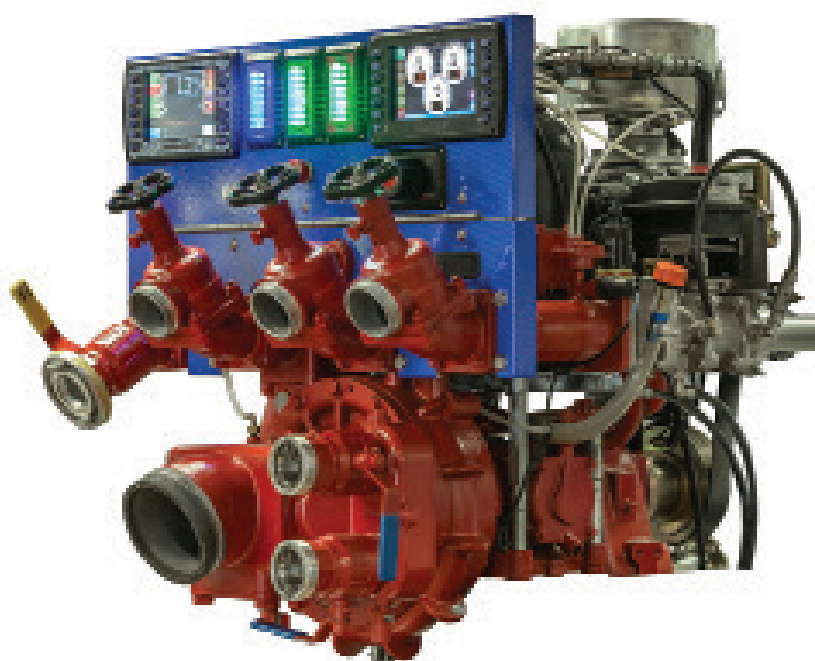




PRIMA UV SMARTCAFS 50/100/200 VEHICLE MOUNTED FIRE PUMP WITH COMPRESSED AIR FOAM SYSTEM AND SMARTGOV CONTROL



INSTALLATION AND OPERATION MANUAL

AMENDMENT RECORD

Model: Prima UV SmartCAFS

Modification No.	Date	Page/s	Amendment	New Issue Number
-	October 2016	-	-	1
1	February 2019	47-51	Include wiring diagram for new harness	2
2	March 2019	5, 61	Information on clutch sparking, normal condition	3
3	March 2019	7	Information on pump maximum recommended speed	3
4	March 2019	53	Note on venting foam tank	3
5	March 2019	10-11	Updated list of recommended foam agents	3
6	June 2019	94-101	Addition of UV SmartGOV Supplement	4
7	June 2019	25	Updated photograph of FoamLogix 3.3 showing new motor controller	4
8	June 2019	35	Addition of Installer Connections information	4
9	January 2020	51	Addition of SmartGOV harness diagram	5
10	January 2020	91	Addition of SmartGOV recommended spares	5
11	May 2020	52	Show 2 types of foam tank level sensor	6
12	May 2020	61	Compressor engagement rpm/pressure	6
13	Feb 2021	40-44	Addition of Oil/Water Separator and Cooling unit installation diagrams	7
14	Jan 2023	4	Added section on Electrical Grounding Requirements	8

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INTRODUCTION

This publication provides information relating to the installation, commissioning and operation of the Prima UV SmartCAFS pumps. This refers to any Godiva Prima pump, single or multi-pressure, when partnered with a Compressed Air Foam System (CAFS). The system can comprise of these main components -

Godiva Prima P1 & P2	Compressor	FoamLogix (foam pump)	UV SmartCAFS	UV SmartGOV
2010	50, 100	2.1A, 3.3	Yes	Yes
3010	50, 100	2.1A, 3.3	Yes	Yes
4010	100, 200	3.3, 5.0	Yes	Yes

Important Notes

Please read this manual before operating the pump

Critical: The pump bearing housing, Gearbox and Compressor are not filled with oil ex works. Refer to section on oil filling points before operation.

Correct lubrication and maintenance is essential if satisfactory performance is to be maintained

Spares

Use only approved replacement parts as recommended by Godiva Ltd. Use of non-approved parts or unauthorised modification of the Godiva Fire Pump may result in death or injury and invalidate any product warranty.

Ordering

When ordering replacement parts please state:

- Model – e.g PC1A2010, where -
P = Godiva Prima Series
1 = Single pressure, 2 = Twin pressure
A = Aluminium, B = Bronze
2010 = Main pump output - 2010 = 2000 l/min, 3010 = 3000 l/min, 4010 = 4000 l/min,
- Serial number - stamped on the side of the volute or on a plate on the instrument panel.
- Year of manufacture
- All the above details are also provided on a plate which will be attached to the pump panel or the side of the pump bay by the vehicle builder.

Pump

Godiva products may only be repaired or serviced by persons trained in said procedures by either Godiva Ltd., or their approved agents.

Electrical Grounding Requirements

Ground Point Installation:

It is recommended that the ground point shall be taken directly from the battery ground to an earth stud on or near the pump. (OEM supplied)

This stud shall then be used as the main ground point for the Prima Pump Electrical Components.

The recommended gauge for the ground cable from the battery ground to the earth stud, is 4 AWG / 25 mm².

SAFETY

Please read this manual before operating the machinery.

Safety notices -



= non-compliance could affect safety

IMPORTANT

= in case of damage to pump

ATTENTION

= in case of personal hazards

Installation and Commissioning

- Once packaging has been removed, installer should ensure rotating parts are not accessible.

In operation

- Rotating parts must be guarded against accidental contact.
- Do not insert items into the suction tube when pump is running.
- Discharge hoses must not be disconnected when the unit is running.
- No components must be unfastened when the unit is running.
- When installing or removing the pump, suitable lifting equipment must be used.
- Suitable ear protection must be worn when pump is running – if necessary.
- When filling the gearbox - avoid spilling oil onto the floor to prevent the danger of slipping.
- Maximum allowable inlet pressure is 12 bar
- Do not run the pump without water for more than one minute as dry running will damage the seal

Training

Godiva pumps must only be operated by trained personnel.

Maintenance

The user must maintain the equipment in an operational condition, as per regulation 5 in the Provision and Use of Work Equipment Regulations 1998.

Environmental Protection

Used oil from the pump bearing housing must be disposed of in accordance with your local regulations

Clutch Engagement

When the clutch is first engaged it is possible to observe some sparking occurring around the clutch assembly. This small amount of sparking is quite normal and nothing to be concerned about. The lower the engagement speed the less sparking will occur.

Risk Assessment

It is the duty of the pump installer to make a method statement and risk assessment of their operations when installing the pump, please contact Godiva Ltd. if assistance is required.

Transportation and Storage

The pump is supplied mounted on a wooden pallet and covered with a wooden box. This protection is suitable for standard methods of freight handling using forklift trucks. No more than one pump should be stacked on top of another. The box is not suitable for storage outside, or when open to the elements. The pump is sprayed internally with a moisture inhibitor when leaving the factory, this treatment may be required if the pump is in long term storage (6 months or more) before use. On receipt of the pump a full inspection must be carried out, if any damage has occurred please contact Godiva Ltd.

Post-production Cleaning Fluid

Immediately after production a special cleaning solution is used to clear the pump of any oil or grease that may be remaining inside the pump. Occasionally this cleaning solution leaves a deposit. This deposit has no effect on the performance and will be flushed away when the pump is first used.



Cleaning fluid deposit
– will be flushed away
when pump is used

Warranty

For all issues relating to warranty claims please contact Godiva Ltd. Please be prepared to quote the six figure pump serial number located on the pump volute.

Associated Publications

Publication	Part No
Spare Parts Manual	TBA

Pump specification numbering

Typical pump model will be PC1A2010

P	C	1	A	2010
= pump series	= compressed air foam	1 = Single pressure 2 = Multi-pressure	A = Aluminium B = Bronze	20 = nominal flow in litres per minute 10 = pressure in bars

Serial numbering - 616123 = typical serial number, located on the side of the volute body and on a plate on the instrument panel.

Spares

Spare parts for the Prima SmartCAFS are supplied in kit form for the various parts of the pump. Please refer to the Spare Parts List.

TECHNICAL DATA

Description

Pump type P1	Single stage - centrifugal
Pump type P2	Two stage. 1 st stage centrifugal, 2 nd stage regenerative
Shaft	Stainless steel
Seal	Self-adjusting mechanical type
Material	Aluminium or bronze (applies to main castings) See Materials of Construction list for details
Direction of rotation	Gearbox input - clockwise only (viewed on gearbox input drive flange)
Priming system	Reciprocating, positive displacement piston
Temperature range	-15°C to +40° ambient (ref: EN1028-1)

Lubrication -

	Oil type	Quantity - litres
Bearing housing	SAE10W/40 or 15W/40	1.0
Gearbox	BP Energol GRXP68	1.2
Compressor - 50scfm	Screw compressor type oil in compliance with ISO viscosity grade 32 to 46. Alternative - SAE 10W/40 automotive multi-grade oil	3.5 (4.0 with filter change)
Compressor - 100scfm		4.5 (6.0 with filter change)
Compressor - 200scfm		12.0

Safety devices	42°C Thermal relief valve (74°C option). Fitted as standard on P2, optional on P1 P2 only - Suction pressure relief valve opens at 13 Bar
Angle of inclination	15° in any plane
Maximum inlet pressure	12 bar
Pump minimum idle speed	900-1000 rpm
Pump maximum recommended speed	3600 rpm

Prima UV SmartCAFS / FoamLogix System / Compressor - Compatibility Chart

Pump model	FoamLogix	FoamLogix	FoamLogix	FoamLogix	Compressor
Prima SmartCAFS50	2.1A	3.3			Tamrotor Tempest 3
Prima SmartCAFS100	2.1A	3.3	5.0		Tamrotor Tempest 6
Prima SmartCAFS200		3.3	5.0	6.5	Enduro 12

Compressor Data

Compressor rating	50scfm
Model	Tempest 3
Maximum operating speed	10000 rpm
Nominal speed of operation	6250 rpm
Nominal power draw	12 kW
Direction of rotation	Anti-clockwise (viewed on pulley)
Volume output	1420 l/min
Oil capacity	3.5 litres
Oil capacity with filter change	4.0 litres
Operational pressure range	4-10 bar
Cooling System	
Type	Oil/water shell & tube type
Cooling water flow rate	10/15 l/min at 7 bar

Compressor rating	100scfm
Model	Tempest 6
Maximum operating speed	8000 rpm
Nominal speed of operation	5350 rpm
Nominal power draw	28 kW
Direction of rotation	Anti-clockwise (viewed on pulley)
Volume output	2830 l/min
Oil capacity	4.5 litres
Oil capacity with filter change	6.0 litres
Operational pressure range	4-10 bar
Cooling System	
Type	Oil/water shell & tube type
Cooling water flow rate	20/30 l/min at 7 bar

Compressor rating	200scfm
Model	Enduro 12
Maximum operating speed	6500 rpm
Nominal speed of operation	5000 rpm
Nominal power draw	40 kW
Direction of rotation	Anti-clockwise (viewed on pulley)
Volume output	5650 l/min
Operational pressure range	4-10 bar

FoamLogix Data

Foam Proportioning System	FoamLogix 2.1A - Class A Foam Compatible
Type	Electronic foam proportioning system
Operating voltage	12V and 24V systems available
Fuse rating 12V / 24V	50 / 40 amp
Current draw (operating) 12V / 24V	25 / 13 amp
Current draw (Maximum) 12V / 24V	40 / 20 amp
Wire size 12V / 24V	Minimum 6.0mm ²
Maximum Foam Agent Flow Rate	8.0 l/min

Foam Proportioning System	FoamLogix 3.3 - Class A and B Foam Compatible
Type	Electronic foam proportioning system
Operating voltage	12V and 24V systems available
Fuse rating 12V / 24V	60 / 40 amp
Current draw (operating) 12V / 24V	30 / 24 amp
Current draw (Maximum) 12V / 24V	60 / 30 amp
Wire size 12V / 24V	Minimum 8.5mm ²
Maximum Foam Agent Flow Rate	12.0 l/min

Foam Proportioning System	FoamLogix 5.0 - Class A and B Foam Compatible
Type	Electronic foam proportioning system
Operating voltage	12V and 24V systems available
Fuse rating 12V / 24V	70 / 40 amp
Current draw (operating) 12V / 24V	30 / 15 amp
Current draw (Maximum) 12V / 24V	60 / 30 amp
Wire size 12V / 24V	Minimum 8.5mm ²
Maximum Foam Agent Flow Rate	19.0 l/min

Foam Proportioning System	FoamLogix 6.5 - Class A and B Foam Compatible
Type	Electronic foam proportioning system
Operating voltage	12V and 24V systems available
Fuse rating 12V / 24V	70 / 40 amp
Current draw (operating) 12V / 24V	30 / 15 amp
Current draw (Maximum) 12V / 24V	60 / 30 amp
Wire size 12V / 24V	Minimum 8.5mm ²
Maximum Foam Agent Flow Rate	24.0 l/min

Lubricants

Pump Gearbox	
Capacity	1.2 litres approximately
Recommended specification	BP Energol GR XP 68 or similar

Pump Bearing Housing	
Capacity	1.0 litres approximately
Recommended specification	10W/40 or 15W/40 Multi-grade engine oil

Recommended Foam Agents

Hale FoamLogix Models 2.1A, 3.3 or 5.0 can be used with the foam concentrates specified on the Hale Foam Proportioning System Foam Concentrate Compatibility List provided below, Hale Bulletin #650, Rev 32 , 7-17-07.

The foam concentrates in the list have been tested by Hale Products to ensure compatibility with FoamLogix models 2.1A, 3.3, 5.0 or 6.5. This information is intended to assist the end user in selecting compatible foam concentrate(s) but is not a determination of fire fighting efficiency. Always consult local application and environmental regulations before selecting a foam concentrate and refer to the FoamLogix user manual for additional information.

Please contact your Hale representative if your foam is not listed.

Class A Foam	Manufacturer	Brand name
US Forestry Service Approved	Ansul	Silvex Class A Foam Concentrate
	Angus	Forexpan S (0.1% - 1.0%)
		Hi-Combat Class A (1st Defense Class A Cold WaterFoam)
	Kerr Fire	Kerr Forest Foam (0.1%-1.0%)
	Chubb National Foam	1st Defense Class A Coldwater Foam
	Chubb National Foam	Knock-Down
	Solberg	Fire-Brake Class A Foam (3150A)
	ICL Performance Products	Phoscheck WD881
		First Response
	Chemonics	Fire-Trol Fire Foam 103
		Fire-Trol Fire Foam 104
Non U.S. Forestry Service Approved	3M	Light Water FT-1150
	ChemGuard	First Class - Class A Faom P/N 5100-307
	ChemGuard	Class A Plus
	Unifoam Co Ltd.	UniA 1%
	3M	Light Water SFFF
	National Foam	Responder
	Angus Fire	FirePower Class A
	Fire Response Systems Inc.	Class A - Fire Stop-R CCR# GOLD7368
	Dr. Stahmer	Sthamex-Class-A Synthetic Class A Foam

Class B Foam	Manufacturer	Brand name
AFFF-Alcohol Resistant Concentrates	3M	3% Alcohol Type AFFF Concentrate (P/N 98-0211-6573-7)
	Ansul	3x3 Low Viscosity Alcohol Resistant Concentrate
		T'storm ATC AR-AFFF 1% or 3%
	ChemGuard	AR 3%-6% Part # CAR36P
		AR-AFFF, 3%x3%, Part # C333
		Ultraguard 1%-3% Part # C133
		3%-6% AR-AFFF Product # C361
		3%-6% AR-AFFF Product # C363
	National Foam	Universal Gold 3% AR-AFFF
		Universal Gold 1% - 3% AR-AFFF
	US Foam	1-3% Alcohol Resistant AFFF (P/N US- AR13)
		3-6% Alcohol Resistant AFFF (P/N US-FCAR36)
	Angus Fire	Niagara 3-3 – AR-FFFP (Class B)
	Solberg	Arctic Foam RF 3x6 ATC – Synthetic AR Foam Concentrate (Class B)
	Williams Fire	ThunderStorm® ATC AR-AFFF 1% or 3% F-601B
AFFF	National Foam	1% Aero-Water
Specialty Foam Concentrates		
Protein	National Foam	Terra Foam 3% CF
	Chemonics	Durra Foam 3%
Fire Fighting Water Additive		
	Hazard Control Tech.	F-500 (1%, 3%, 6%)
	SPL Control LLC	Pyrosolv (FF Agent – 6% Solution) P/N-720328 (MSDS#)
	Novacool	UEF 4%
	Fire Blockade	Fire Extinguishing Agent, 0.4 - 6.0%
	No. 3000-1003	
	FireAde 2000	Fire Fighting Emulsifier 0.25-6% P/N FA2000-5
	FIRE CAP	
	Fire Suppression Products, Inc	Fire Cap 0.25%-6%
	Verde Environmental Inc.	Micro-Blaze Out 2-3%
	Bio Ex S.A.S	Bio for N – FSFF (Fluoro Surfactant Free Foam) Wetting Agent. (Class A)
		Ecopol AR-FFF (Fluoro compound-Free Foam) (Class B)

EN Designation (EN 1028:-1:2002)

Godiva Description and specification	European standard	Classification	Limit pressure pa lim bar
Fire fighting centrifugal pump 2010, low pressure	EN 1028-1	FPN 10 – 2000	17
Fire fighting centrifugal pump 3010, low pressure	EN 1028-1	FPN 10 – 3000	17
Fire fighting centrifugal pump 4010, low pressure	EN 1028-1	FPN 10 – 4000	17
Fire fighting centrifugal pump 6010, low pressure	EN 1028-1	FPN 10 – 6000	17
Fire fighting centrifugal pump – 2010, 3010, 4010, 6010, high pressure	EN 1028-1	FPH 40-250	54.5

Materials of construction

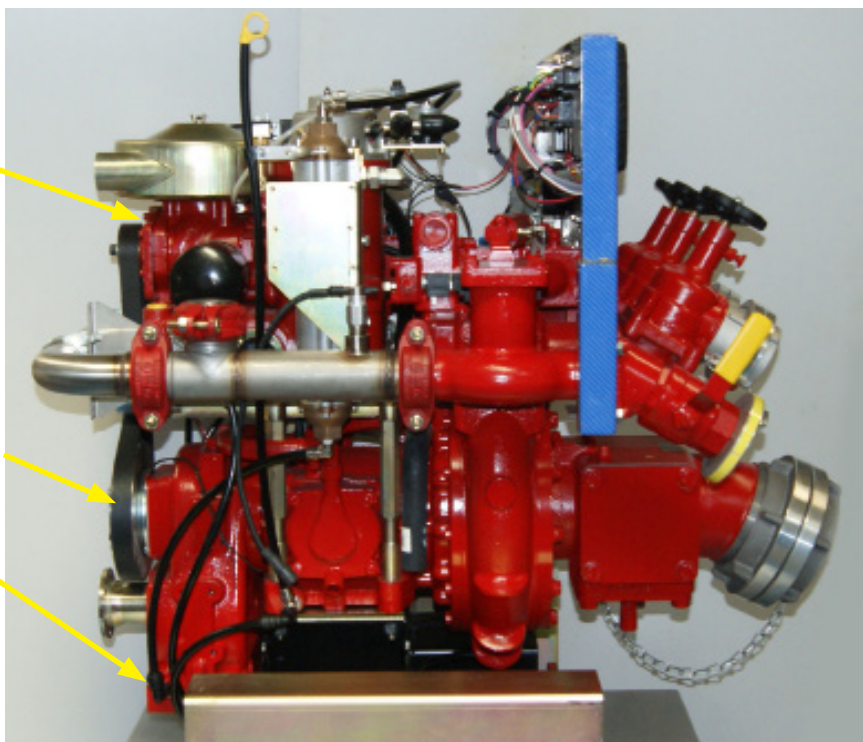
	Material	Material
Component	Aluminium alloy pump	Gunmetal pump
Volute casing	Aluminium Alloy	Gunmetal
Pump head	Stainless steel	Stainless steel
Suction cover	Aluminium Alloy	Gunmetal
L.P. Impeller	Aluminium Alloy	Gunmetal
Front wear ring	Delrin Polymer	Delrin Polymer
Rear wear wing	Delrin Polymer	Delrin Polymer
Bearing housing	Iron	Iron
Shaft	Stainless steel	Stainless steel
Mechanical seal	Silicon carbide / Carbon	Silicon carbide / Carbon
Other mechanical seal components	Stainless steel	Stainless steel
H.P. Impeller – P2 only	Stainless steel	Stainless steel
Cover Plate – P2 only	Stainless steel	Stainless steel

Major components and controls - Prima UV SmartCAFS50

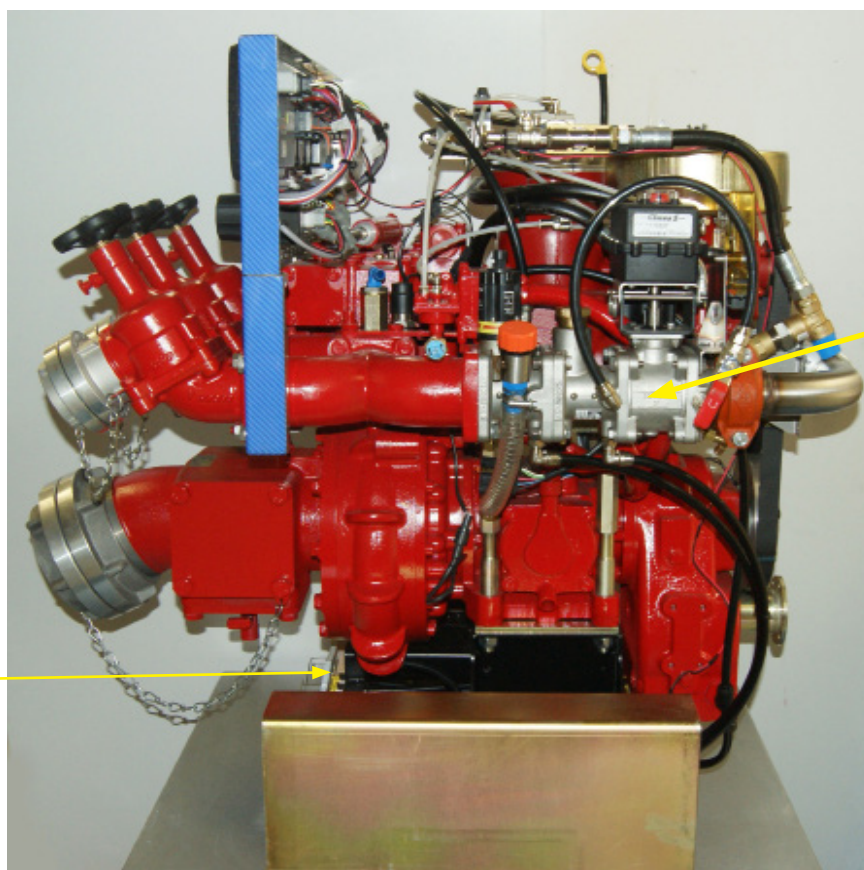
Rotary twin screw compressor with integral air receiver/separator, heat exchanger and lubrication system.

PTO driven gearbox with compressor drive via an electromagnetic clutch.

Integral gearbox oil cooler

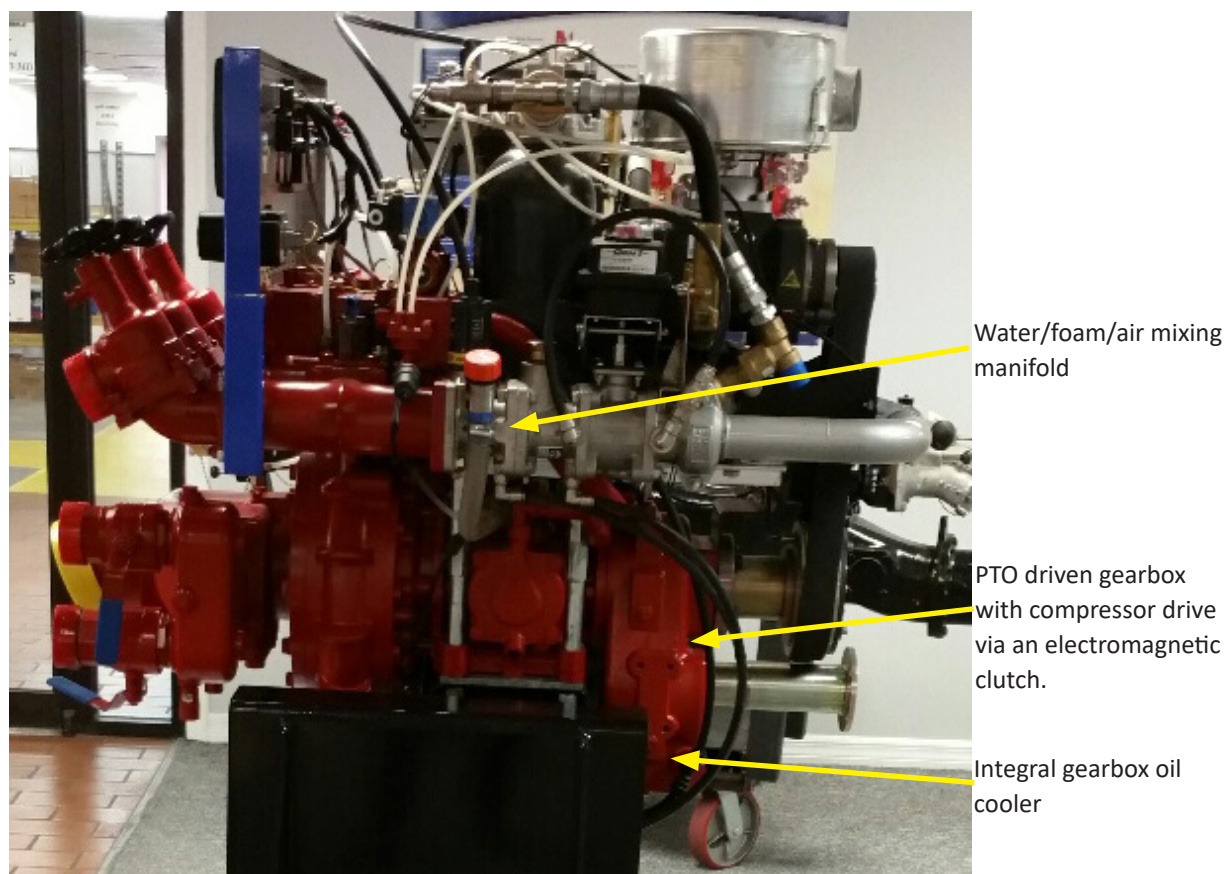
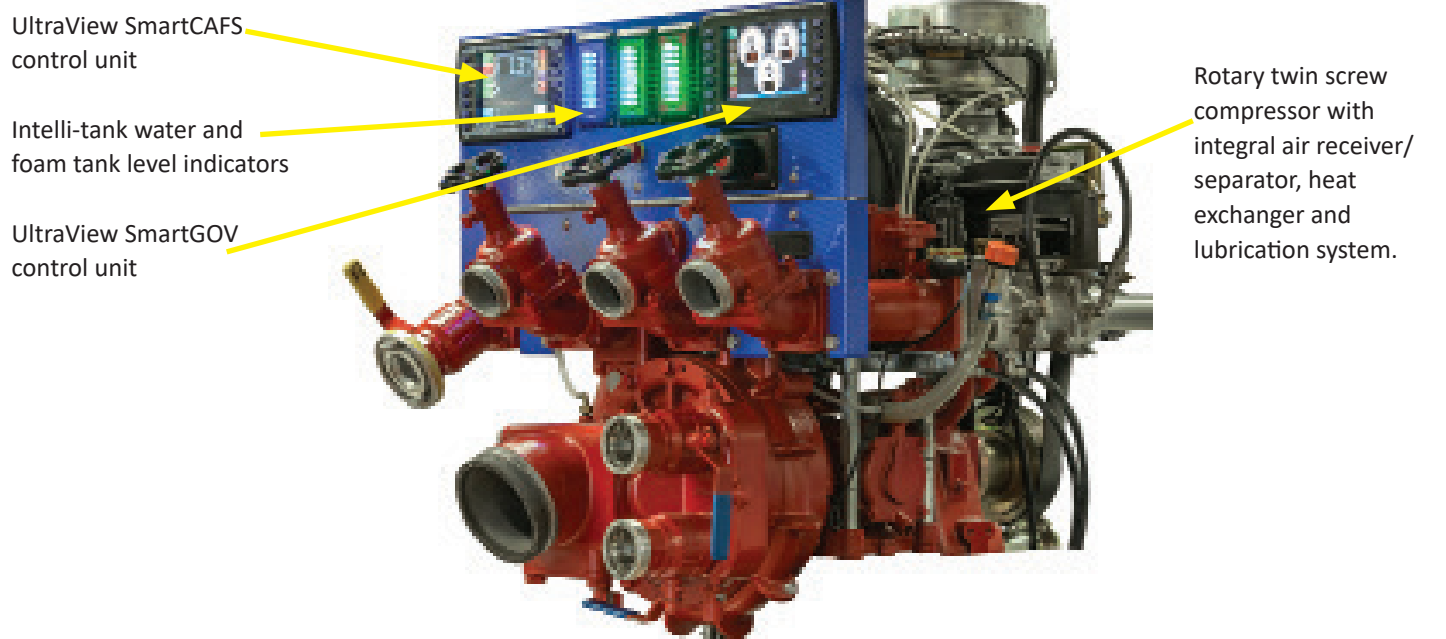


Mounting platform incorporates forklift points, anti-vibration mountings and fluid drain points

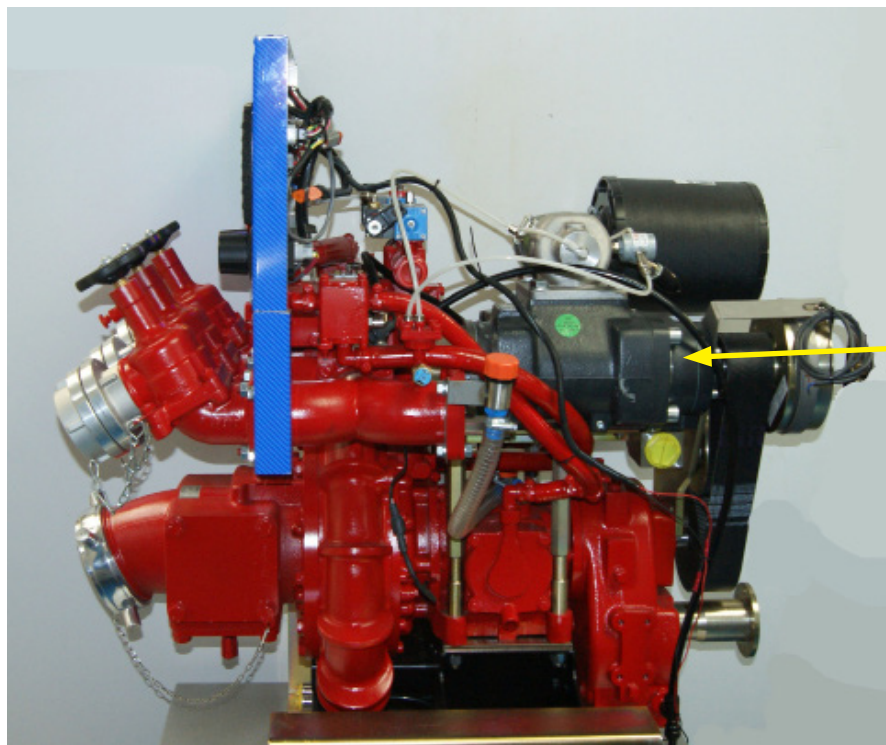


Water/foam/air mixing manifold

Major components and controls - Prima UV SmartCAFS100



Major components and controls - Prima UV SmartCAFS200



Rotary twin screw compressor

These components are mounted separately from the pump to suit the vehicle builders installation



Mixing manifold



Heat exchanger



Oil/Water separator

Interlock for Compressor Clutch Control - Prima SmartCAFS50, 100 and 200 Models

Solid state device complete with pressure switch indicating LEDs and compressor hours run meter. This unit is primarily of interest to service technicians for CAFS fault diagnosis. The device is located on the left side of the pump.



FoamLogix 2.1A Foam Pump Component Group

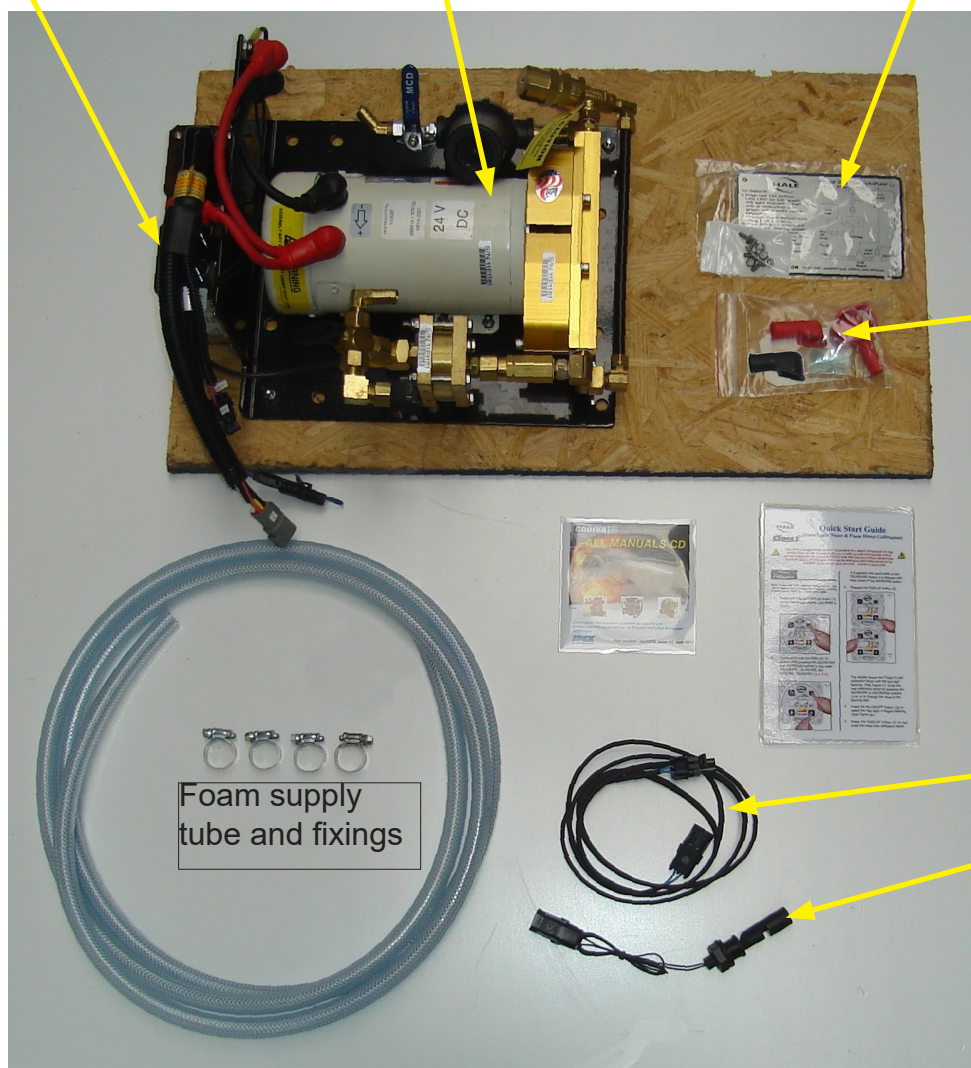
Showing parts supplied loose with standard pump.

Foam pump harness fitted to Distribution box (motor controller/driver)

FoamLogix 2.1A Pump (24V shown)

Instruction plate and fixings

Covers for power leads



Foam supply tube and fixings

Extension lead for low foam level sensor

FoamLogix 3.3 or 5.0 Foam Pump Component Group

Showing parts supplied loose with standard pump.

FoamLogix 3.3, 5.0 or 6.5 Pump (3.3 shown).



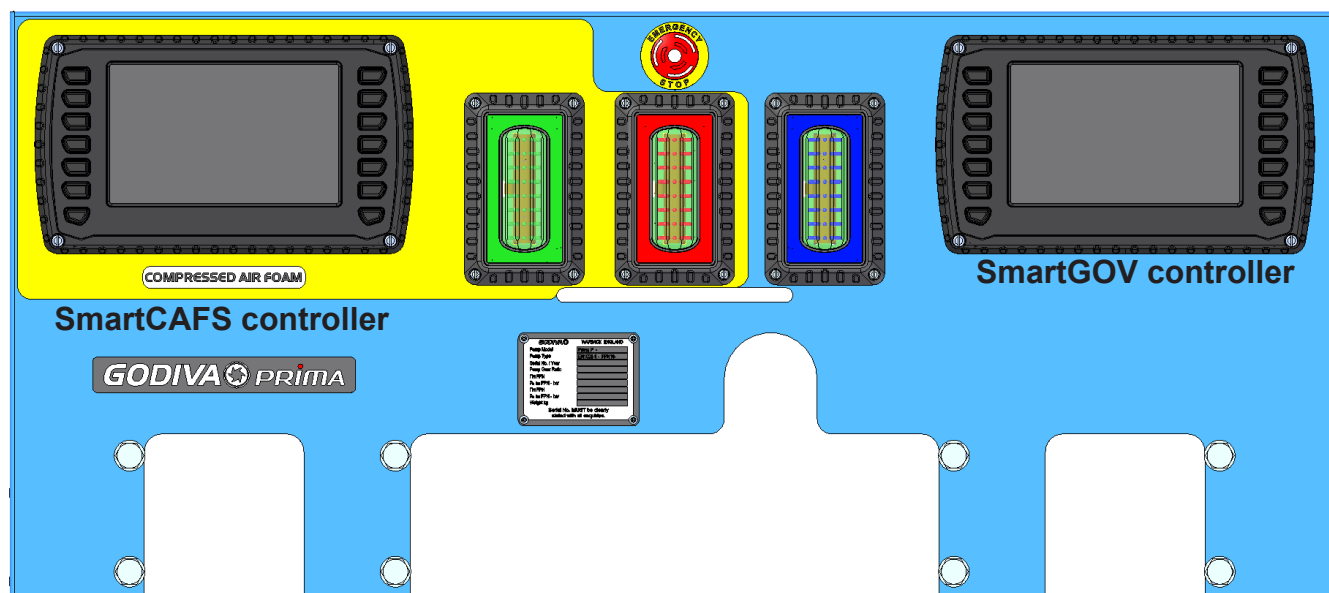
1. MDT Foam Tank Selector can be -
 - MST – Manual Single Tank. Select one foam tank or flush option (not shown)
 - MDT – Manual Dual Tank. Select one of two foam tanks or flush option (shown)
 - ADT – Air Dual Tank. Air operated valve, select one of two foam tanks or flush option (not shown)
- (2) High pressure switches only supplied loose when blue water panel is not fitted

1. Typical Control Panel - SmartCAFS control unit with analogue gauges and manual control of pump speed

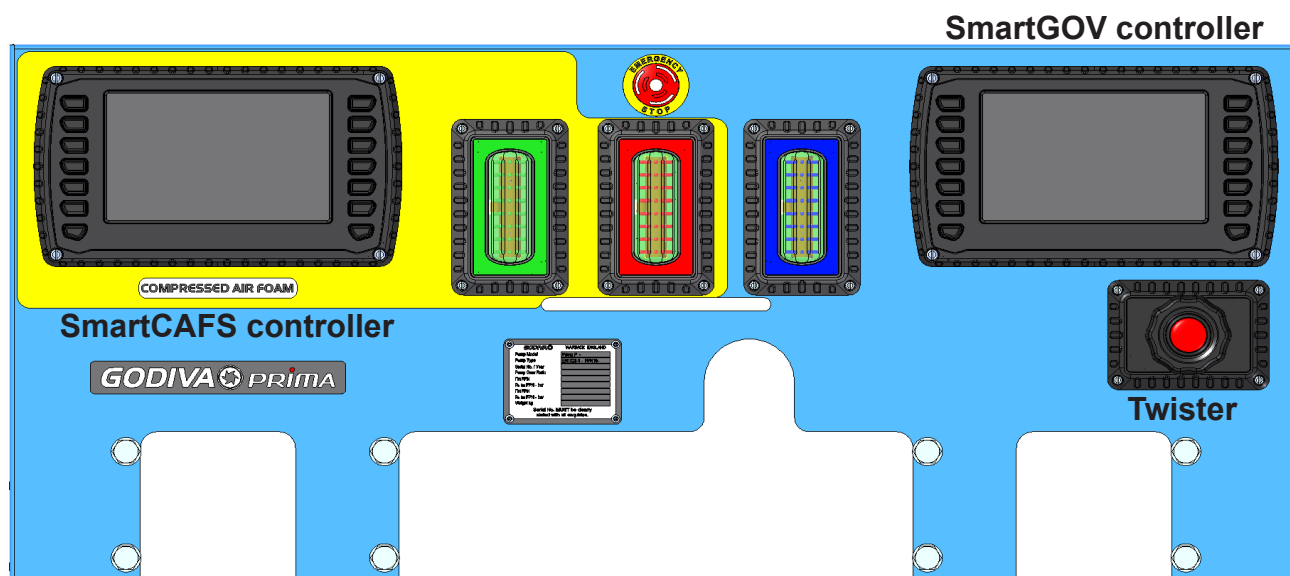


1-Pump low pressure gauge 2-Emergency Stop 3-Pump high pressure gauge
4-Compound gauge 5-Pump tachometer & hour counter 6-Engine speed control Up=increase, Down=decrease, Left or right=preset speeds 7-Vehicle status lamps - Engine high coolant temperature. Engine low oil pressure. 8-Low battery charge. Low fuel. 9-Foam tank level gauge 10-UltraView SmartCAFS controller 11-Water tank level gauge 12-Spare switch locations, can be used for electro-pneumatic control of High/Low pressure selection, and high pressure discharge valve if fitted. 13-High/Low pressure manual selector 14-High pressure stage strainer.

2. Typical Control Panel - SmartCAFS and SmartGOV control units - complete electronic control of CAFS and pump operation



3. Typical Control Panel - SmartCAFS and SmartGOV control units with Twister for manual control of pump speed



4. Typical Control Panel - SmartCAFS control unit supplied to fit within the vehicle builder panel design



SYSTEM OVERVIEW

The PC1_ or PC2_ is a Compressed Air Foam System comprising of three major components (in addition to the main water pump) – Air compressor, FoamLogix (foam proportioning unit) and Manifold (foam mixing and control system).

The FoamLogix components (foam pump and motor assembly) are mounted separately from the water pump and are designed to be remotely mounted according to the vehicle builders requirements.

A metered amount of foam concentrate is introduced into the Manifold and mixed with water from the pump discharge manifold to produce a solution. The foam and water blend is then fed to a control valve (ARC) where wet or dry foam may be selected (air ratio control section of manifold). Compressed air is then injected and the resulting foam / water / air combination is completely mixed by the X-mixers during discharge.

Safety interlocks are provided to ensure that:

1. Foam concentrate cannot be introduced unless water is flowing through the unit. Compressed air cannot be introduced unless foam concentrate is flowing.
2. 'Slugging' (unmixed air and water) in the discharge line is prevented. Air cannot be injected in the absence of foam and water.
3. Air injection when the foam tank is empty is prevented. Foam tank low level switches are provided and MUST be fitted.

Compressor

There are three levels of compressor used –

For Prima SmartCAFS50 systems

The rotary twin-screw compressor is rated at 50 scfm @ 7 bar

For Prima SmartCAFS100 systems

The rotary twin-screw compressor is rated at 100 scfm @ 7 bar

For Prima SmartCAFS200 systems

The rotary twin-screw compressor is rated at 200 scfm @ 7 bar

All compressors are driven by a belt drive. The compressor is engaged, or disengaged from the pump drive, via an electro-magnetic clutch, which is activated by the CAFS selector switch.

Compressor lubricating oil is cooled by water taken from the main pump, via the water supply line; cooling water being supplied from pump delivery and returned to pump suction. The compressor will reject approx. 8.0 kW (CAFS50), 15.0 kW (CAFS100), 32kW (CAFS200) of heat energy to cooling. The installer must consider this additional thermal load.

When the compressor is stationary, residual system pressure is vented by a blow-down valve.

NOTE: The compressor should not be run without cooling water.

Manifold

The manifold incorporates an air ratio control valve through which varying degrees of wet or dry foam mixture can be selected. Compressed air is then injected and the resulting foam / water / air combination is thoroughly mixed by the X-mixers during discharge.

A By-pass valve is fitted to help obtain the required dry foam flow rate, this valve is adjusted and set during the installation stage, it is not required to be adjusted during normal operation.

CAFS units are best suited for use with Fresh Water.

For salt water compatible foams, seek advice from the foam agent manufacturers.

FoamLogix - Foam Proportioning System

The FoamLogix system consists of three main components:

- 1) Foam Pump / Motor Assembly.
- 2) UltraView Controller (integral with main pump control panel).
- 3) Flow measurement and injection manifold.

All three elements combine to provide accurate foam proportioning. From the control panel the operator can initiate the system, adjust the foam ratio, monitor 'real time' water flow rate and record total water and foam concentrate usage.

The FoamLogix system should be powered up when the PTO is engaged. Foam concentrate is only injected when the RED ON control button is operated.

The Foam ON light will illuminate when the FoamLogix is turned on, and flash when injecting foam.

The Hale FoamLogix 2.1A foam proportioning system provides consistent foam concentrate injection for Class A foam operations and is capable of delivering a ratio of 0.1% to 10.0% foam concentrate directly into the water discharge stream.

Further information is available in the FoamLogix Model 2.1A Description, Installation and Operation manual, part number 029-0020-74-0

Hale 3.3, 5.0, 6.5 FoamLogix systems may be used for Class A or B foams,

Further information is available in the FoamLogix Model 3.3/5.0/6.0 Description, Installation and Operation manual, part number 029-0021-68-0.

INSTALLATION AND INITIAL SET-UP

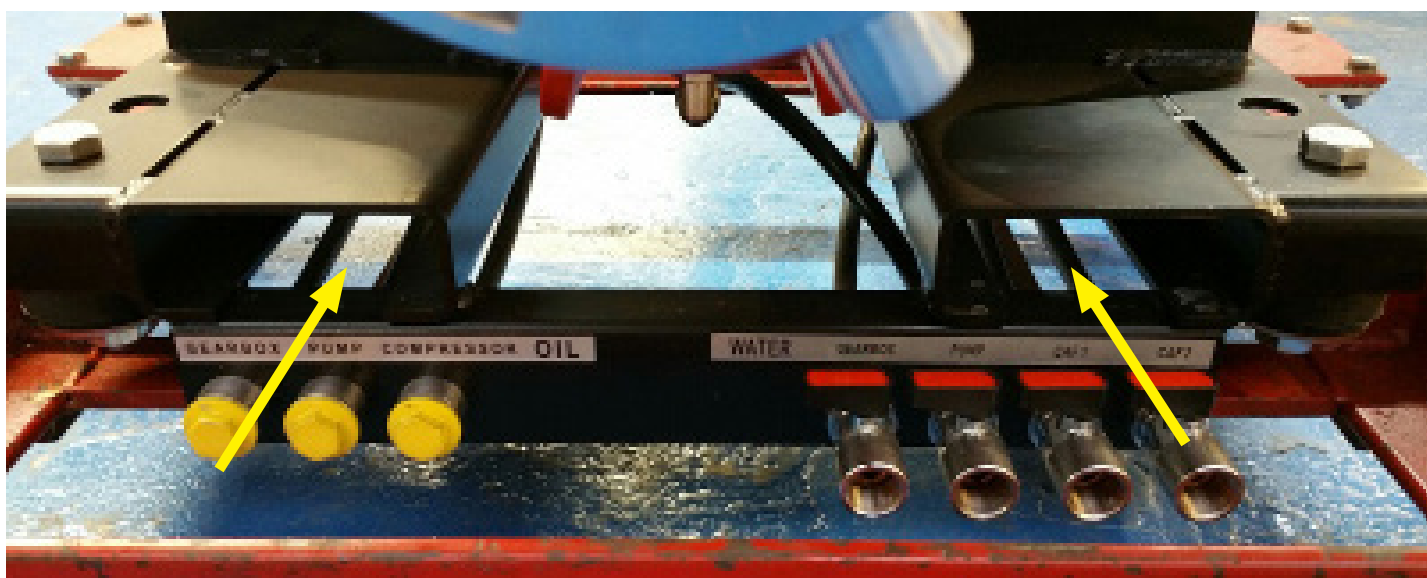
PRIMA SMARTCAFS50
USING FOAMLOGIX 2.1A, 3.3

PRIMASMARTCAFS100
USING FOAMLOGIX 3.3, 5.0 or 6.5

The following connection points should be considered when installing the PC1_ or PC2_ assembly into a vehicle.

Lifting Points – Prima SmartCAFS50 and Prima SmartCAFS100

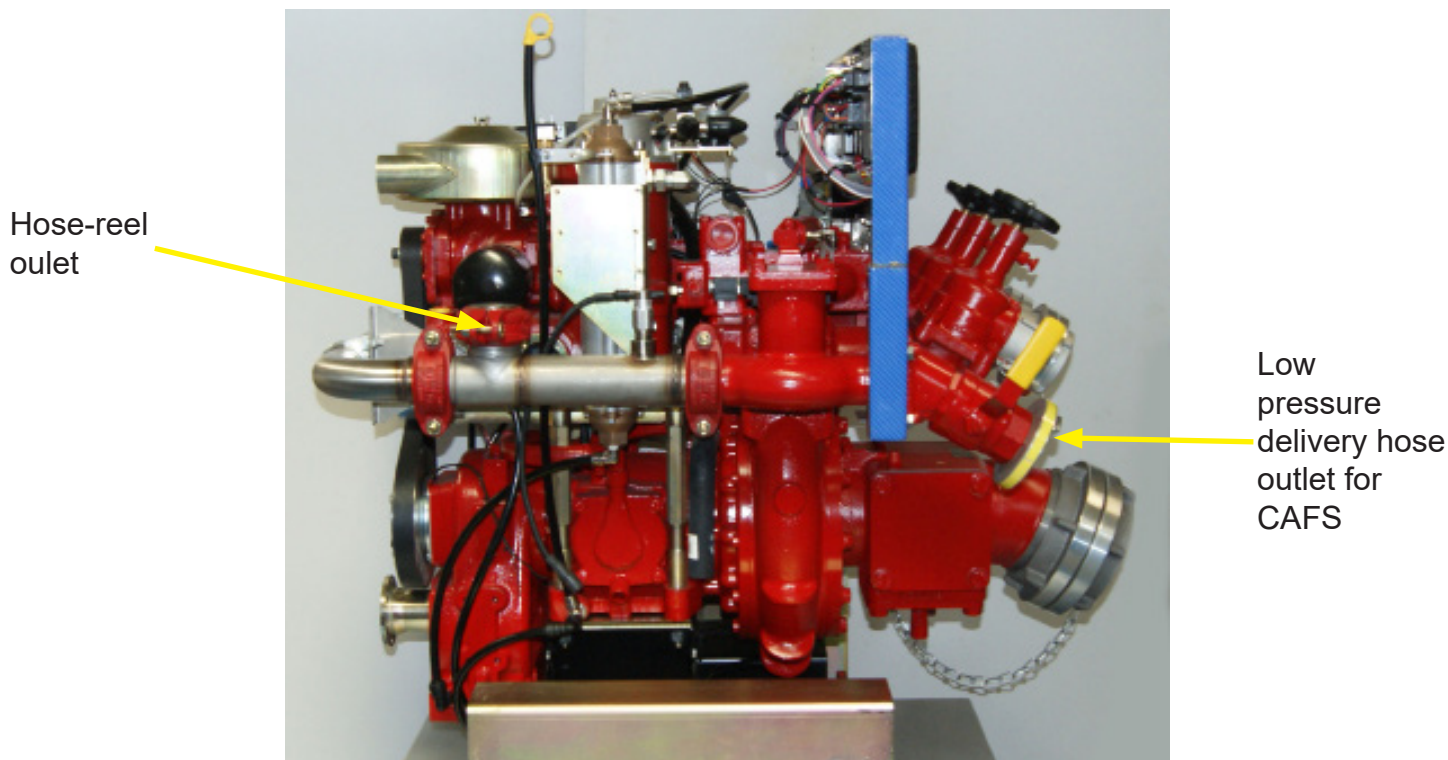
Secure handling of the unit for installation and maintenance is vital. Use only the lifting points provided on the unit.



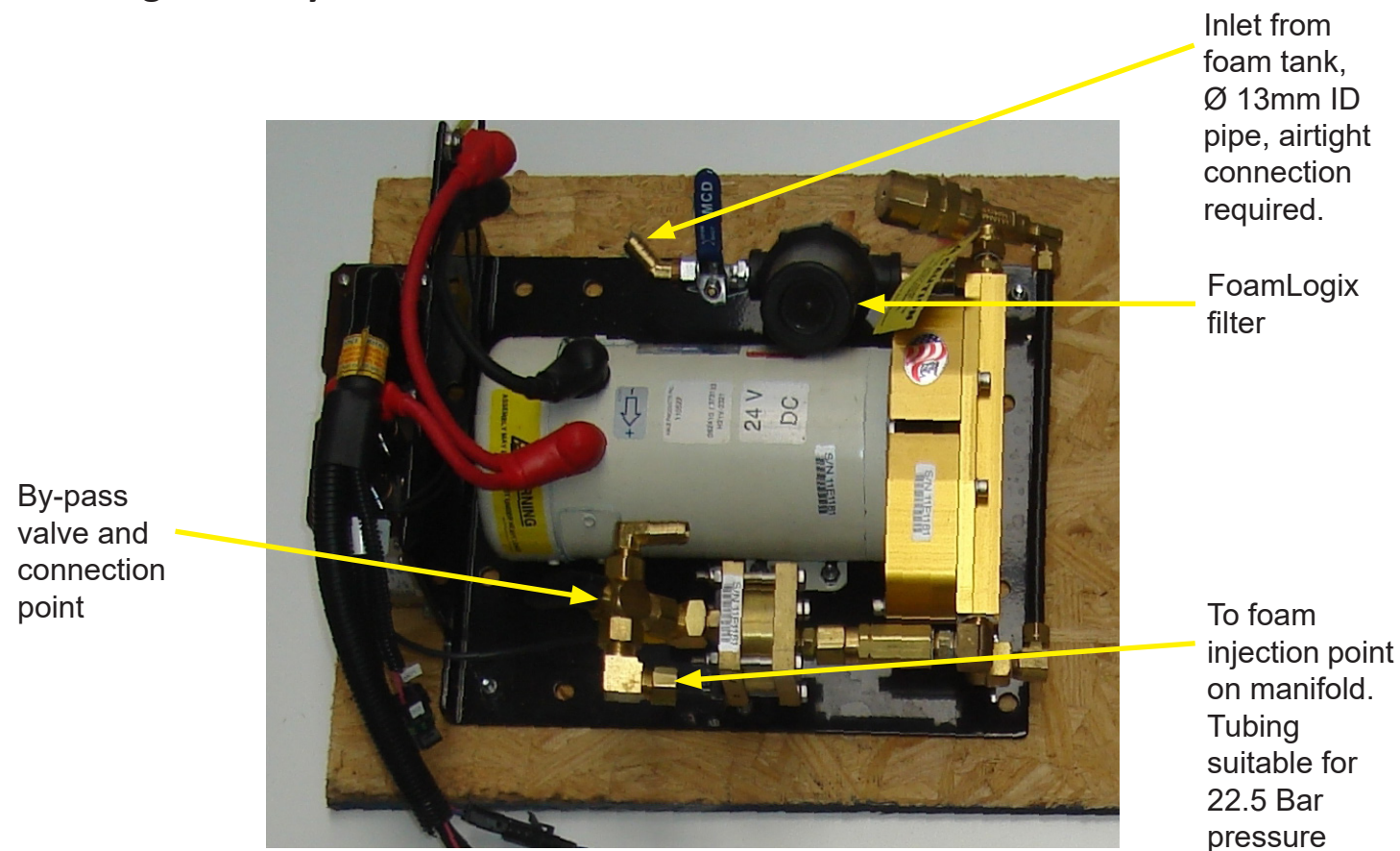
Forklift points

Prima SmartCAFS50 System

CAFS Discharge ports (see installation drawing for dimensions)



FoamLogix 2,1A System - Remote Mounted

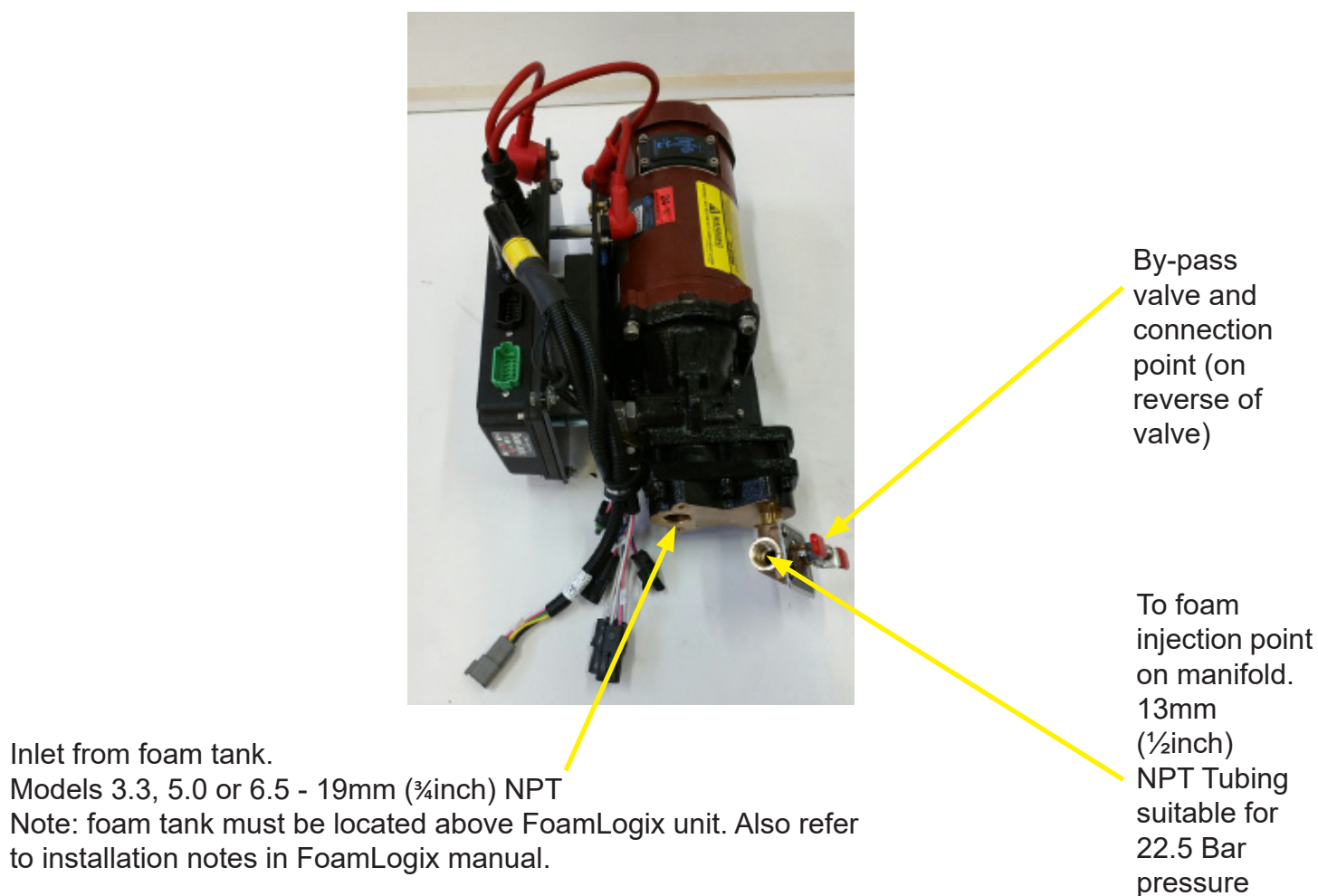


Prima SmartCAFS100 System

CAFS Discharge ports (see installation drawing for dimensions)



FoamLogix 3.3, 5.0 or 6.5 System - Remote Mounted



Fluid Drain Points

Prima SmartCAFS50 / 100 / 200 Systems

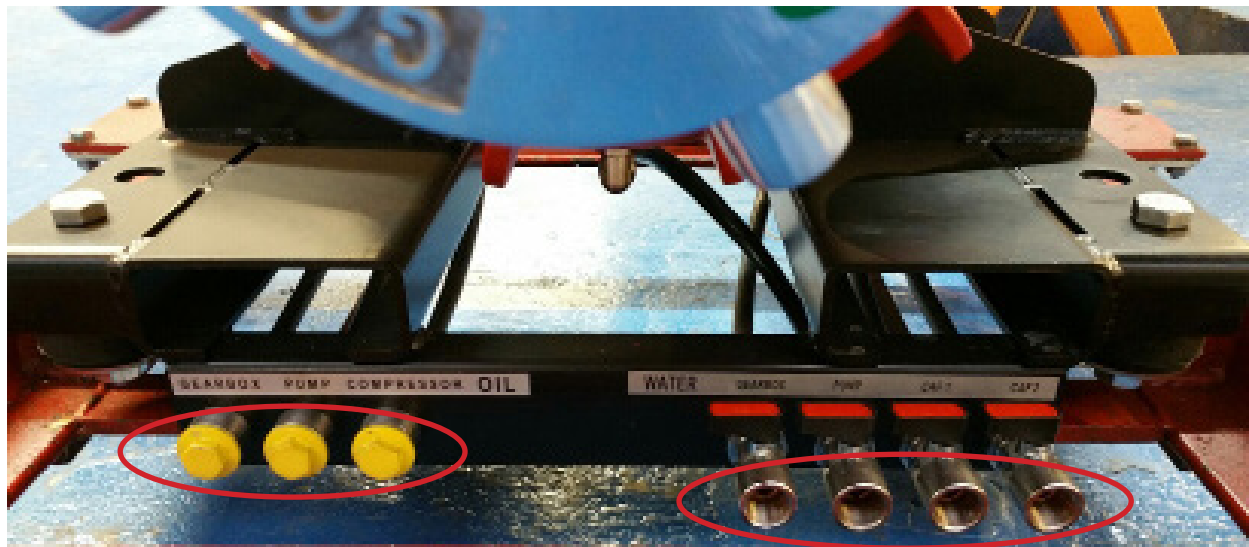
Compressor, Bearing housing, and Gearbox oil drain points are located at the lower left side of the pump (viewed from the suction tube end).

ATTENTION

IMPORTANT

Note: Oil should only be drained from the gearbox/compressor/bearing housing when it has cooled to a reasonable temperature to avoid accidental or inadvertent injury through contact with hot oil.

The oil can be slightly warm to assist in flowing from the unit.



Gearbox/heat exchanger coolant and the CAFS manifold drain points are located at the lower right hand side of the pump. Please note that both manifold drains must be utilized.

Oil Filling Points - Prima SmartCAFS50 / CAFS100

Prima SmartCAFS100 is very similar to the CAFS50 arrangement

The unit is supplied without oil and must be filled with the correct quantity and specification before starting the pump.

The oil filling points for the compressor is located at the left side of the pump (viewed from suction tube).

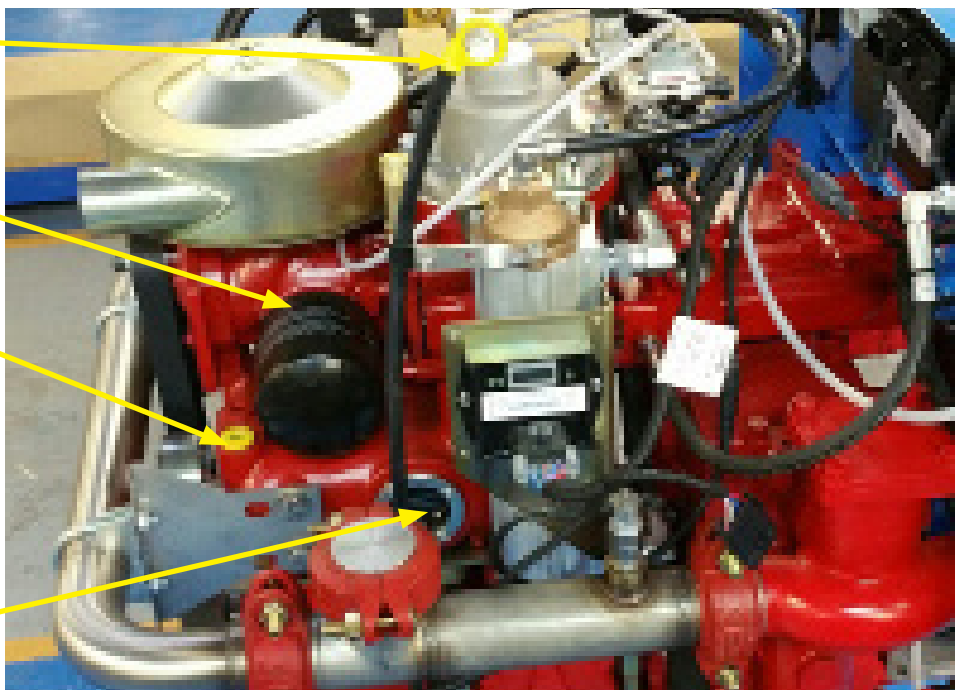
The oil filling points for the bearing housing is located on the right side of the pump (viewed from suction tube).

Oil level dipstick – pump bearing housing

Compressor oil filter

Compressor oil filling point. Note: the plug has a grooved thread to allow for a controlled release of internal pressure.
For oil type and capacity refer to Recommended Lubricants

Compressor oil level – mid point on site glass



Bearing housing oil fill point

Oil Filling Points - Prima SmartCAFS200

The unit is supplied without oil and must be filled with the correct quantity and specification before starting the pump.

The oil filling points for the pump bearing housing are located at the right side of the pump (viewed from suction tube).

Bearing housing oil fill point



The bearing housing is fitted with a breather cap that allow the escape of air when being filled with oil.

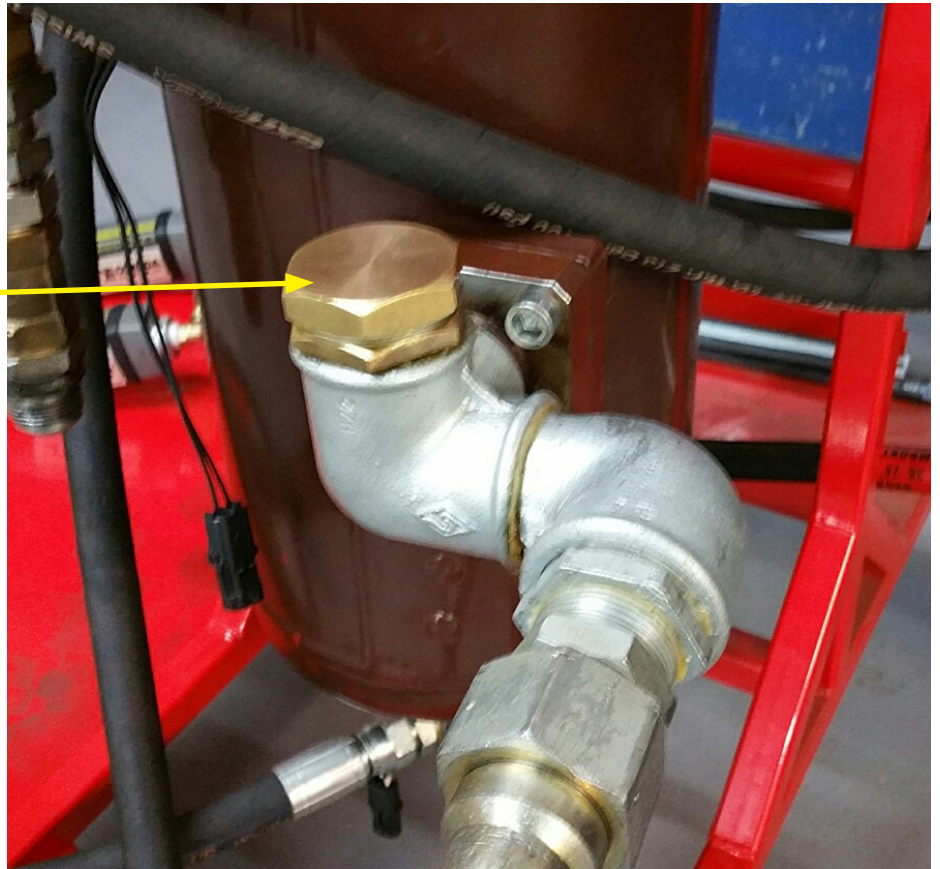
Dipstick - access from left side of pump.
The correct level is when the oil is between the upper and lower marks.



Oil Filling Points - Prima SmartCAFS200

The oil filling point for the compressor system is on the oil / water separator tank. Remove the plug on the elbow to pour in 12 litres of oil. For specification see the Lubriacabts section on page 11

Compressor oil fill point



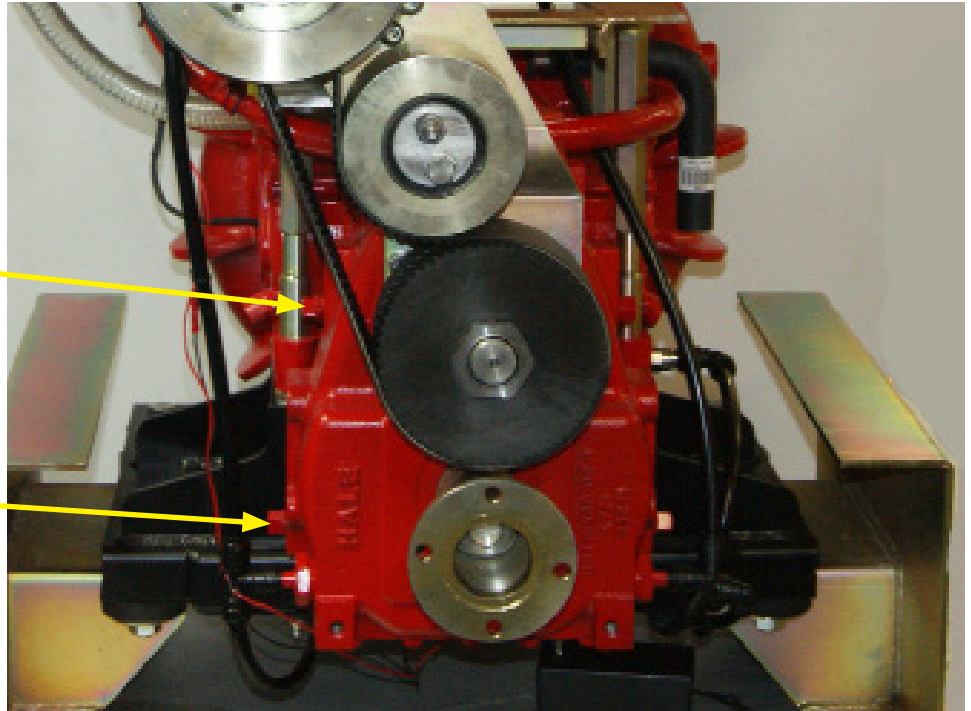
Gearbox Filling Points - Prima SmartCAFS50 / 100 /200

The pump gearbox filling point depends on the gearbox position in relation to the pump.

Gearbox in down position

Oil filling point for oil type and capacity refer to Recommended Lubricants

Oil level check point



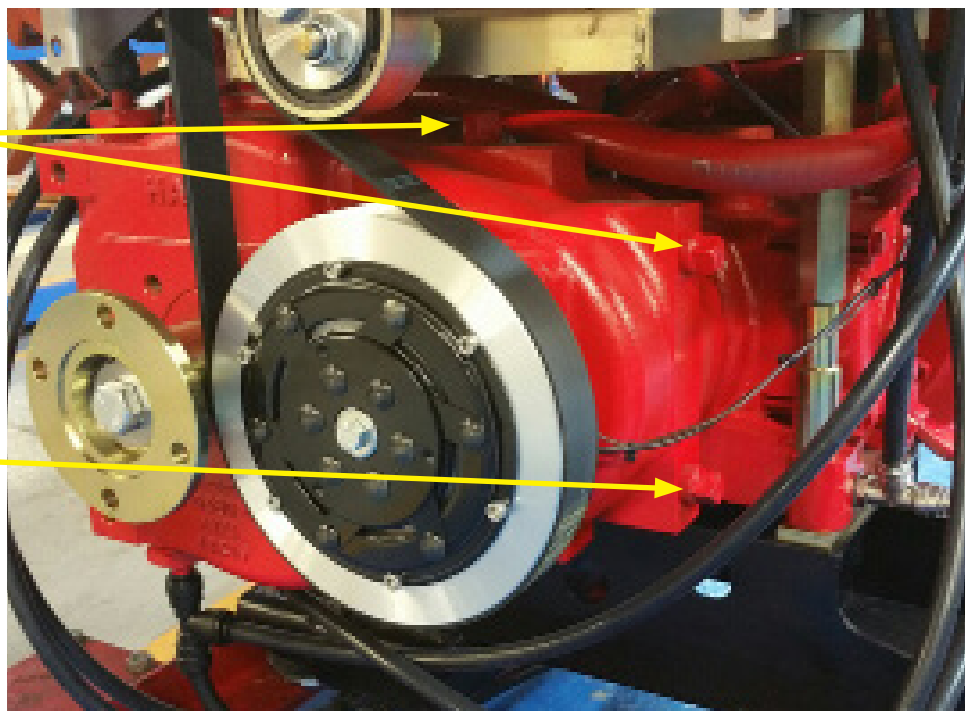
Gearbox in down position

The oil filling point is on the side of the casing (LH gearbox shown) and is symmetrically opposite for RH gearbox.

The oil level check point is lower on the side. Oil capacity and type as Down position detail.

Oil filling point for oil type and capacity refer to Recommended Lubricants

Oil level check point

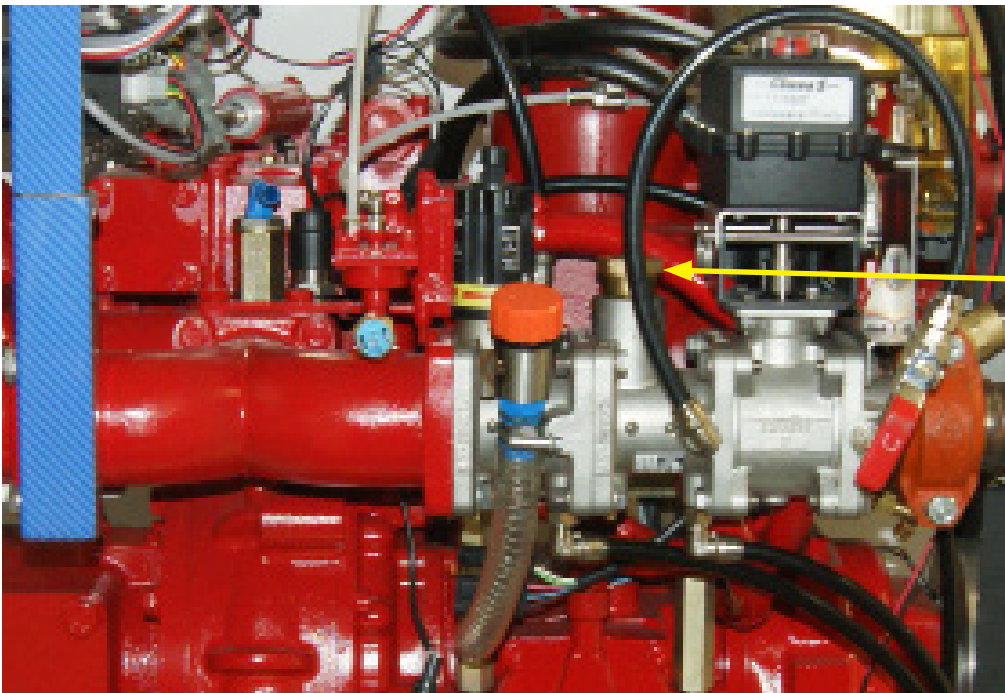


The oil drain points (pump bearing housing, gearbox and compressor) are located at the front of the mounting platform

Fill the gearbox until the oil flows from the oil level check point. This is the only accurate method of checking that the correct amount of oil has been added to the gearbox, as it allows for different sizes of gear ratios. Approximate capacity is 1.2 litres.

Foam Injection Point

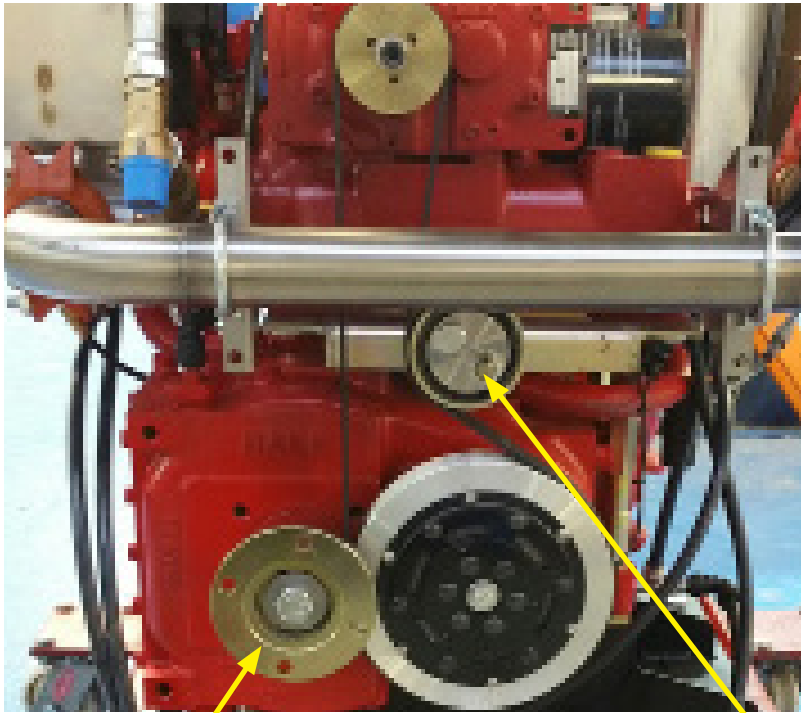
Prima SmartCAFS50 / 100. See separate section for Prima SmartCAFS200



Foam injection point - connect tubing suitable for 22.5 Bar pressure. Connection thread is ½ NPT

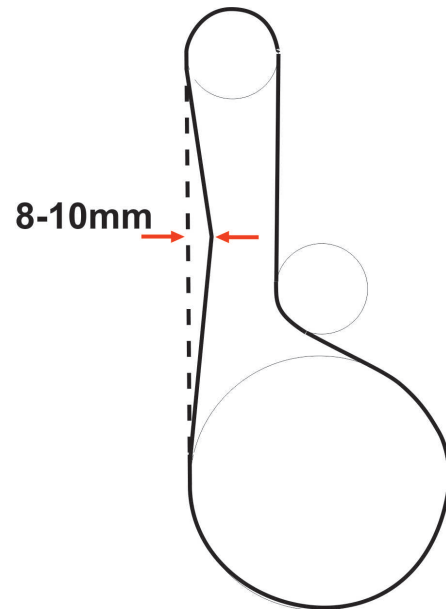
Compressor Drive Belt - Prima SmartCAFS50

The compressor is driven by a Polydrive ribbed belt, specification 12PJ 1200.
The installer must allow for access to adjust the jockey pulley belt tensioner. Tension the belt to achieve an 8-10mm deflection with a 10kg load applied at mid span, see diagram below.



PTO drive flange connection
Various specifications available.

Slacken bolt, rotate tensioner to achieve specified deflection and secure



Optical Belt Tension Meter

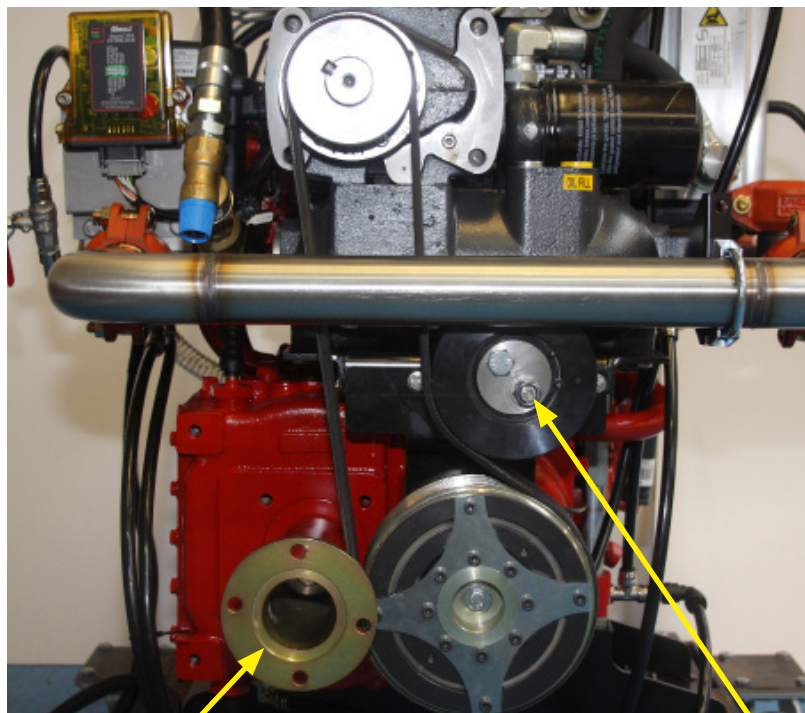
If an optical belt tension meter is available, e.g. the Clavis Optical Belt Tensioner, then the belt can be tightened correctly by measuring the vibration frequency. Follow these steps –

1. Tighten the belt so it is reasonably taut.
2. Operate the optical belt tensioner according to the manufacturer's instructions.
3. The device will register a frequency reading when the belt has been tapped. It is recommended several readings are taken to obtain a representative figure.
4. For the Prima SmartCAFS50 belt the frequency setting must be 79 Hz.
5. If the measured frequency is too low, tighten the belt via the tensioner.
6. If the measured frequency is too high, loosen the belt via the tensioner.
7. Take another reading to confirm the frequency is 79 Hz.

Compressor Drive Belt - Prima SmartCAFS100

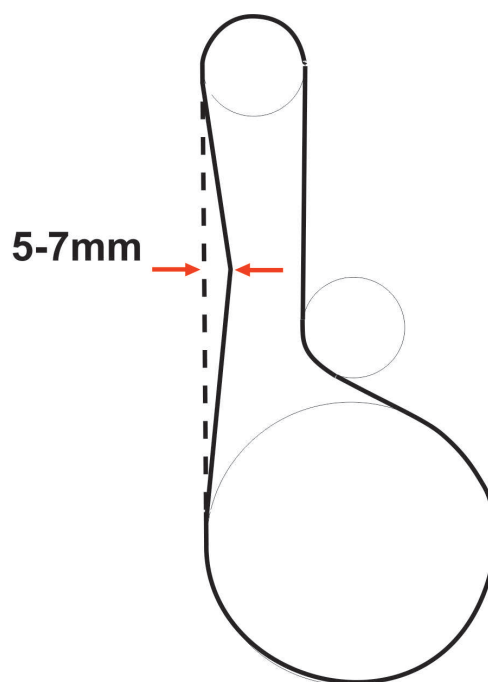
The compressor is driven by a Poly V drive belt, specification 9 PL 1270.

The installer must allow for access to adjust the jockey pulley belt tensioner. Tension the belt to achieve an 5-7mm deflection with a 10kg load applied at mid span, see diagram below.



PTO drive flange connection
Various specifications available.

Slacken bolt, rotate tensioner to achieve specified deflection and secure



Optical Belt Tension Meter

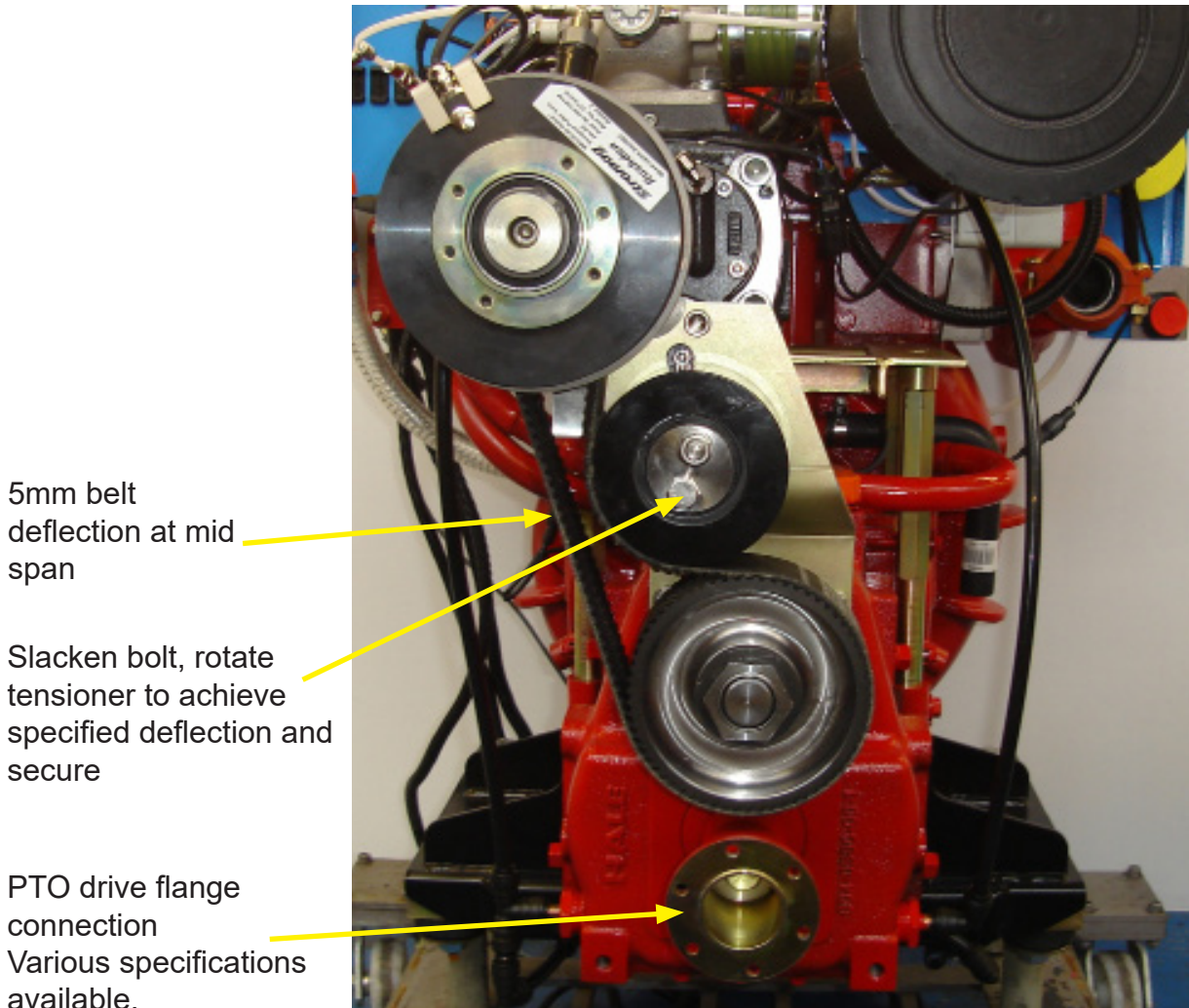
If an optical belt tension meter is available, e.g. the Clavis Optical Belt Tensioner, then the belt can be tightened correctly by measuring the vibration frequency. Follow these steps –

1. Tighten the belt so it is reasonably taut.
2. Operate the optical belt tensioner according to the manufacturer's instructions.
3. The device will register a frequency reading when the belt has been tapped. It is recommended several readings are taken to obtain a representative figure.
4. For the Prima SmartCAFS100 belt the frequency setting must be 65 Hz.
5. If the measured frequency is too low, tighten the belt via the tensioner.
6. If the measured frequency is too high, loosen the belt via the tensioner.
7. Take another reading to confirm the frequency is 65 Hz.

Compressor Drive Belt - Prima SmartCAFS200

The compressor is driven by a Goodyear Eagle PD synchronous drive belt..

The installer must allow for access to adjust the belt tensioner. Tension the belt to achieve a 5mm deflection with a load of 145N (new belt) or 108N (used belt) applied at mid span, see photograph below.



Optical Belt Tension Meter

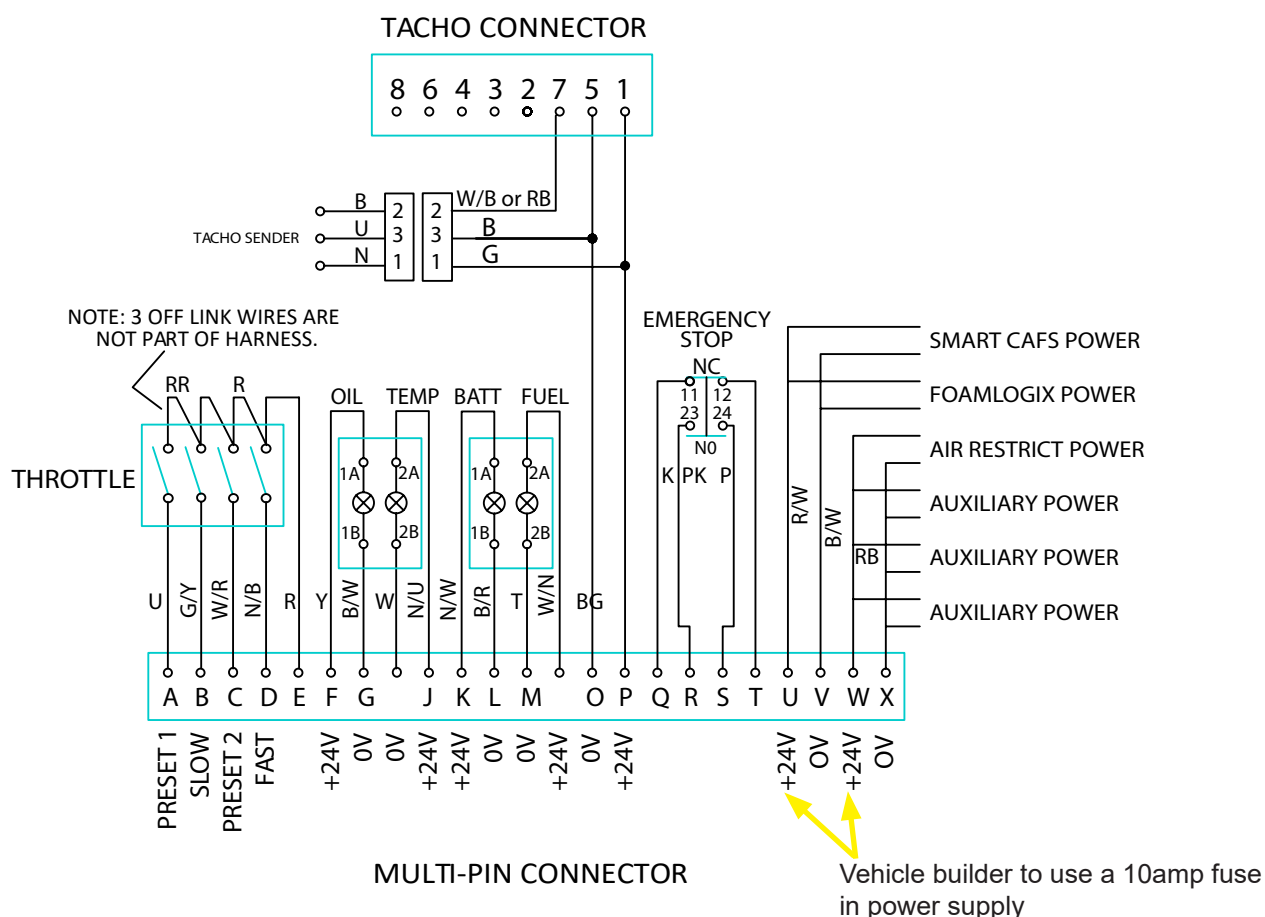
If an optical belt tension meter is available, e.g. the Clavis Optical Belt Tensioner, then the belt can be tightened correctly by measuring the vibration frequency. Follow these steps –

1. Tighten the belt so it is reasonably taut.
2. Operate the optical belt tensioner according to the manufacturer's instructions.
3. The device will register a frequency reading when the belt has been tapped. It is recommended several readings are taken to obtain a representative figure.
4. For the Prima SmartCAFS200 belt the frequency setting must be 128 Hz.
5. If the measured frequency is too low, tighten the belt via the tensioner.
6. If the measured frequency is too high, loosen the belt via the tensioner.
7. Take another reading to confirm the frequency is the recommended Hz.

Electrical Connections - Prima SmartCAFS50 / 100 / 200

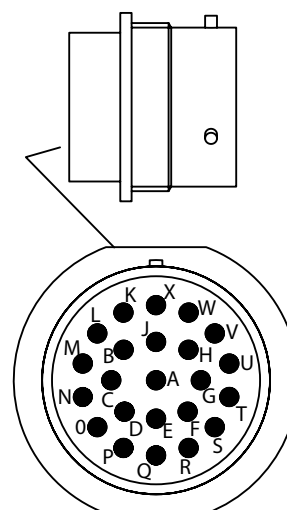
Connect the engine control and warning light module to the vehicle electrical system with the multi-pin plug (supplied with the unit, part number 60764). The connections used will vary according to the pump specification.

Power to the system should be such that the minimum required system voltage is maintained continuously throughout operation. System voltage dips of any duration may cause the clutch interlocking circuitry to inadvertently disengage the system compressor. Having a direct as possible wiring path to the battery supply may help to mitigate this type of situation.



COLOUR KEY (MAIN/TRACER)

B = BLACK	B/R = BLACK/RED
N = BROWN	B/W = BLACK/WHITE
U = BLUE	R/W = RED/WHITE
W = WHITE	R/U = RED/BLUE
Y = YELLOW	U/B = BLUE/BLACK
T = ORANGE	U/G = BLUE/GREEN
G = GREEN	U/W = BLUE/WHITE
P = PURPLE	U/Y = BLUE/YELLOW
S = LIGHT GREY	B/U = BLACK/BLUE
R = RED	W/N = WHITE/BROWN
K = PINK	W/R = WHITE/RED
	W/B = WHITE/BLACK
	N/S = BROWN/LIGHT GREY
	N/W = BROWN/WHITE
	N/U = BROWN/BLUE
	N/B = BROWN/BLACK
	G/Y = GREEN/YELLOW

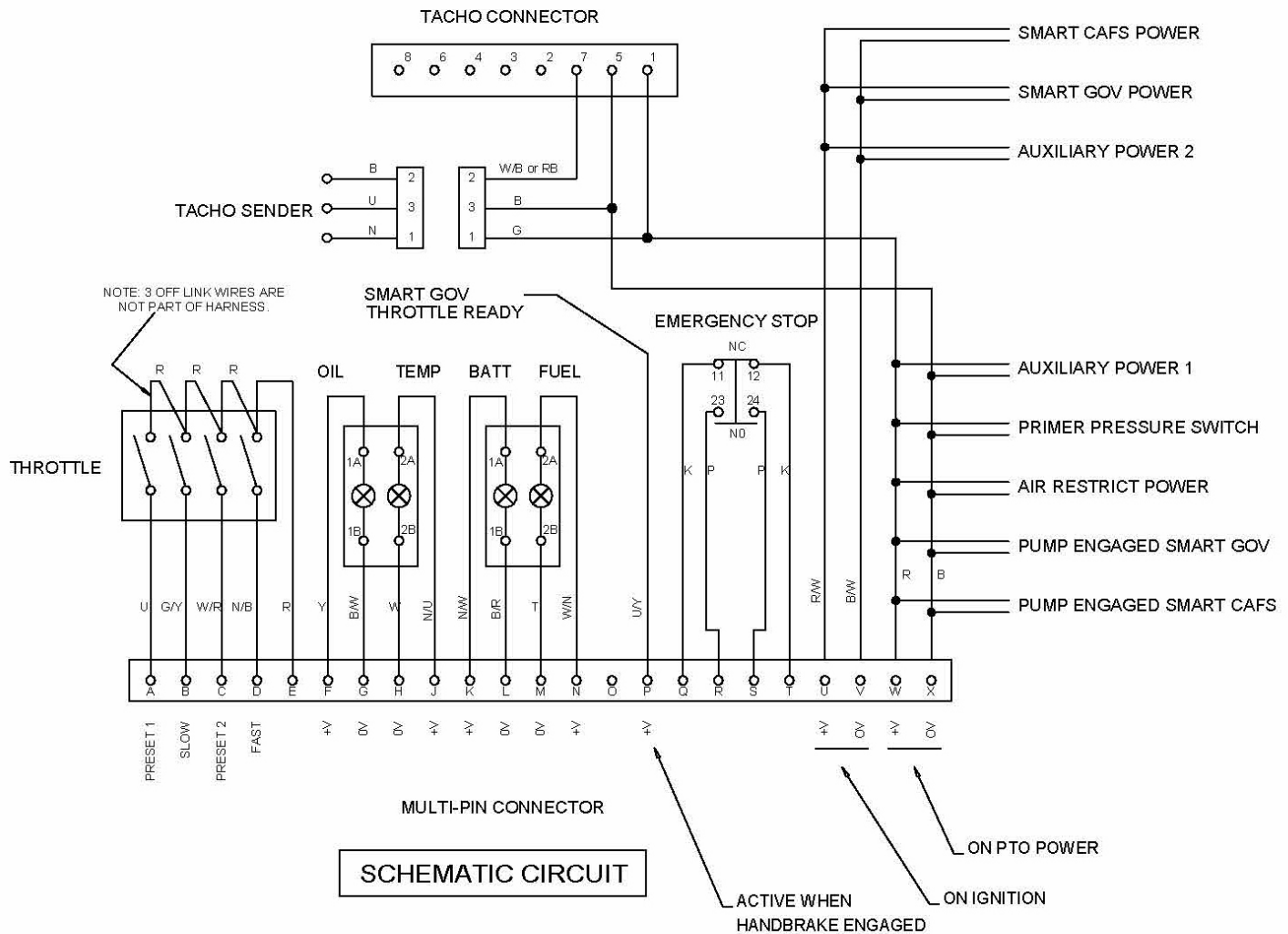


VIEW ON REAR OF MULTI-PIN CONNECTOR (60763/01) I.E. WIRE ENTRY. (SEE W/DIAGRAM FOR CONNECTIONS & WIRE COLOURS)

MULTI PIN CONNECTOR

New Harness - Prima SmartCAFS50 / 100 / 200 - from September 2018

The harness introduced in September 2018 is not interchangeable with the previous harness.

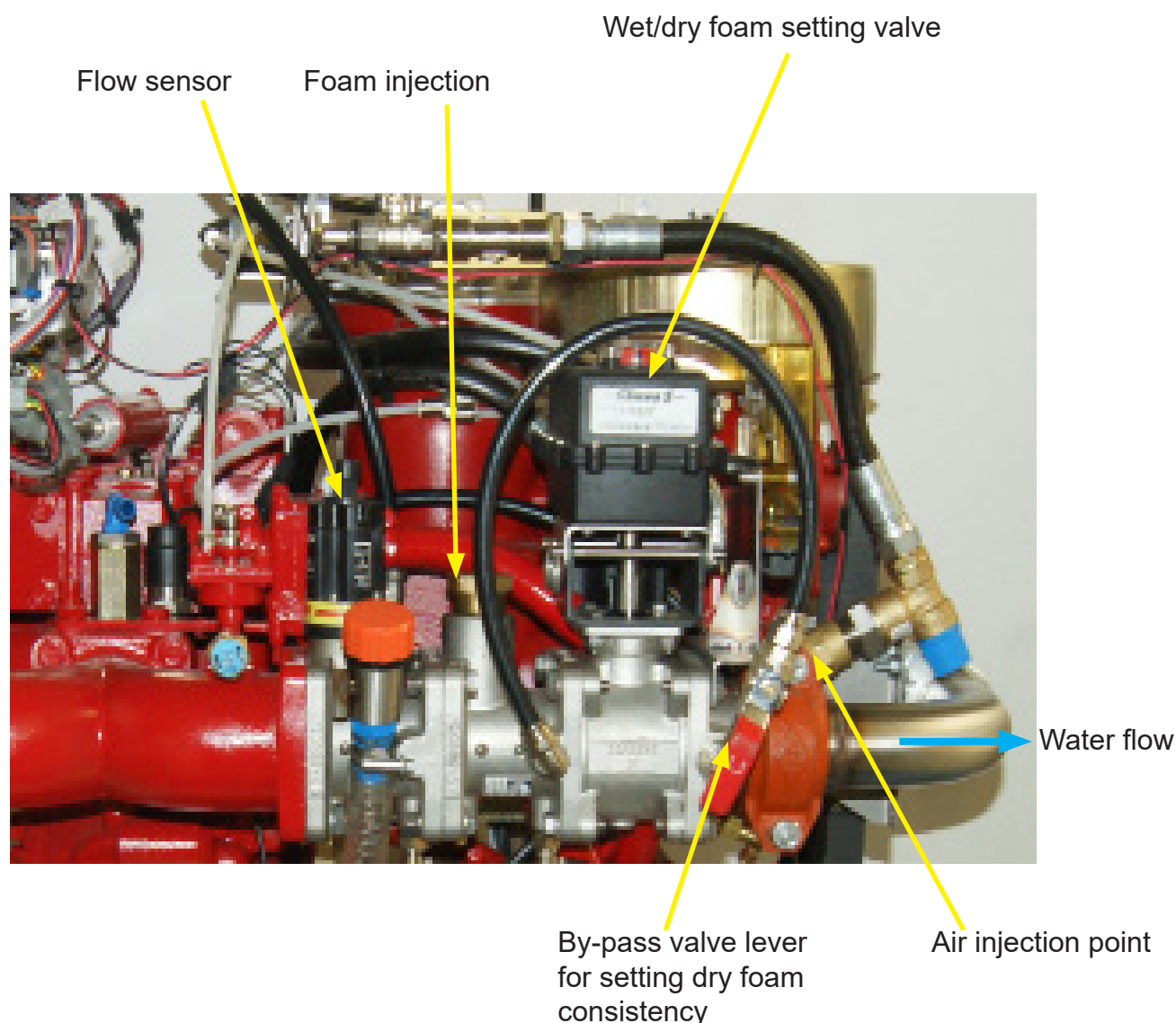


The new harness has these differences to the previous harness –

1. The pins marked U and W are powered separately. U powered with ignition on and W powered with PTO engage.
2. Pin P requires a positive power supply when the handbrake is engaged. This only applies when the system is fitted with a SmartGOV controller as well as SmartCAFS.

Prima SmartCAFS 50/100 - Mixing Manifold

Installation information relevant to these models only



By-Pass Valve

This valve is adjusted to give the required dry foam flow-rate - typically 70 litres/minute @ 7 Bar.

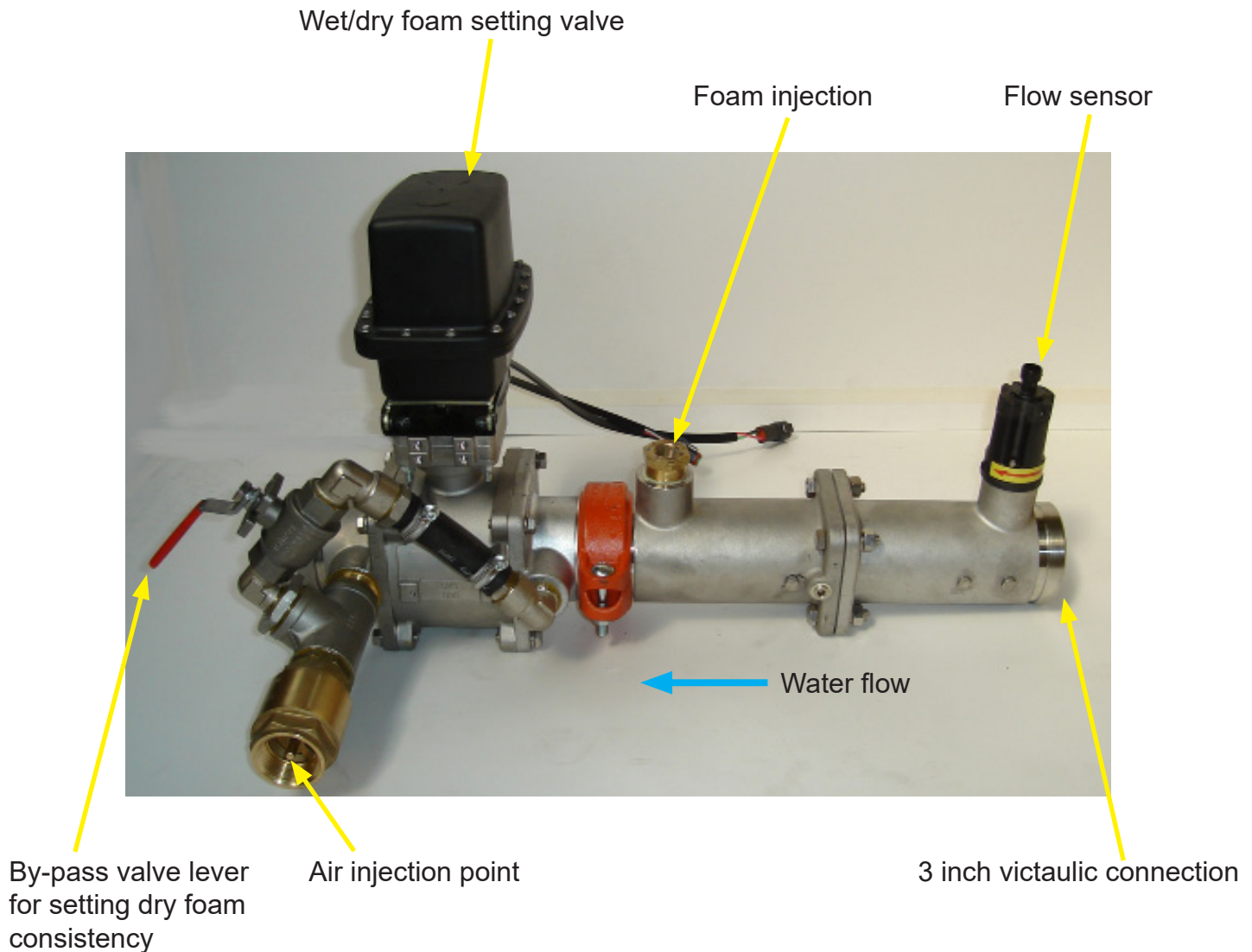
To set the required dry foam constituency –

1. Install the system as directed
2. Run the system at normal operating pressure, discharge compressed air foam through the most restrictive line, typically a Hose-reel.
3. Set the SmartCAFS ARC control to the full dry position.
4. Open or close the By-pass valve (as shown in photograph above) until the required dry foam flow rate is achieved.
5. Remove the By-pass valve lever so this setting cannot be changed in operation.

Prima SmartCAFS 200 - Mixing Manifold

Installation information relevant to this model only

SmartCAFS mixing manifold
Manifold should be mounted with provision for drainage. Foam and air injection points identified as below



By-Pass Valve

This valve is adjusted to give the required dry foam flow-rate - typically 100 litres/minute @ 7 Bar. To set the required dry foam constituency –

1. Install the system as directed
2. Run the system at normal operating pressure, discharge compressed air foam through the most restrictive line, typically a Hose-reel.
3. Set the SmartCAFS ARC control to the full dry position.
4. Open or close the By-pass valve (as shown in photograph above) until the required dry foam flow rate is achieved.
5. Remove the By-pass valve lever so this setting cannot be changed in operation.

Prima SmartCAFS 200

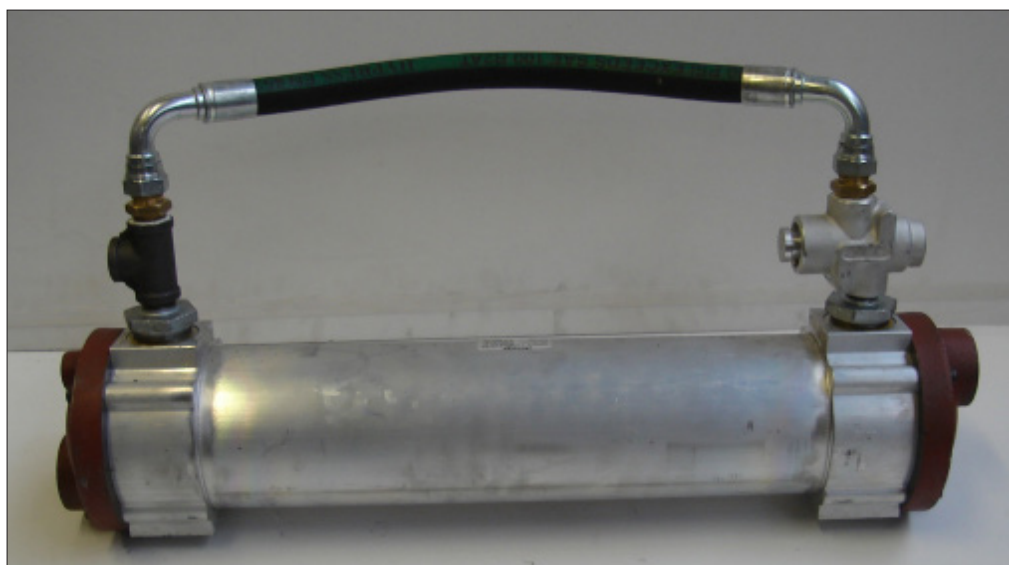
Additional installation information relevant to this model only



Separator tank for compressor oil



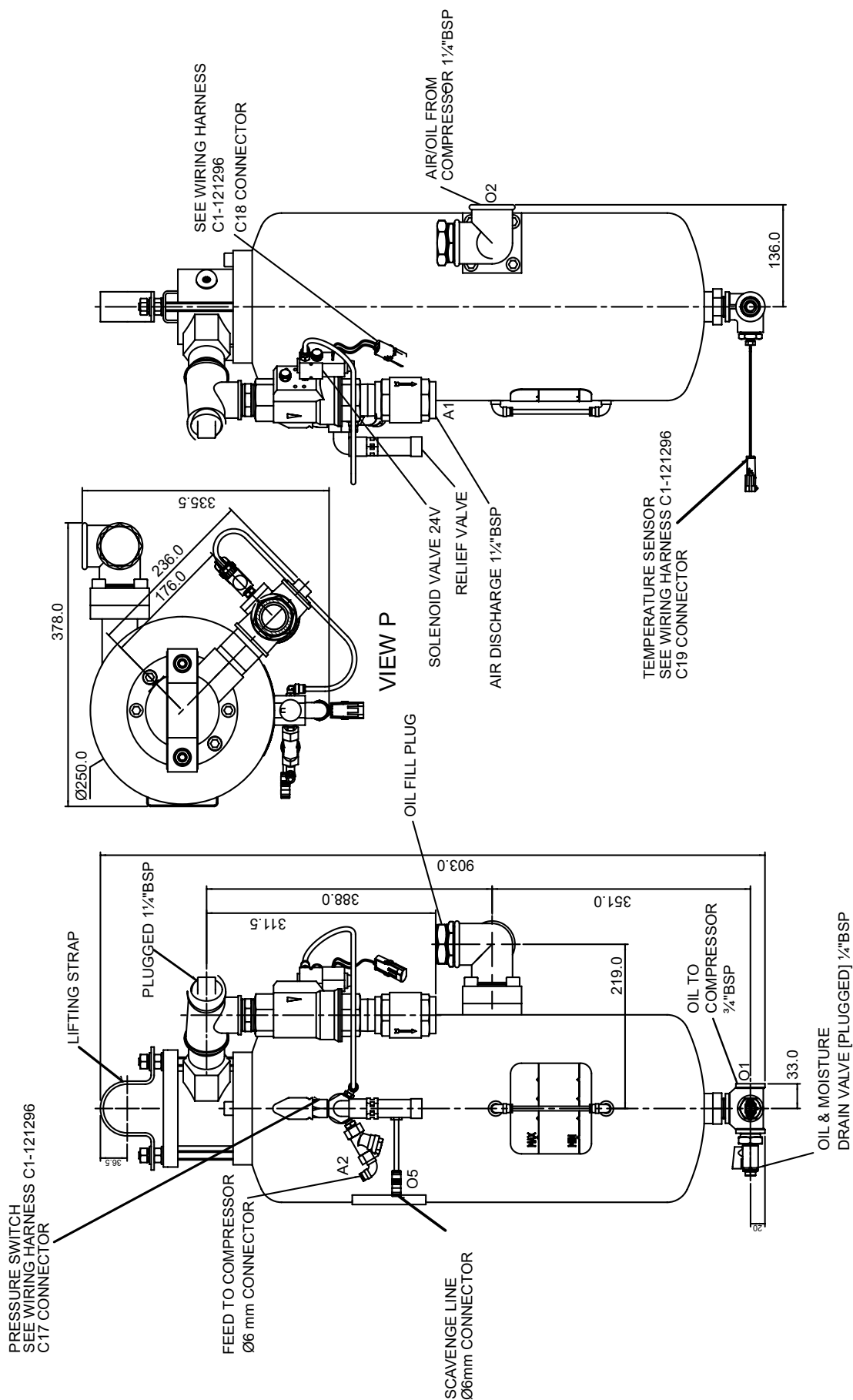
Separator tank - oil level indicator



Compressor oil cooling unit

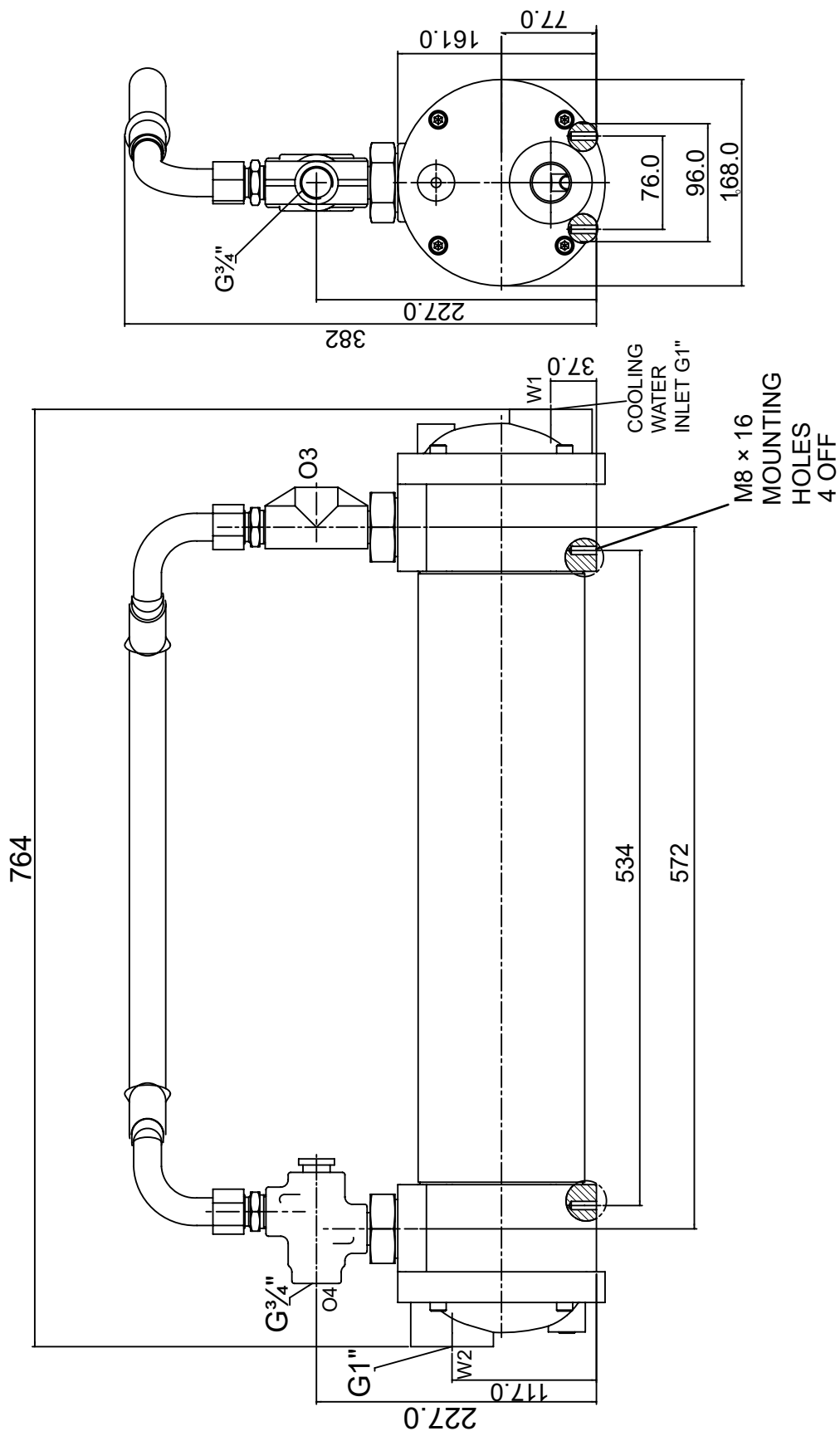
Prima SmartCAFS 200 - Installation Drawings

Oil / Water Separator Tank (Vertical Type)

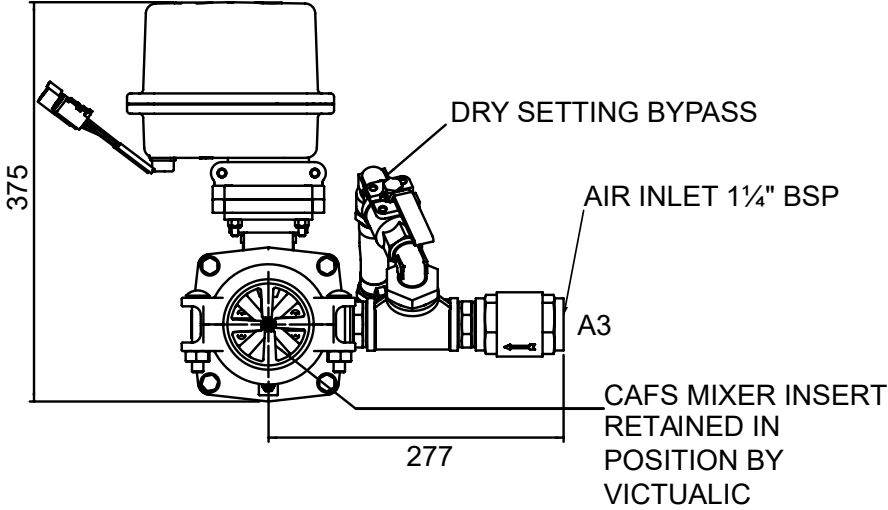
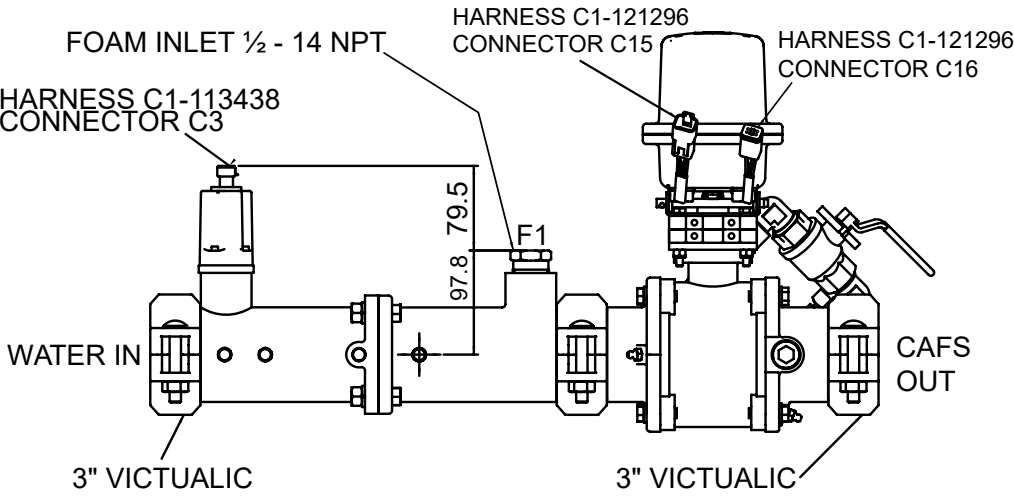
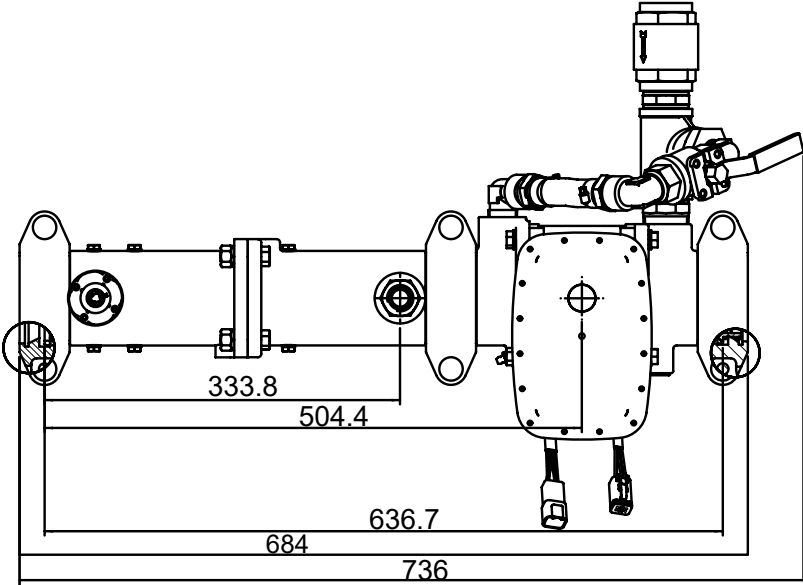


Prima SmartCAFS 200 - Installation Drawings

Cooling unit

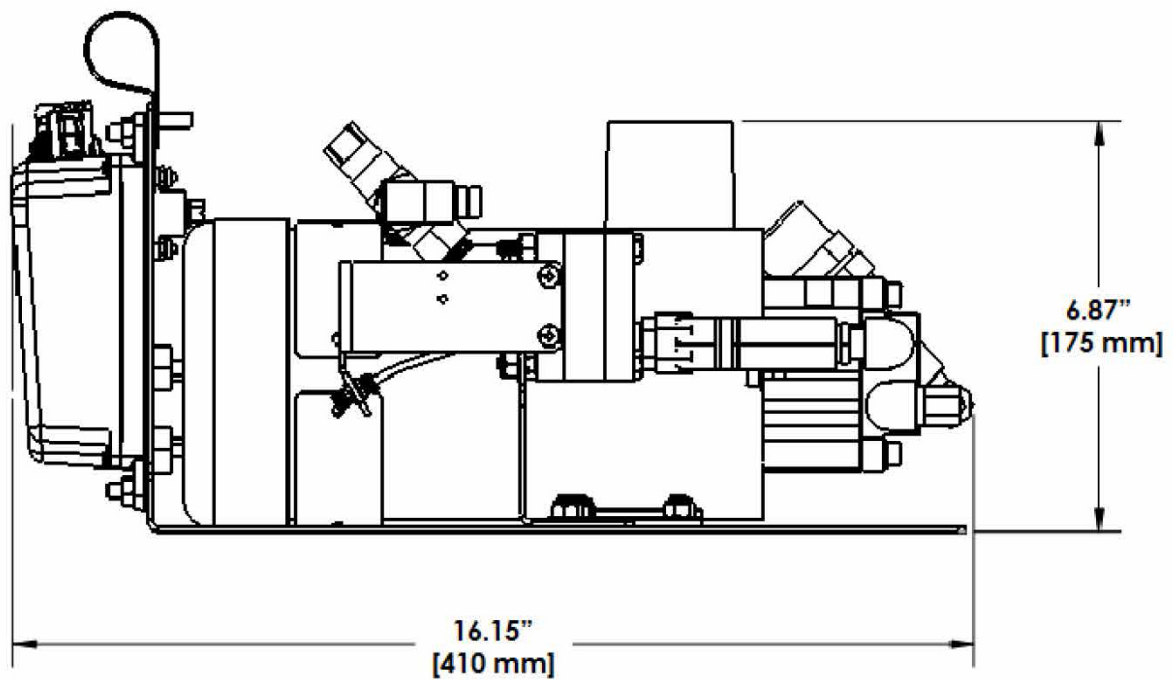
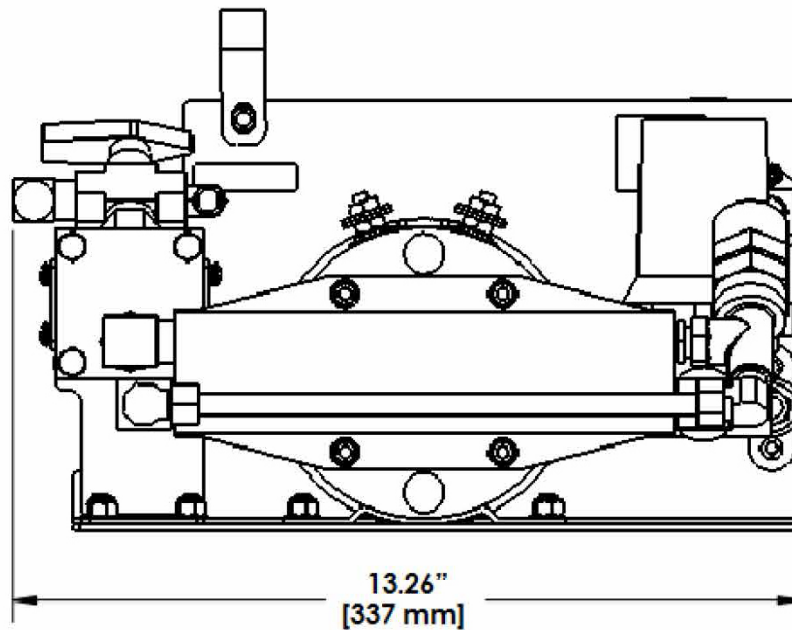


Prima SmartCAFS 200 - Installation Drawings
Mixing Manifold

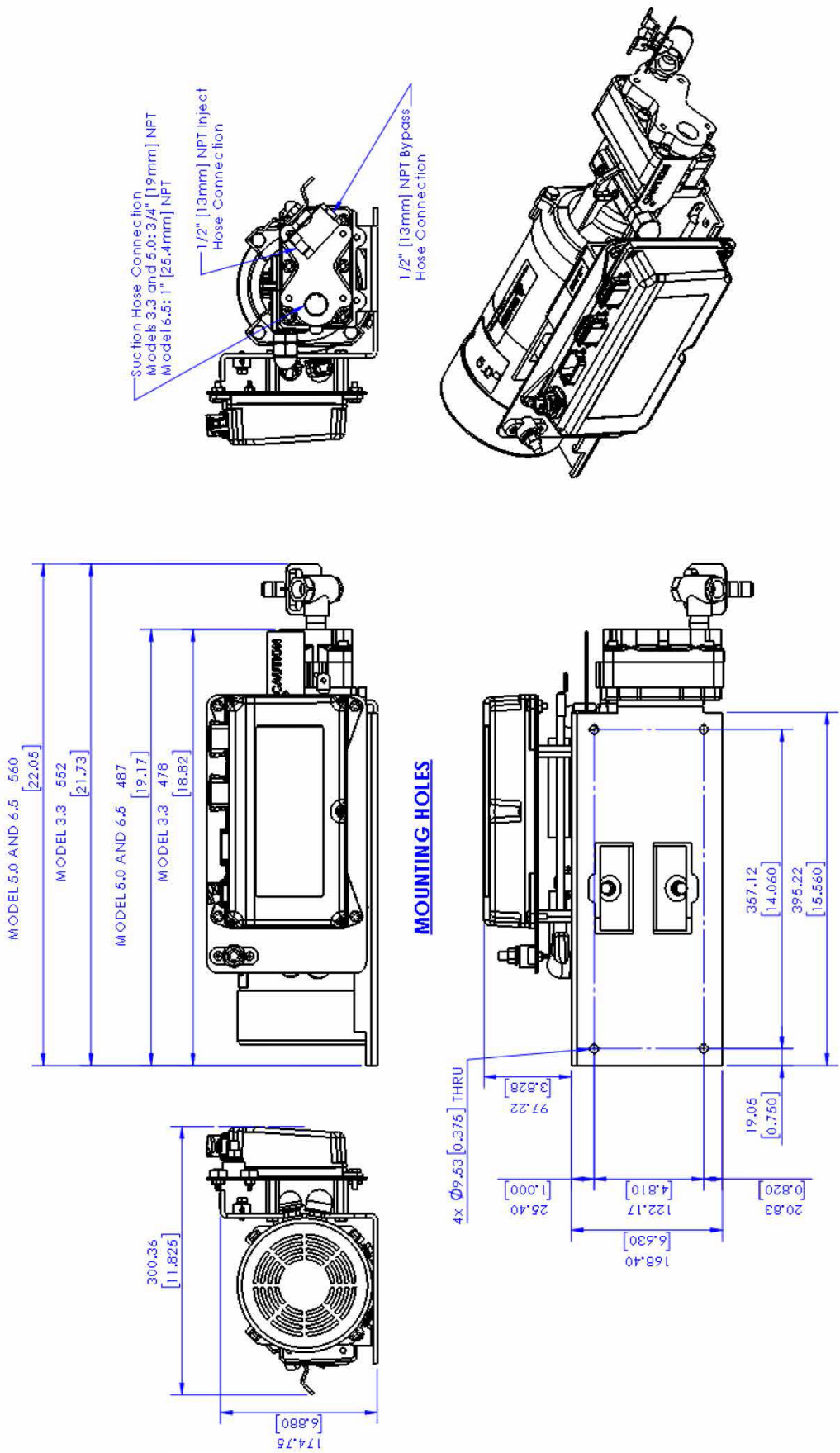


Prima SmartCAFS 200 - Installation Drawings

FoamLogix 2.1

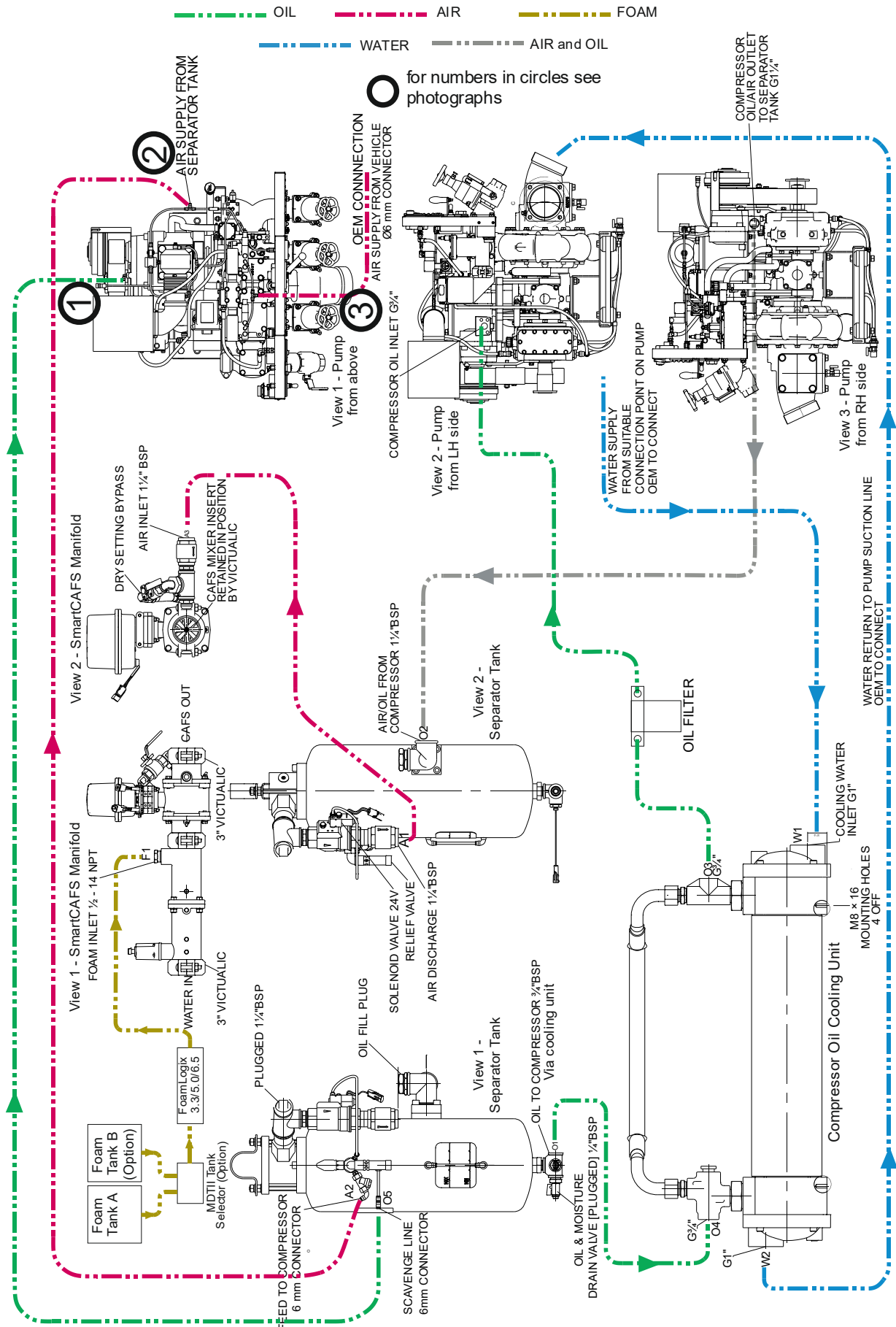


Prima SmartCAFS 200 - Installation Drawings
FoamLogix 3.3, 5.0, 6.5



Prima SmartCAFS 200 - Plumbing Connections - Part 1

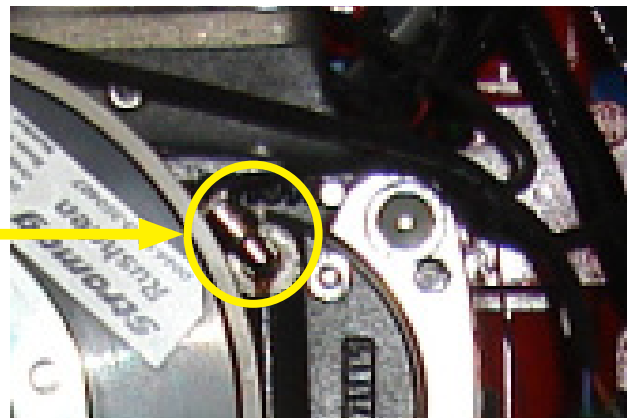
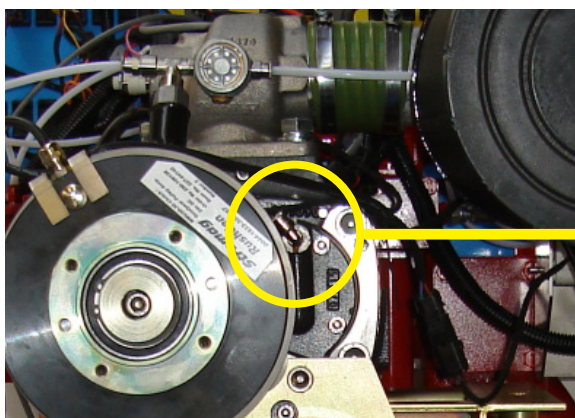
Additional installation information relevant to this model only



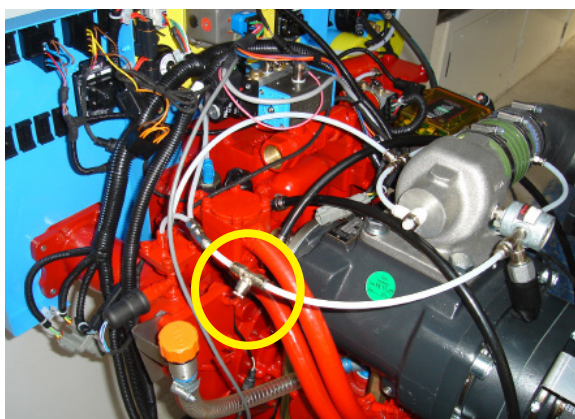
Prima SmartCAFS 200 - Plumbing Connections - Part 2

Additional installation information relevant to this model only

1. Oil scavenge line from separator tank to 6mm connection on rear of compressor



2. Air supply from separator tank to compressor, 6mm tubing/connector.

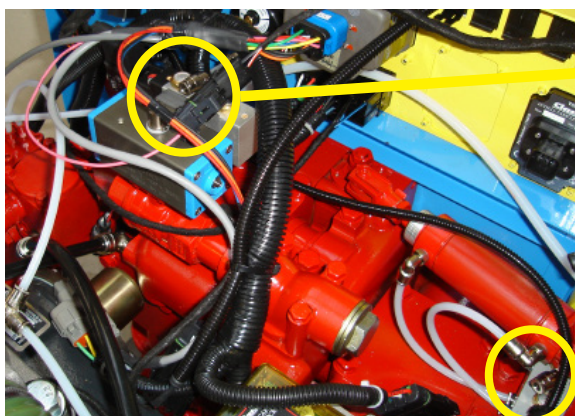


3. Air pressure for pump functions, connect from vehicle supply with 6mm tubing -

3.1 - High Pressure discharge, pneumatic operation of valve - if option fitted.

Note this model features one HP discharge valve. Two discharge valves will be supplied from a T piece.

3.2 - High/Low pressure selector valve (pneumatic operation) – if option fitted.

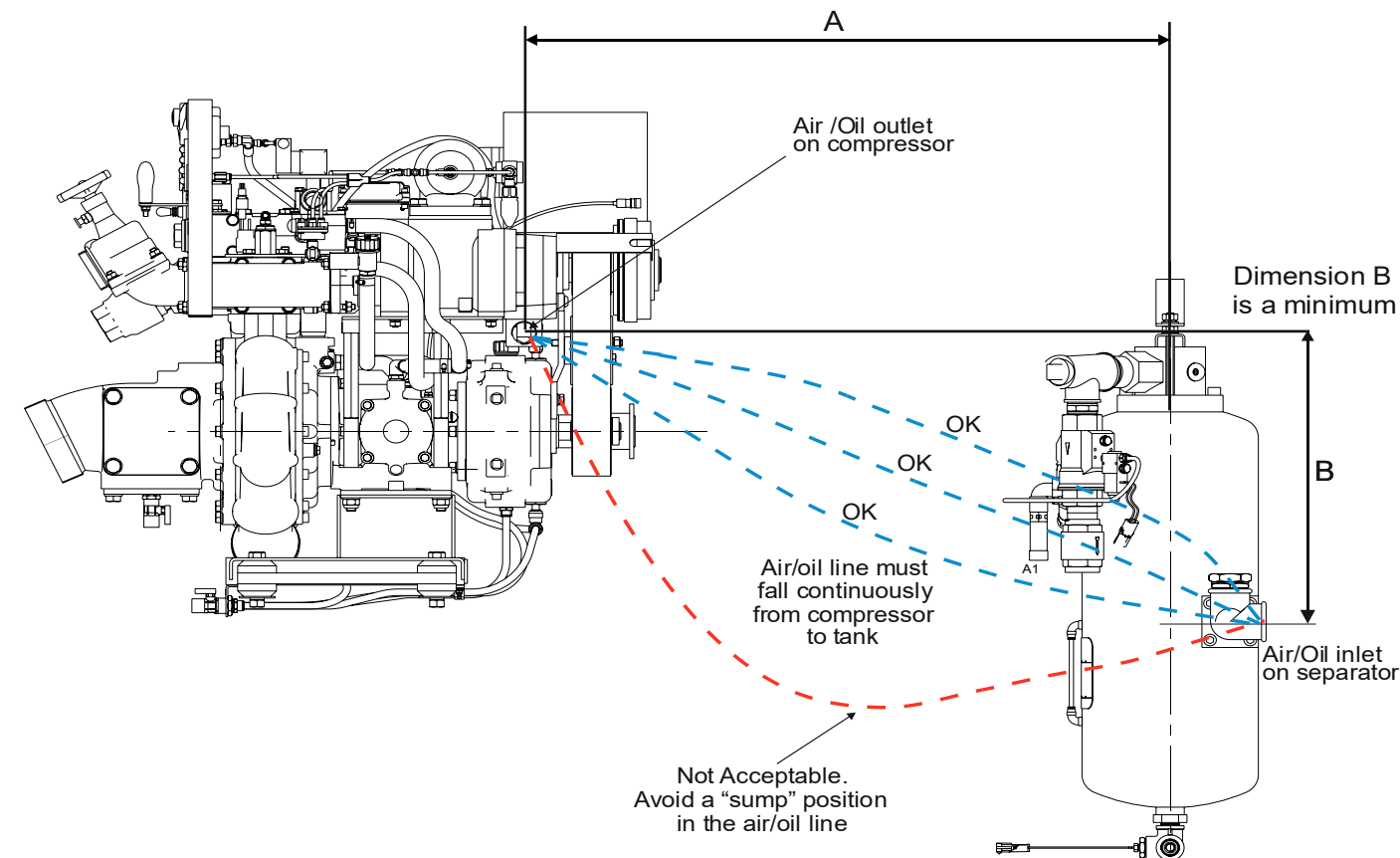


3.1

3.2

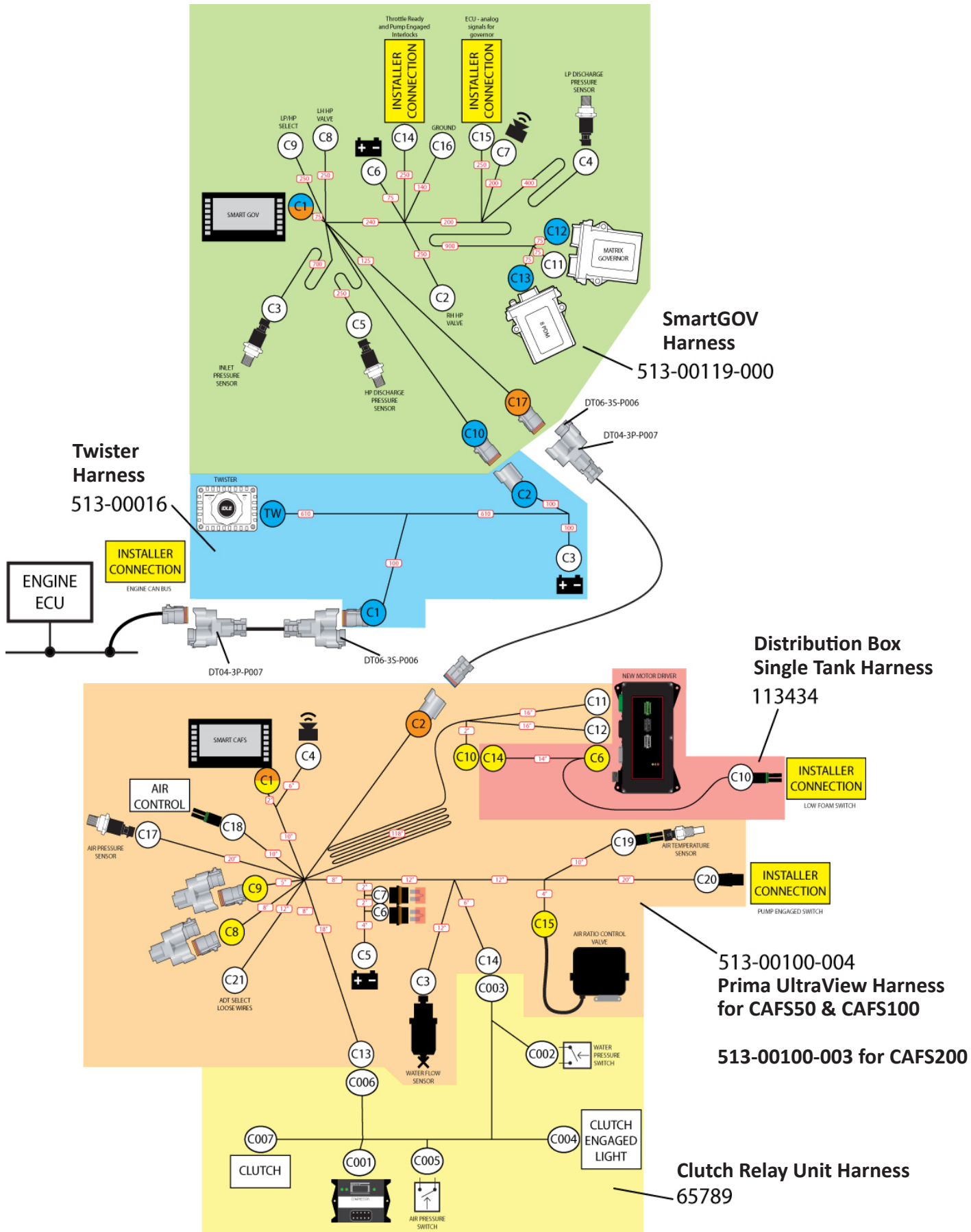


Prima SmartCAFS 200 - Compressor and separator tank - relative positions in installation
Additional installation information relevant to this model only

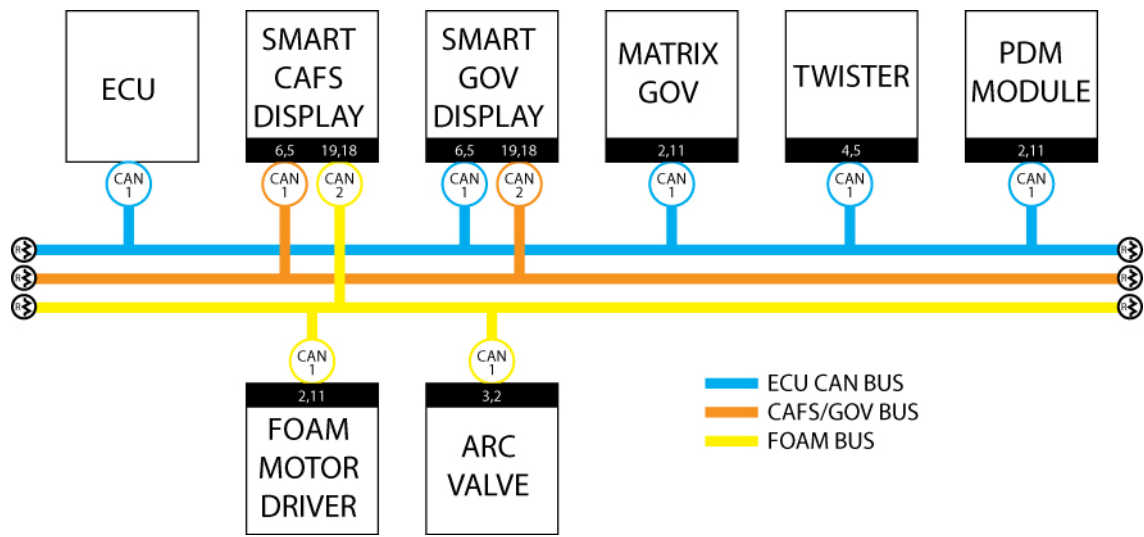


A	B		A	B
300	50		950	212.5
350	62.5		1000	225
400	75		1050	237.5
450	87.5		1100	250
500	100		1150	262.5
550	112.5		1200	275
600	125		1250	287.5
650	137.5		1300	300
700	150		1350	312.5
750	162.5		1400	325
800	175		1450	337.5
850	187.5		1500	350
900	200		1100	250

Prima UV SmartCAFS - Overview of Relationship Between Harnesses

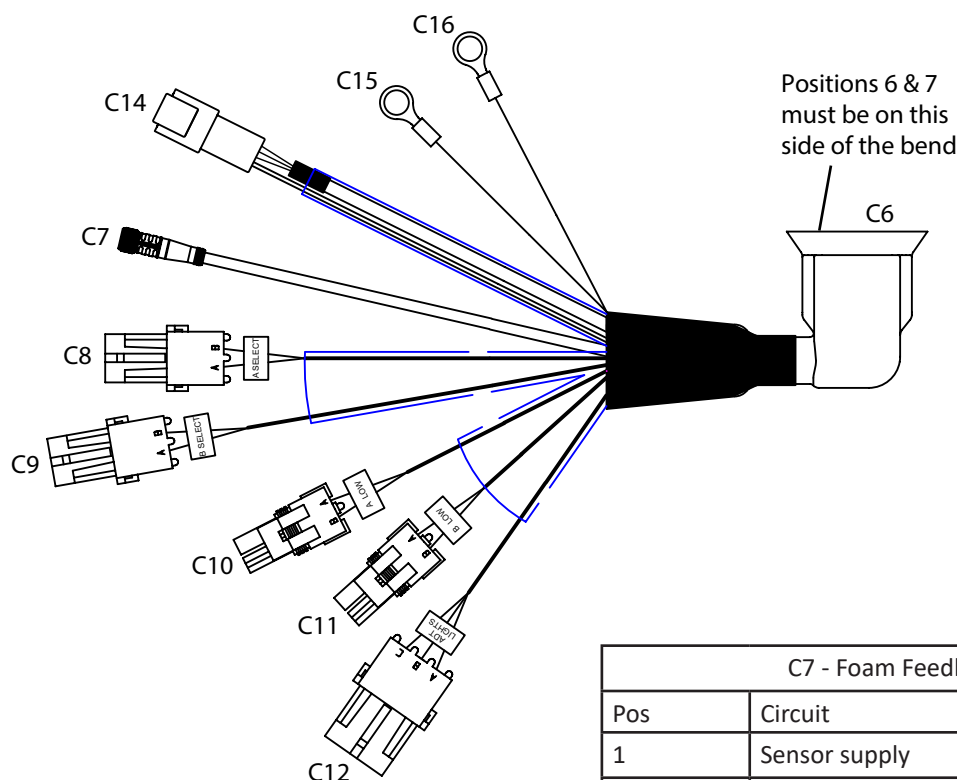


Prima UV SmartCAFS, SmartGOV, Twister Block Diagram.



Prima SmartCAFS 200 - Foam Pump Harness Diagram

Additional installation information relevant to this model only



C6			
Pos	Circuit	Colour	GA
1	Power	Pink	18
2	Can high	Yellow	18
3	Can Shld	Black	18
4	Tank A Select	Blue	18
5	Tank B Select	White	18
6	Tank A Low	Violet	18
7	Tank B Low	Gray	18
8	Sensor supply	Brown	18
9	Ind sensor signal	Black	18
10	Sensor GND	Blue	18
11	Can Low	Green	18
12	Ground 2	Black	16

Note: ground is pre-installed

C14			
Pos	Circuit	Colour	GA
1	Power	Pink	18
2	Can high	Yellow	18
3	Can Shld	Black	18
4	Ground 1	Black	16
5	Can Low	Green	18
6	Plug 114017	-	-

C7 - Foam Feedback Sensor			
Pos	Circuit	Colour	GA
1	Sensor supply	Brown	18
2	Ind sensor signal	Black	-
3	Sensor GND	Blue	-

C8 - A Tank Select - MDT or ADT			
Pos	Circuit	Colour	GA
1	Power	Pink	18
2	Tank A Select	Blue	18

C9 - B Tank Select - MDT or ADT			
Pos	Circuit	Colour	GA
1	Power	Pink	18
2	Tank B Select	White	18

C10 - A Tank low level switch			
Pos	Circuit	Colour	GA
1	Power	Pink	18
2	Tank A Low	Violet	18

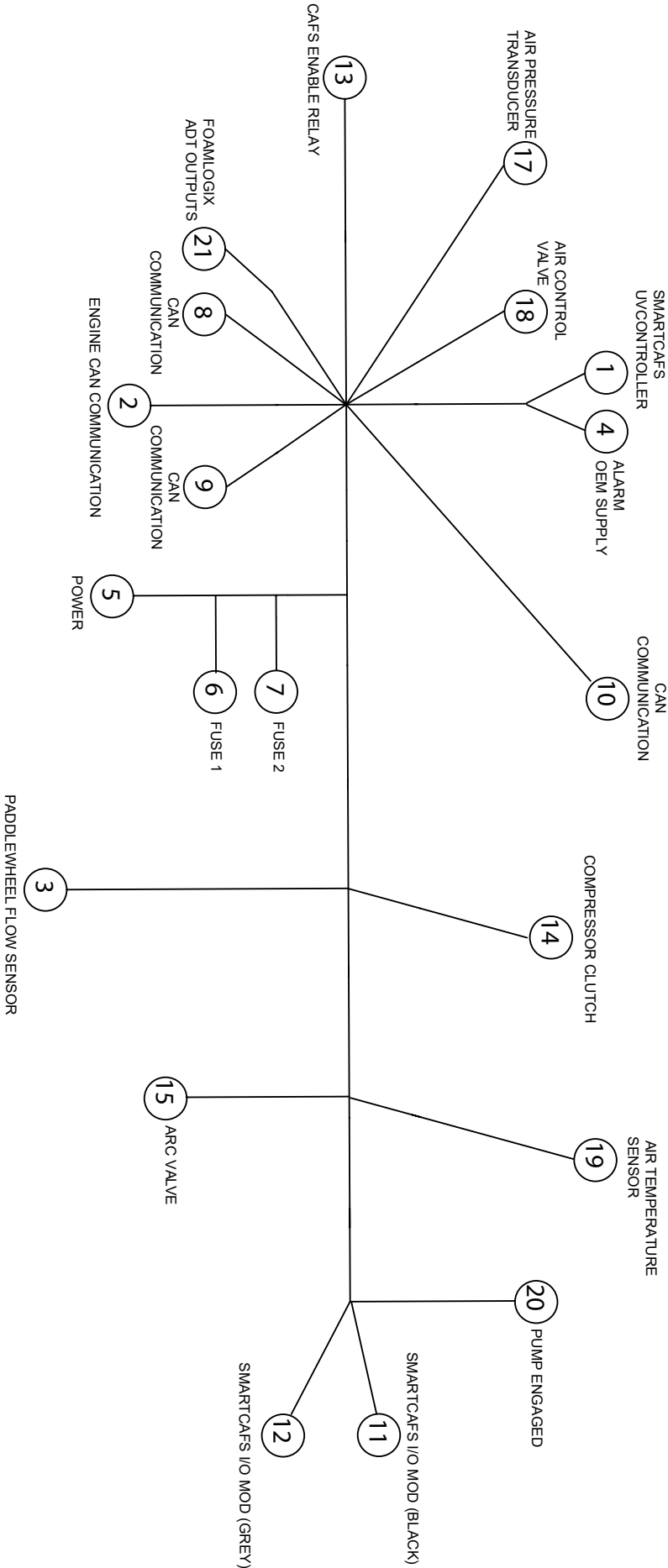
C11 - B Tank low level switch			
Pos	Circuit	Colour	GA
1	Power	Pink	18
2	Tank B Low	Gray	18

C12 - ADT Switch			
Pos	Circuit	Colour	GA
A	Tank A select light	Blue	18
B	Ground 2	Black	16
C	Tank B select light	White	18

Prima SmartCAFS 50/100 - Wiring Harness - with old motor controller

Harness for Prima UV SmartCAFS 50/100 with old motor Driver

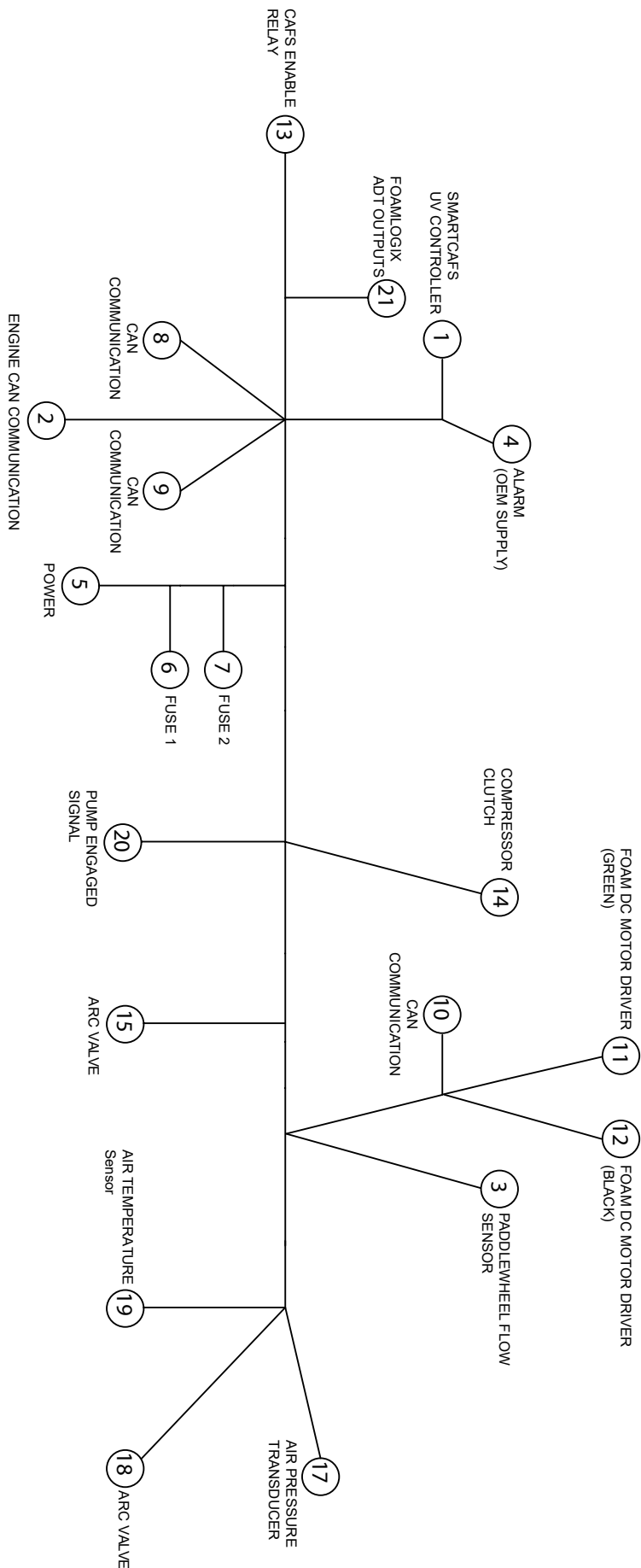
The numbers refer to the connectors on the harness
Drawing - 513-00100-00 Rev C



Prima SmartCAFS 200 - Wiring Harness - with old motor controller

Harness for Prima UV SmartCAFS 200 with old motor Driver

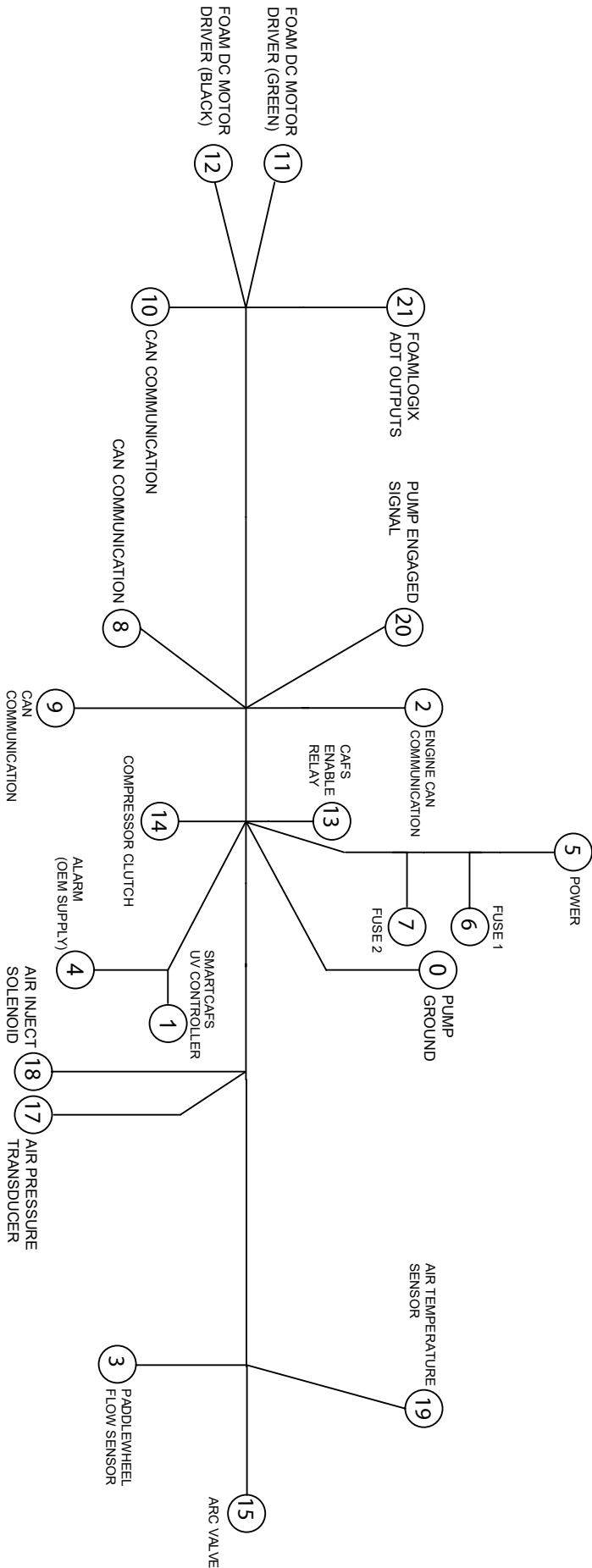
The numbers refer to the connectors on the harness
Drawing -513-00100-000 Rev B



Prima SmartCAFS 50/100 - Wiring Harness - with new motor controller

Harness for Prima UV SmartCAFS 50/100 with new motor Driver

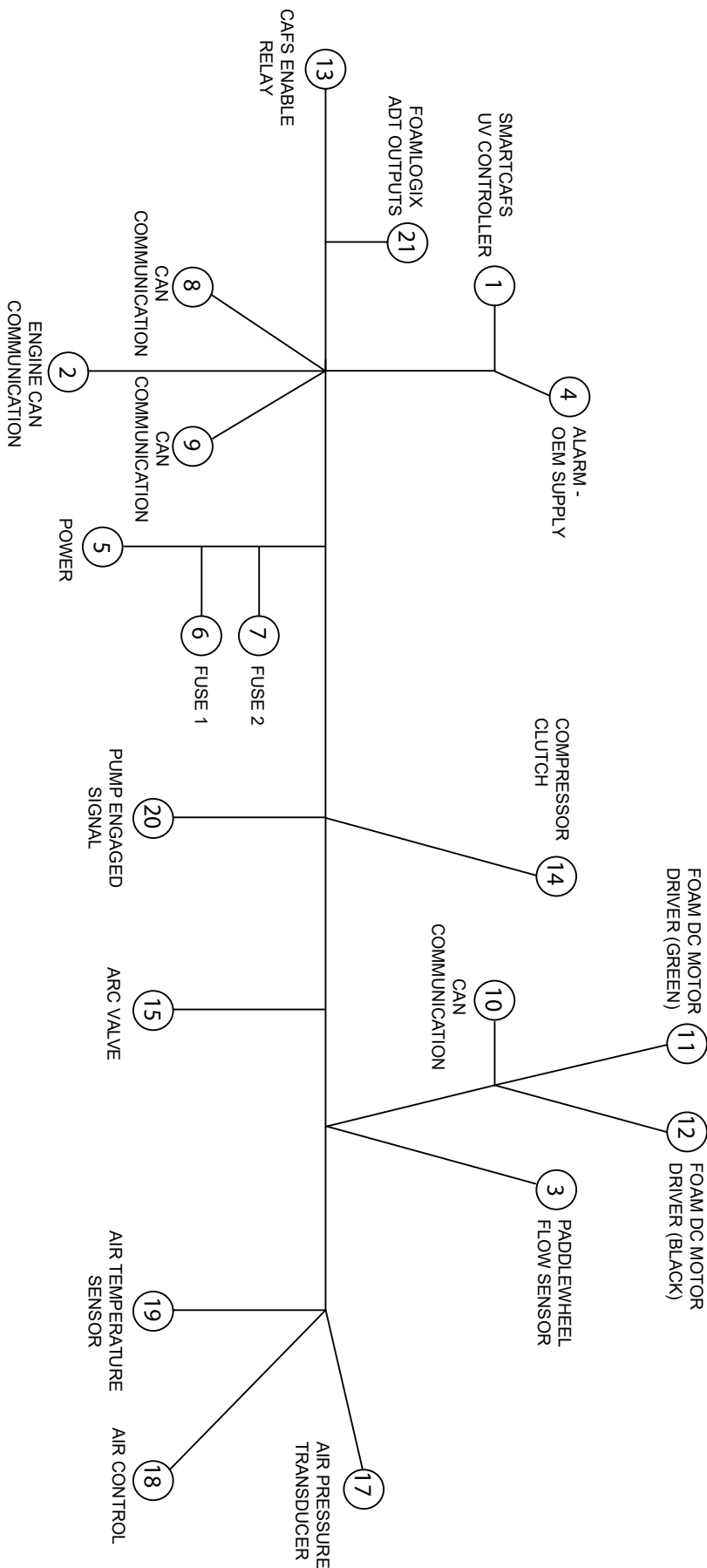
The numbers refer to the connectors on the harness
Drawing -513-00100-004 Rev B



Prima SmartCAFS 200 - Wiring Harness - with new motor controller

Harness for Prima UV SmartCAFS 200 with new motor Driver

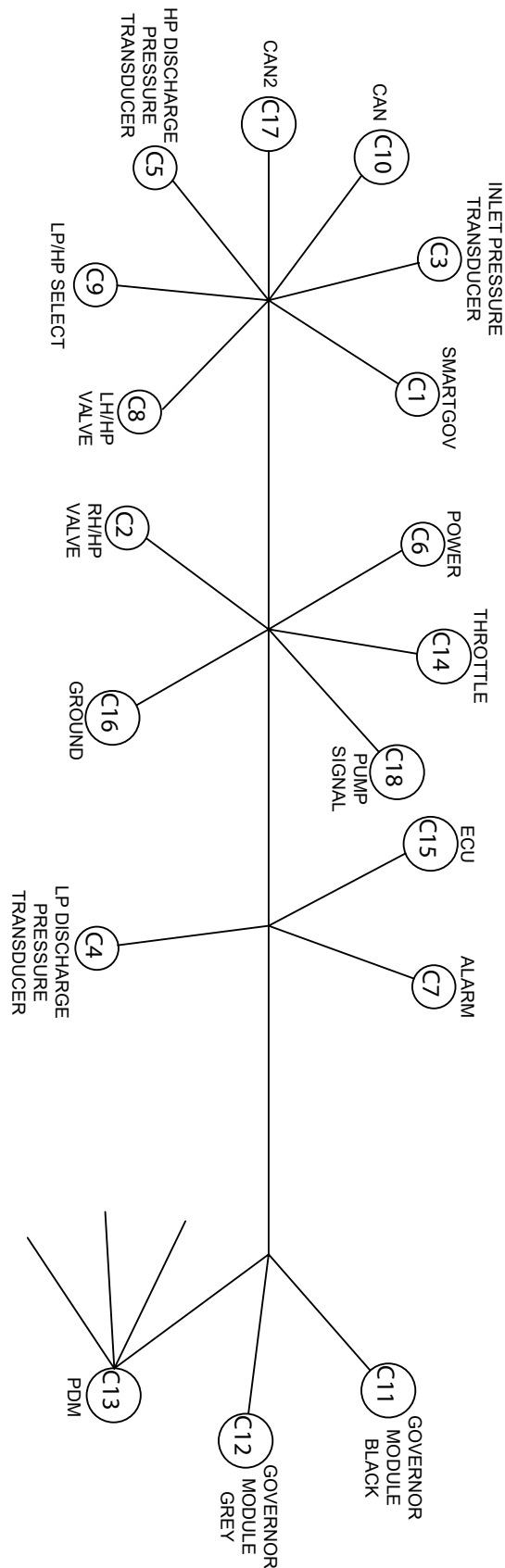
The numbers refer to the connectors on the harness
Drawing -513-00100-003 Rev A



Prima SmartCAFS 50, 100, 200 - SmartGOV Wiring Harness

Harness for Prima UV SmartGOV

The numbers refer to the connectors on the harness
Drawing -513-00119-000



Foam Tank Low Level Sensor

The unit is supplied with a connector for a low foam level sensor. The sensor is supplied with the unit ready for installation (instructions supplied with the sensor).

The low foam level sensor is part of the Safety Interlock system and must be installed.

Note: there are two possible types of sensor in use. In both types the arrow or ridge must point up for correct installation.

Type 1 - Blue Sensor

In this type the float will fall down to the sensor body to register low foam level.

Note: The low foam level sensor must be installed in the tank in the correct orientation. The sensor has a raised ridge on the outer casing, which must be installed pointing upwards, see yellow circle. The foam tank requires a 23mm hole for secure fitting of the switch device and the maximum allowable thickness of the tank wall material is 4mm.

The centre of the level switch should be located a minimum of 40mm above the foam concentrate outflow to the foam pump.

Type 2 - Black Sensor

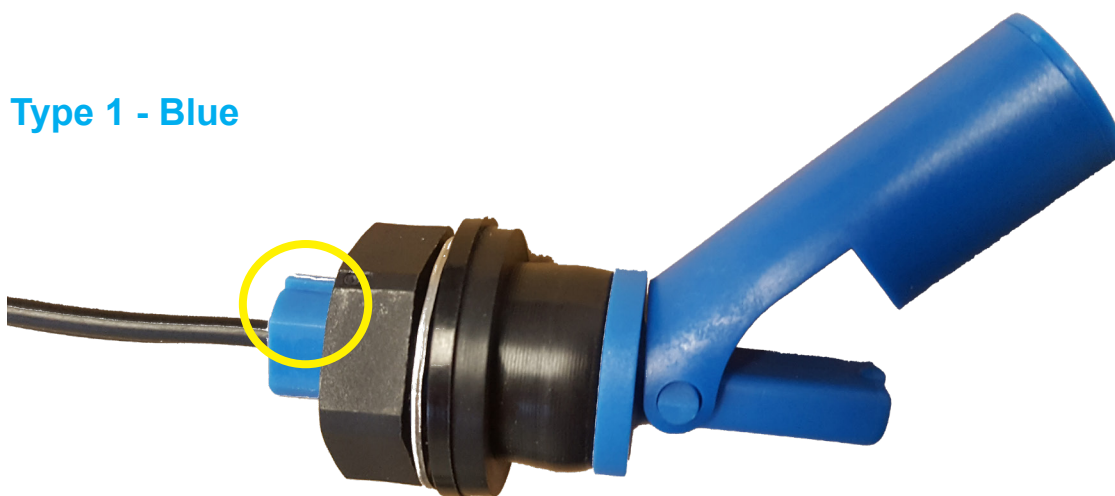
In this type the float will fall away from the sensor body to register low foam level.

Note: The low foam level sensor must be installed in the tank in the correct orientation. The sensor has an arrow on the casing, which must be installed pointing upwards, see yellow circle.

The foam tank requires a 23mm hole for secure fitting of the switch device and the maximum allowable thickness of the tank wall material is 4mm.

The centre of the level switch should be located a minimum of 40mm above the foam concentrate outflow to the foam pump.

Type 1 - Blue



Type 2 - Black



Additional Installation Points

Foam Tank to Foam Pump

The foam feed line must not at any point be lower than the foam pump and be fitted with an isolating tap for maintenance purposes. The isolating tap should be located as close to the tank as possible. A flushing point should be fitted close to the isolating tap to ensure that the maximum length of hose line can be flushed out. The flushing line should also be fitted with an isolating valve.

Foam supply line I.D.	Class A	19mm minimum
	Class B	25.4mm minimum

The foam tank must be located to provide a positive head of foam concentrate to the FoamLogix unit, and the supply hose should be arranged to fall gradually from the tank to the foam pump inlet to avoid air pockets. A tank drain valve must also be fitted.

To prevent over-pressurisation ensure the foam tank is adequately vented.

The foam tank should be made of plastic or stainless steel, with a volume greater than the vehicle main tank by a factor of 0.005. Alternatively, a volume of at least 25 litres may be preferred to allow an entire drum of foam agent to be contained.

Note: To ensure correct operation of the FoamLogix pump, all connections must be secure and pressure tight.

VEHICLE DESIGN CONSIDERATIONS

The following information is included to assist the vehicle builder to achieve a successful installation.

The in line foam strainer / valve assembly is a low-pressure device, rated at 3 bar and will NOT withstand high flushing water pressure.

Seal all electrical power and ground connections with silicone sealant to prevent corrosion.

The system will not operate correctly with poor electrical connections. Verify all electrical connections prior to start up.

Each Hale FoamLogix system is tested at the factory using the wiring harness provided. Improper handling and abuse of connections will cause harm and may result in other system damage.

Use fixings which are compatible with those foam concentrates used. Brass or 300 series stainless steel are suitable.

The areas containing the PC2_ or PC1_ components must be adequately shielded from the ingress of road spray / debris and chassis and vehicle power train lubricant. Exposure to dirt, water and grease will have a detrimental effect on the working life of the drive belt and electronics. Full access to the bearing housing, compressor and gearbox oil fill points and level checkpoints must be considered as well as access for general unit maintenance. The use of removable side panels is advisable.

If the compressed air foam is to discharge through one or both of the side lockers and the vehicle builder is fitting the necessary pipe work and isolating ball valves, those components must have a consistent bore of 38mm up to the hose connector.

To prevent compressed air from being trapped in the pipe work, sealed blank caps MUST NOT be used on CAFS discharges.

Direction of rotation of the input drive flange is clockwise, when viewed on the gearbox.

INSTALLATION AND INITIAL SET-UP FOAMLOGIX 2.1A

For foam pump installation, please refer to the FoamLogix Model 2.1A Description, Installation and Operation manual, part number 029-0020-74-0, supplied separately.

INSTALLATION AND INITIAL SET-UP FOAMLOGIX 3.3, 5.0, 6.5

For foam pump installation, please refer to the FoamLogix Model 3.3, 5.0, 6.5 Description, Installation and Operation manual, part number 029-0021-68-0, supplied separately.

For further information on the MDTII Manual Tank Selector, please see the separate manual supplied, part number 029-0020-40-0.

SMARTCAFS - OPERATION

The Foam unit system consists of three main components:

- 1) Foam Pump / Motor Assembly.
- 2) Control Panel (integral with main pump control panel).
- 3) Flow measurement and injection manifold.

All three elements combine to provide accurate foam proportioning. From the control panel the operator can initiate the system, adjust the foam ratio, monitor 'real time' water flow rate and record total water and foam concentrate usage.

Press to start foam injection

Foam concentrate is only injected when the foam button has the **RED** selector around the control button.

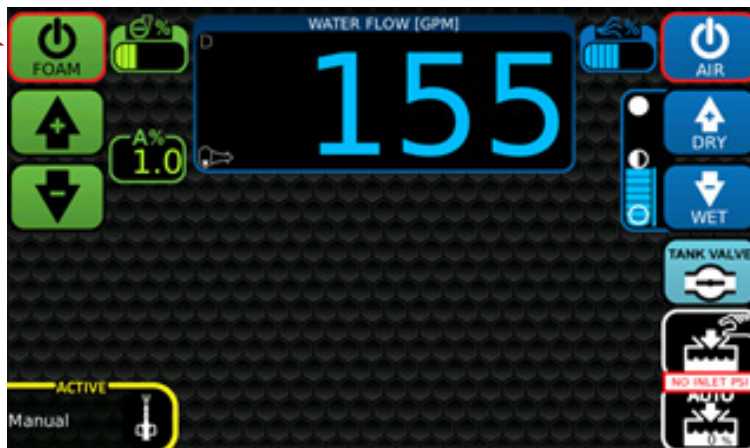


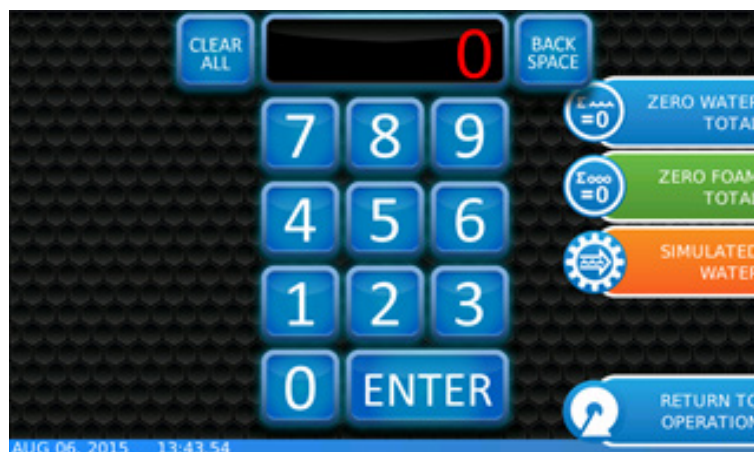
Figure 1 SmartCAFS Foam/CAFS Screen

The Foam unit 3.3, 5.0, 6.5 system for Class A or B foams, will inject foam in the range of 0.1% to 10.0%. Further information is available in the Foam unit Model 3.3/5.0/6.5 Description, Installation and Operation manual.

The FoamLogix 2.1A system is for Class A foam, and will inject foam in the range of 0.1% to 1.0%. Further information is available in the Foam unit Model 2.1A Description, Installation and Operation manual.


COMMISSIONING / START-UP PROCEDURE

1. Check that all the necessary connections have been correctly made.
2. Ensure that the Compressed Air / Oil Separator Tank and pump gearbox are filled with the correct oil type and quantity.
3. Prime and Run the water pump at 8.5 Bar (0.86MPa/125 PSI) with compressor engaged.
4. Run the compressor for 30 seconds to allow oil to circulate.
5. Stop unit and check compressor oil level – top up if necessary.
6. Turn the bypass valve on the Foam unit pump to “bypass” and provide a suitable receptacle to collect the foam agent.
7. Ensure that there is sufficient foam agent in the tank(s). For Foam unit 3.3/5.0/6.5 select tank A
8. Select simulated flow on the UV display by pressing the Menu button then pressing the “Simulated Water” button on the screen or button. Then return to the operating screen by selecting the “Return to Operation” button.



Simulated Flow



9. Press the Foam Power button,  and the Foam unit pump will prime itself. The pump will run for 30 seconds or until prime is achieved. If no prime is made, the display will show a plain test warning. Repeat this step once more to attempt to prime the pump. If priming is not achieved after several attempts, ensure the foam supply is connected and available to the pump.
10. For 3.3/5.0/6.5 Foam unit, flush then select tank B, and repeat the priming procedure for that tank.
11. When prime is achieved, deselect simulated flow by returning to the menu and turning off simulated flow.
12. Return the bypass valve to the inject position.

The unit is now ready to run.

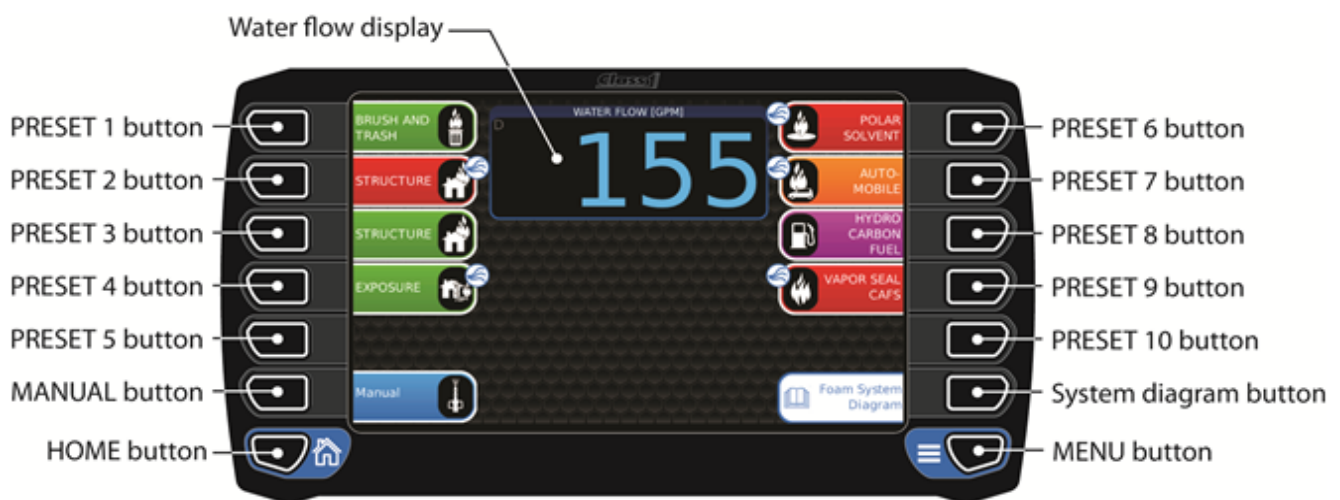


WARNING

NEVER USE CAFS WITH A PRESSURE FEED INTO THE EYE OF THE PUMP.
SMARTCAFS PUMPS SHOULD ONLY BE USED WHEN WORKING FROM OPEN WATER OR A TANK FEED.
PROBLEMS WILL OCCUR WITH THE WATER / AIR PRESSURE RATIO, SHOULD PRESSURISED (HYDRANT) WATER SUPPLY BE APPLIED DIRECTLY TO THE SUCTION TUBE.
HYDRANT SUPPLY MAY ONLY BE USED TO MAINTAIN THE WATER LEVEL IN THE VEHICLE TANK.

PRESET SCREEN (START SCREEN)

The SmartCAFS Controller shows the start screen after a power cycle. This screen allows the operator to select one of 10 preset operating modes (configurable) or manual operating mode.



Preset Buttons



There are 10 configurable preset buttons. The text, icon, bar color, and CAFS indicator are configurable by the user through a password protected configuration screen. The preset configuration screen allows the user to select the operating foam tank (A/B), foam percentage, CAFS mode, and ARC valve position.

The operating screen is entered when a preset button is pressed and held for 0.5 seconds. The operating mode of the foam and CAFS will be set to the configured preset settings.

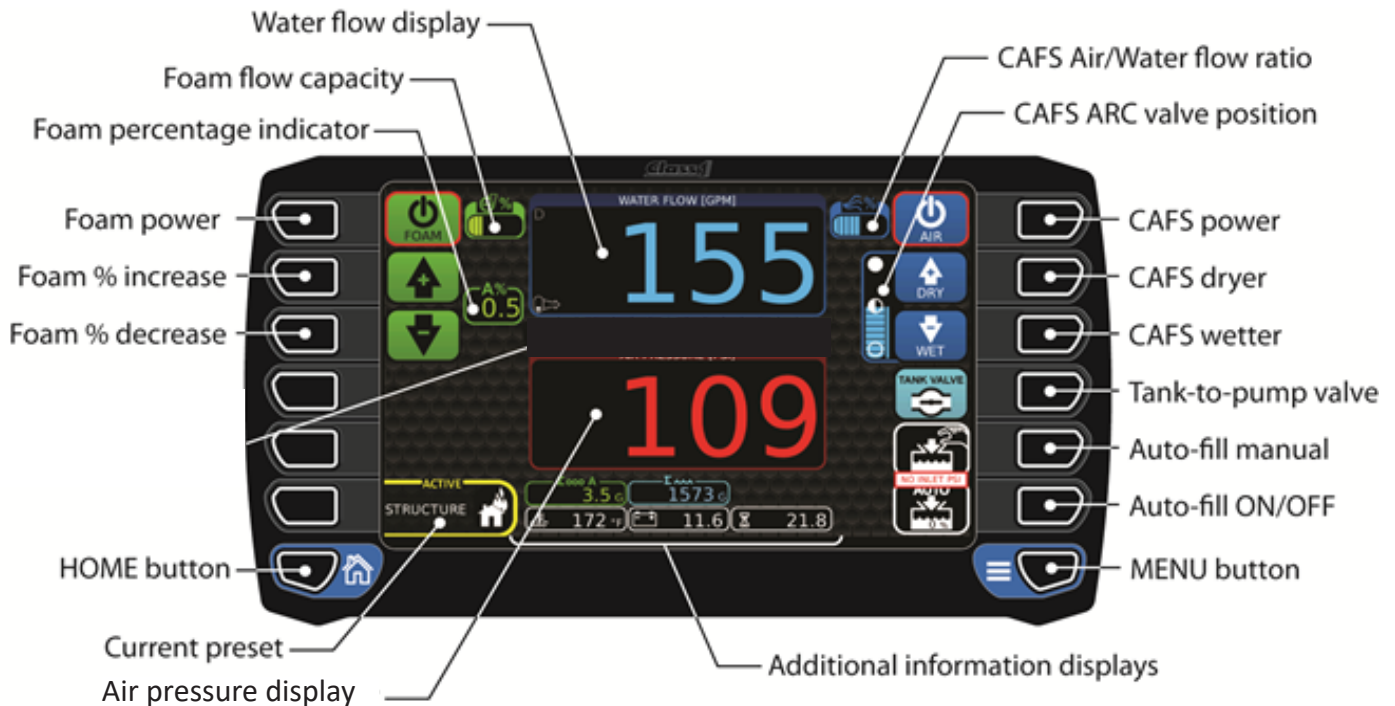
Water flow display

The water flow display is always visible and shows the current water flow rate through the Foam/ CAFS discharge manifold.

1. Home button
This button toggles the display between the Preset Screen and the Operating Screen.
2. Menu button
This button shows/hides the additional information displays. When this button is pressed and held for 3 seconds the menu will be displayed.

OPERATING SCREEN

The operating screen allows control over the foam and CAFS, and if configured, the tank valve. The water flow display is always active, but the air flow display is only shown when the CAFS power is ON.



Water flow display

The water flow display is always visible and shows the current water flow rate through the Foam/CAFS discharge manifold.

Foam flow capacity

The foam flow capacity is a bar graph that shows how hard the foam pump is working (0% to 100%).

Foam percentage indicator

The foam percentage indicator shows the foam proportioning rate for the currently selected tank.

Foam power button

The foam power button turns the foam system OFF or ON. The foam power button's color indicates the currently selected foam tank (A green, B red, FLUSH orange). The border of the power button is black when OFF and red when ON.



Foam system OFF



Foam system ON

Foam increase and decrease buttons

The increase and decrease foam buttons change the foam percentage for the currently selected foam tank. The color of these buttons indicates the tank selected and foam system power state:

- green = foam system ON, tank A selected
- red = foam system ON, tank B selected
- gray = foam system OFF

These buttons will modify the foam percentage value even when the foam power button is OFF.

Home button

Return to the preset screen.

Current preset

This display shows the currently selected preset name and icon (or “manual” if manual was selected).

Air display

This display shows the current air pressure, CAFS ratio, or current air flow rate based on the “CAFS air display” selection configured in the “user menu” (see section 0). The air flow rate and CAFS ratio displays are only shown when CAFS is turned ON.

CAFS air/water flow ratio

The CAFS air/water flow ratio is a bar graph that shows the relationship between the air flow and water flow rates (0% to 100%). This display is only available when equipped with the Hale air flow sensing valve.

CAFS ARC valve position

The ARC valve position indicator is a bar graph that shows the gating of the valve (0% [full wet] to 100% [full dry]). The border color indicates the state of air injection – red = not injecting air, blue = injecting air.

CAFS power button

The CAFS power button activates the CAF System (it will start the foam system if it is not already active). CAFS will be turned OFF when the foam power button is turned OFF. The CAF System will also evaluate the air pressure, compressor temperature, water flow, and foam flow before activating the air injection. The border of the power button is black when OFF and red when ON. The power button’s color is gray when the clutch has been disengaged.



CAFS OFF, clutch disengaged



CAFS OFF, clutch engaged



CAFS ON

CAFS Wet and Dry buttons

The wet and dry buttons open/close the ARC valve. These buttons are only active when CAFS power is active. These buttons are active when they are blue and inactive when they are gray.

Tank-to-pump valve button - Optional feature

The tank valve button opens or closes the tank valve. The icon on the button indicates the current position of the valve (open or closed). The tank-to-pump valve can be configured (in the user menu) to open automatically when the pump engaged signal is detected. Even when set to automatic mode this button can be utilized to manually open/close the tank-to-pump valve.

Auto-fill manual button - Optional feature

(When an auto-fill system is installed) The auto-fill manual button opens the KZCO valve connected to the inlet in order to fill the water tank. This button is a momentary button and the valve will only be open as long as the button is held. The on-screen icon changes to green to indicate that the valve is being forced open.

Auto-fill ON/OFF button- Optional feature

(When an auto-fill system is installed) The auto-fill ON/OFF button turns ON or OFF the automatic water refill system. The on-screen icon shows the status of auto-fill: white = auto-fill ON, white with RED / = auto-fill is OFF.

The auto-fill system will only operate if there is sufficient inlet pressure (7+ PSI). If there is not enough inlet pressure the "NO INLET PSI" warning will be shown between the buttons.

Menu button

Toggle button shows/hides the additional information displays. When this button is pressed and held for 3 seconds it shows the password enter screen.

Additional information display

The additional information displays show the total water flowed, total foam flowed, battery voltage, pump engaged operating hours, and compressor oil temperature. This display is toggle ON/OFF with the menu button.

NOTE: Total water flowed and total foam flowed are erased when the system is repowered. These values may also be zeroed during operation when desired in the system menu.

OPERATING THE SYSTEM



WARNING

DO NOT APPLY HYDRANT PRESSURE TO PUMP SUCTION WHEN OPERATING CAFS. MAY BE OPERATED FROM OPEN WATER OR TANK FEED ONLY

NOTE: The automatic tank-to-pump open function is a menu selectable item and must be set for “automatic: for this operation to occur (this is the default). The SmartCAFS Controller will automatically open the tank-to-pump valve (see note) when the pump engaged signal is recognized.

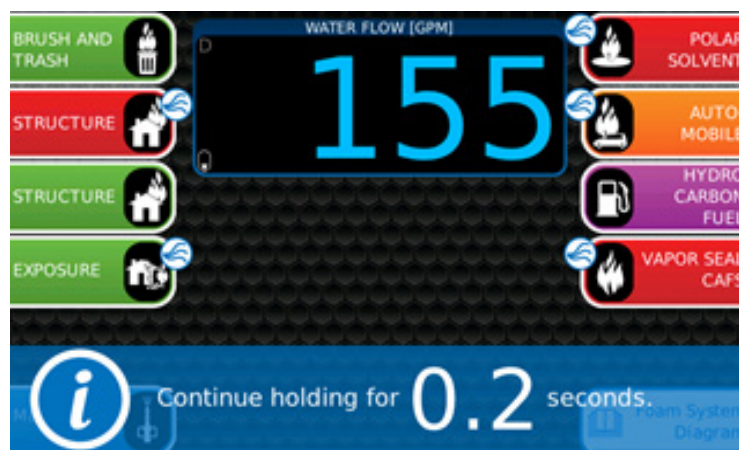
NOTE: The SmartCAFS Controller will automatically engage the compressor clutch when the pump engaged signal is recognized OR when a CAFS preset button is first pressed. This operation is a menu selectable item. If pump input speed is >900rpm the compressor will not engage and a plain text error message will appear. Reduce speed below 900 RPM then the CAFS compressor can be engaged.

NOTE: when the clutch is first engaged it is possible to observe some sparking occurring around the clutch assembly. This small amount of sparking is quite normal and nothing to be concerned about. The lower the engagement speed the less sparking will occur.

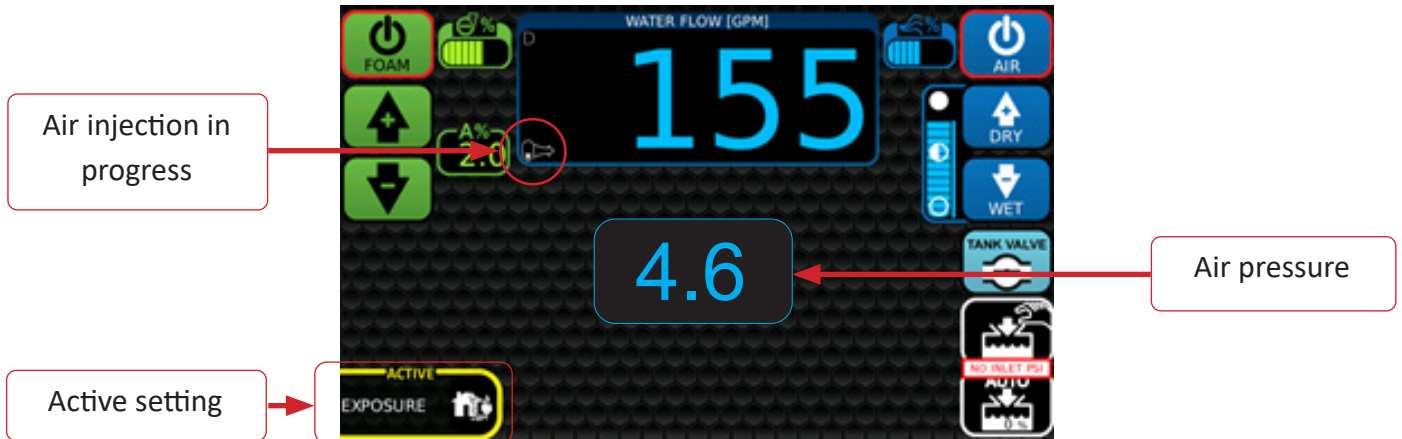
NOTE: When discharging dry foam at low pump pressure, the possibility of hose kinking is increased and should be considered when deploying hoses.

START FOAM/CAFS OPERATION BY SELECTING A PRESET (OR MANUAL)

Press and hold the desired preset button for 0.5 seconds. The display will show an information bar to indicate to keep holding the button for the required time.



The display will then show the operation screen. The SmartCAFS Controller is now ready to manage the foam/CAF System as the preset dictates when water flow is detected. Water flow is the driving factor for system operation in both “foam only” or “foam and air” (CAFS).



The bottom left corner of the screen shows the currently active preset.

INCREASE ENGINE SPEED FOR DESIRED WATER PRESSURE

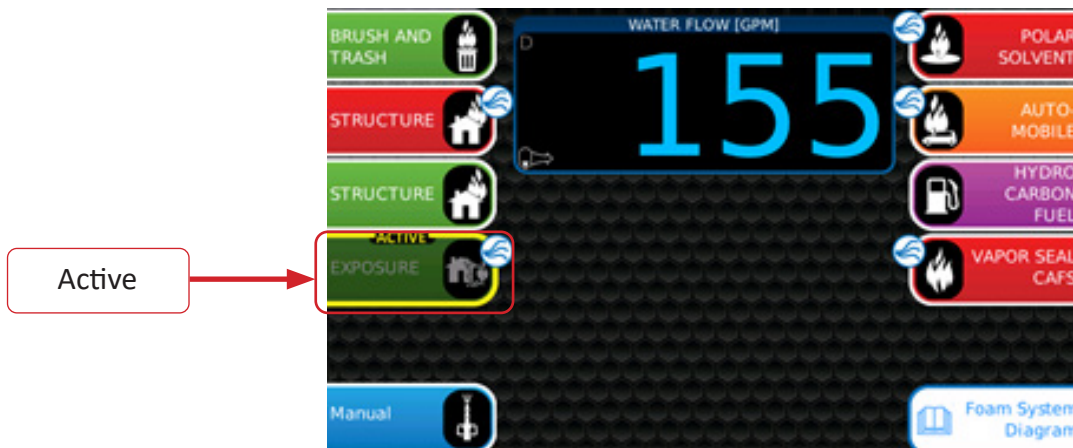
(With SmartGOV fitted) – The SmartCAFS Controller automatically communicates with the SmartGOV governor to set the governing system to RPM mode and ramp to its preset 1 engine speed.

(Without SmartGOV) – Manually adjust the engine speed to set the water/air pressure to the desired value (CAFS operating range = 4 to 10 Bar (58 psi to 145 psi). When using a governor other than the SmartGOV make sure the governing mode is set to RPM.

SELECTING A NEW PRESET

If a new preset is desired, press the HOME button to move back to the preset screen.

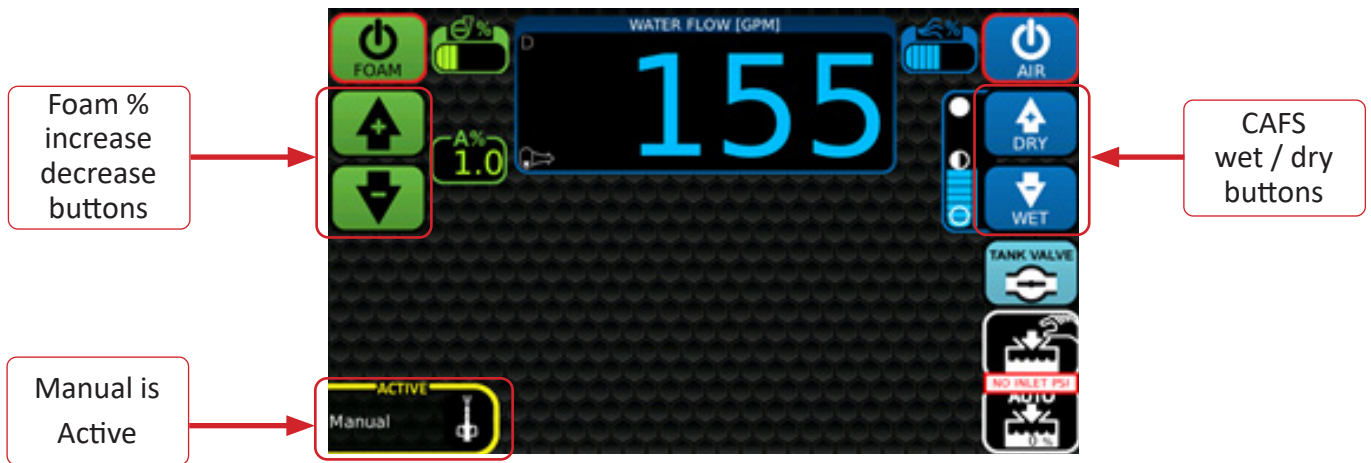
NOTE: The system continues to operate using the current foam/CAFS setting when going back to the preset screen.



The currently active preset will be indicated by the flashing “ACTIVE” border. Press a new preset button (or manual). Simply press the HOME button again if a new preset is not desired. The operation screen will again be shown.

MODIFY THE CURRENT OPERATING PARAMETERS

At any time the operating parameters can be modified by pressing the foam percentage (increase/decrease) buttons or by pressing the CAFS wet/dry buttons.



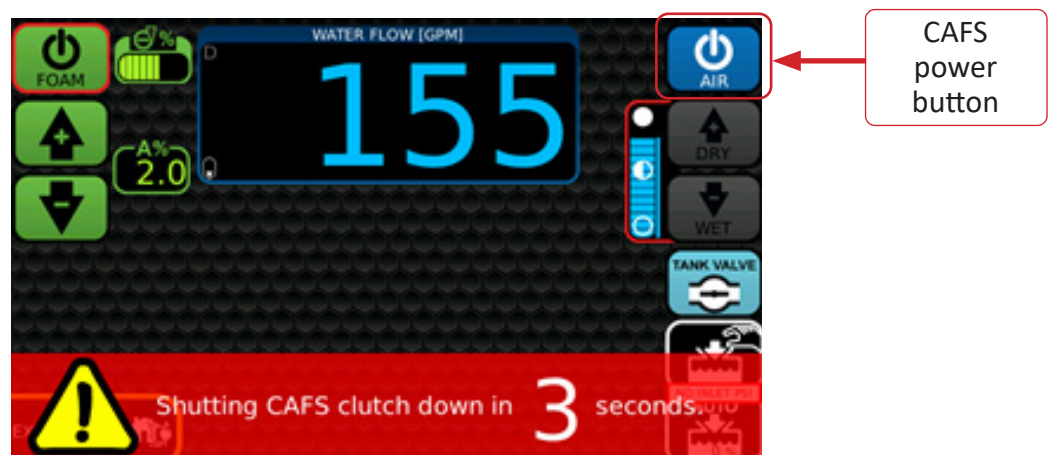
The bottom left corner of the screen will now show “manual” because the settings have been changed from the original preset values.

The foam and/or CAFS power buttons can be pressed to enable/disable the foam/CAF Systems.

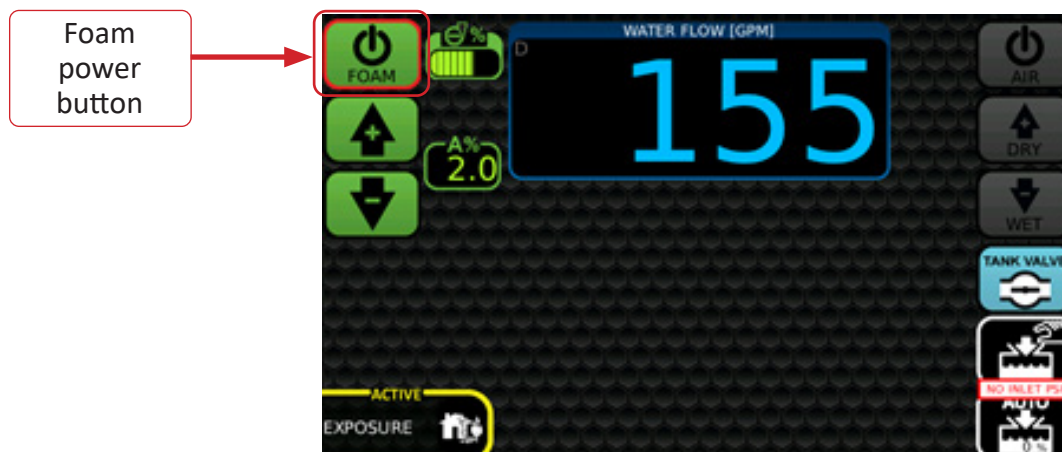
- When foam and CAFS are ON, pressing the foam power button will turn OFF foam and CAFS.
- When foam and CAFS are ON, pressing the CAFS power button turns OFF only CAFS.
- When foam and CAFS are OFF, pressing the foam power button will turn ON only foam.
- When foam and CAFS are OFF, pressing the CAFS power button turns ON foam and CAFS.

DISENGAGING THE COMPRESSOR CLUTCH

1. The compressor clutch will be automatically disengaged when the pump engaged signal is turned OFF. At this time the SmartCAFS Controller will turn OFF foam and CAFS and return to the preset screen.
2. The compressor clutch can be manually disengaged by pressing and holding the CAFS power button for three seconds (the warning banner will pop-up to indicate how long the CAFS power button must be held).



The on-screen CAFS buttons will be gray to indicate that the compressor clutch is disengaged.



NOTE: It will be necessary to turn OFF the foam system if foam operation is no longer desired.

3. Run water through the CAFS discharge system to flush out the foam agent.
4. Close the CAFS discharge valves.
5. If freezing conditions are expected, drain the manifold, pump, water strainer and CAFS heat exchanger.

OVERHEAT SHUT DOWN

1. Should the compressor oil temperature reach 105°C (220°F) a control panel warning indicator will appear on the screen. The compressor can sustain 105°C (220°F) for short periods without damage.
2. If the compressor oil temperature reaches 110°C (230°F), the drive clutch will automatically disengage. This will stop the compressed air supply and only foam/water solution will be discharged. The compressor cannot be re-engaged until the unit has been cooled and the pump input speed is returned to below 900 RPM.
3. The most probable cause of compressor overheating is insufficient cooling water flow.

FLUSHING

When returning the apparatus to ready condition after using class B foam, the Hale Foam unit foam pump must be flushed. This is because some Class B foam concentrates deteriorate rapidly. It is recommended to flush for the preset time in the SmartCAFS.

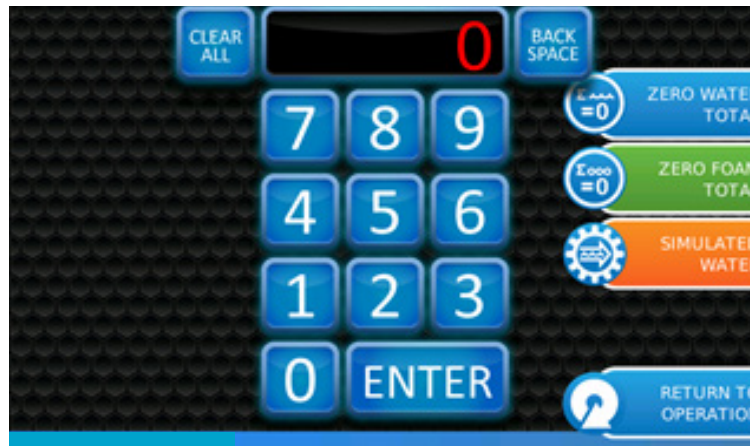
NOTE: Approved class A foam concentrates do not deteriorate at the rate of class B foam concentrates. Provided that an approved class A foam concentrate is used and the system is used within 30 days, flushing is not required. After class B foam concentrate has been used, flush the system then select class A.

For detailed flushing instructions, please refer to the Foam unit Model 3.3/5.0/6.5 Manual 029-0021-68-0.

SYSTEM MENU

Press and hold the MENU button for 3 seconds until the system menu is shown. The system menu allows the clearing (zero) of the total water and total foam display, setting the simulated water flow (for diagnostics), and entering passwords for other menus (user and OEM), for calibrations (water and foam), and for configuration (presets).

NOTE: The password keyboard greyed out if the foam and/or CAFS power buttons are ON.

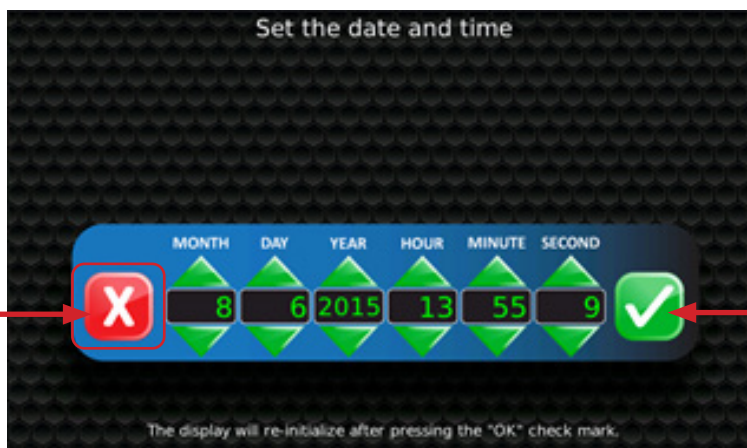


Touch here
to set the
time

SETTING THE SYSTEM TIME

Press the blue bar in the bottom right corner of the system menu screen (over the month and day) and the “set the date and time” screen will appear. Enter the new date/time and press the “green check mark” to save.

NOTE: The display will re-boot after pressing the “green check mark”.

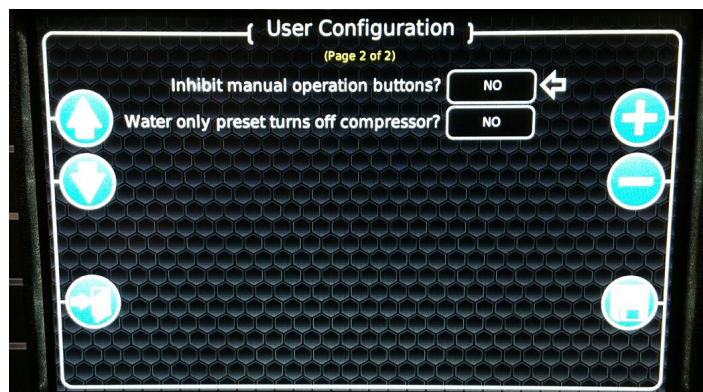
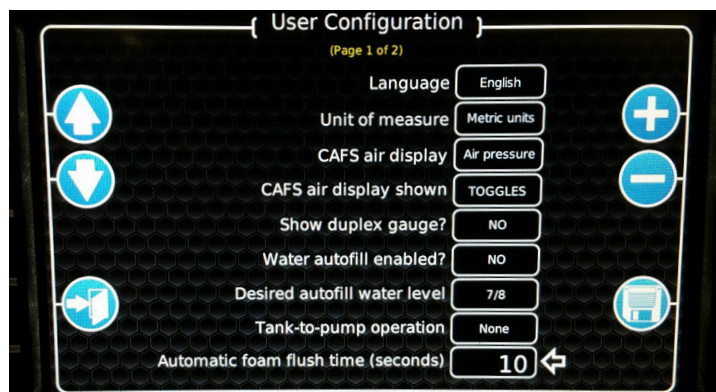


Do not
update date
and time

Update date
and time
(save)

USER MENU

Enter the password 1849 in the system menu's keyboard to open the user menu. The user menu allows setting of user configurable items.



Language	select the desired language to show within the SmartCAFS Controller. Default: English
Unit of measure	select the desired unit of measure for the system (English or metric). Default: English units
CAFS air display	select the desired display to be shown for the air. This display is shown beneath the water flow display (none, air pressure). Default: None - Set Yes
CAFS air display shown	select to show the CAFS air display. Default: Always
Show duplex gauge	select whether to show the duplex gauge when additional information is toggled. Default: No
Water autofill enabled	select whether to use auto-fill. Default: No
Desired autofill water level	select the level to maintain in auto-fill (fill, 7/8, 3/4, 5/8, 1/2, 3/8, 1/4, 1/8, empty). Default: 7/8
Tank-to-pump operation	select whether the tank-to-pump valve is operated manually or automatically (or none if an air actuated tank-to-pump valve is not installed). Default: Set none
Automatic foam flush time	number of seconds that the foam system must be flushed (2 to 60 seconds). Default: 10 seconds
Inhibit manual operation button	Default: No
Water only preset turns off compressor	Default: No



UP/DOWN arrow buttons - Move the arrow to select the menu item. The white arrow points to the currently selected menu item.



“+” and “-” buttons - Change the value of the currently selected menu item.



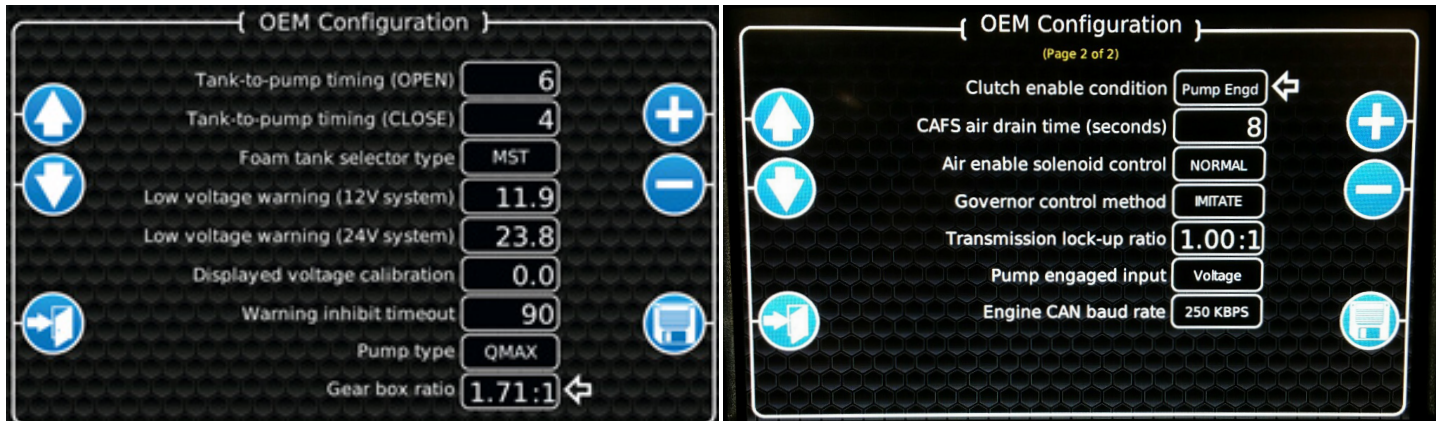
Exit button - Exit the menu



Save button - Save all items the menu

OEM MENU

Enter the password 2314 in the system menu's keyboard to open the OEM menu. The user menu allows setting of user configurable items.



Tank-to-pump timing OPEN	select the amount of time the “open” air solenoid is activated. The tank-to-pump valve is controlled via an linear air cylinder so this setting allows for fine tuning of the amount of time it actually takes to fully stroke the cylinder. Default: 6 seconds
Tank-to-pump timing CLOSE	select the amount of time the “close” air solenoid is activated. The tank-to-pump valve is controlled via an linear air cylinder so this setting allows for fine tuning of the amount of time it actually takes to fully stroke the cylinder. Default: 4 seconds
Foam tank selector type	select the foam tank selector type. Single tank systems (none or MST), dual tank systems (MDT or ADT). Default: MST
Low voltage warning (12V)	select the low voltage warning level for 12V systems. Default: 11.9 volts
Low voltage warning (24V)	select the low voltage warning level for 24V systems. Default: 23.8 volts
Displayed voltage calibration	if the displayed voltage in the additional information displays does not match the actual system voltage this value can be adjusted to calibrate (offset) the voltage (-1.5 to +1.5 volts). Default: 0.0 volts
Warning inhibit timeout	sets the amount of time (30 to 300 seconds) that a warning, which was inhibited (cleared) by the operator, will stay hidden until it shown again (if the warning is still active). Default: 90 seconds
Pump type	select the pump type (PC1, PC2, QMAX-XS, QMAX, QTWO, or DSD). Default: Prima
Clutch enable condition	select when the compressor clutch will be enabled (Pump Engd = clutch engaged when the pump engaged signal is activated, Preset = clutch engaged when a CAFS preset is first pressed). Default: Pump Engd

CAFS air drain time	select how long the air drain solenoid is open when the pump engage signal is deactivated (0 to 10 seconds). This allows the residual air to be bled off after system usage. Default: 8 seconds
Air enable solenoid control	sets how the air enable solenoid is controlled. Inverted = air IS NOT blown into the air valve assembly to activate air injection. Normal = air IS blown into the air valve assembly to activate air injection. Note: when using the Hale air sensing valve this value should be set to "inverted". Default: INVERTED
Governor control method	Imitate or direct
Transmission lock-up ratio	1.01 : 1
Pump engaged input	voltage or Pressure
Engine CAN baud rate	125 / 250 / 500 KBPS



UP/DOWN arrow buttons - Move the arrow to select the menu item. The white arrow points to the currently selected menu item.



“+” and “-” buttons - Change the value of the currently selected menu item.



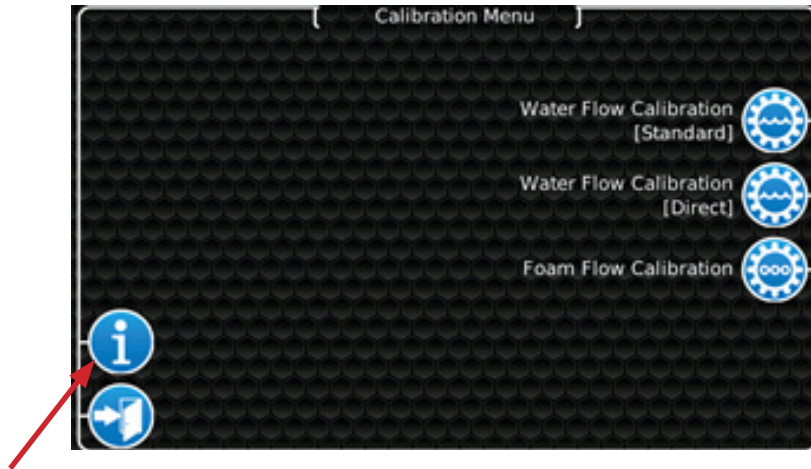
Exit button - Exit the menu



Save button - Save all items the menu

CALIBRATIONS

Enter the password 6679 in the system menu's keyboard to open the calibration menu. The calibration menu allows the foam and water calibrations to be performed.



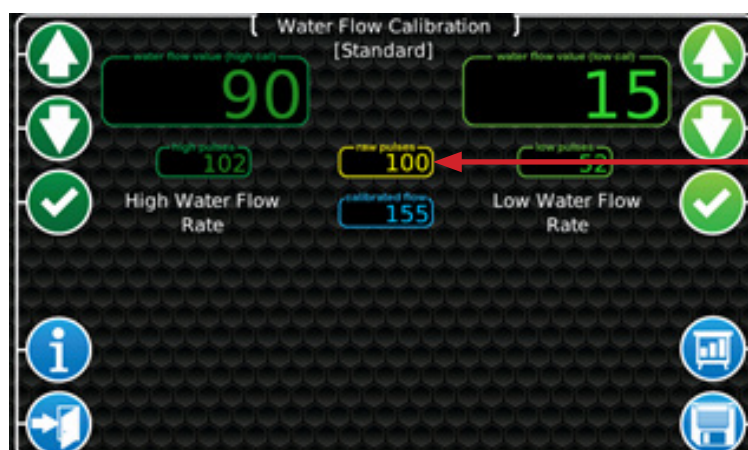
NOTE: Anytime the i button is shown it can be pressed to pop-up a tutorial about the current screen. The tutorial can be canceled at any time by pressing the i button again.

WATER FLOW CALIBRATION (STANDARD)

The standard water flow calibration requires plain water to be flowed through a foam/CAFS capable discharge. The water flow calibration requires flows at a high rate and a low rate. The high and low rate is determined by the person calibrating the system. This two-point calibration yields a very precise water flow calibration across the entire range.

NOTE: An accurate flow measuring device must be used to measure the water flow when calibrating the flow sensor. Use a suitable size, smooth bore nozzle or an accurate inline flow sensor.

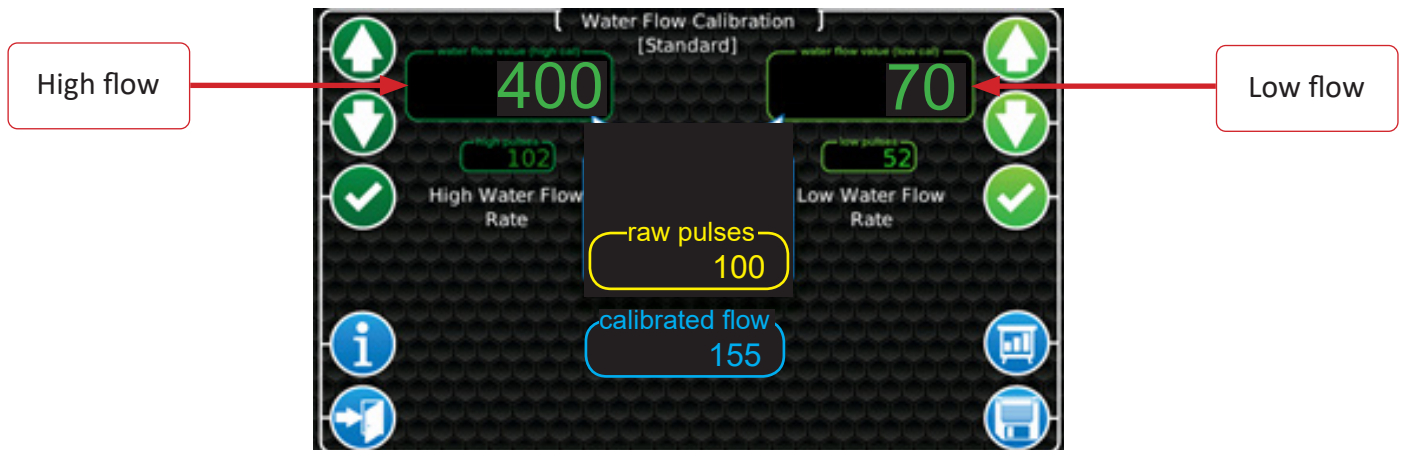
1. Establish flow through a foam/CAFS capable discharge at either the high or low rate. Use the yellow "raw pulses" display window to verify that the paddlewheel sensor is detecting the water flow.



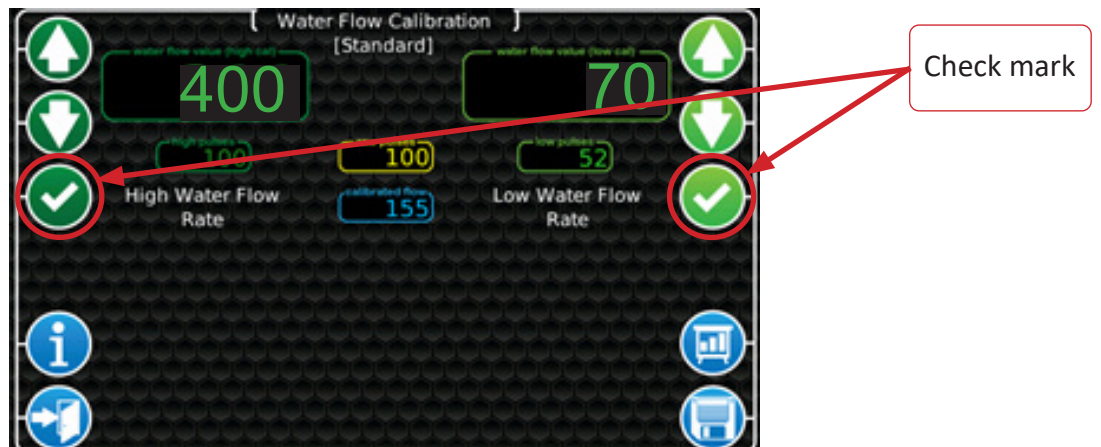
Raw pulses display

System	Low - l/min	High - l/min
CAFS50	70	400
CAFS100	70	800
CAFS200	100	1600

- The display will ask you to enter the flow value. Press the display where you want the value to be placed. Use the UP and DOWN arrows to set the flow rate to a known value.

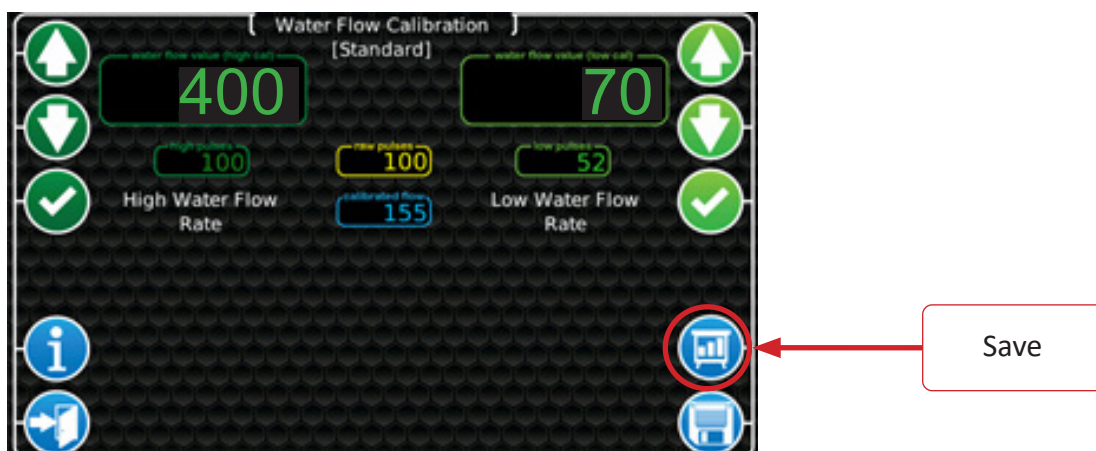


- Press the “check mark” button on the desired side (high or low). Make sure that the value in the yellow “raw pulses” display window is now in the green “high pulses” (or “low pulses”) display window.

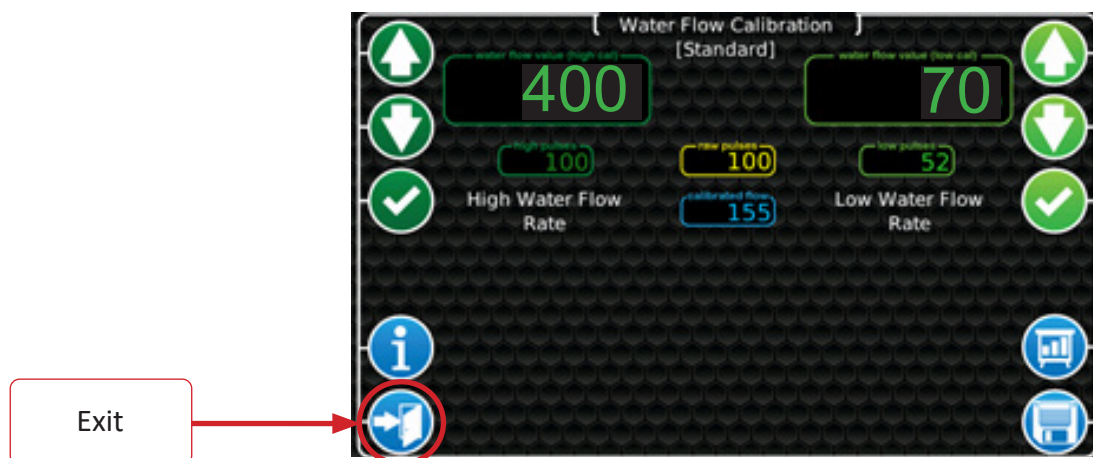


- Perform these same steps for the other flow rate.

7. Press the “save” button to complete the calibration. Decrease the throttle and stop water flow

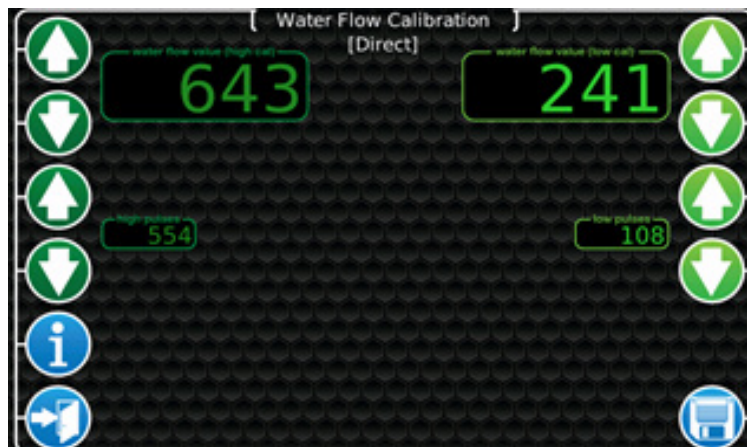


8. Press the “exit” button to return to the calibration menu.



WATER FLOW CALIBRATION (DIRECT)

The direct water flow calibration is simply a means of entering the values from a previous water flow calibration without the need to actually flow water. The direct water flow calibration requires the known values for the water flow value and its related water flow pulses (high and low) from a previously completed calibration. This is typically used when having to replace the SmartCAFS Controller or when another vehicle is determined to be exactly the same as a previous vehicle.

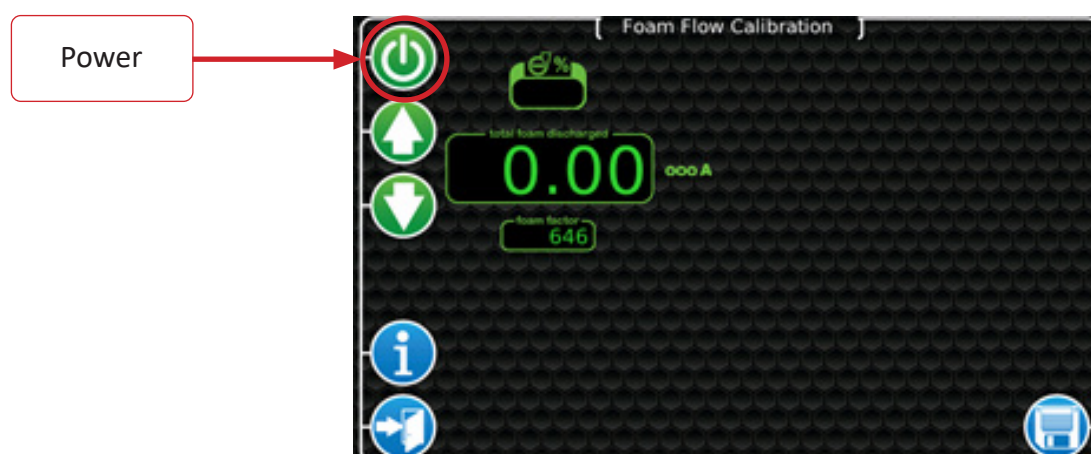


FOAM FLOW CALIBRATION

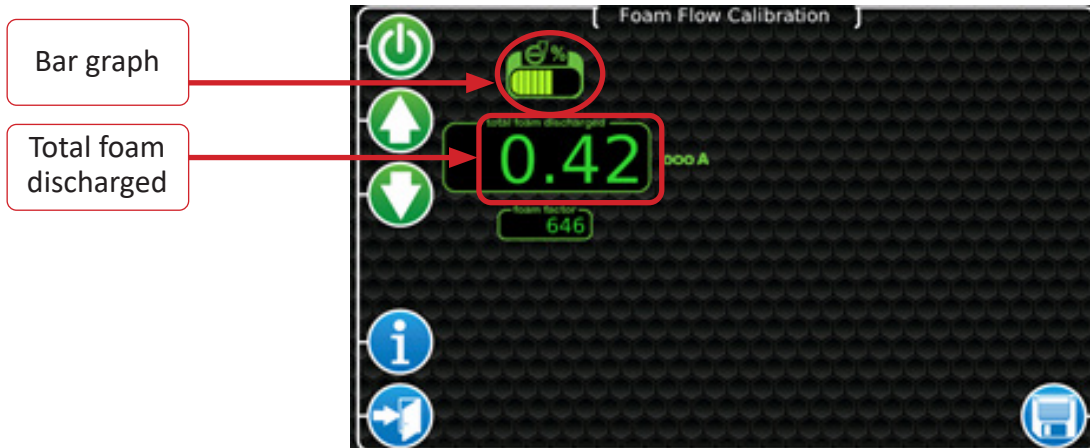
The foam flow calibration requires the discharge of a known quantity of foam concentrate into a calibrated container.

NOTE: Be sure to set the foam bypass handle into the “bypass” position so that the discharged foam concentrate may be collected.

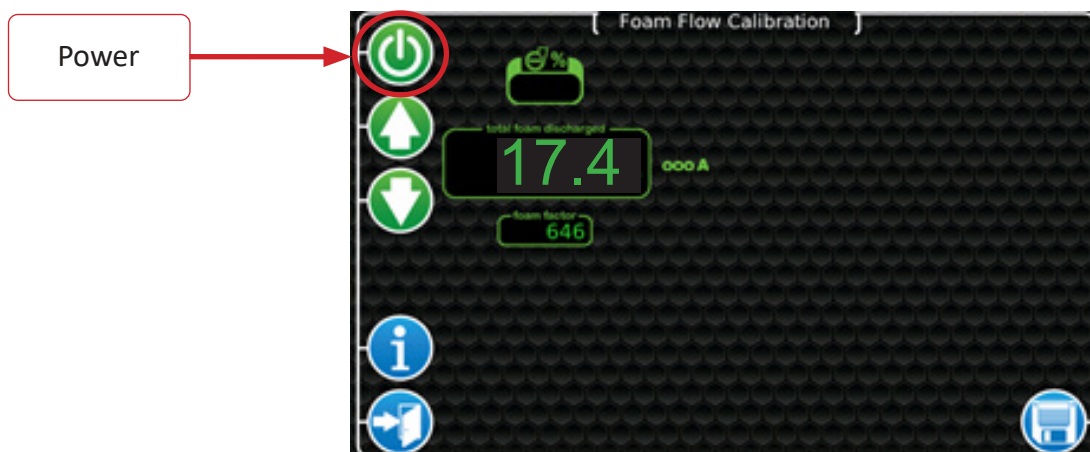
1. Place the foam bypass handle into the “bypass” position. Select the appropriate foam tank, A or B.
2. Place the calibrated container so that it will be filled with foam concentrate as it is discharged through the bypass hose.
3. Press the power button.



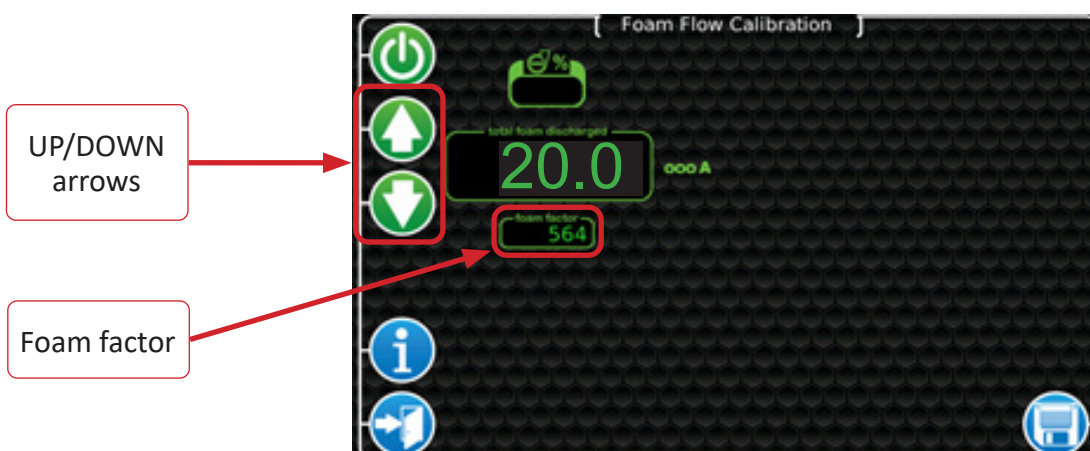
4. The bar graph will increase to indicate that the foam pump is running and the system will begin discharging foam concentrate. The “total foam discharged” display will begin incrementing.



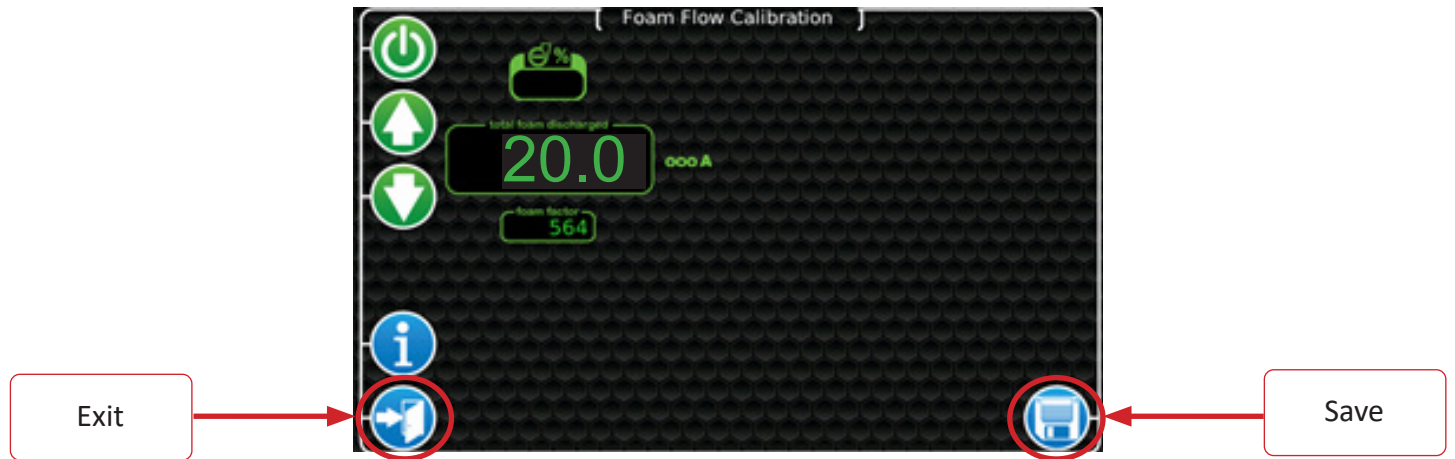
5. When the foam concentrate has filled the container to a known level press the power button again to stop the foam system.



6. Use the UP/DOWN arrow buttons to change the value shown in the "total foam discharged" window to reflect the value actually collected in the container (the "foam factor" value will be changing, but in the inverse direction).



7. Press the "save" button. Repeat for the second foam tank.
8. Press the "exit" button to return to the calibration menu.

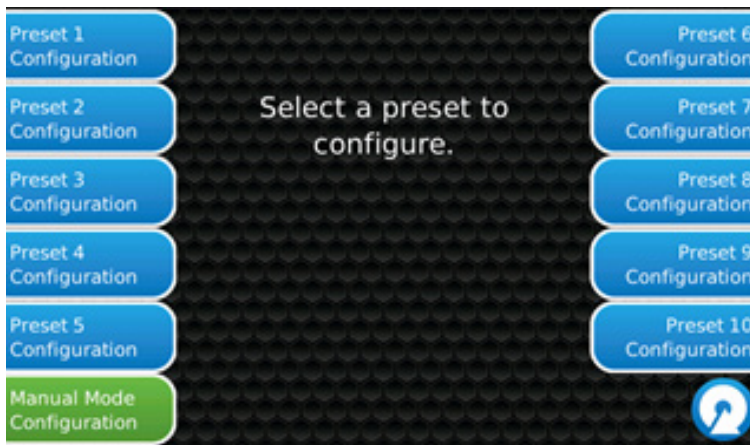


8. Place the bypass handle back to the “inject” position.

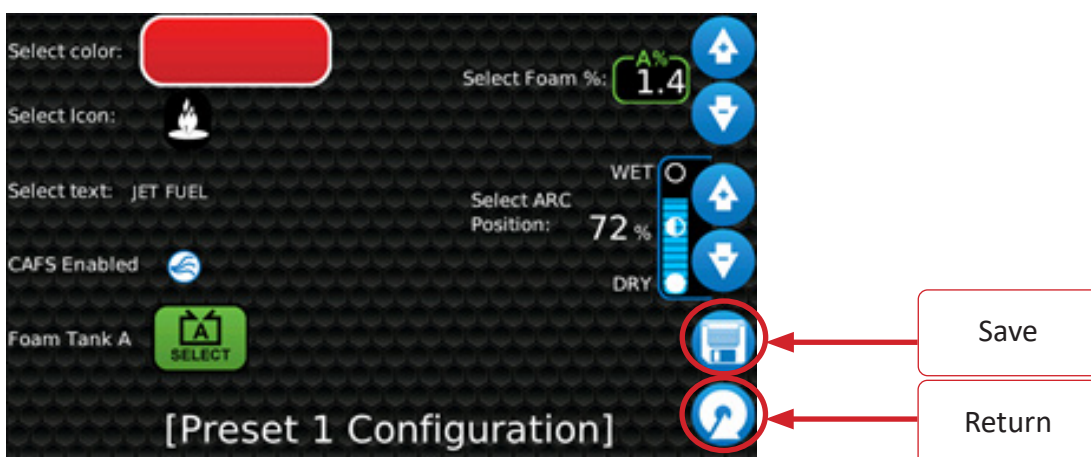
PRESET CONFIGURATION (STANDARD)

The SmartCAFS Controller allows up to 10 presets to be configured. These presets can be set for foam only or foam and air (CAFS).

Enter the password 1023 in the system menu's keyboard to open the preset configuration menu.



Select the preset to configure and that preset's configuration screen will be shown.

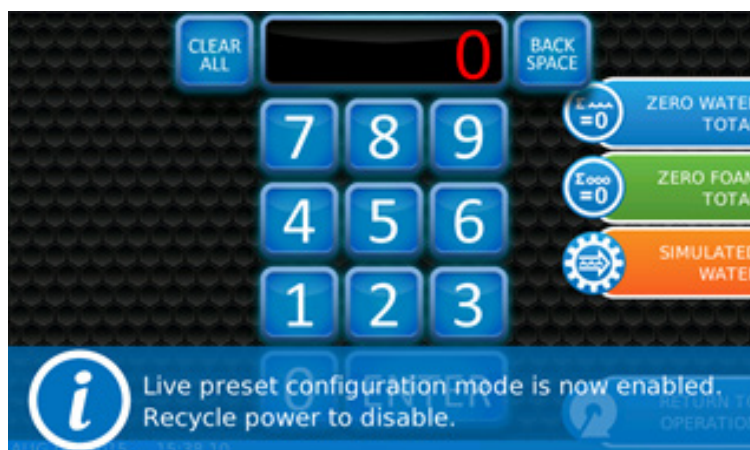


Select colour	Select the color for the preset's bar (green, red, orange, purple, blue, disabled). If "disabled" is selected then the preset is turned OFF.
Select icon	Select the icon to use for this preset.
Select text	Pops-up a keyboard so that text can be set for this preset (9 characters per line, up to 3 lines).
CAFS enabled/disabled	Select whether this preset will be using CAFS or foam only.
Foam tank	Select which foam tank is used with this preset. If the foam selector is not set for the correct tank the SmartCAFS Controller will pop-up a warning to inform the operator to switch to the correct tank.
Select foam %	Set the foam concentrate percentage required for this preset (this option is only visible if CAFS is enabled for this preset).
Select ARC position	Set the consistency of the CAFS by setting the Air Ratio Control valve between WET and DRY (this option is only visible if CAFS is enabled for this preset).
"Save" button	Save this preset to memory.
"Return" button	Return to the "select a preset" configuration menu.

PRESET CONFIGURATION (LIVE)

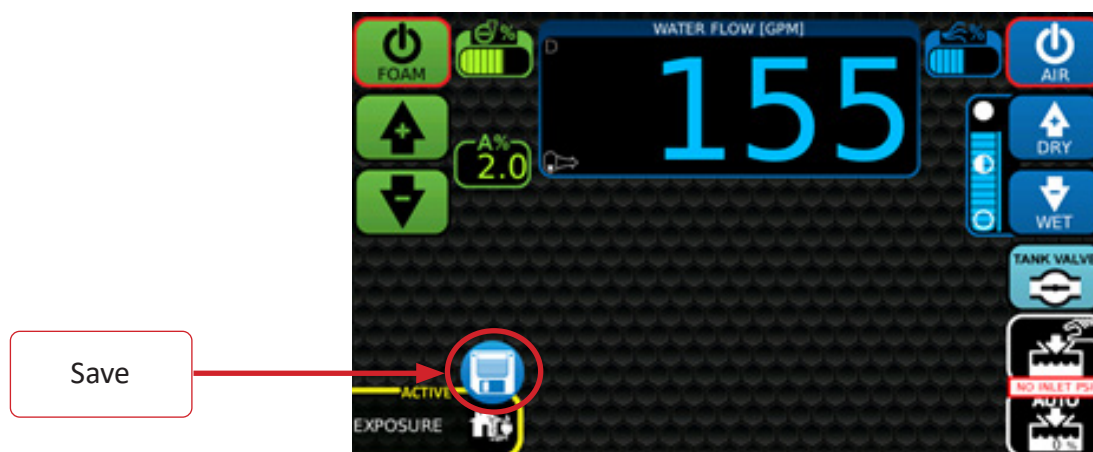
Once a preset has been configured via the standard configuration it may not have produced the CAFS consistency desired. The “live” preset configuration allows the operator to flow CAFS while adjusting the consistency and then re-save that new value to the desired preset.

Enter the password 40692 in the system menu’s keyboard to open the user menu. This enables the “live” preset ability. Information banners will pop-up to indicate that the “live” preset ability has been activated. Touch the banner to dismiss the message.



NOTE: You must recycle the SmartCAFS Controller’s power to disable the live preset configuration.

1. Select the desired preset from the preset page. You will notice a “save” icon above the currently selected preset (bottom left corner of the screen).

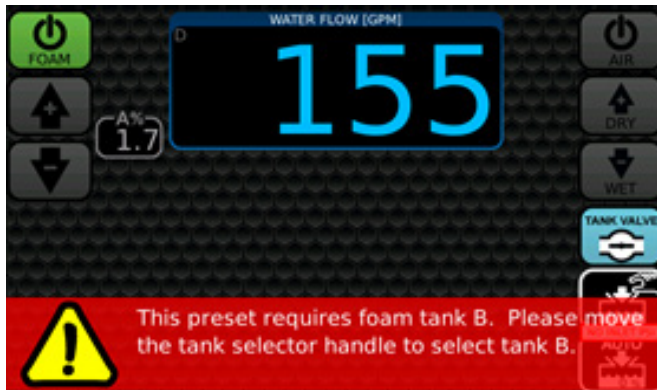


2. Run the CAFS and adjust the CAFS consistency as desired (WET/DRY buttons).
3. Press the button next to the currently selected preset indicator. The “saving” indicator will appear momentarily indicating that the new consistency has been saved.

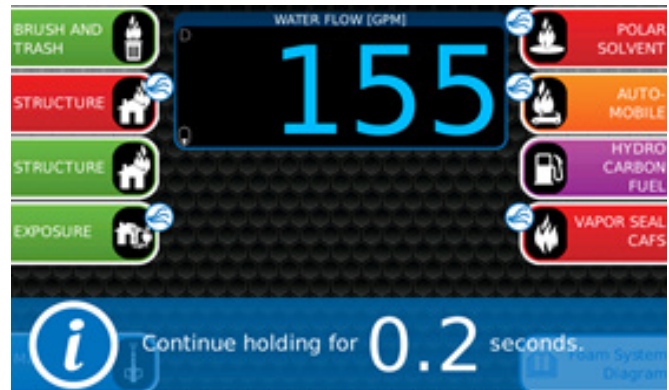


ON SCREEN WARNINGS and INFORMATION

The SmartCAFS Controller uses on-screen pop-up warnings and information to indicate system status to the operator.



Warnings use a red background



Information uses a blue background


Touch the warning/information to dismiss it (inhibited). The warning will be hidden for the number of seconds set in the OEM menu's "warning inhibit timeout". If the condition that caused the warning still exists the warning will pop-up again.

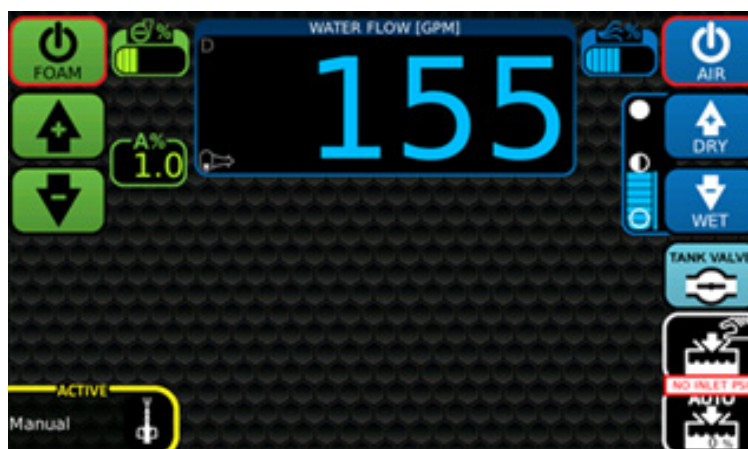
CAFS - SETTING THE AIR BALANCE CONTROL VALVES - CAFS200 Only


1. Symptoms of Improper Adjustment

- a. Air pressure fluctuates or bounces too far from water pressure on the duplex gauge:
 - i. The snubber valve is open too much
- b. A "popping" sound is observed within the air intake filter & ducting:
 - i. The snubber valve is closed too much.

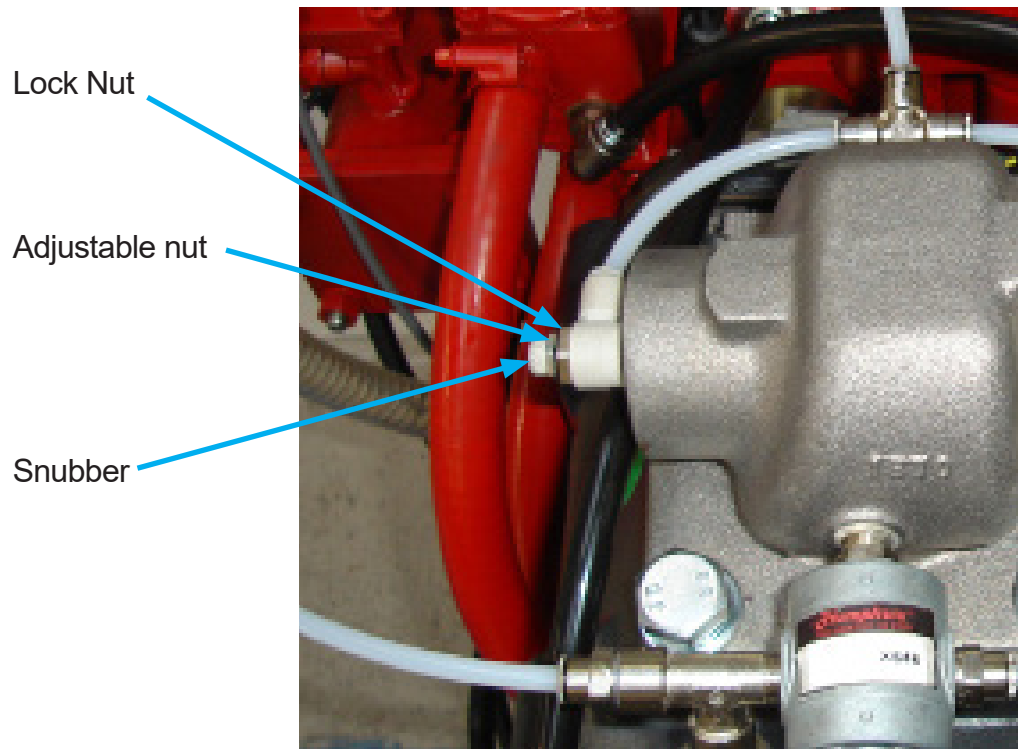
2. Functionally Test Smart CAFS Air Pressure /Water Pressure & Adjust Match

- a. The water pump should be running at 700-800 RPM and discharging water.
- b. Turn system ON by pressing  LED bar graph on display should light up and foam should start pumping.



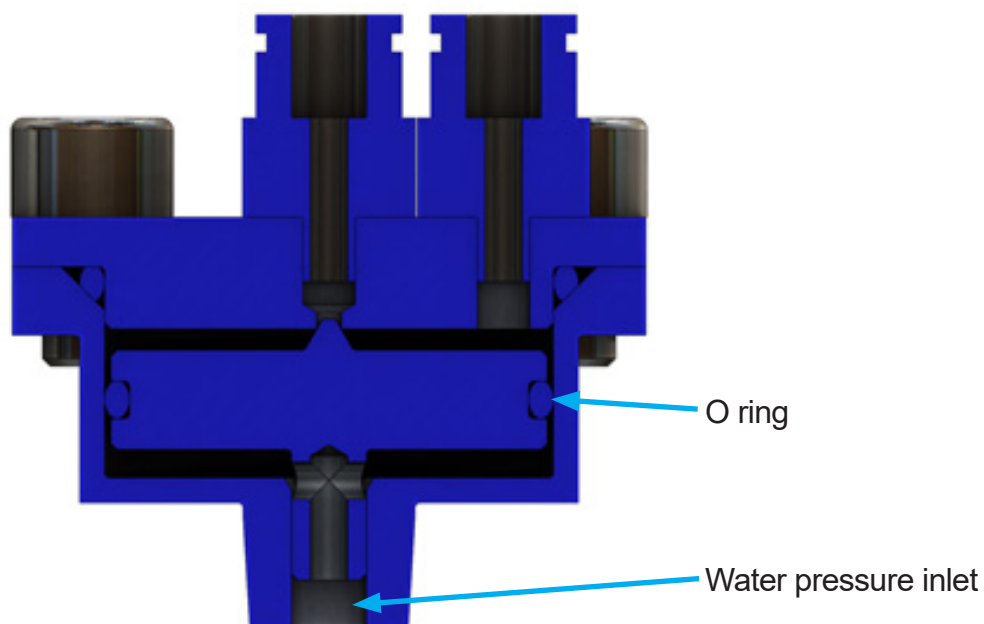
- c. Close the discharge valve completely on the CAFS manifold.
- d. While observing the duplex gauge, engage compressor clutch with the BLUE AIR power button  and increase engine speed and pump pressure to 75 PSI. Air pressure should follow & match while maintaining a stable reading.

- e. Adjust the flow valve located on the side of the air intake to increase or decrease the air flow/pressure for the compressor. Adjust the snubber valve on intake valve body (located on the top of the air compressor) to dampen out pulses and fluctuations to achieve smooth operation as indicated on the duplex gauge.
- f. Lock in place with lock nut. Repeat for "g" through "i" to fine tune compressor air pressure/water pressure match.



Compressor Intake Adjustment

- g. Increase engine speed to 100 psi. Air pressure should follow.
 - h. Increase engine speed to 125 psi. Air pressure should follow.
 - i. Increase engine speed to 150 psi. Air pressure should follow.
 - j. Slowly reduce engine speed to 900 RPM. (Compressor will make howling noise that is much louder if speed is reduced quickly).
3. If the system is still not tracking then there might be an issue with the air balance valve.
 - a. If you can't get the system to go wet, but can get it to go dry or there is a large delay in air pressure when increasing/decreasing water pressure. Grease the o-ring indicated in the diagram below.
 - b. If you can't get the pressure to match in either wet or dry operation the air balance valve may be damaged. Remove the air balance valve and measure the ID of the water pressure inlet, if it is less than 5.97 mm it may be damaged.



Air Balance Valve (61215) Cross Section

MAINTENANCE SCHEDULE PC2_/PC1_

Note: The Godiva Compressor service intervals replace those in the Gardner Denver Compressor manuals.

Equipment	Action	Procedure
Every 3 months		
Pump, PC1 or PC2	Check the pump and gearbox oil levels	Pages 23-25
	Do a vacuum test to test for leaks	
Pump, PC2 only	Clean the high pressure filter	
Compressor	Check the oil level and top up if necessary. Run compressor for 15 minutes	Page 23 for CAFS50/100. Page 31 for CAFS200
	Check the drive belt tension and condition.	Pages 27-29
Mixing manifold	Grease air ratio control valve	
FoamLogix 2.1A, 3.3, 5.0, 6.5	Check that foam pipe connections are tight	See FoamLogix manual
	Operate the system in bypass to move the concentrate and prevent gelling (if concentrate is left in the system without use for three months)	
Every 12 months		
Pump, PC1 or PC2	Change the bearing housing oil	
Compressor	Change the air filter	
	Change the oil and filter	
Gearbox	Change the gearbox oil	
FoamLogix 2.1A, 3.3, 5.0, 6.5	Inspect wiring/connections, hoses/connections	
	Clean the foam strainer	
	Verify water flow calibration	
	Verify foam feedback calibration	
Every 24 months		
Pump, PC1 or PC2	Replace the primer seals	
	Replace the priming valve seals and diaphragm	
	Test the thermal relief valve	
Compressor	Replace the oil separator element	
Every 5 years		
Compressor	Replace the compressor drive belt	
<p>IMPORTANT! In high usage or abnormal operating conditions, the above procedures may need to be more frequent.</p> <p>The best practise is to flush the system after each use.</p>		

MAINTENANCE OPERATIONS

PC2 Pumps Strainer - High Pressure

- 1) Remove strainer / Cap assembly
- 2) With care, remove debris from the strainer by washing.
- 3) The Dowty seal may be reused if free from damage or cuts.
- 4) Re-fit the strainer assembly and secure.



Strainer - high pressure

Gauges

Do not clean the glass surfaces of the gauges with abrasive or solvent cleaners. These will cloud the glass surface. Use a mild detergent and water.

CAFS Mixing Manifold – Greasing Ball Valve

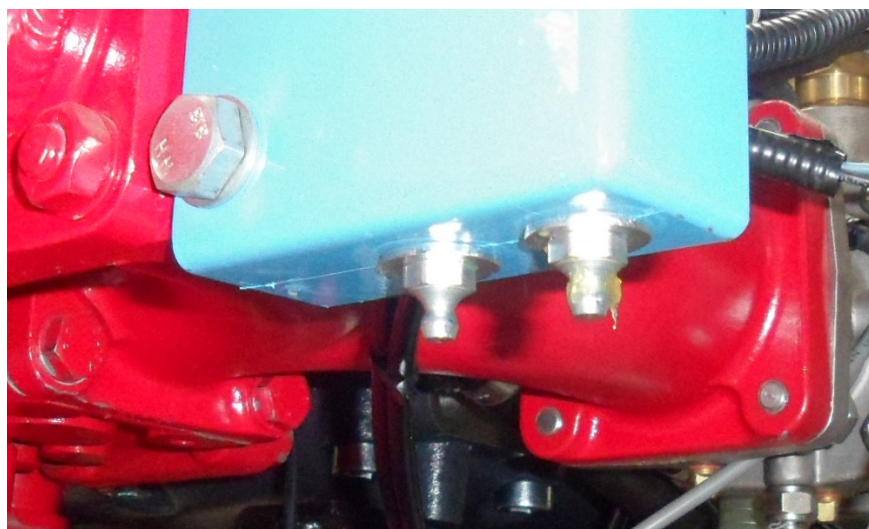
Prima SmartCAFS50 / 100

The CAFS Mixing Manifold contains a ball valve as part of the air ratio control system.

This ball valve must be maintained by inserting lubricating grease at three monthly intervals to ensure smooth and efficient operation.

Use a marine waterproof grease, e.g “Aquaslip” (supplied by Tetrosyl Ltd., Bury, Lancashire, BL9 6RE. www.tetrosyl.com)

The CAFS mixing manifold is fitted with two grease lines, these allow grease to be inserted from the front panel.



Prima SmartCAFS200

On the SmartCAFS200 model the mixing manifold is located at the OEM vehicle builders discretion. There are no grease lines fitted. The grease is inserted through one or two grease nipples. The first nipple is located on the side of the valve facing the discharge end of the manifold. If a second nipple is fitted, it will be on the other side of the manifold. Connect a suitable grease gun to the nipple and insert grease until a resistance is felt, this indicates that sufficient grease has been inserted.

Vacuum Test

Place the blanking cap(s) in position on the inlet(s) of the pump and close the delivery valves. Run the pump at 1300-1500 rpm and observe the vacuum/compound needle. When a vacuum of 0.81bar is obtained, stop the pump. This vacuum should be maintained for at least 15 seconds or drop no more than 0.07bar in a minute.

If the pump will not hold the vacuum with the blanking caps in position, a leak is present in the pump, and the pressure test detailed below must be carried out to trace it.

Should the pump not reach a vacuum of 0.81bar but will hold a lower pressure, a fault in the priming system is indicated.

Pressure Test - carried out without pump running

This test is to be carried out if the pump will not hold a vacuum with blanking cap(s) in position, and is intended to trace the leaks responsible for the loss of vacuum.

Apply a water pressure of 3.5 - 7.0 bar to the pump and check for leaks. The area causing the leak should be visible, and can be dismantled and rectified.

Check each primer drain hole for water leakage. If leakage is found, replace the primer seals and O rings as described in the Maintenance Manual Procedures.

If the pump will not achieve 0.81 bar vacuum, and will not hold what it does achieve, there is a leak, and possibly also a fault, in the priming system.

If no leaks are apparent, the leakage must lie between the priming valve and the primer. Points to be checked are:

The inlet seal in the primer end cap

The priming valve diaphragm

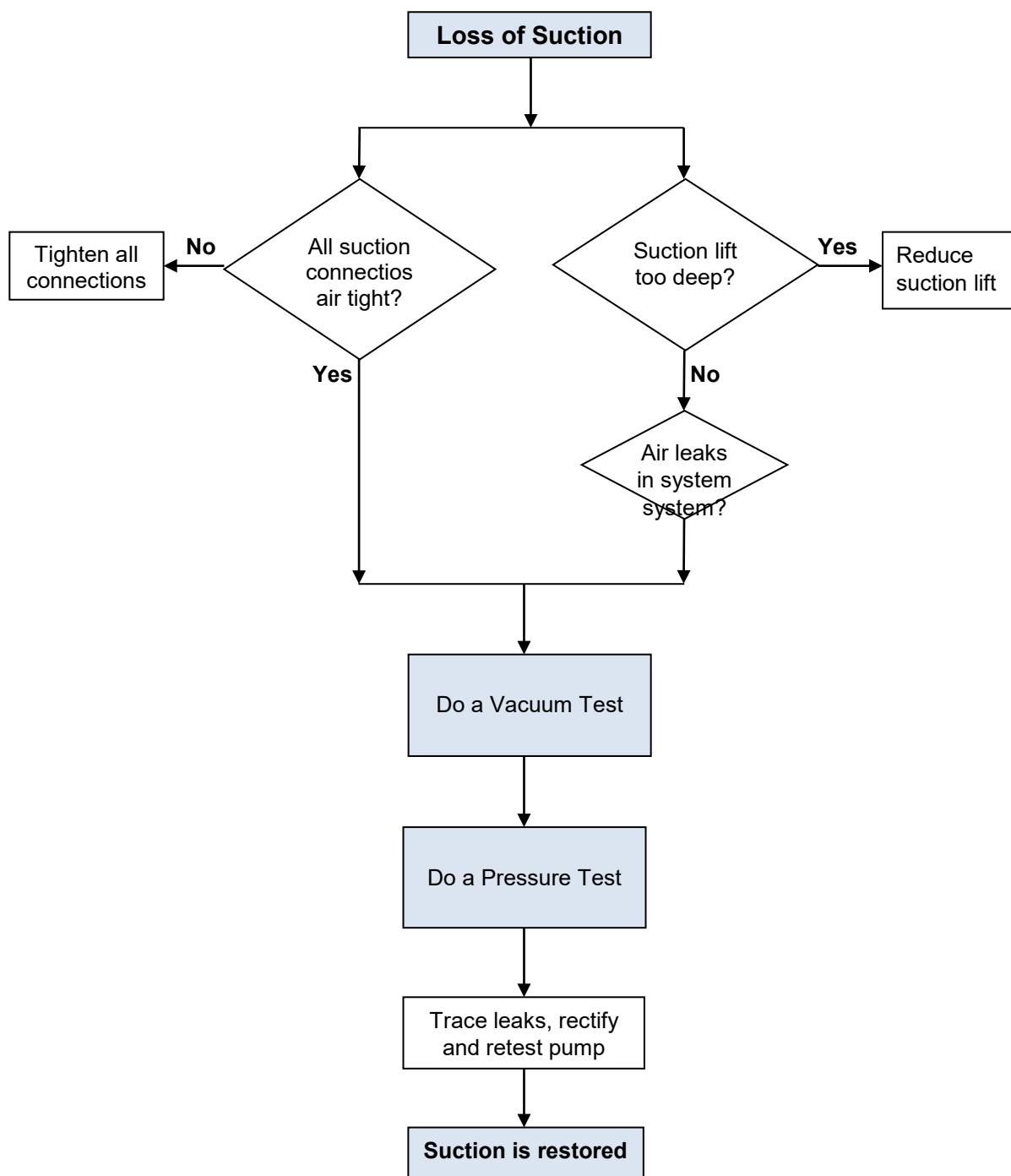
Thermal Relief Valve (TRV) Test

With the pump primed, close all discharges. Run the pump, with high pressure selected, at approximately 2800rpm to permit it to heat up. The TRV should open and discharge water when the pump temperature is in the order of 45 - 55°C with the standard temperature option and 70-75oC with the high temperature option. Observe the valve discharge, if it is open to atmosphere, or feel the discharge pipe become warm if it returns to the vehicle tank. Open a pump discharge valve to permit cool water to enter the pump. The flow from the TRV should now cease.

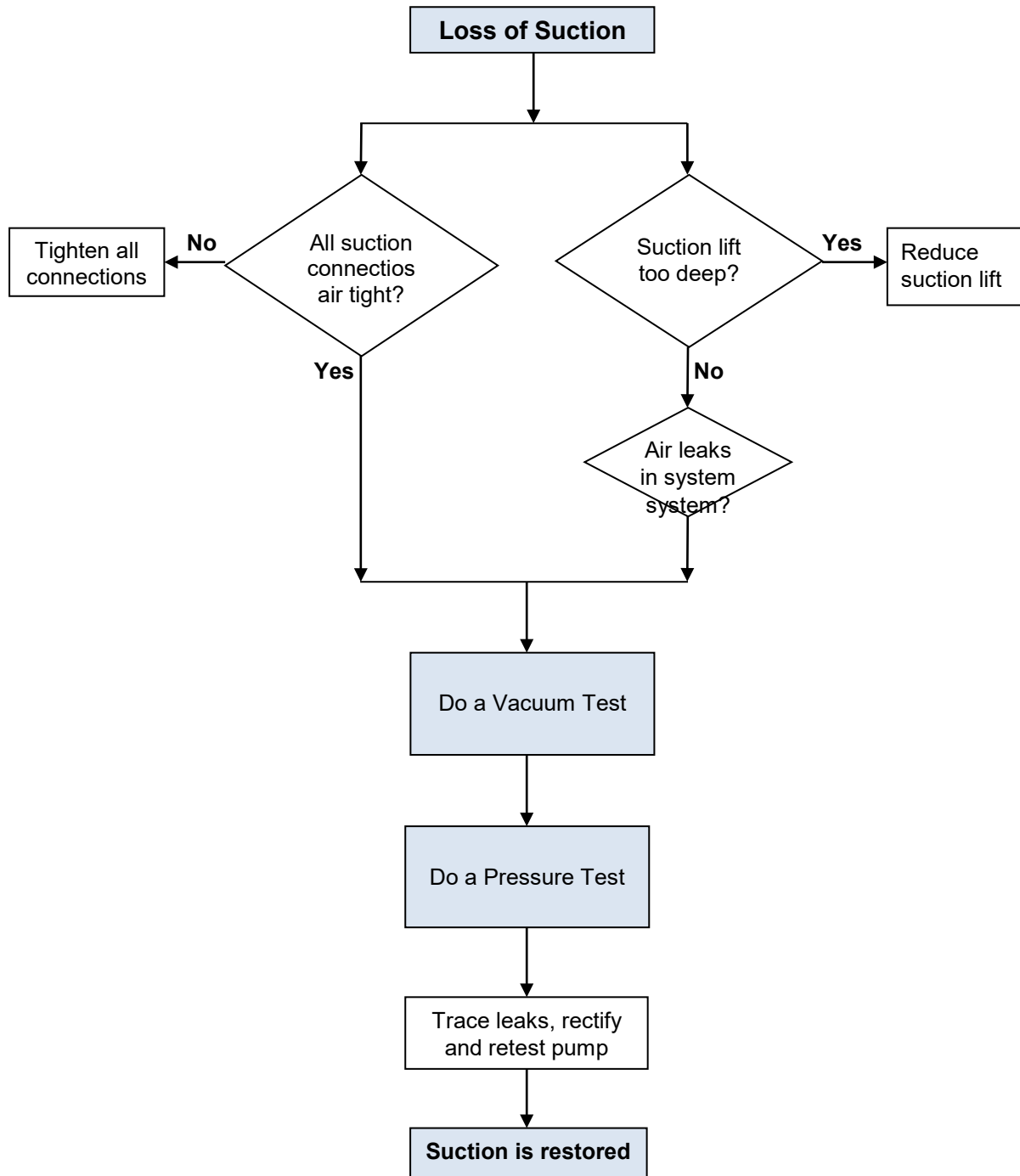
FAULT FINDING

Note: For specific FoamLogix model trouble shooting, please refer to the relevant FoamLogix 2.1A or 3.3/5.0 Description, Installation and Operation manual.

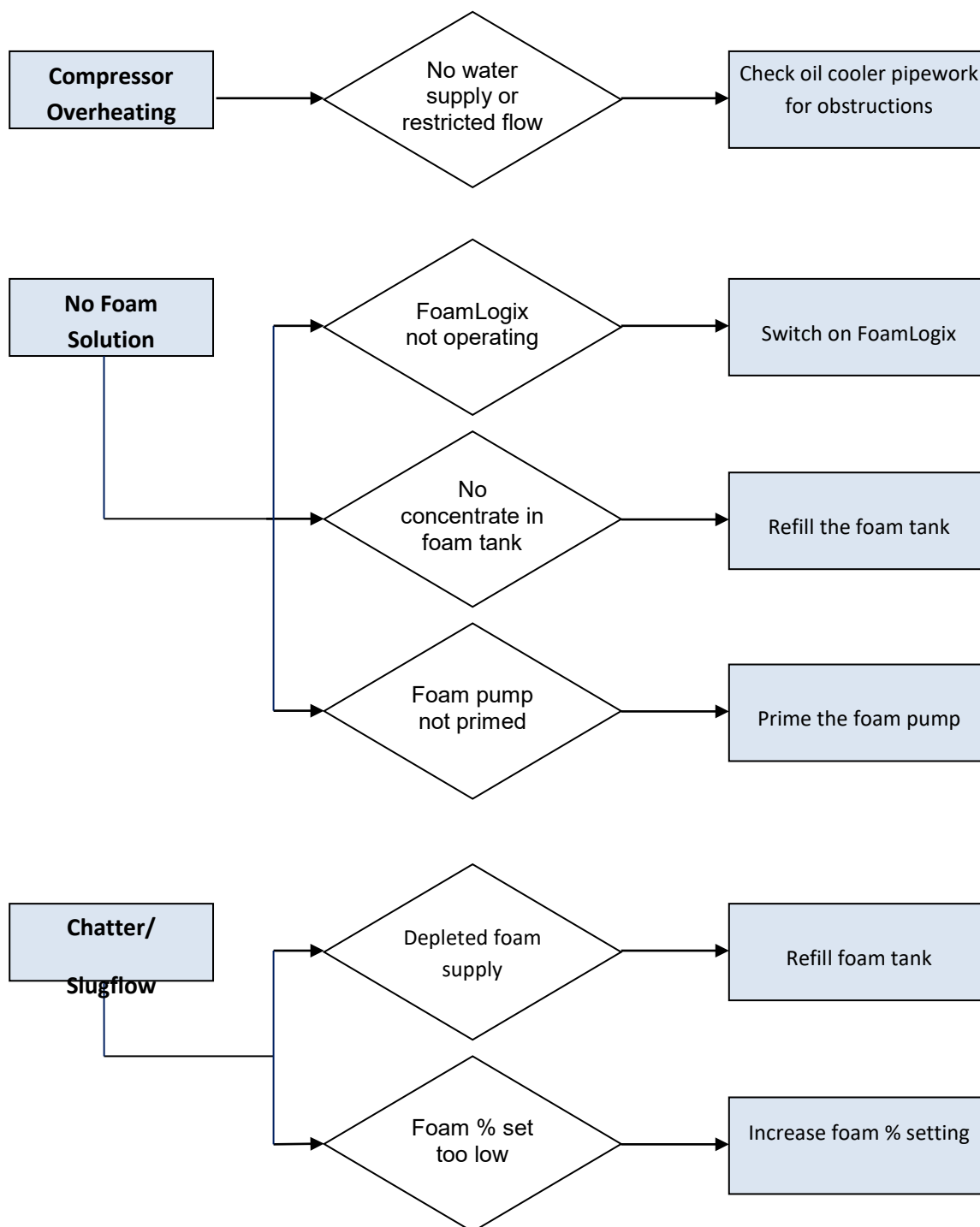
PUMP OPERATING FAULTS 1 – LOSS OF SUCTION



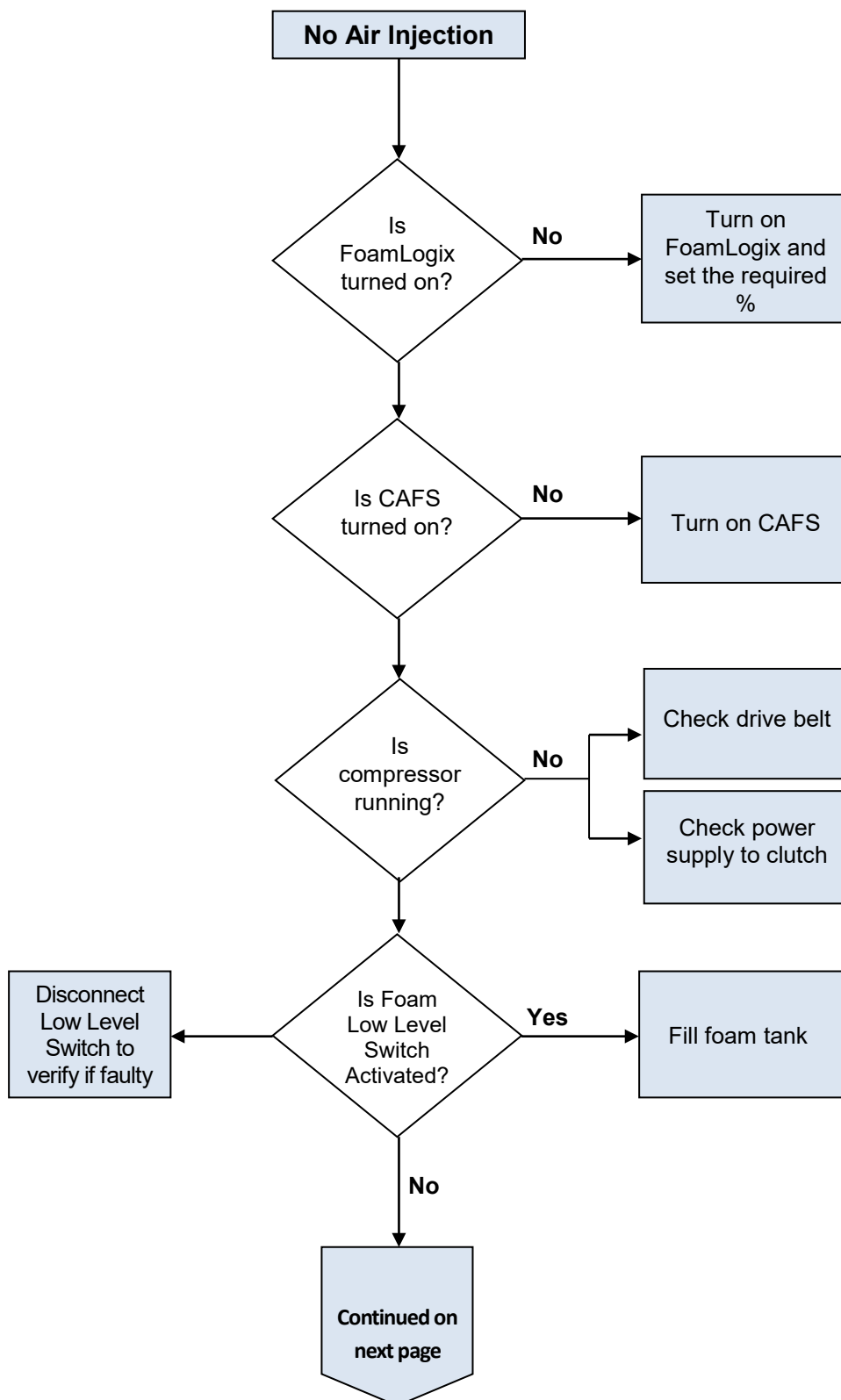
PUMP OPERATING FAULTS 1 – EXCESSIVE PUMP NOISE



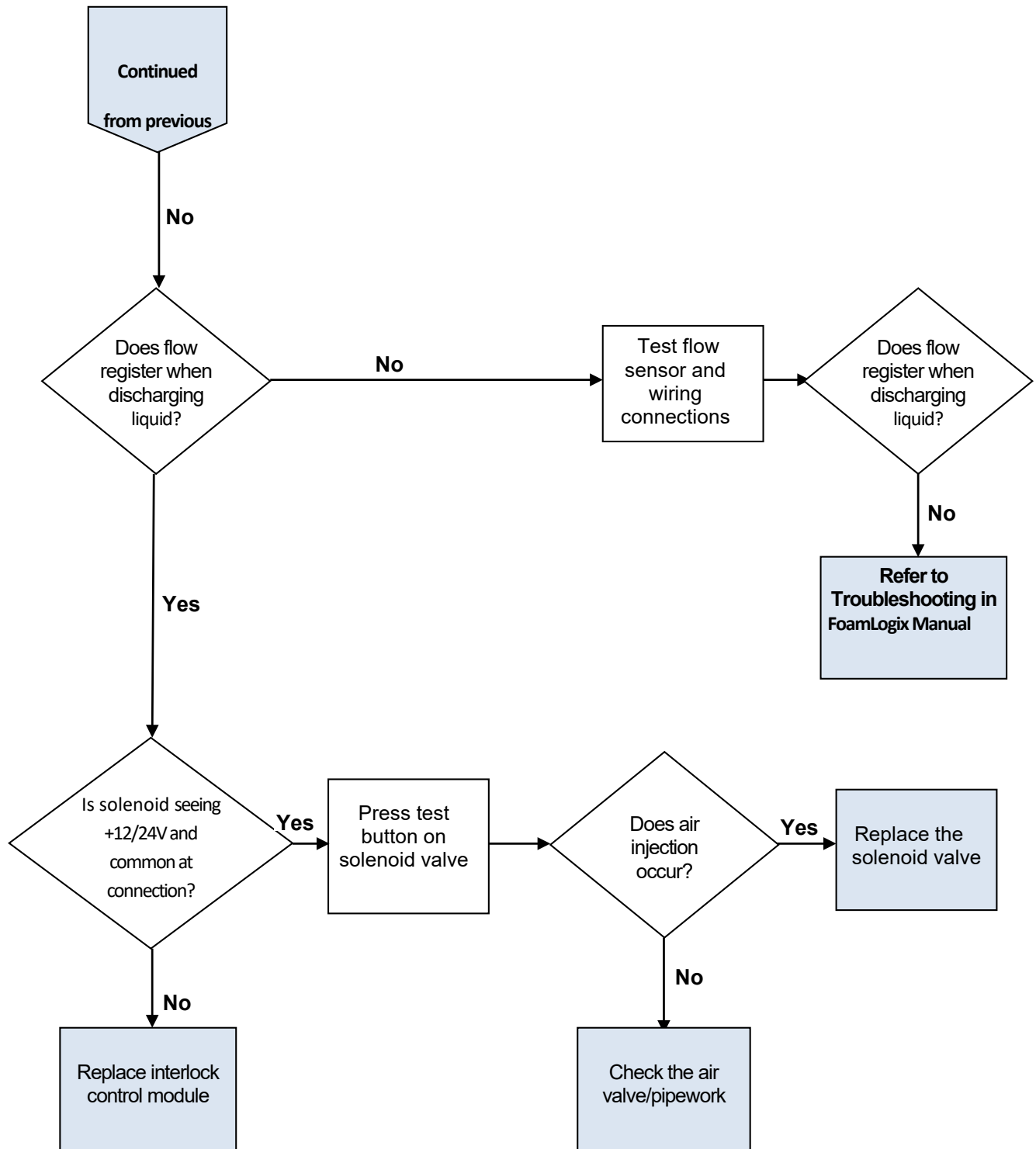
GENERAL OPERATING FAULTS – CAFS



AIR INJECTION FAULTS



AIR INJECTION FAULTS continued



PARTS LISTS

Godiva Prima pump illustrated parts list
Please refer to Godiva Ltd.

Compressor illustrated parts list
Please refer to:
Prima SmartCAFS50 - Gardener Denver Tamrotor Tempest 3 manual.
Prima SmartCAFS100 - Gardener Denver Tamrotor Tempest 6 manual.
Prima SmartCAFS200 - Gardener Denver Enduro 12 manual.

Foamlogix illustrated parts list
Please refer to:
FoamLogix Model 2.1A Description, Installation and Operation manual,
part number 029-0020-74-0.

FoamLogix Model 3.3/5.0/6.5 Description, Installation and Operation manual,
part number 029-0021-68-0-A

RECOMMENDED SPARES KIT FOR BI-ANNUAL SERVICE

Qty	Description	Part Number	Comment
Prima SmartCAFS50 / 100			
Compressor Tamrotor 3			
1	Separator element	59271/02	
4	Filter - Oil	59271/01	
2	Filter - Air	59271	
1	Belt - Drive	60578/01	
As required	Tensioner - Belt drive	60579	
Compressor Tamrotor 6			
1	Separator element	TAM-03498328	
4	Filter - Oil	TAM-89675429	
2	Filter - Air	TAM-81166609	
1	Belt - Drive	60578/03	
As required	Tensioner - Belt drive	65447	
Prima Pump			
As required	Strainer - Hi Pressure	60051	Not PC1_ series
4	Washer - Dowty - Oil drain	UFP 2303/08	
2	Washer - Dowty - High Pressure strainer	UFP 2303/15	Common part
2	Washer - Dowty - NRV Inlet	UFP 2303/10	Common part
Prima SmartCAFS200			
Compressor Enduro 12			
4	Filter - Oil	70025	
2	Filter - Air	010-0690-00-0	
1	Belt - Drive	61291	
As required	Tensioner assembly - Belt drive	61198/002	
Prima Pump			
As required	Strainer - Hi Pressure	60051	Not PC1_ series
4	Washer - Dowty - Oil drain	UFP 2303/08	Common part
2	Washer - Dowty - High Pressure strainer	UFP 2303/15	
2	Washer - Dowty - NRV Inlet	UFP 2303/10	Common part

PRIMA SMARTGOV SPARES

Spares - as needed for the whole life of the pump

Item	Qty	Description	Part Number	Comment
1	1	SmartGOV Display	599-00034	In panel
2	1	Matrix Governor	610-00052	Right side of pump*
3	1	Kit, CAN Connectors	599-00038	
4	1	Twister CAN control	C1-119970	In panel
5	1	Harness, Twister	513-00176-000	Connected to Twister
6	1	Harness, SmartGOV	513-00119-000	Connected to SmartGOV
7	1	Transducer 300 PSI 0-5V ABS, Vacuum	200-00092	Suction tube
8	1	Transducer 600 PSI 0-5V ABS, Low Pressure	200-00108	Low pressure manifold, or on later models the suction tube
9	1	Transducer 1000 PSI 0-5V ABS, High Pressure	200-00126-000	High pressure manifold
10	1	Harness, SmartCAFS & GOV	513-00165-000	
11	1	Interlock control mounting bracket	65114	Right side of pump
12	1	PDM-8 Outlet	610-00034	Right side of pump
13	2	Spacer	048-00098-000	For above
14	2	Washer	MS25/7	For above
15	2	Bolt	MS16/70	For above
* When viewed from the front or suction tube part of the pump.				

OPERATOR MAINTENANCE LOG

Pump serial number

Use this log to record faults, part replacements and major overhauls.

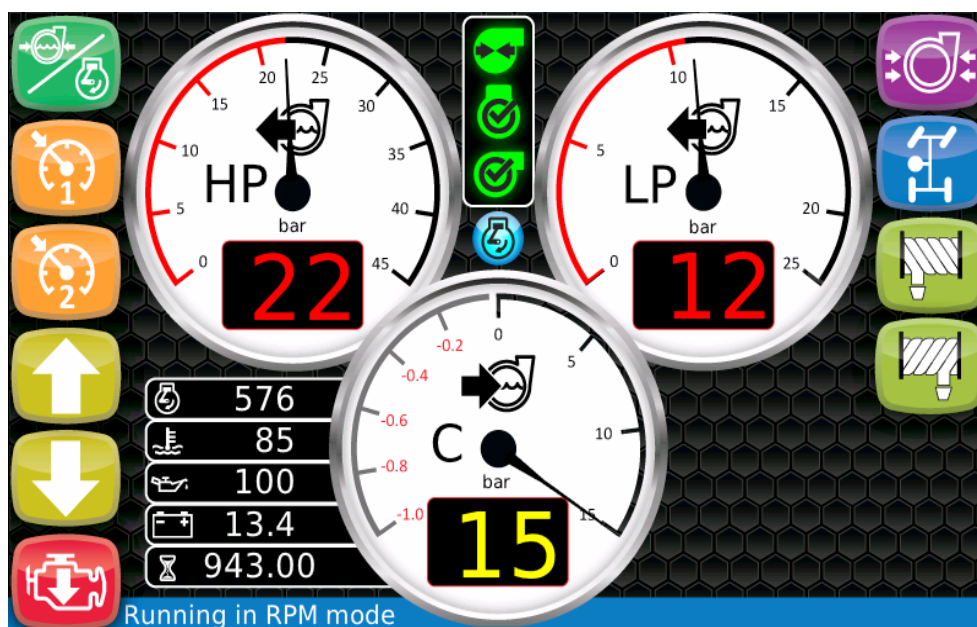
Please contact Customer Service at **Godiva Ltd.** prior to any proposed return of either a single part, or a complete assembly.

[illegible]

Supplement to UV SmartCAFS Manual

UV SmartGOV Operation

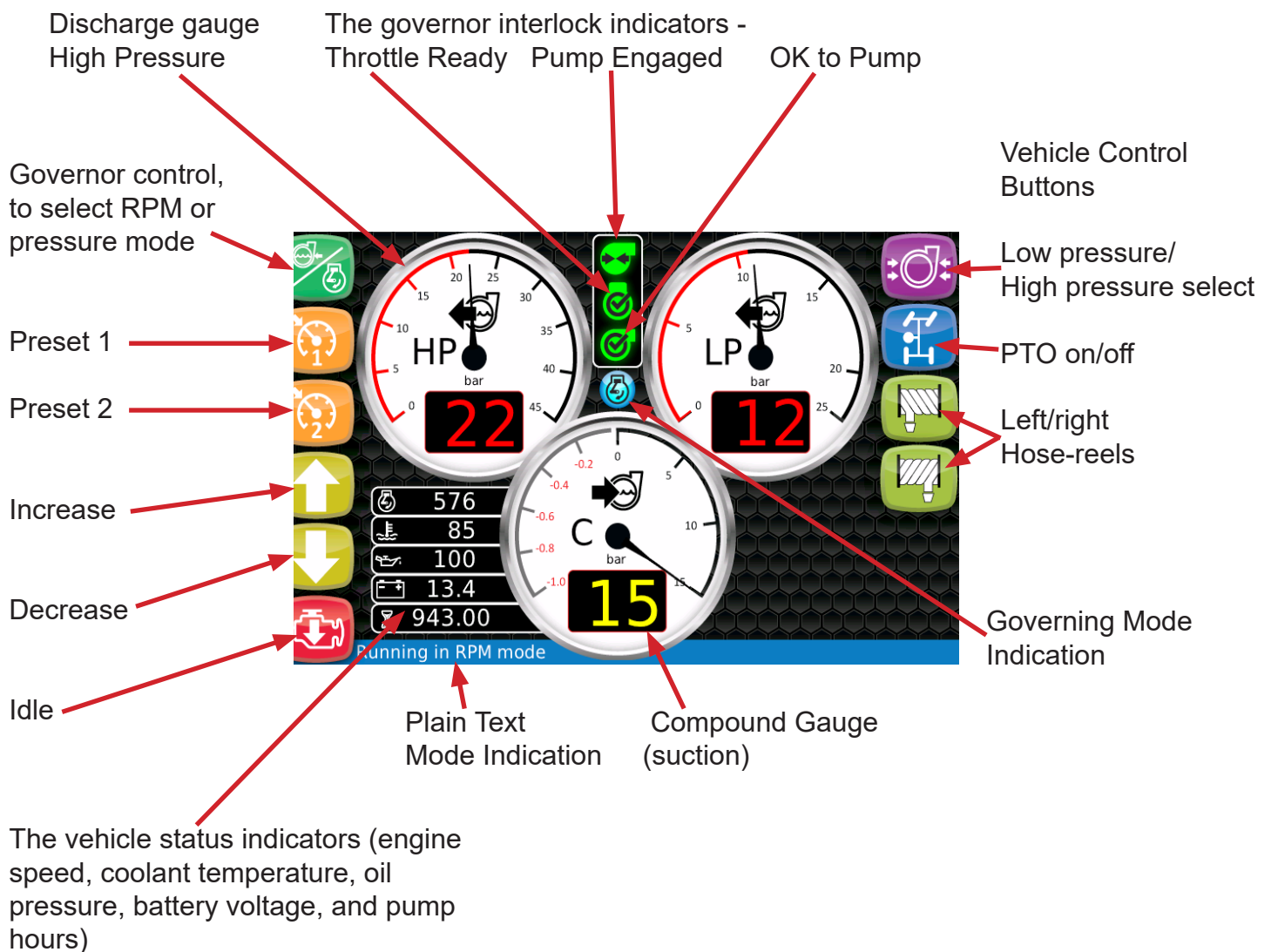
UV700 Matrix Governor display



1.1. Governor screen

Note: The Control Buttons appearing on the screen once powered up will depend on the actual vehicle settings and configuration. Contact your vehicle builder or the factory for more details. The vehicle builder may have done some specific settings within the Setup-Menu to meet certain operation requirements. The settings can be changed by authorised personnel.

The governor screen shows all aspects of the pump operation:



The buttons on the left side of the screen will control the pump pressure by adjusting the engine speed. Engine speed can be controlled manually with the up and down arrow buttons or automatically by selecting a preset (rpm or pressure). There are two presets for rpm and pressure each. If “Auto Mode” is not selected in the Setup Menu, it is required to select a mode (rpm or pressure) as the first operation step before changing the engine speed manually or requesting a preset.

- RPM Mode will maintain a user pre-set engine speed independently from the load on the engine
- PRESSURE Mode will maintain a user pre-set pump pressure independently from the flow rate of the pump (within the limits of the pump’s physical capacity)

The buttons on the right side of the screen will control the pump and related functions like:

- Engaging PTO
- Switching from HP to LP Operation
- Opening Valves for the HP Hose-reels
- Two additional functions are available that can be configured by the vehicle builder

The Display comprises the following:

- Pressure on “Normal Pressure” outlets (LP)
- Pressure on “High Pressure” outlets (HP)
- Pressure on the pump inlet (Compound Gauge) which will be positive when the pump is fed by a pressurised water supply (Hydrant) or negative when the pump is drafting water through a suction hose.

A window shows engine data transmitted via SAE J 1939 CAN from the engine. This could be RPM, oil pressure, coolant temperature, engine hours and chassis battery voltage.

1.1.1. Interlock indicators

The interlock indicator icons illuminate green when interlocks are active.



Pump engaged active



Throttle ready active



Okay to pump active

1.1.2. Governing mode indicator

The governing mode indicator will show the current operating mode



Pressure mode active











RPM mode active

1.1.3. Governor control buttons

The governor control buttons (excluding the mode button) are grey when a mode is not currently selected. To select a mode – ensure the interlocks are active and then press the mode button. Subsequent presses of the mode button will toggle the governing mode between rpm and pressure.

1.1.4. Vehicle control buttons

All buttons (excluding primer) are toggle buttons. The primer button is momentary.

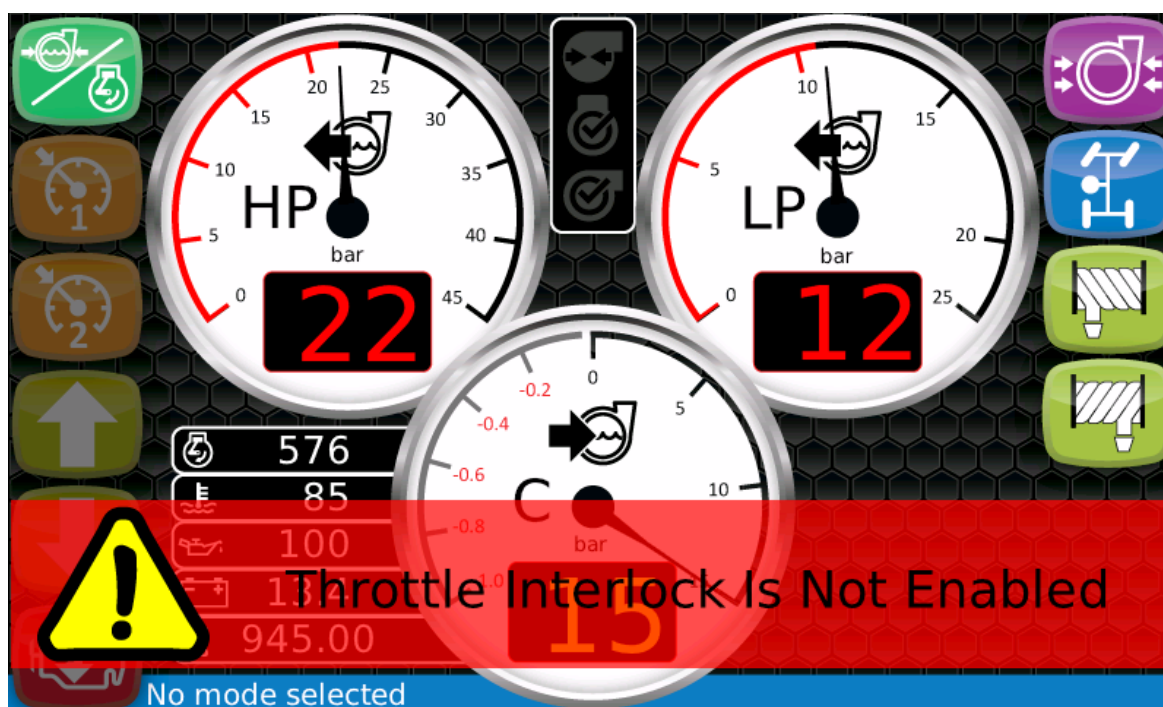
 LP select	 HP select	 Left Hose-reel OFF	 Left Hose-reel ON
 PTO ON	 PTO OFF	 Right Hose-reel OFF	 Right Hose-reel ON

Note that the Display is capable of two additional functions which may be configured by the vehicle builder. As an example these functions could be:

- Opening a “Pump to Tank” valve.
- Opening a “Direct Tank Fill” valve

1.1.5. Warnings

Warnings will pop-up within a red banner and will provide a clear explanation of the current warning.



2. Operation

2.1. Initialization

Upon powering up, the UV700 display will search for the Matrix cycling between 250K and 500K baud rates. Once the Matrix is found the display will stop cycling. Please note that the Matrix does the same cycling process when searching for the engine.

2.2. Operating Mode Selection

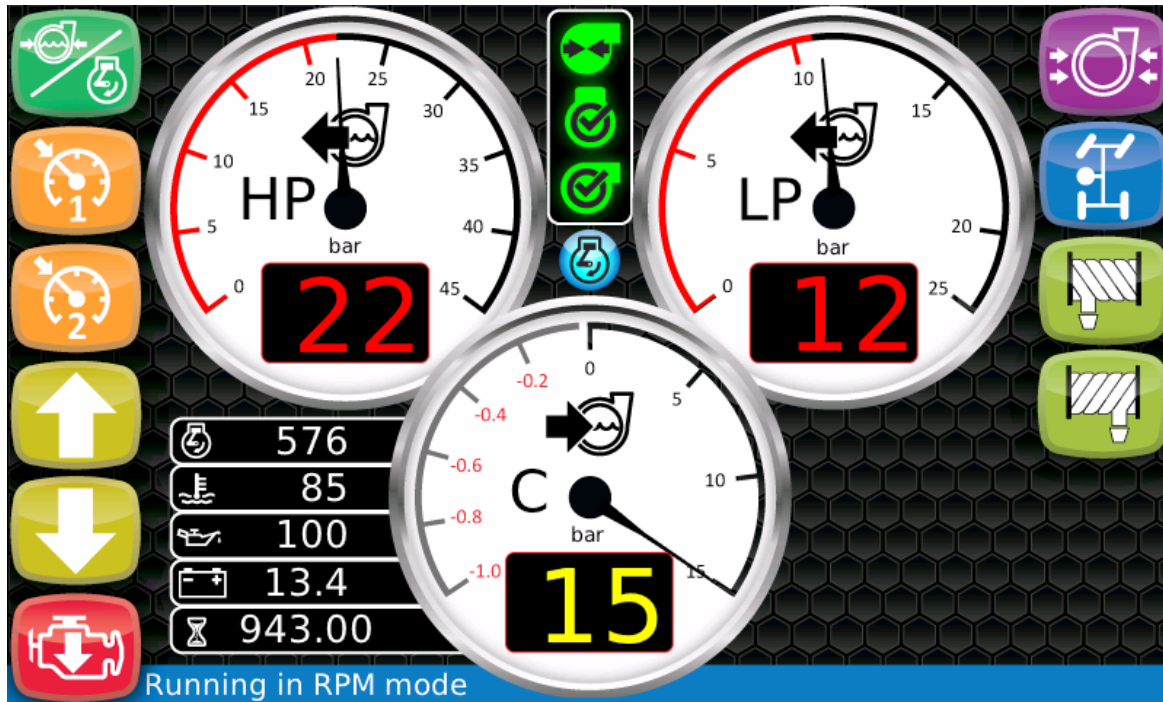
2.2.1. Throttle Mode

In throttle mode the display will transmit RPM based commands from the Presets and Increase/Decrease buttons. Throttle mode requires that the Throttle Ready interlock be active. Any loss of this interlock will send the governor and engine into Idle mode.



2.2.2. Pressure Mode



In Pressure mode the display will transmit Pressure commands from Presets and Increase/Decrease buttons. Depending on the Units the gauges on screen may change but their location will not. Pressure mode requires all interlocks to be active. If an interlock is lost the governor will drop to Idle mode.



2.3. Operation Step by Step



2.3.1. Start Operation

1. The Engine must be running and the screen will show engine data such as rpm, temperature etc.. Parking brake must be applied  PTO must be engaged  the "Okay to Pump" indicator will show.



Note: Depending on configuration the PTO button on the right side of the screen can be used to engage  or disengage  PTO.



2. A mode must be selected by pressing the appropriate button (top green on left) this could be rpm mode  or pressure mode . Pressure mode will maintain the desired pump pressure even if flow conditions will change.

3. It is now possible to change the engine speed or pressure by using the yellow UP or DOWN arrow buttons.

Alternatively one of the Presets (orange buttons) can be pressed and the desired value will be adjusted and maintained.

The actual Pump Pressures will show on the gauges.

4. If necessary the pressure on the HP Hose-reels can be selected by choosing HP  to LP  options.

5. To control the valves on the installed Hose-reels an OPEN button  or CLOSE button  can be used.

6. For additional functions refer to the instructions given by the truck builder.

2.3.2. During Operation

- The selected pressure or rpm values will be maintained automatically. Pressures and engine data can be monitored on the screen.
- Selected values can be changed at any time by using the UP or DOWN buttons or selecting another Preset.
- Valves can be controlled at any time, HP – LP may be selected as required.

2.3.3. End of Operation

- Close the necessary discharge valves
- Reduce pump- pressure or engine speed
- Press the IDLE button (lower red button on the left)
- Disengage PTO

3. Warning and Error Messages

3.1. List of Warning/Error Messages

3.1.1. Throttle Interlock is Not Enabled

This warning will pop up when the user attempts to enter a mode and the Throttle Interlock is not active.

3.1.2. Pump Engaged Interlock Not Enabled

This warning will pop up when the user attempts to enter Pressure mode and the Pump Engaged Interlock is not active.

3.1.3. Okay to Pump Interlock Not Enabled

This warning will pop up when the user attempts to enter Pressure mode and the Okay to Pump Interlock is not active.

3.1.4. DM1 Errors

This warning will pop up when a DM1 error becomes active on the bus and will provide the SPN, FMI, Source address and description of the DM1 being transmitted.

SmartGOV - Installer Connections

These connection details apply to pumps where a SmartGOV is installed.

Electrical power, and in some instances, compressed air supply to the pump are required for full operation.

There are several connections that the vehicle builder will have to make in addition to connecting to the 26way plug located at the lower left side of the panel.

The electrical and air connections are specified below -

Connection	Location/comment
C13 PDM Power input	Located adjacent to CAFS Manifold. Connect +v to stud with 30A supply
C13 PDM Power output: PTO Engage	Located adjacent to CAFS Manifold. Pin 1. Red/Blue cable pigtail
C13 PDM Power output: Pump tank fill	Located adjacent to CAFS Manifold. Pin 5 Orange cable pigtail
C13 PDM Power output: Auto tank fill	Located adjacent to CAFS Manifold. Pin 8 Blue/White cable pigtail
C7 Overheat Alarm	Pigtail Behind panel. Connect to alarm if required
C15 ECU connection for Analogue throttle, if applicable	Behind panel. 3way sureseal connector
C14 Throttle and pump signal	Behind panel. 2-way sureseal connector, +v input required when active
Engine CAN	3-way Deutsch connector behind panel
Tank level	3m cable to connect to tank level sensor
Vehicle Air. Required if pneumatic valves are fitted	6mm nylon hose behind centre of panel

