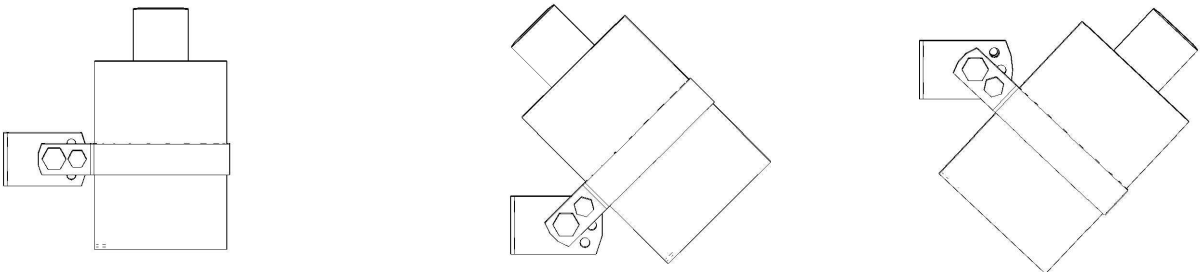
Side View



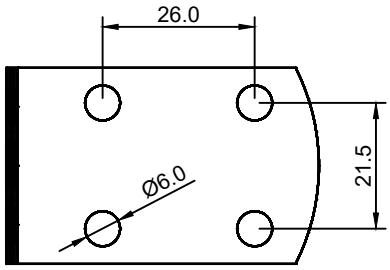
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

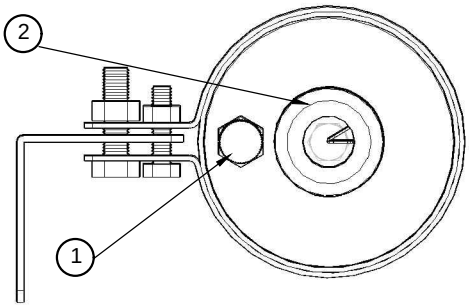
Position	Quantity	Denomination	Type / DWG. Number
5	1	HOUSING EXIT COVER	C1HECT
4	1	HOUSING TUBE	C1HTT
3	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
2	1	IGNITER	C1-2-5IGNT
1	1	BTA BLISTER PART 2	BTABLP2

PART LIST

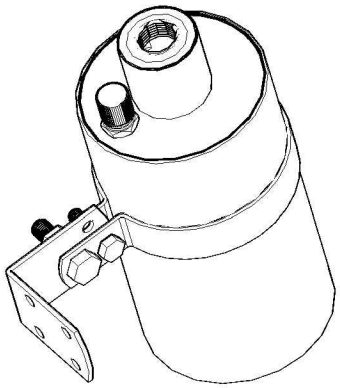
FirePro. ***FirePro Systems Ltd***
Condensed aerosol generator FP-100T

DRAWING NUMBER: ID-100T
DATE: 10/08/2020

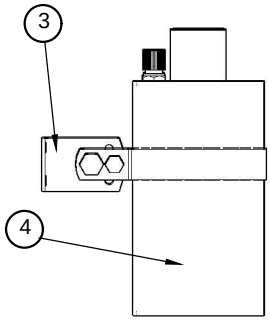
TITLE:
INSTALLATION DRAWING



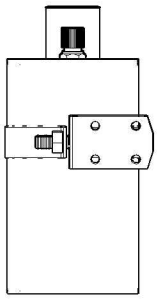
Top View



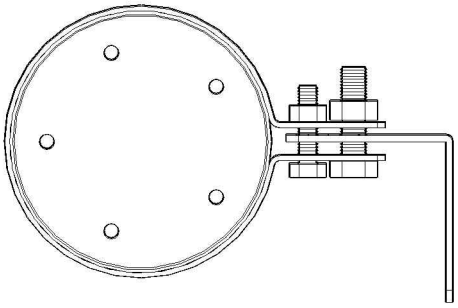
Iso View (Top)



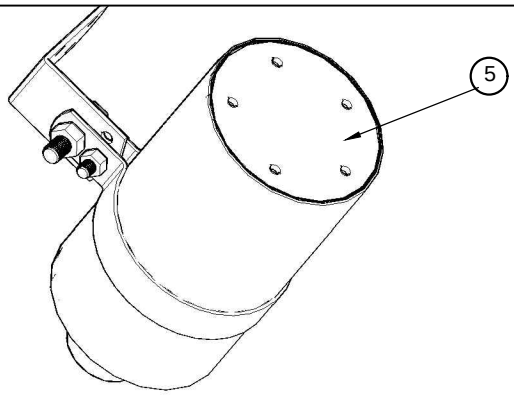
Front View



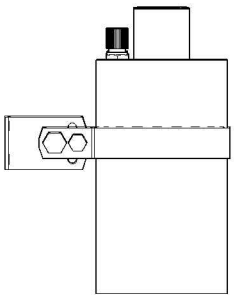
Side View

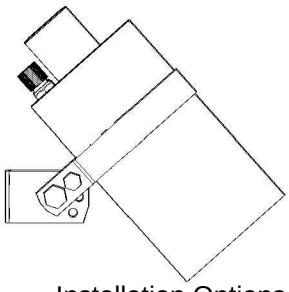


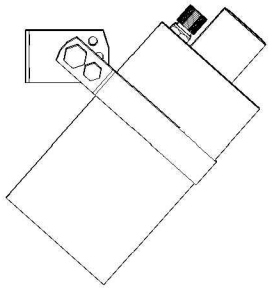
Bottom View



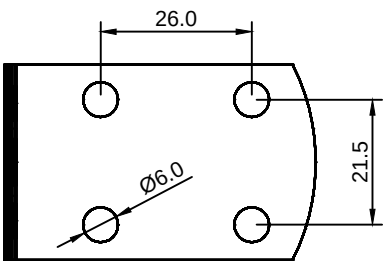
Iso View(Bottom)







Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	HOUSING EXIT COVER	C2HEC
4	1	HOUSING TUBE	C2HT
3	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
2	1	IGNITER	C1-2-5IGN
1	1	BTA BLISTER PART 2	BTABLP2

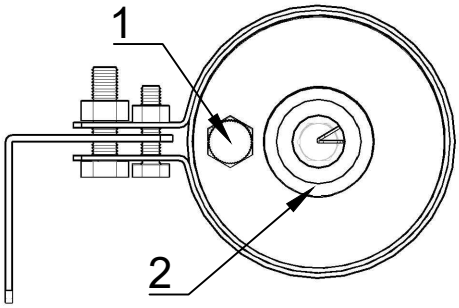
PART LIST

FirePro. ***FirePro Systems Ltd***

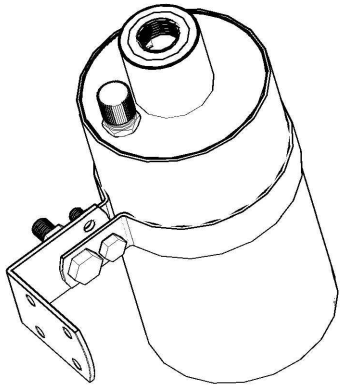
Condensed aerosol generator FP-200S

DRAWING NUMBER: ID-200S
DATE: 05/01/16

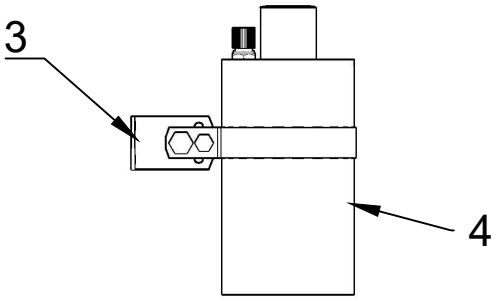
TITLE:
INSTALLATION DRAWING



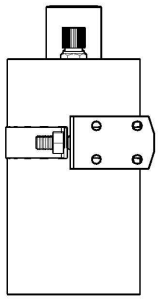
Top View



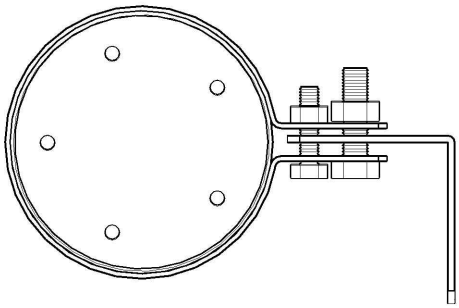
Iso View (Top)



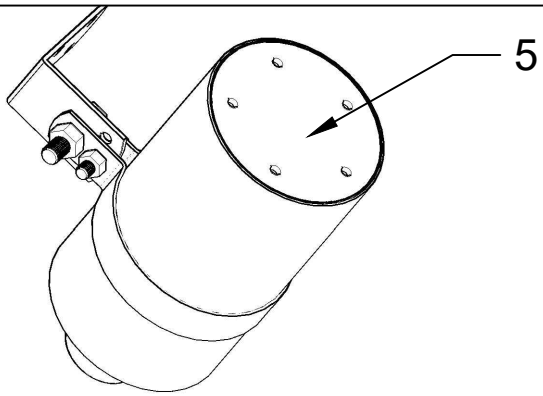
Front View



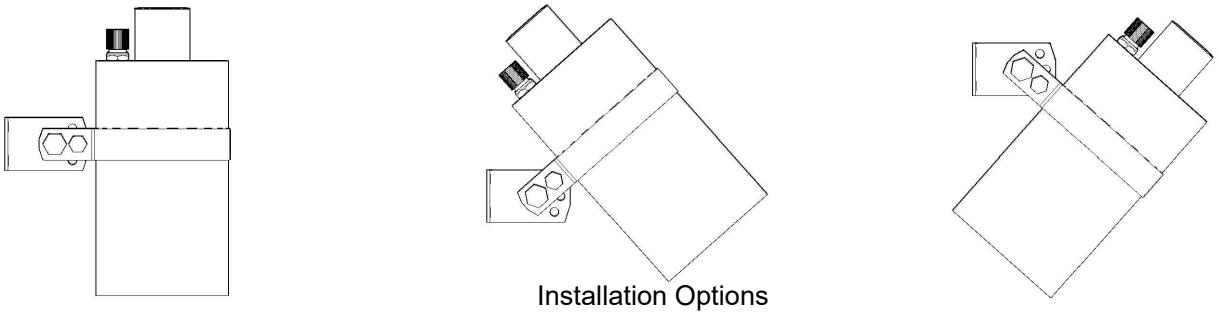
Side View



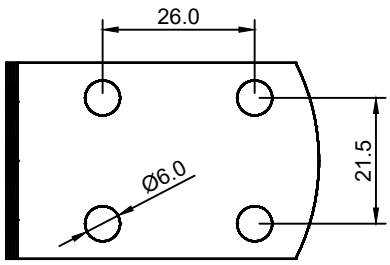
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	HOUSING EXIT COVER	C2HECT
4	1	HOUSING TUBE	C2HTT
3	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
2	1	IGNITER	C1-2-5IGNT
1	1	BTA BLISTER PART 2	BTABLP2

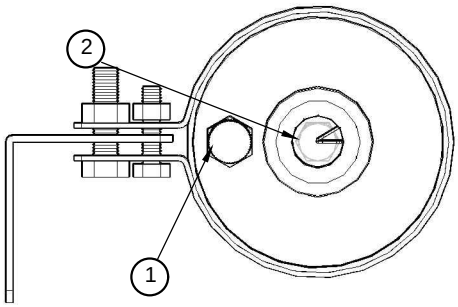
PART LIST

FirePro. ***FirePro Systems Ltd***

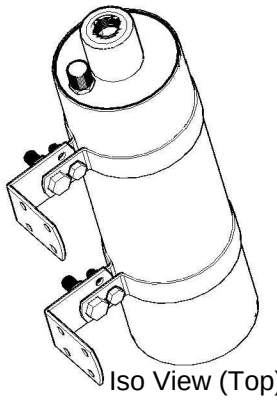
Condensed aerosol generator FP-200T

DRAWING NUMBER: ID-200T
DATE: 10/08/2020

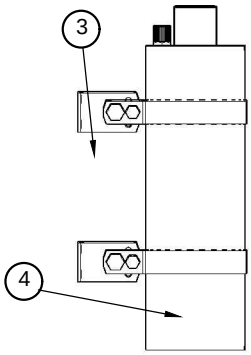
TITLE:
INSTALLATION DRAWING



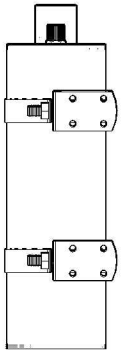
Top View



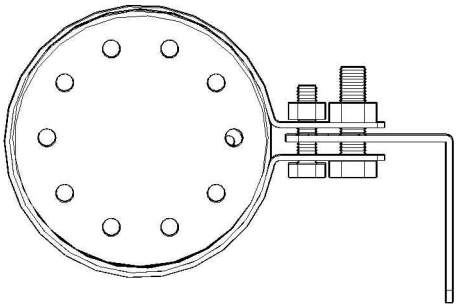
Iso View (Top)



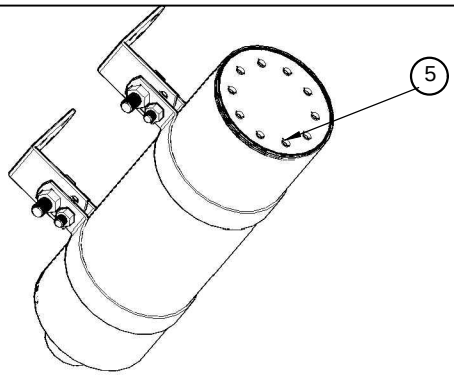
Front View



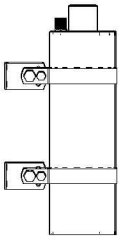
Side View



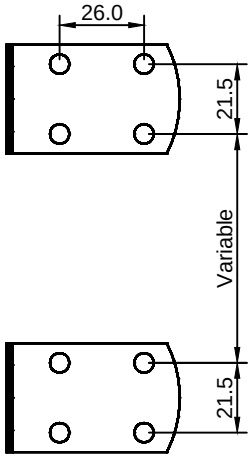
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	HOUSING EXIT COVER	C5HEC
4	1	HOUSING TUBE	C5HT
3	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
2	1	IGNITER	C1-2-5IGN
1	1	BTA BLISTER PART 2	BTABLP2

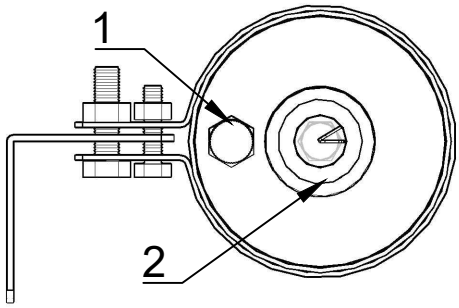
PART LIST

FirePro. ***FirePro Systems Ltd***

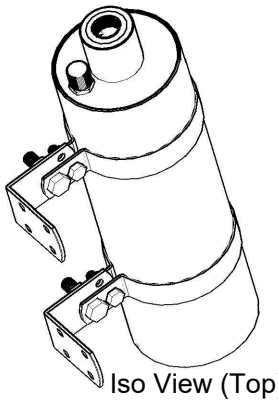
Condensed aerosol generator FP-500S

DRAWING NUMBER: ID-500S
DATE: 05/01/16

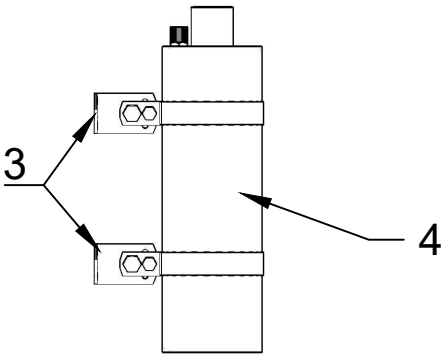
TITLE:
INSTALLATION DRAWING



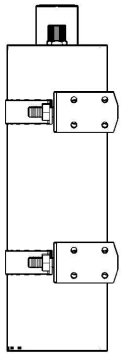
Top View



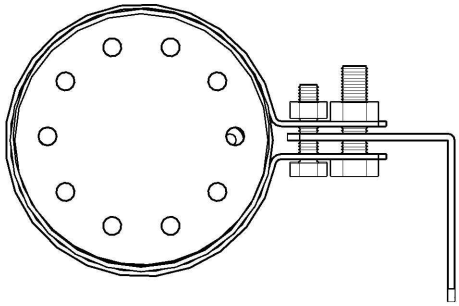
Iso View (Top)



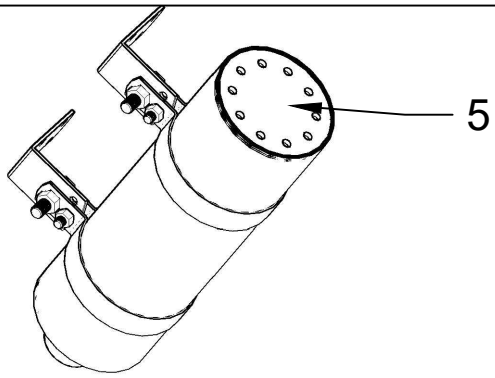
Front View



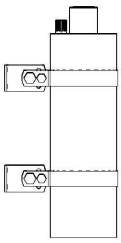
Side View



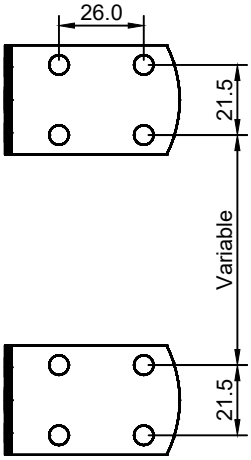
Bottom View



Iso View(Bottom)



Installation Options



Fixing Drills

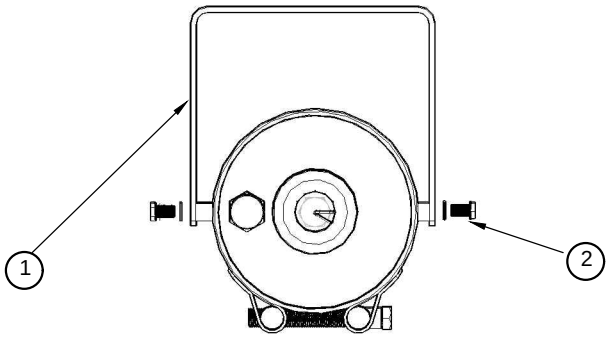
Position	Quantity	Denomination	Type / DWG. Number
5	1	HOUSING EXIT COVER	C5HECT
4	1	HOUSING TUBE	C5HTT
3	1	ANGLE BRACKET SUPPORT	C1-2-5ABS
2	1	IGNITER	C1-2-5IGNT
1	1	BTA BLISTER PART 2	BTABLP2

PART LIST

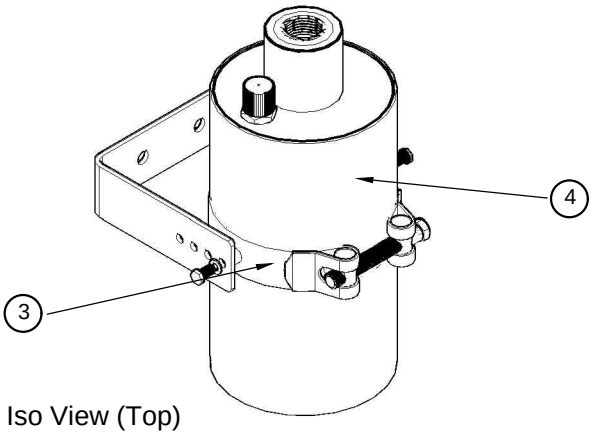
FirePro. ***FirePro Systems Ltd***
Condensed aerosol generator FP-500T

DRAWING NUMBER: ID-500T
DATE: 10/08/2020

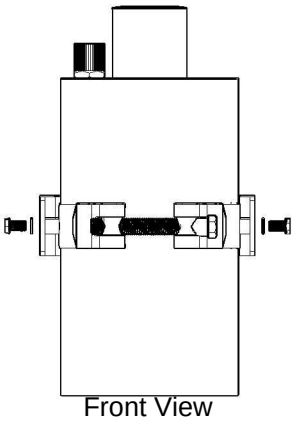
TITLE:
INSTALLATION DRAWING



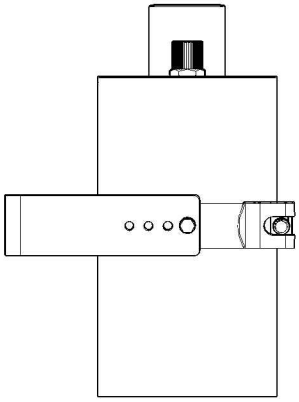
Top View



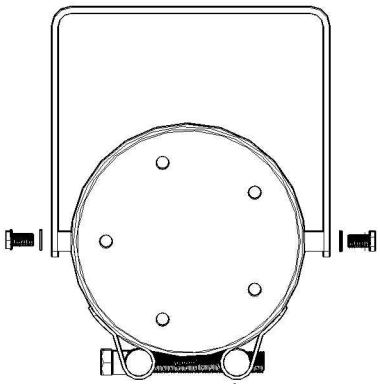
Iso View (Top)



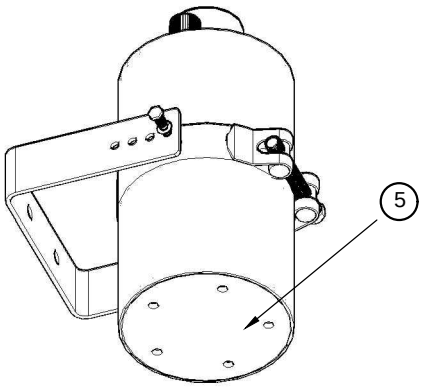
Front View



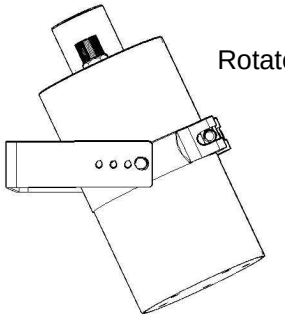
Side View



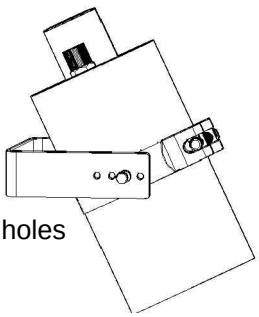
Bottom View



Iso View(Bottom)

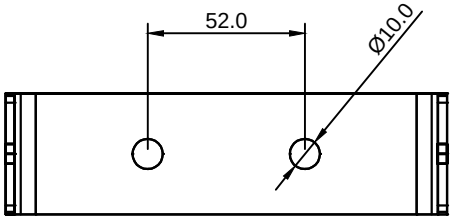


Rotate to desired angle



Fixation to any of 4 bracket holes

Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	AEROSOL OUTLET	
4	1	GENERATOR	
3	1	ROUND BRACKET WITH M8 BOLT	C1-2-5RB
2	1	M5x0.8 BOLT WITH WASHER	C1-2-5BW
1	1	U-BRACKET	C1-2-5U

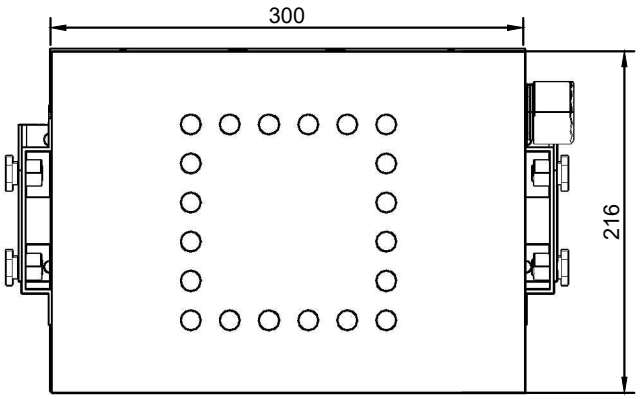
PART LIST

FirePro. ***FirePro Systems Ltd***
Condensed aerosol generator

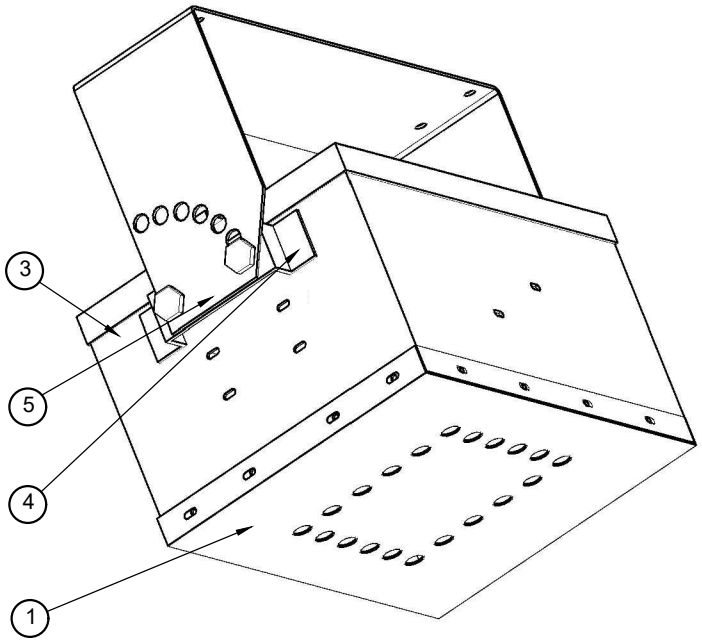
FP-100S
FP-200S
FP-500S

DRAWING NUMBER: ID-SW125
DATE: 22/02/16

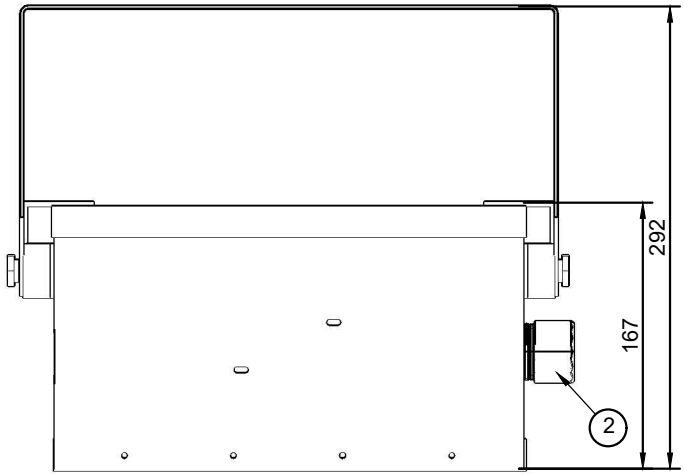
TITLE:
INSTALLATION DRAWING



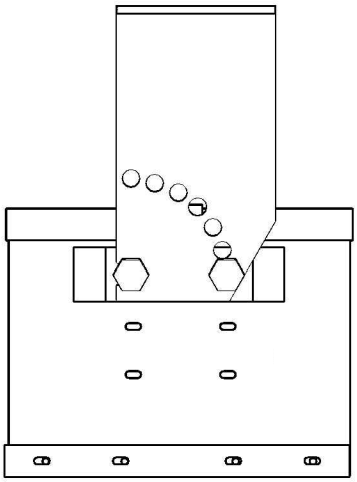
Bottom View



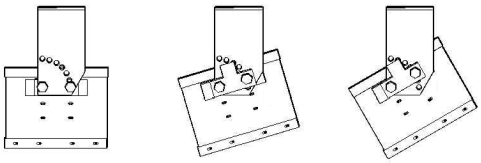
Iso View(Bottom)



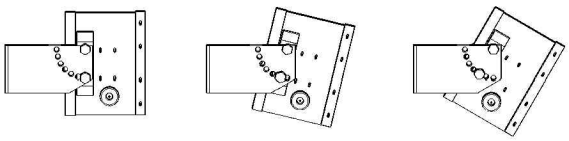
Front View



Side View

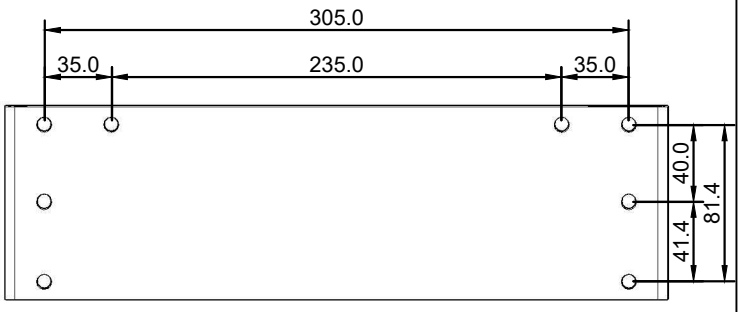


CEILING



WALL

Installation Options



Fixing Drills

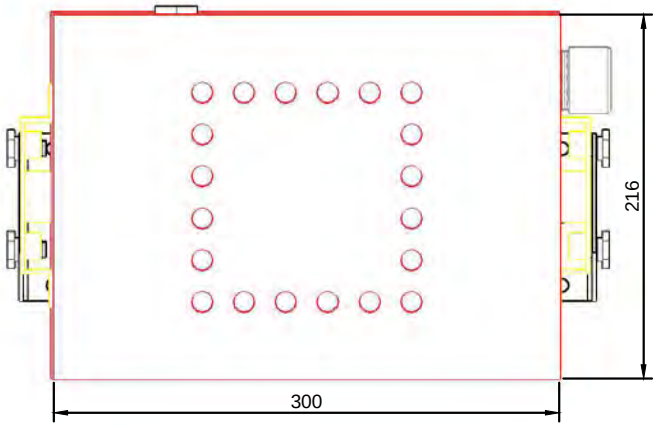
Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	B122030BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	EXTERNAL HOUSING	B12EH
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	EXTERNAL HOUSING TOP COVER	B12EHTC

PART LIST

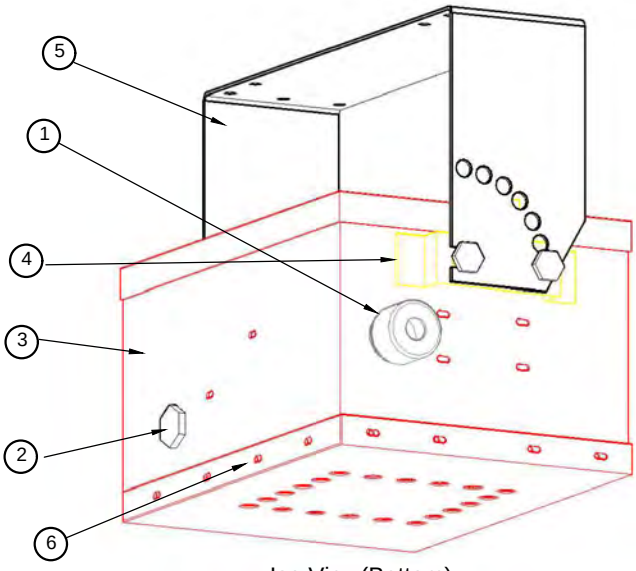
FirePro. ***FirePro Systems Ltd*** FP-1200
Condensed aerosol generator FP-1200S

DRAWING NUMBER: ID-1200/S
DATE: 13/08/2021

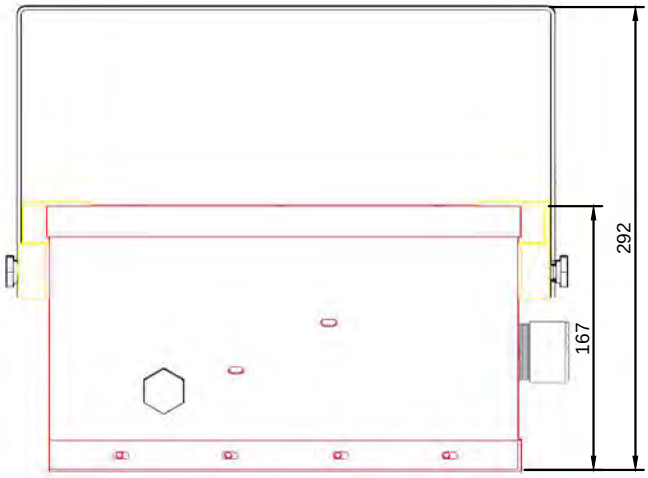
TITLE:
INSTALLATION DRAWING



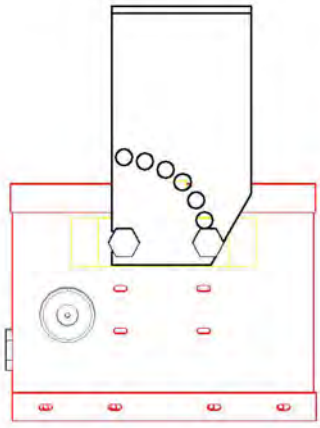
Bottom View



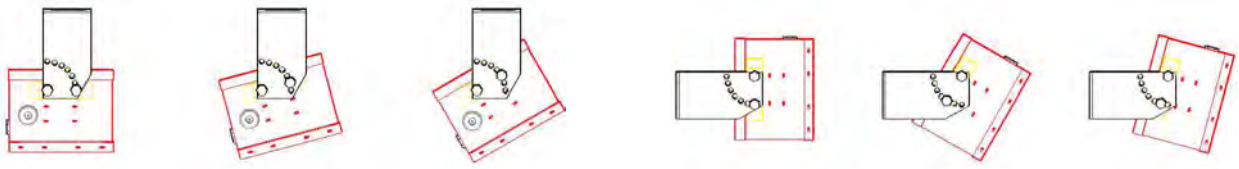
Iso View(Bottom)



Front View



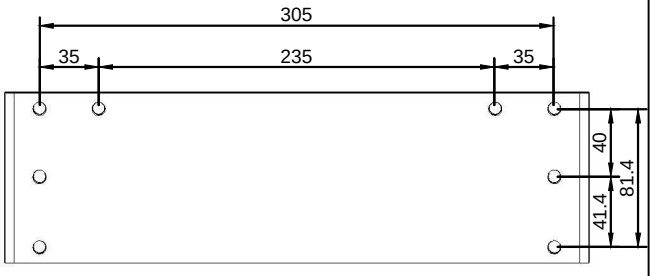
Side View



CEILING

WALL

Installation Options



Fixing Drills

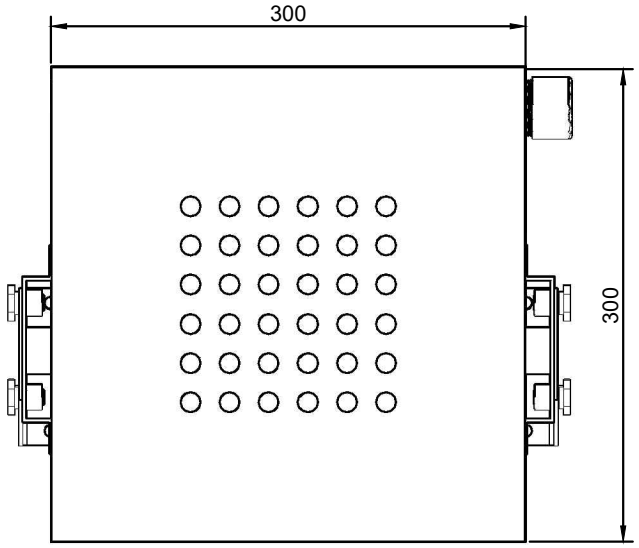
Position	Quantity	Denomination	Type / DWG. Number
6	1	OUTLET	B12EHTC
5	1	BRACKET	B122030BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	GENERATOR	B12TAS
2	1	BTA123 PLUG 1	BTA123P1
1	1	WIRES OUTLET JUNCTION BOX	BWOJB

PART LIST

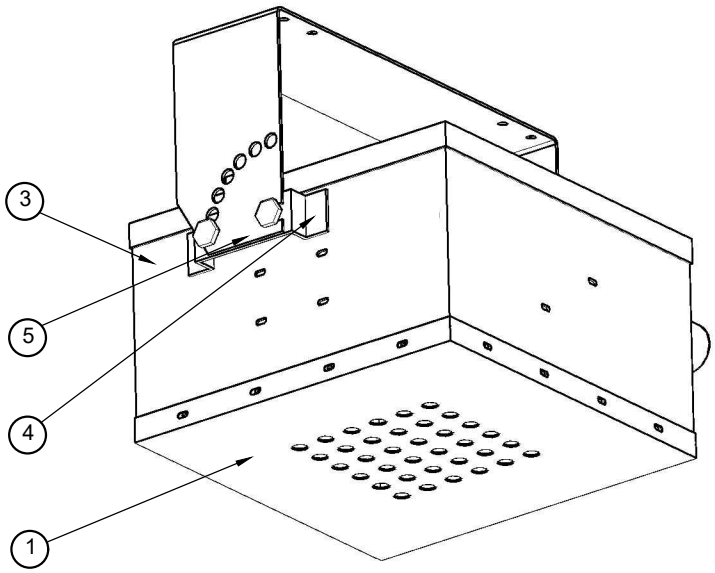
FirePro. ***FirePro Systems Ltd*** FP-1200T
Condensed aerosol generator FP-1200TS

DRAWING NUMBER: ID-1200T/TS
DATE: 05/01/16

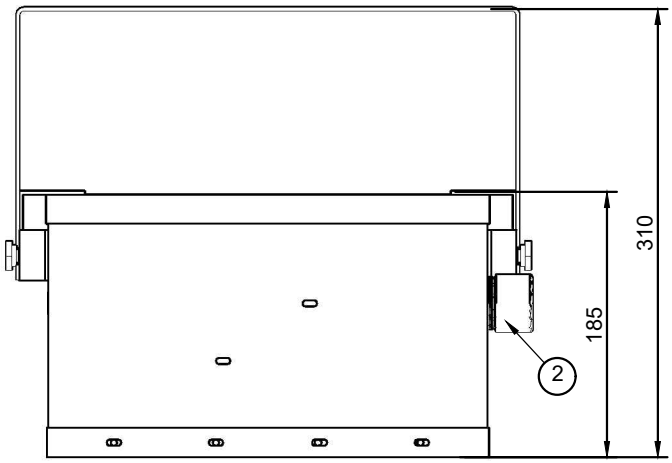
TITLE:
INSTALLATION DRAWING



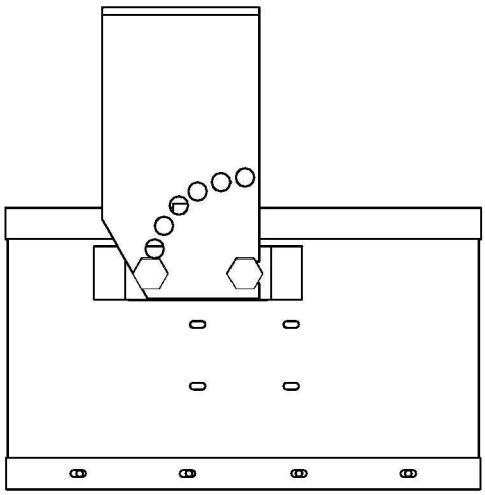
Bottom View



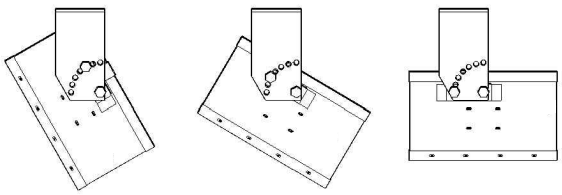
Iso View(Bottom)



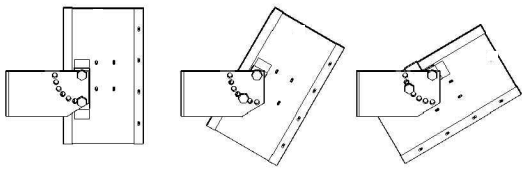
Front View



Side View

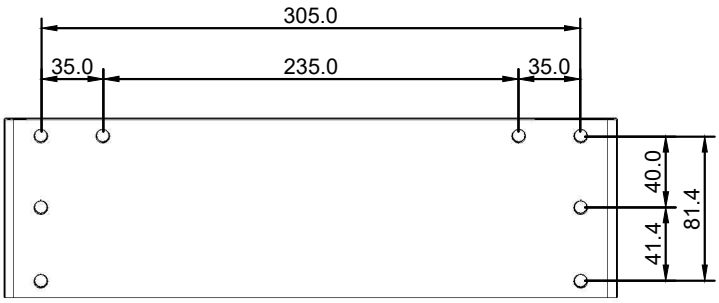


CEILING



WALL

Installation Options



Fixing Drills

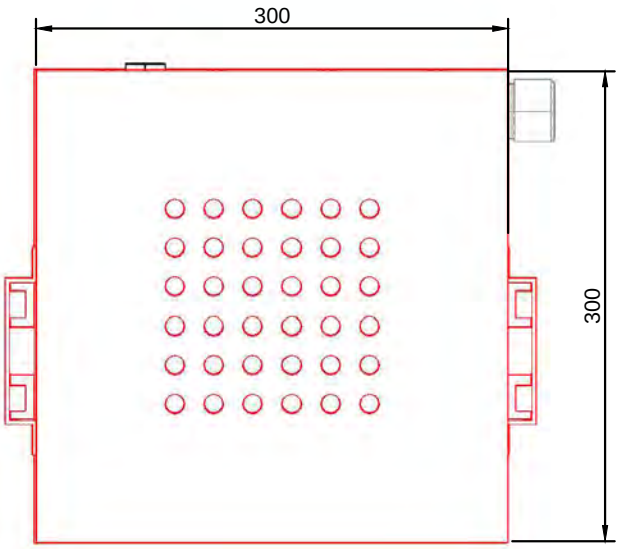
Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	B122030BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	EXTERNAL HOUSING	B2030EH
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	EXTERNAL HOUSING TOP COVER	B203057EHTC

PART LIST

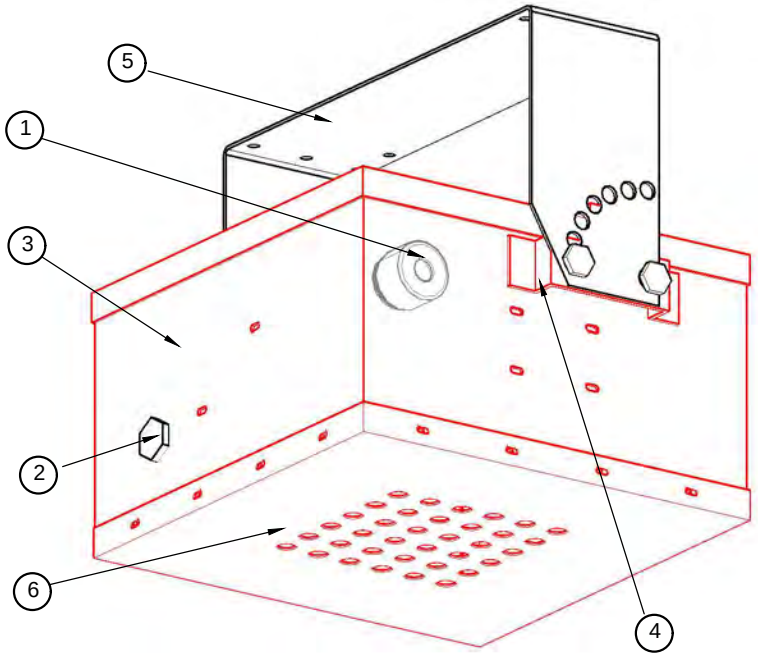
FirePro. ***FirePro Systems Ltd*** Condensed aerosol generator FP-2000 FP-2000S

DRAWING NUMBER: ID-2000/S
DATE: 13/08/2021

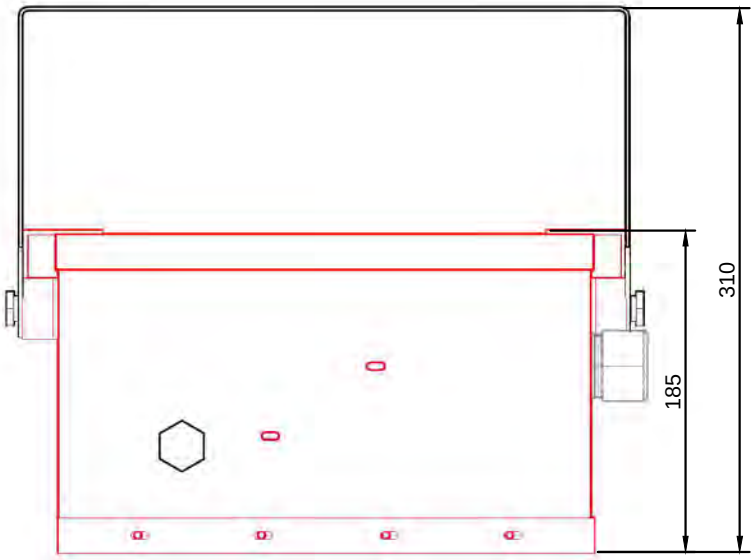
TITLE: INSTALLATION DRAWING



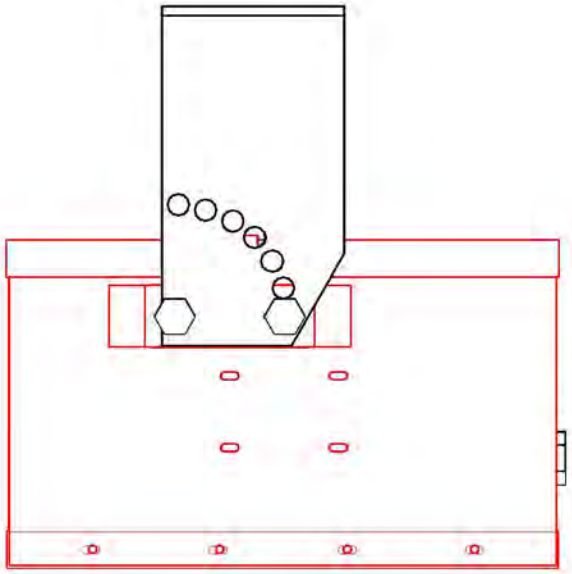
Bottom View



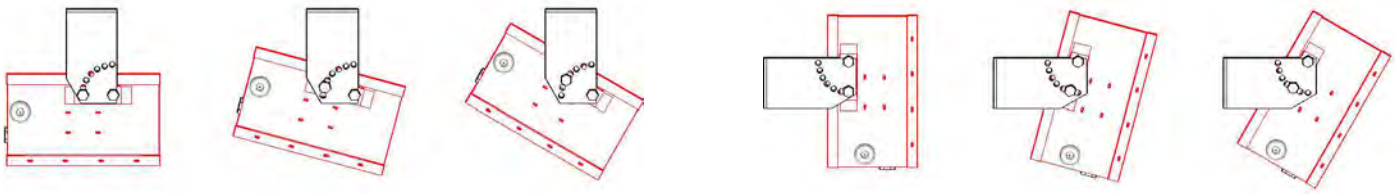
Iso View(Bottom)



Front View



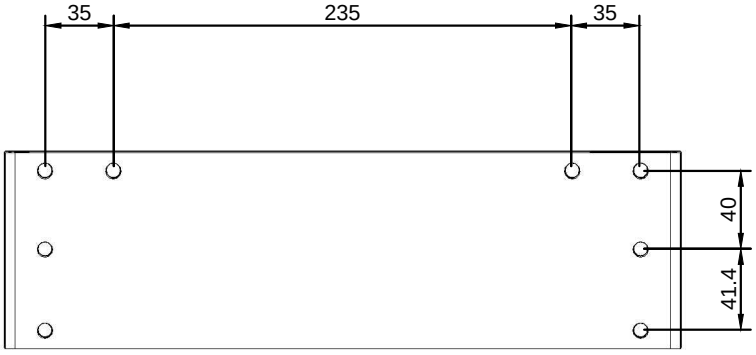
Side View



CEILING

WALL

Installation Options



Fixing Drills

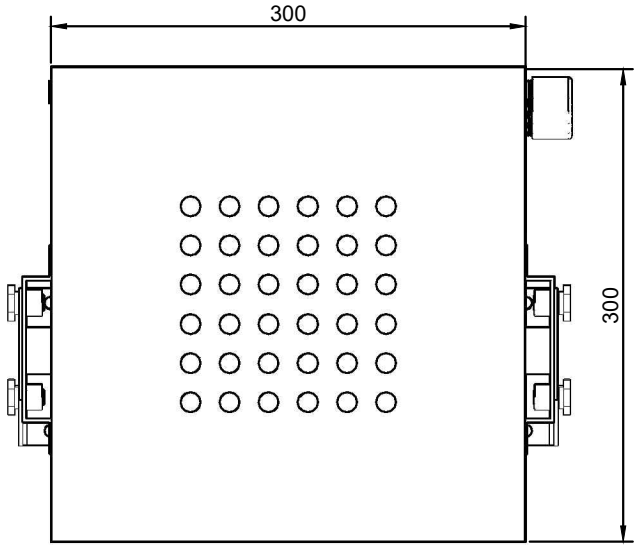
Position	Quantity	Denomination	Type / DWG. Number
6	1	OUTLET	B203057EHTC
5	1	BRACKET	B122030BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	GENERATOR	B20TAS
2	1	BTA123 PLUG 1	BTA123P1
1	1	WIRES OUTLET JUNCTION BOX	BWOJB

PART LIST

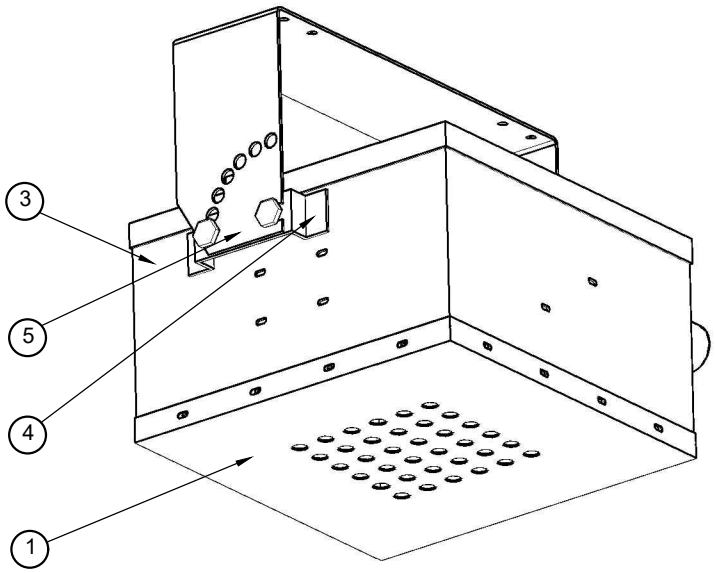
FirePro. ***FirePro Systems Ltd*** FP-2000T
Condensed aerosol generator FP-2000TS

DRAWING NUMBER: ID-2000T/TS
DATE: 05/01/16

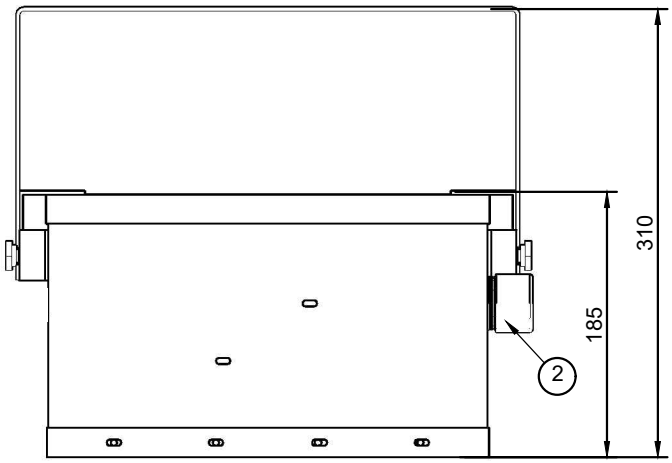
TITLE:
INSTALLATION DRAWING



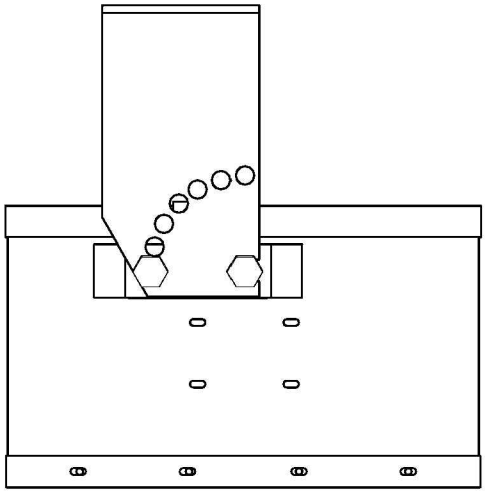
Bottom View



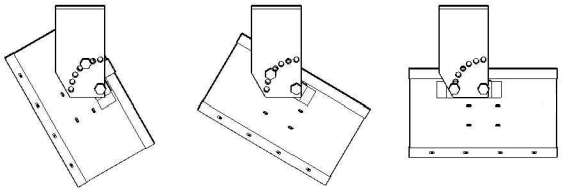
Iso View(Bottom)



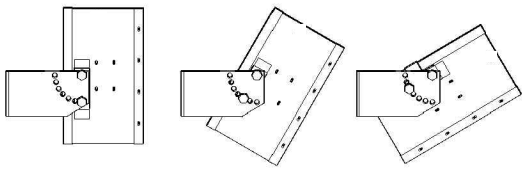
Front View



Side View

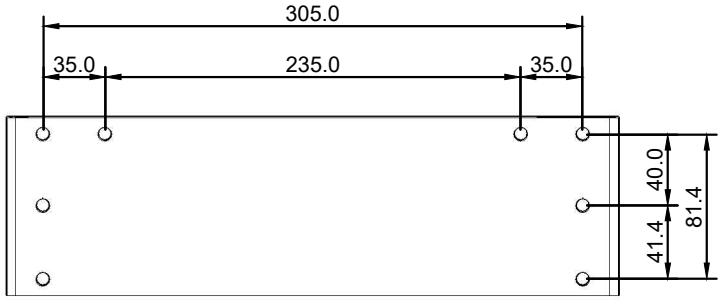


CEILING



WALL

Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	B122030BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	EXTERNAL HOUSING	B2030EH
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	EXTERNAL HOUSING TOP COVER	B203057EHTC

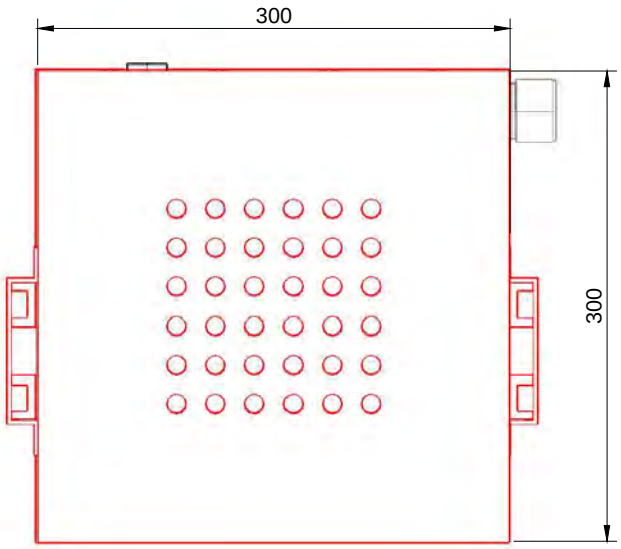
PART LIST

FirePro. ***FirePro Systems Ltd*** Condensed aerosol generator

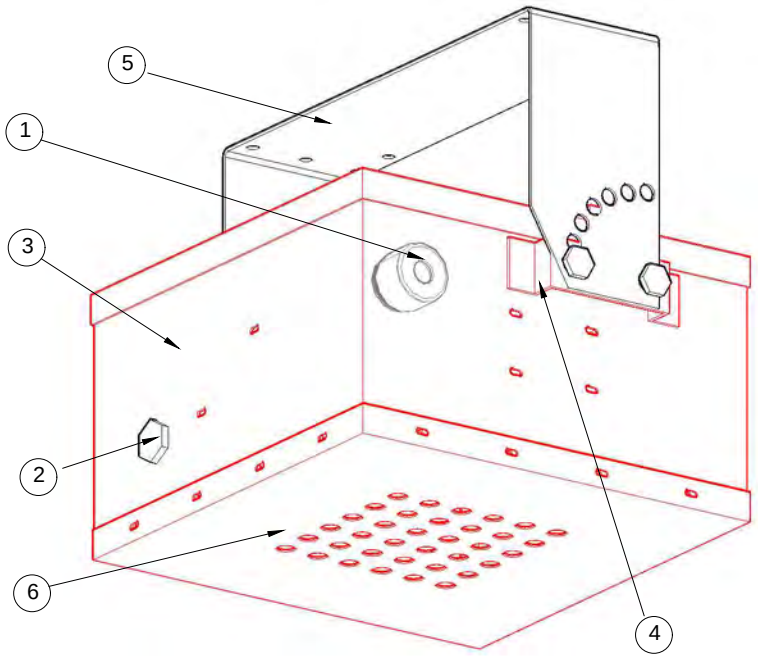
FP-3000
FP-3000S

DRAWING NUMBER: ID-3000/S
DATE: 13/08/2021

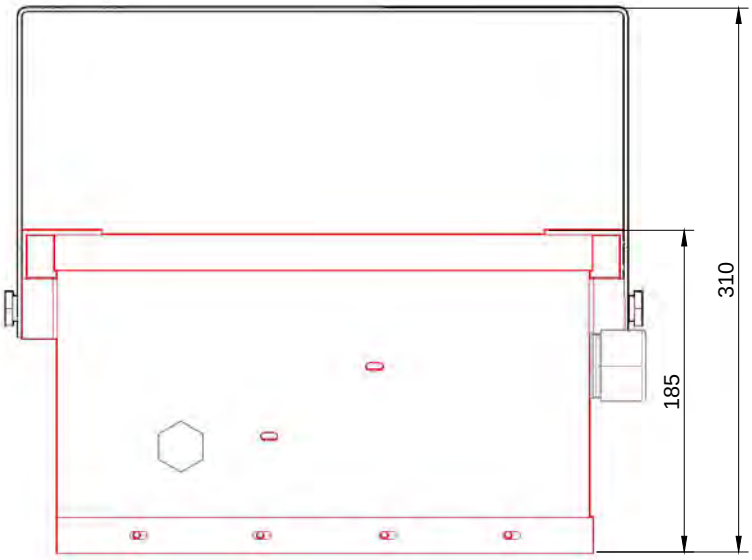
TITLE:
INSTALLATION DRAWING



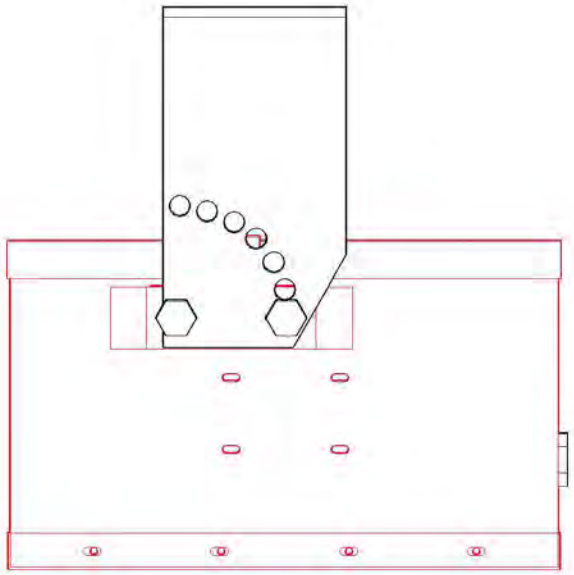
Bottom View



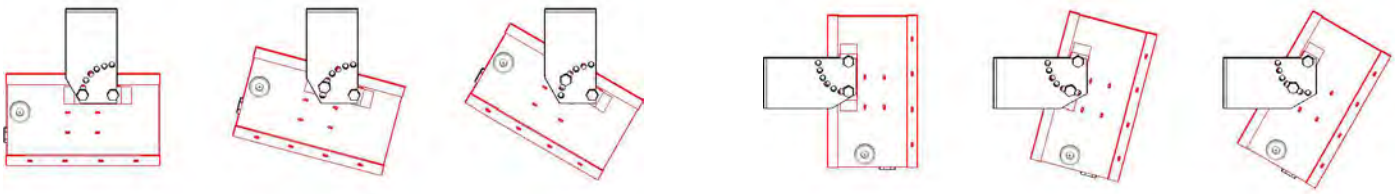
Iso View(Bottom)



Front View



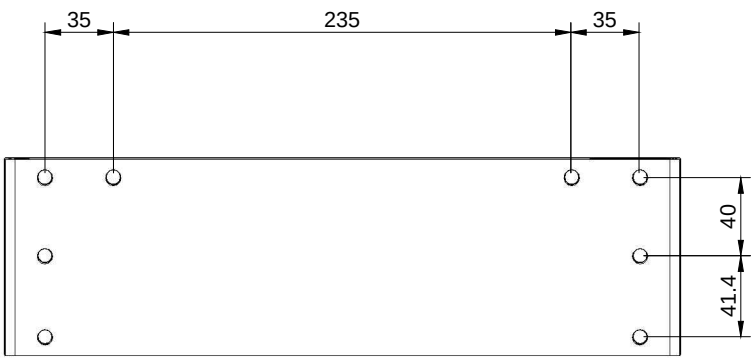
Side View



CEILING

WALL

Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
6	1	OUTLET	B203057EHTC
5	1	BRACKET	B122030BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	GENERATOR	B30TAS
2	1	BTA123 PLUG 1	BTA123P1
1	1	WIRES OUTLET JUNCTION BOX	BWOJB

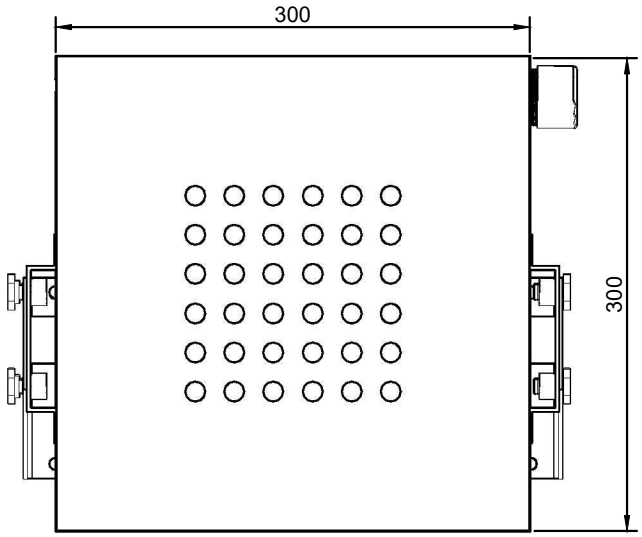
PART LIST

FirePro. ***FirePro Systems Ltd*** Condensed aerosol generator

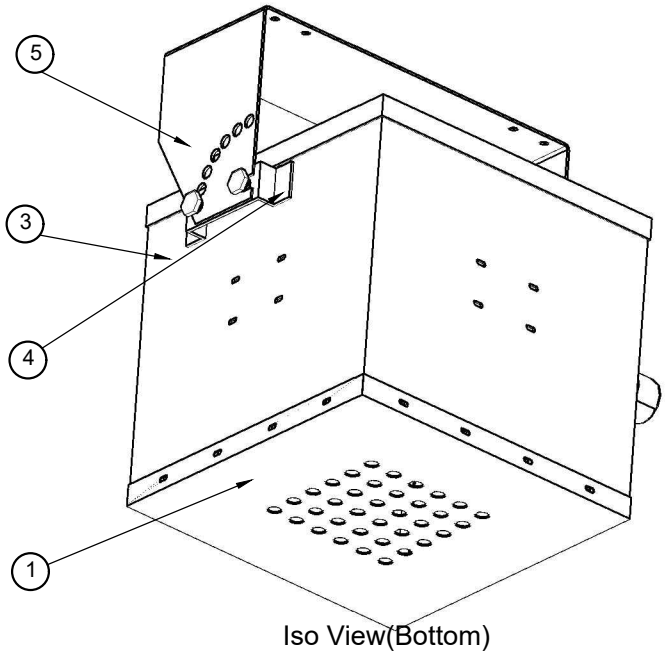
FP-3000T
FP-3000TS

DRAWING NUMBER: ID-3000T/TS
DATE: 05/01/16

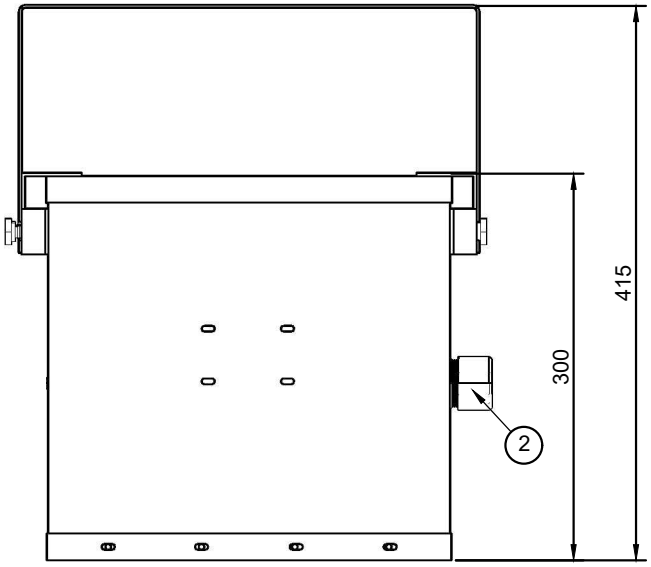
TITLE:
INSTALLATION DRAWING



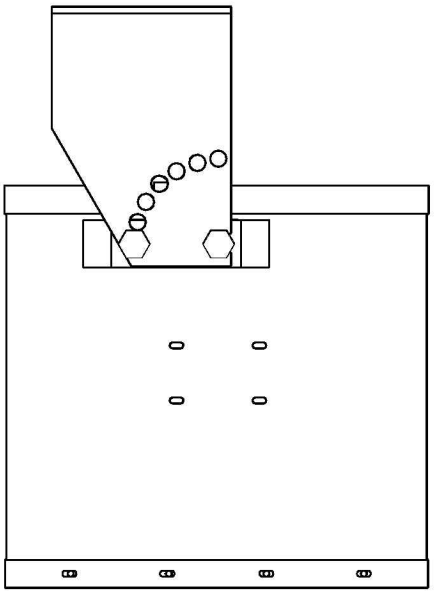
Bottom View



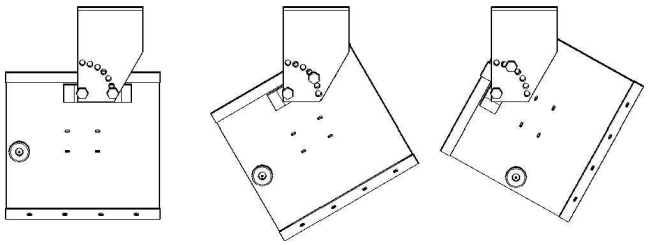
Iso View(Bottom)



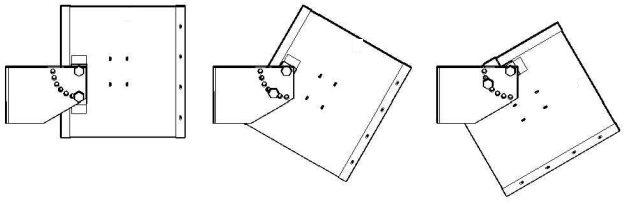
Front View



Side View

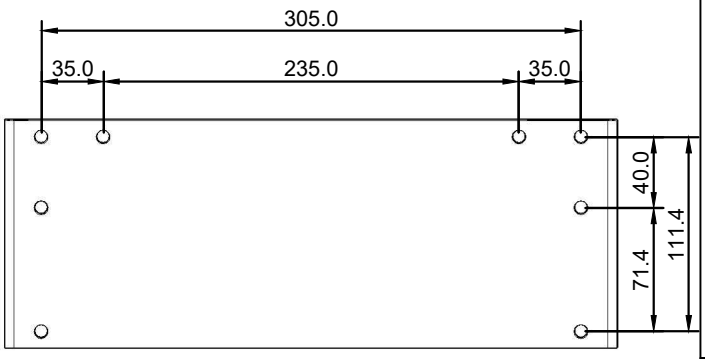


CEILING



WALL

Installation Options



Fixing Drills

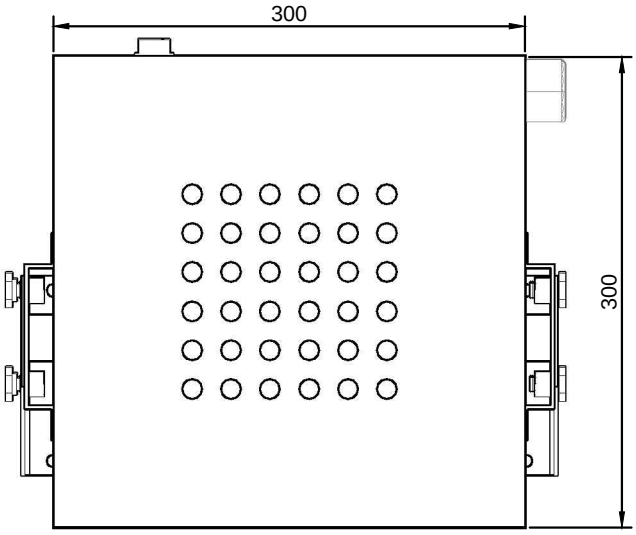
Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	B57BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	EXTERNAL HOUSING	B57EH
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	EXTERNAL HOUSING TOP COVER	B203057EHTC

PART LIST

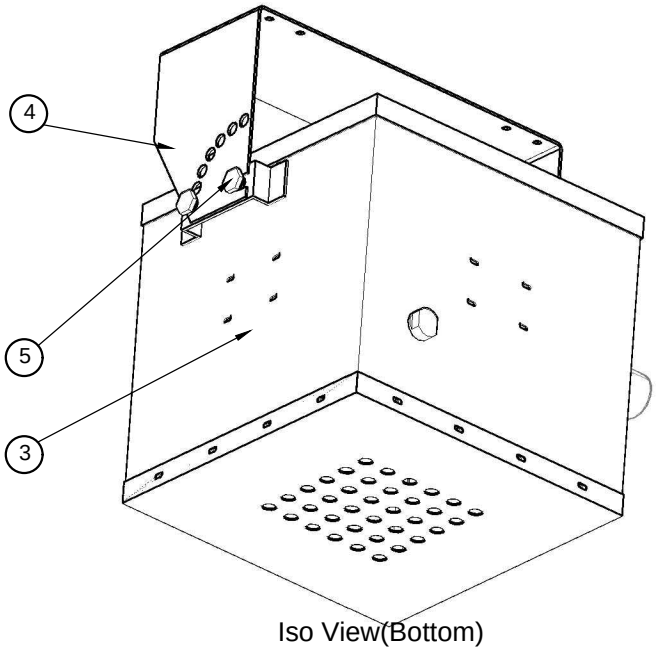
FirePro. ***FirePro Systems Ltd*** FP-4200
Condensed aerosol generator FP-4200S

DRAWING NUMBER: ID-4200/S
DATE: 13/08/2021

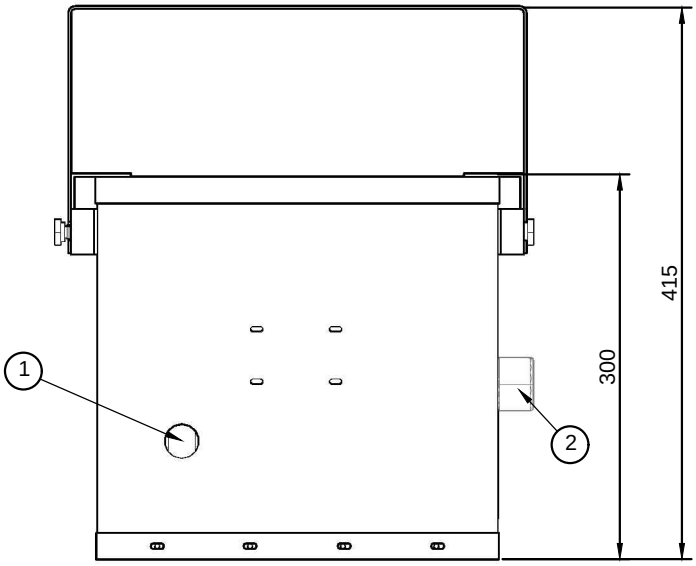
TITLE:
INSTALLATION DRAWING



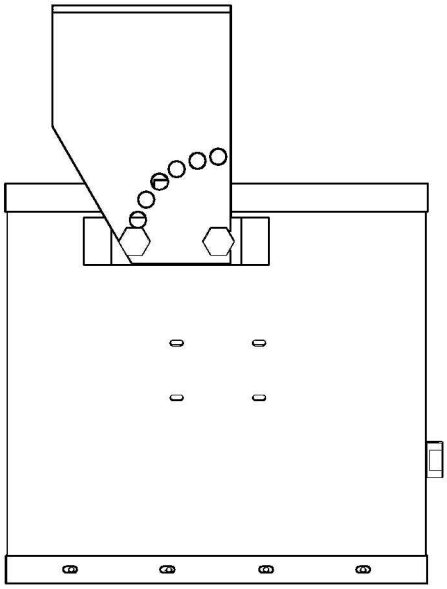
Bottom View



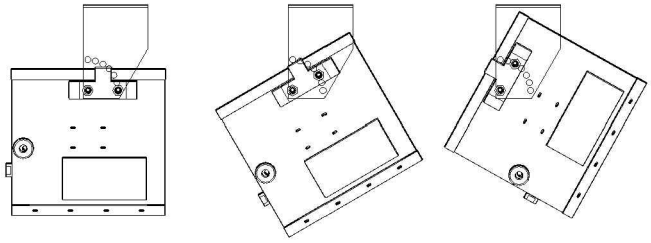
Iso View(Bottom)



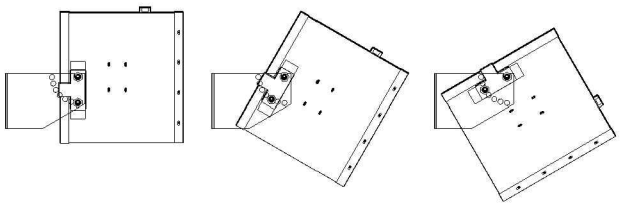
Front View



Side View

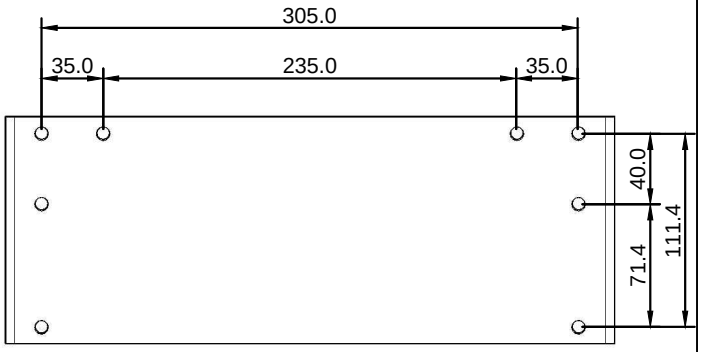


CEILING



WALL

Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	2	BOLT FOR BRACKET SUPPORT	BABBS
4	1	BRACKET	B57BRKT
3	1	GENERATOR	B42AS
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	BTA PLUG1	BTAP1

PART LIST

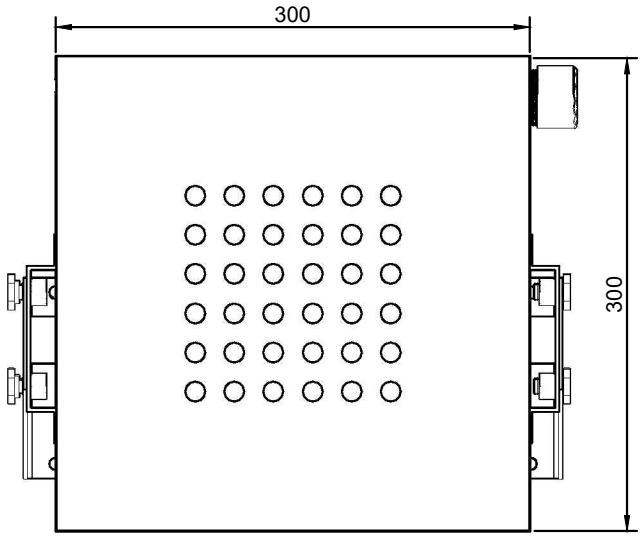
FirePro. ***FirePro Systems Ltd*** FP-4200T

Condensed aerosol generator FP-4200TS

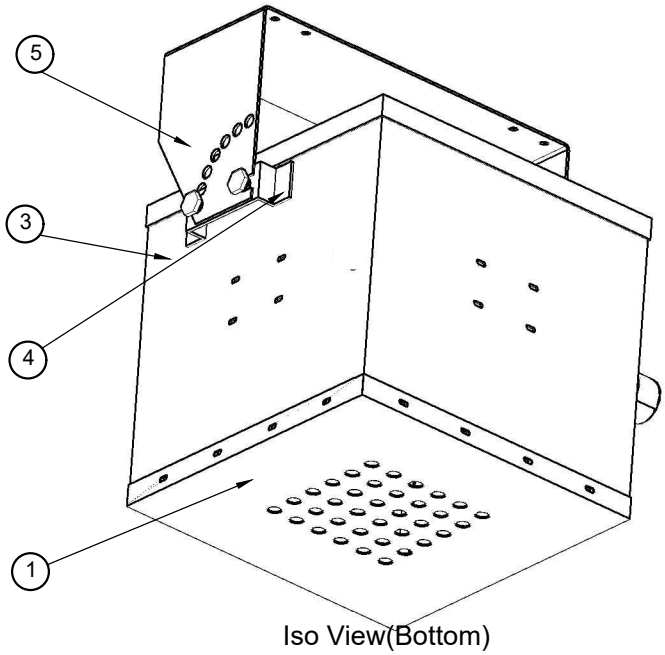
DRAWING NUMBER: ID-4200T/TS

DATE: 02/10/14

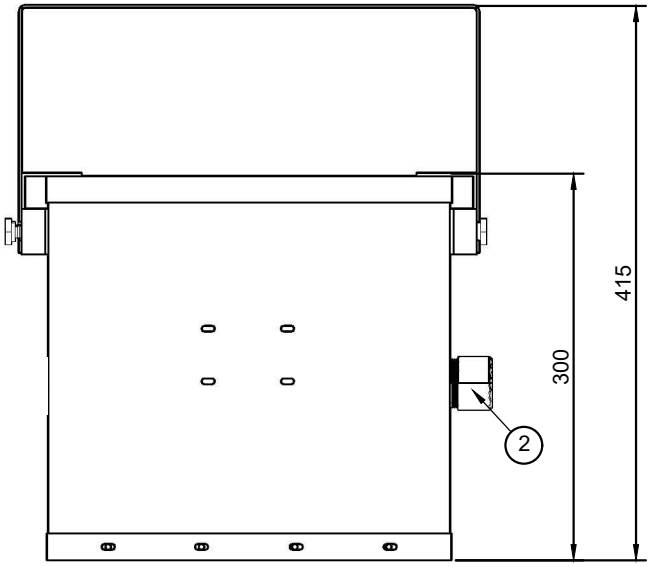
TITLE: INSTALLATION DRAWING



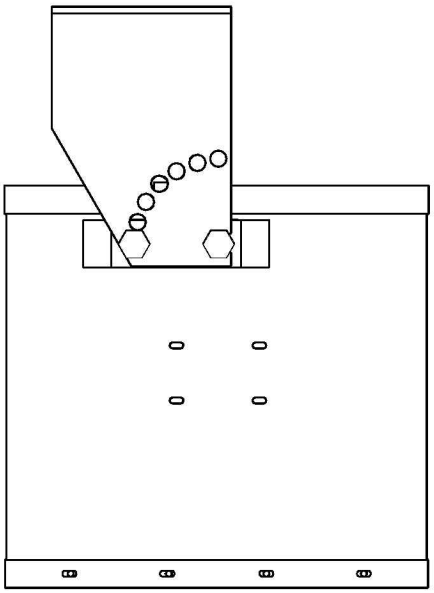
Bottom View



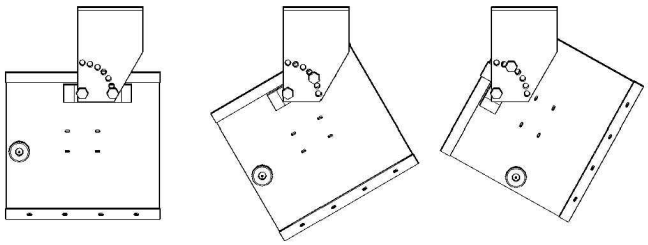
Iso View(Bottom)



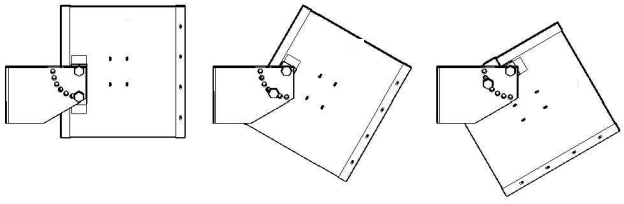
Front View



Side View

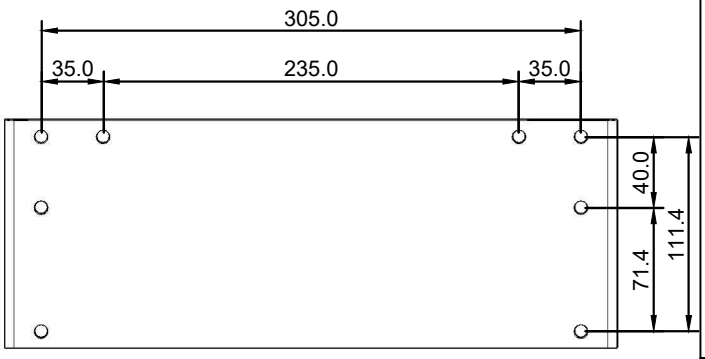


CEILING



WALL

Installation Options



Fixing Drills

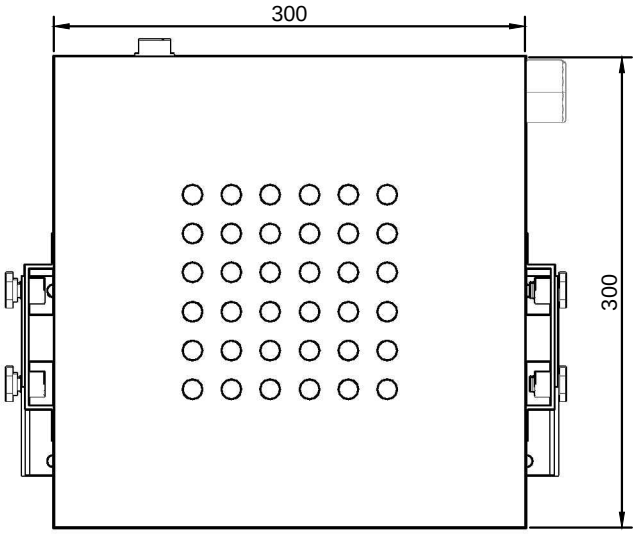
Position	Quantity	Denomination	Type / DWG. Number
5	1	BRACKET	B57BRKT
4	2	EXTERNAL HOUSING BRACKET SUPPORT	BAEHBS
3	1	EXTERNAL HOUSING	B57EH
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	EXTERNAL HOUSING TOP COVER	B203057EHTC

PART LIST

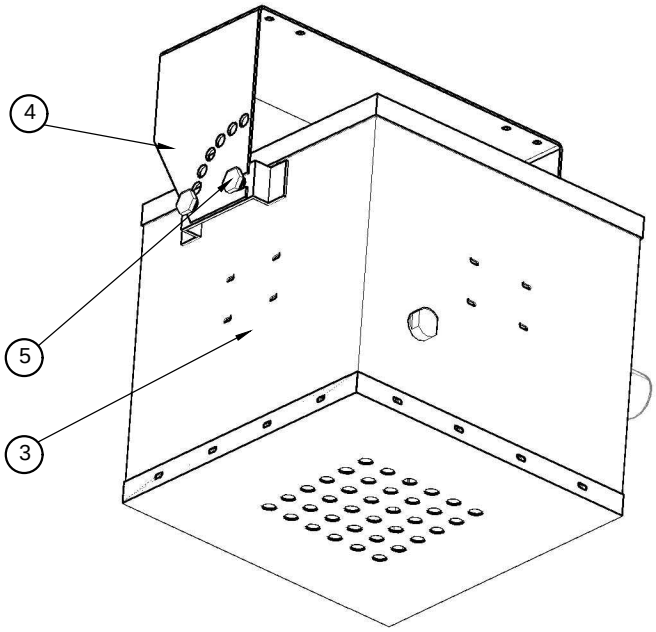
FirePro. ***FirePro Systems Ltd*** FP-5700
Condensed aerosol generator FP-5700S

DRAWING NUMBER: ID-5700/S
DATE: 13/08/2021

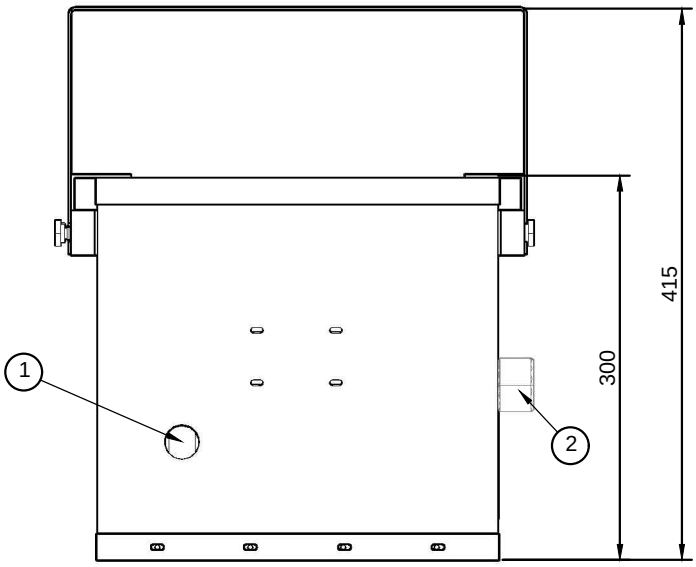
TITLE:
INSTALLATION DRAWING



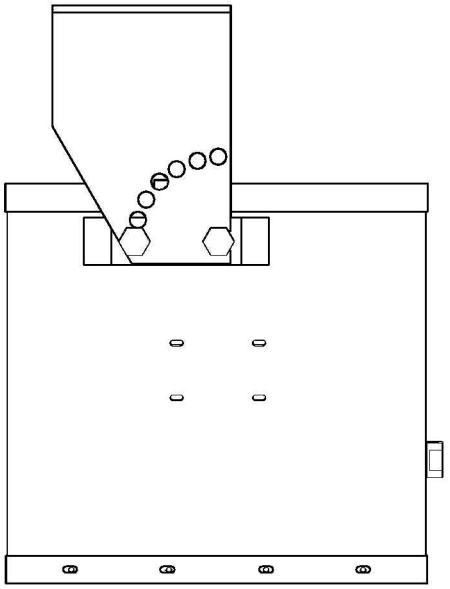
Bottom View



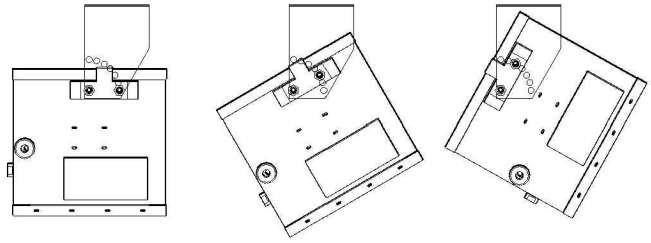
Iso View(Bottom)



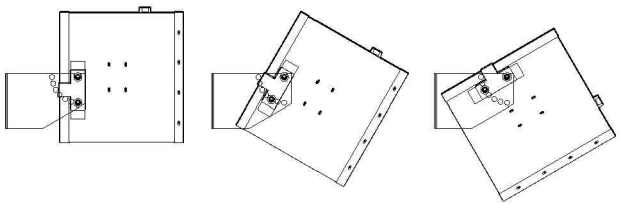
Front View



Side View

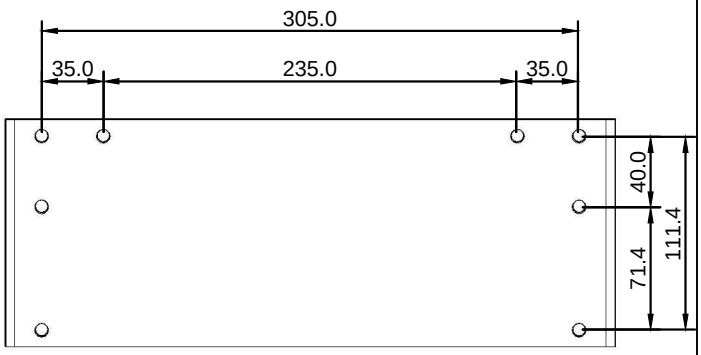


CEILING



WALL

Installation Options



Fixing Drills

Position	Quantity	Denomination	Type / DWG. Number
5	2	BOLT FOR BRACKET SUPPORT	BABBS
4	1	BRACKET	B57BRKT
3	1	GENERATOR	B57TAS
2	1	WIRES OUTLET JUNCTION BOX	BWOJB
1	1	BTA PLUG1	BTAP1

PART LIST

FirePro. ***FirePro Systems Ltd***
Condensed aerosol generator

FP-5700T
FP-5700TS

DRAWING NUMBER: ID-5700T/TS
DATE: 05/01/16

TITLE:
INSTALLATION DRAWING