PULSE Series

Installation, Commissioning & Servicing Manual

Part No. 2A01977
Revision 19

GALLAGHER

IMPORTANT

All rights reserved. This manual may not be copied or reproduced in part or whole by any means without the prior written consent of Gallagher Fuel Systems Ltd.

How to Contact Gallagher

Gallagher Fuel Systems Ltd
2 Station Rd
PO Box 308
Marton 4741
New Zealand

Phone: +64 6 327 0060

Emails: fuelsystems.support@gallagher.com
fuelsystems.som@gallagher.com

Web: http://fuelsystems.gallagher.com

When contacting Gallagher Fuel Systems Ltd always quote the serial number on the product's nameplate which can be found affixed to the column beneath the User Interface.

CONTENTS

LIST OF FIGURES

PART A: GENERAL

1 ABOUT THIS MANUAL

This manual describes the installation, commissioning and servicing of PULSE dispensers.

It is divided into the following parts:

A. General B. Installation C. Commissioning D. Servicing

Included are models dispensing petrol, diesel, LPG and DEF (Diesel Exhaust Fluid).

2 NOTATIONS

Comms	Communication
DEF	Diesel Exhaust Fluid
Gallagher	Gallagher Fuel Systems Limited
IS	Intrinsically Safe
PCB	Printed Circuit Board
SWA	Steel Wire Armoured
UI	User Interface
VR	Vapour Recovery
pump	Three context sensitive meanings: (a) device used to pressurise or transport a liquid. (b) fuel delivery module based on a mechanical pump. (c) where followed by a number (ie. Pump 3) denotes a fuelling position/side of an FDS.
dispenser	Fuel delivery module based on fuel supplied under pressure from a remote storage system and which does NOT contain a mechanical pump. In some instances “dispenser” may apply equally to a pump or a dispenser

3 PICTOGRAMS

DANGER

The associated text highlights a subject area that poses a threat of injury or death if procedures are not carried out correctly.

WARNING

The associated text highlights a subject area in which damage to equipment may result if procedures are not carried out correctly.

INFORMATION

Highlights subject areas that should clarify understanding or provides tips or hints that should assist users and/or technicians.

4 SAFETY WARNINGS & PRECAUTIONS

4.1 Hazard Warnings

No naked flames.

Isolate fuel supplies and empty pipes before working on them.

Isolate electrical supply before opening a dispenser cabinet for maintenance. Physically lock, restrict access to, or tag the circuit breakers you turn off when working on a dispenser.

The dispenser must be supported at all times by all anchor bolts as shown in the appropriate footprint diagram (see “Gallagher PULSE Series - Footprint Manual.” Part No. 2A02068). External support must be used until these are secured. In service, all anchor bolts must be fitted.

All personnel working with dispensers must be made aware of how, in an emergency, to turn OFF power to the dispenser and any remote fuel storage system. They must also be briefed on fire fighting and other relevant inflammable liquid safety procedures.

There are exposed belt-drives between mechanical pumps and their motors in fuel pump equipped dispensers. Ensure that power to the motors is isolated and that the motors have stopped running before opening external panels.

Have all leaks or defects repaired immediately.

Fuels present a toxic hazard and suitable precautions should be taken at all times to prevent ingestion, inhalation and contact with skin and eyes.

Only lift units using the correct lifting points as indicated in the installation part of this manual. Never lift by the nozzle boot, sheet metal, etc. Incorrect lifting also risks damage to equipment which will not be covered under warranty.

Any repairs must not compromise the safety approval of a dispenser.

The system must not be modified without consulting Gallagher.

Only use genuine spare parts. PULSE dispensers are supplied by Gallagher as a fully approved system. Genuine parts as specified in the original design are integral to the correct function and safety of the system. Gallagher cannot be held responsible for any consequences of using non-genuine parts and will not support under warranty any PULSE where substitution has occurred. Any replacement parts should be like for like. In addition the repairer may be legally liable for the consequences of any unauthorised modifications.

Never operate a non-intrinsically safe circuit without the flameproof enclosure cover fitted.

Do not short out isolation or intrinsic safety barriers.

Installation must only be carried out by suitably qualified and competent personnel.

Initial electrical power-up and opening of fuel supply lines must only be carried out after inspection and approval by suitably qualified and competent personnel.

Dispensers contain hazardous liquid and vapour. The instructions in this manual must be followed. In addition, the relevant applicable laws, rules and codes of practice must also be applied. Where contradictions exist, the local legal requirements take precedence.

4.2 Damage Warnings

Electronic equipment in a dispenser is susceptible to damage by electrostatic discharge (ESD). Suitable preventative measures should be taken at all times when working on the electronics system.

Do not clean using hoses or other pressurised systems. Pressurised water ingress damage invalidates the warranty.

The operating environment should avoid extremes of temperature, humidity, etc. including: direct and constant sunlight and heat; atmospheric precipitation (rain, snow, sleet or hail); ice; salt spray; condensing high humidity and dust.

Do not clean using abrasive materials such as steel wool or abrasive polishes unless specifically recommended.

Ensure air is bled from product lines of remote dispensers and mechanical pumps before dispensing product.

Flush all fuel supply lines and ensure flanges, etc. are clear of debris before connection.

Pressure must not be applied to the upper frame or panels by strops or other pieces of lifting equipment.

Hoses that have been used to deliver petrol should not be used to deliver diesel. Plasticisers in the hose lining are replaced by components of the petroleum during use, which are removed if the hose is subsequently used for diesel.

The maximum stated delivery pressure (350kpa) must not be exceeded.

Damage to equipment caused by failure to correctly follow the procedures described in this manual is not covered under warranty.

4.3 Information Relating to DEF (Diesel Exhaust Fluid)

Due to its corrosive nature extreme care must be taken to avoid contamination by DEF (Diesel Exhaust Fluid) when servicing and maintaining DEF equipment. Any DEF product that comes in contact with other dispenser components must be rinsed off with water immediately and thoroughly before any corrosion damage can occur.

The first 10 litres of product flushed through a DEF dispenser and any test vessels must not be returned to the DEF tank.

DEF can be returned to the storage tank only if it is not contaminated.

DO NOT flush DEF down drains. Contact local authorities for acceptable disposal procedures.

Petrol/diesel test equipment should not be used for DEF or vice versa. Use only approved equipment for DEF.

4.4 Materials Not Recommended to be used with DEF

- Gallagher Fuel Systems have seen instances where severe corrosion has occurred on components within the Tatsuno flow meter as a direct result of the use of copper, brass, bronze or other copper alloy components within the Diesel Exhaust Fluid delivery system. ISO 22241-3 2008 Diesel Engines – NOx Reduction Agent AUS 32 – Part 3 – Handling Transportation and Storing provides a list of materials not recommended for use within systems that come in contact with Diesel Exhaust Fluid.
- This list includes non-ferrous metals and alloys; copper, copper alloys (e.g. brass), zinc and lead.
- All components used in delivery systems for Diesel Exhaust Fluid must comply with ISO 22241-3 2008.
- Any issues arising from the presence of copper or other non-recommend materials within the delivery system will not be covered by the Gallagher warranty.

5 GREASING THREADED CONNECTIONS

Grease, petroleum jelly or other suitable thread protectant is commonly applied to threaded connections within fuel dispensers to allow for easy disassembly.

Gallagher endorses this practice and reminds installers and service technicians that grease should be applied to the threaded pipe when a hose is attached during installation or service of any Gallagher fuel dispensers.

Be sure not to over-lubricate this connection as no grease should come in contact with the hose or the Blue face seal on the inside of the hose fitting.

Grease should be applied starting 1-2 threads back from end of the male pipe fitting.

Take care to avoid possible contamination of DEF.

Figure 1. Greasing Threaded Connections

6 FASTENING OF PANEL SCREWS

The following applies to panels that are fastened with M6 stainless steel button screws.

These screws are torqued to 5-7Nm and have an application of Loctite 243 or Loctite 248 to prevent them from self-loosening.

If panels are removed at install or for servicing, then the screws need to be retorqued to 5-7Nm and must have a new application of Loctite 243 or Loctite 248 applied.*

The diagrams highlight the locations of all the relevant screws that these instructions apply to.

* Ensure that the manufacturer's instructions for the application of Loctite are correctly followed.

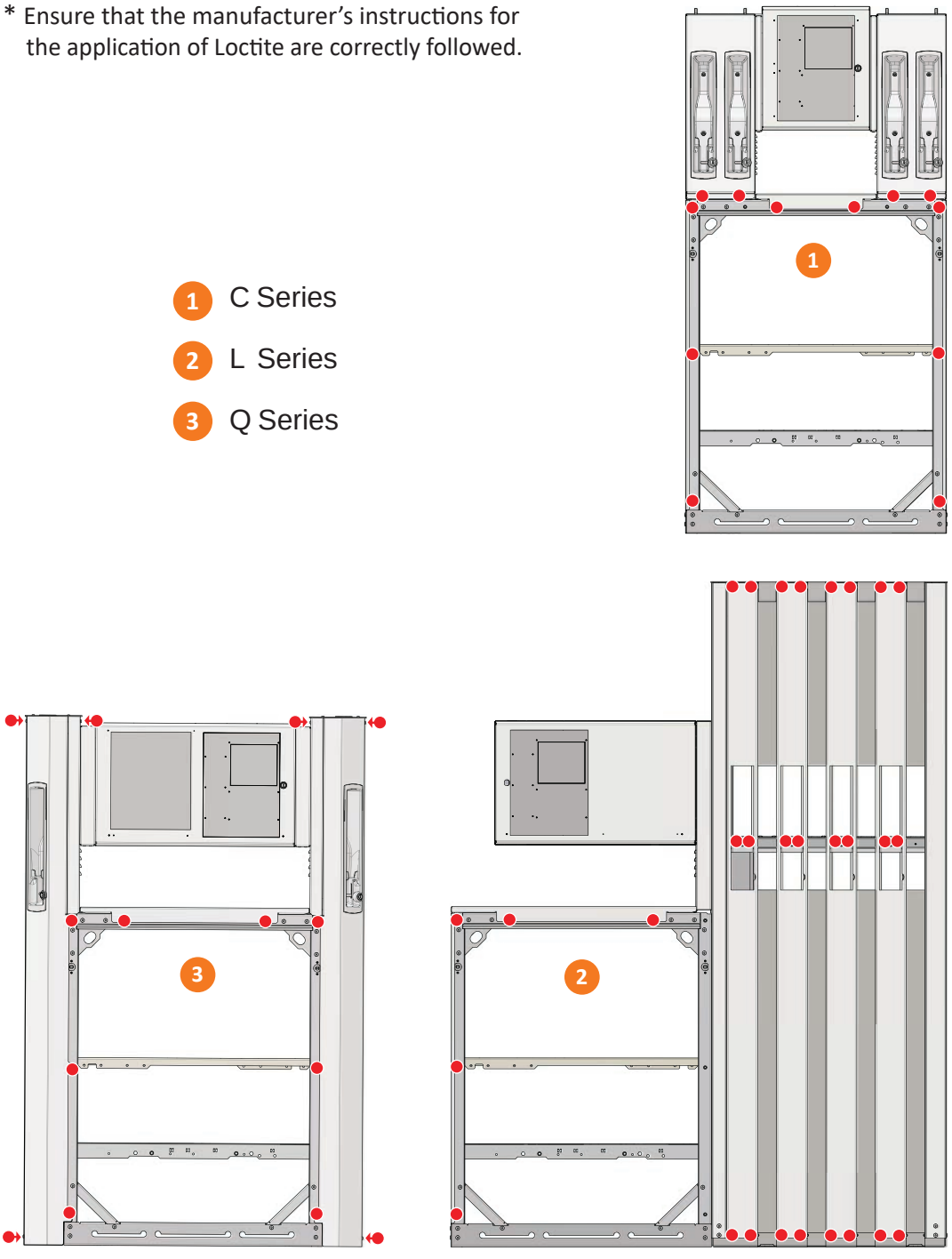


Figure 2. Location of Panel Screws

7 GENERAL SHIPPING & TRANSPORTATION INFORMATION

Each Gallagher PULSE dispenser is supplied in protective packaging consisting of a forklift compatible wood and cardboard crate.

Upon receipt the crate should immediately be inspected for external damage. If any is found it should be recorded at once on the delivery documentation and MUST be notified to Gallagher in writing (email or fax) within 3 working days;

It is strongly recommended that photographs of damaged packaging and equipment be sent to Gallagher to assist the claim process;

All damaged products AND packaging must be retained for inspection by Gallagher.

Prompt action will significantly assist problem resolution.

7.1 Handling

Storage conditions must be met during handling and transportation.

Dispensers in their factory supplied packaging are compatible with forklifts. Always insert forks at the points indicated to avoid tipping to one side.

The estimated maximum external dimensions (cm) and weights (kg) of PULSE dispensers in their factory-supplied packaging are shown in the following tables.

The prefix V signifies models fitted with Vapour Recovery.

The suffixes (S) and (F) stand for Spreader and Flexi respectively.

TYPE	Weight	Width	Depth	Height
LX 8-Hose Pump	476	201	58	221
LX 6-Hose Pump	398	186	58	221
LX 4-Hose Pump	325	168	58	221
LX 8-Hose Dspnsr	340	200	58	221
LX 6-Hose Dspnsr	287	186	58	221
LX 4-Hose Dspnsr	250	168	58	221
LS 8-Hose Pump	450	167	58	221
LS 6-Hose Pump	370	150	58	221
LS 4-Hose Pump	290	130	58	221
LS 2-Hose Pump	280	120	58	221
LS 8-Hose Dspnsr	300	167	58	221
LS 6-Hose Dspnsr	360	150	58	221

TYPE	Weight	Width	Depth	Height
LS 4-Hose Dspnsr	231	135	58	221
LS 2-Hose Dspnsr	300	120	58	221
V LX 8-Hose Pump	340	200	58	221
V LX 6-Hose Pump	431	186	58	221
V LX 6-Hose Dspnsr	300	176	58	221
V LX 8-Hose Dspnsr	380	200	58	221
CX 8-Hose Pump(S)	400	125	58	175
CX 6-Hose Pump(S)	375	125	58	175
CX 4-Hose Pump(S)	350	125	58	175
CX 8-Hose Dspnsr(S)	233	125	58	176
CX 6-Hose Dspnsr(S)	350	125	58	175
CX 4-Hose Dspnsr(S)	325	125	58	175

TYPE	Weight	Width	Depth	Height
CX 8-Hose Pump(F)	430	125	58	221
CX 6-Hose Pump(F)	400	125	58	221
CX 4-Hose Pump(F)	380	125	58	221
CX 8-Hose Dspnsr(F)	350	125	58	221
CX 6-Hose Dspnsr(F)	320	125	58	221
CX 4-Hose Dspnsr(F)	300	125	58	221
CS 4-Hose Pump(S)	250	90	58	175

TYPE	Weight	Width	Depth	Height
CS 2-Hose Pump(S)	220	90	58	175
CS 4-Hose Dspnsr(S)	200	90	58	175
CS 2-Hose Dspnsr(S)	180	90	58	175
CS 4-Hose Pump(F)	240	90	58	205
CS 2-Hose Pump(F)	220	90	58	205
CS 4-Hose Dspnsr(F)	220	90	58	205
CS 2-Hose Dspnsr(F)	200	90	58	205

Dispensers present a tipping risk, and they are heavy. Do not attempt to manoeuvre a dispenser by hand, e.g. DO NOT use a hand trolley (sack barrow).

Any contact with the upper crate or dispenser by ropes, chains, etc. risks seriously damaging the dispenser.

Tying down during transport should only be via the tying points marked on the crate.

Note the following key points:

(a) Lifting forces are applied to pipes inserted through brackets in each top corner of the hydraulic cabinet.*

(b) Spacers must be used to prevent lifting strops from applying pressure to the head and frame. This is essential to avoid damage.*

*Refer to **Part B:** Installation, 1. Lifting of Units

Pressure must not be applied to the upper frame or panels by strops or other pieces of lifting equipment.

7.2 Storage

The storage or transportation environment must be:

(a) Dry and reasonably dust-free;

(b) Reasonably vibration-free;

(c) Have a level surface to minimise tipping risk.

Dispensers should be stored in their delivery crates.

If it is necessary to inspect the equipment prior to storage, record the orientation of the upper cardboard packaging with respect to the base so that it can be replaced correctly with the marked tie-down points in their correct positions.

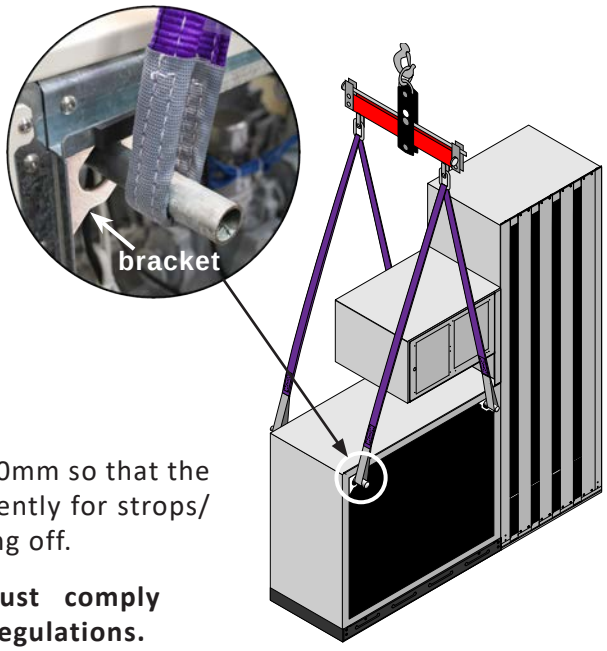
8 PULSE TECHNICAL SPECIFICATIONS

Suction System			
1 pump and motor per product		Dedicated meter for each product hose/nozzle	
Standard - suction head limit 4.0m (petrol @ 25°C @ sea-level) max, includes vertical lift and losses in supply pipe lines and fittings			
Standard - suction head limit 5.0m (diesel @ 25°C @ sea-level) max, includes vertical lift and losses in supply pipe lines and fittings			
Ultra - suction head limit 3.0m maxiumum effective suction head with the T140 only for Ultra/High Diesel flow			
Air Separation			
Tatsuno PGS-0257 FP1001 Pumping Unit			
Bennett T140 Hydrauic High Flow Pumping Unit			
Pressure System			
Submersible pump unit (STP) in the remote fuel tank - controlled from on-board AC Control system. Minimum 1 STP/product			
Inlet manifold pressure		100 - 350kPa max (MUST NOT exceed 350kPa)	
Delivery Flow Rate			
Standard	up to 40L/min	Standard nozzle with reduced spout (38L/min target)	
Boost button	up to 60L/min	Standard nozzle with 19mm standard diesel spout	
Diesel High Flow	up to 80L/min	Nozzle 25mm with 25mm standard spout	
Diesel Ultra Flow	up to 120+L/min	Nozzle 25mm with 25mm standard spout	
DEF - Euro5: Trucks	up to 40L/min	DEF - Euro 6: Passenger cars up to 5L/min (DEF - Diesel Exhaust Fluid)	
LPG	up to 40L/min	Gas Guard GG1DN LPG Nozzle with latching option	
* All quoted delivery flow rates dependent on supply pressure, condition of the underground piping and fuel quality impacts			
Metering			
Tatsuno FM-1007 Flow Meter			
Tatsuno FM-1002 Lobe Meter (Ultra Flow Diesel)			
Electronic System			
All electronic components located in the hazardous areas (hydraulic cabinet and hose stowage area) are intrinsically safe			
All other electronic components are located in the non-hazardous area within the User Interface			
Display	Total Price	7 Digit Transflective backlit LCD. Limited to MAX $9990.00 by POS protocols	
		5 or 6 digit options available	
	Total Volume	7 Digits Transflective backlit LCD. Limited to MAX 9990.00 litres by POS protocols	
		5 or 6 digit options available	
	Preset	5 or 6 Digit Transflective backlit LCDs. Limited to MAX $9990.00	
	Unit Price	5 Digit Transflective backlit LCDs	
Tote		Digital	8 digit totalisator for total volume and dollars per hose
		Electro Mechanical	7 digit totalisator for total volume per hose (option)
Pulser		88918/07434	Intrinsically safe pulser, IECEx certified Ex ib
Forecourt Communications		PEC	Two wire 12V parallel system
		Gilbarco Australia	Two wire current loop system
Electrical System			
Motor		Elnor	750W IECEx certified Ex d single phase
Motor		Elnor	1500W IECEx certified Ex d single phase (Ultra suction solutions)
Solenoid Valves		ASCO	24VDC proportional solenoid valve. IECEx certified Ex m
Temperature Range			-10°C to +50°C
Electrical Requirements			220-240 VAC
Mechanical System			
Hose		Elaflex	16mm AS 2683 compliant
High Flow Hose		Elaflex	21mm or 25mm - AS2683 compliant
Ultra, High or Boosted Flow Switch		Illuminated button available on all models with diesel	
Nozzle		Elaflex	ZVA Automatic Nozzle: ZVA Slimline 2 / ZVA25
Dry-break couplings		Elaflex	SSB16/ SSB25 Straight - Safety Swivel Break at the Nozzle
MAX No. of Products Dispensed			L Series: 5 per side C Series: 4 per side
Ethanol, LPG, Biodiesel and DEF capable		Yes. (Limits: Ethanol up to E10 or E85. Biodiesel up to B20)	
Vapour Recovery option		Yes. Integral with Elaflex VR Hoses and Nozzles	
Hose Reach		L Series:	Reach: 3.3m - Hanging hose 4.0m - Retractor slide activates at 3.3m
		C Series:	Reach: 3.8m - Hanging hose 4.5m - Retractor reel activates at 3.8m
		CS Q:	Reach: 4.2m - Standard Flexi-arm 5.2m - Extended Flexi-arm

PART B: INSTALLATION

1 LIFTING OF UNITS

PULSE Fuel Delivery Systems have brackets in each upper corner of the hydraulic cabinet through which lengths of 32mm (1¼") diameter steel bar are inserted from front to rear. Care must be taken so as not to snag components, wiring etc.



Suitable strops are then attached to the ends of the bars as shown in the accompanying diagram.

The bar length should be a minimum of 750mm so that the ends extend away from the cabinet sufficiently for strops/ ropes to be attached with no risk of slipping off.

All lifting equipment used must comply with appropriate standards and regulations.

2 PRIOR TO INSTALLING

The mechanical, hydraulic and electrical work that must be completed on site prior to installation of the dispenser is described below.

2.1 Underpump Containment Sump

Sumps with secondary containment pipework must be provided at all sites. These can be sourced from an appropriate manufacturer.

The installation method will depend on local, legal and customer requirements.

At all sites with sumps, dispensers must be installed with a liquid level detection device fitted in the sump that will raise an alarm if liquid is detected in the base of the sump. (see Installation - Section 9.5 Float Switch Installation)

2.2 Hydraulic Pre-Installation

The footprint, anchor points and perimeter of the PULSE Series are contained in the document entitled "*Gallagher PULSE Series - Footprint Information*." (Part No. 2A02068)

To view this document access the following website and enter the name (eg footprint manual) in the search window.

https://fuelsystems.gallagher.com/support

2.3 Anchoring Bases

Requirements applicable to all system sizes include:

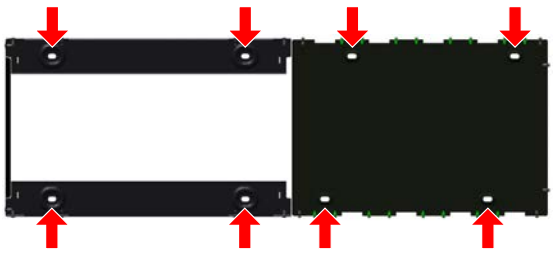
- all anchor points must be bolted to a rigid horizontal surface (see illustration);
- bases must be fixed or anchored to a rigid and level surface. The surface that the pump is fixed to must contact the whole of the base plate's 'ground' contact surface.

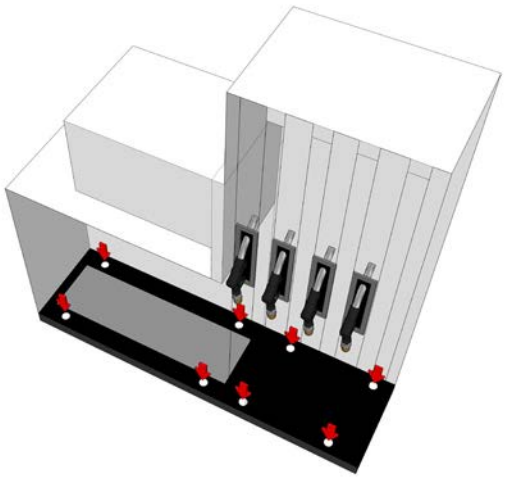
2.3.1 Anchor Point Locations

⚠ Ensure that all anchor points as shown below are fastened with a M12 bolt.

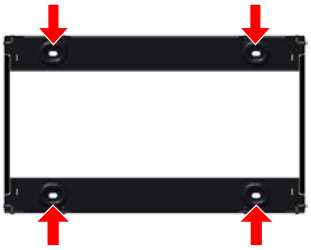
Dispensers are to be installed on a flat surface to ensure that the anchor bolts can be secured sufficiently.

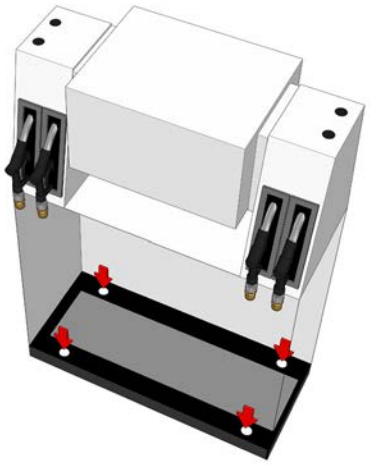
L Series



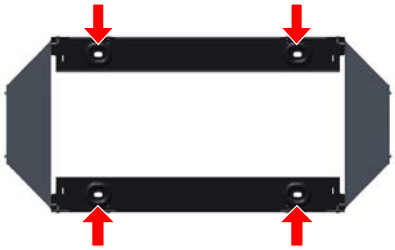


C Series





Q Series



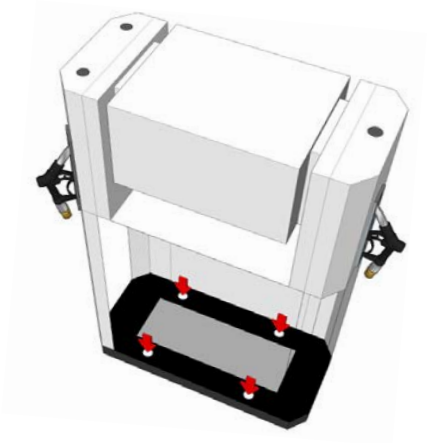


Figure 3. Anchor Point Locations

2.4 Electrical Requirements/Regulations

All cabling must comply with all relevant National and Local Acts, Regulations and Standards, and must be installed by suitably qualified personnel.

- A constant and quality power source is required for all PULSE dispensers in accordance with local regulations.
- All wiring and installation work shall comply with AS/NZS 3000.
- Each dispenser should be protected by a suitable circuit breaker and Residual Current Device (RCD) that is capable of being locked off.
- When designing the site, cable selections should comply with AS/NZS 3008.1 for Australia and AS/NZS 3008.2 for New Zealand.
- When terminating external cables in the dispenser, crimp joints should be used and should comply with AS/NZS 3000.
- If the dispenser is to be installed in a Marina then all wiring shall be performed in compliance with AS/NZS 3004.

Electrical cabling is required by the dispenser for the following purposes:

(a) Power supply;

(b) Pump control circuit for dispenser models;

(c) Communications with Forecourt Controller equipment;

(d) Sump float switch communication (optional).

General cabling requirements are:

(a) Cabling must be laid in accordance with the appropriate local standards;

(b) At least 2m free length of cabling above ground level must be allowed for termination at the dispenser;

(c) Cabling must be routed so that it emerges through the base-plate and is entirely enclosed within the dispenser's panels;.

Details of the electrical connections are given in Installation - Section 9 ELECTRICAL.

Mains wiring configurations for a 4-product dispenser and a single-phase pump are shown in Figure 8.

2.4.1 Mains Power Supply

The mains power supply requirement is 230/240V 50Hz. The maximum certified voltage is 264V, while the minimum operating voltage is 210V.

2.4.2 Remote Pump Control Power Supply (Dispensers)

The electrical load of each remote pump control relay should be less than 15VA.

3 HYDRAULICS

Inlet transit gaskets must be discarded and replaced with suitable new gaskets at the time of installation.

Refer to Part D “Servicing” 1.4 for target torques for gasket sealing.

If the dispenser has been in storage for longer than 3 months, the following checks and actions must be carried out during the installation and commissioning process:

a Hoses - Visually check over each hose and ensure no kinking has occurred;

b Nozzles and swivels - Check that the swivels on each hose move freely through a full range of movement. Check that the rotatory joints are free and not seized;

c Head - Visually inspect the interior of the head for any signs of moisture or condensation. Inspect all PCB’s for any sign of corrosion. Remember to also check the Multiplexer Board which is usually located underneath the top panel of the Hydraulic Cabinet;

d Vee Belt (pumps only) - Check the Vee Belts for any permanent distortion or delamination due to sticking to the pulley.

3.1 Pumps

Fuel lines in are connected to their respective pumps by means of flex-connectors. To facilitate ease of installation, motors may be temporarily removed and the tension of the drive-belts adjusted upon replacement.

3.2 Dispensers

Fuel lines in (from one or more submersible pumps) are connected to their respective meters by means of fixed piping via a shear valve chosen and supplied by the installer.

3.3 LPG

The LPG return valve is not attached to the hydraulic cabinet in order to allow it to be placed in the best position.

Additional LPG Information may be found in Part C “Commissioning” - Section 7 LPG SECTION.

3.4 Vapour Recovery

Vapour Recovery (VR) components are common throughout the Gallagher PULSE range.

Integral models are equipped with their own vapour recovery pump. This pump’s vapour line should be connected to underground vapour lines by means of a shear valve.

All VR models in the PULSE range have vapour recovery pipes and hose components fitted prior to despatch.

A separate Install/Commissioning Manual for VR2 equipment is available, part number 2A03039

4 C SERIES HOSE INSTALLATION (HANGING)

The installation of the spreader and hoses must be carried out in a specific order of steps, namely:

i. Remove the holsters.

ii. Fit the spreader on top of the lower assembly.

iii. Fit the hoses.

iv. Refitting of holsters.

Hoses **SHOULD NOT** be fitted to the spreader prior to placing it on top of the lower assembly. Placing the spreader will require **two** people.

4.1 Remove the Holsters

Remove each holster as follows:

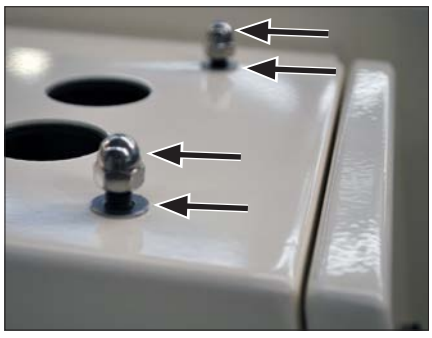
(a) Remove the 2 screws at the bottom of the holster panel.

(b) Pull the holster panel out at the bottom and lift up to remove from the top panel.

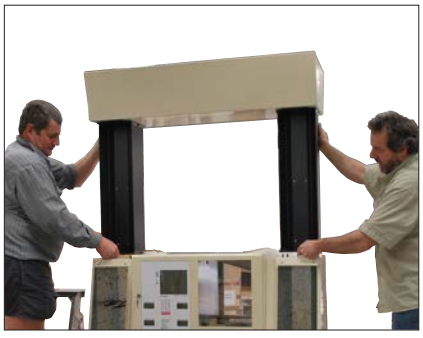
(c) Disconnect the holster switch.

4.2 Fit the Spreader

Inspect the spreader unit and dispenser to confirm they are free from damage. Then complete the following steps: (Note that there is no front or back, both sides are the same)



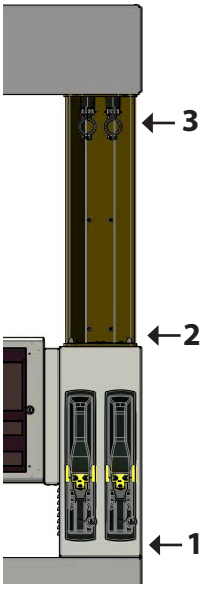
(a) Remove all nuts and washers from the top of the dispenser.



(b) Carefully lower the base of the spreader unit down on the top of the dispenser.

(c) Secure with nuts and washers.

4.3 Fit the Hoses



Thread the hose down through the holes in the spreader base, connecting in the following order.

1. Brass hose end **2. Three bolt flange** **3. Hanger point**

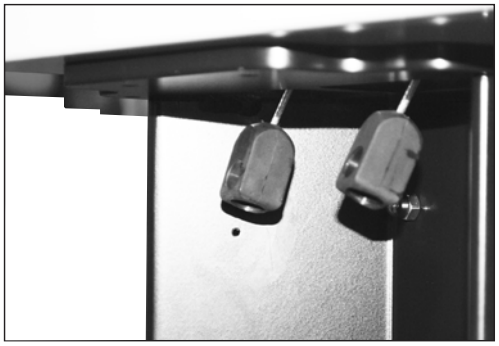
1 Brass Hose End
After threading the hose down through the top, connect and tighten the brass hose end.

2 Bolt Flange
Connect the three bolt flange.

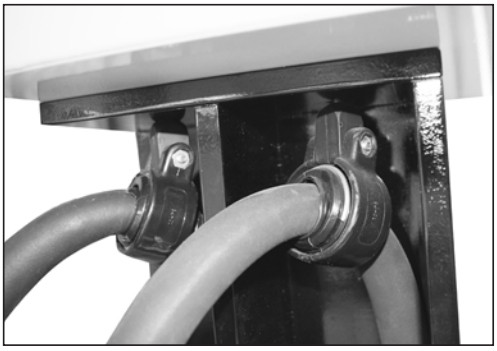
3 Hanger Point

Connect the hanger points.

- The clamp attached to the hose hanger point will fit to the anchor points suspended from the spreader. Secure the clamp to the anchor points using the M5 Screw and nut inside the clamp. Repeat for all hoses.



Anchor points underneath the C-Spreader



The hose clamp attached to the anchor points

- Once all hoses are in place, secure each pair (front and back) in the column behind holsters using cable ties.

4.4 Replace the Holsters

a Insert the nozzle switch cable into the correct nozzle switch on the holster panel. (See Section 6)

b Replace the holster panels and their 2 screws. (Refer to General 6. Fastening of Panel Screws.)

5 C SERIES HOSE INSTALLATION (RETRACTOR)

This process requires the following steps:

i. Removing the spreader panels.

ii. Preparing the cable from the spring reel to be connected to the hose.

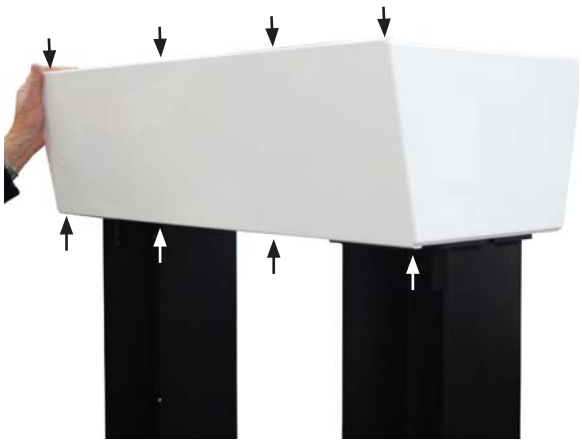
iii. Removing the holster panel to allow access to connect the hose.

iv. Connecting the hoses.

v. Attaching the hose clamps to the hoses and retractor cables.

vi. Replacing the holster panels and the spreader panels.

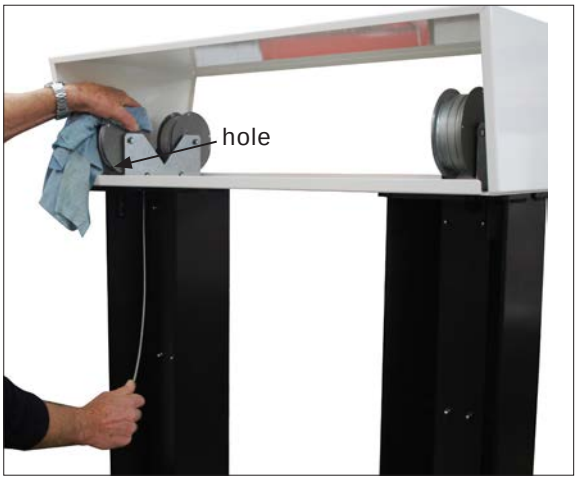
5.1 Remove the Spreader Panels



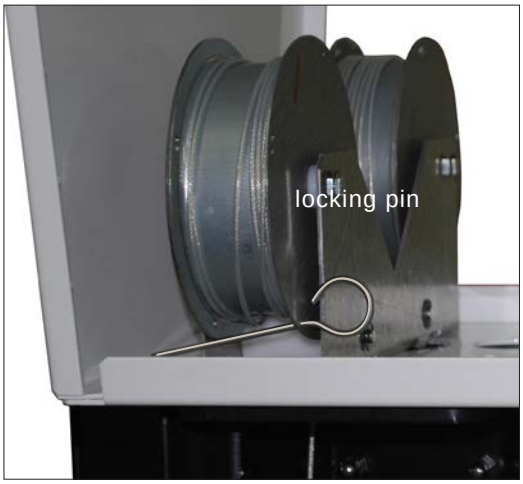
a Unfasten screws.

b Remove panels.

5.2 Prepare Spring Reel Cable for Connection to Hose



a Secure the spring reel while pulling the cable down, until the hole in the spring reel is visible next to the metallic support.



b While maintaining the tension on the reel, secure it by inserting the locking pin as shown above.

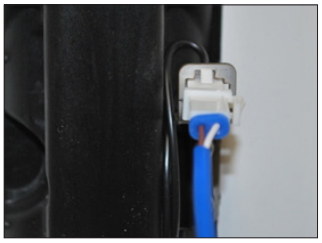
5.3 Remove Holster Panels to Allow Access to Hoses

The holsters and holster panels will need to be removed to allow access to hose connections.

The holster switch cable will also need to be disconnected to release the holster panels.

a Remove both screws at the bottom of the holster panel.

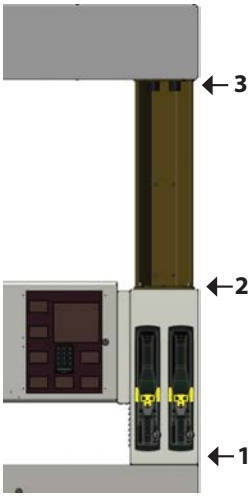
b Pull the holster panel out at the bottom and lift up to remove from the top panel.

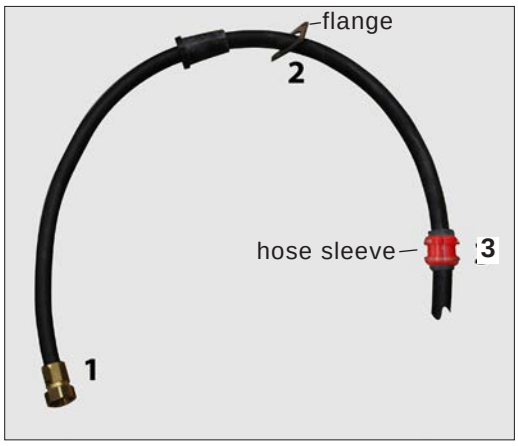


c Disconnect the holster switch cable. (See Section 6)

5.4 Connect the Hoses

Once the hose is threaded into the column it requires securing in 3 places. The brass end to the column; the hose flange to the base plate of the spreader; and the hose hanger point to the hose retractor. These connection points are described with matching numbers in the diagram below. Position 3 is detailed in 5.5.

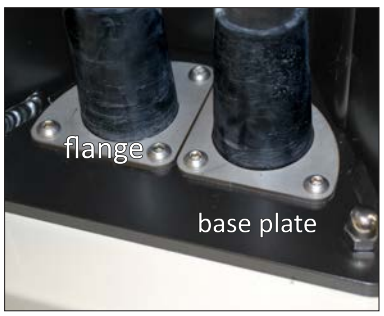




1. Thread the hose end 1 into the column through the holes on the base-plate of the spreader, as indicated.

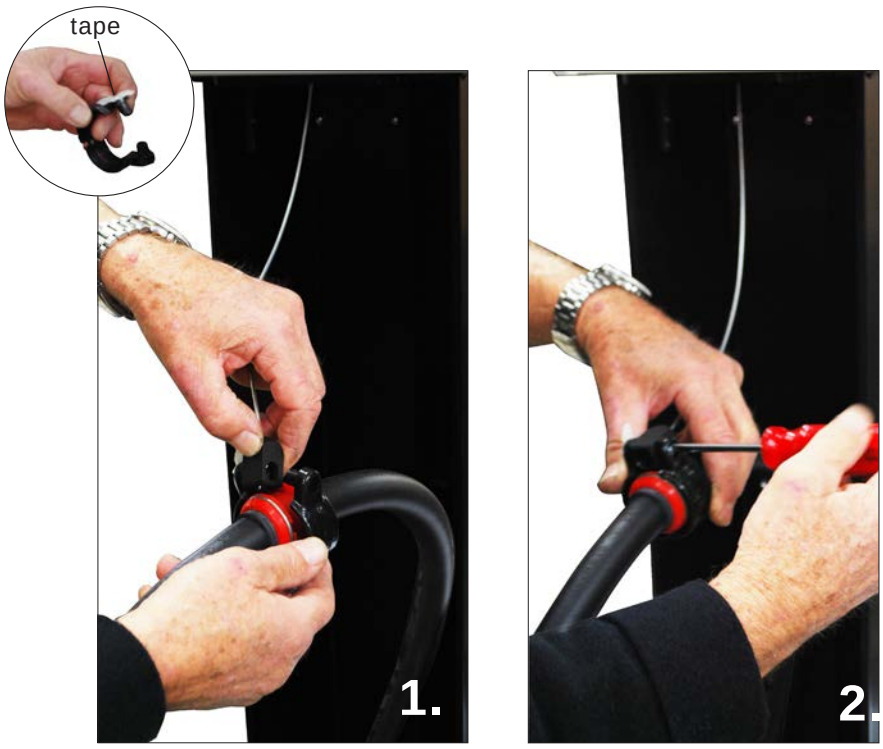
2. Fasten the brass end of the hose to the column.

3. Secure the hose by fastening the 3-hole flange to the spreader base plate.



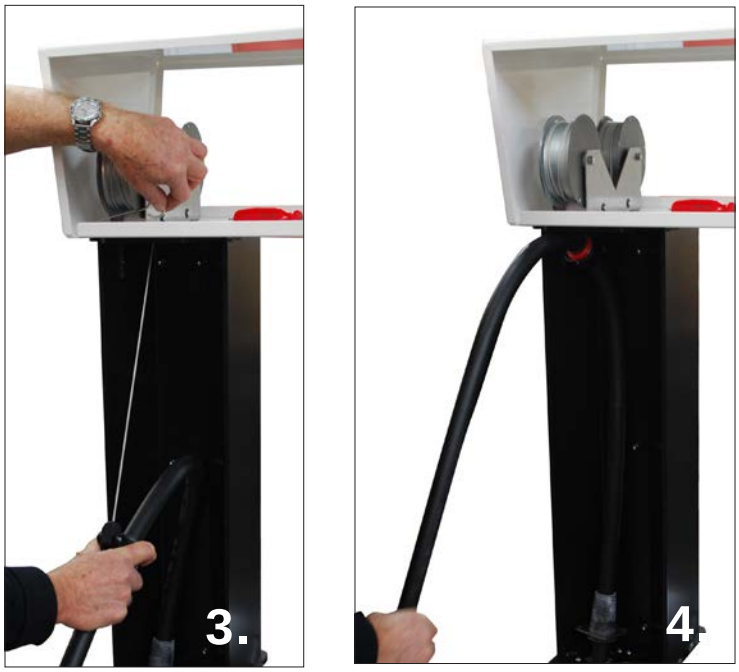
5.5 Attach the Hose Clamp to the Hose and Retractor Cable

Prepare the clamp by using single sided tape to retain the captivated nut in place.



1. Place the clamp around the hose sleeve and fit the cable connector between the two sides of the clamp.

2. Close the clamp and insert the screw into it, engage into nut and tighten.



3. Maintain tension on the cable while pulling the hose down to remove the locking pin.

4. Slowly allow the cable to slide upwards to the reel.

5.6 Refit Panels

The final step is to replace the spreader panels and reconnect the holster switch before replacing the holster panel.

a Replace front and rear spreader panels.

b Fasten the Phillips screws at the top and the bottom of the spreader panels.

c Connect the holster switch cable. (See Section 6)

TYING BACK UNUSED NOZZLE SWITCH CABLES

Holster switch cables come in sets of 2 (for 1 or 2 products) and 4 (for 3 or 4 products).

A single product dispenser has the Grade 2 switch cable tied back.

A three product dispenser has the Grade 4 switch cable tied back.

d Replace the holster panel.

e Fasten the two screws at the bottom of the holster panel. (Refer to General 6. Fastening of Panel Screws.)

6 NOZZLE SWITCH CONNECTION

Make sure that the switch connector is correctly plugged in with the hook fully engaged under the stop.

A cable tie can be used to prevent movement causing the switch to disconnect.

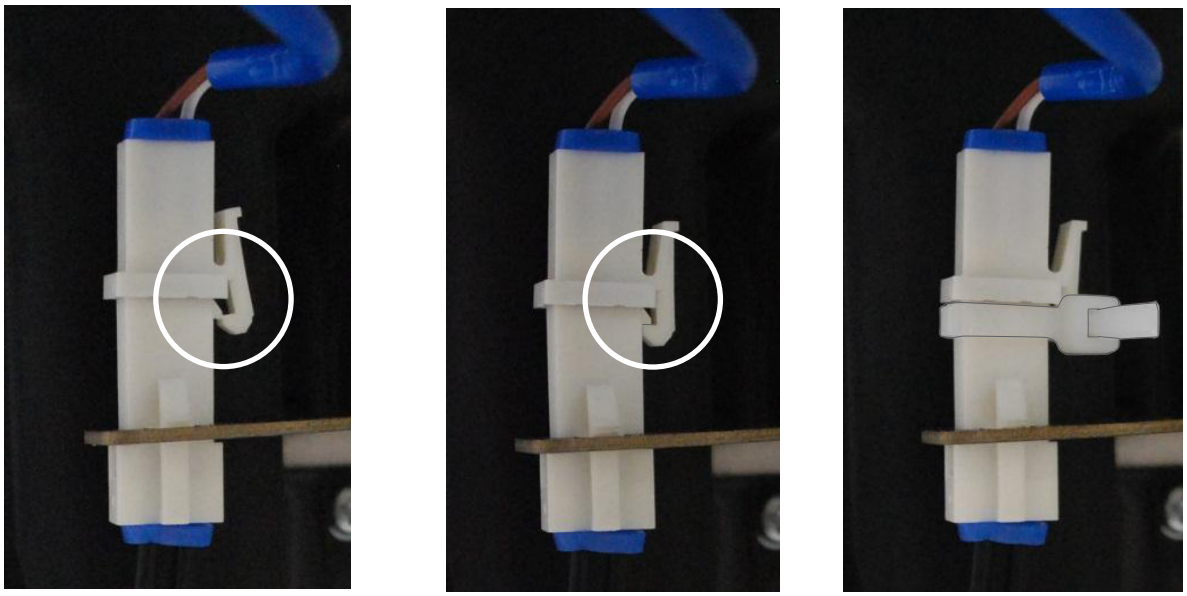


Figure 4. Correct Nozzle Switch Connection

7 CORRECT FITTING OF HOSES TO HI-ARM

As shown in the illustration below, a sufficient length of hose (arrowed) must be provided between where the hose exits the pump and the hose clamp.

This will avoid any crimping of the hose which would restrict product flow and possibly lead to hose damage.

The clamp should be attached slightly past the 12 o'clock position towards the delivery side of the hose.

Once correctly installed the hose may be pulled in any direction and not become tight.

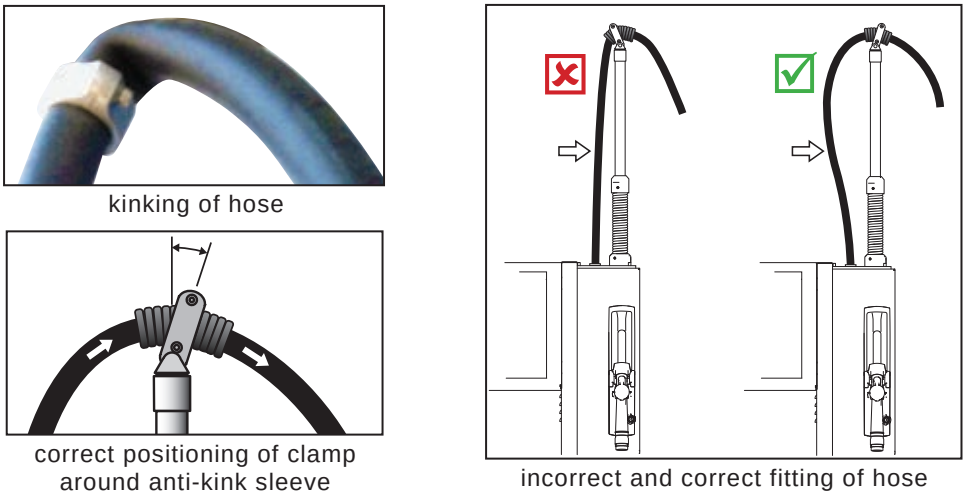


Figure 5. Correct Method of Fitting Hoses to High-Arm

8 BENNETT PUMP UNIT

The Gallagher PULSE uses the Bennett T140 high fl ow pumping unit on commercial Ultra High Flow pump applications.

In order to maintain Warranty and avoid premature pump failure, belt damage and fuses blowing, Service and Install Technicians must be aware of the following:

- The pump must NEVER be run dry for periods exceeding 5 minutes as the fuel is necessary for cooling. Should 5 minutes of running dry occur, the pump must be allowed to rest for a minimum of 30 minutes.
- The pump is not to be used to clean supply lines and should NEVER be operated without the strainer fitted.
- The pump is fitted with an integral check valve. Although it is standard practice to fit a check valve at the base of the pumping unit, this is not required with the Bennett Pump. The adding of an external check valve decreases the available lift.
- Correct belt tension (155N) is necessary for maximum belt life and optimum pump operation. A belt tension gauge is the only accurate way to measure tension.
- Best performance is achieved with a lift of no more than 3m. Greater lifts will see an increase in pump noise, vibration and a decrease in flow rate.
- Excessive cavitation/vibration (due to a blocked filter on the suction side, high suction lift or an air leak) must be avoided and may result in pump or belt failure and/or motor fuse tripping.
- The by-pass pressure setting of the unit should be no more than 34.5 KPa higher than the operating pressure at full flow.
- When attaching the inlet flange the maximum depth of available thread engagement in the pump casting is 13mm. Fasteners longer than this will cause irreparable damage to the pumping unit.

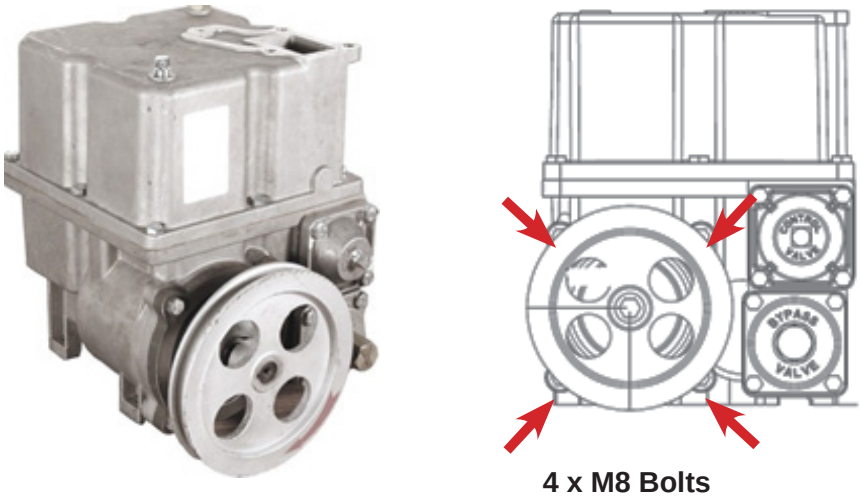


Figure 6. Bennett Pump Unit

8.1 Pre-Installation Check of Rotor Movement

A harsh knock in transit can affect clearance between the rotor, stator and rotor cover. Before the belt is installed, test clearance by turning the pulley wheel by hand.

The wheel should move freely. If it is locked up, or excessive resistance is detected, carry out the realignment procedure below.

8.2 Realignment Procedure

Use a 13mm spanner to loosen the four M8 rotor cover bolts, spin the rotor by hand until it spins freely, then re-tighten the bolts. There is no particular sequence to tighten. Tighten to 19-23 Nm.

8.3 Belt Tension

Tighten drive belt to 35lb.

8.4 Vacuum and Pressure Testing

IMPORTANT:

Vacuum / pressure gauges should be of the thread type G ¼ B and must be suitably rated to record the vacuum or pressure of the pump. Vacuum is tested at the plug located at the centre of the filter cover. Pressure is tested at the centre of the control valve cover.

PRESSURE CONVERSION TABLE

To / From	psi	mbar	bar	atm	Pa	kPa	MPa	mmH_2O	$in.H_2O$	mmHg	in.Hg	kg/cm^2
psi	1	68.95	0.0689	0.0681	6895	6.895	0.006895	703.8	27.71	51.715	2.036	0.0704
mbar	0.0145	1	0.001	0.999967	100	0.100	0.0001	10.21	0.402	0.75	0.0295	0.00102
bar	14.504	1000	1	0.987	100000	100	0.1	10210	401.9	750.1	29.53	1.02
atm	14.7	1013.25	1.01325	1	101325	101.325	0.1013	10343	407.2	760.0	29.92	1.033
Pa	0.000145	0.01	0.00001	0.00001	1	0.001	0.000001	0.102	0.00402	0.0075	0.000295	0.00001
kPa	0.14504	10.0	0.01	0.00987	1000	1	0.001	102.07	4.019	7.5	0.295	0.0102
MPa	145.04	10000	10	9.87	1000000	1000	1	101971.6	4014.6	7500.6	295.3	10.2
mmH_2O	0.001421	0.098	0.000098	0.000097	9.8	0.0098	0.0000098	1	0.0394	0.0735	0.00289	0.0001
$in.H_2O$	0.0361	2.488	0.002488	0.00246	248.8	0.2488	0.00025	25.4.	1	1.866	0.0735	0.00254
mmHg	0.01934	1.333	0.001333	0.001316	133.3	0.1333	0.00013	13.61	0.536	1	0.0394	0.00136
in.Hg	0.4912	33.86	0.03386	0.03342	3386	3.386	0.00386	345.7	13.61	25.4	1	0.0345
kg/cm^2	14.22	980.7	0.9807	0.968	98067	98.067	0.0981	10010	394.1	735.6	28.96	1

For more detail, see the Bennett Pump Manual at: https://www.bennettpump.com/files/oem-components/oem-components-manuals/56-bennett-t140-high-flow-pumping-unit-operation-service-and-parts-manual/file

9 ELECTRICAL

TOTAL ELECTRICAL ISOLATION BEFORE ACCESS

Any procedure that requires access to electrical components of the electronics of a dispenser/pump requires total electrical isolation of that unit. Understand the function and location of this switch or circuit breaker before inspecting, installing or servicing Gallagher equipment.

Before powering up check the tightness of all terminals and plugs.

9.1 General

Mains power and comms cables are connected within the Ex ‘e’ certified enclosure (junction box) located in the hydraulics cabinet. Labels showing connection details are located on the inside of each junction box cover.

Where a SWA cable is terminated within the enclosure, a lock-nut will be required to ground the certified IECEx ‘e’ cable gland to the internal earthing strap.

Unused entry holes must be blanked with a suitable certified IECEx ‘e’ blanking plug.

No connections between system components is required at installation. All internal wiring is connected prior to despatch.

9.2 Mains

As shown in Figure 7 the mains power supply connector block varies between a dispenser and single phase pump.

Installers may need to affix an earth bonding strap to the chassis of the junction box where required by local regulations.

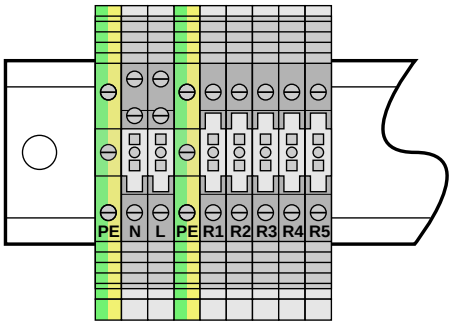
9.3 Comms

POS cabling is connected into a common connector block as shown in Figure 8.

Figure 7. Single Phase Pump Connector Blocks

Mains Supply 230/240 VAC, 10A, 50Hz	
PE	Mains Earth
N	Neutral
L	Live/Phase
R1,R2,R3 R4,R5	STP Control Relays (L)

Dispenser



Mains Supply 230/240 VAC, 16A, 50Hz	
PE	Mains Earth
N	Neutral
L	Live/Phase

Single Phase Pump

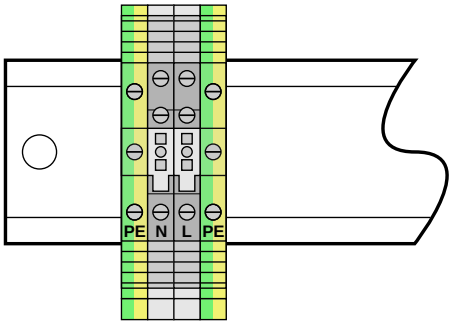


Figure 8. Mains Connections

Communications	PE	1	2	3	4	5	6
2 Wire Pump Comms		+	-				
Vapour Recovery	dG			dA	dB	SP	SN

Dispenser, Single Phase Pump

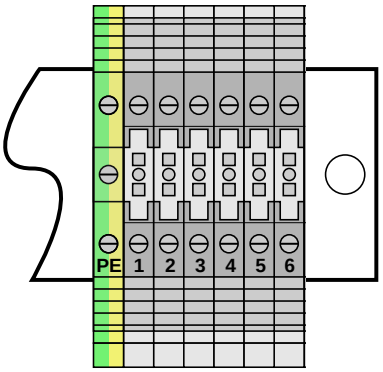


Figure 9. Comms Connections

9.4 Forecourt Communications

The Forecourt Controller must be compatible with one of the following forecourt communication protocols:

1. PEC Pump Communication Protocol Document.
2. Gilbarco Australia Two-Wire Pump Protocol Specification.

The location of the protocol pins and their settings for PEC and Gilbarco protocols are shown in the illustrations below.

NOTE that the Gilbarco setting has an additional jumper which must be removed for the PEC protocol.

The configuration file within the dispenser must match the protocol. Contact Gallagher if this requires changing.

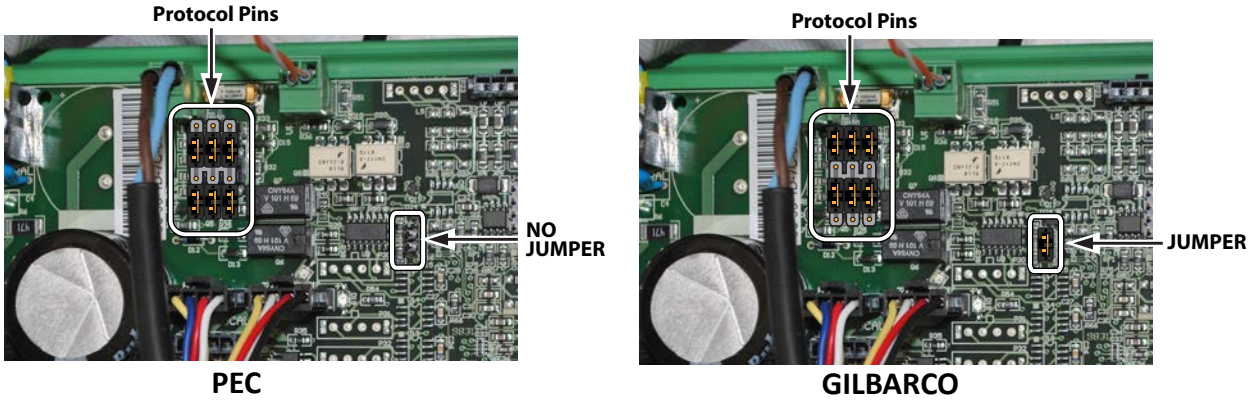


Figure 10. Location and Positioning of Protocol Pins

9.4.1 Central Controller DCE

The Data Centre Enabled (DCE) Central Controller does not require jumpers. Plug into the top for Gilbarco or bottom for PEC and set the protocol in the Service Menu.

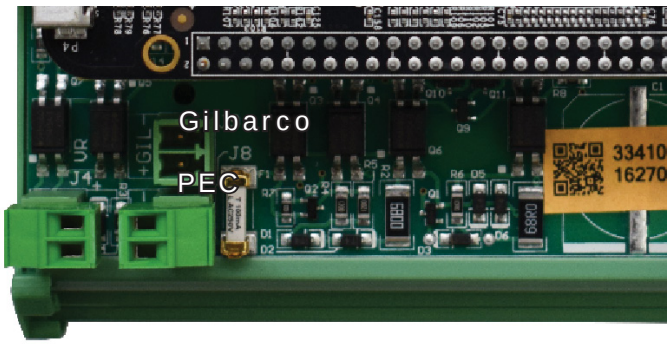


Figure 11. Central Controller DCE

9.5 Float Switch Installation

The Float Switch bracket has a hole at one end and a slot at the other. The switch is installed in the round hole, not the slot, as indicated in Figure 11.

(a) Install the Float Switch in the round hole at the bottom end of the Float Switch bracket as indicated.

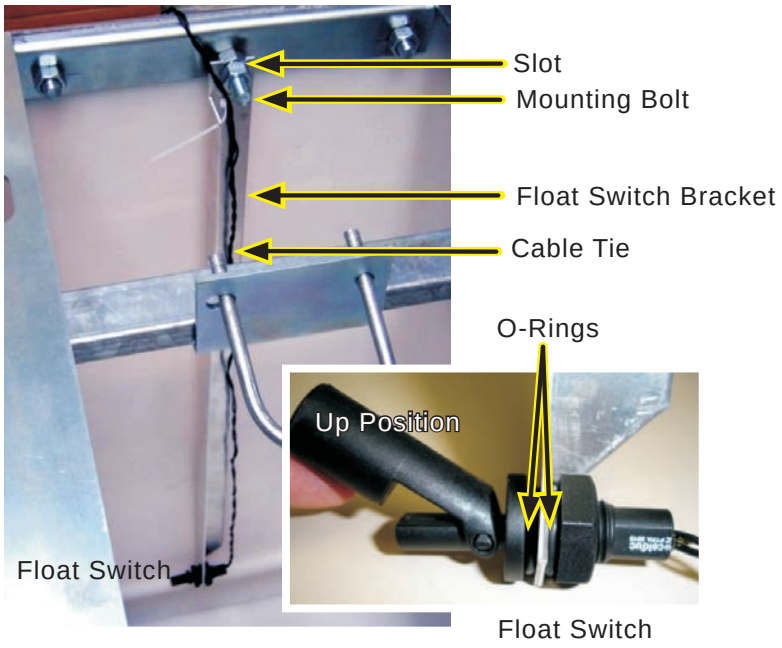
(b) Fit an O-ring on each side of the bracket.

(c) Mount the Float Switch so that the float is level and will rise up when fluid is present, thereby opening the circuit which is normally closed.

(d) Fit the Float Switch bracket to the sump's spare bolt and secure it with the supplied nut.

(e) Secure the cable to the top end of the bracket with the cable tie through the small hole next to the slot. The cable is connected to P31 on the Multiplexer Board, the position of which is shown below.

(f) Secure the cables away from all belts and moving parts using cable ties.



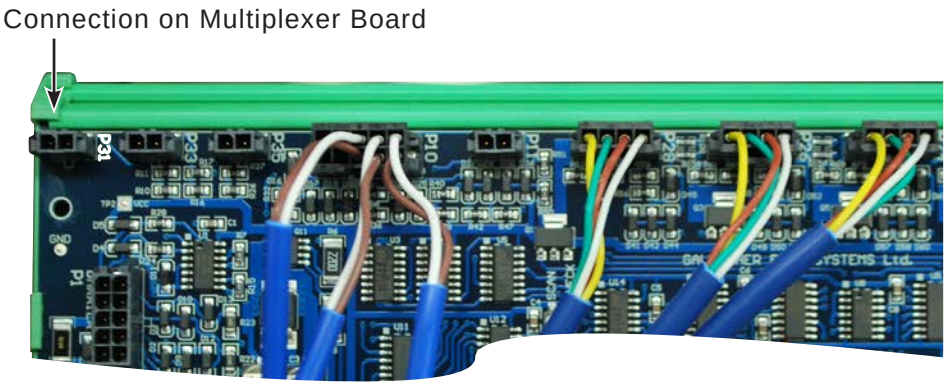
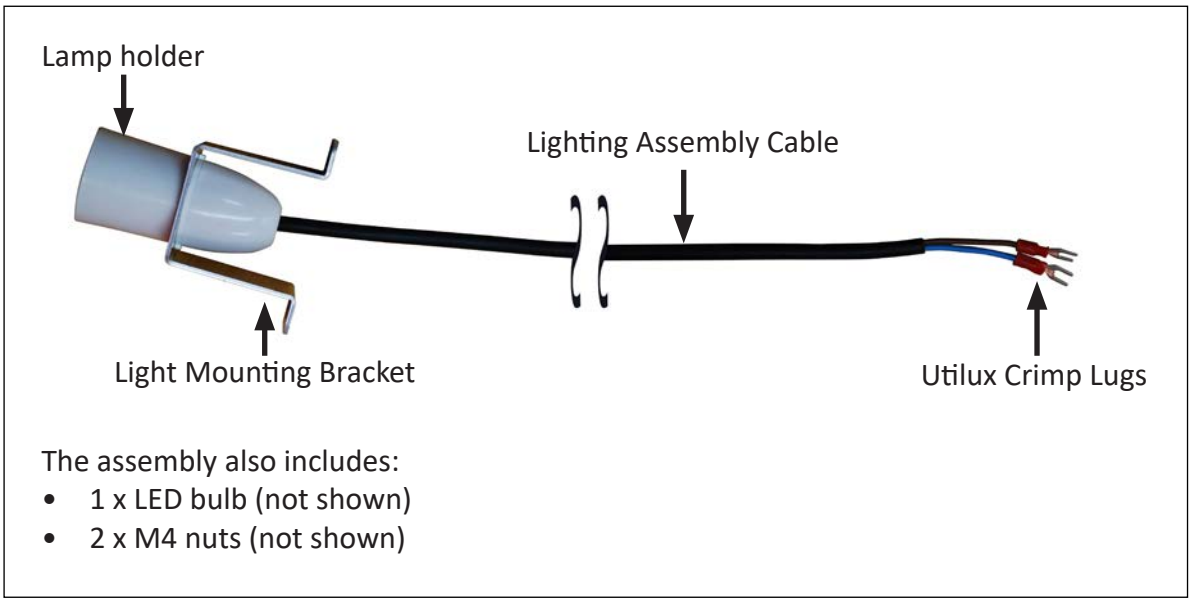


Figure 12. Float Switch Installation

9.6 Installing the Head Lighting

This section describes the process of installing and connecting the Head Lighting Assembly (Part Number 2A100442) inside a PULSE Head with an Advert User Interface.

The Head Lighting Assembly will be supplied as shown in the following figure.



The assembly also includes:

- 1 x LED bulb (not shown)
- 2 x M4 nuts (not shown)

Figure 13. Head Lighting Assembly

The installation procedure should be executed through the rear side of the head. The light mounting bracket should be connected to the 2 studs within the free compartment inside the head. For the power supply, the Utilux Crimp Lugs should be connected to the Motor Drive Module.

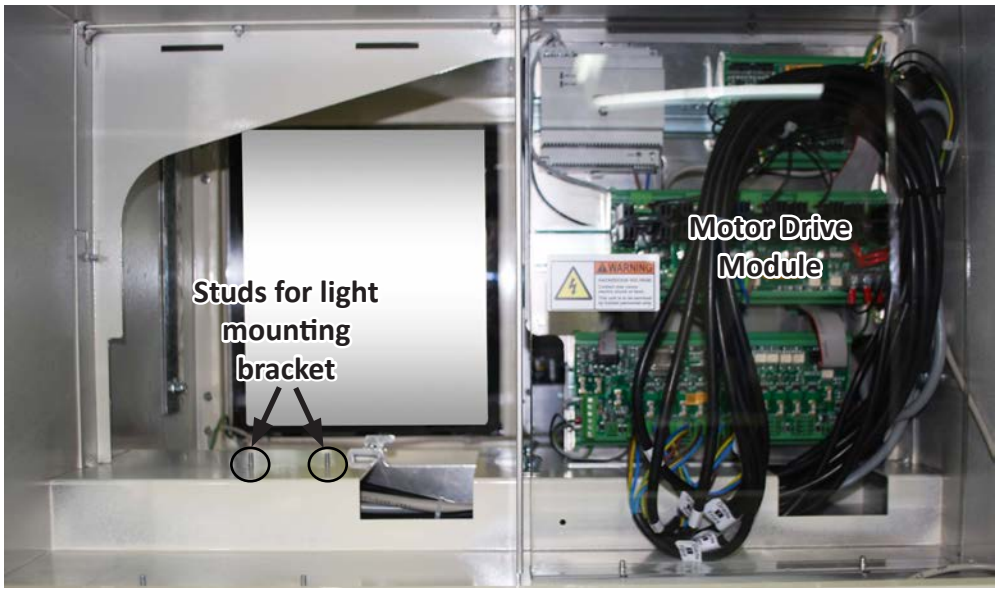
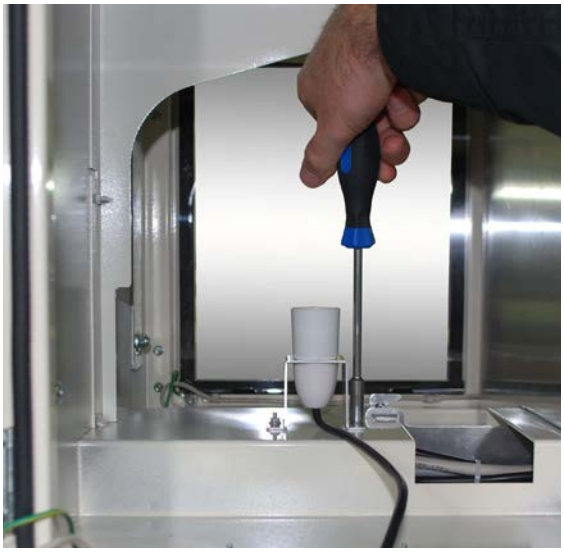


Figure 14. Rear Side of the Head

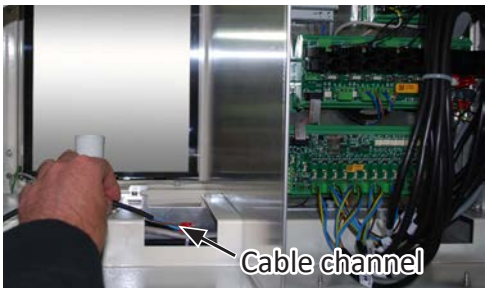
Procedure

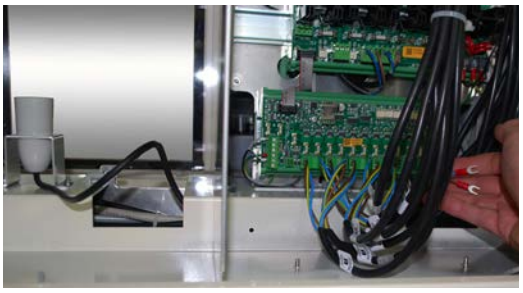
The following steps describe how to install the head lighting

1. At the rear of the head remove the shield covering the gear plate by first removing the dome nuts on the top of the shield.

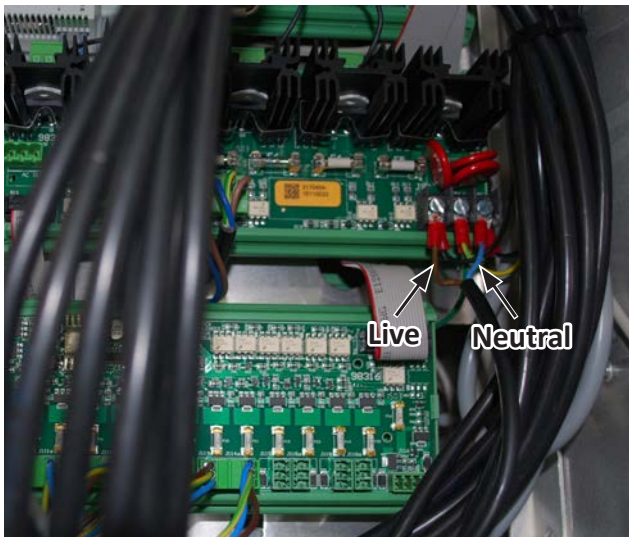


2. Fit the light mounting bracket to the 2 studs in the middle of the head. Secure with 2 M4 nuts.





3. Run the lighting assembly cable through the cable channel and up to the Motor Drive Module.



4. Connect the Utilux Crimp Lugs to the terminal on the Motor Drive Board. Brown cable on the live terminal and blue cable on the neutral terminal.

5. Fit the light bulb to the lamp holder and conduct an electrical safety test as required.

6. Replace the shield over the gear plate and re-fit the dome nuts.

7. Repower the dispenser and test the correct operation of the head lighting.

9.7 Connecting the light cable for the Illuminated Spreader

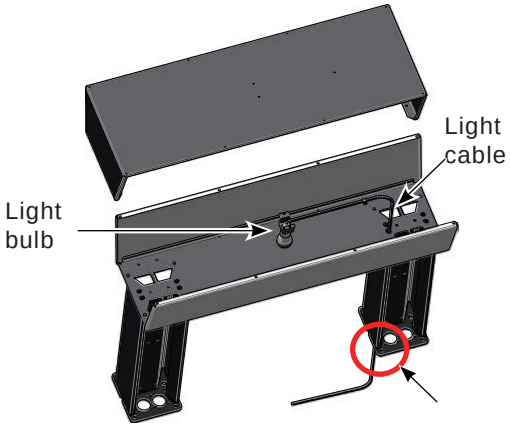
The CX/CS illuminated spreader includes a light and cable bracketed to the top inside panel.

Providing power for this light requires the installer to connect the light cable to a fixed mains output located inside the head.

Depending on the dispenser configuration the cable may be fitted to either the motor drive board, integrated stack controller, or the power distribution board. A phoenix connector is required and is supplied with the spreader.

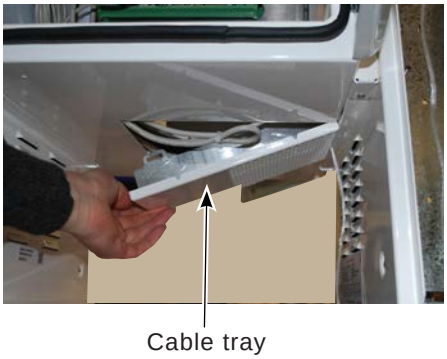
If the connection is to the power distribution board and the connection points are already taken, the cable can be connected via the adjacent screw terminal as shown in the diagram below.

1. Locate the connection end of the light cable.



The light cable end should be protruding from the column of the spreader.

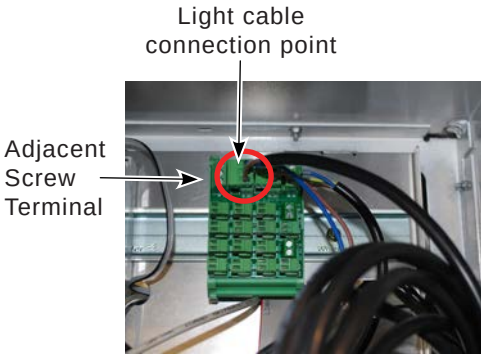
2. Once the spreader is fitted, remove the cable tray at the bottom of the head and pass the light cable through the cable tray from the front.



3. Guide the light cable through to the rear side of the head.

View from the rear side

4. Plug the light cable into a mains output inside the head. This example uses a power distribution board.



PART C: COMMISSIONING

Gallagher dispensers are factory tested using ISOPAR test fluid. A quantity of this fluid may remain within the dispenser and may be released during commissioning.

While this fluid is low in toxicity, it is recommended that the usual safety measures are followed including the use of PPE and washing after contact.

LONG STORAGE

Where, prior to installation, an dispenser was in storage for longer than 3 months, the following checks and actions must be carried out during commissioning:

a **Nozzle Autostop** - Fill a test can to check the nozzle correctly autostops when the sensing port at the end of the nozzle is blocked by product.

b **Proportional Valves** - Test the operation of each valve using the Stack Test Function. When using the Stack Test the valves flow can be adjusted from 0% to 100% in 5% or 1% increments. Test to ensure that the valves open and close properly and responsively. Every hose must be tested (see Servicing - Section 12.14 Hydraulic Stack Test - STACK).

c **Motor -** While the motor is running check the current it is drawing with a clamp meter. Each motor should draw between 3-4 amps.

The costs associated with these tests are not covered by Gallagher.

1 OVERVIEW

The following chart gives an overview of the Commissioning process.

Where an LPG stack is present refer to Commissioning - Sections 7.6 (v1.11) and 7.7 (v1.20) LPG Trade Measurement Verification Process.

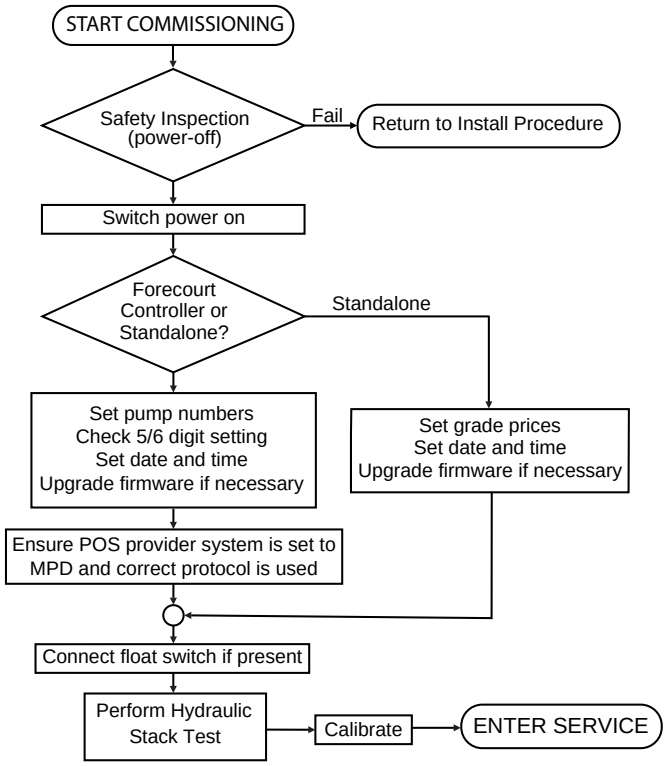


Figure 15. Overall Commissioning Process

2 SAFETY INSPECTION

Before the fuel and electrical supply are turned on for the first time the installation must be inspected and approved for safety by suitably qualified and competent personnel.

Items that must be checked during safety tests include:

(a) VR return line connections (where present).

(b) Electrical power supply connections.

(c) Remote relay connections (where present).

(d) Communications cabling and connections.

(e) Fuel feed line connections.

3 SYSTEM START-UP CHECKS

On start-up, the dispenser performs various operations and self checks. The results of these checks are not communicated audibly and may not be confirmed visually on the displays.

In normal circumstances the dispenser will start without messages.

In the event that an error message is displayed, or if the dispenser does not start up, refer to Part D Servicing - Section 17 TROUBLESHOOTING.

Contact the appropriate technical department or Gallagher Support.

4 LPG TRADE MEASUREMENT VERIFICATION PROCESS

Refer to Commissioning - Sections 7.6 (v1.11) and 7.7 (v1.20) LPG Trade Measurement Verification Process, for details regarding this procedure.

5 SERVICE MODE SETTINGS

Certain actions and settings must be completed before the dispenser can be put into service.

Instructions can be found in Part D Servicing - Section 12 SERVICE MODE FUNCTIONS (v1.11) or Section 13 for v1.20.

All are carried out at the UI and keypad while in Service Mode.

6 CALIBRATION

A Tatsuno Meter is used with petrol and diesel products. The DEF meter, although similar in appearance, is specially constructed for use with DEF. However the adjustment procedure is the same as for the petrol/diesel meter.

Calibration adjustments affect the volume of fuel delivered per revolution of the flow meter, while the displayed volume always advances by exactly the same amount for each revolution.

Calibration is achieved by using the Adjustment Wheel to alter the volume delivered by the Flow Meter per revolution so that it matches the volume displayed after a test delivery.

Refer to local legislation for requirements pertaining to calibration procedures.

Remove the locking pin prior to moving the Adjustment Wheel.

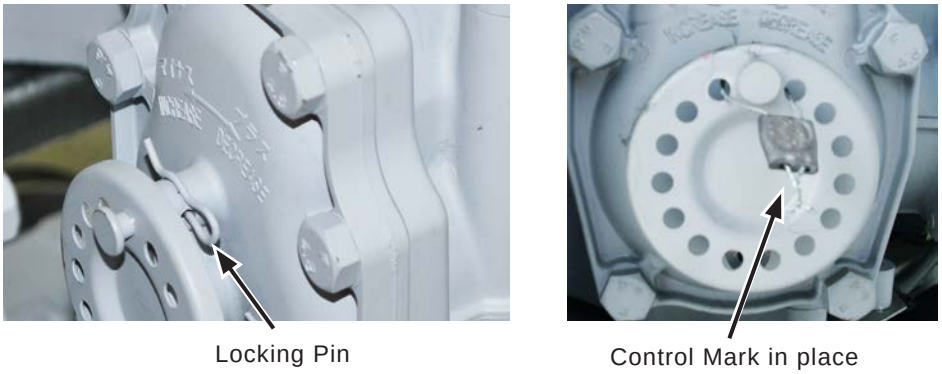


Figure 16. Adjustment Wheel

A single pitch-turn (one hole to the next) varies the flow by 0.04% (approx 0.2ml per revolution). The meter can be adjusted up to a maximum of 0.64% (3.2ml per revolution).

After calibration, the meter must be wired with a sealed plate (Control Mark).

Over-Delivering

When a Flow Meter delivers **MORE** fuel than required the display will show an amount less than the actual delivery.

Solution: "**DECREASE**" the amount delivered per revolution by moving the calibration wheel in a clockwise direction.

Under-Delivering

When a Flow Meter delivers **LESS** fuel than required the display will show an amount greater than the actual delivery.

Solution: "**INCREASE**" the amount delivered per revolution by moving the calibration wheel in an anti-clockwise direction.

6.1 Firmware Test

Certificate of Approval S624 Revision 7 requires units having a firmware version less than version 1.20.xx to have the software updated before verification.

6.2 Lobe Meter (Ultra Diesel)

Due to the Lobe Meter having no mechanical adjustment in its design, the Ultra encoder incorporates a calibration facility which can compensate volume errors within a ±2% range, with a resolution of approximately ±0.1%.

The encoder uses a “Hall Effect” device to detect the rotation of a magnet which is mounted at the end of a shaft within the meter body. The magnetic field is coupled to the Hall Effect device through an aluminium cover plate, which avoids the necessity for an extended shaft and seal.

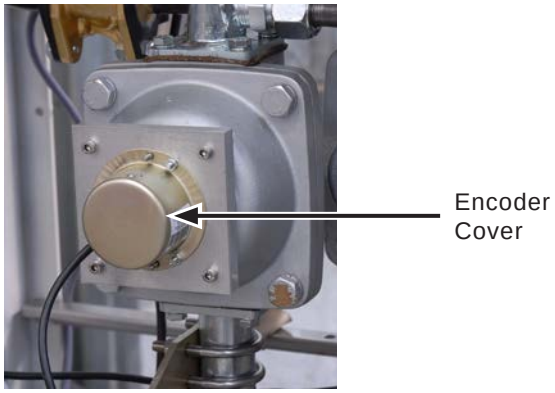


Figure 17. Lobe Meter

6.3 Calibration Procedure

When a test delivery is outside of allowable limits, the following steps must be performed to calibrate the Lobe Meter:

1. To gain access to the encoder PCB assembly, remove the encoder cover by undoing the three M4 nuts holding it in place.

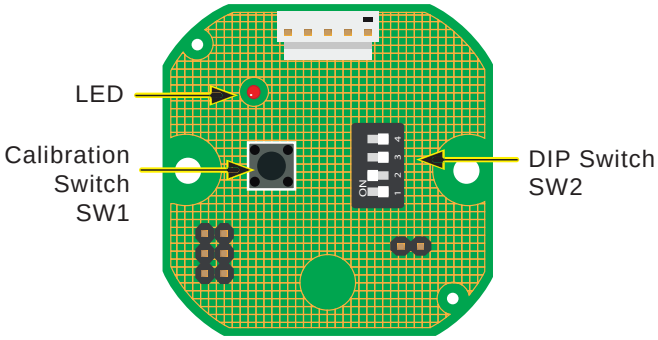


Figure 18. Encoder PCB

2. Select the calibration vessel volume using SW2 DIP-switches 2, 3 & 4.

Volume	*SW2.1*	*SW2.2*	*SW2.3*	*SW2.4*
220 Litre	Off	Off	Off	Off
200 Litre	Off	On	Off	Off
100 Litre	Off	Off	On	Off

Table 1. Encoder SW2 DIP-Switch settings

3. Prepare for a test delivery by lifting the nozzle but do not commence delivering fuel.

4. Press and release the Calibration Switch (SW1) on the Encoder PCB. This will be registered by a 5 flash blink sequence performed by the LED, followed by a single flash once per second. The encoder is now in calibration mode.

5. Fill the vessel to the calibration mark (Do not hang up the nozzle).

6. Press and release the Calibration Switch (SW1) again. If the recorded delivery volume was within the expected range, then there will be an immediate short blink sequence of a length related to the recorded error from the nominal for the vessel (no flash if the error is zero). This will be followed 1.5 seconds later by a 5 flash blink sequence to indicate successful completion of the calibration process.

7. If the recorded delivery volume was outside of the expected range, then there will be a 25 flash blink sequence to indicate an unsuccessful calibration run. The encoder calibration will then be restored to its previous (accurate) state in this case.

8. Hang up the hose nozzle.

9. Re-fill the test vessel to confirm a successful calibration run.

10. Replace the encoder cover by refitting the three M4 nuts. Provision is made for a locking wire with lead seal.

6.4 Calibration Procedure for Blending Units

The procedure for calibrating the various grades of a blending unit is as follows:

Grade 1	98	Nomal procedure
Grade 2	95	No calibration possible
Grade 3	91	Normal procedure
Grade 4	Diesel	Normal procedure

If Grade 2 is out of the acceptable toerance, recalibrate Grades 1 and 3.

7 LPG SECTION

This section describes the procedures required during commissioning specific to LPG such as:

- Fuel flow test.
- Trade Measurement test.

It also provides a brief description of specific LPG components and characteristics including the following:

Stack

The LPG stack is always in the Product A position located as follows:

L Series: closest to the hose column.

C Series: on the far right if you are facing the front of the dispenser.

Flow Meter

E+H Coriolis mass flow meters are used in the LPG stack. They are non-serviceable. In case of failure they must be replaced.

Valves

LPG uses a 2-Stage LPG valve that enables pre-set deliveries.

Return Valve

The return valve is used solely for the return of LPG during testing.

Fuel Density

If fuel density variations are detected during a delivery, dispensing will pause momentarily to allow LPG vapour to recondense to liquid. Normal operation will then resume.

The **rear** LPG flow meter is accessed from the front of the dispenser.

The **front** LPG flow meter is accessed from the rear of the dispenser.

7.1 LPG Stack Components

The image of the LPG Stack shown below is as viewed from the front where the filter housing is located.

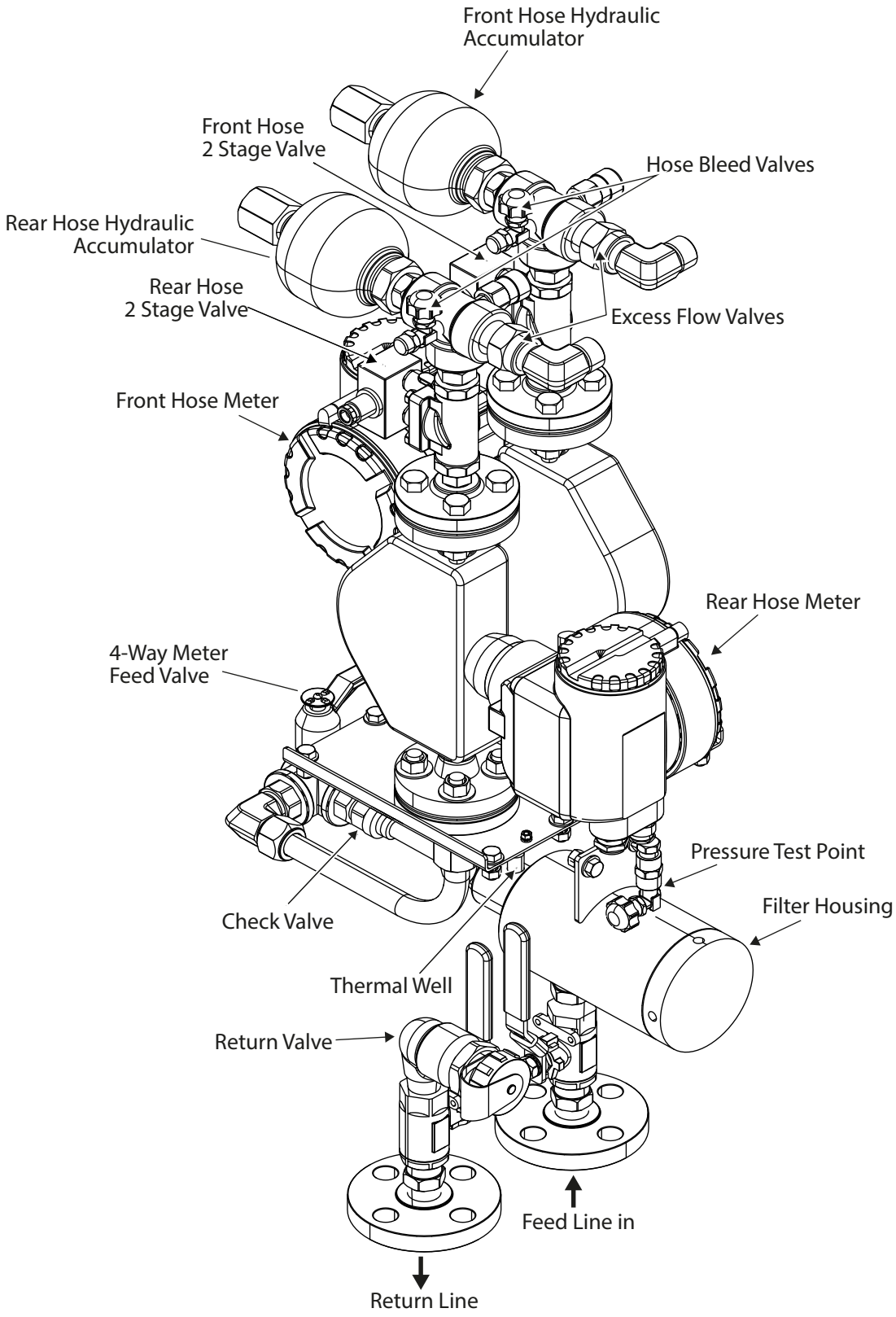


Figure 19. LPG Stack Components

7.2 4-Way Meter Feed Valve Settings

The Meter Feed Valve can be adjusted to supply product to either front or rear meter, both, or none. Settings are shown below.

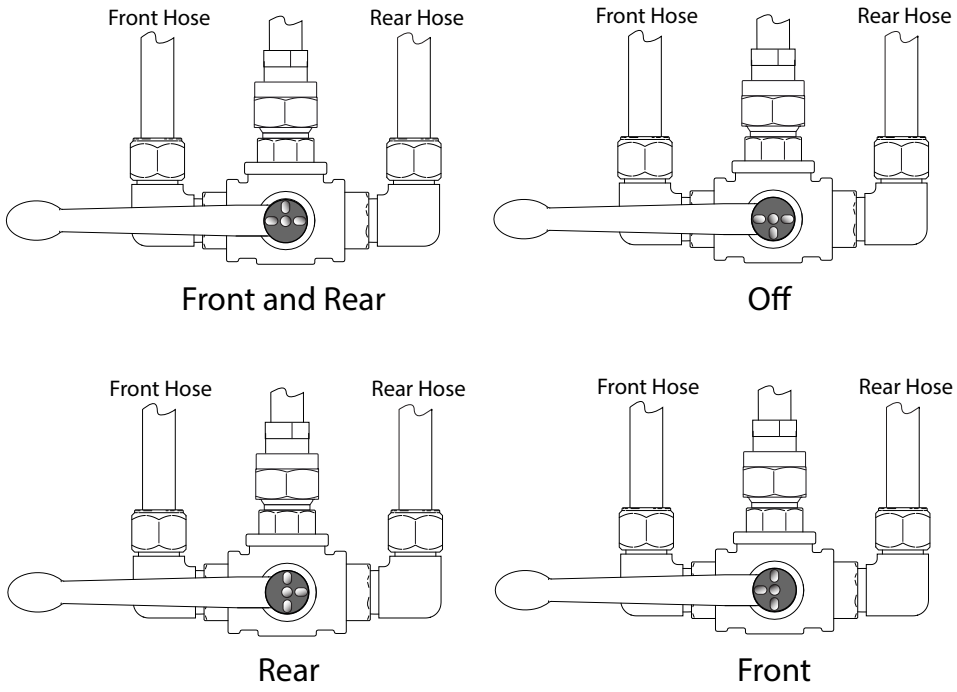


Figure 20. Meter Feed Valve Settings

7.3 Return Line Valve

The return line valve is not fixed to the hydraulic cabinet enabling it to be positioned where required for attaching to the return line flange.

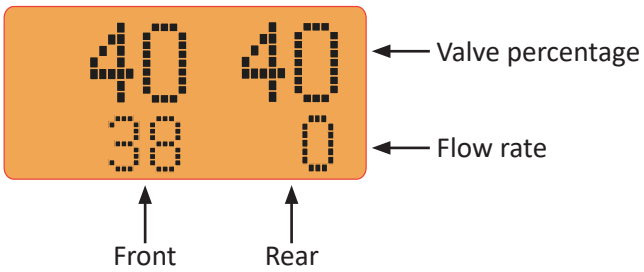
Figure 21. Return Line Valve with LPG Nozzle Attached

7.4 LPG Stack Test - Version 1.11

When installation is complete and fuel is available on site, perform a flow test for each LPG hose to clear out all air and vapour from the supply lines, meters, internal pipework and fittings and delivery hoses as follows:

1. Couple the LPG nozzle to the return line fitting and open the ball valve. Hold the nozzle trigger open.
2. Put the dispenser in Service Mode (see Servicing - Section 12.1) and enter Stack Test for Grade 1 (Servicing - Section 12.14).
3. Start the LPG pump by pressing the [1] key.
4. The valve percentage will show 40 (High Flow).
5. Open the valve by pressing the [3] (front valve) or [9] (rear valve) keys. Fuel flow should be heard and flow rate registered in the bottom row of the grade 1 price display. Wait while any 'gassy' noises cease and the flow settles to a steady value.

   The flow rate displayed will be the high flow rate in L/pm.



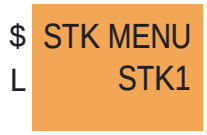
6. Press [8] to adjust the valve percentage to 35 (low flow). The indicated flow rate should drop to about 2 or 3 L/min.
7. Connect the other hose and repeat the procedure from 4.
8. Close the return line ball valve when finished. Press Ⓒ to exit Stack Test.
9. If the expected flow rates are not achieved or all air and vapour is not properly purged, then the cause must be investigated and rectified before proceeding to the Trade Measurement Verification.

△ Check to ensure there are no leaks during the fuel flow test.

7.5 LPG Stack Test - Version 1.20

Enter Service Mode

Use the [2] & [8] keys to scroll through the list until STK MENU is displayed in the Dollars display. STK1 is shown in the Litres display



Press [4] or [6] to select a different stack (if present) eg: STK2.

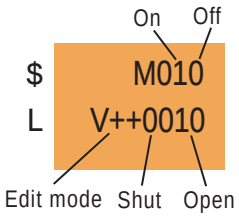
Press [FILL] to enter the stack menu for the selected stack. The CONTROL OUTPUTS window is displayed.

Press [FILL] to enter the control inputs function.

The Dollars display now shows an "**M**" for Motor and a row of digits, indicating the configured motors and their state.(0 = Off 1 = On/Open)

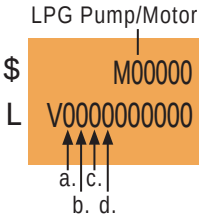
The Litres display now shows a "**V**" for Valve and a row of up to 10 digits indicating the state of the valves. (0 = Off 1 = On/Open + = Edit mode)

A flashing digit indicates the currently selected motor/valve.



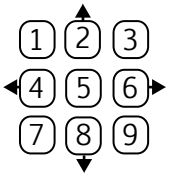
LPG uses two-stage valves, each stage represented by a zero on the V row. LPG is always Grade 1 so will be represented by the first zeros on both the M and V rows.

a. LPG Front low flow
b. LPG Front high flow
c. LPG Rear low flow
d. LPG Rear High flow



Motor and valves can be toggled between On/Off or Open/Shut using the following keys:

Press [5] to turn On/Off the motor/valve, [4] to navigate left [6] to navigate right, [2] & [8] to navigate up and down.



Dispense fuel taking note of the actual flow rate once it has stabilized (after 3-5 seconds of flow)

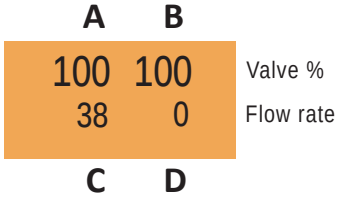
While delivering fuel the Cents per Litre display will show:

A The percentage that the active front valve is open.

B The percentage that the rear valve is open.

C The flow rate of the front hose in L/min.

D The flow rate of the rear hose in L/min.



Important Note:

Flow rate is only accurate for a single hose per side.

Valve percentage of 35 = slow flow.

Valve percentage of 100 = fast flow or fast and slow.

7.6 LPG Trade Measurement Verification Process - Version 1.11

1. Before commencing this procedure, check that the two meter housing covers are secured in place with wire/lead seals.

2. If the seals are not in place, then remove the large cover to inspect the dipswitch settings. You will be opening a flameproof enclosure, so ensure the dispenser power is off and be careful not to damage threads or mating faces.

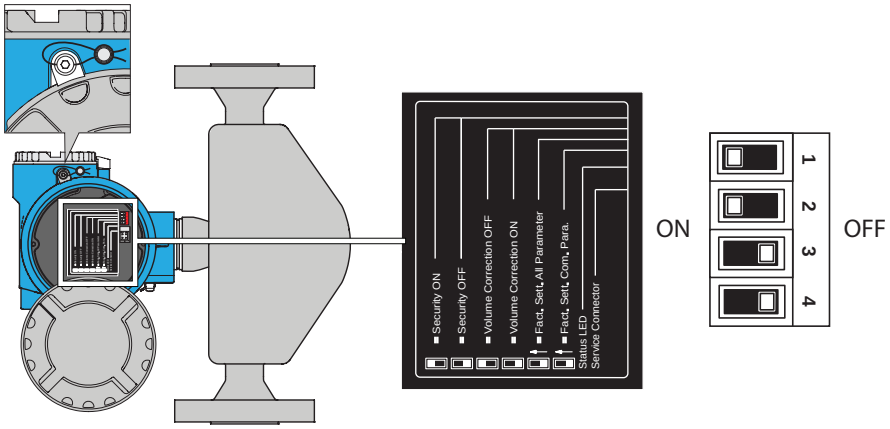


Figure 22. Location of Dipswitches

3. The dipswitches must be in these positions.

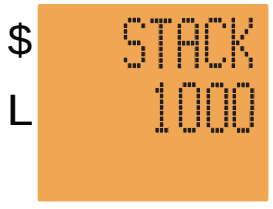
Do not move switches unless advised to by Gallagher technical staff. If moved, essential settings will be lost needing specialist tools to reset.

4. Replace the meter cover before re-powering the dispenser.

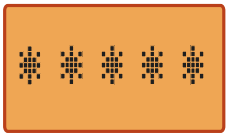
5. If the dispenser is online to the point of sale system, then disable the pump comms and put the dispenser in stand-alone mode (see Servicing - Section 12.12).

6. Put the dispenser in verification mode by going into Service Mode, using the FILL key and password (see Servicing - Section 12.1).

7. Using the 2 or 8 keys, scroll to STACK 1000.



8. Press the 5 key. The following characters are displayed in the LPG price display confirming the key press.



9. Press and hold Ⓒ to leave service mode. The dispenser will now be in verification mode for displaying both compensated and un-compensated delivery values.

10. Now run the NMI approved verification process using a check meter.

PULSE nozzles must have a magnet fitted in the trigger guard.

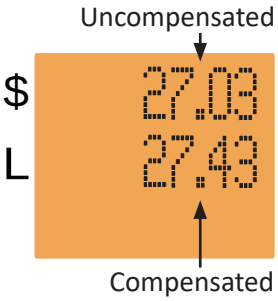
11. Replace the LPG nozzle with a 'dummy' nozzle in the holster while the hose is connected to the external measuring equipment.

12. Use the dummy nozzle to control the start and finish of each test delivery. Do not pull the nozzle trigger until after the pressurization 'bars' have disappeared from the main display.

13. When delivering:

    (a) Uncompensated volume is displayed in the dollars position;

    (b) Temperature compensated volume is displayed in the litres position;



    (c) VCF (volume correction factor); D15 (density corrected to 15°C); and T (liquid temperature) are displayed in sequence in the LPG unit price display. Correction factor and density is displayed to 3 decimal places, temperature to one decimal place, eg:

        VCF 1.015

        D15 ..... 0.523

        T 27.0

14. When the procedure is completed, press (FILL) to exit the verification mode.

15. The test mode expires automatically after 15 minutes of no activity.

16. Insert the wire/lead seals once the Test Verification process is complete.

Generally, the E & H flow meter will not require calibration.

7.7 LPG Trade Measurement Verification Process - Version 1.20

Enter Service Mode

1. Go to LPG MENU – press FILL.
2. Go to LPG TEST - press 4 or 6 to select fuelpoint to be tested, press 5 to turn Test Mode to ON.
3. Hold C to exit Service Mode and enter Test Mode.
4. Do a test delivery (Do not open the nozzle until after the pressurisation bars have gone).

When in Test Mode:

← Dollars display:
Shows the **uncompensated** volume

← Litres display:
Shows the **corrected** volume

LPG price window: 'VCF' (volume correction factor to 3 decimal places)
'D15' (density corrected to 15°C, to 3 decimal places)
'T' (liquid temperature, to 1 decimal place)

5. Press FILL to leave test mode.

Note: Non-LPG hose will be disabled in Test Mode.

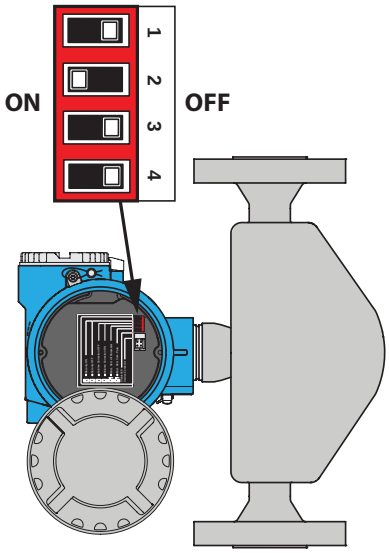
7.8 LPG Meter Calibration - Version 1.20

1. Make a delivery through the calibration meter and record the uncompensated value.

   If calibration is needed – follow these steps:

   Do not repower or perform any other delivery between calibration delivery and completing calibration process.

2. Set security switch 1. to OFF as shown below.



Security Switch 1 OFF
(the meter is on the opposite side to the hose)

3. Enter Service Mode.
4. Go to LPG MENU – press FILL.
5. Go to MTR CAL – 6 for the correct fuelpoint, press FILL.
6. Enter the uncompensated calibration meter value with the keypad, press FILL and wait.
7. The new calibration factor will show.
8. Hold C to exit Service Menu.
9. Set the meter security switch back to ON.
10. Fit the wire/lead tamper seals.
11. Repower the pump.

7.9 LPG Electrical Schematics

The following diagram indicates the interconnection between the various LPG components. Figure 22 is used where other products are present. Figure 23 would normally be used for a stand-alone LPG dispenser.

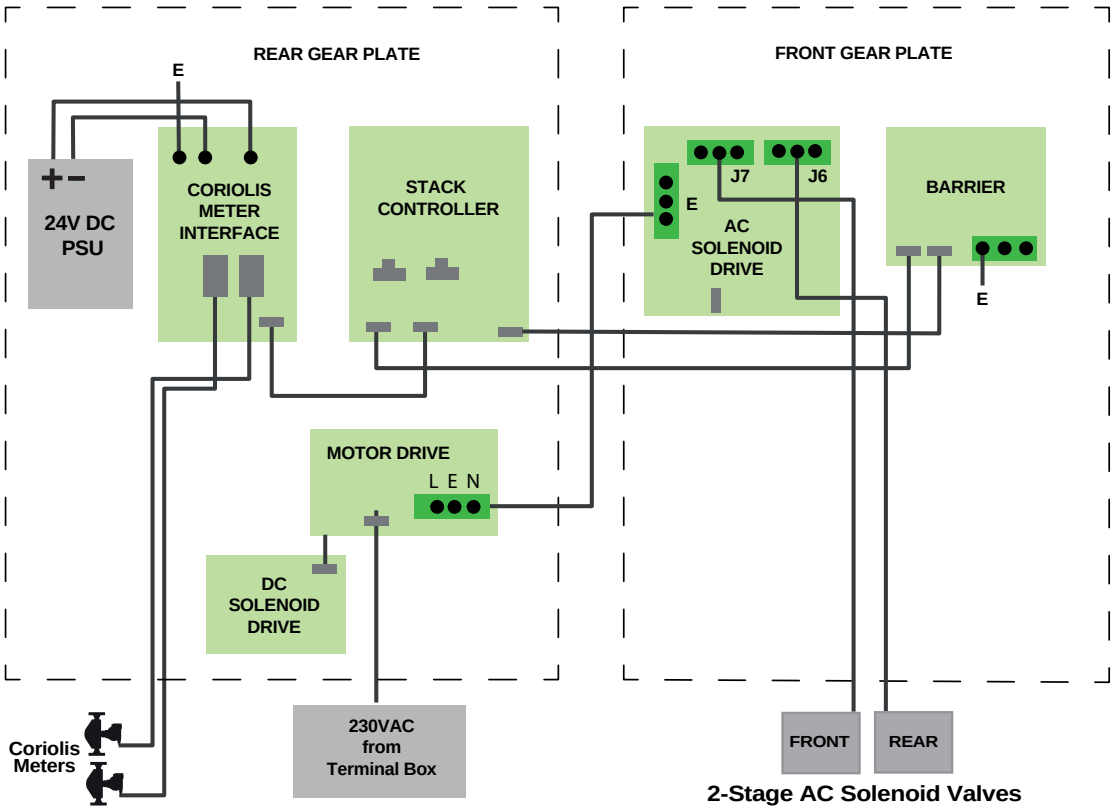


Figure 23. LPG Electrical Schematic

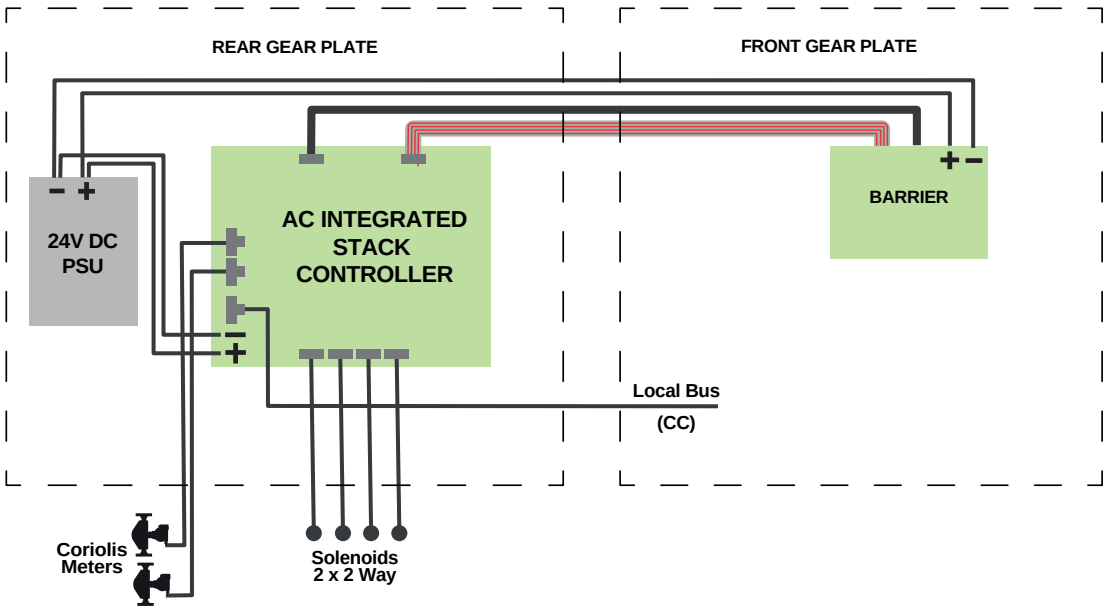


Figure 24. LPG Electrical Schematic Using Integrated Stack Controller

PART D: SERVICING

DEPRESSURISATION WARNING

Pumps or dispensers must first be depressurized before carrying out any hydraulic work on them.

When carrying out this operation:

- Wear safety glasses and other appropriate safety gear.
- Isolate the dispenser from the feed line.
- With the nozzle triggers fully open and the nozzles placed in a container to capture any product, use the “Stack Test” to open the valves manually.
- In the case of a Bennett Pump, any remaining residual pressure can be released by removing the pressure relief plug (arrowed). Cover with a rag to capture any potential spray. Fluid will drain from here so replace the plug or capture.

- Isolate the pump or dispenser from its power supply.
- Care must be taken when disassembling the hydraulics as pressure may still be present. We recommend, when breaking any joint or connection, to do so slowly and cover with a rag to capture any spray. Be prepared with a container to capture spilled product.

1 GENERAL CARE AND MAINTENANCE

Gallagher dispensers are designed to give many years of reliable service. However, a regular maintenance and servicing regime will maximise the life expectancy and reliability of your Gallagher dispenser. The following list is the minimum routine recommended by Gallagher for compliance with the terms of the product warranty.

1.1 Daily Maintenance

Clean all panels using a soft non-abrasive brush or cloth and a mild household detergent. Rinse off with clean, fresh water and dry off with a soft cloth. ***Never*** use steel wool.

Do not use a hose as water may enter the pump electronics and adversely affect operation.

1.2 Monthly Maintenance

1. Remove any product staining on the nozzle holsters by scrubbing with a stiff nylon brush, such as a nailbrush, using a mild household detergent and warm water. ***Never*** use steel wool.
2. If the use of stronger cleaning materials is required, then the following can be used safely on panels: Methylated Spirits, Ethyl Alcohol or Isopropanol rinsed off immediately with clean, fresh water.
3. In addition to the steps listed above, regular and prolonged contact with oil and petrol can cause damage to powder coating. Any petrol or oil spills should be cleaned off immediately as they are found.
4. Apply a light lubricating oil to hose swivels and other moving parts. Remove excess with a cloth. Aerosol type products such as CRC or WD40 are an excellent choice for this task.
5. Apply a silicone based polish to all exterior panels. There are many suitable domestic and automotive polishes available — do not use products containing abrasives.
6. Note any damage to paintwork and have this repaired.
7. Inspect nozzles for signs of damage and wear and tear.
8. Check hoses for signs of wear and tear or damage (e.g. abrasions, bulges, distortion, etc.) and replace any exhibiting such signs. Hoses should not touch the ground when the nozzle is holstered correctly. Adjust the clamp of any which touch the ground, and replace any hoses which have stretched beyond the adjustment limit.

1.3 Annual Maintenance

In addition to regular monthly maintenance include the following:

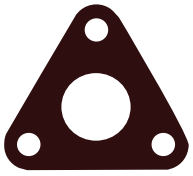
1. Check the hydraulic components of Gallagher dispensers for correct operation.
2. Check the tension of pump vee-belts. Replace any that have excess play or are showing signs of wear or damage.
3. If replacing gaskets on flanged joints, M8 bolts/nuts must be tightened to a target torque for the gasket being replaced. These are shown on the following page.
4. Inspect internal hoses and pipework joints/connections for evidence of leaks.
5. Check and confirm the integrity of all fixings and mounting bolts.

1.4 Target Torques for Gasket Sealing

Tighten all fasteners diagonally, ensuring that the tightening load to each bolt is applied as uniformly as possible, in three or four stages up to the final torque value.

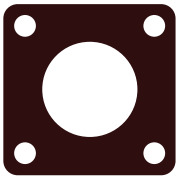
4G85424 Flange Gasket (T) Meter

Torque = 11 Nm



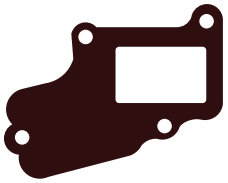
4G82768 Meter Gasket Lobe

Torque = 16.5 Nm



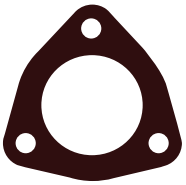
4G100065 Bennett Outlet Gasket

Torque = 23 Nm



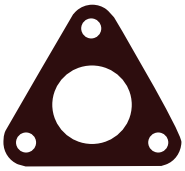
4G82765 Tri Gasket

Torque = 16.5 Nm



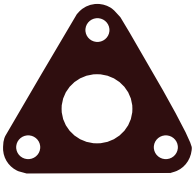
4G00269 Suction Flange Gasket

Torque = 15.5 Nm



4G02167 Gasket In/Out Tatsuno DEF Meter

Torque = 15 Nm



4G87912 Pump Unit Gasket

Torque = 11 Nm

Figure 25. Target Torques for Gasket Sealing

2 NOZZLES

2.1 Elaflex (Petrol/Diesel)

Most of the information below applies in principle to other Elaflex nozzles which may be used with the PULSE range of dispensers.

Maintenance

The nozzle does not require any lubrication.

Regularly inspect the nozzle visually for damage. Pay attention that the spout serration secures the nozzle in the filler neck.

Test the “minimum” shut off and the safety cut off function (3) during the annual pump maintenance and replace in case of damage which may affect the vacuum.

Troubleshooting

NOZZLE FAILS TO OPEN: The pump pressure may be too low to push the valve poppet open. In hot weather dirt and gum deposits can cause stickage at the valve seat (6). If the pump pressure cannot be increased, disconnect the ZVA, remove the swivel, pull the lever to the open position and push the valve stem to free the poppet (7).

poppet spindle

NOZZLE DOES NOT CLOSE AUTOMATICALLY: The vacuum required to operate the automatic action is too low. With the pump running, fully pull the lever (9) to check that full flow can be obtained. Also check, if a loose spout, damaged vacuum cap (5) or clogged strainer (8) has caused the pressure drop.

replacing strainer

ZVA KEEPS TRIPPING OFF PERMANENTLY: The air passage is blocked (2). First check if it is caused by the ball of the safety cut-off by shaking the nozzle. If the ball is free to move, it will rattle. To clear the air passage blow compressed air up the spout until air comes out of the sensing port (1).

Replacement O-Rings (Part No. 4G00062) may be ordered from Gallagher.

DELIVERY PRESSURE EXCEEDS 350kpa: Excessive pressure will result in tripping out the nozzle. Check and rectify.

Damage to the end of spout can affect nozzle operation.

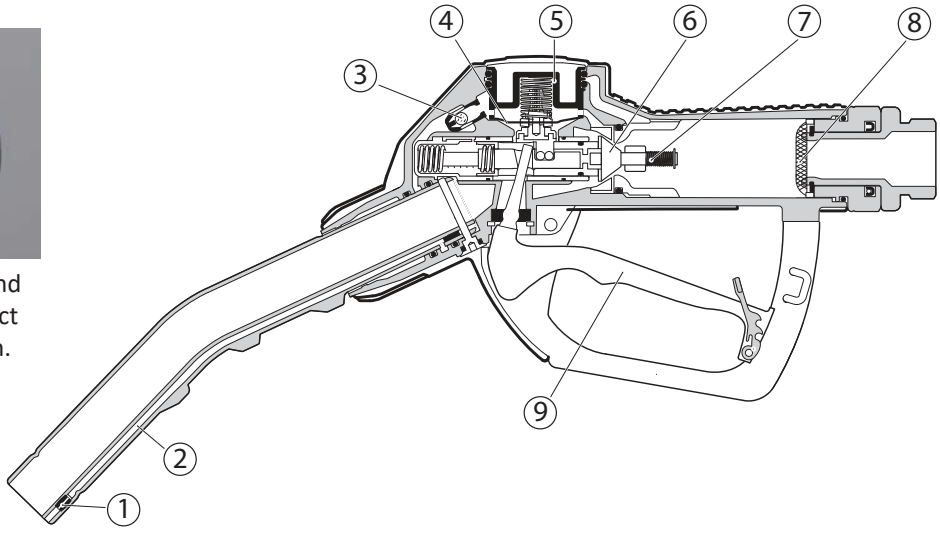


Figure 26. Elaflex ZVA Slimline 2 Nozzle

2.2 Elaflex GG1DN / LPG

Maintenance

It is recommended that LPG nozzles be inspected every 6-12 months for any apparent physical damage to their components.

- Inspect swivel nut/nose piece seals for damage (e.g. cuts or excessive wear).
- Check that there is free rotation of swivel nut.
- Make sure the pawl and pawl spring are functioning correctly. The pawl should not be interfering with the ratchet lugs on the swivel nut when the lever is inactive.
- Inspect the nozzle inlet swivel. The swivel should be secured by the grub screw through the nozzle body.
- Check the free movement of the valve through the slide sleeve assembly when not connected to an adaptor, (i.e., activate the lever several times) making sure there is free movement forward and the valve returns to its inactive position. Remove the swivel nut assembly and clean and lubricate component if movement is not free.
- Inspect the latch assembly making sure that the bushes are firmly attached to the latch pin. The latch spring must hold the latch above the lever latch pin before latching.
- Fit a blanked adaptor firmly to the swivel nut. Activate the lever and check for valve opening (There is usually an audible “click” on the DN Nozzle). Whilst the valve is open, check for nose seal and “U” seal leakage using soapy water.
- Using soapy water check for leaks at the inlet swivel, nozzle body and valve assembly.

If there is seal leakage or component damage, it is recommended that the associated seals be replaced.

Two Yearly Inspection.

It is recommended that a new Seal Kit be fitted throughout the nozzle. Whilst this may seem extreme it will extend the life/service life of the nozzle and reduce the occurrence of nozzle downtime in service.

Troubleshooting

In many instances problems can be dealt with by carrying one or more of the procedures outlined in the above maintenance section.

2.3 Elaflex DEF Nozzles

The PULSE series use Elaflex ZVA nozzles for the dispensing of DEF (Diesel Exhaust Fluid).

Problem

The nozzle will not operate or continually trips out.

Remedies

- Ensure the vehicle filler neck or test drum has the magnetic adapter fitted.

  Fluid will not flow unless the nozzle detects the presence of a magnet upon the lower spout.

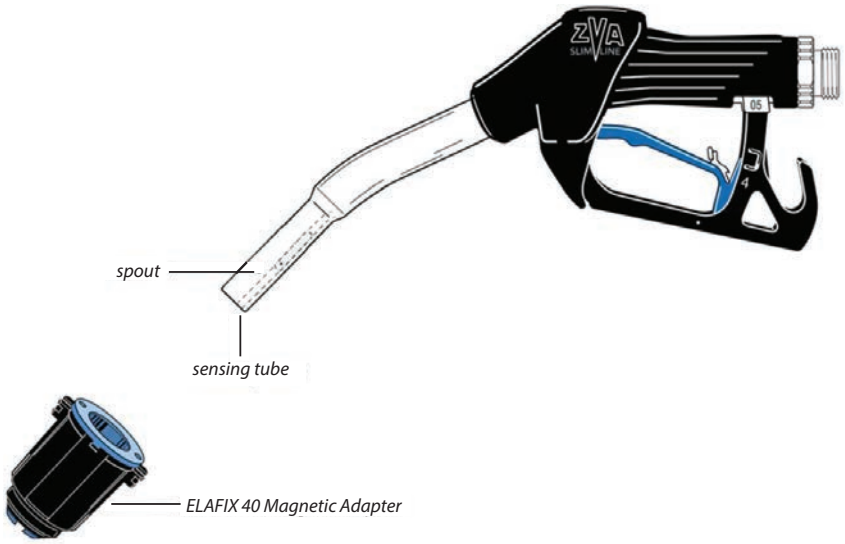


Figure 27. Elaflex ZVA DEF Nozzle and Adapter

- **Ensure the nozzle is not blocked with DEF crystals.**

  Once Diesel Exhaust Fluid is exposed to air, the water will evaporate leaving a crystallized residue. This residue can block the air passage, a sign of this being the nozzle tripping continually.

  This is solved by moving the nozzle spout back and forth in a bucket of warm water.

  In order to avoid contamination, run some Diesel Exhaust Fluid through the nozzle at the end of the procedure.

Any DEF product that comes in contact with other dispenser components must be rinsed off with water immediately and thoroughly before any corrosion damage can occur.

3 SAFETY BREAKS

The PULSE Series dispenser range uses Elaflex Straight (SSB) safety breaks to protect the dispenser, the hose and the vehicle in the event of a drive-off.

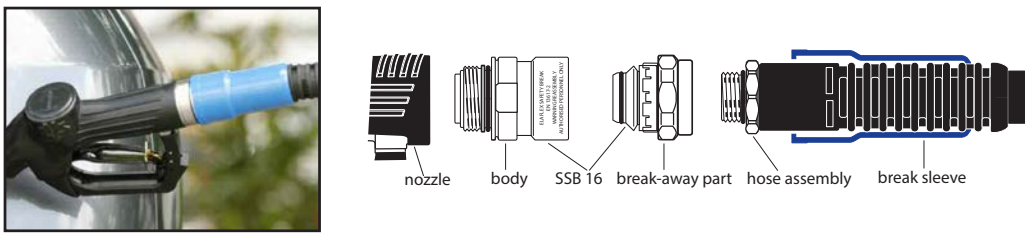


Figure 28. Elaflex SSB Safety Break

SSBs may be used on 5/8” (16mm) and 1” (25mm) hoses.

Reassembly of safety breaks must only be carried out by an authorised service engineer.

To reassemble a safety break:

(a) switch off the dispenser.

(b) push break sleeve up the hose from over the safety break.

(c) clean all parts and check them for damage caused by the drive-off (DO NOT use any couplings which show evidence of such damage).

(d) lightly lubricate parts shown in diagram.

(e) Hold safety break body in a vertical position and center the circlip inside by hand. Fit the break-away part carefully from the top into the body. Both have to be in straight line.

(f) Hold parts centric and compress them with a vice. Make sure that both parts remain aligned axially until they snap together visibly and audibly.

compress in vice

(g) The necessary assembly force has to be applied in 2 steps (two consecutive snaps).

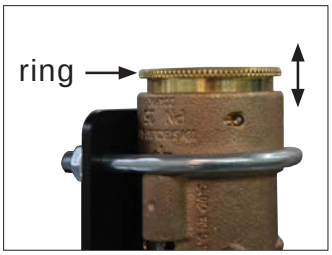
(h) In case of noticeable resistance stop and start again at (f).

Thereafter, reconnect the safety break with the break sleeve between nozzle and hose assembly and test the assembly for tightness.

4 LPG DRY BREAKS

Each LPG hose is fitted with a reusable dry break coupling designed to seal off the outflow of LPG in the event of a drive-off incident.

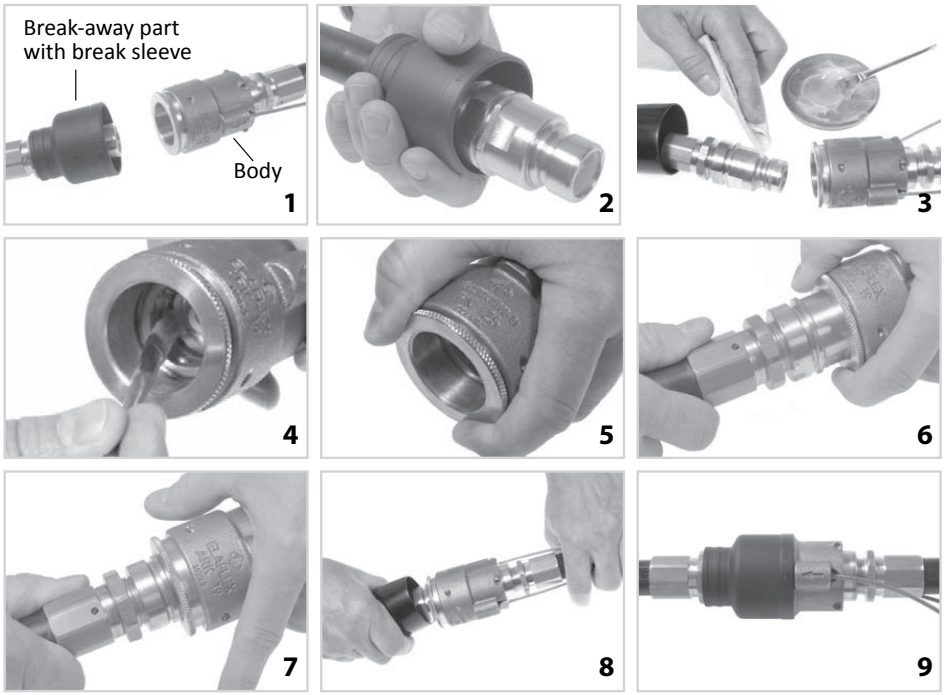
During the reassembling procedure described below care must be taken to ensure the U-Bolt is not too tight to avoid deforming the break. There should be free up and down movement of the ring.



Reassembly After Separation

This work must be completed by authorised personnel.

1. Switch off pump. Check for damage to the dispenser, hose and nozzle.
   The reassembly can take place under pressure.
2. Push break sleeve back over the break-away part and hose fitting.
3. Clean all parts and check them for damages like damaged sealing surfaces of the break-away part, deformations, broken plastic parts or damaged lanyard.
   With such damage, the coupling must be exchanged.
4. Slightly lubricate the O-Ring within the body.
5. Push back the sliding sleeve of the body an hold it.
6. Fit the break-away part into the body. No force is necessary.
7. Release the sliding sleeve - it remains in its position. Now push the break-away part in firmly to the limit. The sliding sleeve will snap back.
   Check the coupling for tightness.
8. Push break sleeve over the coupling and let it snap in.



5 HOSES

Hoses should be checked regularly for signs of wear and tear or damage (e.g. abrasions, bulges, distortion, etc.) and any hoses showing such signs should be replaced.

Also replace any hose which can no longer be adjusted not to touch the ground when the nozzle is holstered correctly.

Most hoses are removed by undoing the brass swivel nut that secures them to their respective delivery pipes. With High Arms it will be necessary to remove the cotter pin and two cap screws in order to release the hose.

Figure 29. Brass Swivel Nuts and Hose Clamp

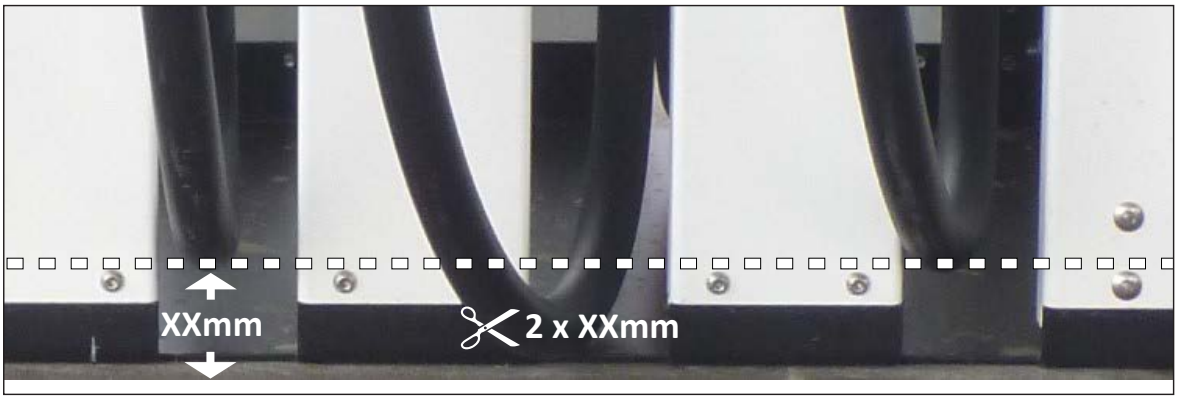
In some cases, for ease of access, it would be advisable to undo the cap screw holding the bottom of a channel runner and swing it up out of the way.

Figure 30. Gaining Access by Moving the Channel Runners

5.1 Shortening Hoses

Minor hose elongation will occur on all hoses. Gallagher supply hoses at a standard length that maintains clearance from touching the ground, even after elongation. In some instances however, certain fuel compositions will result in hose elongation that brings the hose close to, or even touching the ground.

A hose that touches the ground is shortened by an amount equal to twice the required ground clearance. Use the clearance provided by the other grades to maintain a consistent appearance across all hoses.



Preparing the Hose and Cutting

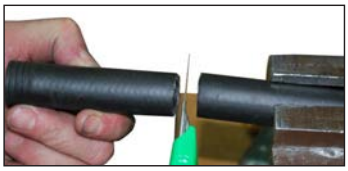
The following tools are required: vice, Elaflex Box Spanner (T tool) PN 4G03232 and straight cut knife. The procedure is as follows:

i. Secure the hose end (with the fitting still attached) into a vice.

ii. Loosen the hose end fitting by inserting the “T tool” and turning it anti-clockwise.

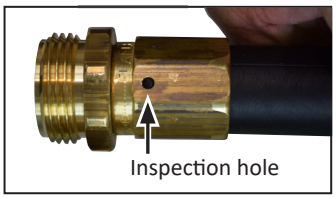
iii. Remove the hose end fitting from the hose.

iv. Cut required length from the hose end using the straight cut knife.

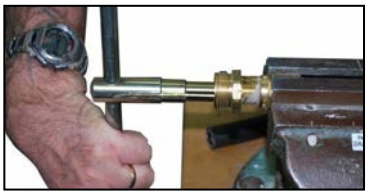


Re-Attaching the Hose Fitting

a Ensure the hose end is 100% clean, dip in water and shake off any excess water.



b Push the hose end fitting onto the hose so that the hose is seated properly and visible through the inspection hole.



c Grease the thread of the nozzle end fitting, insert it and tighten fully using the “T tool”.

AFTER assembly and tightening of the hose fitting, check that hose remains visible through the inspection hole as shown in b. above. This is an important safety check.

6 ASCO 24V PROPORTIONAL VALVE

Disassembly

Pay attention to exploded views provided for identification of parts.

(a) Remove retaining clip, coil and spring washer from solenoid base sub-assembly.

⚠ When metal retaining clip disengages, it can spring upwards.

(b) Unscrew the solenoid base sub-assembly.

(c) Remove core assembly, core spring, guide core assembly, spring piston and bonnet gasket.

(d) Remove bonnet screws, valve bonnet, piston assembly, lip seal, support and body gasket.

(e) All parts are now accessible for inspection, cleaning or replacement.

Reassembly

Reassemble in reverse order of disassembly.

(a) Lubricate all gaskets/O-rings with high quality silicone grease. Replace body gasket, core spring, core assembly and solenoid base sub-assembly.

(b) Replace spring washer, coil and retaining clip.

(c) After maintenance, operate the valve a few times to be sure of proper operation.

No.	Description
1	Retaining clip
2	Spring washer
3	Spring (core asm)
4	Core asm
5	Guide (core asm)
6	Spring (piston)
7	Piston asm
8	Lip seal, piston
9	O-Ring (valve body)
10	Valve Body

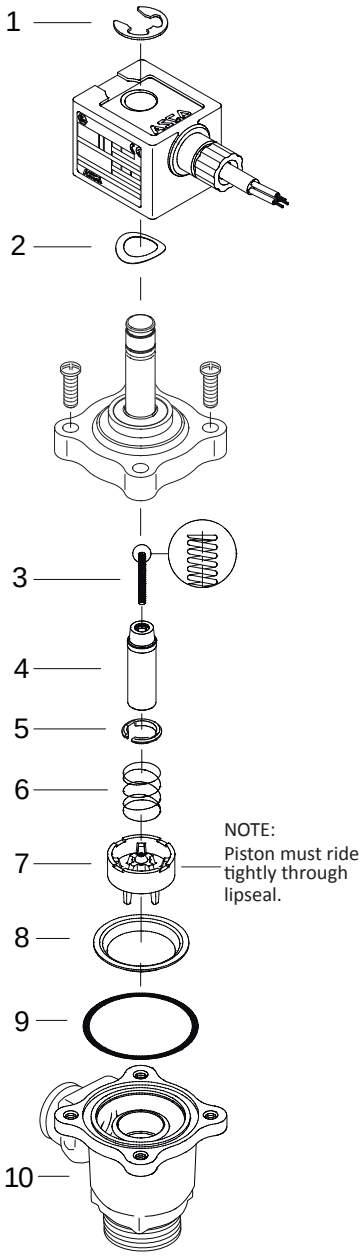
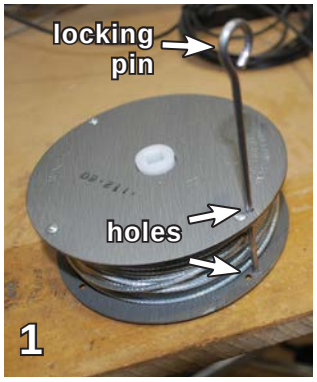


Figure 31.
ASCO Proportional Valve

7 MAINTAINING THE SPRING REEL TENSION (L SERIES)

The following describes the procedure for tensioning the spring reel with the use of a locking pin which is inserted through holes drilled in each side of the spring reel **(1).**



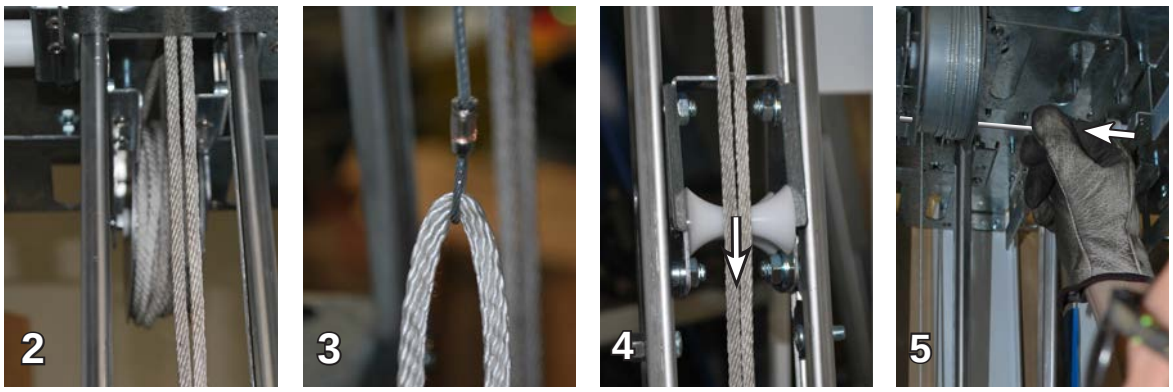
WARNING: Extreme care must be taken to avoid accidental injury should the spring reel be allowed to recoil unexpectedly. Gloves and eye protection **MUST** be worn.

Attach the rope to the wire loop on the spring reel and wrap rope around the reel the required number of times **(2).**

16mm hose: 2.0 turns **VR hose**: 2.5 turns **25mm hose**: 3.0 turns

Pull the rope down to tension the spring reel **(3)** and keep pulling down until the wire loop is level with the retractor carriage **(4).**

While still pulling down on the rope, insert the retractor locking pin through the holes in the reel, locking the spring reel against both sides of the bracket, thereby preventing the rotation of the spring reel.

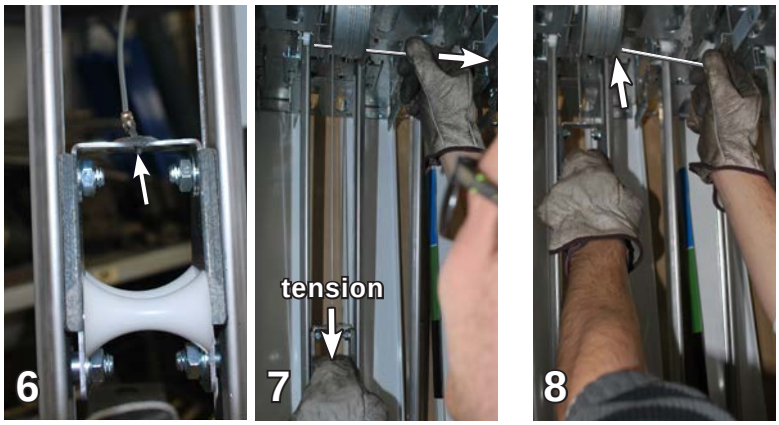


When locked the wire loop should be approx. 20-30mm above the hose carriage **(5).**

Remove the rope from the wire and attach the wire loop to the top of the carriage **(6).**

While keeping tension on the carriage with the left hand, use the right hand to slide out the retractor locking pin **(7).**

Slowly allow the carriage to slide upwards to the top of the rail **(8).**



8 REPLACING THE PUMP UNIT / AIR SEPARATOR STRAINERS

These instructions apply only to a Tatsuno pump. Information relating to a Bennett pump may be found at:

https://fuelsystems.gallagher.com/media/1675/bennett_pump_manual.pdf

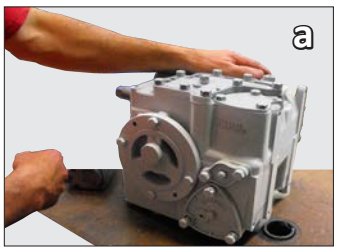
The Pump Unit/Air Separator contains two separate strainers - Inlet and Outlet.

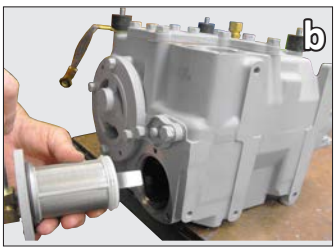
8.1 To Replace the Inlet Strainer:

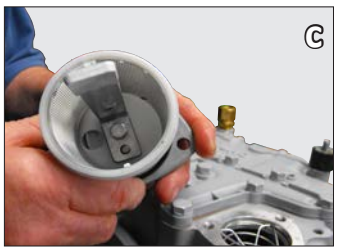
(a) locate the strainer at the back of the pump unit. Unscrew the bolts from the strainer cover.

(b) pull out the inlet strainer.

(c) unscrew the bolt from the stopper that holds the strainer to the strainer cover.



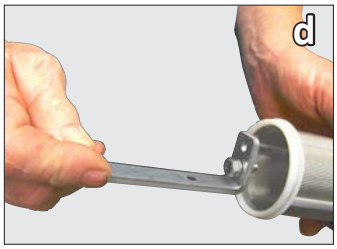


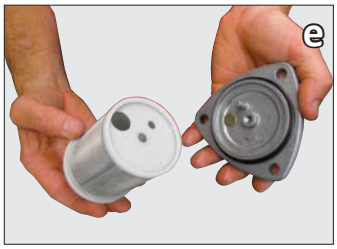


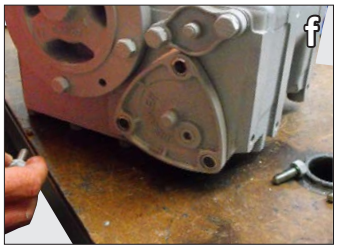
(d) pull out the stopper.

(e) ensure that the replacement strainer has three pre-punched holes.

(f) ensure that the strainer cover is put back in the correct orientation as shown and screw back the bolt to the stopper that holds it to the strainer cover.

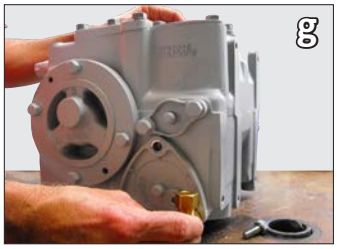


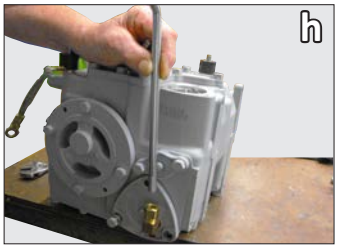




(g) screw in the elbow.

(h) fit the test valve assembly into the elbow.



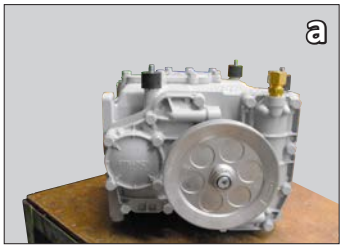


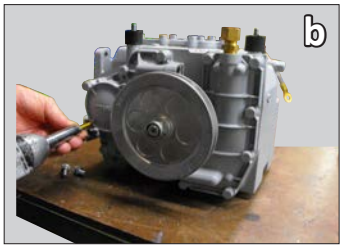
8.2 To Replace the Outlet Strainer:

(a) locate the outlet strainer at the front of the pump unit.

(b) unscrew the bolts from the strainer cover.

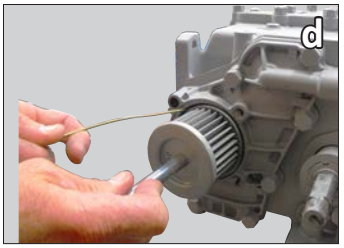
(c) pulling out the strainer will release the float which will obstruct the replacement strainer when inserted.

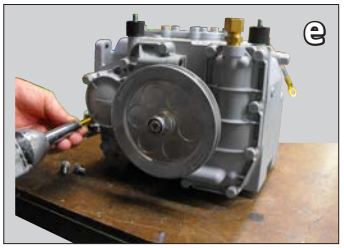




(d) with a thin piece of wire hold back the float to allow the replacement strainer to enter the chamber.

(e) replace the strainer cover.





Cleaning and Maintenance of Strainers

Regular scheduling for maintenance and cleaning is not necessary for the inlet and outlet strainer. However, a slow delivery flow of fuel is a good sign that cleaning is necessary.

The inlet strainer may be cleaned by blowing compressed air through the strainer element or by using proprietary brake dust cleaner or degreaser.

The outlet strainer is not suitable for cleaning with compressed air which only tends to move the dirt around. If degreasers or other solutions do not clean the strainer element effectively, fit a replacement strainer.

9 DEF FILTER CARTRIDGE REPLACEMENT

It is recommended that goggles and gloves are worn when dealing with fluids under pressure.

The filter cartridge should be changed when:

- there is a noticeable reduction in fluid flow.
- the delivery system reaches the maximum recommended differential pressure.

Procedure

(a) Shut off pressure to the dispenser.

(b) Slowly open the drain plug at the bottom of the filter housing to release any remaining pressure.

(c) Using the rod tool provided, unscrew the ring-nut.

(d) Remove filter housing and replace used filter cartridge with a new one.

(e) Inspect O-Rings to ensure they are free of defects and/or debris.

(f) Inspect the O-Ring groove to ensure it too is free of debris etc.

(g) Refit the filter housing, making sure it is properly aligned with the head.

(h) Refit and tighten the ring nut.

(i) Return the rod tool to its storage location in the bracket.

(j) Clean the Y Strainer filter if present.

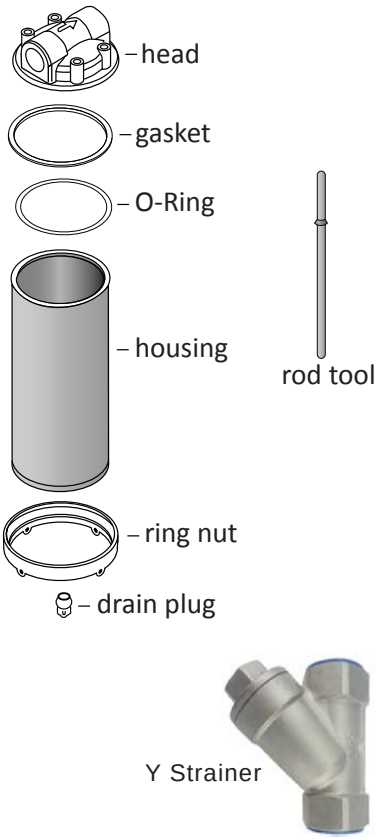


Figure 32.
Filter Housing and Y Strainer

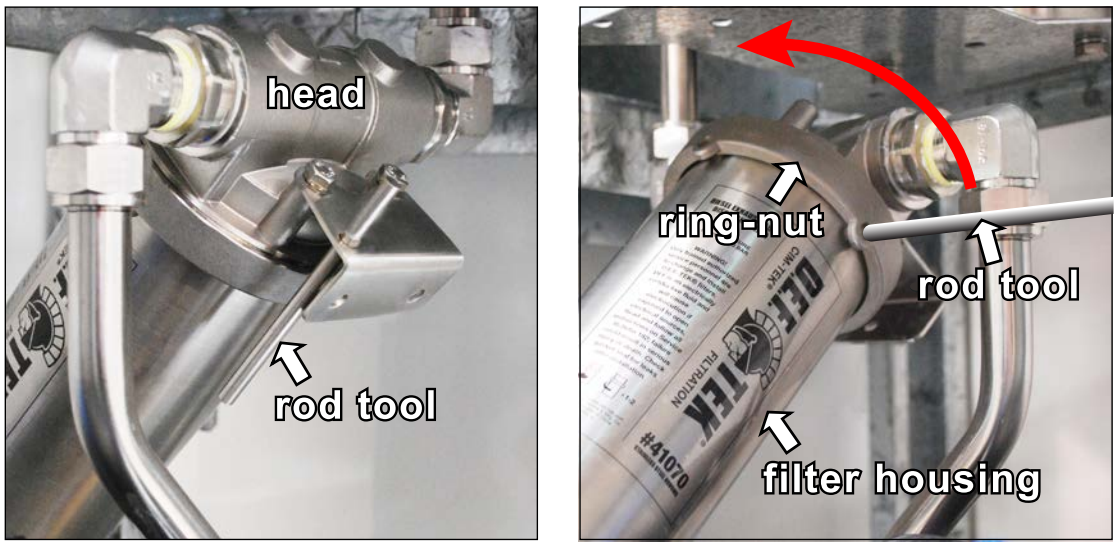


Figure 33. Removal of the Filter Housing

10 ELECTRICAL

TOTAL ELECTRICAL ISOLATION BEFORE ACCESS

Any procedure that requires access to electrical components of the electronics of a dispenser/pump requires total electrical isolation of that unit. Understand the function and location of this switch or circuit breaker before inspecting, installing or servicing Gallagher equipment.

10.1 Remounting a PULSE UI Battery Pack

On occasion the PULSE Battery BUP 4 x AA Pack Assembly, mounted on the inside of the dispenser head cabinet door panel, may come loose and hang on the red and black wires from the BUP board.

This is due to the shield surface not being oil and grease free when the Battery Pack was initially mounted using double-sided adhesive tape.

To reattach the Battery Pack:

(a) Remove the old double-sided adhesive tape from the Battery Pack and any residual tape stuck to the shield surface.

(b) Use Isopropyl alcohol or suitable degreaser to wipe the Battery Pack and shield surface where the Battery Pack will be mounted (as shown below) near the BUP board.

(c) Attach the Battery Pack to the shield surface using 3M VHB 4991 tape (or other suitable double-sided adhesive tape), pressing firmly onto the shield surface for a minimum of 10 seconds.

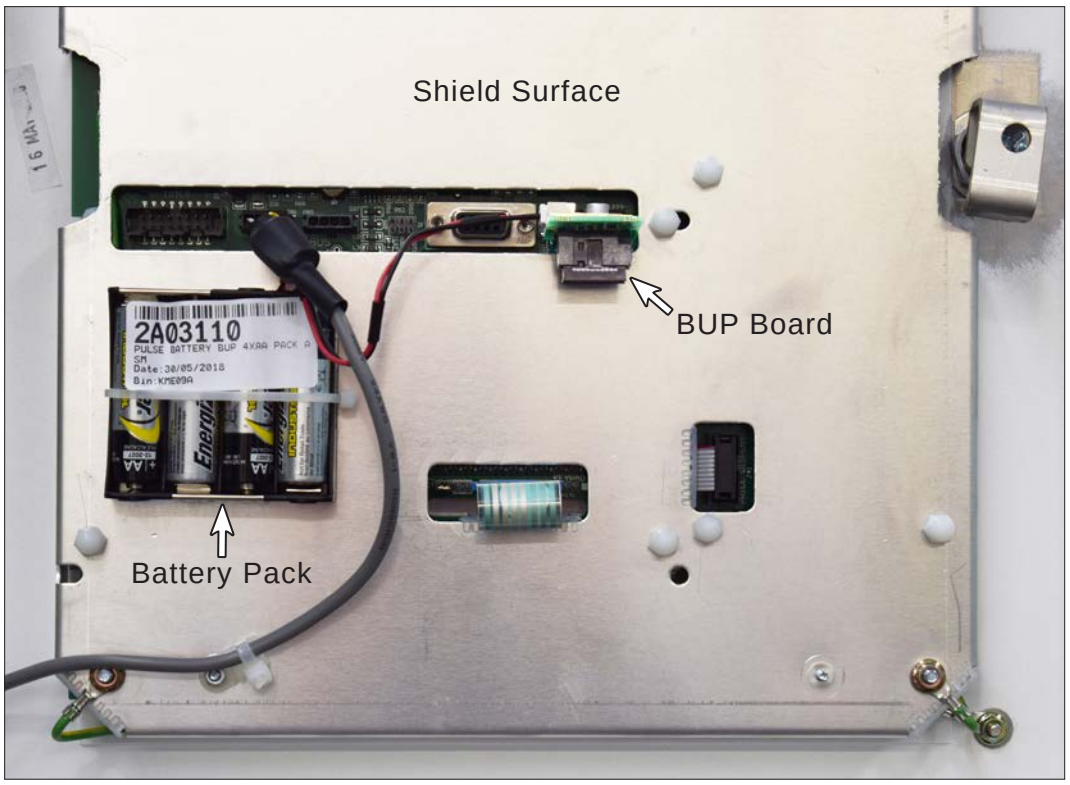


Figure 34. Shield Surface with BUP Board and Battery Pack

10.2 Simple Wiring Diagram

The PULSE Electronic Set Modules are interconnected for communication purposes and power supply.

The following figure shows the connections between the different modules present in the standard PULSE assembly.

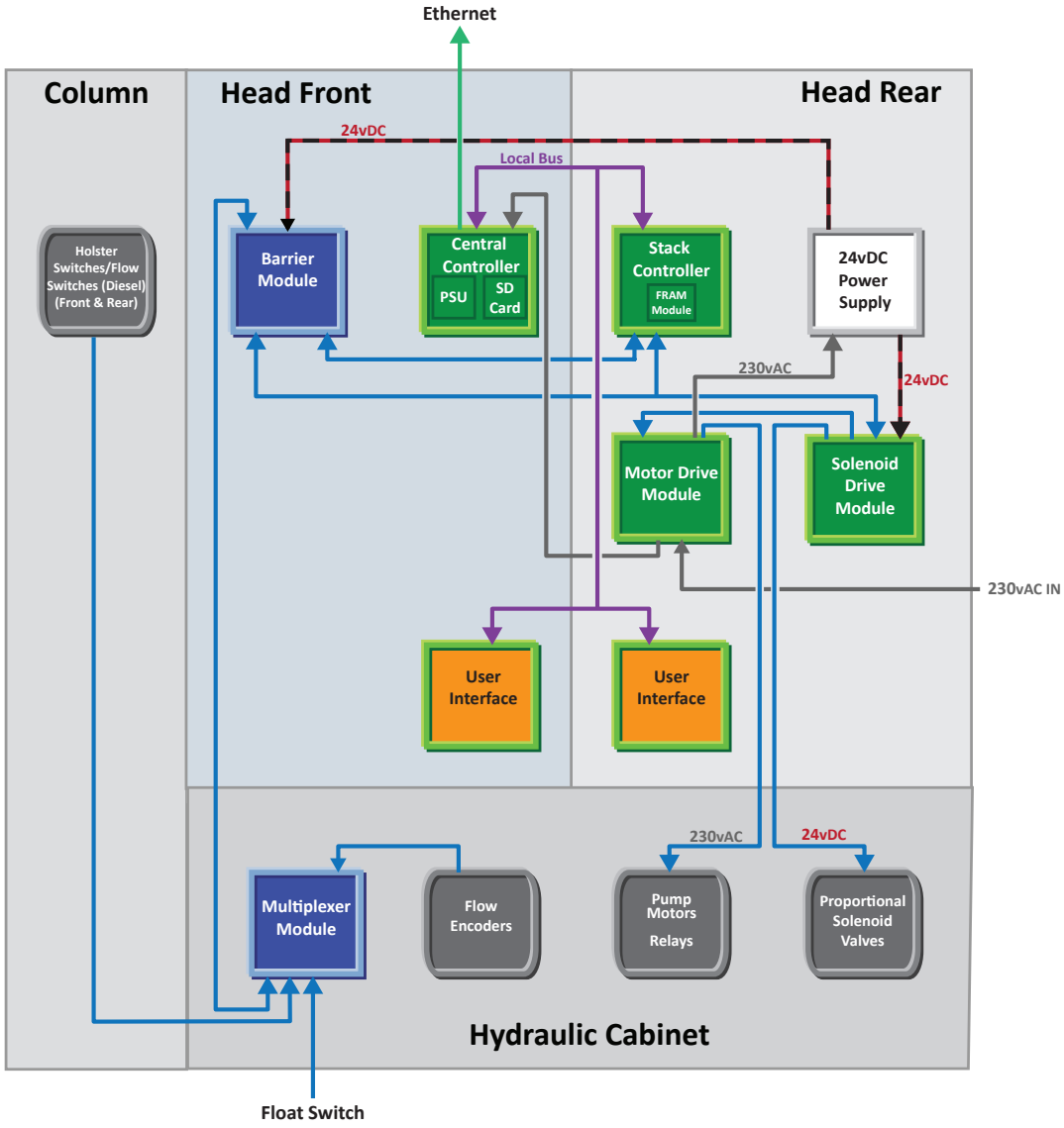


Figure 35. Simplified Wiring Diagram

10.3 Junction Box Wiring Diagrams

As shown in Figure 34 the mains power supply connector block varies between a dispenser, and a single phase pump.

POS cabling is connected into a common connector block as shown in Figure 37.

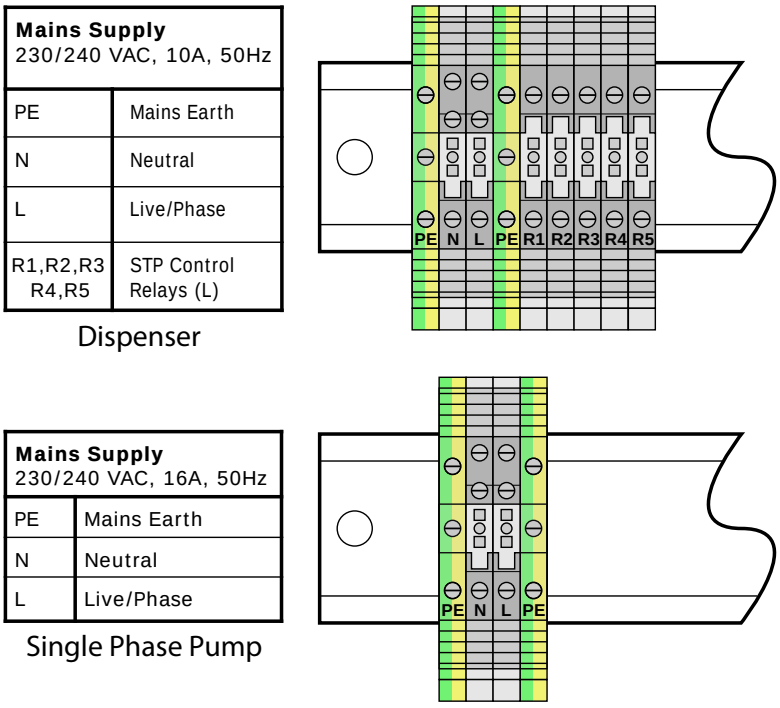


Figure 36. Mains Connections

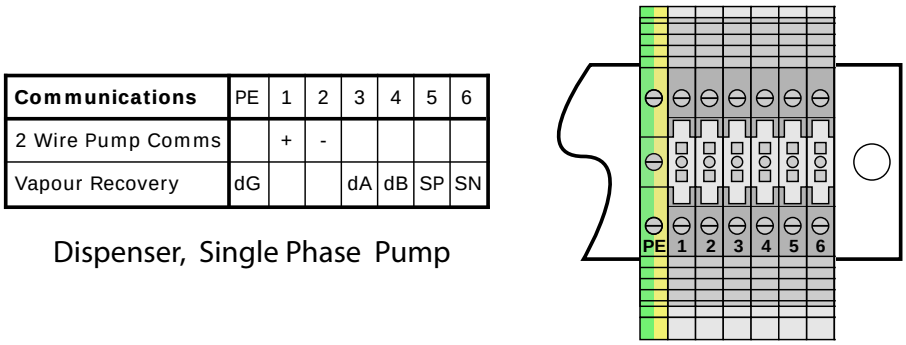


Figure 37. Comms Connections

11 SD CARD CONTENT

The SD Card MUST be set to LOCKED before it can be safely removed and set to ACTIVE once reinserted.

SD (Secure Digital) cards are re-writable data storage devices.

PULSE dispensers read from, and write to, SD cards as follows:

- Reading: loading pump config, keyboard map, firmware upgrades
- Writing: event log files, error logs

Typical SD Card contents for a dispenser:

Firmware Folder

User Interface	12001.UI_
Stack Controller	12001.LSC
Central Controller	12001.CC_
Central Controller	12001.LCC

Logs Folder

Folders are: year, month and day

Config Folder

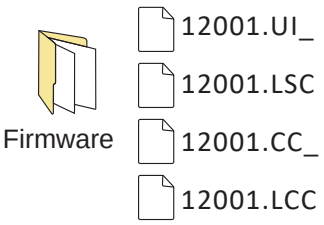
The configuration files for this dispenser	Config.xml
Bitmap file	Bit_maps
Keyboard map	KB_map

11.1 Process for Loading Firmware onto the SD Card

The latest firmware release is available from Gallagher Technical Support or from the Fuel Systems website: https://fuelsystems.gallagher.com/support

The latest firmware release must be installed during the commissioning of a new dispenser. Gallagher recommend that service agents carry a copy of the latest firmware.

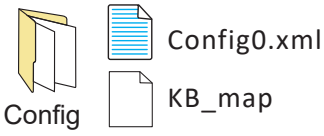
1. Safely remove the SD card (see Servicing - Section 12.2 SD Card Setting).
2. Place the SD card in a computer and open the Firmware folder.
3. Place the supplied firmware in the Firmware folder.
4. The card is now ready to use for a firmware upgrade.



11.2 Configuration Reinstall

To restore default settings:

1. Safely remove the SD card (see Servicing - Section 12.2 SD Card Setting).
2. Place the SD card in your computer, open the Config folder to view the Config file.
3. Rename the Config file by adding a zero (i.e. Config0).
4. Replace the SD card in the dispenser and repower to force the Config to be reinstalled.
5. This will cause the dispenser to revert to default settings, as contained in the Config0 file. Overrides such as pump numbers will need to be re-entered.



11.3 Obtaining Dispenser Logs

Agents may be required to obtain dispenser logs which are used to assist in the diagnosing of dispenser issues or to locate details of specific sales or other events.

1. Safely remove the SD card.
2. Place the SD card in a computer.
3. Copy the entire contents.
4. Replace the SD card in the dispenser.

12 SERVICE MODE FUNCTIONS

Version 1.11

For v1.20 see section 13.

The following Service Mode Functions are also performed during the commissioning of a dispenser. Reference is made to this section in the Commissioning part of this manual.

Only one UI (User Interface Display) should be put into Service Mode at any given time. If an attempt is made to put a second UI into Service Mode it will not respond until the first UI is taken out of Service Mode.

See also Section 12.17 **Manager Mode** which is provided to allow site owners/ managers to view and set a limited number of functions.

12.1 Entering Service Mode

Service Mode is accessed by holding down the FILL key for three seconds. The word FILL is displayed in the Preset window and then disappears.

Enter the Service Mode password and press FILL again.

The screen will show SDCARD ACTIVE.

12.2 SD Card Setting

The SD Card can be set to ACTIVE or LOCKED by pressing the 5 key.

Only remove an SD Card when in the LOCKED mode.

12.3 Service Mode function screens

In Service Mode, the 2 and 8 keys initially serve as direction keys and are used to navigate through to a particular function.

Keys 4 and 6 are also used to navigate within a function.

The figure below shows the order in which the various service mode function screens will appear starting at SDCARD ACTIVE. When scrolling vertically or horizontally it is possible to continue beyond the last option to the first option.

Figure 38. Order of Service Mode Screens

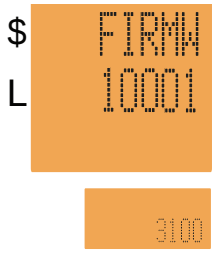
12.4 Firmware - FIRMW

The following actions are possible regarding the firmware:

- viewing of the installed firmware version number(s).
- upgrading firmware.
- rollback to previously installed firmware, provided that the previous version is still available on the module.

Note that the rollback option is not available on a Central Controller.

The display will show FIRMW in the Dollars display. The first available price display will show the module hardware address (ID), according to the table below. The installed firmware version number (e.g. 10001) is shown in the Litres display.



Module Name	ID Numbers
Stack Controller	1000; 1100
User Interface	2000; 2100; 3000; 3100
Central Controller	Remains blank

Use the cursor keys [4] and [6] to navigate left and right to view the different firmware versions installed. From this point, either an upgrade or a rollback can be actioned.

Note that if two or more of the same type of module are present with the same firmware version installed, the display will appear not to change other than the ID in the Price window.

12.4.1 Upgrading the Firmware

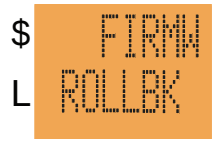
To upgrade firmware, a new firmware file must be present in the firmware folder on the SD Card.

To force a firmware update, scroll to the version to update and press [5]. The Litres display displays UPDATE. Press [5] again to action the upgrade. (If no file is present on the SD card, the Litres display shows NO FILE).

The UI shows BUSY while the update is in progress. Updates can be queued (i.e. both UI's could be updated concurrently). Modules can take up to 10-15 minutes to update, the Central Controller should only take approximately 30 seconds.

When the update is complete the new version number will be displayed. There is no other visible confirmation.

To rollback firmware on a module, press [0]. The Litres display displays ROLL BK. Press [0] again to action the rollback.



Note that the update request may be queued and may not be actioned for some minutes, depending on the number and nature of other queued requests.

Ensure every module's firmware is updated, especially where additional modules exist, such as Stack Controllers or UI's.

12.5 Setting VR Active - VRCTRL

For non-VR sites VR Control can be set as either ACTIVE or OFF.

For VR equipped sites VR Control must be set to ACTIVE.

VR Control can be set to OFF to disable alarms and forced shutdown. This will enable servicing, testing or calibration.

Press (5) to toggle between ACTIVE and OFF.

12.6 Setting Pump Numbers - CGFPID

Setting pump numbers is done at the User Interface via the Service Mode.

The front of the dispenser has the key on the left of the User Interface which contains the Central Controller. This is referred to as Fuel Point 1 and the rear of that cabinet as Fuel Point 2.

Where other Fuel Points (FP's) are present, FP3 will be on the front and FP4 on the rear.

The dispenser leaves the factory with the following default pump numbers:

Dispenser Rear

FP ID 92
FP ID 91

Dispenser Front

Standard PULSE

Dispenser Rear

FP ID 94	FP ID 92
FP ID 93	FP ID 91

Dispenser Front

More than 2 Fuel Points C

Dispenser Rear

FP ID 92	FP ID 94
FP ID 91	FP ID 93

Dispenser Front

More than 2 Fuel Points L

Inactive Fuel Points are numbered 99 and should not be altered.

Once in Service Mode the SDCARD ACTIVE screen is displayed.

Scroll up or down, using keys (2) or (8) to access the CGFPID FP1 (Fuel Point 1) screen.

CGFPID = Change Fuel Point ID.

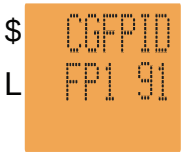
Press the (FILL) key.

Enter the desired number (for example (7)).

Then press the (FILL) key.

Once allocated scroll using keys (4) or (6) to access other Fuel Points and repeat this process.

Hold (C) for 3 seconds to exit Service Mode.



12.7 Setting a Password - CGPWD

Both the Service Agent password (Level 2) and the Manager password (Level 1) can be altered.

Once set, if the password is forgotten, Gallagher will only be able to reset to default when provided with the serial number of the Central Controller.

While it is the responsibility of the site to manage passwords, Gallagher Technical Support have a mechanism for recording alternate passwords if they are informed of the changes.

Procedure:

- Enter Service Mode using the default password:

Scroll to CGPWD LEVEL 1 = Manager Mode
or CGPWD LEVEL 2 = Service Mode

- Press FILL (CGPWD* shows edit mode).
- Enter password (eg: 123456).

- Press FILL (shows CONFIRM).
- Re-enter the password (eg: 123456).
- Press FILL (shows OK - password has been changed).

This will set the password for both sides of the dispenser.

Repeat for each dispenser.

Lost passwords can make dispenser servicing impossible. Do not change passwords unless a reliable system of recording a change is in place.

12.8 Errors - ERRORS

The ERROR function displays the numbers and types of fatal errors that have occurred since the error log was last cleared. The errors are displayed for each fuelpoint.

A PULSE dispenser logs all errors to the SD Card (even those that have been cleared) in a form that is not easily read. Gallagher Technical Support can interpret dispenser logs and provide a more detailed description of errors.

In Service Mode, scroll to ERRORS FP1 (**1**)

Press [5] view the current error status of the fuelpoint. (**2**)

ALL OK = dispenser **is not** currently in an error state.
ERROR = dispenser **is** currently in an error state.

Press [5] to exit.

Press [FILL] and use [4] or [6] to scroll through specific errors.

FLUID, POS, ENCODER, AIR, ERRO5, ERRO6, etc (**3**)

Press [5] to view number of instances of each type of error (since last cleared). (**4**)

Press [5] to exit.

Press [6] to scroll to the next error type. (**5**)

Press [5] to view number of instances of each type of error (since last cleared). (**6**)

Press [5] to exit.

To clear an error press [0], then [0] again.

Press [C] to return to the initial ERRORS screen. (**7**)

Press [4] or [6] to move to another Fuel Point. (**8**)

1. $ ERRORS / L FP1

2. $ FP1 / L ALL OK

3. $ ERRORS / L FLUID

4. $ FLUID 2 / L

5. $ ERRORS / L AIR

6. $ AIR 0 / L

7. $ ERRORS / L FP1

8. $ ERRORS / L FP3

Interpreting Error Codes

Name	Meaning
FLUID	The float switch has been activated
POS	Communications have been lost for an extended period
ENCODER	Encoder operation outside normal parameters
AIR	Air sensor switch has been activated
ERROR 5	Not used
ERROR 6	Not used

FATAL ERRORS require the dispenser to be repowered to clear the error. If the error persists some action will be required to address the cause.

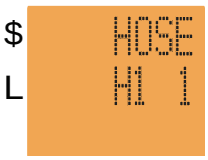
NON-FATAL ERRORS are cleared by lifting and rehanging a nozzle. These errors are not displayed using the method outlined previously. Non-fatal errors are recorded to the SD Card.

12.9 Setting Hoses Active/Inactive - HOSE

Newly delivered dispenser's have hoses set as active before leaving the factory.

To set hoses active/inactive enter the service mode.

Scroll to the screen shown where H1 indicates the hose number followed by 1 for active or 0 for inactive.



Showing Hose 1 as active

Pressing the [6] key will move between hoses and pressing [5] will toggle between active and inactive.

Hoses are set as active/inactive at the local fuel point found on the User Interface on the side of the hose to be set.

12.10 Grade Priority - PRIORTY

If required, the FDS grade priority order can be mapped to match the order of the data from the POS.

The FDS leaves the factory with the default grade priority order 1234.

The Dollars display shows PRIORTY and the Litres display shows the grade priority order (1234 by default).

Press [FILL] to edit the grade priority order, an asterisk will appear next to PRIORTY to indicate that the function is in edit mode. Use the number keys to enter the correct grade priority order and press [FILL] to save or [C] to cancel.

12.11 5/6 Digit Mode - 5DIGIT

When set to 6 Digit mode, a dispenser will allow sales up to a maximum of $9990.00. The 5 Digit mode allows sales up to a maximum of $990.00. The dispenser must be set to the same mode as the POS system, some of which are only capable of operating in 5 Digit mode.

The Dollars display shows 5DIGIT and the Litres display FP(X) 0 (or 1) where (X) represents the Fuel Point number.

Pressing [5] toggles the 0 or 1 following the Fuel Point number in the Litres display, indicating that the selected Fuel Point is set to 5 Digit mode (1) or 6 Digit mode (0).

Fuel Point 3 set to 6-Digits

Each fuel point (side) must be set. After making this change, the dispenser must be repowered. The 5/6 digit setting will only change when a fuelpoint is POS enabled (POS = 1). If the fuelpoint is in standalone mode the dispenser will revert to the previous 5/6 digit setting for that fuelpoint.

12.12 POS/Standalone - POS

Allows the POS/Standalone setting to be changed at the dispenser (via the User Interface). Set for each Fuel Point (FP).

For Standalone mode the dispenser must first be isolated from the Forecourt Controller.

The display shows POS in the Dollars display followed by the Fuel Point number and a 0 or 1 in the Litres display.

Pressing 5 toggles the 0 or 1 following the Fuel Point number in the Litres display, indicating that the selected Fuel Point is set to POS (1) or Standalone (0) mode.

Fuel Point 3
set to Standalone

Use the cursor keys 4 and 6 to navigate left and right through the different fuel points.

After setting one or more Fuel Points to Standalone mode, the dispenser must be repowered.

If the dispenser is overridden to Standalone mode, but communication is received from the POS (e.g. after reconnecting the Comms cable), the dispenser will automatically revert to POS enabled.

12.13 Grade Prices - PRICE

Prices can only be set in Standalone Mode (see Servicing - Section 12.12 POS/Standalone - POS). When the fuel point is POS enabled, the grade price cannot be changed at the dispenser User Interface.

This function allows the grade price to be changed at the dispenser via the User Interface. It is set for each hose individually only on the local fuel point side.

The Dollars display shows PRICE and the Litres display shows GRADE followed by the grade number, starting at 1.

Use the cursor keys 4 and 6 to navigate left and right through the different grades.

To set the price, select the displayed grade by pressing the FILL key. The Dollars display now shows GRADE followed by the grade number and an asterisk (*). The Litres display shows the current price for that grade. Enter the grade price in a sequence of 4 digits, without a decimal point.

To confirm the price, press FILL. The decimal point is automatically applied. For example, 2133 becomes 213.3

The dispenser leaves the factory with a default price of 100.0 cents per litre. The presence of any other price indicates either the grade price has been manually set or a price has been received from the POS.

12.14 Hydraulic Stack Test - STACK

A stack test should be performed for each dispenser to ensure that the fuel supply is flowing freely. This will also flush the delivery pipes and hoses as well as prime the system. A test can is required.

Stack test is accessed by entering the Service Mode.

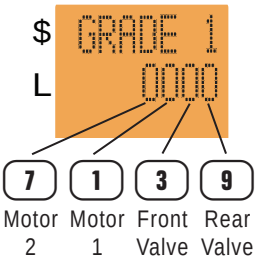
Procedure

Enter Service Mode (see Servicing - Section 12.1 Entering Service Mode).

Use the [2] & [8] keys to scroll through the list until STACK is displayed in the Dollars display. 1000 is shown in the Litres display.

Press [6] to select a different stack (if present) eg: 1100.

Press [FILL] to select the stack for testing.



The Dollars display now shows GRADE 1 and the Litres display shows a row of four digits, indicating the state of the motors and valves (0 = Off 1 = On / Open).

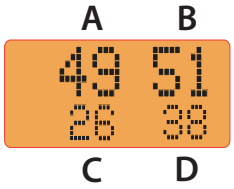
Motor and valves can be toggled between On/Off or Open/Shut using the following keys:

[1] Motor 1 [7] Motor 2

[3] Front Valve [9] Rear Valve

Dispense fuel taking note of the actual flow rate once it has stabilised (after 3-5 seconds of flow).

While delivering fuel the smaller grade display will show:



A The percentage that the front valve is open.

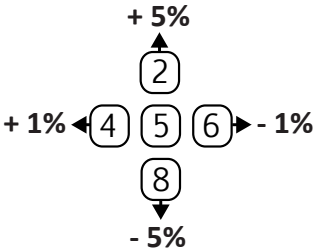
B The percentage that the rear valve is open.

C The flow rate of the front valve in L/min.

D The flow rate of the rear valve in L/min.

Adjusting Flow Rates

When a proportional valve is opened and the motor is turned on (i.e. when the output digit shows a **1**), the flow rate can be adjusted as follows:



5% increments using the keys [2] (+) and [8] (-)

1% increments using the keys [4] (+) and [6] (-)

Press [5] to store the current setting for fast flow.

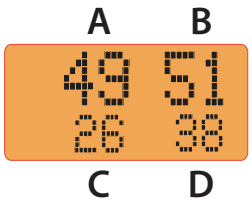
Press the [FILL] key to scroll through and set the available grades (up to 5) in the dispenser.

LPG has a two-stage valve. It is operated at the following valve percentages:

35 - Slow valve open only

40 - Fast valve open only

Key Points



1. The motor must be on and the valves open to set flow rates. Press [5] to store the current setting for fast flow.
2. The number in the top row of the price window (**A or B**) is the valve percentage.
3. The numbers in the bottom row (**B** and **C**) are front and rear flow rates.
4. Pressing [3] and [9] will open both front and rear valves allowing them to be set at the same time.
5. Where there is high flow diesel the flow rate must be set for each hose individually. Ensure the flow rate does not exceed the nameplate Qmax value. The valve % must be set and saved to limit the flow to less than the Qmax.
6. Higher flow rates are not necessarily better. A flow rate of 30 – 38 L/min is optimal. 40 L/min or greater will likely cause the nozzle to trip with tight filler necks.
7. A change of 1 - 2% can affect flow rates by several litres per minute.

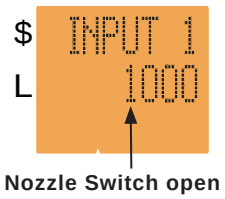
12.15 Checking Input Status

When in Stack Test press the [FILL] key again to display the available stack input groups. The digits in each group relate to the following inputs:

INPUT 1 1 up to 5

FRONT Nozzle Switches

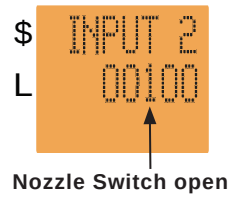
Lifting each nozzle opens the switch which is indicated by a 1 on the associated digit.



INPUT 2 1 up to 5

REAR Nozzle Switches

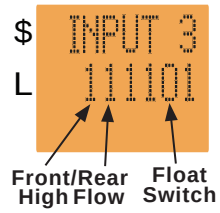
Lifting each nozzle opens the switch which is indicated by a 1 on the associated digit.



INPUT 3

Supplementary Inputs

For use with features such as high flow switches or float switches.

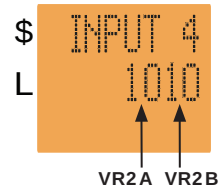


INPUT 4

VR Switches Inputs

For use when VR2 equipment is installed. 10 indicates the system is working correctly.

00, 01 or 11 indicates a fault.

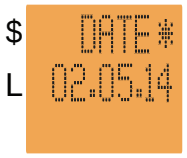


Pressing the [C] key exits the stack test and turns all valves off.

12.16 View/Set Date & Time

Setting the date and time ensures that the time stamps on Transaction and Error Logs are correct.

The display will show DATE in the Dollars display and the current Central Controller date in the Litres display.



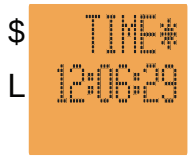
To set the date, press (FILL). The Dollars display shows DATE*

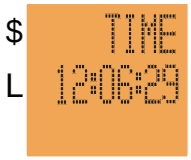
An asterisk (*) after the function name indicates that the system is in edit mode.

Enter the date (DDMMYY). Note that if the date is entered using all six figures, there is no need to confirm entry, i.e. the system automatically accepts and acts on the entered date. If less than six digits are entered, press (FILL) to confirm the new date.

The Dollars display shows DATE (without the asterisk) to indicate that the UI is back in 'view date' mode.

Press (2) to move to TIME and set in the same manner.





Gallagher advise the checking of the date and time when obtaining dispenser logs. Should either be incorrect, make a note to be included with the logs. This will assist in finding the events being investigated.

12.17 Maintaining Isolation of Mains Voltage within Head Cabinet

The perspex cover within the User Interface may be removed by suitably qualified persons for servicing, to gain access to the SD Card, cables, etc.

This cover MUST always be replaced. Under no circumstances can the dispenser be placed into service without this cover in place.

Be aware that the User Interface of all PULSE Dispensers may be opened as part of normal operation (e.g. to change the advertising sheet), therefore live parts must not be left exposed to possible human contact.

13 MANAGER & VIEW TOTES MODES - ALL VERSIONS

13.1 Manager Mode

Manager mode is provided to allow site owners/managers to view and set a limited number of functions.

The available functions are:

- Set SD Card Active/Locked
- View Firmware versions
- Set VR Control Active/Off
- View Errors
- Set Hoses Active/Inactive
- Set POS Active/Inactive
- Set Grade Prices
- View Date
- View Time

13.2 View Totes Mode

Totes mode is provided to allow site staff to view litre and dollar totes. Totes are displayed in the price window of the specific hose. Each Fuel Point of the dispenser must be accessed from its particular side to view its totes.

The procedure is:

1. Press (FILL) for 3 seconds.
2. Enter totes password.
3. Press (FILL) .
4. Press (6) to show dollars totals.
5. Press (C) to show litres totals.
6. Press (4) to exit.
7. Repeat on the other side of the dispenser.

14 SERVICE MODE FUNCTIONS

This section describes the Service Mode 1.20, including new features and changes to the existing functions.

14.1 Summary of New Key Features and Functions

The following information summarises the new key features and functions added to the new service mode. These functions and more are described in detail later in this document.

Stack Menu	Has a new stack test function and is able to display the state of auxiliaries, nozzles, and VR.
Config	Allows config to be backed up or restored from the SD card.
Totes	Has new save and restore totes function from CC.
StartDel	Start delay time can now be set for each hose.
Flow Control	Flow control can be turned on and off and target flow rate set per hose.
Reboot	Allows reboot of the Central Controller using the keypad.
POS	Can put POS in stand alone mode, toggle between 5 and 6 digit mode, change POS protocol, turn comms logging off/on.
Mapping	Edit/map grade priority.
Timeout	Adjustable timeout settings.
VR	ATPM (Automatic Tank Pressure Monitoring) and VR2 monitoring can be turned off/on.
Errors	New error displays added and listed in table “Interpreting Errors” with the “Errors “section.
LPG Menu	LPG calibration, addressing and test mode functionality now available from the UI.

14.2 Entering Service Mode

Service Mode is accessed by holding down the FILL key for three seconds. The word FILL is displayed in the Preset window and then disappears.

Enter the Service Mode password and press FILL to confirm or C to clear and retry.

The screen will show SDCARD ACTIVE.

Once in Service Mode, the 2 and 8 keys initially serve as direction keys and are used to navigate through the service menu.

Pressing the FILL key in most cases allow entry to a particular menu item to edit the settings of a function. Edit mode is indicated with an *.

Pressing the FILL key also saves changes. Press C to clear.

The 2 and 8 keys allow navigation through different menu items.

Keys 4 and 6 are also used to navigate within options for a selected menu item.

The 5 key mostly is used to toggle a function on or off.

Only one UI (User Interface Display) should be put into Service Mode at any given time. If an attempt is made to put a second UI into Service Mode it will not respond until the first UI is taken out of Service Mode.

To Exit Service Mode

To exit service mode press C and hold for 3 seconds.

15 SERVICE MODE FUNCTION SCREENS - VERSION 1.20

The figure below shows the order in which the various service mode function screens will appear starting at SDCARD. When scrolling vertically or horizontally it is possible to continue beyond the last option to the first option.

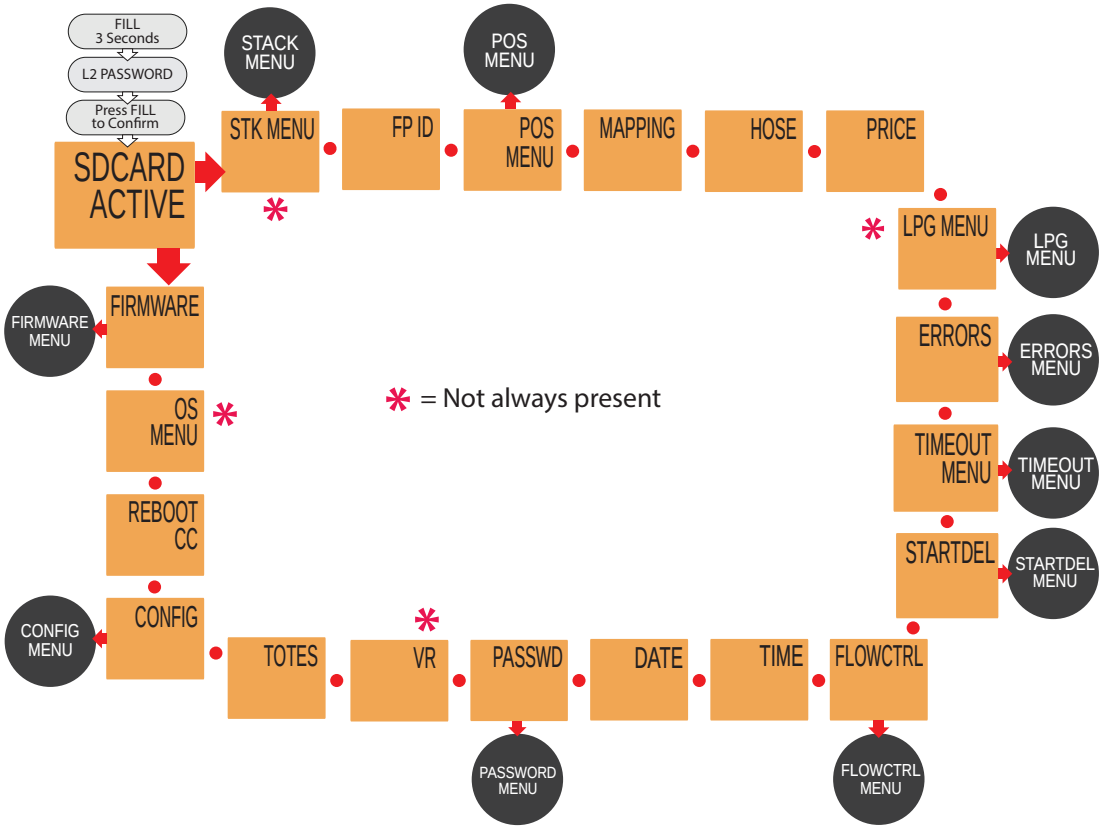
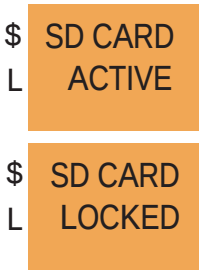


Figure 39. Order of Service Mode Screens

15.1 SD Card Setting - SDCARD

The SD Card can be set to ACTIVE or LOCKED by pressing the [5] key.



Only remove an SD Card when in the LOCKED mode.

15.2 Stack Menu - STK MENU

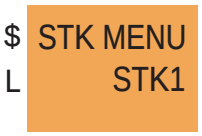
The stack menu allows the completion of a hydraulic stack test. This should be performed for each dispenser to ensure that the fuel supply is flowing freely. It also flushes the delivery pipes and hoses as well as prime the system. A test can is required.

Stack test is also used to set fast and slow flow rates for each hose. These settings are used as limits in flow control where flow control is enabled.

Note: Stack menu is only available when comms are physically disconnected.

15.2.1 Stack Test Procedure

Allows user to test hydraulics and adjust slow, fast and flow control settings.



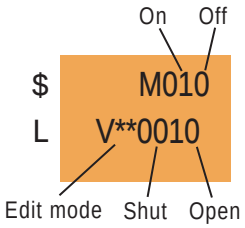
Enter Service Mode (see Section 13.2 Entering Service Mode)

Use the [2] & [8] keys to scroll through the list until STK MENU is displayed in the Dollars display. STK1 is shown in the Litres display

Press [4] or [6] to select a different stack (if present) eg: STK2.

Press [FILL] to enter the stack menu for the selected stack. The control outputs window displays.

Press [FILL] to enter the control outputs function.



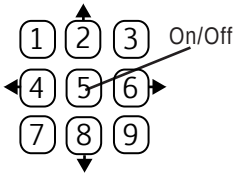
The Dollars display now shows an "**M**" for Motor and a row of digits, indicating the configured motors and their state. (0 = Off 1 = On / Open)

The litres display now shows a "**V**" for Valve and a row of up to 10 digits indicating the state of the valves. (0 = Off 1 = On / Open * = Edit mode)

A flashing digit indicates the currently selected motor/valve.

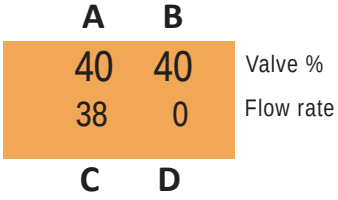
Motors and valves can be toggled between On/Off or Open/Shut using the following keys:

Press [5] to turn On/Off the motor/valve, [4] to navigate left [6] to navigate right, [2] & [8] to navigate up and down.



Dispense fuel, taking note of the actual flow rate once it has stabilized (after 3-5 seconds of flow)

While delivering fuel the Cents per Litre display will show:



- **A** The percentage that the front valve is open.
- **B** The percentage that the rear valve is open.
- **C** The flow rate of the front valve in L/min.
- **D** The flow rate of the rear valve in L/min.

Important Note: Flow rate is only accurate for a single hose per side.

While all motors can be turned on at once this is not recommended for a sustained period of time.

15.2.2 Adjusting Proportional Valves

There are two valve setting modes in stack test, slow flow and fast flow.

The 0 key is used to access the slow flow settings. The 5 key is used to access the fast flow settings.

The 0 and 5 keys are used to toggle valves and motors. Once either key is used the other key has no function until FILL or C is pressed.

When a valve is opened it will open at the configured setting for the mode it has been opened in.

Slow flow is used to start and end a preset/prepay delivery. Fast flow controls normal delivery valve position.

Edit mode is denoted by a (*) in the valve selection. Open valves not in edit mode will show a (1).

When a proportional valve is opened in edit mode, (*), and the motor is turned on, (1), the flow rate setting for the currently selected valve can be adjusted as follows:

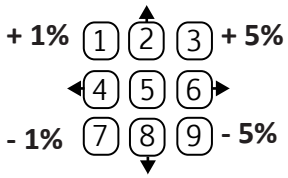
The first two valves opened will default to edit mode. Only when one of these valves is closed can another valve be edited.

1% increments using the keys 1 (+) and 7 (-).

5% increments using the keys 3 (+) and 9 (-).

Press FILL to store the changes made to the valves in edit mode.

Press to C exit without saving to the current stack menu.



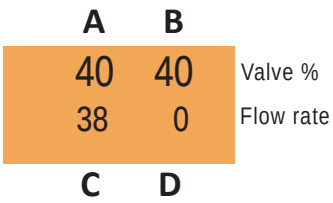
LPG has a two-stage valve. For the purpose of stack test each stage is a separate valve.

Flow control automatically adjusts valve settings and any changes are reflected in stack test.

Slow and fast flow valve settings are used when the flow control function is ON or OFF.

15.2.3 Key Points

1. A valve must be open to set the flow rate. Press FILL to store all changes.
2. Where there is high flow diesel the flow rate must be set for each hose individually. All other hoses should be off. Ensure the flow rate does not exceed the nameplate Qmax value. The valve % must be set and saved to limit the flow to less than the Qmax.



3. Higher flow rates are not necessarily better. A flow rate of 30 – 38 L/min is optimal. 40 L/min or greater will likely cause the nozzle to trip with tight filler necks.
4. A change of 1 - 2% can affect flow rates by several litres per minute.
5. Any adjustment to proportional valves will be over-ridden by the Flow Control setting when set to ON.

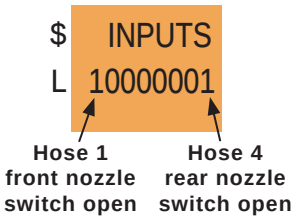
15.2.4 Checking Input Status

When in Stack Menu press the 2 or 8 key to scroll to the input menu item which displays the available stack input groups for the selected stack. The digits in each group relate to the following inputs:

INPUTS 1 - 10

Lifting each nozzle opens the switch indicated by a 1 on the associated digit. The front nozzles correspond with the first 5 digits (left) on the display. The rear nozzles then assume the remaining 5 digits.

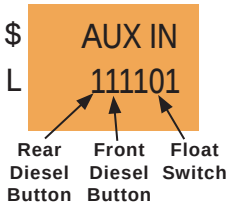
Note: 10 digits are always displayed to allow checking the nozzle switch is in the correct plug.



AUX IN

Supplementary Inputs

With 6 inputs this displays the state of the auxillary inputs such as high flow switches or float switches. The first two are flow buttons. The second to last is the float switch.

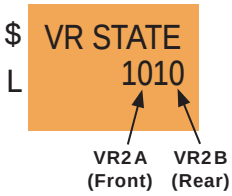


VR STATE

VR Switches Inputs

For use when VR2 equipment is installed. 10 indicates the system is working correctly. 00, 01 or 11 indicates a fault.

Pressing the C key exits the stack menu and turns all valves and motors off.



15.3 Setting Pump Numbers - FP ID

The front of the dispenser has the key on the left of the User Interface and is referred to as Fuel Point 1. The front contains the Central Controller. The rear of the cabinet is referred to as Fuel Point 2.

Where other Fuel Points (FP's) are present, FP3 will be on the front and FP4 on the rear.

The dispenser leaves the factory with the following default pump numbers:

Inactive Fuel Points are numbered 99 and should not be altered.

Dispenser Rear

FP ID 92
FP ID 91

Dispenser Front

Standard PULSE

Dispenser Rear

FP ID 94	FP ID 92
FP ID 93	FP ID 91

Dispenser Front

More than 2 Fuel Points C

Dispenser Rear

FP ID 92	FP ID 94
FP ID 91	FP ID 93

Dispenser Front

More than 2 Fuel Points L

In Service Mode scroll to FP ID FP1 (Fuel Point 1) screen , using keys 2 or 8.

Use 4 or 6 to select the Fuel Points to view or change ID.

Press the FILL key (FP1* shows edit mode).

Enter the desired number (for example 7).

Then press the FILL key to confirm changes or C to cancel.

Hold C for 3 seconds to exit Service Mode or press 2 or 8 to go to the next menu item.

15.4 Point of Sale Menu - POS

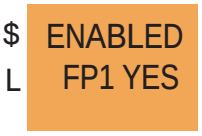
The POS Menu has four options - **ENABLED**, **PROTOCOL, 5/6 DIGIT**, and **COMMSLOG** - allowing all POS related changes to occur whether or not the POS connection is enabled.

Press FILL to enter POS Menu. Press 2 (or 8) to scroll through the four options. Press C to return to the main menu.

The POS Menu has the following four options:

15.4.1 Point of Sale Enabled - ENABLED

The ENABLED option allows the dispenser to be set to POS enabled or disabled (standalone) mode. Set for each Fuel Point (FP).



For POS disabled (standalone) mode, the dispenser must first be isolated from the Forecourt Controller.

The display shows ENABLED in the Dollars display followed by the Fuel Point number and YES or NO in the Litres display.

Use the keys 4 and 6 to navigate left and right through the different fuel points.

Pressing 5 toggles the YES or NO following the Fuel Point number in the Litres display, indicating that the selected Fuel Point is set to POS ENABLED (YES) or Standalone (**NO**) mode.

After setting one or more Fuel Points to POS Disabled (Standalone) mode, the dispenser must be repowered or the Central Controller rebooted.

If the dispenser is set to Standalone mode, but communication is received from the POS (e.g. after reconnecting the Comms cable), the dispenser will automatically revert to POS Enabled.

15.4.2 Forecourt Communication Protocols - PROTOCOL

Allows the dispenser communication protocol to be changed to either PEC or Gilbarco Australia, to match the forecourt controller protocol.

The change of protocol must be done in conjunction with a change of protocol jumpers on the original Central Controller module.

The Dollars display shows PROTOCOL and the Litres display shows PEC or GILB AU (see note below).

Press FILL to edit the current protocol. The * indicates edit mode.

Use the cursor keys 4 and 6 to select the required protocol, either PEC or GILB AU.

Press FILL to confirm changes or C to cancel.

Use the keys 2 or 8 to navigate through other functions of the POS Menu or press C to return to the main menu.

NOTE: While **GILB US** does appear it is not presently operational.

15.4.3 5/6 Digit Mode - 5/6DIGIT

When set to 6 Digit mode, a dispenser will allow sales up to a maximum of $9990.00 and preset up to $9990.00. The 5 Digit mode allows sales up to a maximum of $990.00 and preset up to $990.00. The dispenser must be set to the same mode as the POS system, some of which are only capable of operating in 5 Digit mode.

The Dollars display shows 5/6DIGIT and the Litres display FP(X) 5DG or 6DG where (X) represents the Fuel Point number.

Pressing [5] toggles from 5DG to 6DG following the Fuel Point number in the Litres display, indicating that the selected Fuel Point is set to 5 Digit mode (5DG) or 6 Digit mode (6DG).

Use the cursor keys [4] and [6] to navigate left and right through the different fuel points.

Each fuel point (side) must be set. After making this change, the dispenser must be repowered.

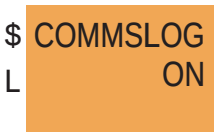
Use the keys [2] or [8] to navigate through other functions of the POS Menu or press [C] to return to the main menu.

15.4.4 Communication Logging - COMMSLOG

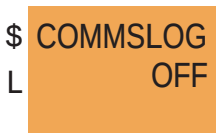
This function extends dispenser logging to include communication. This is logged to the Serial Port only.

The Dollars display shows COMMSLOG and the Litres display shows **ON** or **OFF**.

Pressing [5] toggles between ON and OFF.



Comms logging will turn OFF after 7 days to ensure it is not left ON indefinitely.



Use the keys [2] or [8] to navigate through other functions of the POS Menu or press [C] to return to the main menu.

15.5 Grade Priority - MAPPING

If required, the dispenser grade priority order can be mapped to match the order of the data from the POS.

The dispenser leaves the factory with the default grade priority order 1234.

The Dollars display shows MAPPING and the Litres display shows the grade priority order (1234 by default).

Use the cursor keys [4] and [6] to navigate left and right through the different fuel points.

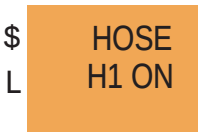
Press [FILL] to edit the grade priority order for the fuel point, an asterisk will appear next to MAPPING to indicate that the function is in edit mode. Use the number keys to enter the correct grade priority order and press [FILL] to save or [C] to cancel.

Use the keys [2] or [8] to navigate to other menu items.

15.6 Setting Hoses Active/Inactive - HOSE

This function allows the hoses to be set to active (ON) or inactive (OFF).

Newly delivered dispensers have hoses set as active before leaving the factory.



The Dollars display shows **HOSE** and the Litres display shows **H(X) ON** (or **OFF**), where (X) represents the hose number.

Use the cursor keys [4] and [6] to navigate left and right through the different hoses.

Press [5] to set a hose active (ON) or inactive (OFF).

Hoses are set as active/inactive at the User Interface on the side of the hose to be set. An inactive hose will not display a price in its Cents per Litre window.

Use the keys [2] or [8] to navigate to other menu items

15.7 Grade Prices - PRICE

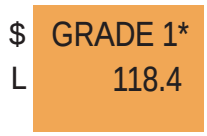
Prices can only be set in Standalone Mode. When the fuel point is POS enabled, the grade price cannot be changed at the dispenser User Interface.

This function allows the grade price to be changed at the dispenser via the User Interface. It is set for each hose individually only on the local fuel point side.

The Dollars display shows PRICE and the Litres display shows GRADE followed by the grade number, starting at 1. The price will show in the first available CPL window

Use the cursor keys [4] and [6] to navigate left and right through the different grades.

To set the price, select the displayed grade by pressing the [FILL] key. The Dollars display now shows GRADE followed by the grade number and an asterisk (*) The Litres display shows the current price for that grade.



Enter the grade price in a sequence of 4 digits. The decimal place is automatically applied (For example, 1234 becomes 123.4).

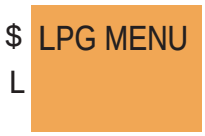
To confirm the price, press [FILL] or press [C] to cancel.

The dispenser leaves the factory with a price of 100.0 Cents per Litre. The presence of any other price indicates either the grade price has been manually set or a price has been received from the POS.

15.8 LPG Menu

The LPG Menu has five options - **MTR SECU**, TEST, XS FLOW, **MTR CAL,** and **MTR SIDE**. Each option allows the following functions.

1. **MTR SECU -** Check the security setting of each LPG meter.
2. **TEST -** Enables testing pump accuracy against the test meter.
3. **XS FLOW -** Set high flow limit for excess flow monitoring and control.
4. **MTR CAL -** Enter the Trade Verification test values for meter calibration.
5. **MTR SIDE -** Check and or edit the bus address of the LPG meters to assign fuel points.



Press (FILL) to enter the LPG menu.

Navigate through the options using (2) or (8).

15.8.1 Check Meter Security Switch State - MTR SECU

The Meter Security Switch menu option is a read only screen and displays the security switch state of each LPG meter. It does NOT allow you to change the ON/OFF state. This is done manually using the physical security switch located on the LPG meter.

Note that the meter security needs to be in the OFF position before the meter is calibrated.

Use (4) and (6) to toggle between fuel points.

Press (FILL) to view the security switch status for the selected Fuel Point.

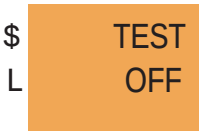
Note: There is a delay of up to 10 seconds to read this security switch status, (MTR Secu*) indicates waiting reply.

Press (C) to exit back to the fuel point.

15.8.2 Enables LPG test mode - TEST

Used for Trade Verification.

Enables testing the accuracy of the pump against the test meter.



Use (4) and (6) to switch between fuel points for calibration check.

Press (5) to toggle test mode on/off for the selected fuel point.

Hold (C) to exit service mode and begin LPG calibration test using TEST mode.

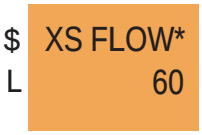
Press (FILL) to cancel TEST mode, or will time out after 15 minutes of no activity.

Non-LPG hoses disabled in test mode.

15.8.3 Safety feature supplementing excess flow rate - XS FLOW

The XS FLOW supplements the physical excess flow valve safety feature. Where an excess flow rate situation occurs the dispenser will cycle the delivery speed down or terminate the delivery to prevent the physical excess flow valve from activating unnecessarily. This event will cause a non-fatal error, unless the flow rate exceeds 75 lpm and disables the hose. In this instance a service agent should be called to inspect the LPG system.

The default setting for this is 60 lpm and the editing range is 0 - 60.



Press (FILL) to edit this value.

Press (FILL) to confirm the value or (C) to cancel.

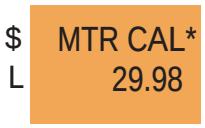
15.8.4 Meter Calibrate - MTR CAL

After completing the test delivery for the Trade Measurement Verification this option is used to enter the uncompensated value from the test meter in order to calibrate the LPG meter.

Note: Ensure the security switch on the meter is set to OFF before entering the value.

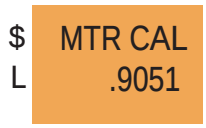
Navigate to the MTR CAL using (2) and (8) keys.

Use (4) and (6) to toggle between fuel points.



Press (FILL) to set the required fuel point to edit mode.

Enter the uncompensated value from the test meter into the Litres display window.

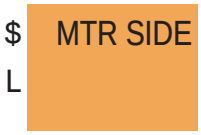


Press (FILL) to confirm the value or (C) to cancel.

If successful the dispenser will return a calculated correction factor. These changes may take time to process.

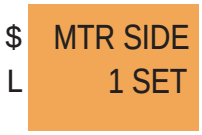
15.8.5 Meter Side - MTR SIDE

This option is used to change the address of an LPG meter. Because the LPG meters share a common bus, any meters NOT being edited must first be disconnected.



Navigate to the MTR SIDE using (2) and (8) keys.

Press (FILL) to assign the LPG meter to the currently selected side.



* indicates in progress, success shows “1 SET” or “2 SET”.

A new address will be assigned automatically to the connected meter.

Repeat this process to assign an address to the remaining meter

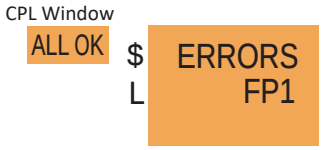
15.9 Errors - ERRORS

The Errors function displays the number and type of errors that have occurred since the error log was last cleared. The errors are displayed for each fuelpoint.

A PULSE dispenser logs all errors to the SD Card (even those that have been cleared) in a form that is not easily read. Gallagher Technical Support can interpret dispenser logs and provide a more detailed description of errors.

In Service Mode, scroll to ERRORS FP1

Press keys (4) or (6) to select the Fuel Point. The status will display in the CPL window as ALL OK or ERROR.

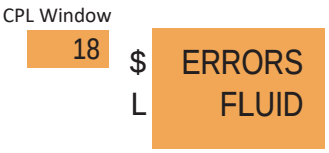


Press (FILL) to enter Errors Menu for the selected Fuel Point.

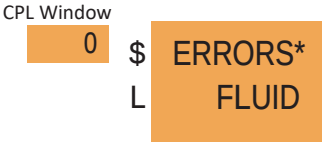
Use (2) or (8) to scroll through specific errors;

FLUID, POS, ENCODER, RATIO, etc

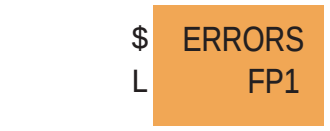
The number of instances of each type of error (since last cleared) is shown in the first available CPL window.



To clear an error counter press (FILL) (**ERRORS*** shows edit mode), then (0).



Press (C) to return to the initial ERRORS screen.



FATAL ERRORS require the dispenser to be repowered to clear the error. If the error persists some action will be required to address the cause.

NON-FATAL ERRORS are cleared by lifting and rehanging a nozzle. These errors are not displayed using the method previously outlined. Non-fatal errors are recorded to the SD Card.

15.10 PULSE Counted Error Codes

	Name	Brief Meaning	Type	Troubleshooting
1	FLUID	The float switch has been activated	Hard	Check sump for fluid. Check fluid switch operation and connections
2	POS	Lost connection with POS during delivery	Soft	Check POS/Forecourt controller loop connection and operation
3	STACK	Stack failed to start delivery	Soft	Replace stack controller. Check encoder
4	OVERRUN	Pre-set delivery amount has been exceeded	Soft	Check for leaking valves
5	LPG MTR	LPG meter communication error	Soft	Check cable to meter, check meter has power, etc
6	SECURITY	LPG meter security error	Soft	Check the security dip switch in the LPG meter and switch to the secure position
7	ENCODER	Reverse or unusual fuel movement detected	Soft but after three triggers per hose a Hard error occurs and on subsequent restart the affected hose is disabled	Check encoder, cables, mux, stack. Check for leaks and leaking valves
8	XS FLOW	Excess LPG flow detected	Soft	Check for leaks in LPG system. May also occur when filling empty tanks
9	RUN ON	Fuel movement detected after nozzle hung up	Soft	Check for valve not closing. Check encoder operation for false counting. Check for fuel leaks. Check nozzle switch operation
10	LPG COMS	LPG communication error	Soft	Check cable to meter, check meter has power, etc
11	RATIO	Blended delivery outside acceptable parameters	Soft but after three triggers per hose a Hard error occurs and on subsequent restart the affected hose is disabled	Check for large pressure differentials caused by clogged filters. Test fuel pathways for unusual flow rates in stack test
12	MUX	MUX communication interrupted	Logged	Check cable to multiplex board and the barrier board, check multiplex board and barriers board have power, etc

Key:

Type

Logged = Recorded in the log file only.

Soft = Stops the current delivery on the affected Fuelpoint. These require a nozzle on the affected Fuelpoint to be hung up twice to clear.

Hard = Stops all deliveries on the pump. This requires a repower to clear.

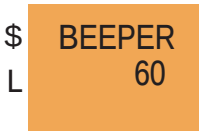
15.11 Timeout Menu - TIMEOUT

This function allows changing the value of the three different timeouts: **BEEPER**, **NOFLOW** and **WAITFLW**.

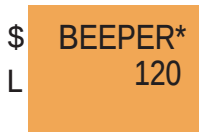
Press FILL to enter the Timeout Menu. Press 2 (or 8) to scroll through the three options.

15.11.1 Beeper Timeout - BEEPER

The timeout beeper will activate when a nozzle has not been returned or there has been no flow for the period of time set on the timeout. Starting the delivery or hanging up the nozzle will turn off the beeper.



Press FILL to edit the time value (**BEEPER*** shows edit mode). Use the numeric keypad to enter the new timeout value, from 30 to 300 seconds (the default is 60 seconds).

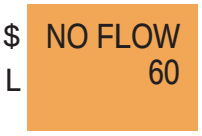


Press FILL to store the change or C to cancel.

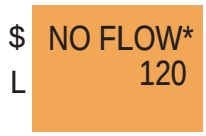
Use the keys 2 or 8 to navigate through other functions of the TIMEOUT Menu or press C to return to the main menu.

15.11.2 No Flow Timeout - NOFLOW

If at the start of a delivery there has been no flow, this timeout will end the transaction and turn off the motor and valves. Flow cannot be started after this timeout. Hanging up the nozzle will clear this timeout.



Press FILL to edit the time value (**NOFLOW*** shows edit mode). Use the numeric keypad to enter the new timeout value, from 30 to 300 seconds (the default is 60 seconds).



Press FILL to store the change or C to cancel.

Use the keys 2 or 8 to navigate through other functions of the TIMEOUT Menu or press C to return to the main menu.

15.11.3 Wait Flow Timeout - WAITFLW

After flow has occurred and paused, this timeout will end the transaction. Flow can be resumed if the timeout has not been reached. This timeout is cleared by hanging up the nozzle.

Press FILL to edit the time value (**WAITFLW*** shows edit mode). Use the numeric keypad to enter the new timeout value, from 30 to 300 seconds (the default is 120 seconds).

Press FILL to store the change or C to cancel.

Use the keys 2 or 8 to navigate through other functions of the TIMEOUT Menu or press C to return to the main menu.

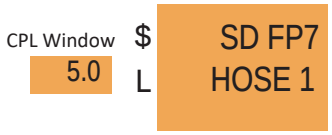
15.12 Start-Up Delay - STARTDEL

This function sets the delay before deliveries can start. Start-up delay is set to 0.0 by default. The delay should be entered in tenth of a second increments with a maximum setting of 30.0 seconds

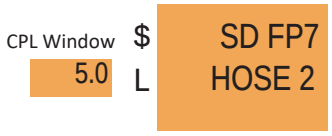
The Dollars display shows **STARTDEL** and the Litres display shows **FP(X)**, where (X) represents the fuelpoint number.

Use the cursor keys [4] and [6] to navigate left and right through the different fuelpoints.

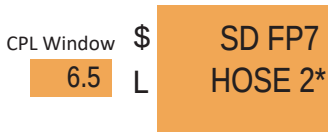
Press [FILL] to view the start-up delay for each hose of the selected fuelpoint. Press [4] or [6] to scroll to other hoses. The Dollars display shows **SD FP(X)**, where (X) represents the fuelpoint number, and the Litres display shows **Hose (Y)**, where (Y) represents the hose number. The start-up delay for the selected hose is displayed in the first available CPL window.



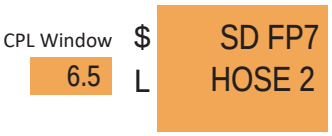
Press [FILL] to change the start-up delay of the selected hose, an asterisk next to the hose number indicates editing mode. In this mode, the keypad becomes numerical entry, so **6.5** is entered as **65** with the decimal place shown on screen.



Press [FILL] to confirm change or [C] to cancel .



Press [4] or [6] to scroll to other hoses or press [C] to return to **STARTDEL** to select another fuelpoint.



15.13 Flow Control - FLOWCTRL

This function can enable or disable the flow control management as well as edit the target flow rate for each hose on each fuelpoint. Changes will be saved to the config.

With Flow Control enabled, the dispenser will control the flow rate by either limiting the flow to the target flow rate set (by default 38 L/min for a standard hose) or increasing the flow to meet this value.

The target flow rate is recommended to be set at **38 L/min** for standard hoses and nozzles.

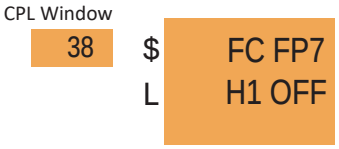
VR hoses/nozzles should **NOT** be set to more than **38 L/min**.

High flow hoses must **NOT** be set to more than **80 L/min**.

The Dollars display shows **FLOWCTRL** and the Litres display shows **FP(X)**, where (X) represents the fuelpoint number.

Use the cursor keys [4] and [6] to navigate through the different fuelpoints.

Press [FILL] to enter the flow control menu for the selected Fuel Point.



Press [4] or [6] to scroll through hoses. The Dollars display shows **FC FP(X)**, where (X) represents the fuelpoint number, and the Litres display shows **H(Y) ON** (or **OFF**), where (Y) represents the hose number. The maximum flow rate for the selected hose is displayed in the first available CPL window.

Press 5 to toggle the flow control ON or OFF. Press FILL to change the target flow rate of the selected hose, an asterisk next to the hose number indicates editing mode. In this mode, the keypad becomes numerical entry.

$ FC FP7
L H2* ON

Enter the new maximum flow rate and press FILL to confirm the change. C to cancel

$ FC FP7
L H2 ON

Press 4 or 6 to scroll to other hoses or press C to return to **FLOWCTRL** to select another fuelpoint.

$ FLOWCTRL
L FP8

15.14 View/Set Time - TIME

Setting the date and time ensures that the time stamps on Error Logs are correct.

The display will show TIME in the Dollars display and the current Central Controller time in the Litres display.

To set the time, press FILL. The Dollars display shows TIME*.

An asterisk (*) after the function name indicates that the system is in edit mode.

$ TIME
L 12.06.29

Enter the time (HHMMSS). Note that if the time is entered using all six figures, there is no need to confirm entry, i.e. the system automatically accepts and acts on the entered time. At any time press FILL to confirm the new time entered.

$ TIME*
L 12.06.29

The Dollars display shows TIME (without the asterisk) to indicate that the UI is back in 'view' mode.

15.15 View/Set Date - DATE

Setting the date and time ensures that the time stamps on Error Logs are correct.

The display will show DATE in the Dollars display and the current Central Controller date in the Litres display.

To set the date, press FILL. The Dollars display shows DATE*

$ DATE
L 12.06.16

An asterisk (*) after the function name indicates that the system is in edit mode.

Enter the date (DDMMYY). Note that if the date is entered using all six figures, there is no need to confirm entry, i.e. the system automatically accepts and acts on the entered date. At any time, press FILL to confirm the new date entered.

$ DATE*
L 12.06.16

The Dollars display shows DATE (without the asterisk) to indicate that the UI is back in 'view' mode.

Gallagher advise the checking of the date and time when obtaining dispenser logs. Should either be incorrect, make a note to be included with the logs. This will assist in finding the events under investigation.

15.16 Setting a Password - PASSWD

Both the Service Agent password (Level 2) and the Manager password (Level 1) can be altered.

Once set, if the password is forgotten, Gallagher will only be able to reset to default when provided with the serial number of the Central Controller.

While it is the responsibility of the site to manage passwords, Gallagher Technical Support have a mechanism for recording alternate passwords if they are informed of the changes.

To change a password:

Use the cursor keys [4] and [6] to select the password level.

LEVEL 1 = Manager Mode or
LEVEL 2 = Service Mode

$ L PASSWD LEVEL1

Press [FILL] (PASSWD* shows edit mode)

Enter password (EG: 123456)

$ L PASSWD*

Press [FILL] (shows CONFIRM*) or [C] to cancel

Re-enter the password (EG: 123456)

$ L CONFIRM*

Press [FILL] to confirm or [C] to cancel (shows PASSWD OK - password has been changed)

This will set the password for both sides of the dispenser.

$ L PASSWD OK

Repeat for each dispenser.

Lost passwords can make dispenser servicing impossible. Do not change passwords unless a reliable system of recording a change is in place.

15.17 Setting VR Active - VR2

For non-VR sites VR Control can be set as either ACTIVE or OFF.

$ L VR2 ACTIVE

VR menu items are VR2 and ATPM (Automatic Tank Pressure Monitoring).

For VR equipped sites both VR Control items must be set to ACTIVE.

VR Control can be set to OFF to disable alarms and forced shutdown. This will enable servicing, testing or calibration.

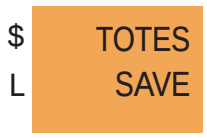
$ L ATPM OFF

Press [5] to toggle between ACTIVE and OFF.

Press [4] or [6] to scroll to between VR2 and ATPM.

15.18 Totes

This menu item allows you to save current tote values from the Central Controller to the Stack Controller and restore tote values from the Stack Controller back to the Central Controller. This can be used when swapping the Central Controller board out to avoid losing the current tote values.



NOTE: If Restore is used when the saved totes are out of date the current Central Controller totes will be overwritten with the outdated ones.

Press 4 or 6 to scroll between **SAVE** and **RESTORE**

Press FILL to action the save to the Stack Controller and FILL to confirm.

Press FILL to restore totes to the Central Controller and FILL to confirm.

Press C to exit return to the main menu.

15.19 Reload Configuration - CONFIG

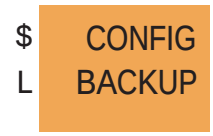
The dispenser configuration can be restored from the SD card or backed up from the dispenser to a new SD card.

Press FILL to reload the configuration from the SD card or C to cancel.

Press FILL again to confirm or C to cancel.

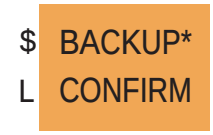
Press 4 or 6 to scroll from **RESTORE** to **BACKUP**.

Press FILL to copy the config file from the internal memory of the Central Controller back to the SD card as Config.XML.



Press FILL to confirm or C to cancel.

The CONFIG function will cause the Service Mode to be exited, any changes saved, and then the dispenser to be restarted.



If the config cannot be backed up **FAIL** will appear.

15.20 Restart Central Controller - REBOOT

This function restarts the Central Controller.

The Dollars window shows **REBOOT** and the Litres window **CC**. Press FILL to restart and FILL again to confirm restart or C to cancel.

The dispenser will leave Service Mode, saving any changes made before restarting the Central Controller.

15.21 Operating System Menu - OS

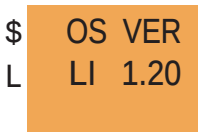
The OS Menu has five options: **OS VER**, **NETWORK**, **CLOUDID**, **LANCHECK**, **INTERNET** and **SYSLOGS**

Press FILL to enter the OS Menu. Press 2 or 8 to scroll through the five options. Press C to return to the main menu.

The OS Menu has the following six options:

15.21.1 Operating System Version - OS VER

The display will show the operating system version.



15.21.2 Network Options - NETWORK

Allows the network settings to be changed to Off, Ethernet or Wifi to match the dispenser's connection to the Data Centre.

Use the cursor keys 4 or 6 to select the required setting.

Press FILL to confirm changes or C to cancel.

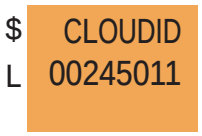
Use the keys 2 or 8 to navigate through other functions of the OS Menu or press C to return to the main menu.

15.21.3 Data Centre Cloud ID - CLOUDID

The dollars display shows **CLOUDID** and the litres display shows the 8 digit Cloud ID for the dispenser (O if an ID has not been entered).

Press FILL to edit the Cloud ID, an asterix will appear next to **CLOUDID** to indicate that the function is in edit mode. Use the number keys to enter the correct **ID** and press FILL to save or C to cancel.

Use the keys 2 or 8 to navigate to other menu items.



15.21.4 Check LAN Status - LANCHECK

Displays **OK** or **FAIL** after checking connection status between itself and the router it is using.

15.21.5 Check Internet Status - INTERNET

Displays **OK** or **FAIL** after checking that there is an internet connection.

15.21.6 SYSLOGS

Creates SYSLOGS when FILL is pressed.

$ SYSLOGS
L CREATE

Press the FILL button to start creation of the logs. The operator will see SYSLOGS "CREATING" and when it is finished SYSLOGS "OK". Press C to return to the main menu. Before removing the SD Card from the pump either lock it or power down the unit.

$ SYSLOGS
L CREATING

The extra logs copied over can be found in the "syslog" folder on the dispenser's SD Card.

$ SYSLOGS
L OK

15.22 Firmware - FIRMWARE

The following actions are possible regarding the firmware:

- viewing of the installed firmware version number(s);
- upgrading firmware, and
- rollback to previously installed firmware, provided that the previous version is still available on the module.

Note that the rollback option is not available on a Central Controller.

The display will show FIRMWARE in the Dollars display. The first available price display will show the module hardware address (ID), according to the table below. The installed firmware version number (e.g. 12001) is shown in the Litres display.

$ FIRMWARE
L 12001

Module Name	ID
Stack Controller	STK1; STK2
User Interface	UI2000; UI2100; UI3000; UI3100
Central Controller	CC

STK1

Use the cursor keys 4 and 6 to navigate left and right to view the different firmware versions installed. From this point, either an upgrade or a rollback can be actioned.

Note that if two or more of the same type of module are present with the same firmware version installed, the display will appear not to change other than the ID in the Price window.

15.22.1 Upgrading the Firmware

To upgrade firmware, a new firmware file must be present in the firmware folder on the SD Card.

To update firmware, scroll to the module to be updated and press (5). The Litres display shows UPDATE?.

Press (5) again to action the upgrade. (If no file is present on the SD card, the Litres display shows NO FILE)

The UI shows BUSY while the update is in progress. Updates can be queued (i.e. both UI's could be updated concurrently). However, the Central Controller cannot be queued with other modules.

Modules can take up to 10-15 minutes to update. The Central Controller should only take approximately 30-60 seconds.

When the update is complete the new version number will be displayed. There is no other visible confirmation.

Roll back the Firmware

To rollback firmware on a module, press (0). The Litres display shows ROLLBK?. Press (0) again to action the rollback.

Note that the update request may be queued and may not be actioned for some minutes, depending on the number and nature of other queued requests.

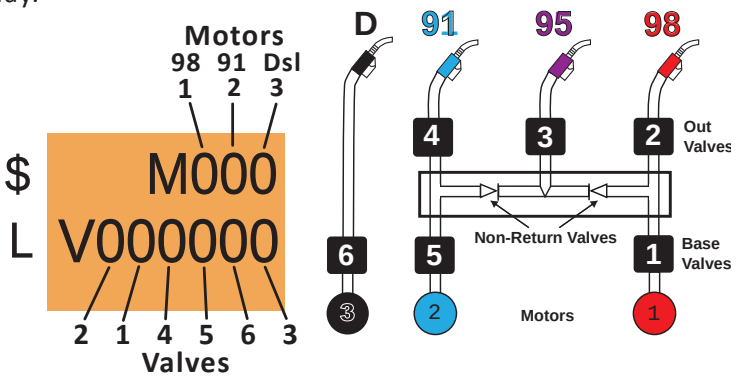
Ensure every module's firmware is updated, especially where additional modules exist, such as Stack Controllers or UI's.

16 HYDRAULIC STACK TEST (BLENDING)

NOTE: The layout of the hoses during a stack test differ from the physical layout on the dispenser.

Valves according to Stack Test display.

Valve 2 Grade 98 Out Valve
Valve 1 Grade 98 Base Valve
Valve 4 Grade 91 Out Valve
Valve 5 Grade 91 Base Valve
Valve 6 Grade Diesel Valve
Valve 3 Grade 95 Out Valve

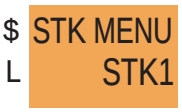


16.1 Procedure

Enter Service Mode.

Note that Stack Test will only show when comms is disconnected .

Use the 2 and 8 keys to scroll through the list until STK MENU is displayed in the Dollars display. STK1 (front) is shown in the Litres display.

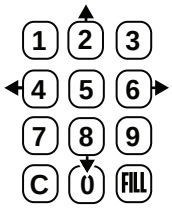


Press 4 or 6 to select STK2 (rear).

Press **FILL** to enter the **Stack Menu** for the selected stack.

Press **FILL** to enter the **Control Outputs** function.

Press **5** to turn **ON/OFF** the motors/valves,
4 to navigate left,
6 to navigate right,
2 and **8** to navigate up and down.

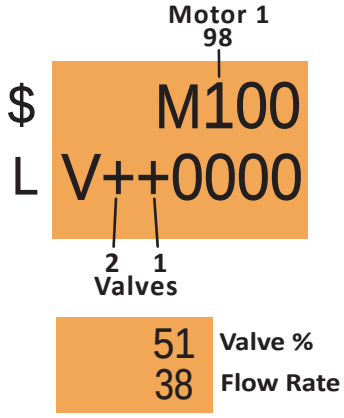


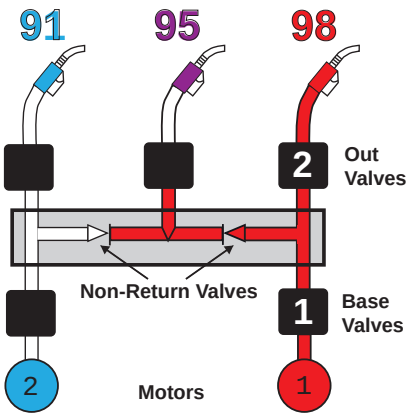
When a motor is on it will display **1.**

When a valve is open and in edit mode it will display **+**.

Grade 98

The flow rate for Grade 98 can be tested by using **Base Valve 1** and **Out Valve 2**. Flow rates for both valves can be adjusted according to their valve percentage.

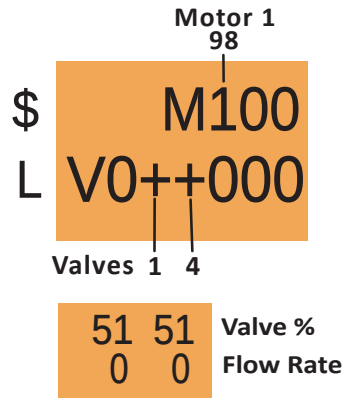


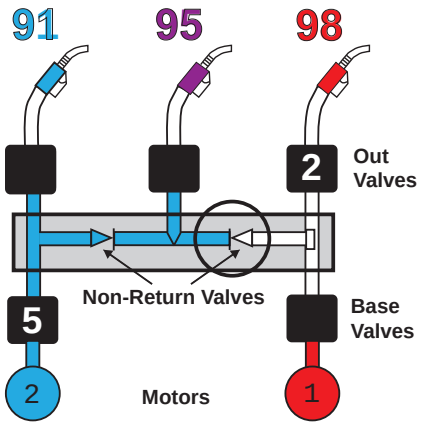


With a normal delivery, the Base Valve will be open to 100% and the Out Valve will adjust the flow rate to meet the target flow defined in the Flow Control settings.

Grade 91

The flow rate for Grade 91 can be tested by using **Base Valve 5** and **Out Valve 4**.

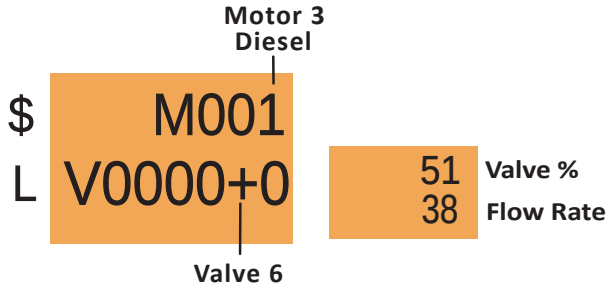


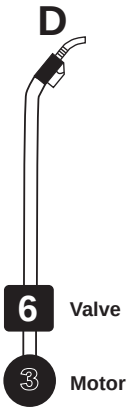


With a normal delivery, the Base Valve will be open to 100% and the Out Valve will adjust the flow rate to meet the target flow defined in the Flow Control settings.

Diesel

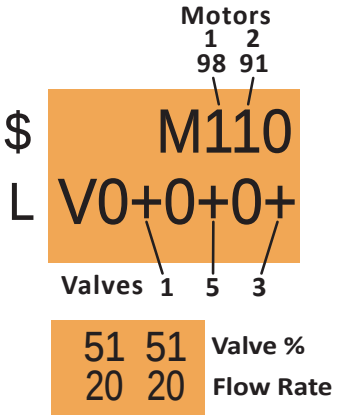
The valve percentage and flow rates of **Valve 6** (Diesel) can be tested and adjusted as on a standard unit.

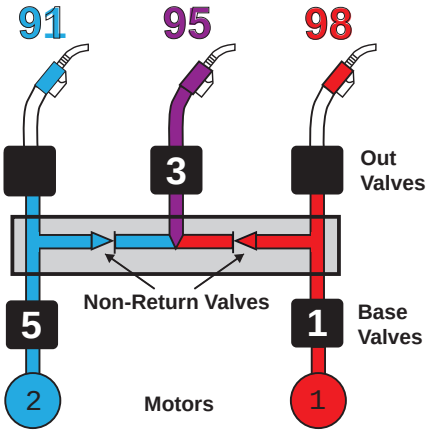




Grade 95

The flow rate for Grade 95 is tested using **Motors 1** and **2** with **Out Valve 3 and Base Valves 5** and **1** simultaneously.



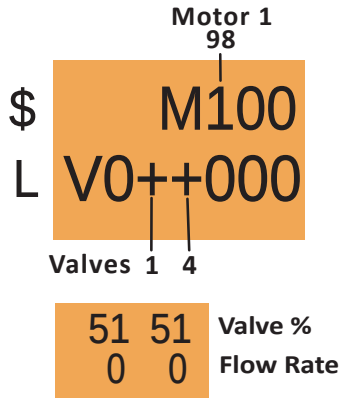


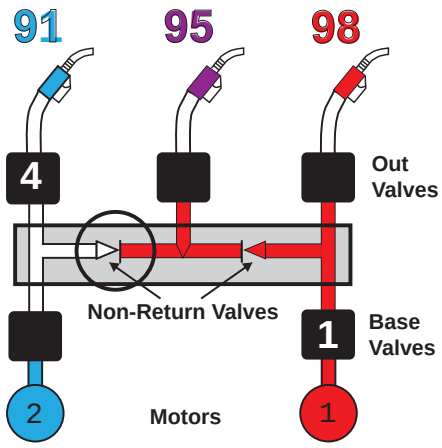
Flow rate settings adjusted in a stack test for Grade 98 or Grade 91 will not affect the normal delivery of Grade 95.

16.2 Testing the Non-return Valves *(circled in diagrams)*

Grade 98

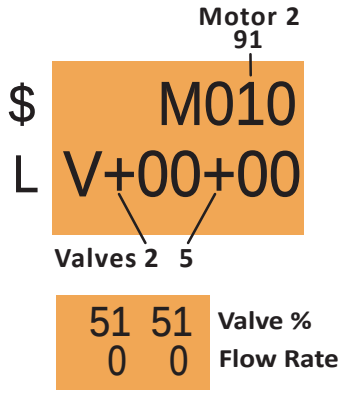
To test the non-return valve for Grade 98, turn on **Motor 1** and open **Out Valve 4** and **Base Valve 1**. Verify that no flow is coming out of the Grade 91 nozzle.

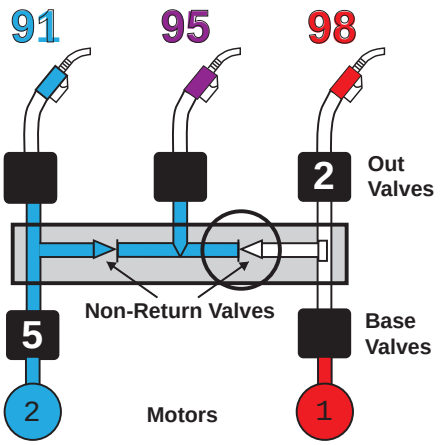




Grade 91

To test the non-return valve for Grade 91, turn **Motor 2** on and open **Out Valve 2** and **Base Valve 5**. Verify that no flow is coming out of the Grade 98 nozzle.





16.3 Adjusting Flow Rates

NOTE: The flow rate for the blended grade cannot be adjusted.

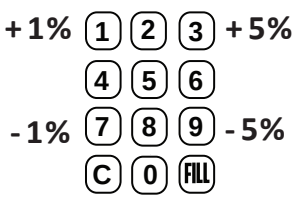
For other grades, when a proportional valve is opened and the motor is turned On (i.e. when the output digit shows a '**+**'), the flow rate can be adjusted as follows:

1% increments using the keys (1) (+) and (7) (-).

5% increments using the keys (3) (+) and (9) (-).

Press (FILL) to store the changes made to the valves in edit mode.

Press (C) to exit without saving to the current stack menu.



16.4 Calibration

The procedure for calibrating the various grades is as follows:

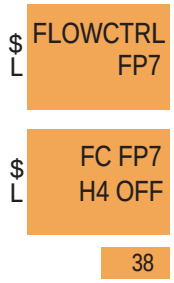
Grade 1	**98**	Normal procedure.
Grade 2	**95**	No calibration is possible.*
Grade 3	**91**	Normal procedure.
Grade 4	**Diesel**	Normal procedure.

*If Grade 2 is out of acceptable tolerance, recalibrate Grades 1 and 3.

16.5 Flow Control - FLOWCTRL

All target flow rates can be adjusted.

Grade 1	**98**	**H1**	Leave on. .
Grade 2	**95**	**H4**	Leave off.
Grade 3	**91**	**H2**	Leave on.
Grade 4	**Diesel**	**H3**	Leave on.



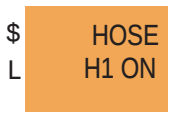
16.6 Grade Priority - MAPPING

Must be set to **1342**.
Note: Will display 134256.

16.7 Setting Hoses Active/Inactive - HOSE

This function allows the hoses to be set to active (**ON**) or inactive (**OFF**)

Grade 1	**98**	**H1**
Grade 2	**95**	**H4**
Grade 3	**91**	**H2**
Grade 4	**Diesel**	**H3**



17 RATIO ERROR

When a blended delivery falls outside the tolerance, the delivery will be stopped and **RATIO ERROR** will display on the screen. The tolerance ensures the blended grade does not fall below 95 Octane.

The error is cleared by lifting and replacing a nozzle on that side of the dispenser.

Should three consecutive blended deliveries stop with a ratio error, the blended hose is disabled and cannot be used until it is reset in service mode by service personnel.

A ratio error can only occur after a minimum delivery of 2 litres.

A hose made inactive due to ratio error will not respond to nozzle lift and no price will be present in the price window.

To re-activate the blended hose, enter the service mode and scroll to the **HOSE** setting for the particular grade. **0** beside the hose number shows it is inactive.

Press **5** to re-activate the hose and the **0** will change to **1**

Ratio Error is most commonly due to an obstructed base valve.

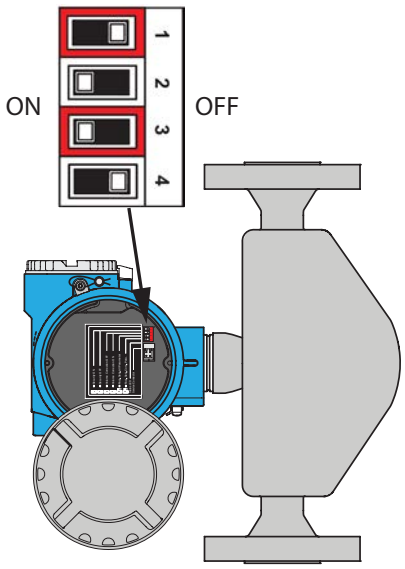
18 ADDRESSING LPG METERS - VERSION 1.20

Only possible with Firmware version 1.20 or later.

New LPG meters are not rear or front specific and require their address to be configured.

To configure the LPG meter addresses (one meter at a time):

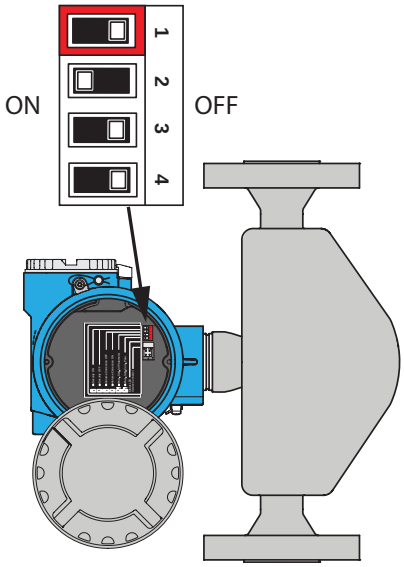
1. Leave pump **ON**.
2. Unplug all LPG meters except the meter to be addressed.
3. Remove wire/lead tamper seals (if present) and the large cover from both meters.
   - Take suitable precautions for opening a flameproof enclosure inside the hazardous zone.
   - Set security switch (dip 1) to **OFF** (indicator LED blinks green/red for ≈3 seconds).
   - If indicator LED does not blink red, turn security switch **ON** (dip 1) and **OFF** again.
   - Set factory reset switch (dip 3) to **ON** (indicator LED turns orange).



   - If indicator LED does not go orange, turn factory reset switch **OFF** (dip 3) and **ON** again.
4. While the LPG meter is performing reset, the indicator LED goes solid orange for ≈45 seconds, then solid red for ≈15 seconds, then returns to solid green (or blinks green/red) when done.

   DO NOT use pump or cut power until the reset is complete.

5. When reset is complete, set factory reset switch (dip 3) to **OFF** and leave security switch **OFF** (dip 1).



6. When a meter is reset, the pump display may show **LPG COMMS ERROR**, which can be cleared by lifting any hose on that side.

7. Enter service mode.

   Hold **FILL** for 3 seconds, enter password, press **FILL** to confirm.

8. Enter LPG menu.

   Press **2** or **8** to scroll until **LPG MENU** is displayed, then **FILL** to enter.

9. (optional) Check that the security switch is off for the meter to be addressed.
   - Press **2** or **8** to scroll until **MTR SECU** is displayed.
   - Press **4** or **6** to scroll to **FP1/FP2** as appropriate.
   - Press **FILL** to query security switch status for **FP1/FP2.**
   - Security switch state is displayed.
   - Turn off security switch setting on the meter if required.

10. Set the LPG meter address.
    - Press **2** or **8** to scroll until **MTR SIDE** is displayed.
    - Press **4** or **6** to select to **FP1/FP2** for the meter to be addressed.
    - Press **FILL** to set address for selected side.
    - "**1 SET**" or "**2 SET**" is displayed when successful. "**RD ERROR**" indicates the meter is not connected or ready for addressing. "**WR ERROR**" indicates security switch is **ON**.
    - Press **C** to get back to **FP** selection.

11. Unplug the newly addressed LPG meter inside the head.

12. Repeat from step 2 for any remaining LPG meters to be addressed, only plugging in the meter currently being addressed.

13. Once all meters have been addressed, unplug all LPG meters inside the head, then plug them all back in.

14. Wait 30 seconds for the meter boot process to complete.

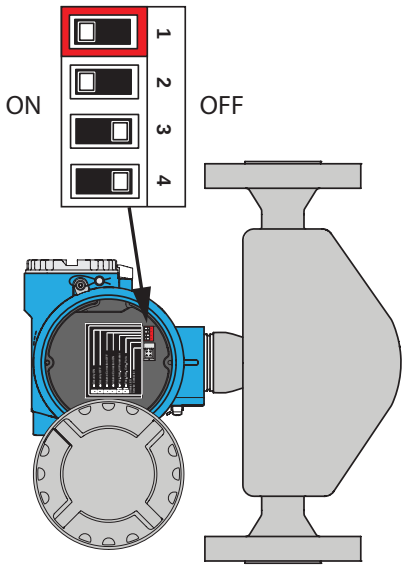
    Indicator LED is red when booting, green when ready.

15. Exit service mode.

16. Turn pump off, wait 30 seconds, and repower pump.

17. **IMPORTANT:** Fluid must now be run in a stack test for all meters being addressed.

18. For all LPG meters, set meter security switches (dip 1) to **ON**, check all meter switches are set to correct positions for both meters.



19. For all LPG meters, replace large meter cover and install new wire/lead tamper seals unless performing a calibration next.

Notes:

i. LPG meter addressing must occur immediately after resetting that meter. A meter should not be repowered between the reset and addressing.

ii. Only one meter address may be set at a time. All other LPG meters must be disconnected or addressing will fail.

iii. LPG meters MUST be repowered after setting a meter address in order to save the new address properly. This is normally done by unplugging and reconnecting meter cables inside the head.

iv. Pump must be repowered after all meter addressing has been completed in order for LPG deliveries to function correctly.

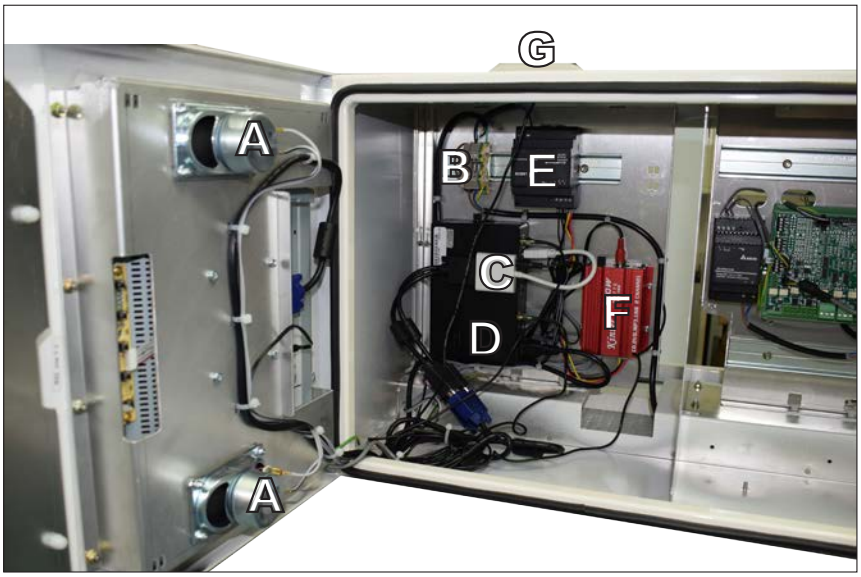
v. The LED indicator is between the dipswitches and plug connector and is usually not directly visible. A key is useful to reflect the light.

19 PULSE MEDIA

PULSE Media is a multimedia solution integrated into the pump. It has the ability to display video on an LCD screen with audio and wireless internet connectivity. All components are located inside the rear side of the head.

Figure 40. External View

The system comprises the components shown in the following illustration.



A. Speakers (x4)
B. Mains Connector Block (x1)
C. VGA to HDMI Converter (x1)
D. Media Player (x1)
E. 12V DC Power Supply (x1)
F. Audio Amplifier (x1)
G. Wireless Antenna (x2)

Figure 41. PULSE Media Components

19.1 Operation

The system works as a standard windows PC, therefore all configurations including WiFi connections should be made accordingly.

A Windows keyboard and mouse may be connected via the two USB ports. By default the system is set to boot directly into the media player. The desktop may be accessed using the key combination windows+D as shown below.

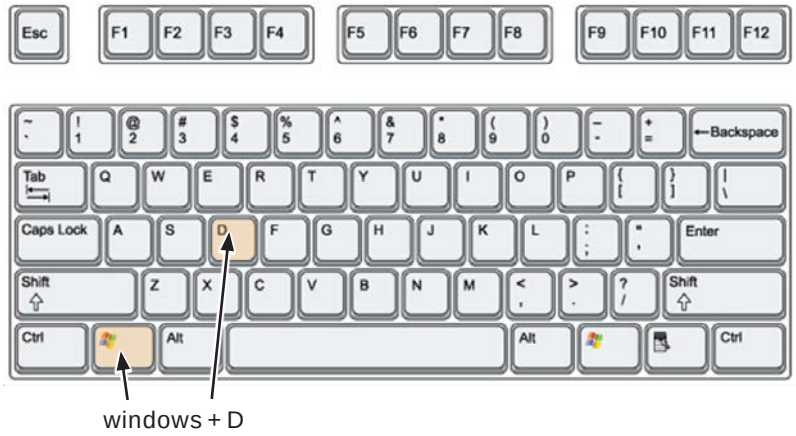


Figure 42. Windows Keyboard

19.2 Power Buttons

The media player and LCD screens should start automatically.

If this is not the case:

- Turn on the media player by pressing the power button located next to the side panel (see below).
- Turn on the screens by pressing the power button located on the rear of each screen, as shown below.

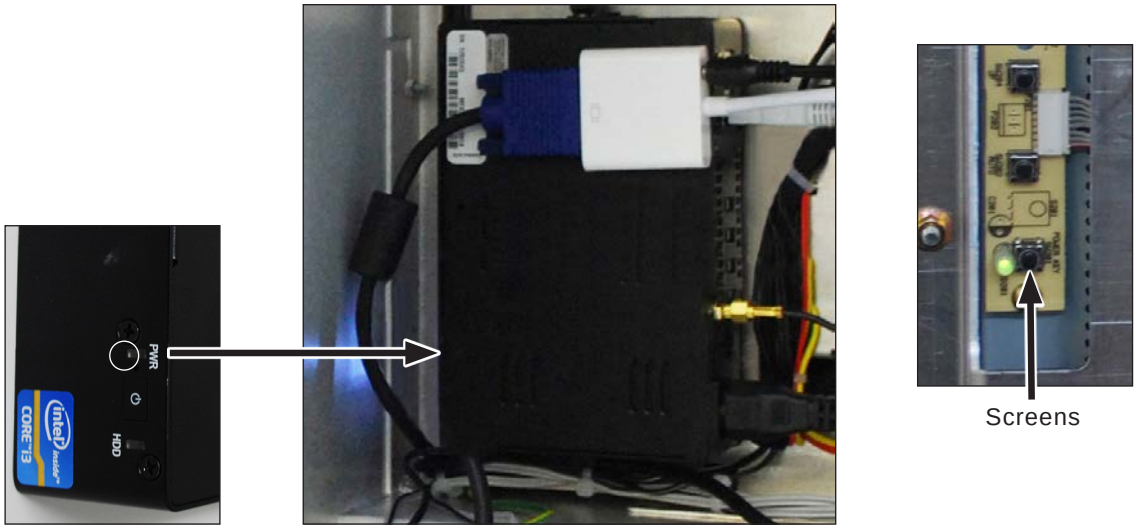


Figure 43. Location of Power Buttons for Media Player and LCD Screen

19.3 Adjusting the Volume

The volume can be adjusted on the amplifier using the volume knob (arrowed).

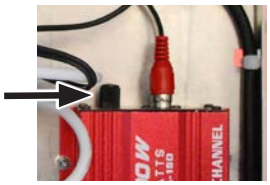


Figure 44. Volume Knob

19.4 Electrical Protection

The media system is protected by a 5A standard small (20x5mm) fuse located in the Mains Connector Block (arrowed).

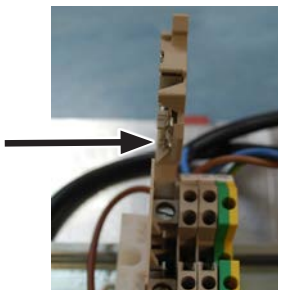


Figure 45. Fuse Location

19.5 Wiring Diagram

The figure below shows a basic wiring diagram for the PULSE Media system.

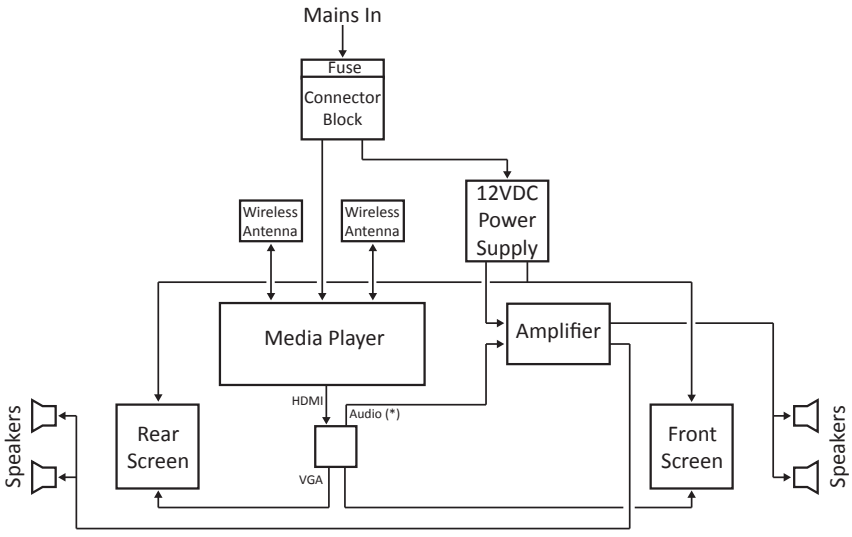


Figure 46. PULSE Media Basic Wiring Diagram

19.6 Cleaning the LCD Screen

Clean the LCD screen with a soft lint-free cloth and glass cleaner. Do not wash the screen with a hose as this may cause water to enter the dispenser electronics and adversely affect the operation of the system.

20 TROUBLESHOOTING

20.1 Dispenser Will Not Deliver Fuel

Fault	Action
(a) No screens (no pixels lit).	• Ensure dispenser is powered (any LED lit indicates presence of power). • Check Central Controller LEDs are correctly lit. No LEDs indicate Central Controller fuse may be blown. • Check Local Bus to displays are correctly connected.
(b) A single screen with no pixels lit.	• Check LEDs on Display PCB rear: - ***ON*** indicates power and heartbeat. - Top red ***ON*** indicates non-recoverable software fault. Cycle the power to the display. • Check Local Bus cables are correctly connected. • Check power to Stack Controller.
(c) Black screen (all pixels lit).	This indicates lack of valid configuration file. • Repower the dispenser. • Reset system defaults (See Servicing - Section 11.2 Configuration Reinstall / Section 14.19 Reload Configuration - CONFIG). • Ensure firmware is up to date (See Servicing - Section 12.4 Firmware - FIRMW / Section 14.22 Firmware - FIRMWARE).
(d) No response to all keys.	• Repower the dispenser. • Reset system defaults (See Servicing - Section 11.2 Configuration Reinstall / Section 14.19 Reload Configuration - CONFIG). • Remove and replace membrane contact block checking all pins contact. • If persists, replace membrane. • If persists, replace display module and membrane.
(e) No response to some keys.	• Remove and replace membrane contact block checking all pins contact. • If persists, replace membrane. • If persists, replace display module and membrane.

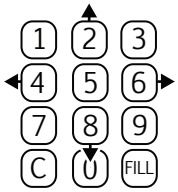
Fault	Action
(f) Screen displays. STACK ERROR	Indicates stack events outside normal parameters. May be a one-off event requiring no action. Cleared by nozzle lift and logged within the dispenser. Repeated Stack Errors can indicate hydraulic issues with valve function, leaks and nozzle function.
(g) All nozzles 'ignored' by dispenser, i.e. display does not change.	• Check Multiplexer, Barrier Module, Stack Controller and cables. • Check hoses are active. • Check nozzles switches.
(h) A single nozzle is 'ignored' by the dispenser, i.e. display does not change.	• Check inputs in Stack Test (see Servicing - Section 12.14 Hydraulic Stack Test - STACK / Section 14.2 Stack Menu - STK MENU). If detecting nozzle lift, check hose is active. • Check nozzle switch.
(i) Dispenser ready to deliver, but will not dispense fuel.	• Check dispenser settings, numbers and protocol are correct. • Check comms LEDs on Central Controller. • Check fuel can be delivered using Stack Test (see Servicing - Section 12.14 Hydraulic Stack Test - STACK / Section 14.2 Stack Menu - STK MENU). This indicates hydraulic operation. • Check fuel can be delivered in Stand Alone mode (see Servicing - Section 12.12 POS/Standalone - POS / Section 14.4 Point of Sale Menu - POS). This indicates correct internal systems operation. • Check fuel can be delivered with POS enabled, cable attached. Failure at this point indicates forecourt communications issues.
(j) Screen Displays. **FLUID** **ALARM**	• Fluid is present in the sump (where float switch is fitted). • Jumper on P31 of the Mux Board (where fitted) is not making contact. • May be a fault with the Barrier PCB.

20.2 Dispenser Will Deliver Fuel

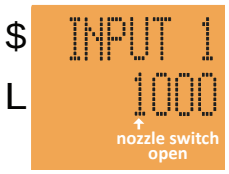
Fault	Action
(a) Continual clicking of nozzle.	• Ensure pressure and flow rate meets pump specifications, i.e. <40 L/min and <350 kPa. • DEF: Check for blocked airway (see Servicing - Section 2.3 Elaflex DEF Nozzles). • Check nozzle tip for damage to airway.
(b) Dispenser delivers too slow, single hose or grade.	Use Stack Test (see Servicing - Section 12.14 Hydraulic Stack Test - STACK / Section 14.2 Stack Menu - STK MENU) to check valve operation: • Slight buzzing to the hand indicates solenoid operation. • 38% should provide slow flow. • ≈ 51% should provide high flow. Inability to provide the expected flow rates at the above settings may indicate: 1. Supply issues outside the dispenser: blocked filters, empty tanks, relay/submersible issues. 2. Delivery issues within the dispenser: valve blockage, diaphragm damage, solenoid failure, nozzle blockage.
(c) Pump over-runs.	This may be caused by sluggish closing of valves due to obstructions or presence of foreign matter, or leaking valves due to internal damage. • Perform a Stack Test (see Servicing - Section 12.14 Hydraulic Stack Test - STACK / Section 14.2 Stack Menu - STK MENU) to confirm whether or not the solenoid valves are opening and closing correctly. • Check for obstructions or presence of foreign matter and remove using compressed air. • Check the piston lip seal for wear and tear and damage. Replace worn or damaged parts. • After performing the first two actions, carry out a test delivery of a preset amount and see whether an overrun still occurs.
(d) Pump over-runs preset.	• Ensure pressure flow and rate meets pump specifications, i.e. <40 L/min and <350 kPa. • See pump over-runs above.
(e) Frozen price display.	• Unplug/replug price display ribbon cable, then repower the dispenser.

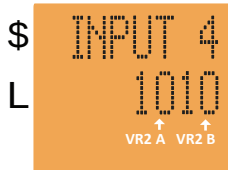
21 QUICK REFERENCE GUIDE - VERSION 1.11

Entering Service Mode
Hold FILL 3 seconds
Enter Password FILL (* displayed)
2 – 8 scroll between options
4 – 6 scroll between settings
5 Changes setting
FILL = Enter
Press CLR 3 seconds to exit



Checking Input Status
In Stack Mode, press FILL to view INPUTS
INPUT 1 – Fuelpoint 1 Nozzles (front, key on left)
Lifting each nozzle opens the switch 0=OFF 1=ON
Press FILL for next inputs
INPUT 2 – Fuelpoint 2 Nozzles (rear, key on right)
INPUT 3 – Aux inputs (high flow/float switches)
INPUT 4 – VR inputs (10 = OK, 00, 01 or 11 indicates a fault)





Change Fuelpoint ID (set pump numbers)
Scroll using 2 or 8 to CGFPID FP1 (Fuelpoint 1)
Press FILL, enter the desired number (eg: 7)
Then press the FILL to set
Scroll using keys 4 or 6 to other fuelpoints and repeat

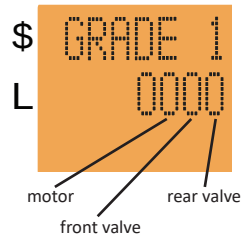
5/6 Digit Setting
1 = 5 Digit, 0 = 6 Digit, Press 5 to change, FILL to set
Repower dispenser to action the change

Firmware upgrade
New Firmware must be on SD card in Firmware folder
Central Controller eg: Firmware\11113.CC_
Central Controller eg: Firmware\11139.LCC
Stack Controller eg: Firmware\11106.LSC
User Interface eg: Firmware\11106.UI_
Insert and unlock SD card
Scroll using 2 or 8 to FIRMW
Display shows the current installed version
Press 4 or 6 to select item to upgrade
Press 5 , then 5 to start, BUSY is displayed
Wait, then check new version is showing
Repeat for all firmware items to be upgraded

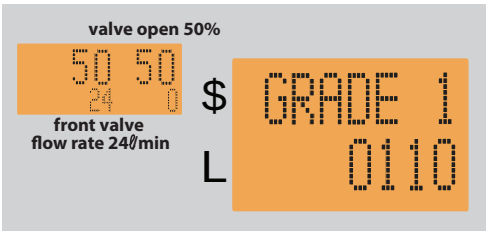
Set Time/Date
Scroll to Time or Date
Press FILL, enter time/date, press FILL (if required)

Safe Removal of SD Card
Enter service mode, screen shows 'SD Card Active'
Press 5, screen shows 'SD Card Locked'
Now safe to remove, dispenser will operate with card out though this is not recommended

Stack Test
Scroll to STACK 1000
Press 4 or 6 to scroll to other stacks where present
Press FILL to enter Stack Mode
Press FILL to view next grade
Motor on = press 1
Front valve open = press 3
Rear valve open = press 9



Setting Flow Rates (setting a % open for each valve)
In Stack Test Mode
Large number in top row shows valve %
To change, motor and valve(s) must be on
Press 1 for motor, 3 for front valve, 9 for rear valve
Open nozzle, wait till flow rate stabilises
Press 4 to increase by 1%, press 6 to decrease by 1%
Watch flow rate, adjust % to achieve desired rate (eg: 38L/min)
Press 5 to store the % value for this valve
Press FILL for next grade, and repeat



POS Enable/Disable (for standalone)
Comms must be isolated for standalone
Press 5 to change
1 = POS enabled, 0 = Standalone
Press 4 or 6 to scroll to fuelpoint
Repower pump to enable
POS will re-enable when cable is re-connected

Reload configuration (config zero)
Safely remove the SD card
Place the card in a computer, open config folder
Rename config file by adding a zero to the end
eg: config is renamed as config0
Replace card in dispenser and repower
Memory is cleared and config is reloaded
Re-enter pump numbers, check other settings

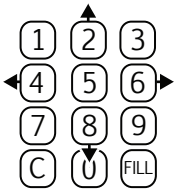
Set Hoses Active
Press 5 to change, 0=OFF 1=ON

VR Control Active/Inactive
Press 5 to change

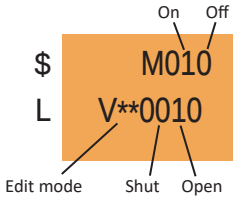
Set Price
FILL enter price FILL press 6 to change Fuelpoint
Only works in Standalone mode

22 QUICK REFERENCE GUIDE - VERSION 1.20

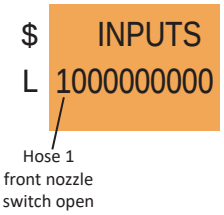
Entering Service Mode
Hold FILL 3 seconds, enter Password, press FILL again
Use 2 and 8 to scroll between items
Use 4 and 6 to scroll between options
Pressing 5 changes setting, turns on/off
FILL = Enter
Press CLR 3 seconds to exit



Checking Outputs (Stack Test Motors and Valves)
Comms must be isolated to view STK Menu
At STK MENU, press FILL to CONTROL OUTPUTS
Press FILL at CONTROL OUTPUTS for Motor and Valve control
Use keys 2,4,6,8 to move around
Use the 5 key to turn M and V on/off
0 = off/valve closed 1 = on/valve open
M: The 1st 0 = grade 1 motor, etc.
V: The 1st 0 = grade 1 front valve
V: The 2nd 0 = grade 1 rear valve
V: The 3rd 0 = grade 2 front valve, etc.



Checking Inputs
At STK MENU, press FILL, then press 8 to view INPUTS
Lifting each nozzle opens the switch 0 = OFF 1 = ON



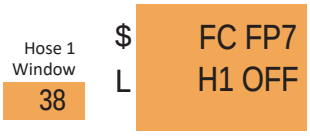
Change pump numbers, FPID
At FP ID Menu
Press FILL, enter the pump number, press FILL to set
Scroll using keys 4 or 6 to other fuelpoints and repeat

5/6 Digit Setting
Press FILL at POS MENU. Press 2 till you see 5/6 DIGIT
Press 5 to change, press 6 for other fuelpoints

Firmware upgrade
New Firmware must be on SD card in Firmware folder
Insert and unlock SD card
Scroll to FIRMWARE
Display shows the current installed version
Press 4 or 6 to select item to upgrade
Press 5, then 5 to start, BUSY is displayed
Wait, then check new version is showing
Repeat for all firmware items to be upgraded

Set Time/Date
Scroll to Time or Date
Press FILL, enter complete time/date

Setting Flow Control
At FLOWCTRL press FILL
Press FILL to edit, enter target in LPM, eg: 38, press FILL
Press 5 to turn Flow Control on/off
Press 6 for next hose
Set for all hoses on all fuelpoints as required
Do not set LPG or ULTRA hoses



POS ENABLED (for standalone)
Comms must be isolated for standalone
At POS MENU press FILL
Press 8 till you see ENABLED, Press 5 to change to NO
Press 4 or 6 to scroll fuelpoints, set to NO
POS will re-enable when cable is re-connected

Set Price
Only works once in Standalone (no comms, POS set to OFF)
At PRICE GRADE1, press FILL, enter price, FILL
Press 6 for PRICE GRADE2, etc.
Repeat on each display

Set Timeouts
At TIMEOUT MENU press FILL, press 6 to choose item
Press FILL, enter time in seconds, press FILL to set

Set Start Delay
At STARTDEL MENU press FILL, press 6 to choose hose
Press FILL, enter time in seconds, press FILL to set
Enter 55 for 5.5 seconds

Set Hoses Active
At HOSE MENU
Press 5 to change, 0 = OFF 1 = ON
Press 6 to move to the next hose

VR Control Active/Inactive
At VR2 Menu
Press 5 to change. Press 6 for ATPM.

Hose Mapping
At MAPPING MENU press FILL, enter order, Press FILL
Press 6 to move to the next fuelpoint

23 APPENDIX - BLENDING INFORMATION

23.1 Flow

The diagram below demonstrates the hydraulic flow of the blending dispenser. Although both the component fuels and the blended fuel can be any octane, this diagram refers to **91** and **98** as the component fuels. The blended grade is referred to as **95**.

Upon nozzle lift, the blended grade **95** draws the correct ratio of each component fuel (**91** and **98**) from their respective submersible pumps. Solenoid valves **1** and **5** open proportionally to control the ratio. The correct proportions of each component grade enter the blending manifold before being dispensed in the conventional way via valve **3** which controls the flow rate.

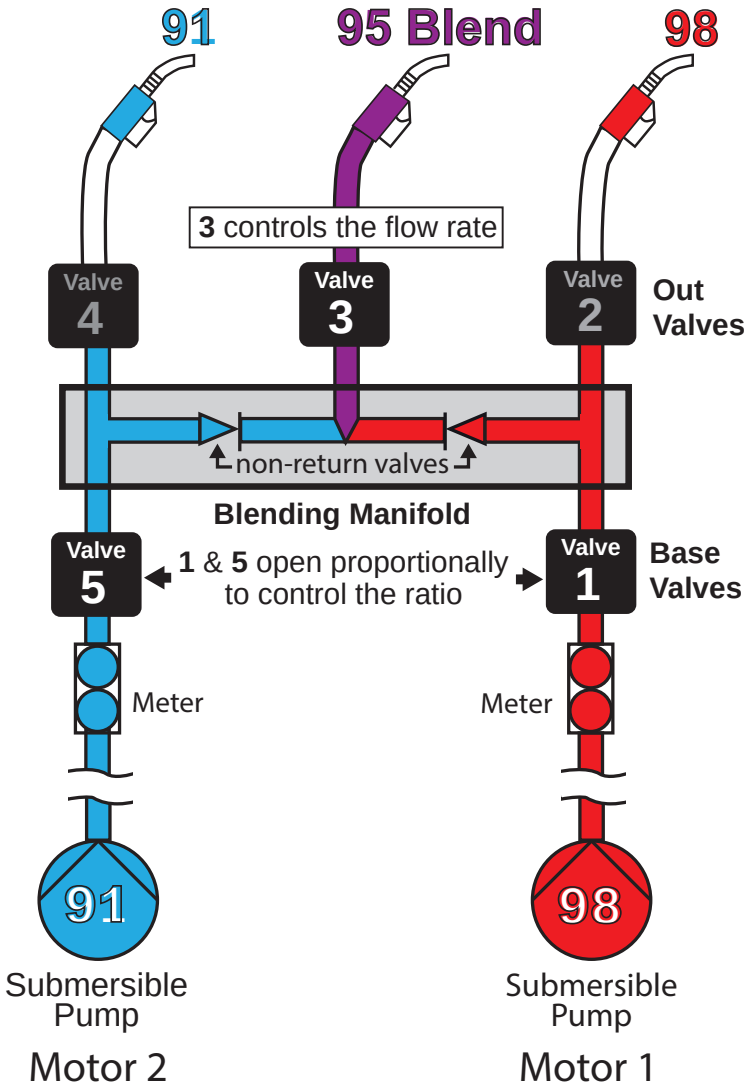


Figure 47. Hydraulic Flow

23.2 Layout

The diagram below shows the hydraulic components and layout.

The large numbers indicate the location of the solenoid valves. These valve numbers, described below, are referred to throughout the document.

The valve numbers are the same for front and rear.

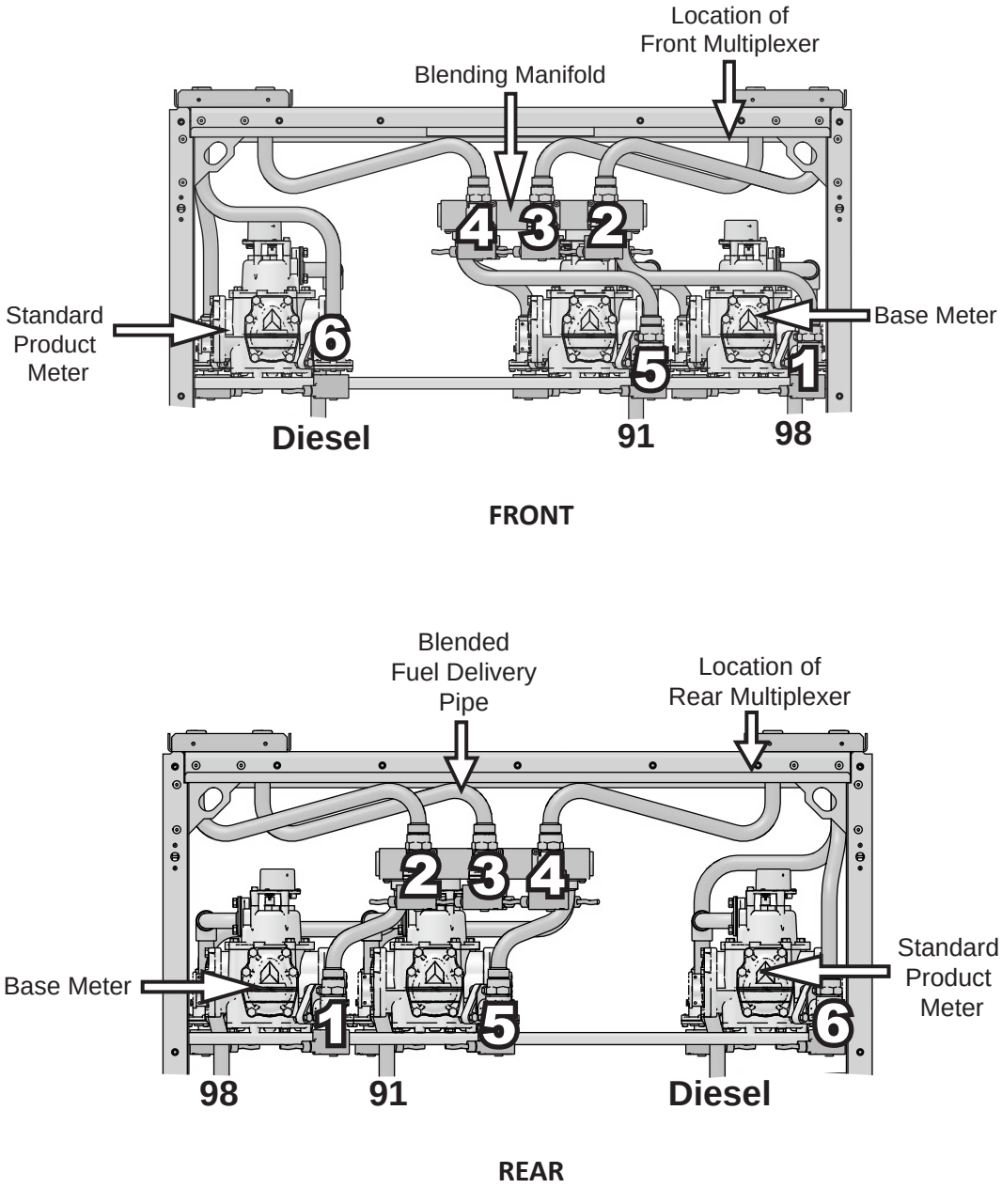


Figure 48. Hydraulic Layout

23.3 Blending Manifold

The blending manifold has 3 proportional valves attached with two non return valves. The two “component” fuels are fed into the manifold and channelled proportionally into the centre of the manifold to make the blended fuel.

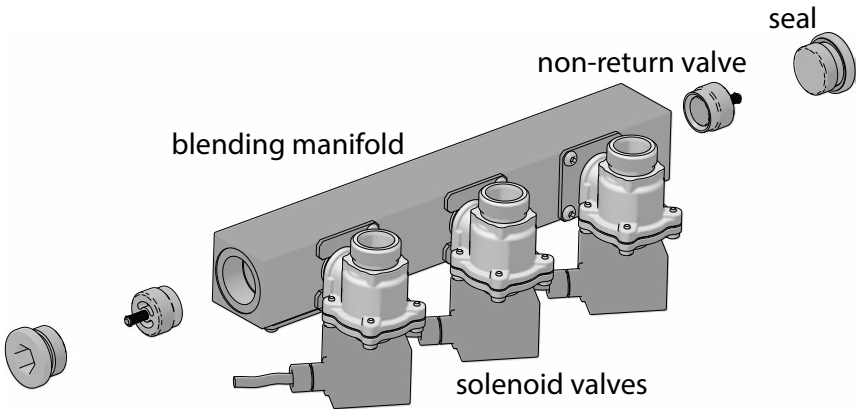


Figure 49. Blending Manifold Assembly

23.4 WIRING

This section describes the wiring and cable connections specific to the blending dispenser.

Additional components used are:

- a second Integrated Stack Controller located in the head
- a second Multiplexer located in the hydraulic cabinet
- a second Barrier located in the head
- an Auxiliary Power Module

The Multiplexer Board for a particular side is located on the right.

Compared to the wiring in a conventional dispenser, the Auxiliary Power Module is wired in a similar way, whereas the Multiplexer Board is slightly different.

23.5 Stack Controllers

Each Integrated Stack Controller has valve sockets marked P28-P22 from left.

Note: **FRONT** solenoid valves connect to Stack Controller 1000, (top)
REAR solenoid valves connect to Stack Controller 1100, (bottom).

front rear

Figure 50. Head Contents

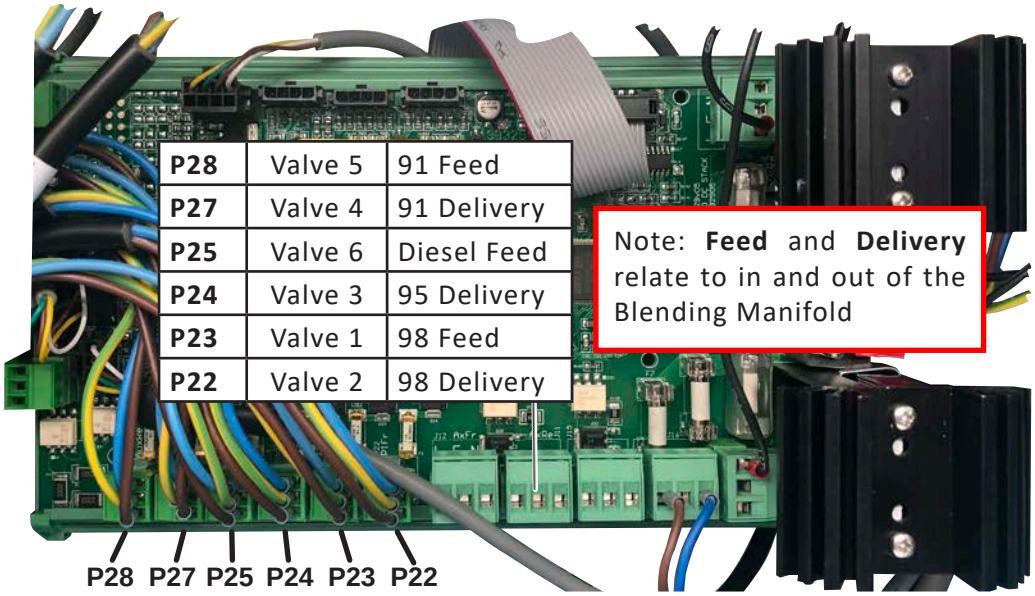


Figure 51. Wiring Positions of the Stack Controller

23.6 Multiplexers

The following diagram illustrates the specific connection points for encoders into the multiplexer boards. Note that the wiring is identical for each multiplexer.

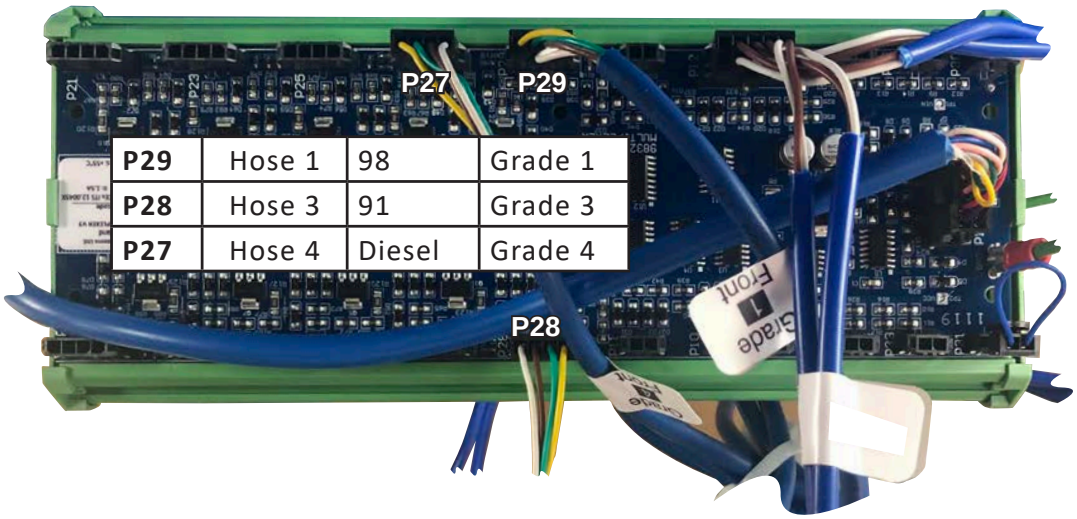


Figure 52. Wiring Positions of the Multiplexer Board

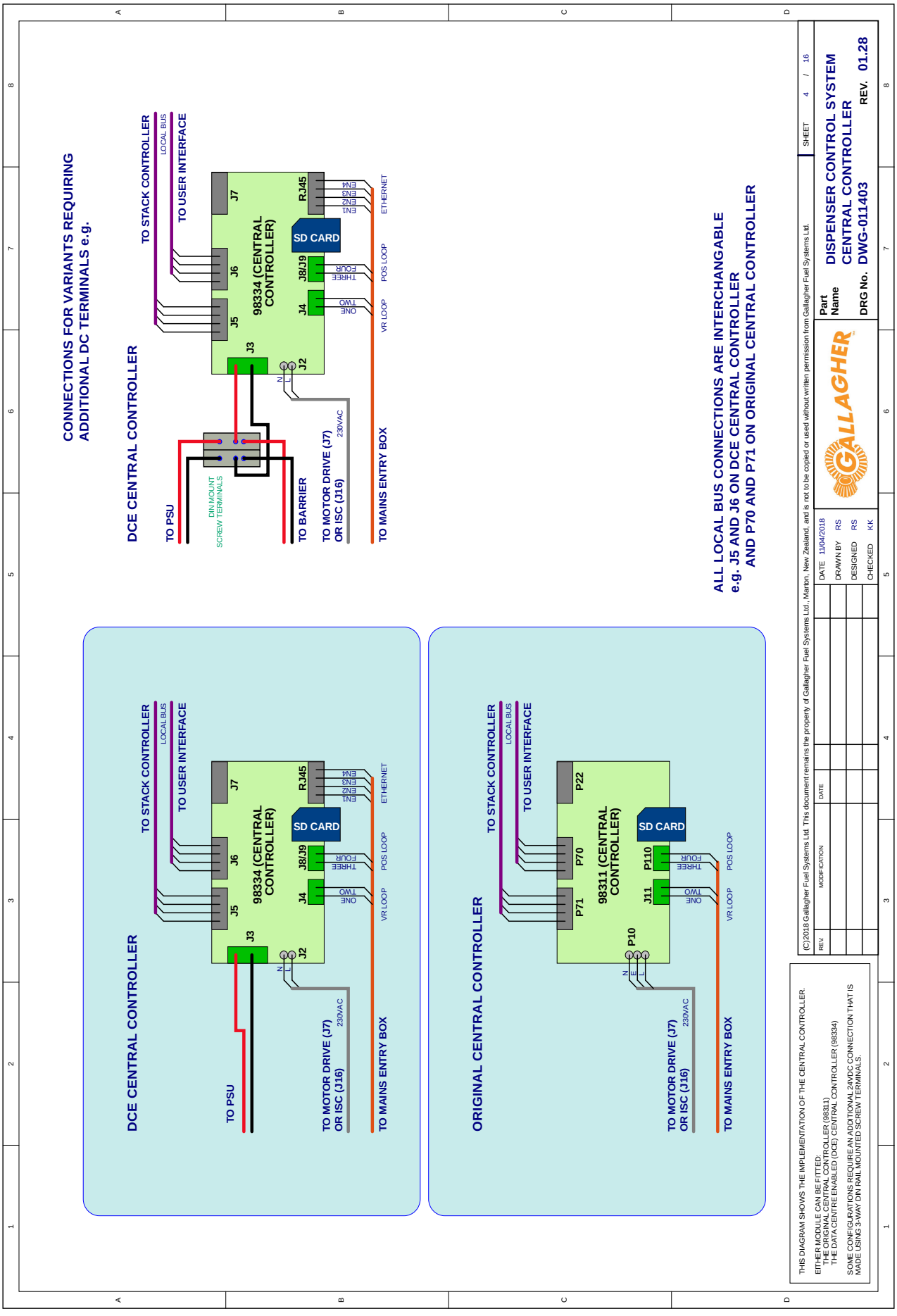


Figure 53. Central Controller

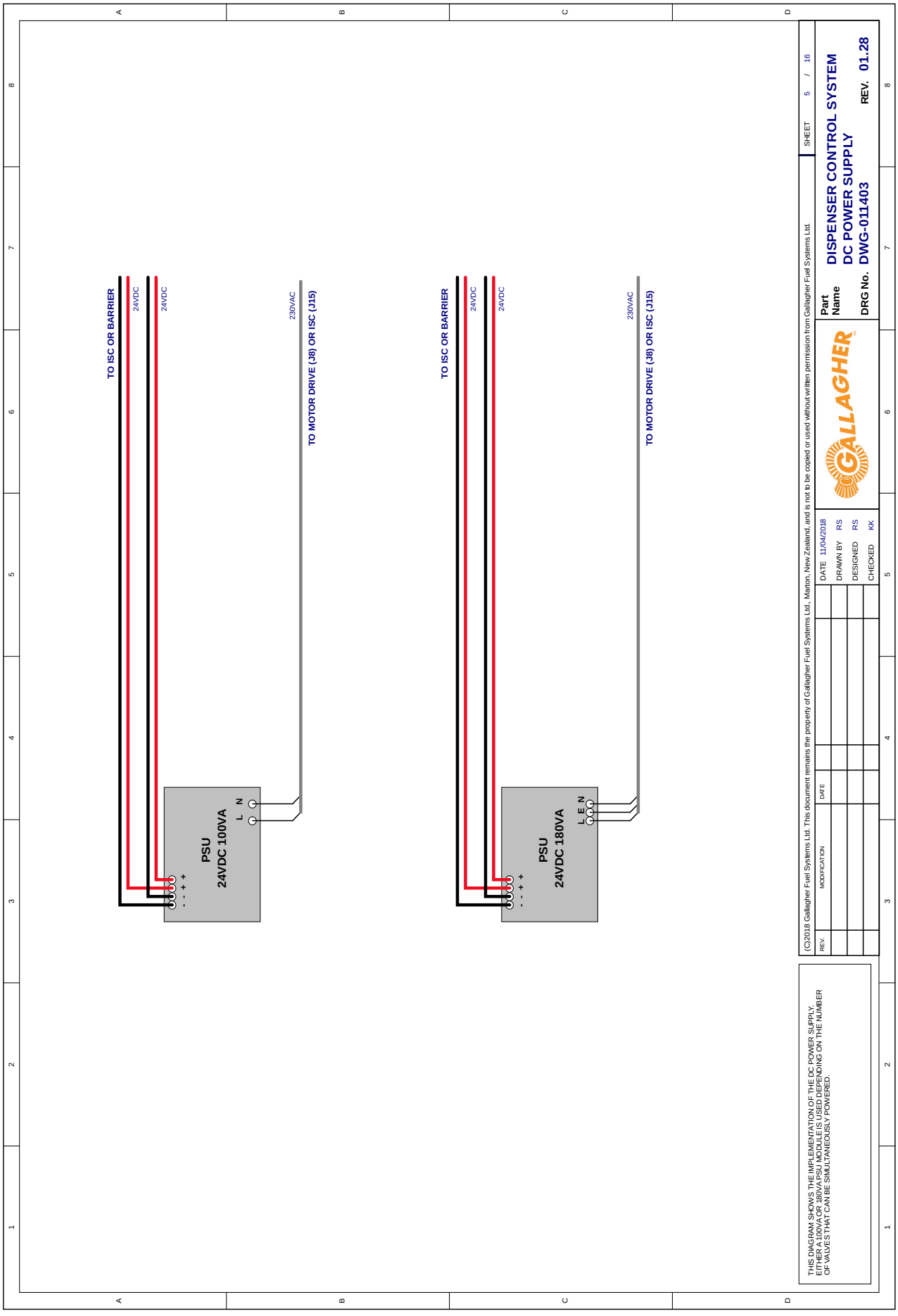


Figure 54. DC Power Supply

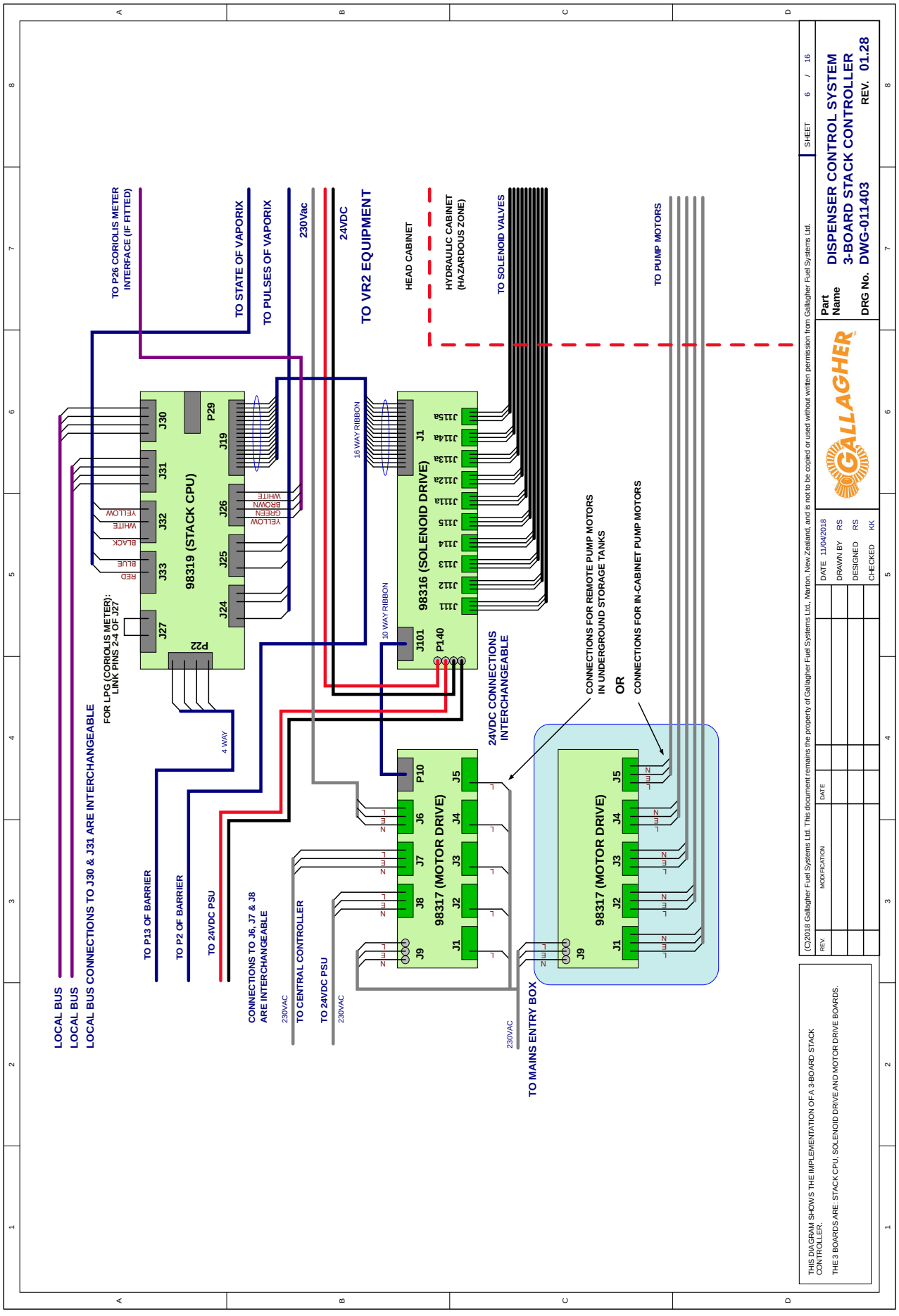


Figure 55. 3-Board Stack Controller

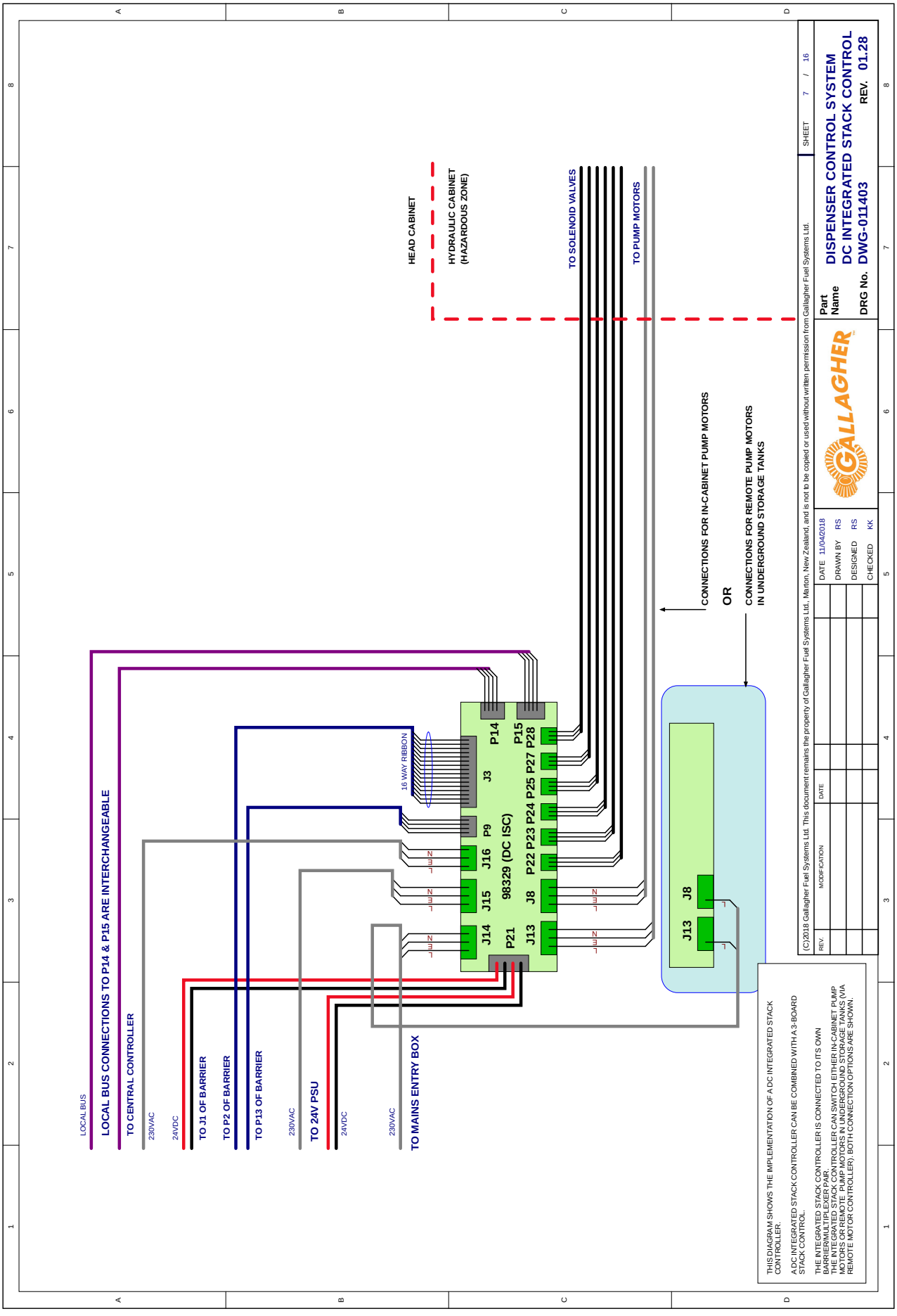


Figure 56. DC Integrated Stack Control - 1

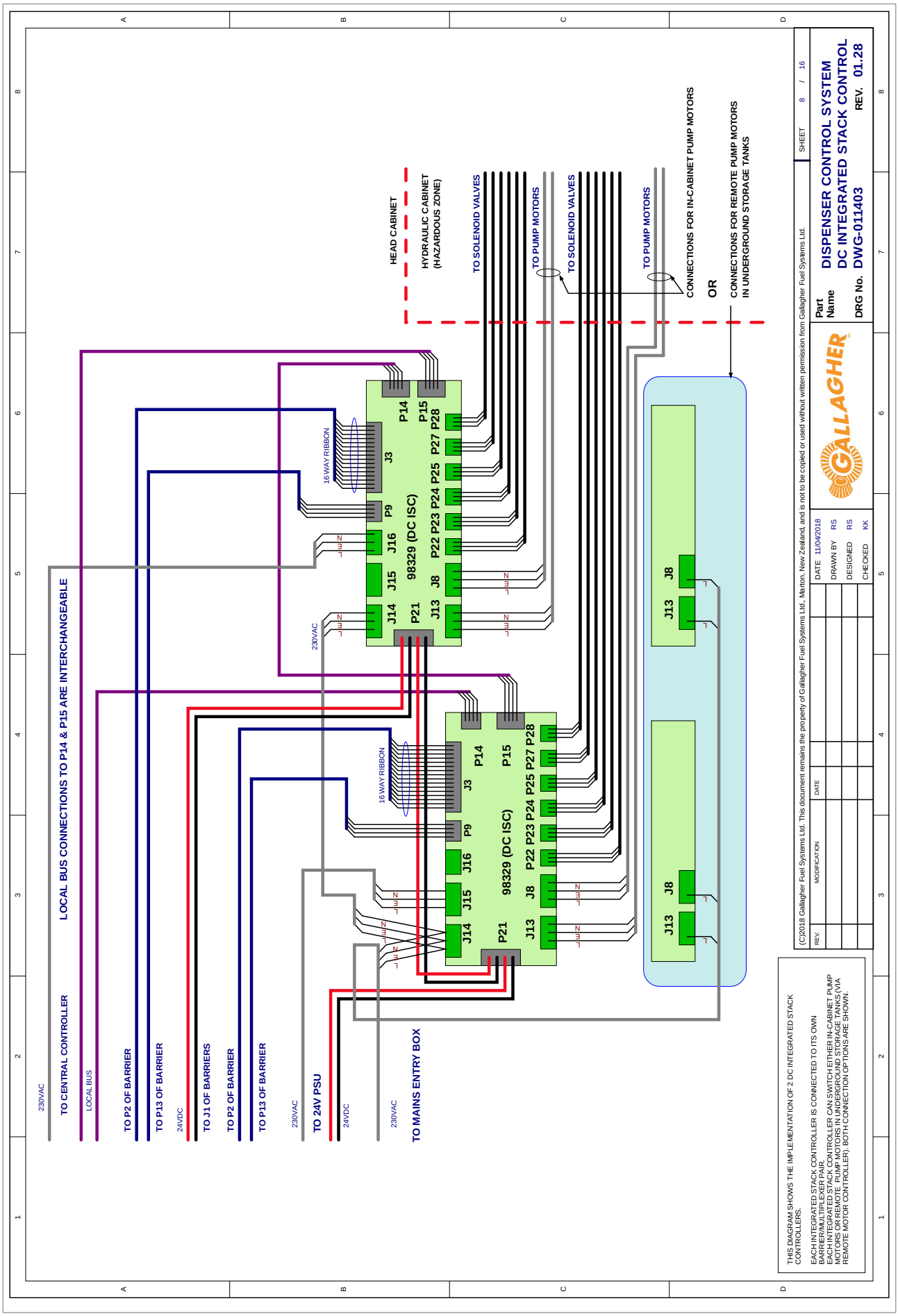


Figure 57. DC Integrated Stack Control - 2

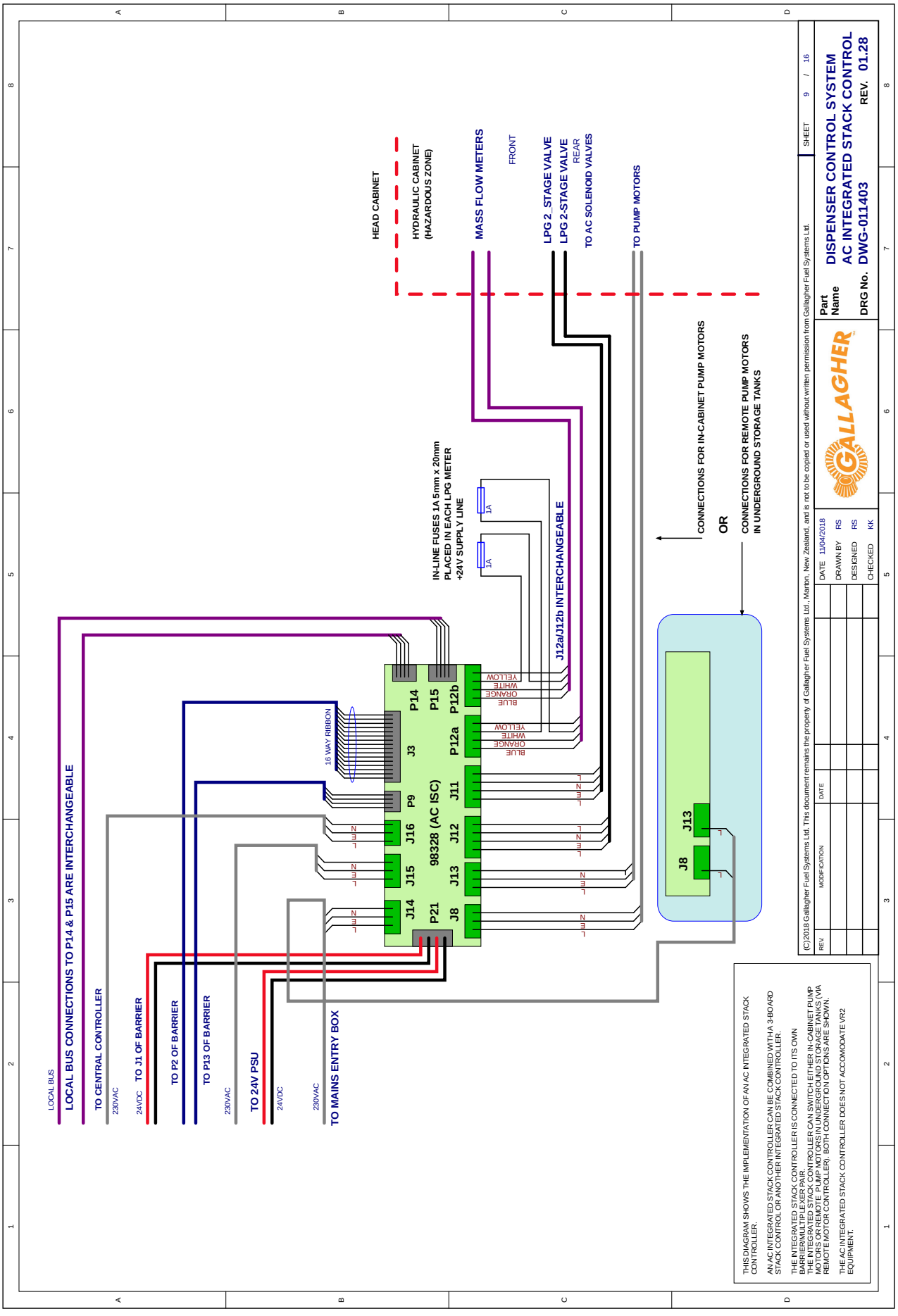


Figure 58. AC Integrated Stack Control

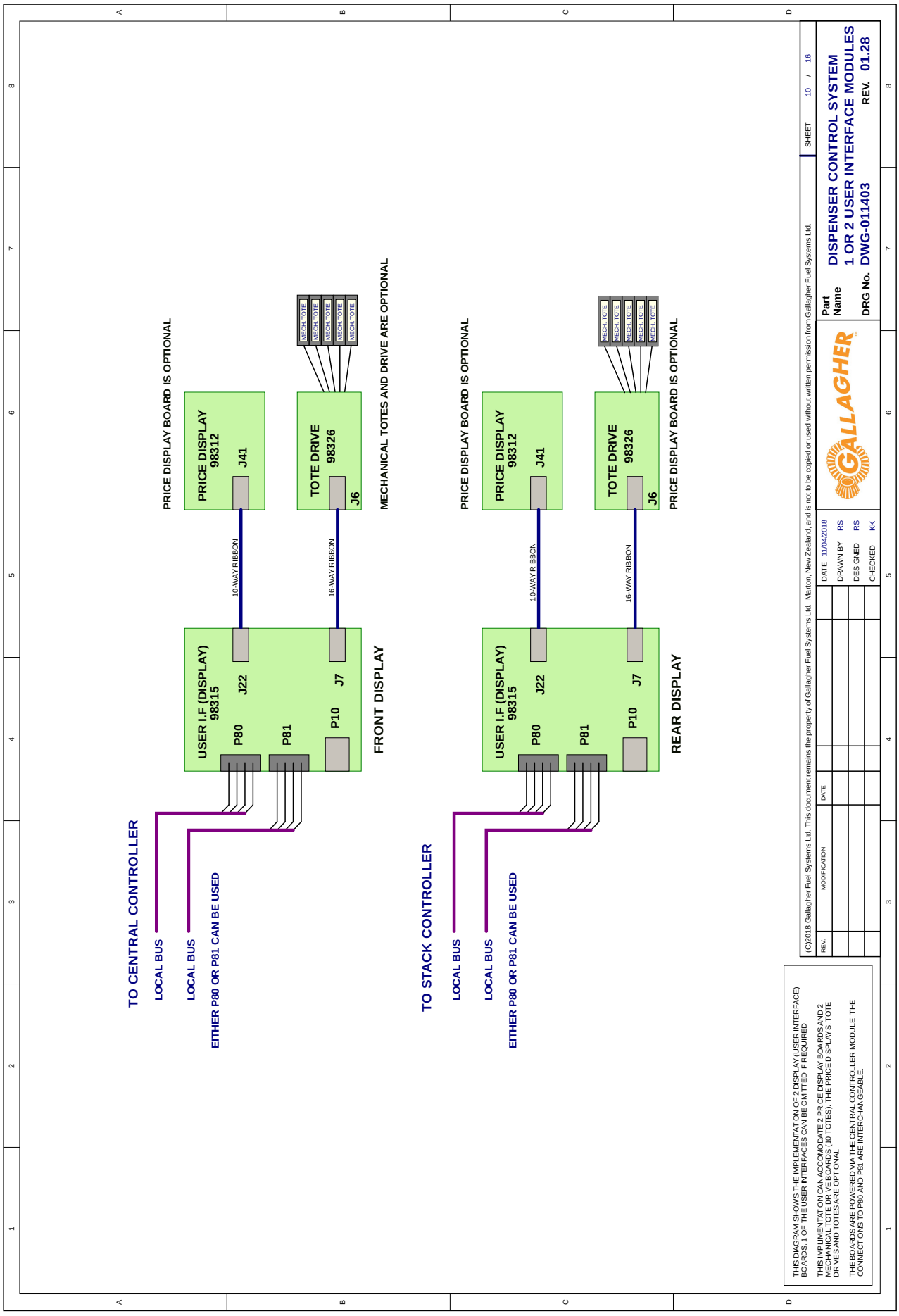


Figure 59. 1 or 2 User Interface Modules

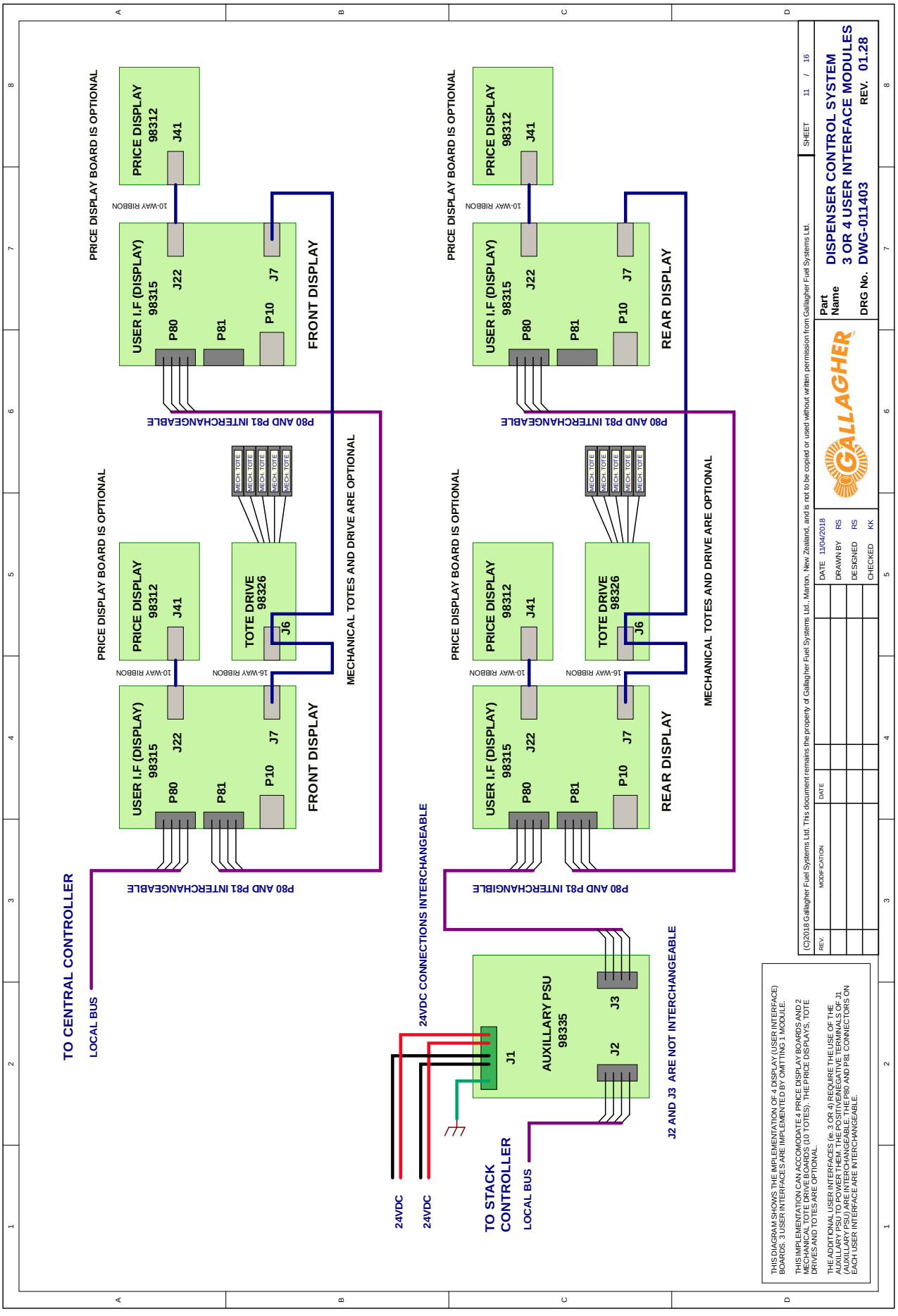


Figure 60. 3 or 4 User Interface Modules

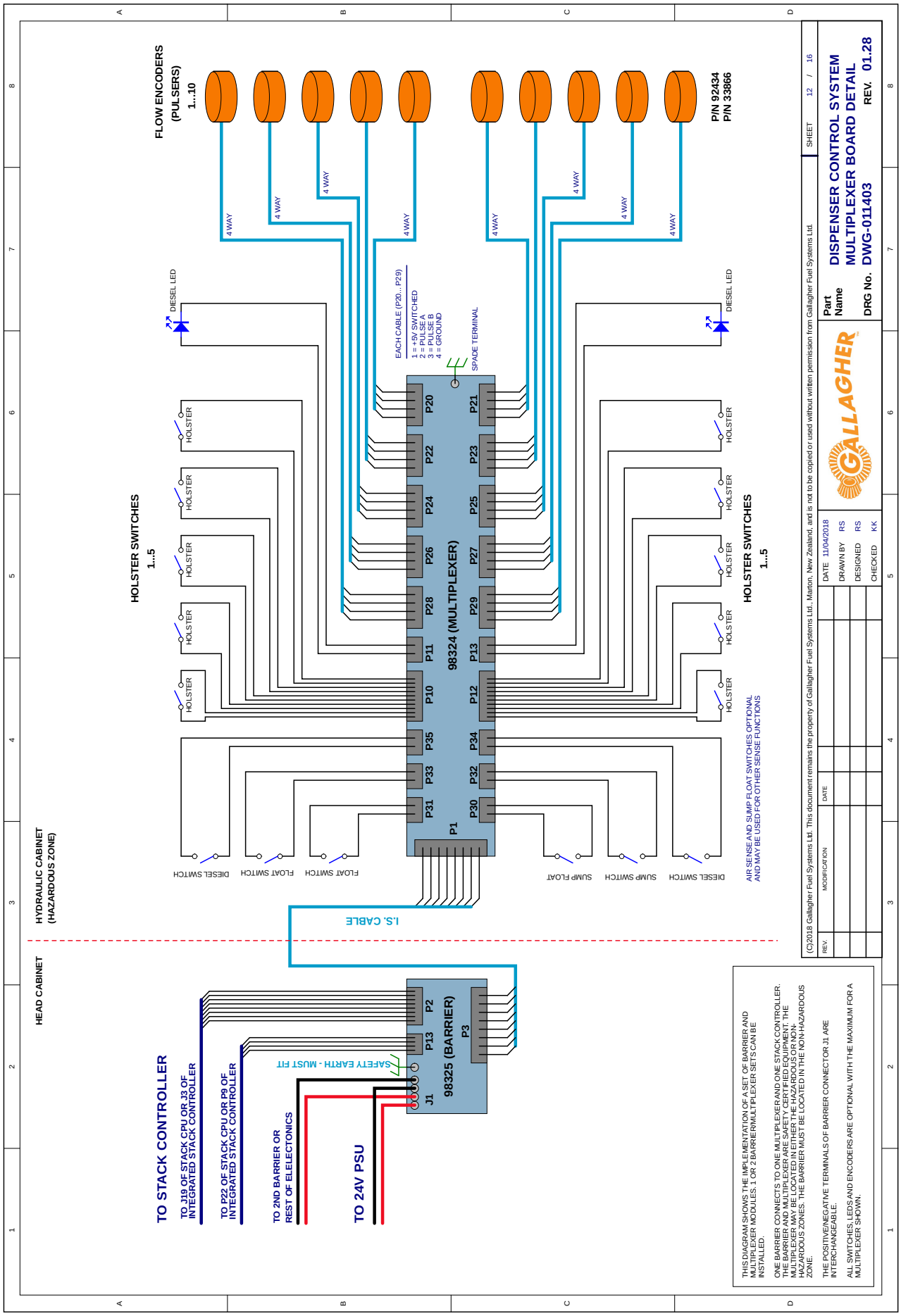


Figure 61. Multiplexer Board Detail

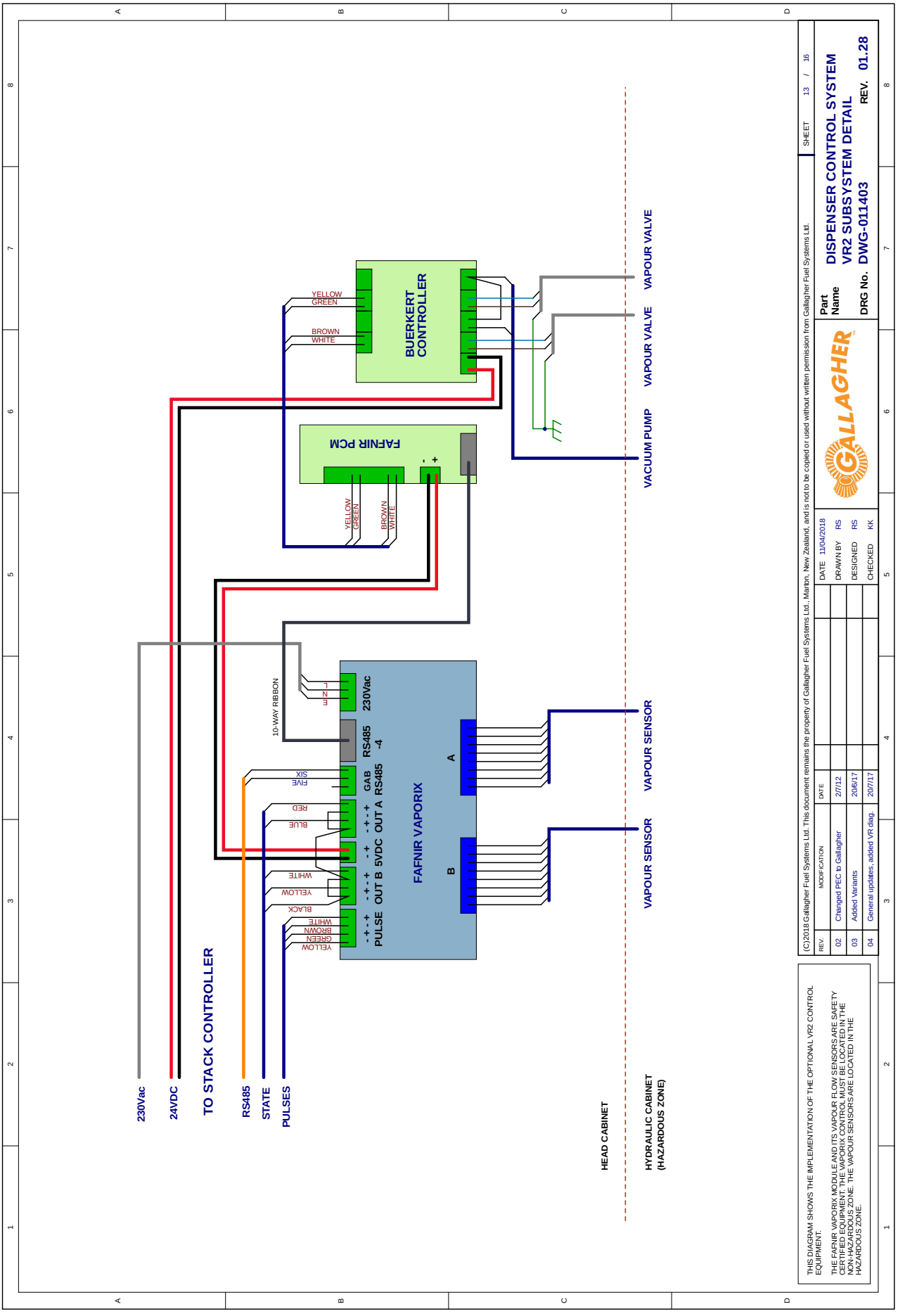


Figure 62. VR2 Subsystem Detail

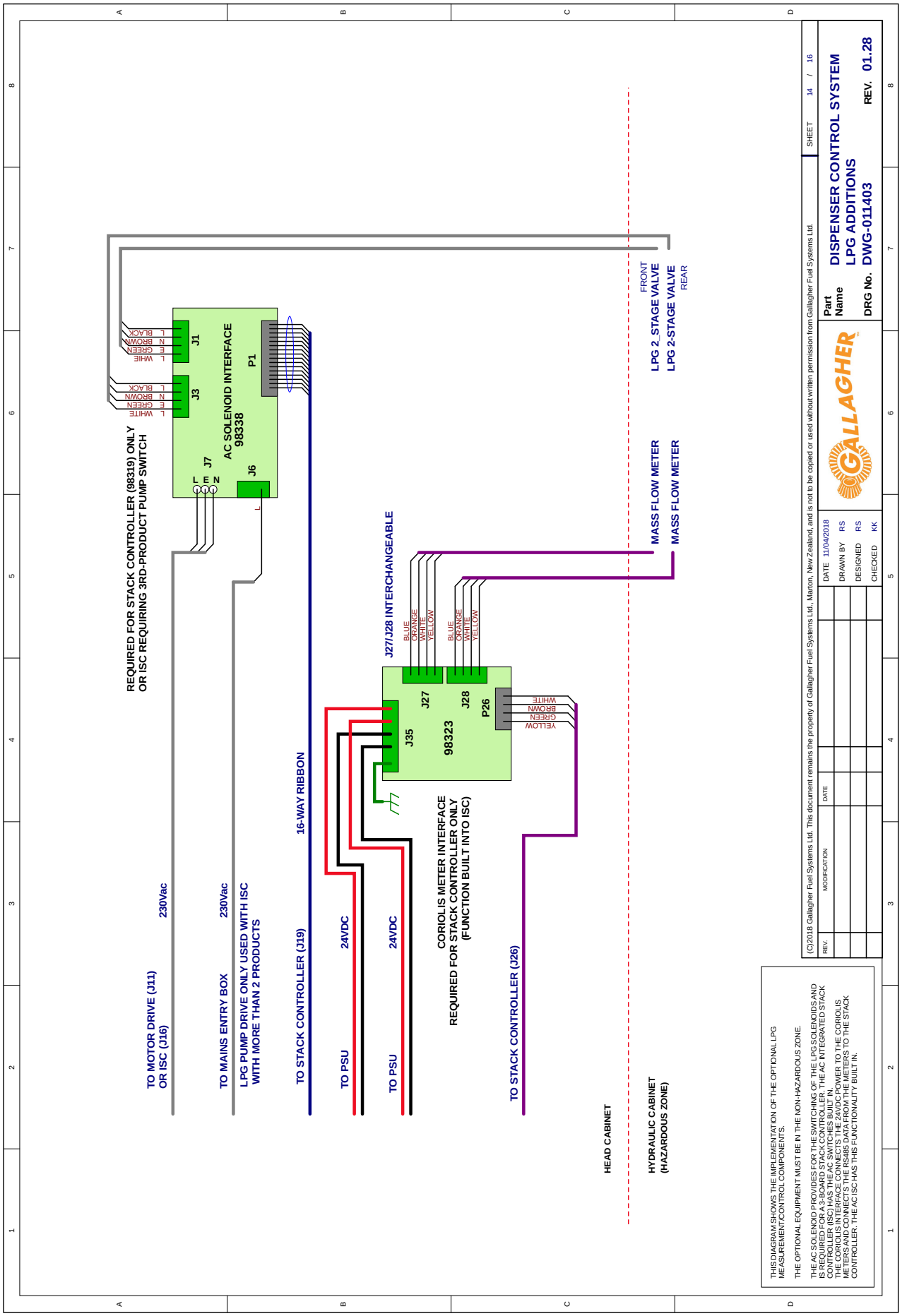


Figure 63. LPG Additions

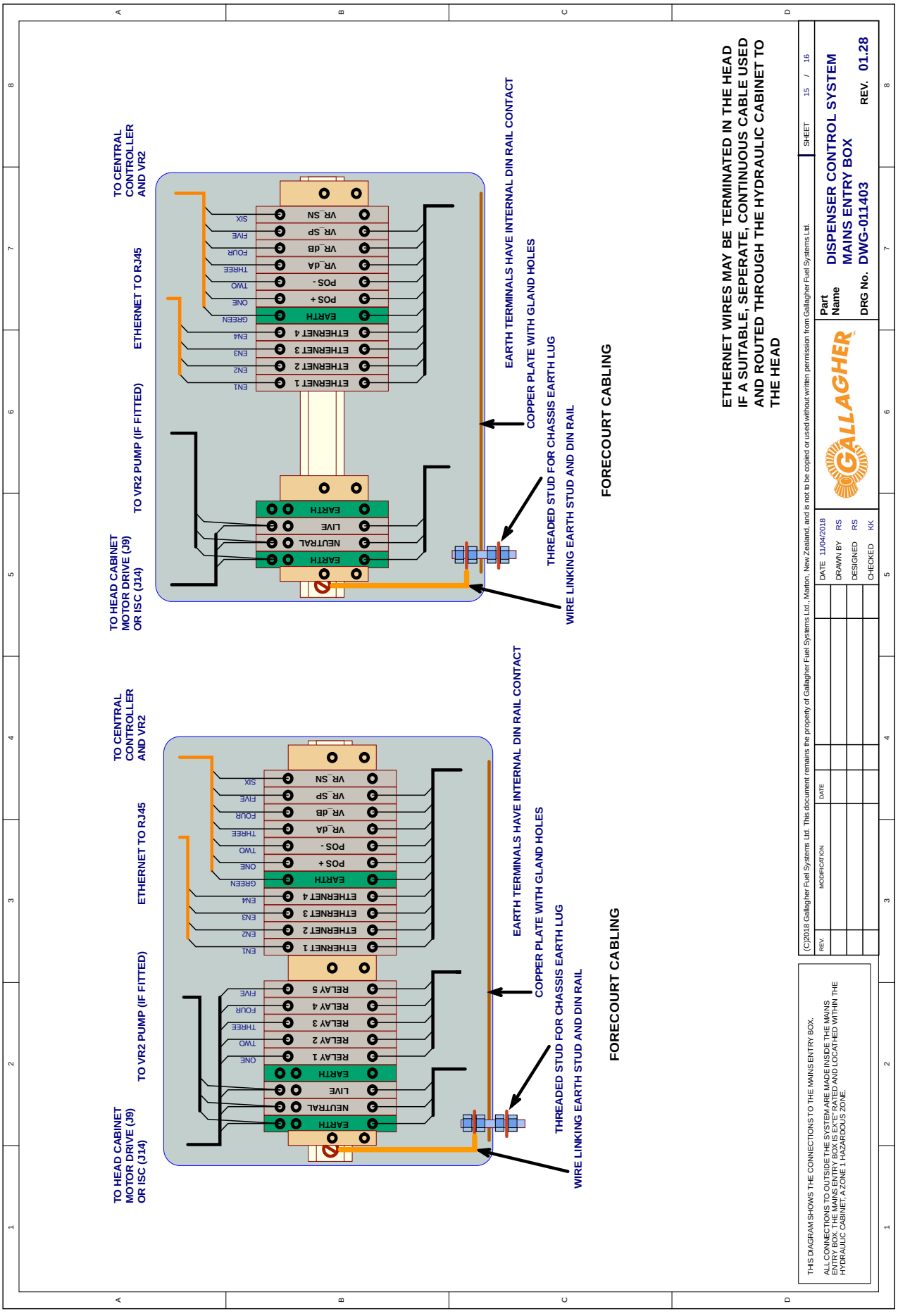


Figure 64. Mains Entry Box