

# Top Fill Bore Pumps

INSTALLATION & OPERATIONS MANUAL



# AIRWELL GROUP Pty Ltd

DESIGNED AND MANUFACTURED IN AUSTRALIA

A.B.N. 46 009 323 871

30 Harris Road, Malaga, Western Australia 6090

Tel: (61) 08 9209 3355 - Fax: (61) 08 9209 2666

Email: [sales@airwellgroup.com.au](mailto:sales@airwellgroup.com.au)

<http://www.airwellgroup.com.au>



## Read this manual

Carefully read this manual before commissioning or servicing the product.



## Notes:

- This documentation is part of the product.
- Retain the documentation during the entire service life of the product.
- Pass on the documentation to any subsequent user.
- Ensure that any supplement to this documentation is included, if necessary.

**The contents and specifications herein are subject to change without notice. All rights reserved.**

|           |  |           |
|-----------|--|-----------|
| <b>1</b>  | <b>INTRODUCTION.....</b>                                     | <b>3</b>  |
|           | 1.1 How the airwell pump works .....                         | 3         |
| <b>2</b>  | <b>TOP FILL PUMPS RANGE.....</b>                             | <b>4</b>  |
|           | 2.1 Top fill pumps 1.75” with reed switch (TF175 . . ) ..... | 5         |
|           | 2.2 Top fill pumps 3.5” with reed switch (TF35..) .....      | 6         |
| <b>3</b>  | <b>PUMPS SPECIFICATIONS .....</b>                            | <b>7</b>  |
| <b>4</b>  | <b>SAFETY .....</b>  | <b>8</b>  |
| <b>5</b>  | <b>TOOLS REQUIRED FOR THIS JOB.....</b>                      | <b>9</b>  |
| <b>6</b>  | <b>PUMP ASSEMBLY .....</b>                                   | <b>10</b> |
|           | 6.1 Connections (TF175... pumps) .....                       | 10        |
|           | 6.2 Connections (TF35... pumps) .....                        | 11        |
|           | 6.3 Getting the pump ready.....                              | 12        |
| <b>7</b>  | <b>LOWERING THE PUMP DOWNHOLE .....</b>                      | <b>13</b> |
| <b>8</b>  | <b>CORROSION FACTORS .....</b>                               | <b>14</b> |
| <b>9</b>  | <b>MAINTENANCE .....</b>                                     | <b>15</b> |
|           | 9.1 Regular checks .....                                     | 15        |
|           | 9.2 Purging the pump – Method A.....                         | 15        |
|           | 9.3 Purging the pump – Method B .....                        | 16        |
|           | 9.4 Depressurising the system .....                          | 16        |
|           | 9.5 Removal of pump from bore and service. ....              | 16        |
| <b>10</b> | <b>TORQUE SETTINGS .....</b>                                 | <b>17</b> |
| <b>11</b> | <b>WARRANTY DETAILS .....</b>                                | <b>18</b> |
| <b>12</b> | <b>WARRANTY REGISTRATION CARD.....</b>                       | <b>20</b> |

## 1 INTRODUCTION

This manual covers the operation, maintenance, servicing and troubleshooting of the Airwell top fill vertical bore pumps. Although these pumps can be found in different formats and sizes, their basic principles are in common.

### 1.1 How the airwell pump works

Compressed air is a particularly useful means of transferring energy to pump water. Air compressed at an existing power source can be carried significant distances through MDPE polyethylene pipe with limited loss of pressure, saving a costly power installation to the water source, whilst allowing the compressor to be used for multiple pumps, or other local purposes.

The Airwell pump component is a 316L grade stainless steel tube that can be manufactured in varying forms and sizes to suit a variety of different applications. The tube is enclosed at each end and incorporates a foot valve(s) to allow the submerged vessel to fill with water and a check valve on the outlet preventing the return of the expelled water. The valves are our own design and incorporate special features to provide exceptional ability to handle silt and sand, whilst keeping a very simple, maintenance free construction. The clean, hard valve seats provided for the polyurethane balls to close on are kept clean by the circulation of the water and are raised above the bottom of the pump to minimise contamination.

Within our most popular pumps there are two level (conductivity) probes; one long enough to reach the bottom of the pump to detect when the pump is empty, and one short one to detect when it's full. This is the key to the automatic function of the pump. We use the conductivity of water to monitor the high and low fluid levels in the pump. This means that a 'contact' is made when the water rises to the height of the short probe at the top of the vessel, (now both probes are wet) and is 'broken' when the water level falls below the lower probe at the bottom of the pump, (when both probes are dry).

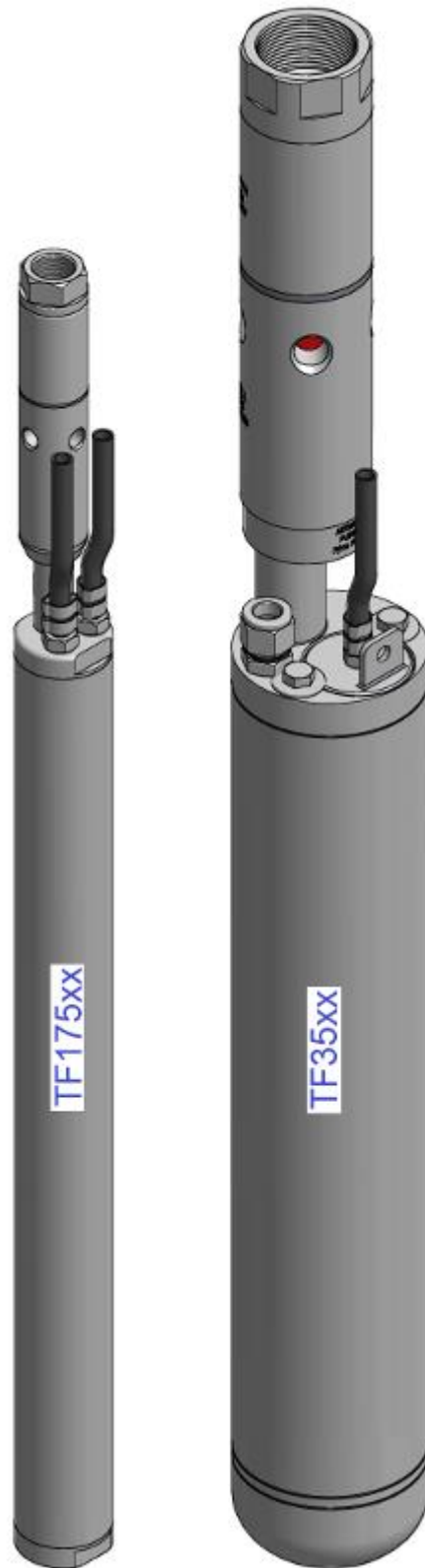
An electronic circuit in the control unit detects this making and breaking of water contact, and subsequently changes the state of a 3-way solenoid valve, allowing compressed air to the pump when a 'full' signal is received, forcing the water up the discharge pipe, and then exhausting the air pressure to allow the pump to refill when the 'empty' signal is seen. The result of this is that the Airwell Pump will only cycle when a 'full' or 'empty' signal is received, regardless of this being every few seconds, minutes, hours, weeks or years.

The control unit is located close to the pump, but above water level. Besides carrying the 3-way valve for the air and the electronic control circuit, it also houses a 4.5 Amp/hour dry cell battery to power the system, which in turn is recharged by the solar panel on the lid of the controller. Mains powered systems are available for those applications where power is close to the water source, as are multiple pump controllers, flow monitoring and flow control options.

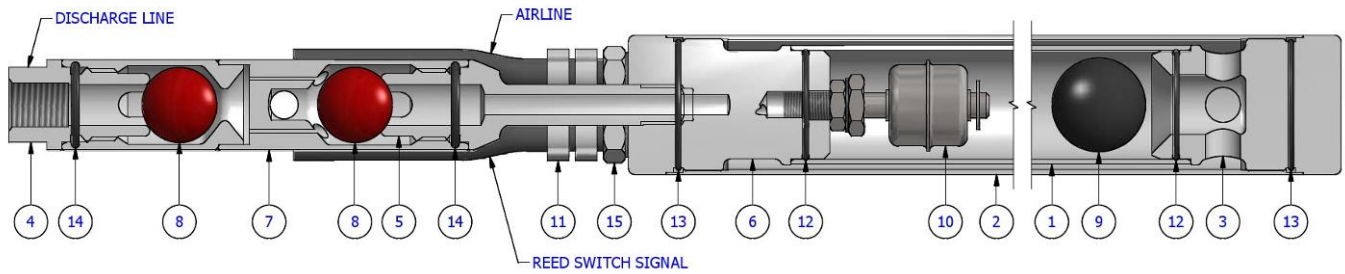
It should be noted that the solenoid valve is a 'latching' type valve and requires a short pulse of power (60 milliseconds) in one direction to change state and will stay that way until a pulse in the opposite direction changes it. A conventional solenoid requires permanent energisation to maintain either an open or closed state.

Should power be lost to the microprocessor, upon reconnection, the system will initialise on pressure, expelling any water in the pump, and regaining a reference for the controller. The water delivered by an Airwell system comes in surges, not a continuous flow like that of most electric pumps. Flow rates from the Airwell pump vary dependant on many factors.

## 2 TOP FILL PUMPS RANGE

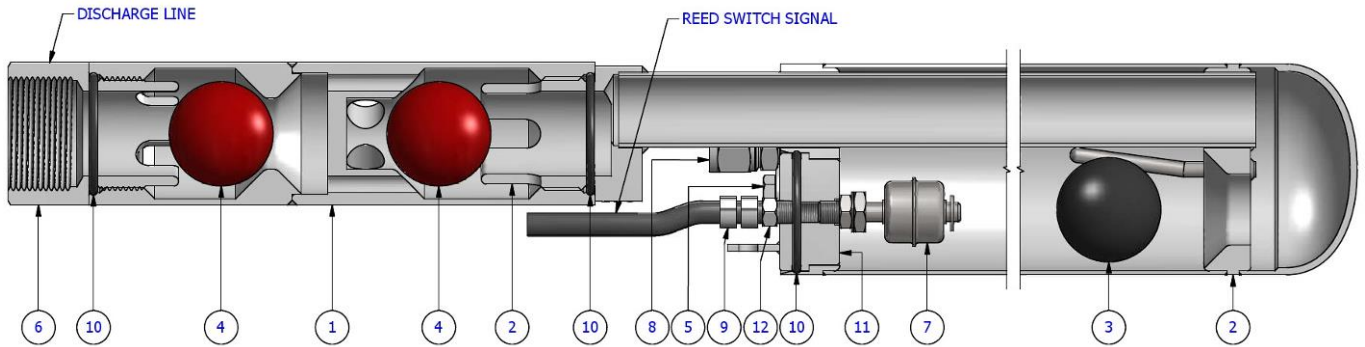


## 2.1 Top fill pumps 1.75" with reed switch (TF175 . . )



| Item | Qty | Type    |         | Description                      |
|------|-----|---------|---------|----------------------------------|
|      |     | TF17510 | TF17520 |                                  |
| 1    | 1   | M518    | M520    | Body (inner)                     |
| 2    | 1   | M517    | M519    | Body (outer)                     |
| 3    | 1   |         | M506    | Bottom end cap                   |
| 4    | 1   |         | M504    | Castle bush                      |
| 5    | 1   |         | M503    | Castle stand                     |
| 6    | 1   |         | M505    | Top end cap                      |
| 7    | 1   |         | FA0066  | Valve assembly                   |
| 8    | 2   |         | U024    | Ball Ø24 (Solid)                 |
| 9    | 1   |         | NW030   | Ball Ø30 (Floating)              |
| 10   | 1   |         | E065    | Float reed switch 1/8"           |
| 11   | 4   |         | H013A   | O-clip Ø9 – Ø11                  |
| 12   | 2   |         | H035    | O-ring BS026                     |
| 13   | 2   |         | H038    | O-ring BS029                     |
| 14   | 2   |         | H078    | O-ring BS118                     |
| 15   | 2   |         | H213S   | Tailpiece Ø1/4" hose x 1/4" BSPT |
| 13   | 1   |         | M508    | Bottom end cap                   |

## 2.2 Top fill pumps 3.5" with reed switch (TF35..)



| Item | Qty | Type    |         | Description                          |
|------|-----|---------|---------|--------------------------------------|
|      |     | TF3510  | TF3520  |                                      |
| 1    | 1   | DRG0068 |         | Valve assembly                       |
| 2    | 1   | FA0020A | FA0019A | Body weld assembly                   |
| 3    | 1   | NW044   |         | Ball Ø44 (floating)                  |
| 4    | 2   | U044    |         | Ball Ø44 (solid)                     |
| 5    | 2   | H626    |         | Bolt (hex) M8 x 16 DIN933-A4-80      |
| 6    | 1   | M026    |         | Castle bush                          |
| 7    | 1   | E065    |         | Float reed switch 1/8"               |
| 8    | 1   | H060    |         | Male connector Ø1/2" tube x 3/8" BSP |
| 9    | 2   | H013A   |         | O-clip Ø9 – Ø11                      |
| 10   | 3   | H050    |         | O-ring BS224                         |
| 11   | 1   | DRG0069 |         | Reed switch plug weld assembly       |
| 12   | 1   | H212S   |         | Tailpiece Ø1/4" hose x Ø1/8" BSPT    |
| 13   | 2   | H686    |         | Washer M8 DIN9021-A4                 |

### 3 PUMPS SPECIFICATIONS

| Pump type | Diameter |      | Nominal length<br>(m) | Actual length<br>(mm) | Weight<br>(kg) | Displacement<br>(Lit) | Discharge line thread<br>(BSP) |
|-----------|----------|------|-----------------------|-----------------------|----------------|-----------------------|--------------------------------|
|           | (inch)   | (mm) |                       |                       |                |                       |                                |
| TF17510   | 1+3/4"   | Ø45  | 1                     | 1222                  | 4.8            | 0.8                   | 1/2"                           |
| TF17520   | 1+3/4"   | Ø45  | 2                     | 2222                  | 8.0            | 1.7                   | 1/2"                           |
| TF3510    | 3+1/2"   | Ø89  | 1                     | 1400                  | 9.9            | 4.6                   | 1+1/2"                         |
| TF3520    | 3+1/2"   | Ø89  | 2                     | 2400                  | 14.6           | 9.6                   | 1+1/2"                         |



## 4 SAFETY

### Protective equipment required for the jobs described below:



### Responsibilities of the person in charge:

- Identify the hazards that arise due to the special working conditions.
- Implement these hazards in the form of operating instructions.
- Specify clearly the responsibilities for the installation, operation, troubleshooting, maintenance and cleaning of this equipment.
- Ensure all personnel is trained and informed about the dangers at regular intervals.
- Ensure that this equipment is always in technically perfect conditions.



### Caution

Access to the equipment is only permitted to qualified persons or persons specially trained by Airwell Group for this purpose.



### Warning

This equipment is designed and constructed exclusively for the proper use described in this manual.  
Misuse of this equipment can cause dangerous situations.

## 5 TOOLS REQUIRED FOR THIS JOB

Spanners  
or  
Adjustable spanners  
or  
Socket wrench.



A pair of 1" pipe wrenches



A set of screwdrivers



Poly pipe cutter



Loctite 569 or PTFE tape for thread sealing



Grease for S/S threads



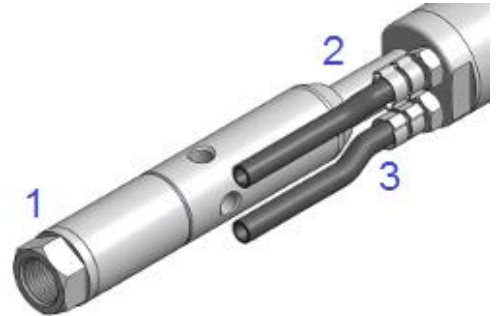
## 6 PUMP ASSEMBLY

Before starting the assembly, please pay attention to the following:

- You must have arranged the water riser plus the fitting needed to connect it to the pump discharge outlet. For correct fitting thread size please refer to the “pumps specifications” table above.
- The threads on the poly fittings used for the air and water connections require sealing. Airwell use and recommends Loctite 569 for this purpose.
- Attach a weight to the s/s cable provided, and lower it into the borehole to determine the correct depth of the hole. Lay the s/s cable on the ground and use as a measure to determine the air and riser pipe length. Remember that the cable attaches to the top of the pump.
- Lay the pump down on a clean spot.

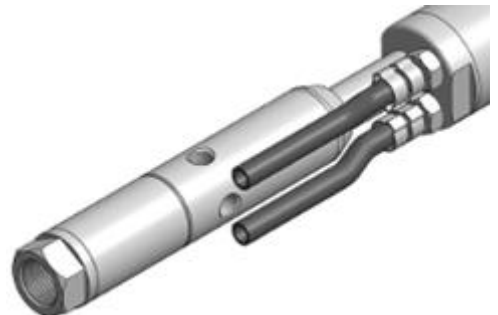
### Typical top fill pump connecting points:

1. Discharge line.
2. Reed switch signal cable.
3. Airline.



### 6.1 Connections (TF175... pumps)

These pumps are being supplied with both the airline and the signal line attached.



Connect the poly air fitting at the pump discharge shown at the next image.



## 6.2 Connections (TF35... pumps)

Take the reed switch assembly which has been shipped with the pump.



Slide gently the reed switch assembly in the pump body hole. Pay attention not to cut the o-ring surface.



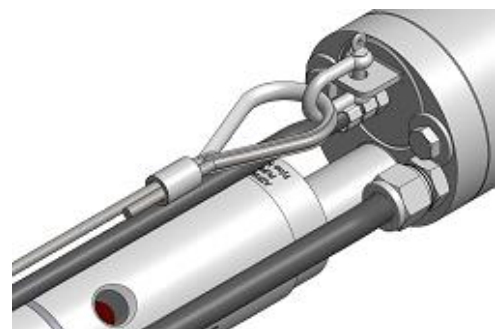
Tighten the reed switch assembly with the two M8 bolts as shown at the next image.



Connect the airline nylon tube ( $\varnothing$ 12mm OD) as shown at the next image.



Connect the wire rope loop to the pump lifting lug by using the D-shackle provided.



Connect the poly air fitting at the pump discharge shown at the next image.



### 6.3 Getting the pump ready

Lay the hoses (air, water, and electrical cable) out ready for taping together. Start taping at the pump end, being sure to keep all the hoses at an even length. The s/s wire rope line is only taped into the bundle for the first metre, and from there, it is left free. Wrap at least 6 turns of tape around the hoses about every one metre. Use plenty of tape just above the pump to prevent wire rope shackles from protruding unnecessarily.

**Note:** Do not tape over stainless pump as this can be bad for corrosion.

Your pump is now ready to be lowered into the bore.

## 7 LOWERING THE PUMP DOWNHOLE

It is recommended that a tripod or windlass be used to lower the pump.

While the pump is still at the surface, have someone to assist you to raise the water riser pipe up in a loop whilst the pump is inserted into the bore to prevent kinking the riser pipe at the top of the pump.

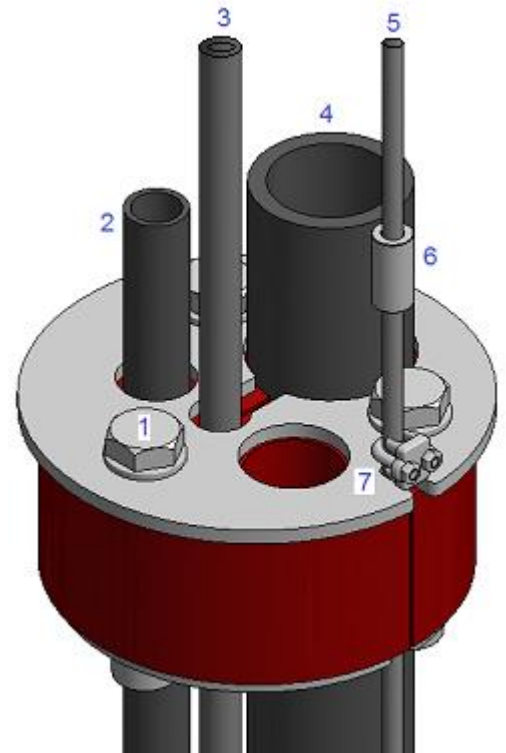
When lowering, all weight must be taken by the stainless-steel rope supplied.

It is important to apply a small lifting force on the hoses to prevent pipes from binding on the bore casing.

When the pump has reached the desired depth, secure the wire rope by crimping the sliding ferrule (6) or by tightening the grip (7).

When everything is in place, tighten the three hex bolts (1) to seal against the bore casing.

Now it is time to make the connections to the controller and to the discharge line.



## 8 CORROSION FACTORS

### **Damage due to corrosion.**

Airwell Pumps uses first grade, new materials throughout with 316L stainless steel as a standard minimum specification on down hole equipment. Every effort is made to maximise corrosion tolerance on all down hole equipment, however due to the unpredictable corrosive nature of ground water, Airwell Pumps Pty Ltd will not provide a warranty on corrosion.

*Refer to Warranty conditions at the end of this manual.*

The exception where a warranty would apply would be if the corrosion is caused by a piece of substandard or wrong grade material was included in a pump unit. (If more than one section of material in a pump has corroded it is safe to assume that it is a general corrosion problem and not a particular piece of material).

### **Corrosion solutions.**

In cases of mild to moderate corrosion, a great deal of protection is achieved with the addition of a sacrificial zinc anode. On request, Airwell pumps can weld a stainless-steel mounting plate to the bottom of your pump before supply. (This plate must be welded on). We then supply the zinc anode to bolt to this plate. We suggest that this anode be inspected and / or replaced every 2 years and 1 year in severe waters.

### **Duplex grade pumps.**

For extreme corrosive environments Airwell pumps do make some of their pump range in 2205 grade Duplex stainless steel. These are generally for water with very low pH and very high salt load.

## 9 MAINTENANCE



### Compressed air

- Never point compressed air at yourself or others.
- Before releasing a fitting make sure it is not under pressure.
- Safety glasses should be worn at all times.
- Use hearing protection whenever allowing compressed air to escape.



### High pressure water

- Never point high pressure water at yourself or others.
- Before releasing a fitting make sure it is not under pressure.
- Hoses should be rated to at least 2x operating pressure.
- Safety glasses should be worn at all times.

**Note:** Before disassembling any components, depressurise the system.

### 9.1 Regular checks

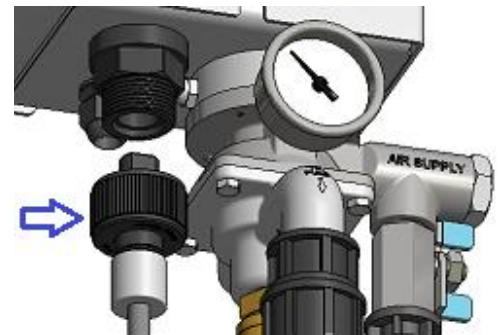
Due to the nature of the Airwell pump system, there is very little that is required or can be done in the way of regular maintenance regarding the pump and controller themselves. The compressor however, will require regular maintenance to achieve life expectancy and reliability targets.

### 9.2 Purging the pump – Method A

If you are planning to raise the pump, it is suggested to empty the water from inside the pump and the riser.

Unplug the cable kit from the controller.

The pump will go to exhaust mode.

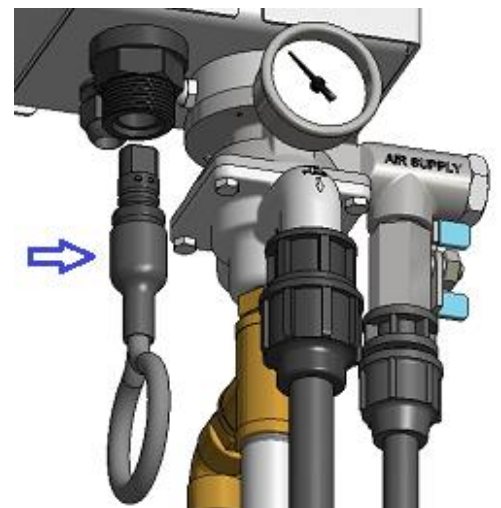


Plug the test plug to the controller.

The pump will go to pressure mode.

Wait until all the water is blown out of the discharge line.

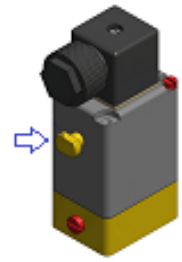
Now the pump and the riser are purged.





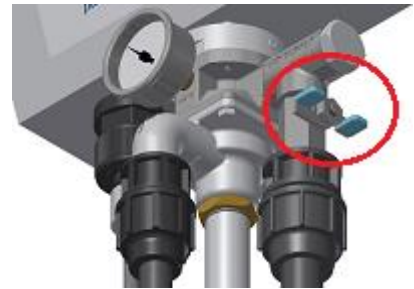
### 9.3 Purging the pump – Method B

Depress and twist to lock the button on the side of the solenoid valve.  
This manually applies pressure to empty the pump and water riser pipe.  
It is important to remember to unlock this purge button when you have finished your job.



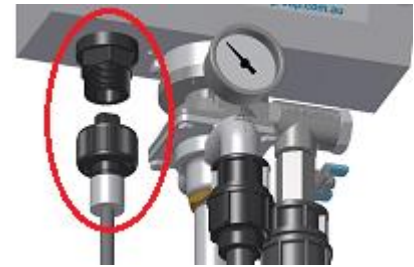
### 9.4 Depressurising the system

Isolate the air supply by turning the air inlet tap to the “OFF” position.



Unplug the pump control cable (or the test plug).

The pump will go to exhaust mode and the system becomes depressurised.



### 9.5 Removal of pump from bore and service.

Remove the pump by following the reverse direction of lowering the pump.

Pump removal is made considerably easier by expelling the water from the pump before lifting.

## 10 TORQUE SETTINGS

|               | Strength grade      |      |      |      |      |
|---------------|---------------------|------|------|------|------|
|               | 4.6                 | 6.8  | 8.8  | 10.9 | 12.9 |
| Metric thread | Torque setting (Nm) |      |      |      |      |
| M 3 x 0.5     | 0.51                | 1.01 | 1.35 | 1.90 | 2.27 |
| M 4 x 0.7     | 0.95                | 1.91 | 2.54 | 3.57 | 4.29 |
| M 5 x 0.8     | 2.28                | 4.56 | 6.09 | 8.56 | 10.3 |
| M 6 x 1       | 3.92                | 7.85 | 10.5 | 14.7 | 17.7 |
| M 8 x 1.25    | 9.48                | 18.9 | 25.3 | 35.5 | 42.7 |
| M10 x 1.5     | 19.1                | 38.1 | 50.9 | 71.5 | 86.8 |
| M12 x 1.75    | 32.6                | 65.1 | 86.9 | 122  | 146  |
| M14 x 2       | 51.9                | 104  | 139  | 195  | 234  |
| M16 x 2       | 79.9                | 160  | 213  | 299  | 359  |
| M18 x 2.5     | 110                 | 220  | 293  | 413  | 495  |
| M20 x 2.5     | 156                 | 312  | 416  | 585  | 702  |
| M22 x 2.5     | 211                 | 422  | 563  | 792  | 950  |
| M24 x 3       | 270                 | 539  | 719  | 1010 | 1213 |
| M27 x 3       | 398                 | 795  | 1060 | 1490 | 1789 |
| M30 x 3.5     | 540                 | 1080 | 1440 | 2025 | 2430 |

| Material    | C/S                 |     | S/S 304 |     | S/S 316 |     | Brass |     |
|-------------|---------------------|-----|---------|-----|---------|-----|-------|-----|
|             | BSP                 | NPT | BSP     | NPT | BSP     | NPT | BSP   | NPT |
| Pipe thread | Torque setting (Nm) |     |         |     |         |     |       |     |
| 1/8"        | 16                  | 18  | 14      | 16  | 16      | 18  | 11    | 13  |
| 1/4"        | 34                  | 50  | 31      | 45  | 34      | 50  | 24    | 35  |
| 3/8"        | 54                  | 63  | 49      | 57  | 54      | 63  | 38    | 44  |
| 1/2"        | 73                  | 160 | 66      | 144 | 73      | 160 | 51    | 112 |
| 3/4"        | 106                 | 200 | 95      | 180 | 106     | 200 | 74    | 140 |
| 1"          | 152                 | 340 | 137     | 306 | 152     | 340 | 106   | 238 |
| 1+1/4"      | 209                 | 450 | 188     | 405 | 209     | 450 | 146   | 315 |
| 1+1/2"      | 286                 | 560 | 257     | 504 | 286     | 560 | 200   | 392 |

**Notes:**

- Always lubricate zinc plated and stainless-steel bolts.
- To convert Nm to lb-ft, multiply by 0.7375.

## 11 WARRANTY DETAILS

# Airwell Group Pty Ltd - WARRANTY

**Airwell Group Pty Ltd** is committed to providing our customers with hardware whose manufacture, selection of materials and inbuilt quality exceeds our customers product expectations. The Airwell system is designed to provide long-term, sustainable service in a wide variety of applications.

Airwell Group Pty Ltd warranty terms and conditions are not intended to restrict your rights or guarantees afforded to you under the Australian Consumer Laws.

Provided the system has been installed in accordance with the instructions incorporated in the 'Installation and Operations' manual, and periodically maintained, the following warranty is applicable:

1. Equipment manufactured by Airwell Group Pty Ltd is warranted to be free from manufacturing and material defects for **5 years** from date of purchase from Airwell Group or one of its recognised distributors.
2. Should a problem arise, **any defective parts are to be returned to the point of purchase at the expense of the owner**, for examination.
3. Replacement parts will be issued under warranty, provided the equipment has not been;
  - i. repaired or altered by anyone other than an Airwell technician, or;
  - ii. the equipment was improperly installed, abused, misused, neglected or accidentally damaged.
4. All repaired or replaced items covered under warranty will be returned to the owner at the owner's expense.
5. Return of the faulty parts for analysis also enables us to continually improve the Airwell product. Please ensure that the returned items are suitably packaged. **Transit damage is not warrantable.**
6. All third-party equipment is supplied in good faith, however, Airwell does not provide warranty on any third-party goods supplied. If required, Airwell will assist our clients with warranty claims on third party goods with the original equipment manufacturer/s. The final decision and responsibility of the warranty claim is reserved by the original equipment manufacturer/s.

### Damage due to corrosion:

Airwell Group uses new first grade 316L stainless steel as a standard minimum specification in the manufacture of down hole pumping equipment. (Wire rope 304).

Every effort is made to maximise corrosion tolerance on all down hole equipment, however due to the unpredictable corrosive nature of ground water, Airwell Group Pty Ltd will not provide a warranty on corrosion.

The exception where a warranty would apply would be if the corrosion is caused by a piece of substandard or incorrect grade material being included in a pump unit. (If more than one section of material in a pump has corroded it is assumable that it is a general corrosion problem and not a particular piece of material).

### Damage due to exposure to chemicals and other hazardous materials:

Every effort is made to maximise tolerance on all down hole and surface equipment to damage from exposure to chemicals or other hazardous materials contained in the fluids being pumped. Airwell Group Pty Ltd will not provide warranty on damage to any equipment damaged due to exposure to chemicals or other hazardous materials.

It is the responsibility of the customer to advise Airwell Group staff if the pump and associated pumping equipment is to be installed in areas deemed 'Hazardous', whereby the environment is potentially explosive.

Airwell Group Pty Ltd shall not be liable for incidental or consequential damages, including any damage to equipment or the environment caused by the failure of the Airwell system.

Please return the warranty registration card either by fax or post to your point of purchase at your earliest convenience. Alternatively, you can email the warranty registration card to [sales@airwellgroup.com.au](mailto:sales@airwellgroup.com.au)

This page has been left blank intentionally.

## 12 WARRANTY REGISTRATION CARD



### WARRANTY REGISTRATION CARD

PLEASE POST OR FAX TO:  
**AIRWELL GROUP PTY. LTD.**  
30 Harris Road,  
Malaga  
Western Australia 6090

Please note: Warranty is conditional upon correct installation and operation of the product as per the Installation and Operations Manual provided with the unit and the warranty disclosure contained within the Installation and Operations Manual.

Pump serial number: - .....

Controller serial number: - .....

Company name: - .....

Address: - .....

Phone number: - (.....)..... Fax number: - (.....).....

Contact name: - .....

Equipment purchased from: - .....

Commissioned by: - ..... Date: - ...../...../.....

### ARE YOU HAPPY WITH THE PRODUCT?

We appreciate your comments regarding our products and service and welcome any suggestions that may help to improve them.

Was there any transport damage?  Yes  No

Were you happy with the quality and presentation of the equipment?  Yes  No

Were you happy with the sales and service personnel?  Yes  No

Comments: