

Installation, Operation and Maintenance Manual



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Weir Minerals Multiflo®

Safety Solutions for Liquid Filling

HYDRAU-FLO® FUEL FILLING SYSTEM

Installation, Operation and Maintenance Manual

Excellent
Minerals
Solutions



**HYDRAU-FLO® COMPONENTS ARE ONLY
RATED FOR THEIR INTENDED USE.**

Revision History

| Revision | Description | Reviewed | Authorised | Date |
|----------|-------------|----------|------------|------|
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1 Introduction

The purpose of this Manual is to advise and instruct installers, and operators of Weir Minerals Hydrau-Flo® Fuel Filling System regarding the recommended installation, operation and maintenance of the equipment. The following information will aid you in the installation, operation and maintenance of your new Weir Minerals Hydrau-Flo® Fuel Filling System. To ensure long life and trouble-free operation, it is imperative that the instructions contained in these manuals are read understood and carried out by all users of this product.

The Weir Minerals Hydrau-Flo® Fuel Filling System is of robust construction and is used to prevent build-up of pressure and overfilling in the fuel tank. It has been designed to be used in conjunction with the existing “fast fill” systems and also the traditional splash filling systems. The Hydrau-Flo® Valve Kits are manufactured to suit a wide range of industrial applications in the mining, oil and gas, transport, construction and maritime sectors. Configurations are designed for individual equipment needs.

Please check our website www.weirminerals.com/hydrau-flo or search YouTube® for “Hydrau-Flo®” to view the promotional animation video on how the system works.

1.1 Disclaimer

Despite of the care taken to compile all information and illustration in this document, neither the author nor the publisher can be held liable for any consequential damages resulting from possible errors in this publication.

The English language was used to write the original manual. Any versions in other languages are translation of the original manual instructions. These translated versions may contain information that differs from the original due to interpretation of the content and meaning of the original text. In the case of such discrepancies, the original English language instructions will be considered the sole authentic source for the purpose of determining the content and meaning of the text.

Weir Minerals Multiflo® reserves the right to make changes to technical and design specifications at the any time without prior notice.

1.2 Copyright

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This document is subject to copyright. Use or copying of this document in whole or part without the written permission of Weir Minerals Multiflo® constitutes an infringement of copyright.


1.3 Warranty

All Hydrau-Flo® Fuel Filling Valve components are covered with a 36 month manufacturer warranty. It is not recommended that unauthorised personnel service the Hydrau-Flo® components and may result a void of warranty. For information regarding servicing or warranty claims, please contact Weir Minerals Multiflo® on the contact details provided at the beginning of this manual.

1.4 Intended Audience

This manual is intended for:

- Personnel who have a relevant basic level of trade/professional competency.

| | |
|---|--|
|  | CAUTION |
| | <p>PERSONNEL INJURY</p> <p>The Hydrau-Flo® components must be installed and operated by personnel who are trained and have sufficient knowledge about the hazards that may occur during operations.</p> |

2 Safety

Weir Minerals Hydrau-Flo® Fuel Filling System has been designed to provide a safe working environment for operators, maintenance personnel and to be used in environmentally sensitive areas where “zero-spill” is mandatory. The instructions within this manual must be followed and carried out accordingly to ensure a safe and efficient operation.

Good, Robust Health, Safety and Environmental Systems, Process and Practices are undoubtedly an important aspect of operating safely.

- Read the instruction manual prior to installing or operation.
- Personal Protective Equipment (PPE) must be used when installing, operating, servicing, maintaining this equipment.
- It is the user's responsibility to be aware of and comply with all federal and state occupational health and safety requirements or the safety regulatory organisation having jurisdiction.
- Use trained competent people to assess all site risks involved with the installation of this equipment in accordance with the Installation and Operations Manual.
- Use the correct, safe and appropriate equipment related to the site conditions.

SAFETY WARNINGS AND PRECAUTIONS ARE PROVIDED IN THIS SECTION. FAILURE TO HEED THESE WARNINGS AND PRECATIONS MAY RESULT IN PERSONAL INJURY AND/OR DEATH TO YOURSELF AND/OR OTHERS ALONG WITH THE RESULTS OF EQUIPMENT AND ENVIRONMENTAL DAMAGES.

Living by our five key safety values and commitment to following safety procedures will enable us all to make the work place a safer environment. Our Five Key Safety Values are:

- My colleagues and my own safety are paramount;
- No task is so important or urgent that it cannot be undertaken safely;
- I will only undertake tasks that I am trained, competent and properly prepared for;
- I will never cut corners, nor take shortcuts at the expense of safety;
- I will stop the job if I believe it is unsafe to continue.

Any aspect of the installation, which the Customer is unsure of, we advise the customer to discuss with a Weir Minerals Multiflo® Representative.

2.1 Safety Symbols










The safety colours incorporated in this manual are indicated in Table 2-1. These colours serve as a guide to the associated risk with the given safety symbols.

Table 2-1: Safety Colours

| Signal | Warning Level | Description |
|----------------|---------------|--|
| DANGER | Danger | Indicates a hazard with high level of risk which, if not avoided, could result in death or catastrophic equipment damage. |
| WARNING | Warning | Indicates a hazard with a medium level of risk which, if not avoided, could result in serious or moderate injury, or serious equipment damage. |
| CAUTION | Caution | Indicates a hazard with a low level of risk which, if not avoided, could result in moderate or minor injury, or moderate equipment damage. |
| NOTICE | Notice | Indicates important information for the user. |

The accompanying documentation supplied with the Weir Minerals Hydrau-Flo® Fuel Filling System utilises the following safety symbols listed in Table 2-2 to highlight potential harmful situations to personnel, equipment and the environment as per ISO 9001:2008.

Table 2-2: Safety Symbols

| SYMBOL | DEFINITIONS | CONSEQUENCES |
|---|---|--|
|  | <p>Imminent risk of fatal or crippling injuries</p> | <p>Fatal or crippling injuries likely to result from any exposure.</p> |
|  | <p>Possibility of a harmful situation</p> | <p>Minor or slight injuries possible.</p> |
|  | <p>Mandatory Instructions</p> | <p>Failure to follow may lead to fatality, injuries or damage to property and environment.</p> |
|  | <p>Prohibited activities</p> | <p>Possible damage to the product, equipment's or property.</p> |
|  | <p>Warning of Electrical shock</p> | <p>Fatal or crippling injuries likely to result from any exposure.</p> |
|  | <p>Mandatory Personal Protective Equipment's</p> | <p>Fatal or crippling injuries likely to result if not worn.</p> |
|  | <p>Explosion Warning</p> | <p>Possibility of explosion if instructions not followed.</p> |
|  | <p>Application Hints and other useful Information</p> | |
|  | <p>Refer other</p> | <p>User has to refer accompanying manuals or other documents.</p> |

2.2 General Safety

Use of the Hydrau-Flo® Components for an application in an environment other than defined at the time of purchase is strictly prohibited and can result in a hazardous situation. The Hydrau-Flo® Components may only be installed and operated by persons who are competent and are aware of the dangers of working with it.

These instructions are intended to facilitate familiarisation with the product and its permitted use. Operating the product in compliance with these instructions is important to help ensure reliability in service and avoid risks. These instructions may not take into account local regulations. It is the responsibility of the purchaser of the product to ensure such regulations are observed by all, including those installing the product. Always coordinate repair activities with operations personnel and follow all plant safety requirements, applicable workplace health and safety laws and regulations. The equipment must not be put into service until all the conditions relating to workplace health and safety in the instructions are met.

Information in these user instructions is believed to be reliable. Despite of all the efforts to provide correct and necessary information the content of this manual may appear insufficient and is not guaranteed as to its completeness or accuracy.

It is not permitted to make changes to the Hydrau-Flo® components without permission from Weir Minerals Multiflo®. If any changes are made to the product without permission, Weir Minerals Multiflo® disclaims all liability.

2.3 Qualified Workers

All personnel involved in the installation operation and inspection of the Hydrau-Flo® Components must be qualified to carry out the work involved. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided by a suitable qualified trainer.

If required, the operator may engage the manufacturer/supplier to provide applicable training.

Always coordinate repair activities with operations and workplace health and safety personnel and follow plant safety requirements and applicable workplace health and safety laws and regulations.

2.4 Safe Working

All standard safety precautions for such equipment must be followed before and during installation, operation, and maintenance. Drain the fuel tanks and isolate pipework before installation. The appropriate workplace health and safety precautions must be taken. All metal mating faces must be cleaned of dirt, rust, paint and other adhering substances prior to installation. Failure to clean parts can affect installation and running clearances and could lead to premature failure of parts.

2.5 Safety Equipment

The correct safety equipment (PPE) and safety instructions must be carried out accordingly in assigned areas. It is the User's responsibility to carry out assigned safety rules. If any incidents/accidents occur due to unsafe act the User's held liable for all cause and responsibilities.

2.6 Risks


It is the User's responsibility to perform the risk analysis specific to the application of the site working conditions.

It is the User's responsibility to understand all the inherent risks and consequences involved during Installation, Operation & Maintenance procedures and take necessary precautions against such risks.

Adequate safety measures **MUST** be taken before performing any operation.

2.7 Operating Conditions

The standard filling temperature recommendation is -65°C to +45°C. If the operating range is outside the recommended operational range, contact Weir Minerals Multiflo® for more information.

| | |
|---|---|
|  | CAUTION |
| | <p>FAILURE DUE TO OPERATING CONDITIONS</p> <p>If the Hydrau-Flo® Components are operated outside the recommended temperature range it may cause mechanical failure leading to safety issues.</p> |

2.8 Material Safety Data Sheets

Material safety datasheets document the information on the properties of hazardous materials and how they may affect Workplace Health and Safety. Material safety data sheets include information on the; identification of the chemical, health hazards, safe storage and handling procedures, emergency information and disposal procedures.

Weir Minerals Multiflo® Hydrau-Flo® Components are produced with a range of materials and operate with a range of chemicals. For specific material safety datasheets relating to the Hydrau-Flo® Components, please contact Weir Minerals Multiflo®.


2.9 Intended Use of the Product

It is the User's responsibility to ensure that Hydrau-Flo® Components as a whole are not used for any other purpose other than the intended usage mentioned in this manual. The procedures followed must be in line with the technical data and instructions provided in this manual.

It is forbidden to physically modify any Hydrau-Flo® Components. Weir Minerals Multiflo® does not take responsibility if they are used after such modifications. If the conditions of service on the purchase order are going to be changed, it is requested that the user seek the manufacturer's agreement before use.

2.10 Unintended Use of the Product

Hydrau-Flo® Components must only be used for applications that are listed in the intended use section of this manual. It is not permitted to use these components for any applications and/or field of activity other than that for which the components were originally specified.

| | |
|---|--|
|  | CAUTION |
| | <p>Weir Minerals Multiflo® is not responsible for incorrect use of the Hydrau-Flo® Components.</p> |

2.11 Warranty

If within a period of 36 months from the date of delivery (“warranty period”) the Equipment is found to be defective in materials or workmanship, or do not conform to any applicable drawings and specifications approved in writing by Weir Minerals Multiflo® do not perform in accordance with the current applicable water performance curves supplied as part of the Weir quotation or published by Weir as at the date of the quotation (within the tolerances specified in applicable Australian Standards), then Weir will, at its option, either repair or provide replacement parts or Equipment provided that:

- a) Purchaser has given written notice to Weir of any alleged defect within the warranty period;
- b) Purchaser has provided Weir a reasonable opportunity to perform all appropriate tests on the Equipment;
- c) The defective Equipment or parts are promptly returned to a designated Weir service centre. Any defective Equipment or parts replaced will become Weir property and the repaired or new Equipment or parts will be delivered free to Purchaser’s site; and
- d) No warranties are given by Weir as to the performance of components other than in a test facility designated by Weir.

For repaired Goods, excluding rubber lining, the warranty period is 6 months from the date of repair and shall only apply to Goods or parts repaired or replaced by Weir. No separate warranty shall apply to repair Goods as a whole or to parts not repaired or replaced by Weir. This warranty does not apply to repair of rubber

The warranties given by Weir above do not cover:

- a) Fair “wear and tear”, or failures or damage not reported to Weir within the warranty period;
- b) Failures or damage due to misapplication, abuse, improper installation or abnormal conditions of operation;
- c) Failures or damage due to operation, either intentional or otherwise, above or below rated capacities or in an otherwise improper manner;
- d) Failures or damage resulting from Goods which have been in any way tampered with or altered by anyone other than an authorised representative of Weir;
- e) Goods damaged in shipment or without the fault of Weir;
- f) Failures or damage resulting from the incorporation of, or failure of, non-Weir manufactured or supplied parts in the Goods; or
- g) Repairs to rubber lining.

Weir does not warrant any equipment or other goods of other manufacturers which is designated by Purchaser or purchased by Weir for resale to Purchaser either separately or as a part of or operating in conjunction with equipment or other goods manufactured by Weir. For such equipment or other goods, Purchaser must rely on the warranty given by the manufacturer of the equipment or other goods.

When Weir supplies Services to Purchaser including laboratory testing, process development, equipment selection, design (as part of design and manufacture), detail, contract supervision and contract management, Weir shall exercise due care and skill in undertaking such Services. Weir’s total liability under any contract shall in no event exceed the total price of the Goods and/or Services supplied.

If any term, condition, guarantee or warranty is implied by law, including the Australian Consumer Law, which cannot be excluded or modified, then the term, condition, guarantee or warranty shall be deemed to be included and the exceptions and limitations do not apply to such term, condition, warranty or guarantee, provided that Weir’s liability for a breach of or failure to comply with any such term, condition, warranty, or guarantee (other than a guarantee under sections 51, 52 or 53 of the Australian Consumer Law) including any consequential loss which the Purchaser may sustain, shall be limited, at the option of Weir, to either replacing or repairing the Goods or, in the case of Services, to supplying the Services again.

All conditions, warranties, terms, undertakings, representations, guarantees and obligations, not expressly set out in any written contract, whether arising under statute, common law, equity, custom, trade usage or otherwise (including without limitation, any implied condition, warranty, term, representation or guarantee as to the correspondence of the Goods or Services with any contract description or as to merchantable quality, fitness for any purpose or safety of the Goods or Services, or operating performance where such performance is conditional on empirical factors or on the whole installation or on the individual or overall operation or on the skills of an operator), whether made known or not and any liability of Weir to compensate or indemnify any person or persons in respect of the foregoing, are expressly negated and excluded;

In no event shall Weir be liable for any special, indirect, consequential, incidental or punitive losses or damages whether in contract, tort (including without limitation negligence), equity, under statute or on any other basis, and whether or not such loss or damage was foreseeable. The term "consequential damages" shall include, but not be limited to, economic loss including loss of actual or anticipated profits, business interruption, loss of use, revenue, reputation and/or data, .increased cost of working, loss or damage to equipment or other property, and liabilities of Purchaser to its customers or third persons.

The owner of the products at all times is responsible for the correct installation and operation of the components as prescribed in this manual. To establish that the products have been serviced and maintained as per the supplied instructions, the owner is required to provide a complete service history in writing for the components. Refer to the commissioning and maintenance check lists in this manual. Failure to comply with these requirements could result in the warranty being void.

If a defect is detected, it is the responsibility of the owner to take appropriate action to stop using the components and/or decommission it. The defect must be reported to the manufacturer directly. It is recommended that the owner documents evidence in regards to the date in which the defect has been reported. Furthermore warranty claims can only be considered and approved by Weir Minerals Multiflo®. For further information on warranty and warranty claims please contact Weir Minerals Multiflo®.

3 Description

This section shall detail the technical description and specifications for the Product.

3.1 Hydrau-Flo® Fuel Filling Valve

The Hydrau-Flo® valve system is a safer, cleaner and more reliable fuel filling valve arrangement which removes the risk of overfilling, spillage and tank rupture while minimising safety and environmental hazards associated with fuel transfer. With flow rates up to 1,000 litres/min (265 gallons/min) and pressures up to 100 kilopascals (20 psi), it is imperative to provide safer solutions for fuel filling. Hydrau-Flo® Fuel Filling Systems offer superior operator protection and improved environmental outcomes.

The Hydrau-Flo® Fuel Filling System overcomes the traditional fuel transferring problems without the need for electronics or complex arrangements prone to blockage and failure. It incorporates robustly designed fuel filler safety valves and float control valves to provide a reliable, hydraulically operated arrangement which depends on fluid level rather than pressure. The system is designed to be used in conjunction with existing “fast fill” systems or traditional “splash” filling.

Advantages of using Hydrau-Flo® Valve are:

- Prevents overfilling, fuel spillage and wastage
- Removes the risk of tank rupture due to pressure build up during and after filling
- Minimises the risk of fire as a result of fuel spillage
- Reduces costs associated with fuel wastage and equipment damage
- Significantly improves safety and environmental outcomes
- Reduces fuel theft.

3.2 Working Principle

The system consists of fuel filling valve, a float valve and a pilot line. The Hydrau-Flo® valve is activated via fuel level, not the contained fuel pressure unlike traditional systems.

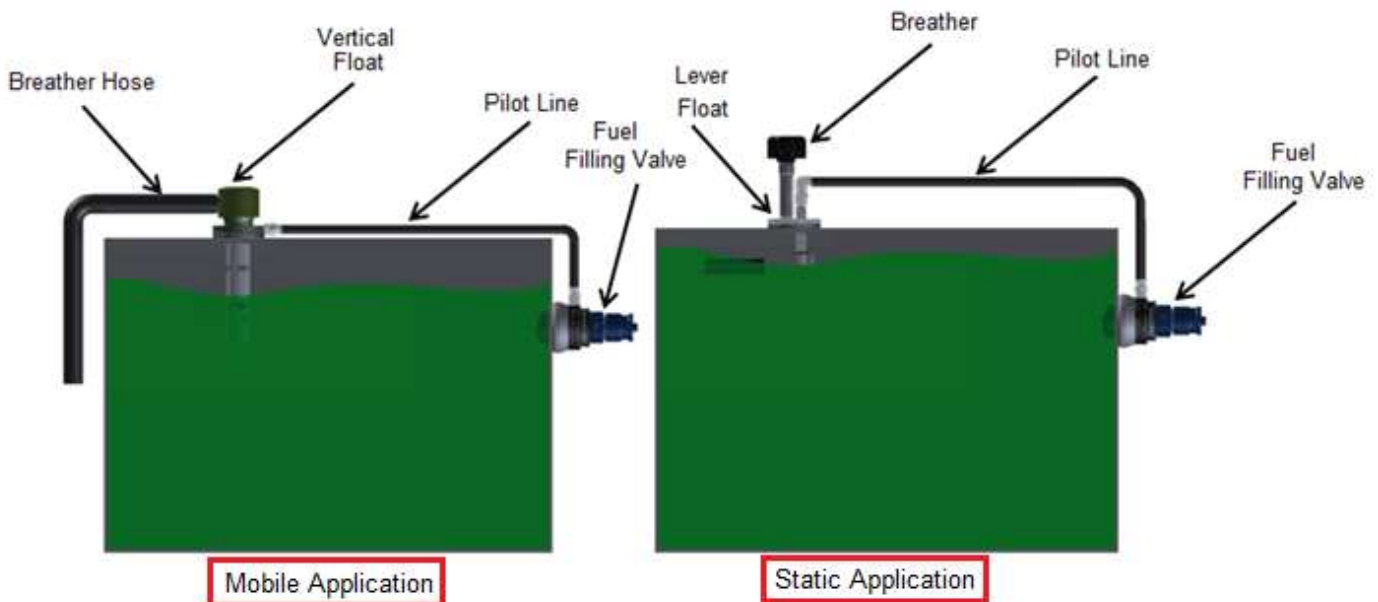


Figure 3-1: Working Principle of a Mobile and Stationary Fuel Filling Set-up

Fuel enters the system through a “fast fill” receiver and into the Hydrau-Flo® valve body. Fuel pressure forces the shut-off piston open against spring pressure, allowing fuel to flow through the porting into the fuel tank. An orifice in the piston also allows a metered amount of fuel to bleed off through a capillary line to a float valve located in the tank. This creates a pressure drop under the piston.

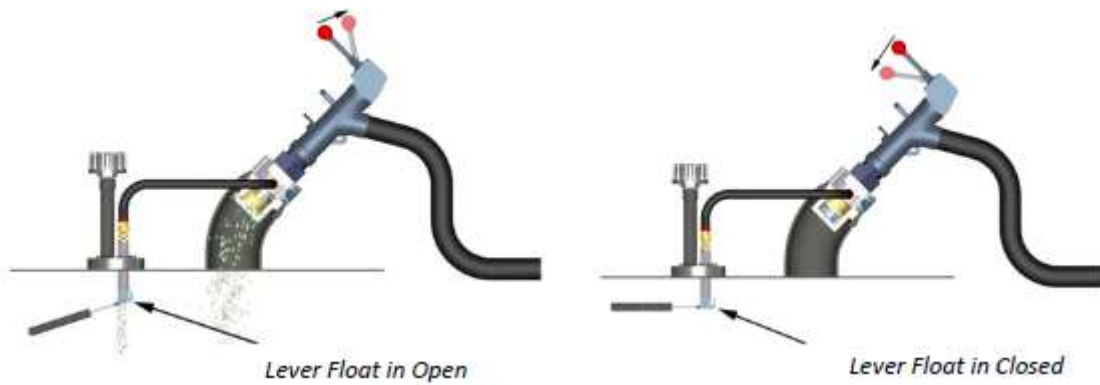


Figure 3-2: Operation of Hydrau-Flo® Fuel Filling System (Vertical Float Not Shown)

When the fuel level in the tank rises and closes the float valve, thus stopping the bleed and pressure leak, the fuel pressure is equalised on both sides of the piston. Spring pressure will force the piston back to close the fuel ports, preventing any extra fuel from entering the fuel tank.



NOTICE

The fuel nozzle cannot be overridden as no matter what the pressure of the fuel trying to open the piston is, it will always be higher under the piston due to the addition of spring pressure.

By preventing over filling above the pre-set float level in the tank, an air space is maintained to allow for fuel expansion (due to temperature rise) and thus prevent the possibility of fuel weeping through the air vents.

3.3 Hydrau-Flo® Configurations



NOTICE




Hydrau-Flo® fuel filling valves and float control valves are available in different configurations, designed to suit various mobile and stationary applications, majority of equipment types and filling requirements.

3.3.1 Hydrau-Flo® Range of Fuel Fillings Valves

Table 3-1: Fuel Filling Valves

| Fuel Filling Valve (FFV) | Description: | Reference Image: |
|---|---|------------------|
| Black FFV HF1105Z0001 1000 Lpm 264 USgpm (3" NPS Valve Mount) | The standard Hydrau-Flo® fuel filling black valve is ideal for all new equipment applications and existing equipment that has suitable fittings. The compact design delivers the highest flow rate capacity in the range. | |
| Red FFV HF1105Z0002 800 Lpm 211 USgpm (2" NPT Male Valve Mount) | The retro fit Hydrau-Flo® fuel filling red valve is designed to fit into tanks using the Wiggins® ZNC3 recess. These are typically used on CAT® 776 and 773 trucks. | |
| Blue FFV HF1105Z0003 800 Lpm 211 USgpm (2" NPT Male Valve Mount) | The most commonly used retro fit Hydrau-Flo® fuel filling valve is the blue valve which fits directly into truck and loader fuel tanks using the same thread (2" NPT) as the conventionally used dry break fittings (which are screwed back into the Hydrau-Flo® fuel filling valve). These valves fit into typical CAT® and Komatsu® fuel tank recesses. | |
| Blue FFV HF1105Z0004 650 Lpm 171 USgpm (1½"NPT Male Valve Mounting) | The 1½" version of the Hydrau-Flo® fuel filling blue valve has being designed for the compact machinery market and underground applications where 1½" NPT mounting are required. Stainless steel versions are also available for underground coal mining applications. | |

Table 3-1: Fuel Filling Valves Continued

| Fuel Filling Valve (FFV) | Description: | Reference Image: |
|---|---|---|
| <p>Gold FFV HF1105Z0006 80 Lpm 21 USgpm (1" NPT Male Valve Mounting)</p> | <p>This Hydrau-Flo® fuel filling gold valve has been designed to fit into compact installations which make it suitable for the bonded fuel tank market where space limitations apply.</p> |  |
| <p>Gold FFV HF1105Z0007 800 Lpm 211 USgpm (2" NPT Male Valve Mounting)</p> | <p>This Hydrau-Flo® fuel filling gold valve has been designed to fit into compact installations which make it suitable for the bonded fuel tank market where space limitations apply.</p> |  |
| <p>Orange FFV HF1105Z0010 1500 Lpm 396 USgpm (4" NPT Male Valve Mounting)</p> | <p>This Hydrau-Flo® fuel filling orange valve has been designed for high flow rate filling applications.</p> |  |

3.3.2 Hydrau-Flo® Float Control Valves





| | |
|---|---------------|
|  | NOTICE |
| <p>Hydrau-Flo® float control valves are connected to the fuel filling valve via a pilot line. It contains a float which rises up and stops the bleed and thereby making the spring backed piston in the filling valve to close and stop filling the tank. The valves are available for both stationary and mobile applications. These floats and lever floats can be set at varying heights, by simple extensions to control the level of fuel in the tank when it is full. This float can purge 32cfm of air from the tank while refuelling at 1000 Lpm (265 USgpm).</p> | |

Table 3-2: Float Control Valves

| Float Control Valve (FCV) | Description: | Reference Image: |
|--|---|---|
| <p>Standard FCV HF1008Z0001 1000 Lpm 264 USgpm (2" NPT Male Valve Mounting)</p> | <p>The Hydrau-Flo® float control valve has a robust design for use on mobile equipment which ensures reliable pilot operation of the Hydrau-Flo® fuel filling valve. It also incorporates roll over shut off protection and an anti-surge fuel breather vent to prevent spillage that can occur as a result of vehicle motion when using "conventional" valves.</p> |  |
| <p>Standard FCV HF1008Z0009 1000 Lpm 264 USgpm (1½"NPT Male Valve Mounting)</p> | <p>The standard Hydrau-Flo® float control valve is now available in a 1½" NPT mounting option.</p> <p>This has being designed for the compact and underground fuel markets where 1½" NPT mounting are required.</p> |  |
| <p>Standard FCV with Breather Option HF1008Z0007 (Std) HF1008Z0008 (Short) 1000 Lpm 264 USgpm (2" NPT Male Valve Mounting)</p> | <p>The newest edition to the Hydrau-Flo® float control range is the float control valve with breather option that is capable of environmental filtering to 3µm while filling the tank at 1,000Lpm. The integrated breather has been engineered on request from major OEM's looking to further enhance diesel engine life in dusty environments. This float control valve is also available with a shorter option.</p> <p>The breather retains all the original anti-surge functions of the standard green float control valve but has additional check valves built into the design to allow venting at 1,000Lpm and one way breathing to prevent any contaminants from being drawn into the fuel tank. For existing systems the float control valve is able to be retrofitted without removing the original valve from the fuel tank, providing a cost effective solution to upgrade your existing Hydrau-Flo® system.</p> |  |



3.3.3 Hydrau-Flo® Anti-Surge Breathers



NOTICE

The Hydrau-Flo® anti-surge breather with filter option is used in the same applications as the original anti-surge breather but provides the benefits of filtered air to prevent fuel contamination.

Table 3-3: Anti-Surge Breathers

| Anti-Surge Breathers (ASB) | Description: | Reference Image: |
|---|---|---|
| <p>Standard ASB HF1008Z0002 1000 Lpm 264 USgpm (2" NPT Male Valve Mounting)</p> | <p>The standard anti-surge breather has the same functions as float control valves including rollover protection and fuel anti-surge.</p> |  |
| <p>ASB with Filter Option HF1008Z0010 1000 Lpm 264 USgpm (2" NPT Male Valve Mounting)</p> | <p>The anti-surge breather with filter option has the same functions as the float control valves including the rollover protection. It also provides filtered air to prevent fuel contamination. This unit is capable of environmental filtering up to 3 microns.</p> |  |

In the normal vertical position, the weight of the vent float compresses the spring and the porting to the atmosphere is un-obstructed. As the assembly starts to tilt, the effective weight of the vent float against the spring decreases and the spring starts to raise the float and closes off the vent porting well before the diesel fuel reaches the open vent porting. As the assembly continues to tilt, the weight of the diesel fuel too holds the float to be closed against the vent port. The positive sealing provided with an O-ring ensures no leakage whatsoever.

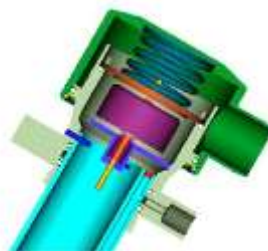


Figure 3-3: Roll Over Protection

3.3.4 Hydrau-Flo® Lever Float Control Valve





| | |
|--|---------------|
|  | NOTICE |
| <p>The lever control valve is typically used on stationary equipment including skid mounted pump sets, generators and lighting plants. The simple and robust design provides a lower cost option for stationary equipment and is available in two different lengths.</p> | |

Table 3-4: Lever Float Control Valve

| Lever Float Control Valve (LFCV) | Description: | Reference Image: |
|--|--|---|
| <p>Standard LFCV HF1007Z0001 (110mm Stem) HF1007Z0002 (250mm Stem) 1.5 bar Working Pressure (7/8" UNF Mounting Stem)</p> | <p>Available for stationary equipment only, such as; skid mounted pump sets, generators and lighting plants.</p> |  |
| <p>Standard LFCV HF1007Z0003 (110mm Stem) HF1007Z0004 (250mm Stem) 20 bar Working Pressure (7/8" UNF Mounting Stem)</p> | <p>Available for stationary equipment and only for remote gravity filling from an auxiliary fuel tank.</p> |  |
| <p>Swivel Lever LFCV HF1007Z0005 (110mm Stem) 90 bar Working Pressure (7/8" UNF Mounting Stem)</p> | <p>Available for mobile and stationary equipment, skid mounted pump sets, generators and lighting plants.</p> |  |

3.4 Hydrau-Flo® Hardware

3.4.1 Hydrau-Flo® Black Fuel Filling Valve Adaptors

Table 3-5: Black Valve Adaptors

| | | | | | |
|---|---|---|--|--|--|
| <p>Hydrau-Flo® Filling Valve and Adaptors</p> | <div style="text-align: center;">  <p>Hydrau-Flo® Black Fuel Filling Valve</p> <p>HF1105Z0001</p> <ul style="list-style-type: none"> • Valve mounting - 3" NPS male o-ring seal • Fuel connection - 2" NPT female </div> | | | | |
|  | <p>Black FFV to 2" NPT male HF1102Z0001</p> |  | <p>Black FFV to 2" BSPT male 102907</p> |  <p>Black FFV to 2" hose tall HF1102Z0004 Steel</p> | |
|  | <p>Black FFV to 2" hose tall HF1102Z0014 Aluminium</p> |  | <p>Black FFV to 2 1/2" hose tall HF1102Z0005 Steel</p> |  <p>Black FFV to 2 1/2" hose tall HF1102Z0015 Aluminium</p> | |
|  | <p>Black FFV to weld-in flush mount C/W flange HF1102Z0010</p> |  | <p>Black FFV to weld-on stand pipe HF1102Z0012 - 150mm HF1102Z0013 - 310mm</p> |  <p>Black FFV to aluminium weld-on flange 209304 Aluminium</p> | |
|  | <p>Black FFV to weld-on ring HF1102Z0002</p> |  | <p>Black FFV to 2" SAE code 61 225231</p> |  <p>Black FFV ANSI 150 flange HF1102P0003</p> | |
| <p>Hydrau-Flo® adaptors for use with Komatsu equipment</p> | <p>Hydrau-Flo® adaptors for use with CAT equipment</p> | <p>Hydrau-Flo® adaptors for use with Hitachi equipment</p> | <p>Hydrau-Flo® adaptors for use with Liebherr equipment</p> | <p>Hydrau-Flo® adaptors for use with John Deere equipment</p> | |
|  <p>Designed for use with Komatsu D375 102350</p> |  <p>Designed for use with CAT fuel tank HF1102Z0008</p> |  <p>215249</p> |  <p>Designed for use with Liebherr 994 / 996 HF1102Z0007</p> |  <p>Designed for use with John Deere fuel tank 216647</p> | |
|  <p>Designed for use with CAT D10R / D11R Fuel Inlet 2" NPT male to 2" SAE Code 61 HF1103Z0003</p> |  <p>Designed for use with Hitachi EX 3600-6 215189</p> |  <p>Designed for use with Liebherr 994 / 996 HF1102Z0009 Black FFV to 2" NPT male</p> | | | |
|  <p>Designed for use with CAT 16M 12 bolt flange fuel tank 225232</p> |  <p>Designed for use with Hitachi EH 4000 103042</p> |  <p>Designed for use with Liebherr Black FFV to 2" SAE Code 61 HF1102Z0011</p> | | | |
| | | |  <p>Designed for use with Liebherr Black FFV to 2 1/2" NPT female 214441</p> | | |

3.4.2 Hydrau-Flo® Blue, Gold and Red Fuel Filling Valve Adaptors

Table 3-6: Black, Gold and Red Valve Adaptors

| | | | | | |
|---|--|---|---|---|--|
| <p>Hydrau-Flo® Filling Valve and Adaptors</p> |  | <p>Hydrau-Flo® Blue Fuel Filling Valve HF1105Z0003 Hydrau-Flo® Gold Fuel Filling Valve HF1105Z0007 Hydrau-Flo® Red Fuel Filling Valve HF1105Z0002</p> <ul style="list-style-type: none"> • Valve mounting - 2" NPT male • Fuel connection - 2" NPT female | | | |
|  | <p>Socket 2" NPT HF1011Z0002</p> |  | <p>Weld in recessed Adaptor 2" NPT female HF1103Z0002</p> | | |
| <p>Hydrau-Flo® adaptors for use with Komatsu equipment</p> | | <p>Hydrau-Flo® adaptors for use with CAT equipment</p> | | <p>Hydrau-Flo® adaptors for use with John Deere equipment</p> | |
|  |  |  | <p>Designed for use with Komatsu 830e / 930e HF1102Z0003</p> | <p>Designed for use with CAT D10R / D11R Fuel tank HF1011Z0001</p> | <p>Designed for use with John Deere Fuel tank 216655</p> |
|  | |  | | <p>Hydrau-Flo® adaptors for use with Wiggins equipment</p>  | |
|  | | <p>Hydrau-Flo® Lever Float Control Valve HF1007Z0001/HF1007Z0002 Hydrau-Flo® Lever Float Control Valve HF1007Z0003/HF1007Z0004 Hydrau-Flo® Lever Float Control Valve HF1007Z0005</p> <ul style="list-style-type: none"> • Valve mounting - 7/8" UNF male thread o-ring seal • Pilot line connection - 1/4" BSPT male thread | | | |
|  |  | <p>Used with HF1012Z0002 or HF1012Z0003</p> | | | |
|  | |  | |  | |
| <p>Breather 3/4" BSPT male thread HF0304Z0003</p> <p>Used with HF1014Z0001</p> | <p>Breather stand pipe 3/4" BSPT male x 3/4" BSPT female thread HF1014Z0001</p> <p>Used with HF1012Z0002</p> | <p>4 Bolt bolt-on float mount 7/8" UNF female thread HF1012Z0003</p> <p>Used with HF1012Z0001 or HF1103Z0001</p> | <p>4 Bolt screw-in float and breather mount 2" male thread HF1103Z0001 221479 NPT BSP</p> <p>Used with HF1012Z0002 or HF1012Z0003</p> |  <p>Weld on socket 2" NPT female thread HF1011Z0002</p> <p>Used with HF1103Z0001</p> | |

3.4.3 Pilot Line Hose Fittings and Accessories

Table 3-7: Pilot Line Hose Fittings and Accessories

| Fitting Size | 3/8" Pilot Line | | | | |
|---|---|---|---|---|---|
|  | Nipple reducing 3/8" BSPT M x 1/4" BSPT male HF527-0604 |  | Swivel hose tail 3/8" BSPP female x 3/8" hose tail HF802-0606 |  | Elbow 90 deg female Swivel hose tail 3/8" BSPP female x 3/8" hose tail HF805-0606 |
|  | Tee male 3/8" BSPT male HF1204Z0012 |  | Pilot line Magnetic anchor Suit 3/8" hose (16.5mm to 18mm hose OD) 68kg (150 lbs) pull force 104073 |  | Pilot line check valve 3/8" BSPT female x 3/8" BSPT female HF1204Z0001 Used where 1 x lever float valve is connected to 2 x fuel filling valves. |
|  | Pilot line check valve 3/8" BSPT female x 3/8" BSPT female HF1204Z0002 Used where 2 x filling valves are connected to 1 x float control valve. Includes balancing port. |  | Adaptor 3/8" BSPT female x 1/4" BSPT male HF1204Z0013 |  | Nipple reducing 3/8" BSPT male x 1/2" BSPT male HF527-0806 |
|  | 1/4" plug Used for plugging unused pilot line port HF1204Z0003 |  | 3/8" Push on pilot line hose Single wire braid HHT16A | | |
| Fitting Size | 1/2" Pilot Line | | | | |
|  | Nipple reducing 1/2" BSPT male x 1/4" BSPT male HF527-0804 |  | Swivel hose tail 1/2" BSPP female x 1/2" hose tail HF802-0808 |  | Elbow 90 deg female Swivel hose tail 1/2" BSPP female x 1/2" hose tail HF805-0808 |
|  | TEE male 1/2" BSPT male HF550-080808 |  | Pilot line Magnetic anchor Suit 1/2" hose (20mm to 22mm hose OD) 68kg (150 lbs) pull force 104074 |  | Nipple Reducing 9/16" JIC male x 1/4" BSPT male HF57-0409 |
|  | Elbow 90 deg male 9/16" JIC male x 1/4" BSPT male HF58-0409 |  | 3/8" hose crimp Coupling 9/16" JIC male x 3/8" hose crimp HFT204-0609 |  | 1/2" push on pilot line hose Single textile braid HF1215Z0002 |

3.4.4 Breather Line Connectors

Table 3-8: Breather Line Connectors

| Fitting Size | 3/4" Breather Line | | |
|---|--|---|---|
|  | Nipple 3/4" BSPT male x 3/4" BSPT male HF527-1212 |  | Swivel hose tail 3/4" BSPP female x 3/4" hose tail HF802-1212 |
|  | Hose tail 3/4" BSPT male x 3/4" hose tail 106409 |  | Elbow 90 deg Female / male 3/4" BSFT female x 3/4" BSPT male 106408 |
|  | Barrel nipple 3/4" BSPT male For mounting HF0304Z003 Rain cap breather HF1014Z0001 |  | Steel air breather 3 micron 3/4" NPT male 106040 |
|  | Nylon air breather 3 micron 3/4" NPT male Built in restriction Indicator 106042 Replaceable element 106043 |  | Bracket weld-on / bolt-on 3/4" BSPT male (Suit rain cap HF0304Z0003) HF1014Z0002 |
|  | Breather mounting Flange 3/4" BSPT male to anti-surge breather HF1008Z0003 |  | Steel rain cap Breather 3/4" BSPT male HF0304Z0003 |
|  | 3/4" push on pilot line hose Single textile braid HHP112 | | |

3.4.5 Exhaust Line Float Control Valves and Breather Hose, Fittings and Accessories

Table 3-9: Exhaust Line Accessories

| Fitting Size | 1 1/4" Exhaust Line | | |
|---|---|---|--|
|  | 1 1/4" push on exhaust line hose Single textile braid Suit all green float valves & breathers HF1215Z0004 |  | 1 1/4" hose clamp Single textile braid RSC-4347 |

3.4.6 Pilot Line

**NOTICE**

The pilot line can be connected to the fuel filling valve and the float control valve either internally or externally of the tank.

NOTE: EXTERNALLY ONLY FOR LEVER FLOATS.

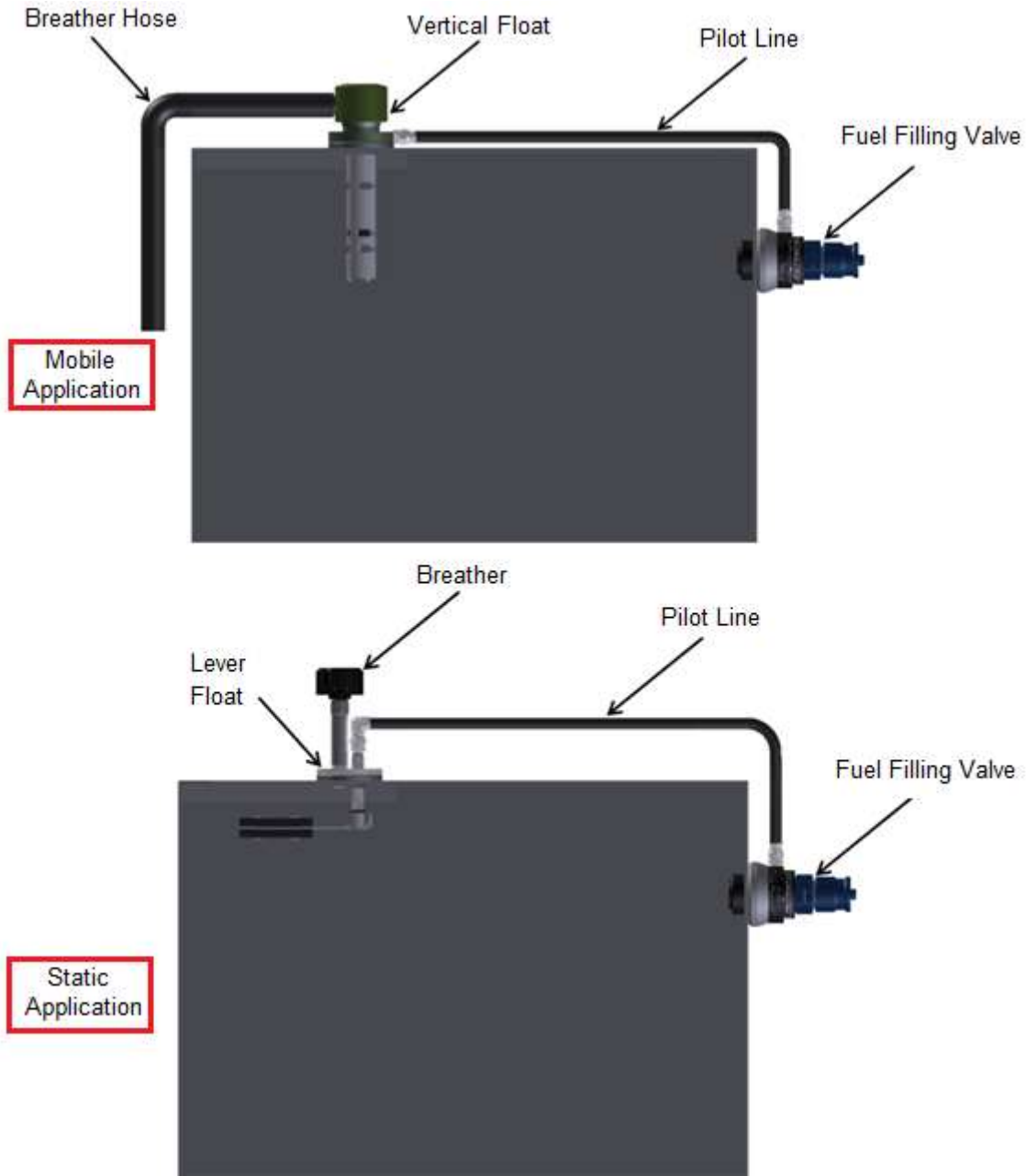


Figure 3-4: Hydrau-Flo® Pilot Line Arrangement for Vertical and Lever Float Control Valves

The standard pilot hose provided with Hydrau-Flo® Fuel Filling System is a marine grade push on hose which is perfect for installation where the exact hose length is not predetermined. The pilot lines are available in 3/8" & 1/4" push on, single wire braid as well as stainless steel wire braided reinforced hoses.


3.5 Optional Features

3.5.1 Internal Pilot Lines

The pilot lines can be connected, if preferred, inside the tank with little modifications to the valves. Both fuel filling & float valves are designed with 2 outlets with ¼” BSP threads, with one of them plugged. Just by replacing the plug from one outlet to the other, the pilot line can be run either internal or external to the tank.



Figure 3-5: Converting External Pilot Line to an Internal Line

| | |
|--|---|
|  | CAUTION |
| | <p>While using internal pilot lines, single wire braided hose is used for abrasion resistance. The hose lines have swivel fittings at their ends to facilitate the easy assembly.</p> |


3.5.2 Anchoring Pilot Lines

The external pilot lines can be anchored to the surface of the fuel tank to avoid the damage caused by flapping of the line. The anchoring options are:

- Fixed anchor hardware
- Cable ties
- Magnetic P-clips (Does not require Hot Working of Tank)




Figure 3-6: Hydrau-Flo® Pilot Line Magnet Anchor

| | |
|---|---|
|  | NOTICE |
| | <p>The magnetic P-clips contain a magnetic base with a screwed on P-clip through which the pilot line can be guided. These magnetic clips can be fixed onto the surface of the metallic tank without any risk of damaging the tank.</p> |

3.5.3 Vertical Float Extensions

The Hydrau-Flo® Vertical Floats can be set at different levels, thereby, providing an option to set the maximum level of fuel in a tank at any point of time. The barrel extensions are available for the Float control valves and are available in set length extensions of 50mm, 100mm, 150mm and 300mm, as per the figure below.

| | |
|---|--|
|  | <p>NOTICE</p> |
| | <p>For further information on the dimensions of the Vertical Floats, refer to the appendices section of this manual for further information.</p> |

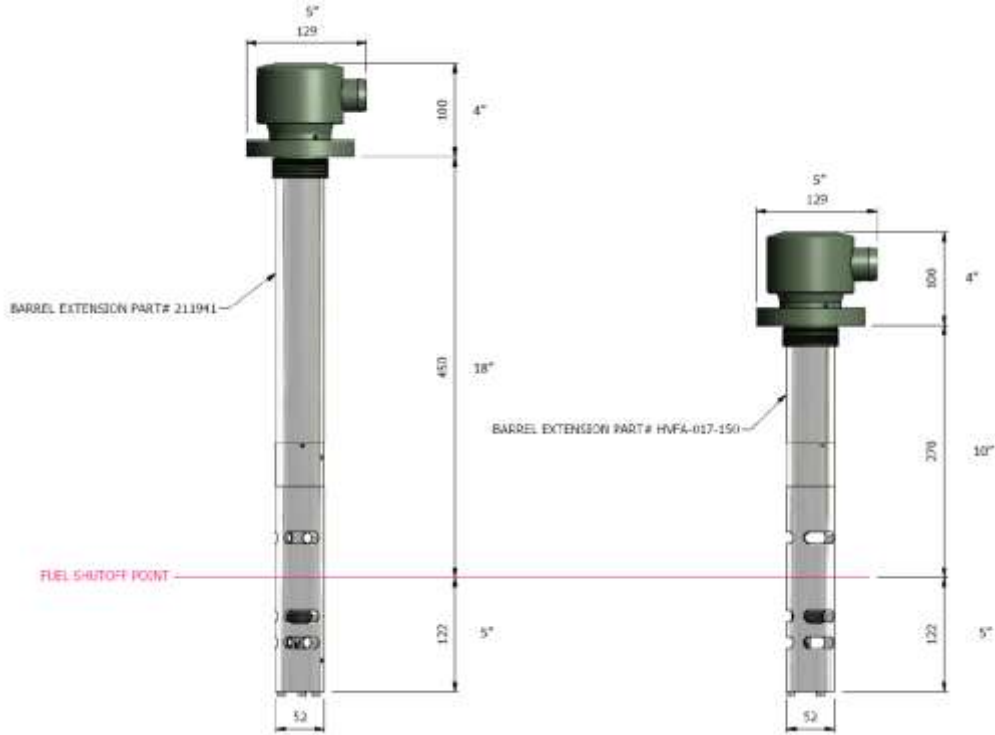





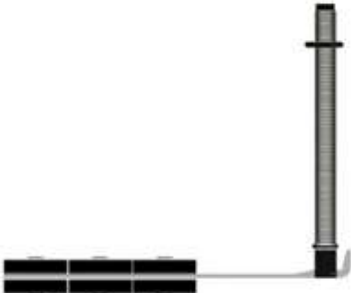
Figure 3-7: Barrel Extensions (300mm and 150mm Extensions Shown)

3.5.4 Lever Float (Fixed) Connections

Lever floats are used as the actuator in stationary tanks using the fast filling process. These lever floats are also suitable for providing over fill protection on remote/trickle feed systems.

| | |
|---|--|
|  | NOTICE |
| | For further information on the Lever Float Settings, refer to the appendices section of this manual. |

Table 3-10: Lever Float Extensions

| Lever Float: | Stem Length: | Rated Pressure: |
|--|--------------|-----------------|
|  HF1007Z0001 | 110mm | 1.5 Bar |
|  HF1007Z0002 | 250mm | 1.5 Bar |
|  HF1007Z0003 | 110mm | 20 Bar |
|  HF1007Z0004 | 250mm | 20 Bar |

3.5.5 Hydrau-Flo® Applications

Hydrau-Flo® fuel filling systems can fuel both stationary and mobile applications. It is suitable for re-fuelling trucks, loaders, excavators, gantries, dozers & graders, etc.

It can also be used to **trickle feed** multiple smaller stationary fuel tanks from a main fuel storage tank. As the fuel is consumed from the smaller tanks and the fuel level in the tank drops, the Hydrau-Flo® fuel filling system will top up until the tank is full and ensures that the tank is always full. The Hydrau-Flo® lever float system is perfect for this type of arrangements.

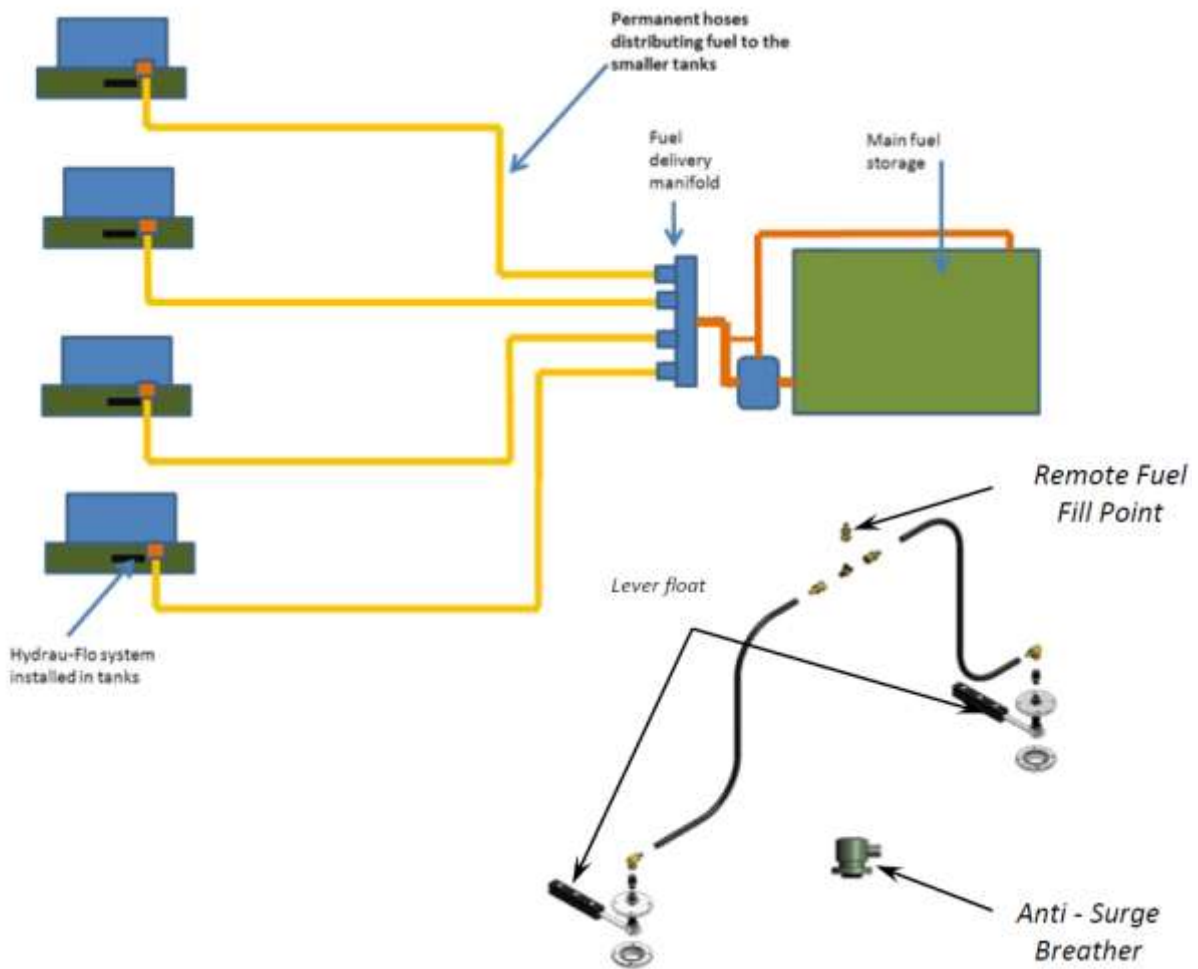




Figure 3-8: Trickle Feed System with Two Floats

| | |
|--|----------------------|
|  | <p>NOTICE</p> |
| <p>Anti-surge breather is used for redundancy and for asset relocation in order to eliminate fuel spill in transit</p> <p>Fuel feed into the tanks and shut off pressure are subjected to the Lever Float Selection.</p> | |

3.6 Hydrau-Flo® Valves Dimensions

| | |
|--|----------------------|
|  | <p>NOTICE</p> |
| <p>Refer to the appendices section of this manual for further dimensions of the Hydrau-Flo® Valve components and Floats.</p> | |



4 Installation

Accurate information must be provided upon inquiry so the unit is supplied with correct adaptors, lines and fittings to the customer's specification. Please check that the supplied fittings and adaptors meet the specific requirements of the installing unit.

4.1 Pre-Installation

The Hydrau-Flo® Valve components must be installed by persons who are qualified and have reviewed this Installation, Operation and Maintenance Manual. Furthermore the installation must be undertaken in a safe working environment that is free from hazards. The installer must be aware of any potential hazards in the working environment and must seek to control and minimise the risk before any installation works are commenced.





The status of the fuel tanks in which the Hydrau-Flo® Valve components are to be installed must be checked prior to installation. The release of fuel in the tanks or residual fuel present could result in contact with persons and could also be a source of ignition.

| | | |
|---|---|---|
|  |  | <p>CAUTION</p> <ul style="list-style-type: none"> • Clean the area around the fuel receiver and adaptor on the fuel tank. • Drain the tank empty before installing. • Isolate, tag out and lock out the machine as per site requirements. • Ensure safe access to the areas to be work on as per site standards. Site specific PPE must be worn for the areas where the work is to be performed. Provision should be made for the catchment and disposal of excess fuel. • Ensure the right type of receiver is selected for the application. |
|---|---|---|

4.2 Installation Tool Kit




The Hydrau-Flo® valves are supplied with a Hydrau-Flo® Installation tool kit (103628), which contains tools for installing all types of Hydrau-Flo® valves.

Table 4-1: Installation Tool Kit

| | |
|---|--|
|  <p>200629</p> | <p>Tool for installing Hydrau-Flo® float control valve – Side entry</p> |
|  <p>201240</p> | <p>Tool for installing Hydrau-Flo® fuel filling valve (Blue & Black) – Side entry</p> |
|  <p>202125</p> | <p>Tool for installing Hydrau-Flo® fuel filling valve (Red)</p> |
|  <p>101023</p> | <p>Tool for installing Hydrau-Flo® fuel filling valve (Blue & Black) – Top entry</p> |




4.3 Installation Procedure – To suit General Installation

- Ensure the working environment is free from hazards or risks before commencing installation.
- Follow any on-site safety operating procedures for onsite installation.
- Completely drain fuel from fuel tank.
- Remove the fuel supply line from the tank adaptor ensuring all residual fuel in the line is caught.
- Remove any lower tank adaptors or other fuelling assemblies from the bottom of the fuel tank.
- If removing a fast fill system, the lower assembly will likely have an internal pilot line which must be removed in order to remove this system.
- Make sure all threads are free of dirt, grease and excessive fuel.
- Install the nipples into the pilot line ports on the Fuel Filling Valve and Float Valve using a thread sealer such as Loctite 242 (blue).
- Bolt the designated tank adaptor to the bottom of the fuel tank using an appropriate thread sealer such as Loctite 242. Ensure the O-ring on the tank adaptor is in new condition.
- Install the Fuel Filling Valve into the adaptor. Use of the supplied wrench or sockets is recommended.
- Install the adaptor into the top of the Fuel Filling Valve using an appropriate thread sealing compound. Use of a strap wrench or other suitable device is recommended.
- Reconnect the fuel supply line to the hose adaptor ensuring a fuel-tight connection. Ensure all connection points are clean and smooth. Use a thread sealer such as Loctite 242 on the bolts.
- Remove the existing breather from the top of the fuel tank.
- Install the Float Adapter ensuring the mating surfaces are clean and smooth. Ensure the O-ring on the tank adaptor is in new condition. Use a thread sealer such as Loctite 242 on the bolts.
- Install the Float Valve using the supplied wrench or other suitable tool using an appropriate thread sealing compound.
- Assemble the pilot line using either push on hose barbed fittings or other appropriate hose ends. (-6 JIC fittings are recommended). Determine pilot line length by routing the pilot line in a manner that will provide the greatest protection from damage.
- Support the pilot line using magnetic hose clamps or other suitable connectors ensuring the line isn't crimped or twisted.
- Refer to the commissioning procedure once installation has taken place.

| | | |
|---|---|--|
|  |  | <p>CAUTION</p> |
| | | <ul style="list-style-type: none"> • Make sure to place the O-ring on the black fuel filling valve before fitting the adaptor and tightening it into place. No O-ring will lead to fuel leakage. • Incorrect routing of the air venting line such as low point/s or bends may result in the discharge of fuel condensate via breather vent and could ignite on a hot surface. • Always have appropriate fire fighting equipment on hand while undertaking servicing and filling operations. |
|  | <p>NOTICE</p> | |
| <p>Refer to the commissioning section of this manual once installation has taken place.</p> | | |




4.4 Installation Procedure – To suit CAT D10R/D11R Dozers

- Ensure the working environment is free from hazards or risks before commencing installation.
- Follow any on-site safety operating procedures for onsite installation.
- Completely drain fuel from fuel tank.
- Remove the fuel supply line from the tank adaptor ensuring all residual fuel in the line is caught.
- Remove any lower tank adaptors or other fuelling assemblies from the bottom of the fuel tank.
- If removing a fast fill system, the lower assembly will likely have an internal pilot line which must be removed in order to remove this system.
- Make sure all threads are free of dirt, grease and excessive fuel.
- Install ¼” BSPT nipples into the pilot line port on the blue valve and green float valves using a thread sealer such as Loctite 242 (blue).
- Bolt the HF1103Z0004 tank adaptor to the bottom of the fuel tank using an appropriate thread sealer such as Loctite 242. Ensure the O-ring on the tank adaptor is in new condition.
- Install the blue receiver valve into the HF1103Z0004 adaptor. Use of the 201240 wrench or 101023 sockets is recommended.
- Install the HF1103Z0003 adaptor into the top of the blue valve using an appropriate thread sealing compound. Use of a strap wrench or other suitable device is recommended.
- Reconnect the fuel supply line to the hose adaptor ensuring a fuel-tight connection. Ensure all connection points are clean and smooth. Use a thread sealer such as Loctite 242 on the bolts.
- Remove the existing breather from the top of the fuel tank.
- Install the HF1011Z0001 green float adaptor ensuring the mating surfaces are clean and smooth. Ensure the O-ring on the tank adaptor is in new condition. Use a thread sealer such as Loctite 242 on the bolts.
- Install the green float valve using the 200629 wrench or other suitable tool using an appropriate thread sealing compound. (The exhaust port can be turned independently of the body of the green valve).
- Assemble the 3/8” pilot line using either push on hose barbed fittings or other appropriate hose ends. (-6 JIC fittings are recommended). Determine pilot line length by routing the pilot line in a manner that will provide the greatest protection from damage.
- Support the pilot line using magnetic hose clamps or other suitable connectors ensuring the line isn’t crimped or twisted.
- Refer to the commissioning procedure once installation has taken place.

| | | |
|---|--|--|
|  |  | <p style="text-align: center;">CAUTION</p> <ul style="list-style-type: none"> • Make sure to place the O-ring on the black fuel filling valve before fitting the adaptor and tightening it into place. No O-ring will lead to fuel leakage. • Incorrect routing of the air venting line such as low point/s or bends may result in the discharge of fuel condensate via breather vent and could ignite on a hot surface. • Always have appropriate fire fighting equipment on hand while undertaking servicing and filling operations. |
|  | <p style="text-align: center;">NOTICE</p> <p>Refer to the commissioning section of this manual once installation has taken place.</p> | |

4.5 Installation Procedure - To suit CAT 16H Grader

- Ensure the working environment is free from hazards or risks before commencing installation.
- Follow any on-site safety operating procedures for onsite installation.
- Completely drain fuel from fuel tank.
- Remove the fuel supply line from the tank adaptor ensuring all residual fuel in the line is caught.
- Remove any lower tank adaptors or other fuelling assemblies from the bottom of the fuel tank.
- If removing a fast fill system, the lower assembly will likely have an internal pilot line which must be removed in order to remove this system.
- Make sure all threads are free of dirt, grease and excessive fuel.
- Apply hydraulic thread sealant (Loctite® 222 or similar) to the valve adaptor and fit it to the thread where the fuel receiver was removed from and tighten.
- If using a Wiggins® receiver, remove the Circlip from the back of the existing fuel receiver. Take care as the spring will be under pressure. Remove the spring from the receiver and fit the replacement spring provided, compress the spring in the receiver and refit the Circlip. Failure to change the springs may result in poor performance of the system.
- Place the O-ring on the black valve, fit the valve to the adaptor and tighten.
- Weld the 2”NPT half socket to the far end manhole of the fuel tank.
- A large range of NPT and BSP adaptors are available for the purpose of configuration.
- Apply hydraulic thread sealant, like Loctite® 545, etc., to the threads of the vertical float, screw the float into the fuel tank where the 2” socket was removed from and tighten by Hydrau-Flo® tools.
- Run the hose to the fuel receiver & keep away from areas of excessive heat and should be clear of rotating or reciprocating parts. The hose should be secured at intervals of no more than 450mm/18”.
- Remove all tags and reenergise all isolated valves and switches.
- Refer to the commissioning procedure once installation has taken place.

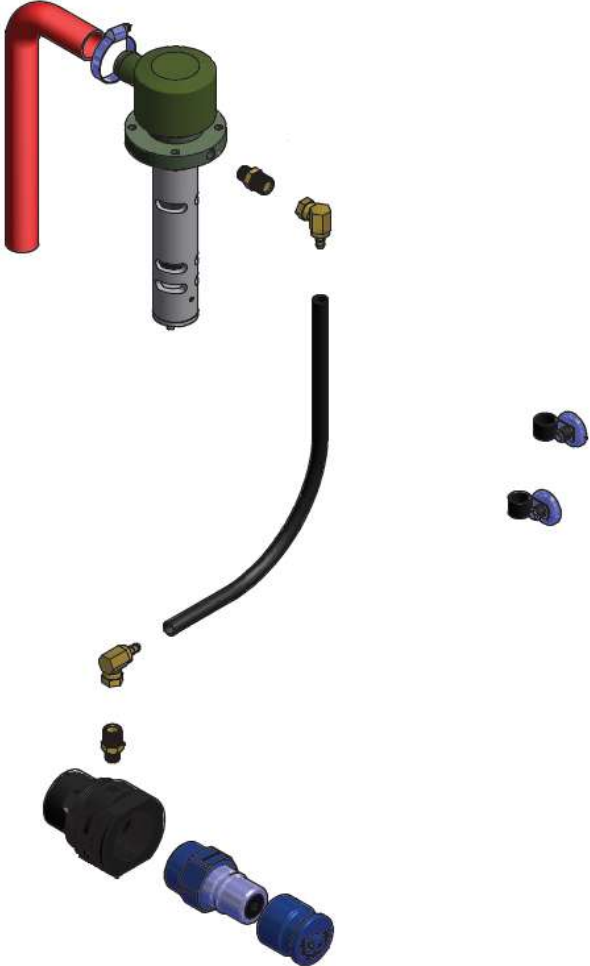

| | | |
|---|--|--|
|  |  | <p style="text-align: center;">CAUTION</p> <ul style="list-style-type: none"> • Make sure to place the O-ring on the black fuel filling valve before fitting the adaptor and tightening it into place. No O-ring will lead to fuel leakage. • Incorrect routing of the air venting line such as low point/s or bends may result in the discharge of fuel condensate via breather vent and could ignite on a hot surface. • Always have appropriate fire fighting equipment on hand while undertaking servicing and filling operations. |
|  | <p style="text-align: center;">NOTICE</p> <p>Refer to the commissioning section of this manual once installation has taken place.</p> | |

4.6 Additional Information on Installation

4.6.1 General Arrangement

The general arrangement for the Hydrau-Flo® Fuel Filling System with a single Vertical Float Valve and Single Lever Float Valve can be seen in the table below.

Table 4-2: General Arrangement for Single Receiver and Single Valve

| Vertical Float Valve General Arrangement | Lever Float Valve General Arrangement |
|--|---|
|  |  |

4.6.2 Multiple Filling Valves with Single Lever Float Valve

If multiple filling valves are installed and a single Lever Float Control valve is used, the combined flow rate of the filling valves must not exceed the rated flow capacity of the Hydrau-Flo® components. The Check Valves must be correctly installed so the fuel flows in the correct direction.

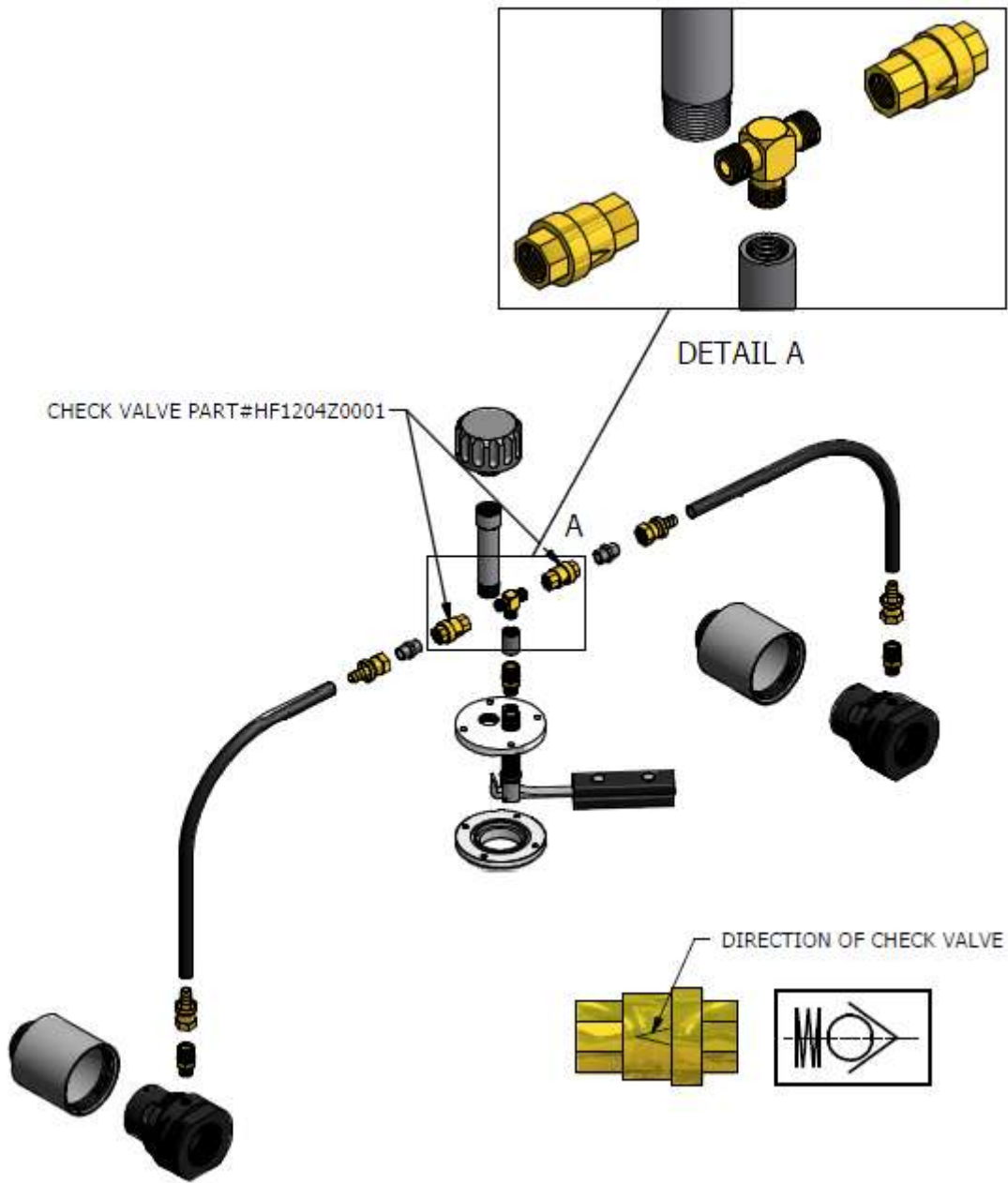


Figure 4-1: Multiple Filling Valves with Single Lever Float and Check Valve

4.6.3 Multiple Filling Valves with Single Vertical Float Valve

If multiple filling valves are installed and a single Vertical Float Control valve is used, the combined flow rate of the filling valves must not exceed the rated flow capacity of the Hydrau-Flo® Fuel Filling System. The Check Valves must be correctly installed so the fuel flows in the correct direction.

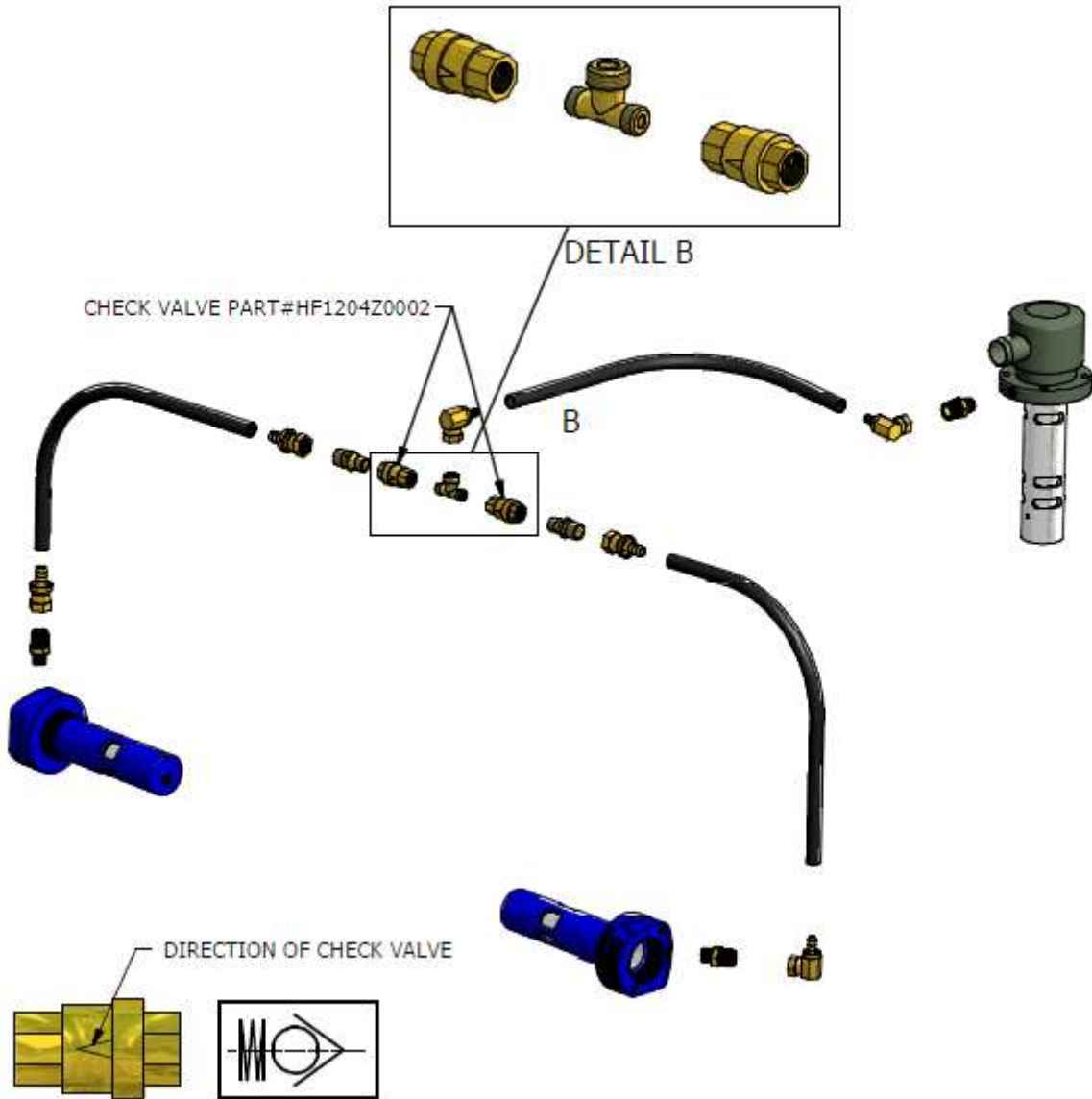


Figure 4-2: Multiple Filling Valves with Single Vertical Float and Check Valve

4.6.4 Check Valve Arrangement

When installing the check valves, care must be taken to ensure that the direction of the check valve is correct. Refer to the figure below for further information.

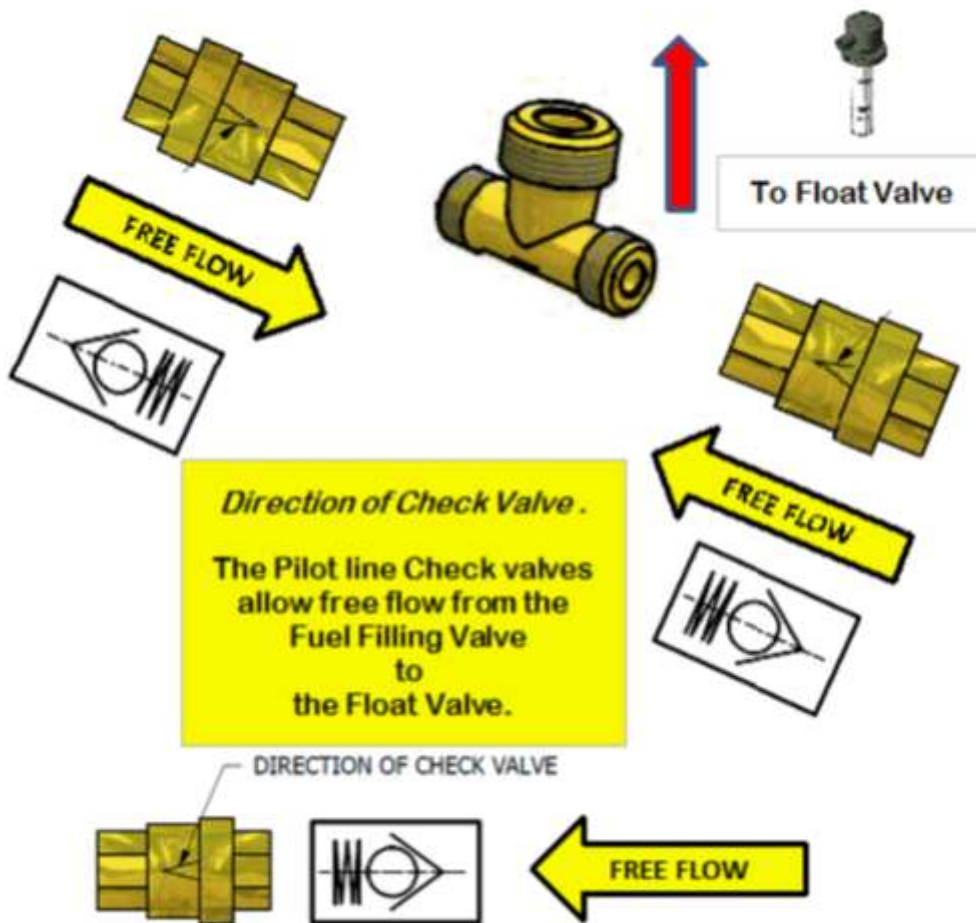


Figure 4-3: Check Valve Arrangement

4.6.5 Lever Float Height Adjustment




| | |
|--|--|
| | <p>NOTICE</p> |
| | <p>Refer to the Lever Float height adjustment information in the appendices section of this manual for height adjustment calculations.</p> |

5 Commissioning


It is the installer’s responsibility to ensure that correct installation procedures have been adhered to. Before testing the integrity of the Hydrau-Flo® Fuel Filling System, ensure that all components have been correctly installed. Incorrect installation on the client’s behalf may impact the functionality and the integrity as well as the performance of the system. Failure to install components correctly may lead to overfilling and ignition.

Once installation has been completed and all safety checks have been undertaken, the following commissioning pressure is to be undertaken to test the integrity of the Hydrau-Flo® Fuel Filling System before field use:

- Make sure all components are properly fitted and sealed appropriately.
- Check if there are leaks in the Filling Valve, Float Valve and other connections etc.
- Check the integrity of pilot line (check for correct pilot line size and correct length). Pilot line size has a requirement for 3/8” or 1/2” size hose. Increase in pilot line size increases their rated capacity to avoid failure and reduced shut-off effectiveness.
- Check Valves must be correctly installed so the fuel flows in the correct direction.
- Synchronise the fuel filling gun and receiver spring settings after installation. Change the spring in the receiver as required.
- Make sure that the fuel station pump characteristics are compliant with the rated flow capacities of the Hydrau-Flo® system.
- Test the system by connecting the filling gun and attempting to “top off the tank” to ensure the system will not overfill and spill fuel.
- Adjust float level to position/height required.


| | | |
|---|---|--|
|  |  | <p>CAUTION</p> <p>Always have appropriate fire fighting equipment on hand while undertaking servicing and filling operations.</p> |
|  | <p>NOTICE</p> <p>Refer to the Troubleshooting guide in this manual for further information if there are any issues upon commissioning.</p> | |

6 Operation

| | |
|---|---|
|  | CAUTION |
| | Always have appropriate fire fighting equipment on hand while undertaking servicing and filling operations. |


6.1 Fuel Filling

Fuel filling operations must be undertaken in accordance with site procedures. Incorrect fuel filling operations can cause early shut off and possible diesel showers. In no circumstances shall the operator manually override the automatic fuel filling gun closing mechanism. This may occur when the operator secures or tampers with the filling gun to force it to stay on.

| | |
|---|--|
|  | CAUTION |
| | The automatic fuel filling system must not be manually overridden. |


6.2 Flow Specification

Each of the Hydrau-Flo® Valve components has a rated flow specification that they are rated for. If these ratings are exceeded the integrity of the system is not guaranteed and the owner will be liable for any damage caused to the system due to incorrect operation. Before any filling operations the operator must ensure that the pump stations rated flow specifications comply with the rated flow capacities of the installed Hydrau-Flo® Valve components.

| | |
|---|---|
|  | CAUTION |
| | Pump station flow specifications must be synced with the rated flow capacity of the installed Hydrau-Flo® Valve components. |


6.3 Fuel Filling of Dual Tanks

When undertaking fuel filling operations with dual tanks, due to manometer effects between the tanks the filling for the second tank is slower and actual level results in over filling which can be further increased by fuel reticulation.

| | |
|---|---|
|  | CAUTION |
| | Make sure correct installation of the dual tanks and make sure the valve is in the right location of the tanks. |


6.4 Multiple Filling Valves Flow Rating

If multiple filling valves are installed and a single Float Control valve is used, the combined flow rate of the filling valves must not exceed the rated flow capacity of the float control valve. If the flow capacity exceeds the float control valve, a secondary float or breather is required.

| | |
|---|--|
|  | CAUTION |
| | Ensure combined flow rate of multiple Fuel Filling Valves match the rated flow capacity of the installed Hydrau-Flo® Valve components. |

6.5 Suitable Mediums

The Hydrau-Flo® Fuel Filling Systems can only be used with filling medium that have a viscosity rating of $1 \pm 10\%$ (primarily diesel fuel, water and coolant).


| | |
|---|--|
|  | CAUTION |
| | Hydrau-Flo® fuel filling systems can only be used with the approved filling mediums. Failure to adhere to the rated filling medium will result in the reduced integrity of the system and premature failure. |

6.6 Fuel Consumption

Dust particles that are present in air can contaminate the fuel during operation, therefore creating a potential obstruction to the fuel filling valve. This may lead to the piston binding open resulting in over-filling, leading to fuel release into the environment and potential ignition. For correct operation of the Hydrau-Flo® Valve components, clean filling mediums with minimal contamination are also recommended to eliminate potential sources of contamination in the system.


6.7 Fuel Reticulation

The operator must have an understanding of the potential for reticulation over filling scenario considered for appropriate operations. The installer and operator must ensure correct positioning of the Hydrau-Flo® Valve and Float for the correct alluge gap in the tank. When adjusting the position of the Hydrau-Flo® Float Valve for the correct alluge gap, the installer must take into account the shape and size of the tank, as well as the position of the Hydrau-Flo® Float Valve in respect to the shape of the tank. Miscalculated alluge could result in the return fuel exceeding tank capacity during refilling and can lead to spillage and potential ignition.

| | |
|--|---|
|  | CAUTION |
| | Before any filling operations, the installer and operator must ensure there is a correct alluge gap in the fuel tank. |

6.8 Float Control

If a lever float is specified or installed on a mobile application, this can result to premature wear and failure of the lever components. This will result in the failure of the system to detect when the tank is full and will ultimately lead to overfilling of fuel into the environment.

| | |
|---|---|
|  | CAUTION |
| | Lever floats are only designed for static applications. |

7 Maintenance



7.1 Maintenance Instructions

The Hydrau-Flo® system is essentially maintenance free and requires minimal attention throughout its life. It is not recommended that the Hydrau-Flo® Valves are to be taken apart. For example if any Hydrau-Flo® component are disassembled and then re-assembled incorrectly, the functionality and integrity of the system will be impacted. There is also a possibility that components may be omitted and operation of the Hydrau-Flo® system will be inhibited and this could result in over filling and release of fuel into the environment.

If any Hydrau-Flo® components are tampered with, incorrectly installed or incorrectly used, the owner is liable for any damages and any remaining warranty will be voided. If there are any issues with the operation of the Hydrau-Flo® system, please contact Weir Minerals Multiflo® directly.

Despite this, the following points must be undertaken as general practice to ensure a trouble free operation of the Hydrau-Flo® system.

- Keep the fuel receiver and the fuel nozzle clean and maintained at all times.
- Visually inspect the pilot lines to ensure their integrity and confirm there are no dents or kinks on the line. Any damage or kinks in the pilot line will lead to a signal loss and the system will not detect when the tank is full.
- Ensure the pilot line is not restricted and not in an area in which it can be readily damaged. If the pilot line is damaged, fuel will be released into the environment.
- Clear any debris from the flow control valve's vent port.

| | |
|---|---|
|  | <p>CAUTION</p> <p>Contact Weir Minerals Multiflo® directly if any servicing or repairs are required for the Hydrau-Flo® system.</p> |
|  | <p>NOTICE</p> <p>Refer to the Troubleshooting guide in this manual for further information if there are any issues upon commissioning.</p> |

7.2 Troubleshooting Guide

Table 7-1: Troubleshooting Guide

| Symptoms | Causes | Remedies |
|---|--|---|
| Fuel nozzle shutting off prematurely | Nozzle or receiver spring setting too low | Check condition & rating of spring. Relace if necessary. |
| | Back pressure in filler pipe too high. | Ensure no excessive restriction in flow of fuel from the Hydrau-Flo® system to the tank. |
| | Breather blocked. | Check & clean. Replace it necessary |
| | Float valve set too low in tank. | Adjust to desired fill height |
| | Restriction in pilot line. | Check line for damage, crushes or kinks. Replace if necessary. |
| Fuel nozzle not shutting off | Float valve not stopping bleeding from pilot line. | Check the operation of the float ensuring it does not hit internal walls of fuel tank. Check valve seats for damage or obstruction. |
| | Piston stuck open. | Check piston operation is free. |
| | Leakage in pilot line | Check and replace if necessary |
| | Float level set above breather height. | Lower float level below the height of breather. |
| | Dislodged Welsch plugs in fuel filling valve or float control valve | Visually check valves and confirm Welsch plugs are fitted securely |
| Fuel weeping from breather after the tank has been filled | Float level set too high, not allowing enough air space for fuel expansion due to rise in temperature. | Lower float level setting. |

8 Appendices

8.1 Commissioning Checklist

Equipment Reference Number: _____

SAFETY

1. Use approved personal protective equipment at all times.
2. If there is a defect identified upon commissioning, safely shut down the fuel supply and refer to the troubleshooting guide.
3. Follow up any defects with approved service personnel.

| CHECK LIST | | O.K. | DEFECT | ACTION TAKEN |
|------------|--|------|--------|--------------|
| 1 | All components are fitted and sealed. | | | |
| 4 | Make Sure Check Valves are Installed in the Correct Direction | | | |
| 5 | Synchronise Fuel Filling Gun and Receiver Spring Settings | | | |
| 6 | Match Fuel Station Pump Flow Characteristics to rated Flow Capacity of Hydrau-Flo® System. | | | |
| 7 | Top off the Fuel Tank | | | |
| 8 | Test the Automatic Stop function. | | | |
| 9 | Adjust Float Level to Height Required | | | |

COMMENTS: _____

NAME (Print): _____

SIGNATURE: _____

DATE: _____

8.2 Maintenance Checklist

Equipment Reference Number: _____

SAFETY

1. Use approved personal protective equipment at all times.
2. If there is a defect identified upon commissioning, safely shut down the fuel supply and refer to the troubleshooting guide.
3. Follow up any defects with approved service personnel.

| CHECK LIST | | O.K. | DEFECT | ACTION TAKEN |
|------------|---|------|--------|--------------|
| 1 | Clean Fuel Receiver | | | |
| 4 | Clean Fuel Nozzle | | | |
| 5 | Visually Inspect Pilot Line for Defects | | | |
| 6 | Ensure Pilot Line is not at Risk | | | |
| 7 | Clear any Debris from Control Valve Vent Port | | | |
| 8 | Visually Inspect Fuel Tank for Defects | | | |
| 9 | Visually Inspect Other Components for Defects | | | |

COMMENTS: _____

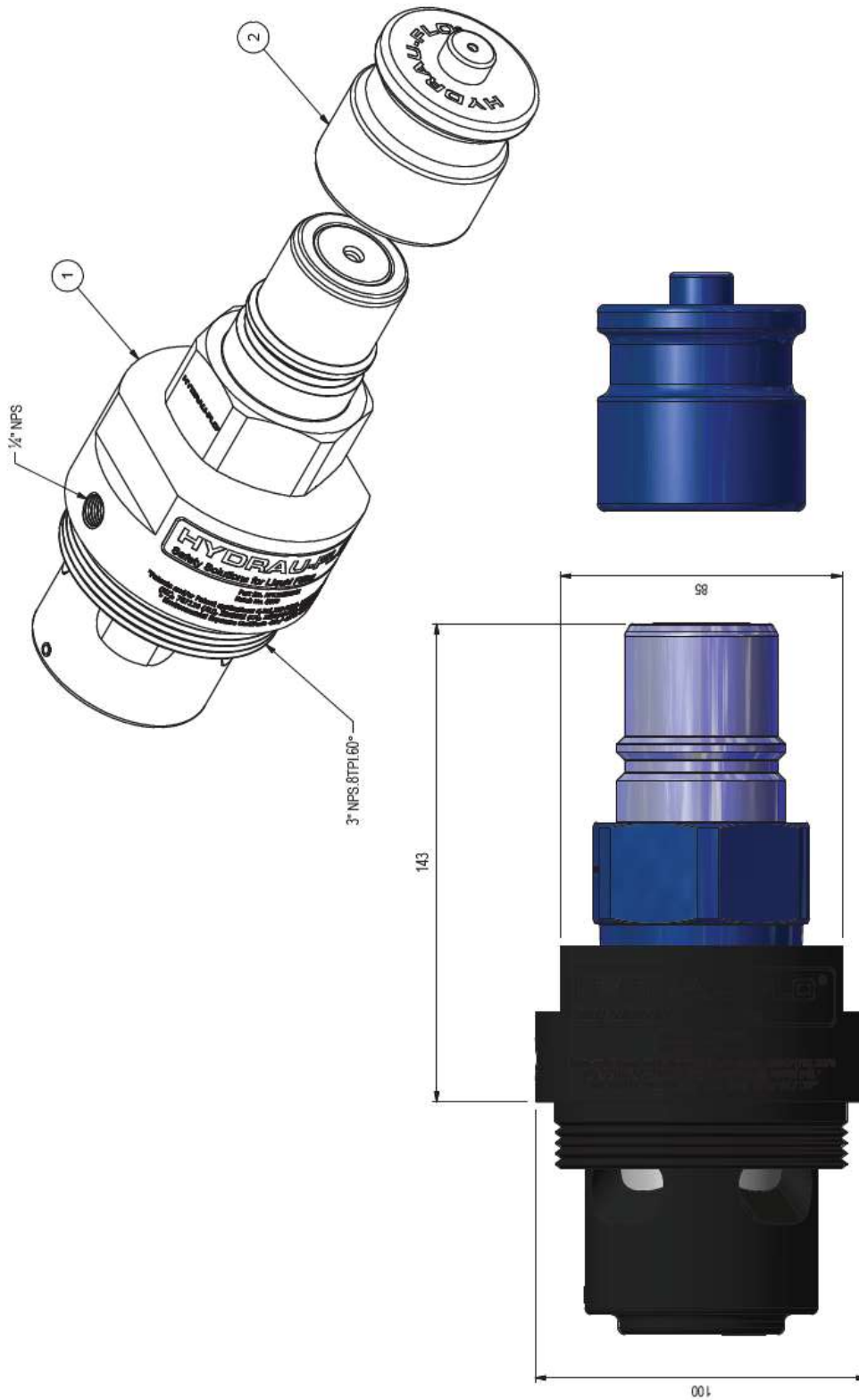
NAME (Print): _____

SIGNATURE: _____

DATE: _____

8.3 Black Valve with Hydrau Flo® Receiver

| ITEM | QTY | PART NUMBER | DESCRIPTION |
|------|-----|--------------|---------------------------------|
| 1 | 1 | HF-1105Z0001 | 3" NPS BLACK FUEL FILLING VALVE |
| 2 | 1 | HF-1113Z0005 | HYDRAU-FLO RECEIVER ASSEMBLY |



CONTROLLED COPY
 3RD ANGLE PROJECTION UNDO. A3
 DRAWING STATUS
 APPROVED
 Drawing Number
 238918
 REV
 A0

HYDRAU-FLO ASSEMBLY
BLACK FFV WITH HYDRAU-FLO RECEIVER

| | |
|--------|--------------|
| SCALE | 1:1.25 UNDO. |
| DESIGN | SJK 14/09/11 |
| DRAWN | JIM 26/11/14 |
| CHECK | M.A 26/11/14 |
| APPD | BL 26/11/14 |

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 Telephone: +61 3 5497 3300 Facsimile: +61 3 549 6204
 Email: enquiries@weirminerals.com Web: www.weirminerals.com

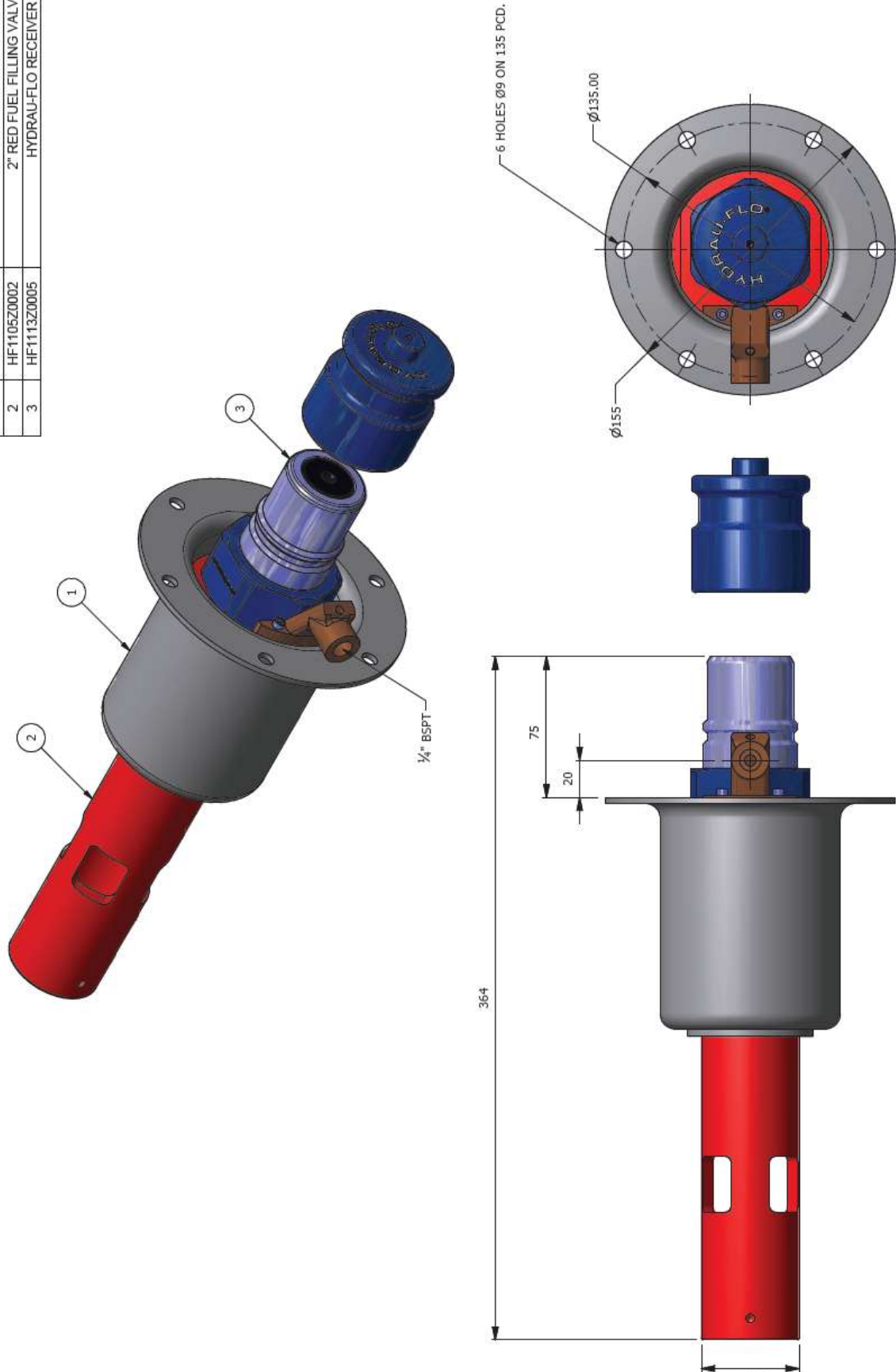
MASS: 2 kg

HYDRAU-FLO®
 Safety Solutions for Liquid Filling

| | | | |
|---------------------------|-------------|------|------|
| WELD CAL | | | |
| FINISH CODE | | | |
| DO NOT SCALE | | | |
| IF IN DOUBT - ASK | | | |
| APPROVED FOR CONSTRUCTION | | | |
| APPR APPROVALS | | | |
| DWN | CHK | APPD | DATE |
| No. | Description | | |

8.4 Red Valve in Adapter with Hydrau Flo® Receiver

| ITEM | PART NUMBER | DESCRIPTION |
|------|-------------|---------------------------|
| 1 | ZNC3 | WIGGINS BOLT ON ADAPTOR |
| 2 | HF1105Z0002 | 2" RED FUEL FILLING VALVE |
| 3 | HF1113Z0005 | HYDRAU-FLO RECEIVER |



6 HOLES Ø9 ON 135 PCD.

Ø135.00

Ø155

364

75

20

Ø 52

¼" BSPT

CONTROLLED COPY

HYDRAU-FLO ASSEMBLY
2" RED VALVE INSERTED IN TO ZNC3 ADAPTOR +
HYDRAU-FLO RECEIVER

| | | |
|----------------------|----------|----|
| 3RD ANGLE PROJECTION | UNCL. | A3 |
| DRAWING STATUS | APPROVED | |
| Drawing Number | 238920 | |
| REV | A0 | |

| SCALE | U. I. NO. |
|--------|-----------|
| DESIGN | JM |
| DRAWN | JM |
| CHECK | MA |
| APPRO | BA |

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 Email: multiflo@weirminerals.com.au Website: www.weirminerals.com

WUSA
 Wiggins Bolt On Adaptor
 Safety Solutions for Liquid Filling
 www.wusa.com.au

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| | |
|-----------------------------------|-------------|
| WELD CAL | FINISH CODE |
| DO NOT SCALE IF IN DOUBT - ASK | |
| APPROVED FOR CONSTRUCTION | DATE |
| DWN CHK APPR | |
| AS PER APPROVALS | |
| No. Description | |

8.5 Blue Valve with Hydrau Flo® Receiver

| ITEM | QTY | PART NUMBER | DESCRIPTION |
|------|-----|-------------|---------------------------|
| 1 | 1 | HFL10520003 | 2" BLUE FUEL FILLER VALVE |
| 2 | 1 | HFL11320005 | HYDRAU-FLO RECEIVER |

CONTROLLED COPY

HYDRAU-FLO ASSEMBLY
2" BLUE FUEL FILLER VALVE WITH HYDRAU-FLO RECEIVER

3RD ANGLE PROJECTION (U.S.D.) A3
 DRAWING STATUS: APPROVED
 Drawing Number: 238921
 REV: A0

| SCALE | U.R.G. | DATE |
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| DESIGN: J.M. | J.M. | 02/12/14 |
| DRAWN: J.M. | J.M. | 02/12/14 |
| CHECK: M.A. | M.A. | 02/12/14 |
| APPRO: B.T. | B.T. | 02/12/14 |

MASS: kg

WELD CAT. _____
FINISH CODE _____

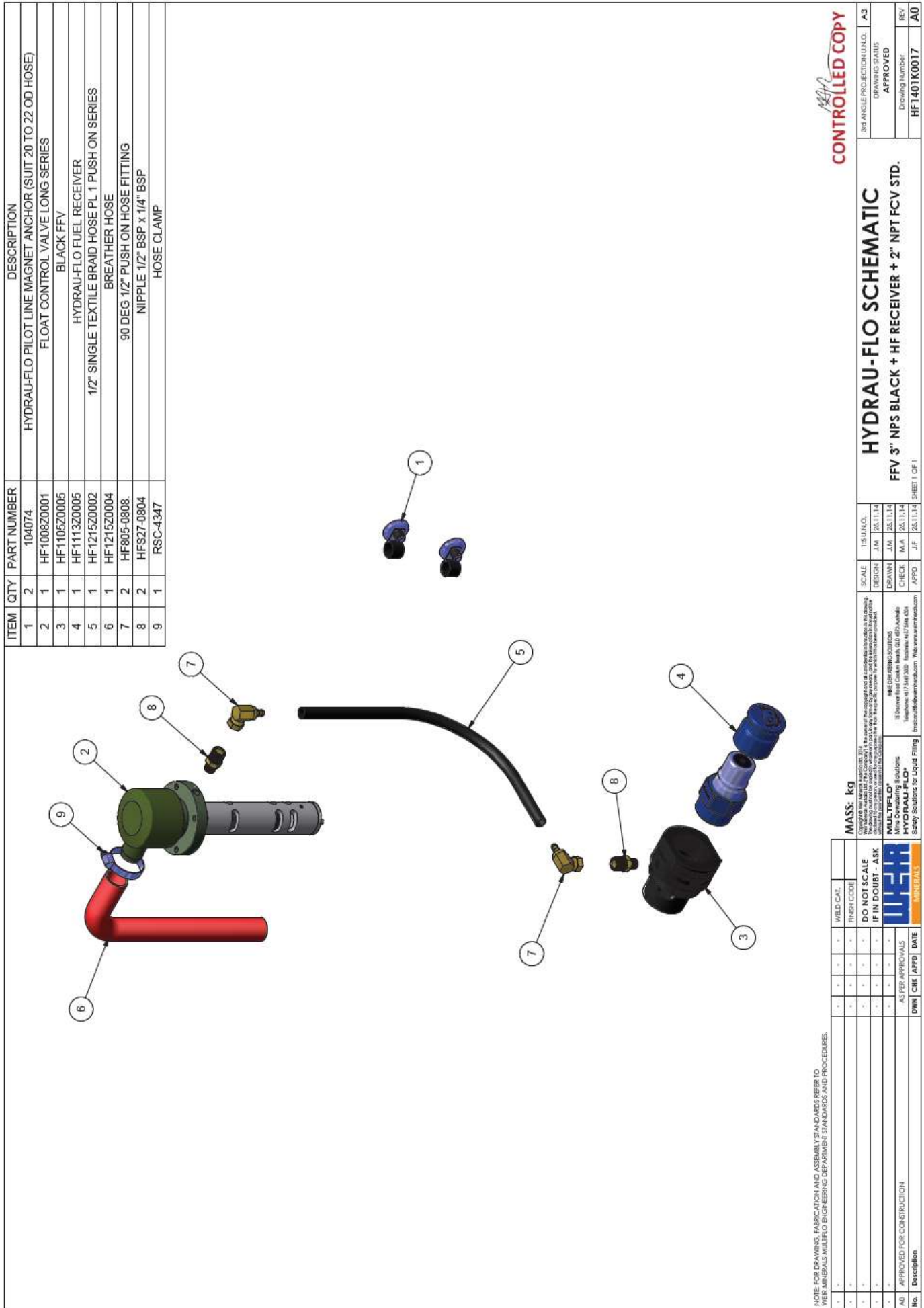
DO NOT SCALE IF IN DOUBT - ASK

WSP (Weir Solutions Pty Ltd)
 MULTIFLO®
 Mine Operating Solutions
 Weir Minerals Australia
 Safety Solutions for Lippert Filtration

NOTE: FOR DRAWING, FABRICATION AND ASSEMBLY STANDARDS REFER TO WEIR MINERALS MULTIFLO ENGINEERING DEPARTMENT STANDARDS AND PROCEDURES.

| No. | Description | APP'D | CHEK | DATE |
|-----|---------------------------|-------|------|------|
| AD | APPROVED FOR CONSTRUCTION | | | |

8.6 Single Receiver and Single Vertical Float (Mobile) General Arrangement



| ITEM | QTY | PART NUMBER | DESCRIPTION |
|------|-----|-------------|---|
| 1 | 2 | 104074 | HYDRAU-FLO PILOT LINE MAGNET ANCHOR (SUIT 20 TO 22 OD HOSE) |
| 2 | 1 | HF1008Z0001 | FLOAT CONTROL VALVE LONG SERIES |
| 3 | 1 | HF1105Z0005 | BLACK FFV |
| 4 | 1 | HF1113Z0005 | HYDRAU-FLO FUEL RECEIVER |
| 5 | 1 | HF1215Z0002 | 1/2" SINGLE TEXTILE BRAID HOSE PL 1 PUSH ON SERIES |
| 6 | 1 | HF1215Z0004 | BREATHER HOSE |
| 7 | 2 | HF805-0808 | 90 DEG 1/2" PUSH ON HOSE FITTING |
| 8 | 2 | HFS27-0804 | NIPPLE 1/2" BSP x 1/4" BSP |
| 9 | 1 | RSC-4347 | HOSE CLAMP |

NOTE FOR DRAWING: FABRICATION AND ASSEMBLY STANDARDS REFER TO WEIR MINERALS MULTIFLO ENGINEERING DEPARTMENT STANDARDS AND PROCEDURES.

| | | | | | |
|--------------------------------|--|--|--|--|--|
| WELD CAT. | | | | | |
| FRESH CODE | | | | | |
| DO NOT SCALE IF IN DOUBT - ASK | | | | | |
| APPROVED FOR CONSTRUCTION | | | | | |
| DESCRIPTION | | | | | |

| | |
|---|--|
| MASS: kg | |
| MULTIFLO® Mine Dewatering Solutions | |
| HYDRAU-FLO® Safety Solutions for Liquid Filting | |
| WEIR MINERALS | |
| 15 Oxmore Road, Cooks Creek, QLD 4054 Australia | |
| Phone: +61 7 34933000 Fax: +61 7 34933004 | |
| http://www.weirminerals.com | |

| | | | |
|--------|------|----------|----------------|
| SCALE | 1:1 | SCALE | AS PER DRAWING |
| DESIGN | JIM | 26/11/14 | |
| DRAWN | JAM | 26/11/14 | |
| CHECK | M.A. | 26/11/14 | |
| APPRO | J.F. | 26/11/14 | |

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|-------------------------------|-------------|
| 3RD ANGLE PROJECTION (UNL.O.) | A3 |
| DRAWING STATUS | APPROVED |
| Drawing Number | HF140TK0017 |
| REV | A0 |

CONTROLLED COPY

HYDRAU-FLO SCHEMATIC
FFV 3" NPS BLACK + HF RECEIVER + 2" NPT FCV STD.

SHEET 1 OF 1

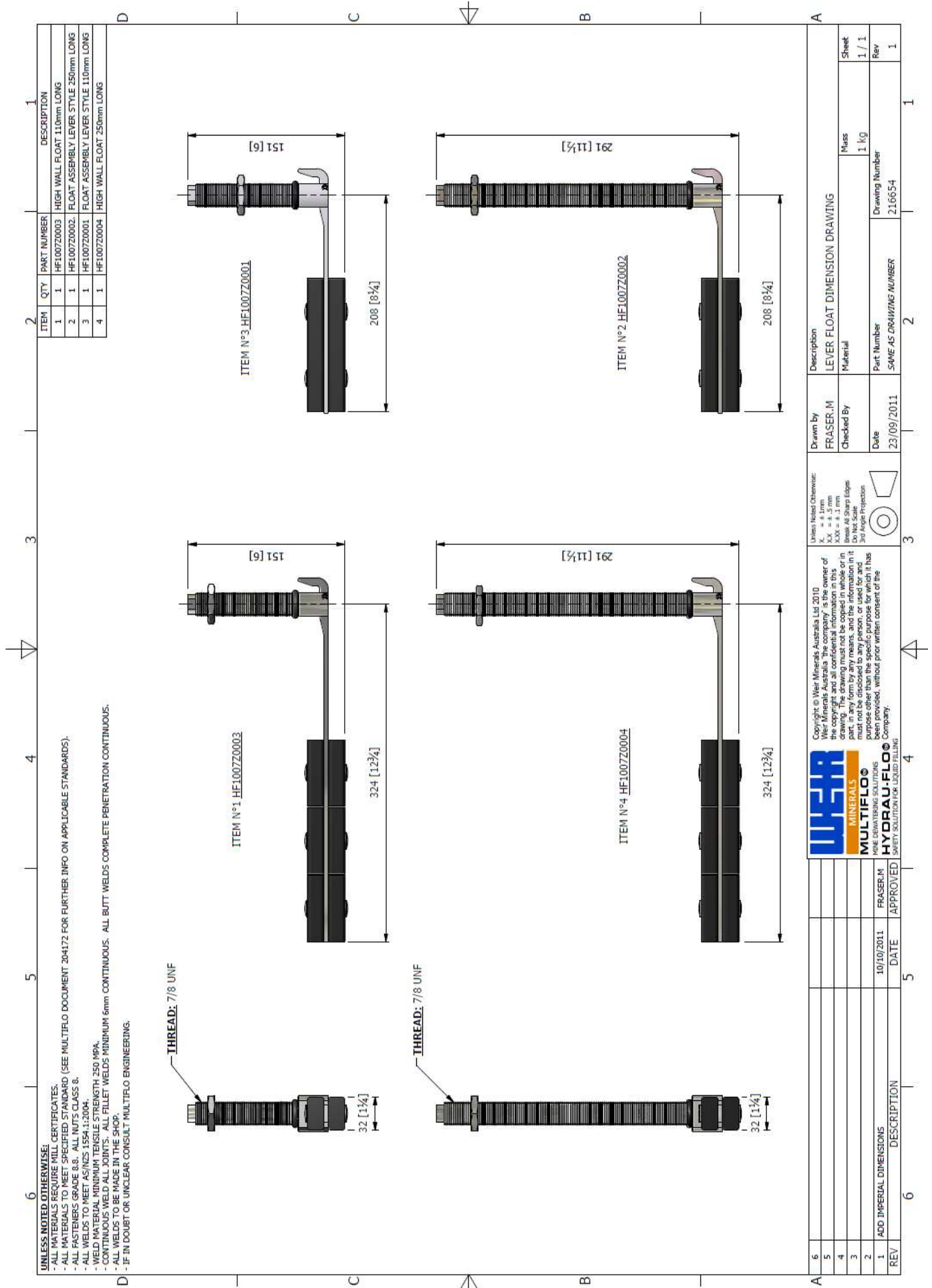
8.7 Single Receiver and Single Lever Float (Stationary) General Arrangement

| ITEM | QTY | PART NUMBER | DESCRIPTION |
|------|-----|-------------|---------------------------------------|
| 1 | 1 | HF1105Z0005 | BLACK VALVE |
| 2 | 1 | HF1103Z0001 | ADAPTOR SCREWED FLANGE |
| 3 | 1 | HH-HP16 | 3/8" HOSE |
| 4 | 2 | HF802-0606 | HOSE FITTING |
| 5 | 1 | HFS27-0604 | NIPPLE 3/8" BSP x 1/4" BSP |
| 6 | 1 | HF1102Z0002 | WELD ON ADAPTOR |
| 7 | 1 | HF1012Z0003 | BOLT ON FLOAT MOUNT |
| 8 | 1 | HFS49-0604 | Male Elbow |
| 9 | 1 | HF1007Z0001 | FLOAT ASSEMBLY LEVER STYLE 110mm LONG |

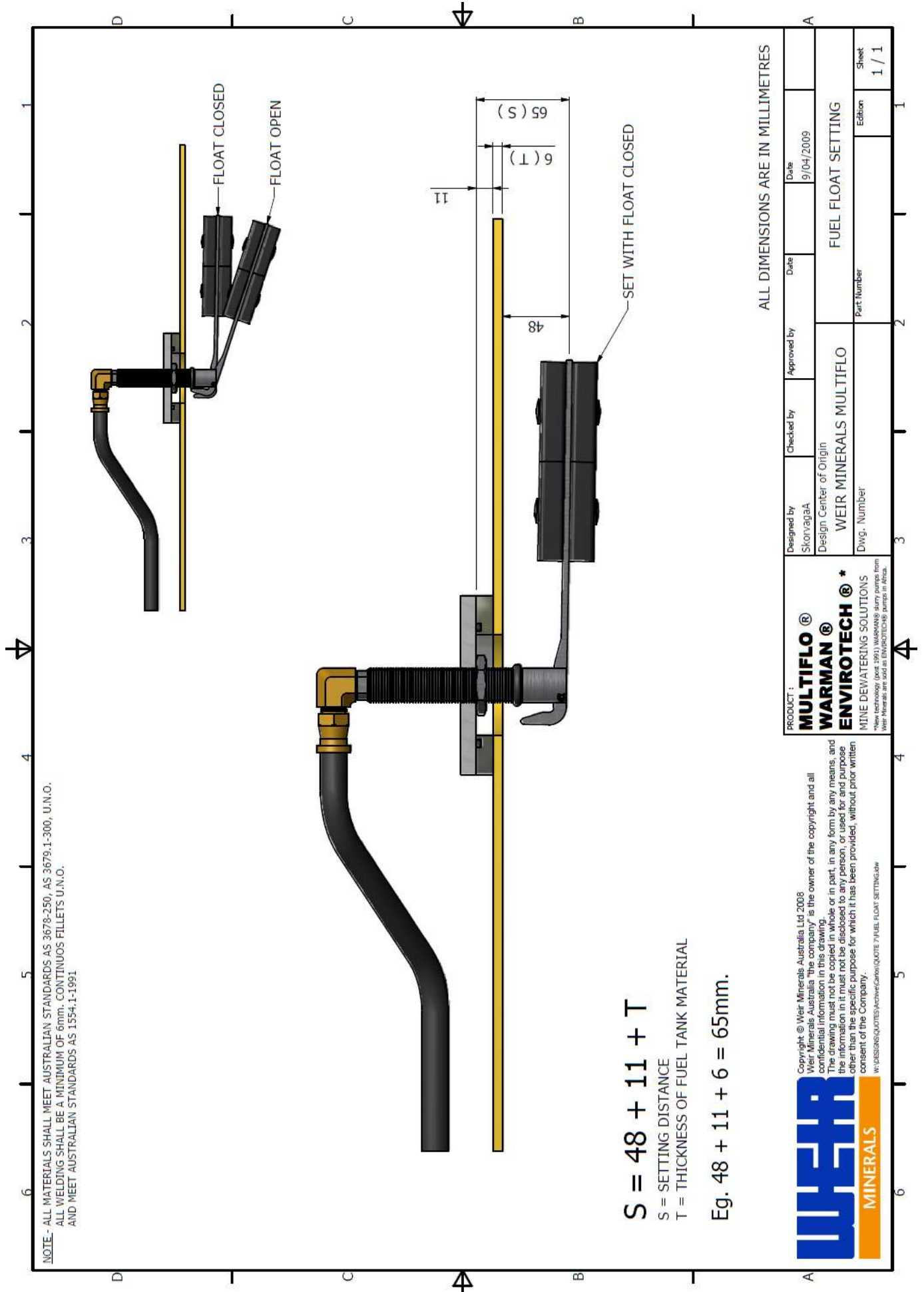


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| Description | | | SCALE: 1:1 (31.48) | | | SHEET 1 OF 1 | | |
| | | | SCALE: 1:1 (31.48) | | | PETRO INDUSTRIAL SCHEMATIC | | |
| | | | SCALE: 1:1 (31.48) | | | DRAWING NUMBER: | | |
| | | | SCALE: 1:1 (31.48) | | | 227165 | | |
| | | | SCALE: 1:1 (31.48) | | | REV: | | |
| | | | SCALE: 1:1 (31.48) | | | P0 | | |

8.8 Lever Float Dimension Drawing



8.9 Fuel Lever Float Settings



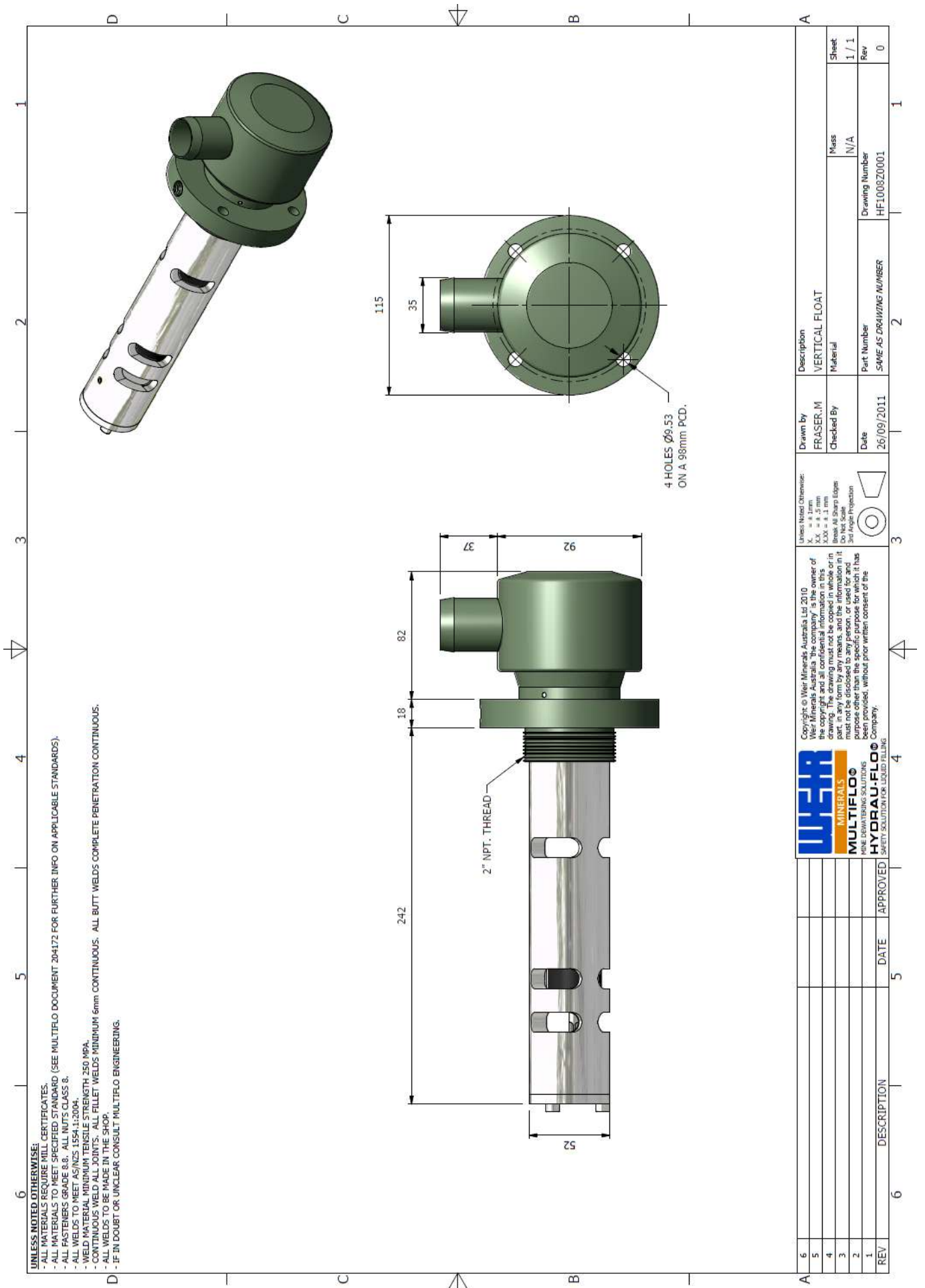
ALL DIMENSIONS ARE IN MILLIMETRES

| | | | | | | | |
|---|--|------------|--|--------------------|--|-------------------|--|
| Designed by Skonvagsa | | Checked by | | Approved by | | Date 9/04/2009 | |
| Design Center of Origin WEIR MINERALS MULTIFLO | | | | FUEL FLOAT SETTING | | | |
| Dwg. Number | | | | Part Number | | | |
| Edition | | | | Sheet 1 / 1 | | | |

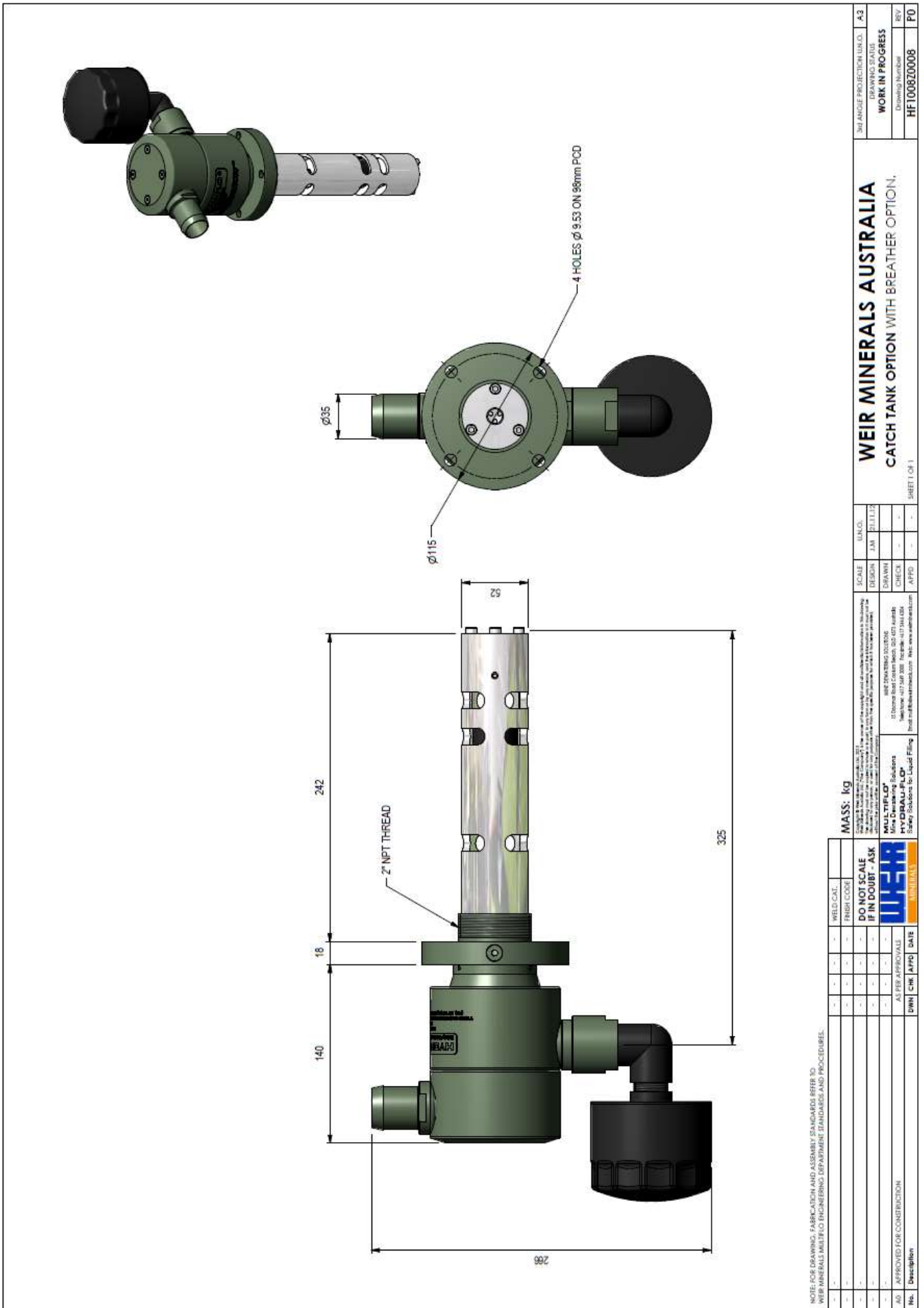
PRODUCT :
MULTIFLO®
WARMAN®
ENVIROTECH® *
 MINE DEWATERING SOLUTIONS
Weir Technology (post 1991) Weir® and Warman® are registered trademarks of Weir Minerals Australia and used as trademarks of Weir Minerals Australia.

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 other than the specific purpose for which it has been provided, without prior written
 consent of the Company.
W:\DESIGN\QUOTES\active\corros\QUOTE 79UML FLOAT SETTING.dwg

8.10 Vertical Float Drawing



8.12 Catch Tank Option with Breather Option Drawing



NOTE: FOR DRAWING, FABRICATION AND ASSEMBLY STANDARDS REFER TO WEIR MINERALS MUEFG ENGINEERING DEPARTMENT STANDARDS AND PROCEDURES.

| | |
|----------------------------|------------------|
| 3rd ANGLE PROJECTION UNITS | A3 |
| DRAWING STATUS | WORK IN PROGRESS |
| Drawing Number | HFT008Z0008 |
| REV | P0 |

| | | | |
|---|--|--------|-------------|
| WEIR MINERALS AUSTRALIA | | SCALE | UNAC. |
| CATCH TANK OPTION WITH BREATHER OPTION. | | DESIGN | JAN 2011.02 |
| | | DRAWN | |
| | | CHECK | |
| | | APPD | |

| | | |
|------|----|---------------------------|
| DATE | BY | DESCRIPTION |
| | | APPROVED FOR CONSTRUCTION |
| | | |

| | |
|--------------------------------|--|
| WELD CAT. | |
| FINISH CODE | |
| DO NOT SCALE IF IN DOUBT - ASK | |

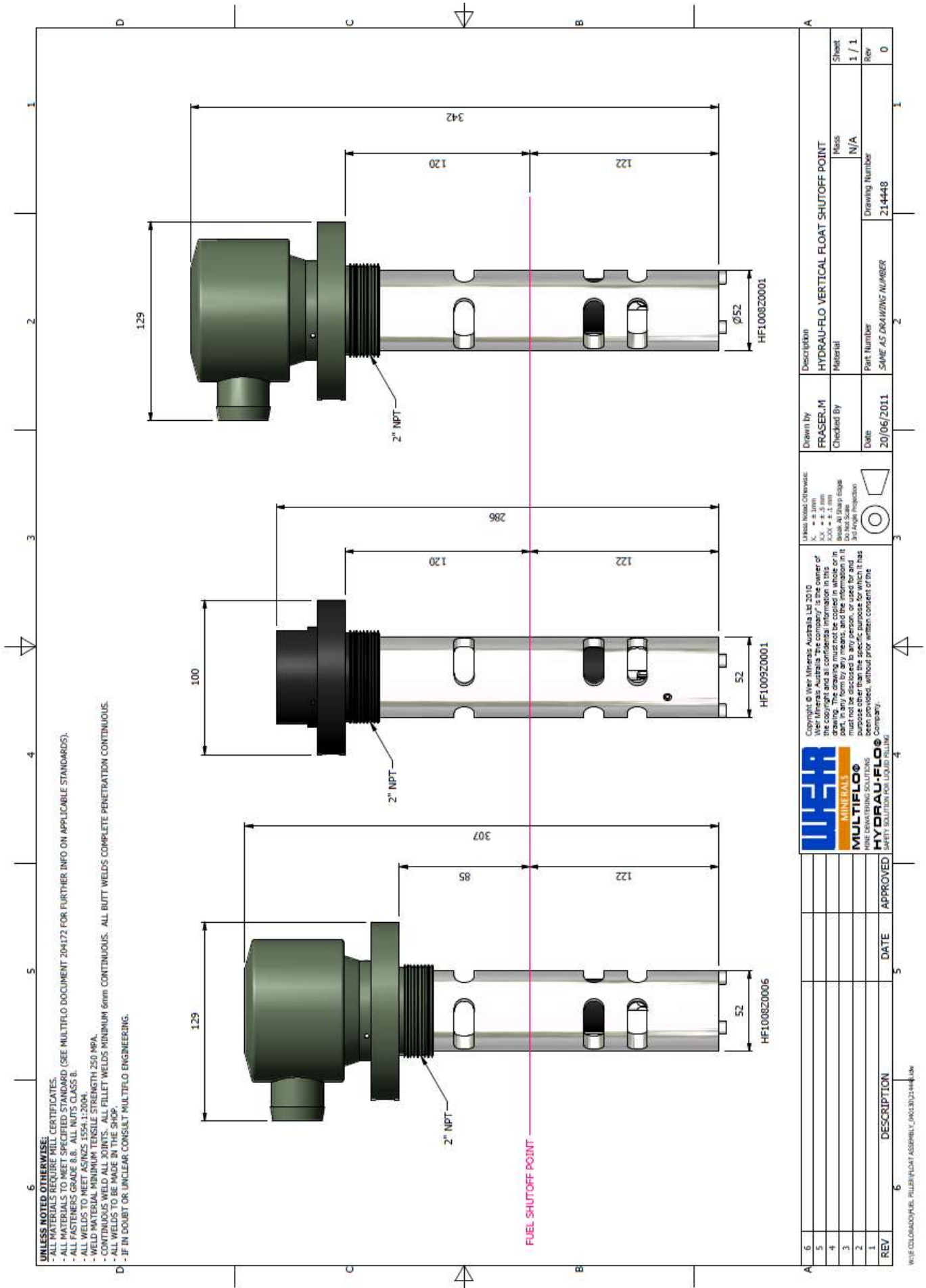
| | | | |
|-----|-----|------|------|
| DWN | CHK | APPD | DATE |
| | | | |

MASS: kg

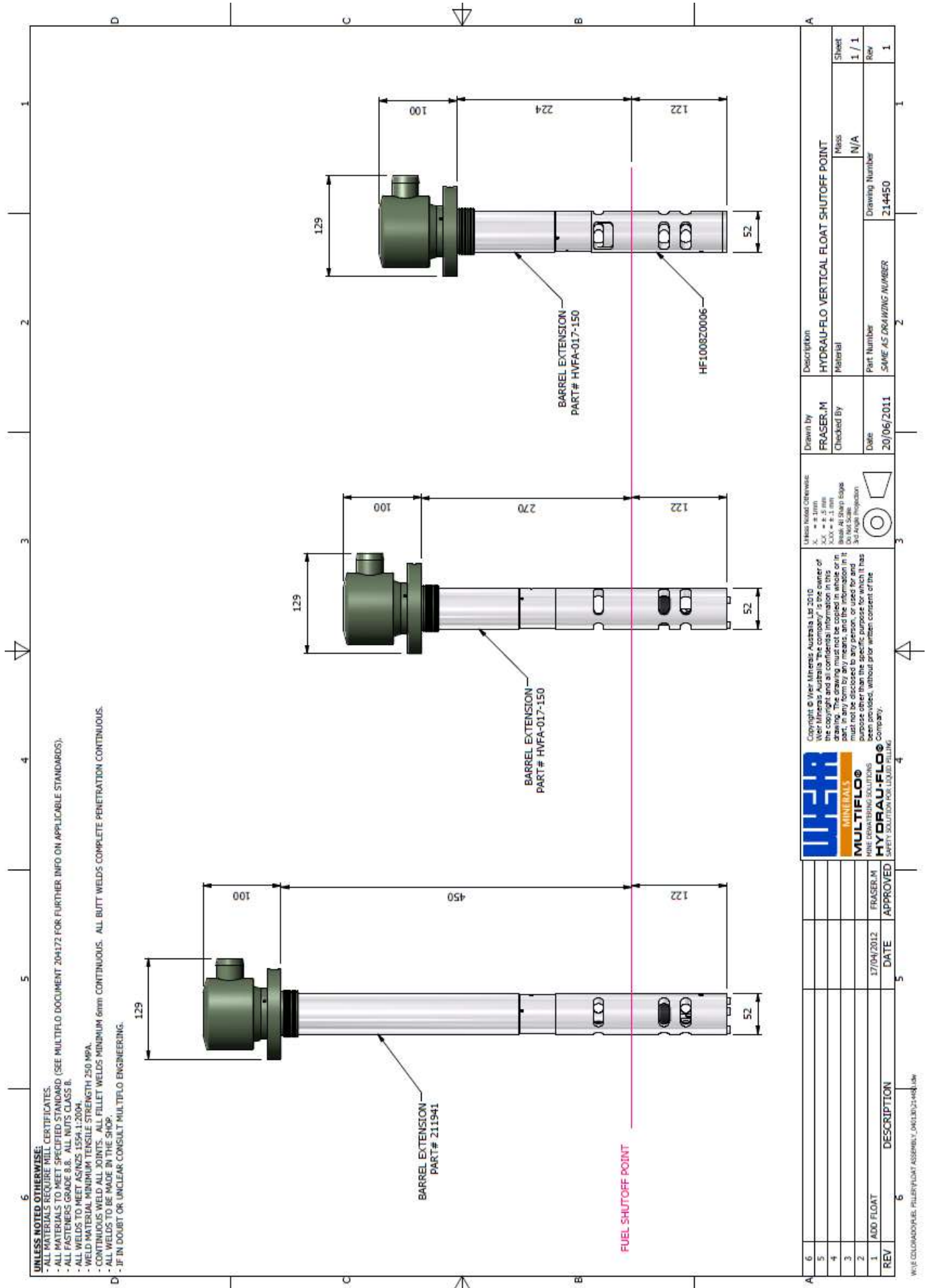
WEIR MINERALS AUSTRALIA
 Mine Drilling Solutions
 HYDRAU-FLO®
 Safety Solutions for Liquid Filling

1120 North Road, Perth, Western Australia 6000
 Tel: +61 8 9447 3000 Fax: +61 8 9447 3001
 Email: sales@weirminerals.com.au
 Website: www.weirminerals.com.au

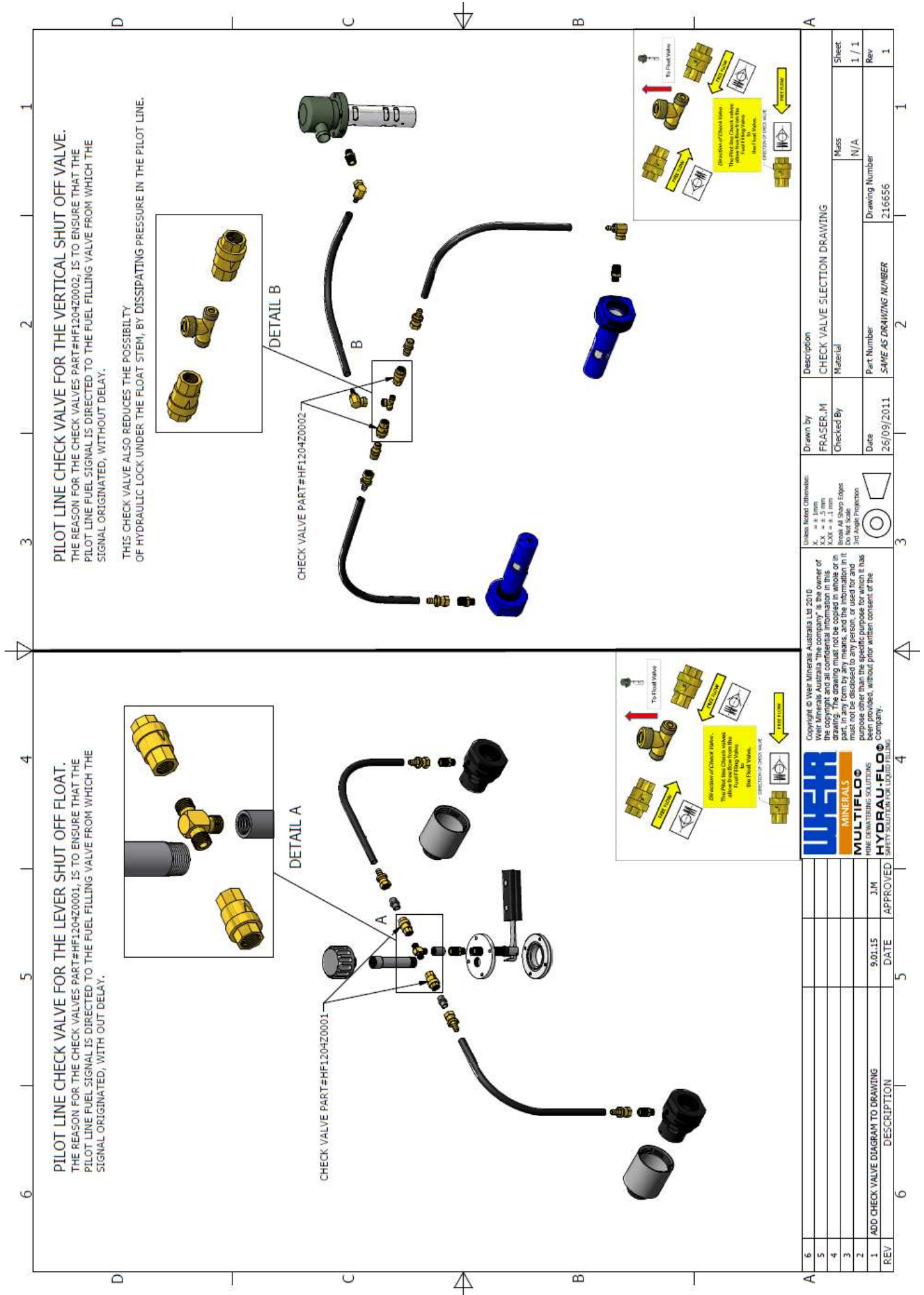
8.13 Vertical Float Shutoff Point Drawing



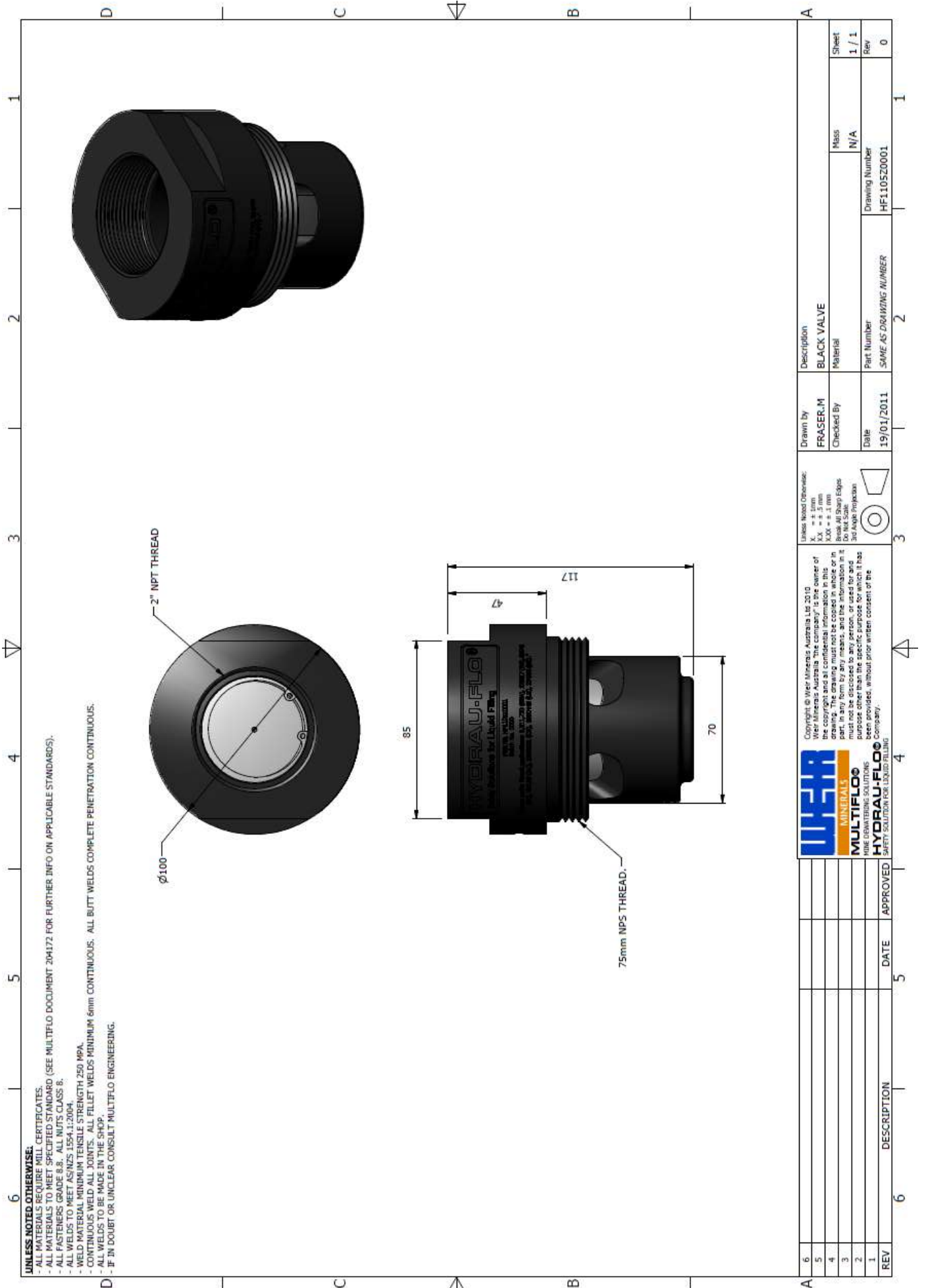
8.14 Vertical Float Shutoff Point Drawing



8.15 Check Valve Selection Drawing



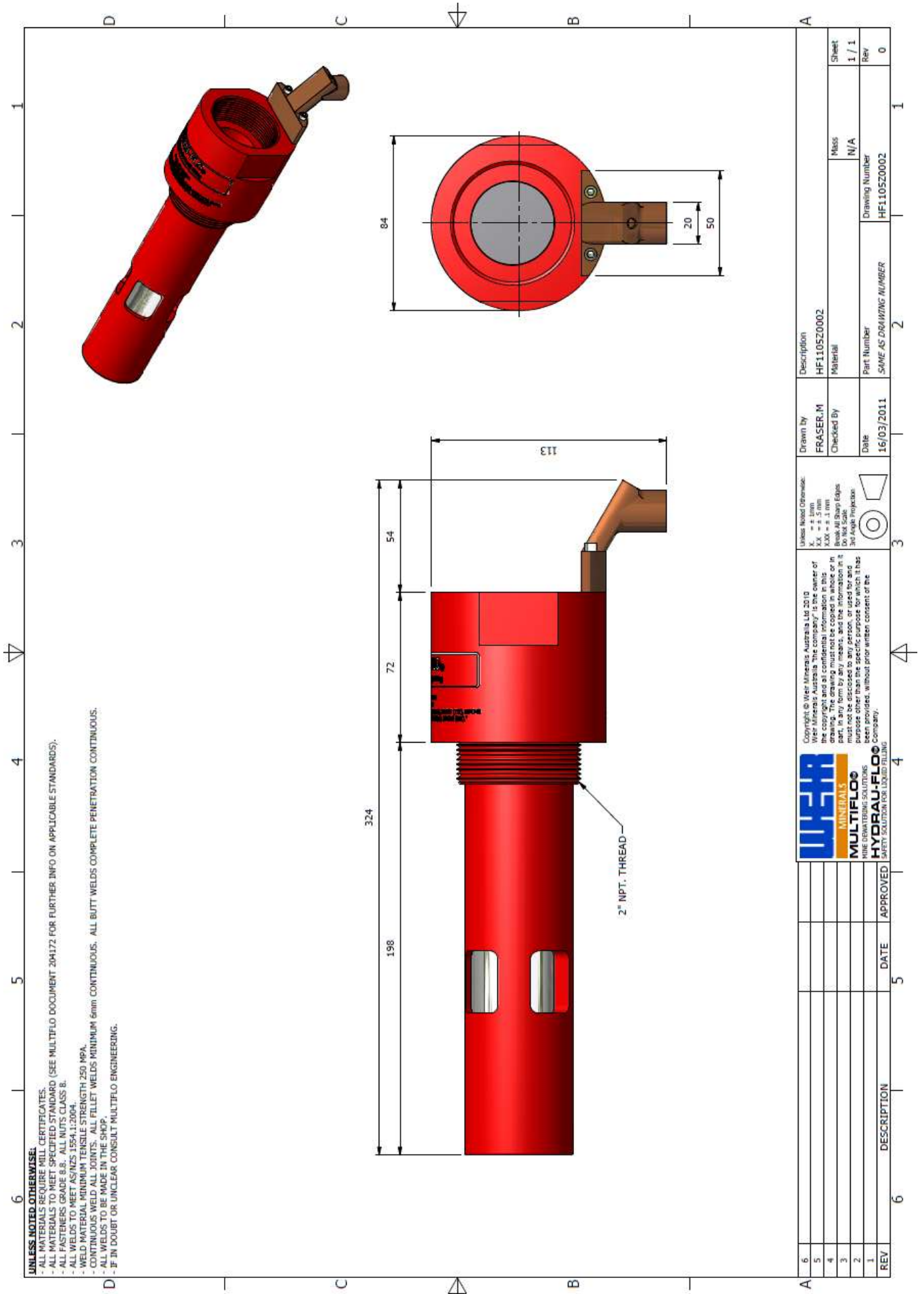
8.16 Black Valve Drawing



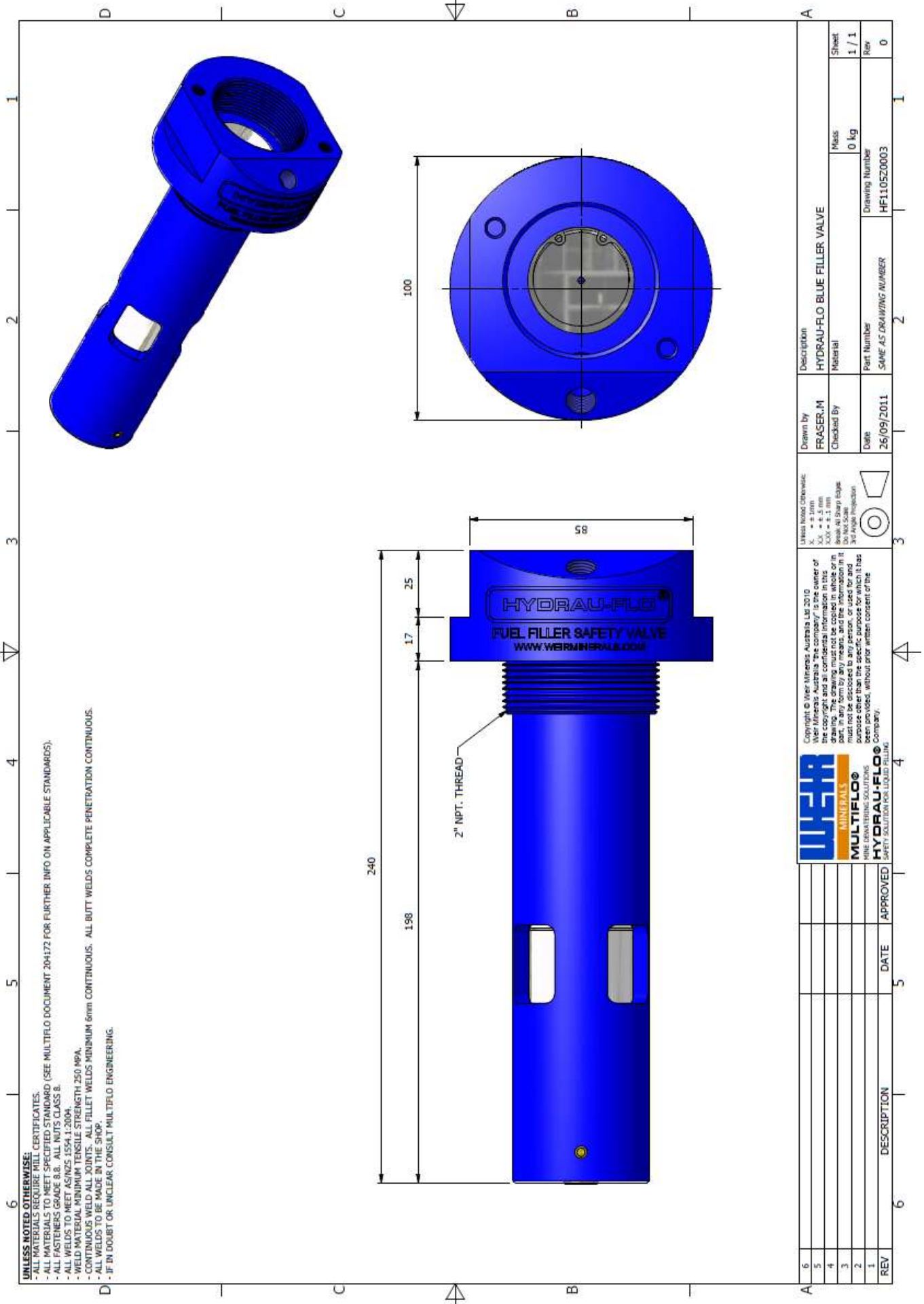
| | | | |
|-----|-------------|------|----------|
| 6 | DESCRIPTION | DATE | APPROVED |
| 5 | | | |
| 4 | | | |
| 3 | | | |
| 2 | | | |
| 1 | | | |
| REV | | | |

| | | | |
|------------|------------|----------------|------------------------|
| Drawn By | FRASER, M | Description | BLACK VALVE |
| Checked By | | Material | N/A |
| Date | 19/01/2011 | Part Number | SAME AS DRAWING NUMBER |
| | | Drawing Number | HF1105Z0001 |
| | | Sheet | 1 / 1 |
| | | Rev | 0 |

8.17 Red Valve Drawing



8.18 Blue Filter Valve Drawing



- UNLESS NOTED OTHERWISE:**
- ALL MATERIALS REQUIRE MILL CERTIFICATES.
 - ALL MATERIALS TO MEET SPECIFIED STANDARD (SEE MULTIFLO DOCUMENT 204172 FOR FURTHER INFO ON APPLICABLE STANDARDS).
 - ALL FASTENERS GRADE 8.8. ALL NUTS CLASS 8.
 - ALL WELDS TO MEET AS/NZS 1594.1:2004.
 - WELD MATERIAL MINIMUM TENSILE STRENGTH 250 MPA.
 - CONTINUOUS WELD ALL JOINTS. ALL FILLET WELDS MINIMUM 6mm CONTINUOUS. ALL BUTT WELDS COMPLETE PENETRATION CONTINUOUS.
 - ALL WELDS TO BE MADE IN THE SHOP.
 - IF IN DOUBT OR UNCLEAR CONSULT MULTIFLO ENGINEERING.

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| REV | DESCRIPTION | DATE | APPROVED |
|-----|-------------|------|----------|
| | | | |
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| | | | |
| | | | |
| | | | |

8.19 Gold Valve Drawing

2" NPT THREAD

2" NPT THREAD

49

157

ø75

HYDRAU-FLO®
Safety Solutions for Liquid Filling

Part No. HF110520007
Serial No. 0000
These valves perform applications 0.5 to 1.729 (0.5 to 1.729) MPa, 200 to 250 (200 to 250) °C.

MASS: 0.6 kg

30° ANGLE PROJECTION UNCL. A3

DRAWING STATUS
WORK IN PROGRESS

Drawing Number
HF110520007

REV
P0

SCALE
UNCL. J.M. 13.6.13

DESIGN
SRAWH J.M. 13.6.13

CHECK
-- -- --

APPD
-- -- --

2" GOLD VALVE

SHEET 1 OF 1

NOTE: FOR DRAWING, FABRICATION AND ASSEMBLY STANDARDS REFER TO WEIR MINERALS MULTIFLO ENGINEERING DEPARTMENT STANDARDS AND PROCEDURES.

| No. | Description | DATE | APPD | CHK | DRN | APPROVED FOR CONTRIBUTION | APPROVED | WHER | FINISH CODE | WELD CODE | MASS |
|-----|---------------------------|------|------|-----|-----|---------------------------|----------|------|-------------|-----------|--------|
| 1 | APPROVED FOR CONTRIBUTION | | | | | | | | | | 0.6 kg |

DO NOT SCALE IF IN DOUBT - ASK

WEIR MINERALS AUSTRALIA

MULTIFLO®
Weir Minerals Australia
17 Dorrville Road, Cullen, South Australia 5161
Tel: +61 8 8547 2000 Fax: +61 8 8547 2001
www.weirminerals.com.au

8.20 Environmental Exposure Certificate



ENVIRONMENTAL EXPOSURE CERTIFICATE

| | | | |
|-----------------------------|---------------------------------------|----------------|------------|
| Report Date | 6/6/2012 | MTO # | 2012-047 |
| Customer | Weir Minerals Multiflo | Quote # | Q2011-539B |
| Test Sample | Fuel Filling System | PO # | 33083 |
| Part Number(s) | HF1105Z0001, HF1105Z0003, HF1008Z0006 | | |
| Serial Number(s) | CSZ 001-CSZ 006 | | |
| Test Start Date | 5/31/2012 | | |
| Test Completion Date | 6/2/2012 | | |
| Performed By | L.Orr | | |

| <u>Equipment Used</u> | <u>Description</u> | <u>Serial #</u> | <u>Calibration Date</u> | <u>Calibration Due Date</u> |
|-----------------------|--------------------|-----------------|-------------------------|-----------------------------|
| ESSC 063 | Accelerometer | S/N: 96052 | 8/24/2011 | 8/24/2012 |
| ESSC 037 | Agree | S/N: 99-AV13526 | 6/15/2011 | 6/15/2012 |
| ESSC 009 | SD Controller | S/N: 2932-7832D | 9/26/2011 | 9/26/2012 |
| ESSC 032 | Signal Conditioner | S/N: 2144 | 8/29/2011 | 8/29/2012 |
| ESSC 048 | Accelerometer | S/N: 70515 | 3/14/2012 | 3/14/2013 |
| ESSC 047 | Accelerometer | S/N: 70514 | 5/25/2012 | 5/25/2013 |

Test samples were subjected to the following conditions

Temperature with Vibration per MIL-STD-810G, Method 514.6, Category 4:
 Composite Wheeled Vehicle Vibration Exposure.

1. The samples were mounted in the vertical axis.
2. Ramped chamber to -65C (-85F) and subjected test item to the vibration profile (Figure 514.6C-3 Category 4) for one hour.
3. Ramped chamber to 24C (75F) and subjected test item to the vibration profile (Figure 514.6C-3 Category 4) for one hour.
4. Ramped chamber to 43.3C (110F) and subjected test item to the vibration profile (Figure 514.6C-3 Category 4) for one hour.
5. Returned chamber to 24C (75 F), repeated steps 2 through 5 for the remaining two axes.

Pictures and video were taken at the start of each axes. Samples were inspected after each temperature. No anomalies were noted.

OBSERVATIONS AND ANOMALIES

| Date | Time | Initials | Description |
|-----------|------|----------|--|
| 5/31/2012 | 1055 | L.O. | The vertical axis starting frequency was changed from 5Hz to 6.25Hz to accommodate shaker limitations. The modification is allowed per this test method. |
| | | | |
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Test results apply only to those parts and serial numbers listed above
 Estimation of Uncertainty Measurements available upon request.

This report shall not be reproduced EXCEPT IN FULL, without the written approval of CSZ TESTING.

8.21 Explosive Atmospheres Certification



Acknowledgement of Receipt

Equipment and protective systems
intended for use in potentially
explosive atmospheres, **Directive 94/9/EC**

| | |
|--------------------------------|--|
| for the equipment: | Hydrau Flo Fuel Filling Valve |
| type: | HF1105Z0003 |
| of the manufacturer: | Weir Minerals MultiFlo |
| Address: | Head Office, 15 Dacmar Road, Coolum Beach QLD 4573, Australia |
| Deposit number: | 35118218 |
| Date of issue: | 2013-03-25 |
| Forwarded technical documents: | consisting of 1 envelope |

According to the conformity assessment procedure as per Directive 94/9/EC, Chapter II, Article 8, Paragraph (1), Letter b, Passage ii) the manufacturer forwarded technical documents for storage purposes acc. to Annex VIII, Number 3 of the Directive for the above mentioned product.

The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC) the receipt of these documents.

The documents are stored until 2023-03-21 (10 years) and afterwards by request of the manufacturer either kept further, sent back or destroyed.



TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body



Peters

Hanover office, Am TÜV 1, 30519 Hannover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

8.22 Hydrau-Flo® Parts List

|  Safety Solutions for Liquid Filling | | Excellent Minerals Solutions  | |
|--|--|---|------------|
| Mechanical and Non-Pressurised Fuel Filling Valves | | | |
| Item No. | Item Description | Mass (kg) | Mass (lbs) |
| Hydrau- Flo Valve Tools | | | |
| 101023 | WRENCH, SPANNER, AND BAR SUIT HYDRAU-FLO BLUE AND BLACK VALVE ASSEMBLY | 3.70 | 8.16 |
| 202125 | WRENCH, SPANNER, AND BAR SUIT HYDRAU-FLO RED VALVE ASSEMBLY | 1.88 | 4.14 |
| 201240 | WRENCH, SPANNER, SUIT HYDRAU-FLO BLUE AND BLACK VALVE ASSEMBLY- SIDE ENTRY | 0.66 | 1.46 |
| 200629 | WRENCH, SPANNER, SUIT HYDRAU-FLO CONTROL VALVE ASSEMBLY- SIDE ENTRY | 0.66 | 1.46 |
| Hydrau- Flo Fuel Filling Valves | | | |
| HF1105Z0001 | HYDRAU-FLO Valve Black filler c/w o'ring | 1.36 | 3.00 |
| HF1105Z0002 | HYDRAU-FLO Valve red with port block | 1.58 | 3.48 |
| HF1105Z0003 | HYDRAU-FLO Valve blue filler. Old p/no HF50-09A. | 1.26 | 2.78 |
| Hydrau- Flo Valves- Float Control and Lever Floats | | | |
| HF1007Z0001 | HYDRAU-FLO Float Assembly Lever style 110mm long | 0.22 | 0.49 |
| HF1007Z0002 | HYDRAU-FLO Float Assembly Lever style 250mm long | 0.32 | 0.71 |
| HF1007Z0003 | HYDRAU-FLO Float Assembly High Wall 110mm Stem | 0.26 | 0.57 |
| HF1007Z0004 | HYDRAU-FLO Float Assembly High Wall 250mm Stem | 0.38 | 0.84 |
| HF1008Z0001 | HYDRAU-FLO Float Assembly Vertical Old P/no HVFA-001 | 1.76 | 3.88 |
| HF1008Z0002 | HYDRAU-FLO Breather Anti Surge | 1.06 | 2.34 |
| HF1008Z0003 | HYDRAU-FLO Adaptor Anti Surge Breather | 0.60 | 1.32 |
| HF1008Z0004 | HYDRAU-FLO Float Assembly Vertical with 100mm extension fitted | 1.94 | 4.28 |
| HF1008Z0005 | HYDRAU-FLO Float Assembly Vertical with 150mm extension fitted. | 2.03 | 4.48 |
| HF1008Z0006 | HYDRAU-FLO Float Assembly Short Series | 1.66 | 3.66 |
| HF1008Z0007 | HYDRAU-FLO Float Assembly Std with breather bypass | 2.10 | 4.63 |
| HF1009Z0001 | HYDRAU-FLO Float Assembly no roll over protection old p/no HVFB-001 | 1.14 | 2.51 |
| Hydrau- Flo Valve Adaptors and Hardware | | | |
| 101441 | HYDRAU-FLO ADAPTOR BLACK VALVE TO 2 IN NPT MALE THREAD | 0.62 | 1.37 |
| 102907 | HYDRAU-FLO ADAPTOR ANODIZED CLEAR 2 IN BSP SUITS BLACK VALVE TO DWG 102907 | 0.62 | 1.37 |
| 209304 | ADAPTOR, HYDRAUFLO; WELD ON ALUMINIUM | 0.52 | 1.15 |
| 103042 | ADAPTOR, HYDRAUFLO; HITACHI BOLT ON TO SUIT BLACK VALVE | 1.82 | 4.01 |
| HF0304Z0001 | HYDRAU-FLO Breather Filler | 0.22 | 0.49 |
| HF0304Z0002 | HYDRAU-FLO Breather | 0.18 | 0.40 |
| HF0304Z0003 | HYDRAU-FLO Breather rain cap | 0.26 | 0.57 |
| HF1011Z0001 | HYDRAU-FLO Adaptor Vertical float to D10R/ D11R Tank | 0.52 | 1.15 |
| HF1011Z0002 | PIPE Socket 2" NPT Black | 1.40 | 3.09 |
| HF1012Z0001 | HYDRAU-FLO Adaptor weld on flange | 0.62 | 1.37 |
| HF1012Z0002 | HYDRAU-FLO Mounting Plate 2 hole | 0.80 | 1.76 |
| HF1012Z0003 | HYDRAU-FLO Mounting Plate single hole | 0.32 | 0.71 |
| HF1014Z0001 | HYDRAU-FLO Breather extension | 0.10 | 0.22 |
| HF1014Z0002 | HYDRAU-FLO Breather mount bolt on HF1014Z0002 | 0.20 | 0.44 |

Hydrau-Flo® Parts List Continued

|  Safety Solutions for Liquid Filling | | Excellent Minerals Solutions  | |
|--|---|---|-------|
| Mechanical and Non-Pressurised Fuel Filling Valves | | | |
| HF1102Z0001 | HYDRAU-FLO ADAPTOR ANODIZED CLEAR 2 IN NPT SUITS BLACK VALVE | 0.62 | 1.37 |
| HF1102Z0002 | HYDRAU-FLO Adaptor weld on | 0.82 | 1.81 |
| HF1102Z0003 | HYDRAU-FLO Adaptor internal mounting of blue valve. | 0.32 | 0.71 |
| HF1102Z0004 | HYDRAU-FLO Adaptor Hose Tail 2"/ Black valve | 3.12 | 6.88 |
| HF1102Z0005 | HYDRAU-FLO Adaptor Hose tail 2 1/2"/ Black valve | 3.36 | 7.41 |
| HF1102Z0006 | HYDRAU-FLO Adaptor Hose tail 3"/ Black valve | 5.20 | 11.46 |
| HF1102Z0007 | HYDRAU-FLO Adaptor Liebherr shovel / Black valve | 3.86 | 8.51 |
| HF1102Z0008 | HYDRAU-FLO Adaptor Black valve / Cat fuel tanks | 0.66 | 1.46 |
| HF1102Z0009 | HYDRAU-FLO Adaptor | 0.98 | 2.16 |
| HF1102Z0010 | HYDRAU-FLO Adaptor- weld in to suit black valve | 10.64 | 23.46 |
| HF1102Z0011 | HYDRAU-FLO Adaptor Liebher | 3.76 | 8.29 |
| HF1102Z0012 | PIPE ASSEMBLY,METAL;STEEL FUEL STANDPIPE 150MM | 5.20 | 11.46 |
| HF1102Z0013 | OBSOLETE SEE P/NO 203653 PIPE ASSEMBLY,METAL;STEEL FUEL STANDPIPE 310MM | 5.20 | 11.46 |
| HF1103Z0001 | HYDRAU-FLO Adaptor screwed flange | 0.66 | 1.46 |
| HF1103Z0002 | HYDRAU-FLO Adaptor- weld in to suit blue valve | 6.82 | 15.04 |
| HF1103Z0003 | HYDRAU-FLO Adaptor D11 Dozer TO DWG HF50-10 | 1.10 | 2.43 |
| HF1103Z0004 | HYDRAU-FLO ADAPTOR D10R-D11R/ BLUE VALVE TO DWG HF50-11 | 1.26 | 2.78 |
| HF1103Z0005 | HYDRAU-FLO Adaptor Bolt on style | 1.37 | 3.02 |
| HF1103Z0006 | HYDRAU-FLO Adaptor ZNC4 Weld in style | 2.75 | 6.06 |
| HF1103Z0007 | HYDRAU-FLO Adaptor Blue valve to Cat weld flange to drg HF50-16 | 1.83 | 4.03 |
| HF1110Z0001 | DUST CAP | 0.01 | 0.02 |
| HF1110Z0002 | RECEIVER;WIGGINS 2" NPT 11 PSI "BLUE NOZZLE" LIGHT SPRING | 0.66 | 1.46 |
| HF1110Z0003 | DUST CAP | 0.01 | 0.02 |
| HF1113Z0001 | SPRING | 0.12 | 0.26 |
| HF1113Z0002 | RECEIVER 5 PSI wiggins | 0.04 | 0.09 |
| HF1113Z0003 | RECEIVER 5 PSI 'L' Banlaw | 1.04 | 2.29 |
| HF1119Z0001 | HYDRAU-FLO Valve Hydrau-flo Filler 45mm | 0.56 | 1.23 |
| HF1204Z0001 | VALVE,CHECK;HYDRAU-FLO | 0.20 | 0.44 |
| HF1204Z0002 | VALVE,CHECK;HYDRAU-FLO WITH BALANCE PORT. Old p/no FBS-54-H. | 0.10 | 0.22 |
| HF1204Z0004 | VALVE,CHECK;HYDRAU-FLO | 0.18 | 0.40 |
| HF1215Z0001 | HOSE 10mm per metre | 0.27 | 0.60 |
| HF1215Z0002 | HOSE 12mm per metre | 0.39 | 0.86 |
| HF1215Z0003 | HOSE 25mm per metre | 0.70 | 1.54 |
| HF1215Z0004 | HOSE 32mm per metre | 0.85 | 1.87 |
| HF1304K0001 | KIT Anti surge tanks Only to suit 992G CAT Loader | 7.10 | 15.65 |
| HF1304Z0001 | TANK Anti Surge Set of 2 | 14.20 | 31.31 |
| HF1311Z0050 | EXTENSION Barrel 50mm suits Verticle floats to drg HVFA-017-050 | 0.18 | 0.40 |
| HF1311Z0100 | EXTENSION Barrel 100mm suits Verticle floats to drg HVFA-017-100 | 0.36 | 0.79 |
| HF1311Z0150 | EXTENSION Barrel 150mm suits Verticle floats to drg HVFA-017-150 | 0.54 | 1.19 |
| 211941 | EXTENSION Barrel 330mm suits Verticle floats to drg 211941 | 1.08 | 2.38 |

8.23 Hydrau-Flo® Deliverables

The Hydrau-Flo® deliverables

The Hydrau-Flo® fuel filling valve system:

- *Allows for safe, ground level refueling;*
- *Based on a sound mechanical principle- spring opposed hydraulic pressure;*
- ✓ ▪ *Prevents overfilling, fuel spillage and waste;*
- *Is industries best practice in refueling;*
- *Reduces fuel theft;*
- ✓ ▪ *Removes the risk of tank rupture due to pressure build up during and after filling;*
- *Minimises the risk of fire as a result of fuel spillage;*
- *Is accompanied by a comprehensive **36month** warranty;*
- ✓ ▪ *Significantly improves safety and environmental outcomes;*
- *Greatly improves fuel filling times compared to traditional filling;*
- *Is mature technology, in use since 1997;*
- *Remove fuel spray issues associated with pressurized systems;*
- *The only Australian made system on the market;*
- *Removes the operator from influencing fill levels; and*
- ✓ ▪ *Environmental exposure certification- proven to operate in extreme temperatures - 65°C (-85°F).*