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NHRS Series™

RESISTIVE ELEMENT STEAM HUMIDIFIER

Engineering Manual

Manual No. H-104
2008-02-18

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RECORD OF REVISIONS

For each revision, put the revised pages in your manual and discard the superseded pages. Write the revision number and revision date, date put in manual, and the incorporator's initials in the applicable columns on the Record of Revisions.

Revision Number	Revision Date	Date Put In Manual	By	Revision Number	Revision Date	Date Put In Manual	By

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10-00
INTRODUCTION

1. PRINCIPLE OF OPERATION

(1) The NORTEC NHRS uses an advanced control system to monitor and maintain optimum operating conditions within the humidifier cylinder.

(2) The NHRS humidifier operates on Potable, DI (De-ionized), or RO (Reverse osmosis) water supply. All components are suitable for DI/RO water operation as a standard.

(3) When the unit is activated in the ON position, and there is a call for humidity, the tank will fill with water through the fill cup located, in the back of the unit.

(4) The water level is being sensed by the float chamber. It contains a dual magnetic float assembly to ensure accurate water level is maintained in the cylinder. Three LEDs on the float chamber indicate the water level.

(5) The bottom red LED is the security level to ensure water is above the heating elements. The middle green light is the optimum operational level for the heating elements. The top yellow light is the maximum water level. The float chamber distinguishes 5 different water levels between the red LED and the yellow LED. The micro-computer can respond to fluctuations in water level to schedule draining and filling of the cylinder without affecting the steam generating process.

(6) At start up, the floats rise in the float chamber, the internal micro-computer evaluates the rise of each float to ensure it is equal. This way, the system ensures the fill valve is functioning properly and that both floats are operational. When the water level reaches the top indication level, the system will flush the water down to the green LED. This ensures correct operation of the drain pump and reading of the floats by the micro-computer

(7) Then, relying on feedback from the signal received by the humidifier, the internal controller will ensure operation of the contactors to power heating elements.

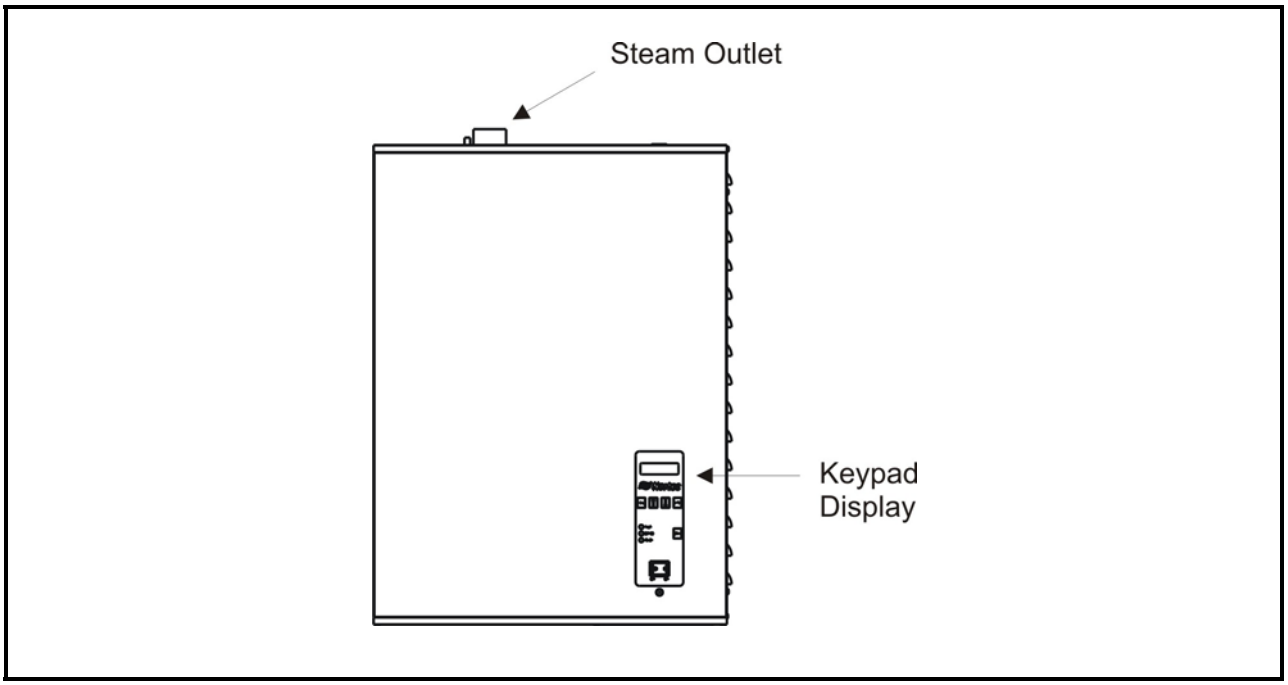

Figure 1. NHRS

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10-10
HUMIDITY, STEAM ABSORPTION & DISTRIBUTION

1. CONTROLS

A. STANDARD CONTROLLERS

(1) NORTEC has a wide range of modulation packages for use with the NHRS humidifiers. The packages all provide humidity controllers complete with point for accuracy up to ±3%. For accuracy up to ±1% a high precision humidistat is required.

B. FULLY INTEGRATED MODULATION ADAPTER

(1) The NORTEC NHRS includes all the circuitry necessary to accept a modulating signal from most modulating humidity controllers with a set point supplied by others. This allows the unit to easily interface with a Building Automation System.

(2) For more accuracy, the set-point is controlled at the humidifier and the integrated controller can accept a direct transducer signal. The accuracy of the humidifier to changing conditions will be dependant on the accuracy of the signal.

C. SIGNAL BY OTHER

(1) When modulating humidity controllers or transducer signals are supplied by others, the NHRS humidifier can accommodate most standard signals, including:

(a) 0-10 vdc
(b) 2-10 vdc
(c) 0-5 vdc
(d) 1-5 vdc
(e) 0-20 mA
(f) 4-20 mA

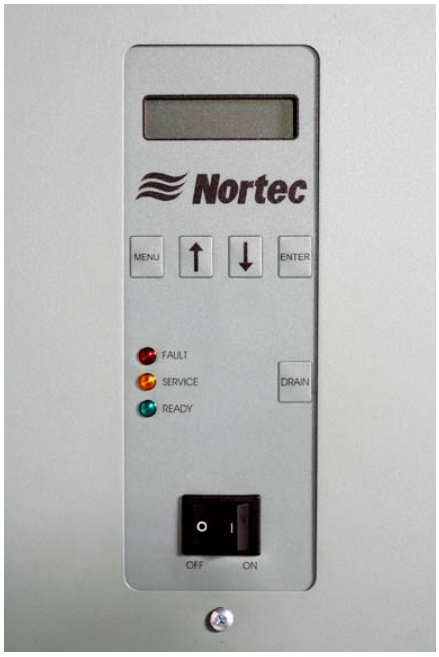

Figure 1. Display Panel

D. VARIABLE AIR VOLUME (VAV) CONTROL SYSTEM

(1) NORTEC offers several VAV control packages where VAV or variable duct temperature, air flow or humidity conditions require additional control flexibility.

2. STANDARD FEATURES AND BENEFITS

(1) NORTEC NHRS humidifiers can be suited for all humidity control applications. Resistive heating elements satisfy controller requirements instantaneously for rapid control with minimum deviation. NHRS units produce pure atmospheric clean steam on Potable, DI, or RO water operation. Fully variable steam output from 0 to 100% of capacity is achieved by electronic power control of the resistive heating elements. When using with deionized water(<20 micromhos) the NHRS with SSR option can control relative humidity to ± 1%. The unique design of the stainless steel cylinder ensures the process is not affected by water fill cycles.

A. INTEGRAL DRAIN WATER COOLER (DWC)

(1) NHRS has a standard internal Drain Water Cooler to meet plumbing codes by tempering the drain water below 140°F (60°C) during normal operation.

B. TWO-LINE ALPHANUMERIC LIQUID CRYSTAL DISPLAY (LCD)

(1) The NORTEC NHRS has a two line display, which provides important operating data using text for system messages and numbers. Operating status, performance data and defined parameters can be accessed and displayed. Its principle language is English, but the NHRS can display in French, on the user level.

C. AUTOMATIC SYSTEMS TEST

(1) Each time a NORTEC NHRS humidifier is started, it automatically undergoes a self-test. It checks the correct operation of the PC board and other components including the fill valve and drain pump. The humidifier will display system faults with the alphanumeric display and the indicator lights.

D. AUTOMATIC END OF SEASON DRAIN

(1) After 3 days of no call for humidity the steam production tank will completely drain the cylinder and automatically restart upon a call for humidity. Does not apply if keep warm feature is activated.

E. AUTOMATIC DETECTION, RESPONSE, AND SYSTEM MESSAGES

(1) Operation is monitored continuously by an automatic check program. When unacceptable deviations from normal operation are detected (such as no water entering humidifier or, improper water level), the NHRS responds by taking appropriate action. Corresponding system messages are displayed on the LCD. By identifying the specific service messages, troubleshooting is simplified and problems external to the unit are more easily diagnosed. For non-critical service messages, the NHRS continues to operate and displays a service message on the LCD and illuminates the yellow light.

F. SIMPLE INSTALLATION

(1) The compact construction of the NHRS allows for a simple installation. The NHRS comes standard with key hole mounting locations, and is ready for field connection.

3. ELECTRICAL

(1) Humidifiers require field wiring to the primary voltage terminal block. Power and fusing requirements are as indicated on the Specification label. Wiring is fed through an electrical knockout in the bottom back of the electrical cabinet.

4. CLEARANCES

(1) The clearance dimensions shown in the manual are for reference only and are the minimum requirements for maintenance of the humidifier.

5. WATER REQUIREMENTS

(1) The NHRS will operate properly on all potable water sources. De-mineralized water supplies such as Reverse Osmosis and De-Ionized water will reduce maintenance intervals significantly.

6. STEAM DISTRIBUTION AND ABSORPTION

(1) The NHRS can be used with stainless steel distributors or SAM-e manifolds for short absorption distance.

(2) The distance between the humidifier and the steam distribution system should not exceed 15 feet for accurate humidity control.

(3) Refer to the Steam Distribution Engineering Manual (Form #XX-232) or the H.E.L.P. software.

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Table 1. Technical Data

NHRS Model / Capacity (lbs/hr)	VOLTAGE	PHASE	RATED AMPS	RATED K.W.	MAX. EXT. CIRCUIT PROTECTION
010 [11.25]	208	1	18.39	3.83	25
010 [11.25]	230	1	15.94	3.83	20
010 [11.25]	460	1	7.97	3.83	15
010 [11.25]	575	1	6.38	3.83	15
015	208	1	24.52	5.10	35
015	230	1	21.25	5.10	30
015	460	1	10.63	5.10	15
015	575	1	8.50	5.10	15
020 [22.5]	208	1	36.78	7.65	50
020 [22.5]	230	1	31.88	7.65	40
020 [22.5]	460	1	15.94	7.65	20
020 [22.5]	575	1	12.75	7.65	20
030	208	1	49.04	10.20	70
030	230	1	42.50	10.20	60
030	460	1	21.25	10.20	30
030	575	1	17.00	10.20	20
030 [33.75]	208	3	31.89	11.48	40
030 [33.75]	230	3	27.64	11.48	35
030 [33.75]	460	3	13.82	11.48	20
030 [33.75]	575	3	11.05	11.48	15
045	208	3	42.52	15.30	60
045	230	3	36.85	15.30	50
045	460	3	18.42	15.30	25
045	575	3	14.74	15.30	20
065 [67.5]	208	3	6379	22.98	80
065 [67.5]	220-240	3	55.28	22.98	70
065 [67.5]	460	3	27.64	22.95	35
065 [67.5]	575	3	22.11	22.95	30
090	460	3	36.85	30.60	50
090	575	3	29.48	30.60	40
135	460	3	55.27	45.90	70
135	575	3	44.22	45.90	60
180	460	3	73.70	61.20	100
180	575	3	58.96	61.20	80

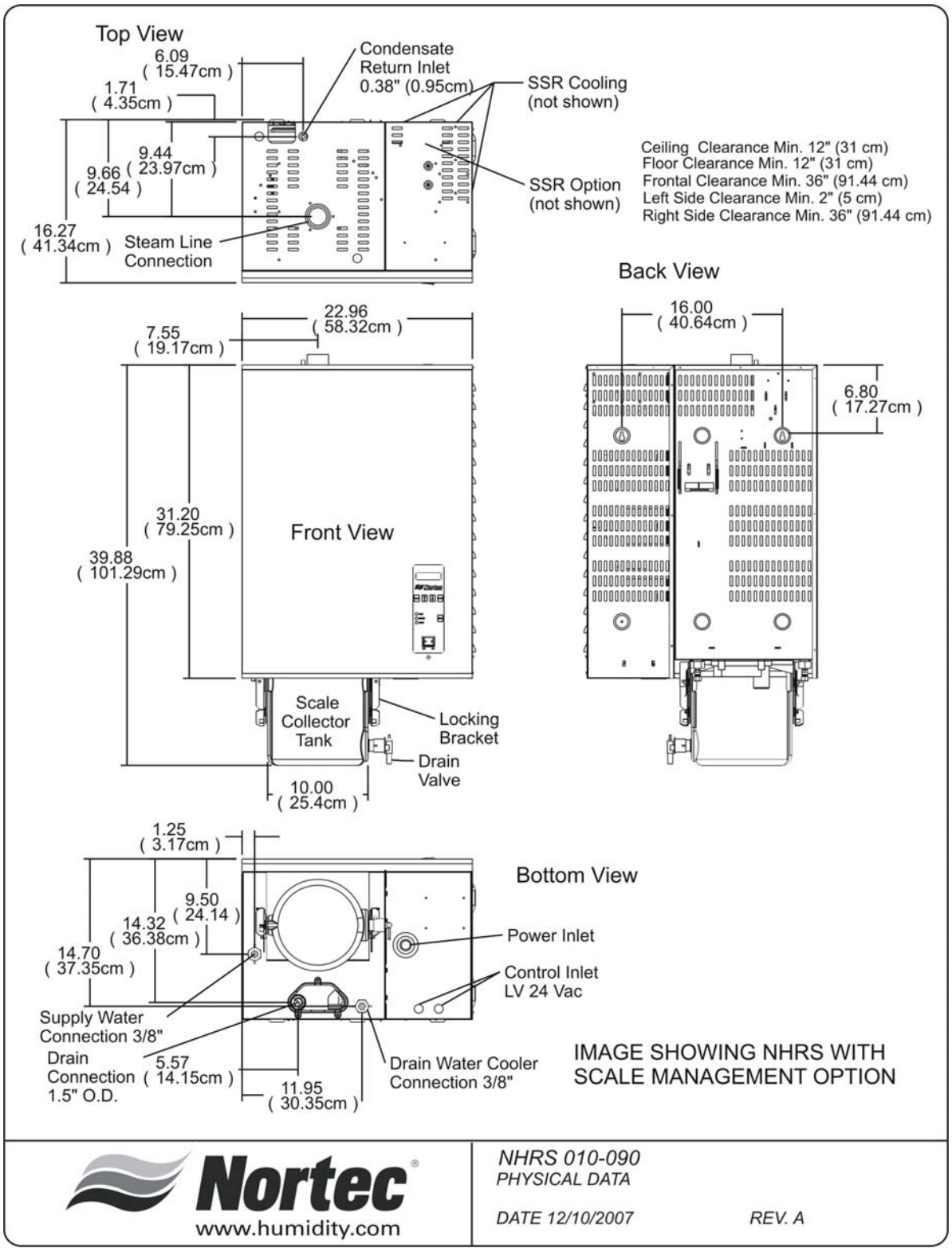


Figure 2. NHRS Physical Data – 010-090

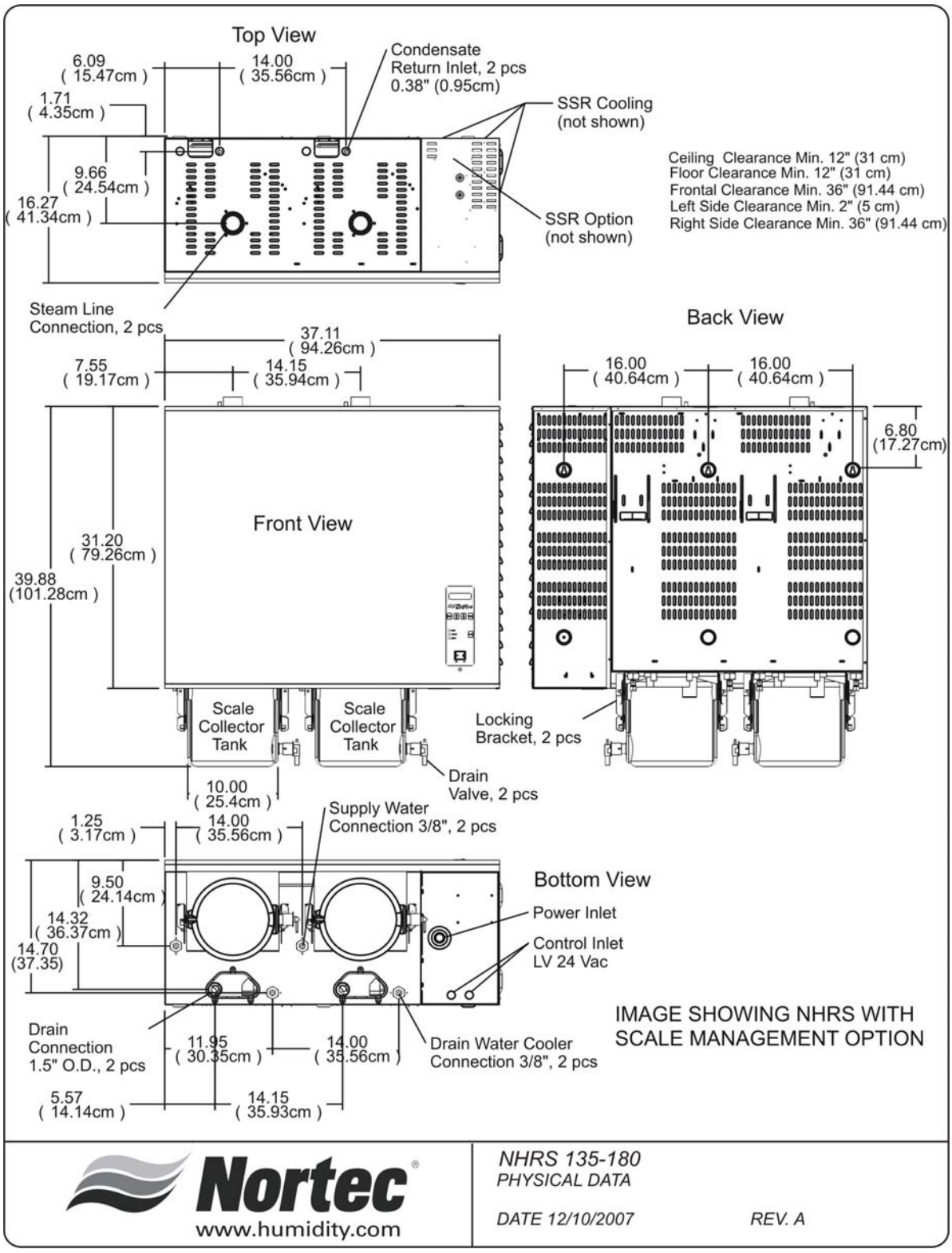


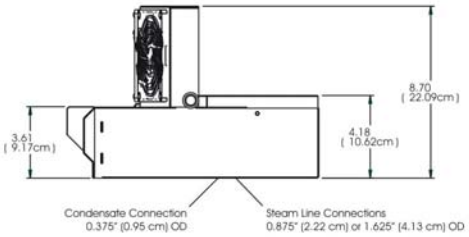
Figure 3. NHRS Physical Data – 135-180

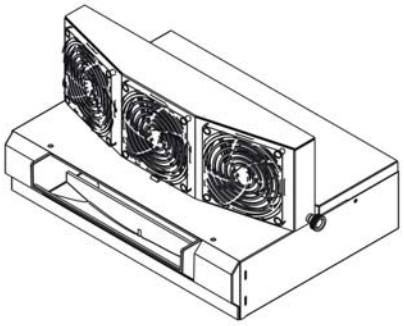
Overhead And Frontal Clearances For Blower Packs

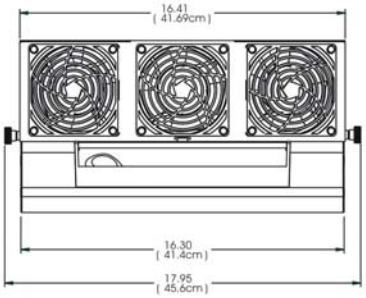
NH Model	Min. No. Of Blower Packs	Min. Overhead Clearance Inches (cm)	Min. Front Clearance Inches (cm)
005	1	18 (45)	30 (76)
010	1	18 (45)	30 (76)
020	1	18 (45)	36 (91)
030	1	18 (45)	72 (183)
050	1	36 (91)	84 (213)
075	1* (2 Recommended)	42 (106)	144 (366)
100	1* (2 Recommended)	48 (122)	156 (396)
150	2* (4 Recommended)	42 (106)	144 (366)
200	2* (4 Recommended)	48 (122)	156 (396)

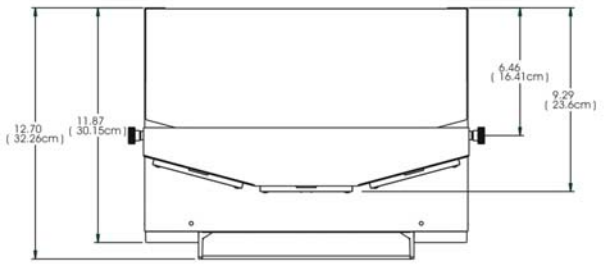
* Remote mounted only. Four remote mounted blower packs are recommended on the 200 model.

Nominal conditions 72°F, 35% RH.









NOTE: Add 8.70" (22 cm) to the over all unit height for BOBP for NHTC / NHPC Only.

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Physical Data Dimensions
NH RMBP
November 21, 2006

Figure 4. RMBP Physical Data Dimensions

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SPECIFICATION

1. HUMIDIFIERS

A. GENERAL

(1) Work Included

(a) NORTEC NHRS Resistive Element steam humidifier[s] as indicated on drawing[s] and as indicated on schedule[s].
(b) Complete and operable humidification system [which meets applicable building codes].
(c) Equipment start-up and project inspection by qualified factory trained representative.

(2) Quality Assurance

(a) Manufacturer: For each product specified, provide components by same manufacturer throughout.
(b) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authority having jurisdiction, and marked for intended use.
(c) Comply with ARI 640, “Standard for Commercial and Industrial Humidifiers.”
(d) Products shall be supported with a warranty that ensures the product will be free from defects in materials and workmanship for a period of two years after shipment.
(e) Commissioning of a system or systems specified in this section is part of the construction process. Documentation and testing of these systems, as well as training of the Owner’s operation and maintenance personnel, is required in cooperation with the Commissioning Authority. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Project Closeout, Section 01700, for substantial completion details. Refer to Section 01810, Commissioning, for detailed commissioning requirements.
(f) Products specified below are to be manufactured is an ISO 9001-2000 certified facility.

(3) Submittals

(a) Submit product data under provisions of Section 15010. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes. Include rated capacities, operating weights, furnished specialties, and accessories.
(b) Submit manufacturer’s installation instructions.
(c) Submit operation and maintenance data.
(d) Submit coordination drawings. Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, sections, details of components, and dispersion tubes. Detail humidifiers and adjacent equipment. Show support locations, type of support, weight on each support, and required clearances.
(e) Submit wiring diagrams including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
(f) Submit minimum water quality requirements and water pressure requirements.

(4) Extra Material

(a) Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

(5) References

(a) ANSI/NFPA 70 - National Electrical Code.

(6) Coordination

(a) Coordinate location and installation of humidifiers in ducts and air-handling units. Revise locations and elevations to suit field conditions and to ensure proper humidifier operation.

XXXXX OR XXXXX

(a) Coordinate location and installation of humidifier in the space it serves with the electrical, mechanical, and plumbing contractors.

B. PRODUCTS

(1) RESISTIVE STEAM HUMIDIFICATION SYSTEM NORTEC MODEL NHRS

(a) Packaged unit, wall mounted, electric steam generating system, suitable for use with potable, De-Ionized (DI), and Reverse Osmosis (RO) water. UL Listed

(b) Methods of distribution require a steam distributor[s] or Short Absorption Manifold [s] [SAM-e] for mounting into AHU/duct[s] or Remote Mounted Blower Pack[s] [RMBP] for direct space applications [refer to options schedule].

(c) Includes stainless steel tank and fill through plastic base to control water stratification by filling at the bottom. Top filling is not acceptable.

(i) Incoloy based resistive heating elements are used to produce steam. Steam production is fully variable from 0 to 100%.

(ii) Control accuracy of up to ±1% using DI/RO water, optional SSR control, and precise humidistat on all models.

(iii) Keypad programming to configure monitor and control humidifier with information messages on alphanumeric LCD display.

(iv) Unit water level is to be continuously monitored with a dual magnetic electronic float system, located outside of the boiling water to ensure accurate water level control and reduced maintenance. Cool fill water is to be supplied into the sensing chamber to keep the device cool. Systems using conductivity probes or floats located within hot reservoir water are not acceptable.

(v) Self-diagnostics during start-up of system to prevent unsafe operation on the unit(s).

(vi) Fill valve check.

(vii) Float level check.

(viii) Drain pump check.

(ix) Dual signal status light indicates unit operation.

(x) Cabinet has powder coated paint finish with removable door to allow the user full front access.

(xi) Plumbing door interlock safety switch.

(c) Factory mounted, alpha numeric, Liquid Crystal Display (LCD) provides full operational status. Display to include a keypad for user interface and adjustment of operational parameters including:

(i) Unit output (lbs/hr or kg/hr).

(ii) Control demand status.

(iii) Relative humidity display when using transducer input(s).

(iv) Humidity set-point adjustment when using transducer input(s).

(v) Controller configuration (Proportional band and Integral) when using transducer input(s).

(vi) Control type configuration on/off or full modulation when demand signal(s), or transducer input(s) are provided.

(vii) Language setting: English, French.

(viii) Fault indication using text. Code cross-reference not acceptable.

(ix) Manual capacity output adjustment range of 10-100%.

(x) Option for BACnet, LonWorks, Johnson N2 or Modbus interface for monitoring and control from a Building Management System (BMS).

(xi) Standard of acceptance: NORTEC NHRS.

(xii) UL Listed.

C. EXECUTION

1. EXAMINATION

(a) Examine ducts, air-handling units, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

(b) Examine roughing-in for piping systems to verify actual locations of piping connections before humidifier installation.

(c) Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

(a) Install humidifiers and steam dispersion panels per manufacturers' instructions.

(b) Seal humidifier dispersion-tube duct penetrations with flange.

(c) Install with required clearance for service and maintenance.

3. TESTING

(a) System verification testing is part of the commissioning process. Verification testing shall be performed by the Contractor and witnessed and documented by the Commissioning Authority. Refer to section 01810, Commissioning, for system verification tests and commissioning requirements.

XXXXX OR XXXXX

(b) Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

(i) Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

(ii) Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.

(iii) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3. TRAINING

(a) Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Authority. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Commissioning Authority after submission and approval of formal training plans. Refer to System Demonstrations, section 01670, for contractor training requirements.

XXXXX OR XXXXX

(b) Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain humidifiers.

(i) Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

(ii) Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."

(iii) Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."

(iv) Schedule training with Owner, through Architect, with at least seven days advance notice.

2. ACCESSORIES / OPTIONS AVAILABLE

A. NHRS UNIT CONFIGURATION OPTIONS

(1) Solid State Relay option provides the highest level of relative humidity control available. With de-ionized water and high precision control the Solid State Relay option is capable of maintaining ±1% relative humidity control. For ordering information see H.E.L.P. software or contact factory.

(2) 253-0626 – NHRS Cooling Kit is used for applications with an ambient temperature exceeding 95ºF (35ºC) to provide additional cooling of the Solid State Relays. The NHRS Cooling Kit does not apply if Solid State Relays are not present.

(3) 253-3179 – Scale Management Option for potable water collects scale debris in a scale collection tank below the steam cylinder. Minor maintenance of the humidifier consists of draining the scale collection tank when the Scale management option is ordered. This option eliminates steam cylinder removal during minor maintenance.

B. HUMIDISTAT WITH INTEGRAL SENSOR AND CONTROLLER (up to ±3% RH Control)

(1) 151-0142 - Modulating 0-10 Vdc wall mounted, P + I control humidistat with setpoint range of 0-100% RH. Connects directly to the low voltage terminal strip via 3 wires (shielded if run exceeds 10 m) and accurately controls RH in a zone or space. Can be used with remote sensors. Time proportioning control not acceptable.

(2) 252-0266 - Modulating 0-10 Vdc duct mounted, P + I control humidistat with setpoint range of 0-100% RH. Connects directly to the low voltage terminal strip via 3 wires (shielded if run exceeds 10 m) and accurately controls RH in a zone or space. Can be used as a control humidistat if placed in return air or as high limit if placed in supply. Time proportioning control not acceptable.

C. MODULATING TRANSDUCER

(1) 1509858 – 2-10 VDC wall sensor with digital display, controlled through the humidifier via the LCD display, the sensor can accurately read relative humidity set-points between 0-100%. The digital display will show the current space condition along with the magnitude of the transducer signal being sent to the humidifier.

(2) 1509857 – 2-10 VDC duct sensor with digital display, controlled through the humidifier via the LCD display, the sensor can accurately read relative humidity set-points between 0-100%. The digital display will show the current space condition along with the magnitude of the transducer signal being sent to the humidifier.

D. STEAM DISTRIBUTORS

(1) Allows for direct introduction (injection) of steam into a duct system or Air Handling Unit. Steam Distributor(s) are selected based upon capacity and duct width. Atmospheric distributors are used with NHRS humidifiers. They are designed to operate at atmospheric steam pressure. All steam distributor tubes are made of stainless steel and are adjustable for horizontal or vertical applications.

E. BLOWER PACK

(1) Wall mounted direct steam distribution system allows for direct space/room humidification when steam introduction into a ducted system is not feasible. The factory assembled remote mounted blower pack includes an integral steam distributor, 3 direct drive fans.

F. SHORT ABSORPTION MANIFOLDS

(1) This distribution system will allow a short absorption distance to be obtained. Refer to SAM-e Engineering Manual Form #XX-247.

G. ON / OFF CONTROLS

(1) 252-0259 – Humidistat, on/off, control or high limit, wall mounted. Standard with internal integrated humidity sensor and digital display. Adjustment range 0-100% relative humidity with ±3% relative humidity control. Can be calibrated in the field.

(2) 132-9203 - Air Proving Switch, on/off, duct mounted, pressure differential switch, adjustable set point from 0.07 IWC to 12.0 IWC, good for positive, negative or differential pressure applications, stops humidifier if duct air pressure is not sensed. Turns humidifier off if air handler fails.

(3) 252-0273 - Humidistat, on/off, control or high limit, duct mounted. Standard with external duct mounted humidity control. Can be calibrated in the field.

G. SSR COOLING KIT

(1) 253-0620 - This kit is used for applications where ambient temperature exceeds 95ºF (35ºC). Provides additional cooling for the Solid State Relays for exceptional conditions.

H. KEEP WARM OPTION

(1) 150-4561 - This feature allows the water temperature in the tank to be maintained at 160ºF (70ºC) for quick response from the unit upon a call for humidity.

I. REMOTE FAULT INDICATION PACKAGE

(1) 150-8069 - This option provides four relays to monitor the humidifier remotely. Relays are:

(i) Steam Production

(ii) Unit fault

(iii) Service / Maintenance

(iv) Unit on

All relays are BMS ready.

J. NORTEC LINKS 2 OPTION

(1) This option provides monitoring and controlling of the humidifier from a BMS (Building Management System) using the industries leading communication protocols. BACnet, LonWorks, Johnson N2 or Modbus. Simply specify what operating protocol you are using at time or order. OnLine capabilities are standard. The OnLine service must be ordered.

WARRANTY

(1) WALTER MEIER INC. and/or WALTER MEIER LTD. (hereinafter collectively referred to as THE COMPANY), warrant for a period of two years after installation or 30 months from manufacturer's ship date, whichever date is earlier, that THE COMPANY's manufactured and assembled products, not otherwise expressly warranted (with the exception of the cylinder), are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

(2) THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, providing the defective part(s) is returned freight prepaid by the customer. 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.

(3) The warranties set forth herein are in lieu of all other warranties expressed or implied by law. No liability whatsoever shall be attached to THE COMPANY until said products have been paid for in full and then said liability shall be limited to the original purchase price for the product. Any further warranty must be in writing, signed by an officer of THE COMPANY.

(4) THE COMPANY's limited warranty on accessories, not of the companies manufacture, such as controls, humidistats, pumps, etc. is limited to the warranty of the original equipment manufacturer from date of original shipment of humidifier.

(5) THE COMPANY makes no warranty and assumes no liability unless the equipment is installed in strict accordance with a copy of the catalog and installation manual in effect at the date of purchase and by a contractor approved by THE COMPANY to install such equipment.

(6) THE COMPANY makes no warranty and assumes no liability whatsoever for consequential damage or damage resulting directly from misapplication, incorrect sizing or lack of proper maintenance of the equipment.

(7) THE COMPANY retains the right to change the design, specification and performance criteria of its products without notice or obligation.

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c UL us LISTED

ISO 9001:2000
QMI
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Certificate No. 002419

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