Trident Model HS-30

Hydrostatic Level Sensor

Installation and Operation Manual

HYDROLOGICAL SERVICES Pty Ltd
48-50 Scrivener Street
Liverpool NSW 2170
Australia
Ph. 61 2 9601 2022 Fax. 61 2 9602 6971
Internet: www.hydrologicalservices.com
E-Mail: sales@hydrologicalservices.com

TABLE OF CONTENTS

1. Introduction

The HS-30, when used with the Gas Chamber Orifice GC01, forms a complete Hydrostatic Level Sensor for measuring water level in dams, rivers, canals and tanks with up to 30m (100ft) of water head. The unit can be used with any pressure transducer.

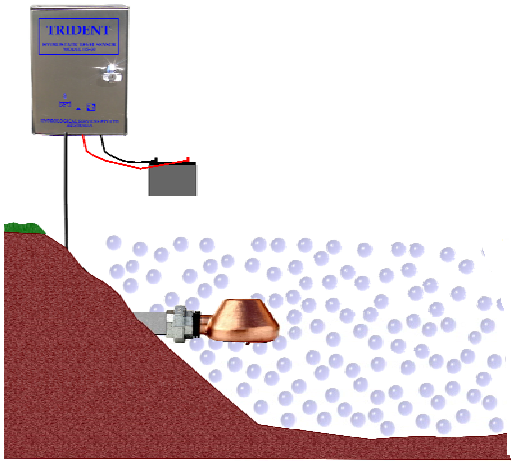
Advantages over other systems :

- Self purging
- Ideal for high silt areas
- Reduced lag between water level rise and orifice pressure
- Long periods unattended
- Low maintenance
- No gas bottle replacement or bubble rates to set up
- Compact size and
- Easy to install

Internal view of the Trident Model HS-30 shown with a Hydrological Services WL3100 Pressure Transducer in the top of the cabinet.
Note: The WL3100 is not included with the standard HS-30

2. Product Overview

The Trident Model HS-30 is designed to be used with a GCO (Gas Chamber Orifice) and replace conventional Dry Nitrogen or Compressed Air bubbler systems.



A dot point view of the product is as follows :

- Must be used with a GCO !!
- Can be used with any pressure transducer.
- Purge sequence :
  1. Switch Valve (to connect pump to GCO).
  2. Operate pump for 5 secs.
  3. Monitor pressure for 30 secs.
  4. Switch Valve back (to connect transducer to GCO).
- Purge when :
  1. Every 3 hours (fixed) and
  2. When water level rises by more than 100mm (4 inches) or
  3. Manual purge by operator.
- Falling water level – excess pressure vents automatically from GCO.
- Pressure on transducer is held constant during a purge.
- Operates with a 12V 38Ah Battery, average consumption is 30mA (=> 40 days batt life - based on 7 x 3 hr purges and a 1m (3ft) water level rise per day)
- A small 5 Watt Solar panel is sufficient to keep the battery fully charged.
- Operates with up to 30m (100ft) head of water.

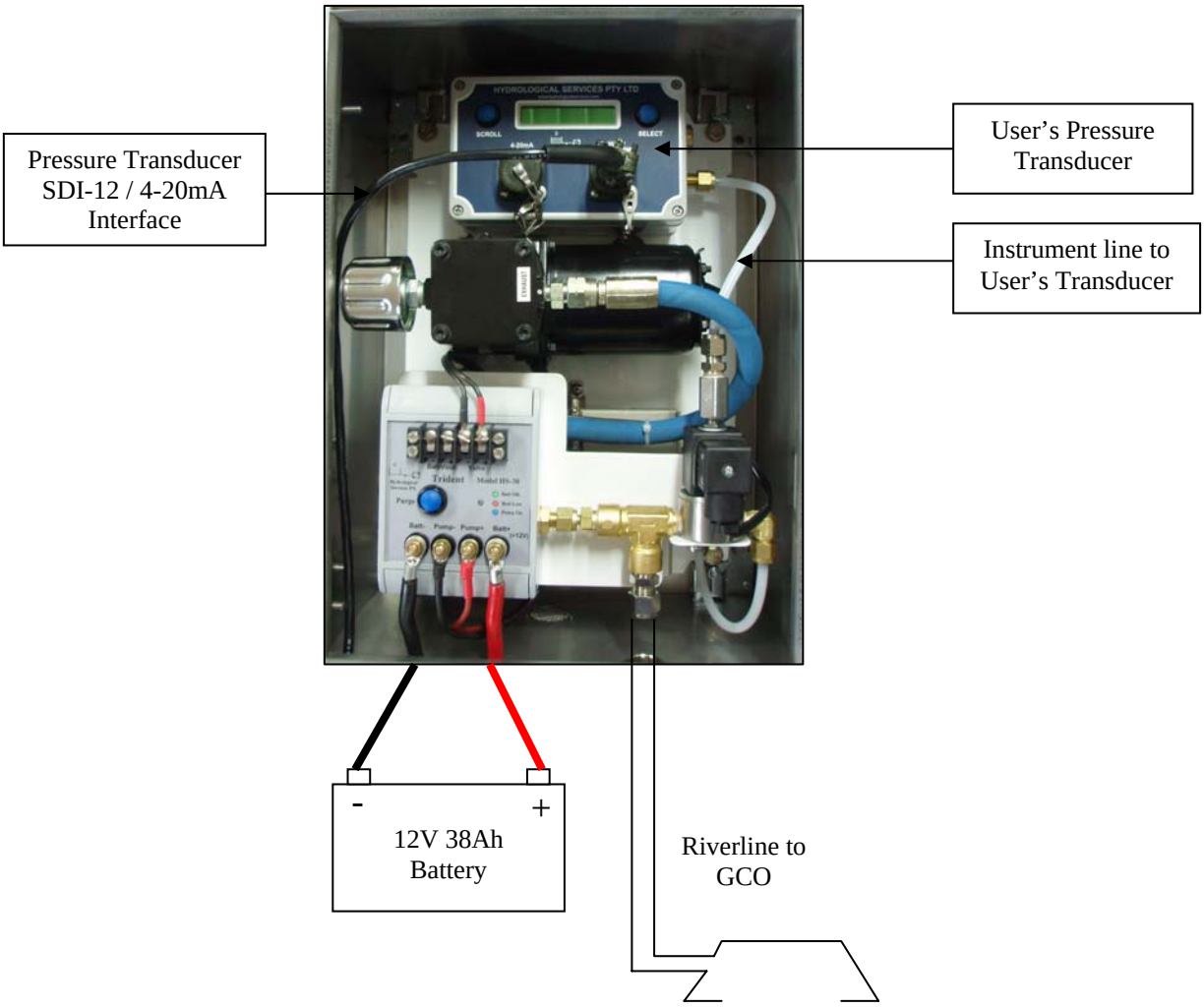
3. Installation

The HS-30 is designed to be mounted in a vertical position. The water / oil separator will not function properly if the unit is in a horizontal position.

Before connecting power to the HS-30, fit the 1/4 inch instrument line to the user's transducer and then fit 3/8 inch river-line tube between the HS-30 and the GCO. The GCO is supported in-situ by a 2 inch galvanized pipe. (See the Appendix C and D for details)

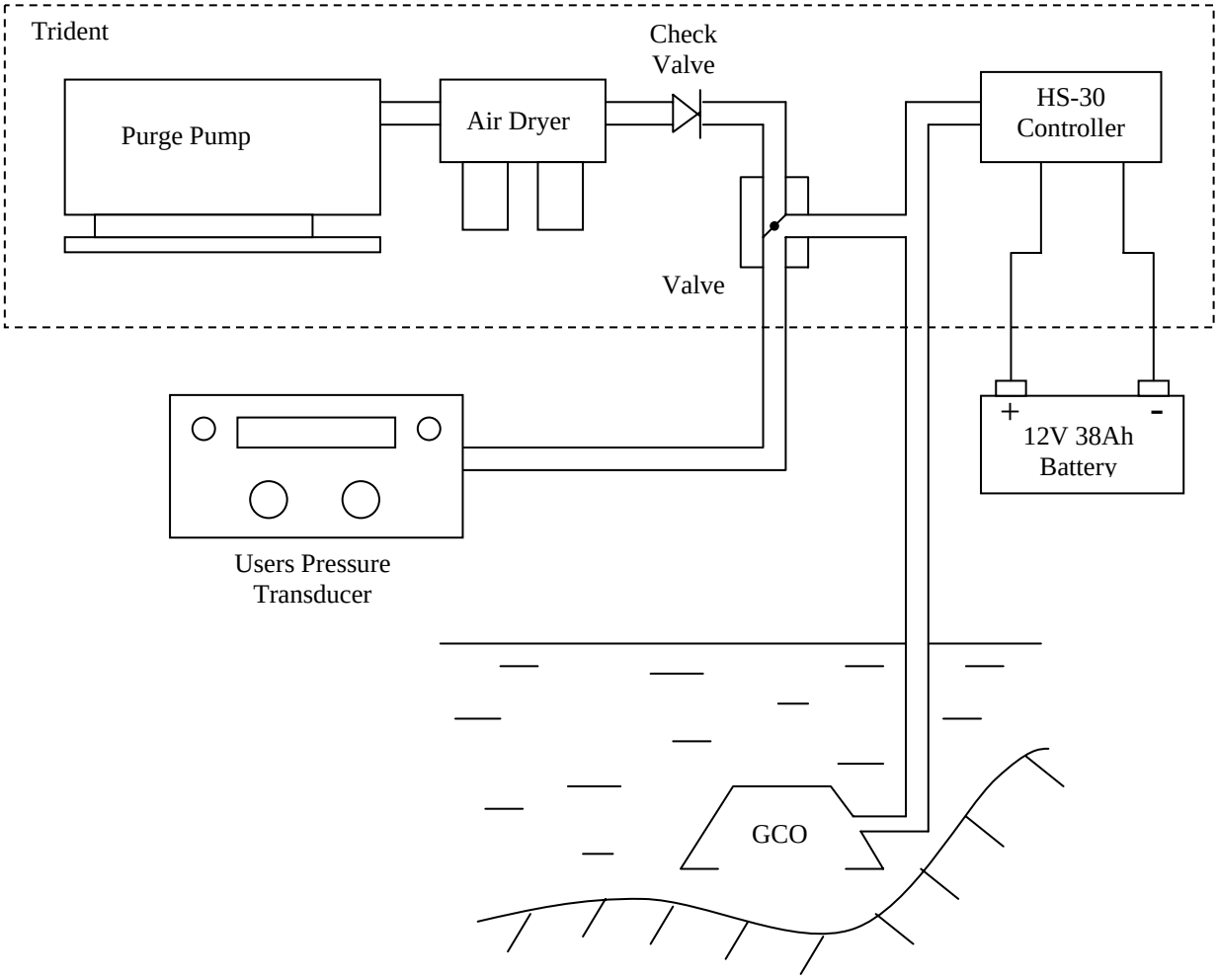
Connect the 12V DC battery as shown, and solar charger if required.

The status LED should cycle through its initial sequence, and then flash quickly (2 flashes/sec) indicating the battery state. Press the Purge button to perform the initial purge. The system is now operational.



4 Operation

The GCO is connected to the user's pressure transducer through a solenoid valve. The water level is continually monitored through an internal pressure sensor (inside the HS-30 Controller) for control purposes. A purge sequence is performed every 3 hours and when the water level increases by 100mm or more. The purge sequence consists of the GCO line being switched to a pump which purges the GCO line for 5 seconds, the GCO pressure should then return to normal within 25 seconds, at which time the GCO line is switched back to the users pressure transducer for normal water level monitoring. (During this purging time, the pressure on the pressure transducer is held relatively constant through the solenoid valve – causing a minimum effect to the water level measurement – if one occurs at this instant.) When the water level is falling, excess pressure vents automatically from the GCO – so a purge is not necessary.



If the battery voltage falls below 10.0V at any time (even during a purge) a low battery indication is given (red LED flash) and the purge pump will not be operated until the battery voltage rises to 12.0V, allowing battery recovery. A small 5W solar panel would be sufficient to keep the battery fully charged with an autonomy of 40 days.

4.2 Description of Controls

The HS-30 has a single purge button and a tri-colour LED indicator.

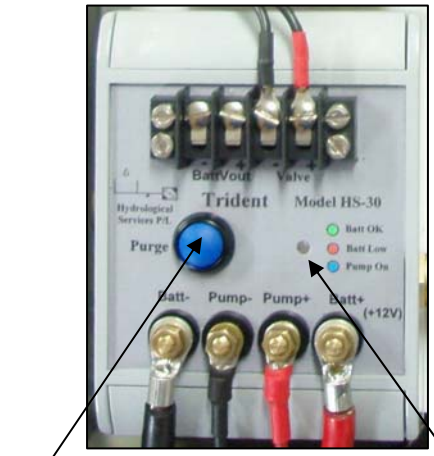
Purge button :

Simply press and release the purge button to initiate a manual purge cycle.

If the purge button is pressed **during** a purge cycle, the purge cycle will be **aborted**, however the valve will be kept diverted to the pump for the required 25 secs so the purge pressure can equalize !

Status LED indicator :

Green Flash => Battery OK
Red Flash => Battery Low
Green Steady => Valve to purge pump is open
Blue Steady => Purge Pump is operating
Red Steady => Purge aborted



Purge button | Status LED

4.3 Startup Sequence

After power up the status LED flashes all 3 colours Green / Blue / Red to confirm all 3 colours are working OK, then it flashes fast (twice a sec) as follows :

Green => battery OK
Red => battery Low

The HS-30 then waits for the operator to press the Purge button to start normal operation.

After the first purge cycle the LED returns to a slow flash (short blink every 2 seconds) and again reflects the battery condition by the LED colour.

4.4 Purge Cycle

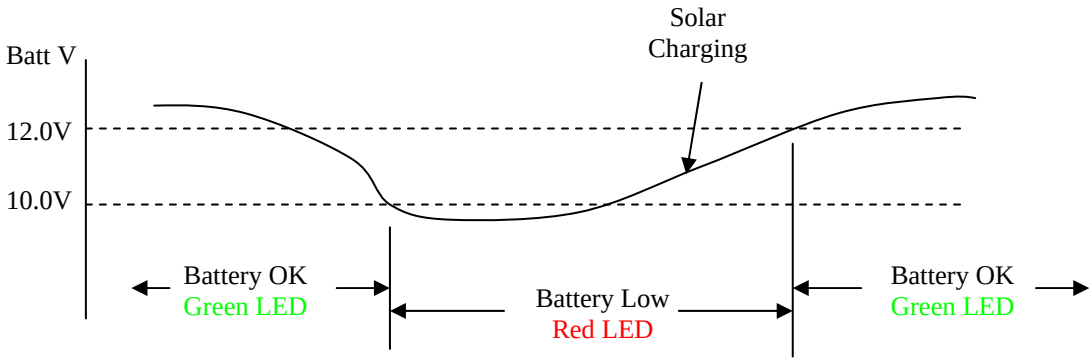
A purge cycle will automatically occur every 3 hours **AND** when the water level increases by more than 100mm (4 inches) **OR** may be initiated manually by pressing the purge button.

The purge cycle consists of :

- Valve switches the river-line from the user's transducer to the purge pump.
- Purge pump operates for 5 seconds (may abort if battery voltage too low)
- System waits for 25 secs while monitoring the river-line pressure.
- If the pressure has fallen to an acceptable level, the valve switches the river-line back to the user's transducer, otherwise a second purge cycle is performed to clear the river-line blockage that is stopping the pressure returning to normal.

4.5 Battery Indication

The battery voltage is monitored during all phases of operation. If the battery voltage falls below 10.0V then the battery low indication will be tripped. The battery voltage must then rise above 12.0V before clearing the battery low condition.



In between purge cycles the status LED flashes. A green LED flash indicates the battery is OK, a red LED flash indicates the battery low indication has been tripped. Once the battery voltage rises above 12.0V the battery low condition will be cleared and the LED will return to a green flash.

A purge cycle will be aborted if a battery low condition occurs. This condition is most likely to occur during a purge because the pump draws approximately 15.5A when operating – causing the battery voltage to droop.

5. Maintenance

The HS-30 is almost maintenance-free. You will need to ensure that your battery / power supply is sufficient for the equipment that you have installed. (See Specification page). As the pump's duty cycle is 5 secs every 3 hours, it will last for many years.

All fittings must be secure. Even a tiny leak will prevent the pressure from being maintained.

The air dryer features an auto drain moisture trap. When the traps' sense moisture build up, a relief valve is opened and the moisture is purged under pressure to atmosphere.

6. Fault Finding

HS-30 Not Powering Up

- Check battery voltage.
- Check battery POWER and GROUND connections.
- Check battery connections to the HS-30 controller.

Pump not operating when a Purge is performed

- Check pump connections to HS-30 controller.
- Check battery voltage is greater than 12 volts before the purge.
  (If status LED is flashing red, then the battery voltage is too low)
- Check if battery voltage drops during the purge.
  (Battery may require charging)
  (If using a power supply, it may be going into current limit with the pump start current)

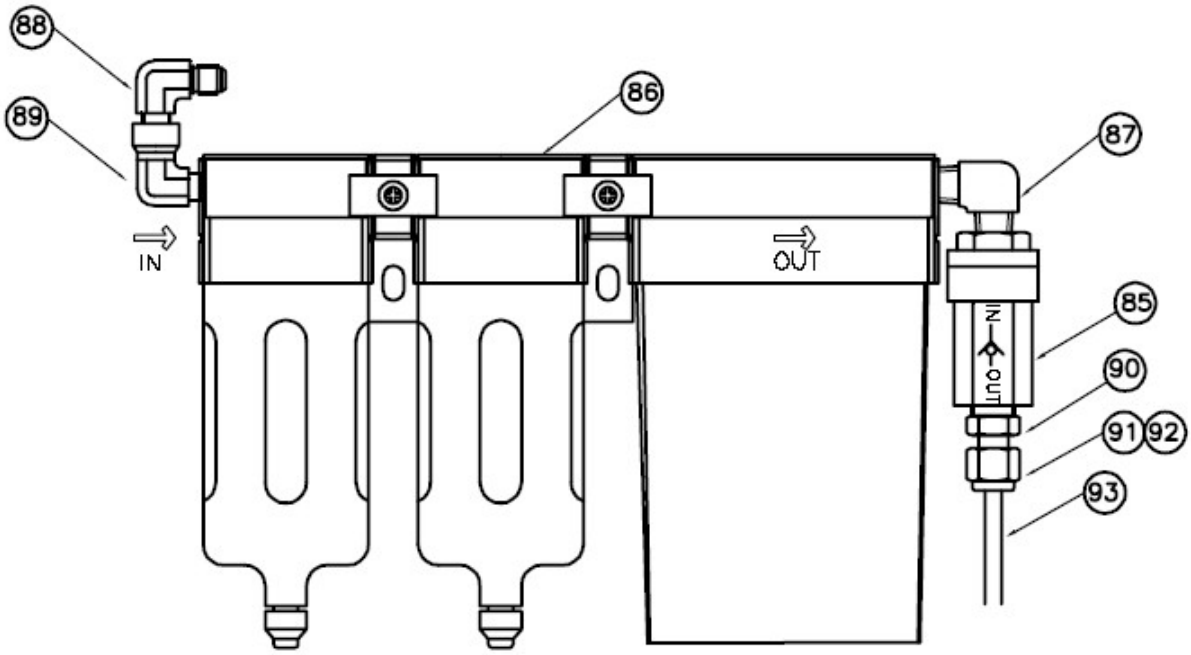
Intermittent Operation

- Check your power and ground connection. Moisture over time, will oxidize and corrode connectors and pins.
- Check your battery voltage.

7. Specifications

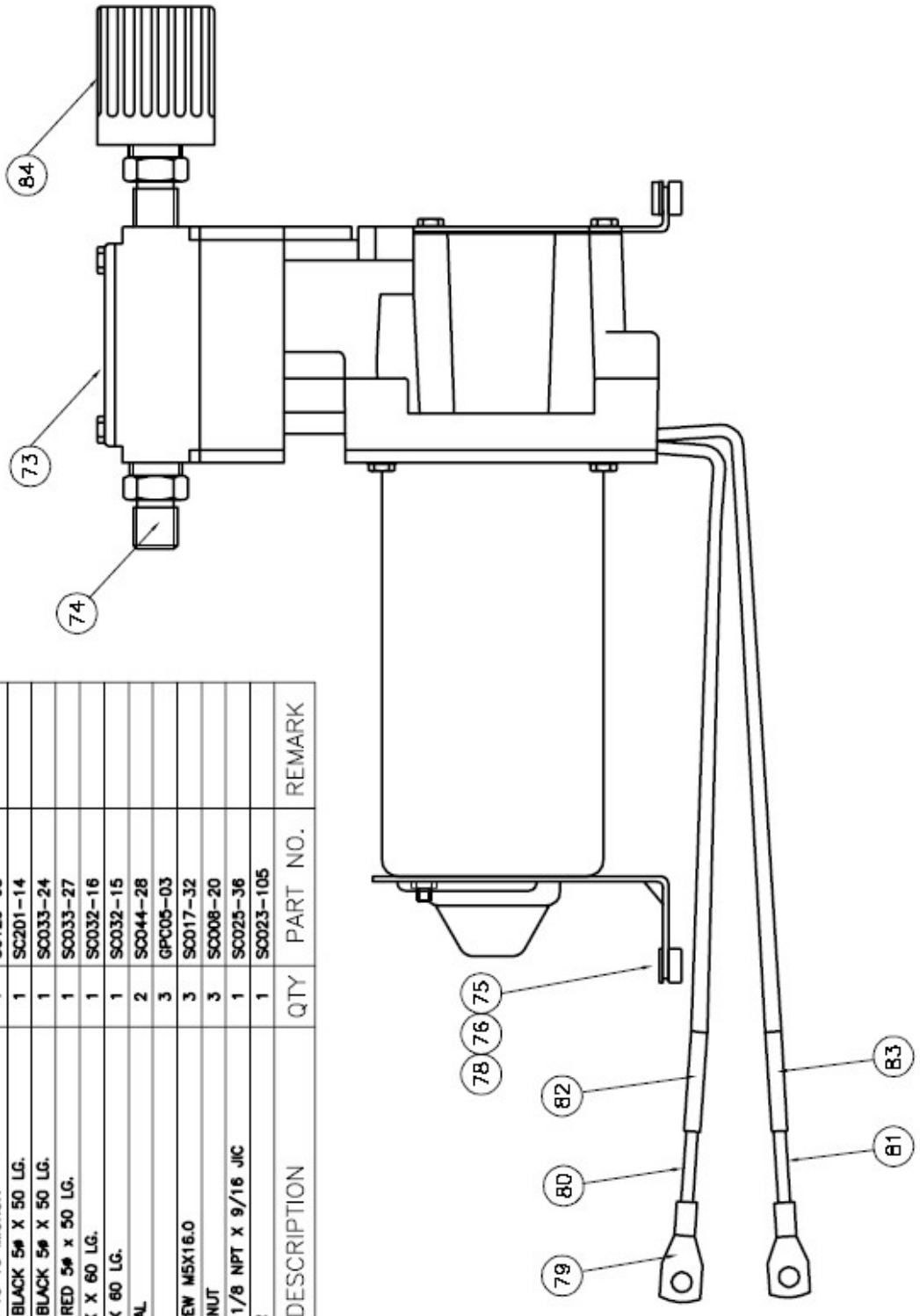
Power :	
Operating Voltage :	12V DC Nominal
Recommended Battery :	12V DC Sealed Lead Acid (38Ah)
This will provide approx 40 days continuous operation. (allowing for battery self discharge)	
Low Battery cut-out :	10.0 V DC
Battery recharge recovery :	12.0V DC
Operation Range :	Up to 30m (100ft) of water pressure head
Purge :	
Compressor Current :	15.5 Amps for 5 secs
Solenoid Current :	0.6 Amps for 30 secs
Electronics Quiescent :	10 mA
Average battery consumption : (based on 7 x 3hr purges and a 1m water level rise)	30mA continuous
Solar :	A small 5Watt solar panel is sufficient to keep the battery fully charged.
Purge Sequence :	5 secs - compressor 25 secs - solenoid valve Once every 3 hours (fixed) and when the water level increases by 100mm or a manually initiated purge
Maximum Pump Pressure :	600 kPa (85 psi)
Minimum Pump Pressure :	400 kPa (60 psi)
Transducer Pressure Connection :	1/4 inch tube
River Line Connection :	3/8 inch tube
Max River-line Length :	200m (600ft) using 3/8 in OD and 1/8 ID tubing
Air Dryer :	5 year maintenance free “Self Purging” Hydrophobic filter
Operating Temperature Range :	-30oC to +70oC
Cabinet Size :	400mm x 300mm x 200mm (H x W x D) 16 inch x 12inch x 8 inch
Weight :	13 kg (29 lbs)

Appendix A Dryer - Oil Separator Assembly



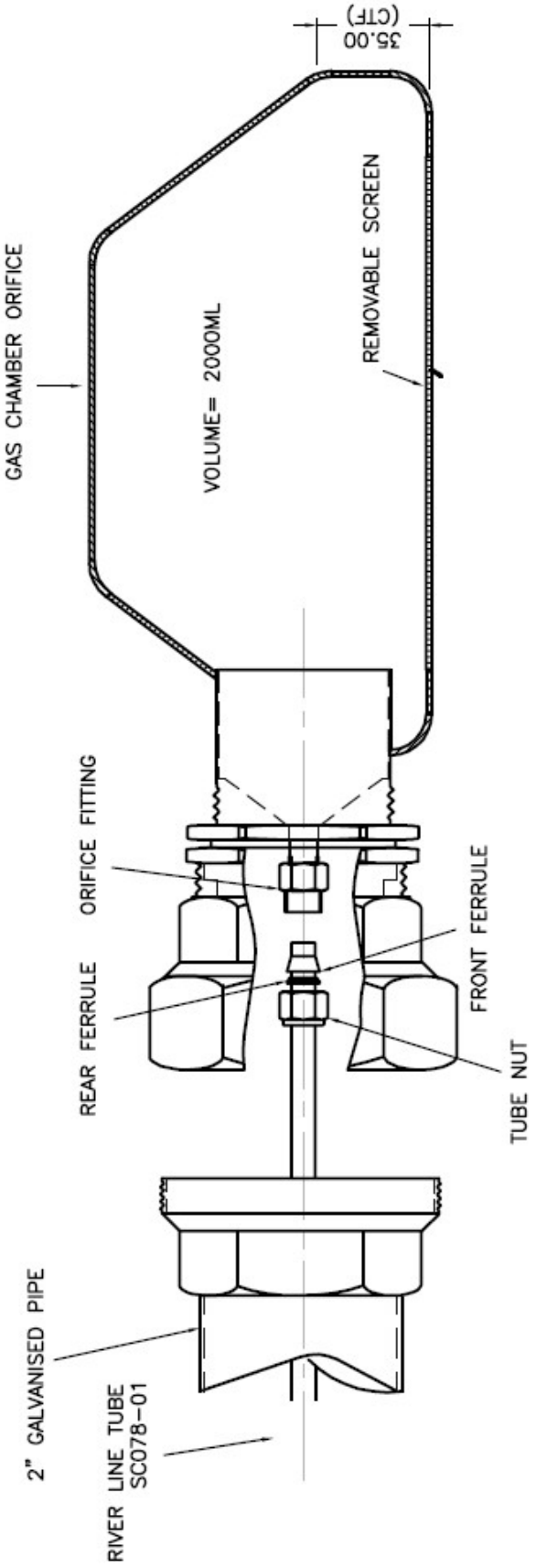
ITEM	DESCRIPTION	QTY	PART NO.	REMARK
93	PRESSURE TUBE 1/4	1	SC078-03	
92	1/4 TUBE NUT BRASS	1	HSF01-02	
91	FERRULE SET 1/4	1	SC025-13	
90	CONNECTOR MALE BSP X 1/4 TUBE	1	SC025-05	
89	MALE FEMALE STREET ELBOW BRASS 1/4NPT	1	SC025-39	
88	MALE ELBOW 1/4 NPTX9/16 JIC	1	SC025-37	
87	MALE COMP ELBOW 1/4 BSP X 1/4 BSP MALE	1	SC025-48	USE LOCTITE
86	IDG5M-02D-S MEMBRANE AIR DRYER	1	SC123-07	
85	NON RETURN VALVE AK2000 SMC	1	SC027-31	

Appendix B Pump Assembly



ITEM	DESCRIPTION	QTY	PART NO.	REMARK
84	UCSAB 1563-10 10 MICRON	1	SC123-08	
83	HEATSHRINK BLACK 5⌀ X 50 LG.	1	SC201-14	
82	HEATSHRINK BLACK 5⌀ X 50 LG.	1	SC033-24	
81	HEATSHRINK RED 5⌀ x 50 LG.	1	SC033-27	
80	CABLE BLACK X 60 LG.	1	SC032-16	
79	CABLE RED X 60 LG.	1	SC032-15	
78	RING TERMINAL	2	SC044-28	
77	WASHER	3	GPC05-03	
76	HEX HD SCREW M5X16.0	3	SC017-32	
75	M5 NYLOCK NUT	3	SC008-20	
74	HEX NIPPLE 1/8 NPT X 9/16 JIC	1	SC025-36	
73	COMPRESSOR	1	SC023-105	

Appendix C Gas Chamber Orifice Assembly



Appendix D Gas Chamber Orifice Installation