



ENGINEERING GUIDE

Herrtronic[®] MD Series

Electrode Steam Humidifiers



Description

The Herrtronic MD system includes the microprocessor-based Herrtronic MD unit, steam distribution hardware and control accessories. The Herrtronic MD features an LCD display, “user friendly” programming, system diagnostics and the flexibility to utilize “on/off,” “proportional” or “proportional + integral” control!

For larger applications, these systems can be networked in a master/slave relationship with up to 29 slave units. The Herrtronic MD is sufficiently versatile to operate with softened water!

Utilize the Herrtronic MD Series to meet your humidification needs – computer rooms, telecommunication switchgear facilities, laboratory clean rooms, etc. Consider these outstanding features:

Styling

These aesthetically pleasing Herrtronic MD units are constructed of 16 and 18 gauge steel finished with white powder coat finish. All piping and wiring is routed thru the bottom behind the integral skirt to maintain smooth lines. Access to the disposable polypropylene cylinder is thru the front access door. Service access to the electrical controls is thru the front and side access doors.

Flexibility

Three sizes are available – (A) 5-30 lbs/hr., (B) 10-100 lbs/hr, (C) 110-250 lbs/hr – to meet your requirements. Power to these units can be 50 or 60 Hz. Single phase units are available thru 50 lbs/hr; three phase units thru 250 lbs/hr. All systems are ETL approved. All units are designed to run on raw or softened water with a conductivity range of 70-1000 micromho.

Versatility

Control versatility is a distinguishing feature assuring application success! “On/Off” control is available for less demanding applications. Modulation can be accomplished in (1) the “proportional” control mode with a control signal (ohms, VDC or mADC) from an input device or “building automation system” or (2) the “proportional + integral” mode receiving input from a sensor (VDC or mADC).

Versatility continues with the selection of the control scheme. For an installation with varying psychrometric conditions (i.e. VAV, high levels of fresh air, humidification during cooling, etc), a system with a conventional (“on/off” duct mounted) high limit could routinely “short-cycle.” The Herrtronic MD system will accept a proportional high limit (in addition to the proportional control input). Typically, the MD unit microprocessor establishes a capacity setpoint based solely on the control input signal. In addition, the Herrtronic MD monitors the proportional high limit input if applicable and, in response, adjusts the capacity setpoint accordingly.

This feature minimizes the likelihood of short-cycling, optimizing system performance! Only the external control devices vary. This inherent versatility is only available with the Herrtronic MD system!

Display

The informational center of the system is the LCD display with two lines, 20 characters per line. The keyboard provides simple access to “scroll” thru unit operating dynamics and adjust setpoints as necessary. Certain setpoints are “secured” and require password entry to make adjustments. All setpoints have a built-in default value to simplify programming. The display varies with the type of control system such that only applicable data is provided. The Herrtronic MD display is an on-line report card!

Diagnostics

The Herrtronic MD monitors system operations and identifies undesirable conditions. Some “faults,” such as “current overload,” result in system shutdown. Other “faults” indicate potential fill or drain system problems but allow the humidifier to continue operating. The “Master” unit will indicate the occurrence of a “fault” in any remote unit. Herrtronic MD diagnostics simplify required maintenance reducing both time and expense.

Networking

The Herrtronic MD utilizes an RS-485 communications network. A master unit can communicate with up to 29 slaves. This represents up to 3,000 lbs/hr. of humidification capacity. And the RS-485 communication link allows up to 4,000 feet between the master and slave units. This integral capability is virtually unlimited.

Accessories

Complementing the Herrtronic MD unit are a full line of accessories. Low profile “Room Distribution Units” are available to deliver humidification directly to the conditioned area. The humidifier provides supply voltage and control. Steam piping can be routed thru the back or bottom. For critical applications, where quick guaranteed absorption is required, consult the factory for selection of the appropriate CS-Series steam distribution grid. Standard stainless steel steam distributors are available in a variety of sizes and configurations. All are designed to return condensate to steam cylinder(s) – eliminating unnecessary condensate piping. A variety of control devices are available for wall or duct installation for any type of system control.

Warranty

Durability and reliability are inherent features in all HERRMIDIFIER products. Each Herrtronic MD system is supported by our two (2) year warranty (applicable to all parts except the disposable steam cylinder).

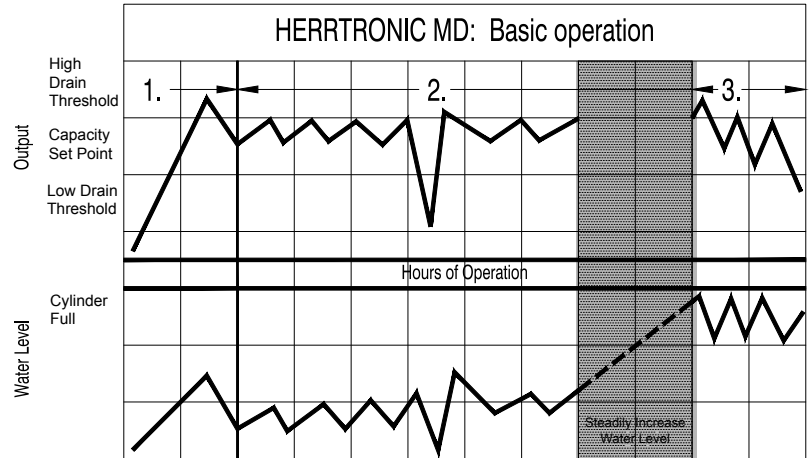
Herrtronic MD: Basic Operation

Controlled humidification requires a very precise control system. The Herrtronic MD utilizes a microprocessor to monitor performance and maintain humidity. Further, the Herrtronic MD evaluates the operation and alerts the operator to problem conditions and prevents undesirable operation.

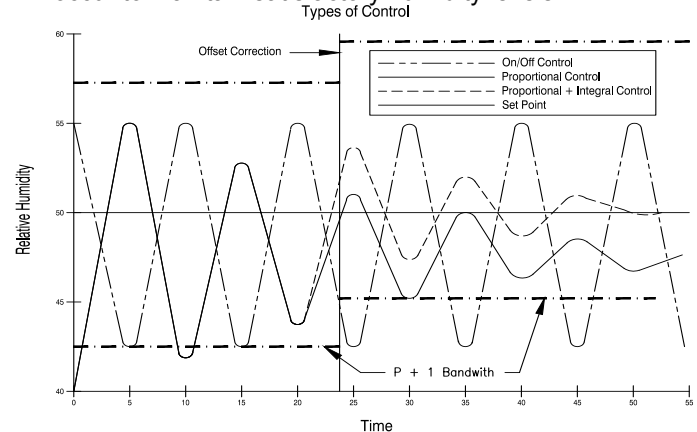
1. **Start-Up:** On initial start-up, the fill valve opens allowing water to enter the cylinder. When the water level rises to the electrodes, current will flow and the water will begin heating. As the water temperatures increases, its conductivity also increases accelerating the rate of temperature increase. When the output reaches the “capacity setpoint,” the fill valve closes. The output capacity may continue to rise slightly beyond the “capacity setpoint.” As the water boils, the water level falls with resulting output reduction.

NOTE: Two conditions may occur on start-up that will alter the normal start sequence:

- A. **Low Conductivity Water:** Under this condition, the output capacity may not initially achieve the “capacity setpoint.” The water level continues to rise until it reaches the cylinder full electrode closing the fill valve. The unit will now cycle between cylinder full and fill mode until a combination of temperature and mineral concentration increases leads to “capacity setpoint” being achieved.
 - B. **High Drain Threshold:** If the rate of output capacity increase is exceptionally fast, the output may achieve the high drain threshold before normal boiling reduces the output. At this point the drain valve will open, reducing the water level until the output reaches the “capacity setpoint.”
2. **Normal Operation:** Upon achieving “capacity setpoint,” the system begins operation in a steady state mode. Output capacity slowly decreases until the elapsed “cycle time” opens the fill valve to replenish the water level until the “capacity setpoint” output is achieved. As the mineral concentration in the water increases, the water conductivity also increases. Accordingly, the rate of boiling increases. Eventually, the rate of boiling reduces the output capacity below the “low drain threshold” before the “cycle time” initiates the fill cycle. At this point, the drain valve opens discarding the mineral laden water, replacing with fresh water, lowering the mineral concentration allowing steady-state operation to resume. This steady state operating mode continues with small increases in water level to maintain output capacity (exposing new electrode surface).



3. **End-of-Cylinder Life:** Steady state operation continues with “fill and boil” and periodic drain cycles with ever increasing water levels. Eventually the water level reaches the cylinder full electrode representing the maximum allowable water level. The system output begins to decrease since there is no new electrode surface to expose. If the system operates for six hours continuously without achieving “capacity setpoint,” an “end of cylinder life” fault will be displayed. Cylinder replacement should occur to maintain satisfactory humidity levels.



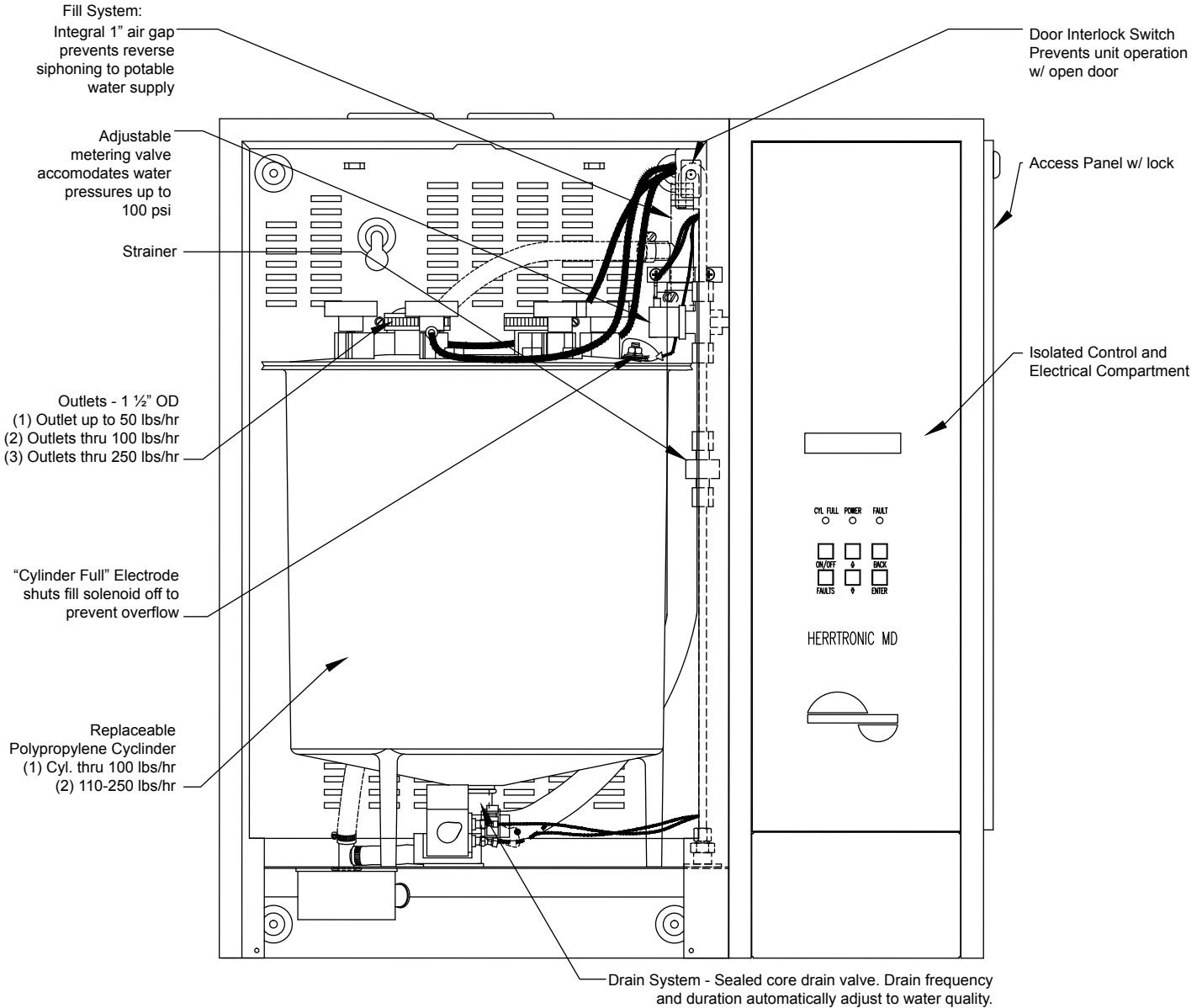
The Herrtronic MD System is available with three (3) types of control – (1) On/Off, (2) Proportional, (3) Proportional + Integral – these provide “good,” “better,” “best” control.

1. **On/Off** – Humidity is sensed by a humidistat that provides digital (Off/Off) input to the humidifier. Humidity varies above and below the setpoint based on tolerance and accuracy of the humidistat.

2. **Proportional** – The variation between the control input signal and the humidity setpoint results in adjustments to the unit output. Variations will be smaller than with “on/off” control and will be within the control band.

3. **Proportional + Integral** – The P + I control simply evaluates the actual humidity vs. desired humidity over a period of time or integration period. The humidity difference, or offset, is corrected by an offset correction. This correction shifts the bandwidth up or down to attempt to eliminate the offset condition.

Engineering Guide



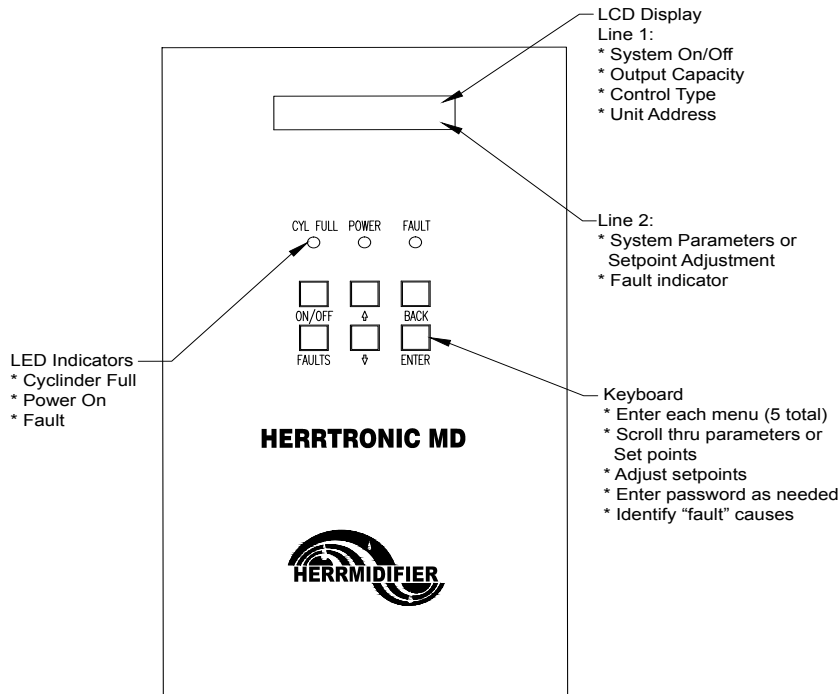
**Conductivity
Micromhos
(approx.)**

70
100
135
170
255
510
765
1020

**Average Life
Expectancy - Hrs
(approx.)**

2000
2000
1900
1800
1300
800
650
500

Herrtronic MD - Features at Your Fingertips



SETPOINT PARAMETERS	CONTROL MODE			
	ON/OFF	PROP.	PROP. INT	PASS-WORD SECURED
Steam Rating ^(1,2) (Lbs/Hr)	✓	✓	✓	✓
Electrode Rating ^(1,3) (Amps)	✓	✓	✓	✓
Capacity Setpoint ⁽¹⁾ (% Cap.)	✓	✓	✓	
Lo Drain Threshold ⁽¹⁾ (% Cap.)	✓	✓	✓	
Hi Drain Threshold (% Cap.)	✓	✓	✓	✓
Auto Drain ⁽¹⁾ (Days)	✓	✓	✓	
Manual Drain ⁽¹⁾ (Active/Inactive)	✓	✓	✓	
Drain Tempering (Active/Inactive)	✓	✓	✓	
Control Setpoint ^(1,4) (% R.H.)			✓	
Limit Setpoint ^(1,5) (% R.H.)		✓	✓	
Hi Humidity Alarm (% R.H.)			✓	
Lo Humidity Alarm (% R.H.)			✓	
Cycle Time (Secs.)	✓	✓	✓	✓
Proportioning Band (% R.H.)			✓	✓
Integration Period (Mins.)			✓	✓
Throtting Range (% R.H.)		✓	✓	✓
Unit Address (Unit #)	✓	✓	✓	✓
Leakage Protection ⁽¹⁾ (On/Off)	✓	✓	✓	
Electrode Run ⁽¹⁾ Time (Hrs.)	✓	✓	✓	
Limit Input (Enabled/Disabled)		✓	✓	
Control Input (Enabled/Disabled)	✓	✓	✓	

Notes:

1. Certain "Setpoint Parameters" are presented in "Display Mode".
2. "Steam Output" in display mode.
3. "Electrode Current" in display mode.
4. "Control Humidity" in display mode.
5. "Limit Humidity" in display mode.

Herrtronic MD Selection / Specifications

CAPACITY	CONTROL MODE			ELECTRICAL CHARACTERISTICS		
Lbs/Hr	On/Off	Prop	Prop. + Int.	208-240/1/60 ⁽⁴⁾	208-240/3/60 ⁽⁴⁾	380-600/3/60 ⁽⁴⁾
5-30 ⁽²⁾	MDM	MDMP	MDMI	5-15 lbs/hr	5-30 lbs/hr	5-30 lbs/hr
10-100 ⁽³⁾	MDS	MDSP	MDSI	10-50 lbs/hr	10-100 lbs/hr	10-100 lbs/hr
110-250 ⁽³⁾	MDD	MDDP	MDDI	N/A	110-200 lbs/hr	110-250 lbs/hr

Notes:

1. All models include digital diagnostics and networking capability; control mode differs
2. Available in 5 lbs/hr. increments
3. Available in 10 lbs/hr. increments
4. Also applicable to 50 Hz.

Typical Model Designation

MDSI-240 3 70

MD	S	I	240	3	70
Model	Size	Control Type	Supply Voltage	Electrical Phase	Output Capacity

Engineering Data: Steam Output / Electrical Characteristics

Capacity:		Steam Output																																				
Lbs/Hr		5	10	15	20	25	30	40	50	60	80	100	110	120	130	140	150	160	170	180	190	200	220	225	230	250												
Kg/Hr		2.3	4.5	6.8	9.0	11.4	13.6	18.2	22.7	27.2	36.3	45.4	50	54.4	59.1	63.6	68.2	72.6	77.3	81.7	86.4	90.9	100	102.2	104.5	113.6												
		Input KW																																				
		1.7	3.3	5	6.6	8.3	10.0	13.3	16.7	20	26.6	33.3	36.6	40	43.3	46.6	50	53.3	56.6	60	63.3	66.6	73.3	75.3	76.6	83.3												
		AMPS																																				
Volts / Ph:																																						
208/1	8	16	24	32	40	48.1	64.1																															
240/1	6.9	13.8	20.8	27.6	34.7	41.7	55.6	69.4																														
208/3	4.6	9.2	13.9	18.5	23.1	27.8	37.0	46.3	55.5	74.0	92.6	101.7	110.9	120.2	129.4	138.6	147.9	157.1	166.4	175.6	184.9																	
240/3	4.0	8.0	12.0	16.0	20.0	24.1	32.1	40.1	48.1	64.2	80.2	88.1	96.1	104.2	112.2	120.2	128.2	136.2	144.2	152.2	160.2																	
480/3	2.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	24.0	32.1	40.1	44.1	48.1	52.1	56.1	60.1	64.1	68.1	72.1	76.1	80.1	88.1	90.5	92.1	100.1													
600/3	1.6	3.2	4.8	6.4	8	9.6	12.8	16.0	19.2	25.6	32.1	35.2	38.5	41.7	44.9	48.1	51.3	54.5	57.7	60.9	64.1	70.5	72.4	73.7	80.1													

$$Kg/Hr = .454 \times Lbs/Hr$$

$$Kw = .333 \times Lbs/Hr$$

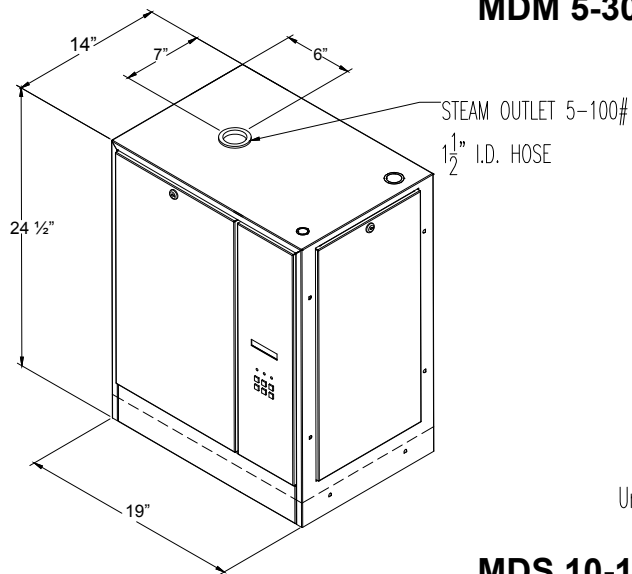
$$Amps (1Ph) = Kw \times 1000 \div Volt.$$

$$Amps (3Ph) = Kw \times 1000 \div (Volt.(s) \times 1.732)$$

$$Min Circuit Ampacity = 1.25 \times Rated Electrode Amps$$

$$(Note: With RDU, add .5 Amps @ 208/240v; add .25 Amps @ 480v)$$

Herrtronic MD Physical Specifications



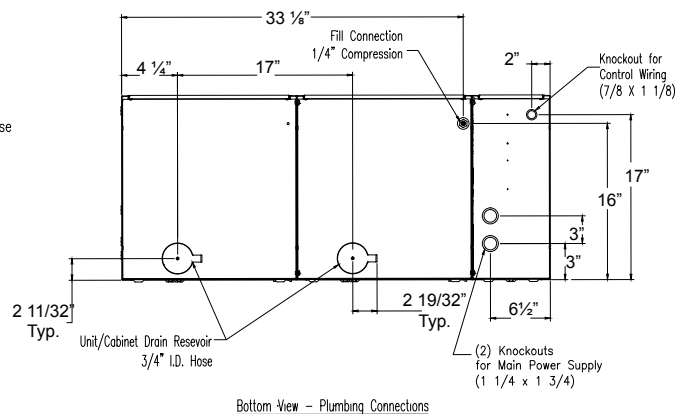
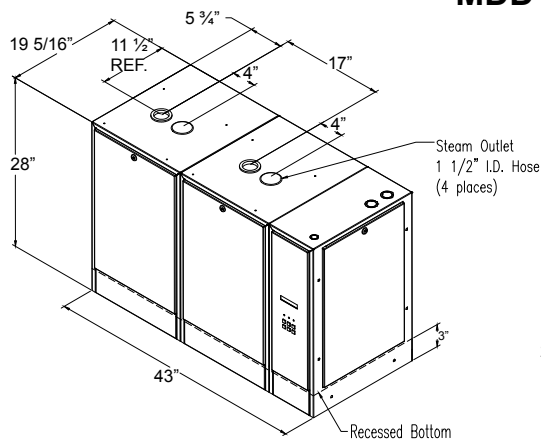
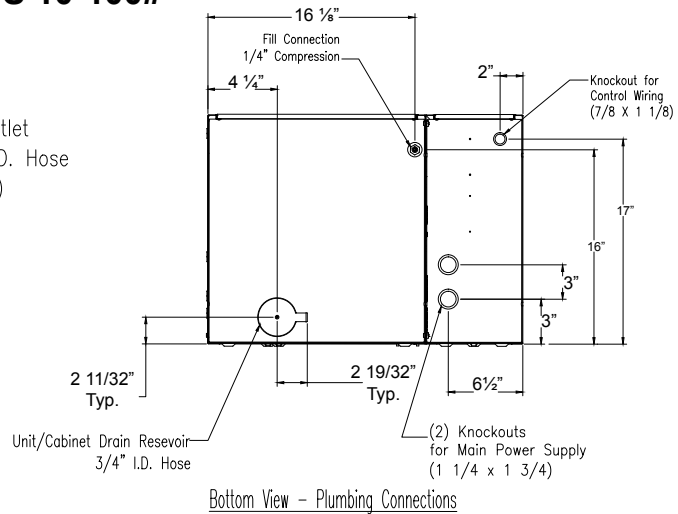
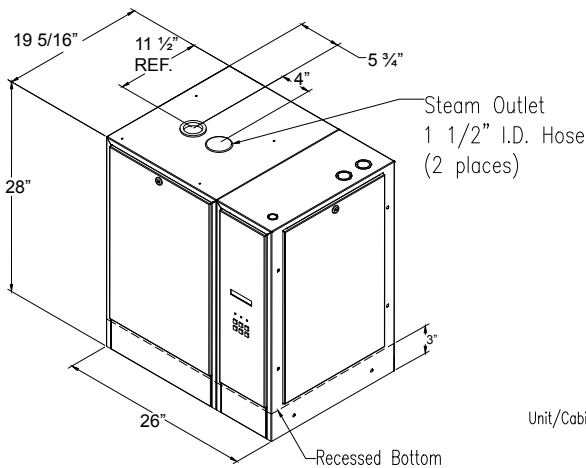
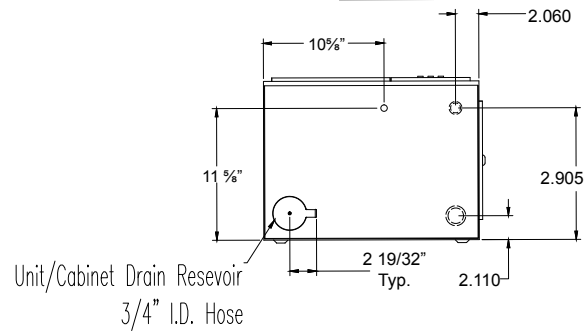
Unit Series	Capacity	OP Wgt. Wet (Lbs.)	Clearances			
			Left	Right	Top	Bottom
MDM	5-30#	82	2"	15"	12"	10"
MDS	10-100#	31	2"	15"	12"***	10"
MDD	110-250#	258	2"	15"	12"***	10"

Notes:

* Clearances shown provide adequate service access unless otherwise stated.

** Clearance provides access for steam hose; "0" acceptable with RDU installation.

FRONT



Herrtronic MD Room Distribution Unit



Model # ⁽¹⁾	Electrical Characteristics	Capacity
RDU-D-1 ⁽²⁾	208-240-1-50/60	5-50 lbs/hr
RDU-D-1T ⁽²⁾	480-600-1-50/60	
RDU-D-2 ⁽³⁾	208-240-1-50/60	60-100 lbs/hr
RDU-D-2T ⁽³⁾	480-600-1-50/60	

- Approximate dimensions: 17"W x 15.5"D x 10"H
- Adjustable speed blower
- Integral air proving switch
- 15 minute blower-off delay
- Unit includes air proving switch
- Supply and control power from humidifier

Notes:

1. Condensate return required; ¼" O.D. tubing (20 feet provided)
2. One Steam Inlet
3. Two Steam Inlets. 100-100 lbs. with > 380V only
4. RDU can not be direct mounted on MDM units

STEAM PLUME (@75° F, 55% R.H.)															
Output lbs/hr	Throw (in.) Blower Speed					Breadth (in.) Blower Speed (CFM)					Rise (in.) Blower Speed (CFM)				
	1 (210)	2 (240)	3 (280)	4 (320)	5 (365)	1 (210)	2 (240)	3 (280)	4 (320)	5 (365)	1 (210)	2 (240)	3 (280)	4 (320)	5 (365)
100			126	138	156			60	60	48			120	50	25
90			136	144	156			58	52	46			72	36	20
80			130	138	156			48	42	40			52	24	16
70			126	132	138			42	40	36			36	20	12
60		120	126	130	134		36	34	28	28		58	30	14	6
50	112	112	116	120	120	40	36	36	36	30	36	22	12	6	
40	98	92	90	94	100	36	36	36	32	26	18	12	5		
30	90	80	75	70	60	28	26	24	24	24	10				
20	50	35	30	35	35	20	20	18	18	18					
10	10	15				15	15								

Herrtronic MD Accessories

- Steam Distributor Pipe – constructed of 304 stainless steel; available in 12" to 72"; for horizontal and vertical installation; inherent pitch to return condensate to unit.
- Control Devices – duct or space application; "on/off," "proportional," and "proportional + integral" available when controls required for application
- CS Series distribution grids available for quick evaporation distances.
- Steam Hose – 2-ply EPDM rubber; 1-1/2" or 2" I.D.
- "Y" Connector, EST-255 – convert single outlet unit to accommodate two steam distribution pipes.
- Drain Pump – removes condensate when gravity drain is not convenient.
- Condensate Separator, EST-250 – drain condensate from low spots in steam hose between unit and steam distributor
- Air Proving Switch – pressure differential switch; assures airflow prior to unit operation

Herrtronic MD General Applications

Engineering and Application

Herrtronic MD Series Steam Humidifiers can be applied in a variety of applications. The simplest application consists of an "MD" unit and an "RDU" (Room Distribution Unit). Steam is generated by the "MD" unit, flows to the "RDU" unit, and is distributed in to the conditioned space. As shown in Figure A, the "RDU" unit can be mounted on the MDS or MDD units or remote mounted with any "MD" configuration. Steam input is either into the bottom or rear of the "RDU" unit. In this application, only the "RDU" needs to be in the conditioned space. One "RDU" is required per "MDM" or "MDS" unit. Two "RDU" units are required for each "MDD" unit.

Note: a condensate return line (provided) must be installed between the "RDU" and "MD" units in the field.

Alternatively, steam generated by an "MD" unit can be discharged directly into the system ductwork. In this application, steam distributor pipe(s) are installed in the system ductwork with laminar airflow with at least three (3) feet downstream clearance. Actual requirements depend on your exact psychrometric conditions. Consult factory if you should have any questions. If the blower operates intermittently, an air-proving switch should be installed to insure blower operation prior to the humidifier turning "on." A high limit humidistat or sensor, located at least 10' downstream of steam distributor, should be included for better system control.

The number of steam outlets on the humidifier is as follows:

MDM – 1 outlet
MDS up to 50 lbs/hr. – 1 outlet
MDS up to 100 lbs/hr. – 2 outlets
MDD – 4 outlets.

A CS-58 Dual Outlet Adapter is available to convert to two (2) 1 1/2" outlets to a single 2" hose connection. Figures C1 and C2 reflect the spacing required within the duct. Note: the standard steam distributors are sloped to return condensate to the humidifier.

The steam piping from the humidifier to the steam distributor should have a slope of +8% up to the steam distributor. Steam hose may be used to a maximum of 20' between the humidifier and the distributor. Beyond 20', system capacity is significantly reduced unless insulated copper pipe, 1-1/2 or 2" ID, is used. If there are any low spots between the humidifier and the distributor, a condensate separator (such as EST-250) should be used (Figure D). MDS and MDD system are designed for a maximum of 7" duct static pressure. MDM units are designed for a maximum of 5" duct static pressure. Consult the factory if you exceed these levels.

For applications requiring a short, guaranteed absorption distance, consult the factory for selection of the appropriate CS Series steam distribution system (Figure E).

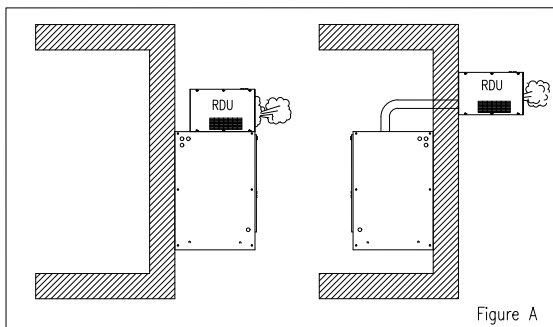


Figure A

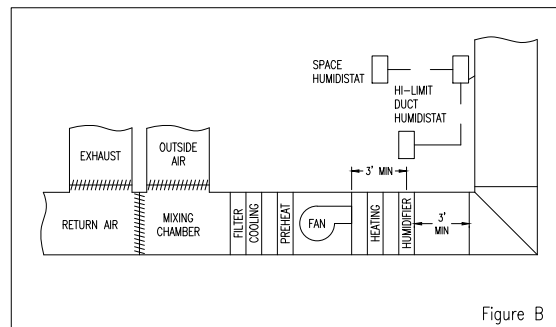


Figure B

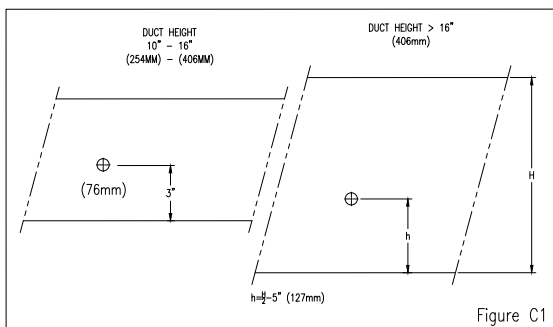


Figure C1

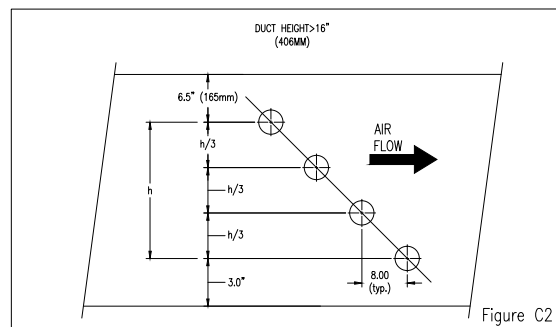


Figure C2

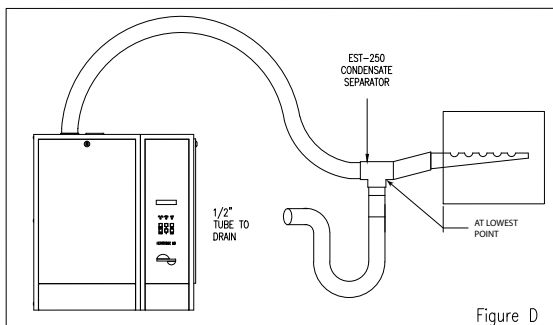


Figure D

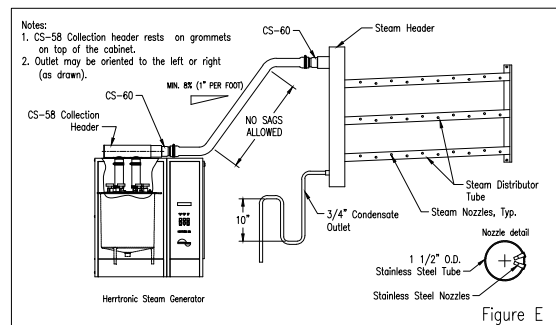


Figure E

Herrtronic MD Suggested Specifications

Part 1 - SCOPE

1. Furnish a humidification system for the project known as _____: _____ ft. long x _____ ft. wide x _____ ft. high.
2. Select a system that will maintain (automatically) _____% R.H. at _____°F with a tolerance of +/- _____% R.H.
3. Warrant the system (except the replaceable steam cylinder) for a period of two years from the date of shipment.
4. Provide an installation/operation/maintenance manual (for startup, maintenance and diagnostics).

Part 2 – PRODUCT

The Herrtronic MD System shall consist of:

1. A self-contained electrode steam humidifier having a capacity of _____ lbs/hr. (or kg/hr.) with electrical characteristics of _____ VAC/ _____ Ph./ _____ Hz. The humidifier shall be capable of operating on water with a conductivity of 70-1000 micromhos automatically.
2. A humidity control system utilizing one of the following control modes (shown with corresponding input method):
 - On/Off (Humidistat)
 - Proportional (Controller or signal-ohms/ VDC/ mADC)
 - Proportional + Integral (Sensor or signal – VDC, mADC)
 The control mode selection is integral with the Herrtronic MD unit. The input devices shall be:
 - A. Control input device or signal _____
 - B. High limit humidistat _____ OR Proportional high limit device (or signal) _____. NOTE: This enables modulating control systems ("Proportional" or "Proportional + Integral") to adapt the capacity setpoint in response to varying psychrometric conditions – i.e., VAV systems, applications with high percentages of outdoor air, etc.
 - C. Air proving switch _____ NOTE: Air proving switch is standard on "Room Distribution Unit."
3. A steam distribution system consisting of:
 - A. Stainless steel steam distributors (for horizontal or vertical installation) with integral pitch OR Room Distribution Unit (RDU) with adjustable speed control. The supply blower shall operate approximately 15 minutes after unit shutdown. Steam input shall be thru the bottom or back of the unit. The RDU shall be remote/ unit mounted. The humidifier shall provide supply voltage and control.
 - B. _____ ft. of EPDM steam hose OR _____ ft. of insulated copper pipe shall be provided for connection between the unit and the steam distribution system NOTE: This system operates at atmospheric pressure. Consult the factory if duct static pressure exceeds 5" (MDM units) or 7" (MDS or MDD units).
4. An integral microprocessor control, monitor and diagnostic system. The microprocessor shall:
 - A. Sense water conductivity and adjust water level and output

- capacity.
- B. Provide programmable setpoints with built-in default values for simplified start-up. Only setpoints pertinent to the control mode are accessible. Certain setpoints shall be password secured to prevent tampering HERRTRONIC MD SUGGESTED SPECIFICATIONS
- C. Provide adjustable drain tempering capability.
- D. Include an LCD display (for longer life and easier viewing) – (2) lines, 20 characters per line – to monitor system operation/ performance. Only parameters pertinent to the specific control mode shall be displayed.
- E. Provide "fault" sensing and display the type of fault. Certain faults shall result in system shutdown. Other faults reflect a potential maintenance problem and allow the unit to continue operation.
- F. The humidifier shall also have (3) LED indicators to display:
 - a. Cylinder Full (Yellow)
 - b. Power (Green)
 - c. Fault (Red)
- G. Network with up to (29) slave units (other MD control boards). The master shall be capable of providing operational information on any of the slave units individually.
5. Terminal connection points for all line and low voltage (control) connections. A system on/off switch shall be externally available. A door interlock switch shall prevent operation when the access door is open.
6. Multiple cylinder humidifiers (Series MDD, over 110 lbs/hr.) shall have separate fill, drain and microprocessor control provisions. These units shall be capable of common or independent control.
7. Unit shall have a powder coated steel cabinet with lockable cylinder access and electrical compartment access doors. The glass filled polypropylene cylinder shall be easily replaced. Electrode wiring shall be connected with nut/lockwasher combination to prevent loosening of the connection (Friction connections are not acceptable).

Part 3 – INSTALLATION

The installing contractor shall assume responsibility according to the installation manual, specifically;

- A. Application with system limitations.
- B. Mounting recognizing clearances.
- C. Provide water supply (including softened water) in accordance with pressure and conductivity criteria. Hot, RO, DI water shall not be applied.
- D. Provide cylinder and cabinet drains.
- E. All wiring in accordance with applicable sections of national, state and local electrical codes. The contractor shall provide and install external overcurrent protection and install system wiring in accordance with the manufacturer's requirements.

PART 4: SOURCE

Herrtronic MD Systems are manufactured by:
TRION/HERRMIDIFIER | 101 McNeill Rd. | Sanford, NC 27330





TRION®

101 McNeill Rd. | Sanford, NC 27330

P: 800.884.0002 | F: 800.458.2379 | www.trioniaq.com | customerservice@trioniaq.com