

Fuel retail outlet



Copper Refinery



Bus depot fuel storage



Minesite fuel storage

Contaminated Site Remediation and Pollution Recovery Systems

System and Technical Information

FEATURES

Airwell has been involved in some of the largest contaminated site remediation and pollution recovery projects in Australia using its unique direct air displacement total fluids pumping technology to create highly efficient and reliable remediation and recovery systems.

The pumps used are the same as those used in Airwell's leachate recovery systems but are adapted to suit the type of contaminant or pollution being recovered (see *Operational Guidelines for Environmental Applications*). Depending on the nature of the fluid being recovered, and whether the contaminant is floating on the surface or has sunk to the bottom, either a top filling or bottom filling bore pump will be employed.

Features of the Airwell remediation and recovery system:

- deals with a wider range of different contaminants
- provides for maximum extraction of contaminant
- 24/7 operation remote from power
- Complete control with pumping rates exactly matching the production of the bore
- Able to handle large amounts of suspended contaminants with low risk of damage to the pump
- Full automation, control and telemetry available
- Intrinsic and non-intrinsic safe options available
- IEC Zone 1 Group 11C classification in hazardous locations
- Full monitoring from remote locations, anywhere in the world

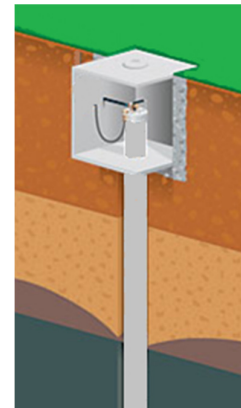


OPERATION

Airwell Pumps employ the total fluids recovery method of hydrocarbon recovery. By installing an Airwell top filling pump below the standing fluid level of the bore and allowing the pump to pump at full capacity (up to 1 L/Second) the pump will create a cone of depression and brings the standing water level to the pump.

This then results in a high flow skimmer pump with either all or a high percentage of the fluid being pumped being hydrocarbon. This has the following benefits:

- Actively migrates hydrocarbon to the recovery bore
- Considerably higher recovery rates
- Increased reliability
- Simplicity of plumbing and water processing



As Airwell recovery pumps are typically controlled by a central PLC it is very easy and beneficial for Airwell to integrate the process water control into their programming and have remote telemetry of the operation as a whole.

Advantages of using Airwell for your automation are:

- The person programming the system is usually hands on in the installation of the project giving them a full understanding of the project requirements.
- Full integration of the pumping system and the processing plant, allowing considerably more flexibility with the use of the equipment

Apart from reliability, another key feature that makes the Airwell system particularly attractive in hydrocarbon recovery applications is the ease with which the system can be fully monitored and controlled from remote locations. In the life of a project in N.S.W. the system was run from Sydney, Perth, Newcastle, and even London (briefly), while the operator was on holiday.

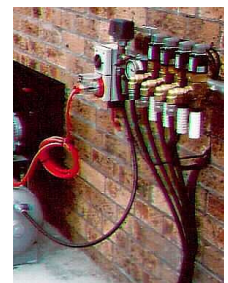


HOW IT WORKS

The Airwell Top Filling pump is designed for applications where the recovery of product floating on the water table is required, such as hydrocarbons, and operates at depths to 80m. By adjusting the depth of the pumps' inlet ports to a predetermined depth below the corrected water table, and controlling the rate at which the pump cycles, maximum product recovery can be achieved.

Equally, as the quantity of product available reduces, the pump can be slowed to maintain maximum achievable rates of product recovery. As the name implies, this is a total fluids pump, and pumps both product and water. The proportions of this mix are influenced by the ground type (as in how quickly the soil will 'release' the product), and how quickly the pump cycles. A rapidly cycling pump in sandy soils, for example, would see a very high proportion of water pumped. By slowing the pumps cycle rate, proportionally less water and more product will be pumped.

Each pump has a level sensor built into it, providing a signal to the surface when full. This signal is fed into the PLC based control system, which in turn activates the solenoid valve that controls the compressed air into the pump to empty it, and the exhaust to allow the pump to refill. By using features in the PLC program, we can manipulate these sequences around the "full" signal to control both the rate and proportion of product recovered.



CONSTRUCTION MATERIALS

The pumps, manufactured from 316 stainless steel as standard, are built to suit bore casings of 2" and above, and are 1 ¾" or 3 ½" in diameter. Lengths of 2m are standard, although other lengths can be manufactured to suit the application and to improve flow rates if required. Operating depths are typically to 80m and the internal ball valves and 'O' rings are usually made from Nitrile.

- *Pump bodies, ball valves and 'O' rings can be made of other materials should the contaminant require less general-purpose material.*

Airline and product lines are generally poly pipes, the size of which is determined by the required flow rate and overall head.

- *Other hose materials can be matched to suit the product to be recovered if these are unsuitable.*

The control system is constructed in an IP56 Rittal enclosure, and is usually mounted in a control room, although occasionally they are mounted outside. Depending on the size of the bore-field, and desired flow rates, the mounting of the solenoid valves can be on a manifold at a central location, or individually at the head of the bore.

USE IN HAZARDOUS LOCATIONS

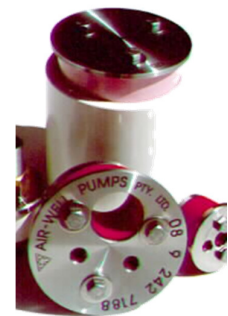
Recovery of potentially flammable or explosive product such as fuel oils etc will require the addition of intrinsically safe barriers to the control circuits of the pump level sensor, the solenoid valves (if located at the head of the bore), and tank level switches. These barriers restrict electrical signals to levels that present no likelihood of sparks being produced in an explosive environment, and are very commonly used in industries that produce combustible chemicals.

- *The level of protection achieved by Airwell in these locations is to IEC Zone 1 Group 11C classification*

WELL-HEAD COMPLETION

Should vacuum extraction of the bores be envisaged, then the Airwell sealing well cap system enables the bore casing to be sealed at the top, giving an air tight seal around the air, product and signal lines. In this type of application the exhaust from the air pilot valves must be connected to the vapour extraction line or returned to the bore casing in order to compensate for the effect of 'negative pressure', which will prevent the pump from refilling.

Standard well caps are available. Apart from providing a neat finish to the bore, they offer support for the lines from the pump, and provide a point to which the stainless steel support cable can be attached.



SPECIFICATIONS

Materials:

- 316 grade Stainless steel, with Nitrile "O" rings and ball valves as standard.
 - Pump level indication by reed switch.
- Other materials are available to suit customer requirements(eg Duplex SAF 2205).

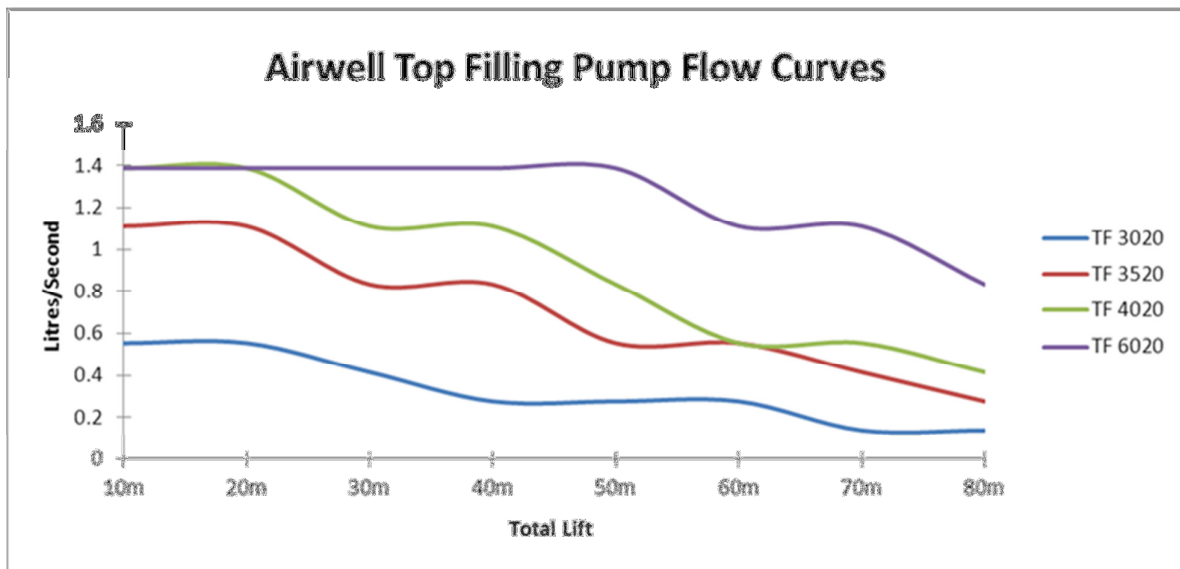
Dimensions:

- Available in standard 3 ½" and 1 ¾" outer diameter but non-standard sizes also available on request to suit a particular application.
- Standard length is 2m although pumps can be made any length to suit project requirements.

Flow Rates and Volume Pumped - Per Cycle:

Flow rates will depend on the recharge rate of the bores and the volume of air/gas used.

- 3 ½"x2m 10.2L
- 3 ½"x1m 5.0L
- 1 ¾"x2m 1.81L
- 1 ¾"x1m 850mL



NB: Flow rates are indicative only. Please confirm flow rate data with your Airwell technical consultant.

(TF 3020 = 3" x 2m, TF 3520 = 3 ½" x 2m, TF 4020 = 4" x 2m, TF 6020 = 6" x 2m)

Other services provided by Airwell Group



Mobile sampling



Flow testing



Leachate recovery



Potable/process water

Airwell group also provides systems for and services including:

- Groundwater sampling and monitoring
- Bore flow testing
- Leachate recovery at tailings dams and landfill sites
- Potable and process water supply
- Salinity management
- Coal bed methane deliquification
- Supply and installation of all pump types

More information

To find out more about our services and products and to request a copy of our remediation and recovery technical data sheet please give me call or email me on the following:

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