

n e p t r o n i c[®]

Direct Steam Injection Humidifier

SKD Series

Installation Instructions and User Manual



Foreword and Safety Instructions

About the Manual

These installation and operation instructions have been developed to facilitate the installation of the Direct Steam Injection Humidifier .

- The strict application of these instructions will ensure the conformity of your installation and operation as per the manufacturer's recommendations.
- The application of these instructions is one of the conditions for the application of the warranty.
- The application of these instructions does not ensure, at any time conformity to procedures, regulation or local codes, regarding electric installation and connection to local water supply.

This product has been declared to conform to the applicable Canadian and American safety standards and directives and bear the CSA (c) & (us) mark. The Certificate of Conformity, CSA is available, upon request with the manufacturer.

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Company Overview

Neptronic is a private corporation, founded in 1976 that designs, manufactures and distributes products for the Heating, Ventilation and Air Conditioning industry (HVAC).

Neptronic products, which include humidifiers, electric heaters as well as electronic damper actuators, actuated valves and control products, are designed, manufactured and assembled by over 200 dedicated employees at its 7,500 m² (80,000 sq²) state-of-the-art facility located in Montreal, Canada.

Neptronic currently holds several national and international patents and with its continued emphasis on research and development, Neptronic ensures innovative technologies to the ever-evolving challenges of our industry. Neptronic has an exclusive distribution network around the globe that provides comprehensive solutions to our customers and meets a worldwide demand that spans 5 continents.

Electricity



All work concerned with electrical installation **MUST** only be performed by skilled and qualified technical personnel such as an electrician or a technician with appropriate training). The customer is always responsible for ensuring the suitability of the technical personnel.

Please observe the local regulations concerning the provision of electrical installations.

Correct Use

Neptronic systems and its products are designed only for humidification use. Any other application is not considered appropriate for the intended purpose. The manufacturer cannot be made liable for any damage resulting from incorrect use.

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Technical Specifications

Product Description

The SKD Direct Steam Injection Humidifier maintains the desired humidity set point by using raw steam from a steam boiler as a source of humidity. The SKD's unique engineering ensures the following:

- There is no undesired energy consumption when there is no humidity demand
- There will be no water drop ejection on cold start-up
- The humidifier always functions properly by constantly monitoring the temperature

The SKD is controlled by a specially designed Electronic Steam Controller (ESC) that monitors and controls the demand and steam temperature. The controller takes care of the humidifier's controlling, isolating, and steam control valve operations. This is done using temperature sensors' readings and the special steam control valve opening sequence. The ESC also simplifies the diagnostics process and is a plug and play configuration for direct steam humidification.

The SKD Direct Steam Injection Humidifier comes in three configurations - the SKD Single Tube, the SKD Multi Tubes, and the SKD MiniRack. The choice of the configuration is driven by the combination of the humidifier capacity and the required maximum absorption distance. The design can be selected using the Humidisoft software.

The Direct Steam Injection Humidifier combines certain unique features, making it one of the most efficient humidifiers. The following are the features of Direct Steam Injection Humidifier :

- *Steam Jacketed Distributor.* The stainless steel jacketed manifold allows pressurized steam to circulate around the inner distribution tube, heating the surface and reducing condensation.
- *Separator.* The stainless steel construction of the separator is a proven internal configuration, which limits the drop in pressure while providing efficient steam-condensate separation and also supplying hot and dry steam to the control valve.
- *Control and Isolating Valves.* Normally, closed globe valve with equal percentage flow characteristics control the flow of steam. Bronze body and brass trim (stainless steel trim optional). The linear electric actuator, is equipped with a heat shield.
- *Electronic Steam Controller (ESC).* The Direct Steam Injection Humidifier comes with a microprocessor based ESC, with backlit LCD display that allows programming of the humidity set points, and monitoring parameters such as actual humidity, air flow switch, interlock, and temperature sensors.
- *Strainer.* The strainer strains foreign matter from pipelines, and provides protection to the components of the steam humidifier.
- *Temperature Sensor.* RTD temperature sensor integrated in a brass thermowell.
- *Float and Thermostatic Steam Trap.* Float and thermostat design with universal four port design, all stainless steel internal components.
- *Steam Header.* A steam header is supplied on multiple tube configurations for an even distribution of steam into the airstream.

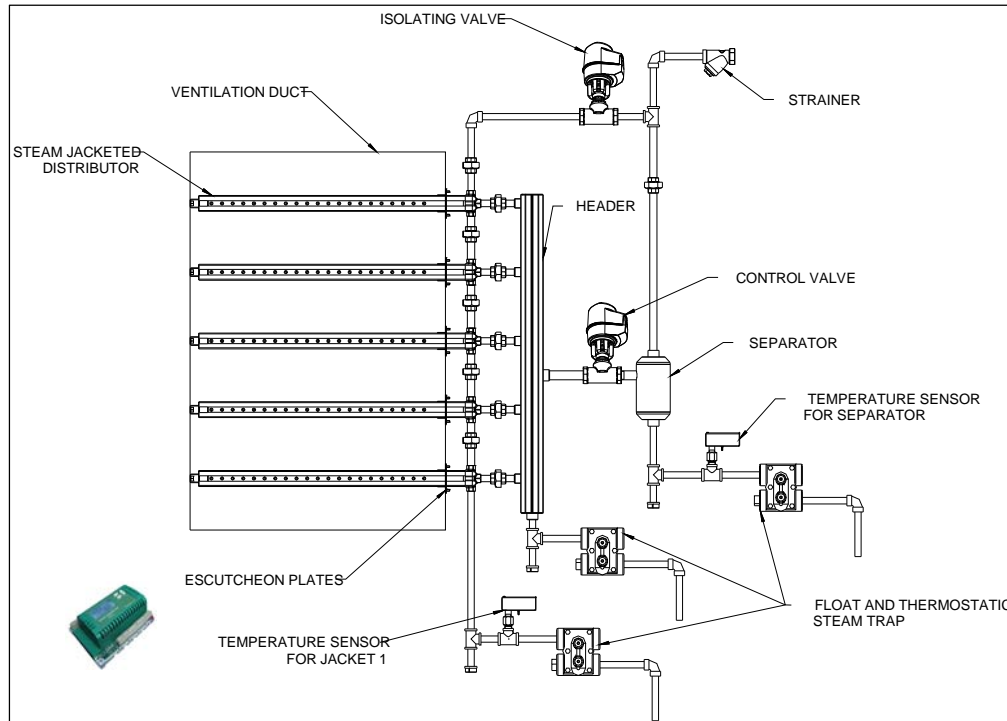


Illustration 1- Multiple Steam Jacketed Distributors

Configuration

The following configurations are available for the Direct Steam Injection Humidifier

Single Steam Jacketed Distributor

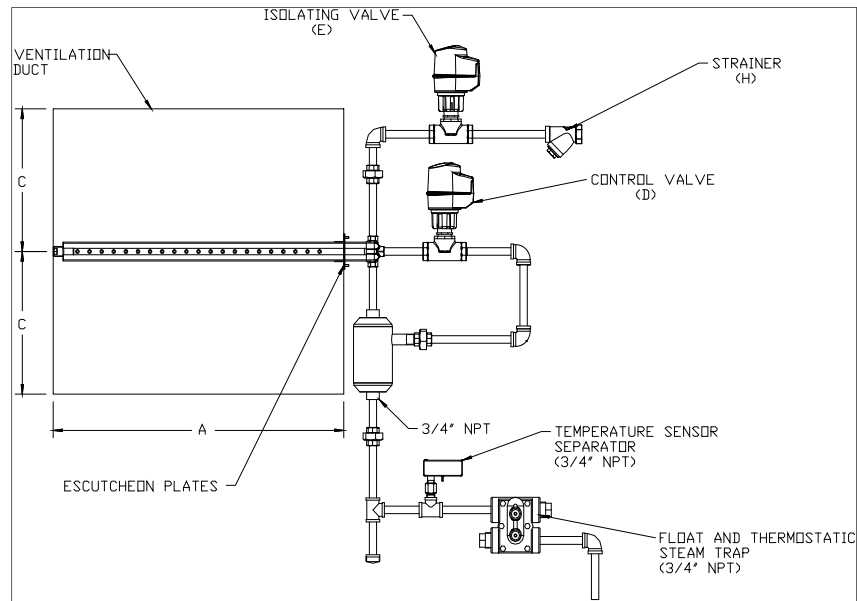


Illustration 2 - Single Steam Jacketed Distributor

Mini Rack

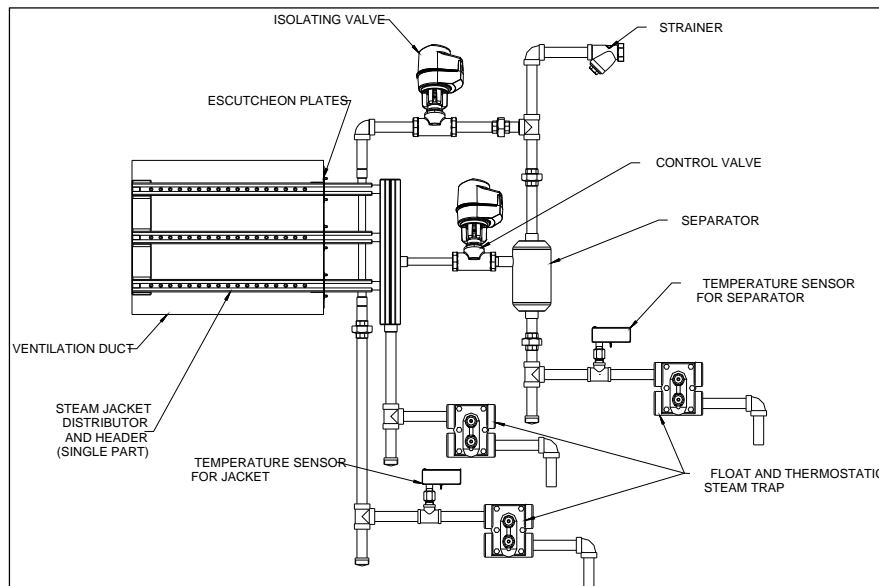


Illustration 3 - Mini Rack

Multiple Steam Jacketed Distributors

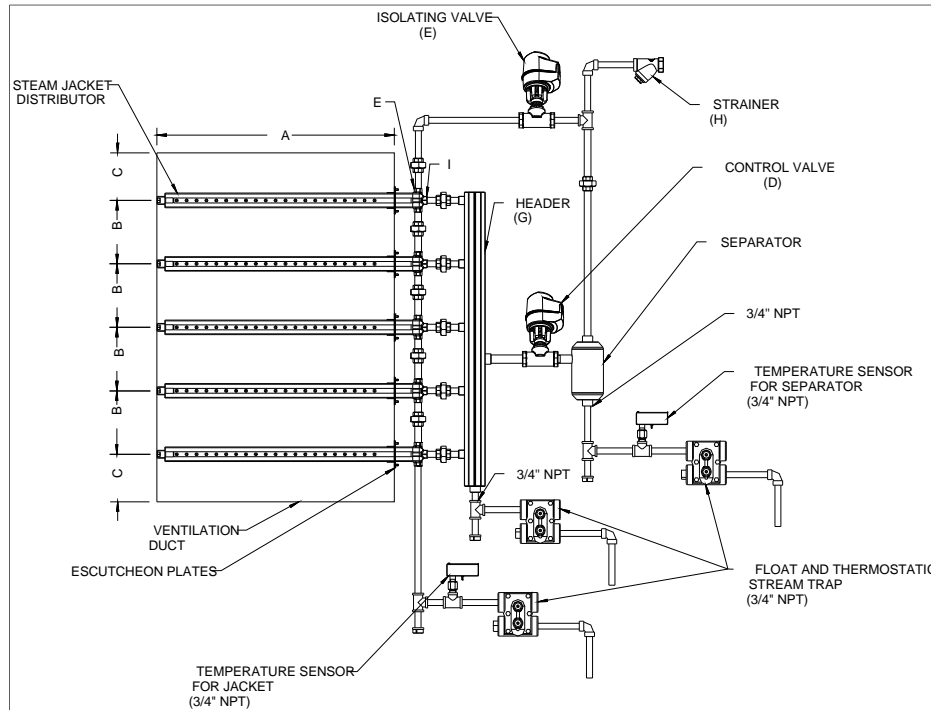


Illustration 4 - Multiple Steam Jacketed Distributors

Large Capacities Multiple Steam Jacketed Distributors

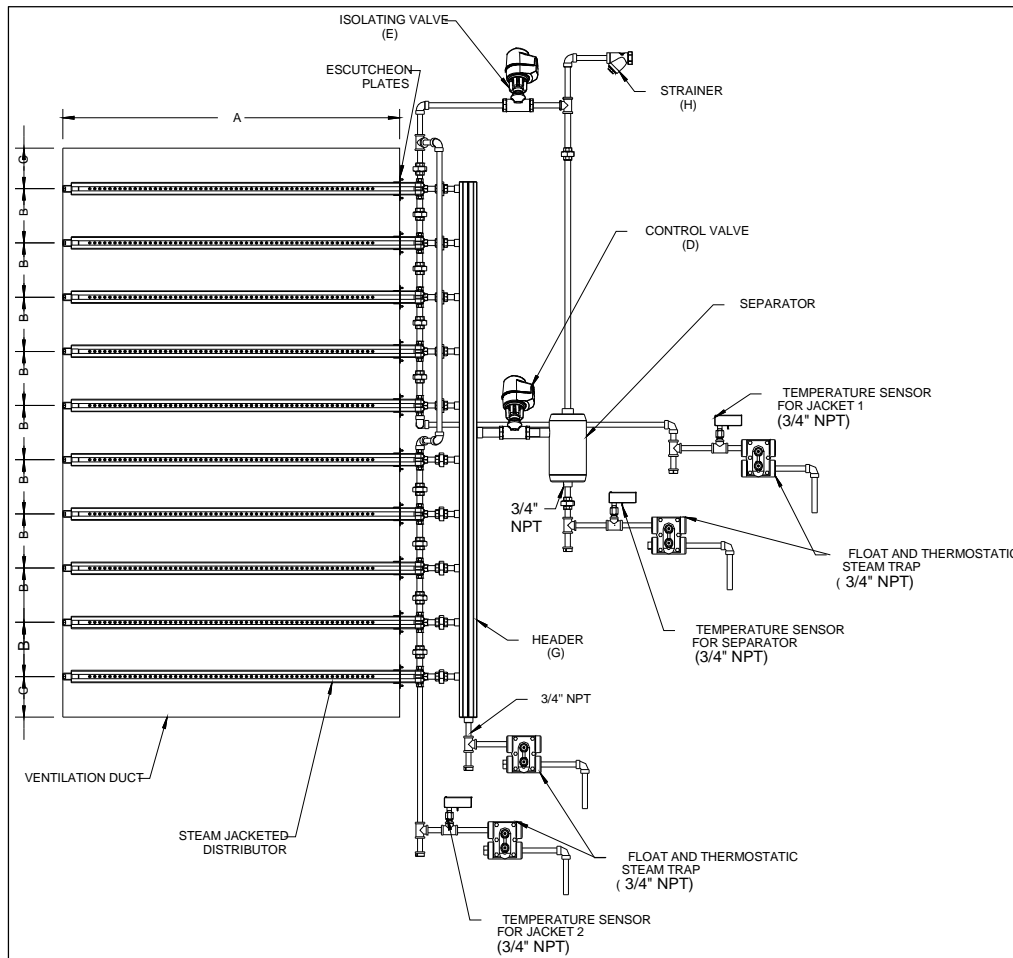


Illustration 5 - Multiple Steam Jacketed Distributors for Large Capacities

Handling and Packing

Handling and Lifting



Lifting or handling **MUST** be carried out by trained and qualified personnel. Ensure that the lifting operation has been properly planned, assessed for risk and that the equipment has been checked by a competent Health & Safety representative, and effective control measures are in place.

It is the customer's responsibility to ensure that the operators are trained in handling heavy goods and to enforce the relevant lifting regulations.

The Direct Steam Injection Humidifier **MUST** always be handled and lifted with care and should remain in its original packaging for as long as possible prior to installation.

The Direct Steam Injection Humidifier package may be carried using a forklift from the underside. Caution should be exercised to ensure balanced load before lifting.

Unpacking

The Direct Steam Injection Humidifier is shipped inside carton boxes or in a wooden crate. Remove packing and skids prior to commissioning.

Installation Overview



All installation work must comply with local regulations.

All work related to the installation of the Direct Steam Injection Humidifier **MUST** only be performed by skilled and qualified technical personnel such as plumbers or technicians with appropriate training. The customer is responsible for ensuring their suitability.

For the installation of the Direct Steam Injection Humidifier and associated components, there are no specific tooling requirements.

Installation Method Statement

Stage 1 – Steam Jacketed Distributor Installation

Stage 2 – Steam Header Installation

Stage 3 – Control Valve Installation

Stage 4 – Steam Separator Installation

Stage 5 – Temperature Sensor Installation

Stage 6 – Float and Thermostatic Steam Trap Installation

Stage 7 – Isolating Valve Installation

Stage 8 – Y-Strainer Installation

Stage 9 – ESC Device, Electrical Supply, and Control Connections

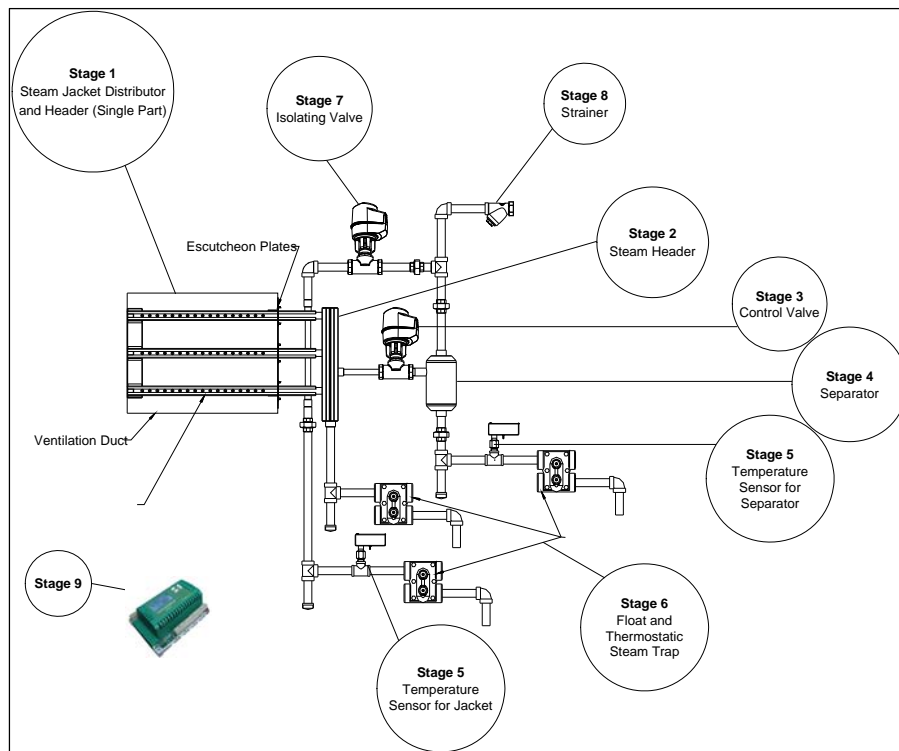


Illustration 6 - Installation Stages

Stage 1 – Steam Jacketed Distributor Installation

General Considerations



Any installation work must be carried out by suitably qualified personnel.

Consider the following points before deciding the location for the SKD steam distribution system:

- Plan a location that is easy to access and permits an easy inspection and servicing of the humidifier.
- Do not install the humidifier where failure of the appliance could cause damage to the building structure or to other expensive equipment.
- Verify that the construction of the duct or AHU wall is suitable to support the steam distributors through the duration of the installation life.

Positioning the Steam Distributors

- The steam distributors must be installed to ensure that the visible steam trail is kept to the shortest possible length.
- Locate the steam distributors far enough from elbow or fan to be in laminar air flow to ensure proper evaporation distance.
- There must be sufficient straight duct downstream from the steam distributors for absorption of the steam.

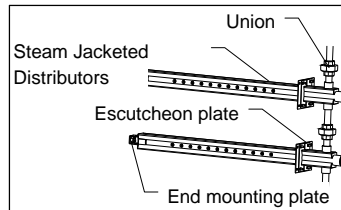


Illustration 7 - Manifold Installation

- For single steam distributor application, position the steam distributor in the middle of the duct.
- For multiple steam distributors, position the steam distributors so that the distance between them is the same.
- Use proper size unions to connect the jacket of each steam distributor together.
- For mini rack models, position the system evenly so that the spacing between the top distributors and the duct/AHU is the same as the bottom distributors and the duct/AHU.
- Use metal screws to mount the escutcheon plate to the wall of the duct or AHU.
- Secure the end of the steam distributor with 3/8" (19.5 mm) rods either vertically or horizontally.

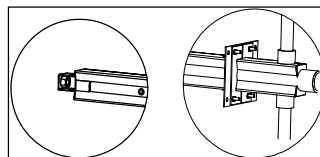


Illustration 8 - End Mounting Bracket and Escutcheon Plate

Stage 2 – Steam Header Installation



Any installation work must be carried out by suitably qualified personnel.

Steam Header Installation (with Multiple steam distributors only)

- Align the outlets of the steam header with the steam inlet of each steam distributors.
- Use proper size union to connect the steam header to the steam distributors. Refer to *Illustration 10 - Mini Rack*.
- The distance between the header and the steam distributor's inlet port must not exceed 8" (203 mm) and both header and steam distributor ports must be aligned, no elbows can be used to pipe the connection.
- Mini rack model, the connections between the steam header and the steam jacketed distributors are assembled at the factory. The steam distributors and the header assembly come as separate, single parts.

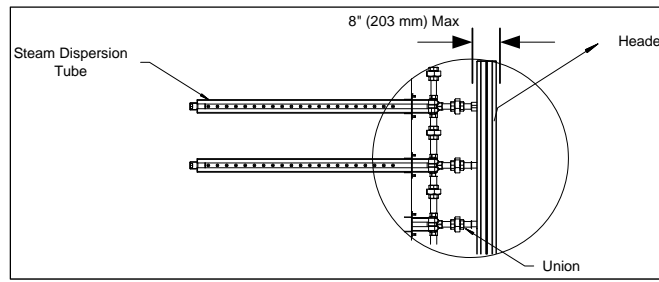


Illustration 9 - Steam Header with Union

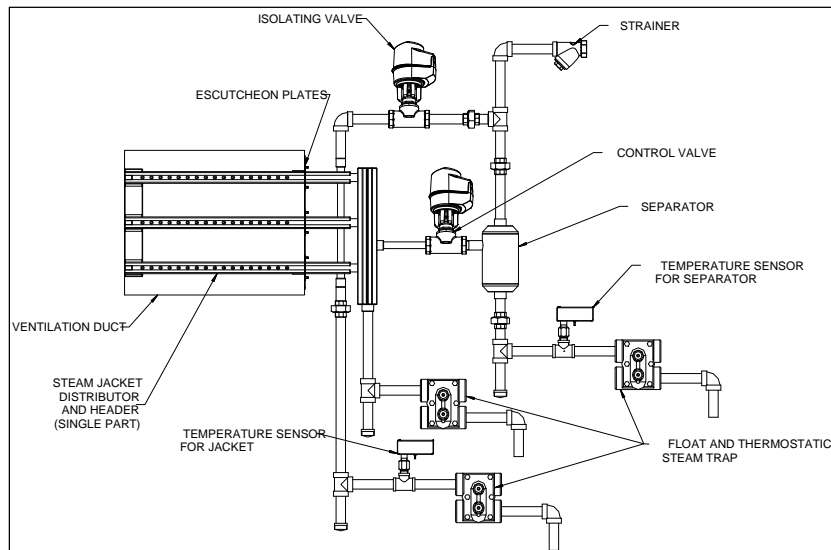


Illustration 10 - Mini Rack

Stage 3 – Control Valve Installation



Any installation work must be carried out by suitably qualified personnel.

Control Valve Positioning

- The body of the valve must be positioned properly to have the steam supply going into the A port and exiting from the AB port. Do not refer to the orientation of the actuator head for positioning, since the head can be reversed.
- Install the actuated valve between 20 to 30 degrees from the vertical line to reduce the radiant heat to the actuator head.

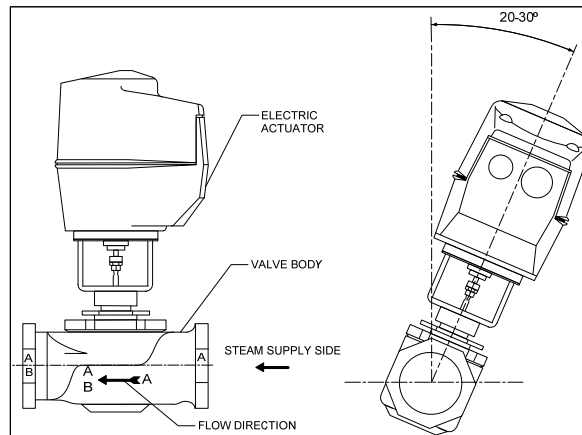


Illustration 11 - Control Valve Orientation and Control Valve Angle

Control Valve Installation without Header

Use the proper size union to connect the control valve to the steam distributor. The maximum distance between the steam control valve and the dispersion tubes port should be 8" (203 mm).

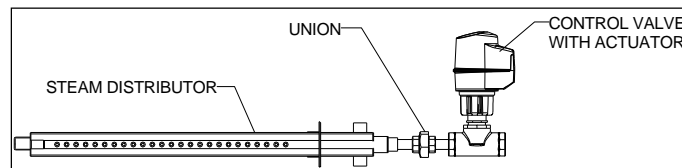


Illustration 12 - Control Valve Connection to Steam Distributor without Header

Control Valve Installation with Header

Connect the steam control valve to the steam header by using a length of threaded pipe of the proper dimension. The connection between those must not exceed 8" (203 mm) and the steam control valve port must be aligned with the header inlet port.

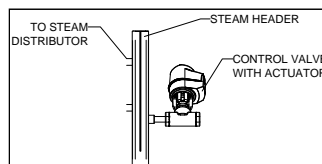


Illustration 13 - Control Valve Connection with Header

Stage 4 – Steam Separator Installation



Any installation work must be carried out by suitably qualified personnel.

Steam Separator Positioning

The steam separator must be installed so that the steam inlet is always on top. The steam inlet and the condensate outlet must be vertical.

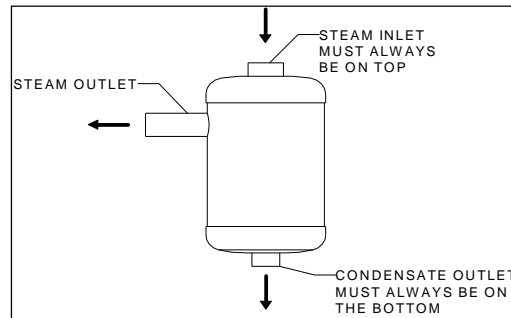


Illustration 14 - Separator Proper Installation

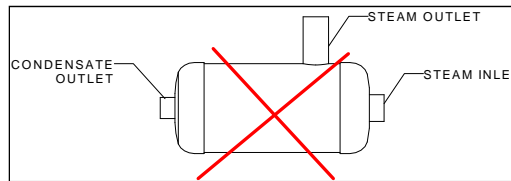


Illustration 15 - Separator Incorrect Installation

Steam Separator Installation

Position the steam separator so that the steam inlet is always located on the top. The separator steam outlet port must be aligned with the steam control valve inlet port and the distance between the two must not exceed 8" (203 mm). Use the proper size of threaded pipe to connect the steam separator to the control valve. Reducing coupling might be needed to perform the installation between the separator and the steam control valve.

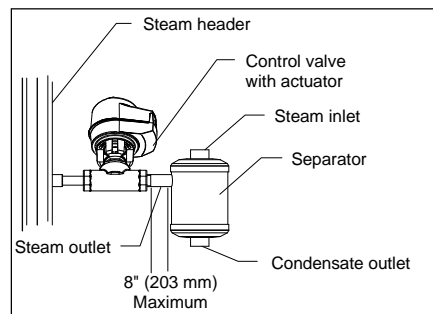


Illustration 16 - Separator Connection to Control Valve

Steam Separator Installation with Single Tube

Position the steam separator so that the steam inlet is always located on the top. The steam separator must be connected to the outlet of the jacketed distribution tube and must be positioned below the tube to avoid a build up of condensate in any area in the piping.

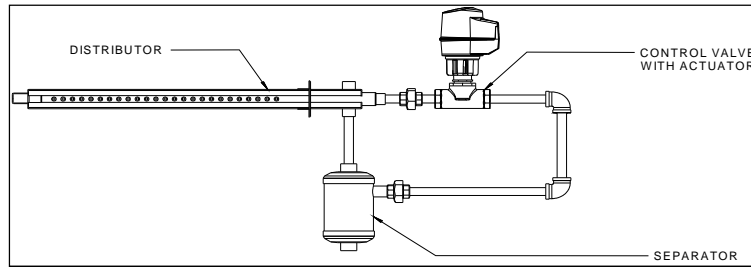


Illustration 17 - Single Steam Distributor Separator Correct Installation

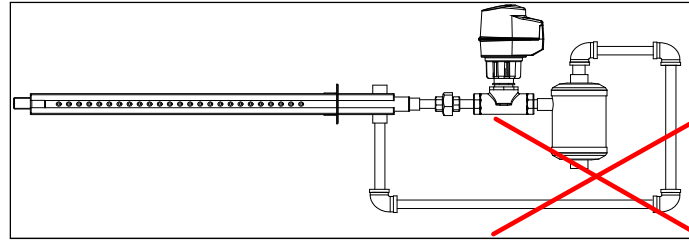


Illustration 18 - Single Steam Distributor Separator Incorrect Installation

Stage 5 – Temperature Sensor Installation



Any installation work must be carried out by suitably qualified personnel.

Temperature Sensor Installation General

- One temperature sensor shall be installed downstream of the condensate outlet of the steam separator.
- The SKD system will require at least one and up to five temperature sensors start-up traps depending on the number of steam traps required on the system.

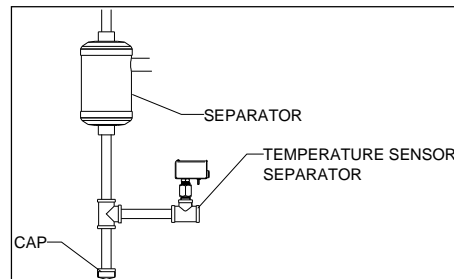


Illustration 19 - Temperature Sensor Separator Installation

- SKD Mini Rack and Multiple steam distributors series will require at least one additional temperature sensor to be installed at the outlet of the steam jacket distributor. Depending on the total steam distributor length and number, the humidifier might require up to 5 temperature sensors on the steam jacket distributors. The system requires 1 temperature sensor for each 50 linear feet (15m) of steam distributors.

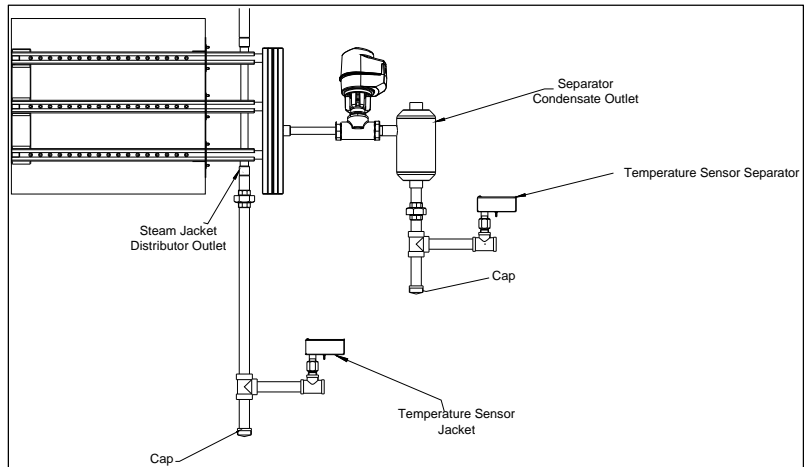


Illustration 20 - Temperature Sensor Jacket Installation

Stage 6 – Float and Thermostatic Steam Trap Installation



Any installation work must be carried out by suitably qualified personnel.

Float and Thermostat Steam Trap Installation

- Install a float and thermostatic steam trap at each condensate outlet of the SKD system. Do not combine return steam lines into one steam trap. Steam traps can only be combined on the condensate side.
- The outlet of the float and thermostat steam trap should be connected to the condensate return pipe of the steam boiler system.
- The distance between the temperature sensor and the steam trap must be between 5” and 7” (100-175 mm).

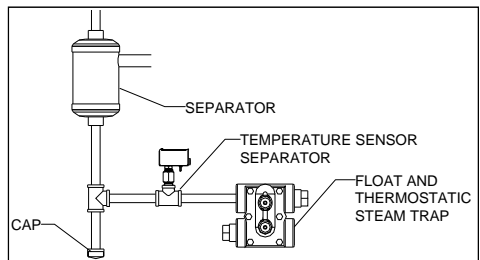


Illustration 21 - Separator Steam Trap Installation

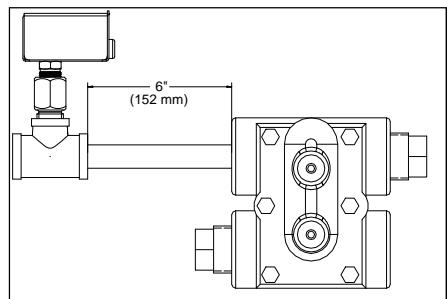


Illustration 22 - Steam Trap Installation: Distance from Temperature Sensor

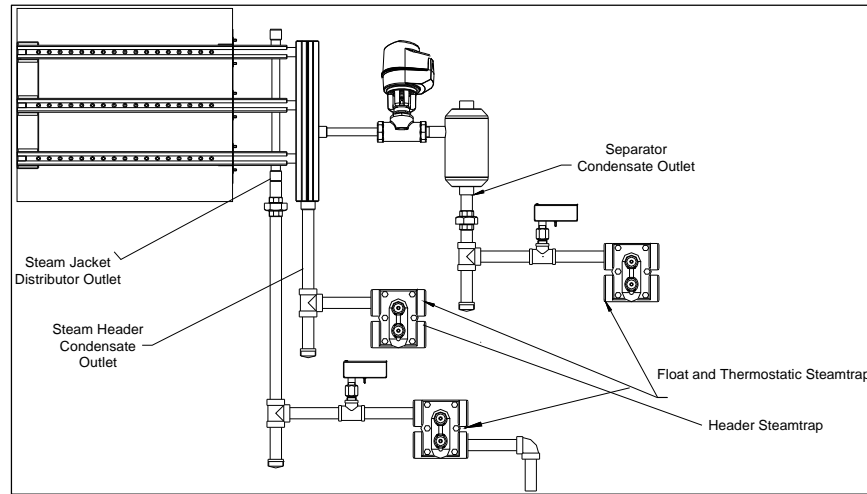


Illustration 23 - Steam Trap Installation - Multiple Steam Distributors

The header steam trap, refer to [Illustration 23 - Steam Trap Installation - Multiple Steam Distributors](#), must be connected to the drain since there is no pressure upstream of the steam control valve to push the condensate back to the boiler. Therefore, normal draining design applies on the condensate side of the header steam trap slope to evacuate the condensate, and a P-trap (6" or 152 mm) to avoid the steam vapor coming from the drain. All other steam traps can be connected to the condensate return line.

Stage 7 – Isolating Valve Installation



Any installation work must be carried out by suitably qualified personnel.

Isolating Valve Positioning

The valve body must be positioned properly to have the steam supply going into the A port and exiting from the AB port. Do not refer to the orientation of the actuator head for positioning, since the head can be reversed. Install the actuated valve between 20 to 30 degrees from the vertical line to reduce the heat transfer to the actuator head.

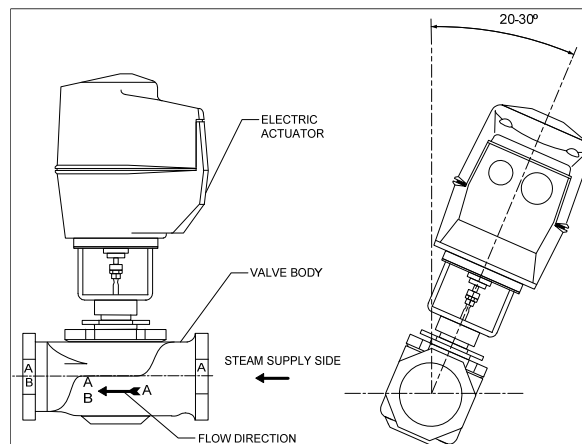


Illustration 24 - Control Valve Orientation and Control Valve Angle

Stage 8 – Y-Strainer Installation



Any installation work must be carried out by suitably qualified personnel.

Strainer Positioning

- The strainer must be installed upstream the separator and the isolating valve for any SKD configuration.
- On the single steam distributor, install the strainer before installing the isolating valve.
- On Mini Rack and Multiple steam distributors configuration, install the strainer before the steam line splits between the separator and the isolating valve.

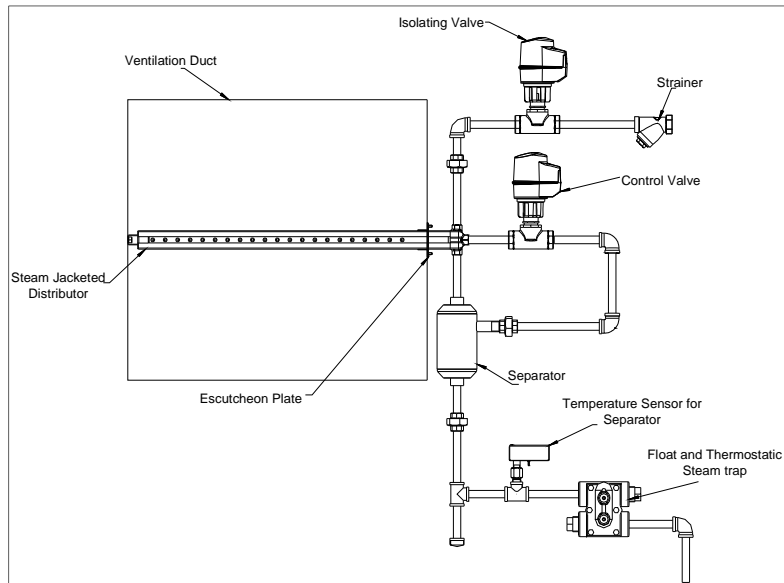


Illustration 25 - Single Steam Distributor Tube Configuration

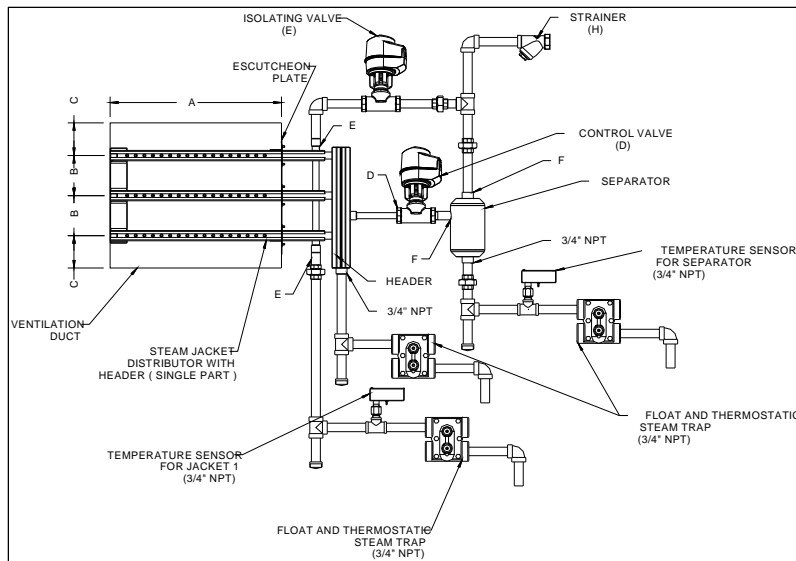


Illustration 26 - MiniRack and Multiple Steam Distributors Configurations

Stage 9 – ESC Device, Electrical Supply, and Control Connections



Any installation work must be carried out by suitably qualified personnel.

Electrical Connection

- Position the ESC device in a safe, cool, and dry place.
- Refer to the ESC (Electronic Steam Controller) manual and [Illustration 27 - ESC Wiring Diagram](#) to connect all the components to the ESC.
- Make all the electrical connections required on the ESC.

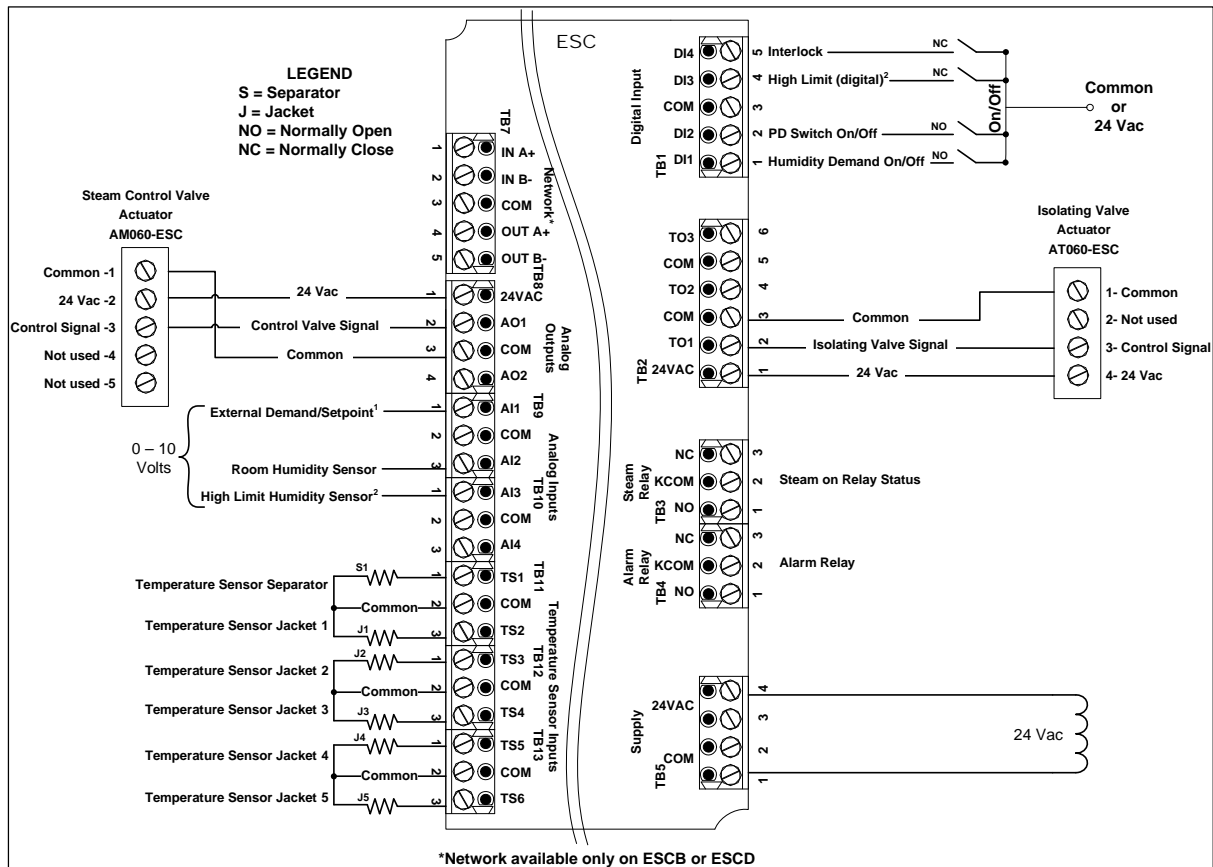


Illustration 27 - ESC Wiring Diagram

Initial Verification



Any installation work must be carried out by suitably qualified personnel.

Installation

- Ensure that the humidifier is installed properly according to the installation manual.
- Check that steam distributors are properly installed into the ventilation duct.
- Ensure that there is no leakage on the SKD piping.

Electrical

- Confirm that 24Vac is present between tab 1&4 of terminal block TB5 on the ESC Controller.

Drain if needed (MiniRack or Multitubes configurations only)

- If there is a steam trap on the header, confirm that the drain piping is properly connected with a pitch of least ¼" (1.5 mm) per 40" (1m). There is no header on the single tube configuration and therefore there is no steam trap on the header.

Steam Supply

- If there is a steam trap on the header, confirm that the drain piping is properly connected with a pitch of least ¼" (1.5 mm) per 40" (1m). There is no header on the single tube configuration and therefore there is no steam trap on the header.

Controls

- Ensure that a high limit duct humidistat is installed, properly connected to the ESC and the set point is properly adjusted.
- Verify that the room humidistat or returned air duct humidistat is installed, properly connected to the ESC, and the set point is properly adjusted.
- Turn on the power at the disconnect switch.
- Confirm the control set-up of the humidifier. The humidifier is factory set with EXTERNAL control set-up, which means that the humidity demand is controlled by the room or duct humidistat.
- Ensure that the type of signal (0-10 Vdc, 2-10 Vdc or 4-20 mA) of the humidistat corresponds to the type set in the humidifier control set-up.

Start-Up Procedure

Start-up

Proceed to start-up the humidifier as follows:

- Make sure that the steam is supplied to the SKD.
- Switch on the ESC.
- Make sure that there is no alarm. If the A6 alarm stays on, it means that the steam does not reach the separator or there is a problem with evacuating the condensate from the separator steam trap.
- Wait for a call for humidity or create it by setting the ESC control mode to ON (set #14), and the External humidity set point to OFF (set #18). Then, adjust the set point to a higher value than the room humidity reading (operation mode B).
- Set the ESC econo mode to ON.
 - The isolating valve will open within 30 seconds. If not, check for alarms (no air flow, enable/disable off). If there is no alarm, there is no humidity demand. Make sure there is a demand and redo start up procedure d).
 - After the isolating valve opens, the temperature of the jacket will increase. Within 30 seconds, the temperature of the jacket should be higher than 212F (100C). The temperature is displayed on the ESC LCD.
 - Once the temperature is high enough, the control valve will open slowly.
 - The start-up is completed and the humidifier is now functional.

Safety Test

- Check for steam or condensate leakage while the humidifier is in operation.

Reset the Set Point and Control Mode

- If the humidity set point is controlled by the ESC, reset the set point to the desired relative humidity % (set #20) as suits the room.
- If the humidity set point is controlled by another device than the ESC, set the internal control signal to OFF.

End

- The humidifier is ready for normal operation.

General Conditions of Sales and Warranty

General warranty policy

- Provided that the terms of payment are observed, the purchaser is offered a warranty of 24 months from the original purchase date of delivery for any Neptronic Humidifier SK300, SKR, SKE, SKS, SKD and SKG Series, provided the equipment has been properly installed and operated in accordance with Neptronic instructions.
- The warranty covers faulty manufacture, design and/or defective materials and is limited to the equipment and components. The warranty shall cease to be valid in the event of misapplication, incorrect installation, improper maintenance or any other incorrect uses or misuse of the product.
- For the SK Series, the warranty furthermore ceases to be valid if the user disconnects or removes any electronic or mechanical components prior disconnecting the input power. Neptronic assumes no responsibility for repairs made on equipment, unless performed by Neptronic's authorized personnel.
- All defective product or component under warranty must have a valid Return Material Authorization (RMA) number issued prior to be processed. To request an RMA number, purchaser must provide the model number and serial number/date code of humidifier and certain components such as sensor and PC board etc.
- Neptronic agrees under the warranty to repair or replace (at the discretion of Neptronic) such standard products or components, which on examination by Neptronic are found to be defective.
- Product or component replaced or repaired under warranty will be sent back to the purchaser, standard ground freight paid by Neptronic.

- Expenses in connection with travelling time, dismantling and mounting shall not be paid by Neptronic.
- Guarantee for products or components sold but not manufactured by Neptronic, is only given to the same extent as given to Neptronic, however, not exceeding the normal Neptronic warranty.
- Parts used for repairs are warranted for the balance of the term of the warranty on the original humidifier or 90 days, whichever is longer.
- Any repairs made at the Neptronic facilities after the original warranty period are warranted for 1 month from the date of repair.

Special agreement on components under warranty

- For certain defected components under warranty, based on valid reasons, the purchaser has two options:
 - 1) Send back immediately the defective component(s) for inspection and the purchaser is responsible for freight to Neptronic. The full purchase price will be credited once the defective component(s) is received and the manufacturing defect is found upon inspection by Neptronic.
 - OR
 - 2) Replacements will be sent without requiring returning of the defective component(s), standard ground freight paid by Neptronic at zero value invoice. Although the purchaser must hold defective component(s) for a period of 12 months whereas Neptronic reserves the right to claim the defective component(s) back for inspection at any time. If the claim is found to be out of warranty coverage upon inspection by Neptronic, the replacement parts sent free of charges will be then charged to the purchaser.

neptronic[®]

400 Lebeau blvd, Montreal, Qc, H4N 1R6, Canada

www.neptronic.com

Toll free in North America: 1-800-361-2308

Tel.: (514) 333-1433

Fax: (514) 333-3163

Customer service fax: (514) 333-1091

Monday to Friday: 8:00am to 5:00pm (Eastern time)