Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

Installation, Operation and Maintenance

Packaged Water-to-Water Heat Exchanger
Model PWW
24 kW – 48 kW

For all questions or service, please contact Pfannenberg at:

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Warranty information

The manufacturer’s warranty covers the material design and quality during the first 12 months starting from the delivery date. Within this defined period our Company will either repair, or replace all parts which, on the sole opinion of the supplier, have caused quality problems which are not a result of poor maintenance, inexperience of the operators, faulty installation or failures which are caused because this instruction was not followed. This warranty does not include the expenses, travel hours and travel allowance related to our technicians in case their presence is required at the customer's factory. These expenses will be wholly invoiced as working hours. The customer shall not have the right to claim any refund from our Company for the time during which the machine shall remain inactive, related to repairs. No refund will be acknowledged for expenses, damages, either direct or indirect, which are a result of the above.

Warnings, Precautions and Safety Notes

Only qualified personnel are allowed to install and operate this equipment, and/or perform maintenance work. All safety and security instructions given in this manual must be observed. National regulations on accident prevention, regulations of the local power supply authorities as well as any specific safety instructions for equipment must be observed. Failure to observe these instructions may cause injury and/or death, and will cancel all manufacturers' warranties.

Attention:

Throughout this manual the following symbols will appear periodically to highlight important information. Read these sections carefully and take the necessary steps to follow these instructions


This symbol indicates hazardous situations, which could result in serious injury or in some cases, death.


This symbol indicates potentially hazardous situations and if not avoided could result in minor injury.


This symbol indicates important information and should be fully understood before operating equipment.

Proper field wiring and grounding required

All field wiring MUST be performed by qualified personnel. Improperly installed electrical wiring could result in fire or electrocution hazards. Follow proper wiring guidelines as per manufacturer's recommendations, NEC and local/ state electrical codes. Failure to follow proper procedures could result in serious injury or death.

Personal Protective Equipment (PPE) Required

Installing and/or servicing this unit could result in exposure to electrical, mechanical and chemical hazards. All personnel servicing the unit MUST wear proper PPE as recommended by local/state/national codes. ALWAYS refer to appropriate MSDS documents and OSHA guidelines for proper PPE requirements.

Hazardous Procedures

Maintenance and troubleshooting practices recommended in this manual could result in exposure to potential hazards. Follow all lockout/ tagout procedures to ensure all electrical power (including remote power) is disconnected and discharge all electrical storing devices. ONLY qualified personnel should service these units. Failure to follow these procedures could result in serious injury or death.

Unit Nameplate

The PWW unit nameplates are applied to the exterior surface of the unit. The nameplate is located on the back of the unit near the fluid connections. Additional nameplates are located within the electrical enclosure and adhered to the document package. The following information is included on the nameplates:

- Unit part number and description
- Unit serial number
- Location of manufacture
- Minimum/maximum ambient conditions
- Minimum/maximum operating conditions
- Electrical data for major components
- Electrical data for unit (Voltage, Phase, Frequency, FLA, MCA and MOP)
- Storage tank capacity and unit weight

The electrical control enclosure has additional information on the nameplate adhered to the enclosure panel door.

General Information

The PWW units are designed to cool a primary process loop using a secondary source of cooling fluid. The primary and secondary loops are designed to use glycol/water mixtures as cooling fluids. The primary process loop is isolated from the secondary cooling fluid via a brazed plate heat exchanger. The primary process loop fluid is circulated by a process pump and has an onboard storage tank. The secondary cooling loop includes a modulating control valve, which regulates cooling supply water based on unit leaving temperature. The entire unit is controlled by a digital controller with display, which provides visual readout of system temperatures and allows for the adjustment of the setpoint. The setpoint controls the temperature of the water leaving the PWW unit on the process loop circuit.

Accessories – Additional accessories/components may be packed (for shipping) inside the electrical enclosure or within the unit behind a removable panel.

Technical Data – General technical data can be found in the unit document package, on the manufacturer's website www.pfannenbergusa.com or contact the factory directly at +1 716-685-6866.

Receiving and Unpacking Unit

Upon delivery of the unit, inspect the packaging for any sign of exterior shipping damage. Notify shipping company and Pfannenberg factory, if any unit damage is suspected. Damage should be documented using pictures and carrier's delivery receipt.

Remove packaging as soon as possible after delivery and inspect unit for concealed damage. If any damage is found, stop unpacking and document damage. Contact shipping carrier and Pfannenberg factory immediately to report damage. Units damaged in shipping should NEVER be installed without permission from the factory service manager or factory representative.

Use proper lifting equipment with rated load capacities. **Lift equipment only from base to avoid damage**.

Avoid sudden movements, which can damage the frame and the internal components.

Unit storage – Store unit in dry, secure area.
Unit should be stored in ambient temperatures ranging from 0°F (-17°C) to 105°F (40.5°C.)

Unit Dimensions / Weights

Please refer to the general arrangement drawing (in document package) for unit dimensions, mounting locations and weights.

Installation

Foundation

This equipment is NOT suitable for outdoor installation.

The equipment should be placed on a rigid, solid base of sufficient strength capable of supporting the operating mass of the PWW unit. Units should be properly anchored to supporting structure and installed level within ¼" over the length and width. The manufacturer is NOT responsible for problems resulting from an improperly installed unit or improper base structure.

Clearances

Equipment should be located in a well-ventilated area that allows for proper air circulation around the unit, and away from heat sources, as well as direct sunlight. This equipment is designed to operate within an indoor environment. Ambient temperatures should be between 122°F (50°C) and 50°F (10°C.) Unit may not function properly if ambient temperature exceeds the recommended values. If possible, place near the process, in order to avoid load losses along the hydraulic connection pipes. It is possible for the internal components to produce surface condensation during operation based on the environmental conditions.

Unrestricted area is required on all side of the unit to allow proper access by service and maintenance personnel. See **Figure #1** for minimum clearance requirements.

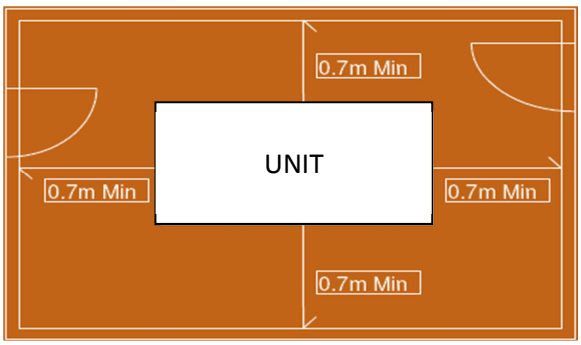


Figure 1 - Minimum Recommended Clearances

Moving / Lifting

Refer to General arrangement drawing (in document package) for typical unit weights. After final positioning of the equipment, inspect the internal connections for any damage that may have occurred during transport.

Heavy Equipment – Only use properly rated equipment which is capable of lifting the full weight of unit and accessories. Unit should only be lifted by the base using fork truck or similar equipment. Failure to use proper lifting equipment and/or technique could result in serious injury or death.

Fluid Connections

Important - Fluid connections should be assembled first, followed by electrical connections.

Important – An external filter is recommended for use to filter solids that may be present in the supply cooling water. Minimum of #60 mesh (US Standard) recommended.

Standard unit connections are 1" JIC male, style. Refer to the flow schematic (in the document package) for connections size, type, field installed pipe specialties and fluid flow direction. Use proper inter-connecting hosing and pipe rated for system pressures and as per local/state ordinances. Contact Pfannenberg factory for assistance if necessary.

Fluid connections should be completed by personnel trained and knowledgeable in correct plumbing practices. Improper fluid connections can cause equipment damage and/or faulty equipment operation.

Figure #2 shows a detailed view of the PWW unit connection points. The connection labels refer to fluid flow IN REALTION to the PWW unit only. The connections are as follows:

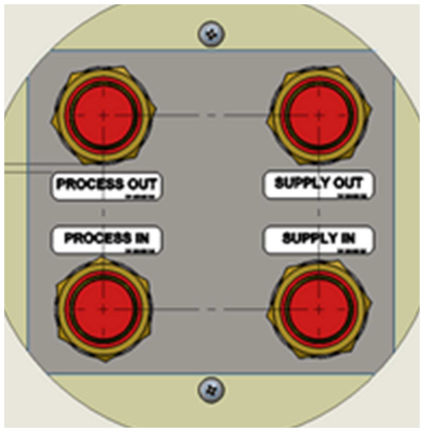


Figure 2 - Fluid Connection

Process Out – This is connected to the inlet of the equipment to be cooled

Process In – This is connected to the outlet of the equipment being cooled

Supply Out – This is connected to the return side of the fluid being used to cool the process fluid

Supply In – This is connected to the supply side of the fluid being used to cool the process fluid. Add filter if required.

The PWW unit has been designed to be an "open" system, meaning the storage tank is open to the atmosphere. If interconnecting pipes are located higher than the tank level, fluid may drain back to the chiller during times when unit is not operating, causing the storage tank to overflow. Piping connections should be designed to eliminate this situation, through use of valves or other means.

Fluid Type/Quality

Consult a local water treatment professional who can provide information regarding water treatment options and requirements.

The PWW unit has been designed to operate using fluids consisting of 100 % distilled water or a mixture of glycol (up to 40% by volume) and distilled water. Factory recommendations for proper fluid mixture can be found on unit nameplate. Additionally, the concentration of the glycol solution will affect the capacity of the cooling equipment. For any questions or assistance, please contact the Pfannenberg factory.

Use only (Ethylene or Propylene) glycol designed for commercial heating and cooling applications. Do NOT use automotive antifreeze! The inhibitors used in automotive antifreeze can break down quickly and accelerate the degradation of the coolant base (glycol); as well as promote corrosion in a system. Silicates used in automotive antifreeze coat heat exchangers, resulting in reduced heat transfer. Also, silicates can gel, causing fouling and plugging of a system. Use of this type of antifreeze will void all manufacturers' warranties.

Freeze Protection:
The ratio of inhibited glycol to water should be adequate to prevent freezing at the lowest operating ambient conditions, plus a safety factor of 15 degrees Fahrenheit. The glycol solution will protect the equipment during operation, during shutdown and/or pump failure.

Corrosion Protection:
Glycol manufacturers may include various rust and algae inhibitors that are vital in the proper operation of PWW equipment. These additives will protect the equipment components and fluid circuit from adverse hydraulic effects. Consult the glycol manufacturer's technical information or a water treatment professional to insure correct inhibitors are contained in the chosen glycol solution.

Water Quality

The water quality of the fluids also has an important effect on unit capacity and longevity. When filling the hydronic circuit, please consider the following:

- Use only distilled water or/a glycol/water mixture
- Use only clean water, free of any contaminating materials or chemicals. Use water filters as necessary.
- Do not allow biological, bacteria, and algae contamination.
- Minimum Water Quality Levels:
    - Ph.-level: 7 - 9
    - Hardness: <5 °dH
    - Conduction: <50µS/cm
    - Chloride: <20 mg/l

Electrical Connections

Hazardous Voltage – This unit requires field connected electrical wiring by certified professional personnel. Follow all safety procedures. Improper electrical connections can cause serious injury or death.

Use Copper Conductors Only – Unit connection points are not designed for any other type of conductors. Failure to use proper conductors could damage equipment.

General Recommendations:

This unit must be electrically connected in the field by others. Only properly trained and knowledgeable personnel should be allowed to electrically install this unit. All wiring MUST comply with local/state regulations as well as the National Electrical Code (NEC.) Field and unit wiring diagrams can be found in the document package and used as a guideline for electrical installation. Minimum circuit ampacity and recommended fuse size can be found on the electrical schematic, unit nameplate and/or electrical enclosure nameplate. It is advisable to install a branch circuit breaker, upstream of the unit feeder cable. Check that the incoming voltage and frequency of the power supply correspond to the specifications on the unit's data plate and/or electrical schematic. Make sure the system is adequately grounded.

Voltage Limitations:

460V/60Hz/3Ph – (voltage +/-5%)
400V/50Hz/3Ph – (voltage +/-5%)

Equipment Start-Up Procedure

Unit start-up should only be done by properly trained personnel. Improper startup procedures could result in personal injury, system damage and/or equipment damage

In order to properly start-up a PWW unit, the following steps should be undertaken:

1. Turn main electrical panel switch and all circuit breakers to the OFF position. Proper lockout / tagout procedures should be used.

2. Remove access screws on all side panels (quantity of 4 screws per panel, quantity of 4 panels.) Set panels aside in area where that will be protected from damage.

3. Check all internal hydraulic connections (clamps and fittings) that may loosen during transportation.

4. Check the external hydraulic connections (clamps and fittings) and ensure correct hoses are connected. Confirm all connections are correct as per the flow schematic diagram.

5. Remove the unit fill cap (see figure #3) of located at the top of the equipment (white plastic.)

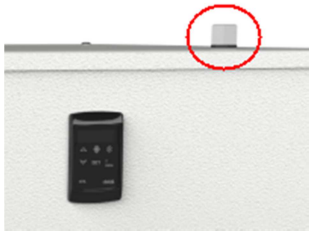


Figure 3 - Unit Fill Cap

6. Fill process loop reservoir with water-glycol solution until the water level is at the MAX level at the indicator (as shown in Figure #4.) Use of a funnel may be required in order to avoid spilling of fluid.

Figure 4 - Maximum Water Level

7. Replace unit fill cap.

8. Equipment power feed cable should be routed through cabinet knockout (rear of cabinet,) through proper enclosure knockout and connected to appropriate terminals on the electrical disconnect, inside the electrical enclosure – See electrical schematic

9. Confirm unit disconnect switch is in OFF position.

10. Turn on main electrical supply at circuit breaker panel.

11. Turn equipment disconnect to ON position. Unit display will display current fluid setpoint (Lower amber display) and current fluid temperature (upper red display.)

12. Confirm pump starts and rotation is correct (observe the cooling fan on pump) and water is flowing through unit.

13. While water circuit is flowing, make sure proper fluid level is maintained and if necessary fill reservoir to the proper level.

14. Open valve on secondary fluid loop to allow water flow.

15. Perform a second visual inspection of the hydronic circuit and all connections to check for leaks.

16. Re-install side access panels and secure with screws.

17. To adjust fluid setpoint - see controller information in document package

18. After proper installation, the equipment is self-regulating.

19. Contact Pfannenberg factory with any questions or concerns

Maintenance

Maintenance procedures should only be performed by qualified, knowledgeable and trained personnel. Improper maintenance procedures may cause personal injury, system and unit malfunctions or damage.

Hazardous voltage - Prior to performing equipment maintenance disconnect the supply voltage at the main circuit breaker and use proper lockout / tagout procedures for electrical protection.

General

Maintenance will help insure a properly functioning unit and prolong equipment service life. Recommended maintenance procedures and inspections should be done at periodic intervals or as operating conditions require. Contact Pfannenberg factory with any maintenance questions.

Recommended Maintenance Schedule

Weekly

- Visually check the fluid level sight glass. Add fluids (proper mixture) as required.
- Visually check for fluid leaks around base of the unit and external hose/pipe connections
- Check unit for any noticeable, unusual noises, such as pump vibration or rubbing

Monthly

In addition to the items listed above, also complete the following

- Check supply loop water external filter (if present) and clean or replace as necessary.
- Check glycol mixture concentration (if applicable) and adjust as necessary.
- Remove access panels and inspect for fluid leaks inside unit.

Troubleshooting

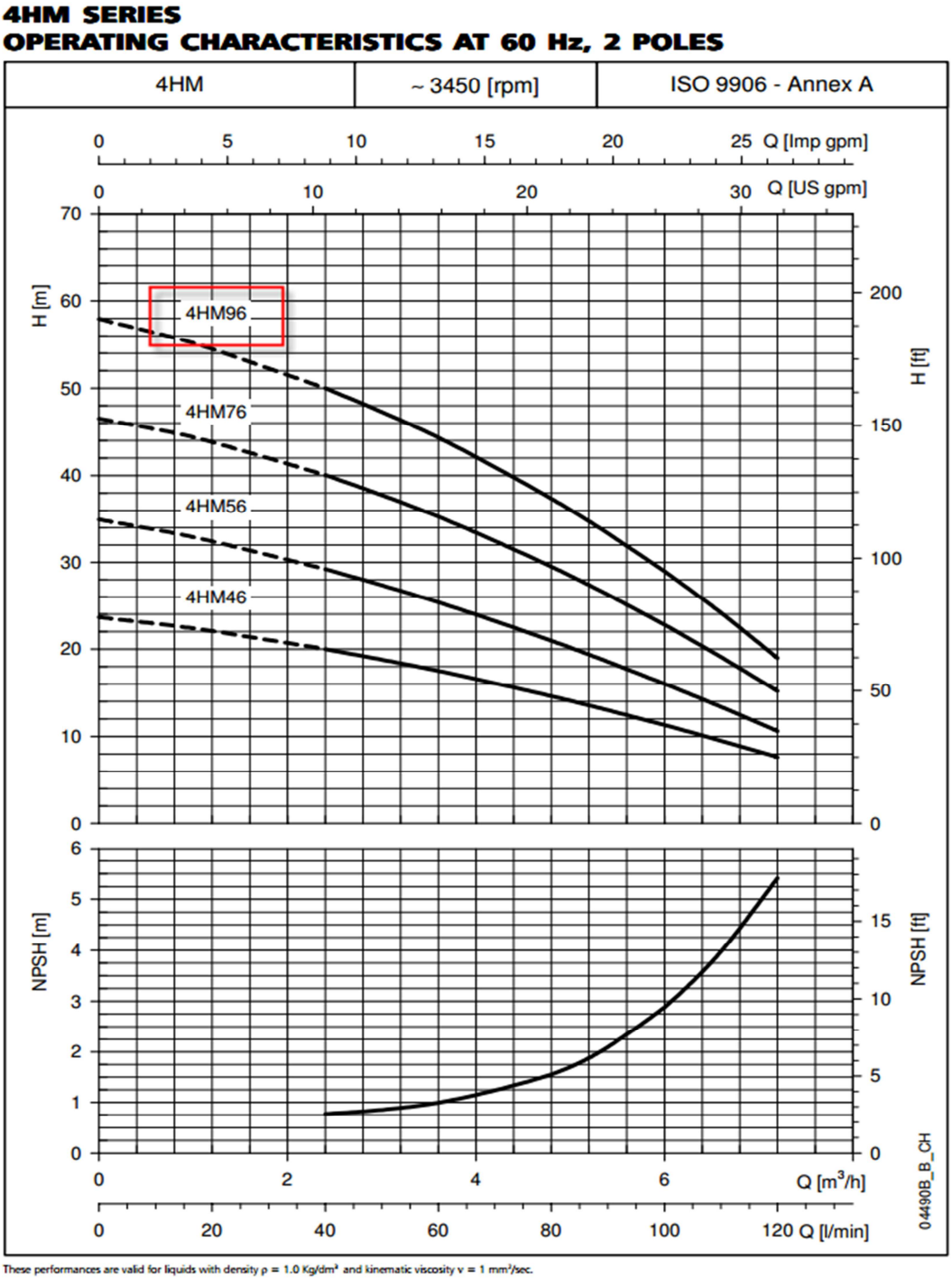
The information shown in this table is designed for the authorized service personal. Follow all electrical regulations when working on the unit, based on valid laws of the countries were the unit is placed.

Equipment		
Problem	**Cause**	**Possible corrective Action**
The unit does not start up	No supply voltage	Check the supply main voltage line
	Controller not working	Inspect the connection, check and correct the parameter settings and if there is no fault, replace the controller,
	Remote start /stop connection	Check remotes start/stop parameter, electrical connections and/ or remote contact
	Improper grounding	Check to make sure unit is properly grounded
Unit is running, process water is not being cooled	Cooling water temperature too high	Reduce the temperature of the cooling supply water
	Motorized valve is not working properly.	Inspect the connection, check and correct the parameter settings and if there is no fault, replace the valve,
	Too high heat load	Possible wrong application, Contact Pfannenberg
	Supply water filter dirty/clogged	Clean fluid filter
	Hose connections are incorrect	Verify inlet and outlet hose connections, as per this manual
Red alarm light is on – Unit is not running	No Flow – A08 alarm code	Check pump rotation
	No Flow – A08 alarm code	Verify inlet and outlet hose connections, as per this manual
	No Flow – A08 alarm code	Inspect flow switch connections, direction. Replace flow switch. Contact Pfannenberg service
	No Flow – A08 alarm code	Fluid level is too low. Investigate for leaks, evaporation. Add fluid to system
	Pump overloaded - A17 alarm Code	Throttle outlet of process water hose
	High return water temperature – A05 alarm code	Check and confirm fluid flow
	High return water temperature – A05 alarm code	Cooling load is too large. Possible wrong application, Contact Pfannenberg
	High return water temperature – A05 alarm code	Supply water filter dirty/clogged. Clean fluid filter
	High return water temperature – A05 alarm code	Cooling water temperature too high. Reduce the temperature of the cooling supply water
Amber (yellow) alarm light is on	Fluid / tank level low	Add fluid to system to bring level up to correct levels
Any alarm code on the controller display	Operating parameter is different than expected values	See alarm code list in document package

Appendix

Pump Curves

PWW 3482

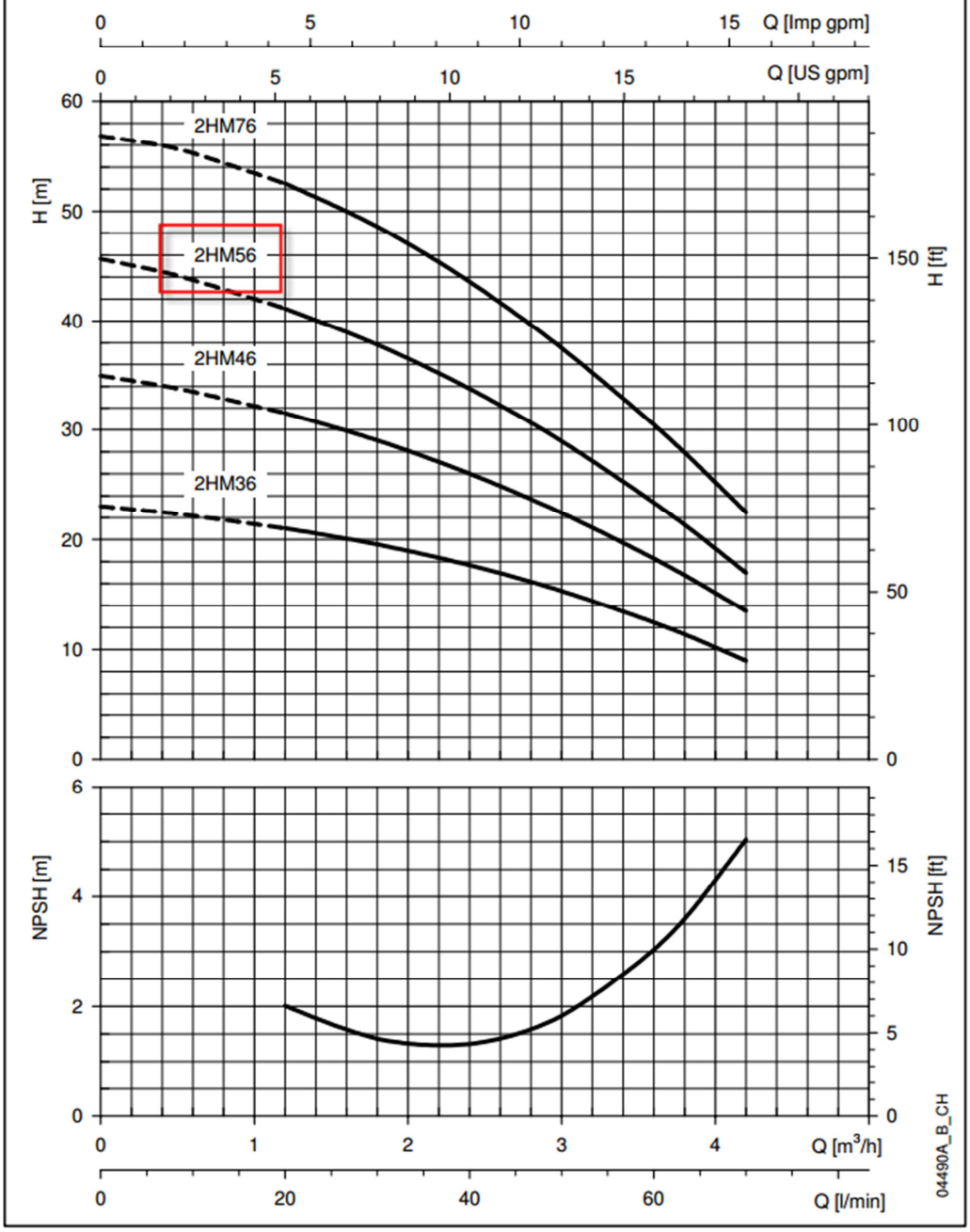


These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.

PWW 3242

2HM SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES

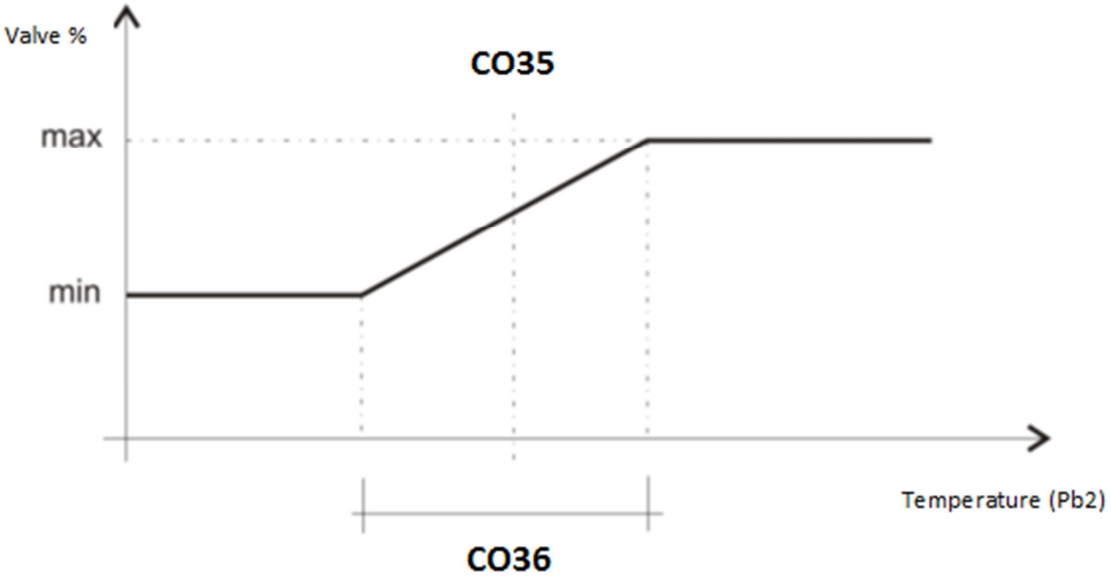
2HM	~ 3450 [rpm]	ISO 9906 - Annex A



These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.

Setpoint Control Logic

Modulation of the valve in response to temperature rise.



C038 is the process supply (tank) water temperature
C039 is the temperature differential (Factory set at 4 C)