



Type 2 500GPM Appliance

Reference guide

Serial # 97- 132



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Recommendations for change:

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Note

Please refer to the Portal for updates of this document.

Contents

Overview	7
Purpose.....	8
Identifying the appliance	10
Features and performance	11
All crew	15
Fixed stowage	16
Rescue ladder.....	20
Hoses.....	21
Storz couplings	23
Cab layout.....	25
Mast lights.....	30
Maintenance.....	31
Officer.....	35
Make sure your driver is prepared	36
Cab layout.....	37
Headlights, beacons, siren and public address (PA).....	39
Scene and letterbox lights.....	41
Driver	43
Driver responsibilities	44
Driving controls	45
Transmission.....	47
Braking.....	48
Electronic vehicle control system controls.....	50
Cruise control	54
Gear shift control	54
Siren.....	55
Drivers checks.....	56
Wheel nut indicators	58

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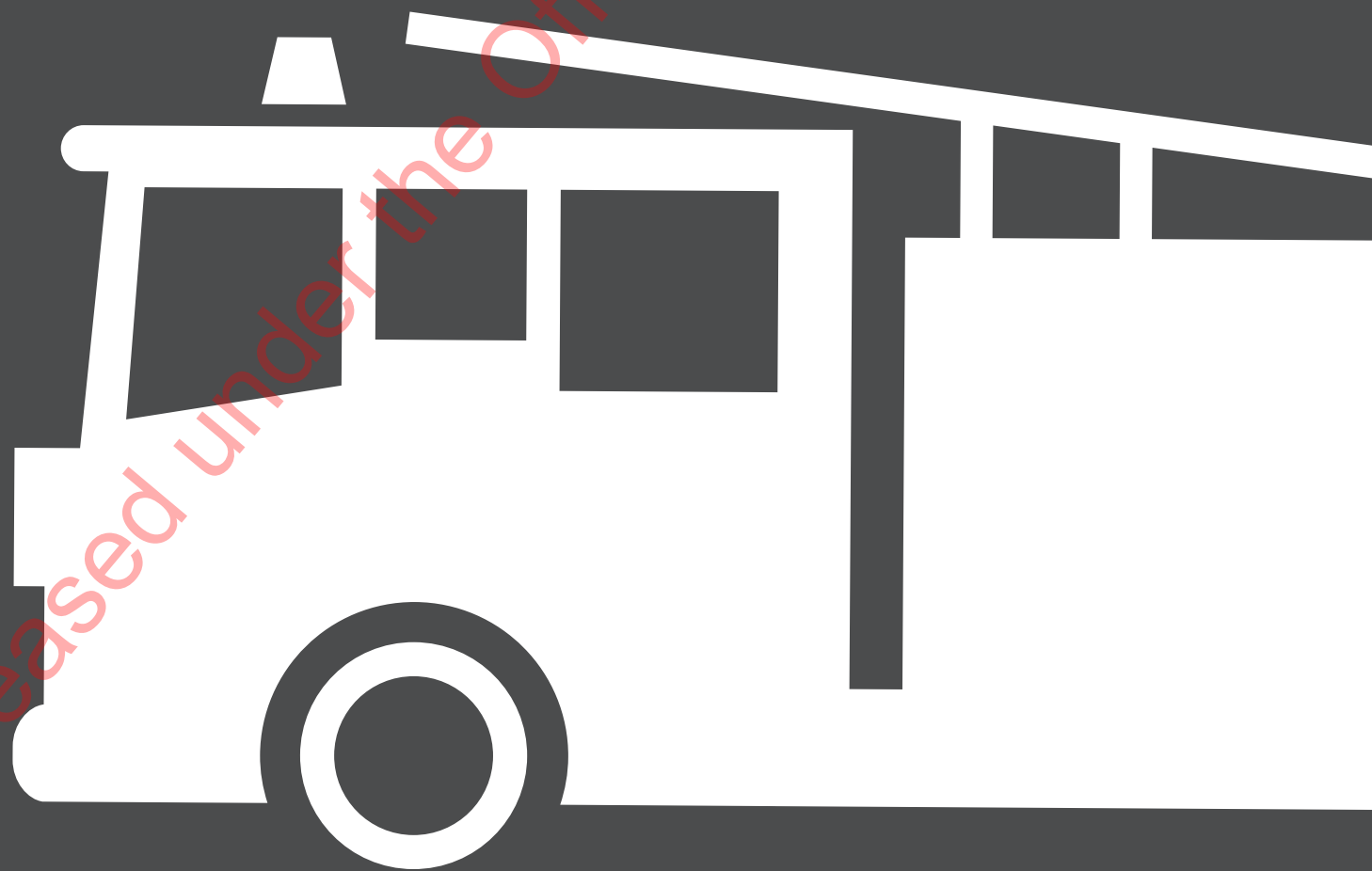
Pump operator	61
Hose reels.....	62
Hose reel circuit breakers.....	63
Specifications.....	64
Relief valves and overflow.....	66
Pump diagram.....	67
Pump Boss controls and indicators.....	69
Engaging the pump.....	71
RPM mode.....	72
Changing the RPM preset.....	72
Open and closed deliveries in RPM mode.....	73
Pressure mode.....	74
Open and close deliveries in Pressure mode.....	75
Changing between RPM and Pressure modes.....	75
Automatic pressure control.....	76
Complete loss of water supply.....	78
Chasing water.....	79
Managing your supply.....	79
Default setting.....	80
Class A foam system.....	81
Class A Foam delivery.....	82
Delivering foam.....	83
Water only delivery.....	84
Maintenance.....	85

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Overview



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Purpose

This reference guide covers the operation of the Type 2 500GPM appliance serial numbers 97-132 and is intended for:

- all crew
- officers
- drivers
- pump operators.

It outlines the features and layout of this appliance and with additional training, will prepare all Fire and Emergency New Zealand (FENZ) personnel to operate this appliance.

Your appliance arrives with copies of the manuals from the manufacturers and equipment suppliers. This content is also available on Learning Station.

FENZ responsibilities

It is FENZ's responsibility to:

- use competent operators
- follow the operating instructions
- inspect the appliance regularly
- repair and maintain the appliance properly
- service and test it regularly
- keep the documentation and records up to date.

Note

This guide is split into sections these include— all crew, driver, officer and pump operator.

We advise you to read sections relevant to your role and to all crew.

Note

This guide does not fulfil the training requirements of Emergency Response Driver (ERD), pump operators, firefighters and officers.



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Identifying the appliance

The serial number is the best way to identify your appliance, as designs change when the cab and chassis manufacturer or other suppliers change their equipment.

To access the correct training material for all recent FENZ appliances, look for the manufacturer's label on the inside of the driver's door, which shows the serial number.



Before riding the appliance

Before riding the appliance:

- familiarise yourself with the appliance on station using this guide
- undertake practical training.

Regional fleet and training staff will work with your brigade to identify what practical training is required.

Operational differences

The differences between this appliance and other Type 2 appliances include the:

- pump control system
- make and model, which may differ from your current appliance.

Features and performance

Engine

This appliance has a Cummins Tector 6 cylinder, 5.9L, turbo charged diesel engine that produces 185kW (250 bhp).

Transmission

The Type 2 has an Allison 5 speed automatic transmission.

The interlock between the Power Take Off (PTO) and transmission prevents the appliance being driven while the PTO is engaged. If Drive (D) is selected while the pump is engaged, D and the broken gear symbols will appear on the dashboard indicator.

Emissions

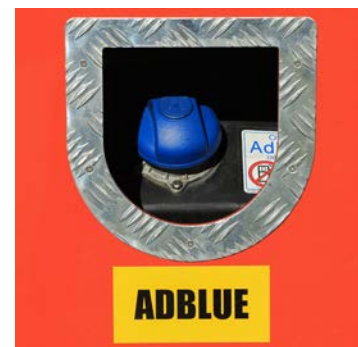
This appliance meets the Euro 5 emissions control standard. The engine management programme has been altered to produce the best performance for emergency response driving.

Exhaust emissions

To control exhaust emissions, the additive Ad Blue is used to reduce the production of Nitrous Oxide. Ad Blue is a solution of urea and water which is injected into the exhaust system.

AdBlue is carried in a separate tank mounted on the offside behind the rear axle. A small AdBlue tank lasts a long time because it is used at only a few percent of the rate diesel is used.

The AdBlue system is automatic and only requires the tank to be topped up. The tank level is checked using the maintenance screens in the cab display.



Specifications

Length	8m
Weight	Gross weight: 12,000kg
Height	3.2m
Width	2.4m
Fuel tank	200L
AbBlue tank	25L

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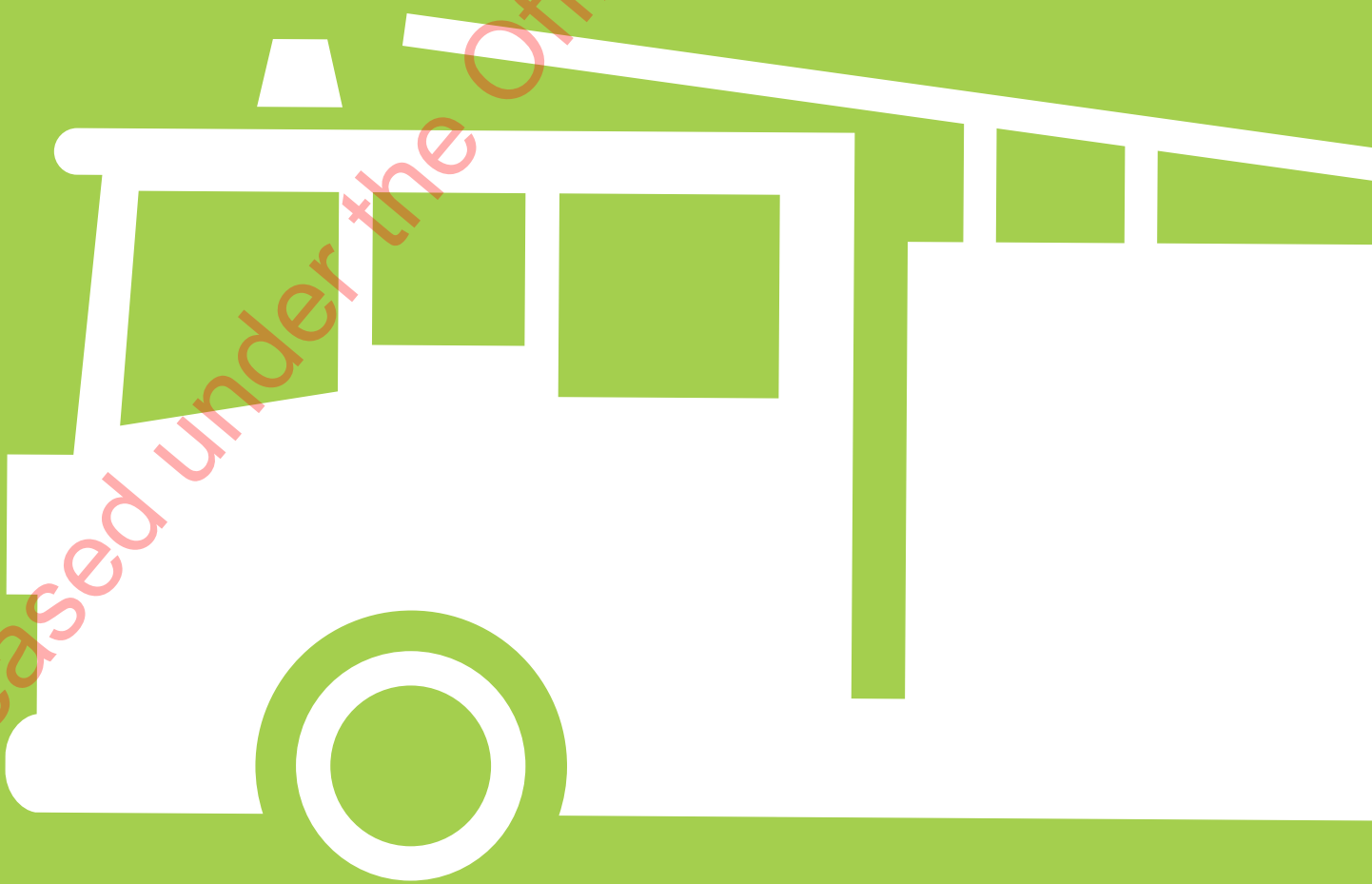
Nearside view of a Type 2 500GPM appliance

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All crew



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Fixed stowage

Nearside lockers

Nearside stowage includes:

- a multi-purpose ladder
- BA Sets
- storage for Motor Vehicle Accident (MVA) equipment
- flaked delivery under hose reel.

Offside lockers

Offside stowage includes:

- charging point for equipment with electric start engines
- forestry packs
- waterway equipment
- salvage sheets
- petrol-powered equipment
- flaked delivery under hose reel.

Rear lockers beside pump panel

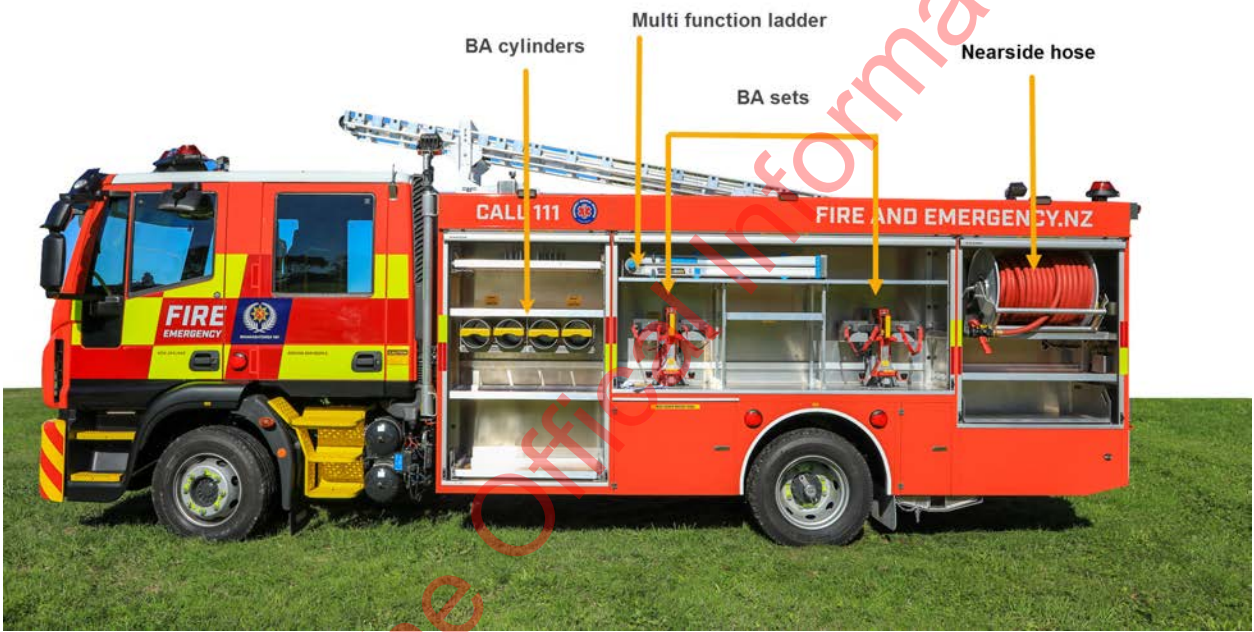
The rear lockers on both sides are available for flaked feeder hose stowage. Three lengths of 70mm feeder hose can be stowed in each tray.

The hose ramps are stowed on each side of the appliance, under the offside and nearside rear lockers behind the rear wheels.

Tray lock pin

The slide-out trays have a lock pin to secure the tray when stowed or fully extended. Lift the pin shown in the top image on page 17, to release the tray to pull out or re-stow.

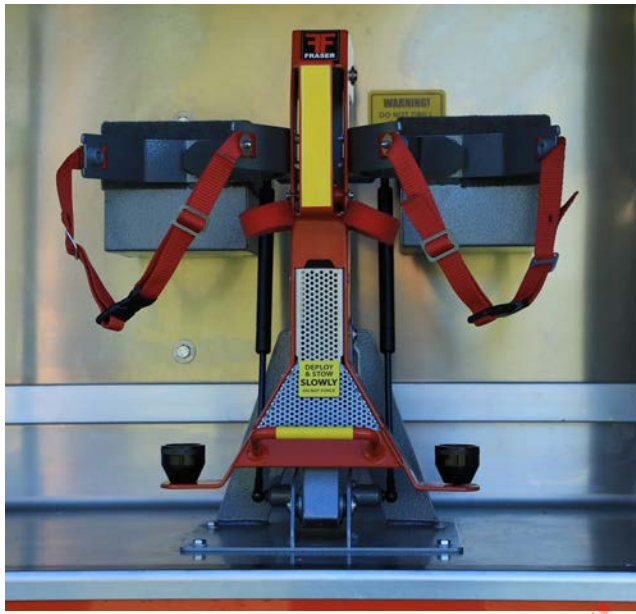
Refer also to the care of locker doors under 'Maintenance' at the end of this section.



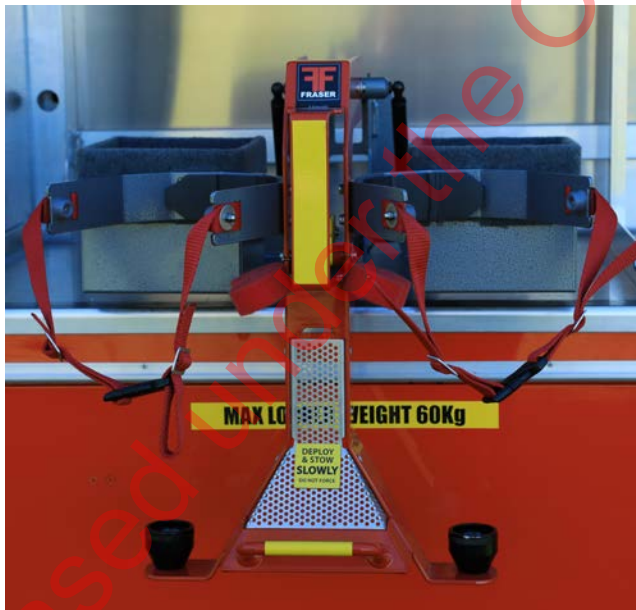
Breathing apparatus (BA) stowage

Images 1-3 show the mounting brackets for the BA set stowage:

1. secured position
2. released position
3. handle for releasing



1.



2.



3.

BA cylinder stowage

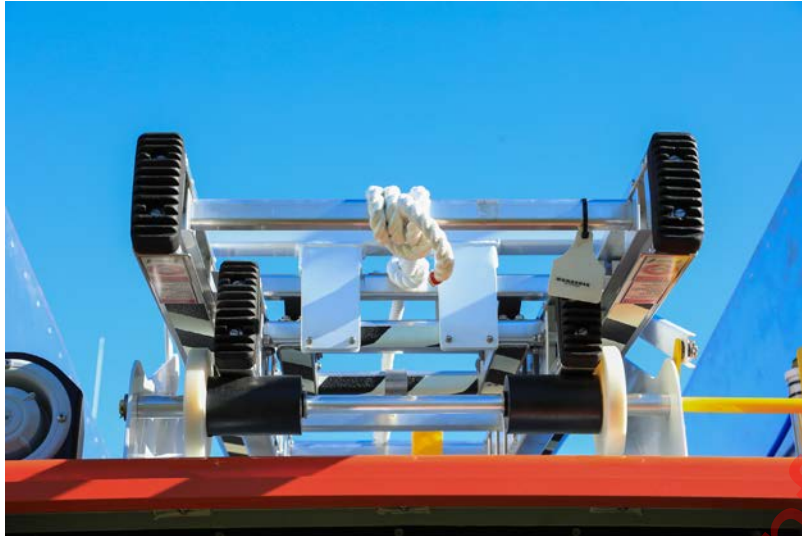
Tubes are used for storage of additional BA cylinders. The yellow bar restrains both pressurised and non-pressurised cylinders when pulled down over the end of the cylinders.



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Rescue ladder

The Type 2 appliance is supplied with a AS 10.5m rescue ladder that sits on top of the appliance.



To release the ladder, lift the yellow lever— see image below.



Hoses

Hose reels

There is 60 metres of hose on each of the two reels, which are mounted on both the nearside and offside rear lockers. The hose guides must be lifted and locked into place before hoses can be used.

The hose reel is fitted with a friction brake which is adjusted using the yellow lever on the right hand side of the hose reel drum. This can be adjusted to create drag to allow more control when rewinding the hose back onto the reel.

Dropping the hose guide back into its stowed position pushes the friction brake lever down to lock it. This prevents the hose from unwinding while driving.

To rewind the hose reel you usually use the powered system. The rewinding system includes an electric brake that stops the drum turning when the rewind switch is released. There is also a crank handle to manually wind the drum if the motor fails.

The circuit breaker for the electric brake is in the rear locker. The rewind motor circuit breaker is on the pump panel.

Hose reel nozzle

The hose reels are fitted with 500 kPa TFT G-Force nozzles. The red markings on the nozzles indicate they are optimised for 500 kPa.

The nozzle has four selectable flow rates ranging from 60 to 230L/pm.

After use, flush the nozzles by rotating the pattern ring. This opens the nozzle and allows debris to pass through. If the debris is too large to be cleared in this way, the branch must be removed from the hose and the strainer cleaned out.

Using the hose reel

The hose reel has the same pressure as the low-pressure deliveries at all times. Your pump operator can't safely supply the hose reel with the higher pressure, as it requires full performance when they are also supplying low pressure deliveries.

When your crew is using low-pressure deliveries, the hose reel becomes a secondary tool for low-risk tasks.

At a car fire, the hose reel can be the primary tool used. For example, 200+ L/pm with Class A foam is sufficient to complete the job.

Note

The hose must be full of water before it is wound onto the drum.

This helps the hose to keep its correct shape and prevents distortion and damage to the drum.

Multimedia

If you want to know more about the G-Force nozzle

Log on to Learning Station and watch the video:

- **G-Force 1 inch hose reel nozzle**

Alert

The hose reel will not provide sufficient water for structural fire suppression and is not to be used for internal fire attack.

Note

A delivery deployed for internal fire attack should be able to flow sufficient water, a minimum of 440L/pm, to manage the fire should it flashover.

Class A foam

Two low-pressure deliveries and the hose reels are Class A foam capable. The foam concentrate is added to the water at the pump.

The amount of foam solution to be used will usually be decided by your officer.

The appliance can supply 0.2% to 1% solutions. Unless you have an aerating nozzle, foam solution will be a wetting agent between 0.2% and 0.3%.

Environmental impacts

The approved Class A foam supplied to your station is biodegradable. The firefighting quantities of foam normally left on the ground are not an environmental concern.

However, contamination of waterways should be avoided by:

- keeping the foam mixing and loading areas at least 50m away from any water supply
- avoiding spills at mixing, loading and application areas
- avoiding spraying foam directly into water supplies
- notifying authorities promptly of any spill into a water supply.

Multimedia

If you want to know more about using Class A foam, log on to Learning Station.

Locate the Qualified Firefighter programme and the Guide to fire suppression.

Both can give you more information on using Class A foam.

Alert

Wash off spills of foam with clean water.

Storz couplings

Storz couplings are symmetric and aren't divided into male or female connections. This allows you to attach either end of a hose to any other hose end. The connections cannot be over-tightened and require a quarter turn to tighten or loosen.

Use the fold-out handles on the suction hose couplings to tighten and loosen the couplings. The locking tab engages when the couplings are properly connected and tightened. To break the couplings, press the locking tab before twisting each half.



Suction hose joined with Storz couplings.

Storz thread adapters

The range of examples are shown in the images below.



Storz spanners

Spanners are supplied with each appliance. These assist in the removal and replacement of the collector head that is attached to the pump with a Storz coupling.



Checking Storz couplings

To ensure the Storz couplings are working properly, check that:

- the seals are in place, undamaged and don't have any debris stuck in them
- the fold-out handles and the locking tab move freely.

Cab layout

When travelling in the appliance you should only carry your uniform with you. All heavy equipment needs to be secured so that it does not interfere with driving or cause injury in an accident.

For full details, refer to the table on the following two pages.

Helmets	Either wear your helmet or attach it to one of the clips on the frames behind the drivers and officers seats.
Rear cab bin	The bin between the rear seats is for stowing lightweight, bulkier equipment.
Front seats bin	The bin between the front seats is intended for maps, risk plans and other items that can be accessed by the officer.
Small and light items	The pockets hanging over the rear of the front seats are for storing jerkins, hearing protection, maps and similar items.
Radios	Radios must be stored in the pouches or their chargers so that they are secure in the event of an accident.
Rear seat storage	<p>Electrical equipment is installed under the rear seat and is protected by a guard. Ensure you don't crowd the electrical equipment as this may restrict airflow required for cooling.</p> <p>There is additional room under the rear seat for equipment, which is suitable for items that need to stay clean and dry.</p>
Back seat storage	<p>In the back of the cab there are dedicated spaces to store equipment, including:</p> <ul style="list-style-type: none"> ▪ seat-back pockets for small and lightweight equipment ▪ storage bin behind the drivers and officers seats ▪ helmet hooks. **Refer to the image on the next page**.



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White and red interior lights

In addition to the standard cab interior lights, there are white and red lights on the ceiling of the cab, above the officer and in the rear of the cab.

The red light is used for map reading. It is less distracting to the driver and doesn't affect night vision as much as the white light.



Parklights and locker lights

Provided the park lights are on, the locker lights will come on automatically when opened.

Spotlight

This is a 12V light and socket.



12V outlets

The cab has 12V outlets in the following places:

- centre console between the driver's and officer's seats
- base of the B-pillar, one each side
- outside of the base on the driver's and officer's seats
- on the dashboard.

12V circuit breakers

Circuit breakers for the cab's rear 12V outlets are mounted at the base of the nearside B-pillar.

Refer also to the maintenance of electrical systems at the end of this section.



Mast lights

Mast lights are located on the front near-side and rear off-side corners of the chassis.

The mast height and direction is adjusted and turned 270 degrees by hand. The lights are tilted using the switch at the base of each mast.

The on/off switch for each mast is at the mast base. The master switch is located on the Land Mobile Radio (LMR) console. This must be switched on for the mast lights to work.



Maintenance

There are a few things you should know about maintenance.

Electrical system

The electrical system on the appliance can be seriously affected by incorrect wiring.

No one can make changes to the electrical systems on the appliance without approval from the Regional Fleet Coordinator.

Care of locker doors

The locker doors protect equipment from the elements. They are not intended to restrain loads, so it is important to ensure that all equipment is secured correctly.

The doors should be cleaned with:

- soap and water only — never use industrial grade cleaner.

The tracks should be lubricated with:

- silicon spray only — never use oil or grease.

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Safe loading of appliances

In addition to the fixed stowage, personnel need to consider the legal requirements of loading additional equipment onto the appliance.

Multimedia

To find out more on safe loading of appliances

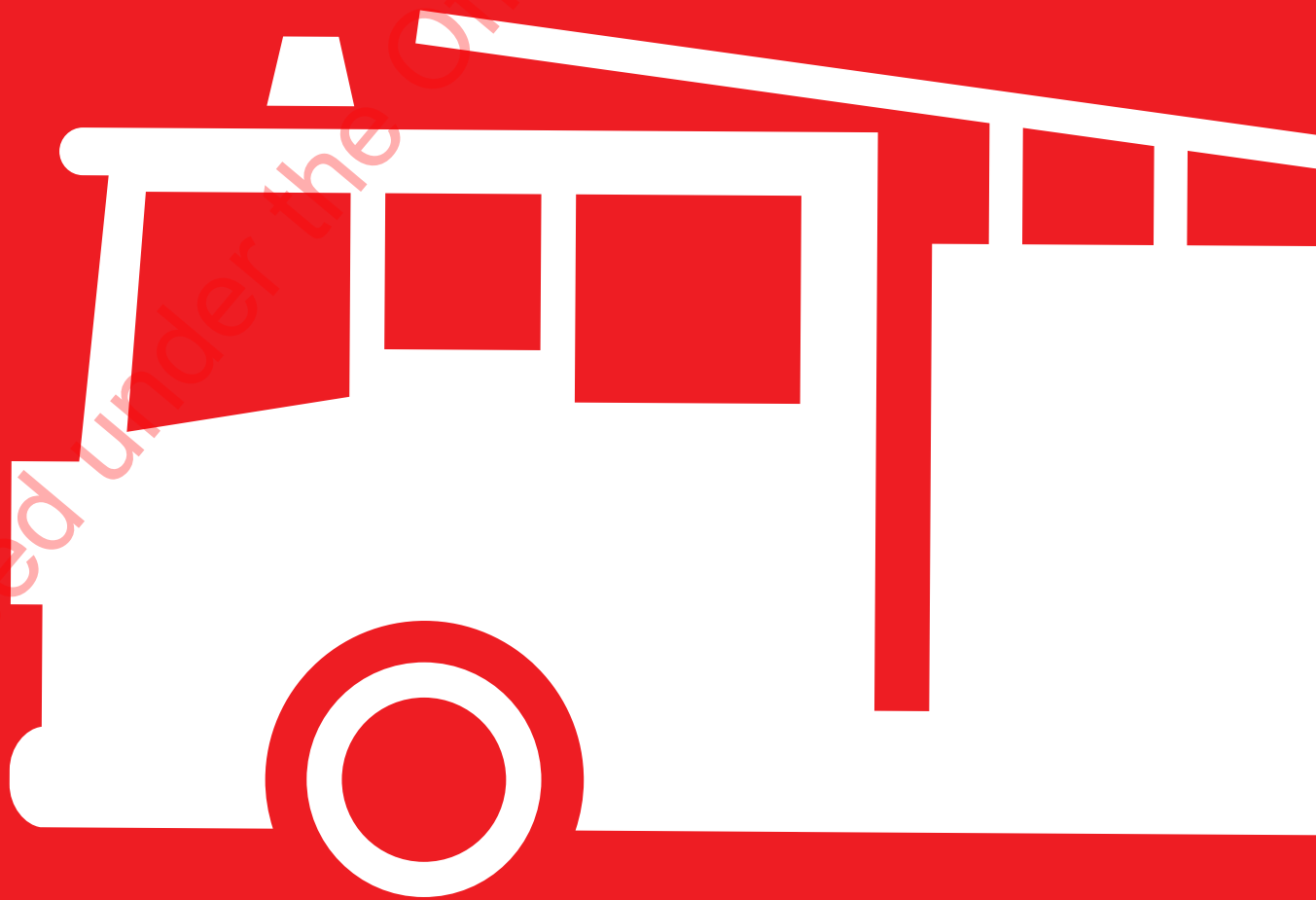
Log on to Learning Station and watch the video:

Safe loading and driver checks.

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Officer



Make sure your driver is prepared

Why?

This appliance is equipped with technology that may be new to many drivers. When driving limits are exceeded and in extreme circumstances, Electronic Vehicle Control (EVC) will assist in the control of the appliance. However, the driver is ultimately responsible for understanding these features and not driving the appliance beyond their limits.

The driving systems monitor wheel slip, lateral acceleration (felt when cornering) and yaw rate (how fast the appliance is turning). Occasionally a minor mistake by the driver — for example, clipping a kerb with a tyre — may trigger one or more systems.

If the different systems are activated while under normal conditions, including emergency response, the driver is driving beyond the road conditions or their own ability.



Housekeeping

Recommendations

1. Drivers instruction on the basic operation give the ASR/ESP and ABS systems and the interaction between these systems. This provides a better understanding of the vehicle's handling and response to conditions.
2. Give the driver sufficient time to drive this appliance prior to an incident, to ensure they are familiar with the operating system and aware of the handling and operational differences.
3. Where possible give drivers time to operate the appliance on hills, inclines, narrow, winding and flat roads to familiarise themselves with the ASR/ESP responses to road conditions.

Cab layout

The following images show the console controls, switches and warning lights. Full details of the cab layout can be found in either the Iveco Driver's Instructions or the Iveco Owner's Manual.



Released under the

Dashboard



Land Mobile Radio (LMR) console



Headlights, beacons, siren and public address (PA)

Headlights

The headlights are those fitted as standard to the cab/chassis. They are linked to the beacons and locker lights. The headlights are controlled by a rotary switch on the dashboard to the right of the steering wheel.

The appliance also has daytime running lights, which remain on all of the time and are not controlled by the rotary switch.

Beacons and emergency response lighting

The emergency response lighting is operated from the button marked *beacons* on the LMR console and can be operated without the siren. The two white pod beacons make the appliance more visible in bright sunlight.

When the headlights are switched on, the white beacons are switched off to prevent them distracting the driver in dark areas.

Beacon patterns

The beacons operate in two modes: all beacons, or the outer pod beacons and hazard lights.

Park brake off:

- engages all beacons and calls right-of-way to other traffic while driving.

Park brake on:

- engages the outer pod beacons and hazard lights
- is used to block right of way while parked at an incident as it is less of a distraction to emergency personnel and other drivers.

PA system

The siren control handset on the officer's side of the LMR console has a microphone for the PA system. The PA can only be used when the beacons are switched on.

✓ Action

When you carry out drivers checks, you will need another person to help check the beacons.

To check all the patterns you will need to sit in the driver's seat and use the service brakes while you release the parking brake.

Siren

The siren will only work if the beacons are on. The siren control handset on the officer's side of the LMR console allows you to:

- change the siren tones — this can help to alert drivers that haven't noticed the appliance
- use the electronic air horn
- use the PA system — turn the beacons on and use the handset like a radio microphone, using the PA button on the side.



Scene and letterbox lights

The three working lights on either side of the locker body are used to illuminate the immediate area around the appliance when needed.

All of the scene lights can be operated from the pump panel, but the working lights master switch on the LMR console must be on. The scene lights will be turned off when the park brake is released, regardless of the position of the master switch.

A letterbox light on each side of the cab roof is aimed to illuminate the roadside.

The switch for the letterbox lights is on the LMR console in the cab.





FIRE
EMERGENCY



FIRE **AP**

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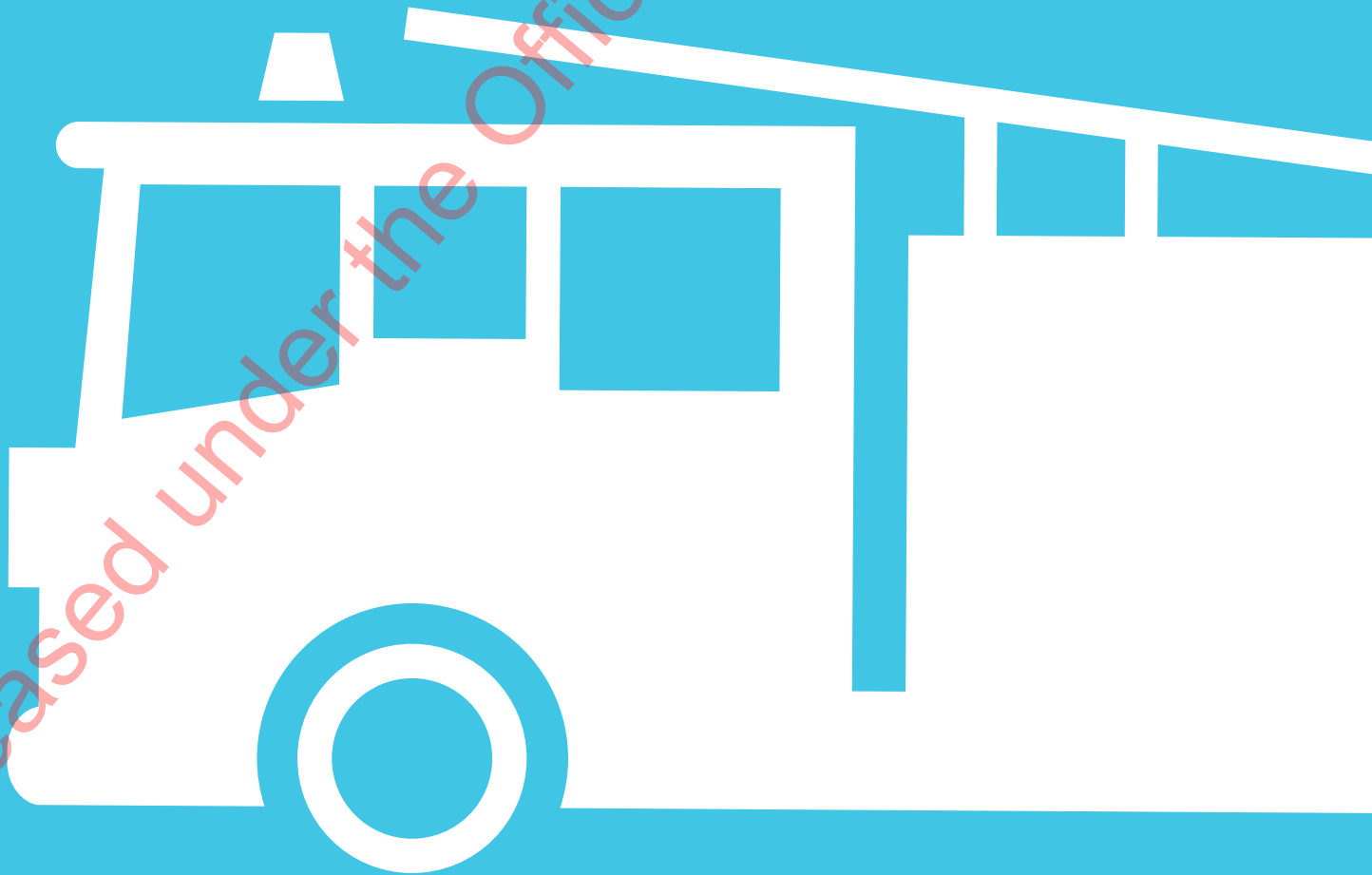
TARE 10160kg

SERVING OUR PEOPLE

NEW ZEALAND

FRASER
LYU
RA

Driver



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Driver responsibilities

Driving safely

The following are general safety notes related to this appliance.

Note that this reference guide does not fulfil the training requirements of Emergency Response Driver training.

Checks before driving

The appliance checks must be carried out at least weekly by Emergency Response Drivers to make sure the appliance is in a fit state to respond to emergency calls.

Drivers need to consider traffic and weather conditions, drive with restraint, and drive to their ability.

Vehicle braking warning

Fire appliances are heavy vehicles that have to be driven according to their weight and braking limits, as well as road conditions and weather conditions. The braking warning will show if the vehicle is driven beyond these limits.

Speed limit

When responding to emergency incidents, drivers of this vehicle must adhere to the policy FL1 SCa, which states the maximum allowable speed is 25km/h above the posted speed limit up to a maximum of 105 km/h.

In restricted speed zones — for example around road works — the maximum speed is the posted temporary speed limit.

Drivers must drive safely and courteously at all times and consider weather, road and traffic conditions.

Multimedia

To find out more on safe loading of appliances

Log on to Learning Station and watch the video:

Safe loading and driver checks.

Alert

This reference guide does not cover emergency response driver training.

Drivers must have completed the Emergency Response Driver programme to drive in emergency response situations.

Alert

This appliance has a rear mounted pump. Park at an angle to ensure the pump operator is protected from the traffic.

Driving controls

Electrical systems isolation switch (battery guard)

The battery guard system prevents the batteries from going flat, and maintains enough charge to ensure the engine will start.

Using the isolation switch is only necessary when the appliance will be left unattended over a couple of nights or longer, and the appliance cannot be plugged in. Isolating the electrical system will stop other functions, including the battery charging for Incident Ground Communications (IGC) radios.

If the electrics are isolated, the battery guard switch will be flashing, and you will need to activate the electrics again before starting the appliance.

How to manually isolate the electrics

To turn the electrics on,
press top of the switch.
To turn the electrics off,
press and hold bottom of switch, until the light on the switch flashes.



Starting

When starting the appliance it is important to pause with the ignition key in the on position before turning it all the way to start the engine. The computer controlling the engine and other systems takes a few seconds to check everything is working properly. If you turn the key straight away to start the engine, it can create errors that may affect performance.

When starting:

1. Turn the key to the ON position.
2. A buzzer will sound and all the warning lights on the dashboard will come on for a few seconds.
3. When the buzzer has stopped and the warning lights go out turn the key to start the engine.

Ignition over ride inhibitor

The appliance has an ignition over-ride inhibitor, which ensures the appliance won't start while it is connected to the 230V station supply.

If the appliance still won't start after the 230V supply is disconnected, press and hold down the inhibit override button and try to start the appliance again.



Transmission

Selection controls

Make sure the appliance is stationary before selecting reverse or drive gear as this ensures a smooth transition between gears.

Transmission response

The transmission response may be delayed. This response is due to the computer systems controlling and monitoring speed, power, ASR and ESP to ensure vehicle safety and stability.

Differential lock

The differential lock assists driving where traction may be a problem. Both sets of wheels on the rear axle keep turning at the same speed regardless of traction.

The differential lock must only be activated when traction is likely to be lost at the rear axle, for example, when travelling over muddy or slippery ground.

The vehicle must be stationary to engage the differential lock.

To disengage the differential lock:

1. Maintain a steady speed
2. Disengage the differential lock switch.
3. Briefly lift the throttle.

If the differential lock fails to disengage immediately, turn the steering wheel slightly to change direction. This will help remove the stress in the rear axle that will prevent the mechanism from operating.

! Alert

Damage can occur to the drive axles if the differential lock is left engaged and driven on a normal road surface.

Refer to the Iveco Manual for detailed information.



Braking

There are disk brakes on all wheels, and a mechanical parking brake system that works on the rear wheels. Braking while driving is controlled through the driver assistance systems described in the next section, Electronic Stability Programme.

Driving with assistance systems

If the warning symbols for ABS, ESP or ASR come on regularly while driving, including emergency response driving — you are driving beyond the road conditions and/or your driving ability.

Braking

Always press the brake pedal with steady pressure.

The pressure you apply to the brake pedal tells the vehicle how fast to slow the vehicle. Let the ABS and the other assistance systems take care of avoiding skids and other issues.

Emergency manoeuvres

If you are faced with no other choice than an extreme manoeuvre to avoid an accident:

- press the brake pedal hard and with steady pressure, and
- steer to avoid a collision/leaving the road

The driving assistance systems are designed to keep the appliance under control. Even if you turn the steering wheel quickly and press the brake pedal to the floor, the driver assistance systems will ensure the appliance maintains traction and control.

Alert

Pulse braking and other techniques used with manual brakes will reduce the effectiveness of braking.

Speed

The Type 2 Appliance is speed limited to 120 km/h. The driver can also set a temporary lower limit to assist driving on long, steep grades.

Drivers must adhere to the policy FL1 SCa when emergency response driving. When not responding to emergencies, the open road speed limit for a heavy vehicle is 90 km/h.

Exhaust brake

The exhaust brake assists braking and reduces the stress on the normal braking system.

The exhaust brake is most effective at high engine speeds referred to as Revolutions Per Minute (RPM). When the exhaust brake is engaged, the transmission will change down through the gears automatically.

The driver can choose between two automatic modes or manual activation of the exhaust brake. The automatic modes are selected using the right steering column control arm.



Air suspension control

The Iveco chassis is fitted with airbag rear suspension. This system automatically adjusts for the vehicle's weight to maintain a consistent ride height.

The control unit for the air suspension is located at floor level to the right of the driver's seat. This control allows the ride height to be adjusted. However height should not be adjusted unless the suspension has deflated due to a lack of compressed air or navigating an obstacle, such as a severe hump in the road.

Electric window and mirror controls

Controls for adjusting the mirrors are on the driver's door.

Both of the front electric windows can be controlled by switches on the driver's door.

Alert

If the suspension is not set to the factory preset height, the vehicle's stability will be affected.

Electronic vehicle control system controls

Electronic Stability Programme (ESP) and Anti Skid Regulation (ASR) use some of the same electronic and mechanical systems, and cannot be controlled separately. Consider raising the ASR/ESP wheel spin threshold only when the reduction of power by the ASR system could affect the vehicle's ability to be driven or manoeuvred in certain conditions.

Driver assistance

The response of the brakes is controlled by the computer system that monitors the ABS, ASR, and ESP.

These systems ensure the vehicle slows at a rate that enhances stability.

Anti lock Brake System (ABS)

This appliance has ABS, which monitors speed and controls braking to prevent the wheels from locking up. ABS braking requires the driver to apply a steady pressure to the brake pedal while skid control is left to the ABS.

The advantages of ABS include:

- the ability to stop quickly without loss of steering and directional stability
- a reduced risk of accidents on slippery roads
- less wear on the tyres.

Alert

Pulse braking will greatly minimise the effect of ABS.

Electronic Stability control (ESP)

ESP is designed to keep the vehicle stable during cornering, when taking evasive action, or if there is oversteer or understeer.

ESP operation

During normal driving ESP works in the background and continuously monitors steering and vehicle direction. It compares where the driver is intending to steer with the vehicle's actual direction.

ESP intervenes only when it detects loss of steering control, for example during emergency evasive swerves, under-or over-steering, poorly judged turns on slippery roads, or when hydroplaning.

ESP estimates the direction of the skid, and then applies the brakes to individual wheels to bring the vehicle back in line with where the driver wants to go.

ESP may reduce engine power or change gears to slow the vehicle down.

Alert

Do not switch off ESP unless it is making it difficult for the driver to control the appliance.

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Anti Skid Regulation

Anti Skid Regulation (ASR) is sometimes referred to as the Traction Control System (TCS).

ASR is designed to prevent loss of traction and maintain control of the vehicle when the appliance is accelerating, cornering on slippery or icy roads or when driving off road.

Although similar to ESP systems, traction control systems do not have the same effect.

ASR can do one or more of the following:

- reduce fuel supply
- brake one or more wheels
- close the throttle
- reduce turbocharger boost.

⚠ Alert

ASR should only be disabled when manoeuvring at low speed. It should never be disabled under normal driving conditions.

Extra driver care is needed when ASR is disengaged.

Disabling ASR/ESP

ASR and ESP use some of the same electronic and mechanical components.

Consider disabling the ASR/ESP only when the reduction of power by the ASR system could affect the vehicles ability to be driven or manoeuvred in certain conditions.

Situations when you should consider disabling ASR include:

- negotiating a undulating rural metal driveway
- run-up to sloping drive/track/roadway
- manoeuvring in open paddock/wet area
- if the ASR system develops a fault.



Speed limiter (SL)
ESP/ASR

ASR / ESP and Speed Limiter controls

Speed limiter (SL)

The Type 2 appliance has a fixed-speed limiter set to 120 km/h. The driver can also set a temporary, lower limit to assist driving on steep grades. The limit is set using the button marked SL found on the dash to the left of the instrument panel.

To activate the speed limiter press the SL button when travelling at the desired speed. If descending, the speed limiter will progressively apply the brakes and exhaust brake to slow the vehicle.

The speed limiter can be deactivated by either pressing the SL button again, applying the brakes or depressing the accelerator pedal.

Driver experience

Under difficult conditions or during more assertive driving, ASR, ESP and ABS may all have noticeable effects.

For example when:

- Cornering at speed, ESP will feel like a wheel losing traction while it is instead applying the brakes on individual wheels to keep the vehicle stable.
- Driving uphill with limited traction, ASR can reduce power, and the driver can change down through gears to maintain speed.

Cruise control

Use cruise control for:

- long downhill stretches because it will help to limit speed increases
- long stretches of non-emergency open road driving

To change the speed:

- use the rocker switch on the end of the control arm.

To engage:

- push Off / RES cruise control button to engage/resume.

To disengage

Any of the following will disengage cruise control:

- push off/resume cruise control button
- press the brake pedal
- press the accelerator for more than 30 seconds.

Note

Do not use the cruise control function for emergency response driving.



Gear shift control

Gear changing can be done by using the right-hand control arm.

1. Push the arm down one click—will change down the gears.
2. Pull the arm up one click—will change up the gears.
3. Push and hold arm down for two seconds—will drop the gears down two ratios.
4. Pull and hold for two seconds—will change gears up two ratios.

Siren

The siren will only work if the beacons are on. The siren control handset on the officer's side of the LMR console allows you to:

- change the siren tones to alert drivers that haven't noticed the appliance
- use the electronic horn
- use the PA, by turning the beacons on and pressing the button on the side of the handset to talk.

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Drivers checks

Several items in the driver checklist can be covered by scrolling through the maintenance and diagnostic menu on the dashboard.



Menu scroll display

Vehicle information menu

You can get information about the status of the various systems using the two arrow buttons on the dashboard to the left of the steering wheel.

This menu includes each of the following:

- engine oil level
- engine oil pressure
- battery voltage
- cooling water level
- AdBlue level
- cab and chassis lights check.

Alert

The lights check in the menu will identify malfunctions in the cab and chassis.

This check **does not** replace the drivers checks of turning on and viewing all the standard and emergency response lighting.

Examples of the menu



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Wheel nut indicators

All FENZ appliances have wheel nut indicators.

Yellow indicates normal operation.

Red indicates that the wheel has been removed and the wheel nuts will need to be re-torqued (checked) between 50 and 100 kms of driving by the authorised tyre service provider. The service provider will then remove the red indicator and replace it with a yellow one.

Alert

FENZ personnel are NOT authorised to change wheels or alter wheel nut indicators on any FENZ appliance.

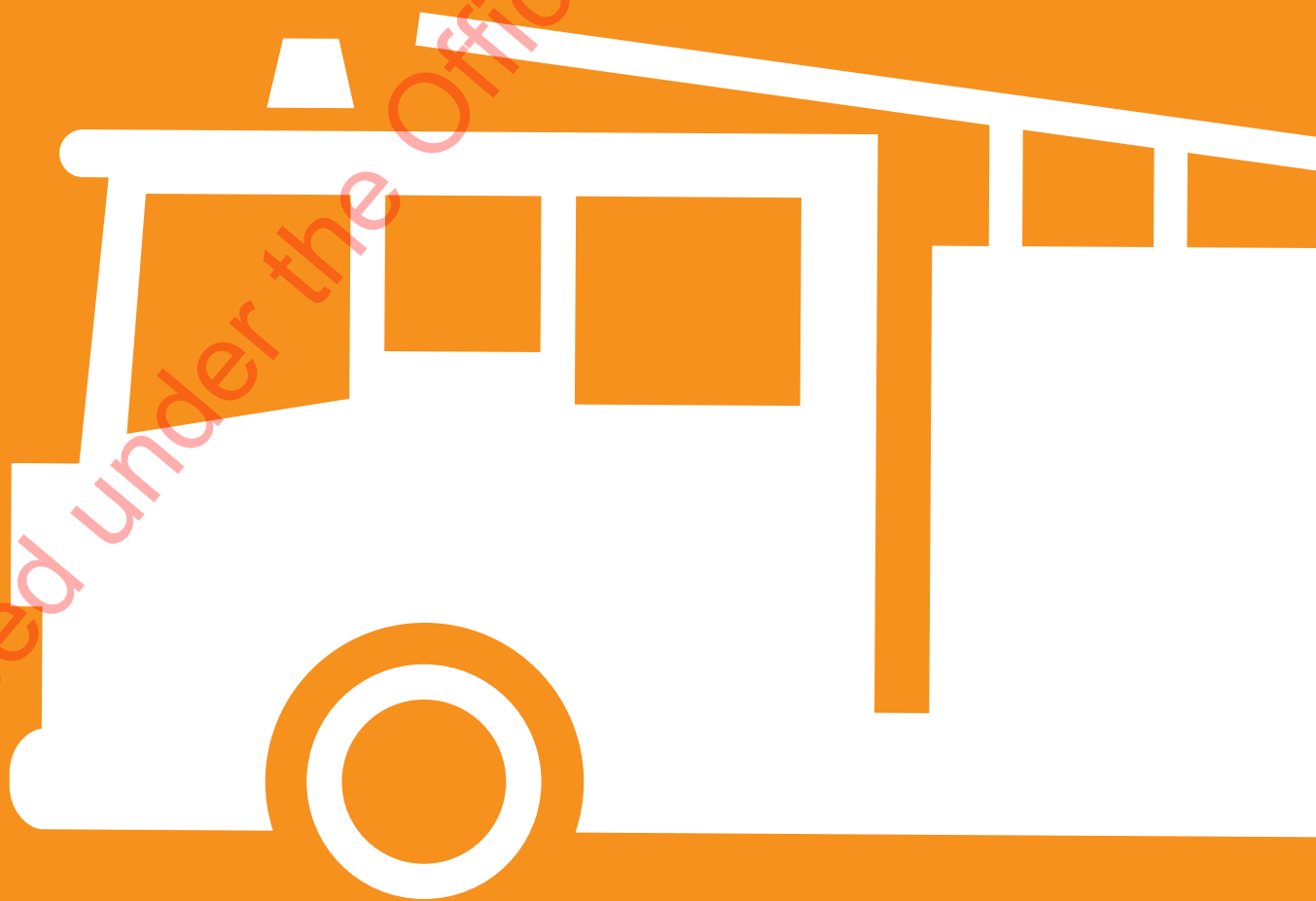


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Pump operator



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Hose reels

The two hose reels have 60 m of hose on each drum.

To operate the hose reel:

1. open the locker
2. release the nozzle from the bracket
3. pull out the locking lug on the hose guide and lift up into position
4. lift the drum brake to unlock it.

When you drop the hose guide after rewinding the hose reel, the brake is pushed back into the locked position. This ensures that the hose reel can't unwind during travel.



Hose reel circuit breakers

The hose reel winding motor has an electric brake that stops the drum quickly when the rewind button is released. The circuit breaker for the brake is located in the locker beside the hose reel.

A circuit breaker for the hose reel motor is mounted on the pump panel.

Hose reel performance

You can select four flow rates of up to 230L/pm from the hose reel when running at 1,750 kPa.

Because all the deliveries receive the same pressure, full performance for the hose reel is only available when it is used by itself.

High-risk fire attacks should always use low-pressure deliveries because you can always add another delivery or increase flow. If you commit to using just the hose reel at full flow, you cannot safely introduce a low-pressure delivery without withdrawing the crew using it.

At 900kPa, the hose reel will provide up to 118L/pm and is still useful for dampening down, overhaul, limited vegetation firefighting and limited exposure protection.

The hose reel nozzle is designed to run at 500kPa. The lower operating pressure allows the pump pressure to be lower to achieve the desired flow.

Hose inlet air bleed valve

The pressure control system can be confused by air going past the delivery pressure sensor, reading a lower pressure than it would with water.

Air is usually introduced as a water supply is being established and trapped air in the standpipe, hose and pipe work is pushed through the pump.

An automatic air bleed valve is installed between the inlet valve and the pump. This valve is set to open at 300kPa and stays open for 20 seconds. Air and water are vented to the ground under the front corner of the pump panel. The vent is located here so that you can see the change when all the air has been vented from the pump.

Alert

The hose reel will not provide sufficient water for structural fire suppression and is not to be used for internal fire attack.

Note

A delivery deployed for internal fire attack should be able to flow sufficient water, a minimum of 440L/pm, to manage the fire should it flashover.

Specifications

Water tank	The on-board water tank holds 2000lts
Foam system	The Foam Pro is manufactured by Fire Research Corp. The foam tank holds 60lts of Class A foam.

Pump specifications

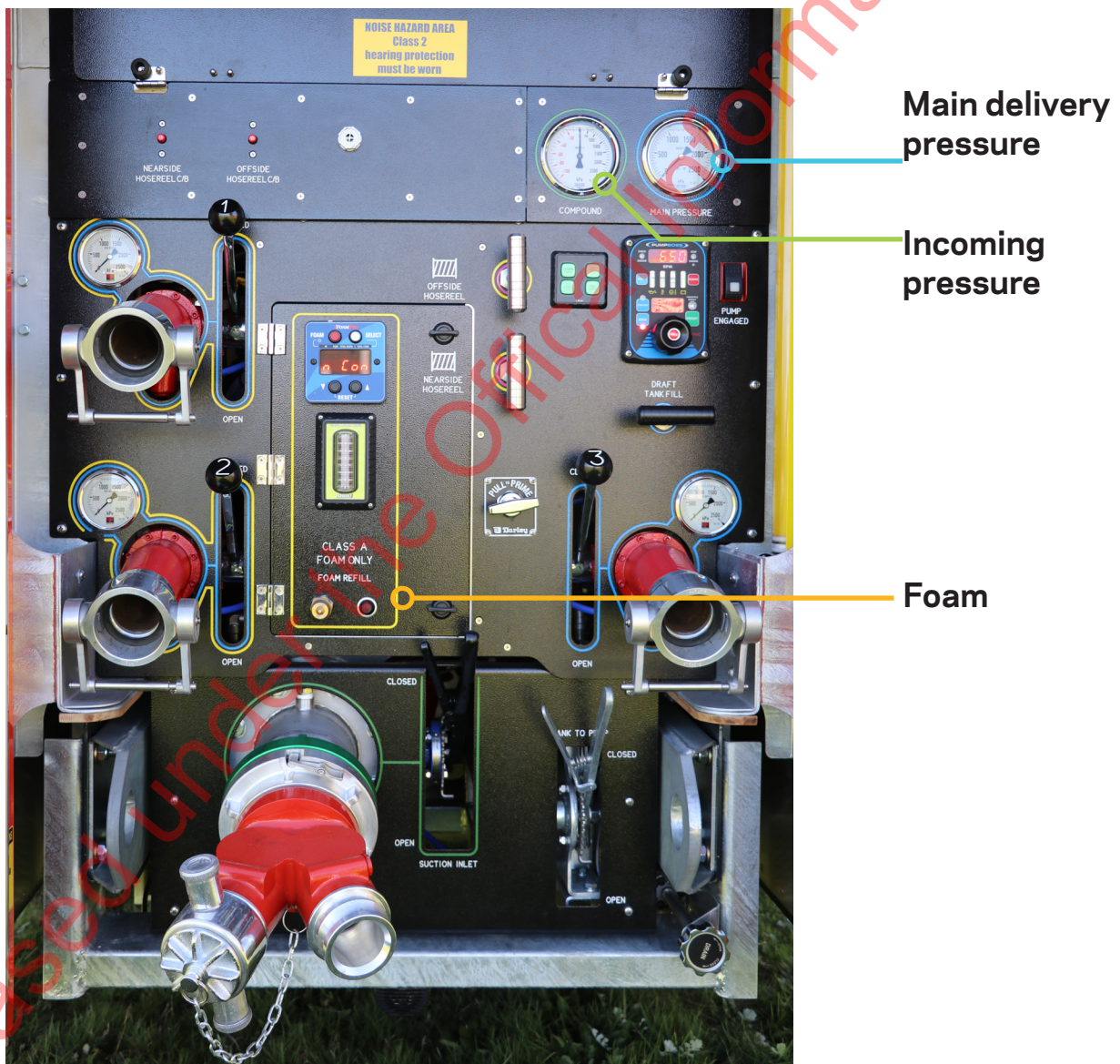
The pump fitted to this appliance is a Darley HM 500 GPM.

It is driven by a Power Take Off (PTO) drive via a shaft from the transmission. The maximum output is approximately 1900L/pm at 1,050kPa.

The output is measured from drafting at 3m. When you use a pressurised supply the output will increase.

Panel colour coding

The valves, controls and gauges on the pump panel are colour coded for easy identification. See image below.



Relief valves and overflow

Overflow

You can see the overflow from the tank under the appliance, at the rear of the water tank.

Tank pressure relief valve

There is a pressure relief valve on top of the tank. This opens when the pressure in the tank is too high and discharges to the roof.

Inlet relief valve

The inlet relief valve is located between the suction coupling and the inlet valve. It protects the feeder hose coming into the pump and the inlet side of the pump from high incoming pressure. It discharges to the ground.

The inlet relief valve is set to 1,150kPa, and cannot be adjusted on station.

High-pressure relief valve

The high-pressure relief valve is set at 1,850 kPa to stop extremely high-pressure water going to the deliveries. The entire output of the pump can be dumped if the pressure is dangerously high.

To reset the relief valve, the pressure needs to be reduced and then reset once the relief valve has closed.

Managing high incoming pressure

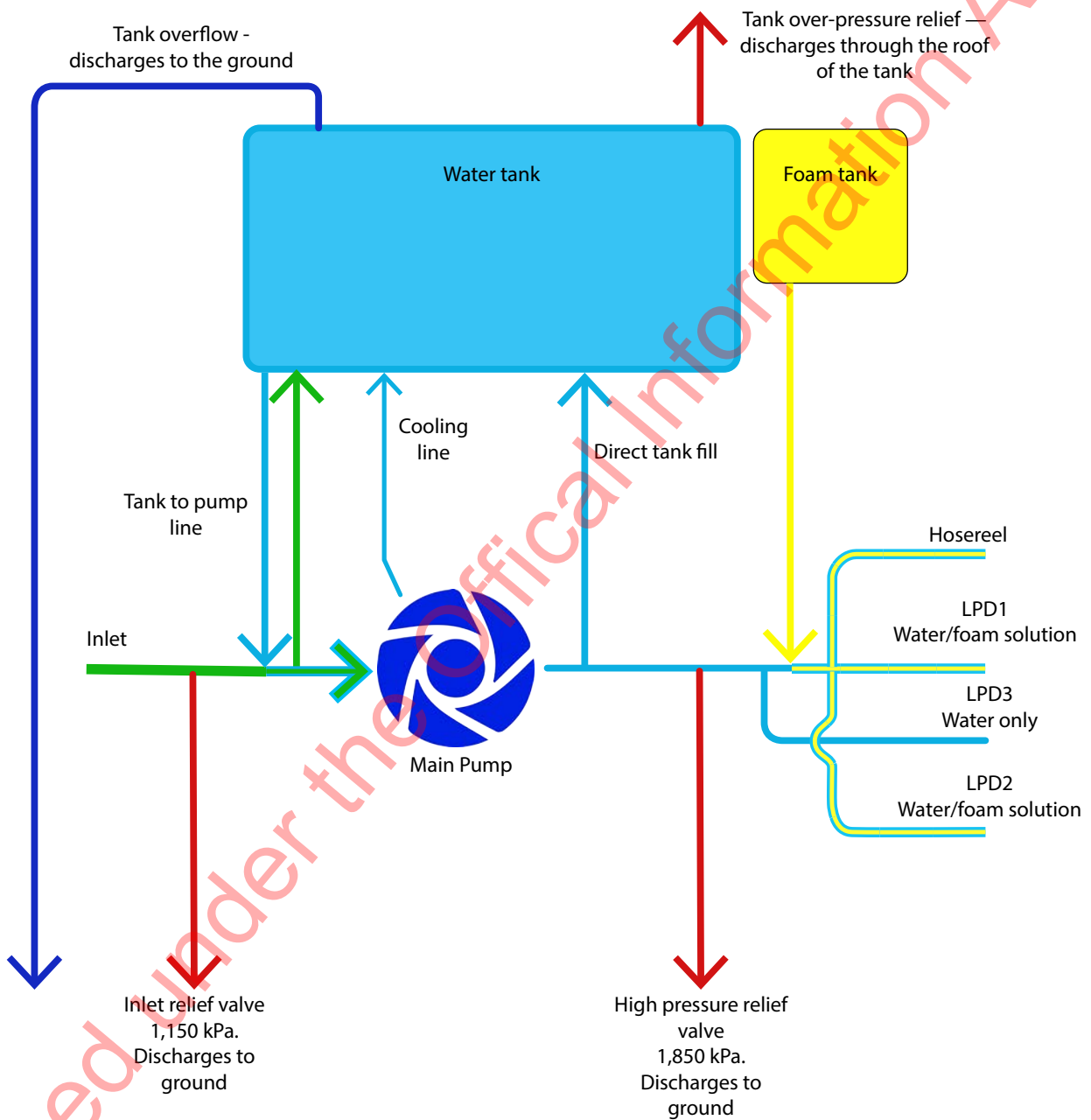
If the incoming pressure is too high, you will have trouble keeping low pressure deliveries at less than 1,050kPa.

To overcome this, you can:

- either gate the inlet valve
- or open the tank to pump valve and gate it to balance the pressure relief.

Pump diagram

The diagram below shows how water and foam solution move through the pump.



Pressure control system

The Pump Boss pressure control system automatically adjusts the engine throttle and will maintain the pressure set by the operator.

The Pump Boss system has sensors in the pump pipework on the inlet side and the discharge side of the pump. Depending on the mode the pump operator sets, it will adjust the throttle to help maintain safe pressures and will provide a stable and continuous water supply to deliveries.

The action of the controller only affects the throttle. The pump operator still has to do all the things they normally do to establish a water supply and decide on the right pressure of supply. Once this is done, the controller will maintain the set pressure and adjust the throttle to maintain it.

You can set the pump to either Revolutions Per Minute (RPM) or Pressure mode.

RPM mode

RPM is the default mode. The pressure control system always starts in this mode.

The throttle knob sets the engine speed (RPM). The pressure control system maintains this and will only make adjustments if the main pump pressure rises more than 200kPa above the last pressure set by the operator.

Pressure mode

In Pressure mode, the throttle knob sets the pressure and the pressure control system maintains it. This is done by making automatic adjustments to the engine speed to keep the main pump pressure constant.

Pump Boss controls and indicators

MENU button	Provides access to stored data and programme features.
Oil pressure	The green bar indicates when the engine oil pressure is normal and red when it is not.
CHECK ENGINE and STOP ENGINE	These are copies of the warnings from the dashboard.
Engine temperature	The green bar indicates when the engine temperature is normal, and indicates red when it is not.
Transmission temperature	The green bar indicates when the transmission temperature is normal.
RPM display	Shows the engines RPM. It also shows error codes, stored data and programme features.
Battery voltage	The green bar indicates when the appliance batteries are at a normal voltage and red when they are not.
SILENCE button	Press to silence audible alarms.
Message display	The message display shows the pressure or RPM setting during normal operations and warning alarms when they occur. It shows the time and date when the THROTTLE READY light is off, as well as stored data and programme features.
THROTTLE READY	This light shows when the pressure control system is ready for you to begin pumping.
PRESET button	Press to change/select a pre-programmed value for RPM setting which will alter the pressure.
IDLE button	Sets the engine RPM to idle.
THROTTLE knob	Changes the pressure or RPM setting when you rotate it. The setting changes in larger steps when the throttle is turned fast.
RPM button	Press to select RPM mode. The light comes on to show you are in RPM mode.
PRESSURE button	Used to select Pressure mode. A light indicates when you are in Pressure mode.

Pump Boss indicator



Engaging the pump

The pump engagement switch is on the pump panel. It is worth noting that the appliance pumps when the transmission is in neutral.

To engage the pump:

1. bring the appliance to a complete stop
2. apply the park brake
3. put the transmission in neutral
4. go to the pump panel
5. turn on the pump engagement switch.

Check the pump engaged and the throttle ready lights on the pressure control system come on.

To disengage the pump:

1. return the engine to idle
2. turn off the pump engagement switch on the pump panel.

Note

The engine should be at idle before the PTO is engaged.

Note

If you disengage the parking brake, the pump will also disengage.

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RPM mode

RPM is the default mode. The pressure control system will be in RPM when you engage the pump.

In RPM mode the pressure control system works like a manual throttle. The pump operator can change the engine speed using the throttle and the controller will maintain it.

The pump delivery pressure varies with changes in the water coming in or the flow going out of the pump.

The system is designed to keep firefighters safe. It will limit any increase in pressure to 200kPa above the last pressure you selected.

If the delivery pressure approaches this limit the system automatically lowers the engine speed. The RPM light blinks if a lower RPM has been set.

In RPM mode the pressure control system will only react to high delivery pressure. It does not automatically increase the engine speed or react when the water supply is exceeded.

Note

As you set up the RPM mode, keep the engine at idle or a constant RPM until you have a stable water supply.

Then set the pressure you want.

Changing the RPM preset

1. Press IDLE button.
The engine has to be at idle and the small display showing IDLE ENGINE before the presets can be changed.
2. Press and hold RPM button to select the setting to be changed.
3. Press and hold PRESET button during the next steps:
The message display shows PRESET. After five seconds the current setting flashes.
4. Rotate throttle to change the preset setting.
5. Release PRESET button.

Open and closed deliveries in RPM mode

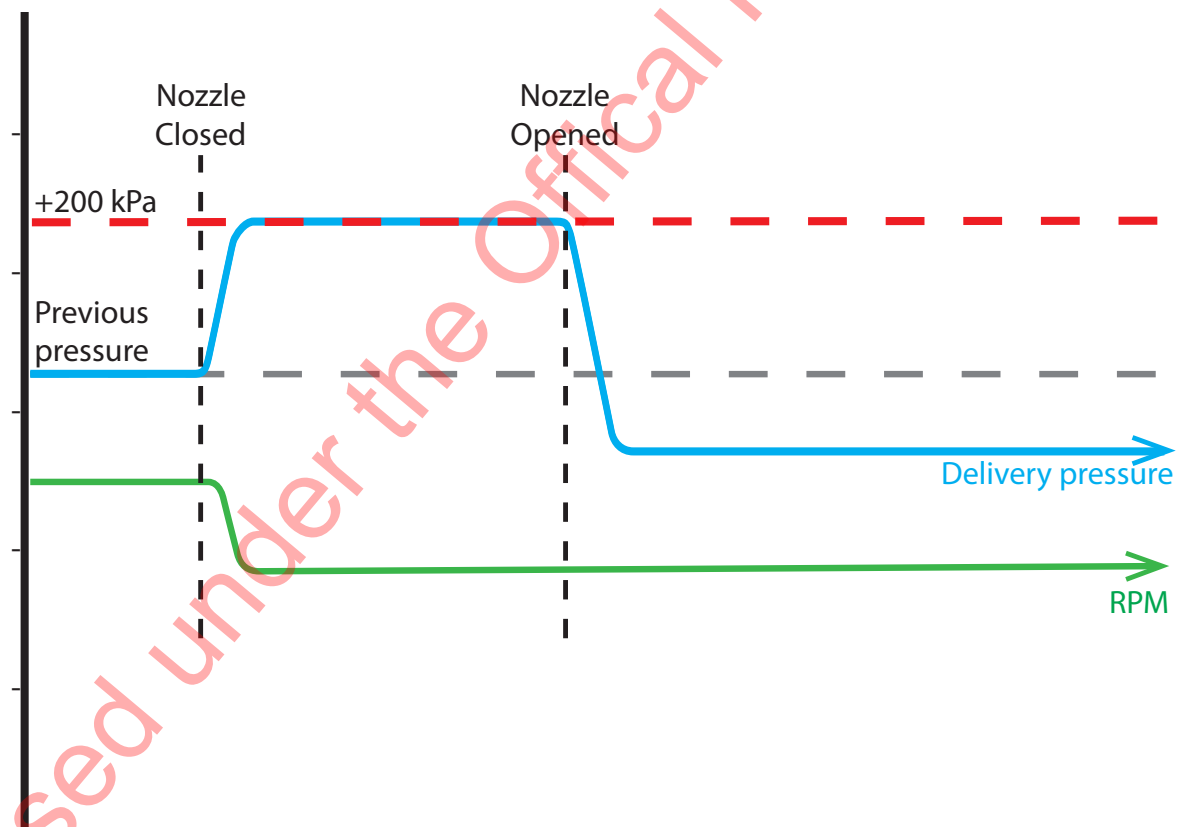
In RPM mode, the pressure control system maintains the RPM setting regardless of the number of deliveries that are opened or closed, as long as there is enough water.

If one delivery is closed and the delivery pressure increases more than 200 kPa above the previous pressure, the pressure control system reduces the engine speed to limit the rise.

The adjusted lower engine speed is the new setting that the system will maintain.

If the delivery is opened again, the delivery pressure will drop. The engine speed won't change and the delivery pressure will be lower than it was before the change.

Diagram showing the delivery pressure when the nozzle is open and closed



Pressure mode

When you are working in Pressure mode, the pressure light will be on. The system maintains a constant delivery pressure within the limits of pressure and flows in and out of the pump.

Switching to Pressure mode

Switch to Pressure mode by pressing and holding the pressure button for three seconds. The Pressure mode light will turn on when Pressure mode is set.

You will see and hear the automatic adjustments to the engine RPM when the delivery pressure changes.

Selecting a pressure

Turn the throttle to change to the pressure you want the system to maintain.

The selected pressure shows in the message display window.

Maximum RPM

In Pressure mode, a maximum engine RPM is programmed into the system. If the engine reaches the maximum, the message display flashes MAX RPM / OPERATOR and the engine RPM is prevented from going any higher.

If the delivery pressure is below 100kPa, the display shows PRESS LOW.

Limits

Dropping the delivery pressure to less than the incoming pressure is not possible. You need to manage high pressures by gating the inlet or opening the tank-to-pump valve.

The Pump Boss is also limited by the available water supply. If there isn't enough water for all the deliveries you are running, you will not get the flow and/or pressure you want.

Open and close deliveries in Pressure mode

In Pressure mode, the pressure control system maintains the pressure setting regardless of the number of deliveries that are opened or closed, as long as there is enough water being supplied.

As deliveries are opened, the delivery pressure starts to drop and the pressure control system raises the engine RPM to maintain the set pressure.

As deliveries are closed and the delivery pressure starts to increase, the pressure control system lowers the engine RPM to maintain the required pressure.

Changing between RPM and Pressure modes

Change from RPM to Pressure

To change from RPM to Pressure mode, hold down the pressure button for three seconds.

The indicator light will come on when the change is set.

Changing mode does not change settings. When you change to Pressure mode, the pressure setting stays the same as it was in RPM mode, and will remain on this setting until something changes.

Change from Pressure to RPM

To change from Pressure to RPM mode, hold down the RPM button for three seconds.

The indicator light will come on when the change is set.

If you change from Pressure to RPM, the engine RPM will not change until you turn the throttle.

Automatic pressure control

If your water supply isn't enough to keep up with the outgoing flow and pressure, the system will reduce the engine speed until the flow matches the supply.

The advantage of the automatic pressure control is that:

- during a brief interruption to the supply, firefighters will continue to get as much water as can be supplied
- the full pressure they need will be restored as soon as the supply returns.

Brief lack of supply

If there are fluctuations in the supply, such as problems with a portable pump, the pump control system (Pump Boss) automatically reduces the engine speed until the pump output matches the incoming supply.

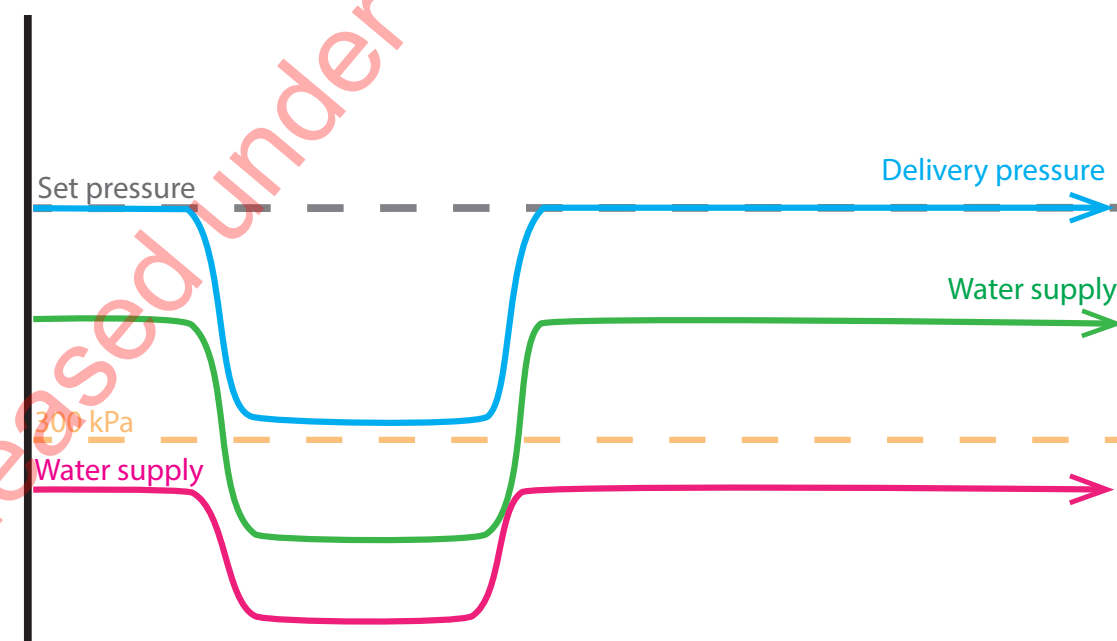
While this is happening the:

- pressure mode light stays on
- RPM display and mode light will flash
- message display shows OPERATOR / RPM LIMIT
- preset function is disabled.

When the supply increases and the pressure control system brings the delivery pressure back to the selected figure, the system returns to normal operation.

When you notice the drop in supply, take action to restore a full supply and alert your OIC/Sector Commander to the problem.

Diagram showing a brief lack of water supply



Limited water supply

When the feed water supply is running out, two delivery pressure levels trigger the pressure control system to take action.

- Low water warning triggers at 300kPa delivery pressure.
- No water warning triggers at 100kPa delivery pressure.

Low water and no water messages show in the window when the control system goes into these modes.

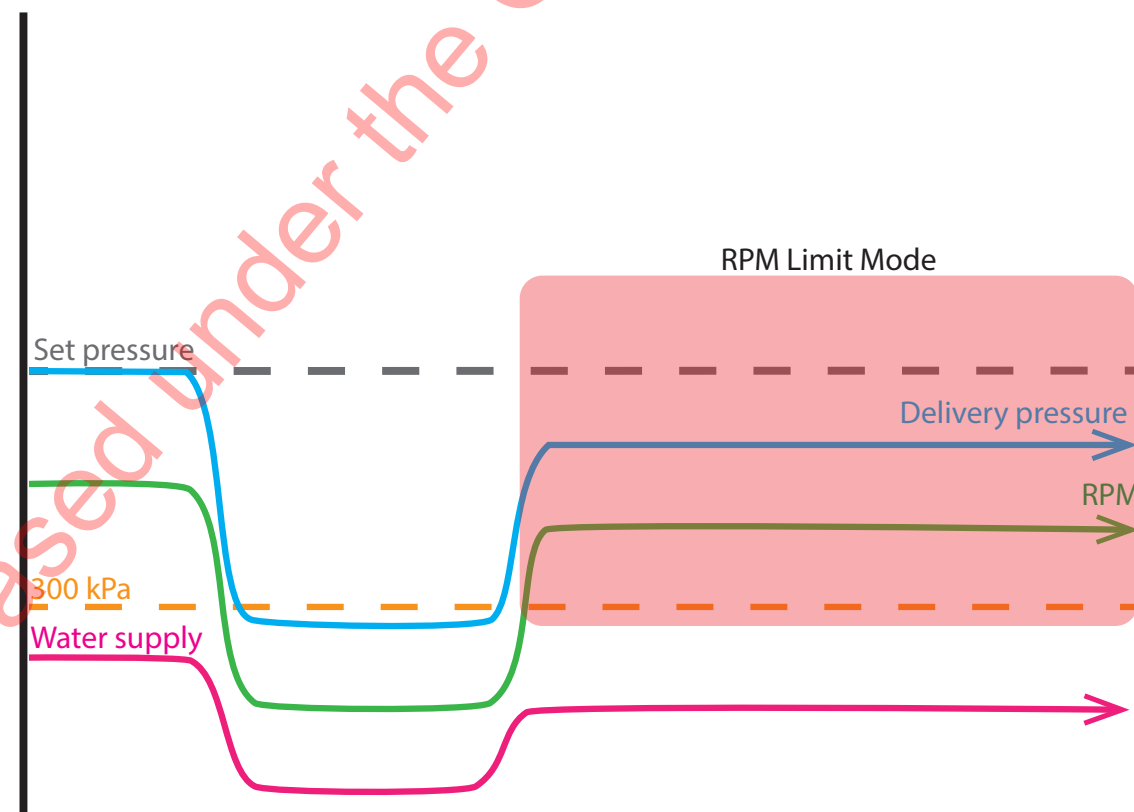
Reduced water supply

If your water supply is restricted and the system can't maintain the selected delivery pressure, but stays above 300kPa, it will stay in RPM LIMIT mode. The throttle will work only as a manual control and the pressure preset will be cancelled.

If you manually adjust the engine speed and find a point where the water supply will keep up and the delivery pressure is stable above 300kPa, the RPM LIMIT mode will cancel. The pressure controller will stay in Pressure mode and the stable pressure will be the new setting it maintains.

If you return the engine to Idle, the RPM LIMIT mode cancels and the previous pressure setting will be cancelled.

Diagram showing reduced water supply



Complete loss of water supply

In Pressure mode, the pressure controller will attempt to maintain the set pressure as the incoming and outgoing flow to deliveries fluctuate.

If the supply fails and the delivery pressure falls below 300kPa, the system will drop engine speed to 1,100 RPM. It will hold this for a maximum of seven seconds, as marked in the diagram below.

If within seven seconds the supply is restored enough for the delivery pressure to rise above 300kPa, the controller will increase engine speed aiming to restore the set pressure.

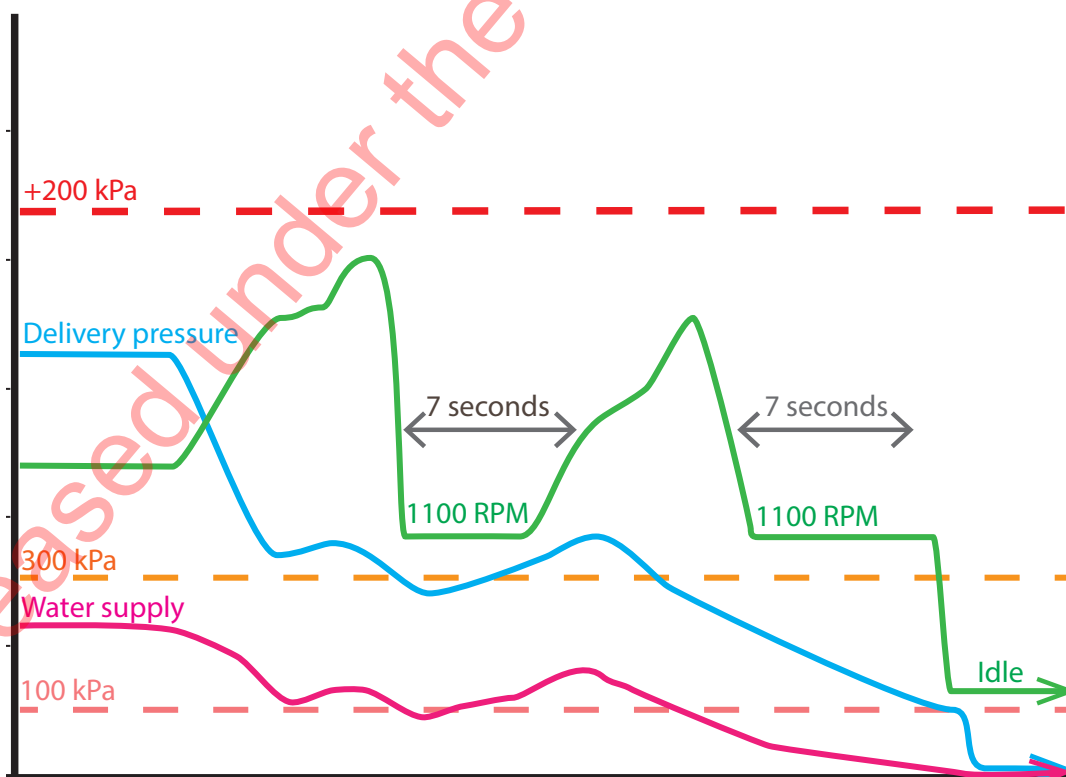
At a delivery pressure of less than 100kPa, the controller will immediately set the engine to idle.

If the water supply is restored within that time and the delivery pressure rises above 300kPa, the system increases the engine speed again. It will try to return to the selected pressure.

After three minutes in the No Water state the controller will set the engine to idle and also cancel the pressure setting. To start pumping again, the pump operator will have to use the throttle or preset button to set a new operating pressure.

If the delivery pressure doesn't rise above 300kPa within seven seconds, the engine will be set to idle.

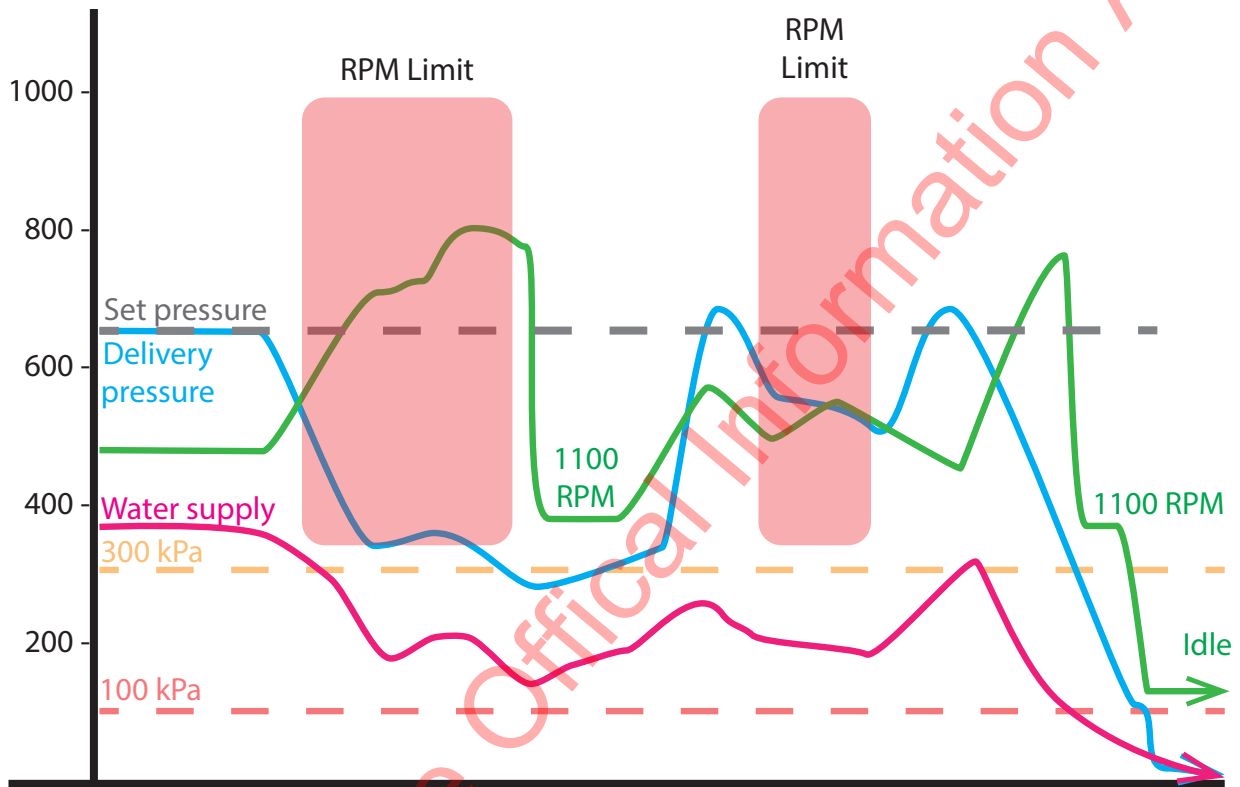
Diagram showing a complete loss of water supply



Chasing water

When there is a fluctuating water supply the controller's continual adjustment can lead to surging in engine speed and delivery pressure as it chases large changes in water supply.

Diagram showing chasing water



Continued surging will usually only occur when the pump is approaching the limit of a water supply—for example, a water main reaching its limit. Increases in engine speed cause the pump to suck the supply dry and the controller will react by dropping engine speed and letting the supply recover.

Surging doesn't occur to the same extent when draughting.

If you hear or see surging, you need to identify the cause and make adjustments using normal pump operation procedures.

Managing your supply

When the compound gauge is showing 300kPa or less you should be working on increasing the supply or balancing pump output with the available supply.

At 300kPa on the compound gauge you are unlikely to be able to supply any more water and you should alert your OIC / Sector Commander to this.

Default setting

If your presets have changed, the default setting is RPM:900, which is approximately equal to 800kPa from tank supply.

800kPa is a safe pressure within the likely range of what you will need for low pressure deliveries.

When to use preset

The preset quickly raises the pump pressure to a usable level. This allows you to get to work from tank supply quickly. Adjustments can be made from here once all deliveries are established and a water supply has been connected to the pump.

Alert

You should only use the preset button when running off the tank supply.

Note

If running off a pressure fed supply, using the preset button may over pressurise your deliveries.

Class A foam system

Foam system (FoamPro)

You can deliver a Class A foam solution to firefighters using the FoamPro system. It is an electrically driven system that injects a proportional amount of foam concentrate into the discharge pipe work.

Note

The foam system is for use with Class A foam only.

Foam output

Foam solution is available through:

1. low pressure deliveries 1 and 2
2. the hose reels.

Foam concentrate tank

The foam tank is plastic, has a capacity of 60L and is mounted behind the cab on top of the body.

A sensor is fitted to the bottom of the tank to stop the foam concentrate pump when the level has reached a minimum.

Note

The foam tank can be filled while foam is being used.

Refilling

There is a self-priming, flexible impeller pump with a flow rate of approximately 16L/pm mounted behind the pump panel. This is used to transfer foam concentrate from drums to the foam tank.

Foam is taken up through a pick-up tube, connected at the pump panel when required. The foam transfer pump will stop when the tank is full to prevent over filling.

Foam concentration and flow

At a frequently used rate of 0.1%, the system can supply enough concentrate out of the 60L tank to treat 60,000L of water.

At 0.3% — the maximum for use without aerating nozzle — the system can supply enough foam concentrate to treat 20,000L of water.

All foam-capable outlets are marked with a yellow border.

Class A Foam delivery


Your officer will advise on the foam solution strength to be used.

More about foam

You can get more information about how Class A foam works and how it is applied from links on The Portal — detailed on the right.

Foam capability

You can supply your firefighters with Class A foam through the hose reels and deliveries 1 and 2. The table below details approximately how long the foam supplies on the appliance will last.

 **Link**

Find on the Portal by going to Bookshelf > At Incident > Firefighter Operations.

- FENZ Guide to Fire Suppression
- Volunteer Qualified Firefighter programme.

Induction rate and application	Hose reel at 220L/pm	Light delivery at 470 L/pm	Two light deliveries/ one heavy delivery at 940 L/pm
Wetting agent 0.2% (range 0.1%-0.2%). Induction rate used for vegetation fires and overhaul. Use normal nozzles.	Uses 0.4 L/pm. The appliance 60L tank will last more than 2hrs. A 20L foam container will last 45 mins.	Uses 0.8 L/pm. The appliance 60L tank will last more than 1hr. A 20L foam container will last 22 mins.	Uses 1.7 L/pm. The appliance 60L tank will last 30 mins. A 20L foam container will last 10 mins.
Wet foam 0.5% (range 0.3%-0.5%) Induction rate used for fires in trees, structures and vehicles. Normal nozzles OK, aspiration nozzles produce superior foam.	Uses 1.1 L/pm The appliance 60L tank will last 54 mins. A 20L foam container will last 18 mins.	Uses 2.3 L/pm The appliance 60L tank will last 25 mins. A 20L foam container will last 8 mins.	Uses 4.7 L/pm The appliance 60L tank will last 13 mins. A 20L foam container will last 4 mins.
Dry foam 1% (range 0.6%-1%) Induction rate used for exposure protection. Use aspiration nozzles.	Uses 2.2 L/pm The appliance 60L tank will last 27 mins. A 20L foam container will last 9 mins.	Uses 4.7 L/pm The appliance 60L tank will last 13.5 mins. A 20L foam container will last 4.5 mins.	Uses 9.4 L/pm The appliance 60L tank will last 6 mins. A 20L foam container will last 2 mins.

Delivering foam

The rate of foam concentrate delivered is determined by the flow of water past a sensor in the pump pipe-work. If no water is flowing, no concentrate is injected. All deliveries can be shut off without foam concentrate being pumped.

To deliver foam solution

1. Start delivering water as usual.
2. Press the red foam on/off button on the FoamPro control.
3. Adjust the concentrate to water ratio using the black reset buttons. The concentrate ratio is displayed momentarily when the buttons are pressed.
4. Monitor the foam concentrate level.

FoamPro controls



CLASS A FOAM APPLICATION GUIDE			
Percentage	Description	Nozzle Type	Application
0.2%	Wetting Agent	Normal Nozzles	Deep Seated Fires Overhaul
0.5%	Wet Foam	Normal Nozzles and Aspiration Nozzles	Direct Attack, Bush, Structures & Transport
1.0%	Dry Foam	Aspiration Nozzles	Exposure Protection

CAUTION
 USE CLASS A FOAM ONLY IN FOAM PRO UNIT
 Foam Spilled into waterways may cause Environmental Damage, Care should be taken to prevent this.
 When using / handling Class A Foam appropriate PPE shall be worn (Gloves, Safety Glasses / Goggles)

Note

This Class A foam application guide is located on the pump panel.

Water only delivery

Delivery three is water only. It will never have foam concentrate sent to it, even when other deliveries are receiving foam solution.

You should always use number three delivery if you want to avoid contamination with foam concentrate.

This includes:

- cooling burns
- running an ejector pump, so that foam can't get into a water supply
- supplying a delivery near a sensitive waterway
- filling another appliance or tanker
- draining suction (there is no check valve to stop air or water entering the pump).

Note

Delivery three has no check valve and must be shut while priming.

Draughting from open water

Draughting from an open water source is done in the same way as for any appliance with an electric primer.

As with other get-to-work procedures with the automatic pressure control, leave the controller in RPM mode until you have a stable delivery pressure.

If the pump loses prime, put the pressure controller back into RPM mode to re-prime.

Note

Air drawn into the pump from suction can interfere with the pressure controller if you use PRESSURE mode while establishing a prime.

Tank refill

Refill the tank from a pressurised supply using the tank-to-pump valve.

If you are draughting you can fill the tank using the direct tank fill line which takes water from the discharge side of the pump. It replaces the need to run a delivery back into the tank to refill it.

Open the direct tank fill valve by pulling the tank refill lever while you are pumping.

The direct fill lowers the main pump pressure as water flows to the tank. If you can't increase the engine RPM to make up the difference you may be able to gate the direct fill valve and fill the tank slowly.

The direct tank fill means you don't need to fill the tank with a hose.

There is no access to the tank from the roof.

Maintenance

To avoid damage to the pump do not run:

- dry, except momentarily and at low revs
- at high speed, unless it is discharging water.

A pump cooling line circulates water between the discharge side of the pump and the water tank. When either the tank-to-pump or inlet valves are open and water is available, the pump is being cooled.

There is no need to open deliveries for cooling.

Draining the water tank

The 2000L water tank can be drained by one of the following methods:

1. Pump the water to waste.
 - Close the inlet valve.
 - Open the tank to pump valve and pump the water from the tank via a delivery.
2. Remove the collector head;
 - without using the pump
 - open the tank to pump valve
 - drain to ground.
3. Through the sump gate valve.
 - Remove the cap attached to the 40mm gate valve that is fitted to the sump of the tank (accessible from underneath the appliance) and connect a length of 41mm forestry hose if required.
 - Open the valve fully and drain the tank.

Flushing the pump system

If pumping with water that is possibly contaminated or could be harmful to the pump, (for example seawater or water with a high mineral content), the pump must be flushed with clean hydrant water after the incident.

Air tank drains

Drain moisture from the air tanks every time you complete a check of the appliance.

The drains are opened by pulling on the lanyards that are clipped to the nearside rear of the cab and in the back nearside locker that contains the batteries.



Air tank drain levers

Located on the nearside behind the passenger door

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