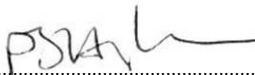


OPERATION & MAINTENANCE MANUAL HEAT RECOVERY PUMP PACK

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HARMILL

LEADING THROUGH INNOVATION

OPERATION AND MAINTENANCE MANUAL

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1 Introduction

This manual is intended as a guide to using and maintaining the run-around coil pump pack.

This manual will provide a quick and easy reference for safe operation and maintenance, however in the interest of safety only operate or maintain the plant if you are qualified to do so.

Read this manual carefully before using the equipment and follow the instructions given to ensure correct and safe operation, maintenance and a long service life.

1.1 Contact Details

Manufacturer: Harmill Systems Ltd:
Address: Unit P Cherrycourt Way,
Leighton Buzzard,
Beds, LU7 4UH
Tel: 01525 851133

1.2 Intended Use

The pump pack has been designed and constructed with the sole purpose of pumping water or water glycol mix fluid in a run-around coil heat recovery system. Any other use not described is to be considered as improper, and thus it will be under the whole responsibility of the operator.

1.3 Technical Specification

1.3.1 Pump

Power supply	400V, 3Ph, 50 Hz
Pump type	Close-coupled, single-impeller centrifugal pump; axial suction and radial discharge.
Pump model	210/4
Power	1.5 kW
FLC	3.17A
Rotational speed	2900
Protection class	IP55
Maximum starts per hour	40

Motor rotation is counter-clockwise facing the pump from the suction port.

1.3.2 Expansion vessel

Type	Diaphragm
Pre-set pressure	1 bar
Capacity	12 litres

1.3.3 General

Fluid	Up to 30% glycol
Maximum temperature	85°C
Connection in	1 ½" BSP Female
Connction out	1 ½" BSP Female
Commissioning set	Included
Relief valve	3 bar
Control panel	Direct Online with local control and remote start contacts
Control panel pre-wired	Yes

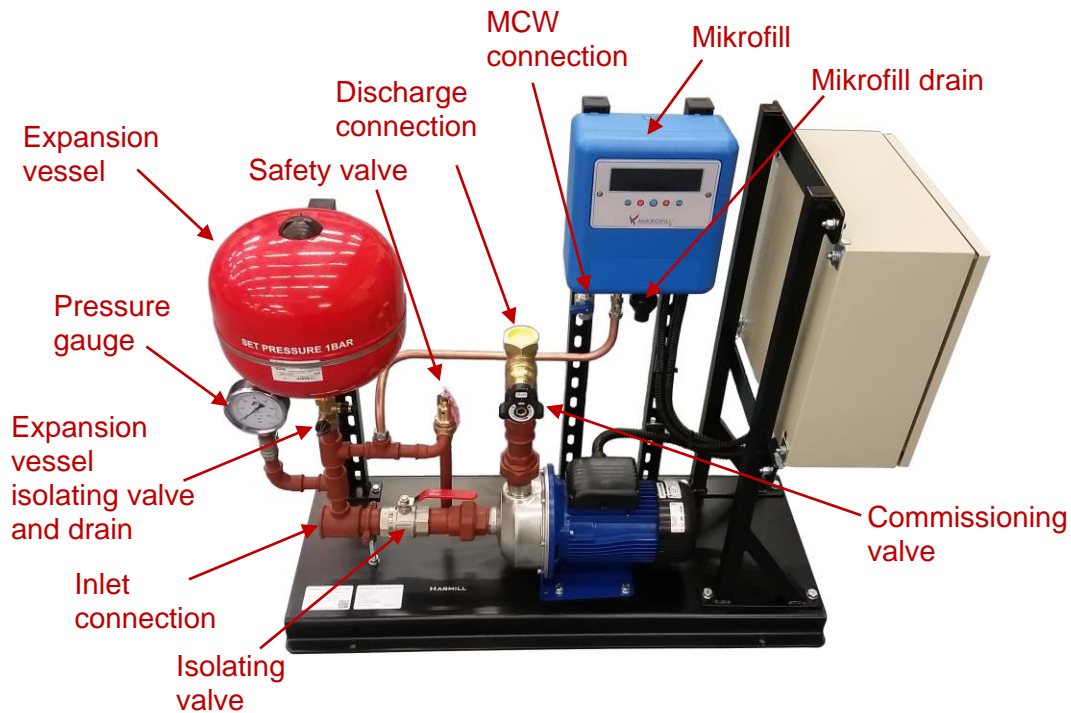
1.3.4 Mikrofill Electronic Filling Device

Type	Mikrofill EFD
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See attached manual for Mikrofill device.

2 Equipment Description

2.1 General Description



3 Installation



Read and understand all instructions and safety procedures below before installing the equipment

3.1 General

The pump pack must only be installed by qualified and competent staff and in line with these instruction and regulations.

Always seek advice from the manufacturer and/or workplace supervisor before carrying out tasks with which you are unsure of when using the equipment.

Do not modify the equipment without manufacturers' advice.

3.2 Receipt and storage

Check all details prior to removing packaging and report any damage to the carrier and Harmill Systems immediately.

3.3 Mounting

The pump set should be mounted on a flat, horizontal surface.

The base has four holes for M10 fixings.

The pump base can be bolted directly to a concrete floor. If anti-vibration mounts are used, flexible connectors must be installed in the pipework.

The equipment must be installed in a dry, well ventilated environment. Ambient air must be at a temperature between -10°C and +40°C, with unimpeded flow across the motor casing to allow cooling.

If mounted externally, a suitable cover must be installed around it to protect from the elements, prevent condensation and provide ventilation e.g. louvres.

Ensure protection of the pump from freezing.

Ensure pump, control panel and all wiring are away from heat sources.

The unit should ideally be position within 3 metres in altitude from the high point in the system being supplied.

The pump must be installed such that the discharge is connected to the flow pipe of the supply coil. The pump suction pipe should be connected to the return pipe from the exhaust coil. This ensures higher fluid temperatures at the pump, which reduces the risk of condensation forming.

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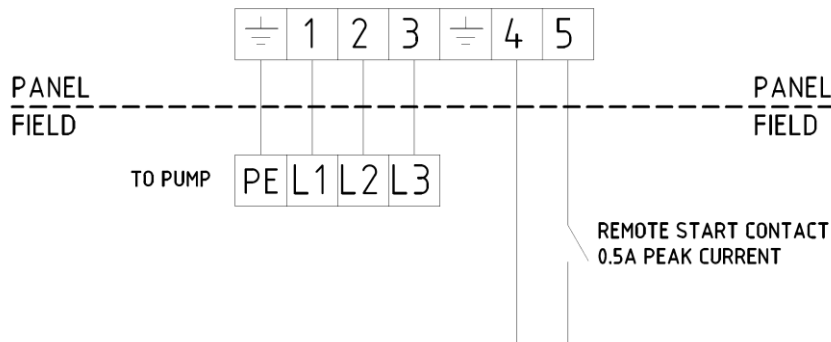
3.4 Electrical connection

Pump pack with pre-wired control panel

The control panel is mounted on the pump pack base.

Connection to mains power and grounding must be executed by qualified electrician in compliance with local regulations and installation standards.

The motor and Mikrofill are pre-wired to the control panel.



Connect the remote start volt free contact to terminals 4 and 5. The control voltage is 24V AC, 0.5A peak current.

Connect the mains supply cable to the panel isolator, 3 phase and neutral plus earth.

Motor rotation is counter-clockwise facing the pump from the suction port. Do not run the pump dry. After filling, check by looking at the fan or by observing the pump's performance (in this case the correct direction of rotation is the one that generates the highest pressure and flows). In the event of incorrect rotation, switch two supply wires.



Do not run the pump dry or with the flow port closed

3.5 Filling



The system must be flushed prior to filling

Prior to filling, the system must be flushed out using a proprietary chemical cleaner (Ferox or similar) to remove any dirt or burrs.

All isolating valves on the pump pack and the rest of the system should be open.

During filling, vent the system at its highest point.

Filling may be achieved using the Mikrofill pressurisation device. Observe all instructions in the Mikrofill manual. If the LCD display indicates filling stopped due to leak, either disable leak detection temporarily or turn the control panel off then back on to continue filling.

The water should be dosed with inhibitor or inhibited glycol solution to the concentration required to prevent system freezing (maximum 30%).

3.6 Commissioning valve

For detailed instructions, see Danfoss MSV-O data sheet.

With the handle in the down position, the valve has a shut-off ball valve function. Turn the handle 90° to shut the valve. An indicator in the window shows the setting:

red = closed

white = open

The commissioning valve has a fixed orifice to read flow on a measuring device. Two measuring nipples for 3mm probes are provided.

The flow is set using the following process:

Setting the required flow is made in 5 steps:

1. Release the lock using the green lever or a 3 mm Allen key.
2. The handle pops up automatically.
3. Turn the handle to set the value.
4. The setting is locked when the handle is pressed to click.
5. Seal - the setting can be protected by using a strip.

4 Operating Instructions



The motor can reach a temperature of 70°C

4.1 Control panel operation

To operate the pump:

Turn the isolator to the 'On' position.

To start the pump under local control, turn the three way rotatory switch to 'Local on'.

To allow remote start and stop of the pump, turn the switch to 'Remote'.

If the pump does not run, check the Mikrofill for alarms.



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Interface	Function	Note
Rotary isolator switch	0 – power off 1 – power on	Switch to 0 position to open panel
Power on lamp (white)	Lamp on – power to panel Lamp off – panel switched off	Lamp indicates 24V power is operational in panel. Lamp switched off does not necessarily mean panel is not live.
Running lamp (green)	Lamp on – Motor contactor is closed (pump should be running) Lamp off – Motor contactor open (pump should not be running)	
Trip lamp (red)	Lamp on - Motor protection circuit breaker is tripped	Motor protection circuit breaker must be reset from inside the panel.
Mode select 3 way switch	'Remote' – start and stop controlled by remote start contacts 'Local off' – pump off 'Local on' – pump on	

5 Maintenance Instructions



Disconnect the mains power before carrying out any maintenance

5.1.5 Isolation of pump

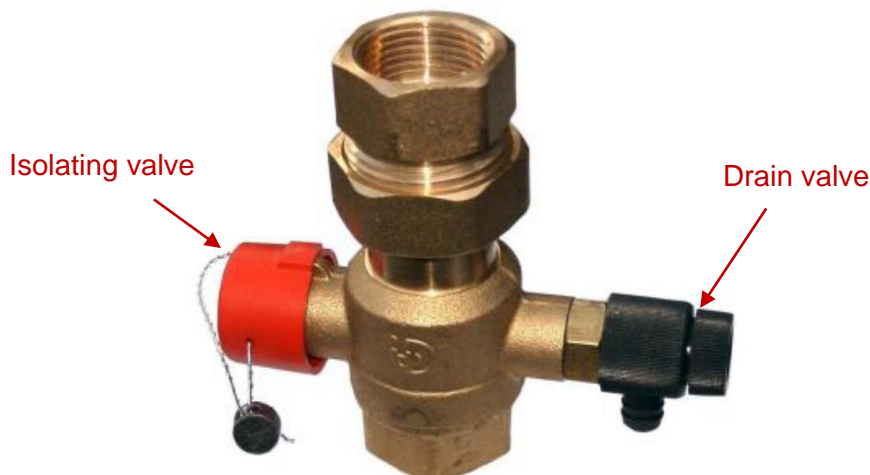
The pump can be isolated using the lever ball valve and the commissioning valve.

5.1.6 Expansion vessel pressure

Expansion vessel is pre-charged with air to 1 bar. Check periodically (e.g. annually) thereafter.

To check the expansion vessel pressure, use the following procedure:

1. Isolate the expansion vessel using the isolating valve located below the vessel.
2. Drain the expansion vessel using the drain valve.
3. Check the pressure using the Schrader valve (as found on a car tyre) located in the top of the vessel. Add air if necessary.
4. Close the drain valve and open the isolating valve.



5.1.7 Safety valve

The safety valve operation should be checked periodically (e.g. annually).

5.1.8 Mikrofill filling unit

The filter which is housed in the inlet ball valve should be checked and cleaned annually.

5.2 Control Panel Fault Finding Table

Problem		Possible Cause		Solution
'Panel On' lamp does not illuminate	A	No mains supply	A	Check mains supply and isolator in 'On' position
	B	24V transformer fuse	B	Check fuses
'Tripped' lamp illuminates	A	Pump tripped	A	Open panel and reset motor overload. If repeated trip, check pump mechanical operation and electrical connections.
Pump does not run in 'local on' mode	A	No mains supply	A	Check mains supply and isolator in 'On' position
	B	24V transformer fuse blown	B	Check 24V transformer fuses
	C	Contactors faulty	C	Check contactor operation
	D	Mikrofill alarm	D	Check Mikrofill display for alarm. In case of a faulty sensor it is possible to override the Mikrofill and allow the pump to run – see the Mikrofill manual.