World Series Pump with Integrated SmartCAFS

Models: WT_C or WS_C with FoamLogix 2.1A & 3.3/5.0 Systems and SmartCAFS Control (from July 2006)

Installation and Operation Manual

GODIVA LTD.
A Unit of IDEX Corporation
Charles St
Warwick CV34 5LR
England

+44 (0)1926 623600

+44 (0)1926 623666

www.godiva.co.uk
godiva@idexcorp.com

GP/249
Issue 2, April 2012

AMENDMENT RECORD

Model: WT_C or WS_C with FoamLogix 2.1A or 3.3/5.0 Systems and SmartCAFS Control

Mod	Date	Page/s	Amendment	New Issue No.
1	July 2006	All	New Issue	Issue 1,
2	April 2012	10	Gearbox oil capacity – now 1.2 litres	Issue 2.

CONTENTS

INTRODUCTION

This manual contains information relevant to Godiva single or multi-pressure World Series Pumps, when partnered with Compressed Air Foam Systems (CAFS) FoamLogix Models **2.1A** and **3.3/5.0** and the SmartCAFS control system.
Distinction between the two models regarding Installation, Maintenance, Operation and Specification is clearly noted with text and illustrations. Installation is the key difference between the two models with the **2.1A** being pump mounted and the **3.3/5.0** vehicle (remote) mounted. Other than performance, foam capability and installation of the FoamLogix units, the Godiva components are common.
For further information on the FoamLogix **2.1A** and **3.3/5.0** Foam Proportioning Systems, MDTII Manual Dual Tank Selector (for 3.3/5.0 system) and Intelli-tank Water/foam level display unit, please see the separate manuals supplied.

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 Installation and Set-up (Oil Filling Points) before operation.

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

Do not run the pump without water in the pump casing.

The heat exchanger system requires a minimum differential pressure of 3 bar to be maintained. To prevent overheating, adequate cool water must be circulated through the pump unit heat exchanger.

The terms ‘Left Hand’ (LH) and ‘Right Hand’ (RH) apply when the pump unit is viewed from the suction tube end; for the purposes of this document, this is regarded as the front of the assembly.

SAFETY - RELEVANT DATA

Thank you for purchasing a Godiva Pump.

Godiva Pumps are designed to give safe and reliable service. BEFORE use however, it is essential that the Operating and Installation Instructions are carefully read and understood.

Maintenance

It is the responsibility of the user to ensure that the equipment is maintained in a safe operational condition. Local legislative conditions may apply. UK only, Maintenance (Regulation 5) of the Provision and Use of Work Equipment Regulations 1998 applies.

Training

It is ESSENTIAL that Godiva pumps are operated ONLY by TRAINED PERSONNEL. Please contact Godiva Ltd to discuss your training needs.
Follow the operating procedures laid down in this document and avoid personal injury.

Safety Points

The following points apply to pumps driven by petrol, diesel or other means:

DO NOT OPERATE the unit close to flammable materials or structures.

DO NOT SMOKE while operating the unit.

DO NOT inhale fumes or gases.

Avoid prolonged skin contact with fluids, particularly if corrosive or carcinogenic.

When in use, keep ALL UNTRAINED people AWAY from the unit.

Where appropriate, eye protection should be worn.

Isolate the electrical supply when working on the pump.

Batteries produce EXPLOSIVE GASES, do not expose to sources of heat and naked flames.

DO NOT lift heavy weights without assistance.

DO NOT remove protective guards or shields.

Noise

Operators must wear suitable EAR PROTECTION when the pump is running.

ENVIRONMENTAL PROTECTION

It is prohibited to pour engine oil and other contaminants onto the ground, down sewers, drains, or into water courses.
Dispose of lubricants through authorised waste disposal contractors, licensed waste disposal sites, or to the waste reclamation trade.
If in doubt, contact your Local Environmental Agency for advice regarding disposal policies.

GENERAL DATA

Compressor

Model	Tempest 3
Maximum Operating Speed	10000 rev / min
Nominal speed of operation	6250 rev / min
Nominal power consumption	12.0kW
Direction of rotation	Anti-clockwise (viewed on pulley)

Cooling System

Type	Oil / Water Shell & tube type
Cooling water flow-rate	10 / 15 Litres / Min at 7.0 Bar

Foam Proportioning System 2.1A - Class A Foam Compatible

Manufacturer	Hale Products Inc
Model	FoamLogix 2.1A
Type	Electronic foam proportioning system
Operating voltage	12 and 24 volt systems available
Fuse rating 12V / 24V	50 / 40 amp
Current draw (Operating) 12V / 24V	25 / 13 amp
Current draw (Max) 12V / 24V	40 / 20 amp
Wire size 12V / 24V	Minimum 6.0mm^2
Max. Foam Agent Flow rate	8.0 Litres / Minute

Foam Proportioning System 3.3/5.0 - Class A and B Foam Compatible

Manufacturer	Hale Products Inc
Model	FoamLogix 3.3/5.0A
Type	Electronic foam proportioning system
Operating voltage	12 and 24 volt systems available
Fuse rating 12V / 24V	60 / 40 amp
Current draw (Operating) 12V / 24V	30 / 24 amp
Current draw (Max) 12V / 24V	60 / 30 amp
Wire size 12V / 24V	Minimum 8.5mm^2
Max. Foam Agent Flow rate	12 Litres / Minute

Direction of Rotation - Gearbox Input Flange

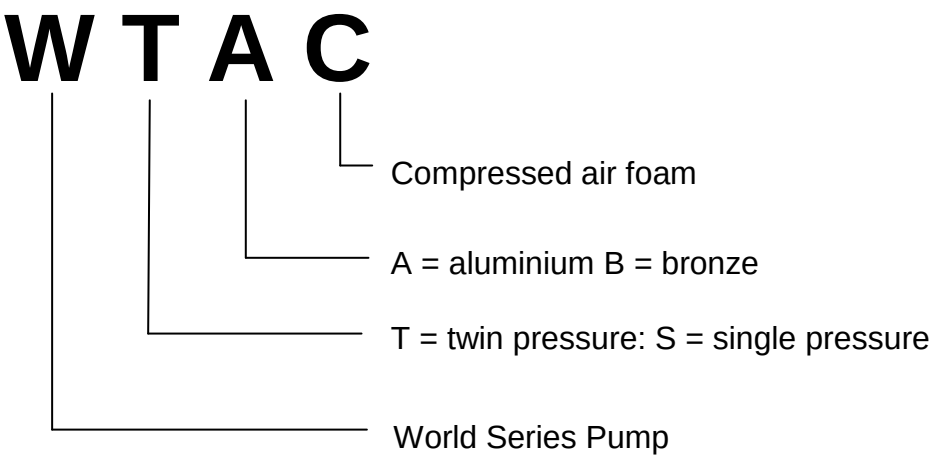
Clockwise only - viewed on gearbox input drive flange

LUBRICANTS

Compressor	**Recommended:** Screw compressor oil in compliance with ISO Viscosity grade 32 to 46. **Alternative:** SAE 10W/40 automotive multigrade oil. Capacity 3.5 litres - (approximately 4.0 litres with filter change)
Pump Gearbox	Capacity 1.2 litres approximately **Recommended:** BP Energol GR XP 68 or similar
Pump Bearing Housing	Capacity 0.75 litres approximately. **Recommended:** 10W/40 or 15W/40 Multi-grade engine oil.

Model Identification System

Variations of the World Series pump with CAFS are identified thus:



RECOMMENDED FOAM AGENTS

Hale FoamLogix Models **2.1A** and **3.3/5.0** approved Foam compatibility list.

Type of Foam Concentrate	Manufacturer	Brand Name
CLASS A FOAM		
US Forestry Service Approved	ANSUL	Silvex Class A Foam Concentrate
	Angus	Forexpan S (0.1%-1.0%)
	Chubb National Foam	1st Defense Class A Cold water Foam
	Chubb National Foam	Knock-Down
	Monsanto	PhosCheck WD881
	Chemonics	Fire-Trol Fire Foam 103
	Chemonics	Fire-Trol Fire Foam 104
	3M	Light Water FT-1150
Non U.S. Forestry Service Approved	ChemGuard	Class A Plus
	Unifoam Co. Ltd.	UniA 1%
	3M	Light Water SFFF
CLASS B FOAM		
AFFF- Alcohol Resistant Concentrates	3M	3% Alcohol Type AFFF Conc. (P/N 98-0211-6573-7)
	Ansul	3x3 Low Viscosity Alcohol Resistant Concentrate
	ChemGuard	AR 3%-6% Part # CAR36P
	ChemGuard	Ultraguard 1%-3% Part # C-133
	Angus	ALCHOSEAL **3.3/5.0**%
	Chubb National Foam	Universal Gold 3% AR-AFFF
	Chubb National Foam	Universal Gold 1% - 3% AR-AFFF
	US Foam	1-3% Alcohol Resistant AFFF (P/N US-AR13)
AFFF	Chubb National Foam	1% Aero-Water
SPECIALTY FOAM CONCENTRATES		
Protein	Chubb National Foam	Terra Foam 3% CF
	Chemonics	Durra Foam 3%
FIRE FIGHTING WATER ADDITIVE		
	Hazard Control Tech.	F-500 (1%, 3%, 6%)

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

Note: Valid from September 2005. Please contact your Hale representative if your foam is not listed.

MAJOR COMPONENTS AND CONTROLS

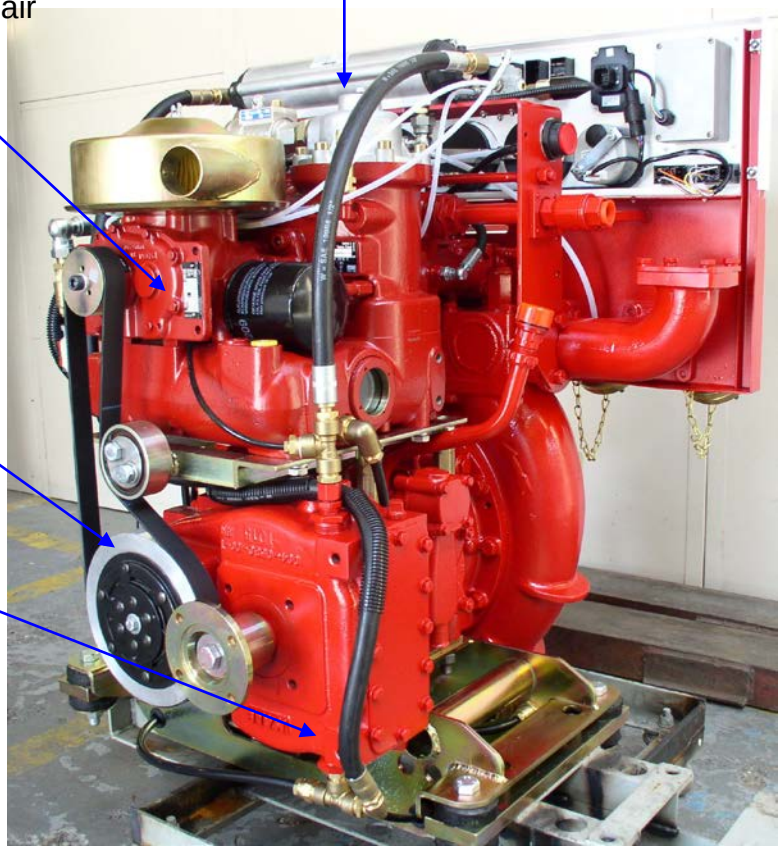
General Arrangement

Cooling: Oil to water heat exchanger

Rotary twin screw compressor with integral air receiver / separator and lubrication system

PTO driven Gearbox with compressor drive via an electromagnetic clutch

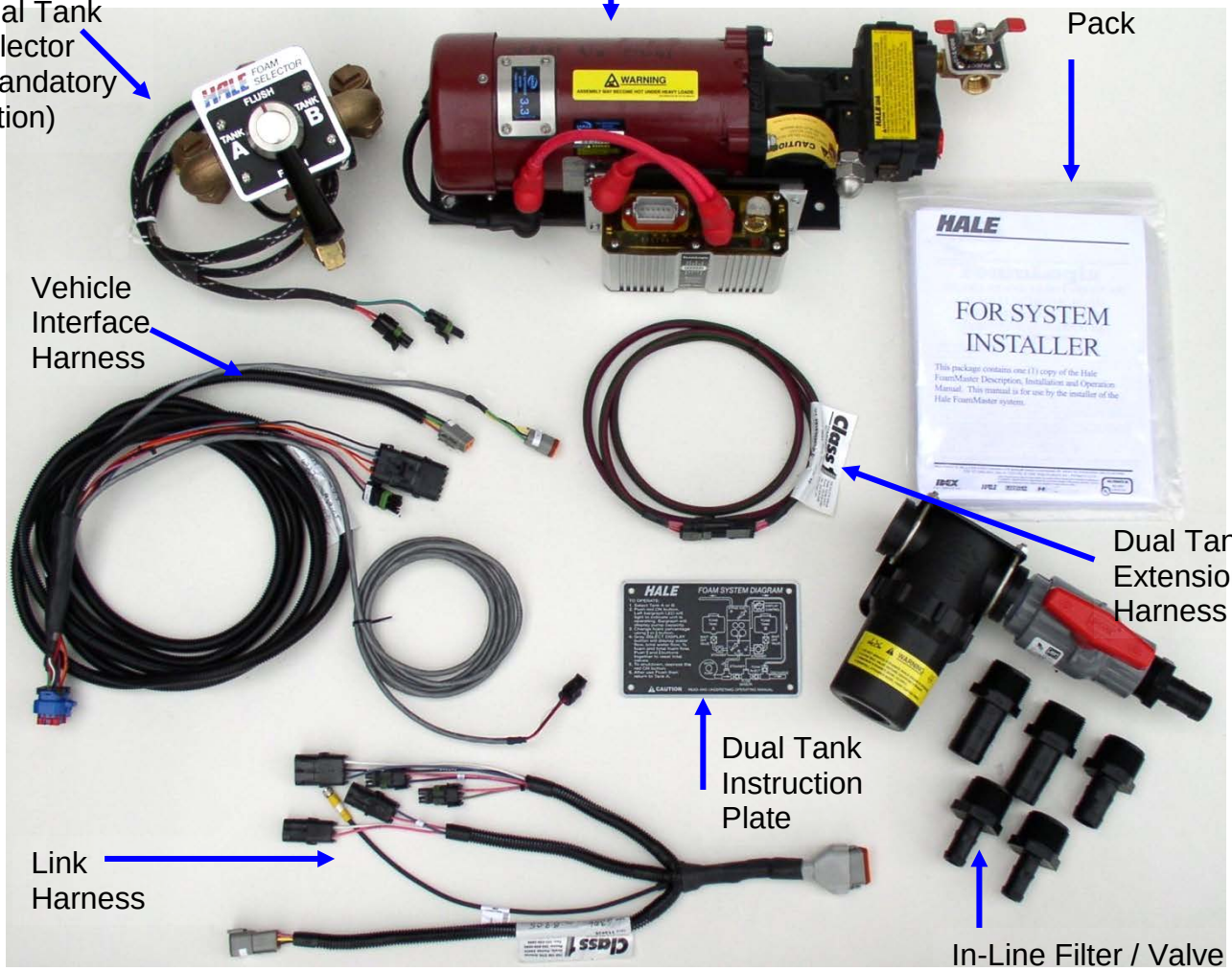
Integral gearbox oil cooler



Photograph shows unit without a FoamLogix 2.1A unit mounted

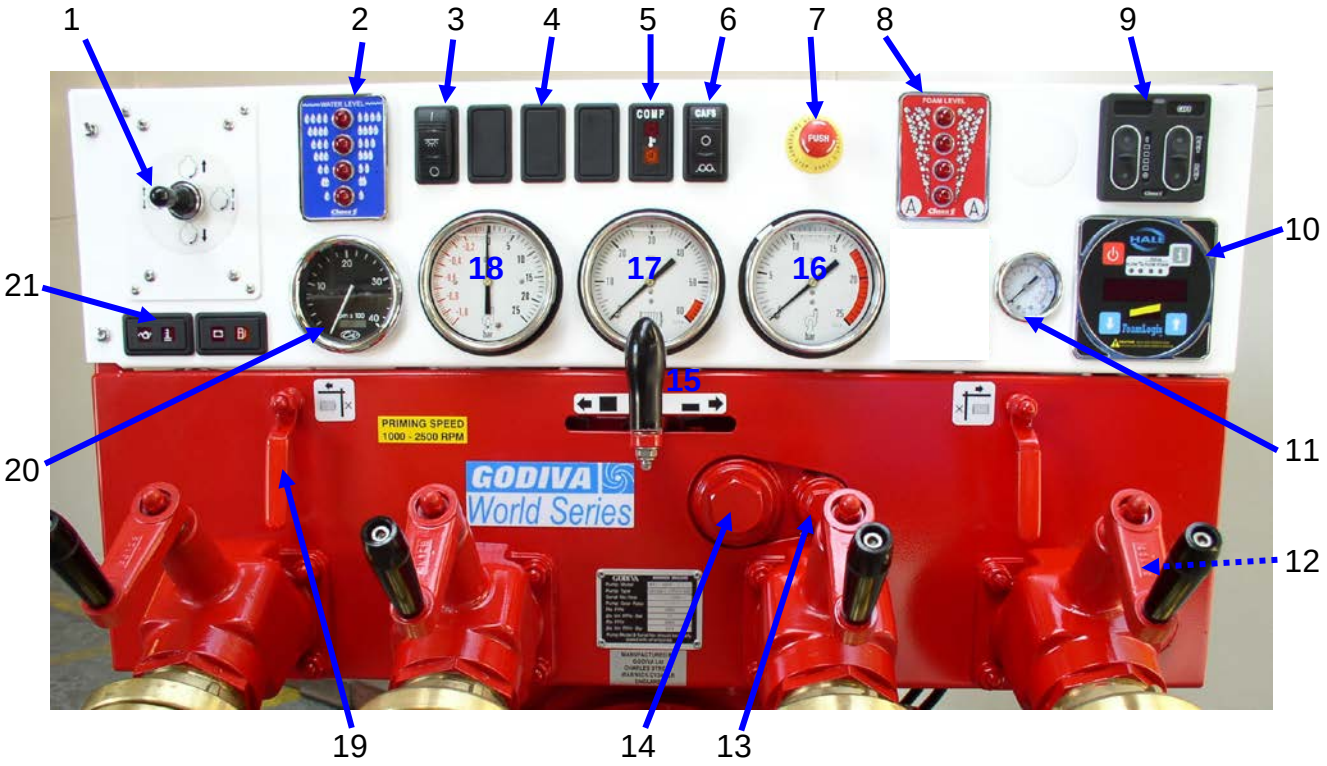
Hale FoamLogix 3.3 or 5.0 Series foam pump is mounted in a separate location to the main pump.

FoamLogix 3.3/5.0 Component Group

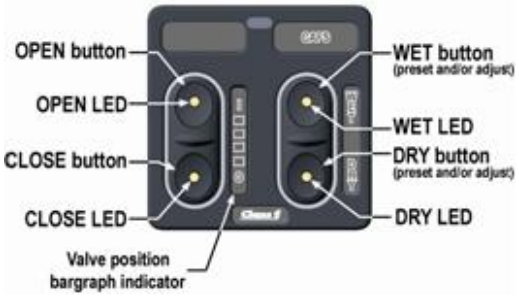


Control panel FoamLogix 2.1A - typical

NB: Options and gauge types may vary.

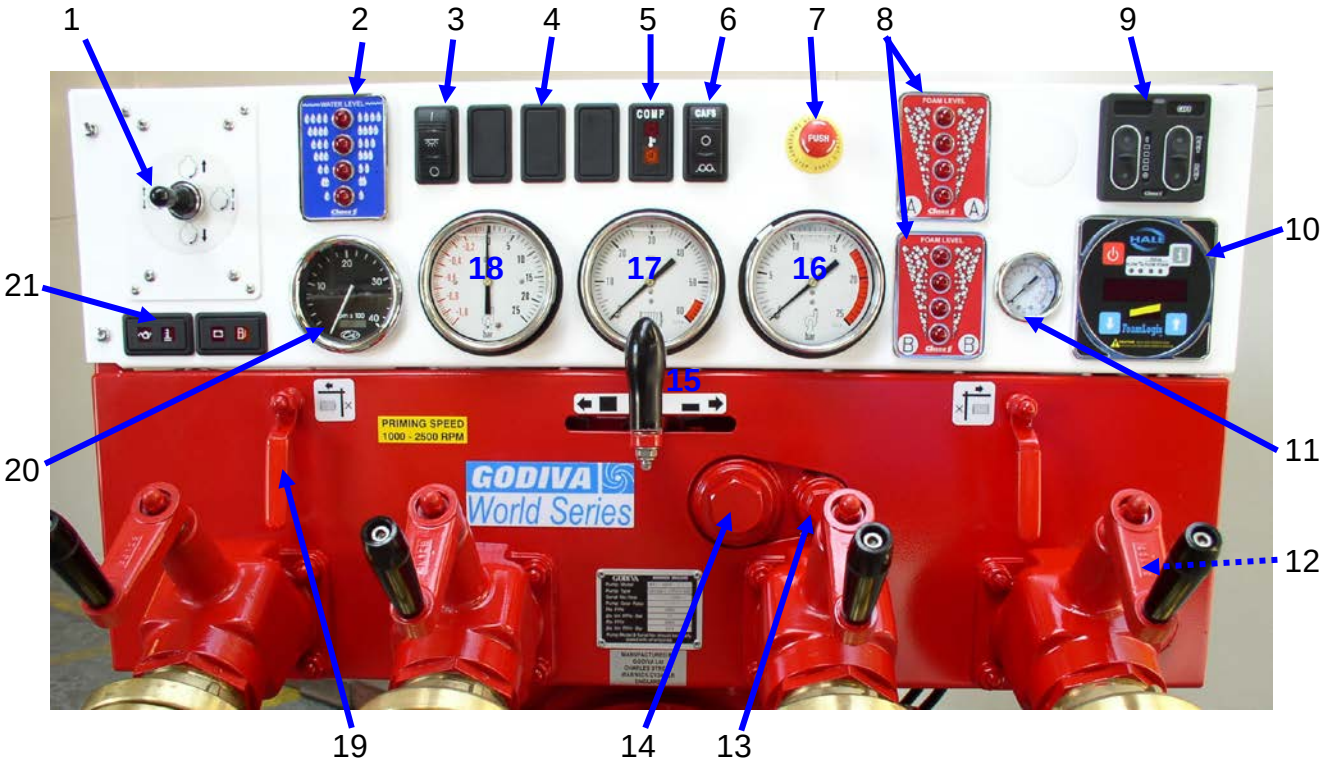


1 - Engine speed control - Up = increase, Down = decrease, Left or right = pre-set speeds.
2 - Water tank level gauge
3 - Vehicle bay light
4 - Low pressure / High pressure hose reel selection – pneumatic control option
5 - Compressor temperature warning light
6 - Foam or CAFS selector switch
7 - Emergency STOP
8 - Foam tank level gauge, Tank A
9 - SmartCAFS control panel
10 - FoamLogix Control Unit
11 - Compressor pressure
12 - Strainer - CAFS Water Feed (behind delivery valve)
13 - Strainer - Primer Lift-Off (behind delivery valve)
14 - Strainer - High Pressure (Not WS series pump)
15 - Manual Pressure Control - High to the Right; Low to the Left
16 - Pump low pressure gauge
17 - Pump high pressure gauge
18 - Compound gauge
19 - High pressure discharge valves (1 LH + 1 RH)
20 - Pump Tachometer (rev / min) & Hour counter
21 - Vehicle status lamps: Engine - high coolant temperature. Engine - low oil pressure Vehicle - low battery charge. Vehicle - low fuel

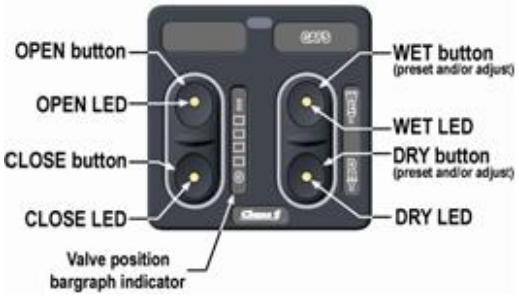


Control panel FoamLogix 3.3/5.0 - typical

NB: Options and gauge types may vary.



1 - Engine speed control - Up = increase, Down = decrease, Left or right = pre-set speeds.
2 - Water tank level gauge
3 - Vehicle bay light
4 - Low pressure / High pressure hose reel selection – pneumatic control option
5 - Compressor temperature warning light
6 - Foam or CAFS selector switch
7 - Emergency STOP
8 - Foam tank level gauge, Tank A and Tank B
9 - SmartCAFS control panel
10 - FoamLogix Control Unit
11 - Compressor pressure
12 - Strainer - CAFS Water Feed (behind delivery valve)
13 - Strainer - Primer Lift-Off (behind delivery valve)
14 - Strainer - High Pressure (Not WS series pump)
15 - Manual Pressure Control - High to the Right; Low to the Left
16 - Pump low pressure gauge
17 - Pump high pressure gauge
18 - Compound gauge
19 - High pressure discharge valves (1 LH + 1 RH)
20 - Pump Tachometer (rev / min) & Hour counter
21 - Vehicle status lamps: Engine - high coolant temperature. Engine - low oil pressure Vehicle - low battery charge. Vehicle - low fuel



SYSTEM OVERVIEW

The WT_C or WS_C is a Compressed Air Foam System comprising of three major components – Air compressor, FoamLogix (foam proportioning unit) and Manifold (foam mixing and control system).
For **2.1A** FoamLogix components are located behind the World Series pump, above the bearing housing and gearbox. The **3.3/5.0** FoamLogix pump / motor assembly however is separate from the WT(S)-C pump and is designed to be remote (vehicle) mounted.

A metered amount of foam is introduced into the Manifold and mixed with water from the pump discharge manifold. 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 cannot be introduced unless water is flowing through the unit.

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

The rotary twin-screw compressor is rated at 50 scfm @ 7 bar and is driven by a Polydrive belt. The compressor is engaged, or disengaged from the pump drive, via an electro-magnetic clutch, being operated 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 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 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.

CAFS units are best suited for use with Fresh Water.
For salt water compatible foams, seek advice from the foam agent manufacturers.

FoamLogix

The FoamLogix 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 usage.

The FoamLogix system is powered up when the PTO is engaged. Foam agent is only injected when the **RED** **ON** control button is operated.

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 1.0% foam concentrate directly into the water discharge stream.

For **3.3/5.0** FoamLogix Class A or B foams, the foam concentration will be in the range of 0.1% to 6.0%.
Further information is available in the **FoamLogix Model 3.3 & 5.0** Description, Installation and Operation manual, part number 029-0020-68-0.

INSTALLATION AND INITIAL SET-UP FOAMLOGIX 2.1A

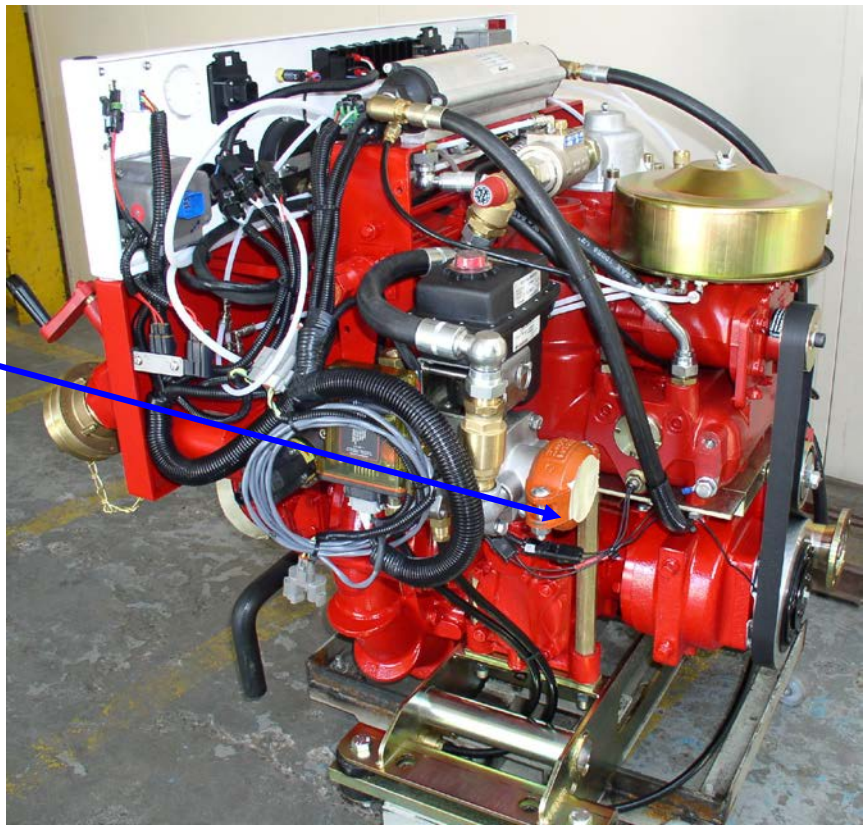
The following connection points should be considered when installing the WT_C or WS_C assembly into a vehicle.

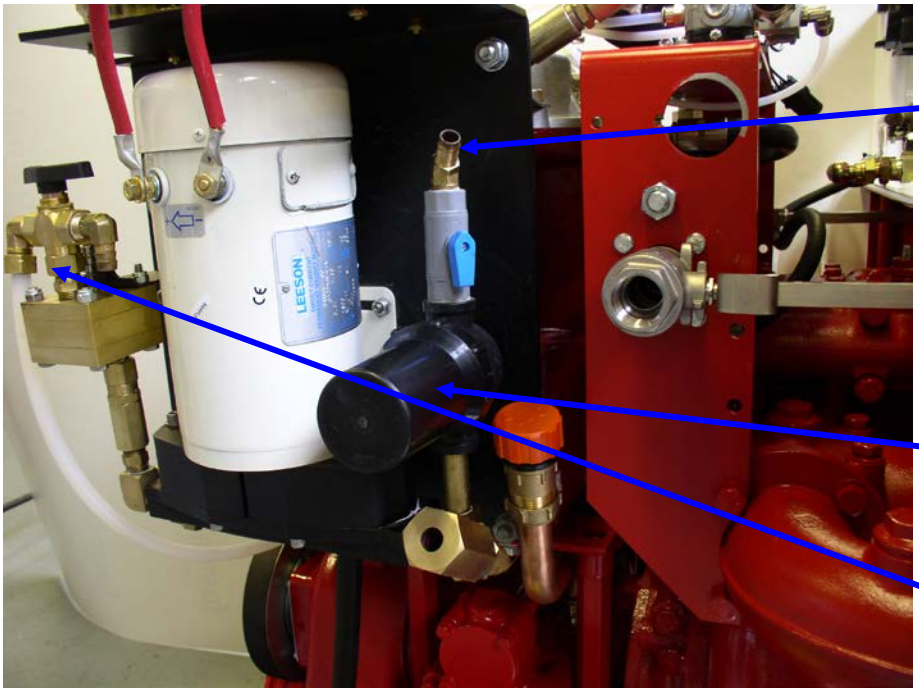
Lifting Points

Secure handling of the unit for installation and maintenance is vital. Use only the lifting points provided on the unit in conjunction with fork Lift Adaptors, part number **60275 / 18**. These items are available from Godiva Ltd..

CAFS Discharge port (see installation drawing for dimensions)

Ø 6mm air connection for ARC valve. **Requires an external air supply**



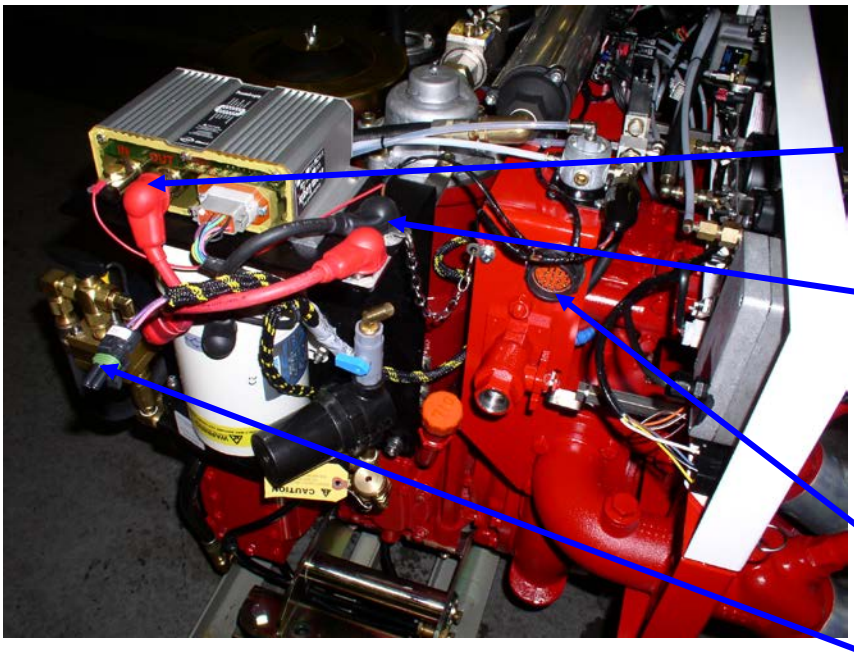


Inlet from Foam tank, Ø13mm ID pipe, airtight connection required
NOTE: the Foam tank must be located **above** FoamLogix unit

FoamLogix foam filter

By-pass valve and connection point

FoamLogix 2.1A System shown (see page 27 for FoamLogix 3.3 / 5.0 System)



FoamLogix pump
Connect feed from Vehicle system, +24 V rated @ 20 A max, 12V system rated @ 40 A max Minimum 6.0mm^2 wire section

Ground connection point

NOTE: the main power supply to FoamLogix should only be energised when the PTO is engaged

Engine control and status Connector

Low foam switch connector

FoamLogix 2.1A System shown (see page 27 for FoamLogix 3.3 / 5.0 System)

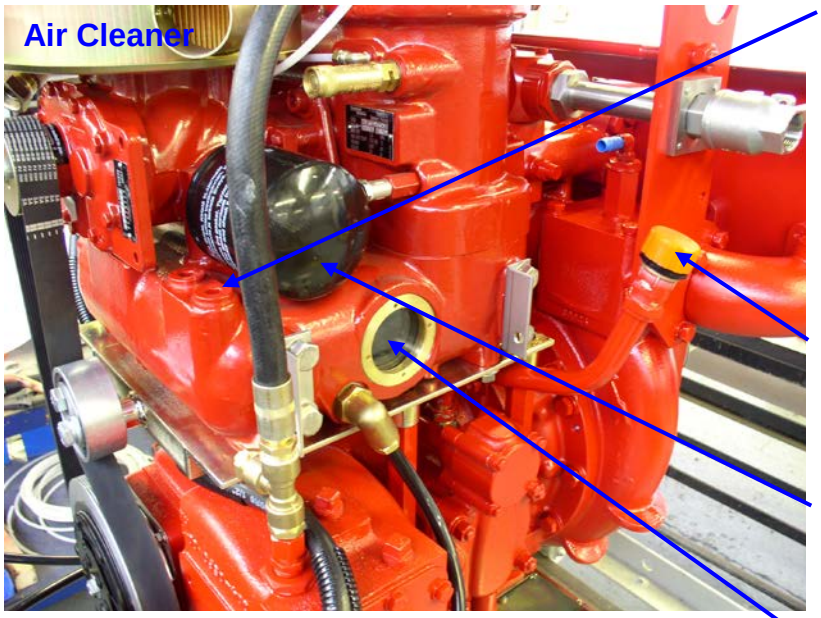
Fluid Drain Points

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

Gearbox 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

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 and pump bearing housing are located at the left side of the pump (viewed from suction tube).



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

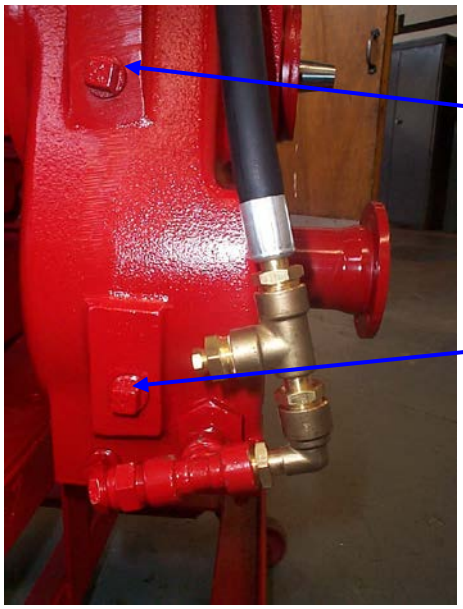
Pump bearing housing oil filling point and oil level check dipstick

Compressor oil filter

Compressor oil level – mid point on site glass

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

Gearbox in Down Position

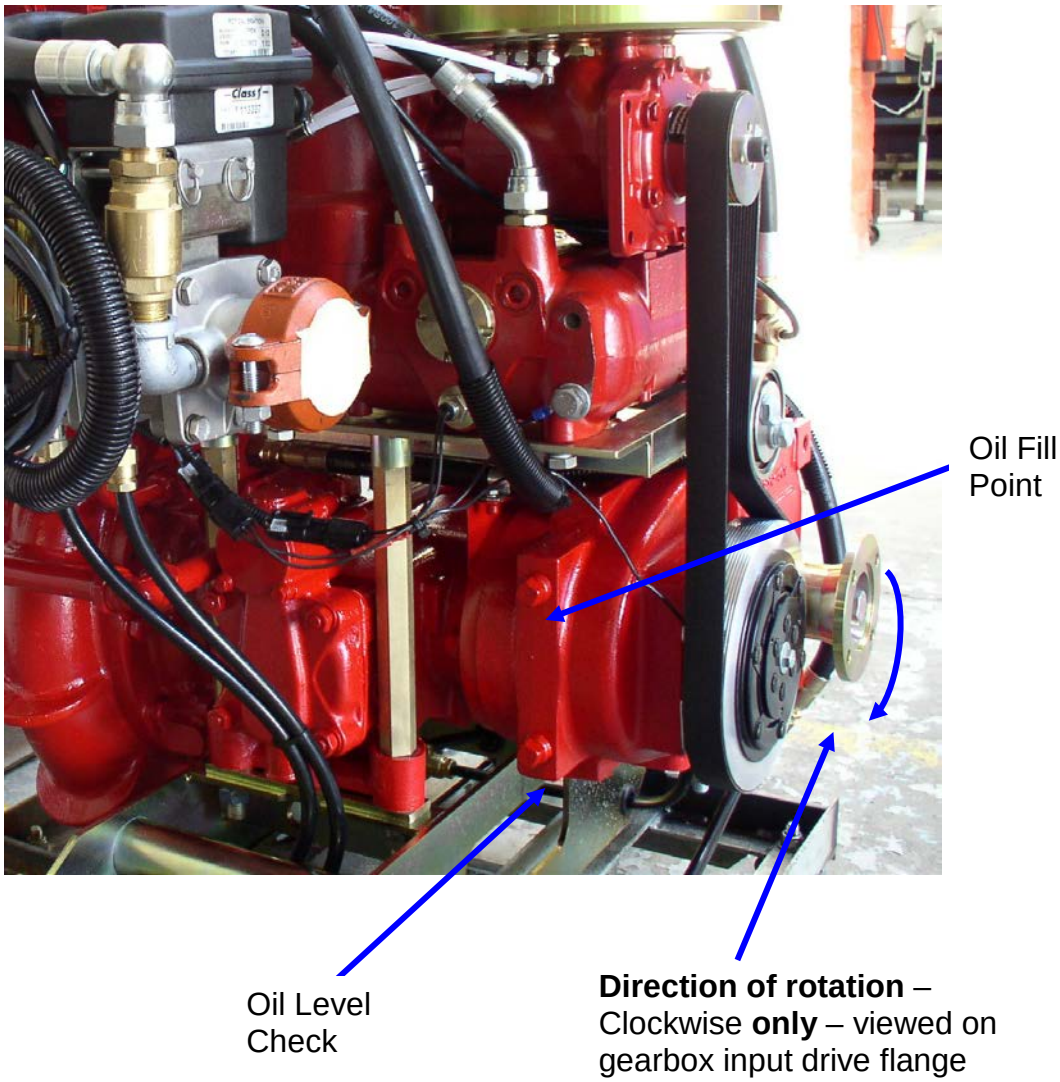


Oil filling point
For oil type and capacity refer to Recommended Lubricants

Oil level check

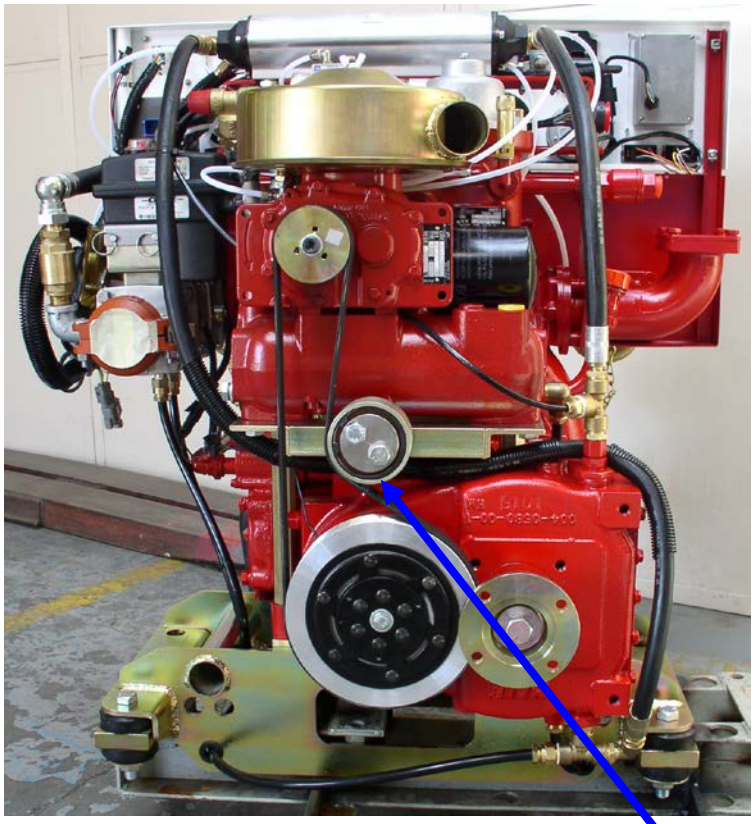
Gearbox in Horizontal Position, Left or Right of pump

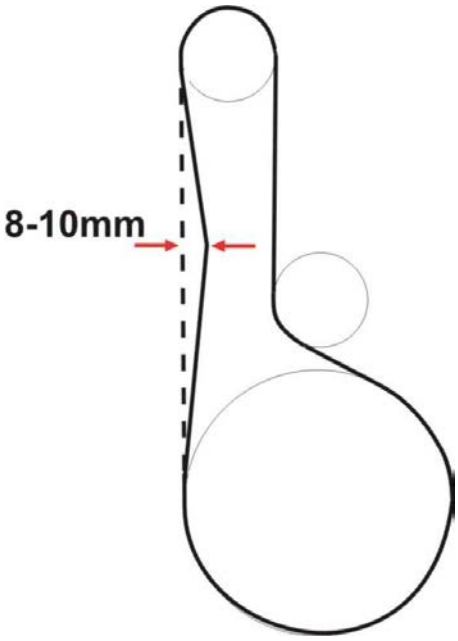
The oil filling point is on the side of the casing (LH gearbox shown) and is symmetrically opposite for RH gearbox.
The oil level check point is lower on the side. Oil capacity and type as Down position detail.



Compressor Drive Belt

The compressor is driven by a *Polydrive* ribbed belt, specification 12PJ.
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.

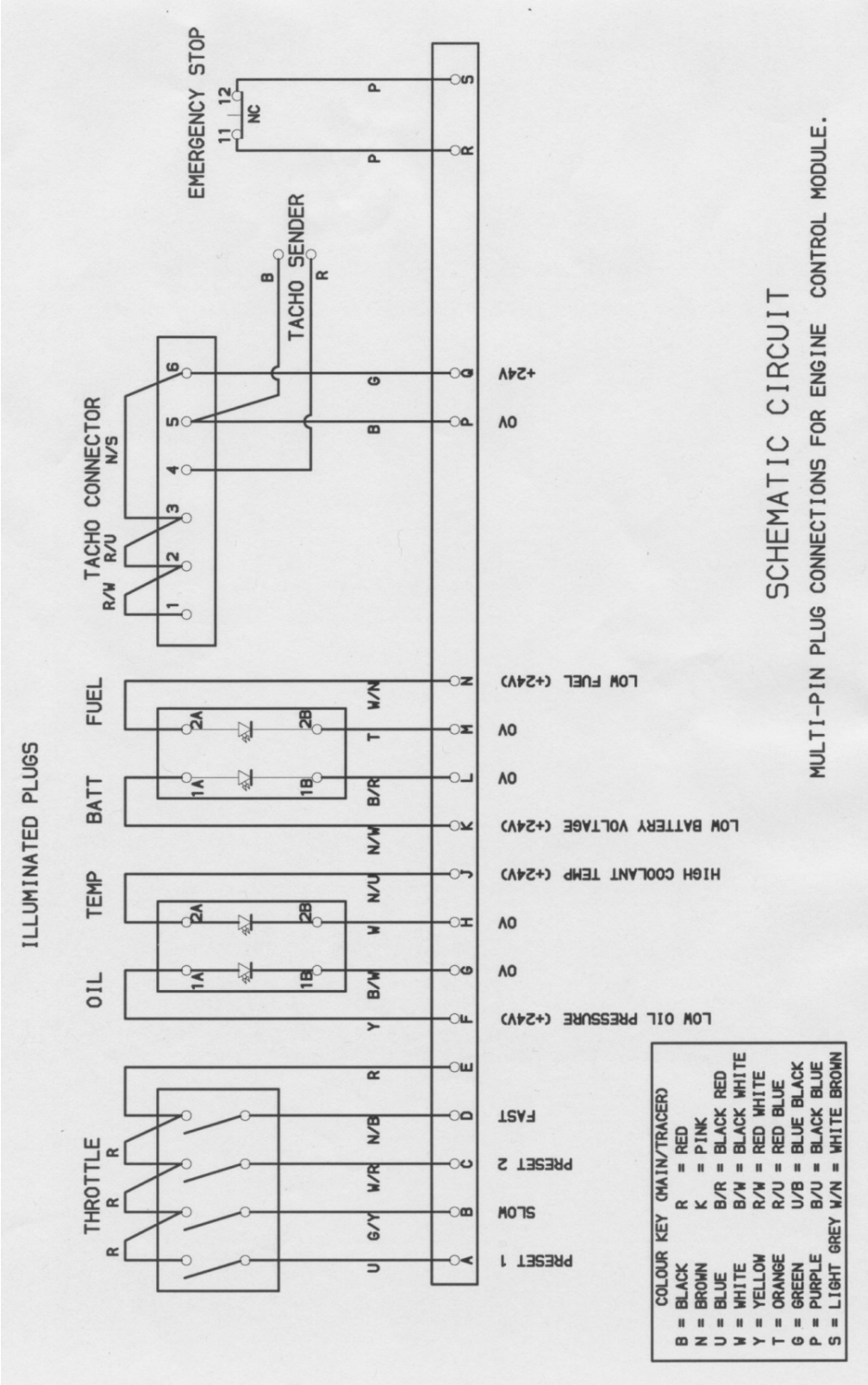




Slacken bolt, rotate tensioner to achieve specified deflection and secure

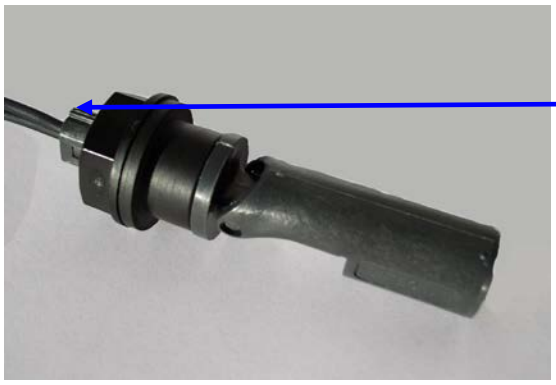
Electrical Connections

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).



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).

Note: The low foam level sensor must be installed in the tank in the correct orientation. The sensor has a raised boss on the casing and must be installed with this boss at 12 o clock (top).
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 outflow to the foam pump.



Additional Installation Points
Foam Tank to Foam Pump
The foam feed line must not at any point be lower that the foam pump; have a 13mm bore 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.
The foam tank must be located to provide a positive head of foam agent 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.
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 and 300 series stainless steel are suitable.

The areas containing the WT_C or WS_C 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.

Access to compressor oil fill and level checkpoint must be considered.

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 3.3/5.0

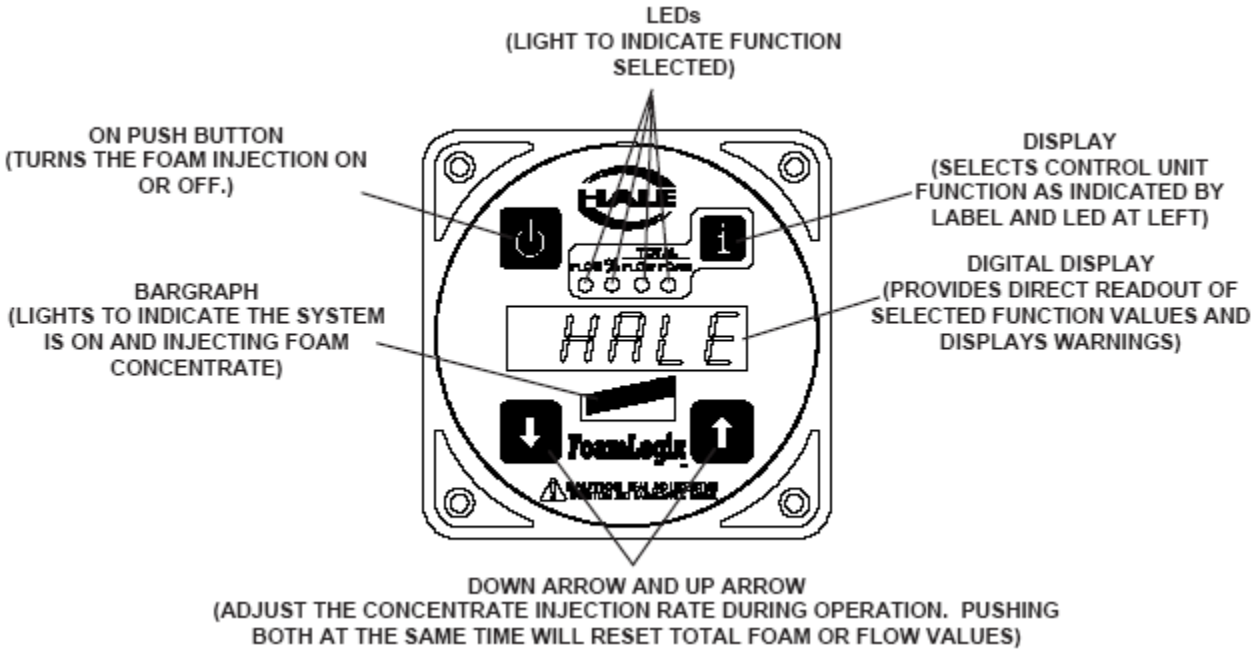
Installation of the WT_C or WS_C assembly into a vehicle, when sourced with a FoamLogix 3.3/5.0 system is the same as the integrated 2.1A option, with the exception of the remote mounted foam pump assembly.
For pump installation, please refer to the **FoamLogix Model 3.3/5.0 & 5.0** Description, Installation and Operation manual, part number 029-0020-68-0, supplied separately.

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

OPERATION

Caution: WT_C or WS_C 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 only to maintain the water level in the vehicle tank.

FoamLogix Control Panel Functions



Commissioning / Start-Up Procedure

1. Check that all the necessary connections have been correctly made.

2. Ensure that the compressor, pump gearbox and bearing housing are filled with the correct oil type and quantity.
3. Run the pump at 2-3 bar 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 FoamLogix 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 **FoamLogix 3.3/5.0**, select tank **A**

8. Select simulated flow on the FoamLogix by pressing both up ↑ & down ↓ at the same time.

9. Press the **RED** **on** button, and the 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 "**no pr**". Repeat this step once more to attempt to prime the pump.
"no Pr" = No prime display

10. **For 3.3/5.0 FoamLogix**, select tank **B** and repeat the priming procedure for that tank.

11. When prime is achieved, deselect simulated flow by pressing both up ↑ & down ↓ at the same time.

12. Return the bypass valve to the inject position.

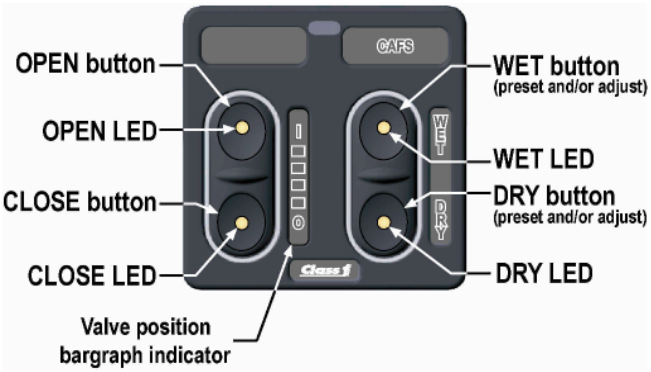
The unit is now ready to run.

Calibration of FoamLogix

The FoamLogix package as supplied is factory tested and calibrated and should not require further attention. However, should any calibration issue arise, please refer to the appropriate **FoamLogix Model** Description, Installation and Operation manual.

Smart Switch operation

The CAFS SPS Panel is the primary component of the CAFS with compressor air-inject system. The SPS Panel allows monitoring and control of the consistency of the discharged CAFS concentrate.



WET and DRY buttons

The WET (or DRY) button is used to position the water valve at the preset position for the desired CAFS consistency. The WET button will open the valve to its WET preset position, and the DRY button will close the valve to its DRY preset position.
The SPS Panel will only open or close the valve within the operating range dictated by the preset WET and DRY positions calibrated by the OEM. The valve position bargraph indicator will display one (1) bar on the bottom when the valve is positioned at the DRY preset and all six (6) bars when the valve is positioned at the WET preset. No valve movement beyond the WET/DRY presets is permitted.

WET and DRY LEDs

The WET led flashes when the WET button is pressed and the valve is in transit to the WET preset position. The WET LED lights steady when the valve is set to the preset WET position.
The DRY led flashes when the DRY button is pressed and the valve is in transit to the DRY preset position. The DRY LED lights steady when the valve is set to the preset DRY position.

OPEN and CLOSE buttons

The OPEN (or CLOSE) button is used to position the valve at any point between the open and closed preset positions. When the OPEN (or CLOSED) button is pressed the WET (or DRY) LEDs will be turned OFF.

OPEN and CLOSE LEDs

The OPEN (or CLOSE) LED lights while the OPEN (or CLOSE) button is pressed. These LEDs will normally be off.

Valve position bargraph indicator

The valve position bargraph indicates the relative position of the valve in reference to the WET (open) and DRY (closed) presets. Fully WET (open) will light all six (6) bars and fully DRY (closed) will light only the bottom bar.

Operating the WT_C WS_C from a Vehicle Water Source

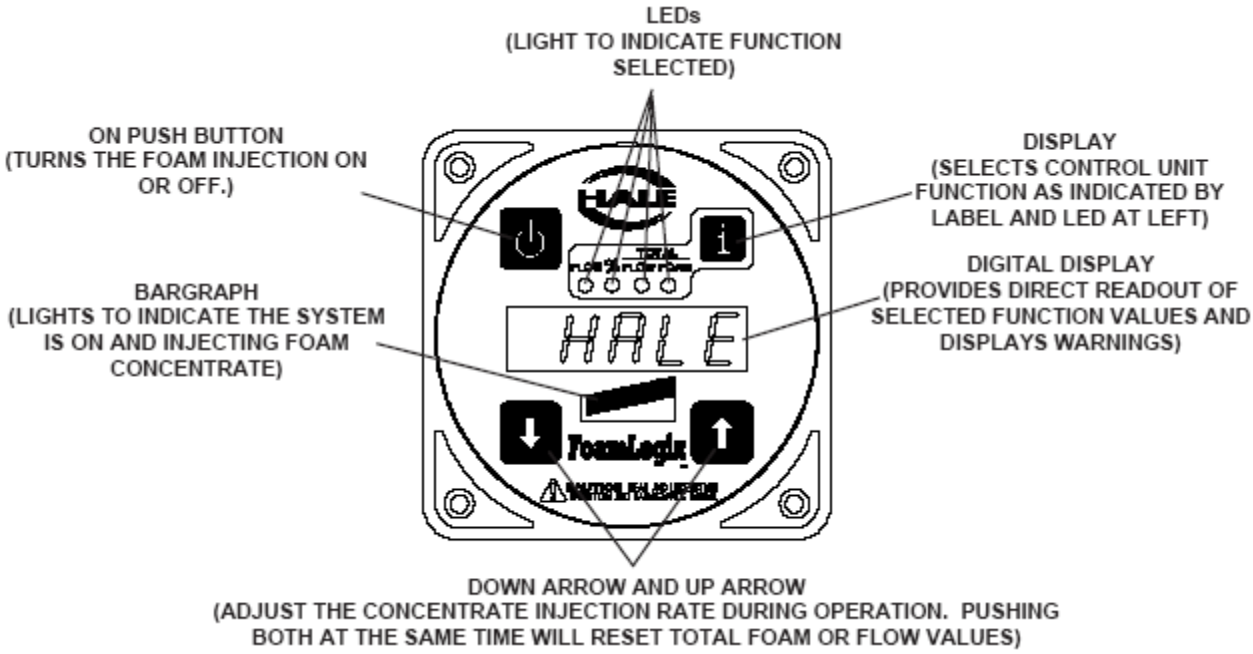
1. Connect a suitable delivery hose and branch to the CAFS discharge. ϕ38 to ϕ45mm diameter lay flat hose is suitable for delivering compressed air foam. If a single discharge is being used, a ϕ25 to ϕ38mm smooth bore nozzle is suitable. If two delivery hoses are used, two ϕ19 nozzles are appropriate.

   Note: Superior foam quality is produced using a smooth bore nozzle and a delivery system with the least amount of valves and sharp bends. However, the scrubbing action of the foam on the hose wall tends to improve the foam quality.

   Note: A standard fog nozzle can be used with CAFS if used on the ‘Flush’ setting.

Using the ‘Fog’ settings severely degrades foam quality.

FoamLogix Control Panel

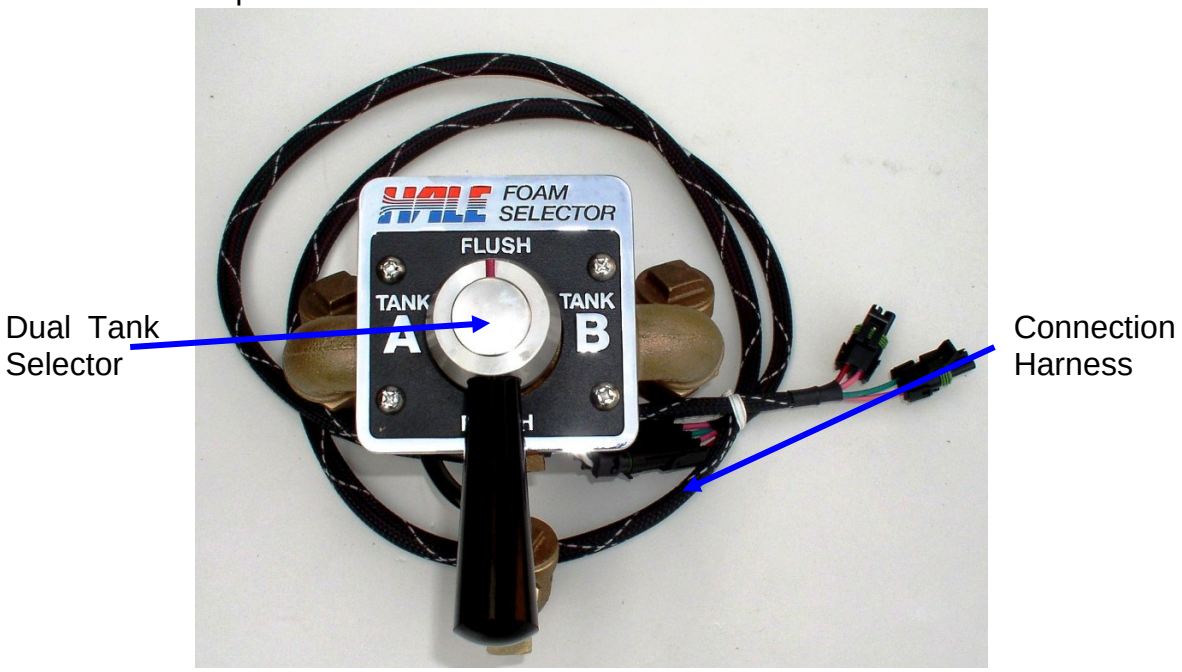


Engaging PTO & Priming Main Pump

1. To ensure a clean pump prime and delivery when running from the tank, leave the pump wet, or if the pump is drained, run the pump at idle until a vacuum of approximately -0.5 bar is achieved and then slowly open the tank to pump valve.

Tank Selection FoamLogix 3.3/5.0 only

For specific detail please refer to the **FoamLogix Model 3.3/5.0 & 5.0** Description, Installation and Operation manual.

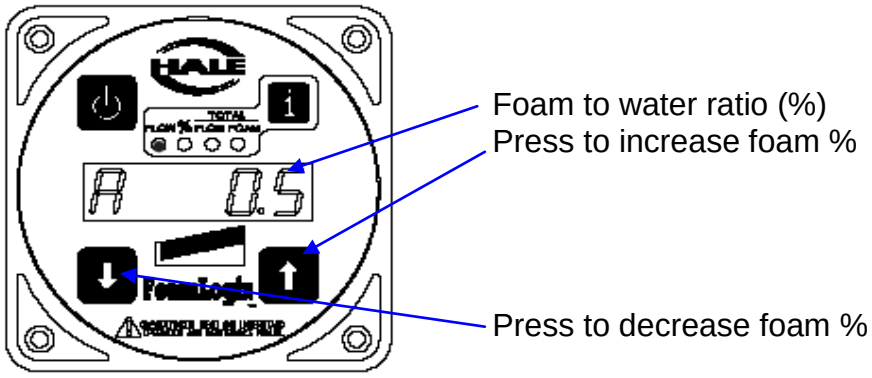


Discharging Foam / Water Agent Mixture Only
(May be operated from open water, tank, or hydrant into pump suction)

1. Set pump at required pressure.

2. Ensure that the foam only option is selected by pressing the bottom of the Foam / CAFS Selector switch, marked with the symbol –

3. Press the **RED** **on** button, and choose desired foam % setting. (Default is 0.5%).



4. Open CAFS discharge valves to deliver foam agent.

Note: the WET / DRY SPS control is only operable when CAFS is selected. The control will default to the wet condition when CAFS is turned off.

Discharging CAFS May be operated from open water or tank feed only. Do not apply hydrant pressure to pump suction.

1. Set the pump to idle.

2. Select CAFS by pressing the top of the CAFS selector switch **– marked "CAFS"**

3. Increase pump speed to required operating pressure (4-10 Bar).

Wet Foam or Dry Foam

1. The operator may select wet or dry foam by pressing the wet or dry button on the SPS switch. This will also start the FoamLogix pump and open the air enable valve.

2. The operator may vary the foam condition from WET to DRY by using the **open/close** button on the SPS switch.

3. An indication of wet / dry foam condition shown by the valve position bargraph indicator.

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

Shutting Down

1. Set WET / DRY selector switch to the WET foam setting.
2. Turn off compressor by setting the Foam / CAFS selector switch to foam position -  .
3. Turn off the FoamLogix, press **RED** button.
4. Set pump to fast idle.
5. Run water through the CAFS discharge system to flush out the foam agent.
6. Close the CAFS discharge valves.
7. Disengage PTO.
8. If frost is expected, drain the manifold and gearbox oil cooler.

Overheat Shut down

1. Should the compressor oil temperature reach 105^{o}C, a control panel warning indicator will illuminate.
2. If the compressor oil temperature exceeds 110º C, the electromagnetic drive clutch will automatically disengage. The compressor can sustain 105º C for short periods without damage. The unit will automatically re-engage when the compressor has cooled.
3. The most probable cause of compressor overheating is insufficient cooling water flow.

Flushing FoamLogix 3.3/5.0 only

When returning the apparatus to ready condition after using class B foam, the Hale FoamLogix foam pump **must** be flushed. This is because some Class B foam concentrates deteriorate rapidly.

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 10-12 weeks, 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 **FoamLogix Model 3.3 & 5.0** Description, Installation and Operation manual.

MAINTENANCE SCHEDULE WT(S)_C

Quarterly

Check compressor oil level and adjust as necessary.
Check belt tension and condition - adjust as necessary.
Check hose connections.
Clean strainer - High Pressure.
Clean strainer - Primer.
Clean strainer - CAFS Water Feed.

Annually or Every 200 Hours (whichever comes first):

Renew compressor oil and filter.
Clean the FoamLogix foam filter.

Annually or every 400 hours (whichever comes first):

Renew compressor air cleaner element.
Renew pump bearing housing oil.
Renew pump gearbox oil.

Bi Annually:

Renew compressor drive belt.
Renew compressor oil separator element.

Note: Both the drive belt and the air cleaner may have to be renewed more often in dusty, dirty or heavy duty applications.

MAINTENANCE SCHEDULE FOAMLOGIX 2.1A

Quarterly

If an approved foam concentrate has been left in the system without use, operate the foam system to move the concentrate and prevent jelling.

Annually

Inspect wiring, hoses, flow sensors, and connections for tightness, corrosion, leaks and/or damage. Refer to installation drawings.

Bi annually

Verify foam feedback calibration.

MAINTENANCE SCHEDULE FOAMLOGIX 3.3/5.0

After Each Use

Flush the Hale FoamLogix foam pump if Class B foam concentrate has been used and select Class A.

Annually

Inspect wiring, hoses, flow sensors, and connections for tightness, corrosion, leaks and / or damage. Refer to installation drawings.

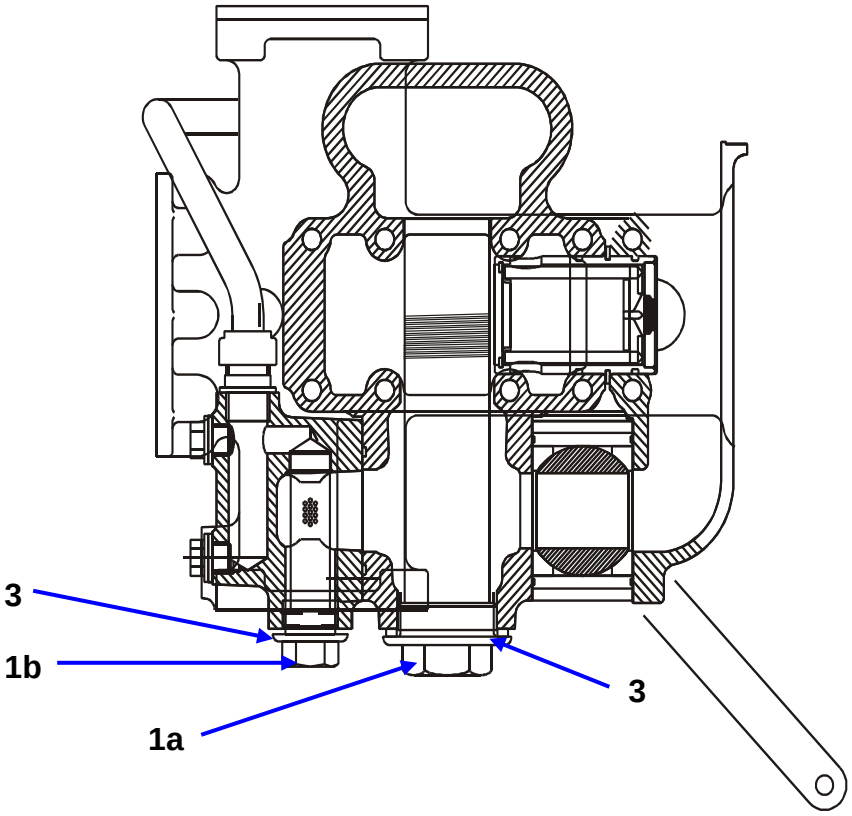
Bi annually

Verify foam feedback calibration.

MAINTENANCE OPERATIONS WT(S)_C

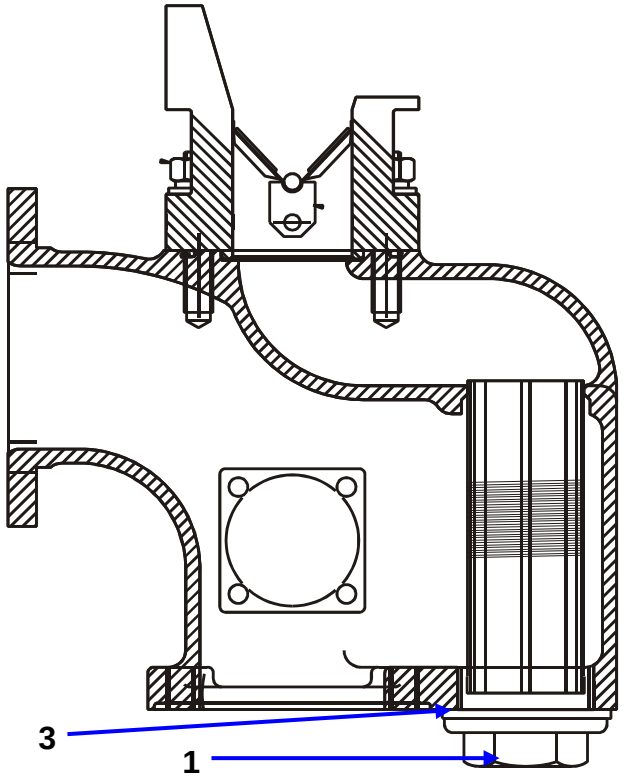
Strainers - High Pressure & Primer

1) Remove strainer / Cap assembly a) High Pressure or b) Primer Lift-Off.
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 - CAFS Water Feed

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.



MAINTENANCE OPERATIONS COMPRESSOR

Compressor Oil Level Check - Oil / Filter Change

Please refer to section **Installation and Initial Set-Up** for location of level checking, drain and filling features.

Drain oil and change the filter at the recommended intervals (with the compressor warm) in accordance with the **Gardener Denver Tamrotor Tempest** manual.

Compressor Air Filter

Change the air filter at the recommended intervals, in accordance with the **Gardener Denver Tamrotor Tempest** manual.

Compressor Oil Separator Element

Change the element at the recommended intervals, in accordance with the **Gardener Denver Tamrotor Tempest** manual.

Compressor Drive Belt

Check and adjust belt tension, as required, in accordance with section **Installation and Initial Set-Up**.

Change the drive belt at the recommended interval or if damage occurs.

To remove the belt, slacken the tensioner bolt and position the tensioner to allow belt removal.

Fit the new belt ensuring that belt alignment and position on the pulleys is uniform.

See section **Installation and Initial Set-Up, Compressor Drive Belt** for tension setting detail.

MAINTENANCE OPERATIONS FOAMLOGIX

Strainer - Foam

Remove and clean the foam strainer screen(s) and flush as required. Please refer to the appropriate **FoamLogix** Description, Installation and Operation manual - System Plumbing Diagrams for location.

Calibration

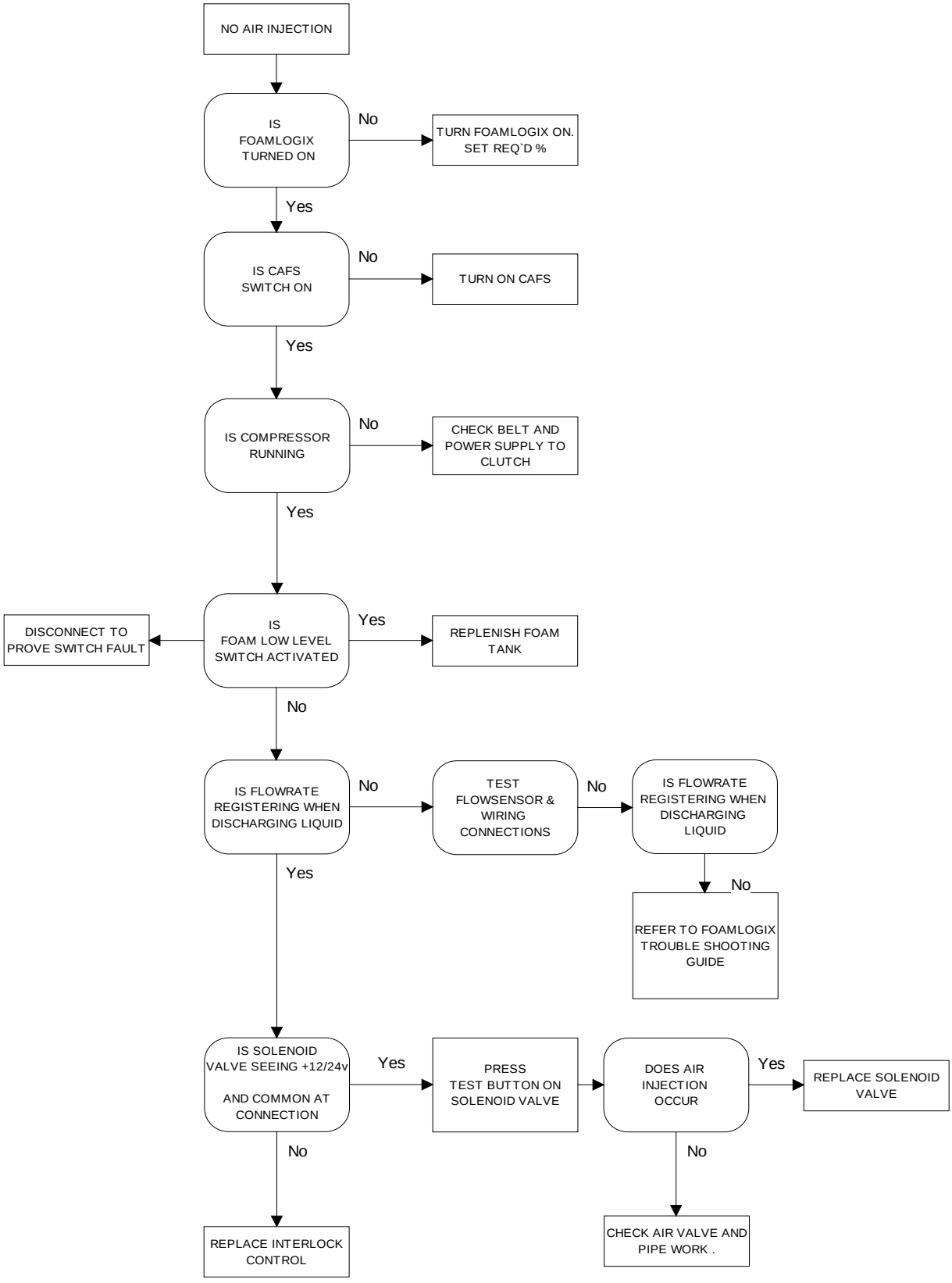
Please refer to the appropriate model **FoamLogix** Description, Installation and Operation manual to calibrate water flow and foam feedback characteristics.

FAULT FINDING

EFFECT	CAUSE	ACTION
Compressor overheats	No water supply or restricted flow	Check oil cooler pipe work for obstructions
Unable to produce foam solution	FoamLogix not operating	Switch on FoamLogix
	No Foam in tank	Refill with foam agent
	FoamLogix not Primed	Prime FoamLogix
No air injection	Compressor not selected	Turn switch on
	Low foam switch activated	Refill foam Tank
	FoamLogix not on	Turn FoamLogix on
Air and liquid not mixing (Slugflow)	Depleted foam supply (Low level switch not fitted)	Refill foam tank
	Foam % set too low	Increase foam % setting
Surging of hose and pressure gauge.	Insufficient air pressure in hose	Increase pump speed Reduce nozzle diameter.

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.

No Air Inject Fault Tree



WT(S) PUMP ILLUSTRATED PARTS LIST

Please refer to: Godiva Ltd. publications:
WT GP147/99.
WS GP 158/00.

COMPRESSOR ILLUSTRATED PARTS LIST

Please refer to:
Gardener Denver Tamrotor Tempest 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 & 5.0 Description, Installation and Operation manual, part number 029-0020-68-0.

RECOMMENDED SPARES KIT FOR BI-ANNUAL SERVICE

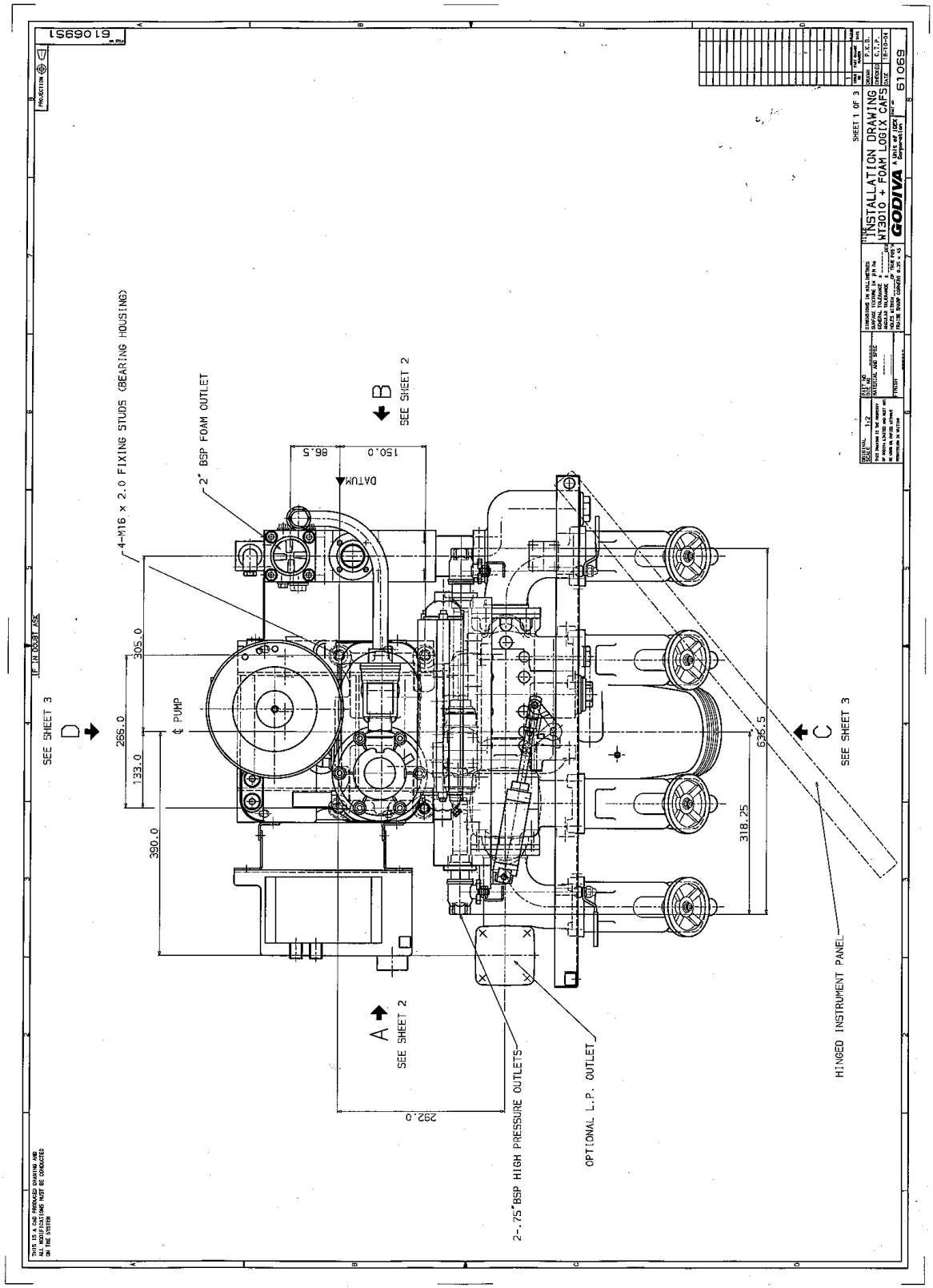
Qty	Item	Unit	Comment
		Compressor	
1	Separator	59271/02	
4	Filter - Oil	59271/01	
2	Filter - Air	59271	
1	Belt - Drive	60578/01	
AR	Tensioner - Belt drive	60579	
		FoamLogix	
1	Strainer - Foam	C1-510-0200-02-0	Class 1 part
		WT(S)-C	
5	Sealing (O) ring	53866	
AR	Strainer - CAFS water feed	60051/01	
AR	Strainer - Hi Pressure	60051MA	Not WS series
AR	Strainer - Primer	57456	
4	Washer - Dowty - Fluid drain	UFP 2303/08	
2	Washer - Dowty - CAFS Water Feed & Hi Pressure	UFP 2303/15	Common part
2	Washer - Dowty - NRV Inlet & Primer	UFP 2303/10	Common part

Notes

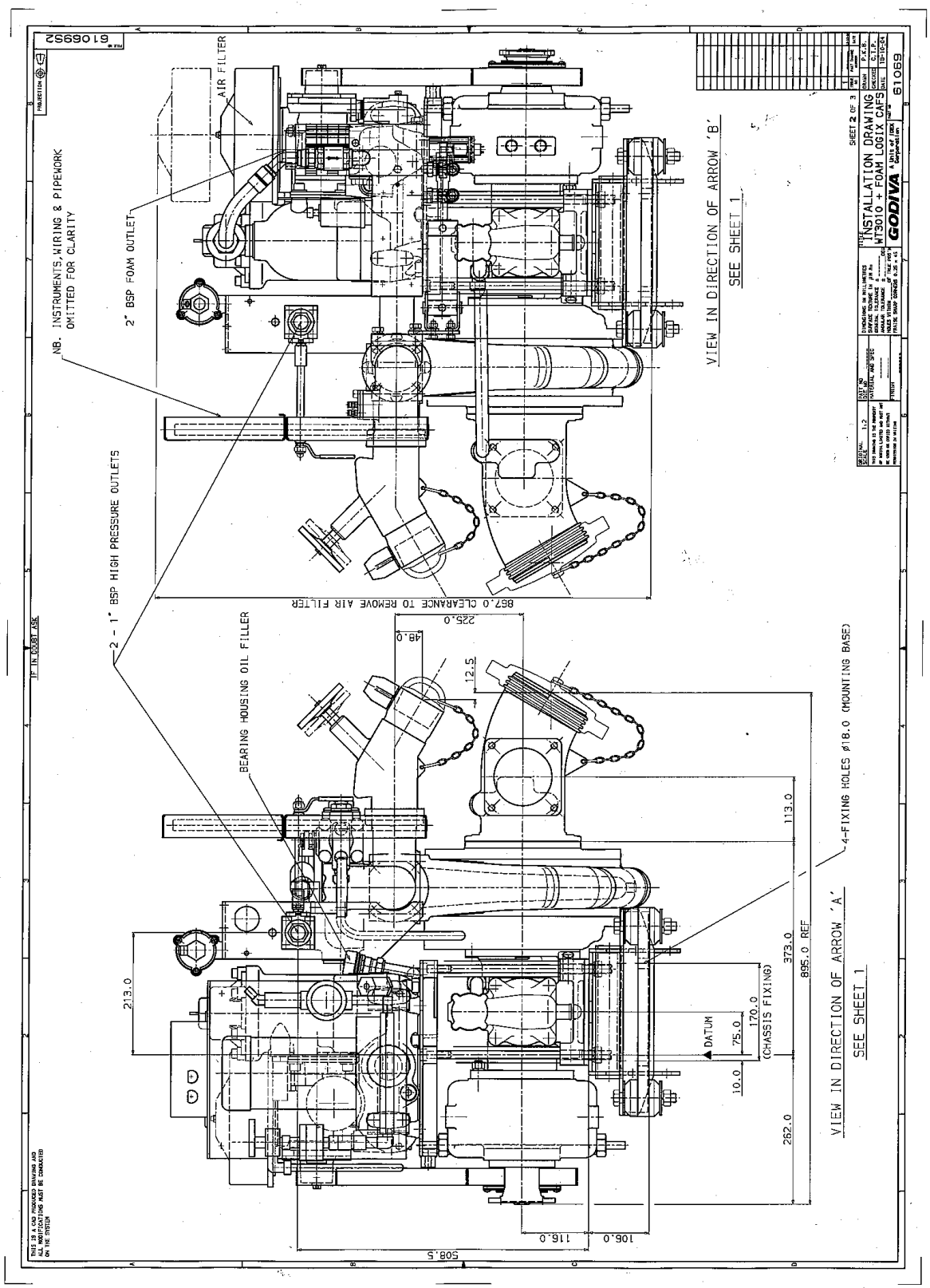
Under normal conditions those items marked AR (As Required) are not deemed to be disposable. However, fluid strainers may be easily damaged during the cleaning process. Please exercise care when handling. It is at the customer's discretion whether said items are carried as 'off the shelf' spares.

INSTALLATION DRAWINGS – WT WITH FOAMLOGIX CAFS

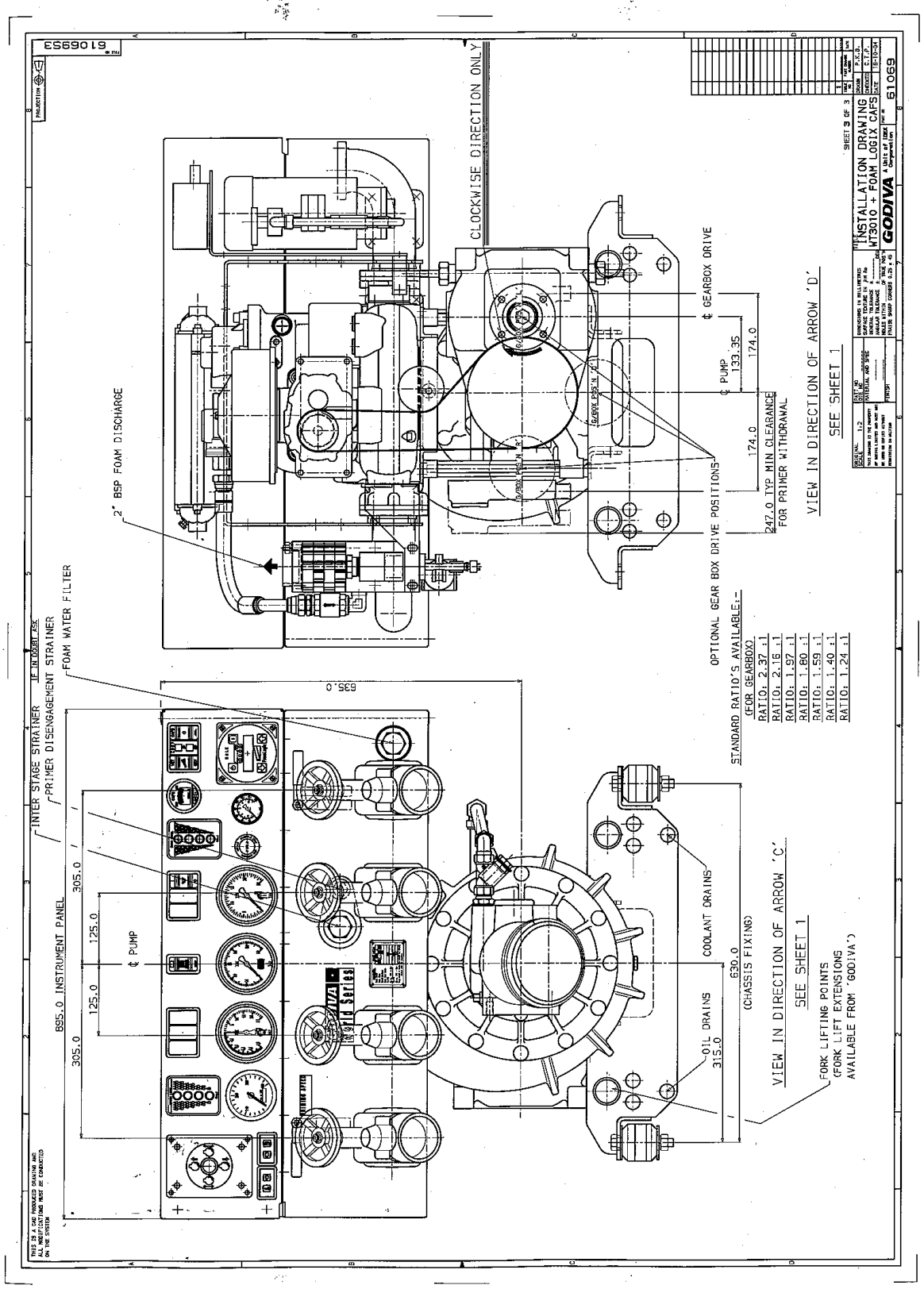
Sheet 1 of 3 (WT)



Sheet 2 of 3 (WT)

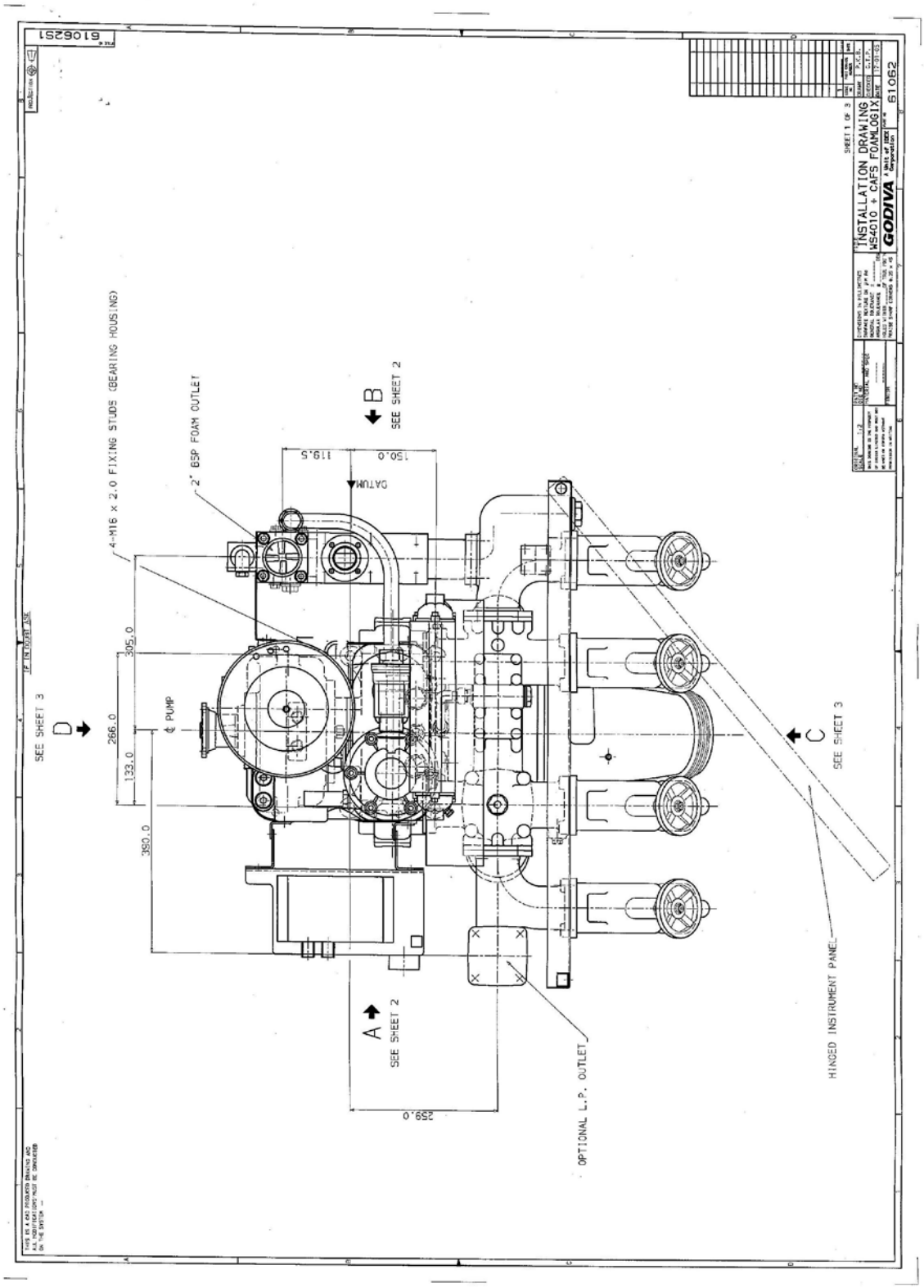


Sheet 3 of 3 (WT)

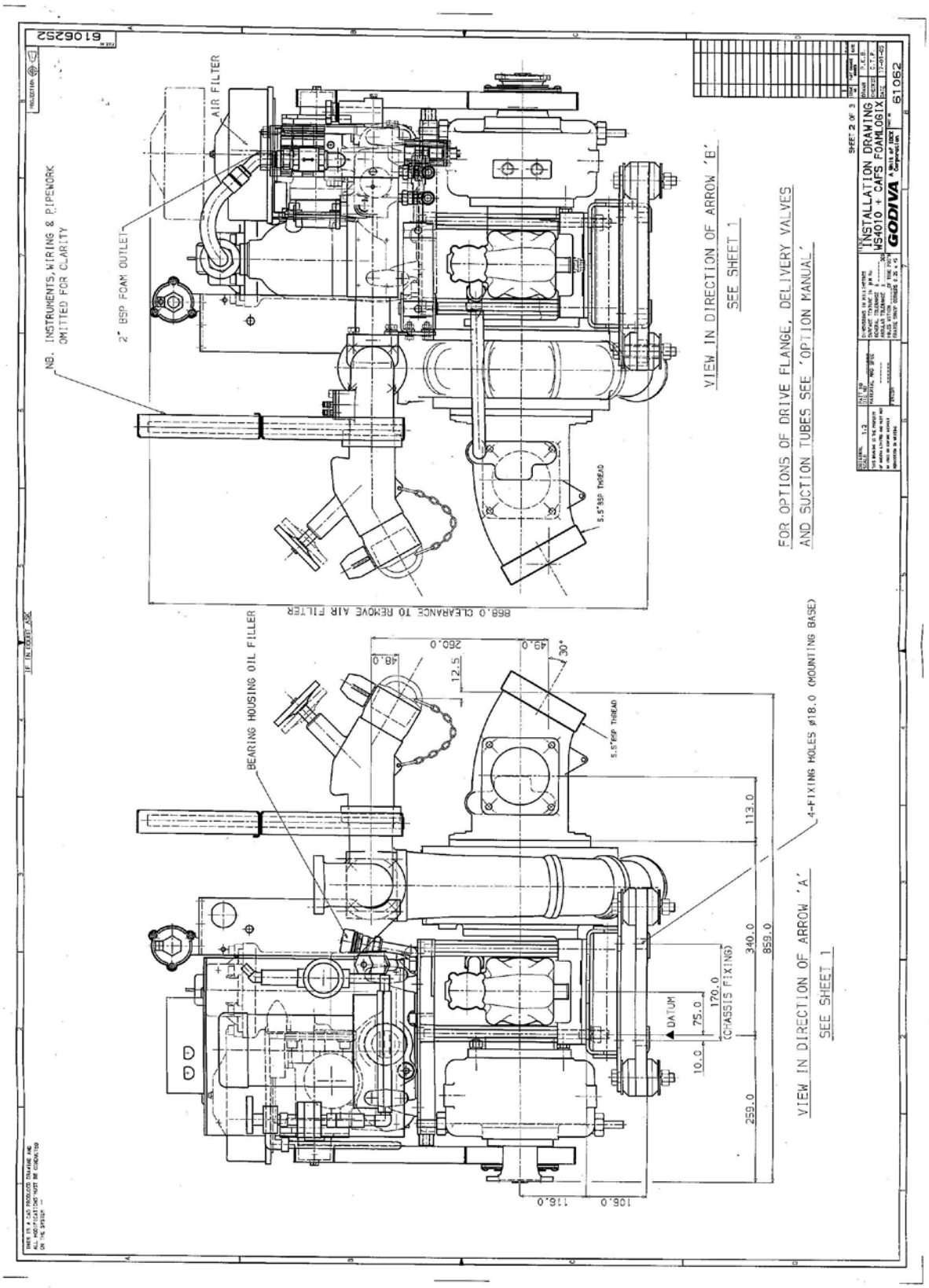


INSTALLATION DRAWINGS – WS WITH FOAMLOGIX CAFS

Sheet 1 of 3 (WS)



Sheet 2 of 3 (WS)



Sheet 3 of 3 (WS)