

**IMPORTANT: READ AND SAVE THESE INSTRUCTIONS**



# **INSTALLATION AND MAINTENANCE MANUAL**



## **ES MK II SERIES HUMIDIFIERS**



**LISTED  
HUMIDIFIER  
E65185**



**LR-35859**

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## Installation Instructions for

Continuous Control 132-9324 - 4-20 mA

132-6160 -

132-9323 -

132-9327 - 1-5 VDC

132-9325 - 0-10 VDC

- 1) Remove white jumper from basic board - see fig. 1
- 2) Press on adapter board as per fig. 1
- 3) Connect wiring harness to adapter board - see fig. 1
- 4) Connect other end of harness to seven point terminal strip as follows - see fig. 2

Blue on terminal 3

Red on terminal 4

- 5) Mount and connect Humidstat to the 7 point terminal strip as per fig. 2

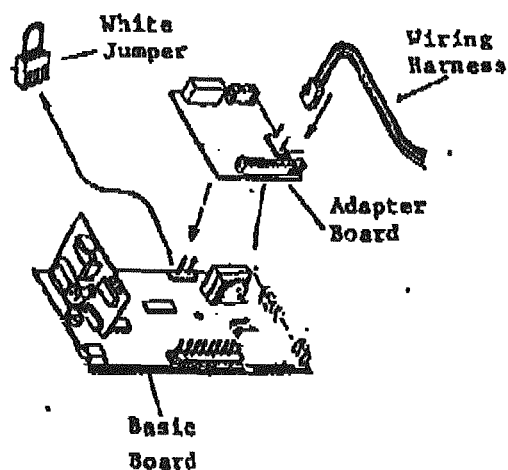


Fig. 1

### Wiring Harness

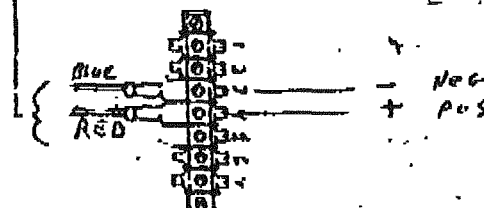


Fig. 2

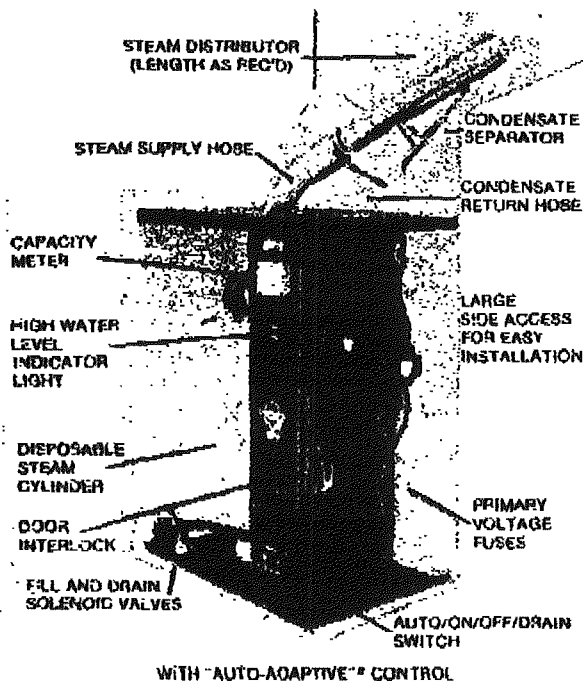
## RECEIVING EQUIPMENT

1. Check packing slip to ensure ALL material has been delivered.
2. All material shortages are to be reported to the factory within 48 hours from receipt of goods. NORTEC assumes no responsibility for any material shortages beyond this period.
3. Inspect shipping crate(s) for damage and note on shipping waybill accordingly.
4. After uncrating, inspect unit for damage and if damage is found, notify the shipper promptly.
5. ALL NORTEC PRODUCTS ARE SHIPPED ON AN F.O.B. FACTORY BASIS. ANY AND ALL DAMAGE, BREAKAGE OR LOSS CLAIMS ARE TO BE MADE DIRECTLY TO THE SHIPPING COMPANY.

## PRE-INSTALLATION CHECKPOINTS

1. Confirm that the voltage and phase of the unit corresponds with available voltage and phase.
2. Ensure that the fused main breaker is of sufficient size to handle the maximum fuse rating as indicated on the specification label.

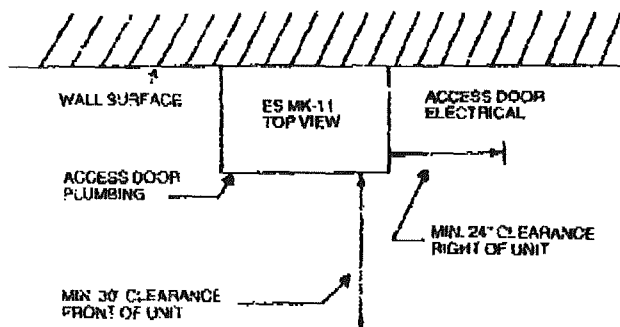
PHOTO 1



## MOUNTING PROCEDURE

1. Location of unit should be as close to and below steam distributor location as possible.
2. Provide a minimum clearance of 24" (600 mm) to the right of the unit and a minimum of 30" (750 mm) in front of the unit. Refer to Diagram 1.

## INSTALLATION CLEARANCES



3. If possible, avoid locating humidifier more than 35 feet from steam distributor location. At this distance, net output will be approximately 88% of unit capacity, as a result of condensation losses. Refer to Chart 1 and to steam hose section.

## UNIT CAPACITY CORRECTION FACTORS

DISTANCE OF STEAM DISTRIBUTOR FROM CABINET		UNIT CAPACITY CORRECTION FACTOR
FEET	METERS	
0 to 15	0 to 4.6	1.00
15 to 20	4.6 to 6.1	0.97
21 to 26	6.4 to 7.9	0.94
27 to 32	8.2 to 10.7	0.88

Note: For longer distances, consult factory.

CHART 1  
UNIT CAPACITY CORRECTION FACTORS

4. Where possible, mount unit at a height convenient for servicing.
5. Mounting bracket provided should be securely attached open edge upwards, horizontally, using 3 fasteners to a vertical, solid surface. See Diagram 2.
6. Make sure unit is level.
7. Do not mount unit on hot surfaces or where temperatures exceed 180°F (82°C).

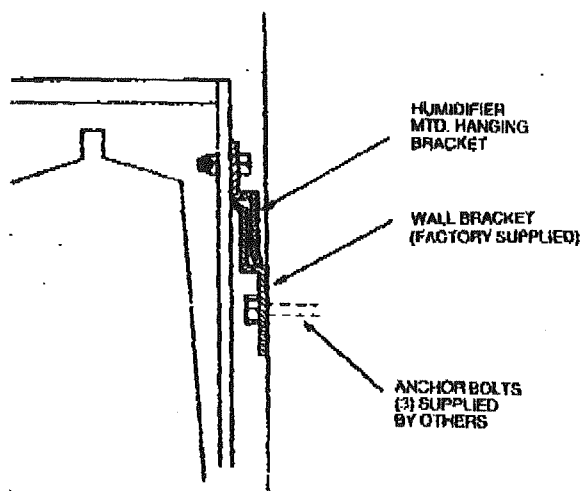


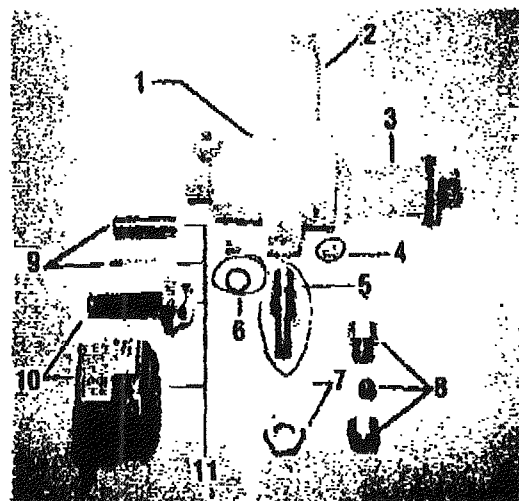
DIAGRAM 2  
WALL BRACKET MOUNTING DETAIL  
WATER SUPPLY AND DRAIN

### WATER SUPPLY

1. Standard fill valves are sized for water pressures ranging between 30 and 85 psi. For other pressure conditions, consult factory.
2. An external in-line water filter is recommended for areas where the water has a high undissolved mineral content. Consult factory about accessory water filter (Part No. 132-9505).
3. DO NOT use softened, de-ionized or any other type of pre-treated water supplies. Softening agents remove minerals but add sodium to give water an unacceptably high conductivity.
4. DO NOT use a hot water supply to the unit. Minerals in suspension will eventually plug the fill valve.
5. An isolating gate valve should be installed in the supply line to the unit.
6. Use 1/4" diameter water line from potable cold water source to the unit.

7. Connect supply line to fill valve inlet located on underside of unit using 1/4" compression fitting provided.

PHOTO NO. 2  
EXPLODED VIEW OF FILL VALVE



ITEM NO.	DESCRIPTION	NORTEC P/N
1	FILL VALVE BODY	4 TYPES
2	STRAINER LOCKING BAR	132-1048
3	STRAINER C/W O-RING	132-4031
4	VALVE STEM SCREW	132-5069
5	FILL VALVE INLET STEM	132-5072
6	O-RING FOR STEM	132-5012
7	WASHER AND HEX NUT	132-5036
8	COMPRESSION FITTING	132-6130
9	CORE AND SPRING	132-5128
10	COIL ASSEMBLY W/O ITEM 9	132-5131
11	COIL ASSEMBLY COMPLETE	132-6001

### DRAIN CONNECTION

1. Unit is equipped with a 3/8" O.D. unthreaded drain outlet on underside of drain canal on bottom of unit.
2. Use of 6' (150 mm) length of steam hose (supplied with unit) to connect drain outlet to funnel drain as shown.
3. If no floor drain is available, route drain line to slop sink. If sink drain is higher than or level with humidifier, a drain pump may be necessary. (Available from factory, Part Number 132-9504). See Diagram 4.

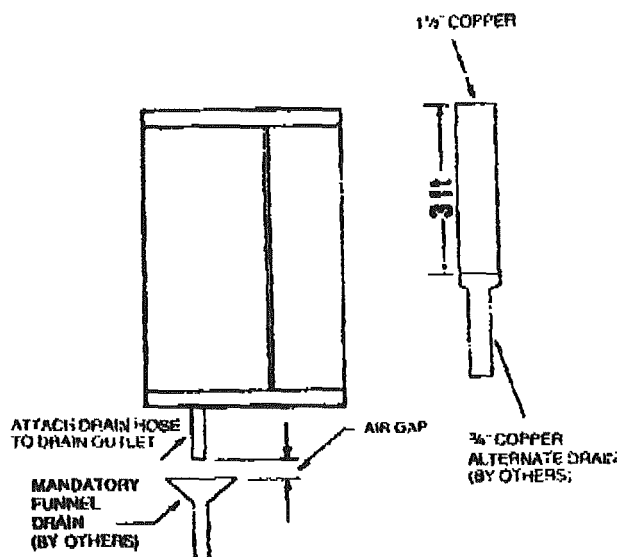
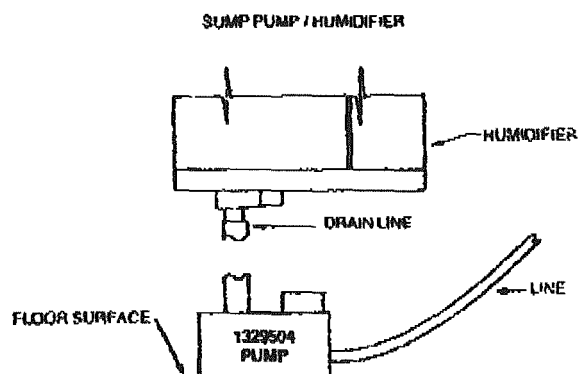


DIAGRAM 3  
FUNNEL DRAIN WITH 1" AIR GAP

#### CAUTION:

Drain water from humidifier can be very hot. For safety reasons, water should not drain into sinks used frequently by personnel.



NOTE: DUE TO DRAIN WATER TEMPERATURE, NOT ALL CONDENSATE PUMPS ARE SUITABLE. CONSULT FACTORY.

DIAGRAM 4

### STEAM DISTRIBUTORS

Each cylinder outlet requires a minimum of one (1) steam distributor. Any one outlet may be divided into multiple branches, each requiring an additional steam distributor. Steam supply 'tees' are available for this purpose. (See accessories section of Product Catalogue.)

#### STEAM DISTRIBUTOR LOCATION

1. Steam distribution can be mounted in supply or return air ducts. Proper location should consider duct temperature, air flow, R.H., outdoor air intake, etc. Additional details are located on following pages. Consult factory or local agent with questions.

2. Steam distributor should be located in a straight length or duct, at least 6 feet (2 meters) before or after any elbow or other fitting to allow air to pass evenly over distributor with minimum turbulence. If distributor is mounted too close to any obstruction, condensation of steam in the duct may result. See Diagram 5.

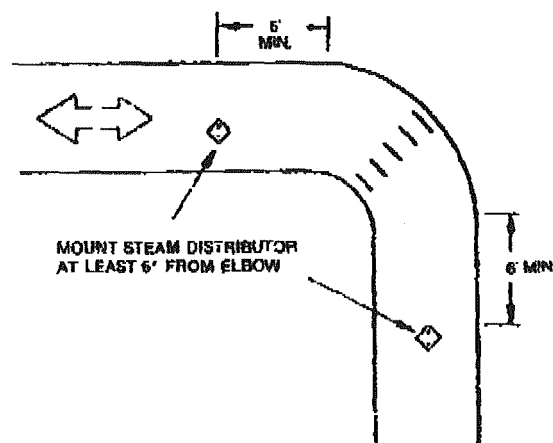


DIAGRAM 5  
STEAM DISTRIBUTOR LOCATION

3. The Steam distributor should not be mounted in ducts where temperatures are below 60°F (15°C), otherwise air saturation and condensation in the duct will result.
4. A high limit humidistat, set to 80 or 90% RH should be incorporated to prevent the possibility of condensation. See On/Off Controls section.
5. Duct air temperatures below 60°F (15°C) may require the use of a field-supplied condensate drain pan below the steam distributor. See Diagram 6.

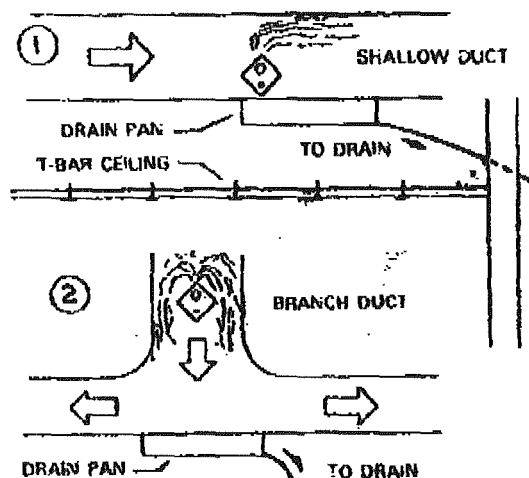
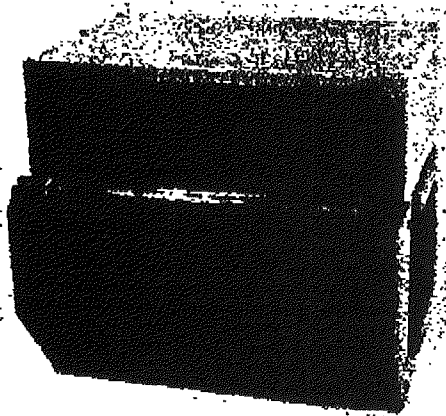


DIAGRAM 6  
CONDENSATE DRAIN PAN

2. Blower packs are available integrally-mounted with the humidifier unit (built-on blower pack, see Photo 4) or detached units field-piped and wired to the humidifier unit (remote mounted blower pack, see Photo 5).



REMOTE-MOUNTED BLOWER PACK  
PHOTO 4

3. All models of blower packs for the MK.II Series humidifiers consist of a steel cabinet containing a steam distribution manifold, steam supply and condensate drainage fittings, blower fan and transformer powered from primary voltage and secondary fuse protection.
4. All blower packs are wired (by factory if built on, by others if remote mounted) to the load side of the primary contactor so as to operate simultaneously with the humidifier.
5. Blower packs equipped with optional air-proving switch (132-9204) are equipped with an additional contactor built into the blower pack cabinet. With this accessory, the blower fan must operate before the humidifier will generate steam.
6. Remote mounted blower packs equipped with the optional 132-9204 air proving switch require field wiring between the primary voltage terminal blocks and the low-voltage control terminal strips; one of each located in the humidifier and the blower pack cabinet. Refer to wiring diagram supplied with unit on inside of plumbing access door.
7. Field wiring of remote blower packs must conform to national and local electrical codes.
8. The ESB-50 and ESB-100 model blower pack assembly is unique to this size humidifier. Both the built-on and the remote mounted models consist of a steel cabinet containing a steam distributor manifold, steam supply and condensate drainage fittings, built-in propeller fan and 0.25 amp fuse protection.
9. ESB-50/100 blower packs are available in 110V built-on 132-9400, 110V remote mounted 132-9410,

208-240V built-on 132-9401, 208-240V remote mounted 132-9411. ESB units are available in other voltages but require separate power supply for the blower pack.

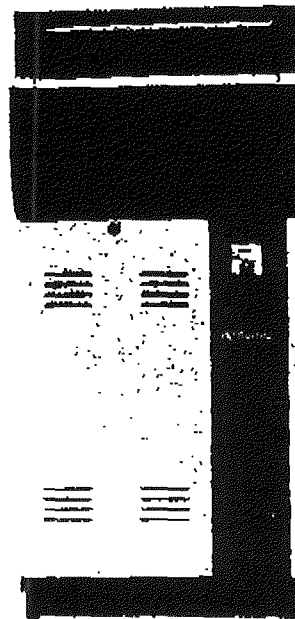


PHOTO 5  
ESB W. BUILT ON H.P.

## MOUNTING AND CONNECTIONS

1. Refer to Chart 2 for ceiling clearance (to top of unit) required for each model unit. Dimensions apply to both built-on and remote-mounted versions of blower packs.

UNIT MODEL	CAPACITY LBS/HR	NO. OF BLOWER PACKS	MIN. CEILING CLEARANCE INCHES (MM)
ESB-50	5	1	18 (450)
ESB-100	10	1	18 (450)
ES MKII-200	10	1	18 (450)
ES MKII-300	17	1	18 (450)
ES MKII-400	30	1	18 (450)
ES MKII-500	60	1	36 (900)
ES MKII-500	60	2*	18 (450)
ES MKII-600	90	1	48 (1200)
ES MKII-800	90	2*	24 (600)
ES MKII-700	120	2*	36 (900)
ES MKII-700	120	4*	18 (450)
ES MKII-800	180	2*	48 (1200)
ES MKII-800	180	4*	24 (600)

\*Remote mounted model only.

CHART 2

2. Mount remote blower pack(s) using supplied bracket(s) with ceiling clearance as recommended in Chart 2.

## BLOWER PACK STEAM HOSE CONNECTION

1. All built-on blower packs are factory fitted with all steam hose connections. No further work is required.
2. Remote mounted blower packs require removal of the bottom coverplate to gain access to the steam manifold fittings. Feed steam supply and condensate return hoses through appropriate holes in bottom plate and replace bottom plate. For steam and condensate hose routing, follow steps outlined in steam supply hose routing section, Page 6.

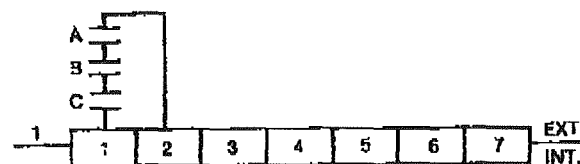
## ELECTRICAL CONNECTION

1. Use 16 ga. or heavier wire for power connection from terminal block of blower pack to fuse/terminal block inside electrical section of humidifier.
2. Use 16 ga. wire to connect from ground clamp of blower pack to ground clamp provided in the electrical compartment of the humidifier.
3. All field wiring should be encased in conduit and conform to national and local building codes.

## PRIMARY VOLTAGE WIRING TO UNIT

1. Check and ensure that available voltage and phase corresponds with operating voltage and phase of unit.
2. Ensure that an adequate service is available to carry full unit amperage drawn as specified by fuse size on unit nameplate.
3. A fused disconnect breaker assembly should be installed to protect unit and to provide complete system shutdown during periods of non-use.
4. Recommended fuse size for disconnect is stated on unit nameplate and in product catalogue.
5. Connect cabinet ground terminal to ground. Do NOT use neutral wire of four wire supply as ground.
6. Single phase units may be run on 3 phase power but load may unbalance power grid.
7. Never use the neutral wire of a 4 wire system as a power lead connection with the exception of 277V and 347V tapped from 480V and 575V respectively.
8. Power leads are connected to the primary terminal block in the electrical section through the knockouts provided in the bottom plate of the unit.
9. Wiring sizes should be in accordance with national and local electrical codes and by-laws, unit electrical codes and by-laws.

## CONTROLS ON/OFF CONTROL



(Control Wiring Diagram 23.1)

ON-OFF

A, B and C are to be wired in series (only one path for current) across terminals 1 and 2 on the low voltage control terminal strip, or replaced with a jumper wire for constant operation.

### A — Control On/Off Humidistat

Wired to make on drop in humidity, break on rise.

### B — High Limit On/Off Humidistat

Wired to make on drop in humidity, break on rise.

Set to a higher set point (max. 85% R.H.) as a safety to prevent saturation.

### C — Air-Proving On/Off Switch

Wired to make when sensing air flow, break when no air flow.

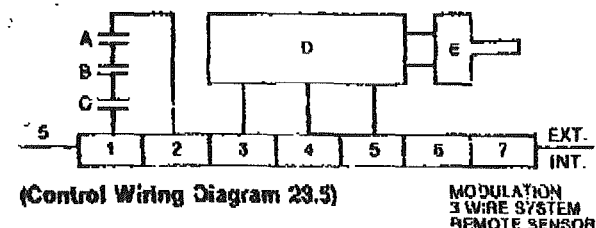
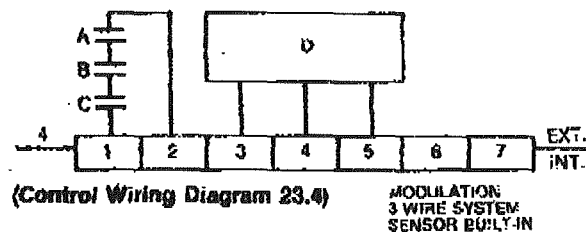
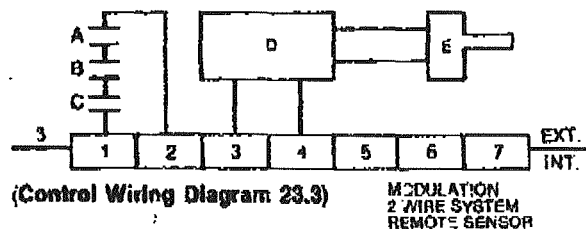
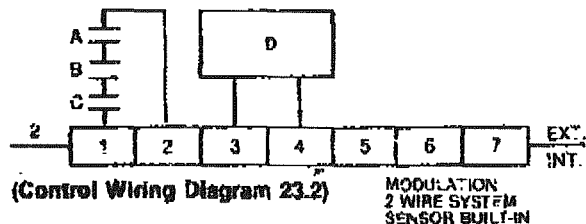
As a safety to prevent saturation when no air flow.

1. The factory offers various versions of A, B and C to suit each application. In general, A is essential whereas B and C are highly recommended.
2. Field wiring from humidistat to humidifier and between devices should be 18 AWG or heavier and should not exceed 100 feet total length to and from since voltage loss in the humidifier will cause reduced power to primary contactor holding coil and the contactor might not function. Measure the voltage across the coil to ensure it is 24 v.a.c.  $\pm$  10%. If it is not, consult factory.
3. The low voltage (7 point) control terminal strip is provided in the electrical compartment. The internal side is factory wired. The external side is to be field wired unless the external controls have been cabinet mounted at the factory.
4. Each unit is supplied with a wiring diagram adhered to the cabinet.
5. A and B: Mount any wall humidistat (control or high limit) over a standard electrical box at a height similar to a typical thermostat. Any wall humidistat should be in a location representative of the overall space being humidified and not in the path of a blower pack or an air supply grille.
6. A: Mount any duct control humidistat in a location representative of the overall air humidity, usually the return duct. Do not mount it directly in front of the steam distributor or in a turbulent or mixing zone. Mount it where the air's humidity and

temperature are uniform and representative of the space(s) being humidified.

7. **B:** Mount any duct high limit humidistat downstream of the steam distributors far enough that under normal humidity and air flow conditions the steam will have been fully absorbed. It must be located to sense high humidity only when the uniform and representative air is over-humidified or approaching saturation.
8. **C:** Mount any air-proving switch so that it is able to sense air flow or the lack of it. Wire it to make when air flow is sensed and break when no air flow.
9. Check operation of A, B and C before starting unit.

### MODULATION (CONTINUOUS CONTROL)



Read ON/OFF CONTROLS section FIRST since it is necessary for ALL control systems.

1. Modulation (continuous control) accessories offered by NORTEC involve one of four CONTROL WIRING DIAGRAMS 23.2, 23.3, 23.4 and 23.5. In all cases, the external modulating signal interfaces through the control terminal strip to a modulating p.c. board inside the humidifier.
2. The external modulation signal is generated by D, a humidistat or a transducer. This signal from D to the humidifier must first be identified as a varying v.d.c. signal, a varying milliamp d.c. signal, or a varying resistance signal. Then the appropriate wiring diagram can be selected according to the following notes.
3. If the humidity sensor E is built into D, see wiring diagrams 23.2 or 23.4. If the sensor is remote mounted, see wiring diagrams 23.3 or 23.5 and use shielded two conductor wire (Belden type 8760 or 8762) or equivalent between D and E to prevent electromagnetic interference (E.M.I.).
4. **Varying V.D.C. Signal Packages:** Only one type of D in this format is presently offered by the factory. It is a Johnson HC8550 humidistat which is to be wired to terminals 3, 4 and 5 as follows: red and white striped humidistat wire to terminal 3, grey wire to 4, and blue wire to 5. See wiring diagram 23.4.

**Varying V.D.C. Signal Adapters:** Four different adapter boards are offered by the factory for use with the appropriate field supplied varying v.d.c. signal humidistat. Ensure that the output signal of the field supplied humidistat is in accordance with the factory supplied adapter board as follows:

NORTEC Accessory No.	Description	Wiring Diagram
132-9325	0-10 v.d.c.	23.2
132-9326	0-16 v.d.c.	23.2
132-9327	1-5 v.d.c.	23.2
132-9328	2.5-10 v.d.c.	23.2

Only two wires are involved. The — signal wires to terminal 3 and the + signal wires to terminal 4. Polarity is critical. The signal must reduce as humidity rises.

5. **Varying Milliamp D.C. Signal Adapters:** Two different adapter boards are offered by the factory for use with the appropriate field supplied varying milliamp d.c. signal humidistat. Ensure that the output of the field supplied humidistat is in accordance with the factory supplied adapter board as follows:

NORTEC Accessory No.	Description	Wiring Diagram
132-9323	0-20 mA d.c.	23.2
132-9324	4-20 mA d.c.	23.2

Only two wires are involved. The — signal wires to terminal 3 and the + signal wires to terminal 4. Polarity is critical. The signal must reduce as humidity rises.



6. **Varying 3 Wire Resistance Signal Packages:** Only one type of D in this format is presently offered by the factory. It is a Honeywell H914A which is to be wired to terminals 3, 4 and 5 as follows: screw "W" to terminal 3, screw "R" to terminal 4, screw "B" to terminal 5. In this way, resistance from 3 to 4 decreases and 4 to 5 increases as humidity rises. See wiring diagram 23.4.

**Varying 3 Wire Resistance Signal Adapters:** Two different adapter boards are offered by the factory for use with the appropriate field supplied varying 3 wire resistance signal humidistat. Ensure that the resistance signal of the field supplied humidistat is in accordance with the NORTEC supplied adapter board as follows:

NORTEC Accessory No.	Description	Wiring Diagram
132-9321	0-135 ohm	23.4
132-9322	0-1000 ohm	23.4

Wire the sweep arm connection to terminal 4. Wire the remaining two wires to 3 and 5 such that resistance from 3 to 4 decreases and 4 to 5 increases as humidity rises.

### PRINCIPLE OF OPERATION

1. Refer to Diagram 24.
2. When controlling humidistat detects drop in RH, its points close, turning on unit, which has been on standby.
3. After 30 seconds, fill valve opens and cylinder fills until 110% F.L.A. (full load amperage) or top of cylinder is reached.
4. If 110% F.L.A. is reached water heats and boils away until 90% F.L.A. If water stopped at top of cylinder, water will boil off sensor pin until concentration is sufficient for normal operation.
5. The auto-adaptive control system continuously monitors the rate of amperage drop between the 110% and 90% points in order to optimize contained water concentration.
6. This 'concentration' process achieves maximum cylinder life and uses less energy.



CUT OPEN VIEW SHOWS CYLINDER  
AFTER 2000 HOURS OF OPERATION

PHOTO 6

7. When 90% F.L.A. is reached, the fill valve will open, refilling cylinder to 110% F.L.A. On occasion, the drain valve will also come on if water level is too low, indicating too high a concentration and the requirements for a dilution of the water in the cylinder.
8. As mineral buildup occurs on lower portions of electrodes, water level will automatically rise in cylinder thus employing fresh electrode mesh and maintaining full rated steam output.
9. When all electrode surface is mineral coated, the cylinder life is exhausted and is indicated by the high water level indicator light coming on. The life of a typical cylinder is one year, depending on the supply water conditions and the frequency of operations.

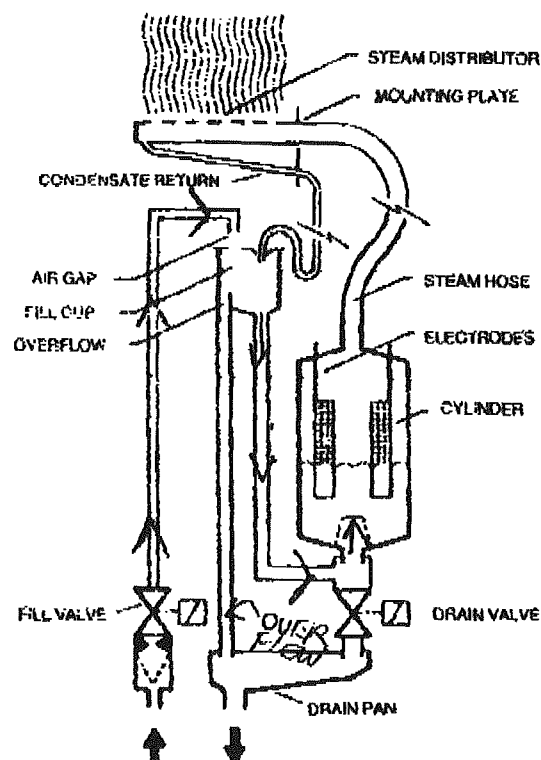


DIAGRAM 24  
PRINCIPLE OF OPERATION  
SCHEMATIC DIAGRAM

### INITIAL START-UP

1. Check that the unit is securely mounted on a vertical surface and that the unit is level.
2. Confirm that unit is properly connected to water supply and drain pipes and that correct voltage and amperage services are supplied.

3. Check that the steam distributor is correctly mounted and the steam supply and condensate return hose are properly routed.
4. Ensure that the external controlling humidistat is located in an area to accurately sense the relative humidity to be maintained by the unit. Check that all controls are correctly wired to unit.
5. Check all electrical connections in unit for wires that may have come loose in shipping.
6. Check that electrode plugs are firmly clamped on electrode pins on cylinder. **IMPORTANT:** Loose electrode plugs may cause overheating and failure of the plugs.
7. Turn on the main fused circuit breaker in the primary service feeding the unit and check unit has power.
8. Open the Isolating gate valve in supply water line of unit.
9. Ensure that control humidistat is set high enough to call for humidification.
10. Depress the switch to 'ON' position to activate unit. Activation will be indicated by green light activating and by sound of electrical contactor pulling in.
11. After a 30 second delay, water will enter the cylinder through its bottom connection and rise in the cylinder to a level determined by the solid state control circuitry.
12. It is not unusual, upon initial start-up, for the water level in the cylinder to rise to the top of the cylinder, causing the red high water level light to activate. This condition is due to the supply water having a low conductivity. The unit is designed to prevent a drain of water until it has reached design running conductivity.

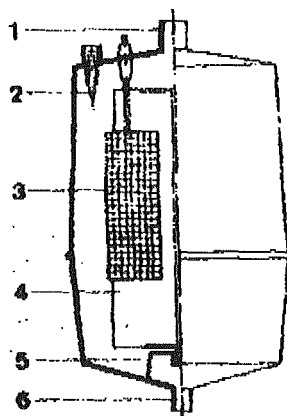


DIAGRAM 25  
STEAM CYLINDER

- 1 Connecting socket for steam hose
- 2 Sensor electrode
- 3 Heating electrodes
- 4 Separating plates
- 5 Strainer basket
- 6 Cylinder socket

## CAPACITY ADJUSTMENT

1. Each NORTEC ESMK II series humidifier is rated at its maximum output capacity. It is internally adjustable so that a reduced output of between 20% and 100% is obtainable.
2. The capacity adjustment control is mounted on a metal bracket in the low voltage section of the electrical compartment. See Diagram 26. Turn adjustment wheel until indicator points to desired level. The humidifier will adjust its output automatically.

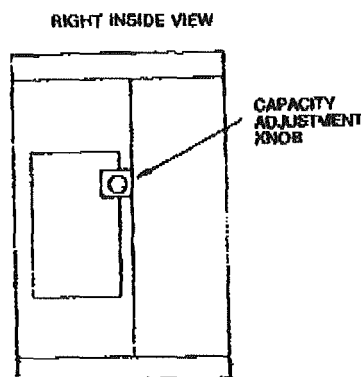


DIAGRAM 26  
UNIT CAPACITY ADJUSTMENT

3. **CAUTION:**  
The capacity adjustment dial is not to be confused with the control humidistat set point. The control humidistat is designed to maintain a desired relative humidity level in a space. The capacity adjustment feature controls only the steam generation rate.

## WARNING

### ARCING OR FLASHING IN CYLINDER

If this condition occurs, it requires your immediate attention. Do not operate the unit. Shut off the unit and consult factory.

## REQUIRED MAINTENANCE

The steam cylinder is disposable and must be replaced on a routine basis. Cylinder life is dependent on water supply conditions and humidifier usage. There are three indications, each of which signify the end of cylinder life:

- (a) After a period of operation (not on start-up), the water level will approach the top of the cylinder. (Life varies from 500 to 2000 operating hours.)
- (b) There will be reduced output in spite of a high capacity setting and/or a demand from the humidistat for more humidity. This is evident by monitoring the unit's capacity output meter.
- (c) A red "full cylinder/change cylinder" light will normally be illuminated during these conditions. However, do not rely solely on the red light to know when to replace the cylinder. (See following note concerning the red light.)

#### NOTE: TESTING THE RED LIGHT

The red "full cylinder/change cylinder" light serves a dual purpose. During the initial start-up (see INITIAL START-UP point 12) this light indicates high water level before concentration has occurred. Following start-up and concentration, the water level again approaches the top of the cylinder indicating end of cylinder life. Again, the red light is activated. The red light depends on the sensor assembly which senses the high water level. To test the red light, temporarily remove the sensor assembly connector from the two male pins on the basic unit p.c. board. Touch across the two pins with a metal screwdriver or equivalent to simulate a signal from the sensor assembly. If the fill valve closes but the red light does not come on, order a replacement red light and repeat test. If the fill valve does not close, order a replacement basic unit p.c. board and repeat test. When light and board are operating, reconnect sensor assembly to the two pins. If water rises uncontrolled into the steam outlet of the cylinder, the sensor assembly is defective. Consult factory.

#### STEAM CYLINDER REPLACEMENT

When ordering a replacement steam cylinder, always quote the three digit model number on the white label applied to the cylinder. (It is advisable to keep a spare cylinder in stock.)

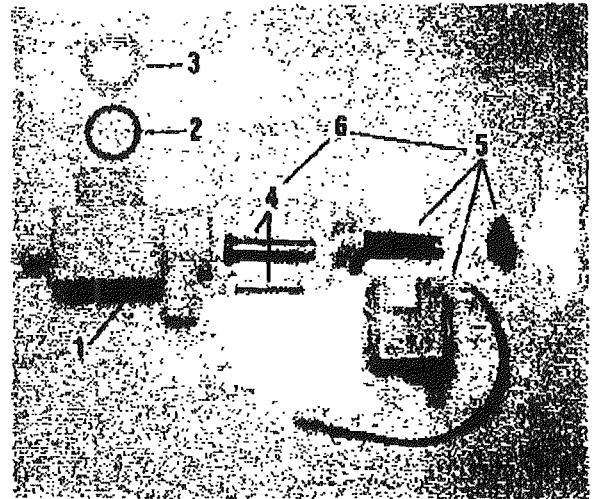
#### REPLACING THE DISPOSABLE CYLINDER

1. Turn off water supply to unit.
2. The old cylinder must be drained completely before removing. This is done by turning the AUTO ON/OFF/DRAIN switch to the DRAIN position.
3. When completely drained, turn the AUTO ON/OFF/DRAIN switch to the OFF position.
4. Once drained, open the main disconnect during the entire cylinder change operation.
5. Power wires to cylinder are attached to cylinder plugs to electrode pins on top of the cylinder.
6. Pull these plugs vertically off the pins. (See top photo opposite column).
7. Using slot screwdriver, loosen the steam hose clamp(s) and pull steam hose off vertically.
8. Shipping clips which retain the cylinder in the holding brackets, if not already removed, can be pulled off with pliers and need not be replaced.
9. Cylinder is now ready to be lifted out of the unit. (See photo 9 on page 14.)

#### MANDATORY CLEANING OF THE DRAIN VALVE

Always clean the drain valve when installing a new cylinder since the valve port is likely to be as dirty as the used cylinder.

- remove old cylinder as described above
- remove two screws holding drain valve body to drain pan
- remove hose clip from hose connection
- remove lock cap and solenoid
- loosen and remove actuator
- clean actuator, spring and drain valve port
- reassemble, reinstall.



EXPLODED VIEW OF  
DRAIN VALVE

PHOTO 7

1. Valve body (132-4042 small, 132-4041 large)
2. O Ring (132-5014)
3. Stuffing Block (132-1042)
4. Core and Spring (132-5127)
5. Coil Assembly w/o Item 4 (132-5132)
6. Coil Assembly complete (132-6002)

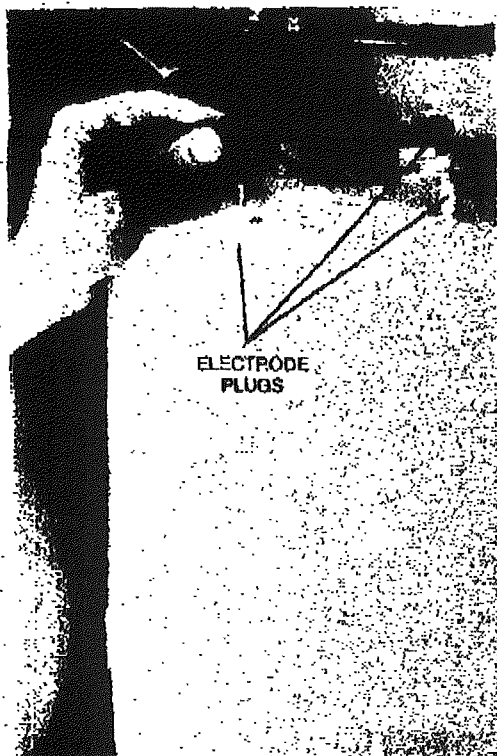


PHOTO 8

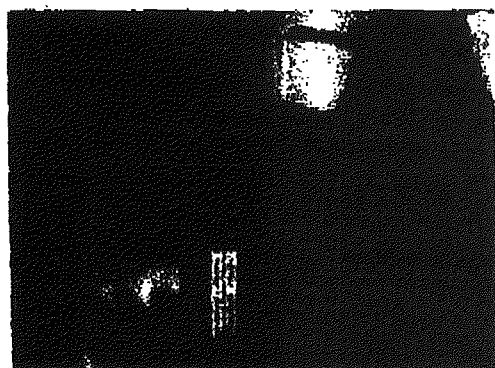
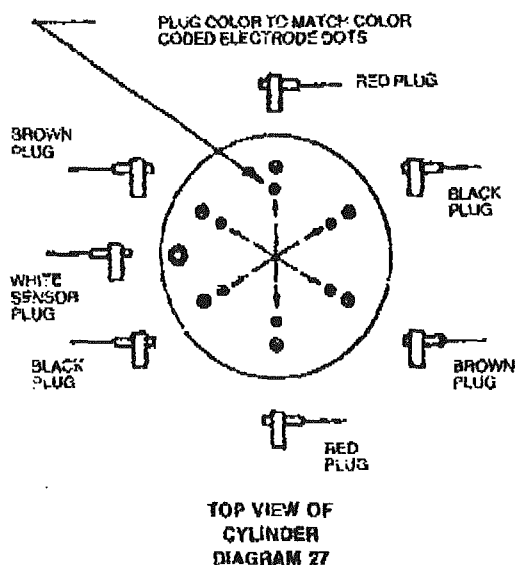


PHOTO 9

### INSTALLING NEW CYLINDER

1. Reverse procedure should be followed to install new cylinder. Main disconnect is to be left open until cylinder is completely installed and reconnected.
2. Ensure that cylinder mounting stubs are seated properly in the allotted side mounting brackets within the unit.
3. The cylinder plugs are color coded in accordance with colored dots beside the electrode pins on top of the cylinder. The factory reserves the right to substitute grey for brown.

4. This color coding must be adhered to when replacing cylinder plugs on pins.



5. With cylinders having six primary voltage cylinder plugs, it should be noted that there are two of each color. See Diagram 27.
6. Care should be taken that cylinder plugs of the same color are always directly opposite each other as indicated by the dot formation on the top of the cylinder.
7. The white cylinder plug on all units is for the sensor electrode which always goes on the single pin surrounded by a plastic shoulder.
8. Ensure that cylinder plugs are very snug on the pins.
9. For loose fitting plugs, squeeze with pliers before installing.

### EXTENDED SHUTDOWN

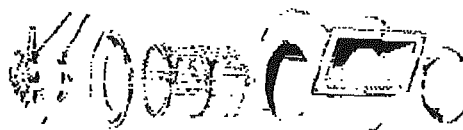
Any time that the unit is going to be shut down for an extended period of time, including summer shutdown, ALWAYS drain down the cylinder before disconnecting power. Otherwise, the electrodes are subject to harmful corrosion.

### RETURNING DEFECTIVE VALVES

Should it be necessary to return a valve for warranty in winter, please disassemble to avoid freezing and cracking.

### BUILT-ON AND REMOTE BLOWER PACKS

OIL HERE



**FAN MOTOR OILING:** The blower pack fan requires occasional oiling of motor bearings. Ten drops of SAE-20 grade motor oil are required. Failure to oil every four months will void the warranty from the fan motor manufacturer.

## TROUBLESHOOTING

### SAFETY

Fault-finding should only be performed by qualified personnel using accepted industrial and electrical code practices.

Relatively high voltages are present in some circuits so safety procedures should be adhered to. Arcing or flashing in the cylinder is dangerous. Shut off unit immediately and consult factory.

The following procedures apply to all standard on/off control units. For more elaborate control and blower pack units, these steps can be used and your factory representative or the Customer Service staff at NORTEC will supply more details.

### PROCEDURES

On/off controlled humidifiers can be functionally diagnosed by following the test procedures outlined below. If a modulation (continuous control) unit is malfunctioning, it is best diagnosed by temporarily removing the adapter p.c. board from the basic unit p.c. board. Connect a jumper wire on the left side of the basic unit p.c. board and diagnose the unit as an on/off control unit.

When the on/off control circuit is made (see CONTROLS section) and the "auto on/off/drain" switch is pushed to "on", the 24 volt holding coil of the primary contactor should energize. The resulting magnetic pull closes the high voltage contacts with a distinct and audible "clunk". The contactor is located on the right side in the high voltage section. If the contactor will not make, measure 24 vac from the grounded secondary leg of the primary-to-24V transformer to the following:

1. The "hot secondary leg". (If not, primary voltage is not applied or transformer is defective or miswired.)
2. The leaving side of the 3A fuse. (If not, fuse is blown or miswired.)
3. The leaving side of the door interlock switch. (If not, plumbing door is off, or switch is defective or miswired.)
4. The output "on" position (top terminal) of the rocker switch. (If not, switch is defective or miswired.)
5. Terminal 2 on the control strip. (If not, unit is miswired.)
6. Terminal 1 on the control strip. (If not, external controls are miswired. Humidistat high limit, and

air proving switch must be made. See CONTROLS section.)

7. Pin 39 on the basic unit p.c.b. (If not, wiring from 1 to 39 is defective.)
8. Pin 35 on the basic unit p.c.b. (If not, on-off jumper plug is open or missing.)
9. The "hot" side of the contactor holding coil. (If not, wiring from pin 35 is defective; If yes, the contactor holding coil is defective.)

Assuming the amp draw (output capacity) is less than 110% of capacity setting, the fill valve solenoid should make about 30 seconds after the contactor makes. If not, and items 1 through 9 have been checked, check for 24 vac from the grounded secondary leg of the primary-to-24V transformer to the following:

10. Pin 38 on the basic unit p.c.b. (If not, unit is miswired from 35 to 38.)
11. Pin 36 on the basic unit p.c.b. (If not, temporarily remove the red and black wired sensor input from the basic unit p.c.b. After 10 seconds, if there is still no power to 36, the basic unit p.c.b. may be defective. If pin 36 gets power, then the sensor is interfering with the fill process. If the water level is high, this is expected. If the water level is low, the sensor is defective.)

Having changed the necessary components, water starts filling the cylinder and begins to submerge the electrodes. Because of the high voltage across the electrodes, the water can now conduct electricity.

The CONCENTRATION PROCESS now takes place through a series of filling and boiling cycles as described earlier. Water fills to the top of the cylinder (where the fill valve is shut off by the sensor). Because the fresh supply water is unconcentrated, it cannot conduct electricity well enough to produce full output. It will come to a boil and when the water level goes below the sensor probe (internal to the cylinder) the fill valve is allowed to reenergize until the water again reaches the top. Each time this happens, more ions are accumulating in the cylinder and the contained water is becoming more conductive (i.e., the cwc is increasing).

In time the cylinder will reach 100% output, assuming the capacity dial is set to 100%. The concentration process does not stop here, i.e., no drain takes place yet. Instead, the unit fills to 110%, fill shuts off, it boils to 90%, fill reactivates and so on allowing the average water level to drop lower and lower in the cylinder.

This is an extremely important design feature because the cylinder is disposable! In order to maximize the life of this throw-away item, it is important to use the minimum amount of electrode surface. As minerals inevitably accumulate on the exposed electrode surface, the water will rise gradually to higher and higher levels to expose clean surfaces as required. When the

## TROUBLESHOOTING (Continued)

cylinder is all used up, (for signs, see Required Maintenance Section), the water level will have been at top of the cylinder and red "full cylinder/change cylinder" light should be activated. If not, check for 15 v.d.c. across pins 45-46 as light may be burned out. To test the light, see note regarding Testing The Red Light in the Required Maintenance section.

### WATER SIDE:

1. Under certain conditions, generally at start-up, the fill valve will open but water will not enter the cylinder properly. It will pass down the fill cup overflow and down the drain. This can be corrected as follows:
  - a) Back pressure from the duct stops water from entering the cylinder. To rectify this situation,

remove the steam hose from cylinder top until there is six inches of water in the cylinder.

- b) Air lock in the hose connecting cylinder base with the fill cup. To correct this problem, remove steam hose from top of cylinder and pinch fill cup hose at bottom until air bubble is removed and water enters the cylinder freely.
2. Water will occasionally enter the drain pan during the drain cycle. This is generally caused by flow restrictions in the drain line or the drain hose is connected directly to drain piping. Correct as follows:
  - a) Make sure drain is connected as in Diagram 3, page 3.
  - b) Remove drain canal and clean.

# VOLTAGE AND FUSE (AMPS) TABLES

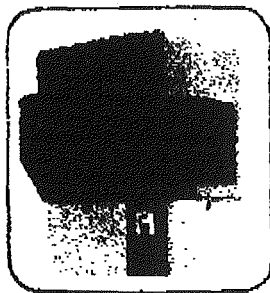
MODEL/VOLTAGE/PHASE	K.W.	UNIT FLA	MAX. UNIT FUSE (AMPS)	MIN. DISCONNECT FUSE (AMPS)	NO. OF UNIT FUSES
ESB-50/115/1	1.4	12.0	15	15	2
ESB-50/208/1	1.7	8.2	10	10	2
ESB-50/230/1	1.7	7.4	9	9	2
ESB-50/277/1	1.7	6.1	8	8	2
ESB-50/347/1	1.7	4.9	6	6	2
ESB-50/380/1	1.7	4.5	6	6	2
ESB-50/416/1	1.7	4.1	6	6	2
ESB-50/460/1	1.7	3.7	5	5	2
ESB-50/600/1	1.7	2.8	4	4	2
ESB-100/208/1	3.4	15.3	20	20	2
ESB-100/230/1	3.4	14.8	20	20	2
ESB-100/277/1	3.4	12.3	15	15	2
ESB-100/347/1	3.4	9.8	12	12	2
ESB-100/380/1	3.4	8.9	12	12	2
ESB-100/416/1	3.4	8.1	10	10	2
ESB-100/460/1	3.4	7.4	9	9	2
ESB-100/600/1	3.4	5.7	7	7	2
ES MKII-200/208/1	3.4	16.3	20	20	2
ES MKII-200/220/1	3.4	15.4	20	20	2
ES MKII-200/230/1	3.4	14.8	20	20	2
ES MKII-200/240/1	3.4	14.2	20	20	2
ES MKII-200/277/1	3.4	12.3	15	15	2
ES MKII-200/347/1	3.4	9.8	12	12	2
ES MKII-200/416/1	3.4	8.2	10	10	2
ES MKII-200/440/1	3.4	7.7	10	10	2
ES MKII-200/460/1	3.4	7.4	9	9	2
ES MKII-200/480/1	3.4	7.1	9	9	2
ES MKII-200/550/1	3.4	6.2	8	8	2
ES MKII-200/575/1	3.4	5.9	8	8	2
ES MKII-200/600/1	3.4	5.7	7	7	2
ES MKII-300/208/1	5.8	27.8	35	35	2
ES MKII-300/220/1	5.8	26.3	35	35	2
ES MKII-300/230/1	5.8	25.1	35	35	2
ES MKII-300/240/1	5.8	24.5	35	35	2
ES MKII-300/277/1	5.8	20.9	30	30	2
ES MKII-300/347/1	5.8	16.7	25	25	2
ES MKII-300/416/1	5.8	13.9	20	20	2
ES MKII-300/440/1	5.8	13.4	20	20	2
ES MKII-300/460/1	5.8	12.6	20	20	2
ES MKII-300/480/1	5.8	12.0	20	20	2
ES MKII-300/550/1	5.8	10.5	15	15	2
ES MKII-300/575/1	5.8	10.0	15	15	2
ES MKII-300/600/1	5.8	9.8	15	15	2

# VOLTAGE AND FUSE (AMPS) TABLES

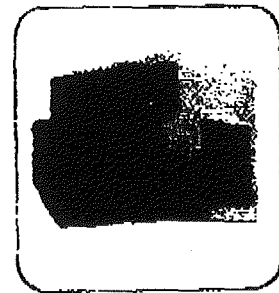
MODEL/VOLTAGE/PHASE	K.W.	UNIT FLA	MAX. UNIT FUSE (AMPS)	MIN. DISCONNECT FUSE (AMPS)	NO. OF UNIT FUSES
ES MKII-400/208/3	10.2	28.3	40	40	3
ES MKII-400/220/3	10.2	26.8	35	35	3
ES MKII-400/230/3	10.2	25.6	35	35	3
ES MKII-400/240/3	10.2	24.5	35	35	3
ES MKII-400/416/3	10.2	14.1	20	20	3
ES MKII-400/440/3	10.2	13.4	20	20	3
ES MKII-400/460/3	10.2	12.8	15	15	3
ES MKII-400/480/3	10.2	12.3	15	15	3
ES MKII-400/550/3	10.2	10.7	15	15	2
ES MKII-400/575/3	10.2	10.2	15	15	3
ES MKII-400/600/3	10.2	9.8	12	12	3
ES MKII-500/208/3	20.4	56.8	40	80	6
ES MKII-500/220/3	20.4	53.5	35	70	6
ES MKII-500/230/3	20.4	51.2	35	70	6
ES MKII-500/240/3	20.4	49.1	35	70	6
ES MKII-500/416/3	20.4	28.3	35	35	3
ES MKII-500/440/3	20.4	26.8	35	35	3
ES MKII-500/460/3	20.4	25.6	35	35	3
ES MKII-500/480/3	20.4	24.5	35	35	3
ES MKII-500/550/3	20.4	21.4	30	30	3
ES MKII-500/575/3	20.4	20.5	30	30	3
ES MKII-500/600/3	20.4	19.6	25	25	3
ES MKII-600/208/3	30.6	84.9	60	120	6
ES MKII-600/220/3	30.6	80.3	50	100	6
ES MKII-600/230/3	30.6	76.8	50	100	6
ES MKII-600/240/3	30.6	73.6	50	100	6
ES MKII-600/416/3	30.6	42.5	25	50	6
ES MKII-600/440/3	30.6	40.2	25	50	6
ES MKII-600/460/3	30.6	38.4	25	50	6
ES MKII-600/480/3	30.6	36.8	25	50	6
ES MKII-600/550/3	30.6	32.1	45	45	3
ES MKII-600/575/3	30.6	30.7	45	45	3
ES MKII-600/600/3	30.6	29.4	40	40	3
ES MKII-700/208/3	40.8	113.2	40	160	12
ES MKII-700/220/3	40.8	107	35	140	12
ES MKII-700/230/3	40.8	102.4	35	140	12
ES MKII-700/240/3	40.8	98.2	35	140	12
ES MKII-700/416/3	40.8	56.8	35	70	6
ES MKII-700/440/3	40.8	53.5	35	70	6
ES MKII-700/460/3	40.8	51.2	35	70	6
ES MKII-700/480/3	40.8	49.1	35	70	6
ES MKII-700/550/3	40.8	42.8	60	60	6
ES MKII-700/575/3	40.8	40.9	60	60	6
ES MKII-700/600/3	40.8	39.2	50	50	6
ES MKII-800/208/3	61.2	169.8	60	240	12
ES MKII-800/220/3	61.2	160.6	50	200	12
ES MKII-800/230/3	61.2	153.6	50	200	12
ES MKII-800/240/3	61.2	147.2	50	200	12
ES MKII-800/416/3	61.2	84.9	25	100	12
ES MKII-800/440/3	61.2	80.4	25	100	12
ES MKII-800/460/3	61.2	76.8	25	100	12
ES MKII-800/480/3	61.2	73.6	25	100	12
ES MKII-800/550/3	61.2	64.2	45	90	8
ES MKII-800/575/3	61.2	61.4	45	90	6
ES MKII-800/600/3	61.2	58.8	40	80	6



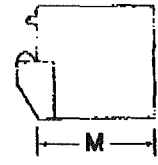
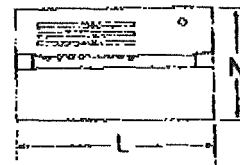
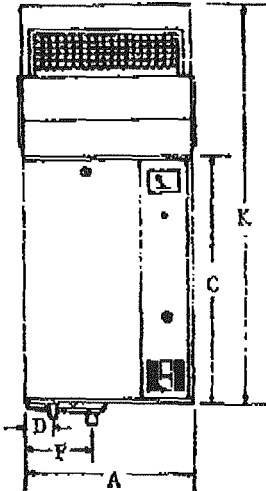
# PHYSICAL DATA



HUMIDIFIER WITH  
BUILT-ON BLOWER PACK



REMOTE MOUNTED BLOWER PACK

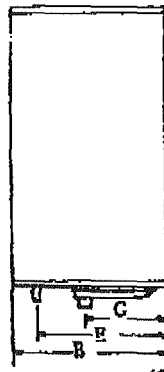
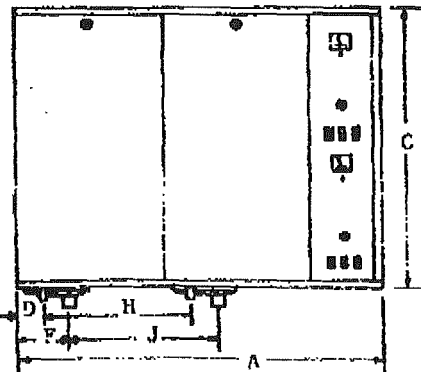


ES MK II 200/300/400 REMOTE BLOWER PACK  
ES MK II 500/600 REMOTE BLOWER PACK  
ESB REMOTE BLOWER PACK

ES MK II 200/300/400 HUMIDIFIER AND BUILT-ON BLOWER PACK  
ES MK II 500/600 HUMIDIFIER AND BUILT-ON BLOWER PACK

HUMIDIFIERS											BLOWER PACKS							
UNIT	DIMENSIONS (Inches)										WT.	Built-on	DIMENSIONS (Inches)				Remote	WT.
MODEL	A	B	C	D	E	F	G	H	J	Lbs.*	132 NO.	K	L	M	N	132 NO.	Lbs.	
ESB-50	12.2	7.2	17.8	1.4	5.7	5.3	2.9	—	—	25	9400	23.9	12.2	7.3	8.0	9410	10	
ESB-100	12.2	7.2	17.8	1.4	5.7	5.3	2.9	—	—	25	9401	23.9	12.2	7.3	8.0	9411	10	
ES-MKII-200	16.6	10.9	23.8	1.6	9.3	6.1	7.2	—	—	45	9402	39.6	16.7	11.0	15.0	9412	45	
ES-MKII-300	16.6	10.9	23.8	1.6	9.3	6.1	7.2	—	—	45	9403	38.6	16.7	11.0	15.0	9413	45	
ES-MKII-400	16.6	10.9	23.6	1.6	9.3	6.1	7.2	—	—	45	9404	38.6	16.7	11.0	15.0	9414	45	
ES-MKII-500	20.9	14.2	27.7	1.6	12.6	7.7	7.7	—	—	70	9405	42.7	21.0	14.3	15.0	9415	55	
ES-MKII-600	20.9	14.2	27.7	1.6	12.6	7.7	7.7	—	—	70	9406	42.7	21.0	14.3	15.0	9416	55	
ES-MKII-700	36.0	17.3	27.7	1.6	15.7	7.7	10.8	14.2	14.2	115	CONSULT FACTORY							
ES-MKII-800	36.0	17.3	27.7	1.6	15.7	7.7	10.8	14.2	14.2	115								

\*Weight Without Blower Pack.



**NOTE:**  
TWO INDEPENDENT CIRCUITS EACH  
REQUIRING ONE HUMIDISTAT, OR  
CAN BE GANG-OPERATED FROM  
ONE HUMIDISTAT.

THE SMALL PLUMBING CON-  
NECTION IS FOR FILL (1/4" COPPER PIPE).  
THE LARGE PLUMBING CON-  
NECTION IS FOR DRAIN (1/2" COPPER  
PIPE).

ES MKII 700/800 HUMIDIFIER



# SPARE PARTS LIST AND EXPLODED VIEWS FOR



## ES MK II SERIES ELECTRONIC ELECTRODE STEAM HUMIDIFIERS



LISTED  
HUMIDIFIER  
E65 185



L9-35853

When ordering any spare part, replacement part, or warranty part, please quote serial number of humidifier. This enables us to double-check component selection to ensure you receive the exact part required.

Serial No. .... Model ..... Voltage .....

**NORTEC INDUSTRIES INC.**

P.O. Box 698  
Ogdensburg, New York, 13669  
Phone (315) 425-1255

83-11

**NORTEC AIR CONDITIONING INDUSTRIES LTD.**

2760 Fenton Road, Box 949  
R.R. 5, Ottawa, Ont. K1G 3N3  
Phone (613) 822-0335 Telex 053-3552

MODEL			ES MK II 200										ES MK II 300										ES MK II 400													
POS. NO.	DESCRIPTION	NORTEC PART NO.	208	220	230	240	277	347	440	460	480	550	575	600	208	220	230	240	277	347	440	460	480	550	575	600	208	220	230	240	440	460	480	550	575	600
1	Electronic Basic Unit	132-4878	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	D.C. Voltmeter Assembly	132-6077	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2.1	D.C. Voltmeter	132-3090	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2.2	P.C. Board for D.C. Voltmeter	132-4601	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2.3	Mounting Bracket	132-7093	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	Jumper Plug	132-4933	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	R.C. Timer P.C. Board 50/2	132-4938	1	1	1	1	1								1	1	1	1	1																	
	R.C. Timer P.C. Board 60/2	132-4939														1	1	1	1																	
	R.C. Timer P.C. Board 80/3	132-4940						1	1	1	1	1	1	1						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	High Water Level Light	132-3095	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	Five Wire Ribbon Cable	132-3958	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Voltage Jumper Wire	132-4935	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Sensor Assembly - Short	132-6111	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Sensor Assembly - Long	132-6222													1	1	1	1	1																	
9	Door Lock Assembly	132-3101	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Current Transformer PCB	132-4947						1	1	1	1	1	1	1																						
	Current Transformer PCB	132-4948																		1	1	1	1	1	1	1					1	1	1	1	1	
	Current Transformer PCB	132-4949																																		
	Current Transformer PCB	132-4950	1	1	1	1	1																													
	Current Transformer PCB	132-4951													1	1	1	1	1								1	1	1	1						
	Current Transformer PCB	132-4957																																		
	Current Transformer PCB	132-4958																																		
	Current Transformer PCB	132-4995																																		
11	Contactors 30A	132-3013	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	
	Contactors 40A	132-3014													1	1	1	1	1								1	1	1	1						
	Contactors 62A	132-3015																																		
	Contactors 93A	132-3018																																		
12	Ground Lug	132-3020	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
13	Transformer 208/24V	132-3206	1																																	
	Transformer 230/24V	132-3230			1	1	1										1	1	1										1	1	1					
	Transformer 277/24V	132-3273																																		
	Transformer 347/24V	132-3347						1												1																
	Transformer 460/24V	132-3460							1	1	1										1	1	1								1	1	1			
	Transformer 600/24V	132-3575										1	1	1										1	1	1	1	1	1	1				1	1	1
14	Capacity Dial	132-1299	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
15	Capacity Potentiometer	132-4008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

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[illegible]

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MODEL			ES MK II 200										ES MK II 300										ES MK II 400													
POS. NO.	DESCRIPTION	NORTEC PART NO.	VOLTAGE																																	
			208	220	230	240	277	347	440	480	550	575	600	208	220	230	240	277	347	440	480	550	575	600	208	220	230	240	440	480	550	575	600			
16	Fuse Block for two JIN Fuses	142-3181	1	1	1	1																														
	Fuse Block for two JIN Fuses	142-3183												1	1	1	1																			
	Fuse Block for three JIN Fuses	142-3184																																		
	Fuse Block for two KTK Fuses	132-3042					1	1	1	1	1	1	1									1	1	1												
	Fuse Block for three KTK Fuses	142-3185																																		
	Fuse Block for two JJS Fuses	142-3182																1	1	1	1	1														
	Fuse Block for three JJS Fuses	142-3186																																		
	Fuse Block for three JJS Fuses	142-3187																																		
17	Fuse JIN-20	142-3171	2	2	2	2																														
	Fuse JIN-35	142-3172																																		
	Fuse JIN-40	142-3173												2	2	2	2																			
	Fuse JIN-50	142-3175																																		
	Fuse JIN-60	142-3176																																		
	Fuse KTK-7	142-3144																																		
	Fuse KTK-8	142-3145												2	2																					
	Fuse KTK-9	142-3146																																		
	Fuse KTK-10	142-3147																																		
	Fuse KTK-12	142-3148																																		
	Fuse KTK-15	142-3149																																		
	Fuse JJS-20	142-3156																																		
	Fuse JJS-25	142-3157																																		
	Fuse JJS-30	142-3158																																		
	Fuse JJS-35	142-3159																																		
	Fuse JJS-40	142-3160																																		
	Fuse JJS-45	142-3161																																		
	Fuse JJS-50	142-3162																																		
	Fuse JJS-60	142-3163																																		
18	Control Terminal Strip	132-3086	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19	Green Lamp	132-3086	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
20	Rocker Switch	132-3087	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
21	Amber Lamp	132-3088	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
22	Fuse Holder	132-5052	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
23	Fuse 3A	142-3058	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	Interlock Switch	132-3091	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
25	Wall Mounting Bracket	142-7020	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Wall Mounting Bracket	142-7040																																		
26	Terminal Block - 95A - 3 Phase	132-3027																																		
	Terminal Block - 150A - 3 Phase	132-3028																																		
	Terminal Block - 220A - 3 Phase	132-3029																																		
27	Terminal Strip Lug	132-5500	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	

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			MODEL		ES MK II 500								ES MK II 600								ES MK II 700								ES MK II 800																	
POS. NO.	DESCRIPTION	NORTEC PART NO.	VOLTAGE																																											
			208	220	230	240	440	460	480	550	575	600	208	220	230	240	440	460	480	550	575	600	208	220	230	240	440	460	480	550	575	600	208	220	230	240	440	460	480	550	575	600				
16	Fuse Block for two JIN Fuses	142-3181																																												
	Fuse Block for two JIN Fuses	142-3183																																												
	Fuse Block for three JIN Fuses	142-3184	2	2	2	2							2	2	2	2							4	4	4	4							4	4	4	4										
	Fuse Block for two KTK Fuses	132-3042																																												
	Fuse Block for three KTK Fuses	142-3185																																												
	Fuse Block for two JJS Fuses	142-3182																																												
	Fuse Block for three JJS Fuses	142-3186					1	1	1																																					
	Fuse Block for three JJS Fuses	142-3187								1	1	1					2	2	2																							2	2	2		
17	Fuse JIN-20	142-3171																																												
	Fuse JIN-35	142-3172		6	6	6																																								
	Fuse JIN-40	142-3173	6																																											
	Fuse JIN-60	142-3175												6	6	6	6																													
	Fuse JIN-60	142-3176																																												
	Fuse KTK-7	142-3144																																												
	Fuse KTK-8	142-3145																																												
	Fuse KTK-9	142-3146																																												
	Fuse KTK-10	142-3147																																												
	Fuse KTK-12	142-3148																																												
	Fuse KTK-15	142-3149																																												
	Fuse JJS-20	142-3156																																												
	Fuse JJS-25	142-3157																																												
	Fuse JJS-30	142-3158																																												
	Fuse JJS-35	142-3159					3	3	3																																					
	Fuse JJS-40	142-3160																																												
	Fuse JJS-45	142-3161																																												
	Fuse JJS-50	142-3162																																												
	Fuse JJS-60	142-3163																																												
18	Control Terminal Strip	132-3086	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
19	Green Lamp	132-3096	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
20	Rocker Switch	132-3097	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
21	Amber Lamp	132-3098	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
22	Fuse Holder	132-5052	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
23	Fuse 3A	142-3056	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
24	Interlock Switch	132-3091	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
25	Wall Mounting Bracket	142-7020	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																									
	Wall Mounting Bracket	142-7040																																												
26	Terminal Block - 95A - 3 Phase	132-3027	1	1	1	1											1	1	1																											
	Terminal Block - 150A - 3 Phase	132-3028											1	1	1	1																														
	Terminal Block - 220A - 3 Phase	132-3029																																												
27	Terminal Strip Lug	132-5500	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	

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