HAVASAZ

Life Is Cool Air Conditioning since 1967

# UNIT HEATER


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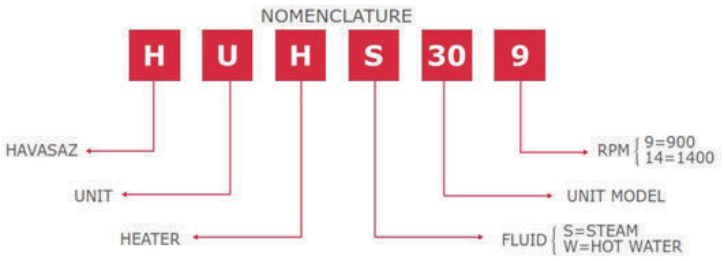
# HAVASAZ Contents








# LIFE IS COOL

## AIR CONDITIONING

# INTRODUCTION

## CABINET:

Is made of thick steel for rigidity and is painted in a fully automated oven baked electrostatically powder coating system.

## MOTOR:

Is from world famous brand single phase 220 volts 50 Hz (3 phase available Swage speed per request) 900 or 1400 RPM or 3 speed.

## FAN:

Is of axial type statically and dynamically balanced to achieve lower sound levels and longer life.

## HEATING COIL:

Is constructed of 3 rows of copper tubes uniformly expanded into continuous flat plate aluminum fins having spacing of 8 fin per inch ( fin plates are turbinated for 20 % higher rating ).Circuiting is designed for minimum water pressure drop.

## DISCHARGE LOUVER:

Is constructed of heavy gage steel painted similar process as cabinet and equipped with a lever for adjusting the louvers to desired angle of air throw.

## PERFORMANCE TABLES ARE LISTED FOR:

Entering air temp. =60 °F
Entering water temp. =180 ° F
Water temp. drop =20 ° F

# SELECTION EXAMPLE

## Hot Water:

Entering air temp..... .....40 °F

Entering water temp.....195 °F

Heating load..... 80000 Btu/hr

Motor.....900 rpm

## Determine:

From table 2 Ent. Air temp of 40°F and Ent. Water temp of 195 °F, the correction factor is 1.24; therefore:

80000/1.24 = 64516 Btu/hr so in the table 1: 65600 Btu/hr

The correction unit capacity = 65600 x 1.24 = 81344 Btu / hr

Then: HUHW -60-9 is selected.

CFM correction factor from table 6 is 1.04 :

Corrected unit air flow rate = (nominal air flow rate) x (correction factor)

= 1085 x 1.04 = 1128 CFM

Leaving air temp.=(CORRECTED UNIT CAPACITY(BTU/HR))/(CORRECTED UNIT AIR FLOW RATE×1.085)+ENT.AIR TEMP

Corrected unit capacity (Btu/ hr)

+ Ent. Air temp.

Corrected unit air flow rate x 1.085

=81344/(1128×1.085)+40=106.5F

# Steam:

Entering air temp.....40°F
Steam Pressure available..... 15 Psig
Heating load..... 90000 Btu/hr
Motor ..... 900 rpm

# Determine:

Standard rating for Havasaz unit heater are based on 60 °F entering air temp.since the given conditions are not based on standard conditions , a correction factor should be applied to the heating load.

C.F = 0.975
90000/0.978 = 92024 Btu/hr
so in the table 3: 96000 Btu/hr
Then HUHS-50-9 is selected.

# HOT WATER CAPACITIES & CORRECTION FACTOR

## TABLE 1 - HOT WATER UNIT HEATER CAPACITIES

| MODEL | MOTOR SIZE(w) | AIR FLOW RATE (M3/HR) | FINAL AIR TEMP(˚C) | WATER FLOW RATE (M3/HR) | WATER PRESS DROP(KPA) | CAPACITY(KW) | CAPACITY MBH |
|---|---|---|---|---|---|---|---|
| HUHW-30-9 | 90 | 1650 | 41,1 | 0,83 | 2.5 | 10,4 | 35.5 |
| HUHW-40-9 | 90 | 1650 | 43,5 | 0,94 | 2.6 | 11,8 | 40.3 |
| HUHW-50-9 | 100 | 2350 | 42,5 | 1,6 | 4.7 | 20,1 | 68.6 |
| HUHW-60-9 | 110 | 2800 | 44,7 | 0.05 | 5.6 | 25,7 | 87.7 |
| HUHW-70-9 | 170 | 4000 | 43,7 | 3 | 9.0 | 37,7 | 128.7 |
| HUHW-80-9 | 170 | 4300 | 45,8 | 3,47 | 9.9 | 43,6 | 148.8 |

| MODEL | MOTOR SIZE(w) | AIR FLOW RATE (M3/HR) | FINAL AIR TEMP(˚C) | WATER FLOW RATE (M3/HR) | WATER PRESS DROP(KPA) | CAPACITY(KW) | CAPACITY MBH |
|---|---|---|---|---|---|---|---|
| HUHW-30-14 | 100 | 1500 | 44,6 | 0,67 | 1.7 | 8,37 | 28.6 |
| HUHW-40-14 | 135 | 2300 | 39 | 1,24 | 4.1 | 15,5 | 52.9 |
| HUHW-50-14 | 160 | 3450 | 39,7 | 1,89 | 6.3 | 23,8 | 81.2 |
| HUHW-60-14 | 175 | 4000 | 41,6 | 2,46 | 7.8 | 30,9 | 105.5 |
| HUHW-70-14 | 360 | 6500 | 40,5 | 3,64 | 12.7 | 45,6 | 155.6 |
| HUHW-80-14 | 370 | 6800 | 42,1 | 4,36 | 14.9 | 54,8 | 187.0 |

*NOMINAL POWER
ENTERING AIR TEMP.=60 °F ENTERING WATER TEMP.=180 °F WATER TEMP.DROP=20 °F

## TABLE -2- HOT WATER CORRECTION FACTOR

| AIR ENTERING (°F) | WATER ENTERING (°F) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 150 | 160 | 170 | 175 | 180 | 195 | 205 | 212 | 220 | 230 | 240 |
| 32 | 0.92 | 1 | 1.08 | 1.16 | 1.24 | 1.35 | 1.42 | 1.5 | 1.6 | 1.68 | 1.76 |
| 40 | 0.85 | 0.92 | 1 | 1.08 | 1.16 | 1.24 | 1.35 | 1.42 | 1.5 | 1.6 | 1.68 |
| 50 | 0.74 | 0.85 | 0.95 | 1 | 1.08 | 1.16 | 1.24 | 1.35 | 1.42 | 1.5 | 1.6 |
| 60 | 0.63 | 0.74 | 0.85 | 0.95 | 1 | 1.08 | 1.16 | 1.24 | 1.35 | 1.42 | 1.5 |
| 70 | 0.54 | 0.63 | 0.74 | 0.85 | 0.95 | 1 | 1.08 | 1.16 | 1.24 | 1.35 | 1.42 |
| 75 | 0.48 | 0.54 | 0.63 | 0.74 | 0.85 | 0.95 | 1 | 1.08 | 1.16 | 1.24 | 1.35 |

# STEAM CAPACITIES

## TABLE -3- STEAM UNIT HEATER CAPACITIES

| | MODEL | MOTOR SIZE(w) | AIR FLOW RATE (M3/ HR) | FINAL AIR TEMP(˚C) | STEAM PRESS (BAR) | CONDENSTE KG/HR | CAPACITY(KW) | CAPACITY MBH |
|---|---|---|---|---|---|---|---|---|
| 900 RPM | HUHS-30-9 | 90 | 1650 | 46.3 | 0.35 | 14 | 8.85 | 30.2 |
| | | | | 60.8 | 1 | 21 | 13 | 44.4 |
| | | | | 71.9 | 2 | 27 | 16.2 | 55.3 |
| | HUHS-40-9 | 90 | 1650 | 44.9 | 0.35 | 19 | 12.4 | 42.3 |
| | | | | 58.8 | 1 | 29 | 18.3 | 62.4 |
| | | | | 69.4 | 2 | 37 | 22.8 | 77.8 |
| | HUHS-50-9 | 100 | 2350 | 43.7 | 0.35 | 32 | 21 | 71.7 |
| | | | | 57 | 1 | 49 | 30.9 | 105.4 |
| | | | | 67.2 | 2 | 63 | 38.5 | 131.4 |
| | HUHS-60-9 | 110 | 2800 | 45.8 | 0.35 | 41 | 26.7 | 91.1 |
| | | | | 60.1 | 1 | 63 | 39.2 | 133.8 |
| | | | | 71 | 2 | 80 | 48.8 | 166.5 |
| | HUHS-70-9 | 170 | 4000 | 44.6 | 0.35 | 60 | 38.9 | 132.7 |
| | | | | 58.3 | 1 | 91 | 57.2 | 195.2 |
| | | | | 68.8 | 2 | 117 | 71.3 | 243.3 |
| | HUHS-80-9 | 170 | 4300 | 46.7 | 0.35 | 69 | 44.9 | 153.2 |
| | | | | 61.5 | 1 | 105 | 66.1 | 225.5 |
| | | | | 72.7 | 2 | 135 | 82.3 | 280.8 |

* Pressures are in absolute

# HOT WATER CAPACITIES & CORRECTION FACTOR

| | MODEL | MOTOR SIZE(w) | AIR FLOW RATE (M3/ HR) | FINAL AIR TEMP(˚C) | STEAM PRESS (BAR) | CONDENSTE KG/HR | CAPACITY(KW) | CAPACITY MBH |
|---|---|---|---|---|---|---|---|---|
| 1400 RPM | HUHW-30-14 | 100 | 1650 | 42.6 | 0.35 | 17 | 11 | 37.5 |
| | | | | 55.4 | 1 | 26 | 16.2 | 55.3 |
| | | | | 65.2 | 2 | 33 | 20.2 | 68.9 |
| | HUHW-40-14 | 135 | 1650 | 40.2 | 0.35 | 25 | 16.3 | 55.6 |
| | | | | 51.8 | 1 | 38 | 24 | 81.9 |
| | | | | 60.7 | 2 | 49 | 29.8 | 101.7 |
| | HUHW-50-14 | 160 | 2350 | 40.8 | 0.35 | 38 | 24.8 | 84.6 |
| | | | | 52.7 | 1 | 58 | 36.5 | 124.5 |
| | | | | 61.8 | 2 | 74 | 45.4 | 154.9 |
| | HUHW-60-14 | 175 | 2800 | 42.6 | 0.35 | 50 | 32.1 | 109.5 |
| | | | | 55.4 | 1 | 75 | 47.3 | 161.4 |
| | | | | 65.2 | 2 | 96 | 58.8 | 200.6 |
| | HUHW-70-14 | 360 | 4000 | 41.3 | 0.35 | 73 | 47 | 160.4 |
| | | | | 53.4 | 1 | 110 | 69.2 | 236.1 |
| | | | | 62.7 | 2 | 141 | 86.2 | 294.1 |
| | HUHW-80-14 | 370 | 4300 | 42.9 | 0.35 | 87 | 56.4 | 192.4 |
| | | | | 55.8 | 1 | 132 | 83.1 | 283.5 |
| | | | | 65.6 | 2 | 169 | 103 | 351.5 |

*Pressures are in absolute

# STEAM CORRECTION FACTOR,SOUND POWER, CFM CORRECTION FACTOR

## TABLE -4- STEAM CORRECTION FACTOR

| STEAM PRESS. (PSIG) | ENTERING AIR TEMP.(°F) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 45 | 50 | 55 | 60 |
| 5 | 1.2 | 1.153 | 1.107 | 1.06 | 1.013 | 0.967 | 0.92 | 0.873 | 0.85 | 0.827 | 0.703 | 0.78 |
| 15 | 1.308 | 1.258 | 1.212 | 1.166 | 1.118 | 1.073 | 1.026 | 0.978 | 0.955 | 0.932 | 0.908 | 0.885 |
| 30 | 1.42 | 1.373 | 1.325 | 1.278 | 1.233 | 1.186 | 1.139 | 1.092 | 1.069 | 1.045 | 1.023 | 1 |

## TABLE -5- SOUND POWER LEVEL (dB)

| MODEL | | 30-9 | 40-9 | 50-9 | 60-9 | 70-9 | 80-9 | 30-14 | 40-14 | 50-14 | 60-14 | 70-14 | 80-14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DISTANCE FROM UNIT (m) | 1.5 | 1.5 | 58 | 61 | 63 | 65 | 68 | 61 | 62 | 65 | 66 | 67 | 70 |
| | 10 | 41 | 44 | 46 | 47 | 48 | 51 | 44 | 45 | 48 | 49 | 50 | 53 |

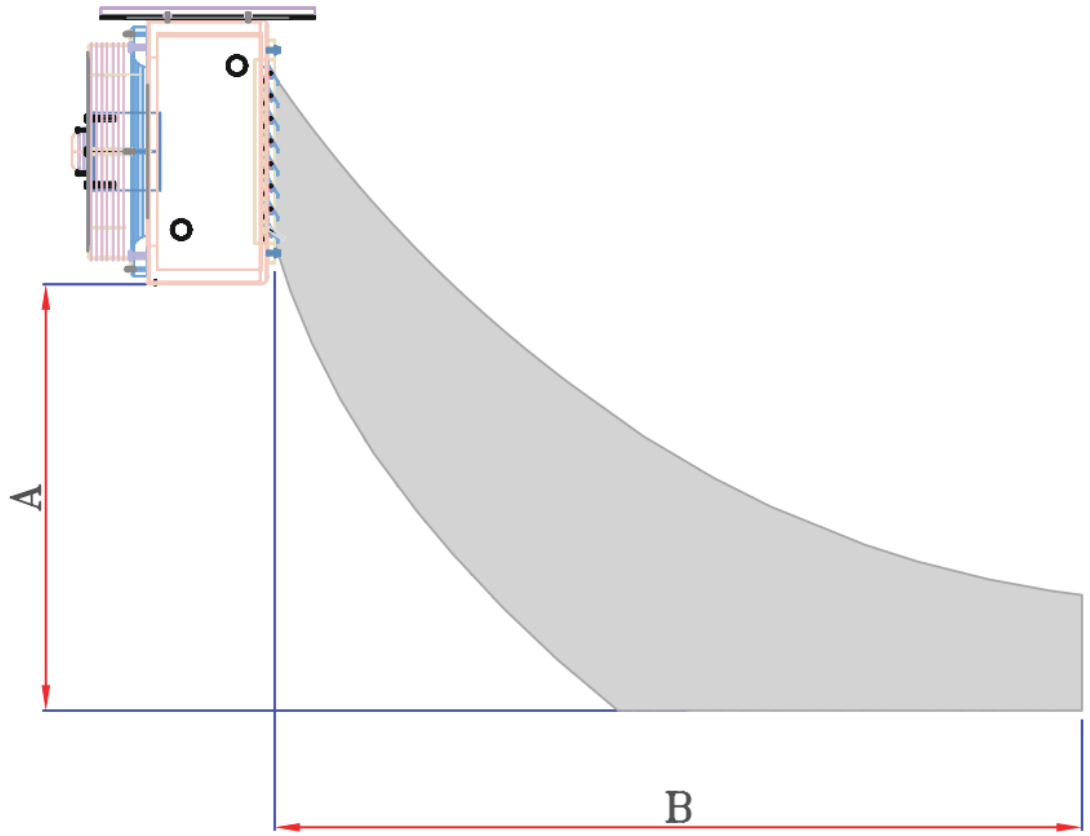
## TABLE -6- CFM CORRECTION FACTOR

| ENTERING AIR TEMP.(°F) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 1.13 | 1.11 | 1.1 | 1.06 | 1.04 | 1.02 | 1 | 0.99 | 0.97 | 0.95 | 0.93 |

# AIR DISTRIBUTION

## TABLE -7- AIR DISTRIBUTION

| | MODEL | A(M) | B(M) |
|---|---|---|---|
| 900 R PM | HUH-30-9 | 3 | 6 |
| | HUH-40-9 | 3 | 7.5 |
| | HUH-50-9 | 3 | 9 |
| | HUH-60-9 | 4 | 12 |
| | HUH-70-9 | 4 | 12.5 |
| | HUH-80-9 | 4.5 | 13 |
| 1400 RPM | HUH-30-14 | 3 | 7.5 |
| | HUH-40-14 | 3 | 8.5 |
| | HUH-50-14 | 3.5 | 11 |
| | HUH-60-14 | 4.5 | 12.5 |
| | HUH-70-14 | 4.5 | 13 |
| | HUH-80-14 | 4.5 | 16 |



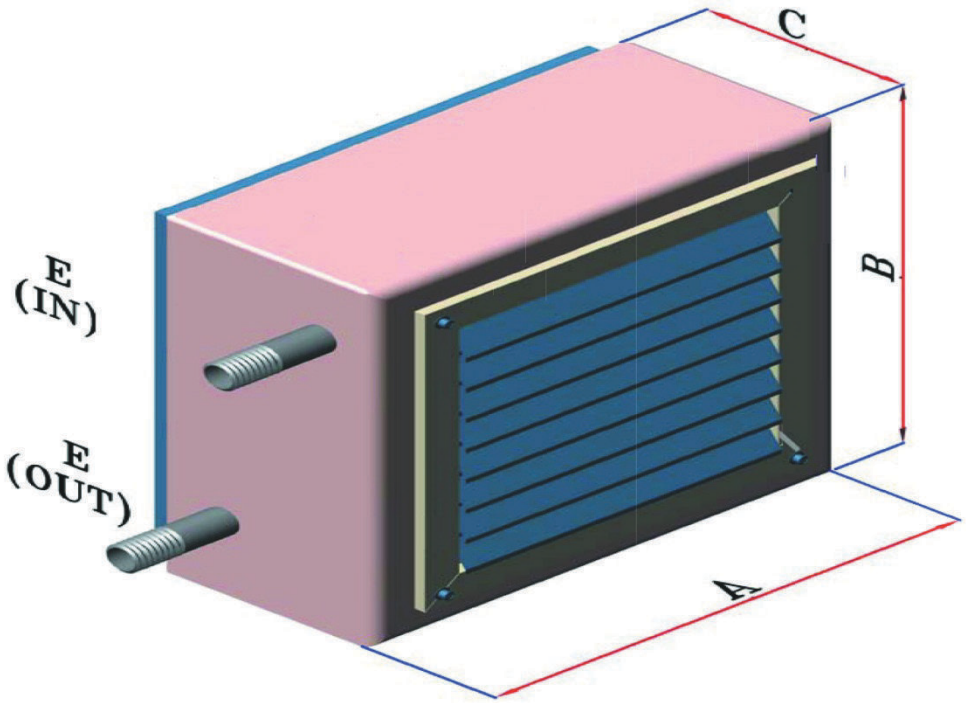
# DIMENSIONS , CONNE

## STEAM UNIT HEATER DIMENSIONS & CONNECTIONS

| | MODEL | A(mm) | B(mm) | C(mm) | STEAM SUPPLY (IN) | SUPPLY HEADER CONDENSATE (IN) | CONDENSATE RETURN (IN) |
|---|---|---|---|---|---|---|---|
| 900 RPM | HUH-30-9 | 460 | 405 | 224 | 1 | 1/2 | 3/4 |
| | HUH-40-9 | 511 | 405 | 224 | 1 1/4 | 3/4 | 1 |
| | HUH-50-9 | 621 | 505 | 224 | 1 1/2 | 3/4 | 1 |
| | HUH-60-9 | 722 | 607 | 224 | 1 1/2 | 3/4 | 1 1/4 |
| | HUH-70-9 | 823 | 703 | 224 | 1 1/2 | 3/4 | 1 1/4 |
| | HUH-80-9 | 923 | 803 | 224 | 1 1/2 | 3/4 | 1 1/4 |
| 1400 RPM | HUH-30-14 | 460 | 405 | 224 | 1 | 1/2 | 3/4 |
| | HUH-40-14 | 511 | 405 | 224 | 1 1/4 | 3/4 | 1 |
| | HUH-50-14 | 621 | 505 | 224 | 1 1/2 | 3/4 | 1 |
| | HUH-60-14 | 722 | 607 | 224 | 1 1/2 | 3/4 | 1 1/4 |
| | HUH-70-14 | 823 | 703 | 224 | 1 1/2 | 3/4 | 1 1/4 |
| | HUH-80-14 | 923 | 803 | 224 | 1 1/2 | 3/4 | 1 1/4 |

# TABLE -9- WATER UNIT HEATER DIMENSIONS & CONNECTIONS

| | MODEL | A(mm) | B(mm) | C(mm) | Inlet & outlet WATER (IN) |
|---|---|---|---|---|---|
| 900 RPM | HUH-30-9 | 460 | 405 | 224 | 1 |
| | HUH-40-9 | 511 | 405 | 224 | 1 |
| | HUH-50-9 | 621 | 505 | 224 | 1 1/4 |
| | HUH-60-9 | 722 | 607 | 224 | 1 1/4 |
| | HUH-70-9 | 823 | 703 | 224 | 1 1/2 |
| | HUH-80-9 | 923 | 803 | 224 | 1 1/2 |
| 1400 RPM | HUH-30-14 | 460 | 405 | 224 | 1 |
| | HUH-40-14 | 511 | 405 | 224 | 1 |
| | HUH-50-14 | 621 | 505 | 224 | 1 1/4 |
| | HUH-60-14 | 722 | 607 | 224 | 1 1/4 |
| | HUH-70-14 | 823 | 703 | 224 | 1 1/2 |
| | HUH-80-14 | 923 | 803 | 224 | 1 1/2 |



# TABLE -10- UNIT WEIGHTS

| MODEL | UNIT WEIGHT (KG) |
|---|---|
| HUHW-30 | 30 |
| HUHW-40 | 35 |
| HUHW-50 | 41 |
| HUHW-60 | 51 |
| HUHW-70 | 61 |
| HUHW-80 | 70 |
| HUHS-30 | 32 |
| HUHS-40 | 37 |
| HUHS-50 | 42 |
| HUHS-60 | 54 |
| HUHS-70 | 64 |
| HUHS-80 | 73 |

# PIPNG DIAGRAMS

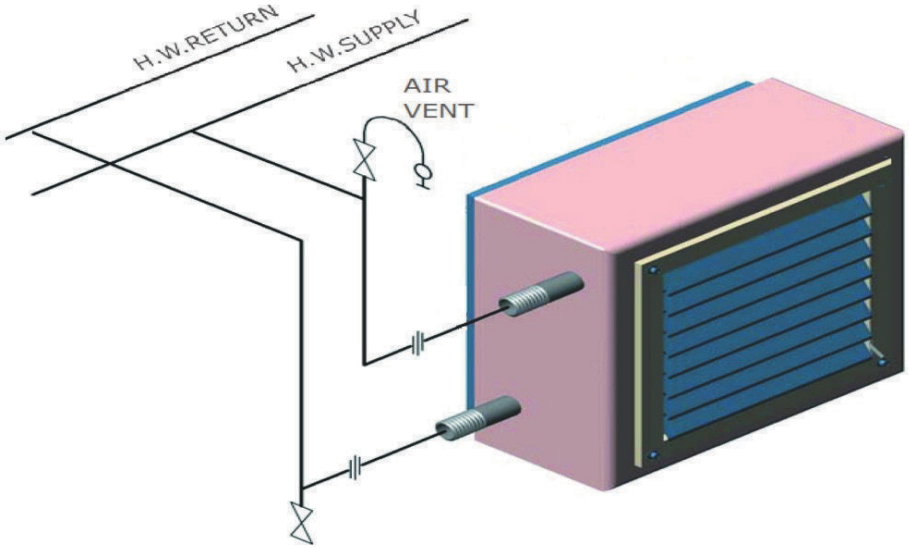



FIGURE -3- HOT WATER UNIT HEATER PIPING DIAGRAM

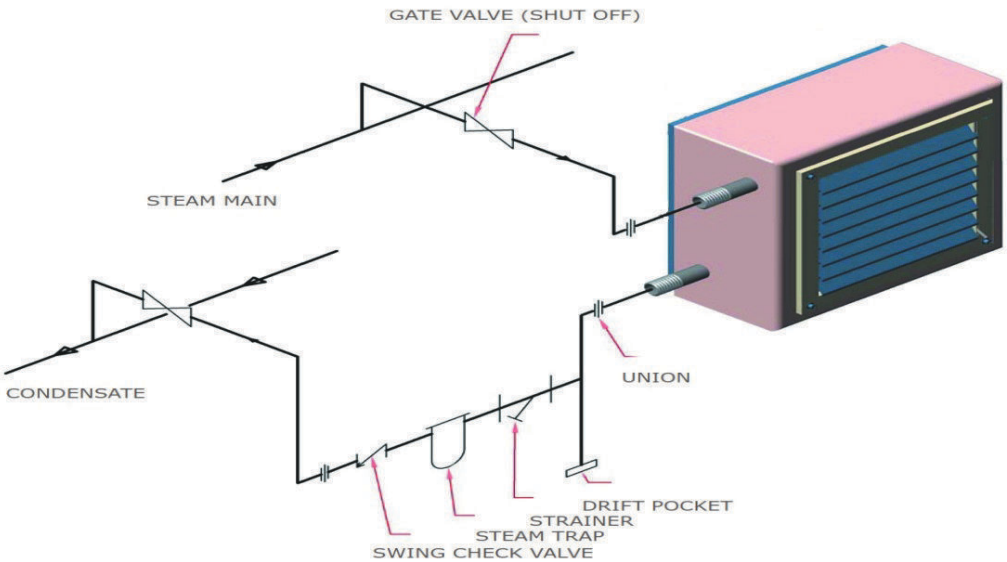
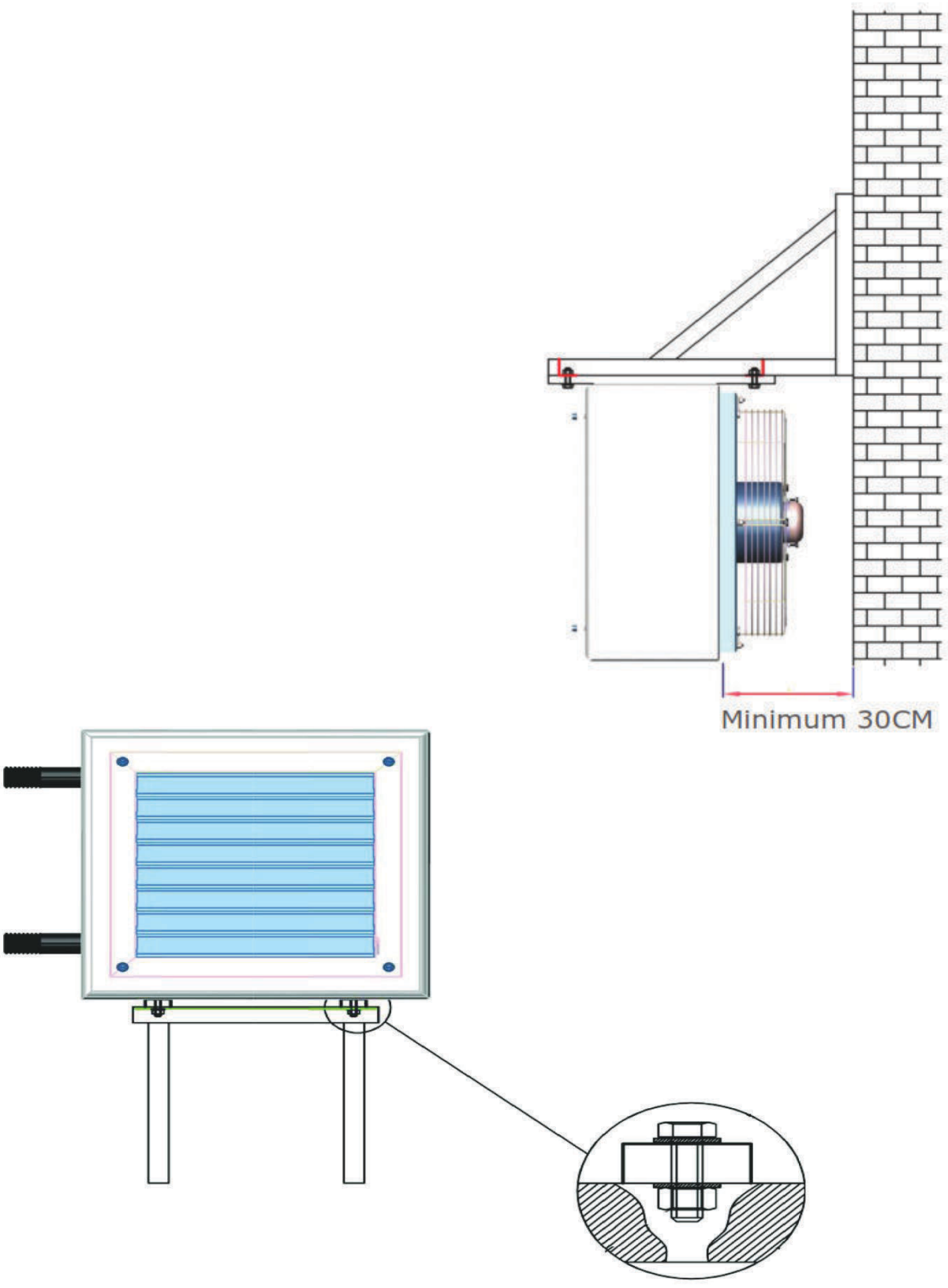
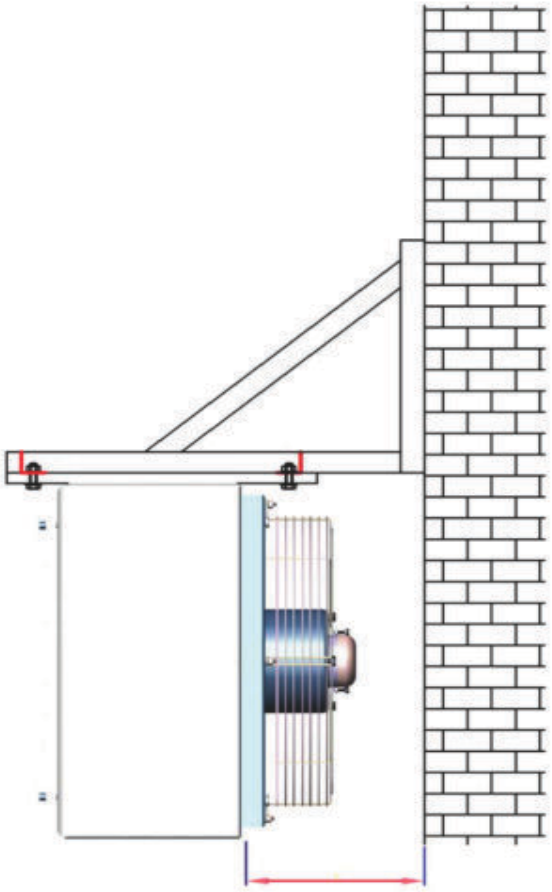
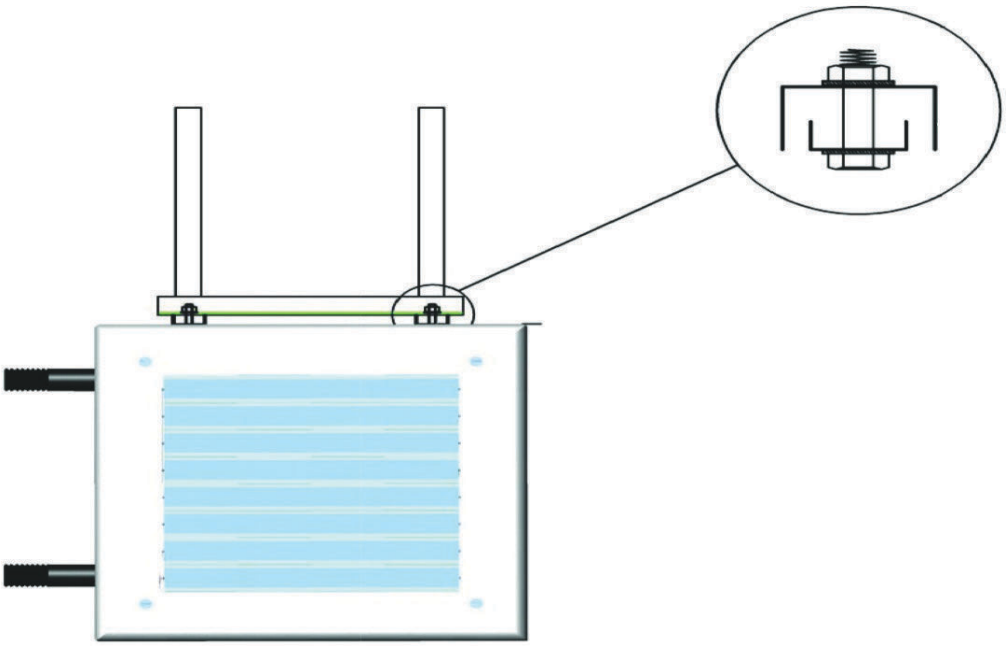



FIGURE -4-STEAM UNIT HEATER PIPING DIAGRAM

# MOUNTING DETAILS




Minimum 30CM



# ELECTRICAL WIRING DIAGRAMS

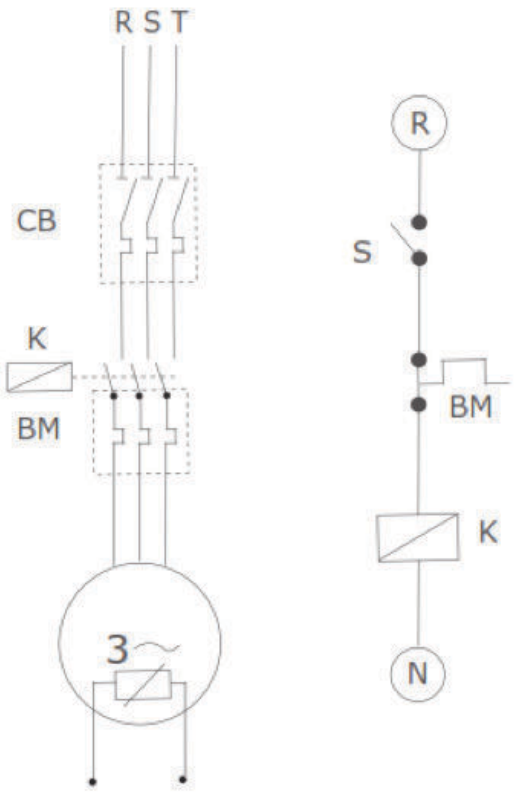



FIGURE 5 - 3 PHASE ELECTRIC MOTOR


FIGURE 6 - 1 PHASE ELECTRIC MOTOR

## LEGEND:

MCB: MINIATURE CIRCUIT BREAKER

CB: CIRCUIT BREAKER

K: CONTACTOR

BM: THERMAL OVERLOAD RELAY

S: MAIN SWITCH

M: ELECTRIC MOTOR

HAVASAZ

Life Is Cool Air Conditioning since 1967

شرکت هواساز همیشه سعی بر آن دارد با استفاده از قطعات و متریال مرغوب نیاز مشتریان خود را برآورده سازد که در ذیل به معرفی برخی از مشارکت کنندگان در تامین قطعات این شرکت می پردازیم :
مرغوب ترین قطعات و اجزاء :

انواع کویل های Cu/Cu , Cu/hydrophilic Al Heresite Coating
کمپرسورهای Frasscold,bitzer,copeland , Carrier,refcomp از نوع Scroll , Screw , Reciprocating
مبدلهای Shell & Tube مارک رادیران و Compact Plate Heat Exchanger مارک Danfoss

HAVASAZ
Life Is Cool Air Conditioning since 1967

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