AUTOMATIC FIRE
SUPPRESSION SYSTEMS

Technical Documentation

Installation and Service Manual

BlazeCut Automatic Fire Suppression

T Series Systems

TxxxE(S)(B)(-E)

TABLE OF CONTENT:

1 INTRODUCTION

MANUFACTURER INFORMATION

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INSTRUCTIONS FOR USE OF THE MANUAL

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

SAFETY FIRST

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

WARNINGS AND CAUTIONS

This symbol within the manual represents warning of specific risks, dangers, or warning of described procedures. Failure to follow the instructions in the text marked with this symbol may result in loss of warranty, damage to property, threat to safety or life of persons performing the operation on the system or persons in the vicinity. Do not proceed without following the instructions marked with such symbols.

FURTHER INFORMATION

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

WARNING

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

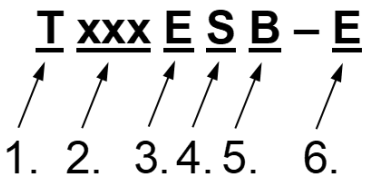
Do not modify any part of the BlazeCut components as this may cause serious injury or a failure of the system.

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

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

2 BASIC INFORMATION ABOUT THE SYSTEM

EXPLANATION OF MODEL PART NUMBERS



1. Part of caption stating the BlazeCut system series
   T (Tube) – type of system using tube

2. Part of caption numerically stating approximate tube length

025 – 25 cm (centimetres)	300 – 300 cm (centimetres)
050 – 50 cm (centimetres)	400 – 400 cm (centimetres)
100 – 100 cm (centimetres)	500 – 500 cm (centimetres)
200 – 200 cm (centimetres)	600 – 600 cm (centimetres)

3. Part of caption stating type of extinguishing agent
   E - Extinguishing agent used HFC-227ea

4. Part of caption indicating a pressure switch is included. E.g. T200ES or T200ES-E (refer to caption 6.)
NOTE: If a pressure switch is not installed the fifth caption will be absent. E.g. T200E

5. Part of the caption indicating Bulk supply only. Only a T Series system and a warning label is supplied.
NOTE: If a product is supplied in retail packaging the sixth caption will be absent E.g. T200E

6. Part of caption indicating Economy pressure switch option. E.g. T200ES-E
NOTE: If a pressure switch is used in harsh environments e.g. mobile applications the “ES” model is required e.g. T200ES.

For full details on pressure switch options please go to Annex 1: PRESSURE MONITORING

DESCRIPTION OF THE SYSTEM

Commercial name: BlazeCut T Series

Characteristics: Automatic Fire Suppression System

Type: Tube series (T Series)

Functionality: The BlazeCut T Series system is designed to protect small enclosed or semi enclosed spaces with greater risks of fire. The BlazeCut T Series system operates automatically without any external power source. Extinguishing agent is stored in the tube, which also serves to apply extinguishing agent directly to the fire at its source. In the case of fire, the detection tube degrades by the effect of fire or high temperature and melts. Extinguishing agent is then released through a nozzle that is created.

BlazeCut T Series is suitable for the protection of spaces such as:

- Marine inboard and outboard engines (including jet ski’s)
- Engine compartments of road vehicles (cars, SUVs, 4x4s, vans, minibuses, classic cars, etc.)
- Engine compartments of other vehicles (agricultural machines, ride-on mowers, motorized carts, etc.)
- Mobile Machinery (small to medium size forklifts, excavators, skid steer loaders, sweepers, cranes etc.)
- Electrical switchboards, fuse boxes, electrical supply sources, battery compartments, car batteries, inductors, MCC Cabinets
- Other enclosed applications (network installations, servers, audio-video equipment, automatic teller machines, electric fuel bowsers, 3D printers etc).

2.1 RETAIL PACKAGE CONTENTS

Table 1: Standard Retail package contents

Component	Amount
BlazeCut T Series Fire Suppression System with a pressure gauge	1
Clean extinguishing agent HFC-227ea	0.05 kg – 1.50 kg (0.11 lb – 3.31 lb)
High Temperature cable ties for installation (part ACT528)	3-18
General warning label ALA008	1
User manual	1
Information about substance	1
BlazeCut sticker	1

The BlazeCut system was designed and tested as a whole using original components with specific properties. Using components and spare parts other than those supplied by the manufacturer is prohibited and may change the functionality of the system and causes loss of warranty. Fastening components for the tube are exempted, provided other installation and maintenance instructions are followed and provided they are suitable for use in the protected equipment (heat resistance etc.). To order original spare parts and for further information contact the supplier of the BlazeCut system.

Please Note: Only the 0.25 to 4 metre systems can be supplied in a retail box.

2.2 TECHNICAL SPECIFICATION AND TYPES

Table 2: Types of BlazeCut T Series systems described in this manual

Type name	Caption
T025E(S)(B)(-E)	T – tube
T050E(S)(B)(-E)	Three-digit number – approximate length of the tube in cm
T100E(S)(B)(-E)	E – extinguishing agent used HFC-227ea
T200E(S)(B)(-E)	S – IP65 Pressure switch fitted (outdoor and mobile applications)
T300E(S)(B)(-E)	B – Bulked packed with no box, manuals or cable ties. Contains only T Series system and warning label
T400E(S)(B)(-E)	-E – IP54 Economy pressure switch fitted
T500E(S)(B)(-E)*	
T600E(S)(B)(-E)*	

*not available in a retail box (B - Bulk supply only)

Inner diameter of the tube: 15 mm (0.59 in)
Outer diameter of the tube: 19 mm (0.75 in)
Standard operation pressure at 20 °C: TxxxE – 2 bar (29 psi), TxxxES(-E) – 6 bar (87 psi)**

** **NOTE:** Due to physical and chemical properties of the agent, pressure in the tube can vary depending on the ambient temperature. The higher the ambient temperature, the higher the pressure will be in the tube and vice versa. At very low temperatures the pressure of agent vapours is zero (see Chapter 7.4).

Indicator on the pressure gauge can vary from 0 bar (0 psi) when temperatures are very low to 17 bar (247 psi) when temperatures are very high. This is not a sign of defect in the system.
When using a T Series with a pressure switch, the system is pressurized with nitrogen (N_2) to a higher pressure than normal extinguishing agent vapor pressure. This is to prevent false alarms, see also Annex no.1 of the manual.

Minimum and maximum operation temperature (without the pressure switch):

- From -40 to +90 °C (-40 to 194 °F)

Minimum and maximum operation temperature (with a pressure switch):

- From -20 to +80 °C (-4 to 176 °F)

Burst pressure:

- 24 bar ± 1 bar (348 psi ± 14 psi) without pressure switch
- 25 bar ± 1 bar (363 psi ± 14 psi) with a pressure switch

Material of the tube: heat sensitive plastic

Material of the fittings: stainless steel

Material of the pressure gauge: Nickel plated brass

Table 3: BlazeCut T Series system details – Standard model

Model*	Type of Agent	Amount of Agent	System Length	Operation Temperature	Activation Temperature	Tube Pressure at Activation
T025E	HFC-227ea	0.05 kg ± 2 g (0.11 lb ± 0.07 oz)	28 cm (11.02 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T050E	HFC-227ea	0.10 kg ± 2 g (0.22 lb ± 0.07 oz)	53 cm (20.87 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T100E	HFC-227ea	0.25 kg ± 5 g (0.55 lb ± 0.17 oz)	113 cm (44.48 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T200E	HFC-227ea	0.50 kg ± 5 g (1.10 lb ± 0.17 oz)	215 cm (84.64 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T300E	HFC-227ea	0.75 kg ± 10 g (1.65 lb ± 0.35 oz)	319 cm (125.59 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T400E	HFC-227ea	1.00 kg ± 10 g (2.20 lb ± 0.35 oz)	422 cm (166.14 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T500E	HFC-227ea	1.25 kg ± 10 g (2.76 lb ± 0.35 oz)	526 cm (207.09 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)
T600E	HFC-227ea	1.50 kg ± 10 g (3.31 lb ± 0.35 oz)	630 cm (248.03 in)	-40 °C to +90 °C (-40 °F to +194 °F)	105 °C ± 3 °C (221 °F ± 5 °F)	24 bar ± 1 bar (348 psi ± 14 psi)

Table 4: BlazeCut T Series system details – with integrated pressure switch IP65

Model*	Type of Agent	Amount of Agent	System Length	Operation Temperature	Activation Temperature	Tube Pressure at Activation
T025ES	HFC-227ea	0.05 kg ± 2 g (0.11 lb ± 0.07 oz)	35 cm (13.78 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T050ES	HFC-227ea	0.10 kg ± 2 g (0.22 lb ± 0.07 oz)	60 cm (23.62 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T100ES	HFC-227ea	0.25 kg ± 5 g (0.55 lb ± 0.17 oz)	120 cm (47.24 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T200ES	HFC-227ea	0.50 kg ± 5 g (1.10 lb ± 0.17 oz)	222 cm (87.40 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T300ES	HFC-227ea	0.75 kg ± 10 g (1.65 lb ± 0.35 oz)	326 cm (128.34 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T400ES	HFC-227ea	1.00 kg ± 10 g (2.20 lb ± 0.35 oz)	429 cm (168.89 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T500ES	HFC-227ea	1.25 kg ± 10 g (2.76 lb ± 0.35 oz)	533 cm (209.84 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T600ES	HFC-227ea	1.50 kg ± 10 g (3.31 lb ± 0.35 oz)	637 cm (250.79 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)

Table 5: BlazeCut T Series system details – with integrated economy pressure switch

Model*	Type of Agent	Amount of Agent	System Length	Operation Temperature	Activation Temperature	Tube Pressure at Activation
T025ES-E	HFC-227ea	0.05 kg ± 2 g (0.11 lb ± 0.07 oz)	31 cm (12.20 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T050ES-E	HFC-227ea	0.10 kg ± 2 g (0.22 lb ± 0.07 oz)	56 cm (22.05 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T100ES-E	HFC-227ea	0.25 kg ± 5 g (0.55 lb ± 0.17 oz)	116 cm (45.67 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T200ES-E	HFC-227ea	0.50 kg ± 5 g (1.10 lb ± 0.17 oz)	218 cm (85.83 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T300ES-E	HFC-227ea	0.75 kg ± 10 g (1.65 lb ± 0.35 oz)	322 cm (126.77 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T400ES-E	HFC-227ea	1.00 kg ± 10 g (2.20 lb ± 0.35 oz)	425 cm (167.32 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T500ES-E	HFC-227ea	1.25 kg ± 10 g (2.76 lb ± 0.35 oz)	529 cm (208.27 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)
T600ES-E	HFC-227ea	1.50 kg ± 10 g (3.31 lb ± 0.35 oz)	633 cm (249.21 in)	-20 °C to +80 °C (-4 °F to +176 °F)	100 °C ± 2 °C (212 °F ± 4 °F)	25 bar ± 1 bar (363 psi ± 14 psi)

***NOTE**: Additional sizes available for commercial quantities please contact your local BlazeCut agent.

OPTIONAL COMPONENTS

The BlazeCut T Series can send a signal after its activation by using a pressure switch with an electronic output. The external alarm or signalling device connects to the pressure switch and a signal is sent at the time of activation, alerting the driver or personnel with light and sound signals. These components can be connected to any type of T Series equipped with a pressure switch. BlazeCut recommends where the T Series is installed into applications above 480 V, a risk assessment must be completed and that the application is immediately de-energized via the use of a T Series pressure switch model. All pressure switches must be fitted to the T Series in the factory before supply.

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

Table 6: List of compatible BlazeCut electrical components for the T Series systems

Part №	Type	Description
TxxxES	Pressure Switch	Simple mechanical switch (IP65, N/O or N/C with DIN connection), with one switch point (fire alarm). *The pressure switch must be factory fitted
TxxxES-E	Pressure Switch	Simple economical mechanical switch (IP54, 2 wire N/C) with one switch point (fire alarm). *The pressure switch must be factory fitted.
ASU001	Signalling Unit	Simple and cost-effective sound and light signalling unit, 81 dB, CE, 6 - 28 V dc, CE Exceeds EN54-3. Suitable for indoor, fixed, low vibration installations
ASR001	Sounder Red	Tone with high base, 92 to 112 dB, IP65, CE/VdS, LPCB, 9 -15 V dc, CE Exceeds EN54-3. Suitable for fixed, low vibration installations
ABR001	Beacon Red	Red xenon beacon, IP65, CE, VdS, 9 – 60 V dc, CE Exceeds EN54-3. Suitable for fixed, low vibration installations
ABR002	Beacon Red	Red LED beacon, IP67, SAE CLASS III, CE, R10, UL, ROHS, 12 V – 80 V dc, -30 to +50 °C. Suitable for outdoor mobile applications
ASB001	Sounder Black	97 dB, IP65, SAE J994 Type C, AMCA, UL,CE, E, 12 – 24 V dc, -40 to +85 °C. Suitable for outdoor mobile applications
ASU002	Signalling Unit	Red sounder and beacon with high base, 114 dB, IP44, EN54-3/CE/LPCB, 24 V dc, CE Exceeds EN54-3. Suitable for indoor, fixed, low vibration installations
ASU003	Signalling Unit	Red sounder and beacon with high base, 101dB(A), IP65, 18 – 24 V dc, CE Exceeds EN54-3. Suitable for fixed, low vibration installations
AWB012	Warning Buzzer	Warning Buzzer with LED ring, 12V dc, 80dB(@1m), IP54. -20 to +50 °C (-4 to 122 °F), Stainless steel. Suitable for fixed and mobile installations
AWB024	Warning Buzzer	Warning Buzzer with LED ring, 24V dc, 80dB(@1m), IP54. -20 to +50 °C (-4 to 122 °F), Stainless steel. Suitable for fixed and mobile installations
TAP200	Alarm Panel	IP65 rated Alarm Panel in robust aluminium body with, universal in dash or external bracket installation. Monitors the pressure switch for fault.

TxxxES models

TxxxES-E models

ASU001

ABR002

ASU003

ASR001

ASB001

TAP200

ABR001

ASU002

AWB012 and AWB024

2.3 USE OF THE SYSTEM

The BlazeCut fire system is a suppression system only and is not designed or intended to extinguish all fires. Where there are high airflows and a high accumulation of combustible materials, this will dramatically alter the systems performance. Always consider supplementary firefighting equipment be available in case system does not totally extinguish a fire. For more information about the use of the system in an area occupied by persons, please contact your supplier.

The use of the BlazeCut T Series in vehicles must be done with additional considerations of air flow and gas concentrations. All recommendations from BlazeCut including the Vehicle Application Guide on the website are indicative only. In vehicles with high ventilation or airflow the suppression ability will be impaired.

Where there are high risks of power arcing, BlazeCut recommends T Series to be installed with a pressure switch on all applications of 240 V and above, so that the application is immediately de-energized via the use of a T Series pressure switch model.

MAXIMUM VOLTAGE APPLICATION

BlazeCut recommends where the T Series is installed into applications above 480 V, a risk assessment must be completed and that the application is immediately de-energized via the use of a T Series pressure switch model.

Metal components (e.g. pressure gauge, fittings) shall be kept clear from the protected electrical equipment. Any BlazeCut system electrical components (e.g. pressure switch) in close vicinity to high voltage equipment shall be grounded. This must be carried out by a qualified electrical contractor.

Referencing below the NFPA 2001:2018 Standards it is stated in Article 5.4.2.5.1

The minimum design concentration for spaces containing energized electrical hazards supplied at greater than 480 volts that remain powered during and after discharge shall be determined by testing, as necessary, and a hazard analysis.

For applications above 480 V, as each application is unique and requires a hazard analysis/risk assessment, the user/installer is responsible for any testing, if required.

Please contact BlazeCut for a copy of our hazard analysis/risk assessment form.

Referencing below FM Global Data sheet 4-9 (OCT 2018) Article 2.2.2.2.B

When the electrical equipment is not de-energized upon activation of the clean agent extinguishing system or has a time-delayed power disconnect, provide the minimum design concentration for an energized electrical fire (Class C – US classification) in accordance with Table 1 for the applicable equipment voltage. If the electrical equipment is not de-energized before the clean agent concentration falls below the minimum design value shown in Table 1, reignition is expected.

Table 1. Minimum Design Concentrations

Agent	Minimum Design Concentration, %			
	Class A	Class B[1]	Class C, <480 V	Class C, ≥480 V[2,3]
FK-5-1-12	4.5	5.9	4.5	10
HFC-125	9.7	11.3	9.0	20
HFC-227ea	6.7	8.7	7.0	12
HFC-23	18	19.5	20.3	Not tested[3]
IG-01	38.0	52.5	42.8	Not tested[3]
IG-55	37.9	39.1	42.7	Not tested[3]
IG-100	37.2	43.7	41.9	Not tested[3]
IG-541	34.2	40.6	38.5	57

[1] Class B values are for hydrocarbon fuels similar to n-Heptane. Class B minimum design concentrations will vary for other ignitable liquid fuels, based on the information provided in the manufacturer's design, installation, operation, and maintenance manual.
[2] These higher concentrations need to be reviewed for restrictions when used in normally occupied areas. See Section 3.2.4 and Table 5 for information regarding No Observed Adverse Effects Limit (NOAEL) and Lowest Observed Adverse Effects Limit (LOAEL).
[3] FM Global conducted testing that indicates higher agent concentrations are needed for high-energy arcing faults. Only certain clean agents were tested. Refer to Section 3.3 for additional information on this testing. Where an agent is listed as "not tested," additional testing is necessary if the clean agent system is intended to protect energized electrical hazards greater than 480 volts that remain energized following discharge. Do not use an agent to protect high-energy electrical hazards if this testing has not been conducted.

Important: Please note the recommended increase gas concentration for Application higher than 480 V by FM Global for Class C (US classification), Electrical applications. Please refer to FM Global for further information

BLAZECUT DESIGN CALCULATION

BlazeCut design the volumetric calculation on a theoretical sealed equipment volume and calculate the gas requirement meeting and exceeding the minimum design concentration according to NFPA 2001:2018 requirements. (Please refer to the BlazeCut gas concentration table for T Series). For applications higher than 480 V consideration to increased gas concentrations are required as part of the risk assessment process.

Maximum volume coverage depends on two major factors: Minimum ambient temperature in the protected equipment and design concentration required. To guide which system to select, below tables list the maximum volume coverage for two major fire risk areas: Electrical Fires and Engine Fires. The design concentrations in the tables are to cover most standard applications like fixed applications with Class A and electrical fires, vehicle applications with Class A, electrical fires and most common Class B and C fires involved in engine fires.

Note: For applications with different design concentration required, use the BlazeCut Gas Calculation Tool and Concentration Table or contact the supplier of the system.

Table 7: Volume coverage with 7% design concentration (Electrical Fires)

Temp (°C)	Maximum volume coverage in m³ with 7.0% design concentration							
	T025E	T050E	T100E	T200E	T0300E	T400E	T500E	T600E
-40	0.07	0.14	0.35	0.71	1.06	1.41	1.77	2.12
-35	0.07	0.14	0.36	0.72	1.09	1.45	1.81	2.17
-30	0.07	0.15	0.37	0.74	1.11	1.48	1.85	2.22
-25	0.08	0.15	0.38	0.76	1.14	1.52	1.89	2.27
-20	0.08	0.15	0.39	0.77	1.16	1.55	1.94	2.32
-15	0.08	0.16	0.40	0.79	1.19	1.58	1.98	2.38
-10	0.08	0.16	0.40	0.81	1.21	1.62	2.02	2.43
-5	0.08	0.17	0.41	0.83	1.24	1.65	2.06	2.48
0	0.08	0.17	0.42	0.84	1.26	1.69	2.11	2.53
5	0.09	0.17	0.43	0.86	1.29	1.72	2.15	2.58
10	0.09	0.18	0.44	0.88	1.32	1.75	2.19	2.63
15	0.09	0.18	0.45	0.89	1.34	1.79	2.24	2.68
20	0.09	0.18	0.46	0.91	1.37	1.82	2.28	2.73
25	0.09	0.19	0.46	0.93	1.39	1.86	2.32	2.78
30	0.09	0.19	0.47	0.95	1.42	1.89	2.36	2.84
35	0.10	0.19	0.48	0.96	1.44	1.92	2.41	2.89
40	0.10	0.20	0.49	0.98	1.47	1.96	2.45	2.94
45	0.10	0.20	0.50	1.00	1.49	1.99	2.49	2.99
50	0.10	0.20	0.51	1.01	1.52	2.03	2.53	3.04
55	0.10	0.21	0.52	1.03	1.55	2.06	2.58	3.09
60	0.10	0.21	0.52	1.05	1.57	2.09	2.62	3.14
65	0.11	0.23	0.53	1.06	1.60	2.13	2.66	3.19
70	0.11	0.23	0.54	1.08	1.62	2.16	2.70	3.24
75	0.11	0.23	0.55	1.10	1.65	2.20	2.75	3.30
80	0.11	0.23	0.56	1.12	1.67	2.23	2.79	3.35
85	0.11	0.23	0.57	1.13	1.70	2.27	2.83	3.40
90	0.11	0.23	0.57	1.15	1.72	2.30	2.87	3.45

Table 8: Volume coverage with 9% design concentration (Engine Fires)

Temp (°C)	Maximum volume coverage in m³ with 9.0% design concentration							
	T025E	T050E	T100E	T200E	T0300E	T400E	T500E	T600E
-40	0.07	0.11	0.27	0.54	0.81	1.08	1.34	1.61
-35	0.07	0.11	0.28	0.55	0.83	1.10	1.38	1.65
-30	0.07	0.11	0.28	0.56	0.85	1.13	1.41	1.69
-25	0.08	0.12	0.29	0.58	0.87	1.15	1.44	1.73
-20	0.08	0.12	0.29	0.59	0.88	1.18	1.47	1.77
-15	0.08	0.12	0.30	0.60	0.90	1.21	1.51	1.81
-10	0.08	0.12	0.31	0.62	0.92	1.23	1.54	1.85
-5	0.08	0.13	0.31	0.63	0.94	1.26	1.57	1.89
0	0.08	0.13	0.32	0.64	0.96	1.28	1.60	1.92
5	0.09	0.13	0.33	0.65	0.98	1.31	1.64	1.96
10	0.09	0.13	0.33	0.67	1.00	1.33	1.67	2.00
15	0.09	0.14	0.34	0.68	1.02	1.36	1.70	2.04
20	0.09	0.14	0.35	0.69	1.04	1.39	1.73	2.08
25	0.09	0.14	0.35	0.71	1.06	1.41	1.77	2.12
30	0.09	0.14	0.36	0.72	1.08	1.44	1.80	2.16
35	0.10	0.15	0.37	0.73	1.10	1.46	1.83	2.20
40	0.10	0.15	0.37	0.75	1.12	1.49	1.86	2.24
45	0.10	0.15	0.38	0.76	1.14	1.52	1.90	2.27
50	0.10	0.15	0.39	0.77	1.16	1.54	1.93	2.31
55	0.10	0.16	0.39	0.78	1.18	1.57	1.96	2.35
60	0.10	0.16	0.40	0.80	1.20	1.59	1.99	2.39
65	0.11	0.16	0.41	0.81	1.22	1.62	2.03	2.43
70	0.11	0.16	0.41	0.82	1.23	1.65	2.06	2.47
75	0.11	0.17	0.42	0.84	1.25	1.67	2.09	2.51
80	0.11	0.17	0.42	0.85	1.27	1.70	2.12	2.55
85	0.11	0.17	0.43	0.86	1.29	1.72	2.16	2.59
90	0.11	0.18	0.44	0.88	1.31	1.75	2.19	2.63

Table 9 Design Concentrations for HFC-227ea

Class A Fires		6.7*	
Energized Electrical Fires <480 V		7.0*	
Class B and C Fires			
1-Propane	10.0	Isopropanol	9.8
2-butoxyethanol	9.0	JP 4	9.0
Acetone	10.0	JP 5	9.0
Acetonitrile	7.0	Kerosene	9.6
Benzene	9.5	Methane	7.2
Commercial Heptane	8.7	Methanol	15.2
Commercial Hexanes	9.0	Methyl Ethyl Ketone	9.6
Crude Oil	8.5	Methyl Isobutyl Ketone	9.1
Cyclohexane	9.4	Methyl Tert Butyl Ether	8.8
Cyclopentanone	9.6	n-Heptane	9.6
Denatured Alcohol	9.8	n-Pentane	8.8
Diesel fuel	8.7	Propane	8.7
Diethyl Ether	9.8	Pyrrolidine	9.5
Ethanol	12.6	Tetrahydrofuran	9.6
Ethyl Acetate	8.9	Toluene	7.6
Gasoline-87 Octane Unleaded	9.0	Transformer Oil	9.5
Hexene	7.6	1-Butane	8.6
Hydraulic Fluid	8.5	Xylene	7.8
Hydraulic Oils	7.7		

***Minimum design concentration according to NFPA 2001, 2018**

The fire suppressing depends on many other factors apart from the amount of extinguishing agent, such as the properties of the flammable substances in the space, shape and degree of closure of the space, air circulation and ambient temperature. In order to reach desired extinguishing concentration and effective use of BlazeCut system consult the choice of type, amount of agent and installation method with the supplier of the system.

It is necessary that conditions in the protected area are in accordance with allowed parameters of the system, especially minimum and maximum temperature in the protected area.

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

Use of the system is also limited by the properties of the extinguishing agent and its possible application. Detailed information is included in Chapter 7.

WARNING

Install and use the BlazeCut T Series with originally supplied components. Do not replace anything in the system. The use of external components not approved by the manufacturer, for example beacons and alarms, will not be the responsibility of BlazeCut and no warranty or claim will be acknowleded in this regard.

The BlazeCut T Series is designed as an independently operating unit. It is not possible to connect several independent systems to one larger system.

The system may be installed only by adult persons, who are physically and mentally capable. Incorrect interference with the system may cause malfunction of the system and may threaten the safety and health of people.

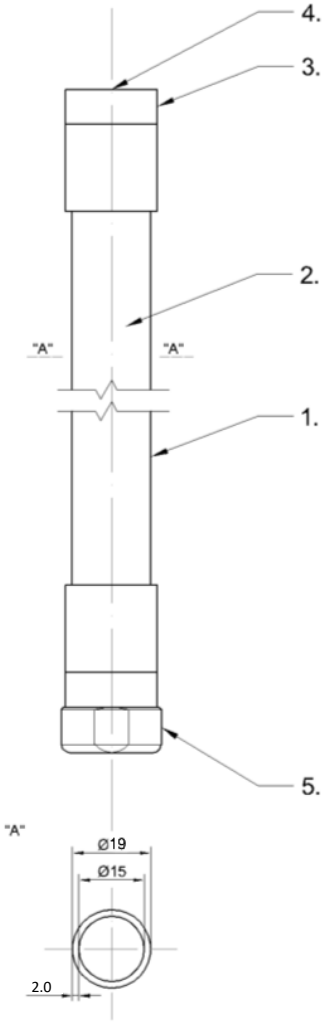
The system is not designed to be used as portable fire extinguisher. Do not try to suppress fire by holding the system in hands or sprinkling the extinguishing agent directly into the fire. Do not use the system in any other way than described in this manual.

PRESSURE TUBE

The plastic tube serves as storage for the extinguishing agent. It is filled with extinguishing agent HFC-227ea and the amount depends on the type of system. The Extinguishing agent is in the form of liquefied gas. Due to physical and chemical properties of the agent, pressure in the tube can vary depending on the ambient temperature.

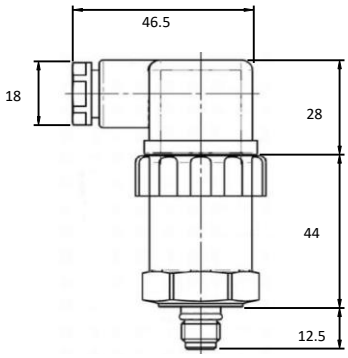
The T Series system is under constant pressure. Do not damage, puncture or throw the system. During transportation, secure the system against movement. During transfer do not rub the system against the ground or objects. Do not try to repair a damaged tube. Do not store or transport the system in the vicinity of strong sources of heat, aggressive chemical substances (caustic, corrosive substances). Prevent contact with sharp objects, vibrations or loading with other objects. Store in a dry and well-ventilated room.

3 COMPONENTS OF THE SYSTEM AND THEIR DESCRIPTION

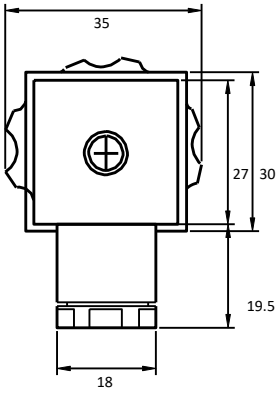


Scheme of the system and description of components, all data in millimetres

1. *Pressure tube*
2. *Extinguishing agent HFC-227ea*
3. *Fitting of the tube with outlet M10x1 and with the filling valve*
4. *Sealing screw (inside the fitting)*
5. *Pressure gauge of the system*

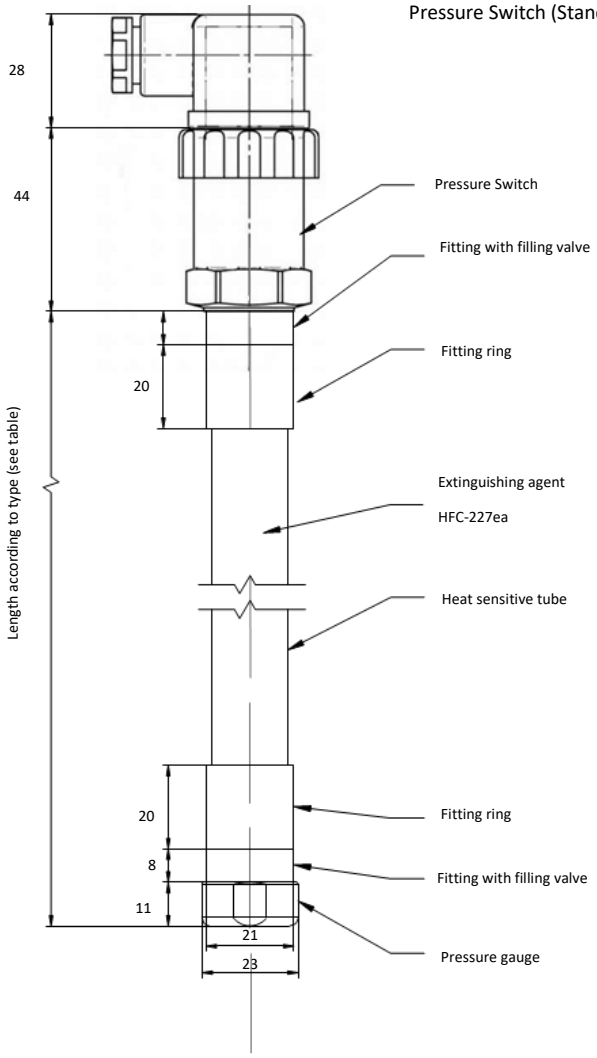


Pressure Switch (sideview)

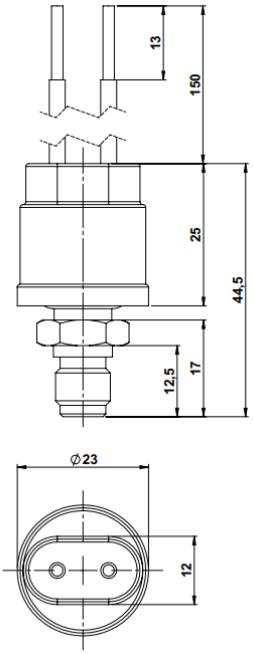


Pressure Switch (frontview)

Pressure Switch (Standard)



Economical Pressure Switch



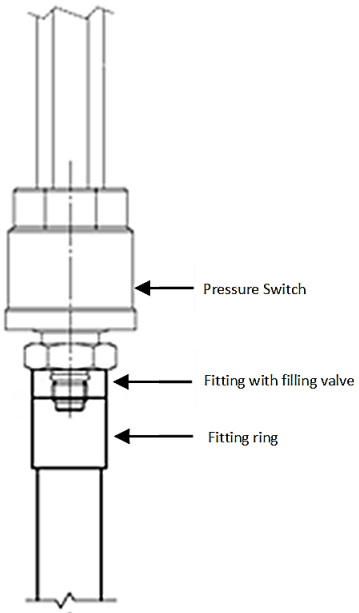


Table 10: Length and weight of systems

System Type	Type of agent	Amount of agent	Length of system	Gross weight of system
T025E	HFC-227ea	0.05 kg ± 2 g (0.11 lb ± 0.07 oz)	28 cm (11.02 in)	0.21 kg (0.46 lb)
T050E	HFC-227ea	0.10 kg ± 2 g (0.22 lb ± 0.07 oz)	53 cm (20.87 in)	0.29 kg (0.64 lb)
T100E	HFC-227ea	0.25 kg ± 5 g (0.55 lb ± 0.17 oz)	113 cm (44.48 in)	0.51kg (1.12 lb)
T200E	HFC-227ea	0.50 kg ± 5 g (1.10 lb ± 0.17 oz)	215 cm (84.64 in)	0.87 kg (1.92 lb)
T300E	HFC-227ea	0.75 kg ± 10 g (1.65 lb ± 0.35 oz)	319 cm (125.59 in)	1.23 kg (2.71 lb)
T400E	HFC-227ea	1.00 kg ± 10 g (2.20 lb ± 0.35 oz)	422 cm (166.14 in)	1.61 kg (3.55 lb)
T500E	HFC-227ea	1.25 kg ± 10 g (2.76 lb ± 0.35 oz)	526 cm (207.09 in)	1.95 kg (4.30 lb)
T600E	HFC-227ea	1.50 kg ± 10 g (3.31 lb ± 0.35 oz)	630 cm (248.03 in)	2.32 kg (5.11 lb)
T025ES*	HFC-227ea	0.05 kg ± 2 g (0.11 lb ± 0.07 oz)	35 cm (13.78 in)	0.34 kg (0.75 lb)
T050ES*	HFC-227ea	0.10 kg ± 2 g (0.22 lb ± 0.07 oz)	60 cm (23.62 in)	0.42 kg (0.93 lb)
T100ES*	HFC-227ea	0.25 kg ± 5 g (0.55 lb ± 0.17 oz)	120 cm (47.24 in)	0.64 kg (1.41 lb)
T200ES*	HFC-227ea	0.50 kg ± 5 g (1.10 lb ± 0.17 oz)	222 cm (87.40 in)	1.00 kg (2.20 lb)
T300ES*	HFC-227ea	0.75 kg ± 10 g (1.65 lb ± 0.35 oz)	326 cm (128.34 in)	1.36 kg (3.00 lb)
T400ES*	HFC-227ea	1.00 kg ± 10 g (2.20 lb ± 0.35 oz)	429 cm (168.89 in)	1.74 kg (3.84 lb)
T500ES*	HFC-227ea	1.25 kg ± 10 g (2.76 lb ± 0.35 oz)	533 cm (209.84 in)	2.08 kg (4.59 lb)
T600ES*	HFC-227ea	1.50 kg ± 10 g (3.31 lb ± 0.35 oz)	637 cm (250.79 in)	2.45 kg (5.40 lb)
T025ES-E*	HFC-227ea	0.05 kg ± 2 g (0.11 lb ± 0.07 oz)	31 cm (12.20 in)	0.24 kg (0.53 lb)
T050ES-E*	HFC-227ea	0.10 kg ± 2 g (0.22 lb ± 0.07 oz)	56 cm (22.05 in)	0.32 kg (0.71 lb)
T100ES-E*	HFC-227ea	0.25 kg ± 5 g (0.55 lb ± 0.17 oz)	116 cm (45.67 in)	0.54 kg (1.19 lb)
T200ES-E*	HFC-227ea	0.50 kg ± 5 g (1.10 lb ± 0.17 oz)	218 cm (85.83 in)	0.90 kg (1.98 lb)
T300ES-E*	HFC-227ea	0.75 kg ± 10 g (1.65 lb ± 0.35 oz)	322 cm (126.77 in)	1.26 kg (2.78 lb)
T400ES-E*	HFC-227ea	1.00 kg ± 10 g (2.20 lb ± 0.35 oz)	425 cm (167.32 in)	1.64 kg (3.62 lb)
T500ES-E*	HFC-227ea	1.25 kg ± 10 g (2.76 lb ± 0.35 oz)	529 cm (208.27 in)	1.98 kg (4.37 lb)
T600ES-E*	HFC-227ea	1.50 kg ± 10 g (3.31 lb ± 0.35 oz)	633 cm (249.21 in)	2.35 kg (5.18 lb)

*including fitted Pressure Switch with cable plug

Always handle the pressure tube as if it were under pressure, unless it is directly verified that it is completely empty.

FITTINGS OF THE TUBE

The Fittings of the T Series system close the tube and keep the system under pressure. The filling valves are fitted in the fittings and closed by a pressure gauge on one end and sealing screw or pressure switch on the other end. The pressure switch is fitted at the factory when ordered.

Do not try to remove fittings of the tube. Protect the fittings from corrosive substances during storage, transportation and when in use.

PRESSURE GAUGE

Actual pressure in the system can be determined by reading the value on the pressure gauge, which is mounted on the fitting tube. Try to install the pressure gauge so that the pressure values can be read.

NOTE: Due to physical and chemical properties of the agent, pressure in the tube can vary depending on the ambient temperature. The higher the ambient temperature, the higher pressure in the tube and vice versa. At very low temperatures the pressure of agent vapours is zero (see Chapter 7.4).

4 INSTALLATION INSTRUCTIONS

4.1 FOLLOW THE FOLLOWING INSTRUCTIONS DURING INSTALLATION

1. The tube in the retail packaging is secured with cable ties. Cut the cable ties carefully, avoiding damage to the tube. Dispose of the silicone and plastic cushions used for packing and transport purposes.

2. The package contains high temperature cable ties for installation in the protected equipment. It is possible to use PVC dipped or rubber insulated metal clamps in harsher environments to prevent detachment of the tube. Do not use a steel fastening material for installation it must be insulated. If in direct contact, steel clamps, steel cable ties or wire will cause heat concentrations on the pressure tube. This can result in a false or lower temperature actuation.

3. Place the BlazeCut T Series in the proximity of the protected equipment where the risk of fire is greatest (in the area of engines, systems containing flammable liquids or gases, protected objects, electrical installations, connections, circuit breakers, inductors, batteries etc.).

4. Bend the tube to shape for the installation. A minimum bend radius of 160 mm (6.30 inches) must be maintained.

5. The BlazeCut T Series must be mounted away from hot parts and cannot directly contact parts or be in proximity of parts that during operation have temperatures exceeding 80 °C (176 °F) for TxxxES models and 90 °C (194 °F) for TxxxE models (e.g. engine, turbocharger, exhaust manifold, hot parts of inductors etc.).

6. If there are doubts on the operating temperature exceeding 80 °C (176 °F) for TxxxES models and 90 °C (194 °F) for TxxxE models, measure the max ambient heat in the area where the tube is to be installed. The tube may not be in direct proximity, but the radiant heat rising to the top of the engine bay or equipment may exceed the maximum temperature limit, causing a false actuation.

7. For maximum efficiency, do not place the BlazeCut T Series behind barriers that could restrict or prevent direct penetration of extinguishing agent into the protected equipment. Do not place the T Series close to vents or openings as this may reduce the amount of agent applied to the protected equipment.

8. Proceed carefully with the installation, so no damage is caused to the tube by sharp objects. Do not break or crimp the tube. Make sure that the tube will not be damage after closing doors or covers of the equipment (e.g. after closing the engine hood, installation of covers or enclosure etc.). No part of the system should be hit by moving parts (engine fans etc.).

9. The BlazeCut T Series must be firmly mounted in the protected equipment so that it does not move. Use included cable ties or PVC dipped/rubber insulated metal clamps. The maximum distance between the mounts shall not be more than 250 mm (10 inches).

10. Fasten the system to fixed interior parts of the protected equipment. Do not fasten to parts, which move during operation of the vehicle or equipment. Make sure that the cable ties or clamps are not damaged during operation of the vehicle or equipment. If the BlazeCut T Series moves out of place after

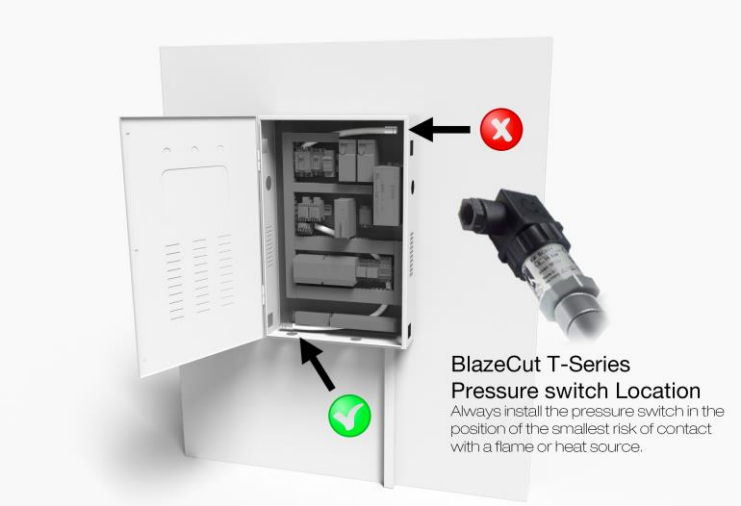
installation, the extinguishing effect of the system may be decreased and part or the entire protected equipment may be damaged.

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

12. When fastening the system make sure not to damage other parts of the vehicle or equipment.

13. After installation, place the general warning label (ALA008) on a highly visible area of the protected equipment. The label should be placed on an even smooth surface. Clean the surface thoroughly before sticking. Do not place the label in areas reaching high temperatures (engine block etc.).

14. Ensure to follow all local laws, for example if required, ensure a date tag is installed and dated.



Always wear appropriate personal protective equipment whilst installing or servicing. Use impervious working gloves and protective eyewear in case of false actuation.

Always place the pressure switch in the lower part of the risk area to avoid direct flames and heat.

Always Isolate any equipment. Be aware of the danger posed by the protected device. Do not install and perform maintenance of the system if engines are in operation or power has not been shut down.

In the case of work in the vicinity of electrical equipment observe corresponding safety rules and instructions. Work on electrical installations may be performed only by qualified persons.

The tube has a minimum bending radius of 16 cm (6.30 inches). Do not bend the tube under this radius. Excessive bending can damage the tube where it can rupture or break. As a result of the damage the extinguishing agent can splash out and provide threat to health of persons.

The tube needs to be mounted away from hot parts that can exceed the burst temperature ratings. Try to avoid mounting directly above heated parts, rather mount the tube to one side of the heated parts.

Do not place the T Series close to vents or openings. This may reduce the amount of agent applied and retained in the protected equipment. Concentration levels may not be achieved.

4.2 GENERAL WARNING LABEL

A general warning label is supplied with each BlazeCut T Series system to ensure that the operator or people that may come in contact with the system are informed about its presence and operation.

Part No.	Description	Comment
ALA008	General Warning label for T Series	To notify there is a fire suppression system.

General warning label ALA008

The ALA008 is supplied with all T Series units and can be ordered as a replacement in case of damage.

5 INSTRUCTIONS FOR FUNCTIONALITY, INSPECTION AND MAINTENANCE

The BlazeCut T Series does not require any special maintenance. It is recommended to visually inspect the system and its condition. Monthly inspections for harsh environments and up to three monthly for non-harsh environments.

5.1 VISUAL INSPECTION

During the movement of the tube bubbles of gas in the extinguishing agent will be visible at its highest point. This indicates that extinguishing agent is in the tube and the BlazeCut T Series is functional. Visually inspect the overall state of the system. Focus on possible damage to the tube, such as grooves, signs of strain (which causes the tube to change a lighter colour), dents, other deformations, corrosion of the metal parts (fittings of the tube, pressure gauge) and any other visible signs of damage. Inspect the fitting parts of the system for any leaks and signs of leakage of extinguishing agent from the system.

5.2 PRESSURE INSPECTION OF THE SYSTEM

Due to physical and chemical properties of the agent, pressure in the tube can vary depending on the ambient temperature. The higher the ambient temperature, the higher pressure in the tube and vice versa at very low temperatures the pressure of agent vapours is zero (see Chapter 7.1).

The indicator on the pressure gauge can vary from 0 bar (when temperatures are very low) to 17 bar (when temperatures are very high). This is not a sign of defect in the system.

Table 11: Overview of inspections

№	Period / interval	Obligatory scope
1.	Every 1 to 3 months	1. Overall inspection of the system for damage or wear. 2. Check mounts for being secure, replace or tighten where necessary. 3. Check for bubbles of gas in the extinguishing agent. 4. Check pressure at normal operating temperature. 5. If applicable ensure date tag is updated.
2.	5 to 10 years	1. Dependent on being in a passive or harsh environment, the T Series may need replacing if any of the above steps fail.

5.3 IMPORTANT: IN THESE CASES THE BLAZECUT T SERIES MUST BE REPLACED

1. The system is leaking, was used or emptied from other reasons.
2. The system was exposed to direct fire.
3. The tube shows signs of damage.
4. Metal parts of the system are corroded or show visible signs of damage.

Inspection and test intervals stated in the Table 11 in Chapter 5.2 are minimum intervals required by the manufacturer. Always ensure that local regulations are followed.

6 FIRE PROCEDURE FOR SYSTEM ACTIVATION

In case of fire in mobile equipment, the driver or operator must immediately stop the equipment, turn off the engine and perform further measures according to the operating instructions of the equipment. For example

there may be a requirement to cut-off the supply of fuel/gas supply in order to protect the persons and property surrounding the protected area. This may be in accordance to applicable legislations.

In case of fire in an enclosure, once determined the fire was extinguished, ventilate the protected equipment properly, do not enter in the area before ventilation.

Once the fault has been identified and repaired in the equipment, remove the used system from the protected equipment and replace with a new system. The same procedure should be followed after the release of extinguishing caused from other issues (system damage etc.).

WARNINGS

Always wear appropriate personal protective equipment whilst installing or servicing. Use impervious working gloves and protective eyewear in case of false actuation.

In case of fire the system activates automatically without previous warning. In case of fire do not come into direct proximity of the system, there is a risk of being affected by extinguishing agent. After release of extinguishing agent do not enter the protected equipment. Always consider supplementary firefighting equipment be available in case system does not totally extinguish a fire.

The system is under constant pressure. Any interference with the system is prohibited.

Any interference or repair of the system may be performed by qualified persons ensuring correct technical practice. Do not repair or replace anything in the BlazeCut T Series. System interference or non-genuine replacements shall result in loss of warranty and may cause malfunction of the system or expose danger to persons.

Do not interfere with the system if it was exposed to high temperature (as a result of operation of the protected device or after exposure to fire etc.). If the system is hot, the temperature of extinguishing agent increases and pressure in the system increases. If the pressure in the system is higher than 15 bar the system is reaching burst pressure. In this case the tube must not be mechanically stressed. Release of extinguishing agent under high pressure can cause serious injury. Wait till the system cools down.

Do not try to suppress the fire by holding the BlazeCut T Series close to fire or by throwing it into the fire. There can be a high danger of serious injury.

7 INFORMATION ON EXTINGUISHING AGENT USED

The BlazeCut T Series uses stored extinguishing agent:

Type of extinguishing agent: HFC-227ea

Chemical name: 1,1,1,2,3,3,3-Heptafluoropropane

General characteristic: liquefied gas, colourless, odourless

The system contains fluorinated greenhouse gases.

GWP: 3220

Amount of extinguishing agent is stated in

HFC-227ea Extinguishing Agent is UL Recognized and FM Approved

Table 10, Chapter 3 and on the information label of each system.

7.1 DESCRIPTION OF THE EXTINGUISHING AGENT

The extinguishing agent is a clean extinguishing medium and used in the BlazeCut T Series for volume fire suppression. Extinguishing agent siphons heat from the fire, alters the chemical chain reaction of burning, slows this reaction and stops it.

Extinguishing agent is not toxic or poisonous, it does not have carcinogenic or a mutagenic effects and it is considered an environmentally accepted suppressing agent.

MAIN ADVANTAGES OF EXTINGUISHING AGENT

- electrically non-conductive
- non-corrosive
- resistant to temperature changes
- safe for people when safety instructions are followed
- leaves no residue
- does not damage equipment or objects
- zero ODP (Ozone Depletion Potential)

7.2 PERMISSIBLE USES

Extinguishing agent may be used for the following classes of fire:

Class A – flammable combustibles (creating flames)

Class B – flammable liquids

Class C – flammable gaseous substances

System is suitable for fire suppression of electrical equipment under voltage

Always consult the supplier to confirm suitability on the use of the system and the extinguishing agent in unspecified conditions.

After long exposure of extinguishing agent to heat the agent decomposes thermally creating dangerous products. In case of installation to equipment with risk of smouldering solid (e.g. wood, coal, paper, textiles etc.) use the BlazeCut T Series with additional components – pressure switch and output for a signalling of system activation.

Although the extinguishing agent is not toxic or poisonous, unnecessary excessive exposure of persons to its influence should be avoided. Under no circumstances should persons be exposed to the extinguishing agent for more than 5 minutes. A protected area cannot have people present when the extinguishing concentration exceeds the 10.5% LOAEL level (see toxicity data in Table 12).

The BlazeCut T Series system is primarily designed for small enclosed areas and equipment where people are not normally present (or are present for a short period of time to conduct inspections, maintenance, etc.).

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

During the system activation the extinguishing agent is discharged from the tube under high pressure and at very low temperature. No permanent work place should be placed less than 1 meter from the system if the system is not installed in equipment that prevents the extinguishing agent being discharged onto persons or no other barriers are in place preventing the extinguishing agent being discharged onto persons.

7.3 IMPROPER USES

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

- Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air;
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium and plutonium;
- Metal hydrides;

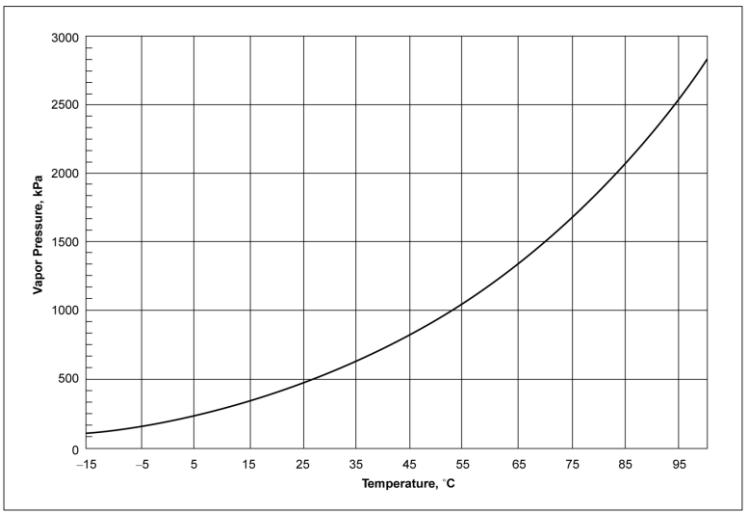
- Chemicals capable of undergoing auto thermal decomposition, such as certain organic peroxidase and hydrazine.

7.4 SOME PHYSICAL AND CHEMICAL PROPERTIES

Table 12: Properties of HFC-227ea

Property	Value
Global warming potential	3220
Ozone depletion potential	0
Chemical name	1,1,1,2,3,3,3-Heptafluoropropane
Formula	CF3CHFCF3
CAS number	431-89-0
Extinguishing concentration*	6.7 % of volume
Boiling point at pressure 1 bar	-16.34 °C
Freezing point	-131 °C
Critical temperature	101.75 °C
Critical pressure	2925 kPa
Critical density	621 kg/m^3
Density in liquefied form at 25 °C	1387.7 kg/m3
Pressure of saturated vapours at 25 °C	454.73 kPa
Molecular weight	170
Dielectric Strength at 1 atm, 25 °C (N_2=1)	2.0
Dielectric Strength in kV (vapor)	13.9
Toxicity LC50 (4 h inh.)	800 000 ppm
Toxicity AEL	1000 ppm
Toxicity NOAEL	9 % concentration, 90 000 ppm
Toxicity LOAEL	10.5 % concentration, 105 000 ppm
Flammability	inflammable substance
Form	liquefied gas
Colour	colourless substance
Odour	odourless

*Extinguishing concentration determined for reference substance n-Heptane



Relation of the HFC-227ea vapour pressure from temperature

Detailed information on extinguishing agent is included in safety data sheet.

7.5 WARNINGS

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

Extinguishing agent is heavier than air in a gaseous state. Accumulation in enclosed or low level areas may cause a lack of oxygen levels and result in suffocation. After use of the system use natural or forced ventilation and do not enter until the agent has been dispersed.

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

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

NOTE

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

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

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

8 FIRST AID INSTRUCTIONS

In case of direct contact with extinguishing agent proceed as follows:

GENERAL INFORMATION

In all cases of doubt, or when the symptoms persist, seek medical attention.

FOLLOWING INHALATION

Move the person to fresh air and keep them in a resting position that is comfortable for breathing. If the person is not breathing or if breathing is irregular or breathing has stopped, administer artificial respiration or oxygen by trained personnel. Loosen tight clothing such as collar, tie, waistband, and belt. Do not administer adrenaline or its derivatives. Seek medical attention immediately.

FOLLOWING EYE CONTACT

Carefully flush/irrigate with water for several minutes. Where applicable, remove contact lenses, if they are inserted. Continue flushing. Seek medical attention.

FOLLOWING SKIN CONTACT

Flush/irrigate the affected area with large amounts of water. Do not use hot water. Remove contaminated clothing affected by extinguishing agent. If you experience frostbite, seek medical attention.

INGESTION

Ingestion is not considered a potential route of exposure.

9 CERTIFICATION AND TESTING

The safety and performance of the BlazeCut T Series system was confirmed by various independent bodies.

A copy of the current certificates can be requested by emailing customerservice@blazecutgroup.com

10 T SERIES CLAIMS AND WARRANTY

DISTRIBUTORS

All orders should be checked within 14 days from receival to make a valid claim of short supply or damage. Provide all information of the relevant order it relates to. Please refer to the BlazeCut warranty claim form for further details.

BlazeCut offer a 3-month window for the sale of the goods to a retail transaction. This effectively gives a 27-month warranty on T Series for distributors shelf stock.

END USERS AND GENERAL PUBLIC

BlazeCut offer a two-year warranty on all T Series models. An extended warranty is available by visiting www.blazecut.com

11 LIST OF ANNEXES

Annex 1: Pressure monitoring

Annex 2: Alarm Panel Kit KTAP200

ANNEX 1: PRESSURE MONITORING

A1.1. PRESSURE SWITCH MODELS *TxxxES*

The Pressure Switch models TxxxES, is a mechanical switch with one pre-set pressure value (switch point). When the pressure in the system drops below the switch point the pressure switch sends a signal to an Alarm Panel or an external device to perform the designed operation. The pressure switch is supplied with the cable connector and can be monitored by the TAP200 panel for connectivity and faults if required.

The Pressure Switch models TxxxES will send a signal when the pressure in the system decreases regardless of the cause, in case of fire or accidental activation or a decrease of pressure in the system which is below the pre-set value. If the cable is disconnected or damaged a fault signal will display on the TAP200 panel if fault monitoring was an installed feature.

The pressure switch can be used as a universal means of sending signal after a T Series system activation. External devices can be informed via the signal (alarm panel, sounder, beacon etc.) or automatic processes can be performed (switching off electrical current, equipment shut-down etc.).

Due to physical and chemical properties of the extinguishing agent, at very low ambient temperatures, the vapour pressure of the extinguishing agent could be zero and the pressure switch could send a false alarm signalling zero pressure. Due to this reason when the pressure switch is used on the system it is pressurized with a nitrogen (N_2) so the pressure in the system shall not fall to zero.

Table 13: Specifications of Pressure Switch models TxxxES

Parameter	Description		
Material of body	nickel plated steel		
Switch point	set to 1 bar (14 psi)		
Switch configuration	NO/NC		
Hysteresis	min. 0.3 bar (4 psi) / max. 1 bar (14 psi)		
Switching frequency	Max. 100 / min		
Maximum pressure	60 bar		
Power rating	Angular connector	All	Current
Resistive load AC-12, DC12	AC 250V	DC 24V	4A
Inductive load AC-14, DC14	AC 250V	DC 24V	2A
IP rating	IP65 with cable connector and seal		
Electrical outlet	DIN EN 175301-803 A		
Operation temperature	from -20°C up to 80°C (-4°F to 176°F)		
Tested to :	EN60947 – Low-voltage switchgear and control gear IEC 68-2-78 Permissible air humidity (4K4H per EN 60721-3-4) IEC 60068-2-6 Vibration resistance 10 g (10…….2,000 Hz) IEC 60068-2-27 Shock resistance 30 g		
Advantages	heavy duty, higher power rating, monitoring function, NO/NC		

Pressure Switch models TxxxES

Cable connector

1. Fixing screw; use a screwdriver for installation and removal of connector. Tightening torque max. 5 Nm.
2. Electrical connector; use flat head screwdriver to remove from the connector body and connect the electrical cable as per drawing on page 28.
3. Gasket
4. Sealing nut to fix the electrical cable. Below the sealing nut is a grommet. Screw the sealing nut tight in order to seal the electrical cable properly.

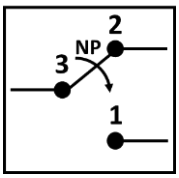
Step 1. Connect cable connector on pressure switch, ensure the seal is mounted on the connector

Step 2. Use screwdriver to fasten. Maximum tightening torque 5 Nm

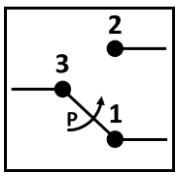
Connecting the cable connector to the pressure switch.

Cable connector with Silicone cable ACS103

Cable connector with Conduit connector ACC001



When supplied and before actuation (pressurized)
This is the configuration of the Pressure Switch on models TxxxES



When actuation has occurred (not pressurized)
This is the configuration of the Pressure Switch on models TxxxES

A1.2. ECONOMICAL PRESSURE SWITCH MODELS *TxxxES-E*

The Pressure Switch models TxxxES-E is a mechanical switch with one pre-set pressure value (switch point). When the pressure in the system drops below the switch point the pressure switch sends a signal to an Alarm Panel or an external device to perform the designed operation.

The Pressure Switch models TxxxES-E will send a signal when the pressure in the system decreases regardless of the cause. In case of fire, accidental activation.

The pressure switch can be used as a universal means of sending signal after a T Series system activation. External devices can be informed via the signal (alarm panel, sounder, beacon etc.) or automatic processes can be performed (switching off electrical current, equipment shut-down etc.).

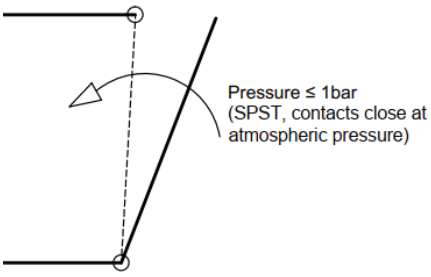
Due to physical and chemical properties of the extinguishing agent, at very low ambient temperatures, the vapour pressure of the extinguishing agent could be zero and the pressure switch could send a false alarm signalling zero pressure. Due to this reason when the pressure switch is used on the system it is pressurized with a nitrogen (N_2) so the pressure in the system shall not fall to zero.

Table 14: Specifications of Pressure Switch models TxxxES-E

Parameter	Description		
Material of body	brass, nickel plated steel with plastic cover		
Switch point	set to 1 bar (14 psi)		
Switch configuration	NC		
Maximum pressure	30 bar(435 psi)		
Max Power rating DC Max Power rating AC	50/60 Hz	36 VDC 240 VAC	3 A
Electrical outlet	2 x wire 0.75 mm^2, 150 mm length		
IP rating	IP54		
Operation temperature	from -20 °C up to 80 °C (-4 °F to 176 °F)		
Tested to:	EN60730 -Automatic electrical controls for household and similar use		
Advantages	light weight, cost-effective		

Pressure Switch models TxxxES-E

Method of closing the electrical circuit with the Pressure Switch models TxxxES-E *on connectors*



Comparison between pressure switch options.

	Models "S"	Models "S-E"
Indoor use	✓	✓
Fixed applications	✓	✓
Harsh environments	✓	×
Outdoor use	✓	×
Mobile/Vibrating applications	✓	×
Fault Monitoring	✓	×

The pressure switch is factory fitted during manufacturing process and must not be tampered with, disassembled or removed. Any user interference will void warranty.

Be aware of the danger posed by the protected equipment. When working in the vicinity of electrical equipment observe corresponding safety rules and instructions. Working on electrical installations may be performed only by qualified persons.

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

Always place the pressure switch in the lower part of the risk area to avoid direct flames and heat. The pressure switch cannot be in direct contact or be in immediate proximity with parts which heat to temperatures of more than 80 °C (176 °F).

A1.3. ELECTRICAL CABLES AND CONDUITS

For installation of Pressure Switch models *TxxxES(-E)*, the use of a three-core electrical cable for the TAP200 panel is recommended. A two-core electrical cable can be used to connect to other external devices.

Silicone cable.  *Cable conduit*  *ACC110.*

Table 15: Specification of silicon cables

Part №	№ of Cores	Description	Comment
ACS102	2x0.75 mm²	-60 °C up to 180 °C, up to 500 volt, UV stabilized, per metre	For installations with high temperatures like in engine compartments.
ACS103	3x0.50 mm²	-60 °C up to 180 °C, up to 500 volt, UV stabilized, per metre	For installations with high temperatures like in engine compartments.

Where installation spaces have increased risk of damage to cables, due to mechanical interference, use the cable conduit with conduit connectors to protect the electrical cables.

Table 16: Specification of conduits

Part №	Internal diameter	Description
ACC110	10 mm	-40 °C to 120 °C, UV stabilized, black, per metre

NOTE

In case of malfunction or disconnection of the electrical of components (Pressure Switch Models *TxxxES(-E)*, electrical installations) the T Series system remains fully functional as these components are not used for the systems automatic activation in case of fire. However functions such as power shut down and fire signalling may be affected.

ANNEX 2: ALARM PANEL KIT KTAP200

A2.1. BASIC INFORMATION ABOUT THE COMPONENTS

Commercial name: BlazeCut Alarm panel Kit KTAP200

Function: Supply audio and visual warning upon actuation or fault.

Reference: For full details on the Alarm Panel TAP200 please see the APM200T manual.

KTAP200 includes the Alarm panel, Alarm panel mounting bracket, Fuse link, and one 6 pin Deutsch plug.

A2.2. ALARM PANEL TECHNICAL SPECIFICATIONS

- Material of body: Durable red anodized aluminium body suited for harsh environments
- Dimensions: Ø 50 mm (1.97 inches) diameter - allows for optional mounting; Flush mounted in a dash or the external bracket may be used to position the panel at any angle. Depth 30mm (1.18 inches) (excluding cable gland)
- Operation temperature: from -30 °C to +70 °C (-22 °F to 158 °F)
- Ingress Protection: IP65 rated
- Operation voltage: from 9 volt DC to 36 volt DC
- Maximum current draw at 24 V DC: 0.06 A - minimized power consumption from external power source.
- External Cable: 1 m cable, 5 cores Ø 0.50 mm
- Sound power: 85 dB @ 10 cm (3.93 inches)
- External fuse: 100 mA
- Luminous intensity of LED lights: 1000 mcd / mA
- Electromagnetic compatibility (EMC) and immunity testing in accordance to E/ECE/324 and EHK 10-04

A2.3. SPECIFICATION AND DESCRIPTION OF FUNCTION

The BlazeCut Alarm Panel TAP200 informs the persons of a decrease in pressure with the system by a light and sound signal. It can be connected to the BlazeCut Pressure Switch models *TxxxES(-E)* and reacts to its signal.

The Alarm Panel is connected to the system with electric cable ASC103. It is connected to an electric power supply of the equipment via a fuse (included in the panel kit). The Alarm panel is installed in the driver/operator area so that the unit is within the reach and light and sound signals may be noticed under all circumstances.

The BlazeCut Alarm Panel TAP200 is especially suitable for use in connection with the systems installed into equipment such as:

- Motorboats,
- Road vehicles (cars, SUVs, vans, recreational vehicles, minibuses, old timers, etc.),
- Off-road vehicles (small tractors, etc.)
- Electrical enclosures
- Generators, lighting towers etc.
- Stand-alone refuelling stations

A2.4. USE

The BlazeCut TAP200 Alarm panel can be used with all T Series systems that include a pressure switch.

Signalling devices can be connected directly to the pressure switch on all types of BlazeCut Pressure Switch models TxxxES or TxxxES-E.

The use of signalling units must only be done using original supplied components. Do not replace anything in the system. Using components not approved by the manufacturer may cause a loss of warranty, malfunction of the system and may present danger to life and the health of persons.

A2.5. INSTALLATION AND CONNECTING

Do not place the unit where it could affect the operation of the equipment or reduce operator visibility from the operating area.

Before interfering with electrical installation on the equipment, make sure that the power supply has been isolated.

Be aware of the danger posed by the protected device. When working in the vicinity of electrical equipment observe corresponding safety rules and instructions. Work on electrical installations may be performed only by qualified persons.

1. Place the Alarm panel of the system in the driver's cabin or operator's area, so that the unit is within the drivers or operator's reach and field of vision (light and sound signals in case of system activation).

   Two methods for mounting include:

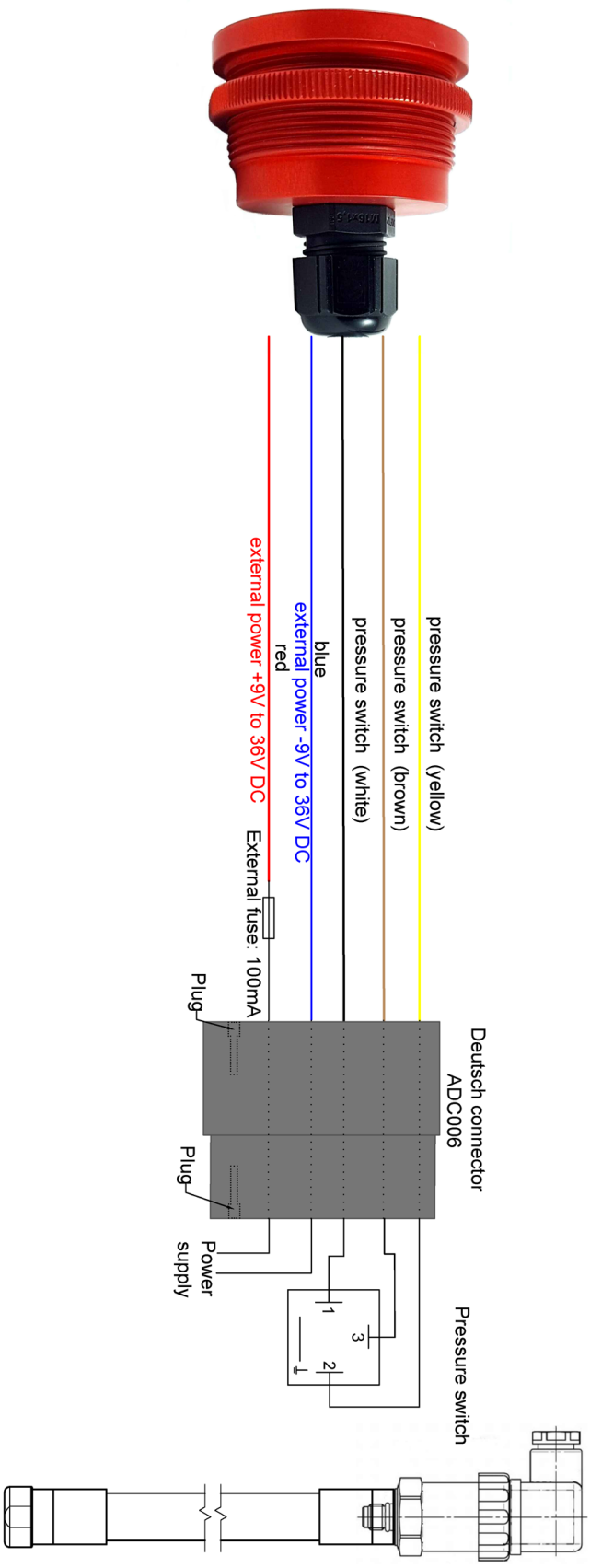
   For a mounted installation use a stainless-steel panel bracket supplied in a kit. The panel has holes for screws in two positions so the panel can be fixed vertically or angled depending on place of installation. The panel bracket can be installed to any surface and position and the panel can be rotated 360° so it can be fixed in a desired position. Use the locking nut to fix the Alarm Panel to the bracket.

   For in-dash installations, it is necessary to prepare round mounting hole in a sturdy panel no more than 13 mm (0.51 inches) thick with a Ø 44 mm (1.73 inches). Once the panel is inserted in the mounting hole use the locking nut to fix the panel in a dash from behind. The panel can be rotated 360° so it can be fixed in desired position.

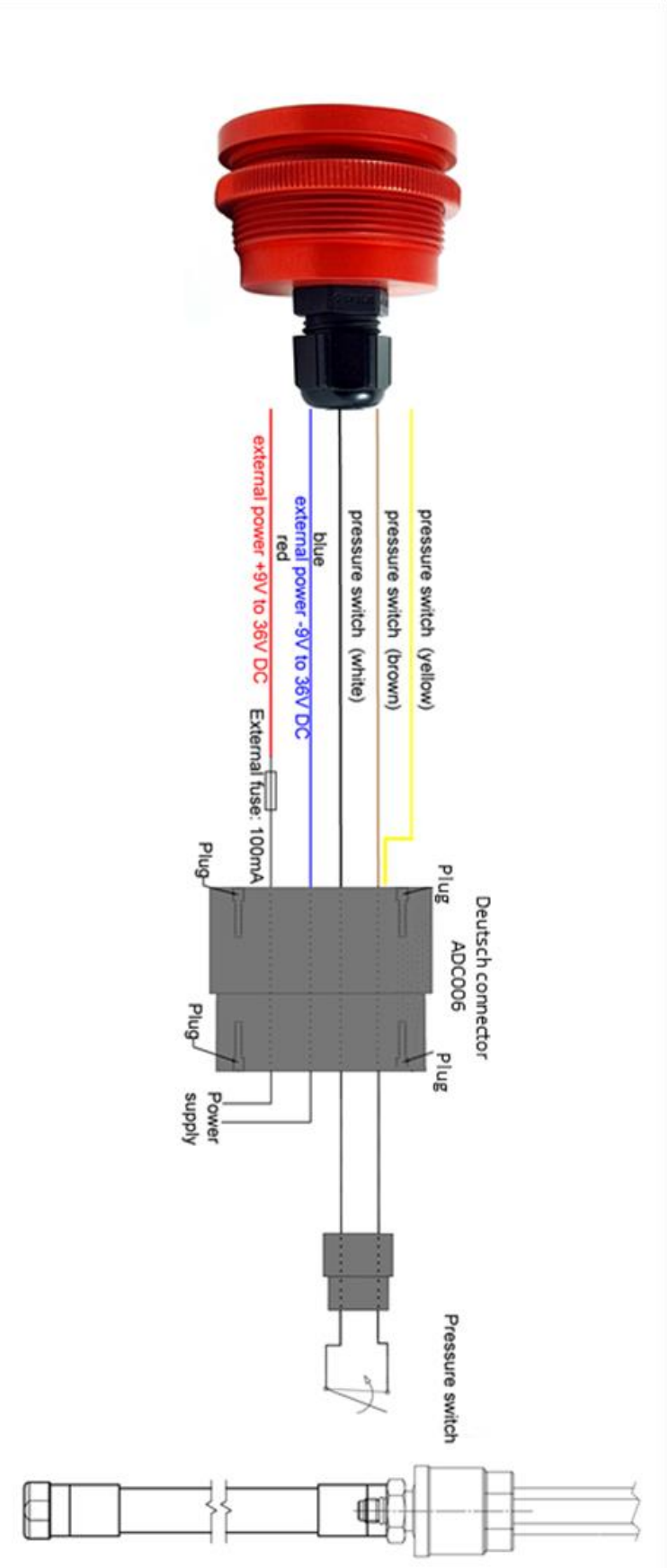
Panel Bracket ABP200

2. Protect the part of the electrical installation placed in the protected equipment by using silicone cable or cable conduit with standard cable. There is a 6 pin Deutsch plug provided in the Alarm Panel kit. Detailed installation instructions can be found in the APM200T manual.
3. Place the wiring from the pressure switch to the Alarm Panel. Fasten the cables to suitable firm parts of the equipment to ensure it will be protected from damage and rubbing. Ensure the Alarm Panel is not obstructed by the equipment, so viewing is not obscured and audio integrity is maintained.
4. The Alarm Panel has its own fuse supplied and must be connected to the positive side of the power supply to the panel. Please ensure you are using a suitable voltage source.
5. Ground the system to the frame of the vehicle or equipment.
6. Connect the Alarm Panel to the pressure switch as shown on the scheme of connecting, proceed in accordance with the instructions for connecting the corresponding pressure switch below.

Connection of Alarm Panel TAP200 to Pressure switch models TxxxES



Connection of Alarm Panel TAP200 to the Economical Pressure switch a models TxxxES-E

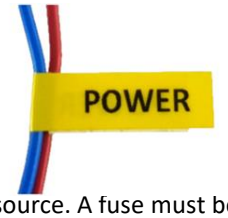


A2.6. WIRING

The BlazeCut Alarm Panel TAP200 includes 1 m output cable with 5 cores that are marked for correct installation.

Power

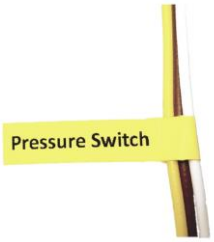
Wire	Signal
Red	+
Blue	-



To connect the power from the vehicle battery or other external power source. A fuse must be used.

Pressure Switch

	Models ES	Models ES-E
Wire	**Signal**	**Signal**
Brown	+	+
White	-	-
Yellow	Monitoring to pressure switch	Not available

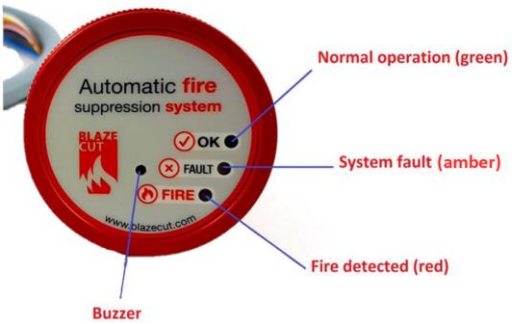


The Pressure Switch circuit wires are used to connect directly to the pressure switch on all types of BlazeCut Pressure Switch models TxxxES or TxxxES-E. When connect to a TAP200 Alarm panel, monitoring of the T Series system can be featured by sending a signal to the panel when the pressure drops below 1 bar or if there is a fault with the wiring.

The Alarm Panel is using ACF001 external fuse rated 100 mA to provide additional protection in case of overloading. The fuse is installed between the panel wiring and external power source. The fuse is supplied with the protective case for external installation. **Wiring: The external fuse must be connected on the positive power wire.**

A2.7. DESCRIPTION OF FUNCTION OF THE TAP200

The TAP200 Alarm panel informs the current condition of the system with light and sound signals.



If the system signals activate the driver/operator must immediately stop the vehicle or shutdown the equipment and perform further measures according to operation instructions of the vehicle or equipment in order to protect the persons and property according to applicable legislations.

SERVICING OF THE ALARM PANEL

The TAP200 alarm panel is a sealed unit which has been designed and manufactured to be a maintenance free item. General external housekeeping is recommended over the life of the panel. The panel has a 3 year warranty.

12 ADDITIONAL NOTES

Please note any suggestions for BlazeCut to improve our manuals and email us at customer service@blazecutgroup.com