SUPPLY FAN

ingēnia

TAG: AHU-03

REV. 0

CONFIGURATION	
Module type	Supply fan
Module	A
Section No.	11
Fan type	SWSI
No. of fans in the section	1
Inlet location	Back
fan discharge	see drawings

SECTION CHARACTERISTICS:	
height:	n/a
width:	81.60
Length:	60.00
exterior wall material:	n/a
exterior finish	n/a
interior wall material:	n/a
interior finish:	n/a
floor material:	0.090" aluminium
floor finish:	diamond
weight:	n/a

FAN DETAILS:	
Fan cfm:	5,200
system I.S.P. (IN.W.G.):	1.19
available E.S.P. (IN.W.G.):	0.56
system T.S.P. (IN.W.G.):	1.75
fan manufacturer:	Twin City
fan type:	BAF-SWSI
fan size:	200
AMCA class:	II
fan wheel width:	100%
fan arrangement:	9
fan rotation/discharge:	CCW
fan RPM:	1545
maximum RPM for class:	2648
fan BHP:	2.47
WR² (lb-ft²):	
static efficiency:	57.83%
mechanical efficiency:	68.36%
bearings (AFBMA L-50):	200,000 hrs

VIBRATION PROTECTION:	
base type:	integral
isolators:	seismic
nominal static deflexion:	2"
flexible connector:	inlet
thrust restraints:	none

SECTION ACCESSORIES:	
access/inspection door:	n/a
inspection window:	n/a
light	n/a
receptacle	n/a
wiring	n/a
extended lube lines:	n/a
pressure test port:	n/a
drain:	n/a
Starter/factory wired & mounted	n/a
VFD:	n/a
VFD installation	n/a

MOTOR DETAILS:	
motor HP / motor frame:	5 - 184T
motor type:	TEFC-EPAct
motor speed RPM:	1800/900
motor V/Ph/Hz:	575/3
cycles:	60 cycles/sec
efficiency:	84.0%
FLA:	5.4/2.2
maximum load inertia (lb-ft²):	n/a
thermistors:	n/a
position (motor & J. Box):	F1
application:	std
manufacturer:	Marathon
catalog no.:	Y487-575
motor weight:	79

DRIVE DETAILS:	
drive arrangement:	V-belt
drive location:	n/a
type:	constant
service factor:	1.5
motor sheave:	t.b.a.
motor bushing:	t.b.a.
fan sheave:	t.b.a.
fan bushing:	t.b.a.
belt model and qty:	t.b.a.

SAFETY:	
belt guard:	OSHA
inlet screen:	n/a
discharge screen:	n/a

NOTES:

1.Blower built with spark resistant construction, type AMCA "B"

19/32

Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (763) 551-7600 · Fax (763) 551-7601 · www.tcf.com

ISO 9001 CERTIFIED

Customer: W/A
Job Name: City of Iqaluit
Job ID: 100058

June 29, 2005
Page: 1

Fan Description

Tag	supply fan
Quantity	1
Type	BAF-SW
Size	200
Width	SWSI
Arrangement	9
Class	II
Rotation	CCW
Discharge	BAU
Wheel diameter (in.)	20
Drive method	60 Hz belt drive
Percentage width	100%
Percentage diameter	100%

Fan Performance

CFM	5,200
Operating SP (in.wg)	1.75
Standard SP (in.wg)	1.75
RPM	1545
Tip Speed (fpm)	8,090
Oper. BHP	2.47
Standard BHP	2.47
Outlet area (sq. ft)	2.3
Outlet Velocity (fpm)	2,261
Temperature (°F)	70
Altitude (ft)	0
Density (lb/ft³)	0.075
Max RPM for Class	2648
Static Efficiency	57.83
Mechanical Efficiency	68.36

Motor Data

HP	5
RPM	1800
Voltage	575V
Phase	3
Hz	60
Enclosure	TEFC
Efficiency	Prm.Eff.
Frame	184T
Motor position	

Sound

Sound Power Levels in dB re. 10-12Watts:

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	83	83	84	83	78	74	68	61	84

Estimated sound pressure level in dBA (re: 0.0002 microbar) based on a single* ducted installation:

Distance in ft	1	3	5
dBA at Inlet	84	74	70

*To estimate dBA level for ducted inlet and ducted outlet (into and out of the room) type installation, deduct 20 from the LWA value shown.

Using a directivity factor of 1.

Estimated Sound Pressure based on free field, spherical (Q = 1) radiation at the stated distance.

Definitions:

LwA — The overall (single value) fan sound power level, 'A' weighted.

dBA — The environment for each fan installation influences its measured sound value, therefore dBA levels cannot be guaranteed. Consult AMCA Publication 303 for further details.
A fan's dBA is influenced by nearby reflective surfaces.

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ENERGY FLOW
by Aerofin

Date: 6/28/2005

Model No.	Qty. In Face	NTL	Total Weight lbs.
HW-6.0AW-30.0 X 60.0-2-0.5	1	60.00	127
Totals:	1		127

Coil Type: HW
TF: 20
Row: 2
Fin: 6.00 / in
Circuit: Half

Tube: 0.625 inch X 0.020 inch Copper Seamless Tubes, Orificed Tubes
Fin Material: 0.0075" Aluminum Wave
Csg Material: 1-1/2" Leg with Galvanized Casings
Connection: 1-2" Threaded
Hdr Material: Standard Carbon Stl with Brazed Joints
Misc:

Dwg: CA-HW-100

Performance V

ressure: 29.92 In Hg Elevation: Sea Level

Airflow:	5,200.0	SCFM	**50% Propylene Glycol**		
System Face Area:	12.5	ft^2	Flow Rate:	37.7	gpm
Standard Face Velocity:	416	fpm	Entering Temp:	180.0	°F
Entering Dry Bulb Temp:	33.0	°F	Leaving Temp:	160.0	°F
			Tube Velocity:	4.0	ft/sec
Leaving Dry Bulb Temp:	91.2	°F	Inside Surface Fouling:	0.0000	hr·ft²·°F/Btu
Outside Surface Fouling:	0.0000	hr·ft²·°F/Btu			
Sensible Heat Load:	326.9	MBH			
Total Heat Load:	326.9	MBH			

Losses

Air Friction:	0.13	In H2O	Pressure Drop:	9.8	Ft H2O

Comments:

Notes & Warnings:

56 Rated in accordance with ARI Standard 410.

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Program Version: 3.5.1 Dll Ver: 1.2.8 PriceDB Ver: 4.1

TAG: Air Cooled Condenser

REV. 1

CONFIGURATION		
Module No.		A
Section No.		10

SECTION CHARACTERISTICS:		
height:	(in)	54.00
width:	(in)	81.60
length:	(in)	27.50
weight:	(lbs)	n/a
knock-down:		n/a
exterior wall material:		16 ga. Galv.
exterior finish		un-painted
interior wall material:		22 ga. Galv.
interior finish:		un-painted
floor material:		16 ga. Galv.
floor finish:		G-90 galv.

SECTION ACCESSORIES:	
access/inspection door:	right
inspection window:	yes
light:	n/a
wired to:	n/a
receptacle:	n/a
pressure test port:	n/a
drain:	n/a
air opening	front
damper	n/a
opening height	see drawings
opening width	see drawings

MARATHON ELECTRIC MOTORS ONLINE CATALOG SALES LOCATIONS SERVICE & SUPPORT WHAT'S NEW?

Product Listing

Model Number: 184TTDR7209

Catalog Number: Y487 – 575

Product Type: SQ CAGE IND RUN

Normally Stocked: YES

Enclosure: DP

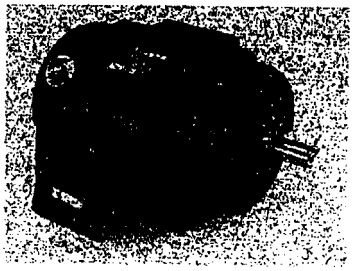
List Price.

Frame: 184T

Multiplier Symbol: S3

Dimensional Drawing A-SS69240-775 PDF
Dimensional Drawing A-SS69240-775 DXF

Connection Diagram A-EE7322 PDF
Connection Diagram A-EE7322 DXF



HP: 5/1.25

Frequency (HZ): 60

Speed (RPM): 1800/900

Mounting: RIGID

Phase: 3

Motor Wt: 79

Volts: 575

Insulation Class: B

F.L. Amps: 5.4/2.2

Duty: CONTINUOUS

Service Factor: 1.15

Max. Ambient: 40

Bearing: BALL/BALL

F.L. Eff.:

DE Bearing: 206

Thermal Protection: NONE

OPE Bearing: 203

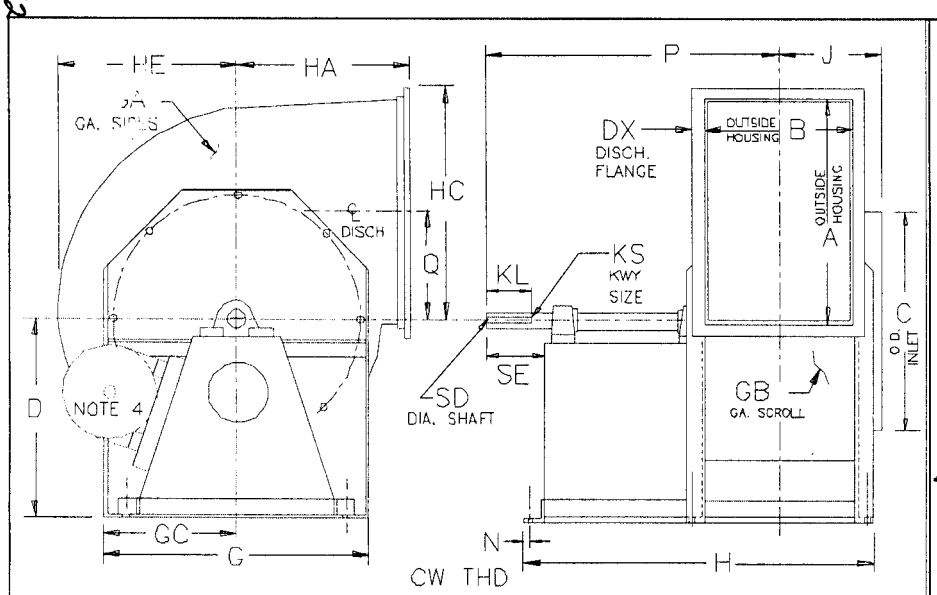
KVA Code:

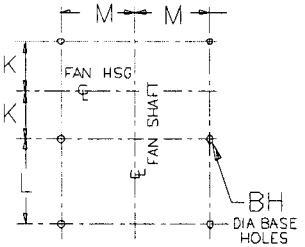
Hazardous Location: NONE

Footnotes: F1 Mounting Only, Cannot reassemble to F2

Performance/Certification Data

Provide Explosion Proof motor





FOUNDATION PLAN

NOTES:
1. DISCHARGE ANGLES ARE INCLUDED ON ALL DISCHARGES EXCEPT 'TAD' AND 'DBD'.
2. 'CW' ROTATION IS SHOWN 'CCW' ROTATION IS SIMILAR BUT OPPOSITE.
*3. SHAFT DIAMETER IS INCREASED TO 1.187 ON HI-TEMP FANS WHICH REQUIRE SHAFT COOLERS.
4. STANDARD ARR. 9 MOTOR LOCATION IS ON THE LEFT FOR 'CW' ROTATION UNITS, AND ON THE RIGHT FOR 'CCW' ROT DIM 'FR' EQUALS MAX. MOTOR FRAME.

'BC', 'BAF', & 'NFC' ARR. NO. 9 ROTATABLE SWSI CLASS I & II

TWIN CITY FAN & BLOWER
MINNEAPOLIS, MINNESOTA 55442

DRAWN 8-13-82
REVISED 11-14-96
DWG NO AC-9239E

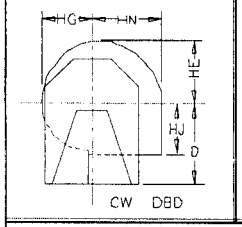
JOB:
LOC.
CONT.
ENG./ARCH.
S.O. NO.

SIZE	CLASS	DISCH	ROT.	MOTOR HP	MOT. LOC.	UNIT NO

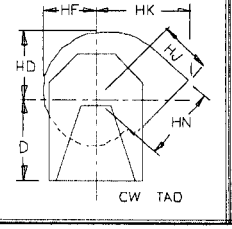
CFM	SP	RPM	BHP	OV	TS

ACCESSORIES REQ'D

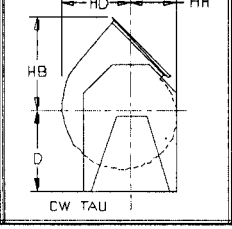
BAF-200-SWSI
CCW-UBD



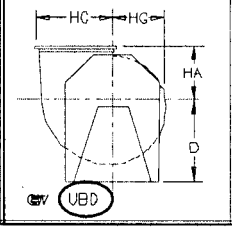
CW DBD



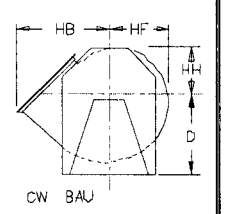
CW TAD



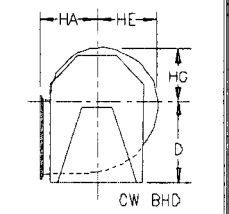
CW TAU



CW UBD



CW BAU

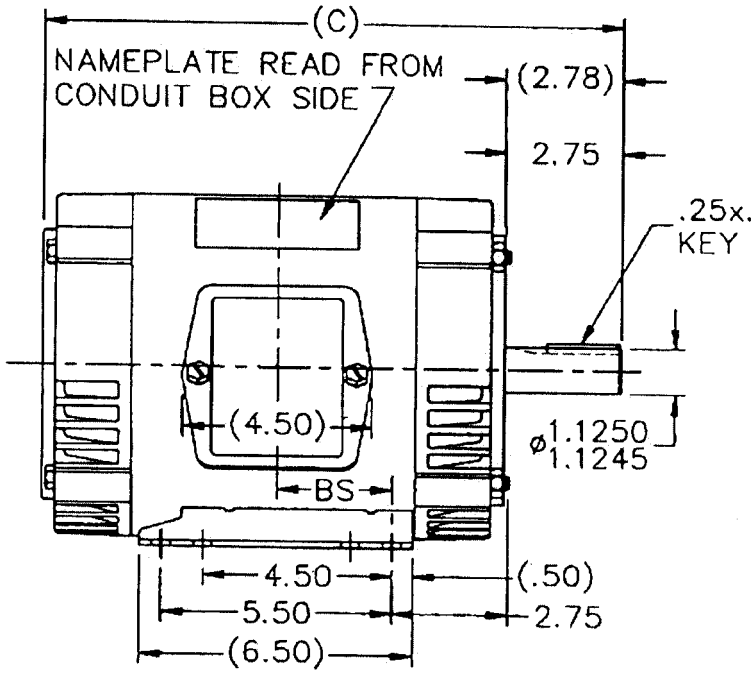


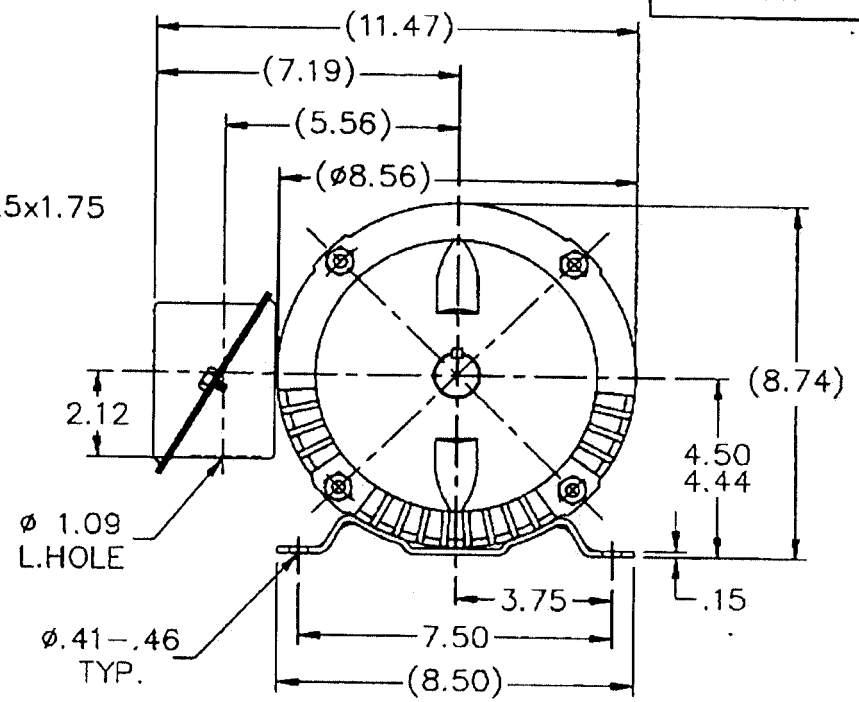
CW BHD

SIZE	A	B	BH	C	D	DX	FR	G	GA	GD	GC	H	HA	HB	HC	HD	HE	HF	SIZE
122	13.00	9.75	.44	13.25	14.50	1.00	145T	15.00	14	14	8.00	27.00	9.75	16.75	13.94	11.19	10.56	9.94	122
135	14.31	10.81	.44	14.56	15.75	1.00	184T	17.50	14	14	8.75	30.63	10.75	18.38	15.25	12.31	11.63	10.94	135
150	15.88	11.94	.44	16.19	17.75	1.00	184T	19.00	14	14	9.50	31.75	11.94	20.31	16.81	13.75	12.88	12.13	150
165	17.44	13.19	.44	17.75	19.00	1.00	215T	20.50	14	14	10.25	36.13	13.13	22.25	18.38	15.06	14.13	13.31	165
182	19.38	14.56	.44	19.50	21.00	1.25	254T	22.50	12	14	11.25	41.88	14.50	24.81	20.56	16.69	15.69	14.75	182
200	21.19	15.94	.56	21.38	22.75	1.25	254T	25.00	12	14	12.50	43.25	15.81	27.00	22.38	18.38	17.31	16.25	200
222	23.56	17.69	.56	23.75	25.50	1.25	256T	27.25	12	14	13.63	45.25	17.69	30.00	24.75	20.44	19.06	17.94	222
245	25.94	19.44	.56	26.06	28.00	1.25	256T	29.75	12	14	14.88	47.00	19.50	33.00	27.13	22.38	21.00	19.75	245
270	28.63	21.38	.56	28.50	30.50	1.50	284T	33.00	12	14	16.50	51.75	21.44	36.44	30.00	24.69	23.19	21.81	270

SIZE	HG	HH	HJ	HK	HN	J	K	KL	KS CL I	KS CL II	L	M	N	P	Q	SD CL I	SD CL II	SE	SIZE
122	9.31	8.69	9.25	15.69	12.94	7.44	5.75	2.5	.25x13	.25x13	14.50	6.75	.50	22.50	6.44	1.000	1.000*	3.25	122
135	10.25	9.56	10.25	17.31	14.25	8.00	6.31	2.5	.25x13	.25x13	17.00	7.38	.50	25.56	7.13	1.000	1.000*	3.25	135
150	11.38	10.63	11.44	19.25	15.81	9.06	6.88	3.0	.25x13	.25x13	17.00	8.25	.50	26.63	7.88	1.000	1.187	3.75	150
165	12.50	11.69	12.63	21.19	17.38	9.69	7.50	3.0	.25x13	.25x13	19.88	8.75	.63	29.75	8.69	1.000*	1.188	3.75	165
182	13.81	12.88	14.00	23.56	19.31	10.88	8.19	3.5	.25x13	.38x13	24.25	9.63	.63	35.31	9.63	1.187	1.437	4.25	182
200	15.19	14.13	15.31	25.75	21.13	11.56	8.88	3.5	.38x19	.38x19	24.25	10.63	.63	38.00	10.56	1.437	1.437	4.25	200
222	16.81	15.69	17.13	28.75	23.56	12.44	10.00	4.0	.38x19	.38x19	23.50	11.75	.88	37.13	11.75	1.437	1.437	4.75	222
245	18.50	17.25	19.00	31.75	25.88	13.31	10.88	4.5	.38x19	.38x19	23.50	12.88	.88	38.50	12.94	1.437	1.687	5.25	245
270	20.44	19.06	20.94	35.00	28.56	14.25	11.81	4.5	.38x19	.38x19	26.38	14.13	.88	42.31	14.25	1.687	1.687	5.25	270

SS69240





BOX CAN BE ROTATED IN 90° STEPS.

DASH	FR.	C	BS	MOUNTING	REMARKS	DASH	FR.	C	BS	MOUNTING	REMARKS
575	182T	12.72	2.25	F1 OR F2		775	182T	14.72	3.25	F1 ONLY	
625	182T	13.22	2.50	F1 OR F2	→	775	184T	14.72	3.25	F1 ONLY	←
675	182T	13.72	2.75	F1 OR F2		825	184T	15.22	3.50	F1 ONLY	
675	184T	13.72	2.75	F1 OR F2		875	184T	15.72	3.75	F1 ONLY	
725	182T	14.22	3.00	F1 ONLY		925	184T	16.22	4.00	F1 ONLY	
725	184T	14.22	3.00	F1 ONLY							

NO.	REVISION	BY & DATE	CHK
2	REDRAWN IN AUTOCAD	TAT 05-19-2006	ML
1	NEW DRAWING CN 31492	DRS 03-15-2002	

TOLERANCES UNLESS SPECIFIED	
DEC.	INCHES
.X	±.1
.XX	±.03
.XXX	±.005
.XXXX	±.0005
ANG	±7'30"

MARATHON ELECTRIC

TITLE OUTLINE
180T FR. – BB – TS – DR.PR.

MATL
FINISH
CAD FILE ss69240

RFP
DIST LB

DRAWN	DRS 03-15-2002
CHK	TB 03-15-2002
APPD	NL 03-15-2002
SCALE	1=4
REF	
FMF	
PREV	

SIZE	DRAWING NO.	PAGE	OF	REV.
A	SS69240			2

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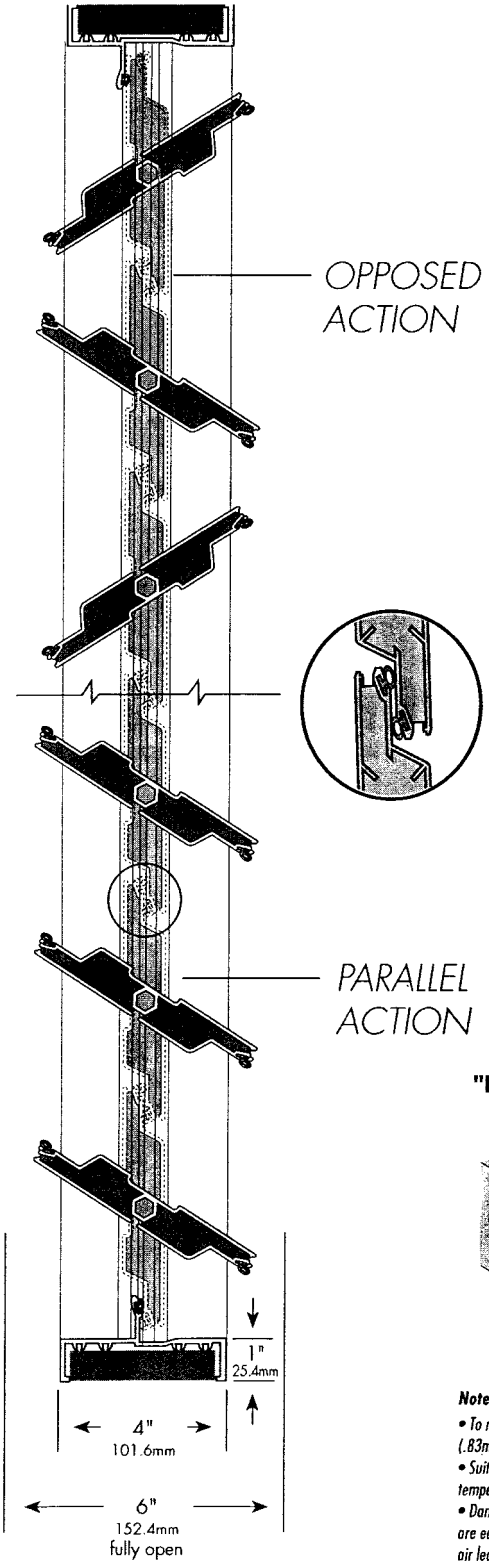
SPECIFICATIONS

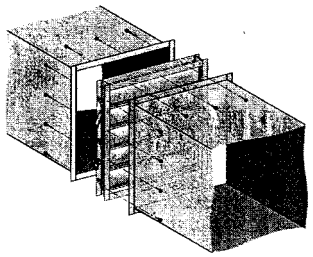


SERIES 9000
THERMALLY INSULATED DAMPER

- Extruded aluminum (6063T5) damper frame is not less than .080" (2.03mm) in thickness. Damper frame is 4" (101.6mm) deep and is insulated with styrofoam on three sides if "Installed in Duct" type and on four sides if "Flanged to Duct" type.
- Blades are extruded aluminum (6063T5) profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29 and a temperature index of 55.
- Blade gaskets are extruded EPDM. Frame seals are extruded TPE thermoplastic. Gaskets are secured in an integral slot within the aluminum extrusions.
- Bearings are composed of a celcon inner bearing fixed to a 7/16" (11.11mm) aluminum hexagon blade pin rotating within a polycarbonate outer bearing inserted in the frame, resulting in no metal-to-metal or metal-to-plastic contact.
- Linkage hardware is installed in the frame side and constructed of aluminum and corrosion-resistant, zinc-plated steel, complete with cup-point trunnion screws for a slip-proof grip.
- Dampers are designed for operation in temperatures ranging between -40°F (-40°C) and 212°F (100°C).
- Dampers are available with either opposed blade action or parallel blade action.
- Air leakage through a 48" x 48" (1220mm x 1220mm) damper does not exceed 4.12 cfm/ft.² (21 l/s.m²) against 4" (1kPa) w.g. differential static pressure at standard air. Tested in accordance with AMCA Test Standard 500 D.
- Air leakage does not exceed 6.7 cfm/ft.² (34 l/s/m²) against 4" (1kPa) w.g. differential static pressure at -40°F (-40°C).
- Pressure drop of a fully open 48" x 48" (1220mm x 1220mm) damper does not exceed .03" (.007kPa) w.g. at 1000 fpm (5.08 m/s).
- Dampers are made to size required without blanking off free area.
- Dampers are available in two mounting types: i.e., "Installed in Duct" or "Flanged to Duct".
- Installation of dampers must be in accordance with manufacturer's installation guidelines.
- Intermediate or tubular steel structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. (See TAMCO Aluminum Damper Installation Guidelines.)

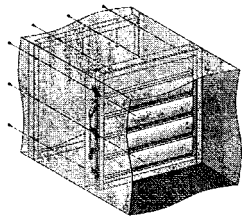
NOTE: *Reduced air leakage at colder temperatures obtainable by upgrading to* ***Series 9000 SC Severe Cold Option.*** *Silicone gaskets & seals are supplied only if* ***Series 9000 SC Severe Cold Option*** *is specified. See Series 9000SC Specification Sheet.*

"FLANGED TO DUCT" TYPE
2" added to duct width & height dimensions



Note:
- *To reduce pressure drop, use "Flanged to Duct" type for sizes under 9 ft.² (.83m²).*
- *Suitable for operation in breathable air environments within stated temperature range.*
- *Dampers sized for duct openings exceeding 37½" (953mm) in height are equipped with a stiffener bar at mid-height to strengthen and maintain air leakage tolerances.*
- *Not available as 4" only blade type.*

"INSTALLED IN DUCT" TYPE
½" deducted for clearance from width & height dimensions unless otherwise specified



For additional information, refer to:
- *Series 9000 Product Brochure*
- *Series 9000 BF Product Brochure*
- *Series 9000 Suggested Specification Sheet*
- *Series 9000 SC Specification Sheet*
- *Series 9000 & 9000 SC Pressure Drop*
- *Aluminum Standard Configurations*
- *Series 9000 & 9000 SC Free Area Charts*
- *TAMCO Aluminum Damper Torque Requirements*
- *Multiple-Section Horizontal Jackshafts*
- *Configurations Using Vertical Jackshafts*
- *Multiple-Section Damper Jumpers*
- *Square-to-Round Transition Option*
- *TAMCO Aluminum Damper Installation Guidelines*

TAMCO

www.tamco.ca

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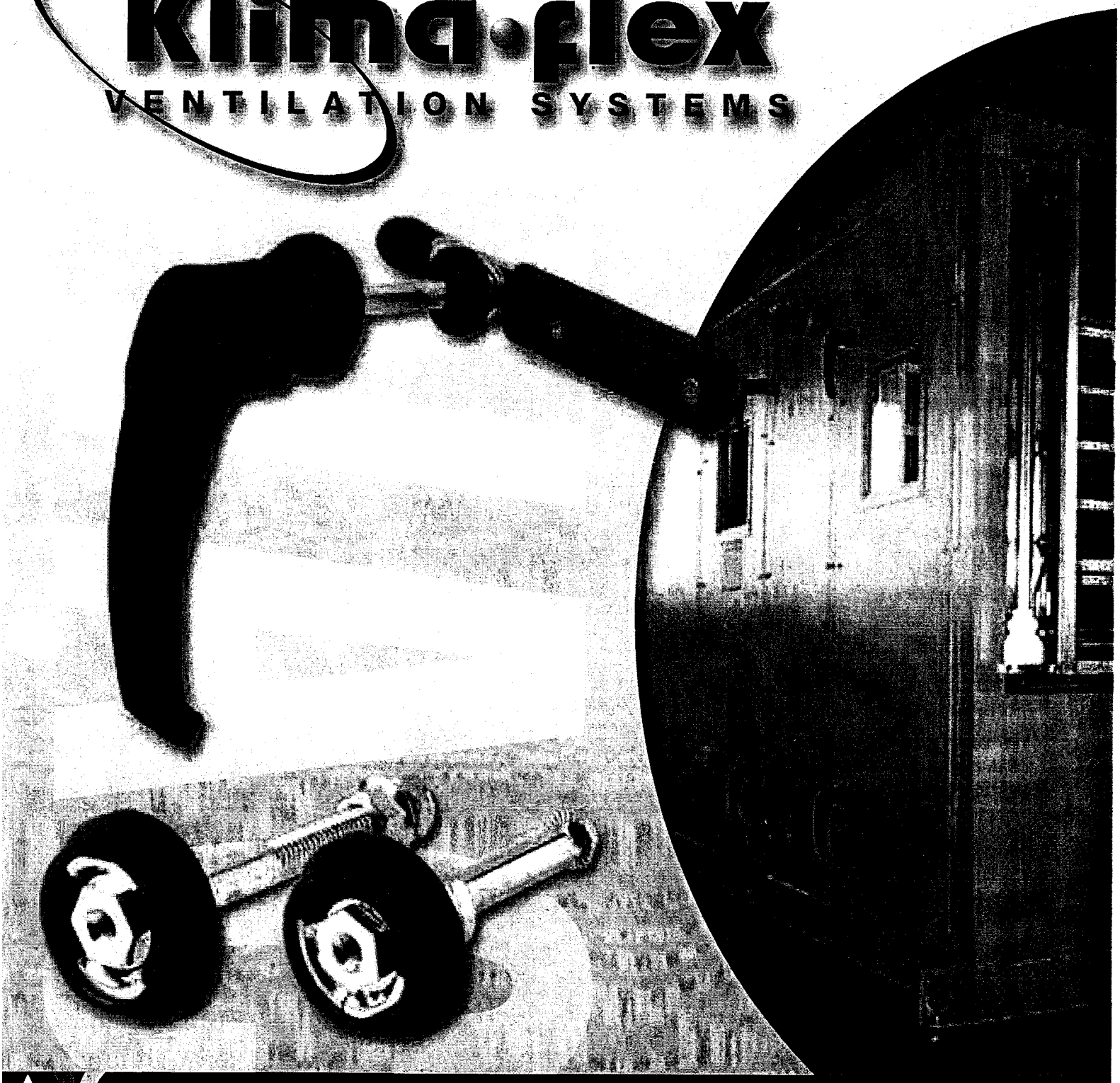
Klima-flex
VENTILATION SYSTEMS



ALLEGIS
A CUSTOMER DRIVEN COMPANY

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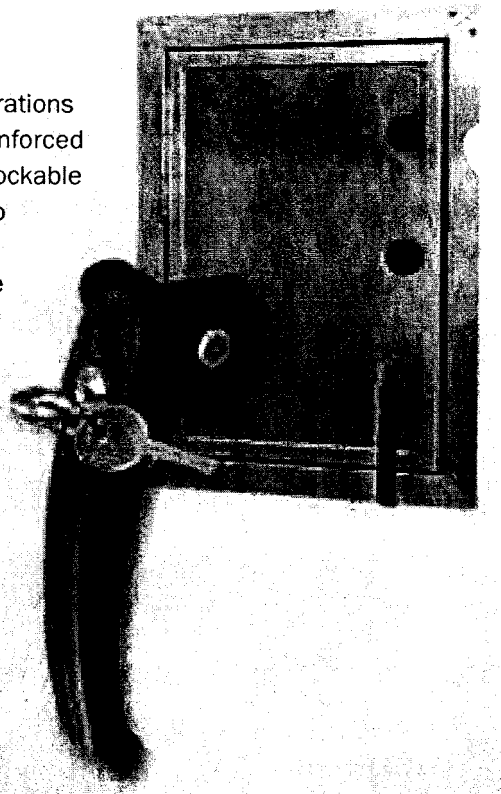
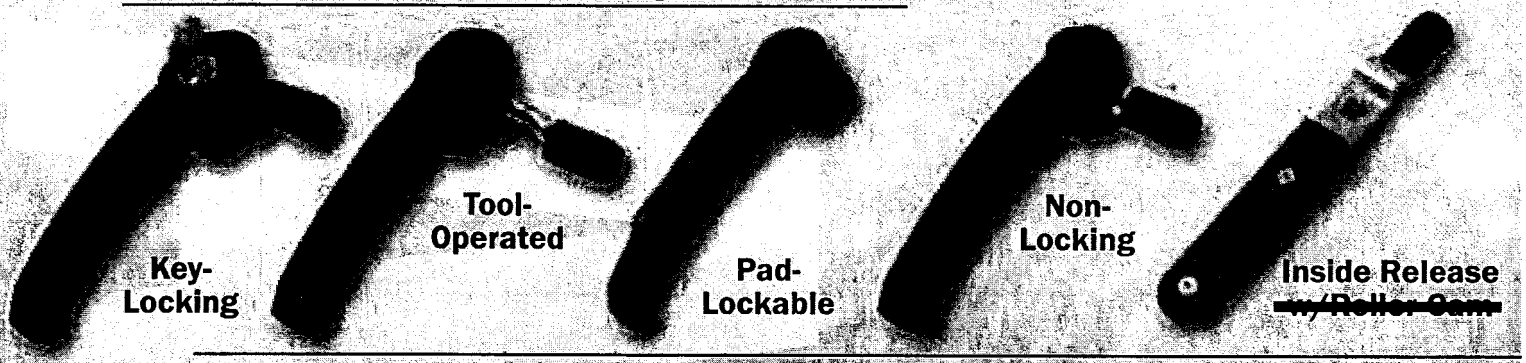
Handles

Our innovative Klima-Flex ventilation handles are available in a variety of configurations and address many of the shortcomings of traditional designs. Durable glass reinforced nylon construction provides UV stability and thermal break. Tool operated, pad-lockable and key-locking versions are available to meet varied security requirements. To prevent breakage, the handles can be removed from the latching mechanism during shipping and installation. When partnered with other components in the Klima-Flex family these handles provide you with an industry leading latching solution for both in-swing and out-swing doors.



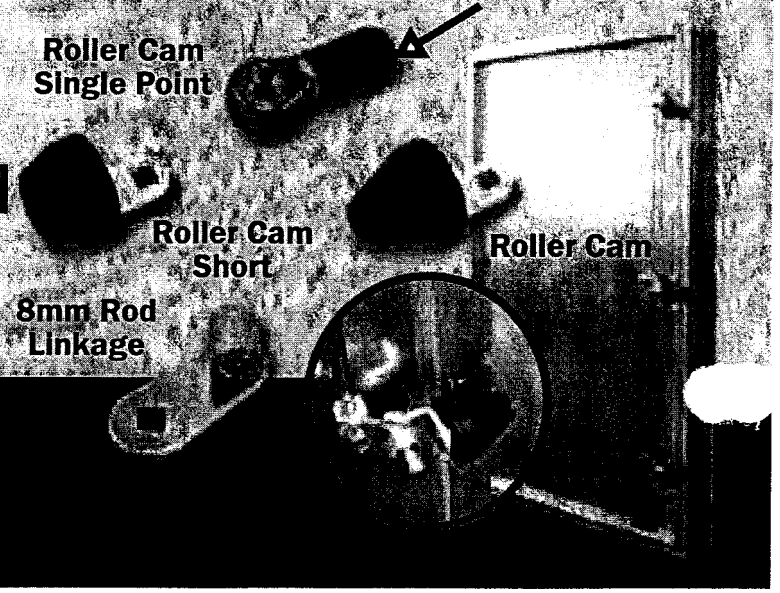
Part #	Locking feature	Door movement	Material
265076-00	Non-Locking	Out-Swing	PA6
265076-10	Key-Locking	Out-Swing	PA6
265076-30	5/16 Hex	Out-Swing	PA6
265077-00	Pad-Lockable	Out-Swing	PA6
265076-02-16	Non-Locking	In-Swing	PA6
265076-12-16	Key-Locking	In-Swing	PA6
265076-32-16	5/16 Hex	In-Swing	PA6
265076-62-10	Pad-Lockable	In-Swing	PA6
265076-52RD	Inside release	Out-Swing	CSR & PA6
26210010 RHG	Inside release	Out-Swing	CSR & PA6



Cams, Linkages & Accessories

We offer a wide selection of cams, linkages and accessories to complete your Klima-Flex latching system. Cams are available in a variety of configurations and provide the compression needed to keep a tight seal on HVAC enclosure doors. A safety catch is available to protect maintenance personnel in out swing door applications. Linkages, when used with rods, allow for multiple latching points. All cams, linkages and accessories are constructed from high grade materials resulting in industry leading reliability and durability.

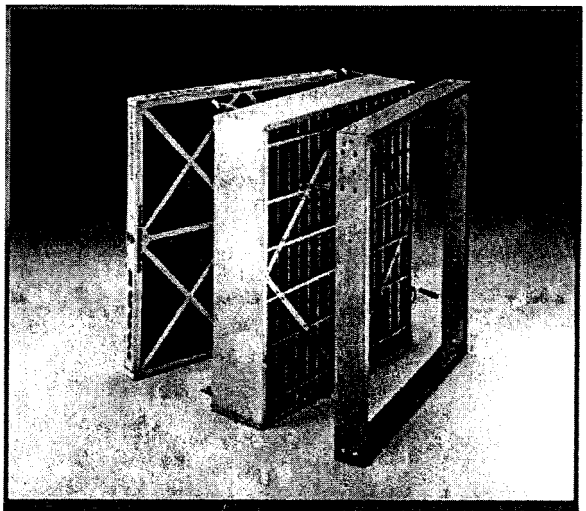
Part #	Description	Roller Size
2321S07-R01	Roller cam	1.48" dia x 2.30"
2321S07-R01-VTS	Roller cam short	1.48" dia x 1.75"
231101.1	Roller cam	.708" dia x 1.74"
231101.2	Roller cam	.708" dia x 1.74"
265078-301	Cover plug	n/a
23210025	Safety catch	n/a
265079-10	8mm Rod Linkage	n/a
26210009	Handle cam	n/a



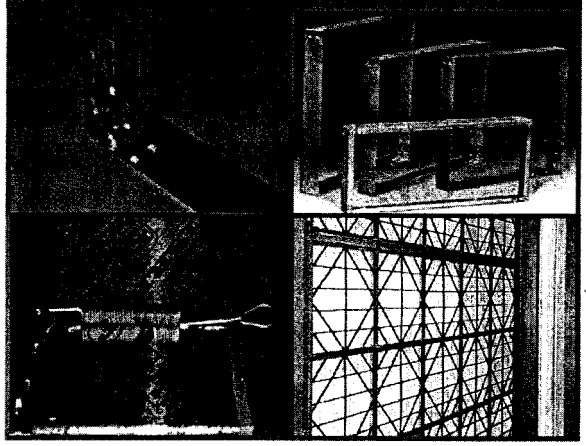
Klima-flex

type 8 frame

ASHRAE Filter Holding Frame for Built-Up Banks



A universal holding frame for ASHRAE built-up bank installations



Top: Type 8 corner showing centering dimples, lances, welded construction and filter sealing gasket

Top: Available in various sizes and in stainless steel

Bottom: C-80 fastener and rigid filter installed, applying 25 pounds of filter sealing pressure

Bottom: Built-up bank, may be assembled to 6 units high

camfil FARR

Universal Application

The Camfil Farr Type 8 filter holding frame, with a variety of fasteners, will allow the installation of various combinations of ASHRAE prefiltration and final filtration. The installation may include any, or combinations of the following:

- Any 1" deep panel or pleated filter
- Any 2" deep panel or pleated filter
- Any 4" deep panel or pleated filter
- Any 6" or 12" deep rigid filter
- Any headered style rigid or pocket filter

System Integrity

The Camfil Farr Type 8 holding frame includes:

- 16-gauge welded galvanized steel construction.
- A 3/4" filter sealing flange to assure proper filter seating and sealing.
- Filter centering dimples for ease of installation and to assure proper filter to gasket alignment.
- Polyurethane gasketing on the frame to filter sealing surface to assure leak free performance in the most demanding of applications.
- Pre-drilled holes for riveting or bolt-together installation of built-up banks.
- Multiple lances for the application of various fasteners to install a wide variety of standard size air filter.

The Camfil Farr Type 8 holding frame:

- May be assembled in banks up to six units high and any number of units wide (flat stock vertical stiffener bars are required for banks 4 to 6 units high alternating every other filter frame).
- May be applied in applications to remove water or oil mist.
- May be assembled in a V-bank configuration to reduce filter face velocity.

Camfil Farr	Product sheet
Type 8 Frame	2301-0302
Camfil Farr—clean air solutions	

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PERFORMANCE DATA **Type 8 Frame**

Model Number	Actual Depth (inches)	Actual Dimensions (inches)		Weight (lbs)
		Height	Width	
Standard Built-up Bank Application				
079473-004	2.69	24	12	4.3
079473-006		20	16	4.4
079473-005		25	16	5.0
079473-002		20	20	4.9
079473-003		25	20	5.5
079473-007		24	20	5.4
079473-001		24	24	6.0
Frames for HP Basket Assembly Applications				
050028-001	2.69	24	24	6.0
050028-004		24	12	4.3

Available options:

Available with or without gasket (standard units include gasket).

Available in 20-gauge stainless steel, 304, 304L, 316, 316L and 430.

For fasteners please consult Camfil Farr Bulletin 2902-0302.

DATA NOTES:
Flat-stock stiffener bars are required for every other vertical row on filter banks 4 to 6 units high. Stiffener bars, screws, nuts, and rivets are not supplied by Camfil Farr. Consult drawing B-073617.
For V-bank assembly consult drawing C-093248.
For mist removal installation consult drawing C-067125.

SPECIFICATIONS

1.0 General

1.1 - Air filter holding frames shall be 16-gauge galvanized steel with filter sealing flange, centering dimples, sealing gasket and lances for appropriate air filter fasteners.

1.2 - Sizes shall be noted on drawings or other supporting materials.

2.0 Construction

2.1 - Filter holding frame shall be constructed of 16-gauge galvanized steel. The frame shall be assembled from two corner sections and welded to assure a rigid and durable frame assembly.

2.2 - The frame shall include a variety of pre-punched lances for filter fastener attachment. Fastener shall be capable of being installed without the use of tools, nuts or bolts. Lance penetrations shall be upstream of filter flange to assure leak-free integrity.

2.3 - The frame shall include filter centering dimples on each frame wall to facilitate ease of filter installation and assure filter centering against filter sealing flange.

2.4 - A 3/4" filter sealing flange shall be an integral component of the holding frame. All corners shall be flush mitered and a permanently mounted polyurethane foam gasket shall be mounted on the sealing flange to assure filter to frame sealing integrity.

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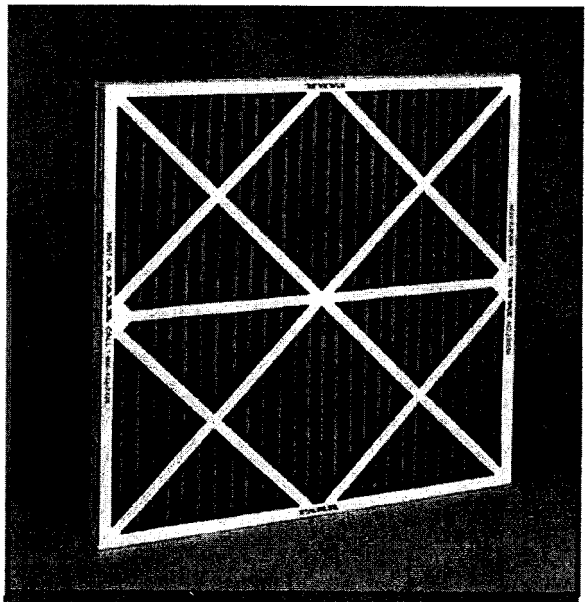
 http://www.camfilfarr.com

Camfil Farr has a policy of uninterrupted research, development and product improvement. We reserve the right to change designs and specifications without notice.

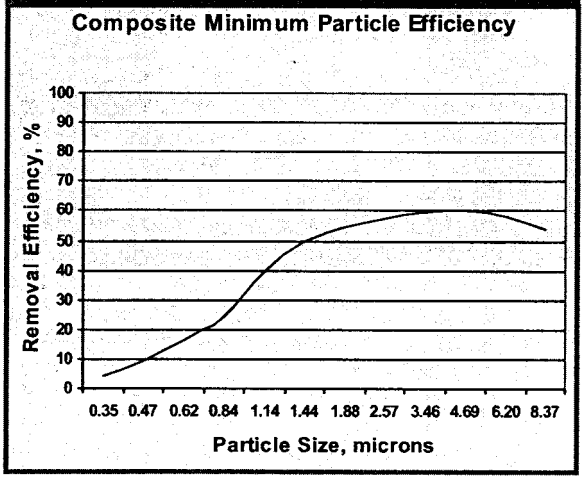
Represented by:

aeropleat® IV

High-Capacity Pleated Panel Filter



High-capacity, MERV 6 efficiency, and excellent service life for HVAC applications



Values are MERVs when evaluated per ASHRAE Standard52.2.

camfil FARR

Meeting Today's Standards

The Camfil Farr Aeropleat® IV extended surface pleated filter offers medium grade ASHRAE efficiency for high capacity dirt loading applications. Incorporating a mechanical particle capture principle, the Aeropleat IV is a MERV 6 filter when evaluated per ASHRAE Standard 52.2-1999.

For Today's Applications

As a stand-alone filter, the Aeropleat IV will remove many of the contaminants associated with today's indoor air quality concerns. Available in 1", 2" and 4" depths, its increased media area offers an extended service life when compared to standard capacity pleated filters. Applications include commercial buildings, educational facilities and specialty manufacturing. As a pre-filter, the Aeropleat IV offers protection for the higher efficiency final filters required for today's high-technology applications.

Built for Today's HVAC Systems

- 15 pleats per linear foot (2" deep model) in a radial pleat design for full use of media area
- A cotton and synthetic media blend provides medium grade ASHRAE performance and high dust-holding capacity
- Welded wire media grid is treated for corrosion resistance and prevents media oscillation or pull-away
- High wet-strength beverage board frame creates a rigid and durable filter pack. The pack will withstand 2.0" w.g. without failure.
- Available in 1", 2" and 4" depths

Camfil Farr	Product sheet
Aeropleat® IV	1012-0603
Camfil Farr—clean air solutions	

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PERFORMANCE DATA

AEROPLEAT® IV

Nominal Filter Depth	Nominal Size (inches)	Actual Size (inches) Height	Width	Depth	Airflow Capacity (cfm) Medium	High	Resistance @ Capacity (inches w.g.) Medium	High	Total Media Area (sq. ft.)	Pleats per Linear Foot
4"	20 x 16 x 4	19.38	15.38	3.75	555	1110	0.05	0.23	15.6	11 pleats per linear foot
	20 x 20 x 4	19.38	19.38		695	1390			18.8	
	24 x 12 x 4	23.38	11.38		500	1000			13.8	
	24 x 18 x 4	23.38	17.38		750	1500			20.1	
	24 x 20 x 4	23.38	19.38		835	1670			22.6	
	24 x 24 x 4	23.38	23.38		1000	2000			27.5	
	25 x 16 x 4	24.38	15.38		695	1390			19.5	
	25 x 20 x 4	24.38	19.38		870	1740			23.5	
2"	20 x 14 x 2	19.50	13.50	1.75	485	970	0.07	0.25	8.3	15 pleats per linear foot
	20 x 12 x 2	19.50	11.50		415	830			7.3	
	20 x 16 x 2	19.50	15.50		555	1110			9.8	
	20 x 18 x 2	19.50	17.50		625	1250			10.8	
	20 x 20 x 2	19.50	19.50		695	1390			11.7	
	24 x 12 x 2	23.38	11.38		500	1000			8.3	
	24 x 18 x 2	23.50	17.50		750	1500			12.9	
	24 x 20 x 2	23.50	19.50		835	1670			14.1	
	24 x 24 x 2	23.38	23.38		1000	2000			17.1	
	25 x 16 x 2	24.50	15.50		695	1390			12.3	
	25 x 18 x 2	24.50	17.50		780	1560			13.5	
	25 x 20 x 2	24.50	19.50		870	1740			14.7	
	25 x 14 x 2	24.50	13.50		610	1220			10.4	
	24 x 16 x 2	23.50	15.50		660	1330			11.8	
	25 x 25 x 2	24.5	24.5		1085	2170			19.0	
	20 x 10 x 2	19.50	9.50		350	700			5.9	
	16 x 16 x 2	15.50	15.50		445	890			7.8	
	20 x 15 x 2	19.50	17.50		520	1040			9.2	
	25 x 15 x 2	24.50	14.50		650	1300			11.6	
1"	24 x 12 x 1	23.50	11.50	0.88	350	700	0.12	0.25	5.0	16 pleats per linear foot
	20 x 14 x 1	19.50	13.50		340	680			4.6	
	20 x 15 x 1	19.50	14.50		365	730			5.1	
	20 x 16 x 1	19.50	15.50		390	780			5.4	
	20 x 20 x 1	19.50	19.50		485	970			6.6	
	24 x 20 x 1	23.50	19.50		585	1165			8.0	
	24 x 24 x 1	23.50	23.50		700	1400			9.8	
	25 x 14 x 1	24.50	13.50		425	850			5.7	
	25 x 16 x 1	24.50	15.50		485	970			6.7	
	25 x 20 x 1	24.50	19.50		610	1215			8.3	
	24 x 18 x 1	23.50	17.50		525	1050			7.3	
	25 x 18 x 1	24.50	17.50		550	1100			7.6	
	24 x 16 x 1	23.50	15.50		465	930			6.5	
	25 x 25 x 1	24.50	24.50		760	1520			10.5	
	20 x 10 x 1	19.50	9.50		245	490			3.3	
	16 x 16 x 1	15.50	15.50		310	620			4.3	
	20 x 7 x 1	19.50	6.50		170	340			2.3	
	20 x 12 x 1	19.50	11.50		290	580			4.1	
	20 x 18 x 1	19.50	17.50		440	880			6.1	
	22 x 22 x 1	21.50	21.50		590	1180			8.2	
	24 x 10 x 1	23.50	9.50		290	580			4.0	
	25 x 10 x 1	24.50	9.50		305	610			4.1	
	25 x 12 x 1	24.50	11.50		365	730			5.2	
	25 x 15 x 1	24.50	14.50		455	910			6.4	
	12 x 12 x 1	11.50	11.50		175	350			2.5	
	24 x 14 x 1	23.50	13.50		410	820			5.5	
	16 x 12 x 1	15.50	11.50		235	470			3.3	

DATA NOTES:
1.0" w.g. recommended final resistance. System design may dictate a lower change-out point.
The Aeropleat IV filter is classified by Underwriters Laboratories as UL Class 2. *Maximum operating temperature 200° F (93° C).*
2" & 4" filters rated at 250 fpm medium and 500 fpm high. 1" filters rated at 175 fpm medium and 350 fpm high.

Camfil Farr, Inc.
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For Aeropleat IV specifications please consult your local Camfil Farr Distributor or Representative or www.camfilfarr.com.

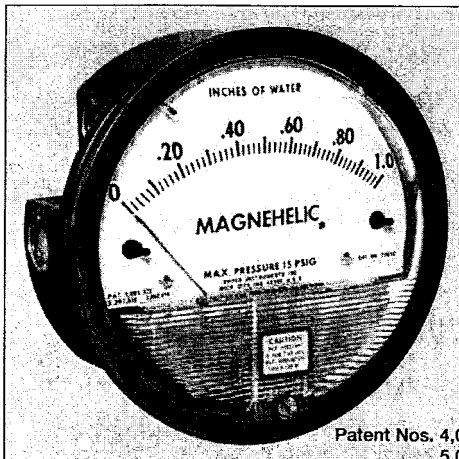
Camfil Farr has a policy of continuous research, development, and product improvement. We reserve the right to change designs and specifications without notice.

Represented by:

http://www.camfilfarr.com

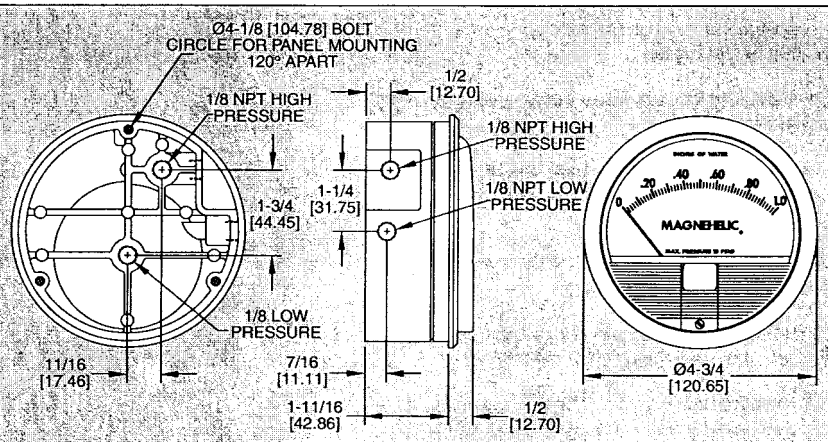
Series 2000 Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%



Patent Nos. 4,030,365
5,012,678

Standard Magnehelic® Pressure Gage has a large, easy-to-read 4" dial.

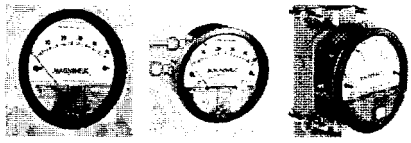


Dimensions, Standard Series 2000 Magnehelic® Pressure Gages. (Slightly different on medium and high pressure models)

Select the Dwyer Magnehelic® gage for high accuracy – guaranteed within 2% of full scale – and for the wide choice of 81 models available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic® movement, it quickly indicates low air or non-corrosive gas pressures – either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

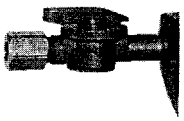
The Magnehelic® is the industry standard to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

NOTE: Do Not use with Hydrogen gas. Dangerous reactions will occur.



Flush ...Surface...or Pipe Mounted

MOUNTING. A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. With the optional A-610 Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1¼" - 2" pipe. Although calibrated for vertical position, many ranges above 1" may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4⅜" hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument.



VENT VALVES

In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

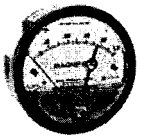
HIGH AND MEDIUM PRESSURE MODELS

Installation is similar to standard gages except that a 4⅜" hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available for all models. Because of larger case, the medium pressure and high pressure models will not fit in a portable case size. Installation of the A-321 safety relief valve on standard Magnehelic® gages often provides adequate protection against infrequent overpressure.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)
Wetted Materials: Consult Factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of full scale (±3% on - 0 and ±4% on - 00 ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20" Hg. to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 kPa), standard gages only.
Temperature Limits: 20 to 140°F.* (-6.67 to 60°C).
Size: 4" (101.6 mm) Diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8" female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Standard Accessories: Two 1/8" NPT plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapter and three flush mounting adapters with screws. (Mounting and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)
*Low temperature models available as special option.
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

OPTIONS AND ACCESSORIES

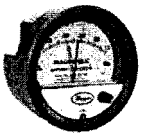


Transparent Overlays

Furnished in red and green to highlight and emphasize critical pressures.

Adjustable Signal Flag

Integral with plastic gage cover. Available for most models except those with medium or high pressure construction. Can be ordered with gage or separate.



LED Setpoint Indicator

Bright red LED on right of scale shows when setpoint is reached. Field adjustable from gage face, unit operates on 12-24 VDC. Requires MP or HP style cover and bezel.

Portable Units

Combine carrying case with any Magnehelic® gage of standard range, except high pressure connection. Includes 9 ft. (2.7 m) of ⅜" I.D. rubber tubing, standhang bracket and terminal tube with holder.

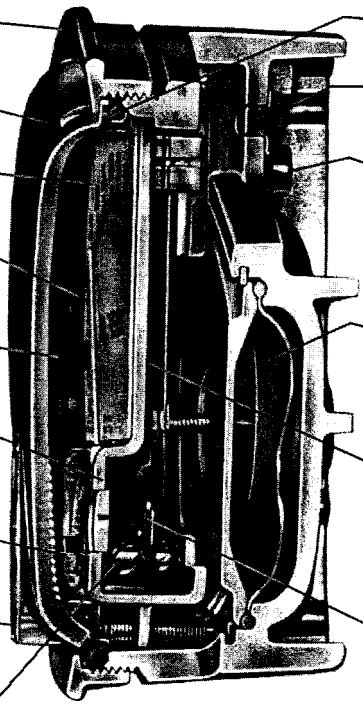
Air Filter Gage Accessory Package

Adapts any standard Magnehelic® for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft. (1.5 m) lengths of ¼" aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves.

21.5

M 1/2

Quality design and construction features



Bezel provides flange for flush mounting in panel.

Clear plastic face is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision litho-printed scale is accurate and easy to read.

Red tipped pointer of heat treated aluminum tubing is easy to see. It is rigidly mounted on the helix shaft.

Pointer stops of molded rubber prevent pointer over-travel without damage.

"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Jeweled bearings are shock-resistant mounted; provide virtually friction-free motion for helix. Motion damped with high viscosity silicone fluid.

Zero adjustment screw is conveniently located in the plastic cover, and is accessible without removing cover. O-ring seal provides pressure tightness.

O-ring seal for cover assures pressure integrity of case.

Blowout plug of silicone rubber protects against overpressure on 15 PSIG rated models. Opens at approximately 25 PSIG.

Die cast aluminum case is precision made and iridite-dipped to withstand 168 hour salt spray corrosion test. Exterior finished in baked dark gray hammerloid. One case size is used for all standard pressure options, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded O-ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Calibrated range spring is flat spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.

Samarium Cobalt magnet mounted at one end of range spring rotates helix without mechanical linkages.

Helix is precision made from an alloy of high magnetic permeability. Mounted in jeweled bearings, it turns freely, following the magnetic field to move the pointer across the scale.

STOCKED MODELS

Dual Scale English/Metric Models		
Model Number	**Range, In. W.C.**	**Range, Pa or kPa**
2000-0D	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-700 Pa
2004D	0-4.0	0-1.0 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa

SERIES 2000 MAGNEHELIC®— MODELS AND RANGES
STOCKED MODELS in bold

The models below will fulfill most requirements. Page 5 also shows examples of special models built for OEM customers. For special scales furnished in ounces per square inch, inches of mercury, metric units, etc., contact the factory.

Model Number	**Range Inches of Water**
2000-00†	0-.25
2000-0†	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2150	0-150

Model Number	**Range Zero Center Inches of Water**
2300-0†	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model Number	**Range PSI**
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

*MP option standard
**HP option standard

Dual Scale Air Velocity Units	
Model Number	**Range in W.C.I Velocity, F.P.M.**
2000-00AV†	0-.25/300-2000
2000-0AV†	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2010AV	0-10/2000-12500

For use with pitot tube.

Model Number	**Range MM of Water**
2000-6MM†	0-6
2000-10MM	0-10
2000-25MM	0-25
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
Zero Center Ranges	
2300-20MM†	10-0-10

Model Number	**Range, CM of Water**
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.

Model Number	**Range, Pascals**
2000-60 Pa†	0-60
2000-100 Pa	0-100
2000-125 Pa†	0-125
2000-250 Pa	0-250
2000-300 Pa	0-300
2000-500 Pa	0-500
2000-750 Pa	0-750
Zero Center Ranges	
2300-250 Pa	125-0-125
2300-500 Pa	250-0-250

Model Number	**Range, Kilopascals**
2000-1 kPa	0-1
2000-1.5 kPa	0-1.5
2000-2 kPa	0-2
2000-3 kPa	0-3
2000-4 kPa	0-4
2000-5 kPa	0-5
2000-8 kPa	0-8
2000-10 kPa	0-10
2000-15 kPa	0-15
2000-20 kPa	0-20
2000-25 kPa	0-25
2000-30 kPa	0-30
Zero Center Ranges	
2300-1 kPa	.5-0-.5
2300-3 kPa	1.5-0-1.5

Accessories
A-310A, 3-Way Vent Valve
A-321, Safety Relief Valve
A-432, Portable Kit
A-605, Air Filter Kit
A-610, Pipe Mount Kit
Scale Overlays — Red, Green, Mirrored or Combination, Specify Locations

Options — To order, add suffix: I.E. 2001-ASF
ASF (Adjustable Signal Flag)
HP (High Pressure Option)
LT (Low Temperatures to -20°F)
MP (Med. Pressure Option)
SP (Setpoint Indicator

Special Purpose Ranges
Scale No. 2401 Square Root Specify Range
Scale No. 2402 Blank Scale Specify Range
Model 2000-00N. range -.05 to +.20" W.C. For room pressure monitoring

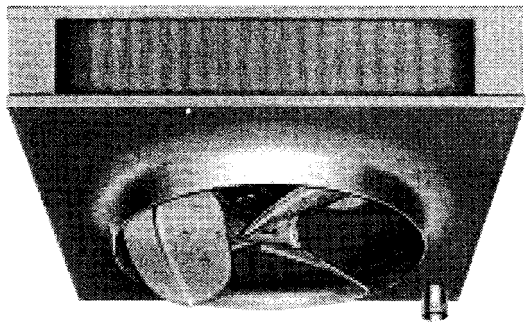
1011R01-0298P

TRANE

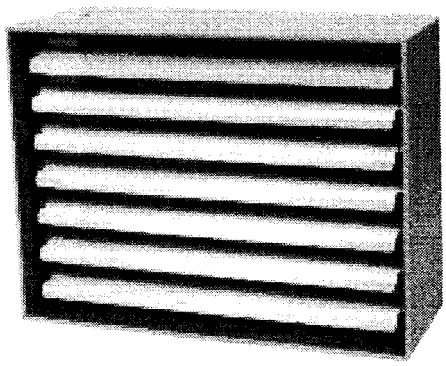
Installation Operation Maintenance

UH-IM-2F

Library	Service Literature
Product Section	Air Terminal Devices & Heat Products
Product	Unit Heaters
Model	Hydronic
Literature Type	Installation/Maintenance
Sequence	2F
Date	September 1999
File No.	SV-TD-UH-UH-IM-2F-09/99
Supersedes	UH-IM-2E 08/97



Model P



Model S

NRTL/C

The "NRTL/C" indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ANSI / UL and CSA Standards, for use in the U.S. and Canada. NRTL, i.e. Nationally Recognized Testing Laboratory is a designation granted by the U.S. Occupational Safety and Health Administration to laboratories which have been recognized to perform certification to U.S. Standards.

The following terms are used throughout this manual, in addition to CSA requirements, to bring attention to the presence of potential hazards or to important information concerning the product.

NOTICE: Used to notify of special instructions or installation, operation or maintenance which are important to equipment but not related to personal injury hazards.

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices and where property-damage-only accidents could occur.

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About The Manual

Literature History

UH-IM-2E (August 1997)
Manual revised to include updated Figure 3, Tables 5A and 5B, and new Figures 12A and 13A.

UH-IM-2D (February 1994)

UH-IM-2C (October 1993)

Installer's Responsibility

Installer Please Note: This equipment has been tested and inspected. It has been shipped free from defects from our factory. However, shipment and installation problems such as loose wires, leaks, or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problem that may be found.**

Notice: It is the equipment owners responsibility to provide any scaffolding or other apparatus required to perform emergency service or annual/periodic maintenance to this equipment.

Attention: Read this manual and all labels attached to the unit carefully before attempting to install, operate or service these units! Check unit data plate for electrical specifications and make certain that these agree with those at the point of installation. Record the unit model and serial numbers in the space provided. Retain for future reference.

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause damage, injury or death. Read the installation, operating and maintenance instructions throughly before inatalling or servicing this equipment.

Receiving Instructions

Inspect shipment immediately when received to determine if any damage has occurred to the unit during shipment. After the unit has been uncrated, check for any visible damage to the unit. Turn fan by hand to determine if damage has occurred. If any damage is found, the consignee should sign the bill of lading indicating such damage and immediately file claim for damage with the transportation company.

Table of Contents

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General Information

Description

All Trane Model P and S Unit Heaters are shipped fully assembled and may be used for steam or hot water applications. Coils are factory tested at 400 psig air under water. Fans are balanced and motors are prelubricated.

Each unit is packaged individually and marked for proper identification. Use normal care in handling and during installation to prevent damage to the coil fins, fan and casing. Do not set the Model P Unit on the floor with the weight of the unit resting against the fan blades. In this position, the blades may be damaged.

Figures 7-1, 8-1 and 10-1 and Tables 7-1, 8-1 and 10-1 give unit dimensions in inches and Tables 7-1A and 8-1A give unit dimensions in millimeters. Unit weights are listed in Table 22-1.

⚠ WARNING

Failure to comply with the general safety information may result in extensive property damage, severe personal injury, or death.

⚠ WARNING

Do not alter the unit heater in any way or damage to the unit and/or severe personal injury or death may occur!

⚠ WARNING

Disconnect all power and steam or water supplies before installing or servicing the heater. If the power disconnect is out of sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electric shock, or severe personal injury.

⚠ CAUTION

Insure that all power sources conform to the requirement of the unit heater, or damage to the unit will result!

⚠ CAUTION

Follow installation instructions CAREFULLY to avoid creating unsafe conditions. All external wiring must conform to applicable current local codes, and to the National Electric Code ANSI/ NFPA No. 70-1996, or the latest edition of. In Canada, all external wiring must conform the the Canadian Electric Code, Part 1 CSA Standard C22.1 all wiring should be done and checked by a qualified electrican using copper only. All steam and hot water connections should be made and leak-tested by a suitably qualified individual, per instructions in this manual. Also follow procedures listed on the "Unit Equipment Start-up Sheet" located in this manual.

Make certain that the power source conforms to the electrical requirements of the heater.

⚠ WARNING

Do not depend upon a thermostat or other switch as sole means of disconnecting power when installing or servicing heater. Always disconnect power at main circuit breaker as described above. Failure to do so could result in fatal electric shock.

Special attention must be given to any grounding information pertaining to this heater. To prevent the risk of electrocution, the heater must be securely and adequately grounded. This should be accomplished by connecting a ground conductor between the service panel and the heater. To ensure a proper ground, the grounding means must be tested by a qualified electrician.

Do not insert fingers or foreign objects into heater or its moving device. Do not block or tamper with the heater in any manner while in operation, or just after it as been turned off, as some parts maybe hot enough to cause injury.

Unless otherwise specified, the follov ing conversions may be used for calculating SI unit measurements:

. 1 foot = 0.305 m
. 1 inch = 25.4 mm
. 1 gallon = 3.785 L
. 1 pound = 0.453 kg
. 1 psig = 6.894 kPa
. 1 cubic foot = 0.028m^3
. 1000 BTU/cu. Ft. = 37.5 MJ/m^3
. 1 inch water column = 0.249 kPa
. liters/second = CFM x 0.472
. meters/second = FPM ÷ 196.8

To meet CSA and OSHA requirements, all units mounted lower than 8 feet (2.4 meters) from the floor must be equipped with OSHA fan guards.

See catalog for details of ordering this option. It is good practice to have a shutoff switch on the electrical power lines controlling the heater. Whenever a unit is serviced, shut power off to the unit.

Since these units are installed in most instances higher than 8 feet, proper type of ladders or scaffolding should be used, as set up by OSHA requirements.

In industrial plants, professional maintenance crews should service this equipment.

Model Nomenclature

Nomenclature

U	H	P	A	0	4	2	S	4	B	A	A	1	T	.	0	0	0	0	0	0	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	

Digits 1,2,3 - Model Type
UHP

Digt 4 - Development Sequence
A

Digit 5,6,7 - Unit Size
042
064
080
102
122
146
166
202
252
280
336
384
500
600
720

Digit 8 - Coil Type
P=Steam or Hot Water

Digit 9 - Fin Series
4 =144 (472 fins/meter)**

Digit 10 - Design Sequence
C = Model P Design Sequence

Digit 11 - Tube Material
A=Copper**
C=Red Brass
D=Cu-Ni
F=Steel

Digit 12 - Fin Material
A=Aluminum**
C=Copper

Digit 13 - Voltage
1=115/60/1**
2=208/60/3
3=230/60/3
4=460/60/3
5=575/60/3 (Totally Enclosed)

Digit 14 - Motor Type
T=Totally Enclosed**
E=Explosion Proof

Digit 15 - Fan Guard
0=None
A=OSHA Guard

Digit 16 - Coil Coating
0=None
R=Epoxy
T=Epoxy Phenolic
W=Baked Phenolic

Digit 17 - Diffuser
0=None
A=Louver Cone Diffuser
C=Louver Cone Diffuser w/ coating

Digit 18 - Manual Starter
0=None
A=Manual Starter w/o overload protection

Digit 19 - Speed Controller (115/60/1 standard motors)
0=None
B=Solid-State Speed Controller (only available up to unit size 102)

Digit 20 - Thermostats
0=None
B=Light-Duty T-stat
C=Heavy-Duty T-stat

Digit 21 - Subbase
0=None
E=Light-Duty
F=Heavy-Duty

**** = Standard Features of Stock Vertical Units**

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Model Nomenclature

Nomenclature

U	H	S	A	0	1	8	S	4	B	A	A	1	T	0	0	0	0	0	0	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Digits 1,2,3 - Model Type
UHS

Digt 4 - Development Sequence
A

Digit 5,6,7 - Unit Size

Standard	Modified
018	019
020	031
038	045
042	053
060	069
070	077
090	091
100	127
126	137
168	181
186	207
230	243
260	273
320	
354	
400	

Digit 8 - Coil Type
S=Steam**
W=Hot Water (Adds a Spiral)

Digit 9 - Fin Series
2=132
8=108**

Digit 10 - Design Sequence
E

Digit 11 - Tube Material
A=Copper**
C=Red Brass
D=Cu-Ni
F=Steel

Digit 12 - Fin Material
A=Aluminum**
C=Copper

Digit 13 - Voltage
1=115/60/1**
2=208/60/3
3=230/60/3
4=460/60/3
5=575/60/3 (Totally Enclosed)

Digit 14 - Motor Type
T=Totally Enclosed**
E=Explosion Proof

Digit 15 - Motor Mount/Fan Guard
0=Standard (None for Non Standard Motors)**
A=Fan Guard (OSHA Type for Standard Unit only)

Digit 16 - Coil Coating
0=No Special Coating
R=Epoxy Coating
T=Epoxy Phenolic Coating
W=Baked Phenolic Coating

Digit 17 - Diffuser
0=None
B=Fin Diffuser
D=Fin Diffuser w/ coating

Digit 18 - Manual Starter
0=None
A=Manual Starter w/o overload protection (Single Phase Only)

Digit 19 - Speed Controller (115/60/1 standard motors)
0=None
D=Solid-State Speed Controller (only available up to unit size 100)

Digit 20 - Thermostats
0=None
B=Light-Duty T-stat
C=Heavy-Duty T-stat

Digit 21 - Subbase
0=None
E=Light-Duty
F=Heavy-Duty

** = Standard Features of Stock Horitozontal Unit

Dimension Data

Figure 7-1 –Dimensions, Model P Heater, Sizes 42-80

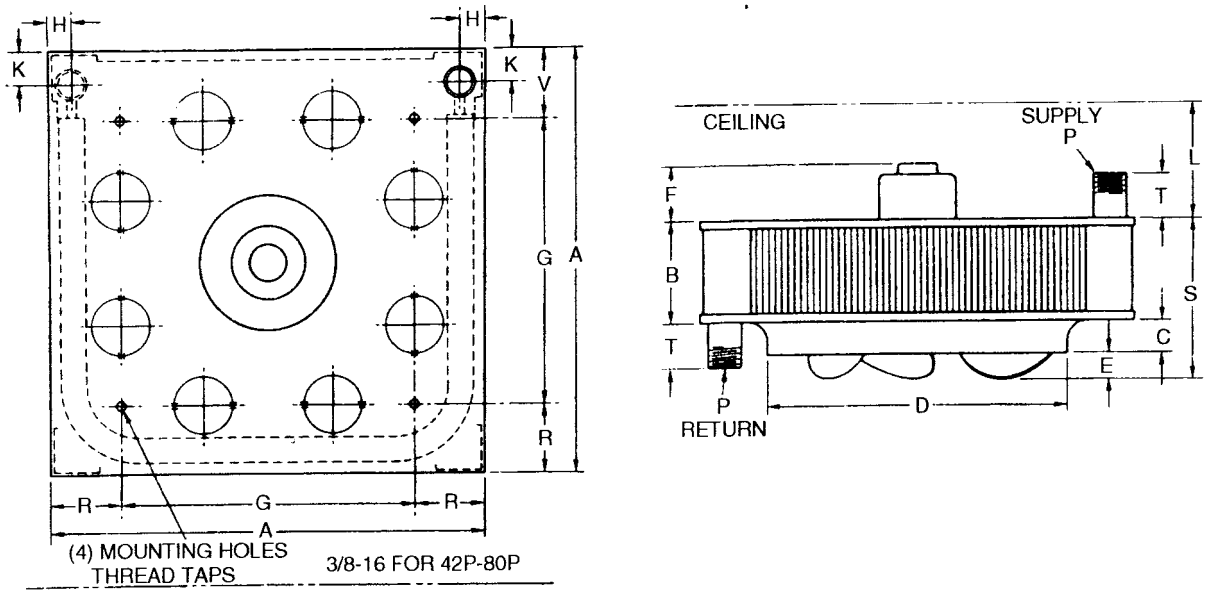

Table 7-1 – Model P Unit Heater Dimensions in Inches (Figure 7-1)

Model P	Fan Dia.	A	B	C	D	E	F	G	H	K	L (Min)	P (NPT)		R	S	T	U	V
42P	11 1/4	18 1/4	4 5/8	1 1/4	11 3/4	3/4	4	11	1 3/8	1 7/8	7	1 1/2		3 5/8	6 5/8	2 3/4	11	3 5/8
64P	13 1/2	21 1/4	4 5/8	1 5/8	14	1	4	14	1 3/8	1 7/8	7	1 1/2		3 5/8	7 1/4	2 3/4	14	3 5/8
80P	13 1/2	21 1/4	4 5/8	1 5/8	14	1	3	14	1 3/8	1 7/8	7	1 1/2		3 5/8	8 3/4	2 3/4	14	3 5/8

Table 7-1A – Model P Unit Heater Dimensions (Given in Millimeters)

Model P	Fan Dia.	A	B	C	D	E	F	G	H	K	L (Min)	P (NPT)	*	R	S	T	U	V
42P	286	464	117	32	298	19	102	279	35	48	152	1 1/2"	38	92	168	70	279	92
64P	343	540	117	41	359	25	102	356	35	48	152	1 1/2"	38	92	181	70	356	92
80P	343	540	156	41	359	25	76	356	35	48	152	1 1/2"	38	92	219	70	356	92

Note: * ="P" equivalent metric diameter

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Dimension Data

Figure 8-1 –Dimensions, Model P Heater, Sizes 102-720

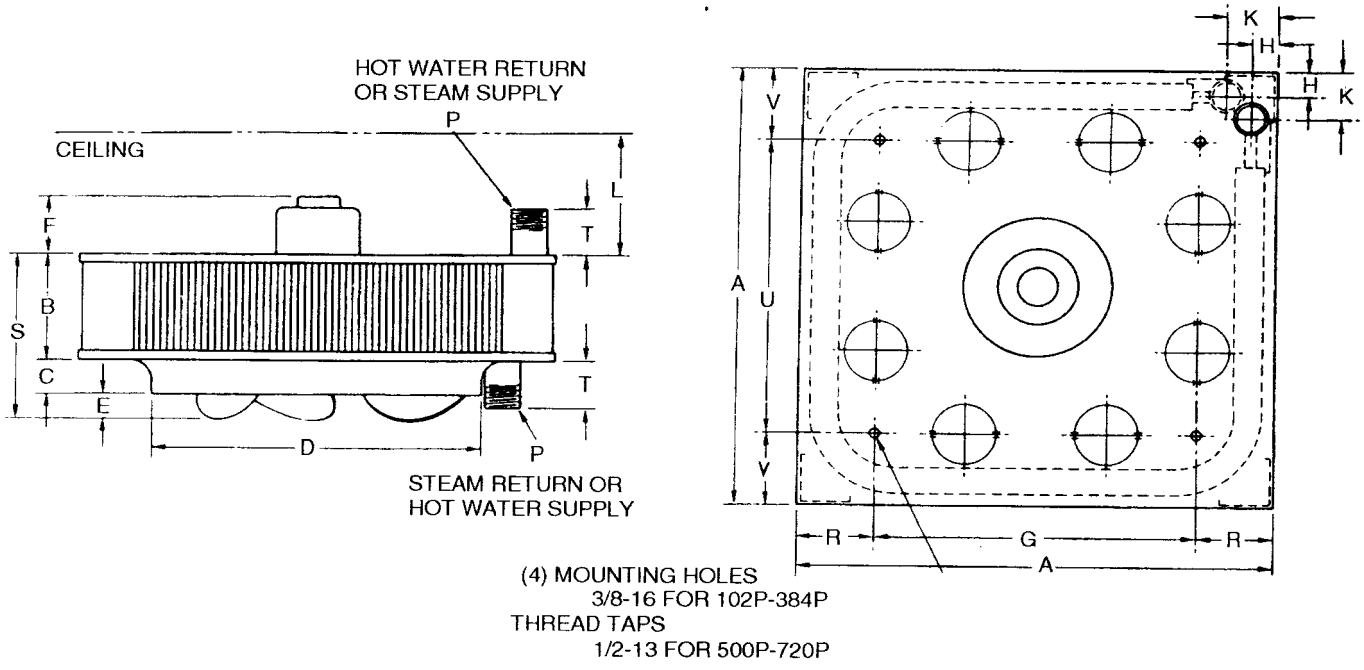

Table 8-1 - Model P Unit Heater Dimensions in Inches (Figure 8-1)

Model P	Fan Dia.	A	B	C	D	E	F	G	H	K	L (Min)	P (NPT)	R	S	T	U	V
102P	16 3/4	25 1/4	6 1/8	2	17 1/2	1 1/8	3	17	1 3/8	2 3/4	7	1 1/2	4 1/8	9 1/8	2 3/4	17	4 1/8
122P	16 3/4	25 1/4	6 1/8	2	17 1/2	1 3/4	3	17	1 3/8	2 3/4	7	1 1/2	4 1/8	9 3/4	2 3/4	17	4 1/8
146P	19 3/4	29 1/2	6 1/8	2 3/8	20 5/8	1 1/4	4	20 1/2	1 3/4	3 1/2	7	2	4 1/2	9 5/8	2 3/4	20 1/2	4 1/2
166P	19 3/4	29 1/2	6 1/8	2 3/8	20 5/8	1 3/4	4	20 1/2	1 3/4	3 1/2	7	2	4 1/2	10 1/8	2 3/4	20 1/2	4 1/2
202P	19 3/4	29 1/2	7 5/8	2 3/8	20 5/8	2	4	20 1/2	1 3/4	3 1/2	7	2	4 1/2	12	2 3/4	20 1/2	4 1/2
252P	25 1/4	37 1/2	7 5/8	3	26 3/8	1	3 1/2	28	1 3/4	3 1/2	7	2	4 3/4	11 5/8	2 3/4	18	9 3/4
280P	25 1/4	37 1/2	7 5/8	3	26 3/8	1 1/4	3 1/2	28	1 3/4	3 1/2	7	2	4 3/4	11 3/4	2 3/4	18	9 3/4
336P	25 1/4	37 1/2	7 5/8	3	26 3/8	2 1/8	4	28	1 3/4	3 1/2	7	2	4 3/4	12 3/4	2 3/4	18	9 3/4
384P	25 1/4	37 1/2	9 1/8	3	26 3/8	2	3 1/2	28	1 3/4	3 1/2	7	2	4 3/4	14 1/8	2 3/4	18	9 3/4
500P	30	42	9 1/8	3 1/2	31 1/4	1 5/8	3	30	2 1/2	4 1/4	7	2 1/2	6	14 1/4	3	30	6
600P	30	42	12 1/8	3 1/2	31 1/4	2 1/8	3	30	2 1/2	4 1/4	7	2 1/2	6	17 3/4	3	30	6
720P	30	42	13 5/8	3 1/2	31 1/4	3	4	30	2 1/2	4 1/4	7	2 1/2	6	20 1/4	3	30	6

Table 8-1A – Model P Unit Heater Dimensions (Given in Millimeters)

Model P	Fan Dia.	A	B	C	D	E	F	G	H	K	L (Min)	P (NPT)	*	R	S	T	U	V
102P	425	641	156	51	444	29	76	432	35	70	152	1 1/2"	38	105	232	70	432	105
122P	425	641	156	51	444	44	76	432	35	70	152	1 1/2"	38	105	248	70	432	105
146P	502	749	156	60	524	32	102	521	44	89	152	2"	51	114	244	70	521	114
166P	502	749	156	60	524	44	102	521	44	89	152	2"	51	114	257	70	521	114
202P	502	749	194	60	524	51	102	521	44	89	152	2"	51	114	305	70	521	114
252P	641	952	194	76	670	22	89	710	44	89	152	2"	51	121	292	70	456	258
280P	641	952	194	76	670	32	89	710	44	89	152	2"	51	121	302	70	456	258
336P	641	952	194	76	670	44	102	710	44	89	152	2"	51	121	314	70	456	258
384P	641	952	232	76	670	51	89	710	44	89	152	2"	51	121	359	70	456	258
500P	762	1067	232	89	794	54	76	762	57	108	178	2 1/2"	64	152	375	76	762	152
600P	762	1067	308	89	794	54	76	762	57	108	178	2 1/2"	64	152	451	76	762	152
700P	762	1067	346	89	794	79	102	762	57	108	178	2 1/2"	64	152	514	76	762	152

Note: * ="P" equivalent metric diameter

Electrical Data

Table 9 -Electrical Characteristics - Model P Unit Heater- Motor

Model Number	Motor Type	Operating Voltage	AMP	MCA	MAX FUSE	HP	RPM
42	Totally Enclosed	115/1/60	1.23**	1.6	15	1/40*	1550
64,80	Totally Enclosed	115/1/60	2.1	2.6	15	1/20*	1550
102	Totally Enclosed	115/1/60	1.2**	1.5	15	1/8*	1070
122,146,166	Totally Enclosed	115/1/60	2.3**	2.9	15	1/6	1100
202	Totally Enclosed	115/1/60	3.6**	4.5	15	1/4	1100
252	Totally Enclosed	115/1/60	3.6**	4.5	15	1/4	1100
280	Totally Enclosed	115/1/60	5.4**	6.8	15	1/2	1100
42	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
64,80	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
102	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
122,146,166	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
202	Totally Enclosed	208-230/460/3/60	1.2-1.4/0.7	1.5-1.8/0.9	15-15/15	1/4	1140
252	Totally Enclosed	208-230/460/3/60	1.2-1.4/0.7	1.5-1.8/0.9	15-15/15	1/4	1140
280	Totally Enclosed	208-230/460/3/60	1.8-2.0/1.0	2.3-2.5/1.3	15-15/15	1/2	1140
336,384	Totally Enclosed	208-230/460/3/60	3.1-3.2/1.6	3.9-4.0/2.0	15-15/15	3/4	1140
500,600	Totally Enclosed	208-230/460/3/60	5.3-5.0/2.5	6.6-6.3/3.1	15-15/15	1 1/2	1160
720	Totally Enclosed	208-230/460/3/60	9.9-9.8/4.9	12.4-12.3/6.1	20-20/15	3	1165
42-252	Totally Enclosed	575/3/60	0.6	0.8	15	1/3	1140
280	Totally Enclosed	575/3/60	0.8	1.0	15	1/2	1140
336,384	Totally Enclosed	575/3/60	1.3	1.6	15	3/4	1140
500,600	Totally Enclosed	575/3/60	2.0	2.5	15	1 1/2	1160
720	Totally Enclosed	575/3/60	3.75	4.7	15	3.0	1165
42	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
64,80	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
102	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
122,146,166	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
202	Explosion Proof with Thermal Overload	115/1/60	4.4	5.5	15	1/4	1140
252	Explosion Proof with Thermal Overload	115/1/60	4.4	5.5	15	1/4	1140
280	Explosion Proof with Thermal Overload	115/1/60	7.8	9.8	15	1/2	1140
42	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
64,80	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
102	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
122,146,166	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
202	Explosion Proof with Thermal Overload	208-230/460/3/60	1.1-1.1/0.55	1.4-1.4/0.7	15-15/15	1/4	1140
252	Explosion Proof with Thermal Overload	208-230/460/3/60	1.1-1.1/0.55	1.4-1.4/0.7	15-15/15	1/4	1140
280	Explosion Proof with Thermal Overload	208-230/460/3/60	1.9-1.9/0.95	2.4-2.4/1.2	15/15/15	1/2	1140
336,384	Explosion Proof with Thermal Overload	208-230/460/3/60	3.1-3.2/1.6	3.9-4.0/2.0	15/15/15	3/4	1145
500,600	Explosion Proof with Thermal Overload	230/460/3/60	5.0/2.5	6.3/3.1	15/15	1 1/2	1150
720	Explosion Proof with Thermal Overload	208-230/460/3/60	10.0-10.0/5.0	12.5-12.5/6.3	20/15	3	1150

*Optional variable speed switch is available.

**These motors have automatic thermal overload protection or impedance protection.

Caution: Select appropriate AMP, MCA, and MAX Fuse for the multiple voltage motors. For example, the AMP,MCA and MAX Fuse for Model 720 with a 230 volt Totally Enclosed motor is 9.8, 12.3 and 20 respectively.

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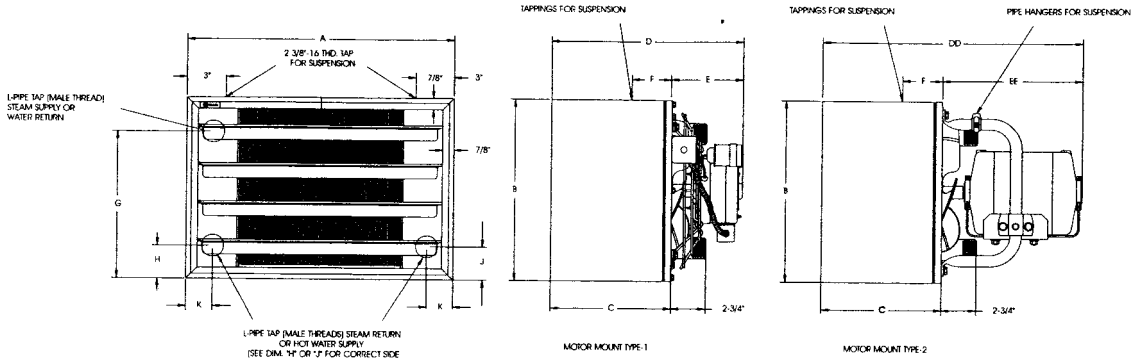
Dimension Data

Figure 10-1 – Dimensions, Model S Unit Heater



Notice:
Motor Mount Type 1 is used on all standard single phase motors.
Motor Mount Type 2 is used on three phase, explosion proof, 1 or 3 phase and special motors.

Table10-1 – Model S Unit Heater Dimensions In Inches (Figure 10-1)

Model S	Fan Dia.	A	B	C	D	DD	E	EE	F	G	H	J	K	L	No. of Horiz. Louvers Std.	No. of Louver Fin Diffusers
18, 19 & 20S	11 1/4	20 7/8	14 1/4	9 3/8	15 3/8	20 5/8	6	11 1/4	3 1/8	8 5/8	2 5/8	---	1 3/4	1 1/4		
31S	11 1/4	20 7/8	14 1/4	9 3/8	16 1/8	20 5/8	6 3/4	11 1/4	3 1/8	8 5/8	---	2 5/8	1 3/4	1 1/4		
38 & 42S	11 1/4	20 7/8	14 1/4	9 3/8	16 1/8	20 5/8	6 3/4	11 1/4	3 1/8	11 5/8	2 5/8	---	1 3/4	1 1/4	4	3
45S	13 1/2	23 7/8	17 1/4	10	17	21 1/4	7	11 1/4	3 1/2	11 5/8	2 5/8	---	2	1 1/4		
60S	13 1/2	23 7/8	17 1/4	10	17	21 1/4	7	11 1/4	3 1/2	14 5/8	---	2 5/8	2	1 1/4		
53S	13 1/2	23 7/8	17 1/4	10	17 1/4	21 1/4	7 1/4	11 1/4	3 1/2	11 5/8	2 5/8	---	2	1 1/4		
70S	13 1/2	23 7/8	17 1/4	10	17 1/4	21 1/4	7 1/4	11 1/4	3 1/2	14 5/8	---	2 5/8	2	1 1/4	5	4
69S	13 1/2	26 3/4	20 1/4	11 1/4	18 1/2	22 1/2	7 1/4	11 1/4	4 1/8	14 5/8	---	2 5/8	2	1 1/4		
90S	13 1/2	26 3/4	20 1/4	11 1/4	18 1/2	22 1/2	7 1/4	11 1/4	4 1/8	17 5/8	2 5/8	---	2	1 1/4	6	5
77S	16 3/4	26 3/4	20 1/4	11 1/4	18 3/4	22 1/2	7 1/2	11 1/4	4 1/8	14 5/8	---	2 5/8	2	1 1/4		
100S	16 3/4	26 3/4	20 1/4	11 1/4	18 3/4	22 1/2	7 1/2	11 1/4	4 1/8	17 5/8	2 5/8	---	2	1 1/4	6	5
91S	16 3/4	31 1/8	23 1/4	11 1/4	21	22 1/2	9 3/4	11 1/4	4 1/8	14 5/8	---	2 5/8	2 1/2	1 1/2		
126S	16 3/4	31 1/8	23 1/4	11 1/4	21	22 1/2	9 3/4	11 1/4	4 1/8	20 5/8	---	2 5/8	2 1/2	1 1/2	7	6
168S	19 3/4	33 3/4	26 1/4	12 3/8	22 1/8	23 5/8	9 3/4	11 1/4	4 5/8	23 5/8	2 5/8	---	2 1/2	1 1/2		
186S	19 3/4	33 3/4	26 1/4	12 3/8	22 1/8	24 5/8	9 3/4	12 1/4	4 5/8	23 5/8	2 5/8	---	2 1/2	1 1/2		
127S	19 3/4	33 3/4	26 1/4	12 3/8	22 1/8	23 5/8	9 3/4	11 1/4	4 5/8	17 5/8	2 5/8	---	2 1/2	1 1/2		
137S	19 3/4	33 3/4	26 1/4	12 3/8	22 1/8	24 5/8	9 3/4	12 1/4	4 5/8	17 5/8	2 5/8	---	2 1/2	1 1/2	8	7
181S	19 3/4	39 3/8	32 1/4	13 1/4	23	25 1/2	9 3/4	12 1/4	5 1/8	23 5/8	2 5/8	---	2 1/2	1 1/2		
230S	19 3/4	39 3/8	32 1/4	13 1/4	23	25 1/2	9 3/4	12 1/4	5 1/8	22 1/8	---	2 5/8	2	1 1/2	10	9
207S	25 1/4	39 3/8	32 1/4	13 1/4	24 1/2	26	11 1/4	12 3/4	5 1/8	23 5/8	2 5/8	---	2 1/2	1 1/2		
260S	25 1/4	39 3/8	32 1/4	13 1/4	24 1/2	26	11 1/4	12 3/4	5 1/8	22 1/8	---	2 5/8	2	1 1/2	10	9
320 & 354S	25 1/4	52 1/8	32 1/4	13 3/4	25	26 1/2	11 1/4	12 3/4	5 3/8	22 1/8	---	2 5/8	2	1 1/2		
243 & 273S	25 1/4	52 1/8	32 1/4	13 3/4	25	26 1/2	11 1/4	12 3/4	5 3/8	23 5/8	2 5/8	---	2 1/2	1 1/2	10	9
400S	25 1/4	52 1/8	32 1/4	13 3/4	---	26 1/2	---	12 3/4	5 3/8	22 1/8	---	2 5/8	2	1 1/2	10	9

Dimension Data

Table 11-1 – Model S Unit Heater Dimensions (Given in Millimeters)

Model S	Fan Dia.	A	B	C	D	DD	E	EE	F	G	H	J	K	L	No. of Horiz. Louvers Std.	No. of Louver Fin Diffusers
18, 19 & 20S	286	530	362	238	391	524	152	286	79	219	67	---	44	32		
31S	286	530	362	238	410	524	171	286	79	219	---	67	44	32		
38 & 42S	286	530	362	238	410	524	171	286	79	219	67	---	44	32	4	3
45S	343	606	438	254	432	540	178	286	89	295	67	---	51	32		
60S	343	606	438	254	432	540	178	286	89	371	---	67	51	32		
53S	343	606	438	254	438	540	184	286	89	295	67	---	51	32		
70S	343	606	438	254	438	540	184	286	89	371	---	67	51	32	5	4
69S	343	679	514	286	470	572	184	286	105	371	---	67	51	32		
90S	343	679	514	286	470	572	184	286	105	448	67	---	51	32	6	5
77S	425	679	514	286	476	572	190	286	105	371	---	67	51	32		
100S	425	679	514	286	476	572	190	286	105	448	67	---	51	32	6	5
91S	425	791	591	286	533	572	248	286	105	371	---	67	64	38		
126S	425	791	591	286	533	572	248	286	105	524	---	67	64	38	7	6
168S	502	857	667	314	562	600	248	286	117	600	67	---	64	38		
188S	502	857	667	314	562	625	248	311	117	600	67	---	64	38		
127S	502	857	667	314	562	600	248	286	117	448	67	---	64	38		
137S	502	857	667	314	562	625	248	311	117	448	67	---	64	38	8	7
181S	502	1000	819	337	584	648	248	311	130	600	67	---	64	38		
230S	502	1000	819	337	584	648	248	311	130	562	---	67	51	38	10	9
207S	641	1000	819	337	622	660	286	324	130	600	67	---	64	38		
260S	641	1000	819	337	622	660	286	324	130	562	---	67	51		10	9
320 & 354S	641	1324	819	349	635	673	286	324	137	562	---	67	51	38		
243 & 273S	641	1324	819	349	635	673	286	324	137	600	67	---	51	38	10	9
400S	641	1324	819	349	---	673	---	324	137	562	---	67	51	38	10	9

Location

It is assumed that the type of system to be used has been selected by the design engineer. The sketches shown are for different types of steam systems or hot water systems. For sizing of piping, traps, filter, etc., consult ASHRAE guides of the manufacturer's literature on these products.

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Electrical and Performance Data

Table 12-1 -Electrical Characteristics - Model S Unit Heater- Motor

Model Number	Motor Type	Operating Voltage	AMP	MCA	MAX FUSE	HP	RPM
18,19,20	Totally Enclosed	115/1/60	0.35	0.4	15	1/50*	1075
31,38,42,45,60	Totally Enclosed	115/1/60	2.1	2.6	15	1/20*	1550
53,69,70,77,90,100	Totally Enclosed	115/1/60	1.7**	2.1	15	1/8*	1550
91,126,127,168	Totally Enclosed	115/1/60	2.3**	2.9	15	1/6	1100
137,181,186,230	Totally Enclosed	115/1/60	3.6**	4.5	15	1/4	1100
207,243,260,273,320,354	Totally Enclosed	115/1/60	5.4**	6.8	15	1/2	1100
18,19,20	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
31,38,42,45,60	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
53,69,70,77,90,100	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
91,126,127,168	Totally Enclosed	208-230/460/3/60	0.98-1.1/0.55	1.2-1.4/0.7	15-15/15	1/6	1140
137,181,186,230	Totally Enclosed	208-230/460/3/60	1.2-1.4/0.7	1.5-1.8/0.9	15-15/15	1/4	1140
207,243,260,273,320,354	Totally Enclosed	208-230/460/3/60	1.8-2.0/1.0	2.3-2.5/1.3	15-15/15	1/2	1140
400	Totally Enclosed	208-230/460/3/60	3.1-3.2/1.8	3.9-4.0/2.0	15-15/15	3/4	1140
18-230	Totally Enclosed	575/3/60	0.6	0.8	15	1/3	1140
207,243,260,273,320,000	Totally Enclosed	575/3/60	0.8	1.0	15	1/2	1140
400	Totally Enclosed	575/3/60	1.3	1.6	15	3/4	1140

* Optional variable speed switch is available.

**These motors have automatic thermal overload protection or impedance protection.

18,19,20	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
31,38,42,45,60	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
53,69,70,77,90,100	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
91,126,127,168	Explosion Proof with Thermal Overload	115/1/60	3.8	4.8	15	1/6	1140
137,181,186,230	Explosion Proof with Thermal Overload	115/1/60	4.4	5.5	15	1/4	1140
207,243,260,273,320,354	Explosion Proof with Thermal Overload	115/1/60	7.8	9.8	15	1/2	1140
18,19,20	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	20	1/6	1140
31,38,42,45,60	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
53,69,70,77,90,100	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
91,126,127,168	Explosion Proof with Thermal Overload	208-230/460/3/60	1.0-1.0/0.5	1.3-1.3/0.6	15-15/15	1/6	1140
137,181,186,230	Explosion Proof with Thermal Overload	208-230/460/3/60	1.1-1.1/0.55	1.5-1.4/0.7	15-15/15	1/4	1140
207,243,260,273,320,354	Explosion Proof with Thermal Overload	208-230/460/3/60	3.1-3.2/1.6	3.9-4.0/2.0	15-15/15	3/4	1145
400	Explosion Proof with Thermal Overload	208-230/460/3/60	3.1-3.2/1.6	3.9-4.0/2.0	15-15/15	3/4	1145

Caution: Select appropriate AMP, MCA, and MAX Fuse for the multiple voltage motors. For example, the AMP,MCA and MAX Fuse for Model 18 with a 230 volt Totally Enclosed motor is 1.1, 1.4 and 15 respectively.

Table 12-2 -Factors For Determining Steam Capacity Of Model S Horizontal Unit Heaters At Various Pressures And Temperatures Table Based on 2 PSIG and 60 F Entering Air

	Steam Pressure	Temperature of Entering Air (F)											
	PSIG	-10	0	10	20	30	40	50	60	70	80	90	100
	0	*1.54*	*1.45*	*1.37*	*1.27*	*1.19*	1.11	1.03	0.96	0.88	0.81	0.74	0.67
	2	*1.59*	*1.50*	*1.41*	*1.32*	*1.24*	1.16	1.08	1.00	0.93	0.85	0.78	0.71
	5	*1.64*	*1.55*	*1.46*	*1.37*	*1.29*	1.21	1.13	1.05	0.97	0.90	0.83	0.76
Blow-	10	1.73	1.64	1.55	1.46	1.38	1.29	1.21	1.13	1.06	0.98	0.91	0.84
Through	15	1.80	1.71	1 .61	1.53	1.44	1.34	1.28	1.19	1.12	1.04	0.97	0.90
Type	20	1.86	1.77	1.68	1.58	1.50	1.42	1.33	1.25	1.17	1.10	1.02	0.95
	30	1.97	1.87	1.78	1.68	1.60	1.51	1.43	1.35	1.27	1.19	1.12	1.04
	40	2.06	1.96	1.86	1.77	1.68	1.60	1.51	1.43	1.35	1.27	1.19	1.12
	50	2.13	2.04	1.94	1.85	1.76	1.67	1.58	1.50	1.42	1.34	1.26	1.19
	60	2.20	2.09	2.00	1.90	1.81	1.73	1.64	1.56	1.47	1.39	1.31	1.24
	70	2.26	2.16	2.06	1.96	1.87	1.78	1.70	1.61	1.53	1.45	1.37	1.29
	75	2.28	2.18	2.09	1 .99	1.90	1.81	1.72	1.64	1.55	1.47	1.40	1.32

Notes:

To determine the Btu per hour capacity of a Model S Horizontal Unit Heater at any steam pressure and entering air temperature multiply rated capacity at 2 psig steam 60 F entering air (Table 13) by factor from above table. Factors in italics:

Units should not be operated when entering air is below freezing at steam pressures below 10 psig.

Performance Data

Table 13-1 -Model S Horizontal Unit Heater Steam Capacities
2 Lbs. Steam 60 F Entering Air Temp

Size	Motor HP	Motor RPM	BTU Per Hour	EDR	Condensate Lbs Per Hr	Final Temp	CFM 70 F Air Basis	Outlet Velocity	Oper. Weight
					Standard Units				
18-S	1/25	1050	17,400	72	18	117	280	162	40
		950	*16,600*	*69*	*17*	*118*	*266*	*154*	
		800	*13,900*	*58*	*14*	*118*	*224*	*130*	
20-S2	1/25	1050	20,000	84	21	118	318	186	40
		950	*19,000*	*79*	*20*	*120*	*298*	*173*	
		800	*15,500*	*64*	*17*	*120*	*250*	*145*	
38-S	1/20	1550	38,700	162	40	126	544	319	40
		1300	*35,900*	*150*	*37*	*130*	*472*	*279*	
		1100	*32,700*	*136*	*33*	*135*	*399*	*238*	
42-S	1/20	1550	41,600	174	43	125	590	347	40
		1300	*38,000*	*158*	*39*	*130*	*495*	*294*	
		1100	*34,700*	*145*	*35*	*136*	*420*	*251*	
60-S	1/20	1550	60,500	252	64	129	815	343	55
		1300	*56,000*	*234*	*58*	*133*	*706*	*300*	
		1100	*51,200*	*214*	*52*	*139*	*597*	*256*	
70-S	1/8	1550	68,200	285	70	117	1100	454	60
		1300	*64,900*	*271*	*67*	*123*	*953*	*397*	
		1100	*59,700*	*248*	*61*	*128*	*806*	*339*	
90-S	1/8	1550	87,600	366	90	127	1214	382	75
		1300	*81,200*	*340*	*84*	*131*	*1053*	*334*	
		1100	*74,200*	*310*	*76*	*137*	*891*	*285*	
100-S	1/8	1550	96,000	400	99	118	1535	476	85
		1300	*91,500*	*380*	*94*	*123*	*1330*	*417*	
		1100	*84,000*	*350*	*86*	*128*	*1126*	*356*	
126-S	1/6	1100	125,700	525	130	126	1760	411	100
168-8	1/6	1100	172,000	716	178	127	2380	452	145
186-S	1/4	1100	185,200	775	191	121	2808	528	145
230-S	1/4	1100	229,700	957	237	124	3300	431	190
260-S	1/2	1100	256,300	1070	265	118	4100	529	195
320-S	1/2	1100	324,000	1350	335	127	4480	442	245
354-8	1/2	1100	355,500	1480	368	118	5660	550	250
400-S	3/4	1145	404,073	1684	418	122	6017	583	260
					Low Final Temp. "Bypass" Units				
19-S2	1/25	1050	19,300	80	20	106	390	220	40
		950	*18,300*	*77*	*19*	*108*	*360*	*205*	
		800	*16,300*	*68*	*17*	*110*	*300*	*173*	
31-S	1/20	1550	30,400	127	31	104	635	359	40
		1300	*27,800*	*116*	*29*	*109*	*520*	*302*	
		1100	*25,300*	*106*	*26*	*112*	*450*	*257*	
45-S	1/20	1550	45,800	191	47	107	897	363	55
		1300	*41,300*	*173*	*43*	*112*	*740*	*304*	
		1100	*37,300*	*156*	*39*	*116*	*630*	*259*	
53-S	1/8	1550	53,300	223	55	105	1090	439	55
		1300	*50,200*	*209*	*52*	*109*	*940*	*383*	
		1100	*46,200*	*192*	*48*	*114*	*795*	*327*	
69-S	1/8	1550	69,400	290	72	108	1337	407	70
		1300	*63,400*	*264*	*66*	*112*	*1125*	*346*	
		1100	*57,600*	*240*	*60*	*116*	*955*	*295*	
77-S	1/8	1550	76,600	320	79	107	1510	458	80
		1300	*71,700*	*299*	*74*	*111*	*1304*	*300*	
		1100	*65,800*	*274*	*68*	*116*	*1100*	*341*	
91-S	1/6	1100	91,000	380	94	108	1740	394	95
127-S	1/6	1100	125,800	524	130	108	2440	448	135
137-S	1/4	1100	135,800	567	140	107	2700	495	135
181-S	1/4	1100	180,700	755	187	109	3392	430	180
207-S	1/2	1100	206,900	863	214	107	4059	514	185
243-S	1/2	1100	238,700	995	248	108	4607	439	230
273-S	1/2	1100	272,200	1135	283	105	5644	536	235

Notes:

1. Constant speed units are rated at capacities shown in regular type: Capacities in italic faced type apply only to units with multi-speed motors.
2. Capacities based on 2 psi steam and 60 F entering air.

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Performance Data

Table 14-1 Model P Projection Unit Heater Steam Capacities
2 Lbs. Steam 60 F Entering Air Temp

Size	Motor HP	Motor RPM	BTU Per Hour	EDR	Condensate Lbs Per Hr	Final Temp.	CFM 70 F Air Basis	CFM at Final Temp	Outlet Velocity	Oper. Weight Lbs.
Standard Models										
42-P	1/25	1550	41,300	172	43	124	595	660	877	30
		1150	*33,600*	*140*	*35*	*131*	*436*	*495*	*658*	
64-P	1/20	1550	65,500	273	68	121	989	1085	1005	35
		1150	*52,800*	*220*	*55*	*129*	*706*	*785*	*727*	
80-P	1/20	1550	80,600	336	83	122	1200	1320	1220	40
		1150	*65,100*	*271*	*67*	*130*	*858*	*954*	*894*	
102-P	1/8	1070	101,800	424	106	123	1490	1635	980	55
		850	*87,900*	*366*	*91*	*129*	*1180*	*1315*	*783*	
122-P	1/6	1070	124,400	518	129	124	1790	1970	1170	55
146-P	1/6	1070	152,000	633	157	123	2220	2440	1045	80
166-P	1/6	1070	173,000	720	179	121	2620	2870	1230	80
202-P	1/4	1070	210,200	838	208	118	3200	3490	1495	85
252-P	1/4	1070	249,800	1040	260	115	4180	4550	1205	135
280-P	1/2	1070	283,800	1180	294	119	4430	4840	1275	135
336-P	3/4	1120	333,400	1390	345	119	5210	5690	1500	135
384-P	3/4	1120	386,000	1610	400	118	6140	6700	1770	175
500-P	1 1/2	1120	496,000	2070	514	117	8020	8750	1640	250
600-P	1 1/2	1120	585,000	2440	605	117	9450	10,300	1930	260
720-P	3	1120	705,000	2940	729	119	11,000	12,020	2250	325
Low Final Temperature Models - Standard Model P Units With All Air Ports Open										
42-P-L	1/25	1150	34,800	145	36	108	668	716	950	30
		1150	*26,000*	*108*	*27*	*111*	*470*	*506*	*672*	
64-P-L	1/20	1550	57,200	238	59	104	1200	1280	1190	35
		1150	*45,800*	*191*	*48*	*109*	*862*	*925*	*858*	
80-P-L	1/20	1550	68,000	283	71	106	1360	1455	1350	40
		1150	*55,000*	*229*	*57*	*111*	*995*	*1070*	*992*	
102-P-L	1/8	1070	85,400	356	89	108	1640	1760	1050	55
		850	*71,200*	*296*	*74*	*111*	*1290*	*1390*	*827*	
122-P-L	1/6	1070	111,000	462	115	107	2180	2330	1390	55
146-P-L	1/6	1070	125,800	524	130	109	2360	2530	1080	80
166-P-L	1/6	1070	149,000	620	154	107	2920	3130	1340	80
202-P-L	1/4	1070	176,800	736	183	108	3390	3640	1560	85
252-P-L	1/4	1070	214,900	895	224	104	4500	4800	1270	135
280-P-L	1/2	1070	251,800	1050	260	106	5040	5380	1420	135
336-P-L	3/4	1120	291,000	1210	302	107	5700	6100	1610	135
384-P-L	3/4	1120	344,000	1430	356	108	6600	7080	1870	175
500-P-L	1 1/2	1120	428,000	1785	446	102	9380	9940	1860	250
600-P-L	1 1/2	1120	515,000	2140	533	106	10,300	11,000	2060	260
720-P-L	3	1120	620,000	2580	642	108	11,900	12,750	2380	325

Notes:
Constance speed units are rated at capacities shown in regular type: capacities in *italic faced type* apply only to units with multi-speed motors. To determine BTU per hour capacities at various steam pressures and entering air temperatures, use conversion factors from Table 14-2. Final temperatures at new conditions can be calculated by applying basic formula.

Table 14-2 Factors For Determining Steam Capacity of Model P Projection Unit Heaters At Various Pressures And Temperatures Based on 2 PSIG and 60 F Entering Air

	Steam Pressure	Temperature of Entering Air (F)											
	PSIG	-10	0	10	20	30	40	50	60	70	80	90	100
	0	1.49	1.41	1.33	1.25	1.18	1.11	1.03	0.96	0.90	0.83	0.76	0.69
	2	1.52	1.45	1.37	1.29	1.22	1.15	1.07	1.00	0.93	0.09	0.80	0.73
	5	1.58	1.50	1.42	1.34	1.27	1.20	1.12	1.05	0.98	0.91	0.85	0.78
Blow-	10	1.64	1.57	1.49	1.41	1.34	1.27	1.19	1.12	1.05	0.98	0.91	0.85
Through	15	1.70	1.62	1.55	1.47	1.40	1.32	1.25	1.18	1.11	1.04	0.97	0.90
Type	20	1.75	1.67	1.60	1.52	1.45	1.37	1.30	1.23	1.16	1.09	1.02	0.96
	30	1.83	1.75	1.68	1.61	1.53	1.46	1.39	1.32	1.25	1.18	1.11	1.04
	40	1.90	1.82	1.75	1.68	1.61	1.53	1.46	1.39	1.32	1.25	1.18	1.11
	50	1.96	1.87	1.81	1.74	1.67	1.59	1.52	1.45	1.38	1.31	1.24	1.17
	60	2.02	1.94	1.87	1.79	1.72	1.64	1.57	1.50	1.43	1.36	1.29	1.22
	70	2.07	1.99	1.92	1.84	1.76	1.69	1.62	1.55	1.47	1.40	1.33	1.27
	75	2.10	2.02	1.94	1.86	1.79	1.71	1.64	1.57	1.49	1.42	1.36	1.29

Notes:
To determine the Btu per hour capacity of a Model P Projection Unit Heater at any steam pressure and entering air temperature multiply rated capacity at 2 psig steam 60 F entering air (Table 14-1) by factor from above table.

Dimension Data

Hot Water Selection Example

Selection Procedure
Select the proper size of unit heater for whatever application desired, as illustrated by the following examples.

Example 1:
Select a Model S horizontal unit heater to deliver 95 MBH with 220°F entering water temperature (EWT), 70°F entering air temperature (EAT) and a 30°F water temperature drop (WTD).

Step 1.
Determine GPM:

$$GPM = \frac{Btu/hr}{(485)\ WTD} = \frac{95000}{485 \times 30} = 6.53$$

Step 2.
Refer to Table 16-1 to select the conversion factor at 220° EWT and 70° EAT. Factor is 1.058.

Step 3.
Determine equivalent MBH at standard conditions (200° EWT, 60° EAT).

$$Equiv.\ MBH = \frac{MBH}{Factor} = \frac{95}{1.058} = 89.8$$

Step 4.
Select unit size by entering the hot water tables at the 200° F EWT column. Select the unit which will provide 89.8 MBH at 6.53 GPM. In this example, the selection indicates a Model S 126W2 unit heater, from Table 17-1, page 17.

To determine the actual capacity of this Model S 126W2 at operating conditions (220° EWT and 70° EAT) proceed as follows.

Step 1.
Determine the MBH at 6.53 GPM by interpolation in the 200° column. (In this case 90.8 MBH.) Multiply this MBH by the conversion factor

90.8 MBH x 1.058 = 96 MBH.

Step 2.
The GPM remains constant = 6.53 GPM.

Step 3.
Calculate the water temperature drop

$$WTD = \frac{Btu/hr}{GPM \times 485} = \frac{96000}{(6.53)(485)} = 30.3$$

Step 4.
Determine the pressure drop at 6.53 GPM. Pressure drops are cataloged for both standard wall (SWT) and heavy wall. (HWT) tube coils. In this example, if a SWT coil is selected the pressure drop, by interpolation is 2.38 feet of water.

Step 5.
Calculate the final air temperature

$$F.T. = E.A.T. + \frac{Btu/hr}{CFM \times 1.085}$$

$$= 70 + \frac{96000}{1661 \times 1.085} = 70 + 53.2 = 123.2°$$

Example 2:
Determine the capacity of a Model 336P unit heater operating at 180° (EWT), 100° (EAT) and 15° (WTD).
Step 1.
Find conversion factor (in Table 16-1) = 0.546
Step 2.
Adjust the water temperature drop

$$Adj.\ WTD = \frac{15}{.546} = 27.5°$$

Step 3.
Multiply the MBH (interpolated) at 27.5° WTD, 200° EWT and 60° EAT by the factor to obtain the MBH at desired conditions.

0.546 x 224.9 = 123.0 MBH

Step 4.
WTD = 27.5 x 0.546 = 15°

Step 5.

$$GPM = \frac{Btu/hr}{485 \times WTD} = \frac{123,000}{(485)(15)} = 16.9$$

Step 6.
Pressure drop interpolated at 27.5° WTD for a SWT coil is 1.82 feet of water.

Step 7.
Calculate final temperature

$$F.T. = E.A.T. + \frac{Btu/hr}{CFM \times 1.085}$$

$$= 100° + \frac{123,000}{5210 \times 1.085} = 121.8°$$

Correction Factors for Propylene Glycol/Water
When sizing equipment for systems that will utilize a propylene glycol solution, consider the following factors:

Propylene Glycol
1. Heat transfer @ 180 F with no increase in flow rate:

20% solution	.97*
50% solution	.90*

2. GPM required @ 180 F, 20° Δt
1.10%
(no correction to pump curve)

3. Pump head required @ 180 F w/increase in GPM 1.23%*

4. Specific gravity
(water = 1.0)
1.045-1.055*

5. Pounds/Gallon @ 60 F
(water = 8.3453 Pounds/Gallon)
8.77

6. pH @ 50% by volume 9.5

7. Freezing Point 55% by volume —

50%	-28 F
40%	-13 F
30%	+4 F
20%	+17 F

*Compared to water.

Note:
If constant water temperature drop is desired, apply the conversion factor to the WTD and to the desired MBH and enter 200° EWT column at these conditions. Select the unit which will provide the equivalent MBH at the adjusted WTD. The GPM can then be interpolated from the table at the adjusted WTD. To determine the actual capacity at opwerating conditions proceed as outlined in example #2. If a constant GPM is desired, enter the 200° EWT column at the given or calculated GPM. Select the unit which will provide the equivalent MBH at this GPM. To determine the actual capacity at operating conditions un this case proceed as outlined in example #1.

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Performance Data

Table 16-1 - Unit Heater HotWater Conversion Factors (Applies to Tables 17-1 - 21-1)

Ent. Air Temp.	Entering Water Temperature												
	160	170	180	190	200	210	220	230	240	250	260	270	280
30	0.962	1.036	1.110	1.182	1.259	1.331	1.408	1.482	1.554	1.627	1.702	1.780	1.850
40	0.880	0.954	1.024	1.100	1.171	1.249	1.318	1.391	1.468	1.539	1.612	1.686	1.759
50	0.795	0.869	0.940	1.011	1.085	1.158	1.230	1.301	1.374	1.448	1.520	1.590	1.664
60	0.715	0.785	0.859	0.929	1.000	1.071	1.141	1.215	1.285	1.359	1.429	1.500	1.571
70	0.634	0.704	0.774	0.845	0.917	0.988	1.058	1.129	1.200	1.270	1.340	1.410	1.482
80	0.568	0.628	0.698	0.768	0.838	0.908	0.978	1.048	1.118	1.188	1.258	1.328	1.398
90	0.484	0.552	0.622	0.690	0.760	0.829	0.898	0.967	1.036	1.106	1.173	1.244	1.311
100	0.410	0.478	0.546	0.615	0.684	0.753	0.820	0.889	0.957	1.025	1.095	1.161	1.230

Apply to the 200 F entering water capacities only.

Ent. Air Temp.	Entering Water Temperature											
	290	300	310	320	330	340	350	360	370	380	390	400
30	1.925	2.000	2.070	2.142	2.220	2.295	2.370	2.440	2.515	2.590	2.660	2.735
40	1.831	1.909	1.976	2.048	2.120	2.193	2.268	2.348	2.417	2.488	2.560	2.632
50	1.735	1.809	1.882	1.953	2.024	2.095	2.168	2.242	2.312	2.388	2.459	2.530
60	1.642	1.715	1.785	1.858	1.930	2.000	2.070	2.140	2.215	2.285	2.360	2.430
70	1.552	1.622	1.694	1.764	1.838	1.907	1.976	2.045	2.116	2.188	2.258	2.332
80	1.468	1.538	1.604	1.674	1.742	1.815	1.884	1.952	2.020	2.091	2.162	2.230
90	1.380	1.450	1.515	1.585	1.655	1.723	1.795	1.862	1.930	1.998	2.067	2.137
100	1.300	1.368	1.433	1.499	1.569	1.638	1.705	1.776	1.843	1.910	1.977	2.046

Apply to the 200 F entering water capacities only.

Table 16-2 – Trane Unit Heater Nomenclature (Applies To Tables 17-1 - 21-1)

Abbreviations	Definitions
MBH	1000 BTU Per Hour
GPM	Gallons Per Minute
FT	Final Temperature °F
PD-S.W.T.	Feet Of Water Pressure Drop - Standard Wall Tubes.
PD-H.W.T	Feet Of Water Pressure Drop - Heavy Wall Tubes

Performance Data

Table 17-1

Model S Unit Heater Hot Water Capacities – 60°F Ent. Air Temp. and 200°F Ent. Water Temp.

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T
18-S	5	12.0	4.94	99.4	0.24	0.28
CFM 280	10	9.2	1.89	90.1	0.04	0.05
RPM 1075	15	6.3	0.87	80.8	0.01	0.01
HP 1/50						
20-S2	5	14.3	5.90	101.9	0.33	0.39
CFM 315	10	10.8	2.23	91.7	0.06	0.07
RPM 1075	15	7.3	1.01	81.5	0.01	0.02
HP 1/50						
	5	29.8	12.27	110.5	1.64	1.96
38-S	10	26.2	5.40	104.5	0.38	0.46
CFM 543	15	22.6	3.11	98.4	0.14	0.17
RPM 1550	**20**	**19.1**	**1.97**	**92.4**	**0.06**	**0.08**
HP 1/20	25	15.5	1.28	86.3	0.03	0.04
	30	11.9	0.82	80.3	0.01	0.02
	5	31.2	12.87	108.7	1.78	2.13
42-S	10	27.5	5.67	102.9	0.42	0.50
CFM 591	15	23.8	3.26	97.1	0.16	0.19
RPM 1550	**20**	**20.0**	**2.06**	**91.2**	**0.07**	**0.09**
HP 1/20	25	16.3	1.34	85.4	0.03	0.04
	30	12.6	0.86	79.6	0.02	0.02
	5	46.2	19.03	112.2	4.46	5.33
60-S	10	42.3	8.72	107.8	1.12	1.34
CFM 815	15	38.4	5.28	103.5	0.46	0.55
RPM 1550	**20**	**34.6**	**3.56**	**99.1**	**0.23**	**0.28**
HP 1/20	25	30.7	2.53	94.7	0.13	0.15
	30	26.9	1.84	90.4	0.07	0.09
	40	19.1	0.99	81.6	0.02	0.03
	5	54.1	22.29	105.3	5.90	7.06
	10	49.5	10.21	101.5	1.48	1.77
70-S	15	45.0	6.18	97.7	0.61	0.73
CFM 1100	**20**	**40.4**	**4.17**	**93.9**	**0.30**	**0.36**
RPM 1550	25	35.9	2.96	90.1	0.17	0.20
HP 1/8	30	31.3	2.15	86.2	0.10	0.11
	40	22.2	1.15	78.6	0.03	0.04
	10	64.3	13.25	108.8	2.84	3.40
	15	60.0	8.24	105.5	1.23	1.47
90-S	**20**	**55.7**	**5.74**	**102.3**	**0.65**	**0.78**
CFM 1214	25	51.4	4.24	99.0	0.38	0.45
RPM 1550	30	47.1	3.24	95.8	0.24	0.28
HP 1/8	40	38.5	1.98	89.2	0.10	0.12
	50	29.9	1.23	82.7	0.04	0.05
	10	72.3	14.90	103.4	3.50	4.19
	15	67.4	9.26	100.5	1.51	1.81
100-S	**20**	**62.5**	**6.44**	**97.5**	**0.80**	**0.95**
CFM 1535	25	57.6	4.75	94.6	0.47	0.56
RPM 1550	30	52.7	3.62	91.6	0.29	0.35
HP 1/8	40	42.9	2.21	85.8	0.12	0.15
	50	33.1	1.37	79.9	0.05	0.06
	60	23.3	0.80	74.0	0.02	0.02
	10	95.0	19.58	109.7	6.97	8.34
	15	89.9	12.36	107.1	3.09	3.70
126-S	**20**	**84.9**	**8.74**	**104.4**	**1.68**	**2.01**
CFM 1760	25	79.8	6.58	101.8	1.02	1.22
RPM 1100	30	74.7	5.13	99.1	0.66	0.79
HP 1/6	40	64.6	3.33	93.8	0.31	0.37
	50	54.4	2.24	88.5	0.15	0.19
	60	44.3	1.52	83.2	0.08	0.09
	15	121.2	16.66	106.9	6.12	7.33
	20	**115.3**	**11.88**	**104.6**	**3.37**	**4.04**
168-S	25	109.4	9.02	102.4	2.08	2.48
CFM 2381	30	103.5	7.11	100.1	1.37	1.63
RPM 1100	40	91.7	4.72	95.5	0.67	0.80
HP 1/6	50	79.8	3.29	90.9	0.36	0.43
	60	68.0	2.34	86.3	0.20	0.23
	15	131.7	18.10	103.2	7.09	8.48
	20	**125.4**	**12.92**	**101.2**	**3.91**	**4.68**
186-S	25	119.1	9.81	99.1	2.41	2.88
CFM 2808	30	112.7	7.74	97.0	1.59	1.90
RPM 1100	40	100.1	5.16	92.8	0.78	0.93
HP 1/4	50	87.4	3.60	88.7	0.42	0.50
	60	74.8	2.57	84.5	0.23	0.28
	15	171.3	23.53	107.8	2.65	3.18
	20	**161.7**	**16.67**	**105.2**	**1.44**	**1.73**
230-S	25	152.2	12.54	102.5	0.88	1.05
CFM 3299	30	142.6	9.80	99.8	0.57	0.68
RPM 1100	40	123.5	6.36	94.5	0.27	0.32
HP 1/4	50	104.4	4.30	89.2	0.13	0.16
	60	85.3	2.93	83.8	0.07	0.08
	70	66.2	1.95	78.5	0.03	0.04
	15	192.1	26.40	103.2	3.25	3.89
	20	**181.1**	**18.67**	**100.7**	**1.77**	**2.11**
260-S	25	170.2	14.03	98.3	1.07	1.28
CFM 4099	30	159.2	10.94	95.8	0.69	0.82
RPM 1100	40	137.3	7.07	90.9	0.32	0.38
HP 1/2	50	115.3	4.75	85.9	0.16	0.19
	60	93.4	3.21	81.0	0.08	0.10
	70	71.5	2.10	76.1	0.04	0.05
	15	245.6	33.75	110.5	5.93	7.09
	20	**234.3**	**24.15**	**108.2**	**3.28**	**3.93**
320-S	30	211.6	14.54	103.5	1.34	1.61
CFM 4481	40	189.0	9.74	98.9	0.67	0.80
RPM 1100	50	166.3	6.85	94.2	0.36	0.43
HP 1/2	60	143.6	4.93	89.5	0.20	0.24
	70	120.9	3.56	84.9	0.12	0.14
	80	98.3	2.53	80.2	6.00	0.08
	15	277.8	38.17	105.2	7.37	8.82
	20	**264.9**	**27.30**	**103.1**	**4.08**	**4.88**
354-S	30	239.0	16.42	98.9	1.67	1.99
CFM 5661	40	213.1	10.98	94.7	0.83	0.99
RPM 1100	50	187.2	7.71	90.5	0.45	0.53
HP 1/2	60	161.3	5.54	86.3	0.25	0.30
	70	135.3	3.99	82.0	0.14	0.17
	80	109.4	2.82	77.8	0.08	0.09
	15	335.0	46.18	110.3	10.06	11.81
	20	**321.0**	**33.09**	**108.0**	**5.79**	**6.91**
400-S	30	286.0	19.66	102.8	2.29	2.59
CFM 6017	40	256.0	13.19	98.3	1.11	1.32
RPM 1140	50	227.0	9.36	94.0	0.60	0.73
HP 3/4	60	196.0	6.74	89.3	0.34	0.42
	70	166.0	4.89	84.8	0.21	0.28
	80	—	—	—	—	—

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Performance Data

Table 18-1 - Model S Unit Heater Hot Water Capacities-
60 F Ent. Air Temp. and 200 F Ent. Water Temp. Hot Water with Turbulators and 132 Fin Series

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	5.0	15.7	6.47	106.0	0.66	0.72
20-W2	10.0	14.0	2.88	100.9	0.15	0.18
CFM 315	15.0	12.2	1.68	95.8	0.06	0.07
RPM 1075	**20.0**	**10.5**	**1.08**	**90.7**	**0.03**	**0.04**
HP 1/50	25.0	8.7	0.72	85.6	0.01	0.02
	30.0	7.0	0.48	80.5	0.01	0.01
	5.0	33.5	13.80	120.0	3.41	4.07
38-W2	10.0	31.4	6.47	116.3	0.96	1.15
CFM 514	15.0	29.3	4.03	112.5	0.44	0.52
RPM 1550	**20.0**	**27.2**	**2.80**	**108.8**	**0.24**	**0.28**
HP 1/20	25.0	25.1	2.07	105.0	0.14	0.17
	30.0	23.0	1.58	101.3	0.09	0.11
	5.0	34.0	14.02	119.1	3.50	4.18
	10.0	31.9	6.57	115.4	0.99	1.18
42-W2	15.0	29.8	4.09	111.8	0.45	0.53
CFM 530	**20.0**	**27.6**	**2.85**	**108.1**	**0.24**	**0.29**
RPM 1550	25.0	25.5	2.10	104.4	0.15	0.18
HP 1/20	30.0	23.4	1.61	100.7	0.10	0.11
	40.0	19.2	0.99	93.3	0.04	0.05
	10.0	47.9	9.88	118.5	2.66	3.17
	15.0	45.5	6.25	115.6	1.24	1.48
60-W2	**20.0**	**43.1**	**4.44**	**112.6**	**0.71**	**0.84**
CFM 755	25.0	40.7	3.35	109.7	0.44	0.53
RPM 1550	30.0	38.3	2.63	106.7	0.30	0.36
HP 1/20	40.0	33.4	1.72	100.8	0.15	0.18
	50.0	28.6	1.18	94.9	0.08	0.10
	10.0	54.9	11.32	110.4	3.33	3.98
	15.0	52.2	7.17	107.9	1.56	1.86
70-W2	**20.0**	**49.5**	**5.10**	**105.4**	**0.89**	**1.06**
CFM 1004	25.0	46.7	3.85	102.9	0.56	0.67
RPM 1550	30.0	44.0	3.02	100.4	0.38	0.45
HP 1/8	40.0	38.6	1.99	95.4	0.19	0.23
	50.0	33.1	1.37	90.4	0.10	0.12
	60.0	27.7	0.95	85.4	0.06	0.07
	10.0	72.1	14.85	117.2	6.84	8.17
	15.0	69.1	9.50	114.8	3.27	3.90
90-W2	**20.0**	**66.2**	**6.82**	**112.5**	**1.89**	**2.26**
CFM 1162	25.0	63.3	5.22	110.2	1.22	1.45
RPM 1550	30.0	60.3	4.14	107.9	0.84	1.00
HP 1/8	40.0	54.5	2.81	103.2	0.45	0.53
	50.0	48.6	2.00	98.5	0.26	0.31
	60.0	42.7	1.47	93.9	0.16	0.19
	10.0	79.6	16.40	111.4	8.07	9.63
	15.0	76.3	10.49	109.3	3.85	4.60
100-W2	**20.0**	**73.0**	**7.53**	**107.2**	**2.23**	**2.66**
CFM 1427	25.0	69.8	5.75	105.1	1.43	1.71
RPM 1550	30.0	66.5	4.57	102.9	0.98	1.17
HP 1/8	40.0	59.9	3.09	98.7	0.52	0.63
	50.0	53.4	2.20	94.5	0.30	0.36
	60.0	46.9	1.61	90.3	0.18	0.22
	15.0	100.8	13.86	116.0	8.10	9.66
	20.0	**97.1**	**10.01**	**113.9**	**4.75**	**5.66**
126-W2	25.0	93.4	7.70	111.8	3.09	3.69
CFM 1661	30.0	89.7	6.16	109.8	2.15	2.57
RPM 1100	40.0	82.2	4.24	105.6	1.18	1.41
HP 1/6	50.0	74.8	3.08	101.5	0.71	0.85
	60.0	67.3	2.31	97.3	0.45	0.54

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	20.0	**129.8**	**13.37**	**112.8**	**9.39**	**11.20**
168-W2	25.0	125.3	10.33	110.9	6.16	7.34
CFM 2267	30.0	120.7	8.29	109.1	4.32	5.15
RPM 1100	40.0	111.6	5.75	105.4	2.41	2.87
HP 1/6	50.0	102.6	4.23	101.7	1.48	1.76
	60.0	93.5	3.21	98	0.96	1.14
	20	**140.5**	**14.48**	**108.1**	**10.71**	**12.77**
	25	135.6	11.18	106.5	7.01	8.36
186-W2	30	130.7	8.98	104.8	4.92	5.87
CFM 2690	40	120.9	6.23	101.4	2.74	3.27
RPM 1100	50	111.0	4.58	98.0	1.68	2.01
HP 1/4	60	101.2	3.48	94.7	1.09	1.30
	70	91.4	2.69	91.3	0.73	0.87
	80	81.6	2.10	87.9	0.49	0.59
	15	194.7	26.75	116.1	7.32	8.73
	20	**187.5**	**19.32**	**114.0**	**4.29**	**5.12**
230-W2	25	180.3	14.86	111.9	2.80	3.33
CFM 3200	30	173.1	11.89	109.9	1.95	2.33
RPM 1100	40	158.7	8.18	105.7	1.07	1.28
HP 1/4	50	144.3	5.95	101.6	0.65	0.77
	60	129.9	4.46	97.4	0.41	0.49
	70	115.6	3.40	93.3	0.27	0.32
	80	—	—	—	—	—
	20	**207.4**	**21.37**	**108.6**	**5.07**	**6.05**
	25	199.3	16.43	106.7	3.30	3.93
260-W2	30	191.2	13.14	104.8	2.30	2.74
CFM 3933	40	175.1	9.02	101.0	1.26	1.50
RPM 1100	50	159.0	6.56	97.3	0.76	0.90
HP 1/2	60	142.9	4.91	93.5	0.48	0.57
	70	126.8	3.73	89.7	0.31	0.37
	80	110.7	2.85	85.9	0.20	0.24
	20	**266.2**	**27.43**	**116.4**	**10.02**	**11.95**
	25	257.1	21.20	114.5	6.59	7.86
320-W2	30	248.0	17.04	112.5	4.64	5.53
CFM 4350	40	229.8	11.84	108.7	2.60	3.10
RPM 1100	50	211.6	8.72	104.8	1.60	1.91
HP 1/2	60	193.4	6.64	101.0	1.05	1.25
	70	175.2	5.16	97.1	0.70	0.84
	80	157.0	4.05	93.3	0.48	0.57
	20	**298.1**	**30.72**	**109.7**	**12.07**	**14.40**
	25	287.9	23.74	108.0	7.93	9.46
354-W2	30	277.8	19.08	106.3	5.59	6.66
CFM 5528	40	257.4	13.26	102.9	3.13	3.73
RPM 1100	50	237.0	9.77	99.5	1.93	2.30
HP 1/2	60	216.6	7.44	96.1	1.26	1.50
	70	196.2	5.78	92.7	0.85	1.01
	80	175.8	4.53	89.3	0.58	0.69
	20	**340.0**	**35.05**	**110.8**	**14.25**	**17.23**
	25	324.0	26.72	108.5	9.53	11.25
400-W2	30	313.0	21.51	106.8	6.66	7.97
CFM 6017	40	289.0	14.90	103.2	3.65	4.24
RPM 1140	50	266.0	10.97	99.8	2.21	2.62
HP 3/4	60	243.0	8.35	96.3	1.43	1.82
	70	221.0	6.51	93.1	1.04	1.28
	90	197.0	5.08	89.5	0.77	0.98

Performance Data

Table 19-1 - Model P Unit Heater Hot Water Capacities- 60 F Ent. Air Temp. and 200 F Ent. Water Temp.

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	10.0	28.8	5.93	104.6	0.37	0.49
42-P	15.0	25.7	3.54	99.9	0.14	0.18
CFM 595	**20.0**	**22.7**	**2.34**	**95.2**	**0.06**	**0.08**
RPM 1550	25.0	19.7	1.63	90.6	0.03	0.04
HP 1/40	30.0	16.7	1.15	85.9	0.02	0.02
	40.0	—	—	—	—	—
	10.0	22.9	4.71	108.3	0.24	0.31
42-P	15.0	20.5	2.82	103.3	0.09	0.12
CFM 436	**20.0**	**18.1**	**1.87**	**98.3**	**0.04**	**0.05**
RPM 1150	25.0	15.8	1.30	93.3	0.02	0.03
HP 1/40	30.0	13.4	0.92	88.4	0.01	0.01
	40.0	—	—	—	—	—
	10.0	48.1	9.92	104.8	1.05	1.40
	15.0	43.9	6.03	100.9	0.41	0.54
64-P	**20.0**	**39.6**	**4.08**	**96.9**	**0.19**	**0.26**
CFM 989	25.0	35.3	2.91	92.9	0.10	0.14
RPM 1550	30.0	31.1	2.14	89.0	0.06	0.08
HP 1/20	40.0	22.6	1.16	81.0	0.02	0.02
	50.0	—	—	—	—	—
	10.0	38.1	7.85	109.7	0.67	0.90
	15.0	34.8	4.78	105.4	0.26	0.35
64-P	**20.0**	**31.5**	**3.24**	**101.1**	**0.13**	**0.17**
CFM 706	25.0	28.2	2.32	96.7	0.07	0.09
RPM 1150	30.0	24.8	1.71	92.4	0.04	0.05
HP 1/20	40.0	—	—	—	—	—
	50.0	—	—	—	—	—
	10.0	58.7	12.11	105.1	0.98	1.27
	15.0	53.6	7.36	101.2	0.38	0.49
80-P	**20.0**	**48.4**	**4.99**	**97.2**	**0.18**	**0.23**
CFM 1200	25.0	43.3	3.57	93.2	0.10	0.12
RPM 1550	30.0	38.1	2.62	89.3	0.05	0.07
HP 1/20	40.0	27.8	1.43	81.3	0.02	0.02
	50.0	—	—	—	—	—
	10.0	46.5	9.59	110.0	0.63	0.81
	15.0	42.5	5.84	105.7	0.24	0.31
80-P	**20.0**	**38.5**	**3.97**	**101.4**	**0.12**	**0.15**
CFM 858	25.0	34.5	2.84	97.0	0.06	0.08
RPM 1150	30.0	30.5	2.09	92.7	0.03	0.04
HP 1/20	40.0	—	—	—	—	—
	50.0	—	—	—	—	—
	10.0	77.2	15.91	106.6	2.06	2.68
102-P	**20.0**	**68.3**	**7.03**	**101.2**	**0.44**	**0.58**
CFM 1528	25.0	63.8	5.26	98.5	0.25	0.33
RPM 1070	30.0	59.3	4.08	95.8	0.16	0.21
HP 1/8	40.0	50.4	2.60	90.4	0.07	0.09
	50.0	41.5	1.71	85.0	0.03	0.04
	60.0	—	—	—	—	—
	10.0	63.7	13.13	108.6	1.43	1.86
	15.0	60.1	8.26	105.8	0.59	0.78
102-P	**20.0**	**56.5**	**5.82**	**103.1**	**0.31**	**0.40**
CFM 1208	25.0	52.9	4.36	100.3	0.18	0.23
RPM 850	30.0	49.2	3.38	97.6	0.11	0.15
HP 1/8	40.0	42.0	2.16	92.0	0.05	0.06
	50.0	34.8	1.43	86.5	0.02	0.03
	60.0	—	—	—	—	—
	10.0	94.9	19.55	108.9	3.04	3.96
	15.0	89.3	12.27	106.0	1.26	1.64
122-P	**20.0**	**83.7**	**8.63**	**103.1**	**0.65**	**0.85**
CFM 1790	25.0	78.1	6.44	100.2	0.37	0.49
RPM 1100	30.0	72.5	4.98	97.3	0.23	0.30
HP 1/6	40.0	61.4	3.16	91.6	0.10	0.13
	50.0	50.2	2.07	85.8	0.04	0.06
	10.0	117.6	24.24	108.8	4.32	5.81
	15.0	111.4	15.31	106.3	1.83	2.45
146-P	**20.0**	**105.2**	**10.84**	**103.7**	**0.96**	**1.29**
CFM 2220	25.0	99.0	8.16	101.1	0.56	0.76
RPM 1100	30.0	92.8	6.38	98.5	0.36	0.48
HP 1/6	40.0	80.5	4.15	93.4	0.16	0.22
	50.0	68.1	2.81	88.3	0.08	0.10
	60.0	55.7	1.91	83.1	0.04	0.05

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	10.0	132.4	27.29	106.6	3.67	4.88
	15.0	125.5	17.24	104.1	1.55	2.06
166-P	**20.0**	**118.6**	**12.22**	**101.7**	**0.81**	**1.08**
CFM 2620	25.0	111.7	9.21	99.3	0.48	0.64
RPM 1100	30.0	104.8	7.20	96.9	0.30	0.40
HP 1/6	40.0	91.1	4.69	92.0	0.14	0.18
	60.0	63.5	2.18	82.3	0.03	0.04
	10.0	156.2	32.20	105.0	5.02	6.66
	15.0	148.0	20.33	102.6	2.12	2.81
202-P	20.0	**139.7**	**14.40**	**100.2**	**1.11**	**1.47**
CFM 3200	25.0	131.5	10.84	97.9	0.65	0.87
RPM 1100	30.0	123.2	8.47	95.5	0.41	0.55
HP 1/4	40.0	106.7	5.50	90.7	0.18	0.25
	50.0	90.2	3.72	86.0	0.09	0.12
	60.0	73.7	2.53	81.2	0.04	0.06
	10.0	—	—	—	—	—
	15.0	188.9	25.95	101.8	3.92	5.22
252-P	20.0	**180.1**	**18.56**	**99.9**	**2.10**	**2.80**
CFM 4162	25.0	171.4	14.13	98.0	1.26	1.68
RPM 1100	30.0	162.7	11.18	96.0	0.82	1.09
HP 1/4	40.0	145.2	7.48	92.2	0.39	0.52
	50.0	127.7	5.26	88.3	0.20	0.27
	60.0	110.2	3.79	84.4	0.11	0.15
	15.0	215.4	29.60	104.8	5.02	6.67
	20.0	**205.4**	**21.17**	**102.7**	**2.68**	**3.57**
280-P	25.0	195.3	16.10	100.6	1.61	2.15
CFM 4430	30.0	185.3	12.73	98.5	1.04	1.39
RPM 1100	40.0	165.1	8.51	94.4	0.49	0.66
HP 1/2	50.0	145.0	5.98	90.2	0.26	0.34
	60.0	124.9	4.29	86.0	0.14	0.19
	15.0	254.9	35.03	105.1	6.88	9.14
	20.0	**242.9**	**25.03**	**103.0**	**3.67**	**4.89**
336-P	25.0	230.9	19.04	100.8	2.21	2.94
CFM 5210	30.0	218.9	15.04	98.7	1.42	1.90
RPM 1140	40.0	194.9	10.04	94.5	0.67	0.90
HP 3/4	50.0	170.8	7.04	90.2	0.35	0.47
	60.0	146.8	5.04	86.0	0.19	0.25
	15.0	294.7	40.49	104.2	6.60	8.86
	20.0	**280.3**	**28.94**	**102.2**	**3.52**	**4.73**
384-P	25.0	267.0	22.01	100.1	2.11	2.84
CFM 6140	30.0	253.1	17.39	98.0	1.36	1.83
RPM 1140	40.0	225.4	11.61	93.8	0.64	0.87
HP 3/4	50.0	197.7	8.15	89.7	0.33	0.45
	60.0	170.0	5.84	85.5	0.18	0.24
	20.0	**368.1**	**37.93**	**102.3**	**5.81**	**7.91**
500-P	25.0	350.8	28.92	100.3	3.52	4.79
CFM 8020	30.0	333.6	22.92	98.3	2.29	3.11
RPM 1160	40.0	299.1	15.41	94.4	1.10	1.49
HP 1-1/2	50.0	264.6	10.90	90.4	0.58	0.79
	60.0	230.0	7.90	86.4	0.32	0.44
	15.0	451.2	62.00	104.0	8.78	11.46
	20.0	**431.1**	**44.43**	**102.0**	**4.72**	**6.17**
600-P	25.0	411.1	33.89	100.1	2.86	3.73
CFM 9450	30.0	391.0	26.86	98.1	1.86	2.43
RPM 1160	40.0	350.8	18.08	94.2	0.89	1.17
HP 1-1/2	50.0	310.7	12.81	90.3	0.47	0.62
	60.0	270.5	9.29	86.4	0.26	0.34
	15.0	—	—	—	—	—
	20.0	**519.4**	**53.52**	**103.5**	**5.29**	**7.25**
720-P	25.0	495.1	40.82	101.5	3.20	4.38
CFM 11,000	30.0	470.9	32.35	99.5	2.08	2.84
RPM 1165	40.0	422.3	21.76	95.4	1.00	1.36
HP 3	50.0	373.7	15.41	91.3	0.53	0.72
	60.0	325.2	11.17	87.2	0.29	0.40

21.4

Performance Data

Table 20-1 - Model P-L Unit Heater Hot Water Capacities- 60 F Ent. Air Temp. and 200 F Ext. Water Temp. (Capacities shown for units with all Air Ports open)

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	10.0	23.9	4.92	92.9	0.26	0.34
42-P-L	15.0	21.4	2.94	89.5	0.10	0.13
CFM 668	**20.0**	**18.9**	**1.95**	**86.1**	**0.04**	**0.06**
RPM 1550	25.0	16.4	1.36	82.7	0.02	0.03
HP 1/40	30.0	14.0	0.96	79.3	0.01	0.02
	40.0	—	—	—	—	—
	10.0	16.7	3.45	92.8	0.13	0.17
42-P-L	15.0	15.1	2.08	89.6	0.05	0.07
CFM 470	**20.0**	**13.5**	**1.39**	**86.4**	**0.02**	**0.03**
RPM 1150	25.0	11.8	0.98	83.2	0.01	0.02
HP 1/40	30.0	—	—	—	—	—
	10.0	41.5	8.56	91.9	0.80	1.06
	15.0	37.9	5.21	89.1	0.31	0.41
64-P-L	**20.0**	**34.2**	**3.53**	**86.3**	**0.15**	**0.20**
CFM 1200	25.0	30.6	2.52	83.5	0.08	0.10
RPM 1550	30.0	27.0	1.85	80.7	0.04	0.06
HP 1/20	40.0	19.7	1.01	75.1	0.01	0.02
	50.0	—	—	—	—	—
	10.0	32.4	6.68	94.7	0.50	0.66
	15.0	29.6	4.07	91.7	0.19	0.26
64-P-L	**20.0**	**26.9**	**2.77**	**88.7**	**0.09**	**0.12**
CFM 862	25.0	24.1	1.99	85.8	0.05	0.07
RPM 1150	30.0	21.3	1.46	82.8	0.03	0.04
HP 1/20	40.0	—	—	—	—	—
	50.0	—	—	—	—	—
	10.0	48.9	10.09	93.2	0.69	0.89
	15.0	44.7	6.14	90.3	0.27	0.35
8O-P-L	**20.0**	**40.5**	**4.17**	**87.4**	**0.13**	**0.17**
CFM 1360	25.0	36.3	2.99	84.6	0.07	0.09
RPM 1550	30.0	32.0	2.20	81.7	0.04	0.05
HP 1/20	40.0	—	—	—	—	—
	50.0	—	—	—	—	—
	10.0	38.5	7.94	95.7	0.44	0.56
80-P-L	15.0	35.2	4.84	92.6	0.17	0.22
CFM 995	**20.0**	**32.0**	**3.29**	**89.6**	**0.08**	**0.11**
RPM 1150	25.0	28.7	2.36	86.6	0.04	0.06
HP 1/20	30.0	25.4	1.75	83.5	0.02	0.03
	40.0	—	—	—	—	—

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	10.0	63.7	13.13	93.5	1.43	1.86
	15.0	60.1	8.26	91.6	0.59	0.78
102-P-L	**20.0**	**56.5**	**5.82**	**89.7**	**0.31**	**0.40**
CFM 1752	25.0	52.9	4.36	87.8	0.18	0.23
RPM 1070	30.0	49.2	3.38	85.9	0.11	0.15
HP 1/8	40.0	42.0	2.16	82.1	0.05	0.06
	50.0	34.8	1.43	78.3	0.02	0.03
	60.0	—	—	—	—	—
	10.0	54.5	11.24	93.5	1.06	1.39
	15.0	51.5	7.07	91.7	0.44	0.58
102-P-L	**20.0**	**48.5**	**4.99**	**89.8**	**0.23**	**0.30**
CFM 1499	25.0	45.4	3.75	87.9	0.13	0.18
RPM 850	30.0	42.4	2.91	86.1	0.08	0.11
HP 1/8	40.0	36.4	1.87	82.4	0.04	0.05
	50.0	—	—	—	—	—
	60.0	—	—	—	—	—
	10.0	83.7	17.24	95.4	2.40	3.12
	15.0	78.8	10.83	93.3	0.99	1.30
122-P-L	**20.0**	**73.9**	**7.62**	**91.3**	**0.51**	**0.67**
CFM 2180	25.0	69.1	5.69	89.2	0.30	0.39
RPM 1100	30.0	64.2	4.41	87.1	0.18	0.24
HP 1/6	40.0	54.5	2.81	83.0	0.08	0.10
	50.0	44.8	1.84	78.9	0.04	0.05
	60.0	—	—	—	—	—
	10.0	95.4	19.66	97.3	2.92	3.92
	15.0	90.5	12.43	95.3	1.23	1.66
146-P-L	**20.0**	**85.5**	**8.81**	**93.4**	**0.65**	**0.87**
CFM 2360	25.0	80.6	6.64	91.5	0.38	0.52
RPM 1100	30.0	75.6	5.20	89.5	0.24	0.33
HP 1/6	40.0	65.8	3.39	85.7	0.11	0.15
	50.0	55.9	2.30	81.8	0.05	0.07
	60.0	46.0	1.58	78.0	0.03	0.04
	10.0	112.3	23.15	95.4	2.70	3.58
	15.0	106.5	14.64	93.6	1.14	1.52
166-P-L	**20.0**	**100.7**	**10.38**	**91.8**	**0.60**	**0.80**
CFM 2920	25.0	95.0	7.83	90.0	0.35	0.47
RPM 1100	30.0	89.2	6.13	88.1	0.22	0.30
HP 1/6	40.0	77.6	4.00	84.5	0.10	0.14
	50.0	66.0	2.72	80.8	0.05	0.07
	60.0	54.5	1.87	77.2	0.02	0.03

Continued on next page:

Performance Data

Table 21-1 - Model P-L Unit Heater Hot Water Capacities- 60 F Ent. Air Temp. and 200 F Ext. Water Temp. (Capacities shown for units with all Air Ports open)

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	10.0	135.8	27.98	96.9	3.85	5.11
	15.0	128.6	17.67	95.0	1.63	2.16
202-P-L	**20.0**	**121.5**	**12.52**	**93.0**	**0.85**	**1.13**
CFM 3390	25.0	114.4	9.43	91.1	0.50	0.67
RPM 1100	30.0	107.3	7.37	89.2	0.32	0.42
HP 1/4	40.0	93.1	4.80	85.3	0.14	0.19
	50.0	78.8	3.25	81.4	0.07	0.09
	60.0	64.6	2.22	77.6	0.03	0.05
	10.0	168.5	34.72	94.5	6.75	8.98
	15.0	161.1	22.14	93.0	2.91	3.88
252-P-L	**20.0**	**153.8**	**15.85**	**91.4**	**1.56**	**2.08**
CFM 4507	25.0	146.4	12.07	89.9	0.94	1.26
RPM 1100	30.0	139.1	9.56	88.4	0.61	0.82
HP 1/4	40.0	124.4	6.41	85.4	0.29	0.39
	50.0	109.7	4.52	82.4	0.15	0.21
	60.0	95.0	3.26	79.4	0.08	0.11
	10.0	—	—	—	—	—
	15.0	188.9	25.95	94.5	3.92	5.22
280-P-L	**20.0**	**180.1**	**18.56**	**92.9**	**2.10**	**2.80**
CFM 5040	25.0	171.4	14.13	91.3	1.26	1.68
RPM 1100	30.0	162.7	11.18	89.7	0.82	1.09
HP 1/2	40.0	145.2	7.48	86.6	0.39	0.52
	50.0	127.7	5.26	83.4	0.20	0.27
	60.0	110.2	3.79	80.2	0.11	0.15

Unit Size	Water Temp. Drop °F	200 F MBH	GPM	FT	PD S.W.T.	PD H.W.T.
	15.0	220.9	30.35	95.7	5.26	6.99
	20.0	**210.6**	**21.70**	**94.1**	**2.81**	**3.74**
336-P-L	25.0	200.2	16.51	92.4	1.69	2.25
CFM 5700	30.0	189.9	13.05	90.7	1.09	1.46
RPM 1140	40.0	169.2	8.72	87.4	0.52	0.69
HP 3/4	50.0	148.6	6.12	84.0	0.27	0.36
	60.0	127.9	4.39	80.7	0.15	0.20
	15.0	260.7	35.82	96.4	5.24	7.04
	20.0	**248.5**	**25.61**	**94.7**	**2.80**	**3.76**
384-P-L	25.0	236.4	19.49	93.0	1.68	2.26
CFM 6600	30.0	224.2	15.40	91.3	1.09	1.46
RPM 1140	40.0	199.8	10.30	87.9	0.51	0.69
HP 3/4	50.0	175.4	7.23	84.5	0.27	0.36
	60.0	151.1	5.19	81.1	0.14	0.20
	15.0	—	—	—	—	—
	20.0	**310.5**	**32.00**	**90.5**	**4.23**	**5.76**
500-P-L	25.0	296.1	24.41	89.1	2.56	3.49
CFM 9380	30.0	281.7	19.35	87.7	1.67	2.27
RPM 1160	40.0	252.8	13.03	84.8	0.80	1.09
HP 1-1/2	50.0	224.0	9.23	82.0	0.43	0.58
	60.0	195.2	6.70	79.2	0.24	0.32
	15.0	394.4	54.19	95.3	6.83	8.91
	20.0	**377.0**	**38.85**	**93.7**	**3.68**	**4.80**
600-P-L	25.0	359.6	29.65	92.2	2.23	2.91
CFM 10,300	30.0	342.2	23.51	90.6	1.45	1.90
RPM 1160	40.0	307.4	15.84	87.5	0.70	0.92
HP 1-1/2	50.0	272.6	11.24	84.4	0.37	0.49
	60.0	237.8	8.17	81.3	0.21	0.27
	15.0	—	—	—	—	—
	20.0	**453.7**	**46.76**	**95.1**	**4.11**	**5.63**
720-P-L	25.0	432.7	35.67	93.5	2.49	3.40
CFM 11,900	30.0	411.7	28.28	91.9	1.62	2.21
RPM 1165	40.0	369.6	19.04	88.6	0.78	1.06
HP 3	50.0	327.5	13.50	85.4	0.42	0.56
	60.0	285.4	9.80	82.1	0.23	0.31

21.6

Installation

Unit Mounting
Install unit heaters to meet Occupational Safety and Health Act (OSHA) and CSA requirements. Model S & P Unit Heaters mounted lower than 8 feet or 2.4 meters (CSA) from the floor must be equipped with an OSHA fan guard.

Weldnuts are provided at the top of all P units for suspension purposes. See Figures 7-1 and 8-1. AVK nutserts are provided at the top of all S units for suspension purposes. Motor Mount Type 1 has a two point suspension while Motor Mount Type 2 uses a 4 point suspension wiht the addition of pipe hangers. Support rods should support the total unit weight to assure that no strain is placed on supply and return piping. Provisions for removal of the unit from the suspension rods may be desirable for servicing purposes.

It is assumed that the type of system to be used has been selected by the design engineer. The sketches shown are for fifferent types of steam systems or hot water systems. For sizing of piping, traps, filters, etc. consult ASHRAE guides of the manufacturer's literature on these products.

It is important that the system be kept clean. Care should be exercised that excessive joint materials or foreign substances be kept out of the system.

On steam systems it is recommended that the unit be installed level for proper condensate drainage. Swing joints should be used in piping, and pipes should be pitched down from the units so condensate can drain freely.

Provide sufficient clearance around units for maintenance purposes. This includes at least 7 inches above all Model P Unit Heaters even though the motor is removable through the bottom.

Isolators are not required but may be desirable for some applications. Refer to Table 22-1 for Unit Weights.

Notice: Increasing the clearance distances may be necessary if there is a possibility of distortion or discoloration of adjacent materials.

⚠ WARNING

Make certain that the lifting methods used to lift the heater and the method of suspension used in the field installation of the heater are capable of uniformly supporting the weight of the heater at all times. Failure to heed this warning may result in property damage or personal injury!

⚠ CAUTION

Unit Heaters must be hung level from side to side and from front to back. Failure to do so will result in poor performance and/or premature failure of the unit.

⚠ WARNING

Insure that all hardware used in the suspension of each unit heater is more than adequate for the job. Failure to do so may result in extensive property damage, severe personal injury, or death.

All hanging hardware and wood is not included with the unit (to be field supplied).

Place the units at points of greatest heat loss. Blanket outside doorway and provide ample coverage of window areas. Keep units away from obstructions that will impede the full and natural air delivery of the units.

To insure delivery of the heated air to the desired area, follow the maximum distance of throw and mounting heights given in Table 23-1 and Table 25-1. Mounting heights are to be measured from the floor to the bottom of the unit.

The discharge air temperature on Model P Units may be adjusted after installation. The top of all Model P Units contain a pattern of easily removed air port openings. To lower the discharge air temperature, it is only necessary to open the desired number of air ports.

Table 22-1 – Units Weights – Lb.

Model P*		Model S			
Unit	Weight Lb.	Unit	Weight Lb.	Unit	Weight Lb.
42P	30	18S	40	19S2	40
64P	35	20S2	40	31S	40
80P	40	38S	40	45S	55
102P	55	42S	40	53S	55
122P	55	60S	55	69S	70
146P	80	70S	60	77S	80
166P	80	90S	75	91S	95
202P	85	100S	85	127S	135
252P	135	126S	100	137S	135
280P	135	168S	145	181S	180
336P	135	186S	145	207S	185
384P	175	230S	190	243S	230
500P	250	260S	195	273S	235
600P	260	320S	245		
720P	325	354S	250		
		400S	280		

* P and PL units

Installation

Table 23-1 – Maximum Mounting Height in Feet For Model P Unit Heaters

Unit Size	Steam Pressure (PSI)				
	2	5	10	50	75
42P	10.5	10.0	10.0	9.0	8.0
	12.5	**12.0**	**12.0**	**11.0**	**10.0**
42P LS *	8.0	8.0	8.0	8.0	8.0
	9.0	**8.5**	**8.5**	**8.0**	**8.0**
42P L* *	12.5	12.0	12.0	10.5	9.5
	14.5	**14.0**	**13.5**	**12.0**	**11.5**
42P LLS	9.0	8.5	8.5	8.0	8.0
	10.5	**10.0**	**10.0**	**9.0**	**8.5**
64P	12.0	11.5	11.5	10.0	9.5
	14.5	**14.0**	**14.0**	**12.0**	**11.5**
64P LS	9.5	9.0	9.0	8.0	8.0
	11.5	**11.0**	**11.0**	**9.5**	**9.0**
64 PL	15.0	14.5	14.5	12.5	12.0
	19.0	**18.5**	**18.5**	**16.5**	**16.0**
64P LLS	11.5	11.0	11.0	9.5	8.0
	14.0	**13.5**	**13.5**	**12.0**	**11.5**
80P	15.0	14.5	14.0	12.0	11.5
	18.5	**18.0**	**17.5**	**15.5**	**13.5**
80P LS	11.0	10.5	10.5	9.0	8.5
	13.5	**13.0**	**13.0**	**11.5**	**11.0**
80P L	18.0	17.5	17.5	15.0	14.0
	22.0	**21.0**	**21.0**	**19.0**	**18.0**
80P LLS	13.0	12.5	12.0	11.0	10.5
	17.0	**16.5**	**16.0**	**14.0**	**13.5**
102P	14.0	13.5	13.0	11.5	11.0
	17.0	**16.5**	**16.0**	**14.0**	**13.5**
102P LS	11.0	10.5	10.5	9.5	9.0
	13.5	**13.0**	**13.0**	**12.0**	**11.5**
102P L	17.5	17.0	16.5	15.0	14.5
	21.5	**21.0**	**20.5**	**18.5**	**17.5**
102P LLS	15.0	14.5	14.5	13.0	12.5
	18.5	**18.0**	**18.0**	**16.0**	**15.0**
122P	16.0	15.5	15.5	14.0	13.5
	19.5	**19.0**	**18.5**	**17.0**	**16.0**
122P L	21.0	20.5	20.0	17.5	17.0
	26.0	**25.5**	**25.0**	**22.5**	**21.5**
146P	15.5	15.0	14.5	13.0	12.0
	19.0	**18.5**	**18.0**	**16.0**	**15.5**

Unit Size	Steam Pressure (PSI)				
	2	5	10	50	75
146P L	18.0	17.5	17.5	15.0	14.0
	22.5	**22.0**	**21.5**	**18.5**	**18.0**
166P	18.0	17.5	17.0	14.5	14.0
	22.5	**22.0**	**21.5**	**19.0**	**18.0**
166P L	22.0	21.5	21.0	18.5	17.5
	27.5	**27.0**	**26.5**	**23.5**	**22.5**
202P	22.0	21.5	21.0	18.5	17.5
	27.5	**27.0**	**26.5**	**24.0**	**23.0**
202P L	25.5	25.0	24.5	22.0	21.0
	31.5	**31.0**	**30.5**	**27.0**	**26.0**
252P	20.0	19.5	19.0	17.0	16.0
	25.0	**24.0**	**23.5**	**20.5**	**19.5**
252 PL	24.0	23.5	23.0	20.0	19.0
	29.5	**28.5**	**28.0**	**24.5**	**23.5**
280P	21.0	20.5	20.0	17.5	17.0
	26.0	**25.5**	**25.0**	**22.0**	**21.0**
280P L	25.0	25.0	24.5	21.0	20.0
	32.0	**31.0**	**30.0**	**26.0**	**25.0**
336P	24.0	23.0	22.0	20.0	19.0
	30.0	**29.0**	**28.0**	**25.0**	**24.0**
336P L	29.0	28.5	28.0	25.0	24.0
	36.0	**35.0**	**34.0**	**30.0**	**29.0**
384P	28.5	28.0	27.5	24.0	23.0
	35.5	**35.0**	**34.0**	**30.0**	**29.0**
384P L	32.5	31.5	30.5	27.5	26.5
	41.0	**40.0**	**39.0**	**35.0**	**33.5**
500P	29.5	29.0	28.5	25.0	24.0
	36.5	**36.0**	**35.5**	**32.0**	**30.5**
500P L	35.0	34.0	33.0	29.0	28.0
	43.5	**42.5**	**41.5**	**35.0**	**34.0**
600P	34.0	33.0	32.0	28.0	27.0
	42.5	**41.5**	**40.5**	**36.0**	**34.5**
600P L	37.0	36.0	35.0	31.0	30.0
	46.5	**45.5**	**44.5**	**39.0**	**37.0**
720P	38.5	37.5	36.5	32.0	30.5
	48.0	**47.0**	**46.0**	**40.0**	**39.0**
720P L	42.5	41.5	40.5	35.0	33.5
	53.0	**52.0**	**51.0**	**44.0**	**42.0**

*LS - Low Speed

**PL - Model P Low Final Temperature Model With All Air Ports Open.

The second row of figures for each unit gives maximum mounting height with louver cone diffuser blades set vertically.

The above table is based on 60 ° F entering air temperature. In providing for the use odf diffusers, it must be remembered that adjustment of a LCD to deflect air toward horizontal immediately lowers the mounting height.

TO MEET OSHA and CSA REQUIREMENTS, MODEL "P" UNIT HEATERS MOUNTED LOWER THAN 2.4 METERS FROM THE FLOOR MUST HAVE AN OSHA FAN GUARD.

21.6

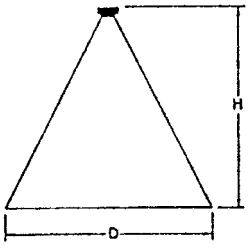
Installation

Table 24-1 – Maximum Mounting Height and Diameter at Floor (Based on 60° F EAT and 219° F EWT or 2 pounds steam)

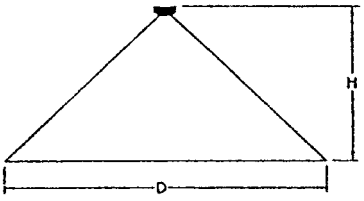
Model	Louver Cone Diffuser Blades 90° See A				Louver Cone Diffuser Blades 45° See B			
	P		PL		P		PL	
	H	D	H	D	H	D	H	D
42P	12.5	11.0	14.5	16.0	9.0	20.0	11.0	25.0
64P	14.5	12.0	19.0	19.0	10.0	24.0	12.0	29.0
80P	18.5	14.0	22.0	23.0	12.5	26.0	15.0	31.0
102P	17.0	18.0	21.5	26.0	11.0	31.0	14.0	35.0
122P	19.5	19.0	26.0	29.0	13.0	33.0	16.0	38.0
146P	19.0	20.0	22.5	30.0	12.0	39.0	15.5	44.0
166P	22.5	21.0	27.5	31.0	13.0	42.0	18.0	48.0
202P	27.5	25.0	31.5	35.0	14.0	45.0	21.0	53.0
252P	25.0	27.0	29.5	38.0	13.0	47.0	19.0	55.0
280P	26.0	29.0	32.0	40.0	15.0	50.0	21.0	60.0
336P	30.0	34.0	36.0	47.0	18.0	55.0	24.0	66.0
384P	35.5	39.0	41.0	52.0	20.0	59.0	28.0	71.0
500P	36.5	42.0	43.5	57.0	24.0	65.0	30.0	76.0
600P	42.5	45.0	46.5	60.0	26.0	70.0	34.0	78.0
720P	48.0	46.0	53.0	63.0	28.0	75.0	38.0	87.0

H = Height in Ft.
D = Diameter in Ft.

A



B



See Example

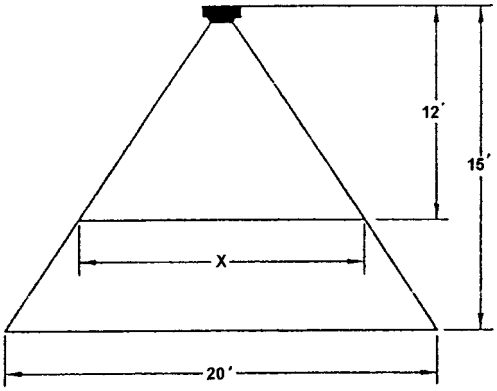


Table 24-1 lists maximum mounting height and floor spread data of warm air coverage at floor level with louver cone diffusers. Correction factors for various water temperatures and steam pressures are in Table 24-2.

An approximation of the floor spread when operating on other than 2 lb. steam or 219° hot water may be obtained by ratioing the new floor spread and maximum mounting height to that at 215° steam or 219° hot water.

Following is an example:

Determine the floor spread and the maximum mounting height of an 80P unit heater with or without a diffuser operating on 280° hot water.

From Table 24-1 maximum mounting height of an 80P at 2 lb. steam or 219° water is 15 ft. with floor coverage of 20 ft. diameter. The maximum mounting height correction factor at 280° hot water is 0.80.

Example
15 ft x 0.80 = 12 ft.
Maximum mounting height of an 80P using 280° hot water.
"X" = floor spread of 80P using 280° hot water

X : 12 x 20 / 15

X = 240 / 15

X = 16 ft.

Table 24-2 – Mounting Height Correction Factors Model P Heaters

Water Temp.	150	160	170	180	190	200	210	219	227	239	250	259	267	280	287	298	307	320
Steam Press. PSI	-	-	-	-	-	-	-	2	5	10	15	20	25	35	40	50	60	75
CF	1.32	1.27	1.23	1.18	1.14	1.09	1.05	1.00	0.97	0.94	0.89	0.86	0.83	0.80	0.76	0.73	0.70	0.66

CF = Correction Factors 42P thru 720P

Installation

Table 25-1 – Maximum Distance of Throw and Mounting Height Feet for Model S Unit Heaters

Unit	Outlet Velocity	CFM	Final Temp. (F)	Mounting Height	Maximum Throw	
					Without Diffuser	With Louver Fin Set for Maximum Throw
18S	162	280	117	8	12	15
20S2	186	318	118	8	15	18
38S	319	544	126	9	18	22
42S	347	590	125	9	20	25
60S	343	815	129	10	22	27
70S	454	1100	117	11	28	35
90S	382	1214	127	12	28	35
100S	476	1535	118	13	28	35
126S	411	1760	126	14	32	40
168S	452	2380	127	14	40	50
186S	528	2808	121	15	45	56
230S	431	3300	124	15	40	50
260S	529	4100	118	15	50	62
320S	442	4480	127	15	50	62
354S	550	5660	118	15	60	75
400S	583	6017	122	8	65	80
19S2	220	390	106	8	18	22
31S	359	635	104	9	20	25
45S	363	897	107	10	25	31
53S	439	1090	105	12	28	35
69S	407	1337	108	13	30	37
77S	458	1510	107	14	32	40
91S	394	1740	108	15	32	40
127S	448	2440	108	15	40	50
137S	495	2700	107	15	45	56
181S	430	3392	109	15	42	52
207S	514	4059	107	15	48	60
243S	439	4607	108	15	55	68
273S	536	5644	105	15	60	75

TO MEET CSA AND OSHA REQUIREMENTS, MODEL "S" UNIT HEATERS MOUNTED LOWER THAN 2.4 METERS (8FT) FROM THE FLOOR, MUST BE EQUIPPED WITH AN OSHA FAN GUARD.

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Installation

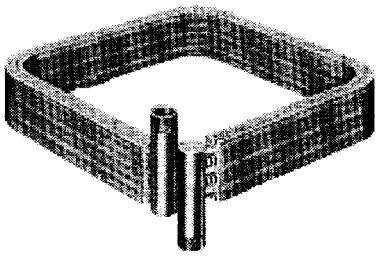
PIPING

To provide proper coil operation, follow all piping recommendations listed in this manual.

Threaded pipe headers are provided on all Model P Units for piping connections. See Figure 26-1. Connections are given in Figures 7-1 and 8-1 and Tables 7-1 and 8-1.

Model S Units have male type threaded pipe connections that are bolted to the casing backplate while pipe connections are being made. See Figure 26-2 Connection sizes are given in Figure 10-1 and Table 10-1.

Figure 26-1 - Model P Unit Heater Coil and Headers

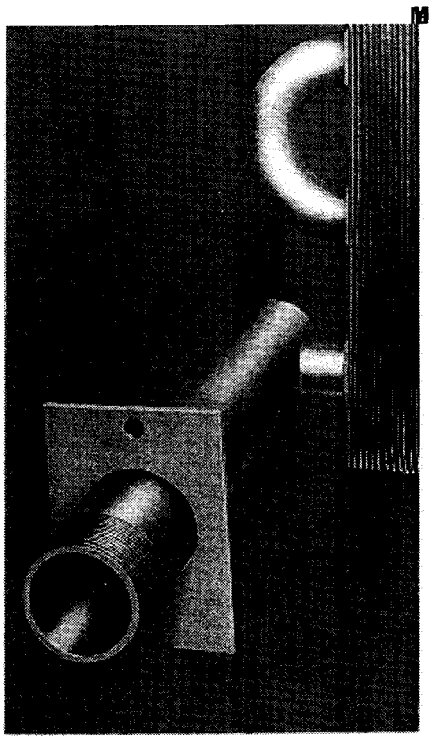


Follow standard practices and codes when installing the piping. Provide swing joints for expansion purposes, unions and shut-off valves for servicing purposes and, as illustrated in Figures 27-1 through 28-2, valves and traps for control purposes. Use 45 degree angle run-offs from all supply and return mains.

Dirt pockets should be the same pipe size as the return tapping of the unit heater. Also, pipe size in the branch-off should be the same size as the tapping in the traps. Beyond the trap, the return lateral pipe should be increased one size up to the return main.

Tables 27-1 and 28-1 list recommended steam trap selections.

Figure 26-2 - Model S Unit Heater Coil and Piping Coupling



Installation

Figure 27-1 – Hot Water System with Lower Supply and Return Lines on a Model P unit. Pet Cock may replace Automatic Air Vent.

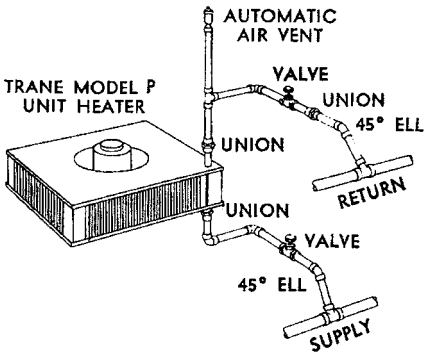


Figure 27-2 – High Pressure Steam System with overhead Supply and Return Mains. Place Bucket Trap below Coil Return Outlet for proper condensate drainage.

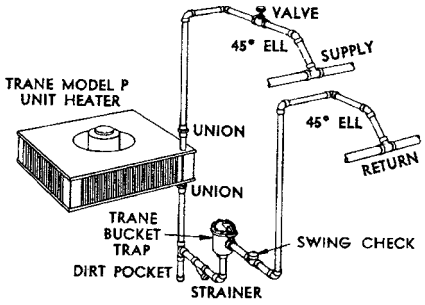


Figure 27-3 - Vapor or Vacuum System with Lower Supply and Return Mains

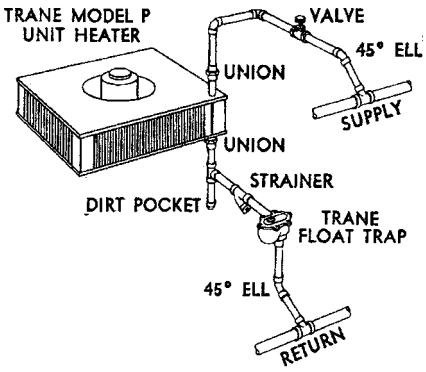


Table 27-1 - Steam Trap Selection – Model P Unit Heaters

Model P Size	2 PSIG	5 PSIG		10 PSIG		15 PSIG	
	F-T Trap	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap
42 - 166	3/4" 55 AL	3/4" 55 AL	No. 62	3/4" 55 AL	No. 62	3/4" 55 AL	No. 62
202 - 252	1" 55 AL	1" 55 AL	No. 62	1" 55 AL	No. 62	1" 55 AL	No. 62
280	1" 55 AL	1" 55 AL	No. 62	1" 55 AL	No. 62	1" 55 AL	No. 62
336	1" 55 AL	1" 55 AL	No. 62	1" 55 AL	No. 62	1" 55 AL	No. 62
384	1" 55 AL	1" 55 AL	No. 191	1" 55 AL	No. 62	1" 55 AL	No. 62
500	1 1/4" 66 CL	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 62
600	1 1/4" 66 CL	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191
720	1 1/4" 66 CL	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191

Model P Size	30 PSIG		50 PSIG		75 PSIG	
	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap
42 - 166	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 62
202 - 252	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 191
280	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 191
336	3/4" 55 AM	No. 191	3/4" 55 AM	No. 191	1 1/4" 66 CH	No. 191
384	3/4" 55 AM	No. 191	3/4" 55 AM	No. 191	1 1/4" 66 CH	No. 191
500	1 1/4" 66 CM	No. 191	1 1/4" 66 CM	No. 191	1 1/4" 66 CH	No. 351
600	1 1/4" 66 CM	No. 191	1 1/4" 66 CM	No. 191	1 1/4" 66 CH	No. 351
720	1 1/4" 66 CM	No. 191	1 1/4" 66 CM	No. 191	1 1/4" 77 HH	No. 351

Note: Above selections of Trane Company Traps are based on cataloged unit capacities.
A load factor of 2 has been used.

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Installation

Figure 28-1 - Hot Water System with Overhead Supply and Return Lines. An Automatic Air Vent may be substituted for the Pet Cock if desired.

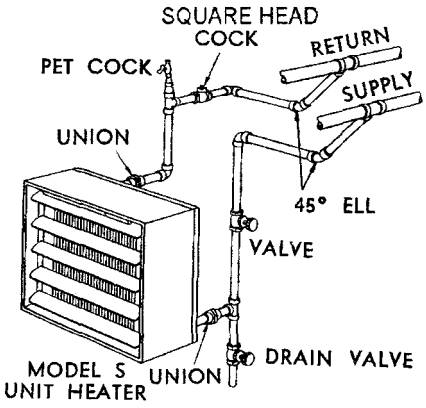


Figure 28-2

Figure 28-2 High Pressure Steam System. Top of Bucket Trap must be located below Return Outlet of Coil to assure complete drainage of condensate.

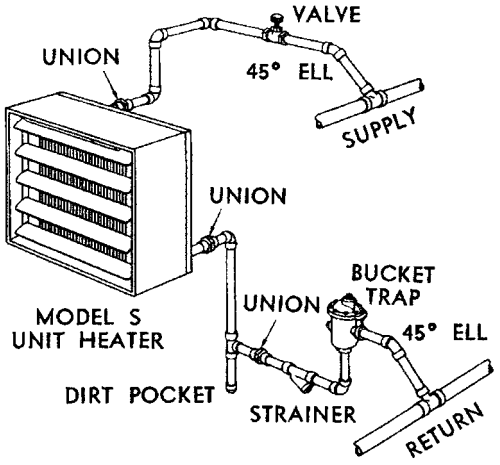


Table 28-1 - Steam Trap Selection – Model S Unit Motors

Model S Size	2 PSIG	5 PSIG		10 PSIG		15 PSIG	
	F-T Trap	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap
18 - 137	3/4" 55 AL	3/4" 55 AL	No. 62	3/4" 55 AL	No. 62	3/4" 55 AL	No. 62
160 -186	3/4" 55 AL	3/4" 55 AL	No. 62	3/4" 55 AL	No. 62	3/4" 55 AL	No. 62
207 -243	1" 55 AL	1" 55 AL	No. 62	1" 55 AL	No. 62	1" 55 AL	No. 62
260 -273	1" 55 AL	1" 55 AL	No. 62	1" 55 AL	No. 62	1" 55 AL	No. 62
320	1" 55 AL	1" 55 AL	No. 62	1" 55 AL	No. 62	1" 55 AL	No. 62
354	1" 55 AL	1" 55 AL	No. 191	1" 55 AL	No. 62	1" 55 AL	No. 62
400	1 1/4" 66 CL	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191	1 1/4" 66 CL	No. 191

Model S Size	30 PSIG		50 PSIG		75 PSIG	
	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap	F-T Trap	Bucket Trap
18 - 137	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 62
160 -186	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 191
207 -243	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 191
260 -273	3/4" 55 AM	No. 62	3/4" 55 AM	No. 62	3/4" 55 AH	No. 191
320	3/4" 55 AM	No. 191	3/4" 55 AM	No. 191	1 1/4" 66 CH	No. 191
354	3/4" 55 AM	No. 191	3/4" 55 AM	No. 191	1 1/4" 66 CH	No. 191
400	1 1/4" 66 CM	No. 191	1 1/4" 66 CM	No. 191	1 1/4" 66 CH	No. 351

Note: Above selections of Trane Company Traps are based on cataloged unit capacities.
A load factor of 2 has been used.

Wiring

Figure 29-1 – Fan Motor Connections
Low Voltage with Protector Select
Rotation (CCW shown) (Marathon)

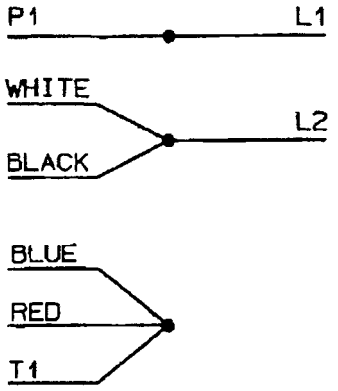


Figure 29-2 - Fan Motor Connections
Low Voltage CCW Internal (Marathon)

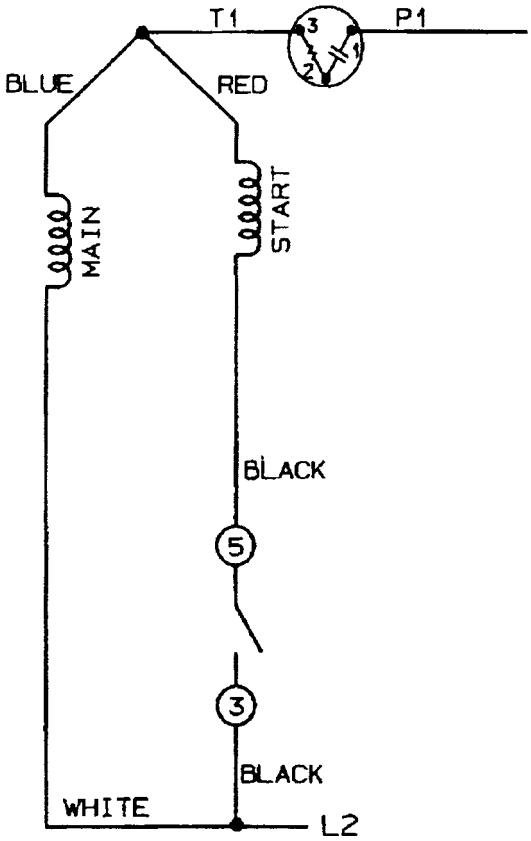


Figure 29-3 – Fan Motor Connections 115/60/1, Constant Speed,
Two Lead (G.E., Marathon, Universal)

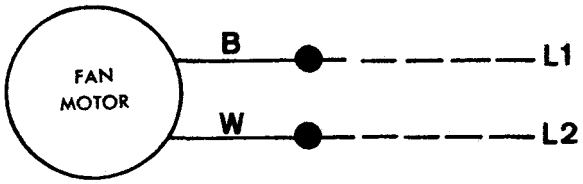
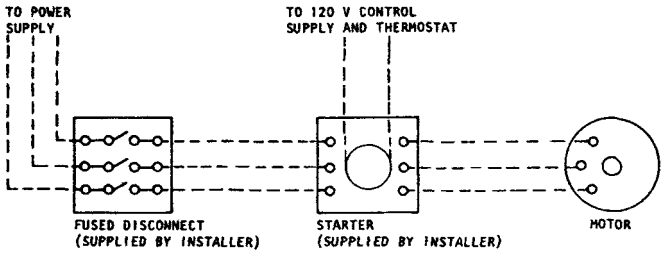


Figure 29-4 – Fan Motor Connections 3 Phase Wiring



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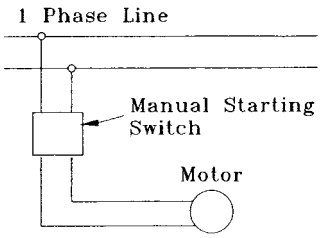
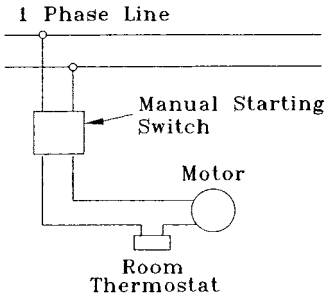
Wiring Installation

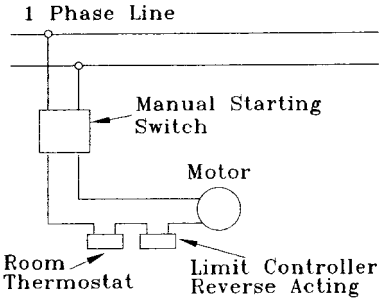
Figure 30-1 - Typical Wiring of Hydronic Unit Heaters



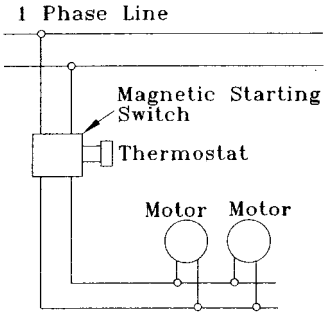
Manual Control With Single Phase Motor



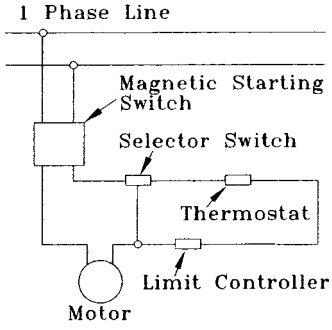
Thermostatic Control With Manual Starter



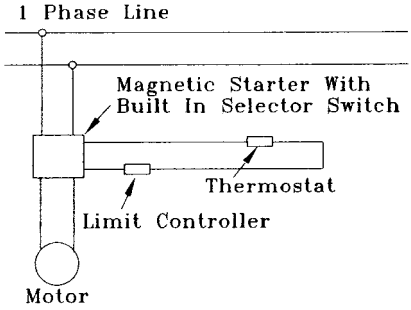
Thermostatic Control With Reverse Acting Limit Controller And Manual Starter



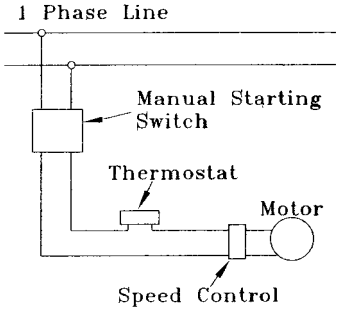
Thermostatic Control Using Magnetic Starter Operating Several Units



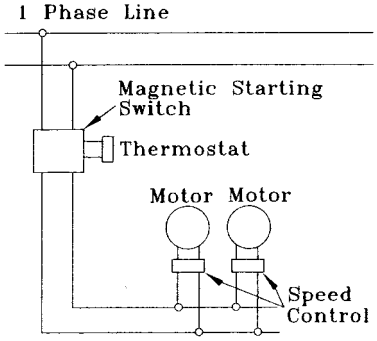
Three Position Selector Switch Used For Either Manual Or Thermostatic Control



Three Position Selector Switch Built Into Magnetic Starter For Manual Or Thermostatic Control



Speed Control With Manual Starting Switch

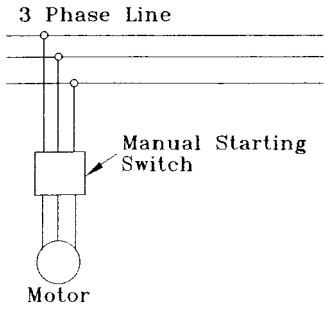


Speed Control With Magnetic Starting Switch For Operating Several Units

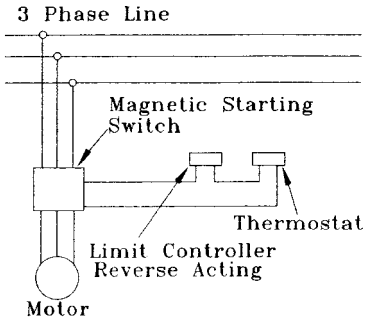
Notice: When using a speed controller, always locate the thermostat between the speed controller and the line, not between the motor and the controller.

Notice: For internal wiring and overload protection on all starters, consult the control manufacturer for details.

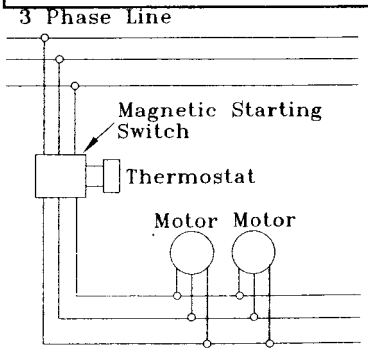
Notice: When using thermostatic control with a manual starter, be sure that the electrical rating of the thermostat is sufficient to carry the motor current.



Manual Control With Three Phase Motor



Thermostatic Control With Limit Controller For Three Phase Motor



Thermostatic Control Of Several Three Phase Units

Maintenance

Electrical Connections

⚠ WARNING
HAZARDOUS VOLTAGE!
Disconnect All Electric Power Including Remote Disconnects Before Servicing. Failure to disconnect power before servicing can cause severe personal injury or death.

Standard units are shipped for use on 115 volt, 60 hertz, single phase electric power. The motor nameplate and electrical rating of the transformer should be checked before energizing the unit heater electrical system. All external wiring must conform to the latest edition of ANSI/NFPA No. 70-1996, National Electrical Code, and applicable local codes; in Canada, to the Canadian Electrical Code, Part 1, CSA Standard C22.1.

⚠ CAUTION
Do not use any tools (i.e. screwdrivers, pliers, etc.) across terminals to check for power. Use a voltmeter.

It is recommended that the electrical power supply to each unit heater be provided by a separate, fused, and permanently live electrical circuit. A disconnect switch of suitable electrical rating should be located as close to the controls as possible. Each unit heater must be electrically grounded in accordance with the latest edition of the National Electrical Code, ANSI/NFPA No. 70-1996, or CSA Standard C22.1.

Wiring

The installer shall furnish all wiring to the fan motor. First, refer to the motor wiring diagram or instructions to determine connections. Typical examples are included on Figure 29-1, 29-2, 29-3 and 29-4. See "Operating Information – Motors" for a discussion of the standard motors used with model S and P unit heaters.

Motors

The standard 115/60/1 motors provided on S and P Unit Heaters are totally enclosed. Class "B" insulated and have built-in thermal overload protection.

NOTE: Motors rated ½ H.P. and smaller are interchangeable between S and P models. This assures simplified and economical maintenance.

Models 53S through 100S – use permanent split capacitor motors with sleeve bearings.

Model S Units, 18 through 60 and Model P Units, 42 through 80, use sleeve type bearings.

Models 91 S through 354S and Model P units, 122 through 280, use permanent split capacitor motors with ball bearings.

Model 400S uses 230, 460/60/3 motor with sealed ball bearings.

All sleeve bearing motors have oil holes to allow lubrication.

Ball bearing motors are permanently lubricated although some three phase or special motors have removable plugs which will allow field installation of grease fittings.

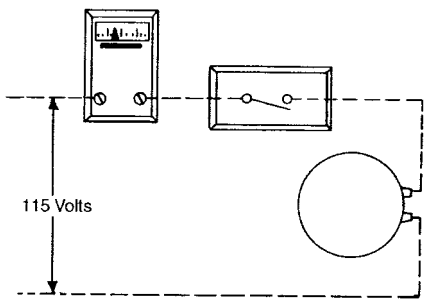
The standard 42P through 102P and 18S through 100S motors can be converted to variable speed operation with the addition of the solid state speed control.

See Figure 30-1 for typical wiring diagrams of units with different accessories.

Variable Speed Control
115 Volt Only (Optional)

The solid state speed controller may be installed at any convenient location and is suitable for surface or flush type mounting. A standard electrical single or double gang wall box is recommended as in Figure 31.

Figure 31 – Wiring Diagram of Speed Control Installation



Installation Procedure:

1. Attach the control's leads to the electrical leads in the control box using wire nuts. The speed control is to be wired in series with the motor. See wiring diagram in Figure 31.
2. Make certain wire nuts are tight with no copper wire being exposed.
3. Place wires and wire nuts back into box allowing room for the control to fit in box also.
4. Mount speed control to box using Number 6 flathead screws provided.

Setting Speed Control:

1. Turn the control shaft fully clockwise. If the motor is not running at the desired low speed, adjust the trim on the face of the control for low speed setting using a small screwdriver.
2. Rotate the control shaft counterclockwise. The speed will increase smoothly from minimum to maximum and then switch off.
3. Mount face plate with screws provided and attach control knob. See Figure 32.

Thermostat Wiring and Location

NOTICE: The thermostat must be mounted on a vertical vibration-free surface free from air currents and in accordance with the furnished instructions.

Mount the thermostat approximately 5 feet (1.5 m) above the floor in an area where it will be exposed to a free circulation of average temperature air. Always refer to the thermostat instruction as well as our unit wiring diagram and wire accordingly. Avoid mounting the thermostat in the following locations:

1. Cold areas – Outside walls or areas where drafts may affect the operation of the control.
2. Hot Areas – Areas where the sun's rays, radiation, or warm air currents may affect control operation.

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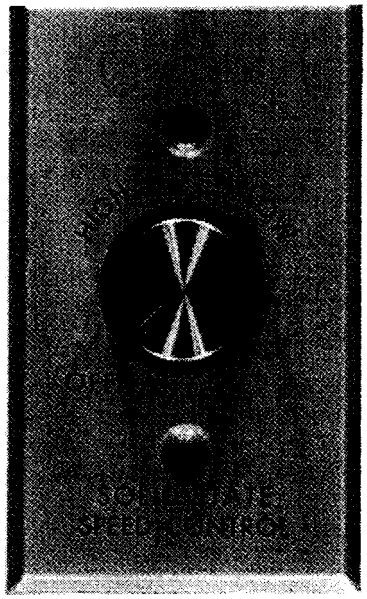
3. Dead Areas – Areas where air cannot circulate freely, such as behind doors or in corners.

Notice: For all wiring connections, refer to the wiring diagram that your unit is equipped with (either affixed to the side jacket or enclosed in your unit's installation instruction envelope). Should any original wire supplied with the heater have to be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

Should any high limit or blocked vent (spill) switch wires have to be replaced, they must be replaced with wiring material having a temperature rating of 200° C minimum.

Figure 32 – Solid State Speed Control

OSHA Fan Guard/Louver



Cone Diffuser Installation

The figures below show how both the OSHA Fan Guard and the Louver Cone Dissuser are installed on the Vertical Steam and Hot Water Unit Heater. Figures 32-1 and 32-2 detail how the louver cone diffuser and OSHA guard are attached to the unit. Figures 32-3 and 32-4 show full views of the vertical steam and hot water unit with the Louver Cone Diffuser and OSHA Fan Guard attached.

Figure 32-1 - Louver Cone Diffuser

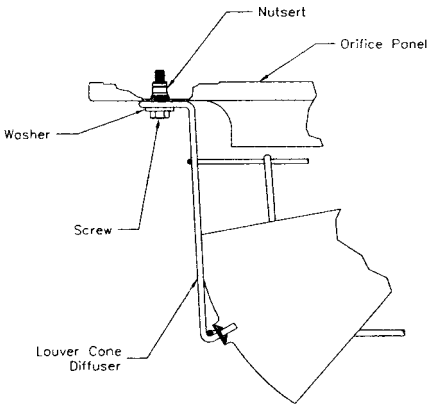
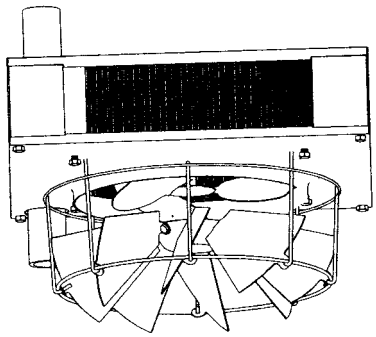


Figure 32-3 - Vertical Unit with Louver Cone Diffuser



⚠ WARNING

Do not mount either the Louver Cone Diffuser or OSHA Fan Guard while unit is in operation or severe personal injury may occur. Disconnect all power supplies to the unit before installing the Louver Cone Diffuser or OSHA Fan Guard.

Figure 32-2 - OSHA Fan Guard

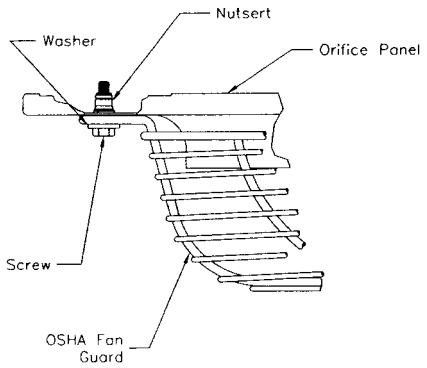
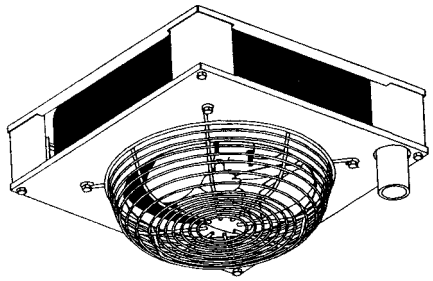


Figure 32-4 - Vertical Unit with OSHA Fan Guard



Installation

Louver Fin Diffuser Assembly

General Information

The Trane Louver Fin Diffuser is a combination of the standard horizontal louvers supplied with each unit (See Figure 33-1) and a set of adjustable vertical fins ordered as an accessory. This set of vertical fins consists of separate rows of several fins each, depending on the size of the unit. Each row of fins is individually mounted on each horizontal louver. Each diffuser fin and each horizontal louver is independently adjustable. This flexiability allows the louver fin diffuser to be set in any pattern to deflect and direct the discharged heated air mass to the desired area or zones. The distance of air throw can be increased up to 25% with this combination.

Installation

Each row of vertical fins is attached to the top of every horizontal louver (except the top louver) with the supplied louver fin clips.

1. To remove the horizontal louver blades (except the top louver), hold the front of the louver blade and compress the spring by sliding the louver blade the left until the right end of the louver blade is free from the side of the unit. Next, pull the blade out of the casing towards you, making sure not to lose the spring.

Figure 33-1 - Standard Unit

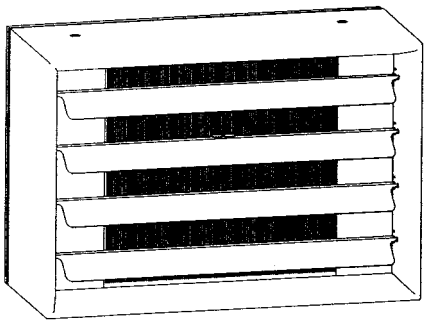
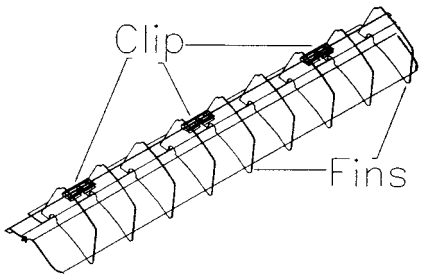


Figure 33-2 - Louver Fin Assembly



2. Attach one of the louver fin diffusers to each of the removed horizontal louver blades with the provided fin diffuser clips. See Figure 33-2. Place clips evenly along the blade starting from one end and working your way to the opposite end of the blade. For clip quantities per blade see Table 33-1.

Table 33-1

Unit Size	Number of Clips per Blade
18 through 126	3
127 through 230, 260	4
243, 273 through 400	6

3. Once all the louver fins are attached, reinstall the louver blades back into the unit. The small end of the spring goes over the left side of the horizontal louver blade first, then place the left side of the louver blade into its appropriate hole. Make sure all of the horizontal louver blades are in the same position when reinstalling them in order to prevent interference. See Figure 33-3.

4. When adjusting the vertical fins, firmly hold the base of the vertical fin in place so as not to cause undue metal fatigue.

Figure 33-3 - Unit with Louver Fins Attached

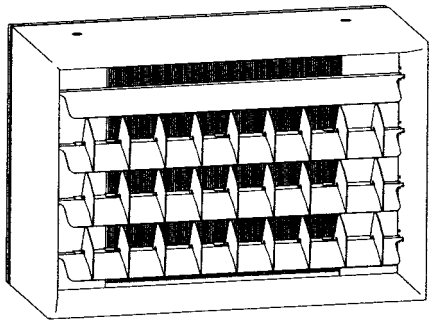
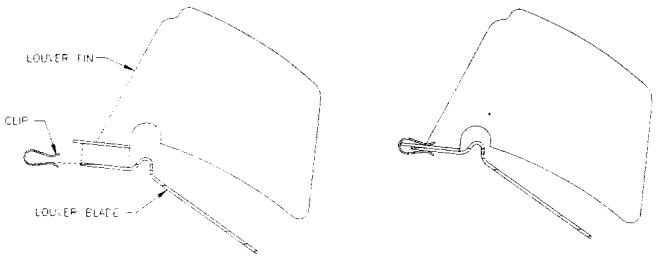


Figure 33-4 - Louver Fin Clip Replacement



After each row has been installed, each vertical fin and each horizontal louver may be set to the desired position. There are many possible combinations of settings to produce a variety of results.

A. When the fins are straight adead as when they are installed, turblence is reduced and the distance of throw is increased.

B. When the fins are toed slightly inward, the airflow is focused and the distance of airflow in increased up 25%.

C. If the fins are turned outward from the center, the horizontal spread is increased.

D. When each row of fins is slanted in opposite directions in an alternating fashion and the vertical fins are slanted downwards, the airflow is directed in a smooth wide spread flow of gentle velocity.

E. Other combinations include:

1. Setting the fins of the top rows to one side and those on the bottom rows to the opposite side.

2. Positioning all the fins in the same direction to one side or the other.

3. Placing half the fins straight ahead and the remaining half to one side or positioned outward frm the center to both sides.

This complete and easy adjustability permits economical diffusion flexibility.

21.6

Operating Information

Coils

Standard Model S Unit Heater coils have 1" O.D. X 0.031" wall copper tubing and standard Model P Unit Heater coils use 5/8" O.D. X 0.25" wall copper tubing. Maximum recommended steam pressure for standard units is 75 psig at 325° F temperature. For hot water applications, the maximum recommended pressure is 200 psig for Model S and 225 psig for Model P Units with 325° F water temperature for both unit.

For higher operating temperatures and pressures, special coils are required. Table 34-1 outlines the limitations for various coil tube materials.

Operation

Most basic unit heater systems are controlled by a room thermostat. Locate thermostat on inner wall or column so that optimum control could be obtained for that area. Set thermostat for desired temperature control.

On steam systems a low limit could be used to prevent fan from blowing cold air unless the heater has steam passing through the coil.

Small hot water systems could have the circulating pump controlled directly by the room thermostat. On large systems, zone valves could be used to control the individual unit heater where constant water circulation is used on the main system.

A louvered cone air diffuser is readily available as an optional accessory for vertical unit heaters. See catalog for details.

Table 34-1 – Coil Tube Limitations (Pressure/Temperature)

Tube Material	Tube				Steam				Hot Water			
Model S	**O.D.**		**Wall**		**Pressure**		**Degrees**		**Pressure**		**Degrees**	
Copper (Std.)	1 in	25.4 mm	0.031 in	0.787 mm	75 psi	517 kPa	325 F	163 C	200 psi	1370 kPa	325 F	163 C
Red Brass	1	25.4	0.049	1.245	75	517	325	163	260	1793	390	199
90-10 Cupronickel	1	25.4	0.031	0.787	75	517	325	163	400	4137	450	232
Steel	1	25.4	0.049	1.245	75	517	325	163	400	4137	450	232
Model P												
Copper (Std.)	0.63	15.9 mm	0.025 in	0.635 mm	75 psi	517 kPa	325 F	163 C	225 psi	1551 kPa	325F	163 C
Red Brass	0.63	15.9	0.049	1.245	75	517	325	163	300	2069	425	218
90-10 Cupronickel	0.63	15.9	0.049	1.245	75	517	325	163	400	4137	450	232
Steel	0.63	15.9	0.049	1.245	75	517	325	163	400	4137	450	232

in = inches
mm = millimeters
psi = pounds per square inch
kPa = kilopascals
F = Fahrenheit
C = Celsius

Maintenance

⚠ CAUTION

Allow rotating fans to stop before servicing to avoid serious injury to fingers and hands.

Motor Lubrication

Sleeve Bearings

Motors with oilers or oil holes are lubricated before shipment with a good grade of electric motor oil. Refill when necessary, with the motor at a standstill, until oil reaches the proper level.

Use SAE 20W oil for motors operating in ambient temperatures of 32° F to 100° F. Above 100° F, use an SAE 30W to SAE 50W oil. Below 32° F, a SAE 10W oil will be required.

The frequency of oiling will depend upon operating conditions and length of running time. Inspect the oilers or oil holes when cleaning the unit. If the unit has a fractional horse-power motor, lubricate at least once a year. Under high ambient conditions or constant fan operation, fractional horse-power motors should be lubricated every 90 days. On those motors without oilers or oil holes, follow the instructions given on the motor nameplate.

Ball Bearings

Ball bearings motors are pre-lubricated and normally not equipped with grease fittings. However, motors are equipped with removable grease plugs to allow installation of grease fittings if desired by the owner. Motor manufacturers do not recommend or require on the job lubrication of ball bearing motors. If on the job lubrication is required by the owner, use the following procedure:

When the motor at a stand-still, remove the vent and grease plugs. Install grease fitting and add grease sparingly. Remove the old grease from the vent relief chamber. Operate the motor a few minutes before reinstalling the vent plug to allow excess grease to escape. If there is evidence of grease working out around the motor shaft, less grease should be added and the greasing periods lengthened. If grease continues to appear, take the motor to the motor manufacturer's authorized service station for repair.

Note: Consult local motor manufacturer's service facility for information on type of grease and oil to be used.

Maintenance

Because of the simple design of the steam and hot water unit heaters, it will be found that these are nearly maintenance free. However, depending on the environment, simple maintenance practices should be adopted.

Fan and Motor Assembly

For cleaning or maintenance purposes, the fan and motor assembly may be removed easily from the Unit Heater. The motor is attached to the fan guard which is, in turn, mounted to the top or back panel of the unit as shown in Figures 35-1 and 35-2.

On Model P units, reach up through the fan and remove the fan guard mounting screws. Lower the motor, fan and fan guard assembly down through the fan outlet. If desired, the top and bottom panels may be removed from the coil by taking out the four panel mounting bolts. See Figure 35-2.

On Model S Units, loosen the fan guard mounting screws and lift the motor, fan and fan guard assembly away from the unit. The one-piece back panel may also be removed and slid back over the connecting piping for greater access. See Figure 35-1.

Figure 35-1 – Cross Section View

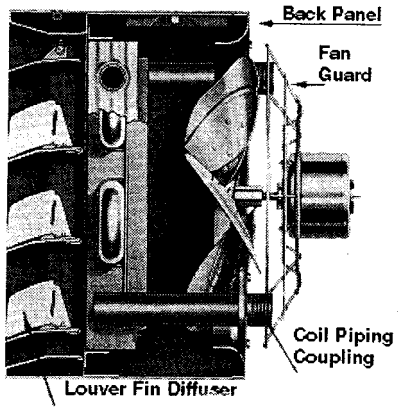
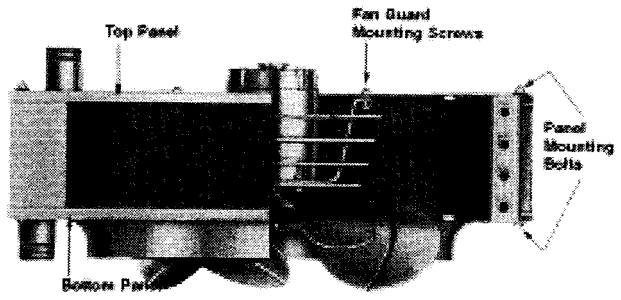


Figure 35-2 – Cross Section View



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Maintenance

Cleaning the Unit

The unit casing, fan, diffuser and coil should be cleaned thoroughly once a year. Coil heat transfer efficiency depends on cleanliness. The following recommended procedures may be performed when lubricating the motor and cleaning the coil.

1. Wipe all excess lubricant from the motor, fan and casing. Clean the motor thoroughly. A dirty motor will run hot and eventually cause internal damage.

2. Clean the coil:

a. Loosen the dirt with a brush on the fan side of the coil. Operate the motor allowing the fan to blow the loosened dirt through the unit.

b. Use high pressure air or steam on the side of the coil away from the fan.

Note: A piece of cheesecloth or burlap bag may be used to collect the large particles during the cleaning process.

3. Clean the casing, fan blades, fan guard and diffuser using a damp cloth. Any rust spots on the casing should be cleaned and repainted.

4. Tighten the fan guard, motor frame and fan bolts. Check the fan for clearance in the panel orifice and free rotation.

Replacement Parts

Should service or replacement of parts be required, give complete nameplate identification including the unit serial number. Motors and motor controls supplied with these units are not manufactured by The Trane Company. Service instructions of these items supersede the previous instructions and should be followed in maintaining the units.

Periodic Service

Notice: *The heater system should be checked once a year by a qualified technician. All Maintenance/Service information should be recorded accordingly on the Inspection sheet provided in this manual.*

⚠ WARNING

Open all disconnect switches and secure in that position before servicing unit. Failure to do so may result in personal injury or death from electrical shock.

Should maintenance be required, perform the following inspection and service routine:

Inspect the area near the unit to be sure that there is no combustible material located within the minimum clearance requirements listed (see "Installation" section of this manual).

Maintenance

Trouble Shooting Chart		
Symptom	**Possible Cause (S)**	**Corrective Action**
Leaking Coil	1. Frozen coil. 2. Defective coil. 3. Corrosion 4. Leak in Joint.	1. Replace 2. Replace 3. Replace 4. Braze joint if joint is exposed where leak has occurred.
Poor output on Steam	1. Check for air in coil. 2. Lint on coil fins.	1. Repair or replace thermostatic air vent. 2. Clean coil and fins. Check filter and clean.
Poor output on Steam or Hot water	1. No circulation of water through coil. 2. Short cycling of motor. 3. Backward rotating motor.	1. Check circulation pump. Check for blocked tubes. 2. Check voltage and correct. Check for linted coil and clean. Check for defective overload and repair or replace motor. 3. On single phase motor, reverse two leads to change rotation. 3. On three phase motor, reverse two leads to change rotation.
Noisy or vibrating unit	1. Damaged fan. 2. Dirty fan.	1. Change fan 2. Clean fan

UNIT EQUIPMENT START-UP

Customer_____**Job Name & Number**_____

PRE-INSPECTION INFORMATION
with power off.

Type of equipment: Unit Heater

Serial Number _____ Model Number_____

Name Plate Voltage: _____ Name plate Amperage _____

Steam _____ Hotwater_____

- ☐ Are all panels in place?
- ☐ Has the unit suffered any external? Damage_____
- ☐ Does the piping and electric wiring appear to be installed in a professional manner?
- ☐ Has the piping and electric been inspected by the local authority having jurisdiction?
- ☐ Is the supply properly sized for the equipment?
- ☐ Were the installation instructions followed when the equipment was installed?
- ☐ Have all field installed controls been installed?
- ☐ Do you understand all the controls on this equipment?

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15116

REQUIREMENTS OF THE GENERAL CONDITIONS OF THE CONTRACT. ANY ACTION INDICATED IS SUBJECT TO THESE REQUIREMENTS.
☑ NO EXCEPTIONS TAKEN
☐ MAKE NOTED CORRECTIONS
☐ REVISE & RESUBMIT
☐ REJECTED
DATE Nov 7 05 BY IV
FABRICATION MAY PROCEED.

Product Information

DOWFROST HD

Inhibited Propylene Glycol-based Heat Transfer Fluid

DOWFROST* HD heat transfer fluid is a formulation of 94.0 percent propylene glycol and a specially designed package of industrial corrosion inhibitors. The fluid is dyed bright yellow to aid in leak detection. Solutions in water provide freeze protection to below -50°C (-60°F) and burst protection to below -73°C (-100°F).

Recommended use temperature range: -45°C (-50°F) to 160°C (325°F)

Suitable applications: single fluid process heating and cooling, closed-loop, water-based HVAC applications where propylene glycol solutions are preferred or required.

For health and safety information for this product, contact your Dow sales representative or call the number for your area on the second page of this sheet for a Material Safety Data Sheet (MSDS).

Typical Concentrations of DOWFROST HD Fluid Required to Provide Freeze and Burst Protection at Various Temperatures

Temperature °C (°F)	Percent DOWFROST HD Fluid Concentration Required	
	For Freeze Protection Volume %	For Burst Protection Volume %
-7 (20)	18	12
-12 (10)	29	20
-18 (0)	36	24
-23 (-10)	42	28
-29 (-20)	46	30
-34 (-30)	50	33
-40 (-40)	54	35
-46 (-50)	57	35
-51 (-60)	60	35

NOTE: These figures are examples only and may not be appropriate to your situation. Generally, for an extended margin of protection, you should select a temperature in this table that is at least 3°C (5°F) lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions of less than 20% glycol. Contact Dow for information on specific cases or further assistance.
ATTENTION: These are typical numbers only and are not to be regarded as specifications. As use conditions are not within its control, Dow does not guarantee results from use of the information or products herein; and gives no warranty, express or implied.

Typical Freezing and Boiling Points of DOWFROST HD Fluid†

Wt. % Propylene Glycol	Vol. % Propylene Glycol	Wt. % DOWFROST HD	Vol. % DOWFROST HD	Freezing Point °C (°F)	Boiling Point °C @ 101 kPa (°F @ 760 mmHg)	Degree Brix††	Refractive Index 22°C (72°F)
0.0	0.0	0.0	0.0	0 (32.0)	100.0 (212)	0.0	1.3328
5.0	4.8	5.3	5.1	-1.6 (29.1)	100.0 (212)	4.8	1.3383
10.0	9.6	10.7	10.2	-3.3 (26.1)	100.0 (212)	8.4	1.3438
15.0	14.5	16.0	15.4	-5.1 (22.9)	100.0 (212)	12.9	1.3495
20.0	19.4	21.3	20.6	-7.1 (19.2)	100.6 (213)	15.4	1.3555
25.0	24.4	26.6	26.0	-9.6 (14.7)	101.1 (214)	19.0	1.3615
30.0	29.4	31.9	31.3	-12.7 (9.2)	102.2 (216)	22.0	1.3675
35.0	34.4	37.2	36.6	-16.4 (2.4)	102.8 (217)	26.1	1.3733
40.0	39.6	42.6	42.1	-21.1 (-6.0)	103.9 (219)	29.1	1.3790
45.0	44.7	47.9	47.6	-26.7 (-16.1)	104.4 (220)	31.8	1.3847
50.0	49.9	53.2	53.1	-33.5 (-28.3)	105.6 (222)	34.7	1.3903
55.0	55.0	58.5	58.5	-41.6 (-42.8)	106.1 (223)	38.0	1.3956
60.0	60.0	63.8	63.8	-51.1 (-59.9)	107.2 (225)	40.6	1.4008
65.0	65.0	69.1	69.1	b	108.3 (227)	42.1	1.4058
70.0	70.0	74.5	74.5	b	110.0 (230)	44.1	1.4104
75.0	75.0	79.8	79.8	b	113.9 (237)	46.1	1.4150
80.0	80.0	85.1	85.1	b	118.3 (245)	48.0	1.4193
85.0	85.0	90.4	90.4	b	125.0 (257)	50.0	1.4235
90.0	90.0	95.7	95.7	b	132.2 (270)	51.4	1.4275
95.0	95.0	a	a	b	154.4 (310)	52.8	1.4315

† Typical properties, not to be construed as specifications.

†† Degree Brix is a measure of the sugar concentration in a fluid and is important in fermentation and syrups applications. Although there is no sugar present in DOWFROST heat transfer fluids, the glycol affects the refractive index of the fluid in a similar fashion.

[a] Propylene glycol concentrations greater than 94% are not attainable with DOWFROST HD fluid.

[b] Freezing points are below -50°C (-60°F).

NOTE: Generally, for an extended margin of protection, you should select a temperature in this table that is at least 3°C (5°F) lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions of less than 20% glycol. Contact Dow for information on specific cases or further assistance.

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DOWFROST HD
Inhibited Propylene Glycol-based Heat Transfer Fluid

Typical Properties of DOWFROST HD Fluid†

	DOWFROST HD Heat Transfer Fluid
Composition (% by weight)	
Propylene Glycol	94
Performance Additives	6
Color	Fluorescent Yellow
Specific Gravity 15/15°C (60/60°F)	1.053–1.063
pH of Solution (50% glycol)	9.5–10.5
Reserve Alkalinity (min.)	15.0 ml

†Typical properties, not to be construed as specifications. Complete sales specifications are available on request.

Saturation Properties of DOWFROST HD Fluid at 30% Propylene Glycol Concentration by Volume

Temp. °C	Temp. (°F)	Specific Heat kJ/(kg)(K) (Btu/lb°F)	Density kg/m³ (lb/ft³)	Therm. Cond. W/mK [Btu/hr ft² (°F/ft)]	Viscosity mPa·s (cps)
10	(50)	3.756 (0.898)	1043.85 (65.17)	0.4344 (0.2510)	4.5068 (4.51)
40	(104)	3.841 (0.918)	1029.85 (64.29)	0.4622 (0.2670)	1.6295 (1.63)
65	(149)	3.913 (0.935)	1014.87 (63.36)	0.4771 (0.2757)	0.9144 (0.91)
90	(194)	3.984 (0.952)	996.86 (62.23)	0.4846 (0.2800)	0.6040 (0.60)
120	(248)	4.070 (0.973)	971.26 (60.63)	0.4838 (0.2795)	0.4246 (0.42)

Saturation Properties of DOWFROST HD Fluid at 40% Propylene Glycol Concentration by Volume

Temp. °C	Temp. (°F)	Specific Heat kJ/(kg)(K) (Btu/lb°F)	Density kg/m³ (lb/ft³)	Therm. Cond. W/mK [Btu/hr ft² (°F/ft)]	Viscosity mPa·s (cps)
-20	(-4)	3.453 (0.825)	1066.76 (66.60)	0.3635 (0.2100)	48.9043 (48.90)
10	(50)	3.564 (0.852)	1055.38 (65.89)	0.3936 (0.2274)	7.2173 (7.22)
40	(104)	3.675 (0.878)	1039.77 (64.91)	0.4150 (0.2398)	2.2389 (2.24)
65	(149)	3.767 (0.900)	1023.55 (63.90)	0.4262 (0.2463)	1.1762 (1.18)
90	(194)	3.859 (0.922)	1004.39 (62.70)	0.4313 (0.2492)	0.7462 (0.75)
120	(248)	3.970 (0.949)	977.53 (61.03)	0.4294 (0.2481)	0.5084 (0.51)

Saturation Properties of DOWFROST HD Fluid at 50% Propylene Glycol Concentration by Volume

Temp. °C	Temp. (°F)	Specific Heat kJ/(kg)(K) (Btu/lb°F)	Density kg/m³ (lb/ft³)	Therm. Cond. W/mK [Btu/hr ft² (°F/ft)]	Viscosity mPa·s (cps)
-30	(-22)	3.165 (0.756)	1081.98 (67.55)	0.3246 (0.1875)	172.8273 (172.83)
-20	(-4)	3.210 (0.767)	1078.51 (67.33)	0.3336 (0.1927)	73.0193 (73.02)
10	(50)	3.346 (0.800)	1065.40 (66.51)	0.3560 (0.2057)	10.6481 (10.65)
40	(104)	3.481 (0.832)	1048.23 (65.44)	0.3716 (0.2147)	3.1103 (3.11)
65	(149)	3.594 (0.859)	1030.83 (64.35)	0.3792 (0.2191)	1.5483 (1.55)
90	(194)	3.707 (0.886)	1010.61 (63.09)	0.3821 (0.2208)	0.9339 (0.93)
120	(248)	3.843 (0.919)	982.63 (61.34)	0.3792 (0.2191)	0.6029 (0.60)

For further information, call...

In the United States and Canada: 1-800-447-4369 • FAX: 1-989-832-1465

In Europe: +32 3 450 2240 • FAX: +32 3 450 2815

In the Pacific: +886 22 547 8731 • FAX: +886 22 713 0092

In other Global Areas: 1-989-832-1560 • FAX: 1-989-832-1465

www.dowfrost.com

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HeatTransferFluids

Full Family of Dow Fluids: **DOWFROST HD**

Propylene Glycol

Inhibited Propylene Glycol-based Heat Transfer Fluid

order

DOWFROST* HD heat transfer fluid is a formulation of 94.0 percent propylene glycol and a specially designed package of industrial corrosion inhibitors. The fluid is dyed flourescent yellow to aid in leak detection. Solutions in water provide freeze protection to below -60 °F (-50 °C) and burst protection to -100 °F (-73 °C).

Recommended use temperature range: -50 °F (-45 °C) to 325 °F (160 °C).

Suitable applications: single fluid process heating and cooling, closed-loop, water-based HVAC applications where propylene glycol solutions are preferred or required. **Not suitable for food or beverage application.**

For health and safety information for this product, contact your Dow sales representative for a Safety Data Sheet (SDS).

Download the tech data sheet for DOWFROST HD in Adobe Acrobat format (70K).

Typical Properties of DOWFROST HD Fluid***

DOWFROST HD Heat Transfer Fluid

Composition (percent by weight)	
Propylene Glycol	94
Performance Additives	6
Color	Flourescent
Specific Gravity 60/60 °F (15/15 °C)	1.053-1.063
pH of Solution (50 percent glycol)	9.5-10.5
Reserve Alkalinity (min.)	15.0 ml

REVIEWED ... TO THE REQUIREMENTS OF THE GENERAL CONDITIONS OF THE CONTRACT. ANY ACTION INDICATED IS SUBJECT TO THESE REQUIREMENTS.

- [ ] NO EXCEPTIONS TAKEN
- [x] MAKE NOTED CORRECTIONS
- [ ] REVISE & RESUBMIT
- [ ] REJECTED

DATE Nov 7/05 BY IV

EARTH TECH (CANADA) INC.

***Typical properties, not to be construed as specifications. Complete sales specifications are available on request.

order

Provide health and safety information

Site Navigation: Home: The Full Family of Dow Fluids: DOWFROST HD

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Material Safety Data Sheet

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

24-Hour Emergency Phone Number: 989-636-4400

Product: DOWFROST* HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 08/03/04 Date Printed: 08/04/04 MSD: 002239

The Dow Chemical Company, Midland, MI 48674

Customer Information Center: 800-258-2436

2. COMPOSITION/INFORMATION ON INGREDIENTS

Propylene glycol	CAS# 000057-55-6	94%
Dipotassium phosphate	CAS# 007758-11-4	<5%
Deionized water	CAS# 007732-18-5	<5%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

****

* Clear yellow liquid. Odorless. Avoid temperatures above 450F, 232C. *

****

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Mists may cause eye irritation.

SKIN CONTACT: Prolonged contact is essentially nonirritating to skin. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Repeated exposures may cause flaking and softening of skin.

INGESTION: Single dose oral toxicity is considered to be extremely low. No hazards anticipated from swallowing small amounts incidental to normal handling operations.

INHALATION: At room temperature, vapors are minimal due to physical properties. Mists may cause irritation of upper respiratory tract (nose and throat).

(Continued on page 2 , over)

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Repeated excessive exposure to propylene glycol may cause central nervous system effects.

CANCER INFORMATION: Did not cause cancer in laboratory animals.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

REPRODUCTIVE EFFECTS: In animal studies, has been shown not to interfere with reproduction.

4. FIRST AID

EYES: Flush eyes with plenty of water.

SKIN: Wash off in flowing water or shower.

INGESTION: No adverse effects anticipated by this route of exposure incidental to proper industrial handling.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES
FLASH POINT: 214 F, 107 C (based on a similar material)
METHOD USED: PMCC
AUTOIGNITION TEMPERATURE: Not determined

FLAMMABILITY LIMITS
LFL: Not determined
UFL: Not determined

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include and are not limited to carbon monoxide and carbon dioxide.

(Continued on page 3)

OTHER FLAMMABILITY INFORMATION: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Flammable concentrations of vapor can accumulate at temperatures above 214F. Liquid mist of this product can burn. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. Container may rupture from gas generation in a fire situation.

EXTINGUISHING MEDIA: Water fog or fine spray, carbon dioxide, dry chemical, foam. Alcohol resistant foams (ATC type) are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Do not use direct water stream. May spread fire.

MEDIA TO BE AVOIDED: Do not use direct water stream.

FIRE FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Fight fire from protected location or safe distance. Consider use of unmanned hose holder or monitor nozzles. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of re-ignition has passed. Immediately withdraw all personnel from area in case of rising sound from venting safety device or discoloration of the container. Move container from fire area if this is possible without hazard.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

PROTECT PEOPLE: Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls/Personal Protection.

PROTECT THE ENVIRONMENT: Avoid contamination of all waterways.

(Continued on page 4 , over)

CLEAN-UP: See Section 13, Disposal Considerations.

7. HANDLING AND STORAGE

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: No special handling requirements data available.

HANDLING: See Section 8, Exposure Controls/Personal Protection.

STORAGE: See Section 10, Stability and Reactivity.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION: Use safety glasses. Safety glasses should be sufficient for most operations; however, for misty operations wear chemical goggles.

SKIN PROTECTION: Use gloves impervious to this material.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. In misty atmospheres, use an approved mist respirator.

EXPOSURE GUIDELINES: Propylene glycol: AIHA WEEL is 10 mg/m3 for total vapor and aerosol.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE/PHYSICAL STATE: Clear yellow liquid
ODOR: Odorless
VAPOR PRESSURE: 0.22 mmHg @ 20 C
VAPOR DENSITY: 2.6
BOILING POINT: 320 F, 160 C
SOLUBILITY IN WATER/MISCIBILITY: Complete
SPECIFIC GRAVITY OR DENSITY: 1.058 @ 25/25 C

10. STABILITY AND REACTIVITY

(Continued on page 5)

CHEMICAL STABILITY: Thermally stable at typical use temperatures.

CONDITIONS TO AVOID: Avoid use temperatures above 450F, 232C. Product can degrade at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid contact with oxidizing materials. Avoid contact with strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply and the presence of other materials.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

SKIN: The LD50 for skin absorption in rabbits is >10,000 mg/kg.

INGESTION: The oral LD50 for rats is 20,000 - 34,000 mg/kg.

MUTAGENICITY: In vitro mutagenicity studies were negative. Animal mutagenicity studies were negative.

12. ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based largely or completely on data for major component(s). Bioconcentration potential is low (BCF less than 100 or Log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50).

DEGRADATION & PERSISTENCE: Based largely or completely on data for major component(s). Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Degradation is expected in the atmospheric environment within minutes to hours.

ECOTOXICITY: Based largely or completely on data for major component(s). Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50 >100 mg/L in most

(Continued on page 6 , over)

sensitive species).

13. DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. THE DOW CHEMICAL COMPANY HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/Information On Ingredients).

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destruction device.

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at 800-258-2436 or 989-832-1556 for further details.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.O.T.): For D.O.T. regulatory information, if required, consult transportation regulations, product shipping papers, or contact your Dow representative.

CANADIAN TDG INFORMATION: For TDG regulatory information, if required, consult transportation regulations, product shipping papers, or your Dow representative.

15. REGULATORY INFORMATION (Not meant to be all-inclusive--selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following

(Continued on page 7)

specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. REGULATIONS
==========

SARA 313 INFORMATION: To the best of our knowledge, this product contains no chemical subject to SARA Title III Section 313 supplier notification requirements.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
1,2-PROPANEDIOL	000057-55-6	PA1

PA1=Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD:

(Continued on page 8 , over)

REGULATORY INFORMATION (CONTINUED)

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

CANADIAN REGULATIONS

WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

This product is not a "Controlled Product" under WHMIS.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):

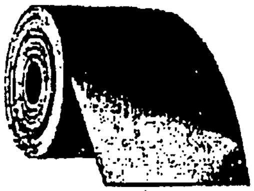
This product contains one or more substances which are not listed on the Canadian Domestic Substances List (DSL). Contact your Dow representative for more information.

16. OTHER INFORMATION

MSDS STATUS: Revised Section 8 (Exposure Guidelines).

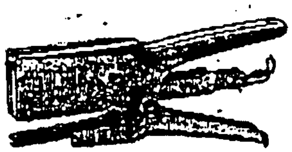
TÉL: (514) 355-4540 FAX: (514) 355-4346
SANS FRAIS: (800) 465-0950

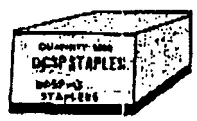
IDENTIFICATION	QTE/CTN	PRIX UNIT.



TISSUS DE RACCORDS DE GAINE "DYN-AIR"
Type COMMERCIAL

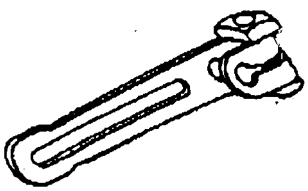
5A-CFN5100	CFN-5-100'	(DFN-5)	NEOPRENE N.T. 32 onces
5A-CFN8100	CFN-8-100'	(DFN-8)	NEOPRENE N.T. 32 onces
5A-CFV5100	CFV-5-100'	(DFX-5)	VINYLFLEX 20 onces



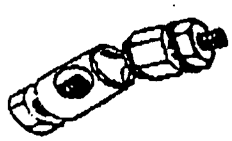


BROCHEUSES MANUELLES ET BROCHES "DYN-AIR"
Type "B X 3/8"

5A-DCS1	DCS-1	(DS-31)	brocheuse RAPID 31
5A-DCSP5	DCSP-5	(DSP-1)	broches seulement (en boîte de 5000)



DCA-38/DCA-50



BRAS DE MANIVELLE ET JOINT A ROTULE "DYN-AIR"
(pour le raccordement de volets mécanisés)

	DCA-38		bras de manivelle 6" (pour arbre 3/8")
5A-DCA38	DCA-50	(CAC-212)	bras de manivelle 6" (pour arbre 1/2")
12 → 5A-DCA50			
12 → 5A-DCS313	DCS-313	(DCS-516)	joint à rotule (pour tige 1/4" & 5/16")

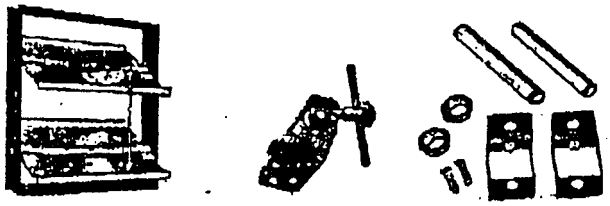
CRANK ARM
TROLEL
5A-Spec. DCAL500
5,718

chp.21

219
1/3

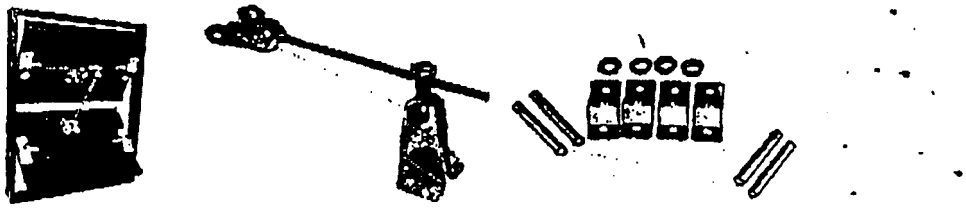
DISTRIBUTION VENTIL-X-PERT INC.
TÉL : (514) 355-4540 FAX : (514) 355-4346
(800) 465-0950 (SANS FRAIS)

IDENTIFICATION				QTE/TN	PRIX UNIT.



ENSEMBLES D'ACCOUPLEMENT DE LAMES 'DYN-AIR'
(pour volets à lames parallèles)

6 —> **5A-DK50** DK-50 (BK-2) ensemble PARA-LINK (avec goupilles 1/2")



ENSEMBLES D'ACCOUPLEMENT DE LAMES "DYN-AIR"
(pour volets à lames opposées)

—> **5A-DK050** DKO-50 (BKO-4) ensemble OPPO-LINK (avec goupilles 1/2")

DCR-63

DBE-2

TIGES D'ACCOUPLEMENT DE LAMES "DYN-AIR"
(pour ensemble de volets ci-haut) 5/16

6 —> **5A-DCR63** DCR-63 1/4" dia. X 62" long (en acier plaqué zinc)

LAMES D'ETANCHEITE (BLADE END) "DYN-AIR"
en aluminium bombé et émaillé
(pour bordure de volets)

5A-DBE2 DBE-2 2" X 100' long

21.9

2/3

IDENTIFICATION				QTE/TN	PRIX UNIT.

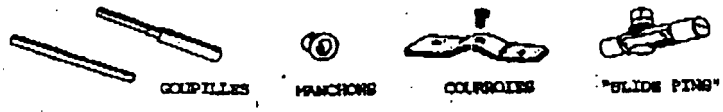
SUPPORTS D'ACCOUPLEMENT DE LAMES "DYN-AIR"
(pour volet à lames parallèles)

5A-PLB14	PLB-14	(BKP-814)	support PARA-LINK "HI" (pour tige 1/4")	
6 → **5A-PLB516**	PLB-516	(BKP-856)	support PARA-LINK "HI" (pour tige 5/16")	

"LO" "HI"

SUPPORTS D'ACCOUPLEMENT DE LAMES "DYN-AIR"
(pour volet à lames opposées)

5A-OLL14	OLL-14	(BKP-23)	support OPPO-LINK "LO" (avec tige 1/4")	
5A-OLS14	OLS-14	(BKP-20)	ensemble de supports OPPO-LINK "HI" et "LO" (avec tige 1/4")	
5A-LBP14	LBP-14	(BKP-24)	support OPPO-LINK "LO" (avec tige 1/4")	
6 → **5A-LBP516**	LBP-516	(BKP-245)	support OPPO-LINK "LO" (avec tige 5/16")	



GOUPILLES, MANCHONS ET COURROIES D'ACCOUPLEMENT "DYN-AIR"
(pour assemblage de lames de volet)

5A-DKP50	DKP-50	(BKP-5)	goupille ronde 1/2" x 2 1/2" long
5A-DKP506	DKP-506	(BKP-6)	goupille ronde 1/2" x 6" long
5A-DKP506A	DKP-506A	(BKP-7)	goupille 1/2" rond à 1/2" carré (6" long)
5A-DKP5	DKP-5	(BKP-10)	manchon de bronze OILITE 1/2" dia. int.
5A-DKP5D	DKP-5D	(BKP-10D)	manchon de nylon DELRIN 1/2" dia. int.
5A-DKP5B	DKP-5B	(BKP-30)	manchon à billes 1/2" dia. int.
5A-DKP13	DKP-13	(BKP-13)	courroie métallique (avec vis d'arrêt)
5A-DKP13S	DKP-13S	(BKP-13S)	vis d'arrêt seulement (à tête carrée)
5A-ZSP50	ZSP-50	(DBP-1)	goupille à glissoire (slide pin) 1/2"-7/16" x 2 3/4" long

PRICE

Detai ubmittal Schedule
Gril egisters/Diffusers

15999

Job Name: Iqualuit WWTP Plant Phase 1
Job Number: QP20052094
Entered By: Raymond Larocque
Reps Job No:
Location:
Engineer:
SDA No.:

Tag Code	Model	Line No.	Location	Qty	Type	Size Length	Size Width	Border	Pattern	Panel Neck	Size LxW	Accessories 1	Accessories 2	Accessories 3	Finish	Submittal	Building	Floor	Room
S-3	302	1		2		48	18		S				A		B15	222038			
S-3	302	2		3		36	12		S				A		B15	222038			
S-3	302	3		1		24	12		S				A		B15	222038			
R-1	80	5		2		18.000	10.000	F	SW				Al		B12	222015			
R-1	97	6		1		24.000	20.000		S				A		B12	222008			
R-1	97	7		1		24.000	24.000		S				A		B12	222008			

REVIEWED ACCORDING TO THE REQUIREMENTS OF THE GENERAL CONDITIONS OF THE CONTRACT. ANY ACTION INDICATED IS SUBJECT TO THESE REQUIREMENTS.

- [x] NO EXCEPTIONS TAKEN
- [ ] MAKE NOTED CORRECTIONS
- [ ] REVISE & RESUBMIT
- [ ] REJECTED

DATE July 21/05 BY SDK
EARTH TECH (CANADA) INC.

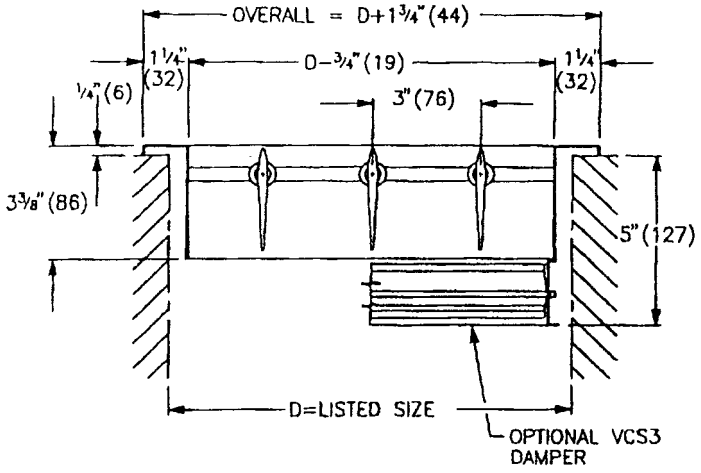
JOB; WASTE WATER TREATMENT PLANT AT IQUALUIT, NUNAVUT
CONTRACTOR PRE-APPROVAL;
SIFEC-KUDLIK per; C. FAUTEUX, T.P.
G, FAUTEUX, P.ENG.
P.A.PELLETIER, P.ENG.

1/5

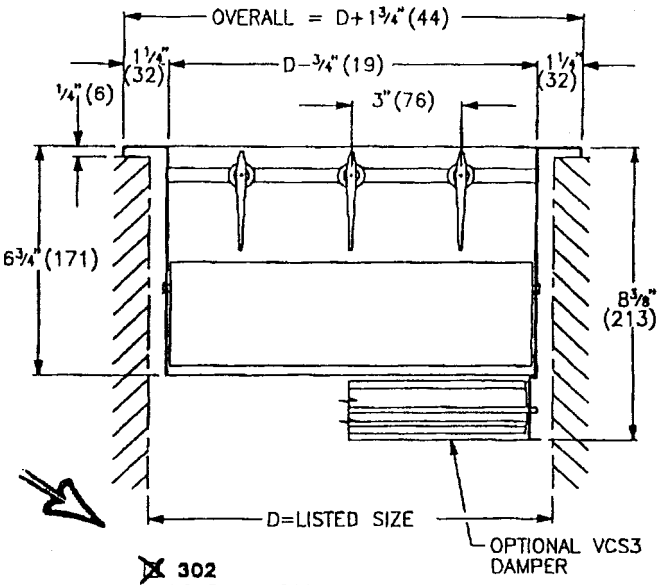
price®

Submittal Sheet

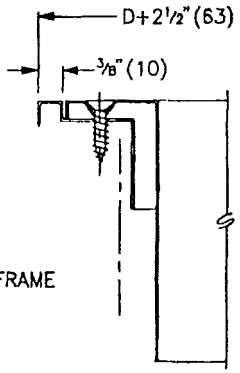
300 SERIES INDUSTRIAL GRILLES & REGISTERS



☐ **MODEL 301**
SINGLE DEFLECTION



☒ **302**
DOUBLE DEFLECTION



☐ **TYPE D**
OPTIONAL
MOUNTING FRAME

FINISH:
☒ B15 ALUMINUM
☐ B12 WHITE
(OPTIONAL FINISHES AVAILABLE)

MATERIAL:

- FRAMES: STEEL
- AIRFOIL BLADES: EXTRUDED ALUMINUM

OPTIONS:

☐ c/w STEEL OPPOSED DAMPER
B17 BLACK FINISH (SPECIFY 301D OR 302D)

NOTES:

- TYPE A FASTENING--COUNTERSUNK SCREWHOLES FOR #8 S.M.S PER FACTORY STANDARD.
- AVAILABLE SIZES: MIN 6"x 6"(152x152)
  MAX 48"x 48"(1219x1219)
- FACTORY TOL: ± 1/32 (1)

ALL METRIC DIMENSIONS ( ) ARE SOFT CONVERTED. IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER.

PROJECT: Iqualuit WWTP Plant Phase 1	price®	
ENGINEER:	KL	**300 SERIES** INDUSTRIAL SUPPLY GRILLES & REGISTERS
CUSTOMER:	222038	
SUBMITTAL DATE: 06/29/2005 **SPEC. SYMBOL:**	APRIL 99	

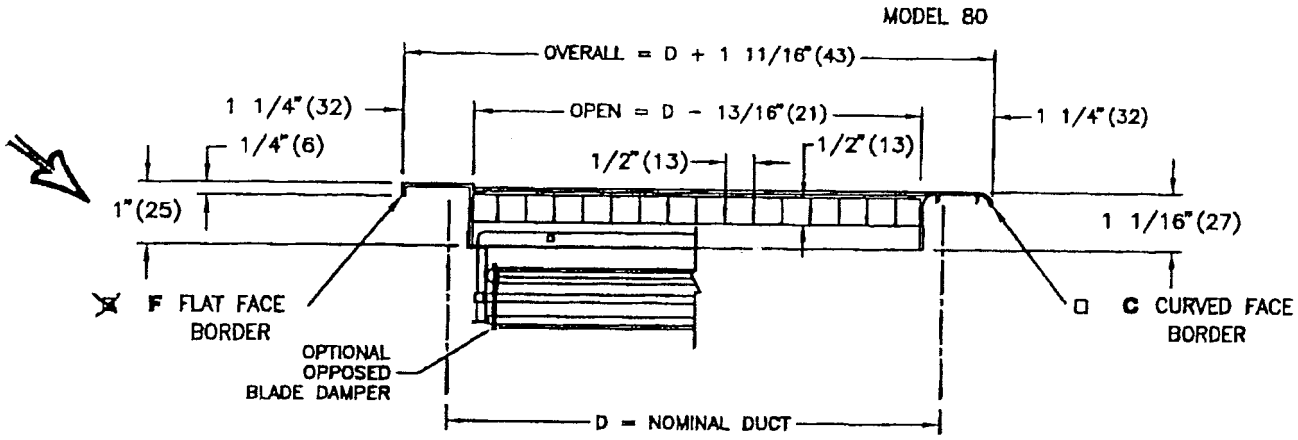
REV D

price®

Submittal Sheet

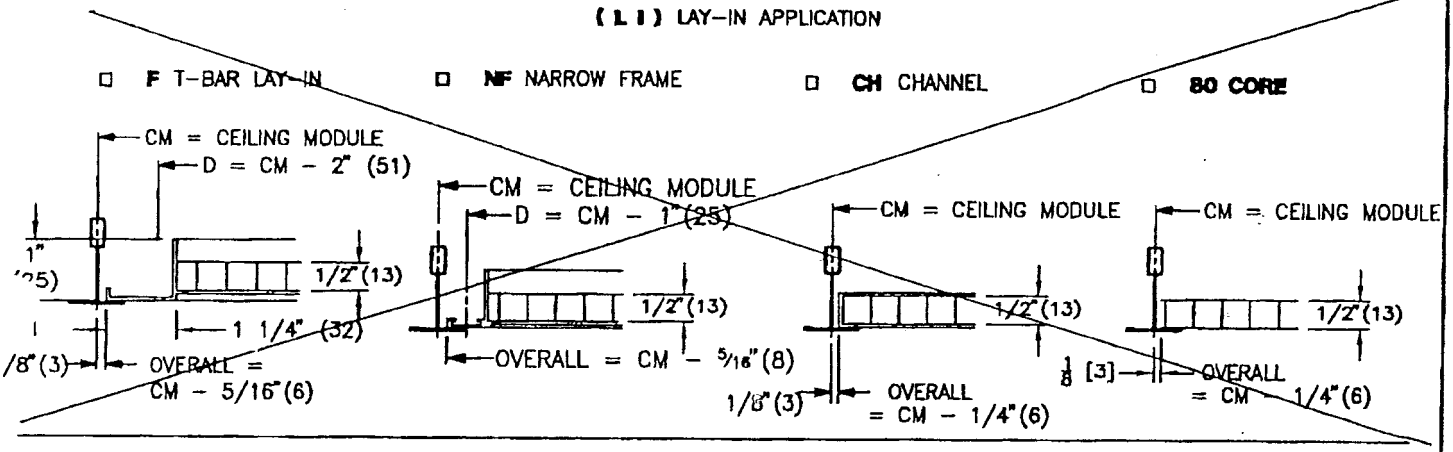
80 RETURN GRILLES & REGISTERS

(S W) SIDEWALL APPLICATION



(L I) LAY-IN APPLICATION

☐ **F** T-BAR LAY-IN ☐ **NF** NARROW FRAME ☐ **CH** CHANNEL ☐ **80 CORE**



FINISH:

☒ B12 WHITE
(OPTIONAL FINISHES AVAILABLE)

MATERIAL:

- ALUMINUM CONSTRUCTION

OPTIONS:

- FOR OPTIONAL MOUNTING OR BORDERS REFER TO SHEET 2

☐ MODEL 80DAL c/w ALUMINUM OPPOSED BLADE DAMPER NOT AVAILABLE WITH CH & 80 CORE

☐ MODEL 80D c/w STEEL OPPOSED BLADE DAMPER B17 BLACK FINISH

NOTES:

- TYPE A FASTENING – COUNTERSUNK SCREW HOLES FOR NO.8 S.M.S. PER FACTORY STANDARD (SCREWS SUPPLIED)
- AVAILABLE SIZE:
  MINIMUM DUCT SIZE = 6" X 4" (152 X 102)
  MINIMUM DUCT SIZE NF FRAME = 6" X 3" (152 X 76)
  MAXIMUM WITHOUT MULLION 48" X 24" (1219 X 610)
- OVERSIZED GRILLE WITH MULLION AVAILABLE UP TO 96" X 48" (2438 X 1219) ONE PIECE FRAME CONSTRUCTION
- UNITS OVER 96" X 48" (2438 X 1219) SUPPLIED IN SECTIONS c/w DUCT MOUNTING CHANNEL
- CORE ONLY UNITS MAXIMUM SIZE 48" X 24" (1219 X 610)

3

ALL METRIC DIMENSIONS ( ) ARE SOFT CONVERTED. IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER.

PROJECT: Iqualuit WWTP Plant Phase 1	price®	
ENGINEER:	RV	**80 SERIES** ALUMINUM RETURN GRILLES & REGISTERS
CUSTOMER:	222015	
SUBMITTAL DATE: 06/29/2005 **SPEC. SYMBOL:**	DEC 2004	

2/2

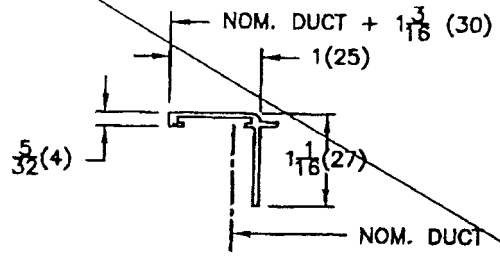
price®

Submittal Sheet

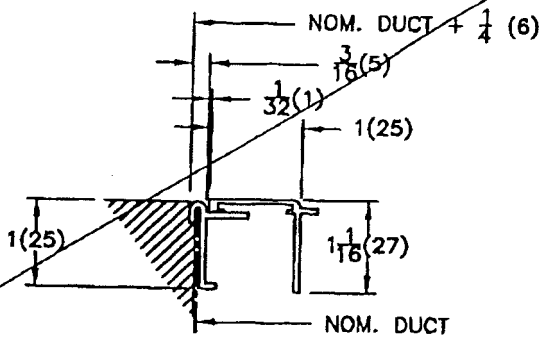
80 SERIES MOUNTING AND OPTIONAL BORDERS

BORDERS

N NARROW MARGIN



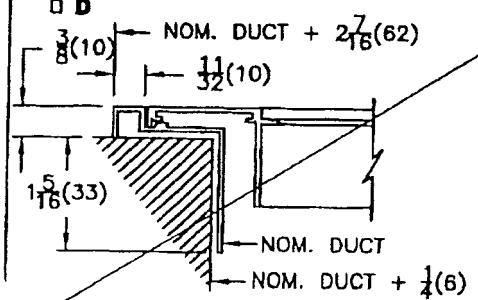
☐ ED EXPOSED DUCT



ED APPLICATION IS SUPPLIED COMPLETE WITH BORDER AND DUCT MOUNTING FRAME

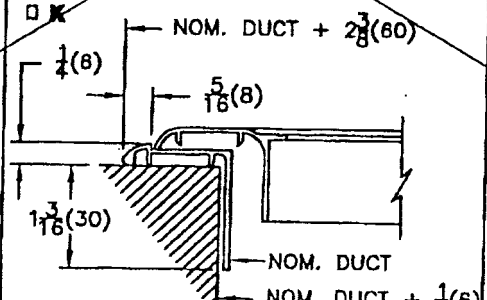
MOUNTING FRAMES

☐ D



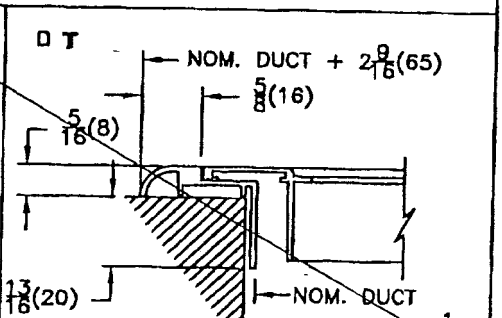
(USE WITH F BORDER ONLY)

☐ K



(USE WITH C BORDER ONLY)

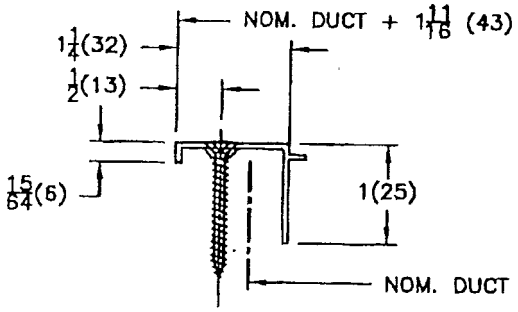
☐ T



(USE WITH N-NARROW BORDER ONLY)

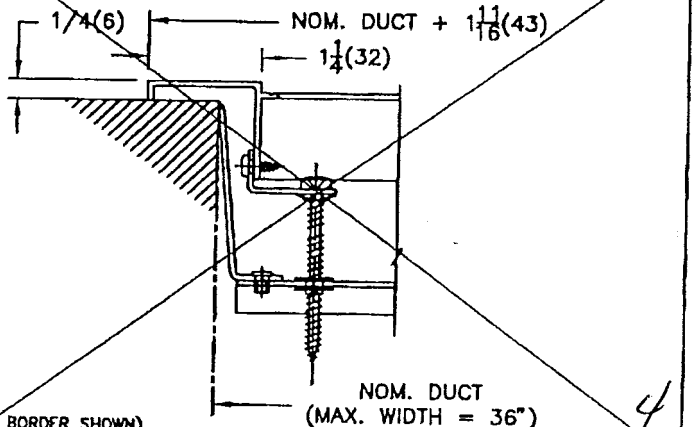
FASTENING

☒ A COUNTER SUNK SCREW



(F BORDER SHOWN)

☐ C CONCEALED BRACKET



(F BORDER SHOWN)

4

ALL METRIC DIMENSIONS ( ) ARE SOFT CONVERTED. IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER.

PROJECT: Iqualuit WWTP Plant Phase 1

ENGINEER:

CUSTOMER:

SUBMITTAL DATE: 06/29/2005 **SPEC. SYMBOL:**

price®

RV

222015

DEC 2004

80 SERIES

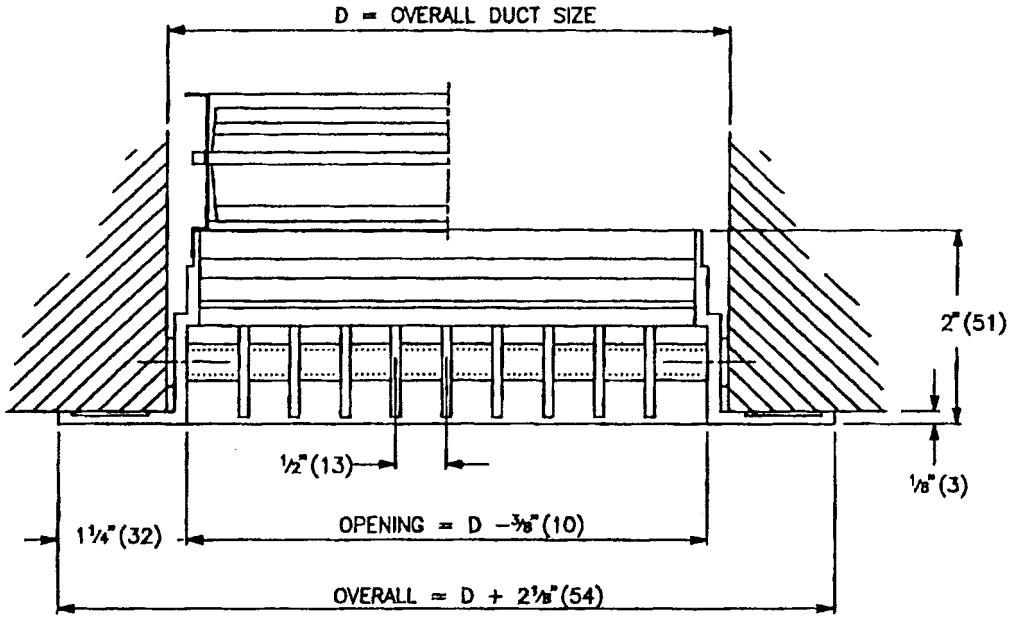
MOUNTING OPTIONS AND BORDERS

210

price®

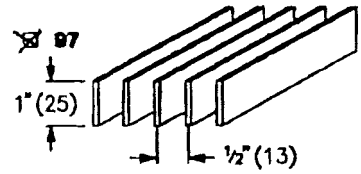
Submittal Sheet

97,98 SERIES RETURN GRILLES & REGISTERS

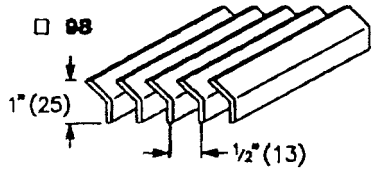


CORE STYLES

☒ 97

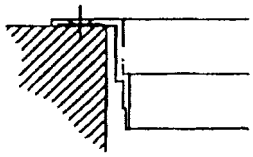


☐ 98

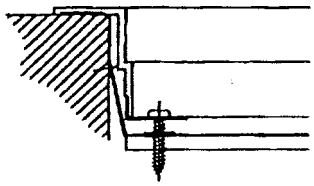


MOUNTING

☒ **A SCREW MOUNTING**



☐ **C CONCEALED MOUNTING**
MAX GRILLE WIDTH = 36" (914)



NOT AVAILABLE ON 98 CORE

FINISH:

☒ B12 WHITE
(OPTIONAL FINISHES AVAILABLE)

MATERIAL:

- GRILLE: ALUMINUM CONSTRUCTION
- 1/8" FLAT FRAME WITH A FASTENING
- 1/8" BLADES
- 5/16" DIA MANDREL TUBES
- .050" EXTERIOR FRAME WITH D MOUNTING

☐ DAMPER: COLD ROLLED STEEL -B17 BLACK (97D OR 98D)
☐ DAMPER: ALUMINUM CONSTRUCTION MILL FINISH (97DAL OR 98DAL)

NOTES:

- FIXED LOUVER BLADES
- TYPE A FASTENING – COUNTERSUNK SCREW HOLES FOR NO. 8 S.M.S. PER FACTORY STANDARD. (SCREWS SUPPLIED)
- AVAILABLE SIZES – MIN.= 6"x4" (152x101) MAX. ONE PIECE 48"x96" (1220x2438)
- OVERSIZED UNITS AVAILABLE c/w DUCT MOUNTING CHANNEL.
- BLADE ORIENTATION
  – L = PARALLEL TO LONG DIMENSION.
  – S = PARALLEL TO SHORT DIMENSION.

ALL METRIC DIMENSIONS ( ) ARE SOFT CONVERTED. IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER.

5/5

PROJECT: Iqualuit WWTP Plant Phase 1	price®	
ENGINEER:	W	**97,98 SERIES**
CUSTOMER:	222008	ALUMINUM GYMNASIUM RETURN AIR GRILLE
SUBMITTAL DATE: 06/29/2005 **SPEC. SYMBOL:**	APRIL 2003	

REV B

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21.10

RIELLO BURNERS

MODEL F20 INSTALLATION MANUAL

RIELLO 40 SERIES

OIL BURNERS

RETROFIT APPLICATIONS ONLY

NON-RETROFIT APPLICATIONS

If this burner is being installed in a packaged unit (ie. burner comes with a boiler or furnace), follow the installation and set-up instructions supplied with the heating unit, as settings may differ from those shown in this manual.

TABLE OF CONTENTS

PARTS LIST

Your Riello 40 F20 burner should include the following parts. Please check to make sure all parts are present before beginning the installation.

QTY.	DESCRIPTION (parts bag)
2 -	Mounting flange bolts (short)
2 -	Semi-flange bolts (long)
4 -	Nuts
2 -	Chrome nuts
1 -	Oil pump connector (supply)
1 -	Oil pump connector (return)
2 -	Female 1/4" NPT adapter
1 -	Male 3/8" NPT adapter

QTY.	DESCRIPTION (carton)
1 -	Burner chassis with cover
1 -	Universal Mounting Flange
2 -	Semi-flanges
1 -	Mounting gasket
1 -	Installation Manual

*** (separate carton)**	
1 -	Combustion head

*** OEM burners shipped with combustion head mounted.**

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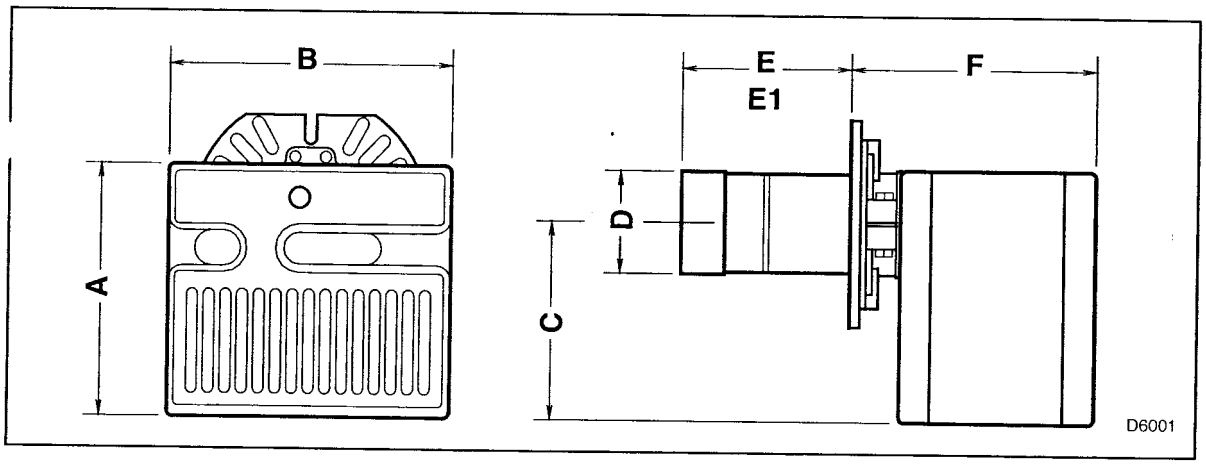
TECHNICAL DATA



DIMENSIONS

MODEL F20	A	B	C	D	E	F
Inches	11 3/4	13 25/32	9 1/16	4 11/16	5	11 27/32
mm	298	350	230	119	127	301

E1: 10 inch long (254 mm) tubes also available.

SPECIFICATIONS

FUEL: No. 2 Fuel Oil

FIRING RATE: 3.50 to 6.40 GPH 11.3 to 20.7 kg/h

EFFECTIVE OUTPUT: 490,000 to 896,000 BTU/h 143.5 to 262.5 kW
123,480 to 225,790 kcal/h

VOLTAGE (Single Phase): 120V 60 Hz (+10% –15%)

ABSORBED ELECTRICAL POWER: 465 Watts

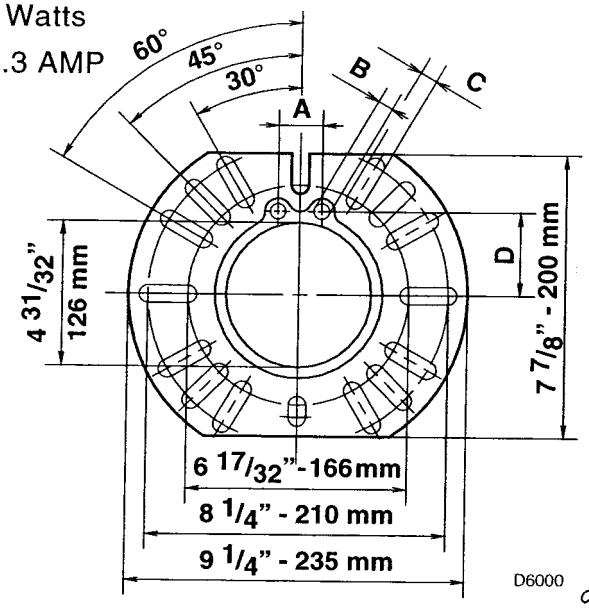
MOTOR (rated): 3250 rpm Run Current 4.3 AMP

CAPACITOR: 16 Microfarads 260V

PUMP PRESSURE: 100 to 200 PSI

PRIMARY CONTROL: RIELLO 530 SE/C

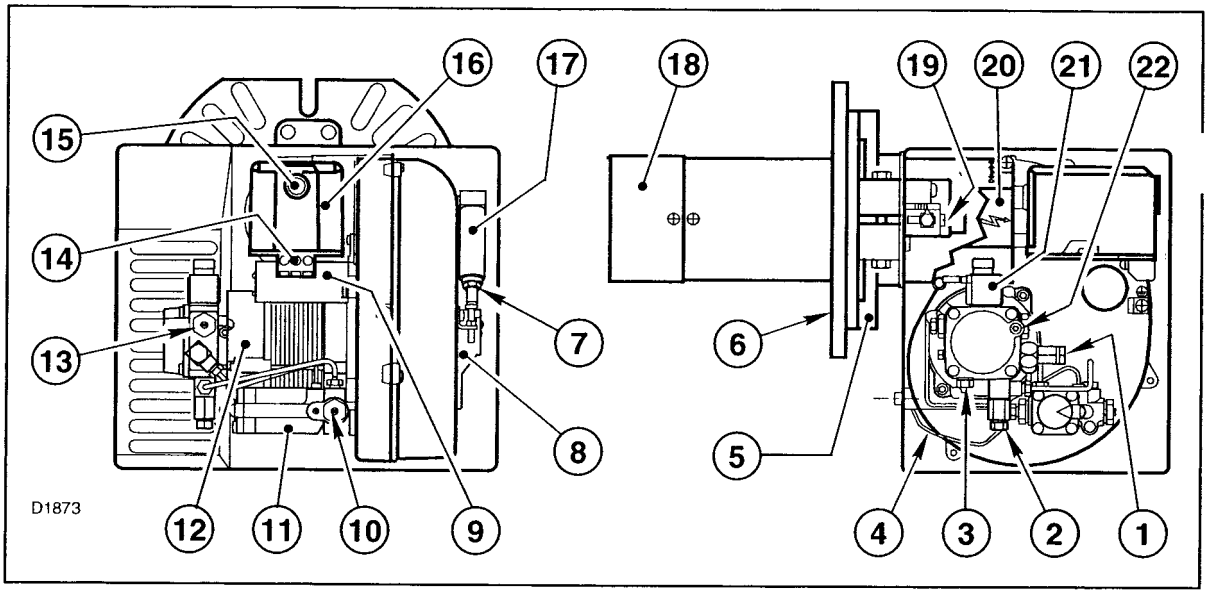
IGNITION TRANSFORMER: 8kV 16 mA



MOUNTING FLANGE DIMENSIONS

MODEL F20	A	B	C	D
Inches	1 1/2	1/4	7/16	2 7/8
mm	38	6	11	73

RIELLO 40 SERIES

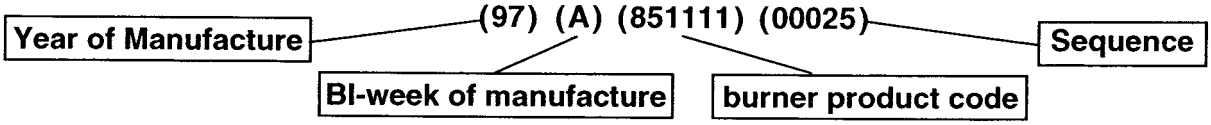


F20 BURNER COMPONENTS

1. Pressure gauge connection port
2. Return fuel line port
3. Inlet fuel line port
4. Capillary tube
5. Adjustable collar
6. Mounting flange with gasket
7. Air adjustment fixing screws
8. Hydraulic air shutter
9. Capacitor
10. Fuel pressure adjustment screw Low fire
11. Hydraulic delay valve Low fire start
12. Motor
13. Pump pressure regulator adjustment screw
14. Primary control sub-base
15. Lockout indicator lamp and Reset button
16. Primary control
17. Hydraulic jack
18. End cone
19. Turbulator adjustment screw
20. Air tube cover
21. Coil
22. Vacuum gauge connection port

SERIAL NUMBER IDENTIFICATION

The Riello 15 character serial number, example, 97 A 8511111 00025, is identified as follows: 97 = last two digits of the year of manufacture; A = BI-week of manufacture; 8511111 = burner product code; 00025 = increment of 1 for each burner produced - specific to product code - reset to zero each January 1st.



INITIAL SET-UP

A) Remove burner and air tube from cartons. Check parts list (inside cover) to ensure all parts are present.

B) Remove burner cover by loosening the three screws securing it. Remove control box and air tube cover (see page 7).

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adjustment for specific input required (see pages 7 & 8), then set aside.

D) Mount air tube to burner chassis.

ASSEMBLY OF AIR TUBE TO BURNER CHASSIS

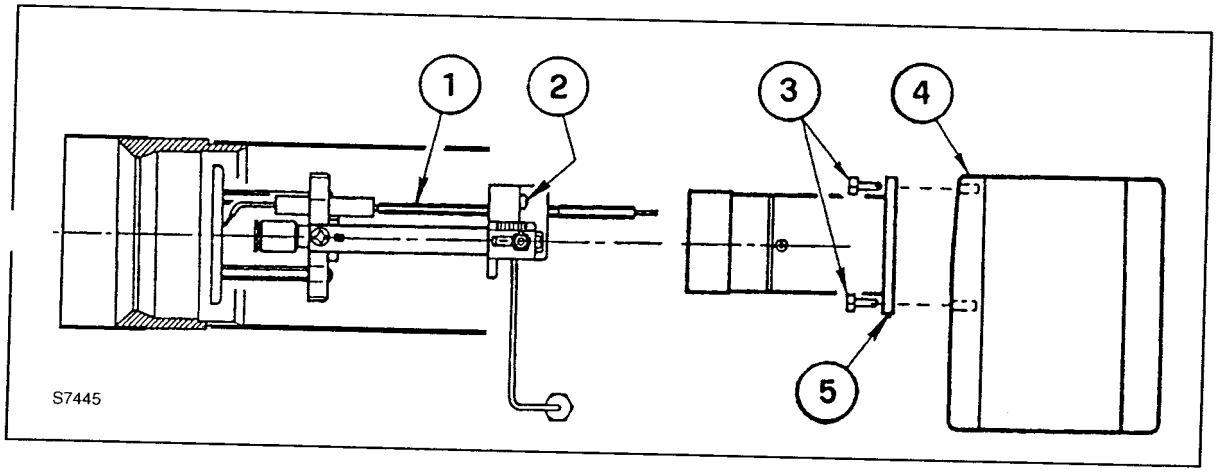
The air tube and drawer assembly are shipped in a carton separate from the burner chassis. Choose the proper air tube length to obtain the tube insertion for the specific installation.

A) Remove the AIR TUBE and BURNER CHASSIS from their respective cartons.

B) Remove the DRAWER ASSEMBLY (1) from inside the AIR TUBE by loosening the screw (2). Carefully pull the DRAWER ASSEMBLY out of the AIR TUBE, install the required nozzle (see page 7) and set aside.

C) Align the two holes on the AIR TUBE HOLDING PLATE (5) with the two holes left open on the BURNER CHASSIS FRONT PLATE (4) with the BOLTS (3) removed. Replace the BOLTS and finger tighten only. Re-install DRAWER ASSEMBLY into AIR TUBE. Tighten SCREW (2) securely (see page 7).

D) Tighten the two bolts (3) securely.



MOUNTING THE BURNER TO THE BOILER OR FURNACE

There are three possible methods to mount the burner, depending on the individual application. These are:

1) Universal flange bolted to Boiler/Furnace unit.

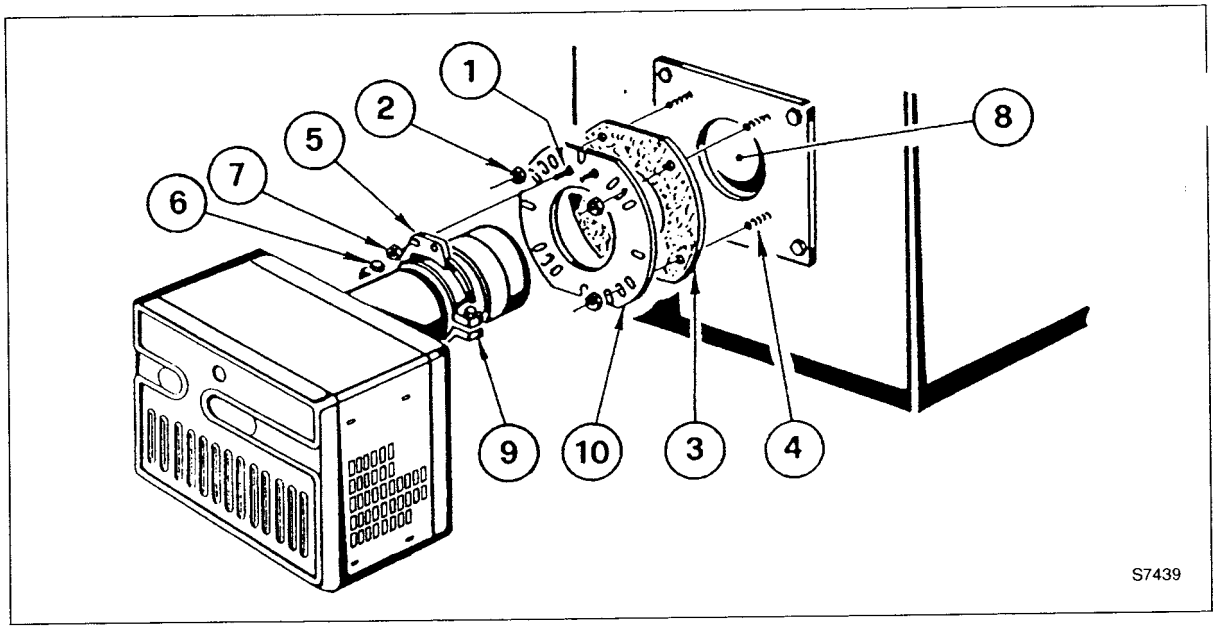
2) Semi-flange collar bolted to Boiler/Furnace unit.

3) Universal flange mounted to optional Pedestal mount, where flange-mounting direct to appliance is not possible. Pedestal kit must be ordered separately.

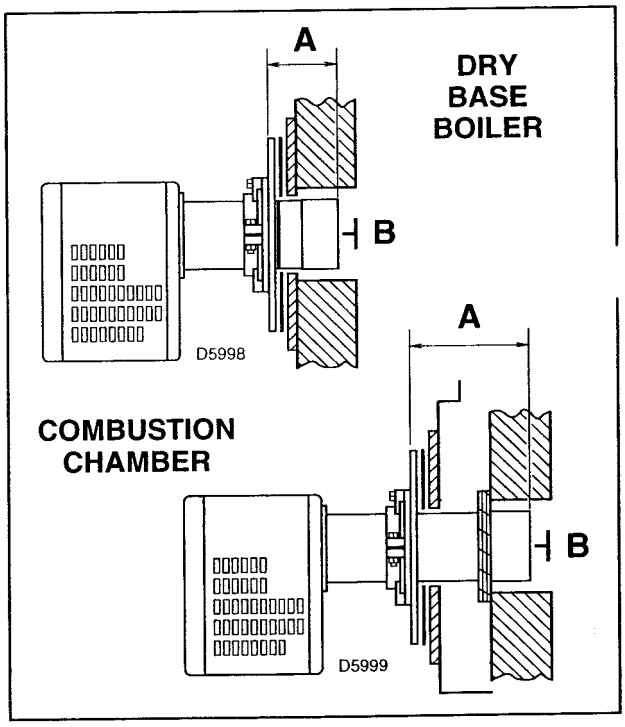
METHOD 1 - UNIVERSAL MOUNTING FLANGE

1) Insert the two BOLTS (1) into the UNIVERSAL MOUNTING FLANGE (10) from the flat side, ensuring the bolt heads are flush with the flat surface. Secure in place using two special CHROME NUTS (2) provided.

MOUNTING FLANGE (10) and the appliance. Line up the holes in the UNIVERSAL MOUNTING FLANGE with the STUDS (4) on the appliance mounting plate and securely bolt the UNIVERSAL MOUNTING FLANGE to the plate.



C) Secure the two semi-flanges of the ADJUSTABLE COLLAR (9) to the AIR TUBE using the two long BOLTS (6). Be sure that the ADJUSTABLE collar is properly positioned so the outside edge of the END CONE will be at least 1/4 inch (6.5 mm) back from the inside wall of the refractory of the combustion chamber (see dimension **B** at right). The measured length **(A)**, is to include MOUNTING GASKET and FLANGE, if used.



D) The burner may now be attached to the heating unit by inserting the AIR TUBE through the BURNER ACCESS HOLE (8) and into the appliance, making sure the BOLTS (1) line up with the two HOLES (5) in the ADJUSTABLE COLLAR. Secure the burner in place using two NUTS (7).

A visual verification of the air tube insertion into the combustion chamber of the heating unit is suggested. Dimension B should be at least 1/4" (see drawing).

NOTE: A suggested method for creating mounting bolt holes in the mounting gasket: Hold the gasket against the appliance mounting bolts using the mounting flange for proper positioning. Lightly tap the flange with a hammer to form the holes.

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A) Follow item C from METHOD 1.

B) Align the air tube and attached adjustable collar so air tube is centered in the burner access hole of the boiler/furnace unit. Mark the center of the two holes in the ADJUSTABLE COLLAR on to the front plate of the heating unit. Then drill 1/4 inch (6.5 mm) holes through the front plate of the unit, using marks as a guide.

C) Install two short BOLTS (1) through the front plate of the heating unit from the inside, and secure on the outside using the two special CHROME NUTS (2).

D) Follow item D from METHOD 1.

METHOD 3 - PEDESTAL MOUNT

Secure the MOUNTING FLANGE to MOUNTING PEDESTAL using the hardware provided with the pedestal. Secure burner to MOUNTING FLANGE as in METHOD 1, items A, C and D.

NOTE: It is suggested that the pedestal be anchored in position on the floor by installing brackets over the pedestal tube and securing brackets to the floor.

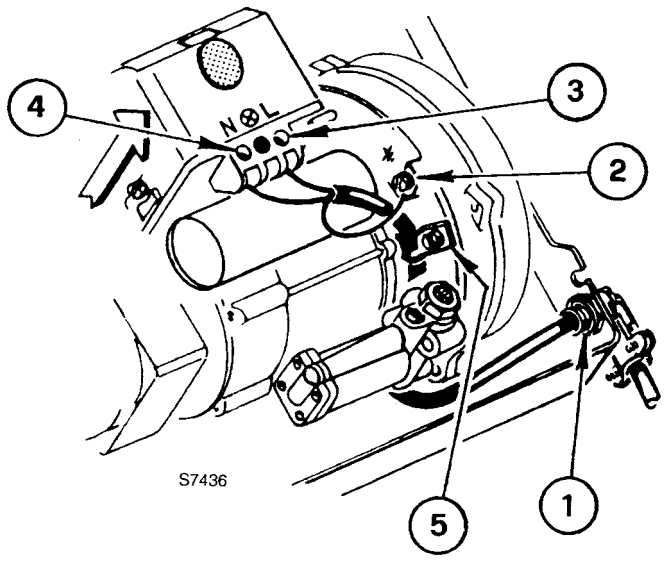
WARNING: WHEN THE COMBUSTION CHAMBER IS LINED WITH A REFRACTORY MATERIAL, IT IS IMPERATIVE THAT THE END CONE NOT PROTRUDE INTO THE CHAMBER AREA, AS EXCESSIVE HEAT AT BURNER SHUT-DOWN WILL DAMAGE THE END CONE.

ELECTRICAL CONNECTIONS

It is advisable to leave the control box off the sub-base while completing the electrical connections to the burner.

1) Wire access hole (Use BX electrical connector)
2) Earth ground conductor terminal (GREEN WIRE)
3) Hot conductor terminal (BLACK WIRE)
4) Neutral conductor terminal (WHITE WIRE)
5) Strain relief clamp

WARNING: The hot (black) wire must be connected to the L terminal and the neutral (white) wire must be connected to the N terminal or the primary safety control will be damaged. Do not connect either wire to the ⊗Terminal.



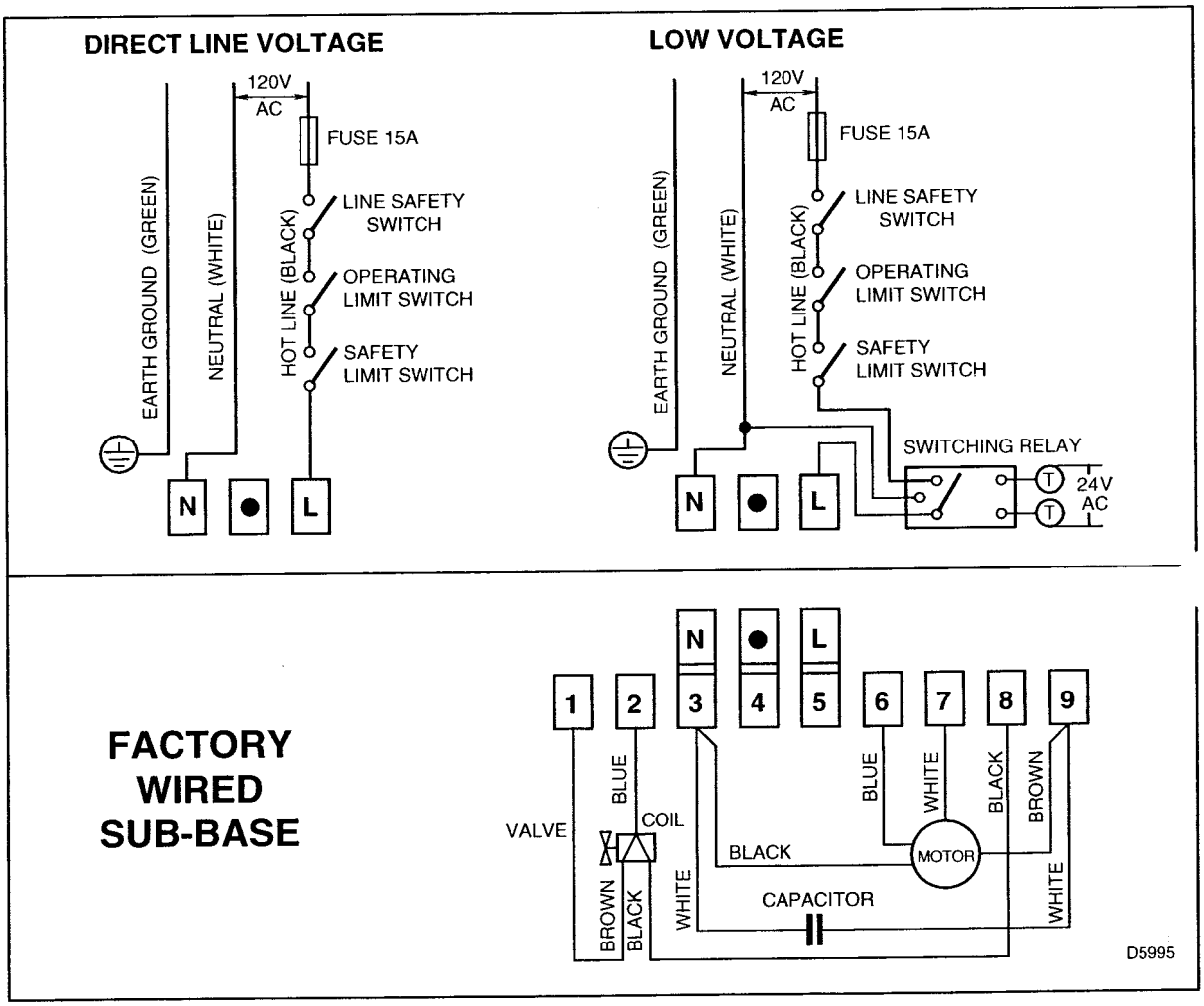
(120V AC 60 cycle) **OR** a LOW VOLTAGE control (24V AC 60 cycle) using a R8038A Honeywell switching relay or equivalent.

Using the appropriate diagram below, make electrical connections to burner. All wiring must be done in accordance with existing electrical codes, both national and local.

When all electrical connections have been made, the control box may be put back in place on the sub-base.

WARNING: DO NOT activate burner until proper oil line connections have been made, or failure of the pump shaft seal may occur.

APPLICATION FIELD WIRING



REMOTE SENSING OF SAFETY LOCKOUT: The SAFETY SWITCH in the 530SE CONTROL BOX is equipped with a contact allowing remote sensing of burner lockout. The electrical connection is made at terminal 4 (●) on the SUB-BASE. Should lockout occur the 530SE CONTROL BOX will supply a power source of 120Vac to the connection terminal. The maximum allowable current draw on this terminal (4) is 1 Amp.

WARNING: If a neutral or ground lead is attached to this terminal, the CONTROL BOX on the burner will be damaged should lockout occur.

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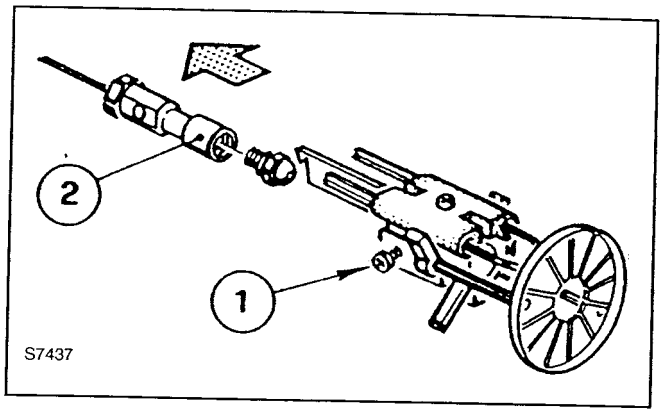
A) Determine the proper firing rate for the boiler or furnace unit, considering the specific application, then use the Burner Set-up chart on page 12 to select the proper nozzle and pump pressure to obtain the required input from the burner.



B) Remove the NOZZLE ADAPTER (2) from the DRAWER ASSEMBLY by loosening the SCREW (1).

C) Insert the proper NOZZLE into the NOZZLE ADAPTER and tighten securely (Do not overtighten).

D) Replace adapter, with nozzle installed, into drawer assembly and secure with screw (1).

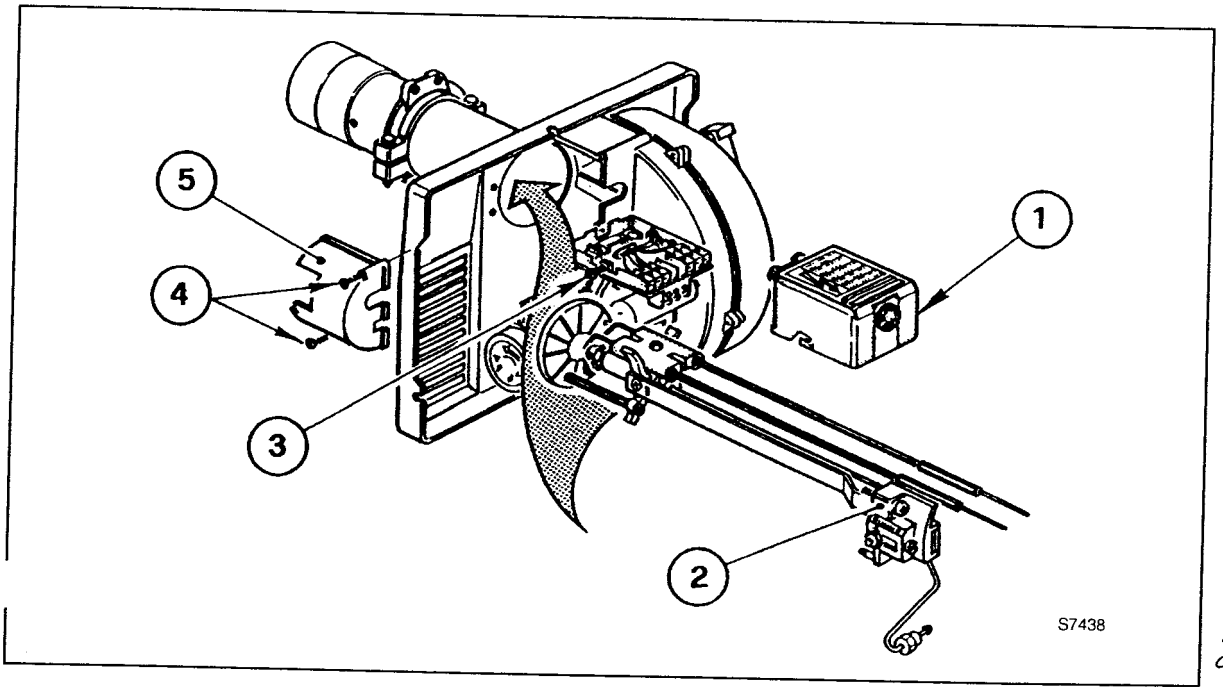
INSERTION/REMOVAL OF DRAWER ASSEMBLY

A) To remove drawer assembly, loosen SCREW (3), then unplug CONTROL BOX (1) by carefully pulling it back and then up.

B) Remove the AIR TUBE COVER PLATE (5) by loosening the two retaining SCREWS (4).

C) Loosen SCREW (2), then slide the complete drawer assembly out of the combustion head as shown.

D) To insert drawer assembly, reverse the procedure in items A to C above, then attach fuel line to the pump.



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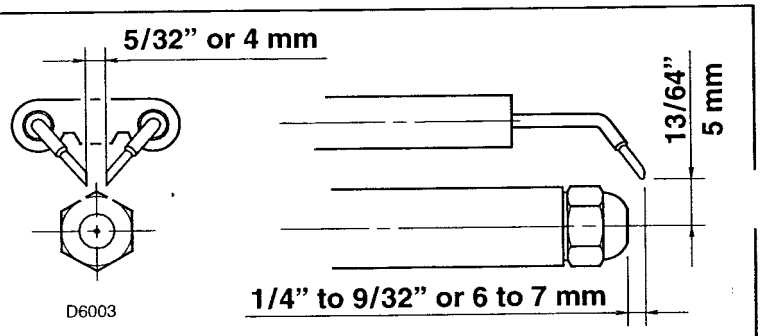
ELECTRODE SETTING

IMPORTANT:

THESE DIMENSIONS MUST BE OBSERVED AND VERIFIED.

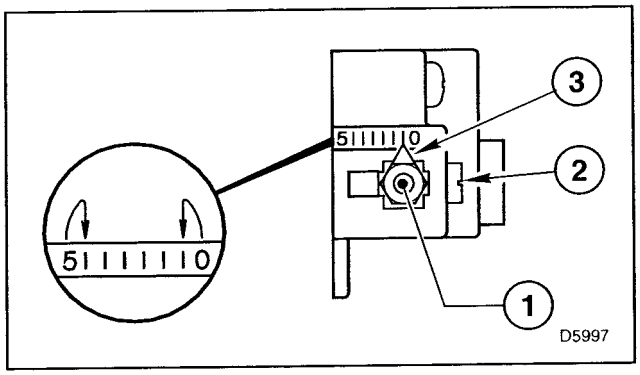


TURBULATOR SETTING

A) Loosen NUT (1), then turn SCREW (2) until the INDEX MARKER (3) is aligned with the correct index number as per the Burner Set-up chart, on page 12.

B) Retighten the RETAINING NUT (1).

NOTE: Zero and five are scale indicators only. From left to right, the first line is 5 and the last line 0.

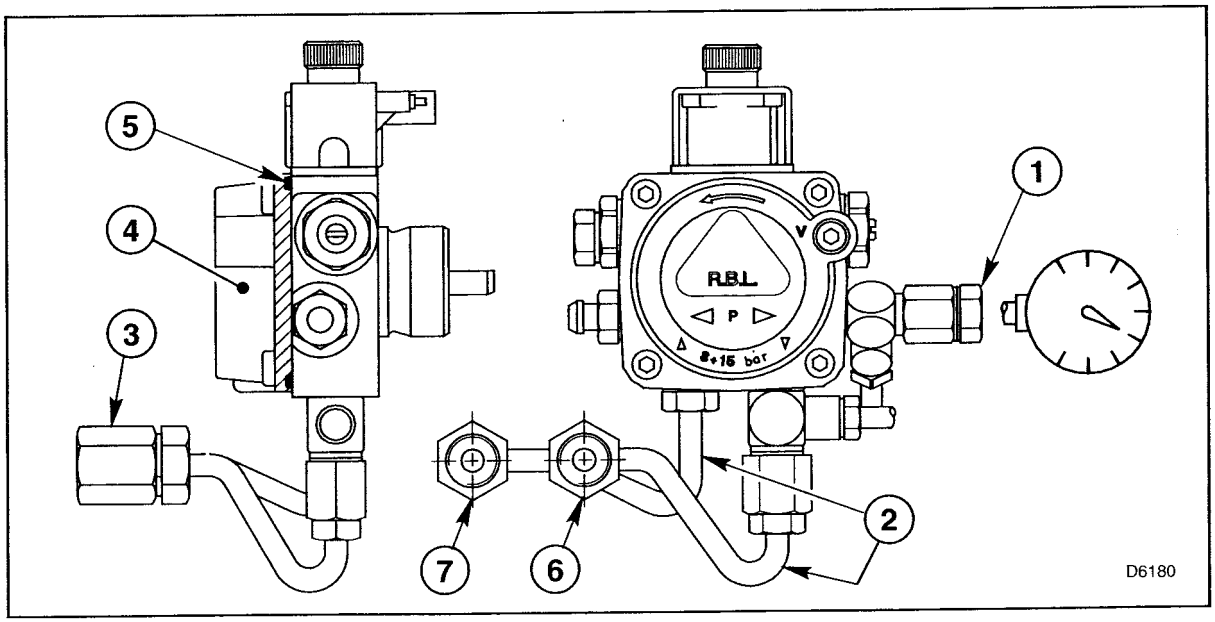


OIL LINE CONNECTIONS

WARNING: The burner is shipped from the factory with the pump set to operate on a TWO line system.

NOTE: THIS BURNER **MUST** BE INSTALLED WITH A TWO LINE SYSTEM TO ALLOW THE HYDRAULIC DELAY VALVE TO OPERATE.

NOTE: Pump pressure **must** be set at time of burner start-up. A pressure gauge is attached to the PRESSURE PORT (1) for pressure readings.



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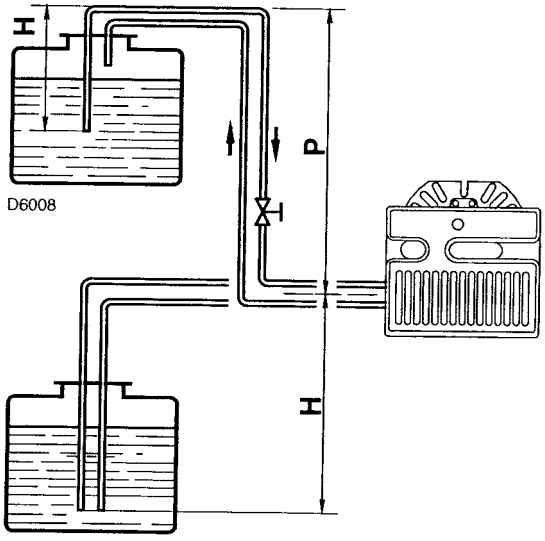
single or a two-pipe system. Also supplied are two adapters (3), two female 1/4" NPT, to adapt oil lines to burner pipe connectors. All pump port threads are **British Parallel thread design**. Direct connection of NPT threads to the pump will damage the pump body. Riello manometers and vacuum gauges do **not** require any adapters, and can be safely connected directly to pump ports. An NPT (metric) adapter **must** be used when connecting other gauge models.

NOTE: If the **pump cover (4)** is removed for any reason, be sure the O-ring (5), is properly seated in the pump cover (4) before re-attaching the pump cover to the pump housing.

TWO LINE (LIFT SYSTEM)

A) The burner is shipped with the pump set to operate on a two line system. Suction and return lines (6 & 7 in drawing on page 8) should be the same diameter and both should extend to the same depth inside the fuel tank. Be sure there are no air leaks or blockages in the piping system. Any obstructions in the return line will cause failure of the pump shaft seal. Do not exceed the pipe lengths indicated in the table.



2 LINE (LIFT) SYSTEM - PIPE LENGTHS					
H		3/8" OD		1/2" OD	
FT	M	FT	M	FT	M
0.0	0.0	115	35	330	100
1.5	0.5	100	30	330	100
3.0	1.0	80	25	330	100
5.0	1.5	65	20	295	90
6.5	2.0	50	15	230	70
9.5	3.0	25	8	100	30
11	3.5	20	6	65	20

NOTE: Do not exceed pipe lengths indicated in chart.

B) Attach the two PIPE CONNECTORS (2) to the pump SUCTION and pump RETURN PORTS (6 and 7). Attach the required piping to these two pipe connectors using the NPT/METRIC ADAPTERS that are supplied with the burner.

WARNING: Pipe dope or Teflon tape are NOT to be used on any direct oil connection to the fuel pump.

WARNING: The height "P" in Pipe Length chart above should not exceed 13 feet (4 m).

WARNING: The vacuum should not exceed 11.44 inches of mercury.

IMPORTANT: An external, appropriately listed and certified oil filter must be placed in the fuel line between the fuel tank and the burner pump.

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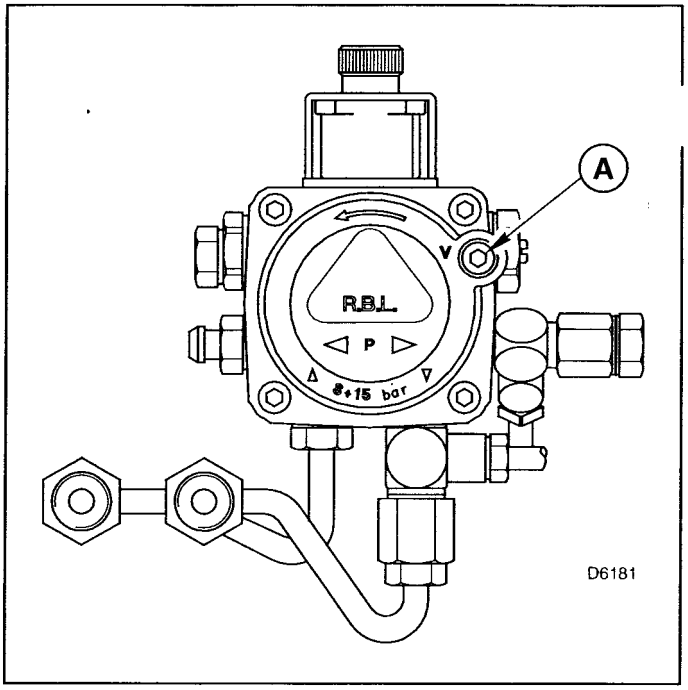
TWO LINE (GRAVITY OR LIFT SYSTEM)

Turn off the main power source to the burner and remove the air tube cover. Shine a light source on the photo cell on the control box (now visible where the air tube cover was removed), return power to the burner and activate the burner.
With the light source in place, the burner will operate in prepurge only.
When the pump is sufficiently purged, the hydraulic air shutter will open.
Once the burner is purged, turn off the power source and replace the air tube cover. Return power to the burner. The burner is now ready to operate.



NOTE: To protect the pump gears, it is advisable to lubricate the pump prior to purging a lift system. Apply oil through the VACUUM PORT (A).

ATTENTION: It is important that the fuel line be completely sealed and free from air leaks or any internal blockages.

WARNING! WHEN THE BYPASS PLUG IS INSTALLED, A TWO PIPE SYSTEM MUST BE USED OR FAILURE OF THE PUMP SHAFT SEAL WILL OCCUR.

AIR SHUTTER SETTING

LOW FIRE SETTING

A) Loosen PRESSURE RELEASING SCREW (1). (One turn is sufficient). This permits the fuel pressure to bleed off to the pump return port and the burner to operate continuously at the low fire rate.

B) Loosen RETAINING NUT (2).

C) Turn the ADJUSTING SCREW (3) until the top of the air shutter (9) is correctly positioned according to the Burner Set-up Chart, column 5, on page 12.

D) Use instruments to establish the proper settings for maximum CO_2 and a smoke reading of zero.

E) Hold ADJUSTING SCREW (3) in position and secure by tightening RETAINING NUT (2).

F) Retighten PRESSURE RELEASE SCREW (1).

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or regulate this pressure it is necessary to attach a pressure gauge to the PRESSURE PORT (6). Loosen the PRESSURE RELEASE SCREW (1) as in step A above. Regulate the pressure by turning the PRESSURE REGULATING SCREW (5).
The corresponding pressure can be read on the pressure gauge attached to the PUMP PRESSURE PORT (6).

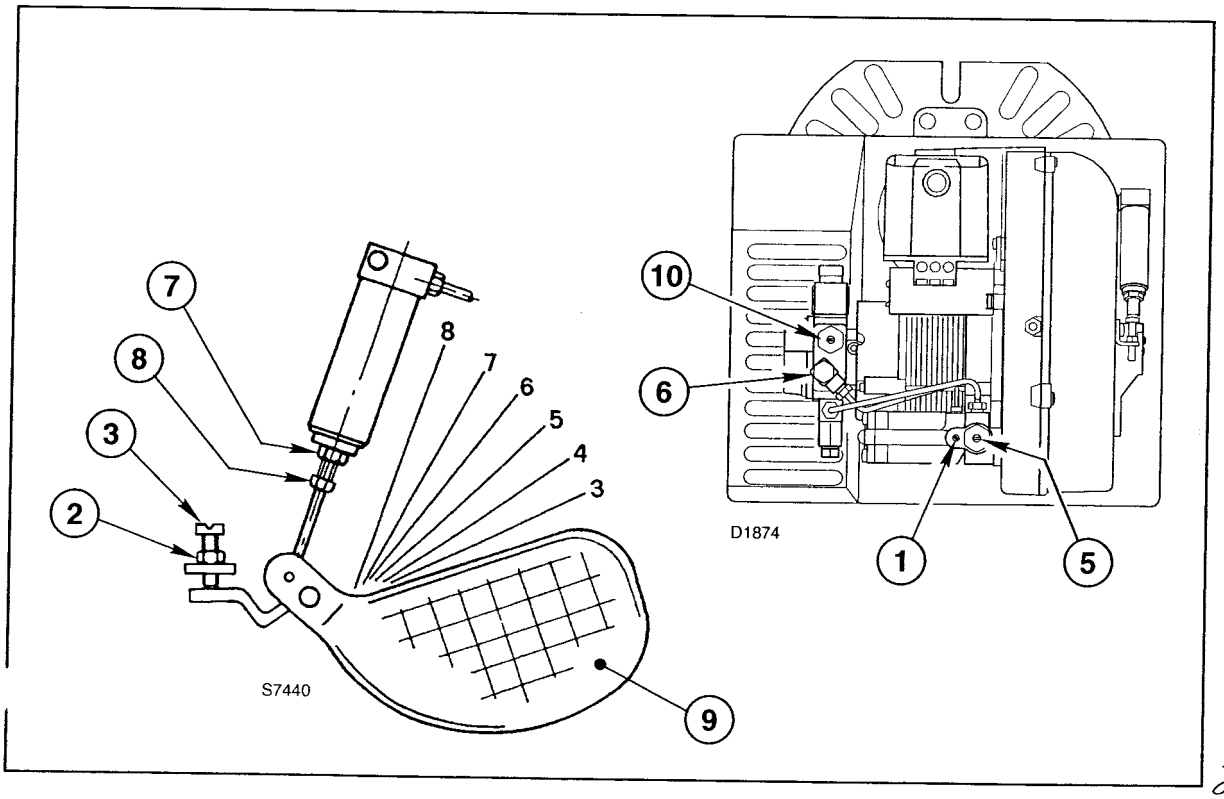
MAIN FLAME SETTING

A) Be sure that the burner is operating at high fire.

B) Set the pump pressure by attaching a pressure gauge to the Pressure port (6) and adjust the pressure by turning the pressure regulator adjustment screw (10).
Loosen the RETAINING NUT (7), and turn the BOLT (8) in a counterclockwise direction until about 3/4 of an inch of thread is visible. Using the setting taken from the Burner Set-up Chart, column 5, position the air shutter (9) so that the top of the shutter is aligned with the proper index line indicated on the air intake side of the burner housing. Holding the shutter in this position, turn ADJUSTING BOLT (8) in a clockwise direction until a resistance is met.

C) The final position of the air adjustment plate will vary on each installation. Use instruments to establish the proper settings for maximum CO_2 and a smoke reading of zero.

NOTE: Variations in flue gas, smoke, CO_2 and temperature readings may be experienced when the burner cover is put in place. Therefore, the burner cover **must** be in place when making the final combustion instrument readings, to ensure proper test results.



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ACTUAL FIRING RATE ± 5%		NOZZLE SIZE	PUMP PRESSURE		TURBULA-TOR SETTING	AIR DAMPER SETTING	
GPH	kg/h	GPH	PSI	BAR		LOW FIRE	MAIN FLAME
3.50	11.3	2.50 x 45°/60°	190	13.0	0.0	2.3	2.8
4.00	12.9	3.00 x 45°/60°	178	12.0	1.0	2.5	3.2
4.65	15.0	3.50 x 45°/60°	178	12.0	2.0	2.8	3.7
5.30	17.1	4.00 x 45°/60°	178	12.0	3.0	3.2	4.5
6.00	19.4	4.50 x 45°/60°	178	12.0	4.0	3.5	5.0
6.40	20.7	5.00 x 45°/60°	165	11.4	5.0	3.8	6.0

NOZZLES: Monarch R-PLP, Delavan W-B, Danfoss S-B, Steinen SS-S, Hago P.

NOTE: A 45° degree nozzle is suggested, however, a 60° degree nozzle may be used in cases where the flame is unstable at light-off when operated at low ambient temperatures.

COMBUSTION CHAMBER

Follow the instructions furnished by the boiler/furnace manufacturer. Size retro application according to the appropriate installation codes (eg. CSA B139 or NFPA #31).

NON-RETROFIT APPLICATIONS

If this burner is being installed in a packaged unit (ie. burner comes with a boiler or furnace), follow the installation and set-up instructions supplied with the heating unit, as settings will differ from those shown in this manual.

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RIELLO 40 SERIES OIL BURNERS
MODELS F3, F5, F10, F15, F20

Dear Purchaser:

Thank you for choosing a Riello oil burner. We are proud of our products and have developed this burner to combine state of the art technology with stringent quality control to give you the very best in heat generation.

Properly installed and maintained, your Riello burner will give you many years of efficient, clean burning, worry-free combustion. Please read the Owner's instructions below and save this sheet for future reference.

OWNER'S OPERATING INSTRUCTIONS

FUEL OIL: Your burner is not to be used with oil heavier than No. 2. Never use gasoline, crankcase oil or any oil containing gasoline.

COMBUSTION AIR: An adequate air supply is required for proper combustion. Do not block the flow air into your furnace or boiler room. Details on air requirements are found in your installation Manual.

OIL FILTER: The oil filter cartridge should be replaced annually, and the filter container thoroughly cleaned by your service technician.

MOTOR: The motor on your Riello oil burners is permanently lubricated, and does not require oiling

WARNINGS:

NEVER try to light oil by putting burning material into the furnace or boiler.

Do not store combustible or flammable material near your heating appliance.

IF THE BURNER FAILS TO OPERATE

First, check the following:

1) Check your thermostat; turn it up well above room temperature
2) Check your master on/off furnace/boiler switch - is it on?
3) Check your electrical panel for blown fuses or tripped breakers.
4) Make sure there is oil in your oil tank

If the burner has shut down on safety, the red reset button will be illuminated. The button is located on the front of the burner cover, near the top. Set your thermostat well above room temperature. Then, press the reset button ONCE ONLY. The burner should restart. Should the burner shut down a second time, or fail to operate when the reset button is pushed, call your service technician.

THERE ARE NO OWNER SERVICEABLE PARTS INSIDE THE BURNER COVER, DO NOT TAMPER WITH THE UNIT OR CONTROLS. CALL YOUR SERVICE TECHNICIAN.

TO STOP BURNER:

Turn your thermostat off, or as low as it will go. Locate the master on/off switch for the furnace or boiler and switch it to the OFF position. If the burner will be shut down for an extended period of time, close your oil valve in addition to the above.

For best efficiency, and to keep your burner in prime operating condition, have it serviced annually by a qualified oil service technician.
For Service, contact: (fill in the name and phone number)

_____

_____

Riello Canada Inc., 2165 Meadowpine Boulevard, Mississauga, Ontario, L5N 6H6
Riello Corporation of America, 35 Pond Park Road, Hingham, Massachusetts 02043

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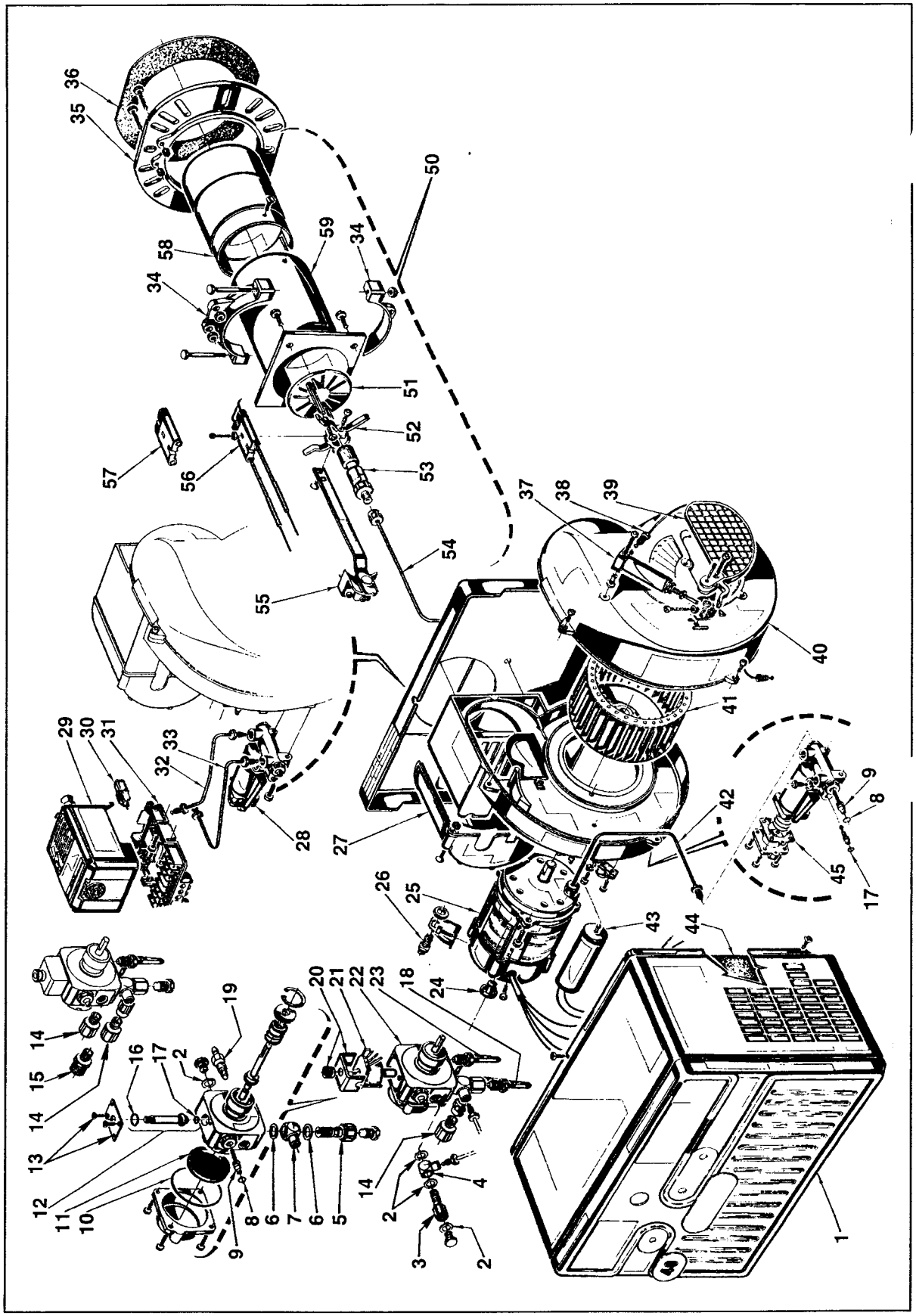
15/20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F20 - 14

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SPA E PARTS LIST

NO.	CODE	DESCRIPTION
1	3007235	Burner Back Cover
2	3007077	Crushable Metal Washer
3	3005771	Banjo Core Adapter - Pressure Port
4	3005803	Banjo Fitting - Pressure Port
5	3005804	Banjo Core Adapter - Return Line
6	3007079	Crushable Metal Washer
7	3005805	Banjo Fitting - Return
8	3007028	O-Ring - Pump Pressure Regulator
9	3007202	Regulator Screw
10	3007162	O-Ring - Pump Cover
11	3005719	Pump Screen
12	3006925	Valve Stem
13	3007203	Valve Stem Plate
14	3005847	1/4" NPT/ Metric Adapter - Female
15	3006571	3/8" NPT/Metric Adapter - Male
16	3007029	O-Ring - Valve Stem Upper
17	3007156	O-Ring - Valve Stem Lower
18	3006995	Pipe connector - Return
19	3007893	Bleeder
20	3006553	Coil U-Bracket and Knurled nut
21	3002279	Coil
22	3007806	Pump
23	3006994	Pipe connector - Supply
24	3000443	Pump Drive Key
25	3005845	Motor
26	3005858	Union - Nozzle Tube / Extension
27	3007318	Air Tube Cover
28	3006500	Hi Fire Delay Valve
29	3001157	Primary Control 530SE/C
30	3002280	Photo-cell
31	3002278	Primary Control Sub Base
32	3005809	Oil Pressure Tube
33	3005808	Oil Return Tube
34	3005849	Semi Flange

NO.	CODE	DESCRIPTION
35	3005851	Universal Mounting Flange
36	3005852	Mounting Gasket
37	3006499	Hydraulic Jack
38	3008050	Capillary Tube
39	3000645	Hydraulic Air Shutter
40	3007211	Air Intake Housing
41	3005799	Fan
42	3005857	Nozzle Oil Tube Extension
43	3005846	Capacitor 16 µF
44	3007358	Acoustic Liner
45	3005801	Gasket
50	**3949271**	**Short Combustion Head 5" (275T1)**
51	3005897	Turbulator Disc
52	3005896	Cross - casting
53	3006965	Nozzle Adapter
54	3006987	Nozzle Oil Tube - Short
55	3005900	Regulator assembly - Short
56	3005902	Electrode assembly - Short
57	3005869	Electrode Porcelain
58	3005894	End Cone
59	3005892	Short Air Tube
50	**3949272**	**Long Combustion Head 10" (275T2)**
51	3005897	Turbulator Disc
52	3005896	Cross - casting
53	3006965	Nozzle Adapter
54	3006988	Nozzle Oil Tube - Long
55	3005901	Regulator assembly - Long
56	3005903	Electrode assembly - Long
57	3005869	Electrode Porcelain
58	3005894	End Cone
59	3005893	Long Air Tube

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AIR FOR COMBUSTION

Do not install burner in room with insufficient air for combustion. Be sure there is an adequate air supply for combustion if the boiler/furnace room is enclosed. It may be necessary to create a window to permit sufficient air to enter the boiler/furnace room. The installer must follow local ordinances in this regard. Should local ordinances be lacking, it is suggested that the installer follow CSA standard B139.

CHIMNEY

Be sure chimney is sufficient to handle the exhaust gases. It is recommended that only the burner be connected to the chimney. Be sure that it is clean and clear of obstructions.

OIL FILTER

An external oil filter is REQUIRED, even though there is an internal strainer in the pump. The filter should be replaced at least once a year, and the filter container should be thoroughly cleaned prior to installing a new filter cartridge.

DRAFT

Follow the instructions furnished with the heating appliance.
The pressure in the combustion area should be kept as close to zero as possible. The burner will operate with a slight draft or pressure in the chamber.

ELECTRICAL CONNECTIONS

All electrical connections should be done in accordance with the C.E.C. Part I, and a local codes. The system should be grounded.

CONTROL BURNER OPERATION

Check out the burner and explain its operation to the homeowner. Be sure to leave the Owner's Instruction sheet with the homeowner.

FIRE EXTINGUISHER

If required by local codes, install an approved fire extinguisher.

18/20

AIR FOR COMBUSTION

Do not install burner in room with insufficient air for combustion. Be sure there is an adequate air supply for combustion if the boiler/furnace room is enclosed. An opening of at least twice the area of the flue should be available, or one square foot of area for every gallon of firing rate. It is important to have one opening near the floor, and one near the ceiling. It may be necessary to create a window to permit a sufficient air to enter the boiler/furnace room. The installer must follow local ordinances in this regard. Should local ordinances be lacking, it is suggested that the installer follow NFPA manual # 31.

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DRAFT

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ELECTRICAL CONNECTIONS

All electrical connections should be done in accordance with the National Electrical Code, and all local ordinances. In most localities, a number 14 wire should be used inside a metal conduit. The system should be grounded. A service switch should be placed close to the burner on a fireproof wall in an easily accessible location.

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FIRE EXTINGUISHER

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19/20

Riello Canada Inc.

2165 Meadowpine Boulevard
Mississauga, Ontario L5N 6H6
Telephone : 905-542-0303
Facsimile : 905-542-1525
Toll Free : 1-800-387-3898

Riello Corporation of America

35 Pond Park Road
Hingham, Massachusetts 02043
Telephone : 781-749-8292
Facsimile : 781-740-2069
Toll Free : (outside Massachusetts) 1-800-992-7637

TECHNICAL HOT LINE (USA and CANADA) 1-800-4-RIELLO
RIELLO CANADA WEBSITE: www.riellocanada.com
RIELLO USA WEBSITE: www.riellousa.com

RIELLO 40 SERIES OIL BURNERS
MODELS F3, F5, F10, F15, F20

Dear Purchaser:

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For Service, contact: (fill in the name and phone number)

_____

_____

Riello Canada Inc., 2165 Meadowpine Boulevard, Mississauga, Ontario, L5N 6H6
Riello Corporation of America, 35 Pond Park Road, Hingham, Massachusetts 02043

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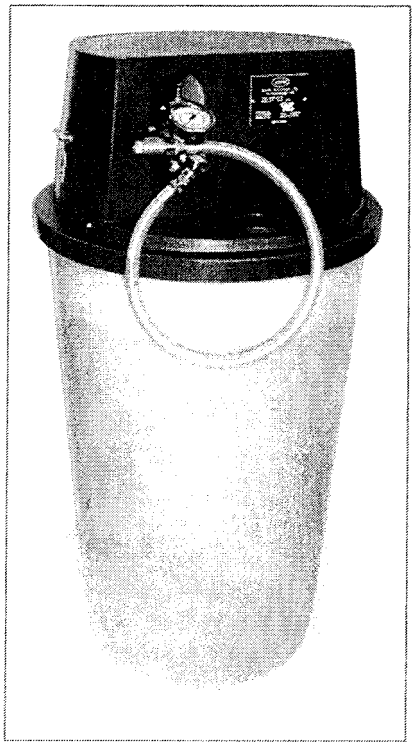
AXIOM INDUSTRIES LIMITED

MODEL SF100 PACKAGED HYDRONIC SYSTEM FEEDER



The SF100 contains everything required to feed and pressurize closed hydronic heating or cooling systems in a neat, simple package that is easy to install and operate. It is compatible with both water and water/glycol solutions.

FEATURES and BENEFITS

- *208 litre (55 US gallon) tank for storage and mixing*
- *Plugs into any standard 115 VAC outlet*
- *Fluid level switch shuts the pump off if the storage tank level gets low*
- *Accumulator tank prevents excessive pump cycling*
- *No direct connection to potable water supply eliminates need for backflow prevention*
- *Make-up fluid stored in the feeder tank can be pre-treated*
- *Diverter valve for purging of air on initial start-up and manual agitation of solution*
- *Prevents major floods - in the event of system rupture, only the contents of the tank can be pumped into the system*
- *Provides leak detection - dropping fluid level provides immediate notice that the system has developed a leak*
- *Fluid drained for service can easily be put back into the system*
- *Flexible connection hose with system check valve makes installation easy*

Represented By:

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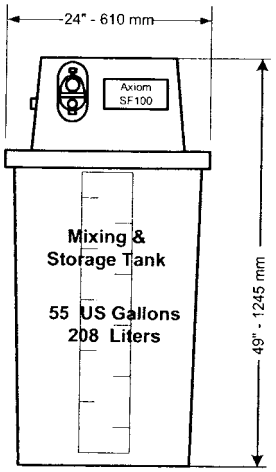
AXIOM INDUSTRIES LIMITED

SF100 HYDRONIC SYSTEM FEEDER TECHNICAL INFORMATION

WEIGHT - 16 kg, 35 lbs.



ELECTRICAL

115/60/1, 0.7 amps
3-prong plug and cord

PUMP PERFORMANCE

0.09 l/s (1.4 gpm) @ free flow
0.06 l/s (1.0 gpm) @ 345KPa (50 psig)
Self-priming up to 2.1 m (7 feet)
Maximum liquid temp. 77 C (170 F)

Certified to CAN/CSA
C22.2 No. 68

9901055
Conforms to UL73

SPECIFICATION

Hydronic system feeder shall be AXIOM INDUSTRIES LTD. Model SF100. System shall include 208 litre (55 US gallon) storage/mixing tank with cover; pump suction hose with inlet strainer; pressure pump with thermal cut-out; integral pressure switch; integral check valve; cord and plug; pre-charged accumulator tank with EPDM diaphragm; manual diverter valve for purging air and agitating contents of storage tank; pressure regulating valve adjustable (35 – 380 KPa; 5 – 55 psig) complete with pressure gauge; integral replaceable strainer; built-in check valve; union connection; 12 mm (½") x 900 mm (36") long flexible connection hose with check valve; low level pump cut-out. Pressure pump shall be capable of running dry without damage. Power supply 115/60/1 0.7 A. Unit shall be completely pre-assembled and certified by a recognized testing agency to CSA standard C22.2 No 68.

ACCESSORIES

- ☐ **2PRV** – Second Pressure Reducing Valve, Pressure Gauge, System Connector Hose and Check Valve to allow for independent pressure supply to a second system.
- ☐ **RIA10-1-SAA** – Low Level Alarm Panel c/w Remote Monitoring Dry Contacts and Selectable Audible Alarm

LIMITED WARRANTY

The SF100 is warranted against defects in materials and workmanship for one year.

Project _____ Location _____

Consultant _____ Contractor _____

Unit Tag _____ Sales Agent _____

21.12

AXIOM INDUSTRIES LIMITED

SF100, SF100L and SF100-HP HYDRONIC SYSTEM FEEDER

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Installation Instructions

WARNING: "Risk of electrical shock". This pump is supplied with a grounding connector and grounding-type attachment plug. To reduce the risk of electrical shock, be certain that it is connected only to a properly grounded, grounding-type receptacle. To prevent electrical shock, disconnect power before initiating any work. In the case of pump failure, the motor housing and/or the pumped fluid may carry high voltage to components normally considered safe.

Set the solution feeder on a secure and level base. Connect the flexible hose supplied with the unit to your system connection point - use a union and isolation valve to allow for future service. **Note that the check valve supplied with the unit must be on the system end of the flexible hose.**

NOTE - Relief and drain valves may be piped to the SF100 tank, but any holes for entry of these pipes should be cut into the side of the tank near the top rather than through the cover. This will allow the cover and top to be easily removed if necessary.

Fill the SF100 tank with fluid. The unit is suitable for water or glycol/water solutions of up to 50% glycol concentration.

Operation Instructions

Leave the field installed isolation valve closed until the SF100 has been cycled and checked for leaks.

Plug the SF100 into an approved electrical outlet. The pump will start, charge the pressure tank, and stop automatically. Check to ensure that all joints are tight and there are no leaks.

NOTE - It may be necessary to purge air from the lines before the pump can draw fluid from the tank. This can be done with the diverting valve, which is accessible through the hole on the left-hand side of the cover. Turn the valve handle so that it is vertical to purge air - return it to horizontal for normal operation.

Verify that the outlet pressure registered on the pressure gauge meets your system needs. It is factory set at 12 psig (83 KPa), but can be increased by turning in the adjusting stem on the top of the regulating valve. **The regular SF100 or SF100L can but increased to 55 psi and the SF100-HP or SF100-HP-L can be increased to 85 psi.**

Fill your system, and then slowly open the valve isolating the system from the SF100.

NOTE: Do not use the SF100 to fill large systems. The pump does not have a high flow rate; using it to fill large systems will cause unnecessary wear on the pump and may void the warranty.

Once the system is filled to the correct pressure, ensure that there is an adequate level of fluid (we recommend about 2/3 full) in the storage tank and record the fluid level. The SF100 will now feed solution automatically to maintain the desired system pressure. **The SF100 or SF100-HP has a 48 gallon (180 litre) tank and the SF100L or SF100-HP-L has a 100 gallon (383 litre) tank.**

The diverting valve, which is accessible through the hole on the left hand side of the cover, can be used to agitate or mix the solution in the tank. Turn the valve handle so that it is vertical - the pump will start automatically and re-circulate the solution back into the tank. When the solution is adequately mixed, turn the valve handle back to horizontal. The pump will re-charge the pressure tank and shut off automatically.

Maintenance Instructions

Periodically check the fluid level in the storage tank, and visually examine the SF100 to ensure that it is clean and that all joints are tight. There is a strainer on the bottom of the suction hose inside the tank that should be checked monthly.

Solution Feeder Limited Warranty

AXIOM Solution Feeder are warranted to be free of defects in material and workmanship under normal use, for a period of one (1) year from the date of manufacture, or one (1) year of use, with proof of purchase. This limited warranty will not exceed two (2) years, in any event.

The limited warranty will not apply to pumps that were improperly installed, misapplied, or incompatible with fluids or components not manufactured by AXIOM. Pump failure due to foreign debris is not covered under the terms of this limited warranty. AXIOM will not warrant any pump, which is damaged or modified outside the AXIOM factory.

Returns are to be shipped postage prepaid to AXIOM Industries. AXIOM shall not be liable for freight damage incurred during shipping, package returns carefully.

AXIOM's obligation under this warranty policy is limited to the repair or replacement of the pump/product. All returns will be tested per AXIOM factory criteria. Products found not defective (under the terms of this limited warranty) are subject to charges paid by the returnee for the testing and packaging of "tested good" non-warranty returns.

No credit or labor allowances will be given for pumps or products returned as defective. Warranty replacements will be shipped on a freight allowed basis. AXIOM reserves the right to choose the method of transportation.

This limited warranty is in lieu of all other warranties, expressed or implied, and no other person is authorized to give any other warranty or assume obligation or liability on AXIOM's behalf. AXIOM shall not be liable for any labor, damage or other expense, nor shall AXIOM be liable for any indirect, incidental or consequential damages of any kind incurred by the reason of the use of sale of any defective product or part. This limited warranty covers products distributed within Canada and the USA. Other world market areas should consult with the distributor for any deviation from this document.

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Chapter 22 PRESSURE GAGES

MANUFACTURER/DISTRIBUTOR:

ROMATEC
6535,HENRI-BOURASSA OUEST
MTL.QUEBEC H4R 1C9
PH:514-332-9302 FAX:0578

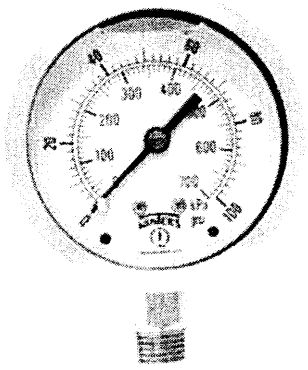
22.1 LF SERIES PRESSURE "WINTER"

END OF CHAPTER 22

WINTERS INSTRUMENTS
MANUFACTURERS OF INDUSTRIAL INSTRUMENTATION

LF Series Quality

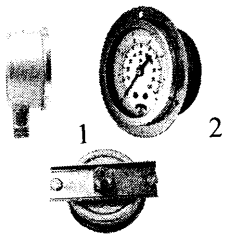
New Crimped Ring Design



2 1/2" (63mm) Stainless Steel Wetted Parts

DETAILED SPECIFICATIONS

NEW 2.5" STAINLESS STEEL



1. Optional Front Flange
2. Optional U-clamp

- Pumps, compressors, hydrau machinery, motors, winches, quality liquid filled gauge is

Features:

Dial:	~~1 1/2" (40mm), 2 1/2~~ 4" (100mm) with blac
Case:	304 stainless steel
Lens:	Polycarbonate
Ring:	304 stainless steel, cr
Pointer:	Aluminum, anodized
Wetted Parts:	Brass or 316 stainless
Connection:	1/8", 1/4"
Accuracy:	1 1/2" (40mm) = 3 Grade B 2 1/2 1.5% ANSI/ASME Grade I
Fill:	Glycerin (Canadian c stainless steel version standard)
Other:	Restrictor screw stanc

Applications:

- Pumps, compressors, hydraulic presses & machinery, motors, winches etc. Whenever filled gauge is required.
- Versatile pressure instrument designed for applications where vibration/pulsation exi

How to Order: Specify product code

22.1

Product Codes

1/2

Dial Size	1 1/2" (40mm)				2 1/2" (63mm)				4" (100mm)	
Connection	Bottom	Back (CB)	Bottom	Back (CB)	Bottom	Back (CB)	Bottom	Back (CB)	Bottom	Bottom
Tube, Socket & Movement	Brass	Brass	Stainless Steel	Stainless Steel	Brass	Brass	Stainless Steel	Stainless Steel	Brass	Brass
NPT Connection	1/8"	1/8"	1/8"	1/8"	1/4"	1/4"	1/4"	1/4"	1/4"	1/2"
30" Hg Vacuum/kPa	*	*	Q1200	Q1220	Q801	Q900	Q820	Q840	Q700	Q1234
30"-0-15 psi/kPa	*	*	*	*	Q790	Q890	Q860	Q870	Q701	Q1235
30"-0-30 psi/kPa	*	*	*	*	Q798	Q898	Q861	Q871	Q702	Q1236
30"-0-60 psi/kPa	*	*	*	*	Q799	Q899	Q862	Q872	Q703	Q1237
30"-0-100 psi/kPa	*	*	*	*	Q791	Q891	Q863	Q873	Q704	Q1238
30"-0-150 psi/kPa	*	*	*	*	Q792	Q892	Q864	Q874	Q705	Q1239
30"-0-200 psi/kPa	*	*	*	*	Q794	Q894	Q866	Q876	Q706	Q1240
30"-0-300 psi/kPa	*	*	*	*	Q795	Q895	Q867	Q877	Q707	Q1241
0-15 psi/kPa	*	*	Q1201	Q1221	Q800	Q901	Q821	Q921	Q708	Q1242
0-30 psi/kPa	Q1102	Q1122	Q1202	Q1222	Q802	Q902	Q822	Q922	Q709	Q1243
0-60 psi/kPa	Q1103	Q1123	Q1203	Q1223	Q803	Q903	Q823	Q923	Q710	Q1244
0-100 psi/kPa	Q1104	Q1124	Q1204	Q1224	Q804	Q904	Q824	Q924	Q711	Q1245
0-160 psi/kPa	Q1105	Q1125	Q1205	Q1225	Q805	Q905	Q825	Q925	Q712	Q1246
0-200 psi/kPa	Q1106	Q1126	Q1206	Q1226	Q806	Q906	Q826	Q926	Q713	Q1247
0-300 psi/kPa	Q1107	Q1127	Q1207	Q1227	Q807	Q907	Q827	Q927	Q714	Q1248
0-400 psi/kPa	*	*	*	*	Q817	Q917	Q880	Q881	Q715	Q1249
0-600 psi/kPa	Q1108	Q1128	Q1208	Q1228	Q808	Q908	Q828	Q928	Q716	Q1250
0-1000 psi/kPa	Q1109	Q1129	Q1209	Q1229	Q809	Q909	Q829	Q929	Q724	Q717
0-1500	Q1110	Q1130	Q1210	Q1230	Q816	Q914	Q834	Q934	Q725	Q718

22.1

Chapter 23 PUMPS

MANUFACTURER/DISTRIBUTOR:

WOSELEY
4200, Hickmore
St-Laurent, Qué., H4T 1K2
PH: (514) 344-9378 FAX: 9341

MANUFACTURER/DISTRIBUTOR:

EHPRICE
4905,DOBRIN
MTL.QUE. H4R 2L8
PH:514-334-9804 FAX:514-745-3159

MANUFACTURER/DISTRIBUTOR:

VENTIL EXPERT
9855, LOUIS-H LAFONTAINE
ANJOU,MTL.QUE.
H1J 2A3
PH:514-355-4540 FAX:4346

23.1 (3) FEW PUMPS MV8-50 (P17-P18-P19), 5HP/ 3PH/575 VOLTS.

23.2 SQUARE D FEW PUMP PRESSURE SWITCH .

23.3 CIRCULATING HEATING (P-04) Grundfos UPS 50-160

23.4 MYER SUMP PUMPS SX50 (P11-P12) 120 VOLTS 60 HZ

(SEE CONTROL PANEL SCHEMATIC ON ELECTRICAL MANUAL)

23.5 ITT FLYGT SUBMERSIBLE PUMP, MAINTENANCE AND PARTS.

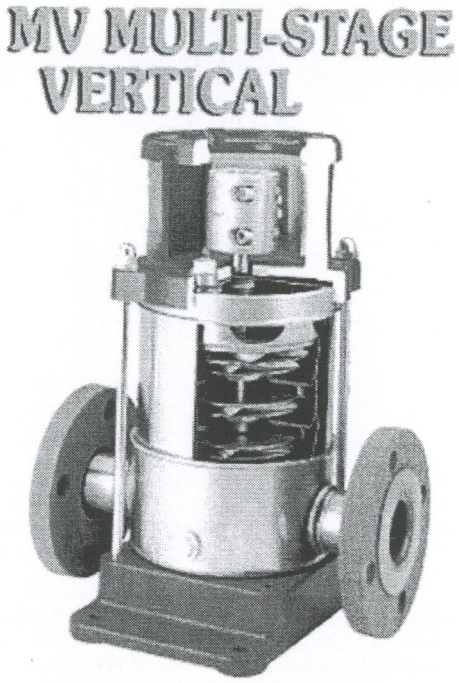
END OF CHAPTER 23

Myers®
Pentair Water

Search: GO

USA - 1101 Myers Parkway Ashland, Ohio 44805 • Phone: 419-289-6898 • Fax: 419-289-6658
Canada - 269 Trillium Drive Kitchener, Ontario, Canada N2G 4W5 • Phone: 519-748-5470 • Fax: 519-748-2553

MV Multi-Stage Vertical
High Pressure Booster Pumps



Applications: Pressure Boosting, Boiler Feed, Condensate Return, Agricultural, Petrochemical, Jockey Pumps, Irrigation/Sprinkling, Municipal, Mining, Washdown, Deaeration, Parts Washer, Liquid Transfer

Features and Benefits

- Industry standard water-lubricated, maintenance-free seal, silicon carbide seal faces, Stainless Steel and Viton construction for maximum chemical resistance
- Split-coupling provides simple, quick, easy connection to the motor
- NEMA motor mounting bracket high-tensile cast iron precision-machined for solid motor support
- Stainless steel vent vent/fill plug
- Stainless steel top plate designed to always maintain lubrication at shaft seal
- Stainless steel pump shaft precision ground and polished with large flat surfaces for positive impeller drive
- Stainless steel impellers/staging are highly polished for maximum corrosion resistance and for smooth and quiet operation
- Stainless steel shell heavy wall for strong support with O-rings for maximum sealing and thermal protection
- Stainless steel base available in flange or Victaulic connection
- Stainless steel drain plug
- Rugged cast iron foot provides solid and sturdy support
- Free-floating flange ANSI connection rotates to match flange and bolt orientation on mating pipe; easy connection for misalignments
- Pump bearings are made of tungsten carbide and ceramic providing long life and excellent wear resistance

Product Capabilities

Item	MV Series	MV (S) & (V) Series
Impeller	AISI 304 Stainless Steel	AISI 316 Stainless Steel

23.1.1

MV Multi-Stage Vertical High Pressure Booster Pumps

Applications: Pressure Boosting, Boiler Feed, Condensate Return, Agricultural, Process Chemical, Jockey Pump, Irrigation/Sprinkling, Domestic, Misting, Washdown, Operation, Pump Master, Liquid Transfer

CMV1830
MRJ
SR1830

Grinder Pumps

MRG20
MRG20 Grinder Pump Systems
MRGD200 NEW
MRGD300 / MRGD500 / MRGD750 Series NEW
Turnkey Simplex Basin Package NEW

Non-Clog Sewage Pumps

3MW Series
3WHV Series
4MSW / 4MSWH / 6MSW Series NEW

Centrifugal Pumps

12C Series - 2 Stage Centrifugal NEW
Centri-Thrift NEW
CT Series NEW
MDPC Series NEW
MPB Series NEW
MV Multi-Stage Vertical NEW
PQP Series NEW

Jet Pumps

Convertible Jet Pumps MFL Series
Convertible Jet Pumps MPL Series
MFL Series
MFN Series NEW
MFNCP42 Series
MPL Series
MPN Series NEW

Submersible Well Pumps and Controls

PRO-Source™ K-Series
PRO-Source™ Epoxy-Lined
PRO-Source™ PLUS KS-Series
PRO-Source™ PLUS KSS-Series
Submersible Motor Controls

Well Tanks

PRO-Source™ Steel Pressure Tanks

Miscellaneous Pumps

Fountain Pumps
FP01P-TTPOP3B0 NEW
FP10M-SSA0A3A0 NEW
FPS03 NEW
FSMA3-A NEW
MCPH

Accessories

Diffuser	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Shell	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Top/Bottom Plate	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Connection Fittings	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Staging Bushings	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Pump Shaft	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Shaft Bushings	Tungsten-Carbide	Tungsten-Carbide
Mechanical Shaft Seal		
Stationary Face	Carbon	Carbon
Rotating Face	Silicon Carbide	Silicon Carbide
Spring	AISI 316 Stainless Steel	AISI 316 Stainless Steel
Seal Drivers	AISI 316 Stainless Steel	AISI 316 Stainless Steel
Bellows	EPDM	Viton
Bearings	Ceramic	Ceramic
Air Vent Plug	Brass	AISI 316 Stainless Steel
O-Rings	250 F (EPDM)	190 F (Viton)
Base	Cast Iron	Cast Iron
Motor Bracket	Cast Iron	Cast Iron
Coupling	Cast Iron	Cast Iron
Coupling Guard	AISI 304 Stainless Steel	AISI 304 Stainless Steel

Model Range

Model	60Hz HP Range	Suction and Discharge Size	Flow Range GPM
MV2/MV2(S)	3/4 - 5 HP	1-1/4 in.	2 - 20
MV4/MV4(S)	3/4 - 20 HP	1-1/4 in.	4 - 40
MV8/MV8(S)	1-1/2 - 15 HP	2 in.	8 - 80
MV16/MV16(S)	5 - 25 HP	2 in.	15 - 130
MV30/MV30(S)	7-1/2 - 30 HP	2-1/2 in.	20 - 180
MV45/MV45(S)	10 - 30 HP	3 in.	40 - 250
MV65/MV65(S)	15 - 30 HP	4 in.	50 - 400

23.1.2

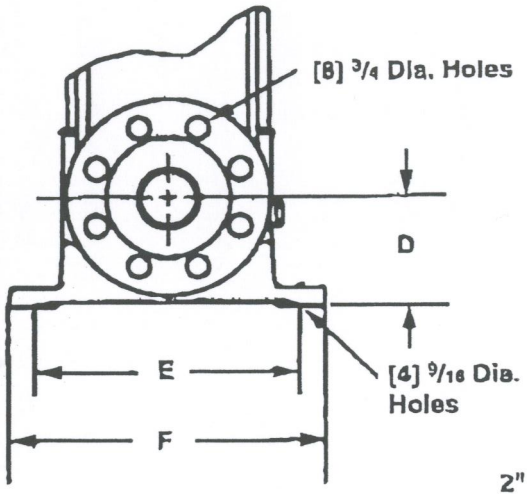
Diffuser	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Shell	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Top/Bottom Plate	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Connection Fitting	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Sealing Destingy	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Pump Shaft	AISI 304 Stainless Steel	AISI 316 Stainless Steel
Shaft Bearings	Tungsten-Carbide	Tungsten-Carbide
Mechanical Shaft Seal		
Stationary Face	Carbon	Carbon
Rotating Face	Silicon Carbide	Silicon Carbide
Spring	AISI 316 Stainless Steel	AISI 316 Stainless Steel
Seal Drivers	AISI 316 Stainless Steel	AISI 316 Stainless Steel
Bellows	EPDM	Viton
Bearings	Ceramic	Ceramic
Air Vent Plug	Brass	AISI 316 Stainless Steel
O-Rings	250 F (EPDM)	150 F (Viton)
Base	Cast Iron	Cast Iron
Motor Bracket	Cast Iron	Cast Iron
Coupling	Cast Iron	Cast Iron
Coupling Guard	AISI 304 Stainless Steel	AISI 304 Stainless Steel

Model Range

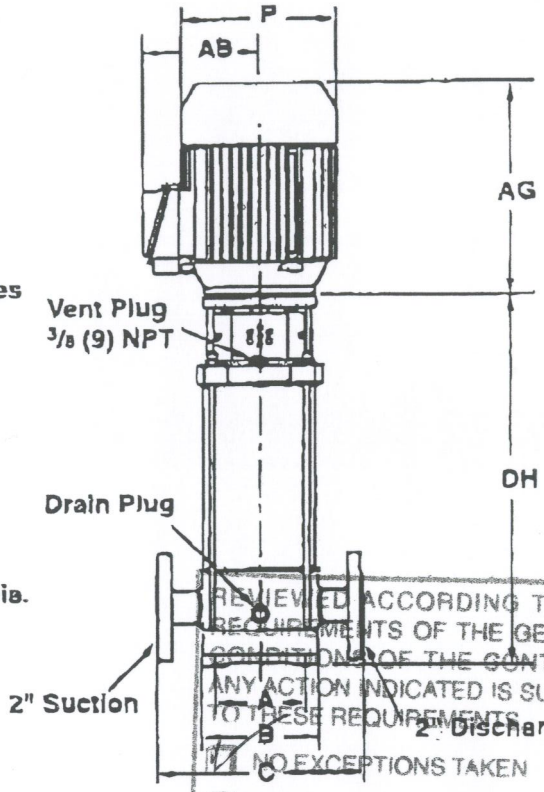
Model	Units HP Range	Suction and Discharge Size	Flow Range GPM
MVS2/MVI2(S)	3/4 - 3 HP	1-1/4 in.	2 - 20
MVS4/MVI4(S)	3/4 - 20 HP	1 1/4 in.	4 - 40
MVS8/MVI8(S)	1-1/2 - 15 HP	2 in.	8 - 80
MVI16 MVI16(S)	3 - 25 HP	2 in.	15 - 150
MVI30/MVI30(S)	7-1/2 - 30 HP	2-1/2 in.	20 - 150
MVI45/MVI45(S)	10 - 30 HP	3 in.	40 - 200
MVI90/MVI90(S)	15 - 30 HP	4 in.	80 - 400

MV8 SERIES

MYERS



Suction and Discharge
ANSI 250 Lb.
Slip Ring Flanges



600 VOLTS
3Ø

Model	# of Stages	60 Hz Hp	50 Hz Hp	Frame	P Inches (mm)	AB Inches (mm)	AG Inches (mm)	DH Inches (mm)	Pump Wt. LBS (kg)
MV8-20	2	1.5	1	143TC	7.38 (187)	6.19 (157)	13.37 (340)	9.92 (252)	35 (15.9)
MV8-30	3	3	2	182TC	9.88 (215)	7.84 (199)	16.5 (419)	11.18 (284)	37 (16.6)
MV8-40	4	3	2	182TC	9.88 (215)	7.84 (199)	16.5 (419)	11.18 (284)	38 (17.3)
MV8-50	5	5	2	184TC	9.88 (215)	7.84 (199)	16.5 (419)	13.66 (347)	45 (20.2)
MV8-60	6	5	3	184TC	9.88 (215)	7.84 (199)	16.5 (419)	13.66 (3.47)	46 (20.9)
MV8-70	7	7.5	3	184TC	9.88 (215)	7.84 (199)	16.5 (419)	15.20 (386)	49 (21.6)
MV8-80	8	7.5	3	184TC	9.88 (215)	7.84 (199)	16.5 (419)	15.20 (386)	49 (22.3)
MV8-100	10	7.5	5	184TC	9.88 (215)	7.84 (199)	16.5 (419)	15.20 (386)	52 (23.7)
MV8-120	12	10	7.5	215TC	11.5 (292)	9.31 (236)	19.5 (495)	15.28 (388)	56 (25.5)
MV8-140	14	15	7.5	215TC	11.5 (292)	9.31 (236)	19.5 (495)	16.42 (417)	59 (26.9)

Model MV8 Dimensions Inches (mm)	
A	5.12 (130)
B	6.69 (170)
C	11.81 (300)
D	3.50 (90)
E	8.46 (215)
F	10.04 (255)

Notes:
1. All dimensions are in inches (mm) and may vary ± 1/4" (6 mm)
2. Not for construction purposes unless certified
3. Coupling gap will vary with motor model.
4. Suction and discharge flanges are ANSI Standard flat face.
5. Max. working pressure 363 PSI (25 Bar)

JOB; WASTE WATER TREATMENT PLANT AT IQUALUIT, NUNAVUT
CONTRACTOR PRE-APPROVAL;
SIFEC-KUDLIK, PER; C.FAUTEUX, T.P.
G.FAUTEUX, P.ENG.
P.A.PELLETIER,P.ENG.

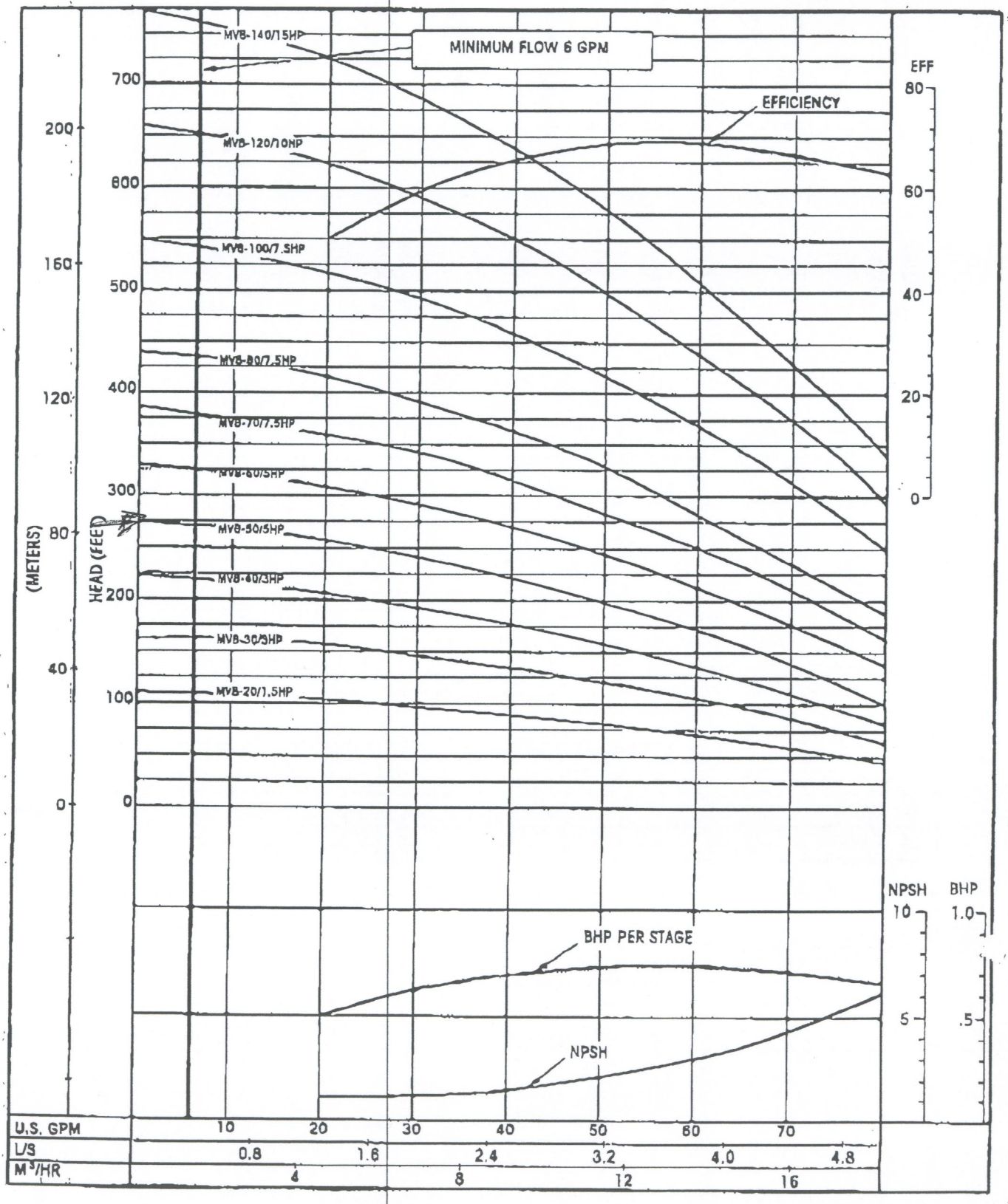
23.1.3

MV8 SERIES

Model	# of Stages	60 Hz HP	50 Hz HP	Frame	P Inches (mm)	AB Inches (mm)	AD Inches (mm)	Inches (mm)	Inches (mm)
MV8-20	2	1.5	1	143TC	7.38 (187)	4.19 (107)	13.37 (340)	9.62 (256)	36 (19.7)
MV8-30	3	3	2	182TC	8.38 (213)	7.48 (190)	15.3 (389)	17.79 (452)	39 (19.9)
MV8-40	4	3	3	182TC	8.38 (213)	7.48 (190)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-50	5	5	3	184TC	8.88 (213)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-60	6	5	3	184TC	8.38 (213)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-70	7	7.5	5	184TC	8.38 (213)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-80	8	7.5	5	184TC	8.38 (213)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-100	10	7.5	5	184TC	8.38 (213)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-120	12	10	7.5	215TC	9.31 (236)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)
MV8-140	14	15	7.5	215TC	9.31 (236)	7.84 (199)	15.3 (389)	11.16 (284)	36 (17.3)

MV8 SERIES

60 Hz/3450 RPM



Individual 50 Hz/2880 RPM Performance Curves begin on Page 22.

23.1.4

ERIALS OF CONSTRUCTION

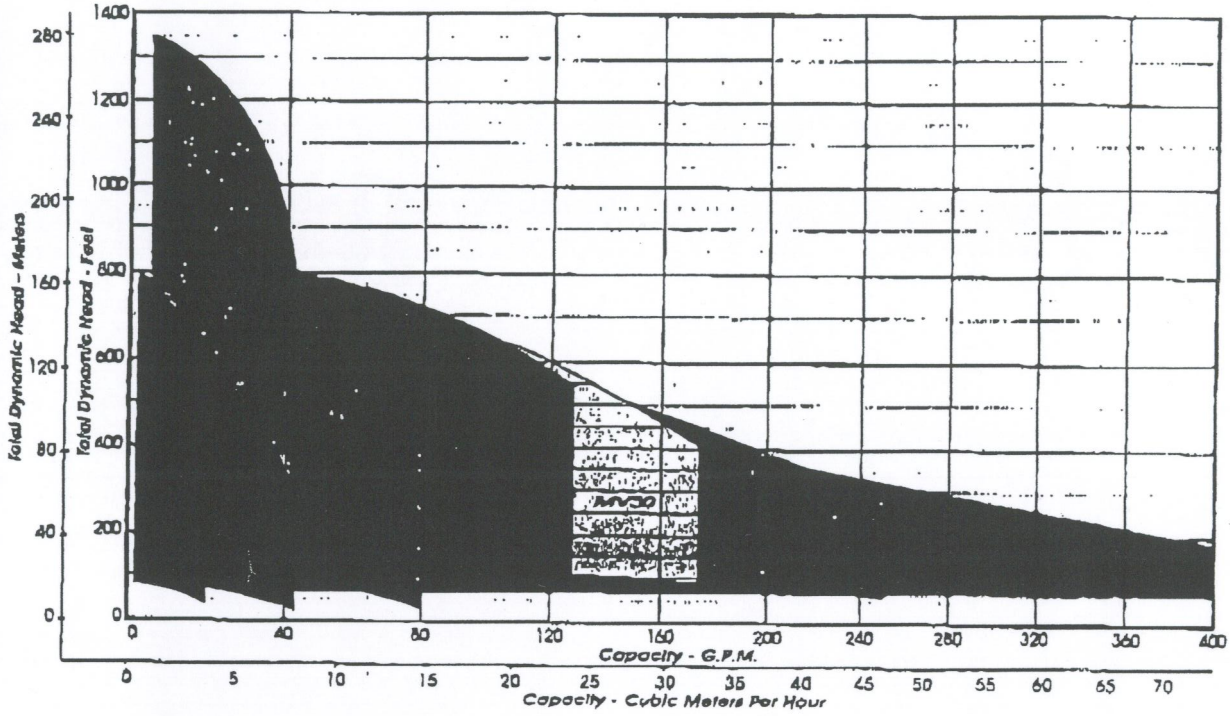
Item	MV Series	MV (S) & (V) Series
Impeller	AISI 304 SST	AISI 316 SST
Diffuser	AISI 304 SST	AISI 316 SST
Shell	AISI 304 SST	AISI 316 SST
Top/Bottom Plate	AISI 304 SST*	AISI 316 SST
Connection Fittings	AISI 304 SST*	AISI 316 SST
Staging Bushings	AISI 304 SST	AISI 316 SST
Pump Shaft	AISI 304 SST	AISI 316 SST
Shaft Bushings	Tungsten Carbide	Tungsten Carbide
Mechanical Shaft Seal		
- Stationary Face	Carbon	Carbon
- Rotating Face	Silicon Carbide	Silicon Carbide
- Spring	AISI 316 SST	AISI 316 SST
- Seal Drivers	AISI 316 SST	AISI 316 SST
- Bellows	Viton	Viton
Bearings	Ceramic	Ceramic
Air Vent Plug	Brass	AISI 316 SST
O-Rings	250°F (EPDM)	195°F (Viton)
Base	Cast Iron	Cast Iron
Motor Bracket	Cast Iron	Cast Iron
Coupling	Cast Iron	Cast Iron
Coupling Guard	AISI 304 SST	AISI 304 SST

*MV30 and MV45 Models - Currently Cast Iron

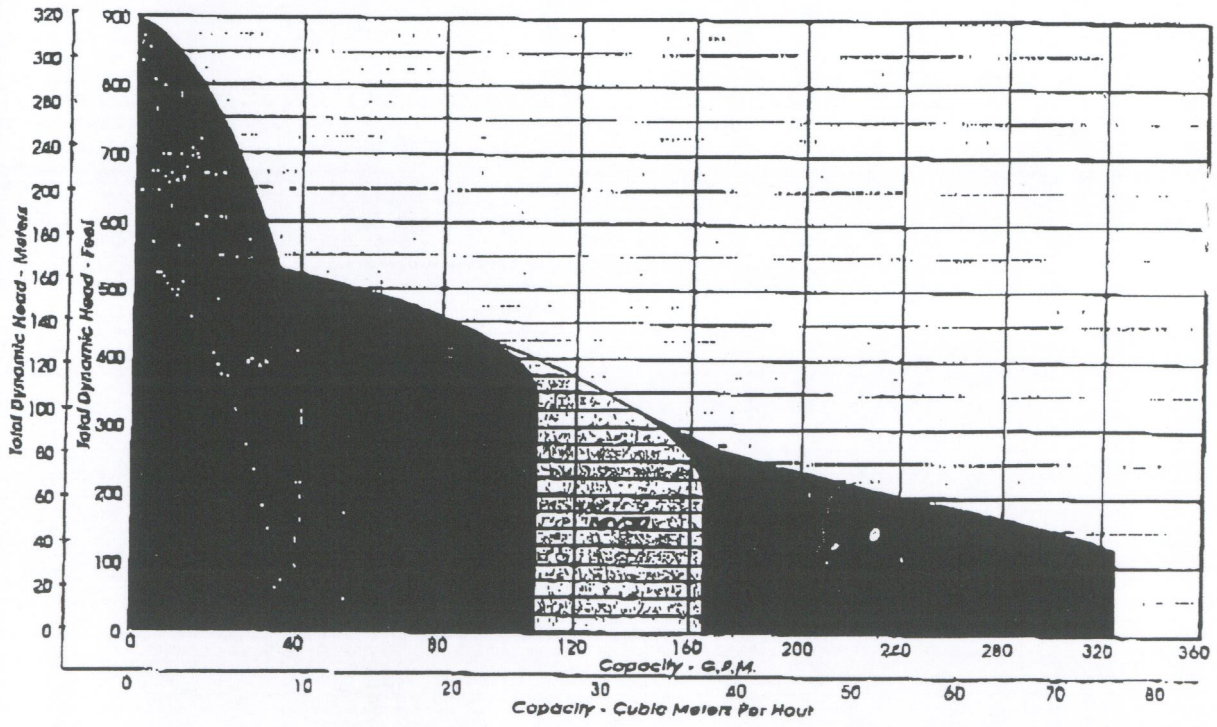
Model Range			
Model	**60 Hz HP Range**	**Suction and Discharge Size**	**Flow Range GPM**
MV2/MV2(S)	3/4 - 5 HP	1 1/4"	2 - 20
MV4/MV4(S)	3/4 - 20 HP	1 1/4"	4 - 40
MV8/MV8(S)	1 1/2 - 15 HP	2"	8 - 80
MV16/MV16(S)	5 - 25 HP	2"	15 - 130
MV30/MV30(S)	7 1/2 - 30 HP	2 1/2"	20 - 180
MV45/MV45(S)	10 - 30 HP	3"	40 - 250
MV65/MV65(S)	15 - 30 HP	4"	50 - 400

TANDING PERFORMANCE

60 Hz / 3450 RPM



50 Hz / 2880 RPM



Individual 50 Hz/2880 RPM Performance Curves begin on Page 22.

Myers®

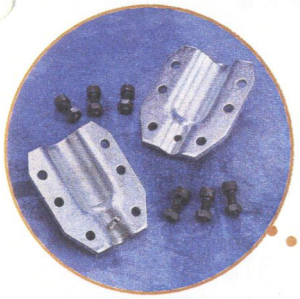
Pentair Pump Group

MV SERIES MULTI-STAGE PUMPS

23.1.7

CONTENTS

NEMA Motor Mounting Bracket
High tensile cast iron precision machined for solid motor support.

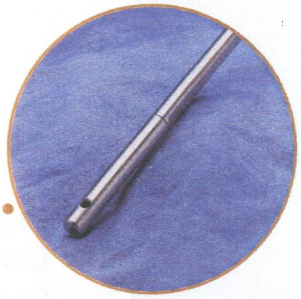


Split-Coupling
Provides simple, quick, easy connection to the motor.

Stainless Steel Top Plate
Designed to always maintain lubrication at shaft seal.

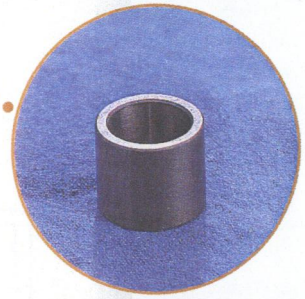
Mechanical Shaft Seal
Industry standard water lubricated, maintenance-free seal, silicon carbide seal faces, SST and viton construction for maximum chemical resistance.

Stainless Steel Vent/Fill Plug

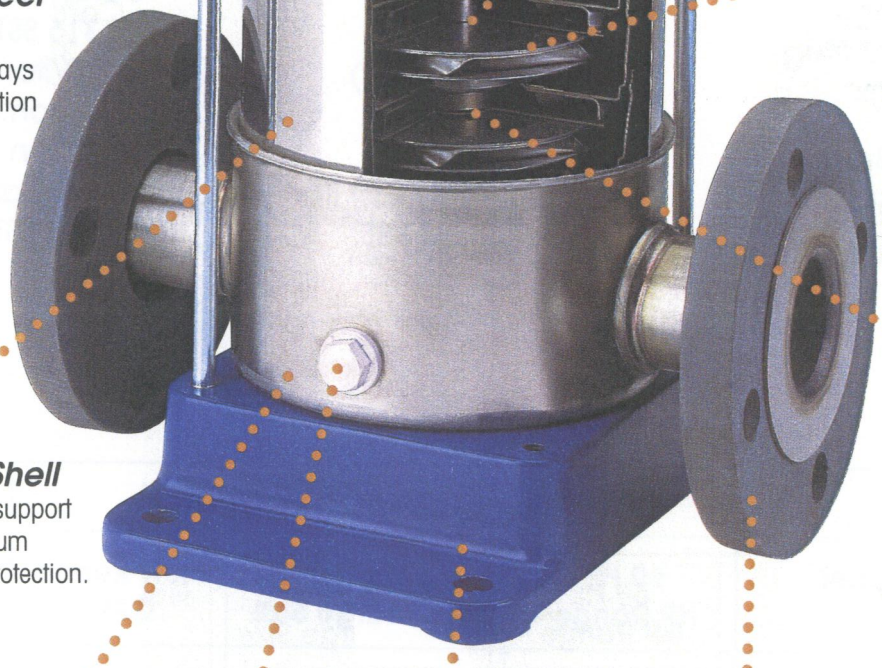


Stainless Steel Pump Shaft
Precision ground and polished with large flat surfaces for positive impeller drive.

Stainless Steel Impellers/Staging
Maximum corrosion resistance. Highly polished for smooth and quiet operation.



Pump Bearings
Tungsten carbide and ceramic provide long life and excellent wear resistance.



Stainless Steel Shell
Heavy wall for strong support with O-rings for maximum sealing and thermal protection.

Stainless Steel Drain Plug

Free Floating Flange
ANSI connection rotates to match flange and bolt orientation on mating pipe. Easy connection for misalignments.

Stainless Steel Base
Available in flange or victaulic connection.

Rugged Cast Iron Foot
Provides solid and sturdy support. Special coating for oxidization protection.

Myers®

23.1.8

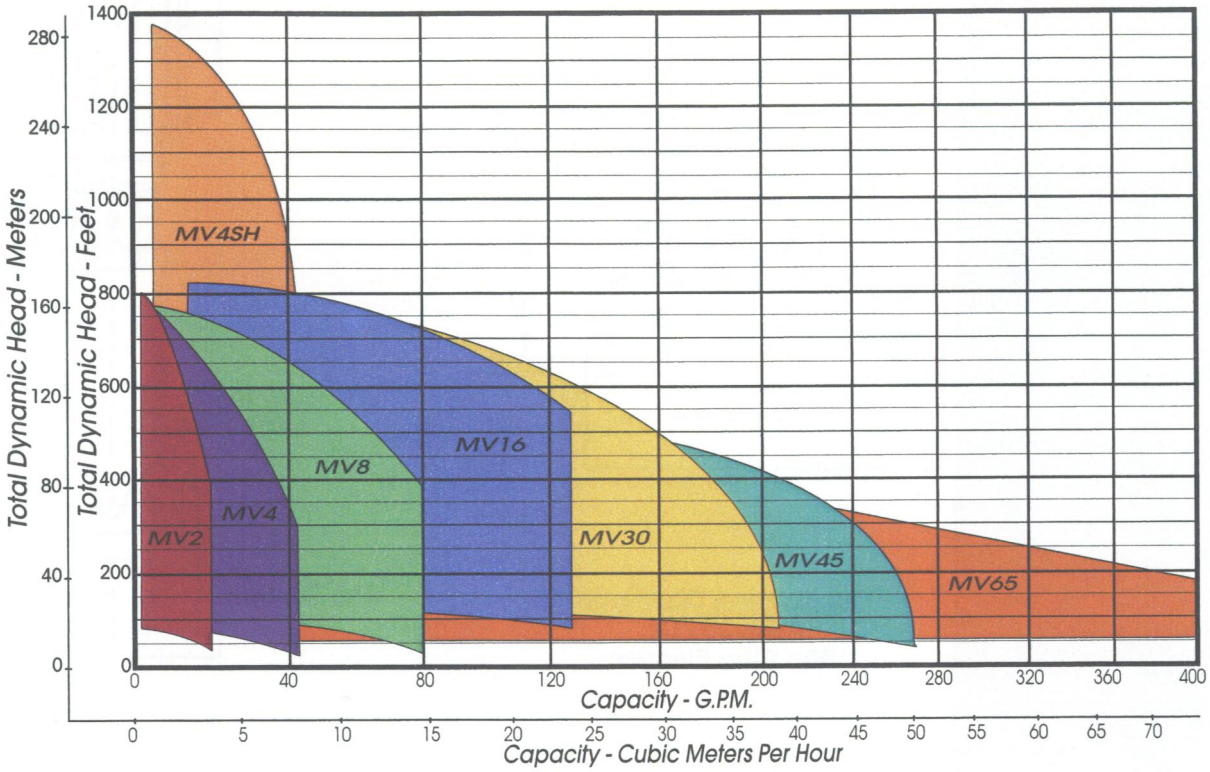
MATERIALS OF CONSTRUCTION

Item	MV Series	MV (S) & (V) Series
Impeller	AISI 304 SST	AISI 316 SST
Diffuser	AISI 304 SST	AISI 316 SST
Shell	AISI 304 SST	AISI 316 SST
Top/Bottom Plate	AISI 304 SST	AISI 316 SST
Connection Fittings	AISI 304 SST	AISI 316 SST
Staging Bushings	AISI 304 SST	AISI 316 SST
Pump Shaft	AISI 304 SST	AISI 316 SST
Shaft Bushings	Tungsten Carbide	Tungsten Carbide
Mechanical Shaft Seal	Carbon & Silicon Carbide	
- Spring	AISI 316 SST	AISI 316 SST
- Seal Drivers	AISI 316 SST	AISI 316 SST
- Bellows	EPDM	Viton
Bearings	Ceramic	Ceramic
Air Vent Plug	AISI 316 SST	AISI 316 SST
O-Rings	250°F (EPDM)	195°F (Viton)
Base	Cast Iron	Cast Iron
Motor Bracket	Cast Iron	Cast Iron
Coupling	Aluminum & Cast Iron	Aluminum & Cast Iron
Coupling Guard	AISI 304 SST	AISI 304 SST

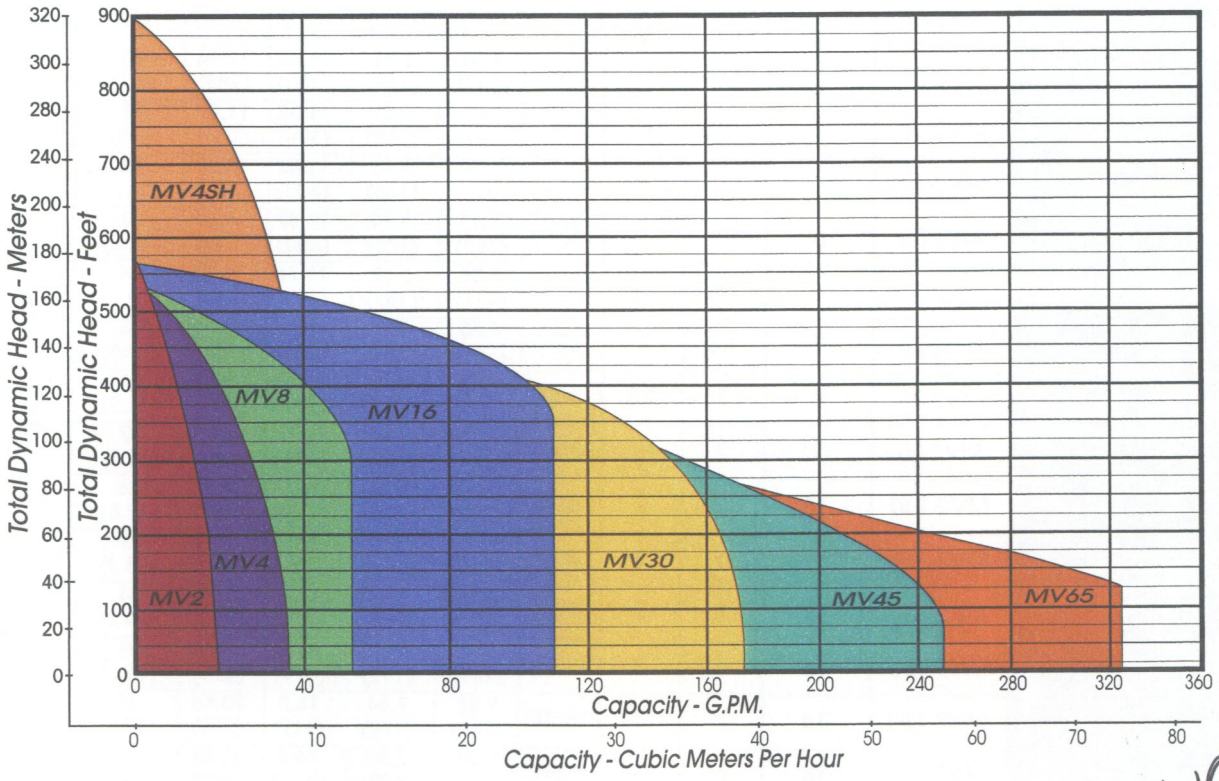
Model Range			
Model	**60 Hz HP Range**	**Suction and Discharge Size**	**Flow Range GPM**
MV2/MV2(S)	3/4 - 5 HP	1 1/4"	2 - 20
MV4/MV4(S)	3/4 - 20 HP	1 1/4"	4 - 40
MV8/MV8(S)	1 1/2 - 15 HP	2"	8 - 80
MV16/MV16(S)	5 - 25 HP	2"	15 - 130
MV30/MV30(S)A	10 - 40 HP	2 1/2"	20 - 180
MV45/MV45(S)A	10 - 50 HP	3"	40 - 250
MV65/MV65(S)	15 - 30 HP	4"	50 - 400

OUTSTANDING PERFORMANCE

60 Hz/3450 RPM



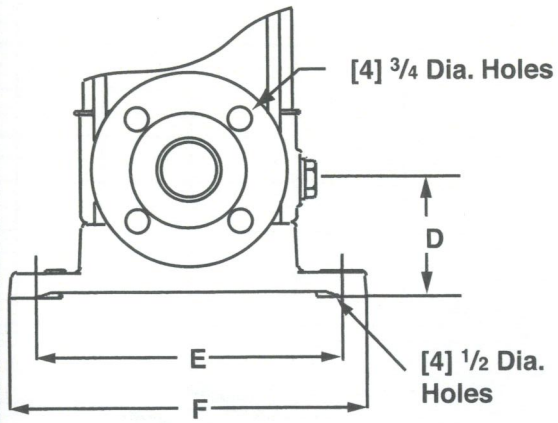
50 Hz/2880 RPM



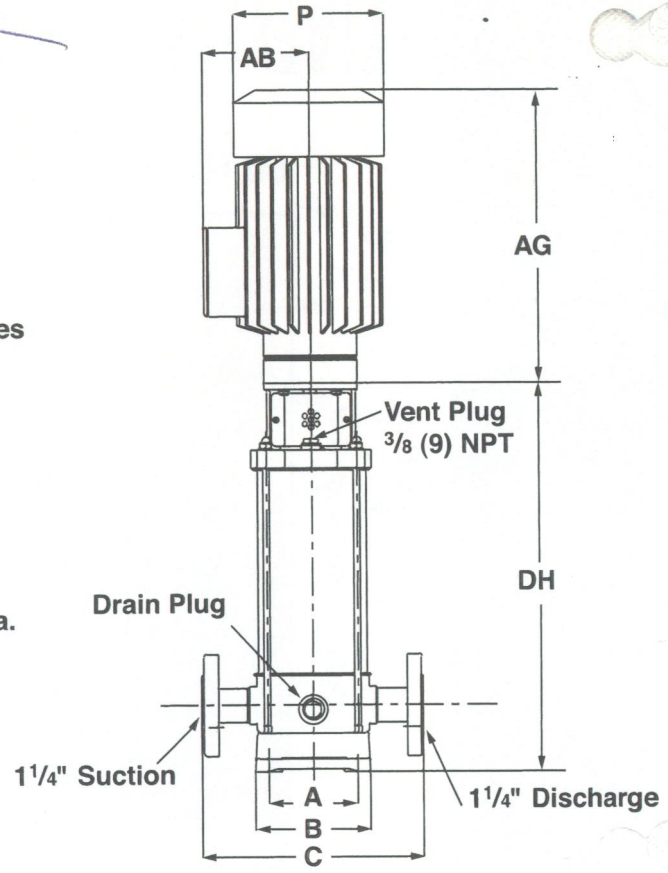
Individual 50 Hz/2880 RPM Performance Curves begin on Page 22.

23.1.10

MV2 SERIES



Suction and Discharge
ANSI 250 Lb.
Slip Ring Flanges



Model	# of Stages	60 Hz HP	50 Hz HP	Frame	P Inches (mm)	AB Inches (mm)	AG Inches (mm)	DH Inches (mm)	Pump Wt. Lbs. (kg)
MV2-20	2	0.75	0.5	56C	7.38 (187)	5.75 (146)	11.82 (300)	11.14 (283)	20 (9.1)
MV2-30	3	0.75	0.5	56C	7.38 (187)	5.75 (146)	11.82 (300)	11.97 (304)	21 (9.5)
MV2-40	4	1	0.75	56C	7.38 (187)	5.75 (146)	11.82 (300)	12.80 (325)	22 (10.0)
MV2-50	5	1.5	1	143TC	7.38 (187)	5.75 (146)	11.82 (300)	13.62 (346)	23 (10.5)
MV2-60	6	1.5	1	143TC	7.38 (187)	6.19 (157)	11.76 (299)	14.45 (367)	24 (10.9)
MV2-70	7	1.5	1	143TC	7.38 (187)	6.19 (157)	11.76 (299)	15.28 (388)	25 (11.4)
MV2-80	8	2	1.5	145TC	7.38 (187)	6.19 (157)	11.76 (299)	16.10 (409)	26 (11.9)
MV2-90	9	2	1.5	145TC	7.38 (187)	6.19 (157)	11.76 (299)	16.93 (430)	27 (12.3)
MV2-100	10	3	2	182TC	9.88 (251)	7.84 (199)	16.5 (419)	18.62 (473)	28 (12.8)
MV2-110	11	3	2	182TC	9.88 (251)	7.84 (199)	16.5 (419)	19.50 (495)	29 (13.3)
MV2-130	13	3	2	182TC	9.88 (251)	7.84 (199)	16.5 (419)	21.12 (536)	31 (14.2)
MV2-150	15	5	3	184TC	9.88 (251)	7.84 (199)	16.5 (419)	22.76 (578)	28 (12.7)
MV2-160	16	5	3	184TC	9.88 (251)	7.84 (199)	16.5 (419)	23.58 (599)	39 (17.8)
MV2-180	18	5	3	184TC	9.88 (251)	7.84 (199)	16.5 (419)	25.24 (641)	41 (18.7)

Model MV2 Dimensions Inches (mm)	
A	3.94 (100)
B	5.12 (130)
C	9.84 (250)
D	3.00 (75)
E	7.08 (180)
F	8.27 (210)

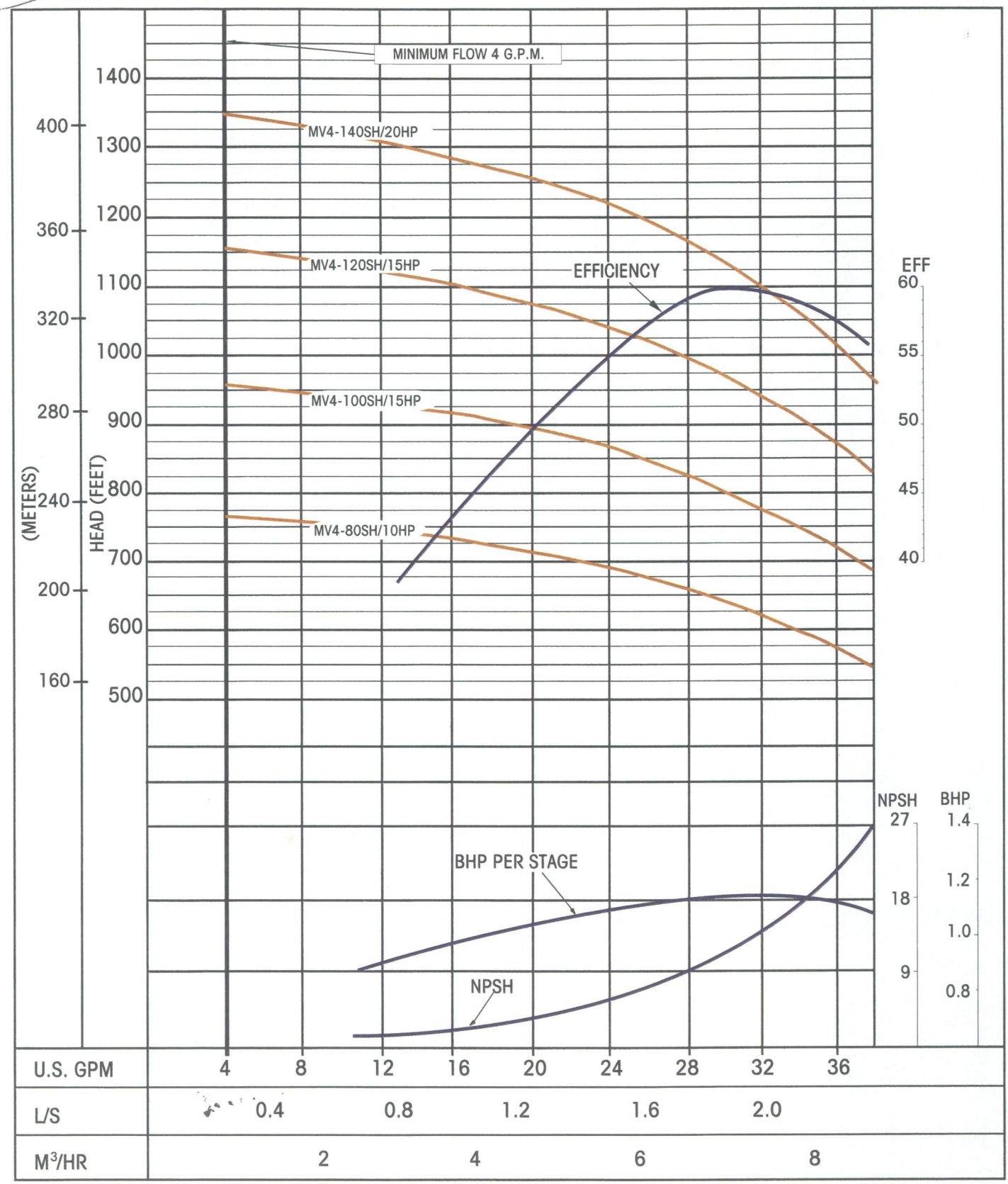
Notes:

1. All dimensions are in inches (mm) and may vary ± 1/4" (6 mm).
2. Not for construction purposes unless certified.
3. Coupling gap will vary with motor model.
4. Suction and discharge flanges are ANSI R.F. dimensional.
5. Max. working pressure 363 P... (25 Bar).

23.1.11

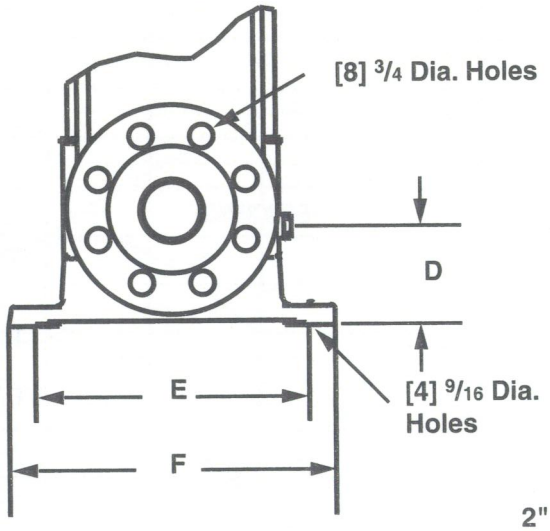
MV4SH SERIES

60 Hz/3450 RPM

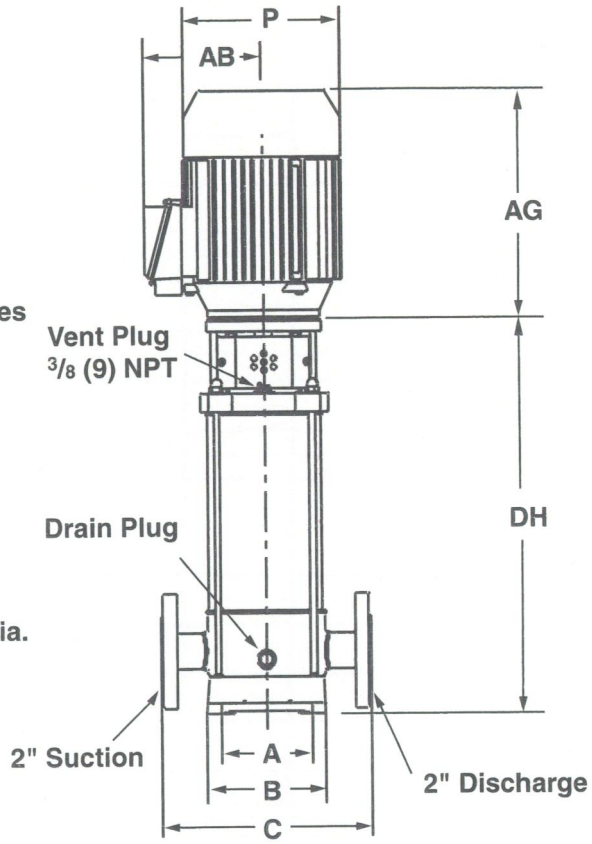


23.1.12

MV8 SERIES



Suction and Discharge
ANSI 250 Lb.
Slip Ring Flanges



Model	# of Stages	60 Hz HP	50 Hz HP	Frame	P Inches (mm)	AB Inches (mm)	AG Inches (mm)	DH Inches (mm)	Pump Wt. Lbs. (kg)
MV8-20	2	1.5	1	143TC	7.38 (187)	6.19 (157)	13.37 (340)	13.62 (346)	35 (15.9)
MV8-30	3	3	2	182TC	9.88 (215)	7.84 (199)	16.5 (419)	15.50 (394)	37 (16.6)
MV8-40	4	3	2	182TC	9.88 (215)	7.84 (199)	16.5 (419)	16.62 (422)	38 (17.3)
MV8-50	5	5	3	184TC	9.88 (215)	7.84 (199)	16.5 (419)	17.62 (447)	45 (20.2)
MV8-60	6	5	3	184TC	9.88 (215)	7.84 (199)	16.5 (419)	18.62 (473)	46 (20.9)
MV8-70	7	7.5	5	184TC	9.88 (215)	7.84 (199)	16.5 (419)	19.75 (502)	49 (21.6)
MV8-80	8	7.5	5	184TC	9.88 (215)	7.84 (199)	16.5 (419)	20.87 (530)	49 (22.3)
MV8-100	10	10	7.5	215TC	9.88 (215)	7.84 (199)	16.5 (419)	23.00 (584)	52 (23.7)
MV8-120	12	10	7.5	215TC	11.5 (292)	9.31 (236)	19.5 (495)	25.50 (648)	56 (25.5)
MV8-140	14	15	10	215TC	11.5 (292)	9.31 (236)	19.5 (495)	27.50 (699)	59 (26.9)

Model MV8 Dimensions Inches (mm)	
A	5.12 (130)
B	6.69 (170)
C	11.81 (300)
D	3.50 (90)
E	8.46 (215)
F	10.04 (255)

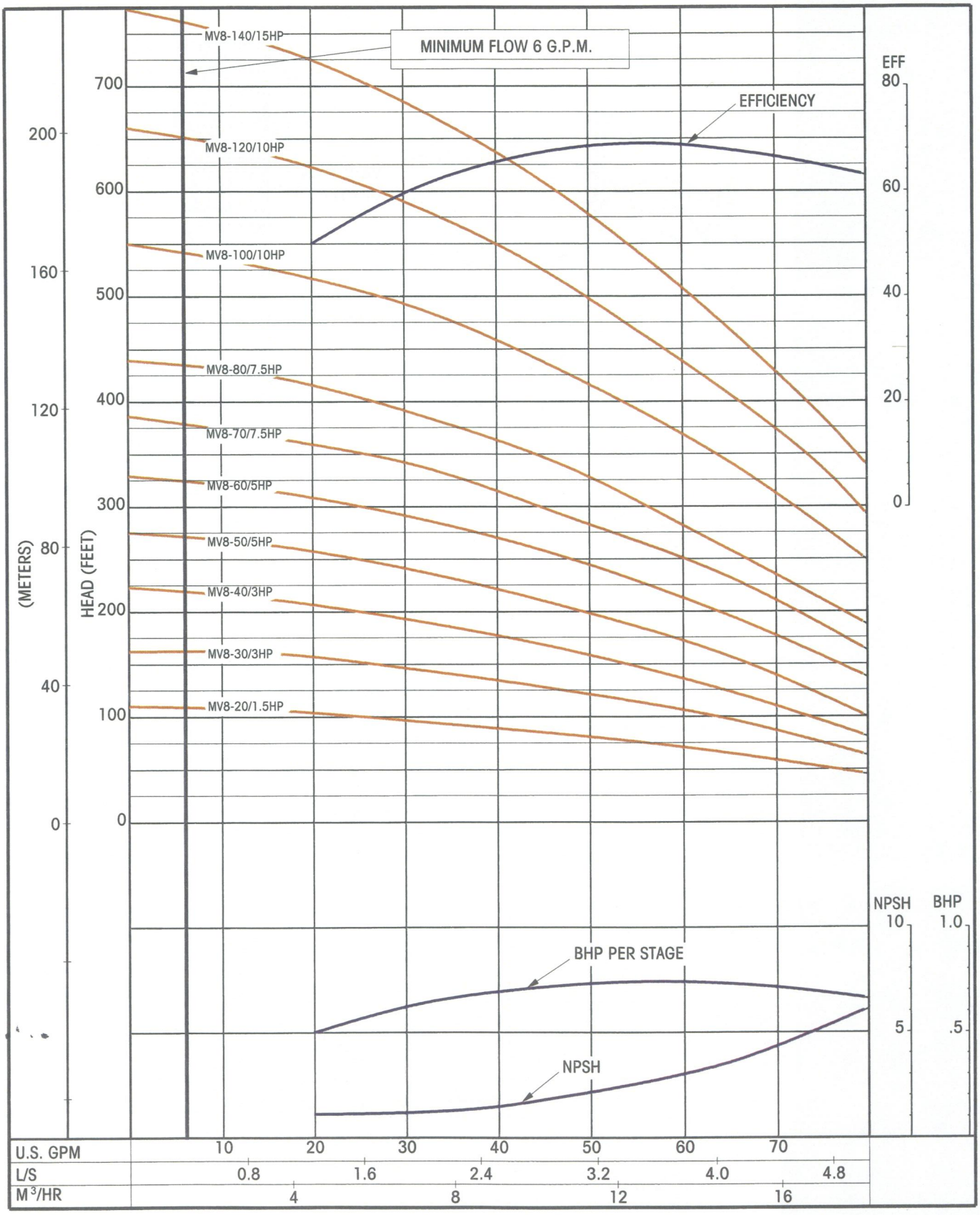
Notes:

1. All dimensions are in inches (mm) and may vary ± 1/4" (6 mm).
2. Not for construction purposes unless certified.
3. Coupling gap will vary with motor model.
4. Suction and discharge flanges are ANSI R.F. dimensional.
5. Max. working pressure 363 PSI (25 Bar).

23.1.13

MV8 SERIES

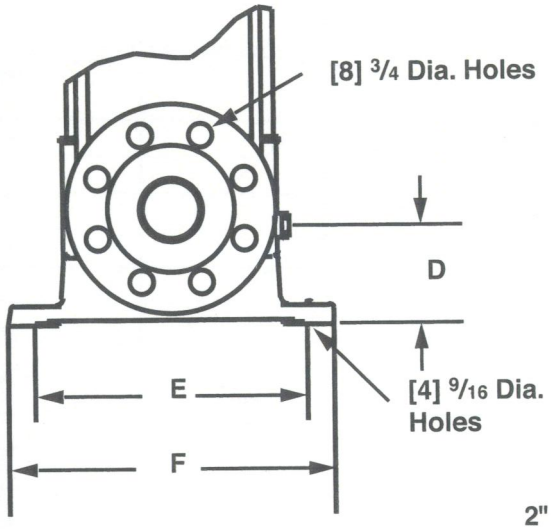
60 Hz/3450 RPM

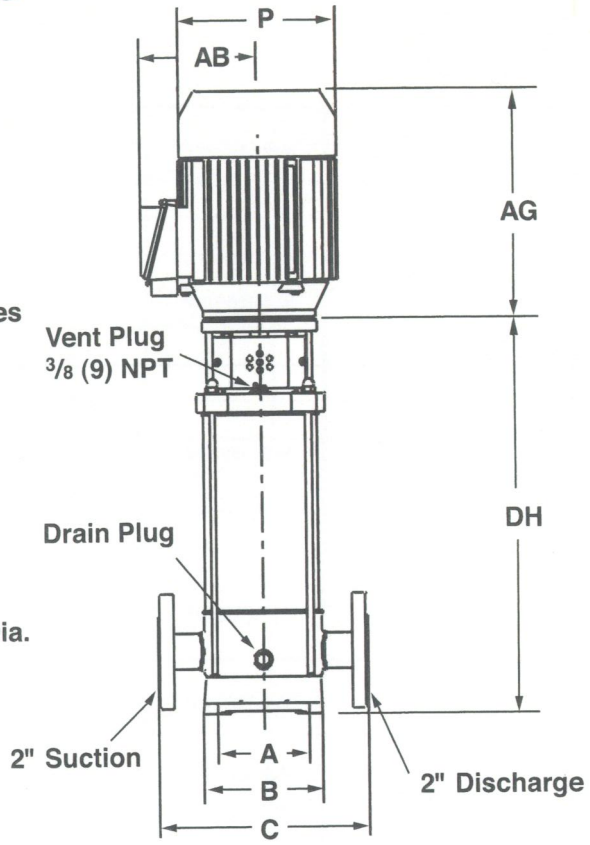


Individual 50 Hz/2880 RPM Performance Curves begin on Page 22.

23.1.14

MV16 SERIES





Suction and Discharge
ANSI 250 Lb.
Slip Ring Flanges

Model	# of Stages	60 Hz HP	50 Hz HP	Frame	P Inches (mm)	AB Inches (mm)	AG Inches (mm)	DH Inches (mm)	Pump Wt. Lbs. (kg)
MV16-20	2	5	3	184TC	9.88 (251)	7.84 (199)	16.5 (419)	15.3 (389)	42 (19.2)
MV16-30	3	7.5	5	184TC	9.88 (251)	7.84 (199)	16.5 (419)	16.37 (416)	44 (20.1)
MV16-40	4	7.5	5	184TC	9.88 (251)	7.84 (199)	16.5 (419)	17.75 (451)	46 (21.0)
MV16-50	5	10	7.5	215TC	11.5 (292)	9.31 (236)	19.5 (495)	19.50 (495)	49 (22.3)
MV16-60	6	15	10	215TC	11.5 (292)	9.31 (236)	19.5 (495)	21.10 (536)	51 (23.2)
MV16-70	7	15	10	215TC	11.5 (292)	9.31 (236)	19.5 (495)	22.44 (570)	53 (24.1)
MV16-80	8	15	10	215TC	11.5 (292)	9.31 (236)	19.5 (495)	23.50 (597)	55 (25.0)
MV16-90	9	20	15	256TC	12.75 (324)	10.38 (264)	21.13 (537)	25.50 (647.7)	61 (27.5)
MV16-100	10	20	15	256TC	12.75 (324)	10.38 (264)	21.13 (537)	27.17 (690)	63 (28.4)
MV16-120	12	25	20	284TSC	12.75 (324)	10.38 (264)	21.13 (537)	28.87 (733)	71 (32.4)

Model MV16 Dimensions Inches (mm)	
A	5.12 (130)
B	6.69 (170)
C	11.81 (300)
D	3.50 (90)
E	8.46 (215)
F	10.04 (255)

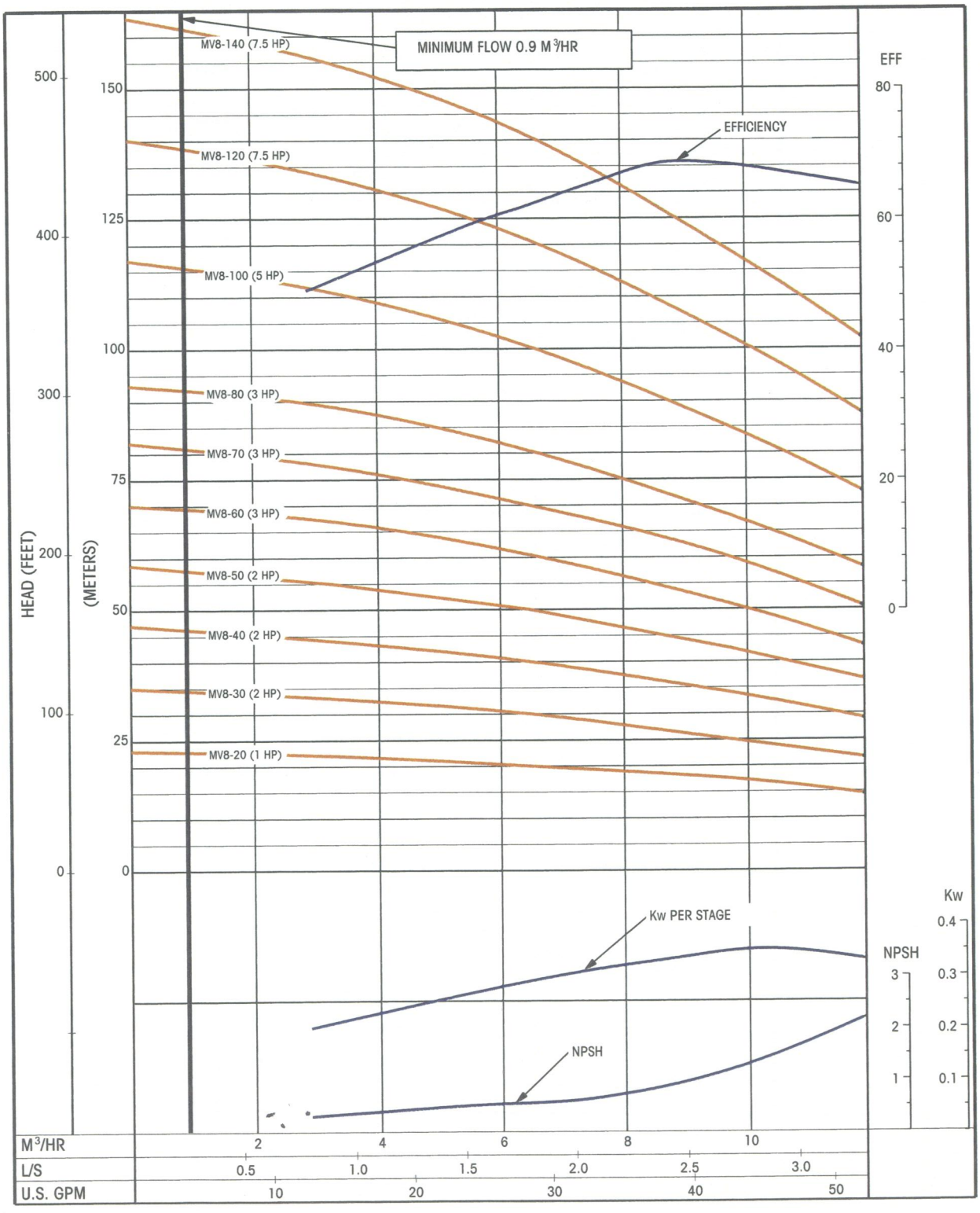
Notes:

1. All dimensions are in inches (mm) and may vary ± 1/4" (6 mm).
2. Not for construction purposes unless certified.
3. Coupling gap will vary with motor model.
4. Suction and discharge flanges are ANSI R.F. dimensional.
5. Max. working pressure 363 PSI (25 Bar).

23.1.15

MV8 SERIES

50 Hz/2880 RPM



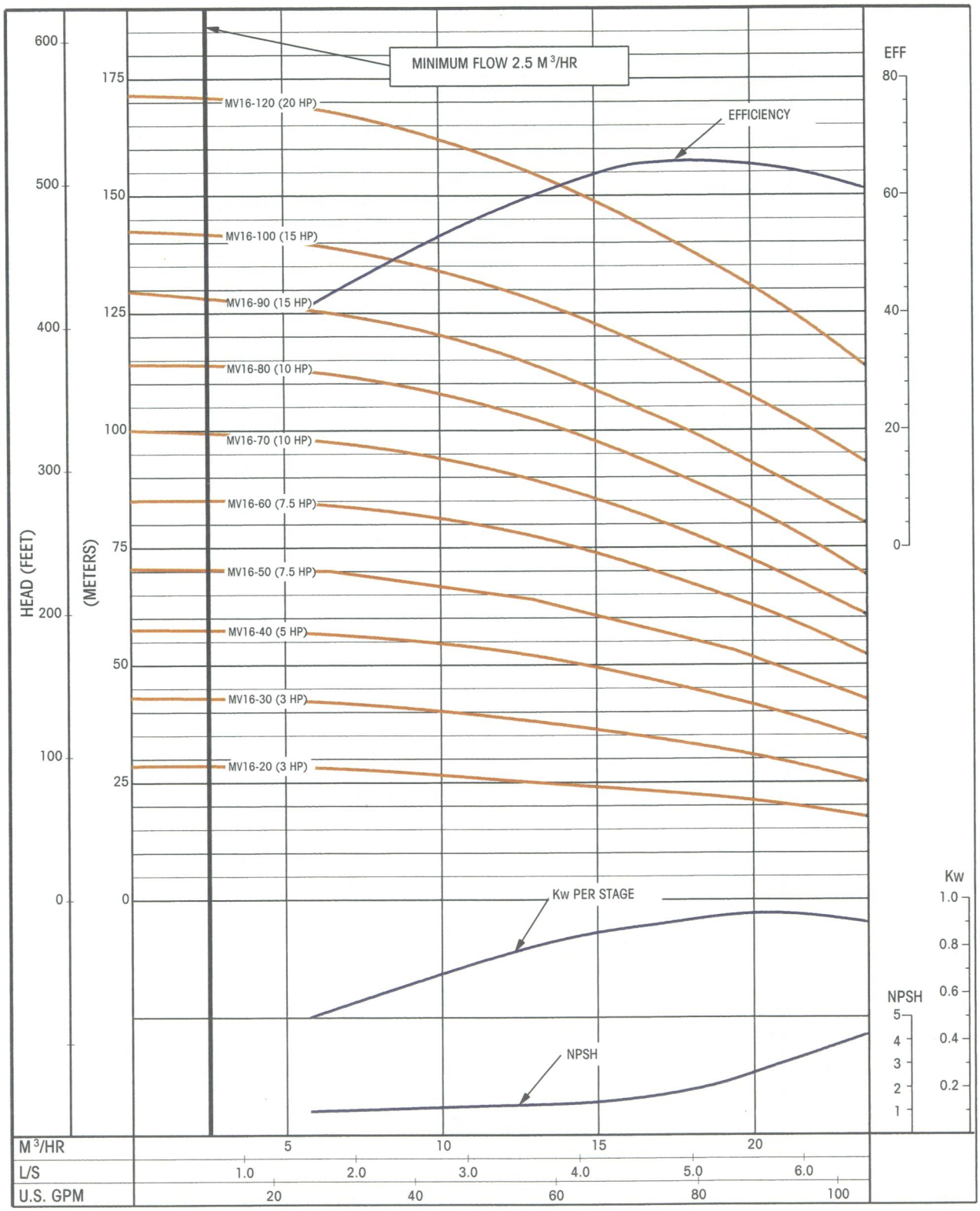
23.1.16

A Combined 50 Hz Performance Curve can be found on Page 5.

50 Hz PERFORMANCE CURVES

MV16 SERIES

50 Hz/2880 RPM



23.1.17

A Combined 50 Hz Performance Curve can be found on Page 5.

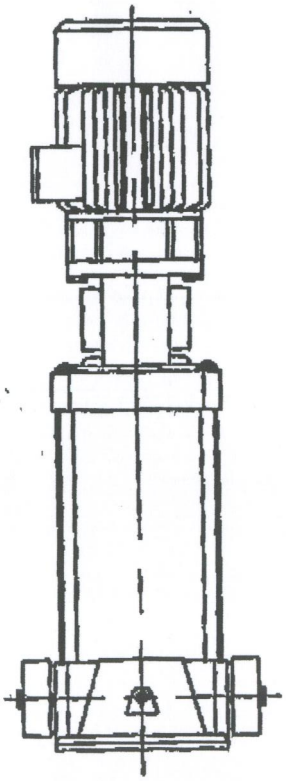
Myers®

Pentair Pump Group

MV Series

Multi-Stage, In-Line Centrifugal Booster Pumps

Safety Instructions
Installation and Operation Guide



- **A** Pump Selection & Inspection
- **B** Materials of Construction
- **C** Pre-Installation and Mounting Dimensions
- **D** Piping and Plumbing
- **E** Electrical Connections
- **F** Start-Up
- **G** Maintenance
- **H** Motor Assembly/Replacement
- **I** Troubleshooting

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23.1.18

Myers®

Pentair Pump Group

MV Series

Multi-Stage, In-Line Centrifugal Booster Pumps

Safety Instructions Installation and Operation Guide

A Pump Selection & Inspection

These pumps are intended to be used as in-line booster pumps, to boost water pressure both hot and cold. Other nonexplosive fluids can be pumped, it is up to the end user to insure that the fluid being pumped is compatible to the materials of construction of our pump (see materials of construction list). It is also up to the end user to insure that if corrosive fluids are being pumped all mating equipment will be protected. Protection should also be provided from both heat and chemical leakage. Check local code to insure that you are in compliance. The basic pumps are 304 series stainless, 316 stainless is available for more corrosive fluids. If these pumps are used for any other application it is up to the end user to insure the safety of the application.

The pump should be selected so that the intended flow rate is in the middle of the pump flow rate.

The pump will be shipped on its side, to prevent tip over damage. Make sure you look for damaged wires and that the shaft turns free.

B Materials of Construction

ITEM	MV (F) Series	MV (FS) & (V) Series
Impeller	AISI 304 SST	AISI 316 SST
Diffuser	AISI 304 SST	AISI 316 SST
Shell	AISI 304 SST	AISI 316 SST
Top/Bottom Plate	AISI 304 SST	AISI 316 SST
Connection Fittings	AISI 304 SST	AISI 316 SST
Staging Bushings	AISI 304 SST	AISI 316 SST
Pump Shaft	AISI 303 SST	AISI 316 SST
Shaft Bushings	Tungsten-Carbide	Tungsten-Carbide
Mechanical Shaft Seal		
- stationary face	Carbon	Carbon
- rotating face	Silicon-Carbide	Silicon-Carbide
- spring	AISI 316 SST	AISI 316 SST
- seal drivers	AISI 316 SST	AISI 316 SST
- bellows	Viton	Viton
Bearings	Ceramic	Ceramic
Air Vent Plug	Brass	AISI 316 SST
O-Rings	EPDM	Viton
Base	Cast Iron	Cast Iron
Motor Bracket	Cast Iron	Cast Iron
Counter Flange	Cast Iron	AISI 316 SST
Coupling	Cast Iron	Cast Iron
Coupling Guard	AISI 304 SST	AISI 304 SST

C Pre-Installation, Location and Mounting Dimensions

The pump should be mounted vertical, on a level, well-supported, ridged concrete or metal base, in a clean, dry and well-ventilated environment. It should be mounted inside, located as close to the liquid source as possible. The pump should not be located at the lowest point in the system due to the natural accumulation of dirt and sediment. If sediment is present a strainer or filter should be used. The pump should be located in an easily accessible place. The pump should be mounted with at least 6" of clearance of any hot surface or obstructions. The motor requires an adequate air supply to prevent overheating, do not enclose the motor. Dimensions are given in Figure 1 for mounting and clearance. Secure the pump to the foundation with four bolts and shim the pump base to ensure proper alignment and support.

23.1.19

A Pump Selection & Inspection

These pumps are intended to be used as in-line booster pumps, to boost water pressure both hot and cold. Other compatible fluids can be pumped, it is up to the end user to insure that the fluid being pumped is compatible to the materials of construction of our pump (see materials of construction tab). It is also up to the end user to insure that if corrosive fluids are being pumped all mating equipment will be protected. Protection should also be provided from both heat and chemical leakage. Check local code to insure that you are in compliance. The basic pumps are 304 series stainless, 316 stainless is available for more corrosive fluids. If these pumps are used for any other application it is up to the user to insure the safety of the application.

The pump should be selected so that the intended flow rate is in the middle of the pump flow rate.

The pump will be shipped on pallets, to prevent its over damage. Make sure you look for damaged wires and that the shaft turns free.

B Materials of Construction

ITEM	MV (S) Series	MV (E,S) & (V) Series
Impeller	AISI 304 SST	AISI 316 SST
Diffuser	AISI 304 SST	AISI 316 SST
Shell	AISI 304 SST	AISI 316 SST
Top/Bottom Plate	AISI 304 SST	AISI 316 SST
Centerection Fittings	AISI 304 SST	AISI 316 SST
Staging Bushings	AISI 304 SST	AISI 316 SST
Pump Shaft	AISI 303 SST	AISI 316 SST
Shaft Bushings	Tungsten-Carbide	Tungsten-Carbide
Mechanical Shaft Seal		
- sealing face	Carbon	Carbon
- rotating face	Silicon-Carbide	Silicon-Carbide
- spring	AISI 316 SST	AISI 316 SST
- seal drivers	AISI 316 SST	AISI 316 SST
- bellows	Viton	Viton
Bearings	Ceramic	Ceramic
Air Vent Plug	Brass	AISI 316 SST
O-Rings	EPDM	Viton
Base	Cast Iron	Cast Iron
Motor Bracket	Cast Iron	Cast Iron
Coupler Flange	Cast Iron	AISI 316 SST
Coupling	Cast Iron	Cast Iron
Coupling Guard	AISI 304 SST	AISI 304 SST

C Pre-Installation, Location and Mounting Dimensions

The pump should be mounted vertical, on a level, well supported, rigid concrete or metal base, in a clean, dry and well-ventilated environment. It should be mounted inside, located as close to the liquid source as possible. The pump should not be located at the lowest point in the system due to the natural accumulation of dirt and sediment. If sediment is present a strainer or filter should be used. The pump should be located in an easily accessible place. The pump should be mounted with at least 6" of clearance of any hot surfaces or obstructions. The motor requires adequate air supply to prevent overheating, do not enclose this motor. Dimensions are given in Figure 1 for mounting and clearance. Secure the pump to the foundation with four bolts and shim the pump base to ensure proper alignment and support.

MODEL	FLANGED				VICTAULIC			
	A	B	C	D	E	F	G	H
MV2-20	9.843	2.953	20.472	1¼	8.268	1.969	20.472	1.654
MV2-30	9.843	2.953	21.299	1¼	8.268	1.969	21.299	1.654
MV2-40	9.843	2.953	22.126	1¼	8.268	1.969	22.126	1.654
MV2-50	9.843	2.953	22.53	1¼	8.268	1.969	22.953	1.654
MV2-60	9.843	2.953	24.370	1¼	8.268	1.969	24.370	1.654
MV2-70	9.843	2.953	25.197	1¼	8.268	1.969	25.197	1.654
MV2-80	9.843	2.953	27.283	1¼	8.268	1.969	27.283	1.654
MV2-90	9.843	2.953	28.110	1¼	8.268	1.969	28.110	1.654
MV2-100	9.843	2.953	28.937	1¼	8.268	1.969	28.937	1.654
MV2-110	9.843	2.953	29.764	1¼	8.268	1.969	29.764	1.654
MV2-130	9.843	2.953	31.417	1¼	8.268	1.969	31.417	1.654
MV2-150	9.843	2.953	36.417	1¼	8.268	1.969	36.417	1.654
MV2-160	9.843	2.953	37.244	1¼	8.268	1.969	37.244	1.654
MV2-180	9.843	2.953	38.898	1¼	8.268	1.969	38.898	1.654
MV4-20	9.843	2.953	20.472	1¼	8.268	1.969	20.472	1.654
MV4-30	9.843	2.953	21.299	1¼	8.268	1.969	21.299	1.654
MV4-40	9.843	2.953	21.717	1¼	8.268	1.969	21.717	1.654
MV4-50	9.843	2.953	23.543	1¼	8.268	1.969	23.543	1.654
MV4-60	9.843	2.953	25.630	1¼	8.268	1.969	25.630	1654
MV4-70	9.843	2.953	26.457	1¼	8.268	1.969	26.457	1.654
MV4-80	9.843	2.953	27.283	1¼	8.268	1.969	27.283	1.654
MV4-90	9.843	2.953	28.110	1¼	8.268	1.969	28.110	1.654
MV4-100	9.843	2.953	32.383	1¼	8.268	1.969	32.383	1.654
MV4-110	9.843	2.953	33.110	1¼	8.268	1.969	33.110	1.654
MV4-130	9.843	2.953	34.764	1¼	8.268	1.969	34.764	1.654
MV4-150	9.843	2.953	36.417	1¼	8.268	1.969	36.417	1.654
MV4-160	9.843	2.953	37.244	1¼	8.268	1.969	37.244	1.654
MV8-20	11.811	3.543	23.346	2	10.276	3.543	23.346	2.375
MV8-30	11.811	3.543	25.709	2	10.276	3.543	25.709	2.375
MV8-40	11.811	3.543	26.772	2	10.276	3.543	26.772	2.375
MV8-50	11.811	3.543	31.181	2	10.276	3.543	31.181	2.375
MV8-60	11.811	3.543	32.244	2	10.276	3.543	32.244	2.375
MV8-70	11.811	3.543	34.803	2	10.276	3.543	34.803	2.375
MV8-80	11.811	3.543	35.866	2	10.276	3.543	35.866	2.375
MV8-100	11.811	3.543	37.992	2	10.276	3.543	37.992	2.375
MV8-120	11.811	3.543	40.551	2	10.276	3.543	40.551	2.375
MV8-140	11.811	3.543	43.819	2	10.276	3.543	43.819	2.375
MV16-20	11.811	3.543	28.976	2	10.276	3.543	28.976	2.375
MV16-30	11.811	3.543	31.850	2	10.276	3.543	31.850	2.375
MV16-40	11.811	3.543	33.189	2	10.276	3.543	33.189	2.375
MV16-50	11.811	3.543	35.000	2	10.276	3.543	35.000	2.375
MV16-60	11.811	3.543	37.480	2	10.276	3.543	37.480	2.375
MV16-70	11.811	3.543	38.858	2	10.276	3.543	38.858	2.375
MV16-80	11.811	3.543	40.197	2	10.276	3.543	40.197	2.375
MV16-90	11.811	3.543	45.118	2	10.276	3.543	45.118	2.375
MV16-100	11.811	3.543	46.496	2	10.276	3.543	46.496	2.375
MV16-120	11.811	3.543	53.425	2	10.276	3.543	53.425	2.375
MV30-20	12.598	4.134	33.583	2½				
MV30-30	12.598	4.134	35.787	2½				
MV30-40	12.598	4.134	38.701	2½				
MV30-50	12.598	4.134	40.472	2½				
MV30-60	12.598	4.134	45.787	2½				
MV30-70	12.598	4.134	47.559	2½				
MV30-80	12.598	4.134	53.583	2½				
MV30-90	12.598	4.134	55.354	2½				
MV45-20	12.598	4.134	34.409	3				
MV45-90	12.598	4.134	37.598	3				
MV45-40	12.598	4.134	43.150	3				
MV45-50	12.598	4.134	49.409	3				
MV45-60	12.598	4.134	51.417	3				
MV45-70	12.598	4.134	53.425	3				
MV4-80SH	14.370	3.543	36.772	1¼				
MV4-100SH	14.370	3.543	39.094	1¼				
MV4-120SH	14.370	3.543	40.276	1¼				
MV4-140SH	14.370	3.543	45.000	1¼				

23.1.20

F Start-Up

Before start-up the pump must be primed (full of fluid). If the inlet fluid level is above the pump or the system has a positive suction head close the isolation valves and remove the priming plug. Let the fluid fill the pump by opening the valve and bleed the fluid out the priming hole until all the air is removed. To keep the fluid from spilling it might be necessary to catch the run off with two pipe nipples an elbow and a bucket. If the fluid level is below the pump the priming plug should be removed, the isolation valves open and the drain plug should be loosened. The pump should be filled through the priming plug and all the air should be purged. Make sure that the drain plug, priming plug, and fittings are replaced and tightened before start up. Also make sure that the isolation valves are open, the discharge valve should be partially closed to prevent water hammer when first turning on the pump. After the pump is running the valve should be opened completely.

It is also important to check the direction of rotation. With the power off remove the coupling guard. Next turn the shaft to make sure that the shaft turns freely. Carefully turn the pump on making sure hands and objects are kept clear of the unprotected coupling. The rotation should be counterclockwise from the top. After checking make sure the guard is counterclockwise from the top. After checking, make sure the guard is replaced. If you need to reverse the direction turn the power off and change any two power leads on a three phase unit, on a single phase unit see the wiring diagram on motor nameplate.

Have a qualified electrician, using standard safety practices, check the voltage at the control box and using a clip-on amp meter, check the amps in each leg. The readings should be within 2% of each other. If the voltage or current is in imbalance, check with the Power Company for corrective action. Voltage should be within 10% of nameplate volts, amps should not exceed the nameplate amps.

The cut-in and cut-out pressures should be checked. Pump cycling should also be checked to insure that the pump is not cycling too frequently. Rapid cycling could cause premature motor failure due to the excess heat buildup. Up to 5 HP should not cycle more than 20 times per hour, from 7½ HP to 15 HP the cycle rate should not exceed 15 times per hour, and from 20 HP to 30 HP the pump should not cycle more than 10 times per hour.

Check for shaft seal leaks, leaks in the system, unusual vibrations or noise.

G Maintenance

If the pump is located in an area that freezing could occur, the pump and system should be drained. If the drain plug becomes lost or damaged do not replace the plug with a standard pipe plug, internal recirculation will occur, use an exact replacement.

The electric motors are prelubricated at the factory and do not need additional lubrication at start-up. Motors should be greased and maintained only with the motor manufacturer's recommendations. Over greasing the bearings could cause increased bearing heat and result in motor failure. Do not mix petroleum and silicon grease.

If the pump has not been operated for a long time see Start Up Instructions to insure that the shaft is free and the power readings are okay.

Periodically check and clean the filters.

23.1.21

The pump runs, but at reduced capacity or does not deliver water.	1. Wrong rotation	Check wiring for proper connections. Correct wiring.
	2. Pump is not primed or is airbound.	Turn pump off, close isolation valve(s), remove priming plug. Check fluid level. Refill the pump; replace plug and start the pump. Long suction lines must be filled before starting the pump.
	3. Strainers, check or foot valves are clogged.	Remove strainer, screen or valve and inspect. Clean and replace. Reprime pump.
	4. Suction lift too large.	Install compound pressure gauge at the suction side of the pump. Start pump and compare reading to performance data. Reduce suction lift by lowering pump, increase suction line size or removing high friction loss devices...
	5. Suction and/or discharge piping leaks.	Pump runs backwards when turned off. Air in suction pipe. Suction pipe, valves and fittings must be airtight. Repair any leaks and retighten all loose fittings.
	6. Pump worn.	Install pressure gauge, start pump, gradually close the discharge valve and read pressure at shut-off. Convert measured pressure (in PSI) to head (in feet): (Measured PSI x 2.31 ft./PSI = _____ ft.). Refer to the specific pump curve for shut-off head for that pump model. If head is close to curve, pump is probably okay. If not, remove pump and inspect.
	7. Pump impeller or guide vane is clogged.	Disassemble and inspect pump passageways. Remove any foreign materials found.
	8. Incorrect drain plug installed.	If the proper drain plug is replaced with a standard plug, water will recirculate internally. Replace with proper plug.
Pump cycles too much.	1. Pressure switch is not properly adjusted or is defective.	Check pressure setting on switch and operation. Check voltage across closed contacts. Readjust switch or replace if defective.
	2. Level control is not properly set or is defective.	Check setting and operation. Readjust setting (refer to level control manufacturer's data). Replace if defective.
	3. Insufficient air charging or leaking tank or piping.	Pump air into tank or diaphragm chamber. Check diaphragm for leak. Check tank and piping for leaks with soap and water solution. Check air to water volume. Repair as necessary.
	4. Tank is too small.	Check tank size and air volume in tank. Tank volume should be approximately 10 gallons for each gpm of pump capacity. The normal air volume is 2/3 of the total tank volume at the pump cut-in pressure. Replace tank with one of correct size.
	5. Pump is oversized.	Install pressure gauges on or near pump suction and discharge ports. Start and run pump under normal conditions, record gauge readings. Convert PSI to feet (Measured PSI x 2.31 ft./PSI = _____ ft.) Refer to the specific pump curve for that model, ensure that total head is sufficient to limit pump delivery within its design flow range. Throttle pump discharge flow if necessary.
Fuses blow or circuit breakers or overload relays trip.	1. Low voltage.	Check voltage at starter panel and motor. If voltage varies mor than ±10%, contact power company. Check wire sizing.
	2. Motor overloads are set too low.	Cycle pump and measure amperage. Increase heater size or adjust trip setting to a maximum of motor nameplate (full load) current.
	3. Three phase current is imbalanced.	Check current draw on each lead to the motor. Must be within ±5%. If not, check motor and wiring. Rotating all leads may eliminate this problem.

23.1.25

WARNING! IMPORTANT SAFETY INSTRUCTIONS! READ CAREFULLY BEFORE INSTALLATION. This manual contains important information for the safe use of this product. Read this manual completely before using this product and refer to it often for continued safe product use. DO NOT THROW AWAY OR LOSE THIS MANUAL. Keep it in a safe place so that you may refer to it often

FAILURE TO FOLLOW THESE INSTRUCTIONS AND COMPLY WITH ALL CODES MAY CAUSE SERIOUS BODILY INJURY, DEATH AND/OR PROPERTY DAMAGE

⚠ 1) Before installing or servicing your pump, **BE CERTAIN THE PUMP POWER SOURCE IS TURNED OFF AND DISCONNECTED.**

⚠ 2) All installation and electrical wiring must adhere to state and local codes. Check with appropriate community agencies, or contact your local electrical and pump professionals for help.

⚠ 3) CALL AN ELECTRICIAN WHEN IN DOUBT. Pump must be connected to a separate electrical circuit directly from the entrance box. Have the electrical outlet checked by an electrician to make sure it is properly grounded. There must be an appropriately sized fuse or circuit breaker in this line. Tying into existing circuits may cause circuit overloading, blown fuses, tripped circuit breakers, or a burned up motor.

⚠ 4) Do not connect pump to a power supply until the pump is grounded. **CAUTION: FAILURE TO GROUND THIS UNIT PROPERLY MAY RESULT IN SEVERE ELECTRICAL SHOCK.**

⚠ 5) **WARNING:** Reduced risk of electric shock during operation of this pump requires the provision of acceptable grounding:

a) If the means of connection to the supply-connection box is other than grounded metal conduit, ground the pump back to the service by connecting a copper conductor, at least the size of the circuit conductors supplying the pump, to the grounding screw provided within the wiring compartment.

⚠ 6) The voltage and phase of the power supply must match the voltage and phase of the pump.

⚠ 7) Do not use an extension cord; above ground joints must be made in an approved junction box.

⚠ 8) Do not work on this pump or switch while the power is on.

⚠ 9) Never operate a pump with a frayed or brittle power cord, and always protect it from sharp objects, hot surfaces, oil and chemicals. Avoid kinking the cord.

⚠ 10) Never service a motor or power cord with wet hands or while standing in or near water or damp ground.

⚠ 11) The three phase units must be wired by a qualified electrician, using an approved starter box and switching device.

⚠ 12) Make sure the control box matches the motor in voltage, horsepower, and phase.

⚠ 13) Some single phase motors are equipped with automatic resetting thermal protectors. The motor may restart unexpectedly causing the leads to energize or pump to turn. Three phase motors should be protected by proper, thermal and amperage protection. (Check local codes.)

⚠ 14) Check for nicks in the wire and pump insulation by using an ohm meter and checking resistance to ground before installing the pump and after installing the pump. If in doubt on the proper procedure check with a qualified electrician.

⚠ 15) Do not pump gasoline, chemicals, corrosives, or flammable liquids; they could ignite, explode, or damage the pump, causing injury and voiding the warranty.

⚠ 16) Do not run this pump with the discharge completely closed this will create superheated water, which could damage the seal, and shorten the life of the motor. This superheated water could also cause severe burns. Always use a pressure relief valve, set below the rating of the tank or system.

⚠ 17) Pump is capable of building pressures in excess of 500 psi. Always use a pressure relief valve.

⚠ 18) For drinking water applications, test water for potability; chlorinating or purifying, is recommended every time the pump is serviced. Check with local Health Departments for testing and sanitizing procedures.

⚠ 19) The following may cause severe damage to the pump and void warranty, it could also result in personal injury:

- Running the pump dry.
- Failure to protect the pump from below freezing temperatures.
- Running the pump with the discharge completely closed.
- Pumping chemicals or corrosive liquids.

⚠ 20) Never work on the pump or system without relieving the internal pressure.

⚠ 21) Do not pump water above 250° Fahrenheit.

⚠ 22) Never exceed the pressure rating of any system component.

⚠ 23) After carefully removing your pump from the carton, make a visual inspection for any apparent shipping damage.

23.1.23

WARNING! IMPORTANT SAFETY INSTRUCTIONS! READ CAREFULLY BEFORE INSTALLATION. This manual contains important information for the safe use of this product. Read this manual completely before using this product and refer to it often for continued safe product use. DO NOT THROW AWAY OR LOSE THIS MANUAL. Keep it in a safe place so that you may refer to it often

⚠ 1) All installation and electrical wiring must adhere to state and local codes. Check with appropriate community agency, or contact your local electrical and pump professionals for help.

⚠ 2) CALL AN ELECTRICIAN WHEN IN DOUBT. Pump must be connected to a properly grounded circuit directly from the service box. Have the electrical circuit checked by an electrician to make sure it is properly grounded. There must be an appropriate fuse or circuit breaker in the line. Wiring into existing circuits may cause circuit overloading, blown fuses, tripped circuit breakers, or a burned up motor.

⚠ 3) Do not connect pump to a power supply until the pump is grounded.

CAUTION: FAILURE TO GROUND THIS UNIT PROPERLY MAY RESULT IN SEVERE ELECTRICAL SHOCK.

⚠ 4) Warning: Personnel dot of electrical shock during operation of this pump (including the provision of accessible grounding).

a) If the means of connection to the supply-connection box is other than grounded metal conduit, ground the pump back to the service by connecting a copper conductor, at least the size of the circuit conductors supplying the pump, to the grounding screw provided within the wiring compartment.

⚠ 5) The voltage and phase of the power supply must match the voltage and phase of the pump.

⚠ 6) Do not use an extension cord above ground (plug must be made in an approved junction box.

⚠ 7) Do not work on this pump or switch while the power is on.

⚠ 8) Never operate a pump with a frayed or brittle power cord, and always protect it from sharp objects, hot surfaces, oil and chemicals. Avoid kinking the cord.

⚠ 9) Never service a motor or power cord with wet hands or while standing in or near water or damp ground.

⚠ 11) This three phase units must be wired by a qualified electrician, using an approved starter box and switching device.

⚠ 12) Make sure the control box matches the motor in voltage, phase, power, and phase.

⚠ 13) Some single phase motors are equipped with automatic resetting thermal protectors. The motor may restart unexpectedly causing the motor to energize or pump to turn. These phase motors should be protected by proper, thermal and amperage protection. (Check local codes.)

⚠ 14) Check for plugs in the wire and pump manufacturer by using an ohm meter and grounding resistance to ground before installing the pump and after installing the pump. If in doubt on the proper procedure check with a qualified electrician.

⚠ 15) Do not pump gasoline, chemicals, explosive, or flammable liquids; they could ignite, explode, or damage the pump, causing injury and voiding the warranty.

⚠ 16) Do not run this pump with the discharge completely closed and open to atmosphere. water. which could damage the seal, and shorten the life of the motor. The superheated water could also cause skin burns. Always use a pressure relief valve, set below the rating of the tank or system.

⚠ 17) Pump is capable of building pressure in excess of 600 psi. Always use a pressure relief valve.

⚠ 18) For drinking water applications, test water for potability, chlorinating or purifying, is recommended every time the pump is serviced. Check with local Health Department for testing and sanitizing procedures.

⚠ 19) The following may cause severe damage to the pump and void warranty. It could also result in personal injury:

- Running the pump dry.
- Failure to protect the pump from low freezing temperatures.
- Running the pump with the discharge completely closed.
- Pumping chemicals or corrosive liquids.

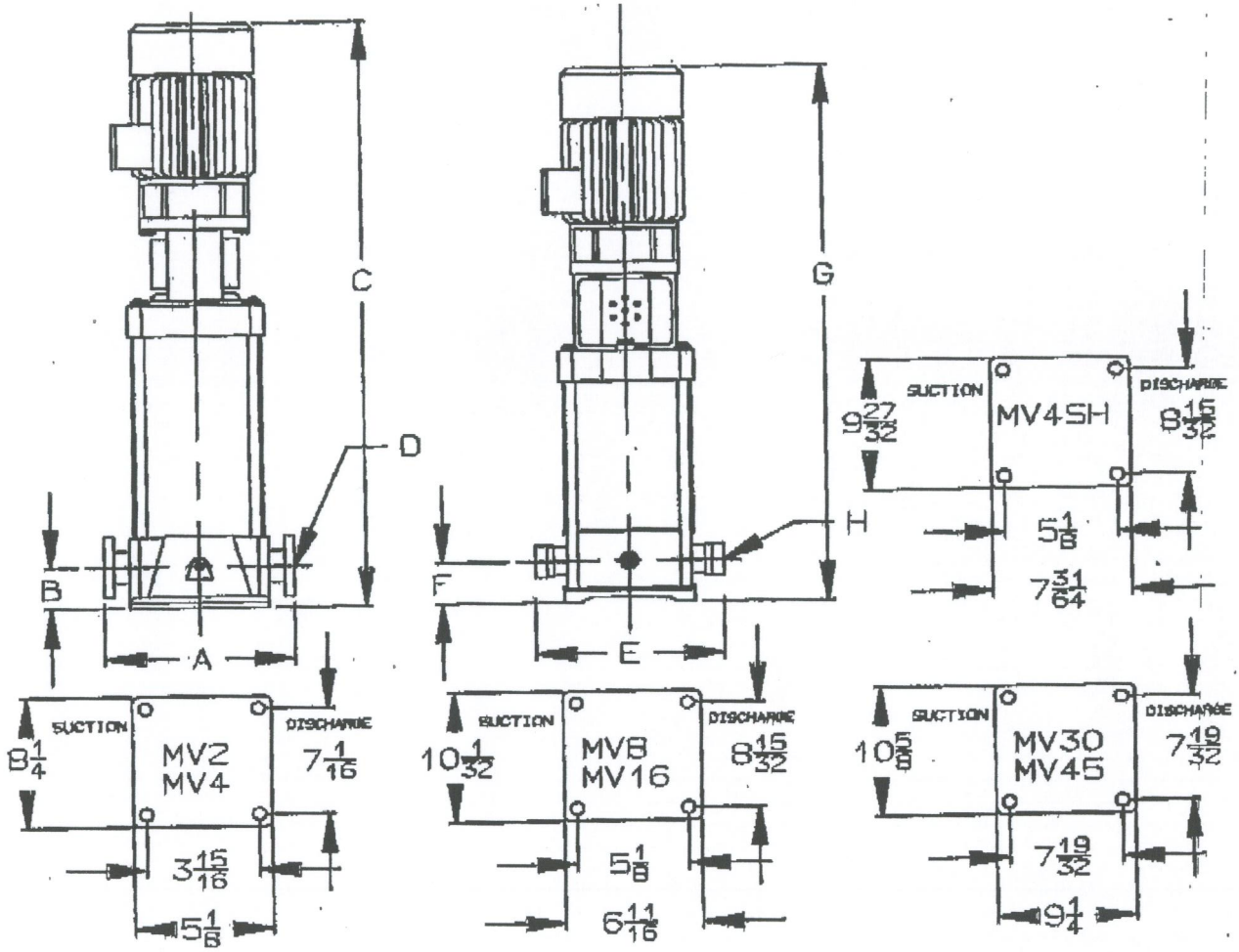
⚠ 20) Never work on the pump or motor when the pump is running.

⚠ 21) Do not pump water above 200° Fahrenheit.

⚠ 22) Never exceed the pressure rating of any system components.

⚠ 23) After carefully removing heat pump from the carton, make a visual inspection for any apparent shipping damage.

DIMENSIONS



23.1.24

D Piping and Plumbing

The pipe must line up and not be forced into position by unions. Piping should be independently supported near the pump so that no strain will be placed on the pump. Where noise is objectionable, pumps should be isolated from the piping with rubber connections. Whenever possible keep pipe sizes as large as pump fittings or larger and use a minimum of fittings to reduce friction loss (use schedule 40 pipe minimum).

Models	HP Ranges	Suction & Discharge	Flow Range GPM	Min. Flow Range
MV2/MV2(S)	½-5 HP	1¼"	2 - 20	3 GPM
MV4/MV4(S)	½-15 HP	1¼"	4 - 40	4 GPM
MV8/MV8(S)	1½-15 HP	2"	8 - 80	6 GPM
MV16/MV16(S)	5-25 HP	2"	15 - 130	16 GPM
MV30/MV30(S)	10-30 HP	2½"	20 - 180	20 GPM
MV45/MV45(S)	15-30 HP	4"	40 - 250	25 GPM

Pipes, valves and fittings must have a pressure rating equal or greater than the maximum system rating. Always install a bypass valve or pressure relief valve in the discharge line. If the pump operates against a closed valve it could cause pressurized superheated water and could damage the pump. When the pump is operating it must have a minimum flow to maintain adequate cooling and lubrication (see chart). A check valve is recommended in the discharge, isolation valves can be installed in the suction and discharge lines. If sediments are present in the pumping fluid, a screen or filter is recommended in the suction line. Install pressure gauges at the inlet and discharge to check performance. Some pumps are shipped with covered suction and discharge, make sure these covers are removed.

E Electrical Connections and Wiring

All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

WARNING: The safe operation of this pump requires that it be grounded in accordance with the National Electrical Code and local Governing codes or regulations. Connect the ground wire to the screw in the terminal box and then to an acceptable ground.

The motor provided is a heavy-duty 3450 RPM, O.D.P., Nema C frame motor, T.E.F.C. motors can also be supplied. If motors, other than what is supplied by the factory, are used it is up to the end user to insure that they meet or exceed the factory supplied motors. If you are installing, replacing, or rotating the motor, see the Motor Replacement Section for proper adjustment of the coupling.

Single phase motors up to and including 5 HP have internal built-in thermal protection. The 7½ and 10 HP motors do not have internal protection and require external overload protection in the starter box.

Three phase motors must be used with the proper sized motor starter. It should protect against damage from low voltage, phase failure, current imbalance, overload, and locked rotor. A properly sized starter with manual reset and ambient compensated extra quick trip in all three legs should be used. The overload should be sized to the full load amp rating of the motor. Do not set overloads at a higher value than the full load amp rating of the motor nameplate. This will void the warranty.

The decision to use direct on-line starting (D.O.L.) or soft starts (auto transformers - resistance starters) is up to the end user, local codes, and power restrictions. Overloads for soft starts should be sized in accordance to the manufacturer's recommendations.

Starter boxes should be mounted high on a dry interior wall that is protected from the weather and temperature extremes. It should be secured against accidental or intentional non-service human contact. The box should be Nema approved for the application and comply with all local codes.

The wire size and type should be in accordance with the National Electric Code or local codes. The nameplate electrical rating information should agree with the power supply.

Prior to start-up have a qualified electrician check the insulation resistance. To do this the power needs to be turned off and the supply leads disconnected from the pump terminal box. The electrician can then proceed to check the insulation resistance to ground. Using an ohm or mega ohmmeter, set the selector to Rx 100K and zero adjust the meter. Measure the resistance between each of the terminals and ground it should read between infinite and 1,000,000 ohms. A reading lower means that the motor should be replaced. If the reading checks out okay then the power supply leads can be hooked up

23.1.25

H Motor Replacement

Always replace the motor with an equivalent motor. If needed contact the factory on a question on equivalency.

1. **TURN OFF POWER**, and remove the power leads and ground.
2. Remove the coupling guard.
3. Loosen the screws in the coupling.
4. Remove the four bolts that hold the motor to the base.
5. Lift the motor straight up until the shaft is free.
6. Clean all mating surfaces and the shaft, install the coupling on the pump shaft.
7. Install the motor making sure that the terminal box is in the location desired.
8. Secure the motor to the pump with the four bolts alternately tighten diagonally.
9. With a large screwdriver under the coupling lift the pump shaft and coupling. It should raise approximately .200 of an inch. Lower the coupling halfway (about .100) and tighten all screws.
10. Check to see if the gaps between coupling halves are equal.
11. Be certain the pump shaft can turn freely.
12. Reconnect the power and ground leads.
13. Proceed to start-up instructions.

I Troubleshooting

The pump does not run.	1. No power at motor.	Check for voltage at motor terminal box. If no voltage at motor, check feeder panel for tripped circuits and reset circuit.
	2. Fuses are blown or circuit breakers are tripped.	Turn off power and remove fuses. Check for continuity with ohmmeter. Replace blown fuses or reset circuit breaker. If new fuses blow or circuit breaker trips, the electrical installation, motor and wires must be checked.
	3. Motor starter overloads are burned or have tripped out.	Check for voltage on line and load side of starter. Replace burned heaters or reset. Inspect starter for other damage. If heater trips again, check the supply voltage and starter holding coil.
	4. Starter does not energize.	Energize control circuit and check for voltage at the holding coil. If no voltage, check control circuit fuses. If voltage, check holding coil for shorts. Replace bad coil.
	5. Defective controls.	Check all safety and pressure switches for operation. Inspect contacts in control devices. Replace worn or defective parts or controls.
	6. Motor is defective.	Turn off power and disconnect wiring. Measure the lead to lead resistances with ohmmeter (RX-1). Measure lead to ground values with ohmmeter (RX-100K). Record measured values. If an open or grounded winding is found, remove motor and repair or replace.
	7. Defective capacitor, (single phase motors)	Turn off power and discharge capacitor. Check with ohmmeter (RX-100K). When the meter is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity (∞). Replace if defective.
	8. Pump is bound.	Turn off power and manually rotate pump shaft. If shaft does not rotate easily, check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair.

23.1.26

Motor Replacement

Always replace the motor with an equivalent motor. If needed contact the factory or a distributor for assistance.

1. **TURN OFF POWER**, and remove the power leads and ground.
2. Remove the coupling guard.
3. Loosen the screws in the conduit box.
4. Remove the four bolts that hold the motor to the base.
5. Lift the motor straight up until the shaft is free.
6. Clean all mating surfaces and the shaft. Install the coupling on the pump shaft.
7. Install the motor making sure that the terminal box is in the location desired.
8. Secure the motor to the pump with the four bolts alternately tighten diagonally
9. With a large screwdriver under the coupling lift the pump shaft and coupling. It should raise approximately .060 of an inch. Lower the coupling halfway (about .100) and tighten all screws.
10. Check to see if the gaps between coupling halves are equal.
11. Be certain the pump shaft can turn freely
12. Reconnect the power and ground leads.
13. Proceed to start-up instructions.

Troubleshooting

The pump does not run.

1. No power at motor.
2. Fuses are blown or circuit breakers are tripped.
3. Motor starter overloads are tripped out.
4. Starter does not energize.
5. Defective overload.
6. Motor is defective.
7. Defective capacitor (single phase motors)
8. Pump is frozen.

Check for voltage at motor terminal box. If no voltage at motor check starter power for tripped circuits and open circuits.

Turn off power and observe fuses. Check for continuity with ohmmeter. Replace blown fuses or reset circuit breakers if new fuses blow or circuit breaker trips, the electrical installation, motor and valve must be checked.

Check for voltage on line and load side of starter. Replace burned heaters or relays. Inspect starter for other damage. If starter coils open, check the supply voltage and starter holding coil.

Energize control circuit and check for voltage at the holding coil. If no voltage, check control circuit fuses. If voltage, check holding coil for opens. Replace bad coil.

Check all safety and pressure switches for operation. Unwired contacts in control devices. Replace worn or defective parts or contacts.

Turn off power and disconnect wiring. Measure the load to load resistances with ohmmeter (RX-1). Measure load to ground values with ohmmeter (RX-100). Record measured values. If an open or grounded winding is found, remove motor and repair or replace.

Turn off power and discharge capacitor. Check with ohmmeter (RX-100). When the motor is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity (∞). Replace if defective.

Turn off power and manually rotate pump shaft. If shaft does not rotate easily check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair.

Fuses blow or circuit breakers or overload relays trip. (Cont'd)	4. Motor is shorted or grounded.	Turn off power and disconnect wiring. Measure the lead-to-lead resistance with an ohmmeter (RX-1). Measure lead-to-ground values with an ohmmeter (RX-100K) or a megaohm meter. Record values. If an open or grounded winding is found, remove the motor, repair and/or replace.
	5. Wiring or connections are faulty.	Check proper wiring and loose terminals. Tighten loose terminals. Replace damaged wire.
	6. Pump is bound.	Turn off power and manually rotate pump shaft. If shaft does not rotate easily, check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair.
	7. Defective capacitor (single phase motors).	Turn off power and discharge capacitor. Check with ohmmeter (RX-100K). When the meter is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity (∞). Replace if defective.
	8. Motor overloads at higher ambient temperature than motor.	Use a thermometer to check the ambient temperature near the overloads and motor. Record these values. If ambient temperature at motor is lower than at overloads, especially where temperature at overloads is above 104°F (40°C), ambient-compensated heaters should replace standard heaters.

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23.1.27

Fuses blow or circuit breakers or overload relays trip. (Cont'd)	4. Motor is shorted or grounded.	Turn off power and disconnect wiring. Measure the bearing-to-lead resistance with an ohmmeter (RX-100Ω or a megaohm scale). Record values. If an open or grounded winding is found, remove the motor, repair and/or replace.
	5. Wiring or connections are faulty.	Check proper wiring and loose terminals. Tighten loose terminals. Replace damaged wire.
	6. Pump is locked.	Turn off power and manually rotate pump shaft. If rigid, open the motor casing, clean, reassemble and adjust as necessary. If shaft rotation is still rigid, remove pump and inspect. Disassemble and repair.
	7. Defective capacitor (single phase motors)	Turn off power and discharge capacitor. Check with ohmmeter (RX-100Ω). With the motor is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity (∞). Replace if defective.
	8. Motor overloads at higher ambient temperature than motor.	Use a thermometer to check the ambient temperature near the pump/motor and motor. Record these values. If ambient temperature is at motor is lower than at overloads, especially where temperatures at or above 104°F (40°C). Ambient-compensated heaters should replace standard heaters.

65013-101-12F
Raleigh, NC, USA 11/01
Replaces / Reemplaza / Remplace 65013-101-12E 3/96

Pressure Switches
Interruptores de presión
Manostats

Class / Clase / Classe	Types / Tipos / Types	Series / Serie / Série
9013	GHB, GHG, GSB, GSG	C

APPLICATIONS

This instruction bulletin applies to all Class 9013 Series C pressure switches of Types: GHB2, GHB5; GHG1–GHG6; GSB2; and GSG1–GSG3.

Class 9013 Type G pressure switches are two-pole devices for controlling electricity-driven water pumps and air compressors. Based on their pressure ranges, Types GHB and GHG are generally applied to air compressor applications, and GSB and GSG to water pumps.

APLICACIONES

Las instrucciones de este boletín son relevantes para todos los interruptores de presión serie C clase 9013, tipos: GHB2, GHB5; GHG1–GHG6; GSB2 y GSG1–GSG3.

Los interruptores de presión clase 9013 tipo G son dispositivos de dos polos que sirven para controlar compresores de aire y bombas de agua accionadas por electricidad. Según las gamas de presión, los tipos GHB y GHG se utilizan generalmente con los compresores de aire y los GSB y GSG con las bombas de agua.

APPLICATIONS

Ces directives d'utilisation s'appliquent à tous les manostats de classe 9013, série C, types : GHB2, GHB; GHG1 à GHG6; GSB2; et GSG1 à GSG3.

Les manostats de la classe 9013 type G sont des appareils bipolaires pour commander les pompes à eau et compresseurs d'air électriques. À cause de leurs gammes de pression, les types GHB et GHG sont généralement utilisés pour les applications de compresseurs d'air et les types GSB et GSG pour les pompes à eau.

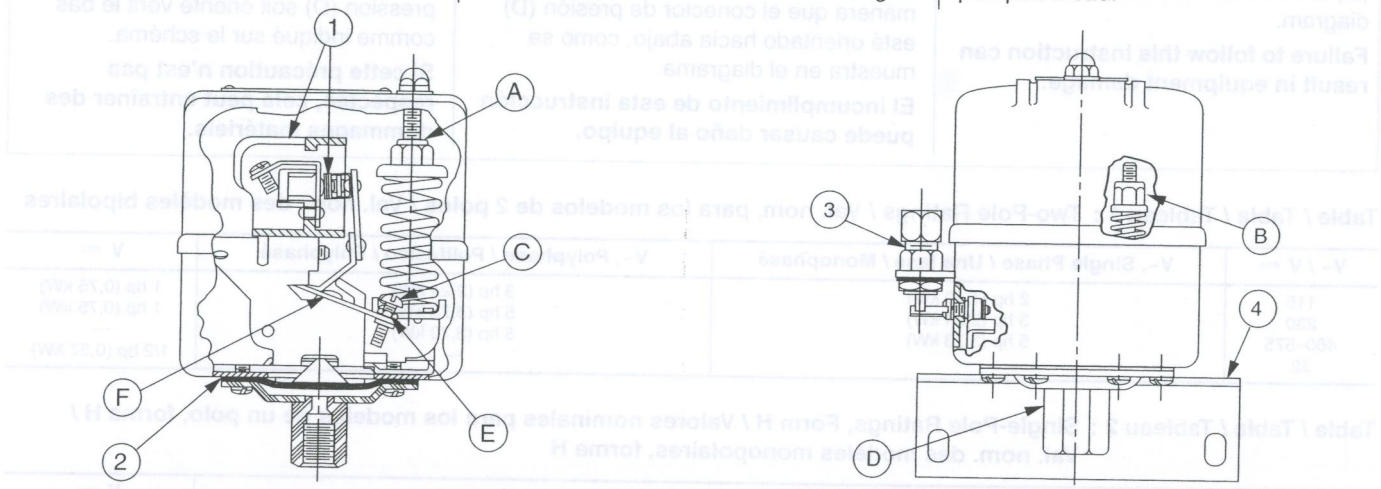


Figure / Figura / Figure 1 : Pressure Switch / Interruptor de presión / Manostat

⚠ DANGER / PELIGRO / DANGER

HAZARDOUS VOLTAGE

Disconnect all power before working on equipment.

INCOMPATIBLE PRESSURE MEDIA

- Use this device on pressure media that is compatible with the NBR Elastomeric Diaphragm and zinc plated steel flange.
- To prevent leakage, do not allow incompatible fluids such as alcohol, acids, or salts into the device.

Failure to follow these instructions will result in death, serious injury, or equipment damage.

TENSIÓN PELIGROSA

Desenergice el equipo antes de realizar cualquier trabajo en él.

MEDIOS DE PRESIÓN INADECUADOS

- Utilice este dispositivo en medios de presión adecuados para el diafragma elastomérico NBR y reborde de acero con revestimiento de zinc.
- Para evitar fugas, no permita que entren líquidos tales como alcohol, ácidos o sales en el dispositivo.

El incumplimiento de estas instrucciones podrá causar la muerte, lesiones serias o daño al equipo.

TENSION DANGEREUSE

Coupez l'alimentation avant de travailler sur cet appareil.

FLUIDES SOUS PRESSION INCOMPATIBLES

- Utilisez cette appareil avec des fluides sous pression compatibles avec le diaphragme en élastomère NBR et la bride en acier plaqué zinc.
- Pour éviter des fuites, ne laissez pas de fluides incompatibles tels que l'alcool, les acides ou des sels pénétrer dans l'appareil.

Si ces précautions ne sont pas respectées, cela entraînera la mort, des blessures graves ou des dommages matériels.

23.2.1

MOUNTING

Under conditions of moderate vibration and if connected to a short length of rigid steel pressure pipe, this switch may be mounted and supported by its pressure connector (D). For added mounting support use the flange-mounted bracket (4). Order the mounting bracket kit separately as Class 9049 Type A52.

MONTAJE

Bajo condiciones moderadas de vibración y, si está conectado a un tramo corto de tubo de presión de acero rígido, es posible montar este interruptor y soportarlo con el conector de presión (D). Para proporcionar un soporte de montaje adicional, utilice el soporte (4) montado en el reborde. Solicite, por separado, el accesorio de soporte de montaje clase 9049 tipo A52.

MONTAGE

Dans des conditions de vibrations modérées et lorsqu'il est raccordé à un tuyau de pression court en acier rigide, cet manostat peut être monté et supporté par son connecteur de pression (D). Pour fournir davantage de soutien, utiliser le support (4) monté sur bride. Le kit de support de montage, classe 9049, type A-52, est commandé séparément.

CAUTION / PRECAUCIÓN / ATTENTION

IMPROPER DRAIN ORIENTATION

GHB and GSB pressure switches have NEMA 3R enclosure ratings and must be mounted so that pressure connector (D) is oriented down as shown in diagram.

Failure to follow this instruction can result in equipment damage.

ORIENTACIÓN INCORRECTA DE DRENAJE

Los interruptores de presión GHB y GSB están clasificados como gabinetes NEMA 3R y deberán montarse de manera que el conector de presión (D) esté orientado hacia abajo, como se muestra en el diagrama.

El incumplimiento de esta instrucción puede causar daño al equipo.

MAUVAISE ORIENTATION DU DRAIN

Les manostats GHB et GSB ont des boîtiers conformes aux normes NEMA 3R et doivent être montés de telle manière que le connecteur de pression (D) soit orienté vers le bas comme indiqué sur le schéma.

Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.

Table / Tabla / Tableau 1 : Two-Pole Ratings / Val. nom. para los modelos de 2 polos / Val. nom. des modèles bipolaires

V~ / V ⎓	V~, Single Phase / Una fase / Monophasé	V~, Polyphase / Polifásico / Polyphasé	V ⎓
115	2 hp (1,49 kW)	3 hp (2,24 kW)	1 hp (0,75 kW)
230	3 hp (2,24 kW)	5 hp (3,73 kW)	1 hp (0,75 kW)
460–575	5 hp (3,73 kW)	5 hp (3,73 kW)	—
32	—	—	1/2 hp (0,37 kW)

Table / Tabla / Tableau 2 : Single-Pole Ratings, Form H / Valores nominales para los modelos de un polo, forma H / Val. nom. des modèles monopolaires, forme H

V~ / V ⎓	V~, Single Phase / Una fase / Monophasé	V ⎓
115	1 hp (0,75 kW)	1/2 hp (0,37 kW)
230	2 hp (1,49 kW)	1/2 hp (0,37 kW)
460–575	2 hp (1,49 kW)	—

Table / Tabla / Tableau 3 : Maximum Ratings / Valores nominales máx. / Valeurs nominales max.

Max. Pressure without Leakage / Presión máx. sin fuga / Pression max. sans fuite	Max. Pressure without Damage / Presión máx. sin daño / Pression max. sans dommage	Temp. MAX.	Control Rating Val. nom. de control Val. nom. de commande
300 psi / lb/po^2 (20 kg/cm^2)	450 psi / lb/po^2 (30 kg/cm^2)	225 °F (107 °C)	A600

ENCLOSURE RATING

Types GHG and GSG have NEMA 1 enclosures, which are intended for indoor use primarily to provide protection against contact with the enclosed equipment in locations where unusual service conditions do not exist.

CLASIFICACIÓN DEL GABINETE

Los interruptores GHG y GSG vienen de fábrica con gabinetes NEMA 1, los cuales son adecuados para uso en interiores y cuya función principal es brindar protección para evitar el contacto directo con el equipo en el gabinete instalado en lugares con condiciones normales.

CATÉGORIE DU BOÎTIER

Les types GHG et GSG ont des boîtiers NEMA 1, conçus pour utilisation à l'intérieur, principalement afin de protéger l'appareil dans le boîtier contre le contact avec l'extérieur en présence de conditions de service habituelles.

23.2.2

Types GHB and GSB have NEMA 3R enclosures, which are intended for outdoor use to provide protection for the enclosed equipment against falling rain.

Los interruptores tipos GHB y GSB vienen de fábrica en gabinetes NEMA 3R, adecuados para exteriores los cuales brindan protección contra la lluvia al equipo en el gabinete.

Les types GHB et GSB ont des boîtiers NEMA 3R, conçus pour utilisation à l'extérieur afin de protéger l'appareil dans le boîtier contre la pluie.

⚠ WARNING / ADVERTENCIA / AVERTISSEMENT

HIGH PRESSURE AIR OR FLUID
Reduce pressure to zero before disconnecting the device from the pressure source.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

FLUIDO O AIRE DE ALTA PRESIÓN
Reduzca la presión a cero antes de desconectar el dispositivo de la fuente de presión.

El incumplimiento de esta instrucción puede causar la muerte, lesiones serias o daño al equipo.

AIR OU FLUIDE À HAUTE PRESSION
Remettre la pression à zéro avant de déconnecter l'appareil de la source de pression.

Si cette précaution n'est pas respectée, cela peut entraîner la mort, des blessures graves ou des dommages matériels.

ADJUSTMENT

Range: Always adjust the range spring nut (A) first, setting it to the desired operating point on falling pressure. Keep in mind that this adjustment changes both the high and low operating points, but it should always be adjusted for the low operating point. Turning the nut (A) clockwise increases the setting.

Differential: To set the operating point on rising pressure, adjust the differential spring nut (B). Turning the nut (B) clockwise increases the high operating point, which effectively increases the pressure difference between the high and low operating points.

Release Valve (Form X): This valve is factory installed and may not be added to a device that formerly had no valve. If the valve is replaced or the valve screw (C) requires adjustment for any reason, perform the following steps:

1. With air pressure applied to the valve, and with the switch contacts open (closed if form R), turn the adjusting screw (C) until the valve just begins to release air.
2. Turn the screw (C) clockwise an additional one and one half turns.
3. Lock the jam nut (E) against the bearing plate lever (F).

AJUSTE

Gama: Siempre, ajuste primero la gama de presión de la tuerca de resorte (A), hasta obtener el punto de funcionamiento deseado en la disminución de la presión. Tenga en cuenta que este ajuste cambia los puntos de funcionamiento alto y bajo, pero siempre deberá estar ajustado en el punto de funcionamiento bajo. El ajuste de la tuerca (A) aumenta girándola en sentido de las manecillas del reloj.

Diferencial: Para ajustar el punto de funcionamiento en la presión alta, gire la tuerca de resorte del diferencial (B) en sentido de las manecillas del reloj; esto aumenta eficazmente la diferencia de presión entre los puntos de funcionamiento alto y bajo.

Válvula de alivio (forma X): Esta válvula se instala en la fábrica y no es posible instalarla en un dispositivo que actualmente no la tiene. Si hay necesidad de sustituir la válvula o si el tornillo de la válvula (C) necesita ajustarse, realice los siguientes pasos:

1. Aplicando presión de aire a la válvula, y con los contactos del interruptor abiertos (cerrados si tiene un dispositivo forma R), gire el tornillo de ajuste (C) hasta que la válvula empiece a soltar aire.
2. Gire el tornillo (C) una y media vuelta más en sentido de las manecillas del reloj.
3. Fije la tuerca de inmovilización (E) en la palanca (F) del disco de presión.

RÉGLAGE

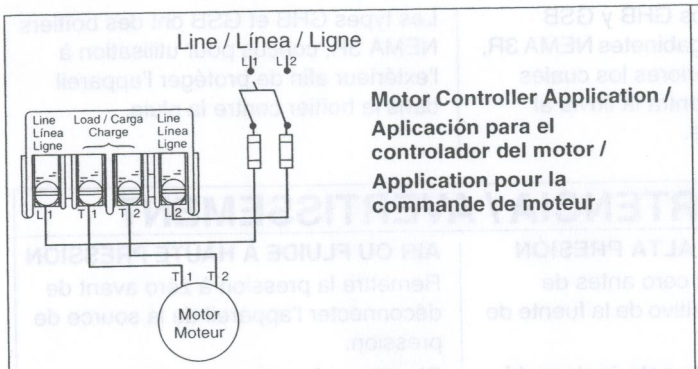
Gamme : Régler d'abord l'écrou à ressort de la gamme (A) jusqu'à l'obtention du point de fonctionnement sur pression descendante désiré. Ce réglage change à la fois les points de fonctionnement haut et bas, mais doit toujours être réglé pour le point de fonctionnement bas souhaité. Faire tourner l'écrou (A) dans le sens horaire pour augmenter le réglage.

Différentiel : Régler le point de fonctionnement sur pression montante en ajustant l'écrou à ressort de différentiel (B). Le fait de tourner l'écrou (B) dans le sens horaire augmente la différence de pression entre les points de fonctionnement haut et bas, en augmentant le point de fonctionnement haut seulement.

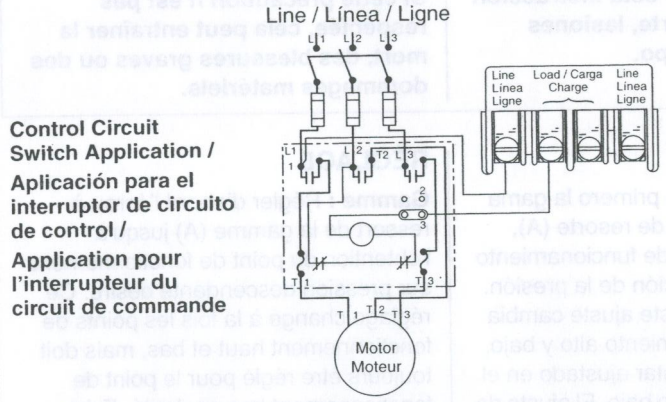
Soupape d'échappement (forme X) : Cette soupape est installée par l'usine et ne peut pas être ajoutée à un appareil qui n'a pas eu de soupape auparavant. Si la soupape est remplacée ou si la vis de la soupape (C) doit être réglée pour n'importe quelle raison, procéder ainsi.

1. Tout en appliquant de l'air sous pression à la soupape et en maintenant en position ouverte les contacts du manostat (position fermée pour la forme R), tourner la vis de réglage (C) jusqu'à ce que la soupape commence à relâcher de l'air.
2. Tourner la vis (C) dans le sens horaire d'un tour et demi supplémentaire.
3. Verrouiller alors le contre-écrou (E) contre le levier de la plaque d'appui (F).

23.2.3

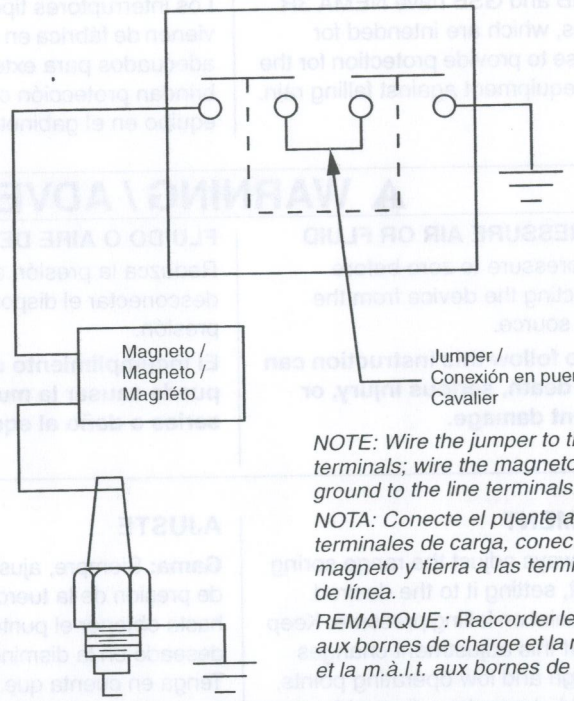


Motor Controller Application / Aplicación para el controlador del motor / Application pour la commande de moteur



Control Circuit Switch Application / Aplicación para el interruptor de circuito de control / Application pour l'interrupteur du circuit de commande

Figure / Figura / Figure 2 : Typical wiring diagrams / Diagramas típicos de cableado / Cablâges typiques



NOTE: Wire the jumper to the load terminals; wire the magneto and ground to the line terminals.

NOTA: Conecte el puente a las terminales de carga, conecte el magneto y tierra a las terminales de línea.

REMARQUE : Raccorder le cavalier aux bornes de charge et la magnéto et la m.à.l.t. aux bornes de ligne.

Figure / Figura / Figure 3 : Special Application—Wiring Diagram For a Gas Engine Cut-Out Application / Aplicación especial—Diagrama de cableado para la aplicación de corte de un motor de gas / Application spéciale—schéma de câblage pour application de déconnexion de moteur à essence

Table / Tabla / Tableau 4 : Replacement Parts / Piezas de repuesto / Pièces de rechange

Item Art.	Description / Descripción / Description	Class & Type Clase y tipo Classe et type	Qty. Cnt. Qté.	Used on Class 9013 Type / Para utilizarse en la clase 9013 tipo / Utilisé avec la classe 9013, type
1	Replacement contact kits (includes moveable contacts and stationary contact blocks) / Accesorios de contactos de repuesto (incluye bloques de contactos móviles y contactos fijos) / Kits de contacts de rechange (comprend les blocs de contacts mobiles et de contacts fixes)	9998 PC205	1	All except Forms H & R / Todos excepto las formas H y R / Tous sauf formes H et R
		9998 PC206	1	Form H only / Forma H solamente / Forme H seulement
		9998 PC207	1	Form R only / Forma R solamente / Forme R seulement
2	Diaphragm assembly / Ensamble de diafragma / Assemblage de diaphragme	9998 PC208	1	All except Form D50 / Todos excepto la forma D50 / Tous sauf forme D50
		9998 PC252	1	Form D50 only / Forma D50 solamente / Forme D50 seulement
3	Replacement valve kit / Accesorio de válvula de repuesto / Kit de soupape de rechange	9049 A12	1	Form X only / Forma X solamente / Forme X seulement
4	Mounting bracket kit (not furnished with switch) / Accesorio de soporte de montaje (no viene incluido con el interruptor) / Kit de support de montage (non inclus avec le manostat)	9049 A52	1	All Types GHG and GSG only / Todos los tipos GHG y GSG solamente / Tous les types GHG et GSG seulement

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Knightdale, NC 27545
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www.squared.com

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Schneider Canada Inc.
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Toronto, Ontario
(416) 752-8020
www.schneider-electric.ca

23.2.4

P-04

15300 2.2

GRUNDFOS

VersaFlo UPS50

Wet-Rotor, In-Line, Single Stage Circulator Pumps

Submittal Data — 60 Hertz

JOB or CUSTOMER: City of Iqaluit

ENGINEER: JOB; WASTE WATER TREATMENT PLANT AT IQUALUIT, NUNAVUT

CONTRACTOR: CONTRACTOR PRE-APPROVAL;

SUBMITTED BY: SIFEC-KUDLIK, PER; C.FAUTEUX, T.P. G.FAUTEUX, P.ENG. DATE: 28-6-2005

APPROVED BY: P.A.PELLETIER,P.ENG. DATE:

ORDER NO: 14726 DATE: 28-6-2005

SPECIFICATION REF:

575 34

QUANTITY	TAG NO.	MODEL NO.	GPM	FEET	VOLT	PHASE	COMMENTS
1	P-04	UPS50-160	75	25	~~575~~ 230	~~3~~ 1	VOLTS AND PHASE TO BE CHECK ON SITE BEFORE FINAL ORDER

Technical Data

FLOW RANGE: 20 – 180 U.S. GPM

HEAD RANGE: 1 – 62 FT.

MAXIMUM WORKING PRESSURE: 145 PSI

FLANGES: 2", 4-Bolt with (4) 9/16" diameter holes

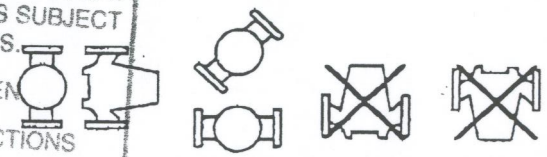
MINIMUM FLUID TEMPERATURE: 14°F (-10°C)

MINIMUM FLUID TEMPERATURE (Open Systems): 140°F (60°C)

MAXIMUM FLUID TEMPERATURE (Closed Systems): 248°F (120°C)

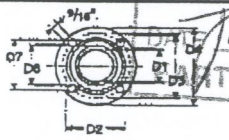
AMBIENT AIR TEMPERATURE: 32°F (0°C) to 104°F (40°C)

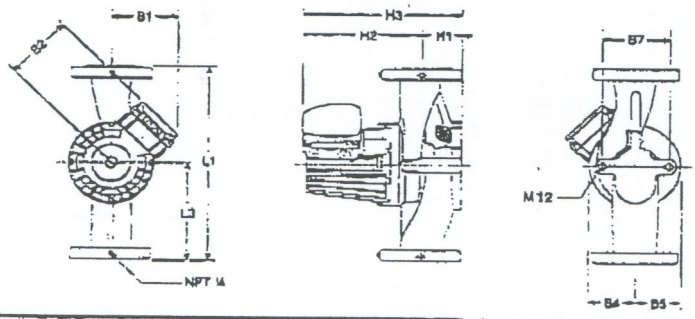
Mounting Positions



Recommended | Optional | DO NOT Mount Motor Shaft in Vertical Position.

Dimensions





Type Designation

UPS 50 - 80 /2 B

- UPS: Circulator Pump
- 50: Nominal diameter of ports in mm
- 80: Maximum head in meters x 10
- /2: Number of motor poles if 2 and 4 are available
- B: Bronze (optional)

Weights

Pump Type	PH	Net Wt. (Lbs.)	Ship. Wt. (Lbs.)	Ship. Vol. (Cu. Ft.)
UPS50-40	1 & 3	49	52.5	1.62
UPS50-80/4	1	64.5	68	1.62
UPS50-80/4	3	60.5	64	1.62
UPS50-80/2	1 & 3	49	52.5	1.62
UPS50-160	1 & 3	59.5	62.5	1.62
UPS50-240	3	62	65.5	1.62

Electrical Data and Dimensions

Pump Type	Nominal HP at Speed 3	PH	Voltage	Suc. Disc. Size	DIMENSIONS IN INCHES														
					L1	L3	B1	B2	B4	B5	B7	H1	H2	H3	D1	D2	D3	D4	D6	D7
UPS50-40	1/3	1	115 or 230	2	14	7	5 5/16	5 9/16	3 9/16	3	4 3/4	3 1/4	9 3/4	13	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
	1/3	3	208/230 or 460*																	
UPS50-80/4	3/4	1	115 or 230	2	11 1/2	5 3/4	5 3/4	6 11/16	4 3/8	4	4 3/4	3 1/4	10 1/2	13 3/4	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
	3/4	3	208/230 or 460*																	
UPS50-80/2	3/4	1	115 or 230	2	11 1/2	5 3/4	5 5/16	5 9/16	3 3/4	3	4 3/4	3	9 1/2	12 1/2	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
	3/4	3	208/230 or 460*																	
UPS50-160	1 1/2	1	230 only	2	14	7	5 3/4	6 11/16	4	4	4 3/4	3	10 3/16	13 3/4	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
		3	208/230 or 460*																	
UPS50-240	2	3	208/230 or 460*	2	14	7	5 3/4	6 11/16	4	4	4 3/4	3	10 3/8	13 5/16	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16

NOTE: *460 volt models are two speed only–speeds 2 & 3.

1/2

23.3

Wet-Rotor, In-Line, Single Stage Circulator Pumps

Submittal Data

QUANTITY	TAG NO.	MODEL NO.	GPM	FEET	VOLT	PHASE	COMMENTS

Technical Data

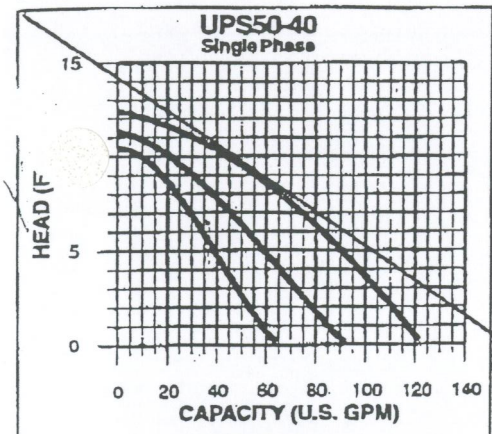
Dimensions

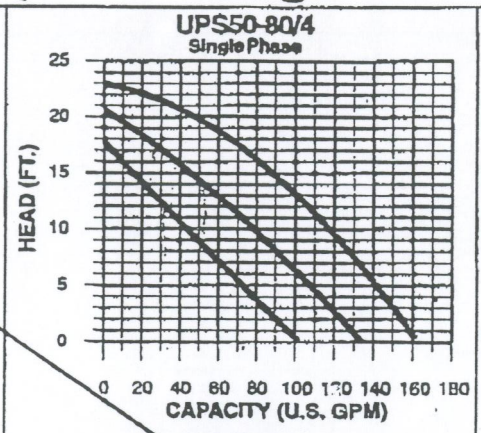
Electrical Data and Dimensions

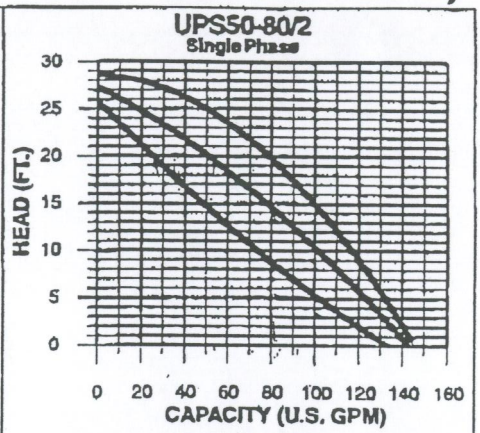
Pump Type	Nominal HP at Speed 3	PH	Voltage	Conduit Size	L1	L2	B1	B2	B3	B4	B5	B7	H1	H2	I1	I2	I3	D1	D2	D3	D4	D5	D7
UP550-40	1/6	1	115 or 230	3/4	7	14	5¾	5¾	7	3	4⅝	4⅝	3	4⅝	7/8	2¾	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛
	1/4	3	208/230 or 460																				
UP550-60M	1/4	1	115 or 230	3/4	7	14	5¾	5¾	7	3	4⅝	4⅝	3	4⅝	7/8	2¾	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛
	1/4	3	208/230 or 460																				
UP550-60V	1/4	1	115 or 230	3/4	7	14	5¾	5¾	7	3	4⅝	4⅝	3	4⅝	7/8	2¾	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛
	1/4	3	208/230 or 460																				
UP550-80	1/3	1	115 or 230	3/4	7	14	5¾	5¾	7	3	4⅝	4⅝	3	4⅝	7/8	2¾	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛
	1/3	3	208/230 or 460																				
UP550-100	1/2	1	115 or 230	3/4	7	14	5¾	5¾	7	3	4⅝	4⅝	3	4⅝	7/8	2¾	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛
	1/2	3	208/230 or 460																				

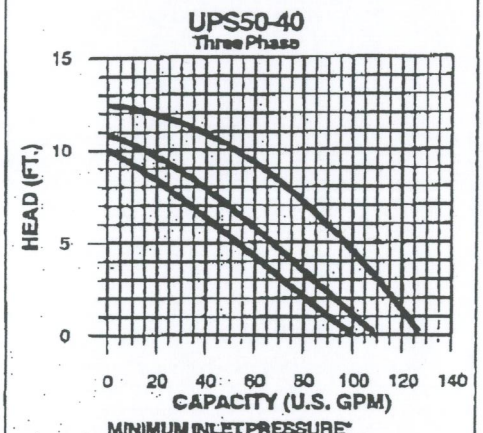
NOTE: *460 Volt models are two speed only.

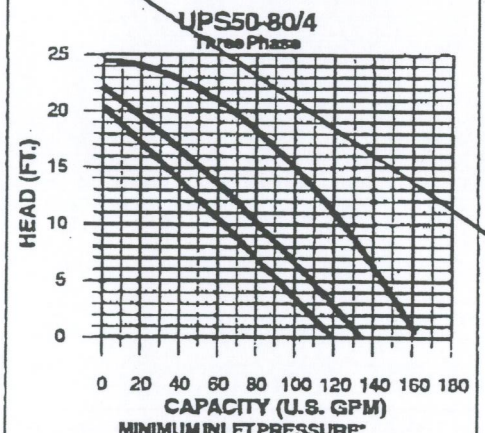
Performance Curves (60 Hz – Single and Three Phase Models)

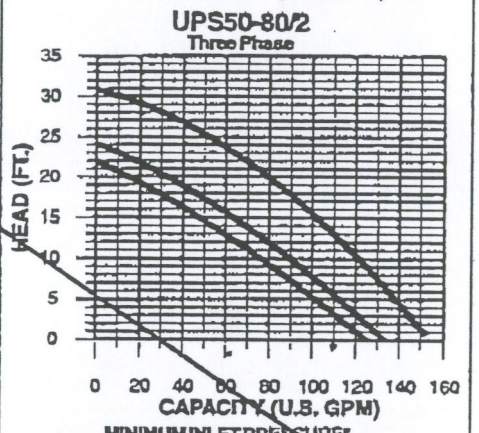










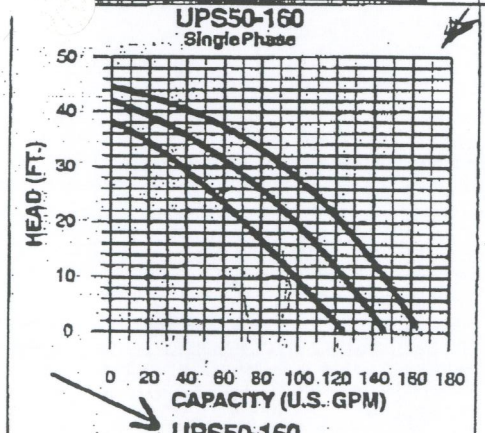


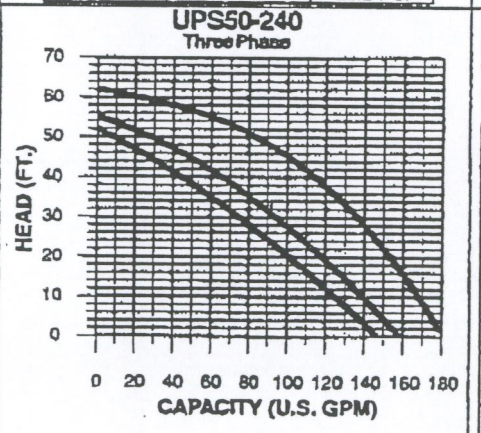
MINIMUM INLET PRESSURE*

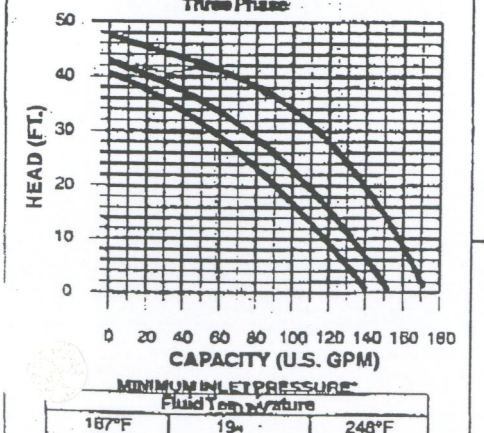
Fluid Temperature		
167°F (75°C)	194°F (90°C)	248°F (120°C)
1.8 Ft. 0.7PSI	10.2 Ft. 4.4 PSI	53.6 Ft. 23.2 PSI

MINIMUM INLET PRESSURE*

Fluid Temperature		
167°F (75°C)	194°F (90°C)	248°F (120°C)
10.2 Ft. 4.4 PSI	20.1 Ft. 8.7 PSI	61.9 Ft. 26.8 PSI







MINIMUM INLET PRESSURE*

Fluid Temperature		
167°F (75°C)	194°F (90°C)	248°F (120°C)
23.6 Ft. 10.2 PSI	33.5 Ft. 14.5 PSI	75.3 Ft. 32.6 PSI

*Minimum gauge pressure required at the inlet (suction) to ensure effective, trouble-free operation. Varies by fluid temperature.

Materials of Construction

DESCRIPTION	MATERIAL
Impeller, Bearing Plate, Rotor Cladding, Rotor Can, Bearing Retainers	AISI 304 SS
Impeller Seal Ring	AISI 304 SS/Teflon
Shaft (cast iron pumps), Inspection Screw Split Cone, Split Cone Nut	AISI 303 SS
Shaft (bronze pumps)	AISI 316 SS
Shaft Bearing Journals	Chrome Carbide/ Tungsten Carbide
Pump Housing*	Cast Iron ASTM GG25
*Bronze – Optional	35B-40B
Stator Housing	Aluminum AISI 10Cu2
Rotor End Caps	Copper or Brass
Upper and Lower Radial Bearings	Ceramic Al2O3
Thrust Bearing	Carbon MY106
O-rings	EPDM
Terminal Box, Nameplate	Composite PA66
Plug for Sensor	Composite PPS, GF40

GRUNDFOS

Leaders in Pump Technology

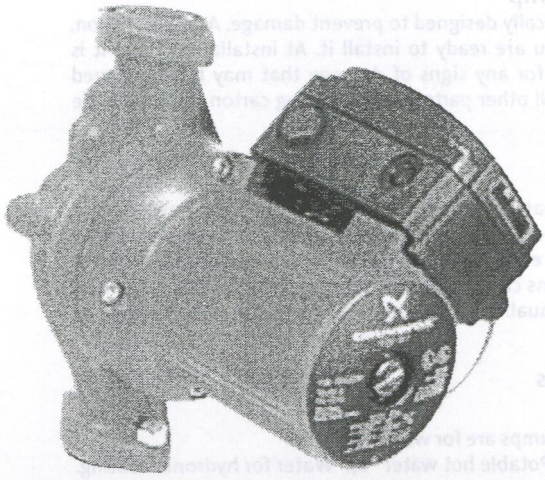
GRUNDFOS Installation & Operation Manual
Installation et opération

VersaFlo® UPS
& Series 200 UMC/UPC Powerheads
VersaFlo® UPS
& têtes de pompes des séries 200 UMC/UPC

Wet Rotor, In-Line,
Single Stage Circulator Pumps

Rotor immergé, en ligne
Pompes de circulateur à un étage

Table of Contents:



BE›THINK›INNOVATE›

GRUNDFOS

23.3.1

READ THIS BOOKLET

This booklet is designed to help a certified installer install, begin operation of, and troubleshoot your Grundfos VersaFlo UPS pump. It should be left with the owner of the pump for future reference and information regarding its operation. Should the owner experience any problems with the pump, a certified professional should be contacted.

ELECTRICAL WORK

All electrical work should be performed by a qualified electrician in accordance with the latest edition of the *National Electrical Code* (US) *or Canadian Electrical Code* (Canada), local codes and regulations.

SHOCK HAZARD

Faulty wiring, or a faulty motor, can cause electrical shock that could be fatal—whether touched directly or conducted through standing water. For this reason, proper grounding of the pump to the power supply's grounding terminal is required for safe installation and operation.

In all installations, the above-ground metal plumbing should be connected to the power supply ground as described in Article 250-80 of the *National Electrical Code* or rule 10-406 of the Canadian Electrical Code.

PRE-INSTALLATION CHECKLIST

1. Verify You Have the Correct Pump

Read the pump nameplate to ensure it is the pump ordered. Compare the pump's nameplate data and its performance curve (for flow, head, etc.) with the application in which it will be installed. Make certain that your VersaFlo UPS will do what you expect it to do.

2. Verify the Condition of the Pump

Your pump's shipping carton was specifically designed to prevent damage. As a precaution, it should remain in the carton until you are ready to install it. At installation time, it is recommended the pump be examined for any signs of damage that may have occurred during shipping. Additionally examine all other parts of the shipping carton for any visible damage.

3. Verify Electrical Requirements

Verify the electrical supply to ensure that its voltage, phase and frequency matches that of the pump motor. These motors are designed to run on ±10% of the nameplate-rated voltage. Proper operating voltages and electrical information can be found on the motor nameplate. Wiring connection diagrams can be found inside the terminal box cover and within this Installation & Operation Manual. If voltage variations are larger than ±10%, do not operate the pump.

4. Pumped Liquid Requirements

CAUTION: The VersaFlo UPS pumps are for water use only.
It can be used to circulate 1). Potable hot water 2). Water for hydronic heating.
3). Up to 50/50% water-glycol mixture.

23.3.2

4. Pumped liquid requirements cont'd

When a pump is installed in a heating system, the water it pumps should meet the requirements of accepted standards on water quality in heating systems. It is advisable to use bronze [VersaFlo UPS] pumps in domestic hot water systems where the degree of water hardness is lower than 14 grains per US gallon. In systems with higher degrees of water hardness, the direct-coupled VersaFlo TP pump is recommended.

The VersaFlo UPS is a wet-rotor pump—lubricated and cooled by the liquid being pumped—and, therefore, must be in continuous circulation. Extended periods without circulation will cause premature wear to the pump bearings, resulting in excessive motor heat.

The pumped liquid must meet the following requirements:

Minimum Pump Inlet Pressure (During Operation)

UPS MODEL	AT THESE LIQUID TEMPS					
	167°F 75°C		194°F 90°C		230°F 110°C	
	[PSI]	H, ft	[PSI]	H, ft	[PSI]	H, ft
32-40/4	0.7	1.6	2.2	5.1	21.0	48.5
32-80/2	0.7	1.6	5.1	11.8	23.9	55.2
32-160/2	11.6	26.8	16.0	37.0	34.1	78.8
40-40/4	0.7	1.6	4.4	10.2	23.2	53.6
40-80/4	0.7	1.6	1.5	3.5	18.1	41.8
40-80/2	6.5	15.0	10.9	25.2	29.0	67.0
40-160/2	5.1	11.8	9.4	21.7	27.6	63.8
40-240/2	11.6	26.8	16.0	37.0	34.1	78.8
50-40/4	0.7	1.6	2.9	6.7	21.8	50.4
50-80/4	0.7	1.6	4.4	10.2	23.2	53.6
50-80/2	4.4	10.2	8.7	20.1	26.8	61.9
50-160/2	11.6	26.8	16.0	37.0	34.1	78.8
50-240/2	10.2	23.6	14.5	33.5	32.6	75.3
80-40/4	11.6	26.8	16.0	37.0	34.1	78.8
80-80/4	14.5	33.5	18.9	43.7	37.0	85.5
80-160/2	21.8	50.4	26.1	60.3	43.5	100.5
100-4/4	27.6	63.8	31.9	73.7	50.0	115.5

Liquid Temperature Range

Continuous circulation: 14°F (-10°C) up to 230°F (110°C)
Intermittent circulation: < 284°F (140°C) (for short periods of time)
Domestic Hot Water circulation: <140°F (60°C)

23.3.3

INSTALLATION PROCEDURES

WARNING: NEVER make any connections in the pump terminal box unless the electrical supply has been switched OFF.

WARNING: Do NOT start the pump until the system has been filled with liquid and vented.

Pumped liquid may be scalding hot and/or under pressure: If the pump is already installed in the system, the system must be drained, or both its isolation valves on either side of the pump must be closed before removing the Allen screws.

1. Electrical Preparation

Terminal Box Position

The terminal box must be positioned to allow condensed water to escape from the 8 (eight) drain holes located at the bottom of its stator–close to the housing. These drain holes MUST face downwards, hence facing the terminal box upwards, as shown in Figure 1 .

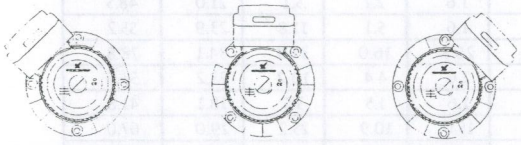


Fig 1: Single Head pumps. These terminal box positions apply whether the piping is mounted vertically or horizontally.

Rotating the Terminal Box

a. Remove the 4 (four) Allen screws holding the pump head onto the pump housing
b. Carefully lift the pump head while rotating it so as to place the terminal box in the desired position. DO NOT locate the terminal box beneath the pump. Make sure the O-ring is properly seated in the pump housing.
c. Replace the pump head onto the pump housing
d. Tighten the Allen head screws evenly. Torque to:
   8mm: 15 ft. lbs
   10mm: 25 ft. Lbs
e. Verify that the rotor turns freely by removing the vent plug in the middle of the pump nameplate. Insert a medium size flat-headed screwdriver into the slot at the exposed end of the shaft and gently turn the shaft. If it does not turn easily, repeat steps a through d, above.
f. The nameplate can be moved by gently lifting its outer edge with a screwdriver and turning it to the desired position. Once positioned, push back into place.

23.3.4

2. Piping Considerations

Thoroughly clean and flush all dirt and sediment from the system before attempting to install the pump.

Location in the Piping Line

The pump should NEVER be located at the lowest point of the piping system, where dirt and sediment collect, nor at the highest point, where air accumulates.

Mounting Positions

Fig. 2 indicates the direction of water flow. Although the VersaFlo UPS may be installed in either vertical or horizontal piping positions, its motor shaft must remain horizontal (see Fig. 1)

REMEMBER: Pumps installed outdoors MUST be protected by a ventilated, watertight cover to keep moisture and dirt OUT.

WARNING: The pump must be positioned so that someone cannot accidentally come into contact with any of its hot surfaces.

3. Connect the Pump

Install the pump into the piping system. Grundfos recommends that pressure gauges be installed in the inlet and discharge flanges, or pipes—giving the user access to periodically check both pump & system performance.

4a. Electrical Connection

The electrical connection and protection should be carried out by a qualified electrician in accordance with the latest edition of the *National Electrical Code* or *Canadian Electrical Code*, local codes and regulations.

The operating voltage and frequency are indicated on the pump nameplate—ensure that the motor is suitable for the electrical supply it is being installed to. Ground the pump properly to protect against indirect contact—a ground fault interrupter can be used as additional protection.

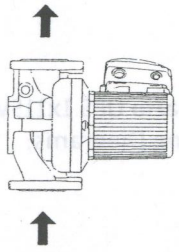


Fig. 2

WARNING: ALWAYS switch OFF electrical supply before making any connections to the pump terminal box.

- The pump must be grounded
- The pump must be connected to an external main power switch

Multi-Speed Pump (1 phase)

All single phase pumps are equipped with built-in, automatic resetting, thermal overload protection. The pump is protected at all three speeds.

Multi-Speed Pump (3 phase)

3 Phase pumps have the capability for thermal protection but must be connected to the

23.3.5

electrical supply via an external contactors. The contactors must be connected to the built-in thermal overload switch terminals T1 & T2 (3x208-230V) or P1 and P2 (3x460V & 575V) to protect the pump against overloading at all three speeds,

OR:

If the pump is protected by a motor starter, the starter must be set to the current consumption of the pump at the selected speed. **The motor starter setting must be changed EVERY time the pump speed is changed**. The current consumption at the individual speeds is stated on the pump nameplate. Figures 4, 6, 7,9 & 10 show the possible connections.

VersaFlo UPS 1x115V & 230V Terminal Box:

All VersaFlo UPS single pumps come with a protection module and a speed switch as shown in Fig.3. All are equipped with built-in, automatic resetting thermal overload protection. The pump is protected at all three speeds.

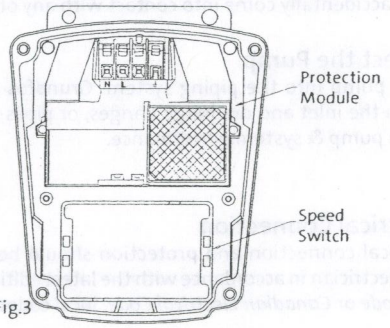


Fig.3

VersaFlo UPS 1x115V & 230V Wiring Diagrams:

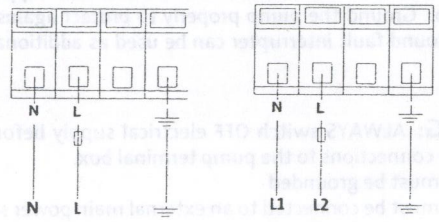


Fig.4: The electrical connections for a single phase pump with protection module.

Note: Provide electrical disconnect and current protection as per local electrical codes.
K = External contactor sized to FL & LR pump current. Auxiliary contacts rated for supply voltage.

23.3.6

VersaFlo UPS 3x208-230V Terminal Box:

All 3X208-230V VersaFlo UPS single pumps come with a standard module and a speed switch as shown in Fig.5. All are equipped with an internal thermal overload switch (terminals T1 & T2, to be connected to an external contractor) to protect the pump at all three speeds.

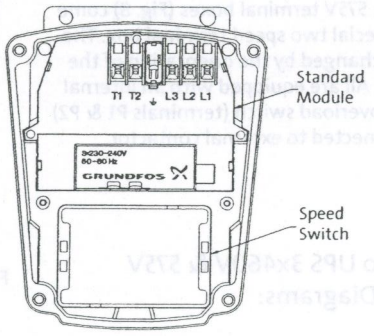


Fig. 5

VersaFlo UPS 3x208-230V Wiring Diagrams:

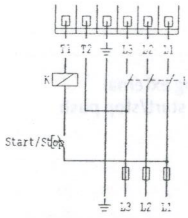


Fig.6: The electrical connections when using external impulse contacts (momentary contacts) for start/stop push button station

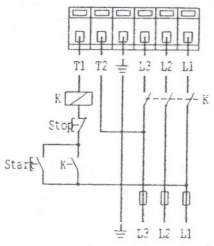


Fig. 7: The electrical connections when using an external changeover contact (maintained contacts) for start/stop push button station.

23.3.7

VersaFlo UPS 3x460V & 575V Terminal Box:

All VersaFlo UPS single pumps with 3 phase x 460V & 575V terminal boxes (Fig. 8) come with a special two speed terminal box. The speed is changed by the orientation of the jumpers. All are equipped with an internal thermal overload switch (terminals P1 & P2) to be connected to external contactor.

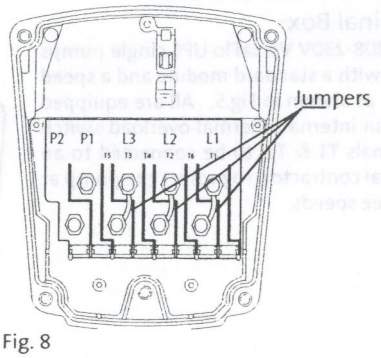
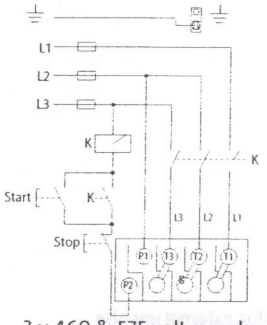


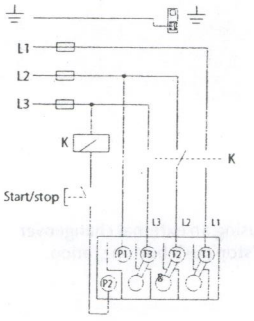
Fig. 8

VersaFlo UPS 3x460V & 575V Wiring Diagrams:



3 x 460 & 575 volt supply

Fig. 9: The electrical connections when using external impulse contacts (momentary contacts) for start/stop push button station.



3 x 460 & 575 volt supply

Fig. 10: The electrical connections when using an external changeover contact (maintained contacts) for start/stop push button station.

23.3.8

STARTING THE PUMP

1. Vent the Piping System of Air

NEVER operate the pump dry—the system must FIRST be filled with liquid and vented of air BEFORE operation. Once the pump is installed and its electrical connections are made, vent the piping system of air. Do NOT vent through the pump itself—follow these steps:

a. Fill and pressurize the system with liquid, and vent all trapped air from the piping by suitable means
b. Ensure isolation valves, if any, are OPEN
c. Remove the vent screw (center of nameplate) to vent the motor of air.

WARNING: When loosening the vent screw, beware of escaping liquid—it can be scalding hot—take caution to avoid personal injury or damage to pump components (see Fig. 11).

2. Verify Direction of Shaft Rotation

APPLIES TO 460V & 575V 2-SPEED MODELS ONLY

(Direction of rotation for 3-speed pumps can be verified on troubleshooting chart)

a. Turn the power OFF
b. Unscrew and remove the vent plug located in the center of the nameplate
c. Insert a small, flat-headed screwdriver into the slot at the end of the motor shaft, turning the shaft until it can rotate freely (see Fig.12).
d. Start the pump briefly, and stop, observing in which direction the shaft rotates—it must rotate in the COUNTER-CLOCKWISE direction as shown on the name plate (see Fig. 11).
e. If the pump shaft is rotating in the correct direction, continue to "f". If it is rotating incorrectly, disconnect the power and interchange any 2 (two) power leads in the terminal box, and repeat "d" to verify rotation direction.
f. When the shaft is rotating in the correct counter-clockwise direction, replace the vent plug

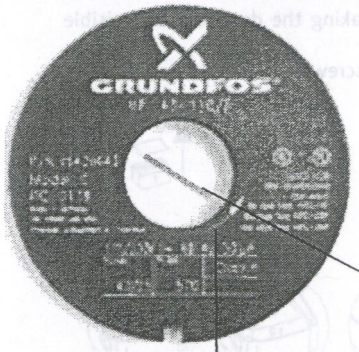


Fig. 11 Direction of Rotation

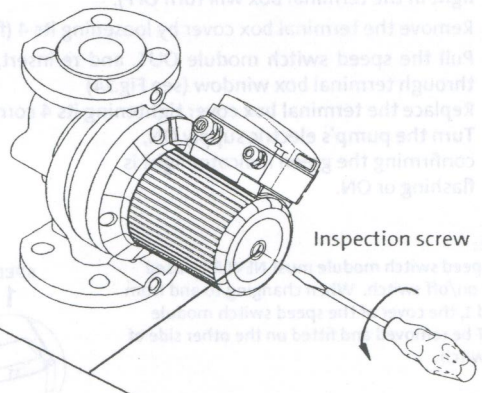


Fig.12 Vent Plug

23.3.9

3a. Select Speed (for 3-speed—all models except 3 x 460V & 575V)

Select one of 3 (three) speeds using the switch in the terminal box. See Fig. 13 for pump performance at each of the settings. Lower speeds offer considerable reduction in energy consumption and produce less noise in the system.

Switch Position	Speed in % of Maximum Speed	
	Single-Phase Pumps	Three-Phase Pumps
1	approx. 60%	approx. 70%
2	approx. 80%	approx. 85%
3	100%	100%

Pump Performance at Speed Settings:

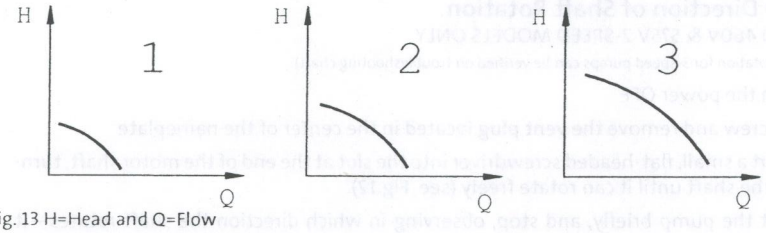


Fig. 13 H=Head and Q=Flow

WARNING: Never make any connections in the pump terminal box unless the electricity supply has been switched OFF.

To Change the Pump Performance:

a. Turn the pump's electrical supply OFF at the main circuit breaker (the green indicator light in the terminal box will turn OFF).
b. Remove the terminal box cover by loosening its 4 (four) corner screws
c. Pull the speed switch module OUT, and re-insert, making the desired speed visible through terminal box window (see Fig.14)
d. Replace the terminal box cover tightening its 4 corner screws
e. Turn the pump's electric supply ON, confirming the green indicator light is flashing or ON.

NOTE:
The speed switch module must NEVER be used as an on/off switch. When changing to and from speed 1, the cover of the speed switch module MUST be removed and fitted on the other side of the switch.

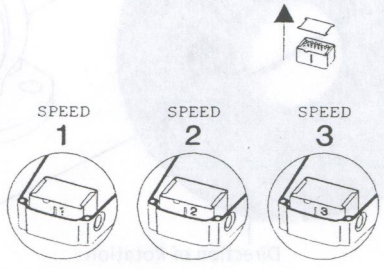


Fig.14

23.3.10

3b. Select Speed (2-speed, 3 x 460V & 575V)

There are 2 (two) possible speed settings in the terminal box, as described in the table below:

Speed Step	Speed in % of Maximum Speed
1	approx. 75%
2	100%

WARNING: NEVER make any connections in the pump terminal box unless the electrical supply has been switched OFF.

To change the pump performance:

The speed may be changed by the adjusting positions of the bridges in the terminals. The bridges are fitted according to low speed (Fig. 15) or high speed (Fig. 16):

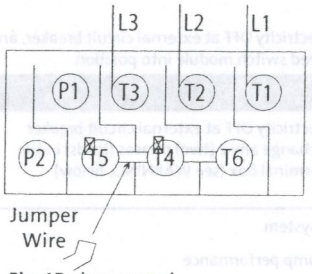


Fig. 15 - low speed

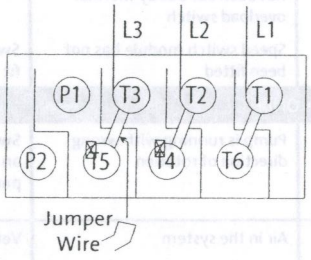


Fig. 16 - high speed

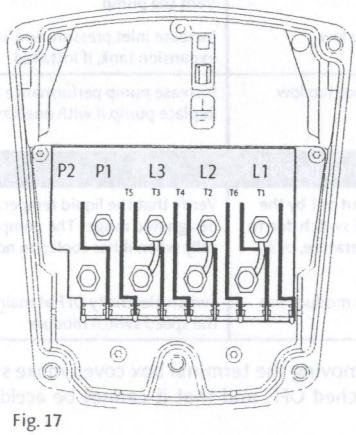


Fig. 17

23.3.11

TROUBLESHOOTING

Problem	Cause	Remedy
Pump does not run Pump's indicator lights not ON	One fuse in the installation is blown	Replace the fuse
	External circuit breaker is switched off	Switch the circuit breaker on
	Current/voltage operated ground fault interrupter has tripped	Repair the insulation defects and reset teh circuit breaker
	The pump's internal thermal overload switch has cut out (Standard module only)	Check that liquid temperature falls within the specified range. With external on/off changeover contact: The pump will restart automatically when it has cooled to the normal temperature. With external on/off impulse contacts: The pump can be restarted when it has cooled to normal temperature
Pump does not run. Green indicator light is ON	Blocked rotor, but pump has not been cut out by thermal overload switch	Switch electricity OFF and lean/repair the pump
	Speed switch module has not been fitted	Switch electricity OFF at external circuit breaker, and fit the speed switch module into position
Three-Phase Pumps ONLY:		
The pump is running, but Red & Green indicator lights are ON	Pump is running with wrong direction of rotation	Switch electricity OFF at external circuit breaker an dinterchange any 2 (two) phases (leads) in the pump's terminal box (see WARNING, below)
Noise in the SYSTEM. Green indicator light is ON	Air in the system	Vent the system
	Pump flow too high	Reduce pump performance
	Pressure too high	Reduce pump performance
Noice in the PUMP Green indicator light is ON	Air in the pump	Vent the pump
	Inlet pressure too low	Increase inlet pressure and/or verify air volume in expansion tank, if installed
Insufficient heat in some places of heating system	Pump performance too low	Increase pump performance if possible. Replace pump if with one having higher flow
Single phase pumps with protection module ONLY:		
Pump does not run Red indicator light is ON Green indicator light is OFF	Pump has been cut out by the thermal overload switch due to high liquid temperature, or a blocked rotor	Verify that the liquid temperature falls within the designated range. The pump will restart automatically when it has cooled to normal temperature
	The speed switch moduel has not been fitted	Switch electricity OFF at main external switch and fit the speed switch module

WARNING: Before removing the terminal box cover, make sure that the electrical supply has been switched OFF, and that it cannot be accidentally switched ON.

WARNING: The pumped liquid may b escalding hot, and under high pressure. Before any removel or dismantling of the pump, the system must be drained or the isolating valves -- on both sides of the pump -- must be closed.

23.3.12

Measure Supply Voltage

Use a voltmeter to measure the voltage being supplied to the pump's motor. BE CAREFUL—power is still being supplied to the pump. Do NOT let the voltmeter leads touch each other while they are in contact with the power lines.

Three Phase Motors

Touch a voltmeter lead to:

- Power leads L1 and L2
- Power leads L2 and L3
- Power leads L3 and L1

Single Phase Motors

Touch one voltmeter lead to each of the lines supplying power to the pump L1 and L2, (or L1 and N for 115V circuits).

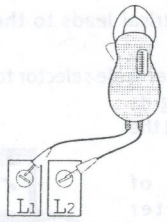


Fig. 18: measuring single phase power

Evaluating the Supply Voltage Reading

When the motor is under load, the voltage should be within 10% (+ or -) of the nameplate voltage. Any variation larger than this may indicate a poor electrical supply and can cause damage to the motor windings. The motor should not be operated under these conditions. Contact your power supplier to correct the problem or change the motor to one requiring the voltage you are receiving.

Measure Current

Use an amp meter to measure the current, following these steps:

a. Make sure the pump is operating
b. Set the ampmeter to the correct scale
c. Pinch the leg to be measured using the ammeter tongs
d. Compare the results with the amp draw information on the motor nameplate
e. Repeat for the other legs

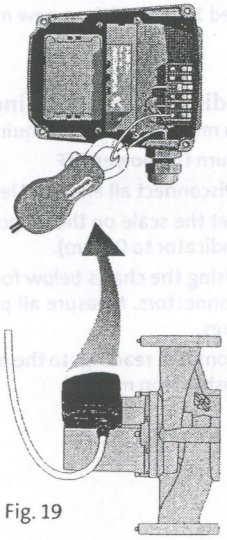


Fig. 19

Evaluating the Current Reading

If the current draw exceeds the listed nameplate amps, or if the current imbalance is greater than 5% between each leg on three phase units, then check the following:

- Voltage supplied to the pump maybe too high or too low
- Contacts on the motor starter may be burnt
- Terminals in the starter or terminal box may be loose
- There may be a winding defect—verify the winding and insulation resistance
- Motor windings may be shorted or grounded
- The pump may be damaged, causing a motor overload
- A voltage supply or a balance problem may exist

Measure Insulation Resistance (lead-to-ground)

Use a megohmmeter to measure insulation resistance.

a. Turn Power OFF
b. Disconnect all electrical leads to the motor
c. Set the megohmmeter scale selector to R X 100K. Touching its leads together, adjust the indicator to 0 (zero)
d. Touch the leads of the megohmmeter individually to each of the motor leads and to ground (i.e. L1 to ground; L2 to ground, etc)

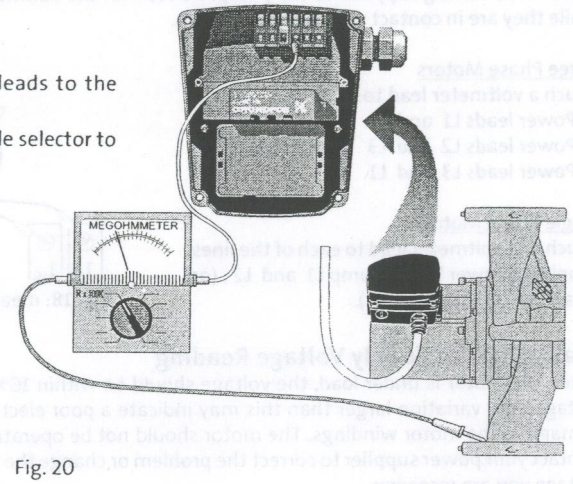


Fig. 20

Evaluating Insulation Resistance (lead-to-ground)

Resistance values for NEW motors must exceed 1,000,000 ohms. If the reading does not exceed 1,000,000 for a new motor, the motor must be replaced.

Winding Resistance (line to line)

Use a megohmmeter is required to measure the motor windings' resistance:

a. Turn the power OFF
b. Disconnect all electrical leads to the motor
c. Set the scale on the megohmmeter to Rx1. Touching its leads together adjust the indicator to 0 (zero).
d. Using the charts below for reference, touch the megohmmeter leads to the paired connectors. Measure all present pairs, writing and labeling (R_A, R_{S1}, R_{S2}, R) all readings.
e. Compare readings to the matching model, phase and voltage chart provided on this instruction manual.

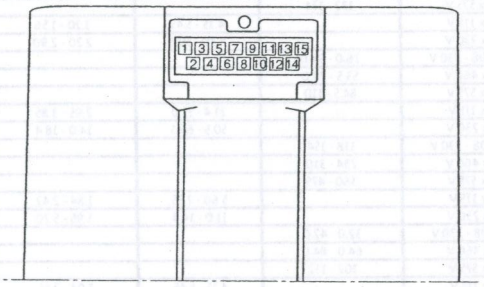
23.3.14

Evaluating the Winding Resistance Reading:

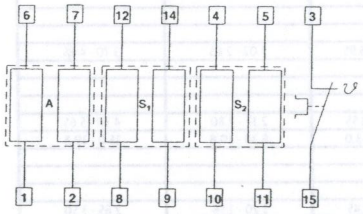
The resistance values must fall within the tolerances listed on the winding resistance chart. It they do not, the motor must be replaced.

Internal Wiring (UPS):

Terminal Plug-In Stator:



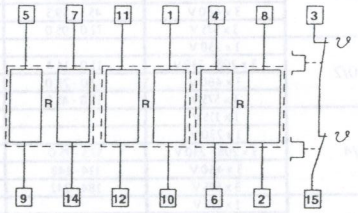
Single Phase:



R_A:	6-1	or	6-1, 7-2
R_{S1}:	12-8	or	12-8, 14-9
R_{S2}:	4-10	or	4-10, 5-11

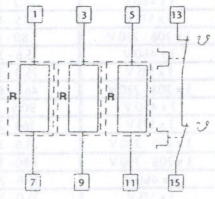
A: Main winding
S_2: Auxiliary winding
S_1: Auxiliary winding

Three Phase 208-230V:



R:	5-9	or	5-9, 7-14
R:	11-12	or	11-12, 1-10
R:	4-6	or	4-6, 8-2

Three Phase 460/575V:



23.3.15

Winding Resistance Chart for UPS Models, [Ω] 68°F - 122°F (20°C-50°C)

Pump Model	Voltage	R	RA	RS1	RS2
UPS 32-40/4	1 x 115 V		17.8 - 23.2	3.95 - 5.20	9.40 - 12.4
	1 x 230 V		70.0 - 91.5	17.0 - 22.2	39.5 - 52.0
	3 x 208 - 230 V	180 - 236			
	3 x 460 V	360 - 470			
	3 x 575 V	575 - 750			
UPS 32-80/2	1 x 115 V		9.55 - 12.6	3.05 - 4.00	6.70 - 8.80
	1 x 230 V		19.4 - 25.5	5.45 - 7.10	12.6 - 16.4
	3 x 208 - 230 V	44.0 - 57.5			
	3 x 460 V	83.5 - 110			
	3 x 575 V	132 - 174			
UPS 32-160/2	1 x 115 V		4.35 - 5.45	1.20 - 1.56	2.65 - 3.50
	1 x 230 V		8.30 - 10.8	2.20 - 2.90	5.05 - 6.65
	3 x 208 - 230 V	26.0 - 34.0			
	3 x 460 V	53.5 - 70.0			
	3 x 575 V	84.5 - 110			
UPS 40-40/4	1 x 115 V		11.4 - 15.0	2.95 - 3.85	5.60 - 7.35
	1 x 230 V		50.5 - 66.5	14.0 - 18.4	25.5 - 34.0
	3 x 208 - 230 V	118 - 154			
	3 x 460 V	234 - 310			
	3 x 575 V	360 - 475			
UPS 40-80/2	1 x 115 V		5.60 - 7.35	1.84 - 2.42	4.50 - 5.90
	1 x 230 V		11.0 - 14.4	3.95 - 5.20	8.55 - 11.2
	3 x 208 - 230 V	32.0 - 42.0			
	3 x 460 V	64.0 - 84.0			
	3 x 575 V	102 - 132			
UPS 40-80/4	1 x 115 V		4.15 - 5.45	1.94 - 2.55	3.30 - 4.35
	1 x 230 V		8.10 - 10.6	3.05 - 4.00	4.60 - 6.05
	3 x 208 - 230 V	46.5 - 61.0			
	3 x 460 V	90.5 - 118			
	3 x 575 V	164 - 216			
UPS 40-160/2	1 x 115 V		2.85 - 3.75	1.10 - 1.44	1.94 - 2.55
	1 x 230 V		5.60 - 7.35	2.02 - 2.66	3.75 - 4.95
	3 x 208 - 230 V	22.8 - 30.0			
	3 x 460 V	45.5 - 59.5			
	3 x 575 V	72.0 - 95.0			
UPS 40-240/2	1 x 230 V		6.80 - 8.95	2.02 - 2.65	3.70 - 4.85
	3 x 208 - 230 V	11.0 - 14.4			
	3 x 460 V	22.0 - 29.0			
	3 x 575 V	35.0 - 45.5			
UPS 50-40/4	1 x 115 V		6.55 - 8.55	2.12 - 2.80	4.30 - 5.65
	1 x 230 V		25.0 - 33.0	8.30 - 10.8	15.0 - 19.8
	3 x 208 - 230 V	57.5 - 75.0			
	3 x 460 V	114 - 148			
	3 x 575 V	184 - 242			
UPS 50-80/2	1 x 115 V		4.15 - 5.45	1.20 - 1.56	2.65 - 3.50
	1 x 230 V		8.30 - 10.80	2.20 - 2.90	5.05 - 6.65
	3 x 208 - 230 V	26.0 - 34.0			
	3 x 460 V	33.5 - 70.0			
	3 x 575 V	84.5 - 110			
UPS 50-80/4	1 x 115 V		2.75 - 3.60	1.74 - 2.30	2.85 - 3.75
	1 x 230 V		5.50 - 7.25	2.65 - 3.50	4.95 - 6.50
	3 x 208 - 230 V	37.0 - 49.0			
	3 x 460 V	79.0 - 104			
	3 x 575 V	120 - 156			
UPS 50-160/2	1 x 230 V		6.80 - 8.95	2.02 - 2.65	3.70 - 4.85
	3 x 208 - 230 V	12.4 - 16.2			
	3 x 460 V	24.2 - 31.5			
	3 x 575 V	37.5 - 49.5			
UPS 50-240/2	3 x 208 - 230 V	7.80 - 10.2			
	3 x 460 V	15.6 - 20.6			
	3 x 575 V	25.0 - 33.0			
UPS 80-40/4	3 x 208 - 230 V	46.5 - 61.0			
	3 x 460 V	90.5 - 118			
	3 x 575 V	164 - 216			
UPS 80-80/4	3 x 208 - 230 V	23.6 - 31.0			
UPS 80 -160/2	3 x 208 - 230 V	7.80 - 10.2			
	3 x 460 V	15.6 - 20.6			
	3 x 575 V	25.0 - 33.0			
UPS 100-40/4	3 x 208 - 230 V	27.5 - 36.0			
	3 x 460 V	54.5 - 71.5			
	3 x 575 V	86.0 - 114			

Winding Resistance Chart for UMC/UPC Models, [Ω]68°F-122°F (20°C-50°C)

Pump Model	Voltage	R	RA	RS1	RS2
UMC50-40	1 x 115 V		9.80	2.28	4.10
	1 x 230 V		38	9.30	18.0
UMC65-40	1 x 115 V		4.85	1.26	2.75
	1 x 230 V		19.0	5.00	12.0
	3 x 208 V	31.0			
	3 x 230 V	37.5			
UMC50-80	1 x 115 V		5.75	2.08	4.30
	1 x 230 V		10.0	4.80	7.50
	3 x 208 V	32.0			
	3 x 230 V	39.5			
UMC65-80	1 x 115 V		3.0	1.90	3.10
	1 x 230 V		5.80	4.00	6.00
	3 x 208 V	17.0			
	3 x 230 V	21.2			
UMC80-80	1 x 115 V		3.00	1.94	3.10
	1 x 230 V		5.75	2.75	4.25
	3 x 208 V	14.4			
	3 x 230 V	18.2			
UPC50-160	1 x 115 V		3.05	1.06	1.86
	1 x 230 V		6.10	2.00	3.70
	3 x 208 V	13.4			
	3 x 230 V	15.6			
UPC65-160	1 x 115 V		7.15	2.12	3.08
	1 x 230 V		7.50	7.05	6.80
	3 x 208 V		9.40	8.75	8.50
	3 x 230 V	4.30			
	3 x 230 V	5.40			

23.3.17

REPLACING COMPONENTS

Replacing the Pump Head (Removal)

1. Disconnect or TURN OFF the power supply.
2. Close any isolation valves on either side of the pump to avoid draining the system of liquid.
3. Disconnect the electrical leads from the terminal box.
4. Disconnect and remove the conduit from the terminal box.
5. Loosen and remove the four Allen screws (8 or 10 mm) which connect the pump head housing to the pump housing.
6. Remove the pump head from the pump housing.
7. Clean the machined surfaces in the pump housing of any foreign material.

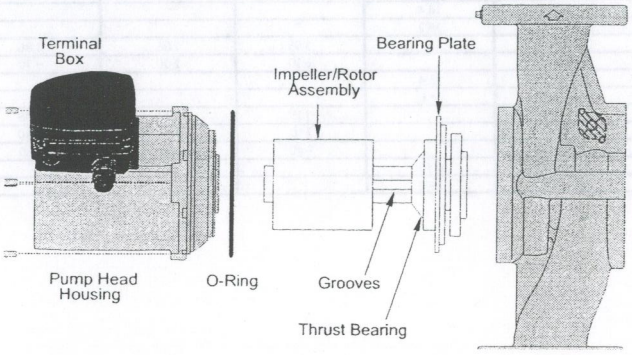


Fig. 21

Replacing the Pump Head (Installation)

1. Carefully remove the new pump head assembly from its packaging. Separate the impeller/rotor assembly from the new pump head
2. While holding the thrust bearing, carefully place the impeller/rotor assembly into the pump housing. The bearing plate should fit snugly into the lowest machined surface in the pump housing
3. Make sure that the impeller/rotor assembly can rotate freely.
4. Place the O-ring over the rotor and locate it into the inner diameter of the pump housing
5. Carefully place the pump head housing over the rotor and rotate it so the terminal box is in the position you wish (see page 4 for positioning).
6. Make sure the pump head housing is properly seated on the pump housing. Do not force the two together -- if there is binding, disassemble them and repeat steps 2-6. Tighten the Allen screws evenly to secure the pump head. Torque to:

   8mm.... 15 ft.. Lbs
   10mm.. 25 ft.. Lbs
7. Check to make sure the motor shaft turns freely, as explained in step 5 under "Rotating the Terminal Box".

23.3.18

Replacing the Terminal Box or Capacitor

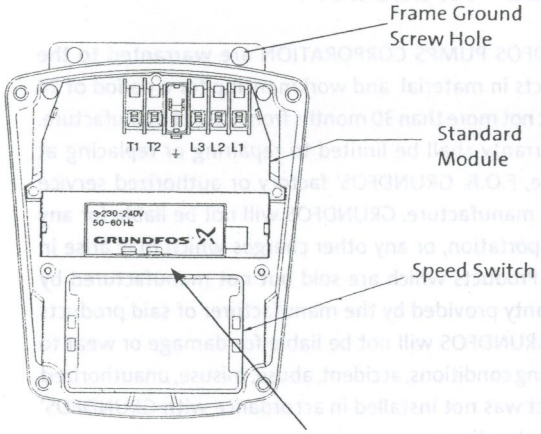


Fig.22

If the terminal box is replaced, make certain the electrical information listed on the new box matches the information listed on the old box, and that it is compatible with the pump and incoming electrical supply.

For all terminal boxes, it is very important to tightly secure the frame grounding screw through the terminal box, so that a proper connection between the terminal box and motor is made.

1. Before replacing the terminal box or capacitor, make sure the power is OFF
2. Remove the terminal box cover by completely loosening all four torx/standard screws
3. Remove the speed switch (noting its position) by pulling firmly and evenly on both sides of it. (Not for 460/575 V)

(Single-phase pumps only) Skip to #5 for 3-phase pumps

4a. **Capacitor replacement:** disconnect the two connector clips from the capacitor and unscrew the complete plastic strain relief nut. Remove capacitor wire and strain relief

4b. Screw in new complete strain relief nut and connect new clip connectors. Pull excess sheathed cable out of terminal box, being sure to leave at least $^1/_8$" of sheath inside of terminal box

5a. **Terminal box replacement:** disconnect all wiring, remove the three Phillips-head screws holding the terminal box in place and remove the terminal box by pulling firmly and evenly on both side

5b. Check that the clear rubber gasket is in place around the terminal box connector stem, carefully press the terminal box into the stator socket, replace the three Phillips-head terminal box screws and replace wiring

6. Replace the speed switch to its proper position, making sure to push it all the way in (Not for 460/575V)
7. Replace the terminal box cover and tighten all four torx/standard screws
8. Switch on electrical power supply. The pump is now ready for operation

23.3.19

LIMITED WARRANTY

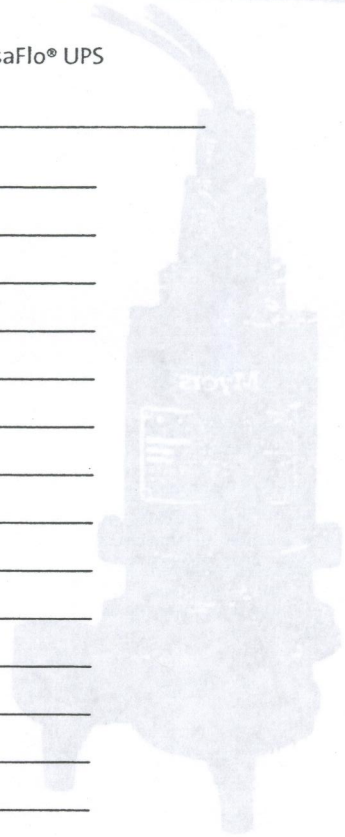
Products manufactured by GRUNDFOS PUMPS CORPORATION are warranted to the original user only to be free of defects in material and workmanship for a period of 24 months from date of installation, but not more than 30 months from date of manufacture. GRUNDFOS' liability under this warranty shall be limited to repairing or replacing at GRUNDFOS' option, without charge, F.O.B. GRUNDFOS' factory or authorized service station, any product of GRUNDFOS' manufacture. GRUNDFOS will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by GRUNDFOS are subject to the warranty provided by the manufacturer of said products and not by GRUNDFOS' warranty. GRUNDFOS will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with GRUNDFOS' printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of GRUNDFOS' products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact GRUNDFOS or an authorized service station for instructions. Any defective product to be returned to GRUNDFOS or a service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Material Authorization must be included if so instructed.

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

23.3.20



23.3.21

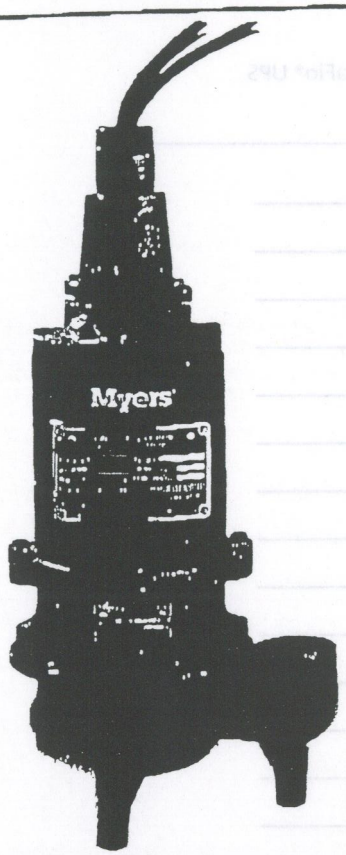
15300 2.3
P11 and P12

Myers

1/2

SX50 and SX50H

Explosion-proof ½ hp Submersible Sump Pumps



JOB; WASTE WATER TREATMENT PLANT AT IQUALUIT, NUNAVUT
CONTRACTOR PRE-APPROVAL; SIFEC-KUDLIK, PER; C.FAUTEUX, T.P. G.FAUTEUX, P.ENG. P.A.PELLETIER,P.ENG.

The Myers SX50 and SX50H are rugged ½ horsepower submersible centrifugal sump pumps designed for residential, light commercial, or industrial applications. The SX50 and SX50H are U.L. and CSA listed with construction for use in Class 1, Division 1, Group D hazardous locations. These pumps are designed to pump contaminated water, sewage, or effluent with a wide range of pollutants listed under the U.L., CSA listing. A Myers intrinsically safe control panel must be used with the SX50 and SX50H.

F.E. Myers offers a complete line of submersible sump, sewage, effluent, grinder, non-clog waste-water pumps, controls, basins and accessories. For additional information, please contact your local Myers representative or the Myers Kitchener, Ontario sales office at 519-748-5470.

APPLICATIONS INCLUDE:

- Service Stations
- "Quick-lube" stations
- Car/Truck washes
- Truck docks
- Military base

ADVANTAGES BY DESIGN

Durable motor will deliver many years of reliable service.

- Oil-filled motor for maximum heat dissipation and constant bearing lubrication.
- Recessed impeller reduces radial bearing loads, increases bearing life.
- Seal leak probes warn of seal leak condition.
- On-winding heat sensors protect motor from overheating and prevent costly motor damage.

PRODUCT CAPABILITIES

Capacities to	95 gpm	6 L/S
Heads to	34 ft.	10 m
Solids Handling, SX50	2 in.	50 mm
Solids Handling, SX50H	¾ In.	19 mm
Liquids Handling	domestic effluent & drain water	
Intermittent Liquid Temp.	up to 140 deg F.	up to 60 deg C.
Winding Insulation Temp. (Class B)	266 deg F.	130 deg C.
Motor Electrical Data (Single phase motors are PSC start type. Myers control panels or capacitor kits are recommended for proper operation and warranty.)	½ HP, 1750 RPM, 1 ph 208, 230 volt, 60 Hz, 3 ph 208, 230, 460, 575 volt	
Std. Third Party Approvals	CSA, UL Class 1, Div. 1, Group D	
Acceptable pH Range	6-9	
Specific Gravity	9 – 1.1	
Viscosity	28 – 35 SSU	
Discharge, NPT SX50	2 in.	50 mm
Discharge, NPT SX50H	1½ In.	38.1 mm
Min. Sump Diameter Simplex	24 in.	610 mm
Min. Sump Diameter Duplex	36 in.	914 mm

Note: Consult factory for applications outside of these recommendations.

CONSTRUCTION MATERIALS

Motor Housing, Seal Housing, Cord Cap, Volute Case	cast iron, Class 30, ASTM A48-76
Impeller	recessed, cast iron, Class 20 A48-62
Power Cord	15' 14/4 SOW/SOW-A
Control Cord	15' 18/5 SOW/SOW-A
Mechanical Seals: Std.	dbl. tandem carbon & ceramic
Mechanical Seals: Opt.	lower tungsten carbide
Pump, Motor Shaft	416 SST
Fasteners	300 Series SST

REVIEWED ACCORDING TO THE REQUIREMENTS OF THE CONDITIONS OF THE CONTRACT. ANY ACTION INDICATED IS SUBJECT TO THESE REQUIREMENTS.
☑ NO EXCEPTIONS TAKEN
☐ MAKE NOTED CORRECTIONS
☐ REVISE & RESUBMIT
☐ REJECTED
DATE July 21/05 BY STC
EARTH TECH (CANADA) INC.

M 1/2

WHERE INNOVATION MEETS TRADITION

Myers
Pentair Pump Group

23.4

Myers

2/2

P11 & P12

SX50 and SX50H

Explosion-proof

½ hp Submersible Sump Pumps

STATOR
Press fit for perfect alignment and best heat transfer. Oil-filled motor conducts heat and lubricates bearings.

CABLE ENTRY SYSTEM
Provides double seal protection. Cable jacket sealed by compression grommet. Individual wires sealed by epoxy potting.

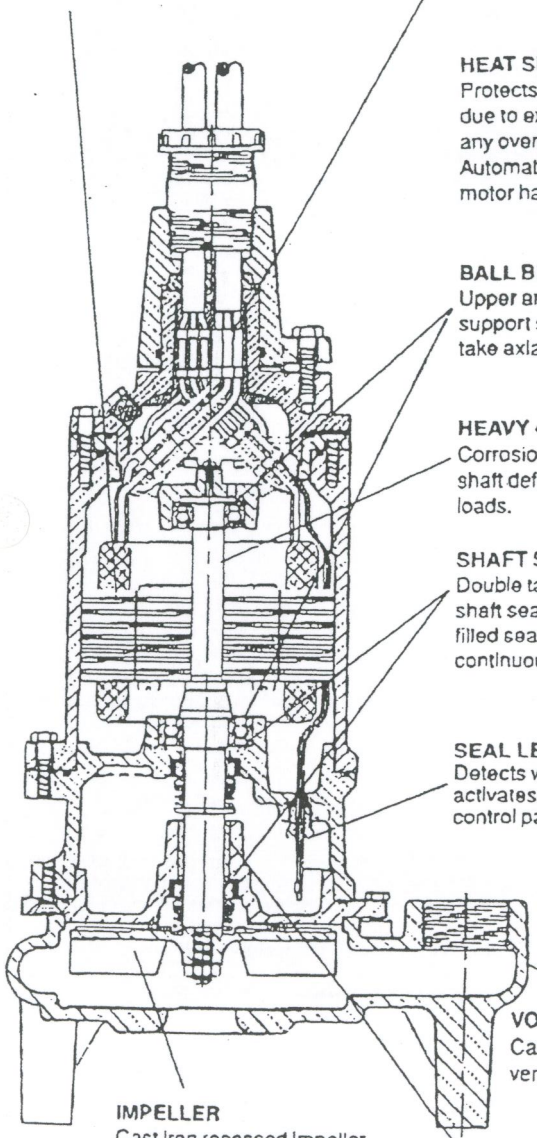
HEAT SENSOR
Protects motor from burn-out due to excessive heat from any overload condition. Automatically resets when motor has cooled.

BALL BEARINGS
Upper and lower ball bearings support shaft and rotor and take axial and radial loads.

HEAVY 416 SST SHAFT
Corrosion resistant. Reduces shaft deflection due to grinding loads.

SHAFT SEALS
Double tandem mechanical shaft seals protect motor. Oil-filled seal chamber provides continuous lubrication.

SEAL LEAK PROBE
Detects water in seal housing, activates warning light in control panel.



VOLUTE CASE
Cast iron 1 1/2" - 2" vertical discharge.

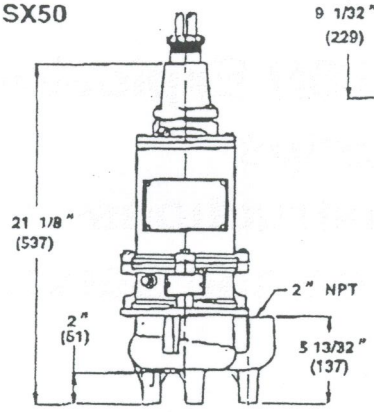
IMPELLER
Cast iron recessed impeller handles ground slurry without clogging or binding. Provides unobstructed flow passage. Reduces radial loads. Pump-out vanes help keep trash from seal, reduces pressure at seal faces.

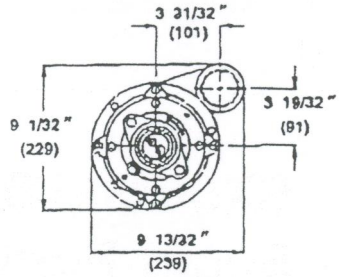
SLEEVE BEARING
Takes radial load; provides flame path.

DIMENSIONS

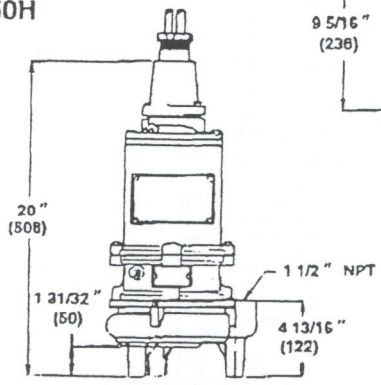
[Dimensions in MM]

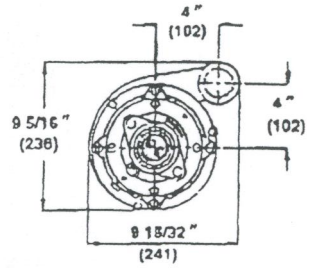
SX50



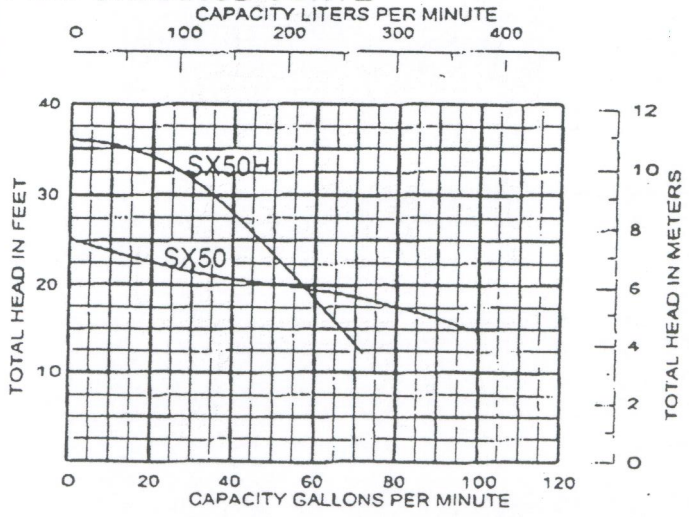


SX50H





PERFORMANCE CURVE



SX50BROCHUREPMD052304

Myers
Pentair Pump Group

F.E. Myers Co., Div. of Pentair Canada Inc.
P.O. Box 9138, 269 Trillium Drive,
Kitchener, Ontario N2G 4W5
Tel: (519)748-5470 Fax: (519)748-2553

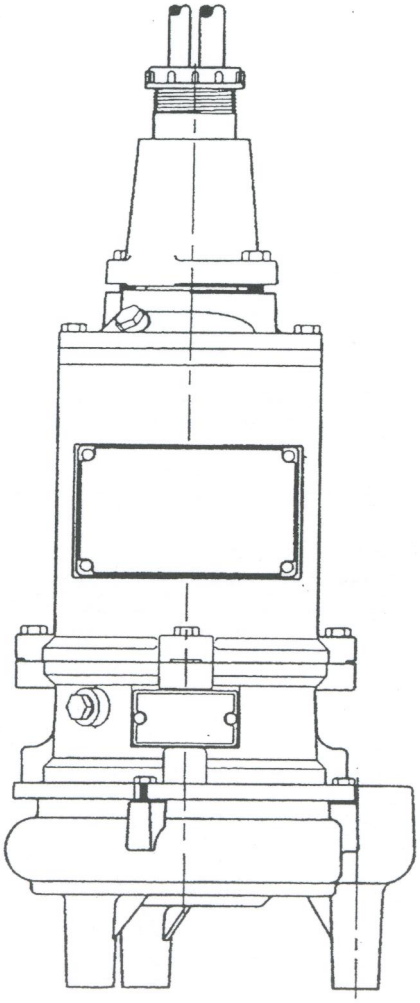
M 2/2

23.4

Myers®

Pentair Pump Group

SX50/SX50H Explosion Proof Sump Pumps Safety Instructions Installation and Service Manual



Class 1, Div. 1
Group D

Class 1, Div. 1
Group D

23833A465

23.34.1

Myers

Pentair Pump Group

SX50/SX50H Explosion Proof Sump Pumps Safety Instructions Installation and Service Manual

WARNING! IMPORTANT SAFETY INSTRUCTIONS! READ CAREFULLY BEFORE INSTALLATION. This manual contains important information for the safe use of this product. Read this manual completely before using this product and refer to it often for continued safe product use. DO NOT THROW AWAY OR LOSE THIS MANUAL. Keep it in a safe place so that you may refer to it often.

GENERAL

1. Most accidents can be avoided by using ***COMMON SENSE.***
2. Read the operation and maintenance instructions manual supplied with the pump.
3. Do not wear loose clothing that can become entangled in the impeller or other moving parts.
4. This pump is designed to handle materials which could cause illness or disease through direct exposure. Wear adequate protective clothing when working on the pump or piping.

ELECTRICAL

⚠5. To reduce the risk of electrical shock, pump must be properly grounded in accordance with the National Electric Code and all applicable state and local codes and ordinances.
⚠6. To reduce risk of electrical shock, disconnect the pump from the power source before handling or servicing.
⚠7. Any wiring to be done on pumps should be done by a qualified electrician.
⚠8. Never operate a pump with a power cord that has frayed or brittle insulation.
⚠9. Never let cords or plugs lay in water.
⚠10. Never handle connected power cords with wet hands.

PUMPS

⚠11. Pump builds up heat and pressure during operation, allow time for pump to cool before handling or servicing.
⚠12. Only qualified personnel should install, operate or repair pump.
⚠13. Keep clear of suction and discharge openings. **DO NOT** insert fingers in pump with power connected.
⚠14. Do not pump hazardous material not recommended for pump (flammable, caustic, etc.).
⚠15. Make sure lifting handles are securely fastened each time before lifting.
⚠16. Do not lift pump by the power cord.
⚠17. Do not exceed manufacturers recommendation for maximum performance, as this could cause the motor to overheat.
⚠18. Secure the pump in its operating position so it can not tip over, fall or slide.
⚠19. Keep hands and feet away from impeller when power is connected.
⚠20. Submersible sump pumps are not approved for use in swimming pools, recreational water installations, decorative fountains or any installation where human contact with the pumped fluid is common.
⚠21. Do not operate pump without safety devices in place.
⚠22. For hazardous locations, use pumps that are listed and classified for such locations.

IMPORTANT! Myers is not responsible for losses, injury or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

GENERAL INFORMATION

Pump Models: These instructions cover the installation and service of the Myers SX50 and SX50H series submersible sump pumps. The models are UL listed explosion proof for hazardous sewage locations Class 1, Div. 1, Group D.

Motor HP & Voltages: The SX50/SX50H sump pumps are offered in single and three phase up to ½ HP. Voltages will vary according to the application and can be seen in the tables in this manual.

Electrical Controls: All of these pump models must be used with a control panel. Myers built control panels are designed to supply the correct electrical controls, motor starting equipment and include the circuitry for moisture and heat sensors. It is recommended that a Myers built control panel be used so that all warranties apply.

General Construction: The SX50/SX50H motor construction is designed to meet Underwriters Laboratory requirements for Class 1, Group D sewage applications. These models are certified and nameplated with this approval. A cross sectional view of the internal workings of the pumps can be seen on pages 7 & 8. The motor chamber and seal chamber are filled with a high dielectric type oil for improved lubrication and heat transfer of the bearings and motor. Since the bearings have been designed for 50,000 hours of life, the oil should never require replacement under normal operating conditions. An air space above the oil level in both the

23.4.2

seal and motor chambers is provided to allow for the expansion of the oil when at operating temperature. The power and control lines are sealed and strain relieved on the outside entrance with a standard cord grip, and internally through the use of a dielectric potting resin surrounding the electrical wires.

Internal connection wiring diagrams are shown in Figure 8. All of the pump fasteners and shafts are made from corrosion resistant stainless steel, while the pump castings are made of ASTM A-48 Class 30 cast iron, and the multi-vane vortex impellers are made from Class 20 cast iron.

General Installation: Various configurations and methods of plumbing this series of sump pumps may be used.

Note: If the SX50/SX50H explosion proof pumps are used in conjunction with a rail lift-out system, it must be a U.L. approved non-sparking, explosion proof system.

IMPORTANT: If the following guidelines are not followed, the U.L. Explosion Proof approval is void.

Explosion Proof Service: These pumps are to be used for handling septic tank effluent, sewage, and storm water only. ***Do not*** use in other hazardous locations. These motors must be repaired and serviced only at a Myers Authorized Service Center or at the Myers Factory. Any unauthorized field repair voids warranty and the explosion proof rating.

CAUTION: After the pump is installed and sewage has entered the basin there is "Danger". Sewage water gives off methane and hydrogen sulfide gases, which are poisonous. Never enter a wet well unless the cover is open for a sufficient period of time to allow fresh air into the basin. It is recommended that a man in the basin have a harness on with a rope to the surface, so that he can be pulled out in case of asphyxiation. It is for this reason that Myers recommends using the rail lift-out system so that no service is required inside the basin.

Motor: Each motor is provided with heat sensor thermostats attached directly to the motor windings. The thermostats open if the motor windings see excessive heat and, in turn, open the motor contactor in the control panel, breaking the power to the pump. When the motor is stopped due to an overheat condition, it will not start until the motor has cooled and the heat sensor reset button is manually pushed on the front of the Myers control panel. This circuitry is provided in the Myers control panel designs.

The SX50/SX50H pumps are equipped with internal thermostats. The SX50/SX50H models are designed to meet Class B heat rise of 266°F (130°C).

Note: Failure to use proper circuitry and to connect the motor overheat protection in the control panel would negate all warranties and U.L. Listings.

Motor Seal Failure Warning: The seal chamber is oil filled and provided with moisture sensing probes to detect water leakage through the lower shaft seal. The probes can also detect moisture present in the upper motor housing.

The presence of water energizes a red seal leak warning light at the control panel. This is a warning light only, and does not stop the motor. It indicates a leak has occurred and the pump must be repaired. Normally, this indicates the outboard seal has leaked. Allowing the unit to operate too long after the warning could cause upper seal leakage along with motor failure.

The resistance across the moisture sensing (seal failure) probes, should be checked after a seal leak warning light has lit. This can be done by disconnecting the red and orange control wires from the control panel, and measuring the resistance with an ohm meter between the wires. For an explosion proof pump the reading should be above 30,000 ohms. If the measured values are below those indicated above, the pump may have a lower seal failure and require service.

On the Myers explosion proof control panels the seal leak test switch tests the seal leak circuit continuity. When pushed the seal leak test bulb should light. If the test bulb does not light it means either the wiring circuitry to the seal leak probes has been broken or the bulb has burned out.

Note: Myers built control panels supply the correct circuitry for moisture and heat sensor connections. Failure to install the correct circuitry with proper connection would negate warranty and UL Listing. See Figure 7.

Motor Power Cord, Control Cord and Cord Cap Assembly: Each motor power cord has 4 conductors - white, black, red and green. For a single phase motor the black is connected to the common lead, the white is connected to the main lead, while the red is connected to the start circuitry, and the green is attached to a good ground. The rotation of a single phase pump is set properly at the factory.

For three phase motor, the black, white, and red conductors are power leads and the green is ground.

Note: Rotation should be clockwise when observed from the top of the pump. This can be checked by noting which direction the pump torques upon initial starting. A properly rotating pump will torque counterclockwise upon start.

ALWAYS CHECK THREE PHASE PUMPS FOR PROPER ROTATION BEFORE INSTALLING PUMPS.

The control cable has 5 conductors - black, white, red, orange and green. White and black connect to the heat sensor terminals in the control panels; red and orange connect to the seal failure terminals in the control panel; and the green connects to the ground in the control panel.

The cord cap is epoxy potted. This allows the cord cap, with cords, to be removed from the motor. With this arrangement, the cords can be permanently installed in a sealed fitting in the sump. This should be an approved explosion proof junction box for hazardous locations. ***The control and power cables cannot be spliced!***

Note: Each cable has a green ground wire and must be properly grounded per the National Electric Code and local codes.

Electrical Motor Controls: All electrical controls and motor starting equipment should be as specified in these instructions. Consult factory for any acceptable alternates. For Hazardous locations the controls and control panel must be installed outside the hazardous area. Approved explosion proof controls that are intrinsically safe must be used.

Junction Box: If a junction box is used in a hazardous location, it must be an explosion proof approved type with explosion proof cord connectors. Wires from the junction box must pass through an explosion proof seal connector.

Level Sensing Controls: Intrinsically safe-type float controls are recommended for all applications and required for explosion proof service. An intrinsically safe control panel relay will limit the current and voltage to the level controls. A Myers control panel can be supplied with this type circuitry.

The float level controls maintain the basin sewage water level by controlling pump turn-on and turn-off levels.

1. The lower turn-off control should be set so that the pump stops with the water covering the entire motor housing. Consult the factory for any settings below this point.

2. The upper turn-on control should be set above the lower turn-off control. The exact height between the two controls is determined by the number of pump starts desired and the depth of the basin. A maximum of 10 starts per hour should not be exceeded.

3. The override control is set at a specified height above the upper turn-on control.

4. The alarm control is set about 6" to 12" above the override control.

5. No control should be set above the inlet invert.

Electrical Connections: All electrical wiring must be in accordance with local code and only qualified electricians should make the installations. Complete wiring diagrams are included for use in making the installation. All wires should be checked for shorts to ground with an ohmmeter or meager after the connections are made. This is important, as one grounded wire can cause failure of the pump, control panel or personal injury.

Pump: The fluid end of the pump is field serviceable and can be disassembled in case of wear, damage, plugging or outboard seal failure. The following will describe the disassembly and reassembly process.

WARNING! Disconnect pump from power source before servicing or handling.

Disassembly

1. With the pump located in a secure place, remove the bolts fastening the seal housing to the volute. The motor and impeller can now be removed as a unit.

2. Lay the unit down on its side. If the lower seal is to be removed, it is recommended that the oil in the seal chamber be drained. This can be done by removing the lower seal chamber plug and draining the oil into a holding container.

3. Using a proper wrench, the impeller retaining nut must be removed. This may require a piece of wood placed between the vanes to keep the impeller from rotating while removing the nut.

Loctite™ is used on this bolt and heating to 450-500°F may also be required to loosen. The impeller is mounted on a threaded shaft. To remove impeller, rotate impeller with one hand, while holding pump shaft with screwdriver.

4. If the lower seal needs removed, first remove the compression spring that rides between the impeller and the seal assembly. Next take a pair of screwdrivers and remove the compression ring that surrounds the rubber bellows on the rotating portion of the seal assembly. Again using the screwdrivers, pry the remaining portion of the rotating seal assembly off the shaft. The ceramic stationary can be removed by placing a screwdriver between the rubber and the ceramic face, and then prying, working around the entire diameter. Note, these parts should be discarded and a new seal assembly installed.

5. If the oil in the seal chamber was drained, examine the contents to determine if the upper seal has been damaged. Signs of grit or other abrasive material may indicate that the upper seal has also been damaged. Pressurizing the motor housing assembly between 7 and 10 PSI and observing any drop in pressure will indicate if the upper seal is functioning properly.

Note: Upper seal repairs must be done at a Myers authorized service center or at the Myers factory. Any unauthorized field repair voids warranty and the explosion proof approval on the U.L. Listed pumps.

Reassembly

1. Remove the ceramic portion of the new seal from the package. Brush new dielectric oil around the rubber portion of the stationary assembly and into the pocket in the seal housing. Note, keep the oil off the seal face. Without scratching the seal face, press the ceramic stationary portion into the seal housing. A piece of PVC pipe that fits onto the face of the seal works well for installation. With clean cloth, lightly wipe the face of the seal surface to make sure it is dirt free. Remove the rotating portion of the seal from the package and lubricate the inside diameter of the rubber bellows and the outside diameter of the shaft. Place the seal over the shaft. Evenly press on the body of the rotational assembly and slide it down the shaft until the seal faces meet. A PVC pipe with the inside diameter slightly larger than the shaft diameter can work well to press the rotational assembly into position. Once the seal assembly is in position, place the spring over the register on the rotational portion of the seal.

2. Thread the impeller onto the shaft, making sure that the seal spring is registered properly onto the back side of the impeller. Place the proper Loctite fluid on the impeller retaining nut. Tighten nut on shaft.

3. Fill the seal chamber with new dielectric oil. An air gap of 10-15% volume must be left for the expansion of the oil when it is at operating temperature.

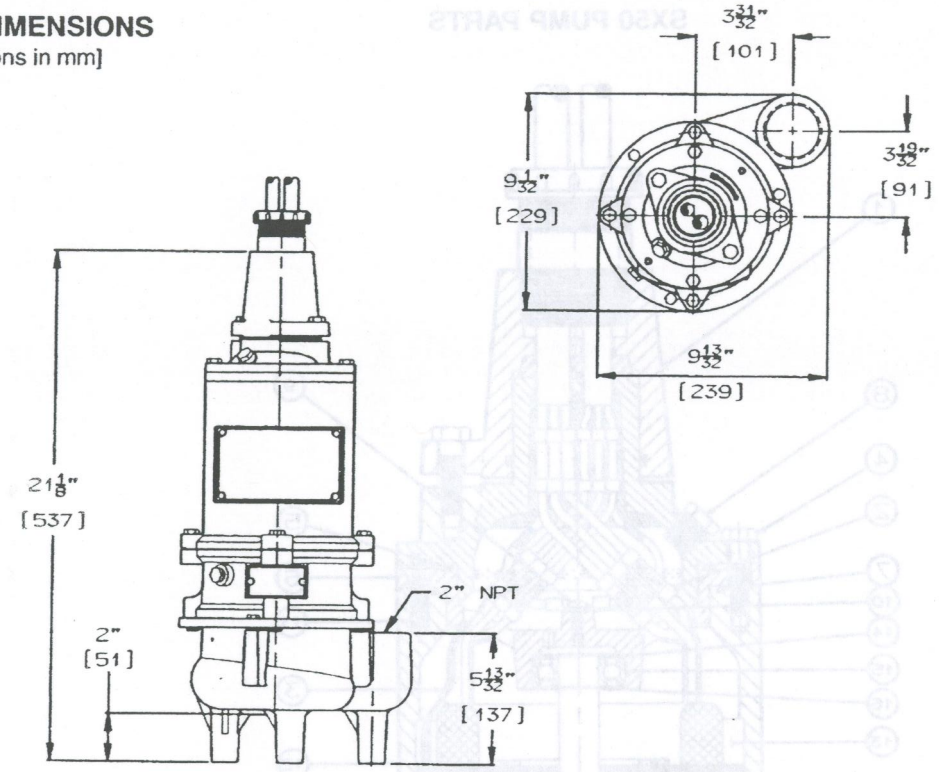
4. The motor and impeller assembly can be installed into the volute, making sure that the units are aligned properly. Install the volute retaining bolts and tighten.

5. Air tends to trap in the pump case when water rises in the sump or when the pump is lowered into the water after service. To vent off this air a small hole is drilled into the volute casting. ***Be sure this vent hole is clean after any service work on pump***. Air venting is not a problem after initial start.

23.4.5

SX50 DIMENSIONS

[Dimensions in mm]



SX50H DIMENSIONS

[Dimensions in mm]

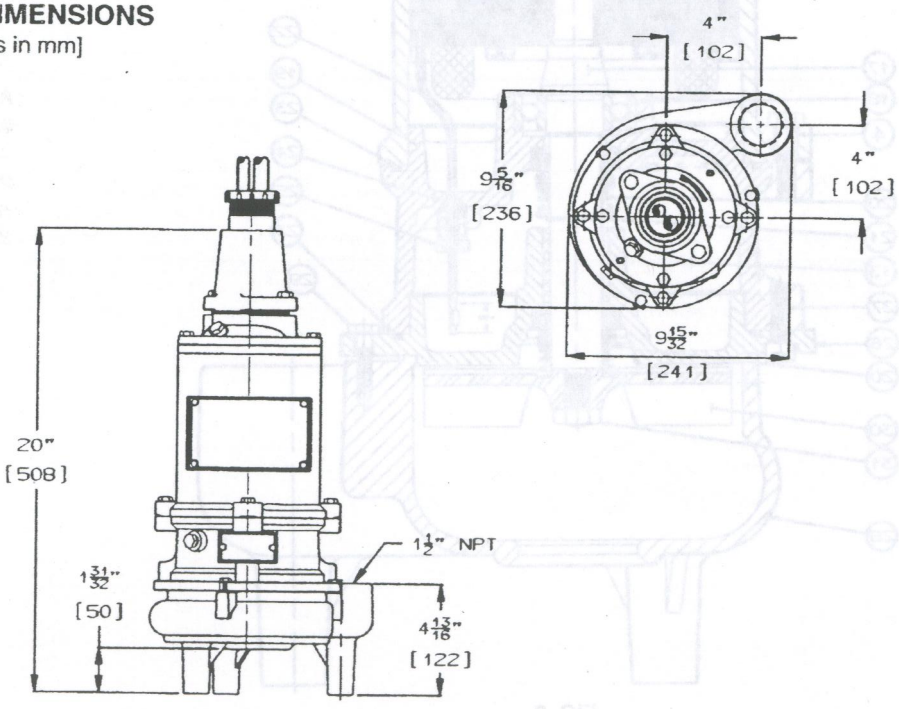


FIG. 1

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SX50 PUMP PARTS

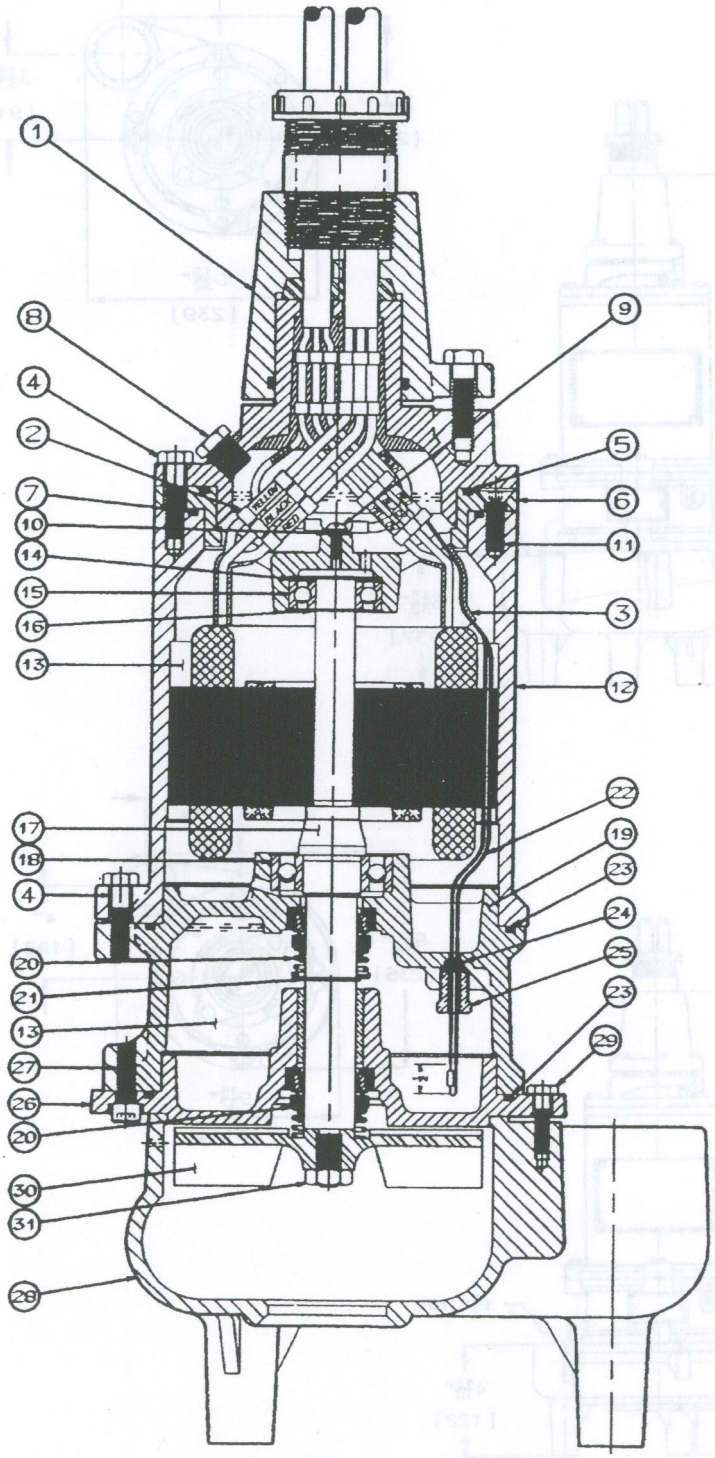

FIG. 2

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SX50H PUMP PARTS

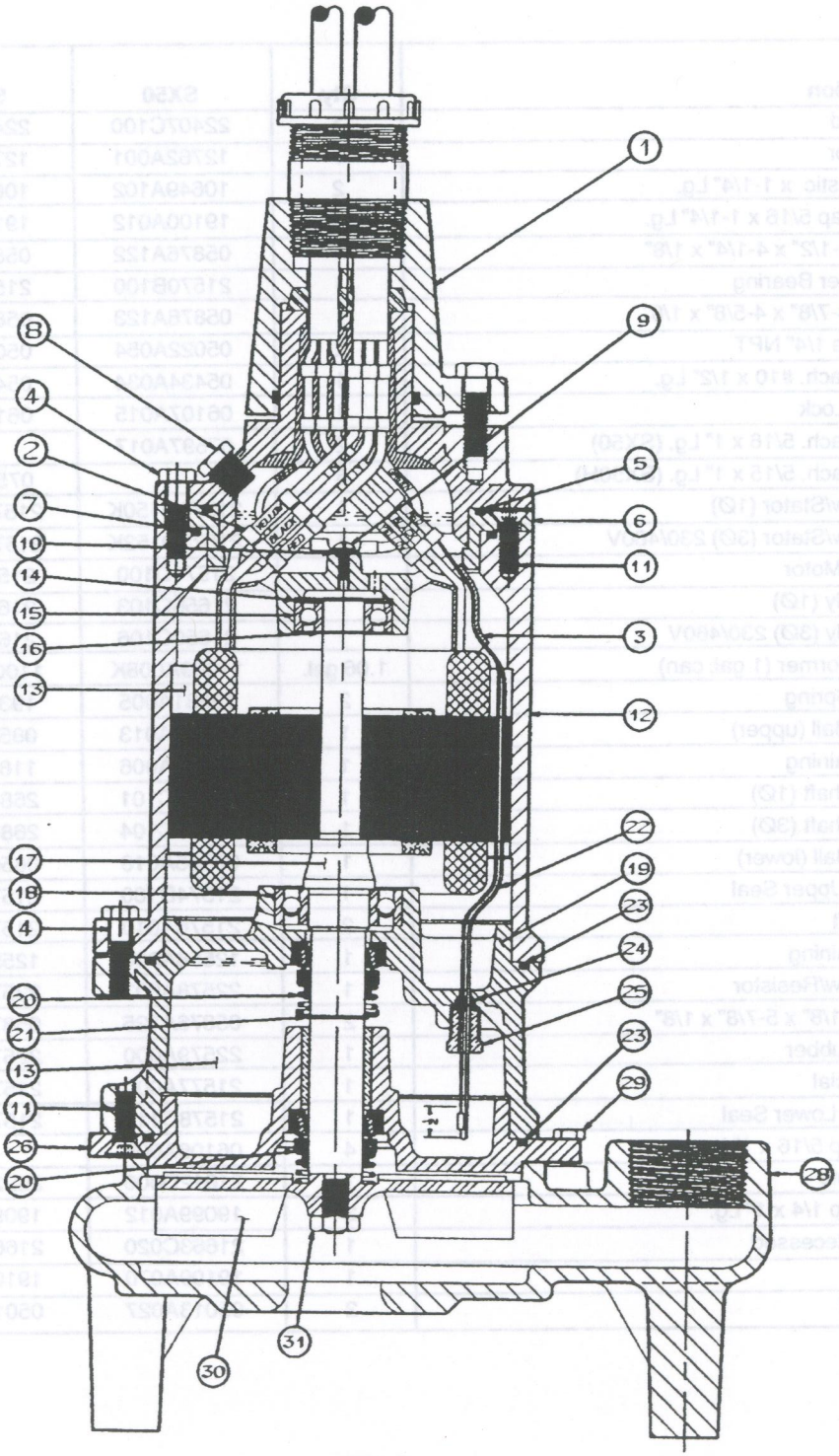

FIG. 3

23.4.8

SX50/SX50H PARTS LIST

Ref. No.	Description	Qty.	SX50	SX50H
1	Cap, Cord	1	22407C100	22407C100
2	Connector	7	12762A001	12762A001
3	Tube, Plastic x 1-1/4" Lg.	2	10649A102	10649A102
4	Screw, Cap 5/16 x 1-1/4" Lg.	8	19100A012	19100A012
5	O'Ring, 4-1/2" x 4-1/4" x 1/8"	1	05876A122	05876A122
6	Cap, Upper Bearing	1	21570B100	21570B100
7	O-Ring, 4-7/8" x 4-5/8" x 1/8"	1	05876A123	05876A123
8	Plug, Pipe 1/4" NPT	2	05022A054	05022A054
9	Screw, Mach. #10 x 1/2" Lg.	1	05434A034	05434A034
10	Washer, Lock	1	06107A015	06107A015
11	Screw, Mach. 5/16 x 1" Lg. (SX50)	2	07597A017	
11	Screw, Mach. 5/15 x 1" Lg. (SX50H)	6		07597A017
12	Housing w/Stator (1Ø)	1	21571D150K	21571D150K
	Housing w/Stator (3Ø) 230/460V	1	21571D152K	21571D152K
	Housing, Motor		21571D100	21571D100
	Stator Only (1Ø)		21656C103	21656C103
	Stator Only (3Ø) 230/460V	1	21656C106	21656C106
13	Oil, Transformer (1 gal. can)	1.06 gal.	11009A008K	11009A008K
14	Washer, Spring	2	19331A005	19331A005
15	Bearing, Ball (upper)	1	08565A013	08565A013
16	Ring, Retaining	1	11816A006	11816A006
17	Rotor w/Shaft (1Ø)	1	26859C101	26859C101
	Rotor w/Shaft (3Ø)	1	26859C104	26859C104
18	Bearing, Ball (lower)	1	08565A018	08565A018
19	Housing, Upper Seal	1	21574D100	21574D100
20	Seal, Shaft	2	21576A010	21576A010
21	Ring, Retaining	1	12558A006	12558A006
22	Electrode w/Resistor	1	22578A003	22578A003
23	O'Ring, 6-1/8" x 5-7/8" x 1/8"	2	05876A125	05876A125
24	Ferrule, Rubber	1	22579A000	22579A000
25	Plug, Special	1	21577A000	21577A000
26	Hoousing, Lower Seal	1	21578C110	21578C115
27	Screw, Cap 5/16 x 1" Lg.	4	06106A008	-----
28	Case, Volute	1	21612D000	26226D012
29	Screw, Cap 1/4 x 1" Lg.	3	19099A012	19099A012
30	Impeller, Recessed	1	21663C020	21663C010
31	Nut, Jam	1	19109A070	19109A070
32	Screw, Set	2	05013A027	05013A027

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PERFORMANCE CURVE

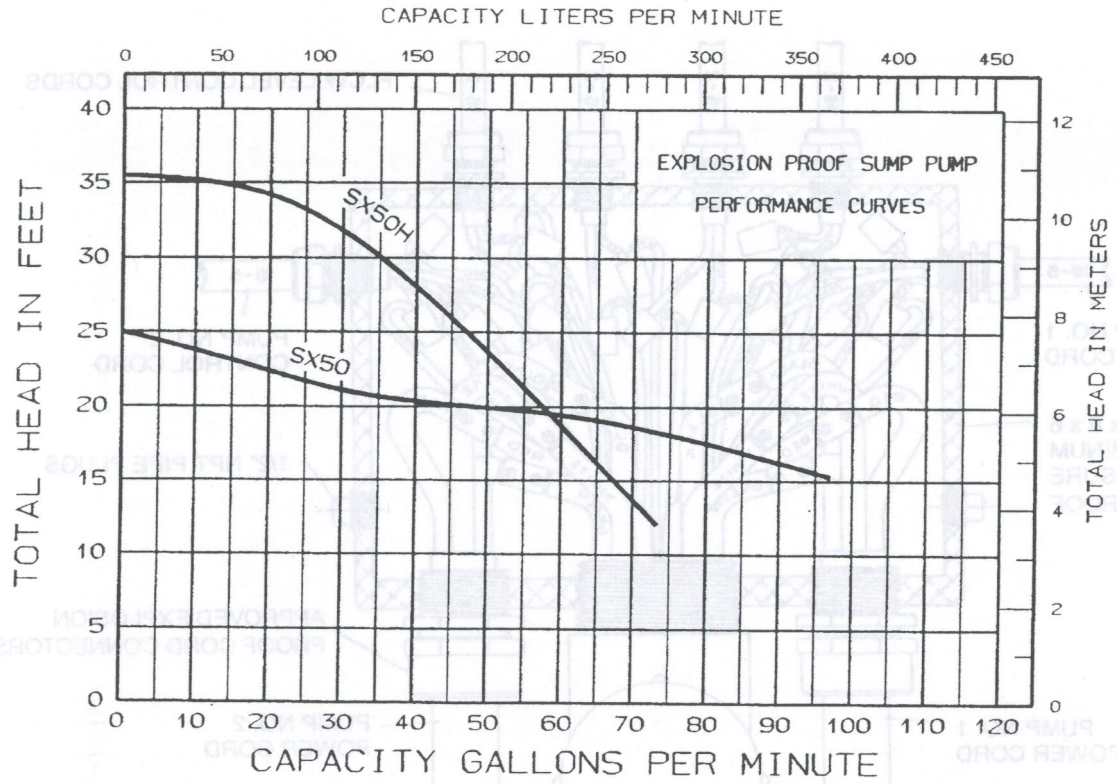

FIG. 4

Available Models	Motor Electrical Data								
Standard	HP	Volts	Phase	Hz	Start Amps	Run Amps	Service Factor Amps	NEC Code Letter	Service Factor
SX50-21	½	230	1	60	12.5	5.3	5.8	H	1.1
SX50H-21	½	230	1	60	12.5	5.3	5.8	H	1.1
SX50-23	½	230	3	60	10.8	3.2	4.0	G	1.25
SX50H-23	½	230	3	60	10.8	3.2	4.0	G	1.25

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