SANDVIK

Sandvik Mining and Construction Adelaide Ltd

ABN 73 007 980 645

Quality System

Quality Endorsed Company

ISO 9001 Lic 12239
SAI Global
Manufactured under a quality system certified as complying with ISO 9001 by an accredited certification body

NFP1000

PRE-ENGINEERED FOAM FIRE SUPPRESSION SYSTEM FOR MOBILE EQUIPMENT

PARTS AND SERVICE MANUAL

5th Edition – January 2007 Revision (April 07 update)

FPA AUSTRALIA

Corporate Gold Member

ALL INFORMATION CONTAINED WITHIN THIS MANUAL IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

Sandvik Mining and Construction Adelaide Ltd reserve the right to revise and improve the product at any time. This publication describes the product at the time of issue and may not reflect the current product.

PLEASE NOTE

For systems that were supplied with chrome plated brass components, please add a **–C** to the end of the standard brass part and assembly numbers listed in this manual.

For example: A chrome plated head assembly would be part number 69-334-805-C.

© Publication Number 69 343 094

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GENERAL DESCRIPTION

The patented Sandvik NFP1000 is a fixed fire suppression system for mobile plant and equipment. The primary function of this system is to ***protect the operator***.

The system is ***pre-engineered***, self-contained and requires no electrical, pneumatic or gas cartridge activation devices. Designed and manufactured in Australia, it greatly reduces risk to people and property by providing effective fire protection and therefore safer operating conditions. It has been specifically designed to suppress hydrocarbon fuel & oil fires by application of ***foam extinguishing agent***.

When a hydrocarbon fuel is ignited, it is not the fuel, but the vapours that are burning. For the fire to sustain combustion, fuel, oxygen, heat and chain reaction are required. If any one of these is eliminated, the fire will go out. Foam will ***cut off the oxygen*** supply, act as a ***vapour seal*** over the fuel and at the same time ***cool the area*** due to the water content in the foam (greatly reduces risk of re-ignition).

The flexibility of the NFP1000 design allows it to be ***custom fitted*** to almost any type of mobile or stationary equipment, plant or machinery. The system uses a unique ***patented*** unstressed diaphragm head assembly, mounted on a pressurised stainless steel tank (1200 kPa). All lines in the activation circuit of the system are pressurised. Activation is by releasing the stored pressure from this circuit. This is known as a ***loss of pressure type system***. The discharge circuit is arranged in the form of a ring main. It consists of high standard fire rated hose with a series of nozzles aimed at the risk areas that have been identified in a ***fire risk assessment*** (potential fuel sources, ignition sources and areas where fuel could collect).

There are three ways the system can be activated:
It can be ***activated manually*** by operating the large yellow valve handle on one of the manual activation modules (in cabin or externally).
It can be ***activated automatically*** by the fire detection and system activation tubing. This auto-detect and activation tube is made from a synthetic material designed to melt in the heat of a fire at approximately ***150 degrees Celsius***, with the resulting pressure drop in the activation circuit initiating the system discharge.
It can be ***activated electrically*** by operating a solenoid valve to release the pressure from the activation lines. This is an optional accessory and not fitted to all systems. It is mainly used on remote controlled equipment to activate the system from a switch on the remote control transmitter.

For ***integration*** into the ***engine management*** system, the fire system can be fitted with a pressure switch in the activation circuit. This switch sends a signal to the fire system control panel in the cabin when the system pressure drops to below ***900kPa*** (system activated or low on pressure). This results in an ***audio-visual alarm*** and initiates a delay timer sequence for ***automatic engine shutdown***. The standard engine shutdown ***delay*** is ***6 seconds*** (with provision for a 20 second extension).

During operation, the nozzles spray a ***full cone*** pattern of foam. Various quantities and sizes of tanks are available to provide the required area coverage (number of nozzles) and give a ***minimum*** effective system ***discharge*** period of ***60 seconds***.

All nozzles, fittings and head assemblies are ***corrosion resistant*** (brass).

The system operates on pressure differential (rather than numerous moving and sliding parts) and requires ***minimal maintenance***. It can be recharged easily (water, foam and Nitrogen), resulting in ***almost no downtime*** and very ***low running costs***.

⚠ PRECAUTIONARY NOTICES ⚠

- OH&S REQUIREMENTS AND PROCEDURES MUST BE FOLLOWED AT ALL TIMES.
- THE NFP1000 IS A FIRE SUPPRESSION SYSTEM, NOT A FIRE EXTINGUISHING SYSTEM AND DOES NOT REPLACE ON BOARD HAND HELD FIRE EXTINGUISHERS.
- ALL INSTALLATION, COMMISSIONING AND SERVICING SHOULD BE PERFORMED BY ACCREDITED PERSONNEL ONLY.
- SYSTEM USES PRESSURISED NITROGEN AND MUST ALWAYS BE CONSIDERED CHARGED.
- ALWAYS RELIEVE PRESSURE AT FILLER BUNG PRIOR TO REMOVING ANY PART OF THE SYSTEM.
- USE ONLY SPECIFIED RECHARGING AGENTS. USE OF OTHER AGENTS MAY IMPAIR EFFICIENCY OR CAUSE MALFUNCTION.
- ENSURE THAT CORRECT RATIO OF AGENT IS ADDED TO GUARANTEE OPTIMUM FOAM GENERATION ON DISCHARGE.
- SYSTEM SHOULD BE ACTIVATED AND FULLY DISCHARGED AS PER SERVICING SCHEDULE TO AVOID DETERIORATION OF PRE-MIXED WATER AND FOAM SOLUTION.
- RECHARGING SHOULD ONLY BE CARRIED OUT USING SPECIFIED APPROVED NITROGEN CHARGING ASSEMBLY No. 69-334-080 OR 69-344-180.
  OTHER RECHARGING APPARATUS ARE NOT RECOGNISED BY MANUFACTURER AND MAY CAUSE INJURY.
- DO NOT OVER-TIGHTEN THE HEAD SWIVEL NUT. TORQUE THE NUT TO A MINIMUM OF 100 Nm AND A MAXIMUM OF 150 Nm.
- REGULAR SERVICING IS IMPERATIVE AND NON COMPLIANCE WITH SERVICING SCHEDULE MAY VOID WARRANTY.
- DAMAGED HOSES OR FITTINGS SHOULD BE REPLACED IMMEDIATELY TO ENSURE SYSTEM REMAINS FULLY OPERATIONAL.
- PRESSURE TEST OR REPLACE TANK AT REQUIRED INTERVALS TO COMPLY WITH RELEVANT STANDARDS AND REGULATIONS.
- COMPONENTS HAVE BEEN CUSTOM DESIGNED FOR THE NFP SYSTEM AND MUST NOT BE USED IN ANY OTHER APPLICATION.
- PLEASE NOTE THAT STANDARDS ARE CONTINUOUSLY REVIEWED AND COMPLIANCE MUST BE WITH LATEST ISSUE OF THE RELEVANT AUSTRALIAN STANDARD.

ABOVE PRECAUTIONARY NOTICES MUST BE READ IN CONJUNCTION WITH WARRANTY TERMS & CONDITIONS AND SERVICE PROCEDURES.

SYSTEM OPERATION

A. IN CASE OF FIRE

When a fire starts, the way you react is very important. As soon as you become aware of a fire, do the following things:

1. If you are in no immediate danger, **turn off the engine**. If at all possible, do not leave the equipment or machinery running; it may add more fuel and oil resulting in the fire spreading faster.

2. **Turn the valve handle** on the fire suppression activation module anti-clockwise to activate the system.

3. **Retreat** from the area quickly and **raise the alarm**.

4. **Stand by with portable fire extinguisher** where possible to prevent re-ignition of fire or to extinguish fire outside the protected area of the fire suppression system.

B. EXPLANATION

Quickly retreat from the fire to protect yourself against wind blown flames, smoke, gases and other dangers created by the fire. Fires are very unpredictable and can turn suddenly, flare up, turn into a fireball by sudden ignition of large quantity of fuel.

It is important to keep your distance until the fire has been knocked down by the fire suppression system.

Residual heat from the fire could cause re-ignition after the system has discharged and therefore it is important that someone stand by, at a safe distance, with a portable fire extinguisher. This stand-by should be maintained until expert attention has arrived or there is no possibility of re-ignition.

C. AFTER THE FIRE IS OUT

The engine should not be restarted until the equipment and fire suppression system have been inspected, repaired, serviced and cleaned to ensure that the fault causing the fire has been rectified and the fire suppression system is fully operational for continued protection.

Immediately recharge the fire suppression system.

NOTE - YOU'VE NEEDED IT ONCE, YOU MAY NEED IT AGAIN!

No fire is too small for a fire suppression system to be operated - All fires start small.

The NFP1000 fire suppression system has been primarily designed to protect life and if possible also save the equipment. Therefore this system is for the protection of the operator or driver as well as other people in the immediate area.

FOAM CONCENTRATES

AFFF (6%) type foam - **Kerr (Croda) Filmform 916** - supplied as standard.
AFFF stands short for **A**queous **F**ilm **F**orming **F**oam.
It is a synthetic compound that forms a film as the solution drains from the finished foam. This gives an effective vapour seal and fast knockdown of hydrocarbon fires even with low application rates and only a thin layer of foam present. Due to these film-forming properties, this type of foam can be applied by non-aspirated nozzles.
AFFF foam has excellent knockdown capabilities, however there are some brands that lack resistance to burnback (re-ignition) and fuel contamination.

FFFP (6%) type foam - **Angus Fire Petroseal 6%** - supplied as an alternative.
FFFP stands short for **F**ilm **F**orming **F**luoro**P**rotein.
It is a film-forming compound with a protein rather than a synthetic base.
The knockdown capabilities (with non-aspirated nozzles), burnback and re-ignition characteristics are very similar to our AFFF. It has very good resistance to fuel contamination, which gives it a slight advantage over the AFFF.
The major advantage of FFFP is that it is environmentally friendly (low toxicity) and **fully biodegraded in 21 days**. A significant drawback of protein foam however is the strong inherent **organic odour** (stink). As this is a concern in underground situations (majority of our installations), FFFP foam is only offered for applications with particular environmental issues such as forestry or agriculture.

Foam brand

ONLY USE THE SPECIFIED BRAND OF FOAM CONCENTRATE !
AFFF and FFFP are generic terms and not all available foam performs the same.
The pre-engineered Sandvik system has been tested with the above products and no alternatives shall be used without written authorisation by Sandvik.

Mixing ratio

All mixing references throughout this manual are based on **6%** Foam concentrate. This percentage represents the recommended portion of concentrate in the overall amount of agent, ie **6% of foam** concentrate plus **94% of water**. As this is applied with non-aspirated nozzles, the actual ratio is increased.

Foam storage

Foam concentrate must be ***stored in original containers*** as supplied by Sandvik. Foam concentrate must not be decanted into alternative containers. Improper decanting can lead to foam contamination and may affect system performance.

Shelf life

Unused or partially used foam concentrate in original uncontaminated containers can be stored for long periods of time, providing the temperature does not generally exceed ***25°C***. We recommend that turnover of stock concentrate should not exceed ***three (3) years***. Bottle caps are marked the fill date (month and year) and boxes with the expiry date to facilitate turnover on a first in first out basis.

Foam pre-mixing

The foam compound **must remain in a concentrated form** and must not be pre-mixed with water **until** it is **added to the tank** during the charging procedure.
Once the concentrate is mixed with water, the life span is reduced and deterioration will occur after approximately two (2) years.
That is one of the reasons why foam based fire suppression systems are regularly discharged as part of their routine service procedure.

FOAM CONCENTRATES

Foam contamination

Any contamination of foam concentrate or solution can affect system performance:

- **Using unclean water.** The use of clean water (drinking quality preferred) is important. Low quality water may accelerate deterioration of pre-mix.
- **Using a dirty funnel or measuring container.** If the funnel or container was used previously with other substances (oil, break fluid, etc) and not cleaned properly, the resulting contamination could destroy the film-forming properties.
- **Cross contamination from changing to different foam.** For example, left over foam residue of FFFP will coagulate when AFFF is added, causing potential blockages in the system. Vice versa, AFFF residue in a FFFP charge will adversely affect the foaming properties. It is very important to clean the complete system before charging it with different foam. The same applies even if there is no change from FFFP to AFFF ore vice versa. Changing from one brand of AFFF to another can have the same adverse effect. Different suppliers' products may not necessarily be compatible.
- **Using the fire system discharge line for de-greasing the engine.** Although it makes degreasing very simple, this practice does lead to contamination of the foam and must be avoided.

In a worst case scenario, contaminated foam may not extinguish the fire!

It is very important that all systems are cleaned thoroughly at the time of commissioning or recharging and only clean water and clean charging utensils are used to avoid any such contamination.

System cleaning for recharging

To ensure that there will be no foam contamination, proceed as follows:

- Flush all hoses with clean water. This applies to ***all*** the hoses, including the foam discharge ring main, the activation hoses and auto-detect lines.
- Remove the head and siphon tube from the tank. Flush head and siphon tube with clean water. Check that the ball in the head check valve moves freely (rattles when shaken).
- Flush the tank with clean water. Continue flushing until the foaming stops.
- Drain all remaining water, re-assemble and charge the system. Please note that rubber grease used for protection of O-rings should be used sparingly to avoid excess grease penetrating the lines.

It is recommended to use this cleaning procedure at every system re-charge. You can never be completely sure of what foam was used in the previous charge. Cleaning before each charge eliminates potential contamination and ensures free passage through all the lines, which is part of the regular servicing requirements.

RECHARGING INSTRUCTIONS

- Break seal on tank bung to release any remaining pressure in the system. Do not remove any part of system until all pressure has vented.
- Remove head from tank and flush tank with clean water.
- Flush out all the hoses with clean water and check that nozzles operate correctly. Clean or replace nozzles if required.
- Check Auto Fire Detection tube and replace if required.
- Reset solenoid if system was activated electrically.
- Turn handles on activation modules to closed position and reset the solenoid if the system was activated electrically.
- Drain the tank. **THE TANK MUST BE EMPTY BEFORE YOU RECHARGE IT.**
- Fill tank with clean water and add foam charge as per following requirements :

Tank	Clean Water	Foam*	Standard - 6% AFFF	Alternative - 6% FFFP
20 Litres	16.0 Litres	1.5 Litres	Part No. 69 335 194	Part No. 69 335 075
25 Litres	19.5 Litres	2.0 Litres	Part No. 69 335 195	Part No. 69 335 076
45 Litres	34.0 Litres	4.0 Litres	Part No. 69 335 189	Part No. 69 335 077
65 Litres	48.0 Litres	6.0 Litres	Part No. 69 335 190	Part No. 69 335 078
110 Litres	74.0 Litres	8.0 Litres	Part No. 69 335 196	Part No. 69 335 079

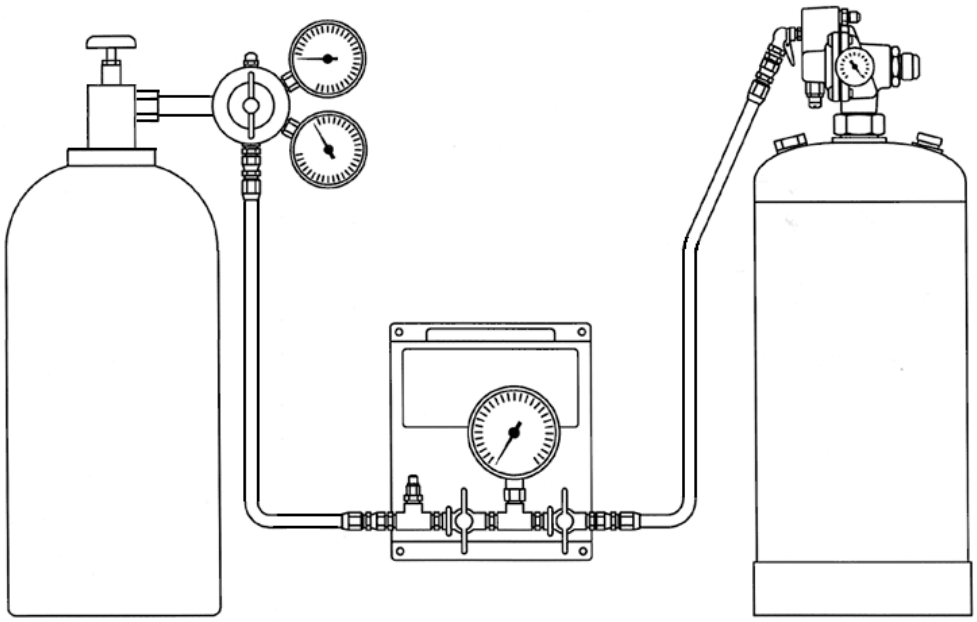
*** Amount of foam is based on 6% concentrate. Do not use 3% concentrate.**
Only specified brand of foam must be used in a pre-engineered fire system !
AFFF - Use only Kerr (Croda) Filmform 916 concentrate
FFFP - Use only Angus Fire Petroseal 6% concentrate

- Check sealing surfaces and O-ring seal on head assembly and tank bung.
- Screw head assembly and bung onto tank. Ensure both have O-rings fitted.
- Tighten head swivel nut to a minimum of 100 Nm and a maximum of 150 Nm.
- Remove caps from head outlets and reconnect main feed lines (if required).
- Charge tank with Nitrogen through the charging connection. The system design pressure is 1200kPa at 23° ±2°C. In order to compensate for pressure variation from temperature, pressure equalisation within the system and expansion of hosing, charge to 1400-1450kPa on a hot day or 1250-1300kPa on a cold day.
- Fit safety ties to all activation module handles and fit dust caps to all nozzles.
- Record recharging details on attached service tag (and Log book if required).

WARNING

RECHARGING SHOULD ONLY BE CARRIED OUT USING SPECIFIED APPROVED NITROGEN CHARGING RIG ASSY PART No. 69 334 080 OR 69 344 180 CHARGING LINE. OTHER APPARATUS ARE NOT RECOGNISED BY THE MANUFACTURER AND MAY CAUSE INJURY.

CHARGING RIG OPERATING INSTRUCTIONS



Picture 69343098a.gif

Check that low-pressure Nitrogen regulator is turned off.

- Connect regulator line to left-hand fitting.
- Close right valve. Open left valve. Adjust regulator until indicator between valves shows required charging pressure - see note 1 below before continuing.
- Connect charging line to charging connection on tank head valve.
- Slowly open right valve to pressurise the tank.

⚠ Opening valve too quickly may damage equipment and may cause injury. ⚠

- Close left valve to check tank pressure. Note position of indicator needle on tank head.
- Close right valve. Disconnect charging line from charging connection on tank.
- Check that position of indicator needle on tank head has not changed. If the pressure has dropped, reconnect charging line and repeat procedure.

PLEASE NOTE:

1. If you top up a charged system, make sure that your whole charging line (both valves open) is pressurised before you connect to the charging connection. You need at least system pressure in your charge line to prevent accidental system activation by gas escaping from the system to pressurise the hose!
2. The gauge on this rig must be calibrated at three (3) monthly intervals for continued accuracy of the system charging pressure.

MAINTENANCE AND SERVICING

Maintaining the fire system is the purchasers, owners and operators responsibility.
This section lists **minimum requirements** for Sandvik foam fire suppression systems in accordance with Australian Standard AS5062-2006 - Fire protection for mobile and transportable equipment. A well maintained fire suppression system provides a safe working environment for the operator and continued protection of the equipment.

PREVENTIVE MAINTENANCE, INSPECTION AND TESTING SCHEDULE

	Daily	6-monthly	Yearly
Check that all pressure indicators are in the green operating zone (1050 to 1500kPa).	✓	✓	✓
Check that the anti-tamper ties on module handles are in place and secured.	✓	✓	✓
Check that activation modules are clean, secure, undamaged and readily accessible.	✓	✓	✓
Check that electric panels (if fitted) are clean, secure, undamaged and readily accessible.	✓	✓	✓
Check that indicators on alarm or shutdown panels (if fitted) show green light.	✓	✓	✓
Discard all nozzle caps and fit new nozzle caps (even if they still look OK).		✓	✓
Check that all nozzles still point at intended target areas.		✓	✓
Check that nozzles and mounting brackets are secure and undamaged.		✓	✓
Check that foam distribution hoses and hose saddles are undamaged and secured.		✓	✓
Check that activation hoses and hose saddles are undamaged and secured.		✓	✓
Check that electrical wiring and connectors (alarm, shutdown) are undamaged and secured.		✓	✓
Check that automatic detection tube is secure, intact and shows no signs of deterioration. Replace the tube if it has hardened and lost the flexibility to prevent accidental activation.		✓	✓
Check that all system warning and notification labels are in place, visible and legible.		✓	✓
Check tank and head valve assembly for signs of damage.		✓	✓
Check that tank and tank mounting bracket are undamaged and secure.		✓	✓
Check that tank is clean, all labels are clearly legible and service tag is attached.		✓	✓
Check that all pressure relief valves (on tank and head valve) have a dust cap fitted. If not, then clean the valve and fit a replacement cap.		✓	✓
Remove tank from bracket and inspect tank and bracket for signs of wear or damage.			✓
Check the test or manufacturing date on the tank to identify if hydrostatic test is required.			✓
Operate the system from one of the activation points. Check that the discharge is in accordance with product standards and all nozzles are performing satisfactory. Verify and record the effective system discharge time on the service report.			✓
Check that siphon tube is secure, free of obstructions or signs of damage.			✓
Check all manual activation modules for corrosion and free movement of valve handle.			✓
Check for free passage through all hoses and fittings by using dry nitrogen (or water).			✓
Test audible and visual low pressure and system discharge alarms (if fitted) and check condition and attachment of associated cables and wiring (earth check).			✓
Test engine shutdown function, shutdown timer delay and shutdown override (if fitted) and check condition and attachment of associated cables and wiring (earth check).			✓
Replace valve core on charging connections. Lubricate valve core seals with Molykote111.			✓
Check both the activation and discharge circuits for leaks.			✓
Recharge system in accordance with recharging instructions.			✓
Record the service on the attached service tag (and in logbook if required).		✓	✓

Inspection, test and servicing must be in accordance with the above schedule to comply with Sandvik warranty conditions.

For systems that operate in aggressive environments (such as corrosive atmospheres, salt spray, exposure to extremes of temperature, abnormally high humidity or intense vibrations) we strongly recommended to implement a more frequent servicing interval. Carry out the six-monthly service every three months and the annual service every six months.

Please refer to next page for further details regarding general servicing requirements

MAINTENANCE AND SERVICING

The requirements below are in addition to the schedule on the previous page:

3 yearly service

In addition to the normal yearly requirements as listed in the schedule on the previous page, please carry out the following:

Replace the Auto-Detection tube. This tube hardens with age and becomes vulnerable to cracking which causes accidental system activation.
The tube must be replaced as soon as it shows signs of deterioration (hardening). 3 years is the maximum interval between changes of tube.

For systems operating in **aggressive environments** (such as corrosive atmospheres, salt spray, exposure to extremes of temperature, abnormally high humidity or intense vibrations) the automatic **detection tube may** need to be **replaced at annual intervals**.

5 yearly service

In addition to all of the previously listed requirements (including the annual and the 3 yearly servicing) please carry out the following:

Hydrostatic test of the tank to the test pressure specified on the tank data plate, **5 years from date of manufacture of the tank** (not from date of commissioning).
In order to comply with Australian Standard AS2030.1 and as a requirement of the fire suppression tank manufacturer, the interior/exterior of the tank must be examined and the tank must be hydrostatically tested. Hydrostatic test must be done by a certified gas cylinder test station in accordance with Australian Standard AS2337.1. Tanks failing hydrostatic test must be replaced.

Renew all O-ring seals throughout the system (head, bung, hose ends).

Disassemble head valve to inspect the diaphragm and clean check valve. Replace the diaphragm only if it shows signs of deterioration. Re-assemble the head valve and carry out leak and function test.
It is recommended that inspection and testing of the head valve is carried out by one of the authorised Sandvik service centres (see back cover of this manual) that has the necessary facilities and spare parts readily at hand.

For systems operating in **aggressive environments** (such as corrosive atmospheres, salt spray, exposure to extremes of temperature, abnormally high humidity or intense vibrations) It is **strongly recommended** to do all of the 5 yearly servicing at **3 year intervals.**

Please note that NON COMPLIANCE with servicing requirements MAY VOID WARRANTY.

Service tag marking

Service tags are to be **punched or stamped** as follows:

- Punched hole denotes date of commissioning and start of servicing intervals.
- Figure "**1**" denotes 6 month service.
- Figure "**2**" denotes 1 year service.
- Figure "**3**" denotes 3 year service.
- Figure "**4**" denotes 5 year service (hydrostatic test).
- Figure "**5**" denotes service after system discharge.

MAINTENANCE AND SERVICING

If the system has been activated or accidentally discharged, the system is to be serviced by an accredited technician as per the check list below:

SERVICING AFTER DISCHARGE

INSPECTION	CHECK
• Ask the owner or operator of the equipment if the reason for the fire system discharge is known.	
• If system activation was accidental, you must verify that this is the case. Small fires are known to be extinguished by the fire system without anyone being aware that there was a fire.	
• If the reason is unknown, proceed with fault finding and trouble shooting to determine the cause of the system discharge.	

• If the discharge was as a result of damage to the fire system, please rectify the problem. Make any necessary alterations to prevent it from happening again.	
• If the discharge was a result of a fault on the equipment, please advise the client and have him rectify the equipment fault to prevent a recurrence of the same problem.	

⚠ IMPORTANT ⚠

IF SYSTEM WAS ACTIVATED TO SUPPRESS A FIRE, ALL FIRE DAMAGED PARTS MUST BE REPLACED.

DO NOT RESTART THE EQUIPMENT ENGINE UNTIL THE FIRE SYSTEM IS FULLY OPERATIONAL AGAIN. THE FIRE COULD RE-IGNITE IF THE EQUIPMENT ENGINE IS STARTED BEFORE THE FAULT THAT CAUSED THE FIRE HAS BEEN RECTIFIED.

• Carry out a standard yearly service and recharge the system.	
• Complete service report (form CF09 - annual column) and list problems found, repairs carried out and parts replaced. Obtain the client representative signature on your report and forward copies as per distribution listed at the bottom of the service report.	
• Record this service on the service tag by stamping the figure "**5**" in the appropriate date field of the tag. *Although you are doing an annual service every time the system has discharged, we stamp a figure "**5**" to indicate that this is outside the regular servicing schedule. A tag filled with 5's would indicate to you as the service technician that this is a problem machine, equipment operator or fire system.*	

MAINTENANCE AND SERVICING

To assist with regular servicing requirements, a series of service kits are available. The kits listed below contain all components required for a regular yearly service.

There are 2 different types of foam available. The left-hand column is for service kits with the standard AFFF foam. The right-hand column lists the kits containing FFFP.

Standard 6% AFFF Foam	Alternative 6% FFFP Foam
SERVICE KIT No. 69-344-240 For 20 litre tank system	**SERVICE KIT No. 69-334-400** For 20 litre tank system
SERVICE KIT No. 69-344-250 For 25 litre tank system	**SERVICE KIT No. 69-334-410** For 25 litre tank system
SERVICE KIT No. 69-344-260 For 45 litre tank system	**SERVICE KIT No. 69-334-420** For 45 litre tank system
SERVICE KIT No. 69-344-270 For 65 litre tank system	**SERVICE KIT No. 69-334-430** For 65 litre tank system
SERVICE KIT No. 69-344-280 For 110 litre tank system	**SERVICE KIT No. 69-334-440** For 110 litre tank system

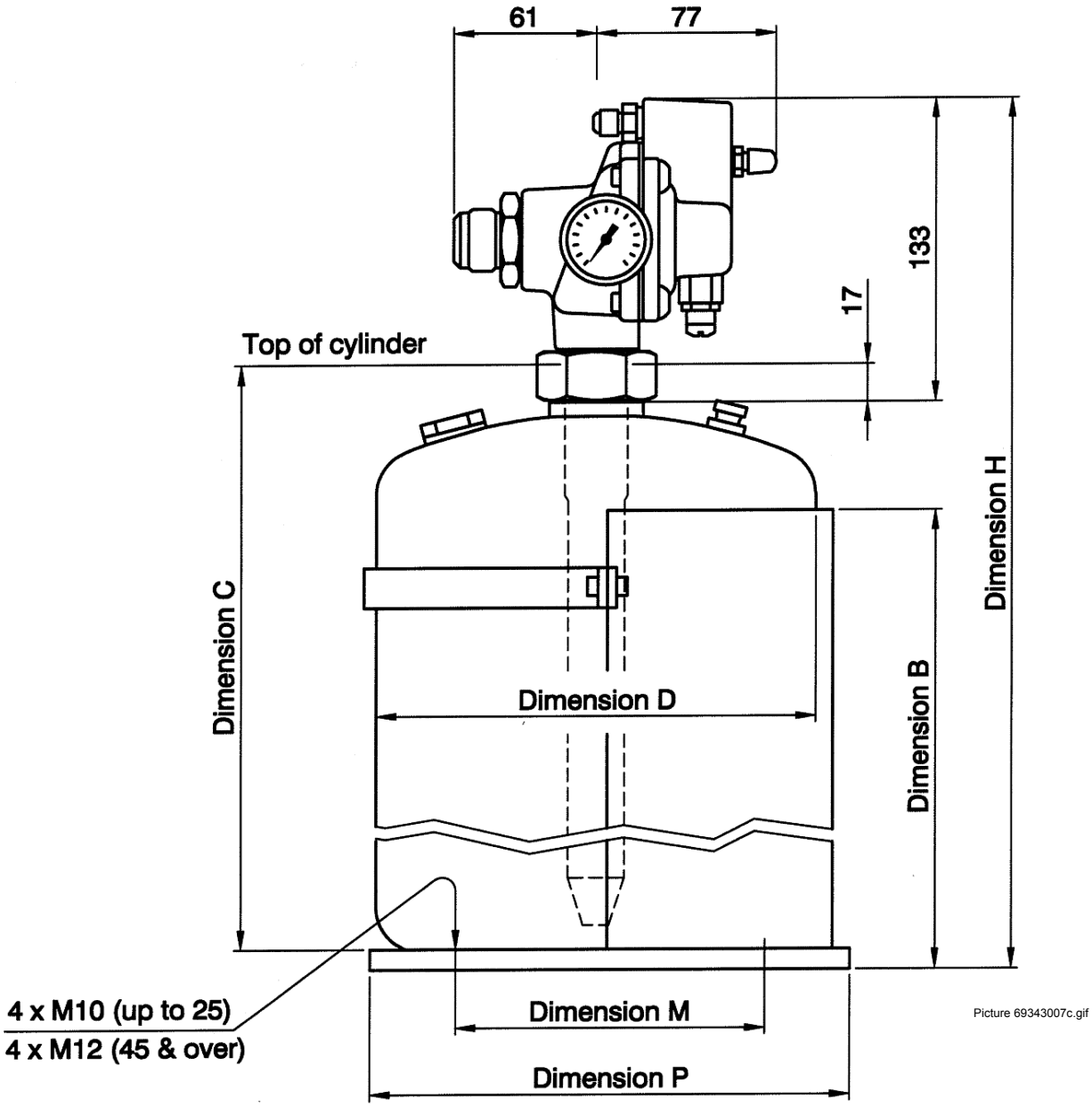
Above kits contain following parts: Foam concentrate; Safety ties for modules; Nozzle dust caps; O-rings for tank head and bung; Dust cap for vent valve; Charging valve; Valve cores for charging connections; O-rings for activation line fittings.

OVER-STICKER No. 69-335-373
AFFF Over-sticker for tank label.
For conversion from FFFP to AFFF.

OVER-STICKER No. 69-335-492
FFFP Over-sticker for tank label.
For conversion from AFFF to FFFP.

AUTO DETECT REPLACEMENT KIT No. 69-334-375
5 METRES OF TUBE – 3 YEAR SERVICE
Contains all components required to replace Auto Detect tube.

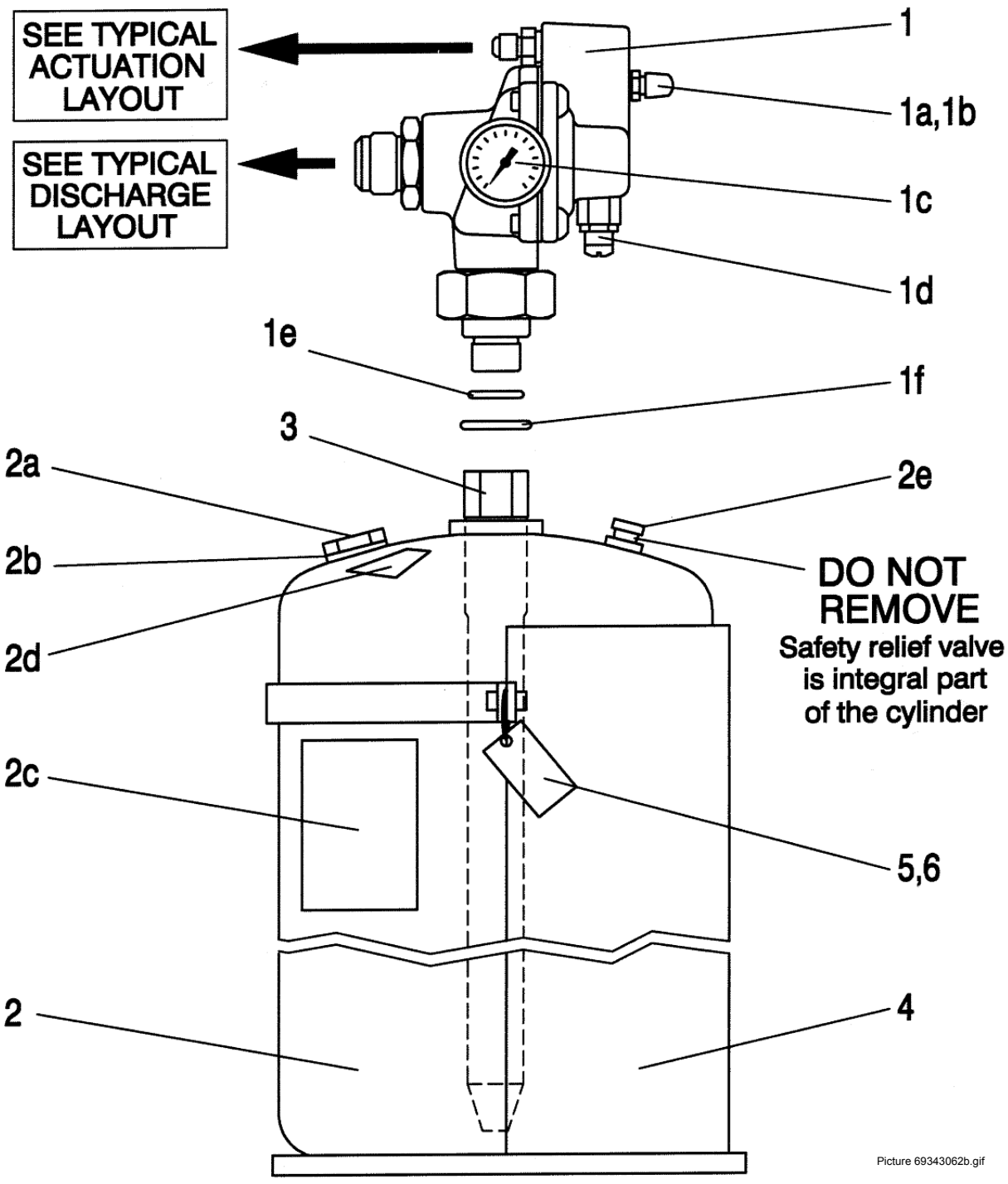
GENERAL DIMENSIONS AND WEIGHTS



Nominal capacity in litres	Tank Height Dim. C	Tank Diameter Dim. D	Overall Height Dim. H	Bracket Height Dim. B	Width across Clamp band	Bracket Base Dim. P	Bolt Hole Pattern Dim. M	Weight Empty (approx.)	Weight Charged (approx.)
20	642	216	762	504	288	232x233	184x184	18 kg	36 kg
25	782	216	902	504	288	232x233	184x184	22 kg	44 kg
45	579	360	701	476	460	400x365	295x295	39 kg	78 kg
65	779	360	901	641	460	400x365	295x295	48 kg	103 kg
110	1194	360	1320	910	460	400x365	295x295	67 kg	150 kg

Subject to change without prior notice

All dimensions are in millimetres

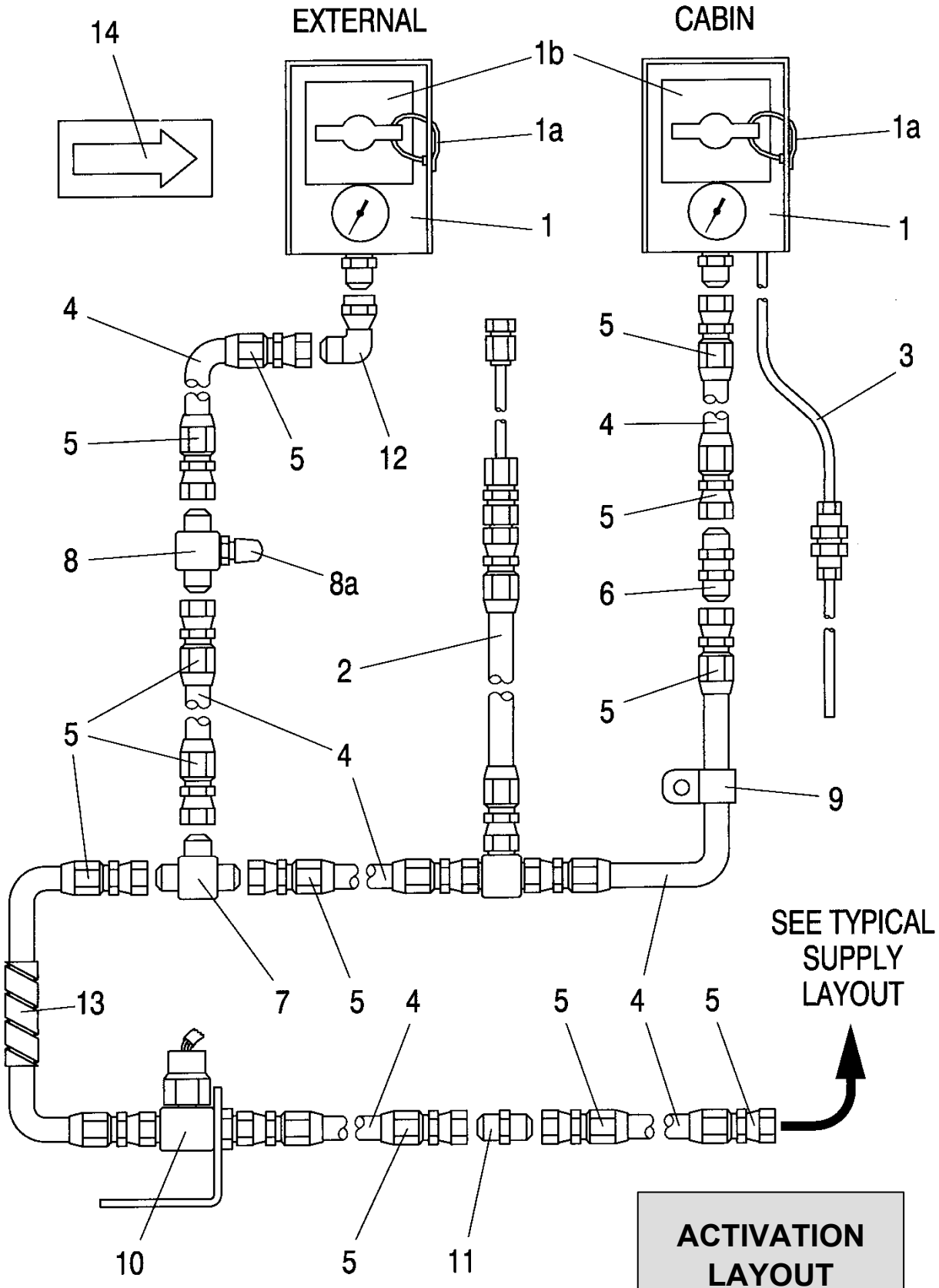


SUPPLY LAYOUT (TYPICAL)

For reasons of durability and operator safety, all tanks are made from AS1449 grade 304 stainless steel and have an in-built pressure relief valve as per AS2613. Tanks are designed to AS3509S.

SPARE PARTS LISTING – SUPPLY COMPONENTS

ITEM	PART NO.	DESCRIPTION
1	69-334-805	HEAD ASSEMBLY
1a	69-335-004	CHARGING CONNECTION (Part of item 1)
1b	69-335-107	DUST CAP - CHARGING VALVE (Part of item 1)
1c	69-335-234	PRESSURE INDICATOR (Part of item 1)
1d	69-335-259	DUST CAP – VENT VALVE (Part of item 1)
1e	69-335-464	SIPHON TUBE O-RING (Part of item 1)
1f	69-335-029	HEAD O-RING (Part of item 1)
2	69-334-880-20 69-334-880-25 69-334-880-45 69-334-880-65 69-334-880-110	TANK ASSEMBLY – 20 Litres TANK ASSEMBLY – 25 Litres TANK ASSEMBLY – 45 Litres TANK ASSEMBLY – 65 Litres TANK ASSEMBLY – 110 Litres
2a	69-335-551 (69-335-027)	BUNG 7/8" SAE (part of item 2) BUNG ¾" UNS (older version tanks)
2b	69-335-553 (69-335-029)	BUNG O-RING (part of item 2) BUNG O-RING (older version) to suit bung 69-335-027
2c	69-335-485 69-335-486 69-335-487 69-335-488 69-335-489	CYL. LABEL – 20 Ltr - AFFF (FFFP = 69-335-370) CYL. LABEL – 25 Ltr - AFFF (FFFP = 69-335-371) CYL. LABEL – 45 Ltr - AFFF (FFFP = 69-335-416) CYL. LABEL – 65 Ltr - AFFF (FFFP = 69-335-417) CYL. LABEL – 110 Ltr – AFFF (FFFP = 69-335-418)
2d	69-335-060	WARNING LABEL (Part of item 2)
2e	69-335-258	FLANGE COVER (Part of item 2)
3	69-334-835 69-334-845 69-334-855 69-334-865 69-334-875	SIPHON TUBE – 20 Litres SIPHON TUBE – 25 Litres SIPHON TUBE – 45 Litres SIPHON TUBE – 65 Litres SIPHON TUBE – 110 Litres
4	69-335-022 69-335-023 69-335-024 69-335-025	MOUNTING BRACKET – 20 & 25 Litres MOUNTING BRACKET – 45 Litres MOUNTING BRACKET – 65 Litres MOUNTING BRACKET – 110 Litres
5	69-335-242	SERVICE TAG
6	69-335-325	RING



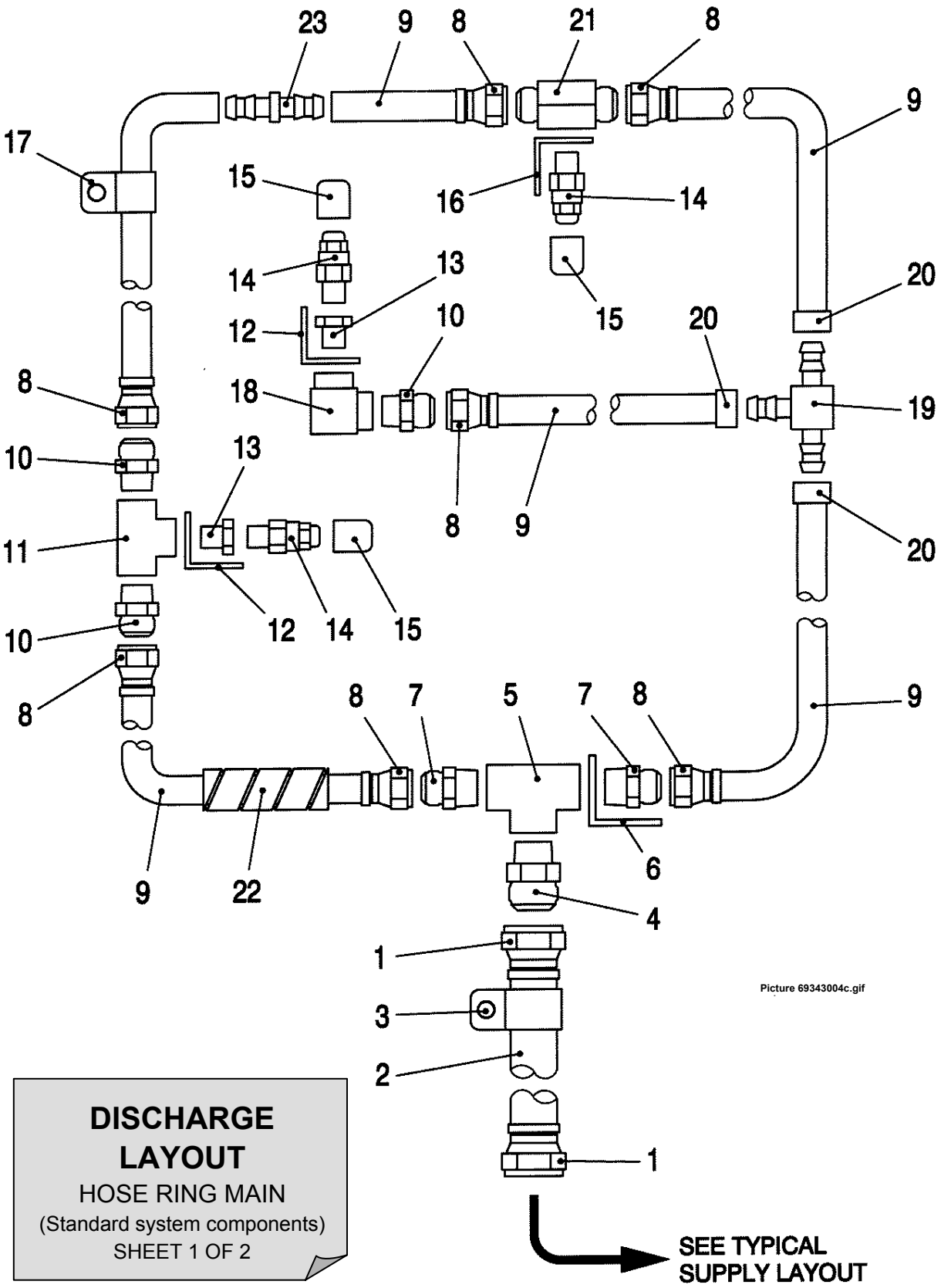
Picture 69343003d.gif

ACTIVATION LAYOUT (TYPICAL)

SPARE PARTS LISTING – ACTIVATION COMPONENTS

ITEM	PART NO.	DESCRIPTION
1	69-334-710	MODULE ASSEMBLY (see note below)
1a	69-335-001	SAFETY TIE (Part of Item 1)
1b	69-335-319	MODULE LABEL (Part of Item 1)
2	69-344-110	AUTO DETECT ASSEMBLY
2a	69-334-375	TUBE REPLACEMENT KIT (Part of Item 2)
3	69-334-065	VENT LINE EXTENSION
4	69-335-444	HOSE 1/4" (-4) Length as required
5	69-344-150	HOSE END ASSEMBLY –4 Consists of 69-335-445 Hose Tail 69-335-446 Ferrule 69-335-159 O-Ring
6	69-335-007	BULKHEAD FITTING –4
7	69-335-105	TEE MALE –4
8	69-344-160	CHARGING ASSEMBLY
8a	69-335-004	CHARGING CONNECTION (Part of Item 8) Includes Dust Cap 69-335-107
9	69-335-011	HOSE SADDLE –4
10	69-344-175	900kPa PRESSURE SWITCH ASSY (12V - 24V) OPTIONAL EXTRA (Various Brands of switches are supplied. Pictorial presentation may not be of switch used)
(10)	(69-344-430)	900kPa PRESSURE SWITCH ASSY (up to 240V) OPTIONAL EXTRA (Alternative for higher Voltage applications)
11	69-335-455	UNION –4 (Hose Joiner)
12	69-335-294	SWIVEL ELBOW –4
13	69-335-273	SPIRAL HOSE GUARD –4 (Length as required)
14	69-335-320	ARROW LABEL
15	69-335-461	MODULE COVER (Not shown) OPTIONAL EXTRA (protective cover available on request for mounting to frame of existing activation module item 1)

NOTE: Standard range systems are supplied with two manual activation modules. One for mounting in the cabin, second for external mounting accessible from ground level.



DISCHARGE LAYOUT

HOSE RING MAIN

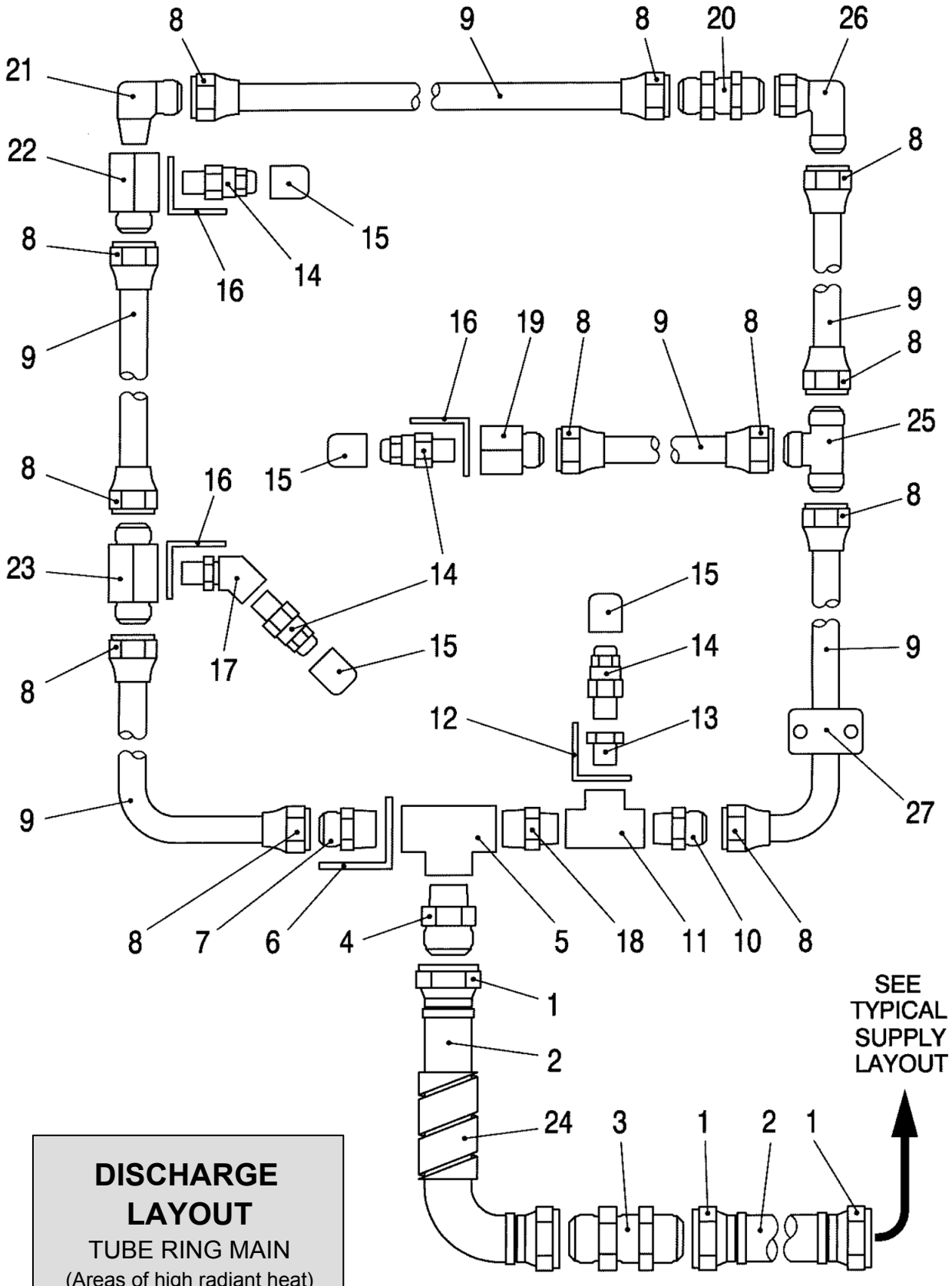
(Standard system components)

SHEET 1 OF 2

SPARE PARTS LISTING – DISCHARGE COMPONENTS (Sheet 1)

ITEM	PART NO.	DESCRIPTION
1	69-335-033	HOSE TAIL 3/4", FEMALE SWIVEL -12
2	69-335-034	HOSE 3/4" (-12) Length as required
3	69-335-035	HOSE SADDLE 3/4"
4	69-335-036	NIPPLE 1/2" x -12
5	69-335-037	TEE, FEMALE 1/2"
6	69-335-038	BRACKET (for 1/2" tee)
7	69-335-039	NIPPLE 1/2" x -8
8	69-335-040	HOSE TAIL 1/2", FEMALE SWIVEL -8
9	69-335-041	HOSE 1/2" (-8) Length as required
10	69-335-042	NIPPLE 3/8" x -8
11	69-335-043	TEE, FEMALE 3/8"
12	69-335-044	BRACKET (for 3/8" tee)
13	69-335-045	BUSH 3/8" x 1/4"
14	69-334-340 69-334-380	NOZZLE - 60° FULL CONE (Standard) NOZZLE – WIDE ANGLE (Available on request)
15	69-335-048	DUST CAP (Standard) DUST CAP – WIDE ANGLE (Avail. on request)
16	69-335-049	NOZZLE BRACKET (or bracket 69-335-482)
17	69-335-051	HOSE SADDLE 1/2"
18	69-335-054	ELBOW 90°, FEMALE 3/8"
19	69-335-230	TEE, 1/2" HOSE TAILS – See note below
20	69-335-231	HOSE CLAMP 1/2" (-8) – See note below
21	69-335-057	NOZZLE TEE –8 x –8 x 1/4"
22	69-335-274	SPIRAL HOSE GUARD –8 (length as required)
23	69-335-122	HOSE JOINER 1/2" (-8)

NOTE: Tee and Clamp (items 19 & 20) are no longer used in new systems. Use Union Tee (item 25 shown on page overleaf) and Hose Ends (item 8) instead.



DISCHARGE LAYOUT

TUBE RING MAIN

(Areas of high radiant heat)

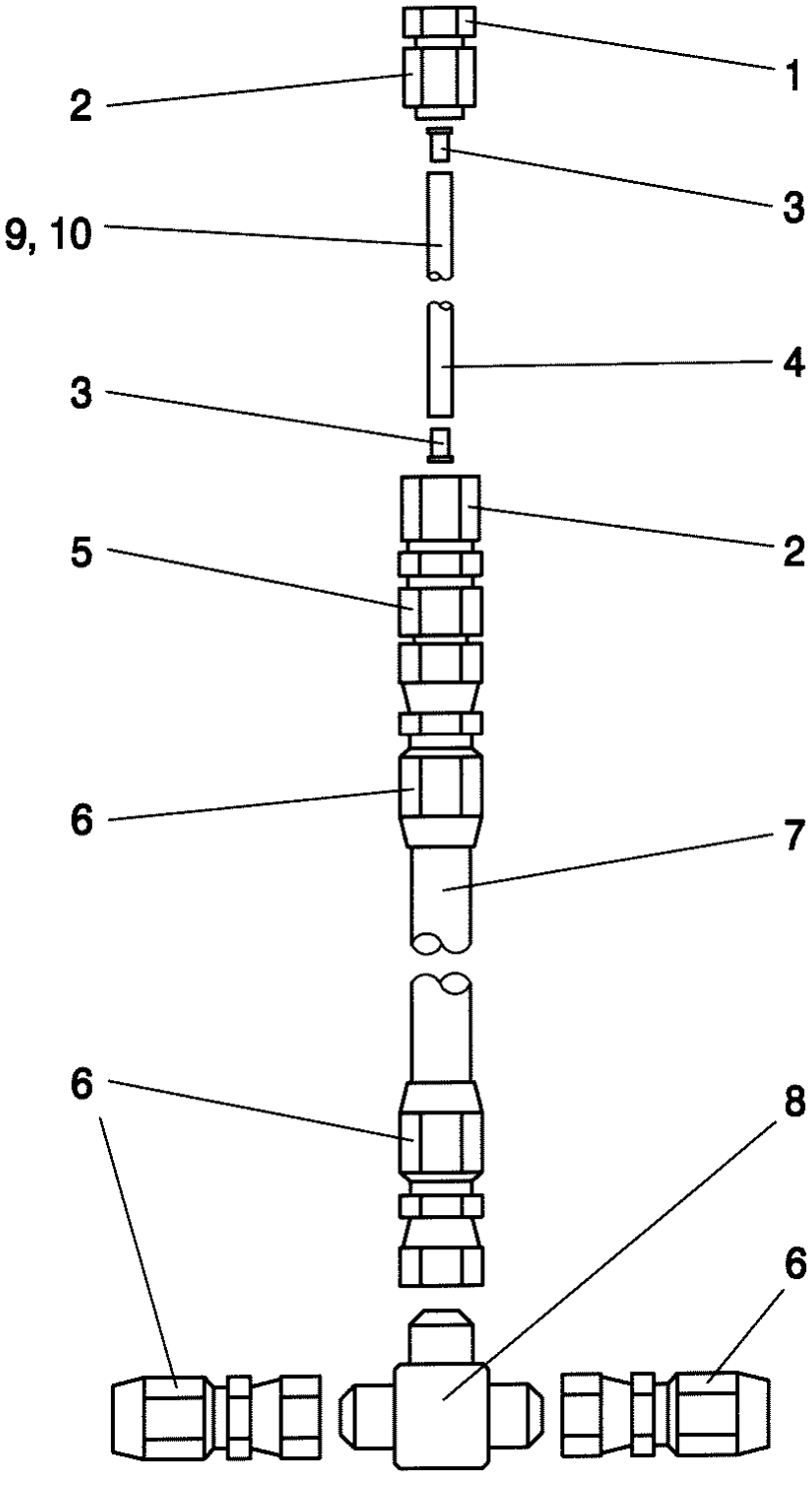
SHEET 2 OF 2

Picture 69343005e.gif

SPARE PARTS LISTING – DISCHARGE COMPONENTS (Sheet 2)

ITEM	PART NO.	DESCRIPTION
1	69-335-033	HOSE TAIL 3/4”, FEMALE SWIVEL -12
2	69-335-034	HOSE 3/4” (-12) Length as required
3	69-335-179	BULKHEAD FITTING -12
4	69-335-036	NIPPLE 1/2” x -12
5	69-335-037	TEE, FEMALE 1/2”
6	69-335-038	BRACKET (for 1/2” tee)
7	69-335-039	NIPPLE 1/2” x -8
8	69-335-266	TUBE NUT 1/2”, FLARED, SHORT
9	69-335-268	STAINLESS TUBE 1/2” (Length as required)
10	69-335-042	NIPPLE 3/8” x -8
11	69-335-043	TEE, FEMALE 3/8”
12	69-335-044	BRACKET (for 3/8” tee)
13	69-335-045	BUSH 3/8” x 1/4”
14	69-334-340 69-334-380	NOZZLE - 60° FULL CONE (Standard) NOZZLE – WIDE ANGLE (Available on request)
15	69-335-048	DUST CAP (For nozzles)
16	69-335-049	NOZZLE BRACKET (or bracket 69-335-482)
17	69-335-221	ELBOW 45°, M/F 1/4” BSPP
18	69-335-228	REDUCING NIPPLE 1/2” x 3/8”
19	69-335-052	END LINE USER –8 x 1/4”
20	69-335-180	BULKHEAD FITTING -8
21	69-335-055	ELBOW 90°, MALE –8 x 3/8”
22	69-335-056	NOZZLE TEE –8 x 3/8” x 1/4”
23	69-335-057	NOZZLE TEE –8 x –8 x 1/4”
24	69-335-275	SPIRAL HOSE GUARD –12 (length as reqd)
25	69-335-538	UNION TEE –8
26	69-335-537	SWIVEL ELBOW, M/F -8
27	69-335-260	TUBE CLAMP 1/2”, STAUFF

NOTE: Spare Parts Listing shows common components used in current systems. Other parts may be available on request.



Picture M344110.gif

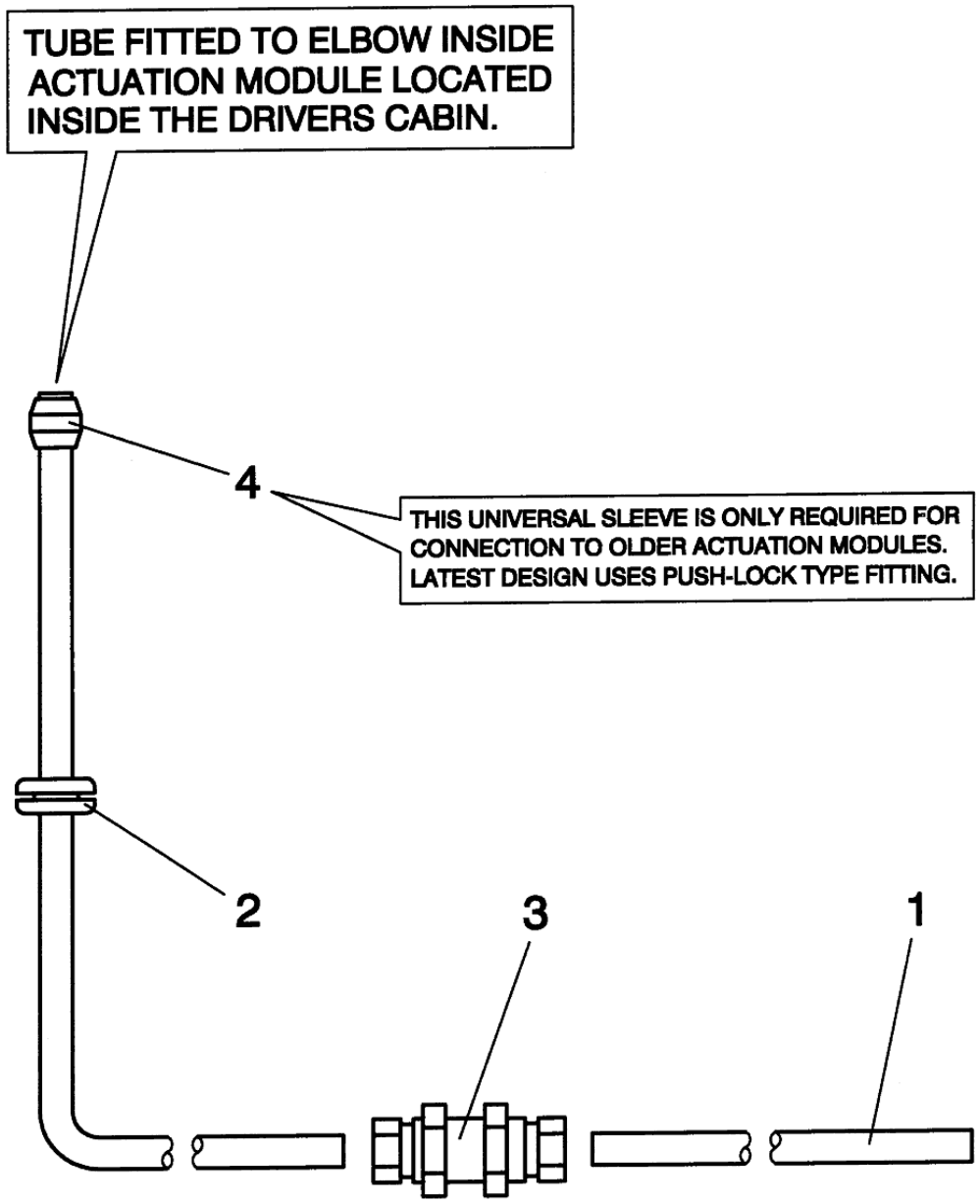
AUTO DETECT ASSEMBLY
69-344-110

SPARE PARTS LISTING FOR SUB-ASSEMBLIES

AUTO DETECT ASSEMBLY 69-344-110
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-204	1	TUBE CAP 1/8”BSP
2	69-335-102	2	ADAPTOR 1/4” x 1/8”BSP
2a	69-335-201	(2)	Universal sleeve (olive) – part of item 2
3	69-335-133	2	Spigot 1/4”
4	69-335-101	5m	NYLON TUBE 1/4” (2000kPa) Cut to suitable length on assembly
5	69-335-127	1	ADAPTOR 1/8”BSP FEMALE x –4 MALE
6	69-344-150	4	HOSE END ASSEMBLY -4 Consists of 69-335-445 Hose Tail 69-335-446 Ferrule 69-335-159 O-Ring
7	69-335-444	3m	HOSE –4 Cut to suitable length on assembly
8	69-335-105	1	TEE, MALE –4
9	69-335-011	10	HOSE SADDLE 1/4” (not shown)
10	69-335-251	10	SLEEVE FOR SADDLE (not shown)

AUTO DETECT REPLACEMENT KIT No. 69-334-375
REPLACEMENT PARTS REQUIRED FOR 3 YEAR SERVICE
Contains 1-off each Item 1, 2 and 2a, 2-off Item 3 and 5 metres of Item 4.



VENT LINE EXTENSION
69-334-065

SPARE PARTS LISTING FOR SUB-ASSEMBLIES

VENT LINE EXTENSION 69-334-065
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-101	2m	NYLON TUBE 1/4" (2000kPa) Cut to suitable length on assembly
2	69-335-217	1	GROMMET 1/4"
3	69-335-134	1	BULKHEAD UNION 1/4"
4	69-335-201	1	UNIVERSAL SLEEVE (OLIVE) (only used on older activation modules)

To fit vent line extension, proceed as follows:

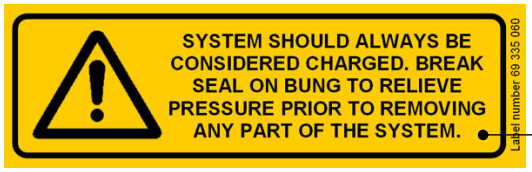
- Remove already fitted short piece of tube from elbow in activation module.
- Fit grommet item 2 into wall or floor of cabin.
- Alternatively, fit bulkhead union item 3 into wall or floor of cabin.
- Fit tube item 1, cut to length(s) as required.

NOTE :

FOR OLD ACTIVATION MODULES THAT HAVE NO SHORT VENT LINE FITTED, PLEASE USE VENT LINE ASSEMBLY KIT NUMBER 69-334-060

PLEASE NOTE - LABELS SHOWN ARE NOT TRUE SIZE AND SCALE VARIES

1



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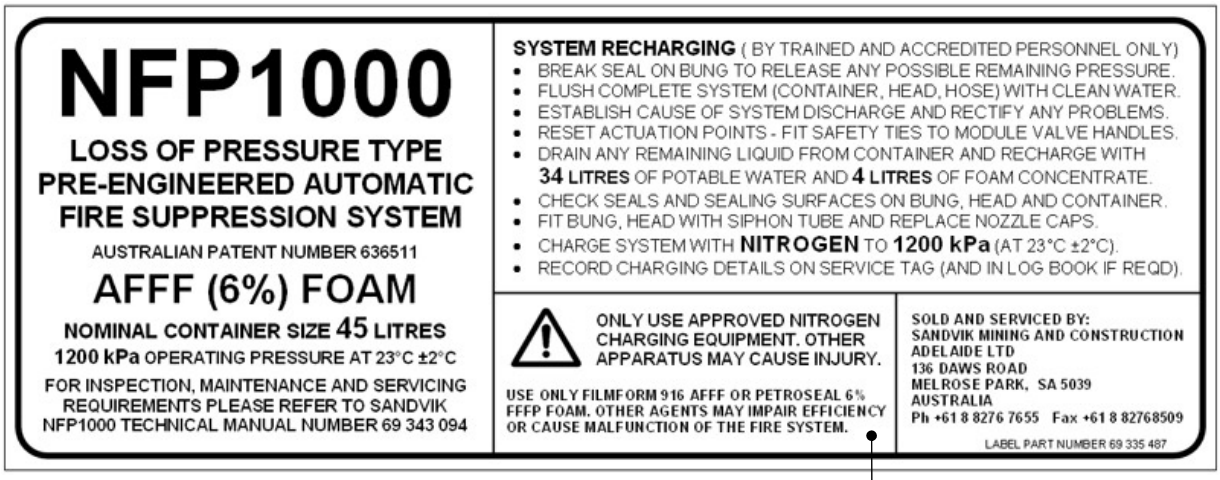

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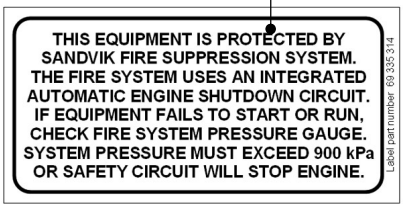


7

8

9

AFFF 10

11 FFFP

SPARE PARTS LISTING FOR LABELS

ITEM	PART NO.	DESCRIPTION
1	69-335-546	LABEL - AUTOMATIC DISCHARGE WARNING
2	69-335-060	LABEL - PRESSURE WARNING
3	69-335-319	LABEL - MANUAL ACTIVATION MODULE
4	69-335-485	LABEL - 20L TANK
	69-335-486	LABEL - 25L TANK
	69-335-487	LABEL - 45L TANK
	69-335-488	LABEL - 65L TANK
	69-335-489	LABEL - 110L TANK
5	69-335-314	LABEL - ENGINE SHUTDOWN
6	69-335-321	LABEL - ENGINE SHUTDOWN WARNING
7	69-335-545	LABEL - FIRE EVENT INSTRUCTION
8	69-335-320	LABEL - MANUAL ACTIVATION LOCATION
9	69-335-534	LABEL - HEAD NUT TORQUE
10	69-335-373	LABEL - AFFF OVER-STICKER (for label item 4 - conversion to AFFF)
11	69-335-492	LABEL - FFFP OVER-STICKER (for label item 4 - conversion to FFFP)

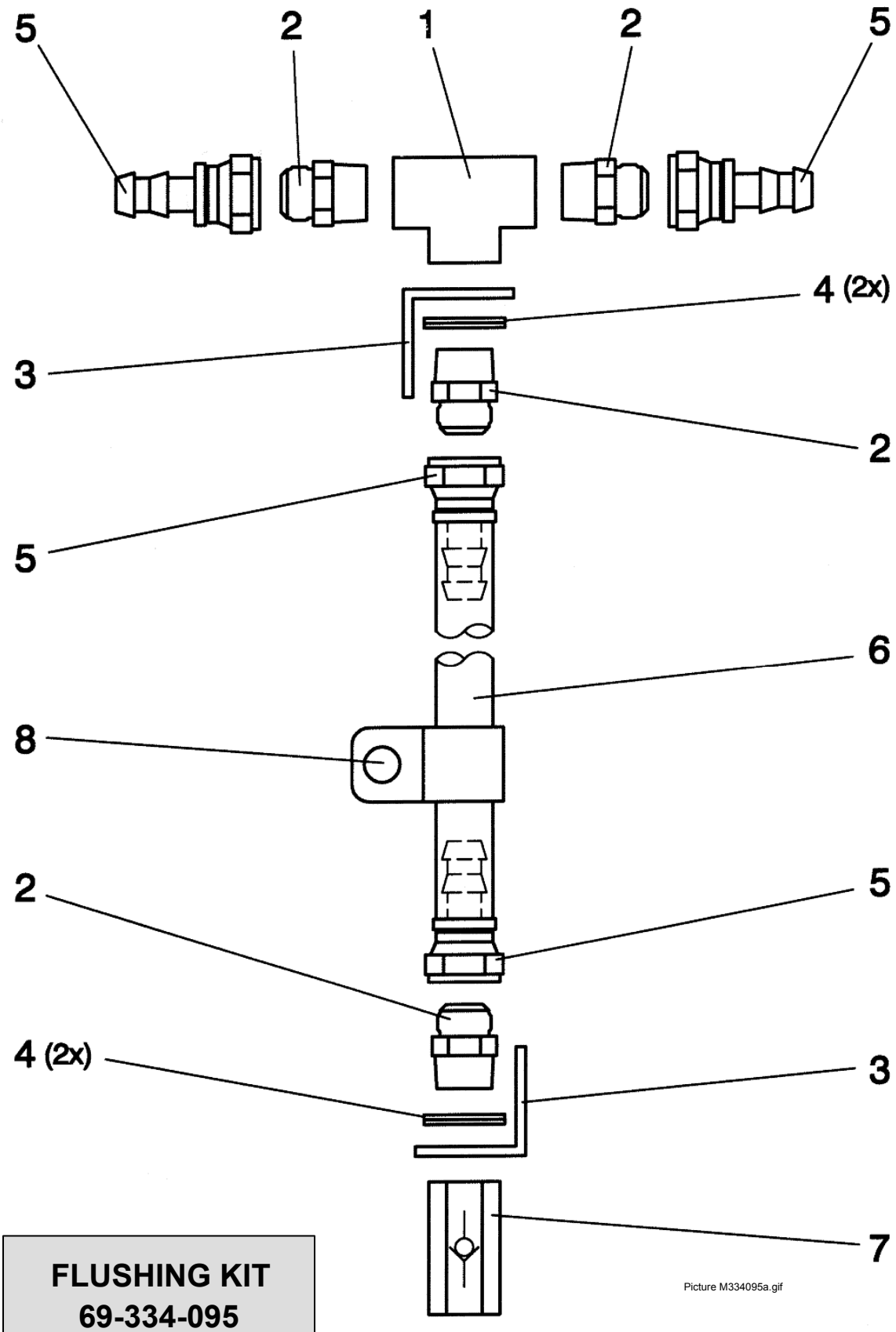
Please note:

All labels shown are pictorial presentation only.
Labels are not shown in true size and the scale varies from one label to the next.

Label design in accordance with Australian Standards AS 1318 and AS1319.

For manuals copied in black and white, label colouring is as follows:

- Black text on yellow background - Labels 1, 2, 6 and 9
- Black text on white background - Labels 4, 5, 10 and 11
- White text on red background - Labels 3, 7 and 8



FLUSHING KIT
69-334-095

SPARE PARTS LISTING FOR OPTIONAL EXTRAS

FOAM LINE FLUSHING KIT 69-334-095
CONTAINS ALL ITEMS LISTED BELOW.

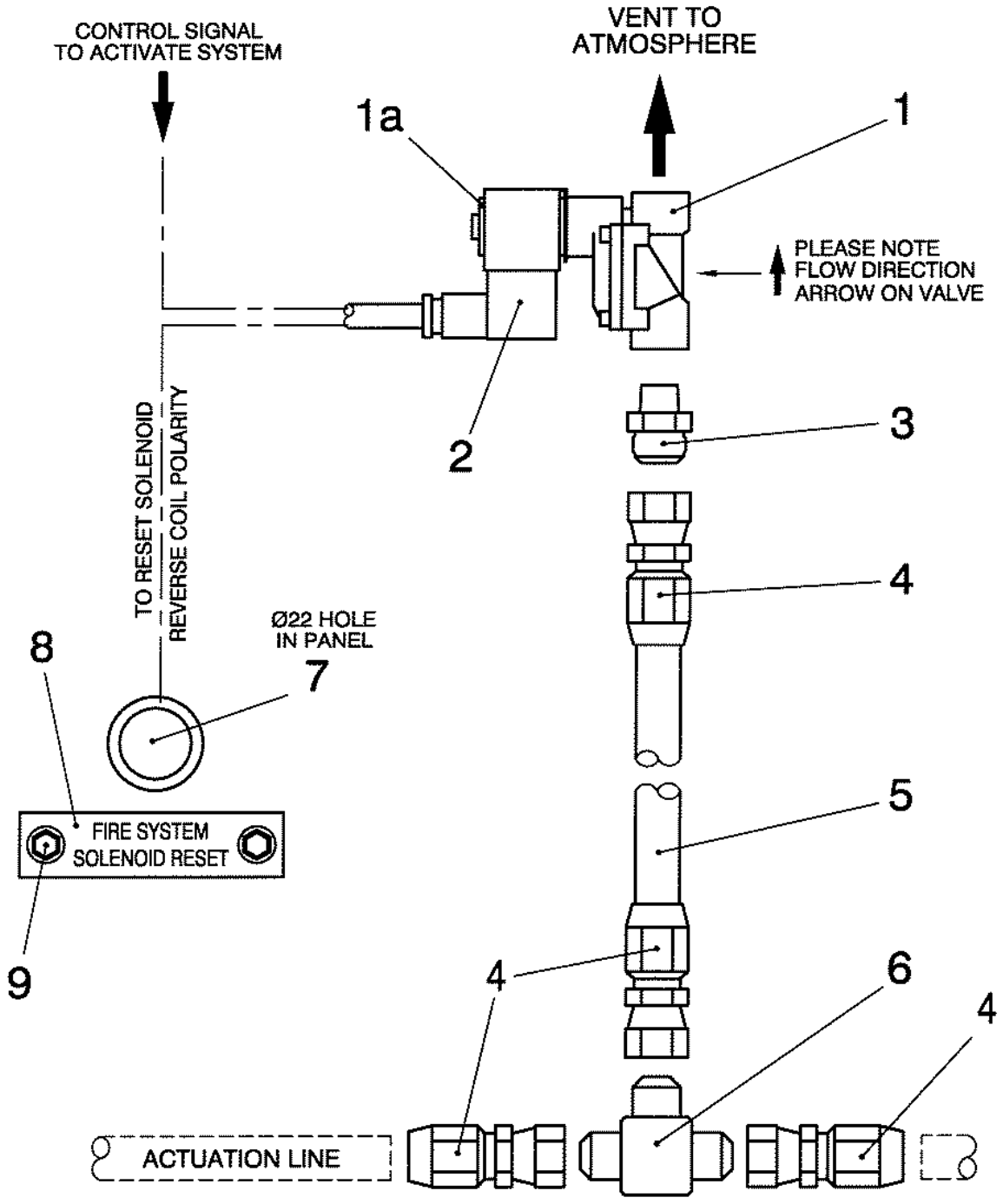
ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-037	1	TEE, FEMALE 1/2"
2	69-335-039	4	NIPPLE, 1/2" x –8
3	69-335-038	2	BRACKET (For 1/2" tee)
4	69-335-285	4	FLAT WASHER
5	69-335-040	4	HOSE TAIL 1/2", FEMALE SWIVEL -8
6	69-335-041	3m	HOSE 1/2" (-8) Cut to suitable length on assembly
7	69-335-061	1	CHECK VALVE, FEMALE 1/2"
8	69-335-051	4	HOSE SADDLE -8

OPTIONAL

NOTE :

The flushing kit is connected into the ring main of the system to allow flushing of the foam lines with water after a system discharge, checking foam lines for clear passage or for testing the spray pattern of the nozzles without the need to activate the system. It can further be used to connect the ring main to a mains water supply for continued application of water after system discharge is complete (additional cooling after fire is extinguished).

DO NOT USE FLUSHING KIT & FIRE SUPPRESSION RING MAIN HOSING FOR DEGREASING OF ENGINE AS THIS MAY CONTAMINATE THE FOAM AND ADVERSELY AFFECT FIRE FIGHTING PROPERTIES OF FOAM!



PLEASE NOTE: MUST BE FITTED IN CONJUNCTION WITH AN AUTO DETECT TUBE TO ENSURE THAT SYSTEM ACTIVATION REMAINS FAILSAFE.

Picture M344320.gif

SOLENOID ACTIVATION
69-344-320

SPARE PARTS LISTING FOR OPTIONAL EXTRAS

24V SOLENOID ACTIVATION 69-344-320
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-501	1	SOLENOID LATCHING VALVE 2/2 NC G1/4”
1a	69-335-519	(1)	COIL RETAINING CLIP (Part of item 1)
2	69-335-502	1	CLICK ON COIL 24V DC
3	69-335-072	1	NIPPLE, 1/4” x -4
4	69-344-150	4	HOSE END ASSEMBLY -4 Consists of 69-335-445 Hose Tail 69-335-446 Ferrule 69-335-159 O-Ring
5	69-335-444	2m	HOSE ¼” (-4) Cut to suitable length on assembly
6	69-335-105	1	TEE, MALE -4
7	69-335-245	1	PUSH BUTTON SWITCH
8	69-335-248	1	LABEL – SOLENOID RESET
9	69-335-095	2	SELF TAPPING SCREW

OPTIONAL

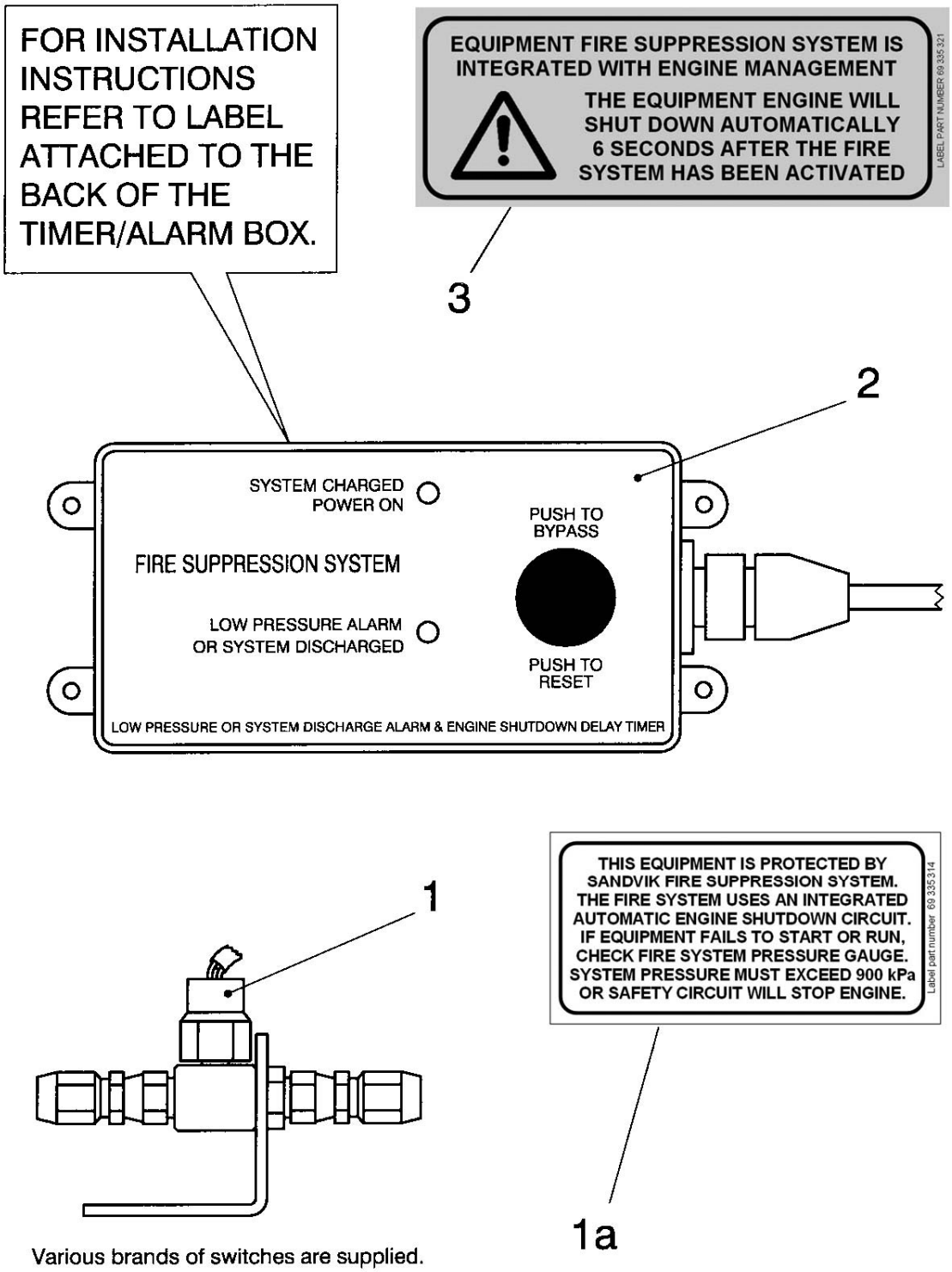
NOTE :

The latching solenoid valve has a 24V DC click-on coil, ie it requires only a pulse signal to activate the system (open the valve) and a pulse signal to reset the valve for charging (close the valve). Once the pulse has been received, the valve will remain in the relative switched position even if power is lost.

To reset the valve after system activation, reverse the polarity of the coil.

The solenoid valve and hosing should be connected into the activation line and the reset button installed near one of the activation modules (preferrably in cabin).

Please note that solenoid activation must be used in conjunction with an auto-detection assembly as a backup system, in case the control signal can not be sent due to a power failure. For details of auto detection, see separate page in this manual.



Various brands of switches are supplied.
Pictorial presentation may not be switch used.

Picture M344130d.jpg

ENGINE SHUTDOWN KIT

WITH ALARM, TIMER & OVERRIDE FUNCTION

69-344-130

SPARE PARTS LISTING FOR OPTIONAL EXTRAS

ENGINE SHUTDOWN KIT 69-344-130
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-344-175	1	PRESSURE SWITCH ASSY Set @ 900 KpA – falling (Switch brand may vary)
1a	69-335-314	(1)	NOTIFICATION LABEL (Part of assembly item 1)
2	69-335-311	1	ALARM & ENGINE SHUTDOWN TIMER
2a	69-335-539	(1)	FUSE, 5AMP (Part of assembly item 2)
3	69-335-321	1	NOTIFICATION LABEL

OPTIONAL

This kit is suitable for connection to 12 or 24V DC.

The basic function of this kit is to detect fire system activation, give the operator an audiovisual alarm and shut down the engine after a given delay period.

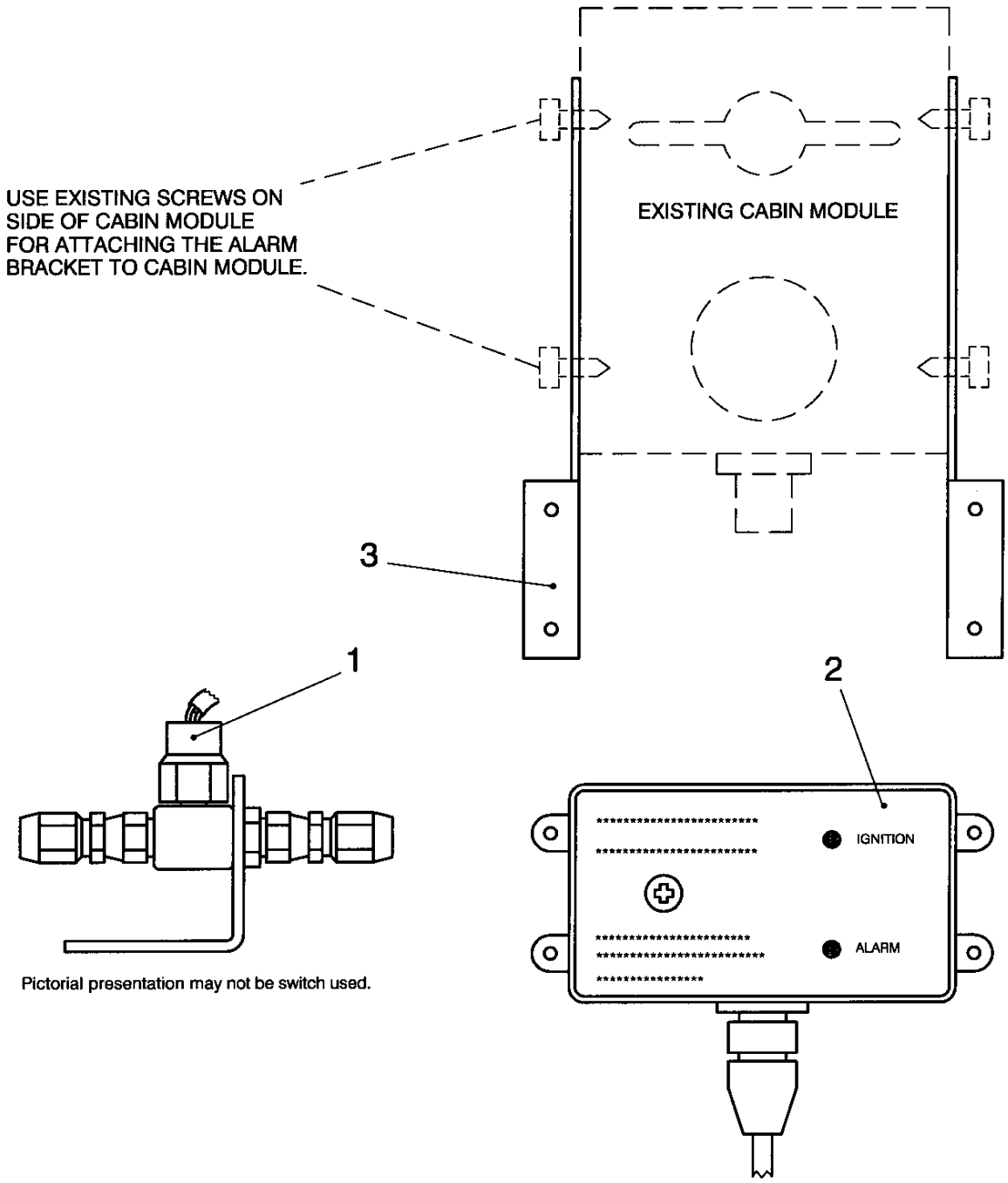
The shutdown timer is activated if the system pressure falls below 900kPa. The engine shutdown delay is set at 6 seconds. This delay is extended by 20 seconds if the reset button is pressed during the initial 6 second delay period.

The shutdown unit is fitted with a manual override function. The button must remain pressed to maintain override. As soon as the button is released, the unit will return to the shutdown mode.

Audio alarm and red light will warn operator that the system pressure is below 900kPa, or the system has discharged (alarm active until system is recharged).

NOTE :

For applications where an alarm is needed to warn the operator that his Fire Suppression System has activated, but engine shutdown is not required, an Alarm only kit (Part number 69-344-420) is available. See overleaf for details.



ALARM ONLY KIT

AUDIO-VISUAL – SELF-MONITORING

69-344-420

Picture M344420.gif

SPARE PARTS LISTING FOR OPTIONAL EXTRAS

ALARM ONLY KIT 69-344-420
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-344-175	1	PRESSURE SWITCH ASSY Set @ 900 KpA – falling (Switch brand may vary)
2	69-335-527	1	AUDIO-VISUAL ALARM
3	69-335-540	1	MOUNTING BRACKET (Set of 2)

OPTIONAL

This kit is suitable for connection to **12 or 24V DC**.

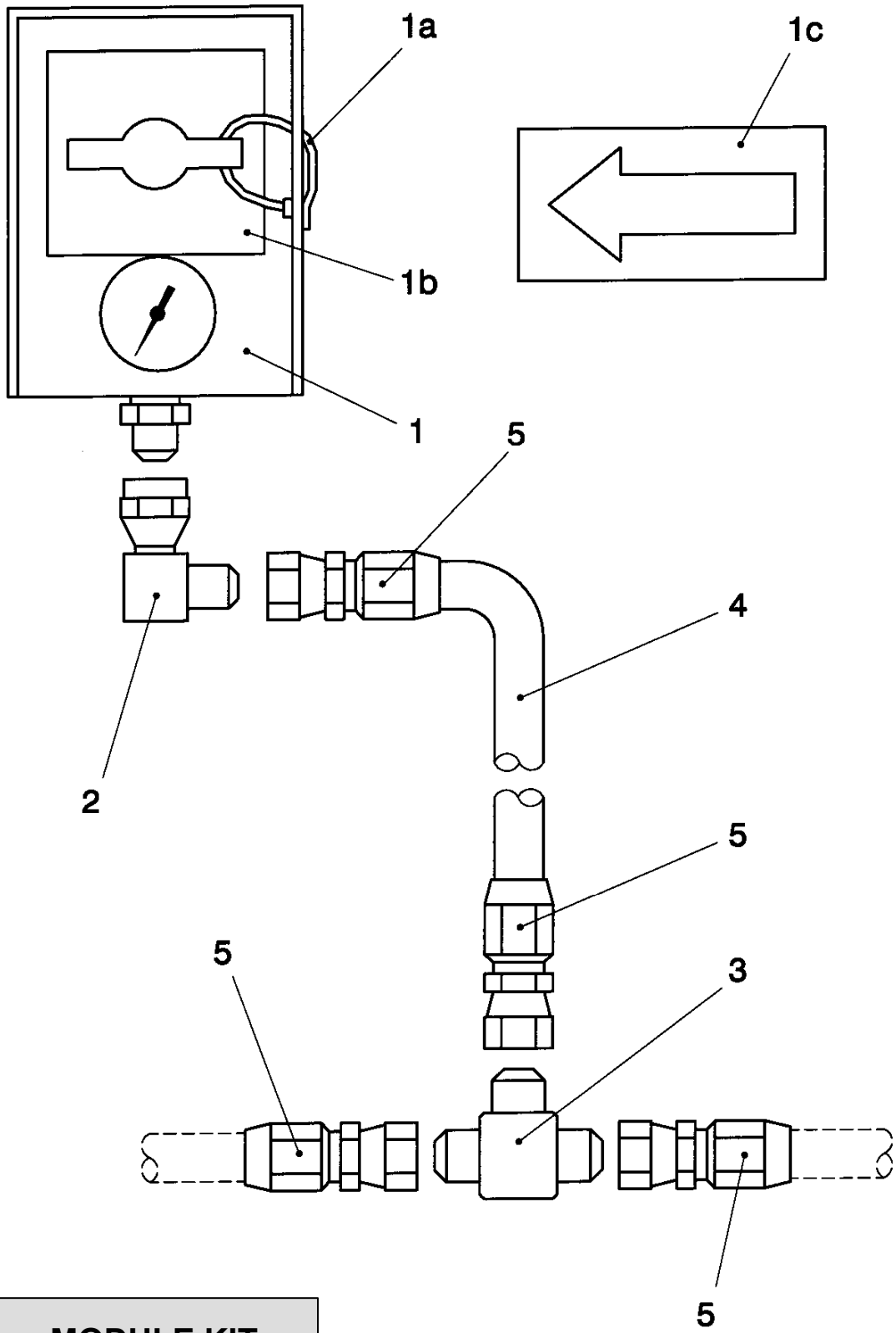
Pressure Switch (item 1) is fitted into activation circuit.

The audible and visual alarm is activated if the system pressure falls below 900kPa,as a result of system activation or low system pressure.

The Audio-visual Alarm has the following features:

- Self test function every time ignition is turned on
  (checks continuity of circuit through pressure switch to alarm)
- **Bright green LED** to indicate system OK and functional
- **Bright red LED** to indicate fault and or system discharging or low on pressure
- Intermittent audio alarm when system is discharged or low on pressure

If the system is not fitted with automatic engine shutdown (see previous page), it is highly recommended that this alarm only kit be fitted as a minimum requirement to warn the equipment operator that the system has activated (fire warning) or is low on pressure.



MODULE KIT
69-344-140

Picture M344140.gif

SPARE PARTS LISTING FOR OPTIONAL EXTRAS

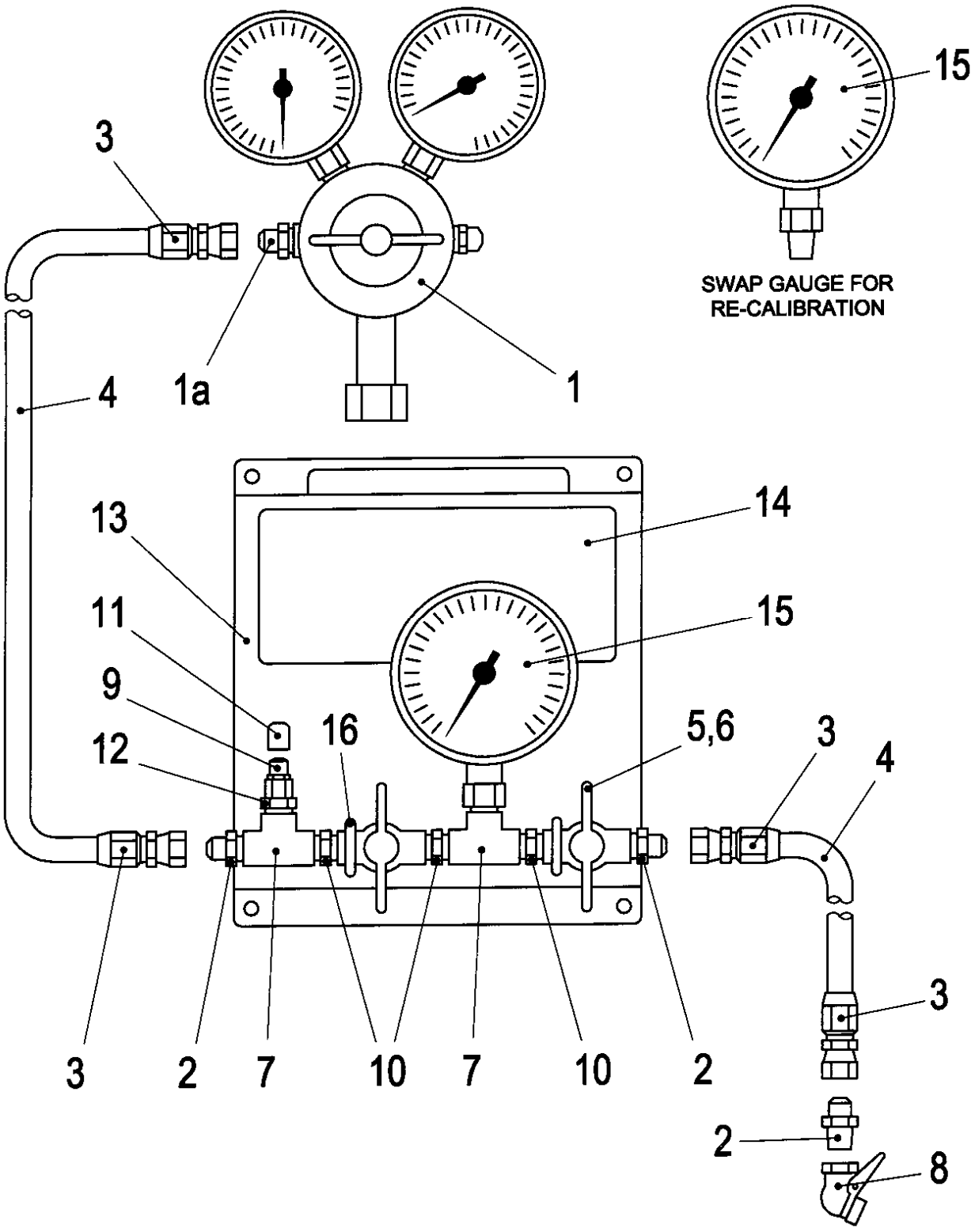
MODULE KIT 69-344-140
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-334-710	1	MODULE ASSEMBLY
1a	69-335-001	(1)	SAFETY TIE (Part of Item 1)
1b	69-335-319	(1)	MODULE LABEL (Part of Item 1)
1c	69-335-320	(1)	ARROW LABEL (Part of Item 1)
2	69-335-294	1	SWIVEL ELBOW –4
3	69-335-105	1	TEE, MALE –4
4	69-335-444	3m	HOSE –4 Cut to suitable length on assembly
5	69-344-150	4	HOSE END ASSEMBLY –4 Consists of 69-335-445 Hose Tail 69-335-446 Ferrule 69-335-159 O-Ring

OPTIONAL

NOTE :

The standard system is supplied with two activation modules. The above module kit is available if additional manual activation points are required. Large equipment may have multiple units fitted to give quick access to fire system activation from various points on the equipment.



CHARGING RIG
69-334-080

Picture M334080d.gif

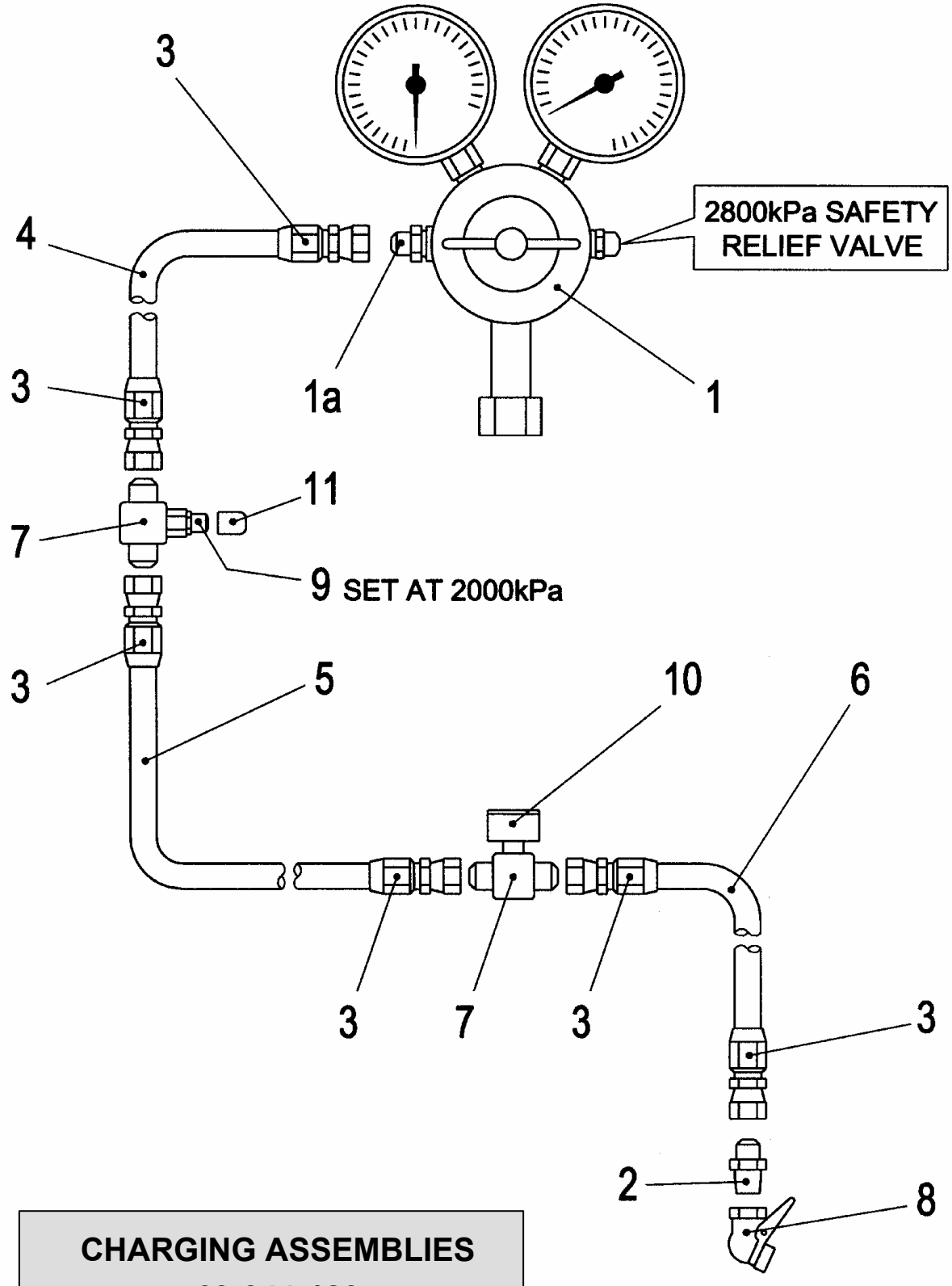
SPARE PARTS LISTING – CHARGING AND SERVICING

CHARGING RIG ASSEMBLY 69-334-080
CONTAINS ITEMS 1 TO 17 LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-071	1	INERT GAS REGULATOR
1a	69-335-072	(1)	NIPPLE, ¼" x –4
2	69-335-072	3	NIPPLE, ¼" x –4
3	69-344-150	6	HOSE END ASSEMBLY –4 Consists of 69-335-445 Hose Tail 69-335-446 Ferrule 69-335-159 O-Ring
4	69-335-444	7.5m	HOSE, ¼" (-4) – see note below
5	69-335-203	2	BALL VALVE (no handle)
6	69-335-186	2	HANDLE, WIDE, YELLOW
7	69-335-263	2	TEE, ¼" BSP, No.35E
8	69-335-073	1	GAS COUPLING
9	69-335-074	1	VENT VALVE
10	69-335-213	3	NIPPLE, ¼" BSP
11	69-335-259	1	DUST CAP
12	69-335-257	1	BUSH, 1/4"x 1/8" BSP, REDUCING
13	69-335-496	1	PLATE
14	69-335-497	1	LABEL, OPERATIGN INSTRUCTIONS
15	69-335-498	2	GAUGE, CALIBRATED
16	69-335-499	2	U-BOLT
17	69-335-500	1	CARRY CASE (not shown)

NOTE – 3 hose assemblies are supplied (1m, 1.5m and 5m), ie 7.5 metres total.

OPTIONAL



CHARGING ASSEMBLIES

69-344-180
69-344-190

Picture M344180a.tif

SPARE PARTS LISTING – CHARGING AND SERVICING

CHARGING REGULATOR ASSY 69-344-180
CONTAINS ITEMS 1 TO 11 LISTED BELOW.

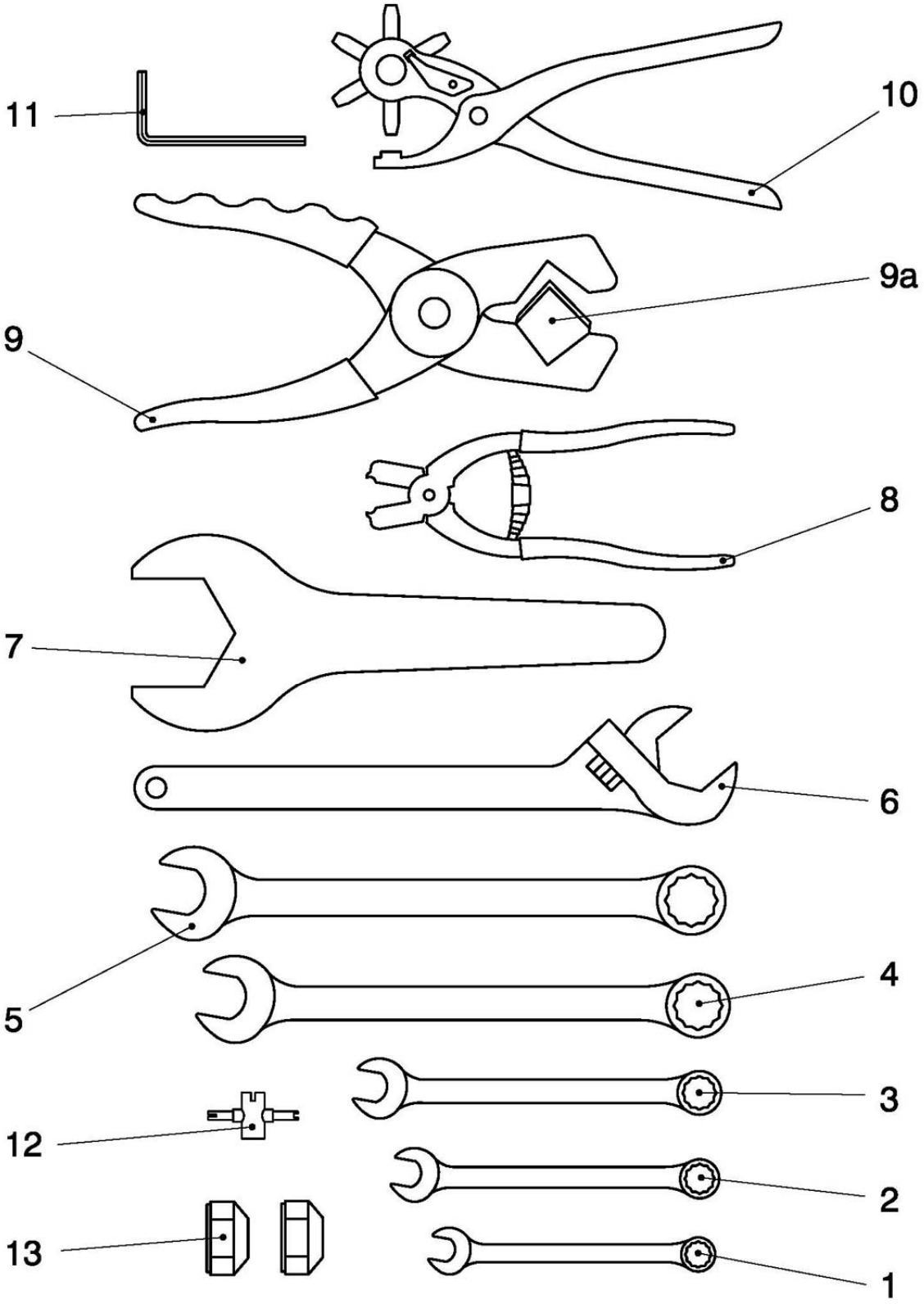
OR

CHARGING LINE ASSEMBLY 69-344-190
CONTAINS ITEMS 2 TO 11 LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-071	1	INERT GAS REGULATOR
1a	69-335-072	(1)	NIPPLE, ¼" x –4
2	69-335-072	1	NIPPLE, ¼" x –4
3	69-344-150	6	HOSE END ASSEMBLY –4 Consists of 69-335-445 Hose Tail 69-335-446 Ferrule 69-335-159 O-Ring
4	69-335-444	0.25m	HOSE, ¼" (-4) – see note below
5	69-335-444	4.5m	HOSE, ¼" (-4) – see note below
6	69-335-444	0.25m	HOSE, ¼" (-4) – see note below
7	69-335-447	2	TEE, -4 MALE x 1/8"BSP FEMALE
8	69-335-073	1	GAS COUPLING
9	69-335-074	1	VENT VALVE
10	69-335-234	1	PRESSURE INDICATOR
11	69-335-259	1	DUST CAP

NOTE – A total of 5 metres of hose is supplied.

OPTIONAL



Picture M344110e.jpg

SERVICE AND ASSEMBLY TOOL KIT No. 69-334-110

SPARE PARTS LISTING – CHARGING AND SERVICING

SERVICE & ASSY TOOL KIT 69-334-110
CONTAINS ALL ITEMS LISTED BELOW.

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-065	1	OPEN END RING SPANNER – 7/16”AF
2	69-335-066	1	OPEN END RING SPANNER – ½”AF
3	69-335-067	1	OPEN END RING SPANNER – 9/16”AF
4	69-335-068	1	OPEN END RING SPANNER – 13/16”AF
5	69-335-069	1	OPEN END RING SPANNER – 7/8”AF
6	69-335-070	1	ADJUSTABLE WRENCH – 300mm
7	69-335-062	1	HEAD NUT SPANNER
8	69-335-137	1	CRIMPING PLIERS
9	69-335-531	1	HOSE CUTTERS
9a	69-335-532	(1)	BLADE (Replacement for item 9)
10	69-335-350	1	NUMERICAL PUNCH
11	69-335-458	1	KEY (For tamperproof screws)
12	69-335-315	1	VALVE REPAIR TOOL
13	69-335-556	2	CAP, -12 (For head discharge line nipple)

OPTIONAL

FILLING INSTRUCTIONS

Please read these instructions carefully.

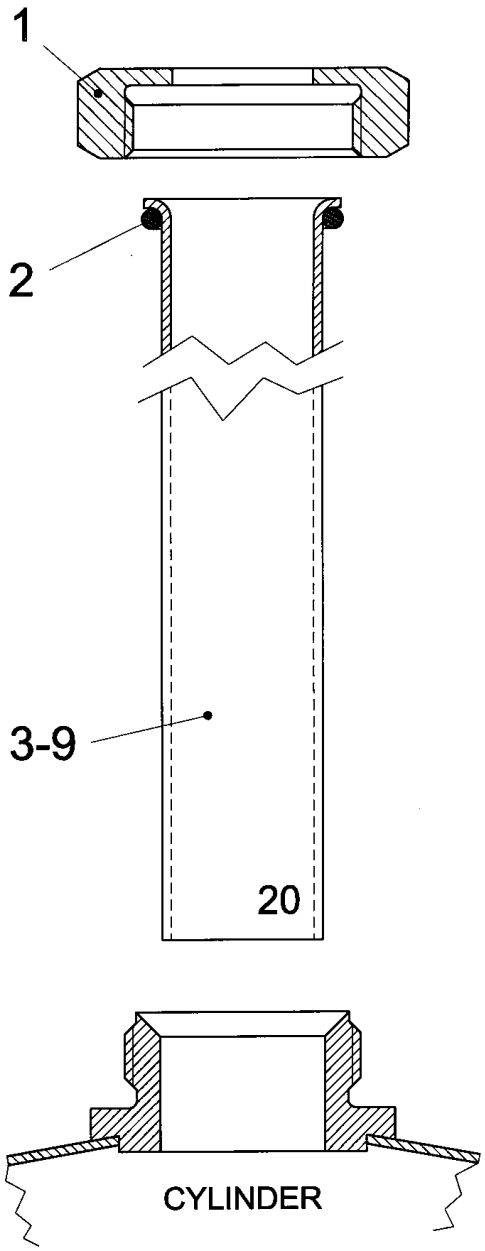
Procedure is different to hand-held extinguisher charging !

Fill spouts are designed to eliminate the need to measure the required amount of water in buckets. The air trapped in the top of the tank will give the exact amount of water required when (re)charging the tank according to the recharging instructions (see tank label).

Note: The design of the spouts is based on using a 6% foam concentrate.

To fill water, proceed as follows:

- Select fill spout according to the nominal tank size – **Spouts are stamped with tank size near bottom edge**.
- Insert spout with O-ring into clean tank neck and secure handtight with brass nut.
- Ensure the tank bung is sealed airtight.
- Insert the water hose through the spout into the empty tank and turn on the water.
- When the water overflows, remove the hose and top up with water to the top of the brass nut.
- Remove the fill assembly and let the remaining water in the spout drain into the tank.
- Add the foam concentrate according to the recharging instruction label on the tank.



WATER FILL KIT
69-334-490

SPARE PARTS LISTING – CHARGING AND SERVICING

WATER FILL KIT 69-334-490
CONTAINS ITEMS 1 TO 7 LISTED BELOW.
(For filling tanks with water)

ITEM	PART NO.	QTY	DESCRIPTION
1	69-335-222	1	NUT
2	69-335-310	7	O-RING
3	69-335-223	1	SPOUT FOR 20 LITRE TANK
4	69-335-224	1	SPOUT FOR 25 LITRE TANK
5	69-335-225	1	SPOUT FOR 45 LITRE TANK
6	69-335-226	1	SPOUT FOR 65 LITRE TANK
7	69-335-227	1	SPOUT FOR 110 LITRE TANK

Other sizes available (not part of above kit) are:

8	69-335-289	(1)	SPOUT FOR 12 LITRE TANK
9	69-335-441	(1)	SPOUT FOR 50 LITRE TANK (Trolley)

NOTE : Individual parts are available on request if full kit is not required.

OPTIONAL

WARRANTY for NFP FIRE SUPPRESSION

1. Sandvik Mining and Construction Adelaide Ltd (hereafter referred to as Sandvik) warrants the product to be free from defects in materials and workmanship for a period of twelve (12) months from date of commissioning of the system or date of delivery of parts to the first user.
2. The obligation, statutory or otherwise, of this warranty is limited to the replacement or repair at a Sandvik facility, or at a point designated by Sandvik, of parts which are found upon inspection by Sandvik at such point, to be defective in materials or workmanship.
3. Assemblies and components purchased and installed on the product by Sandvik are included within this warranty, but will not be considered defective as units, and repair or replacement will be limited to the individual part proven defective. Any part so replaced will become property of Sandvik.
4. Excluded from this warranty are :
   - Any product which has been altered or repaired in such a way, in Sandvik's judgment, as to affect the product adversely.
   - Repair or replacement of any part which has, in Sandvik's judgment, been subjected to damage through negligence, accident, abuse, improper use or storage.
   - Any product which has not been operated and maintained in accordance with normal practice and with the recommendation of Sandvik.
   - Use of non-genuine spare parts.
   - Normal wear and tear.
   - Products damaged in shipment or otherwise without the fault of Sandvik.
5. This warranty does not obligate Sandvik to bear costs of labour, overtime labour, travel time, travel expenses or freight charges in connection with the replacement or repair of defective parts.
6. Sandvik will not consider any claim for warranty unless notified within fourteen (14) days of the defect or end of warranty period, and parts subject to warranty are returned to Sandvik facility for assessment at the purchasers risk and expense.
7. Sandvik do not issue replacement product for warranty claims. Our policy is to credit customers' account when the warranty claim has been processed and approved. Therefore if replacement product is required, a new order needs to be placed on Sandvik. This order may be marked 'subject to warranty' if desired.
8. Subject to the Trades Practices Act (and any other relevant legislation) and to the fullest extent permitted by law, the liability of Sandvik in respect of the product is limited in accordance with Clause 2 of this warranty and Sandvik shall otherwise be under no liability to the purchaser, to any third party at law or in equity or pursuant to any statute rule or regulation or otherwise for any claims, demands, losses, damages, costs, expenses, deaths or injuries arising out of or in connection with the performance or non-performance of the product.

MATERIAL SAFETY DATA SHEET – AFFF 6% (STANDARD FOAM)

CRODA

Material Safety Data Sheet (AFFF)

Chemical product and company identification

Trade name: Filmfoam (913/916) U.L Grade
Product Application: Fire fighting foam concentrate
Manufacturer: Croda Fire Fighting Chemicals Ltd Ashcroft Road Knowsley Ind Park Kirkby Liverpool L33 7TS United Kingdom
Telephone: + 44 (0) 151 548 6424 Fax: + 44 (0) 151 548 7263

Composition and ingredient information

An aqueous concentrated solution of fluorocarbon - hydrocarbon surfactants and foam stabilisers / preservatives (Glycols).

Component name	CAS no	%composition	Symbol	Phrase
Water	7732-18-5	25 - 90		
Butyl Diglycol	112-34-5	5 - 30	Xi	R36
Fluoro-alkyl surfactants		2 - 11	Xi	R36/38
Alfa Olefines		3 - 18	Xi	R36/38
Polyethylene Glycol	25322-68-3	2 - 12		

Hazard identification

Irritating to skin and eyes. Ingestion may cause nausea, vomiting and diarrhoea.

First aid measures

Inhalation: Move to fresh air
Skin contact: Wash off with plenty of water
Eye contact: Irrigate with fresh water for at least ten minutes holding eyelids apart
Ingestion: Rinse mouth with water and give plenty of water to drink. Do not induce vomiting.
If symptoms persist seek medical advice and treat symptomatically.

Fire fighting measures

No specific measures required as this product is a fire extinguishing medium. If product containers are involved in fire then suitable extinguishing media should be applied.

Accidental release measures

Washing of any spillages into drains should be avoided. Absorb spillage with absorbent granules and transfer to containers for safe disposal.

Croda Fire Fighting Chemicals Ltd Ashcroft Road Knowsley Industrial Park Kirkby Liverpool L33 7TS England
Tel +44 (0)151 548 6424 Fax +44 (0)151 548 7263

MATERIAL SAFETY DATA SHEET – AFFF 6% (STANDARD FOAM)

CRODA

Filmfoam (913/916) U.L Grade

Handling and storage
Product should be diluted with water before use. (913 at 3%, 916 at 6%).

Handling:	Avoid repeated inhalation or contact with eyes and skin of the foam concentrate.
Storage:	Product should be stored in sealed original containers above the freezing point and below 40°C.

Exposure controls and personal protection
Occupational exposure standards:
United Kingdom OES: None

Personal Protection: Use of gloves, goggles and protective clothing is recommended.

Physical and chemical properties

Appearance:	Clear Amber liquid
Odour:	
pH at 15.6°C	7.0 - 8.0
Specific Gravity:	1.00 - 1.05
Solubility:	Miscible with water in all properties
Flammability:	Non-flammable
Flash Point:	> 98°C
Boiling Point:	100°C at 760mmHg
Freeze Point:	913/916: -2°c

Stability and reactivity
If stored at ambient temperature away from direct sunlight, shelf life is normally over ten (10) years.

Toxicological properties

Ingestion:	Can cause vomiting, nausea and diarrhoea
Skin contact:	Can irritate skin
Inhalation:	Prolonged extensive or repeated inhalation can be harmful.
Eye contact:	Can irritate eyes.

Aquatoxicity of concentrate:

	913	916
Rainbow Trout (oncorhynchus mykiss)		
LC_{50} (96 Hours)	>2000 mg/l	>4000 mg/l
Daphnia Magna		
EC_{50} (24 Hours)	>1000 mg/l	>2000 mg/l
EC_{50} (48 Hours)	>500 mg/l	>1000 mg/l

Page 2 of 3

MATERIAL SAFETY DATA SHEET – AFFF 6% (STANDARD FOAM)

CRODA

Filmfoam (913/916) U.L Grade

Ecological information
As product is intended as a fire fighting foam it will create copious quantities of foam if washed into watercourses, although it is biodegradable. In the event of large spillage, advise appropriate authorities. (In UK, Environment Agency or SEPA and local water company).

Biodegradation

5 days	21%
20 days	73%
28 days	81%

Disposal considerations
Dispose of surplus product or contaminated packaging according to local and national legislation. Do not dispose with water reactive materials.

Transport information
Not classified as hazardous for transport.

Regulatory information
Not classified under Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 as hazardous. Refer to Health and Safety at Work Act and the Control of Substances Hazardous to Work Regulations. This material safety data sheet does not constitute the user's own assessment of workplace risk as required by the above regulations. The Manual Handling Operations Regulations may be applicable to certain pack sizes of this product.
EEC directive (67/548/EEC and 88/379/EEC).

Other information
The information in this safety data sheet is based on the present state of knowledge and current national legislation. It provides guidance on safety health and environmental aspects of the product and should not be construed as any guarantee of performance. The product should not be used for purposes other than fire-fighting without first referring to the supplier. The user is responsible for ensuring that requirements of relevant legislation are complied with.

Further information may be obtained from the following Health and Safety Executive publications:
EH40 Occupational Exposure Limits (updated annually)

Page 3 of 3

MATERIAL SAFETY DATA SHEET – FFFP 6% (ALTERNATIVE FOAM)

Data Sheet No: F08-02/N
Page 1 of 4
Issue/Date: 4/1.6.95
Supersedes: 3/11.12.92

ANGUS FIRE
ANGUS FIRE ARMOUR (AUSTRALIA) PTY. LTD.
328 BOUNDARY ROAD, DINGLEY, VICTORIA 3172
Telephone: (03) 9239 9650 Fax Sales: (03) 9239 9656 Fax Accounts: (03) 9239 9655

MATERIAL SAFETY DATA SHEET

1. PRODUCT INFORMATION

1.1 Product Identification
PETROSEAL 6%

1.2 Application and Use
Fire Fighting foam concentrate

1.3 Manufacturer/Supplier
Angus Fire Armour (Australia) Pty. Ltd. 1001 Mountain Highway, Boronia, Vic.. 3155. Telephone (03) 9729 3433

Emergency Telephone Number
for information and supply: Angus Fire (03) 9729 3433, (03) 9438 4114, (03) 9305 6606.

1.4 Product Description
Hydrolysed protein solution containing fluorosurfactants and glycol solvent.

2. COMPOSITION

Substance	Synonyms	Concentration %	Cas-No.
Hexylene glycol	1,2 Hexanediol 2-Methylpentan -2.4-diol	1 - 10	107-41-5
Sodium chloride		5 - 10	7647-14-5
Fluorosurfactant		<5	
Hydrolysed protein		~20	
Bactericide		<2	
Balance water			

3. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Liquid	pH at 20°C:	7 - 8
Colour:	Dark brown	Boiling Point:	100°C at 760 mm Hg
Odour:	Organic Odour	Freeze Point:	-13°C
		Flash Point:	>62°C
		Flammability:	Not flammable
		Solubility:	Miscible with water in all proportions
		Viscosity at 20°C:	5cs
		Specific Gravity:	1.13

MATERIAL SAFETY DATA SHEET – FFFP 6% (ALTERNATIVE FOAM)

Data Sheet No: F08-02/N
Page 2 of 4
Issue/Date: 4/1.6.95
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4. HAZARD INFORMATION

4.1 Health Hazard Information

Inhalation
Inhalation of hazardous amounts is unlikely when used as intended. Is irritant to respiratory tract when inhaled.

Ingestion
Low oral risk when used as intended. May cause nausea, vomiting and diarrhoea when ingested.

Contact to eyes or skin
Low risk if appropriate precaution measures are taken (see section 6). Can cause skin and eye irritation when contact to eyes or skin.

4.2 Occupational Exposure

Occupational Exposure Limit
Pure Hexylene glycol: Occupational Exposure Standard (OES)
Long term exposure limit (8 hour time weighed average) : 25ppm
Short term exposure limit (10 minutes) : 25ppm

Other Limits
Pure Hexylene glycol: ACGIH : Threshold Limit Value (TLV)
Ceiling concentration : 25 ppm

PETROSEAL 6% is available for use at 6% dilution.

4.3 Fire and Explosion

General Hazards
PETROSEAL 6% is not flammable or explosive.

Hazardous Decomposition Products
Do not expose containers to heat or flame. since the containers are made from high density polyethylene and will burn. Thermal decomposition of containers and/or products may generate acrid smoke and fumes and traces of Na_2O,Cl^-,SO_x,No_x,ZnO and HF.

Fire Fighting Measures
Fire Fighting measures are not applicable as PETROSEAL 6% is a fire extinguishing media. If product containers are involved in fire, then a suitable extinguishing agent should be applied.

4.4 Stability and Reactivity

Generally stable. As with all aqueous solutions PETROSEAL 6% should be excluded from contact with any materails which have violent reactions with water.

4.5 Sources of Information

Clayton, G.D. and F.E. Clayton: Patty's Industrial Hygiene and Toxicology. Fourth edition volumes I - III (1991).
Sax, N.I. and R.J. Lewis, Sr: Dangerous Properties of Industrial Materials. Seventh edition volumes I - III (1991).
Health & Safety Executive: Occupational Exposure Limits (EH 40/92).
Note: EH40 is revised on an annual basis and newest issue should be applied.

MATERIAL SAFETY DATA SHEET – FFFP 6% (ALTERNATIVE FOAM)

Data Sheet No: F08-02/N
Page 3 of 4
Issue/Date: 4/1.6.95
Supersedes: 3/11.12.92

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5.1 General
First aiders should know and take the precautions appropriate to avoid danger to themselves and the casualty. Take casualty together with material safety data sheet of this product to hospital or doctor, if necessary.

5.2 Inhalation
Remove casualty from exposure. If there is breathing difficulty or cough keep patient at rest seated in position of maximum comfort.

5.3 Ingestion
If ingestion is suspected, do not induce vomiting, send casualty to hospital immediately.

5.4 Contact to eyes
If there is eye contact, wash immediately with plenty of clean, gently flowing water for 10 minutes, then send casualty promptly to a doctor or hospital.

5.5 Contact to skin
If there is skin contact, wash immediately with plenty of clean, gently flowing water.

6. EXPOSURE CONTROL/PERSONAL PROTECTION

6.1 Personal Protective Equipment - Fire Fighting

Angus Fire Foam Concentrates will be used by professional firefighters to control and extinguish flammable liquid fires. The nature of this process may involve exposure to heat, flame and possibly toxic vapours and fumes. It is normal procedure to wear appropriately designed personal protective equipment designed for use in firefighting situations. Angus Fire advises that this form of personal protective equipment should be used if the packaging materials become involved in fire.

6.2 Personal Protective Equipment - Other Handling

Avoid prolonged, extensive or repeated inhalation or contact to eyes and skin.

Hand Protection Wear impervious gloves of an approved type (e.g. neoprene).

Eye Protection Wear safety goggles of an approved type (BS 2092).

7. HANDLING/STORAGE/DISPOSAL

7.1 Handling and Storage
No special handling techniques required. For best results, the product should be stored in sealed, original containers above -10°C and below 40°C. Freezing and thawing do not affect the substance properties but care must be taken to avoid freezing the container and its contents since the expansion of the container contents may cause cracking of a completely rigid container as ice forms.

7.2 Accidental Release
SPILLAGE: The practice of washing spills into drains should be avoided if at all possible and should under no circumstances be allowed without first consulting the local Water Authority and National Rivers Authority. Absorb spillage with absorbent granules and transfer to container.

7.3 Disposal
Waste should be disposed via local authority waste collection service or registered waste carrier. Ensure the destination is a licensed facility.

MATERIAL SAFETY DATA SHEET – FFFP 6% (ALTERNATIVE FOAM)

Data Sheet No: F08-02/N
Page 4 of 4
Issue/Date: 4/1.6.95
Supersedes: 3/11.12.92

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7.4 Transport

Special transport techniques are not required. No classification for supply or carriage by road required.

8. TOXICOLOGICAL INFORMATION

8.1 Aquatoxicity

Rainbow Trout (Ocorhynchus mykiss)

LC_{50} (48hrs) 3400 ppm

LC_{50} (3hrs) >10000 ppm
LC_{50} (6hrs) >10000 ppm
LC_{50} (24hrs) >10000 ppm
LC_{50} (48hrs) >10000 ppm
LC_{50} (72hrs) 1300 ppm
LC_{50} (96hrs) 1300 ppm

Water Flea (Daphnia magna)
EC_{50} (24hrs) 167878 ppm
EC_{50} (48hrs) 37857 ppm

8.2 Sources of Information

Huntingdon Research Centre: AFA 14(d) 911377.
Acer Environmental: RT-ESV-024-01/R3.

9. ECOLOGICAL INFORMATION

9.1 Biodegradation

Biodegradable

Chemical oxygen demand
COD 0.34 gg^{-1}

Biochemical oxygen demand
5-day BOD_5 0.12 gg^{-1} (34%)
21-day BOD_{21} 0.34 gg^{-1} (100%)

9.2 Sources of Information

Huntingdon Research Centre: AFA 7/87921

SANDVIK

Sandvik internal job number

Certificate number

FIRE SUPPRESSION SYSTEM COMMISSIONING CERTIFICATE

Subject in all things to the rights (if any) of the client at law - failure to return fully completed copy of certificate to Sandvik within one (1) month of commissioning date will result in warranty and guarantees being null and void.

Purchased by : .....
Purchasers address : .....
.....
End user : .....
End users address : .....
.....
Mine site : .....
Site contact : .....
Site phone number : .....

Vehicle application : ☐ Surface ☐ Underground

Type of foam used : ☐ 6% AFFF ☐ 6% FFFP

Vehicle type : .....
Vehicle make : .....
Vehicle model : .....
Vehicle serial or asset number : .....
.....
Container (tank) size and Qty : .....
Total number of nozzles fitted : .....
Serial no. of head(s) : .....
Serial no. of container(s) : .....
.....
Manual activation module Qty and location : .....
.....
.....

Basic system operation explained to client : ☐ Yes ☐ No .....
Service requirements explained to client : ☐ Yes ☐ No .....
Parts and service manual given to client : ☐ Yes ☐ No .....
Container (tank) test certificate given to client : ☐ Yes ☐ No .....

System coverage as per fire risk assessment : ☐ OK Estimated area coverage of ..... square metres
Number of nozzles and spray coverage : ☐ OK Remarks .....
Verification of all system functions : ☐ OK Remarks .....
Container (tank) position and orientation : ☐ OK Remarks .....
Access to container (tank) for servicing : ☐ OK Remarks .....
Access to manual activation point(s) : ☐ OK Remarks .....
Visibility of labelling and pressure indicators : ☐ OK Remarks .....

Tick box for options fitted and checked :

☐ Auto detection & activation ☐ Foam line flushing kit ☐ Engine shutdown alarm and timer
☐ Solenoid activation ☐ Pressure switch only ☐ Other .....
☐ Cabin module vent line ☐ Alarm only ☐ Other .....

SYSTEM CHARGED AND ACTIVATED FOR TESTING : EFFECTIVE DISCHARGE TIME ..... SECONDS

Foam line checked for loose fittings and leaks : ☐ Yes ☐ No .....
Shutdown, alarms & override tested (if fitted) : ☐ Yes ☐ No .....
System left fully charged and operational : ☐ Yes ☐ No .....
Service tag marked with commissioning date : ☐ Yes ☐ No .....

COMMISSIONING AGENT SIGNATURE

Date commissioned : .....
Name (please print) : .....
Signature : .....
Sandvik accreditation certificate number : .....

CLIENT REPRESENTATIVE SIGNATURE

Date accepted : .....
Name (please print) : .....
Position title : .....
Signature : .....

Distribution : **WHITE** – Client representative **YELLOW** – Commissioning agent **BLUE** – Sandvik

Revision e - issued 1.11.2006 Form number CF09

PERSONAL NOTES AND REMARKS

PERSONAL NOTES AND REMARKS

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AUTHORISED SERVICE CENTRES

For advice, service inquiries and locations of approved dealers contact any of the Sandvik Mining and Construction Adelaide Ltd service workshops below.

AUSTRALIA

Call 1300 737 740 30

FROM ANYWHERE IN AUSTRALIA

ADELAIDE
136 Daws Road
MELROSE PARK SA 5039
Phone: (08) 8276 7655
Fax: (08) 8276 8509

BROKEN HILL
11 Kanandah Road
BROKEN HILL NSW 2880
Phone: (08) 8088 2111
Fax: (08) 8088 4411

KALGOORLIE
20 Broadwood Street
KALGOORLIE WA 6430
Phone: (08) 9091 6300
Fax: (08) 9091 6003

MOUNT ISA
4 Duke Street
MOUNT ISA QLD 4825
Phone: (07) 4743 8111
Fax: (07) 4743 2635

OLYMPIC DAM
Gunson Street
OLYMPIC DAM SA 5725
Phone: (08) 8671 0015
Fax: (08) 8671 0115

PERTH
15 Magnet Road
CANNING VALE WA 6155
Phone: (08) 9334 4100
Fax: (08) 9455 6800

SINGLETON
Unit 1, 44 Magpie Street
SINGLETON NSW 2330
Phone: (02) 6572 2699
Fax: (02) 6572 2933

TOWNSVILLE
133-135 Enterprise Street
BOHLE QLD 4818
Phone: (07) 4774 4675
Fax: (07) 4774 4656

BRISBANE
12 Archimedes Street
DARRA QLD 4076
Phone: (07) 3375 3300
Fax: (07) 3375 3582

ORANGE
1 Stephen Place
ORANGE NSW 2800
Phone: (02) 6361 7600
Fax: (02) 6361 7610

PILBARA
2/384 Tecoma Street
TOM PRICE WA 6751
Phone: (08) 9143 3642
Fax: (08) 9189 3261

BENDIGO
12 Ramsay Court
KANGAROO FLAT VIC 3555
Phone: (03) 5447 7100
Fax: (03) 5447 7688

INTERNATIONAL

INDONESIA - JAKARTA
PT Sandvik Mining and Construction Indonesia
JL. MT Haryono Kav 10
JAKARTA 12810
Indonesia
Phone: +62 21 8308 411
Fax: +62 21 8308 410

INDONESIA - BALIKPAPAN
PT Sandvik Mining and Construction Indonesia
JL. Mulawarman RT.23
No. 17A Batakan Kecil
BALIKPAPAN 76115
East Kalimantan
Phone: +62 542 763 066
Fax: +62 542 763 062

SOUTH AFRICA - MIDRAND
Sandvik Exploration Rock Tools (Africa)
Tillbury Park E1, 16th Road
MIDRAND
South Africa
Phone: +27 11 314 7461
Fax: +27 11 314 1598