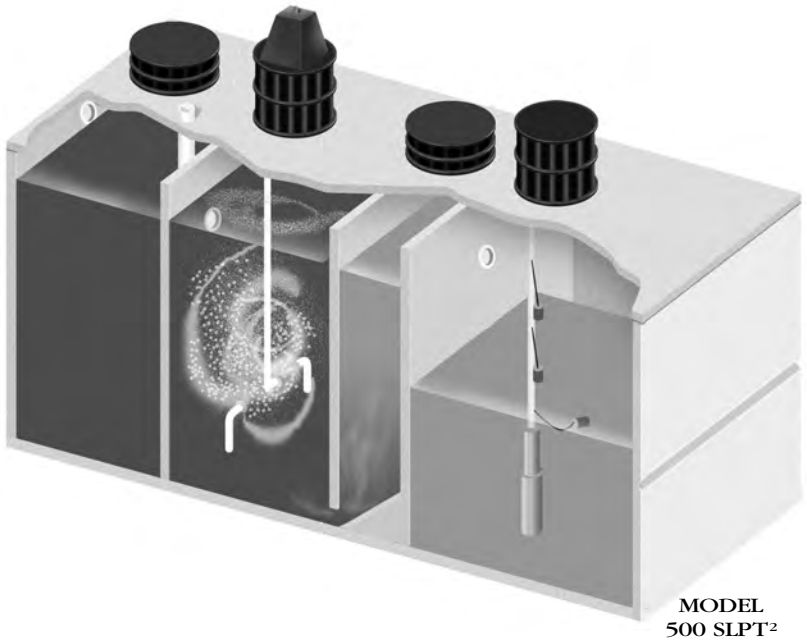
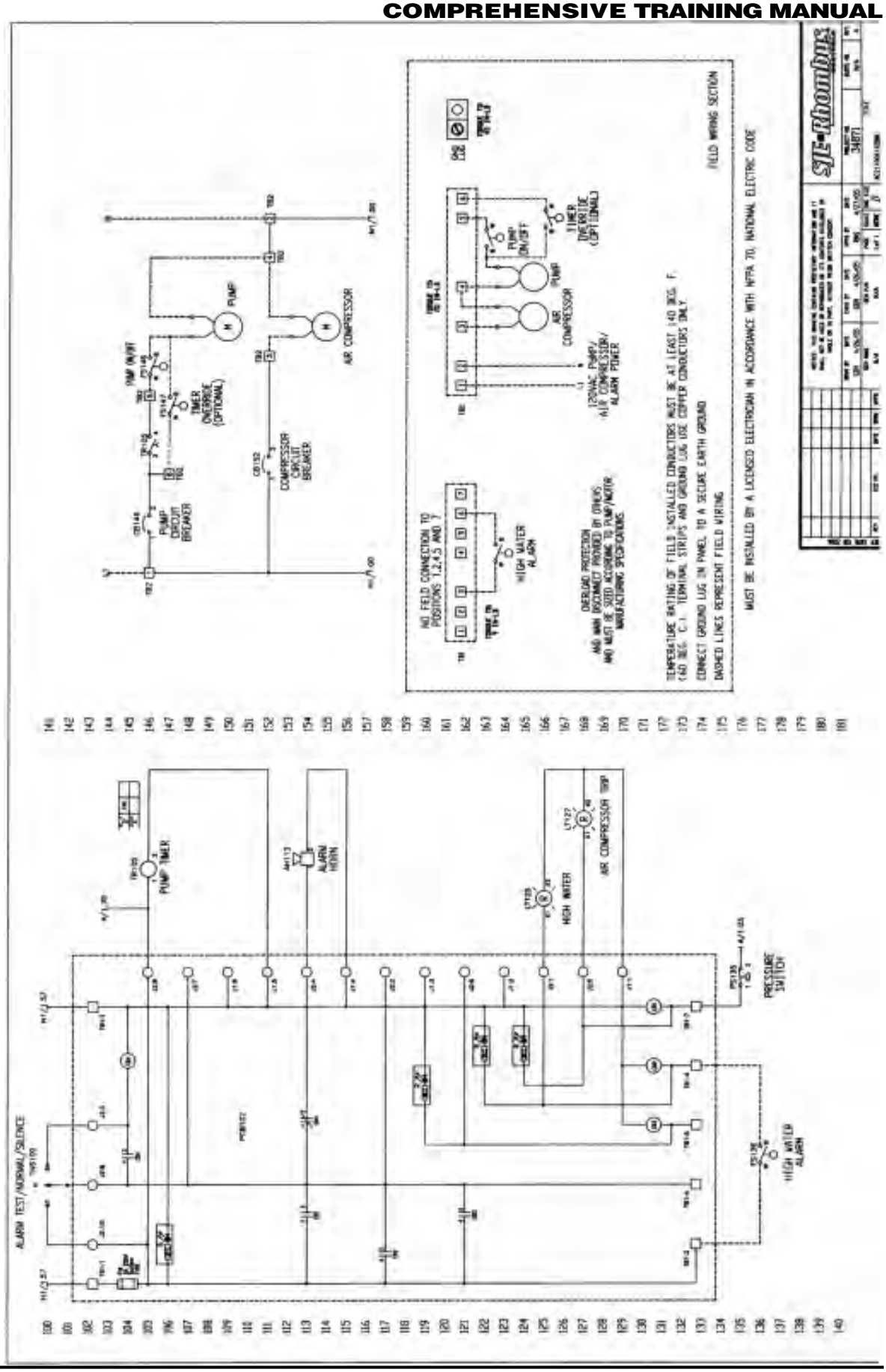
PRO FLO AEROBIC SYSTEMS, LP

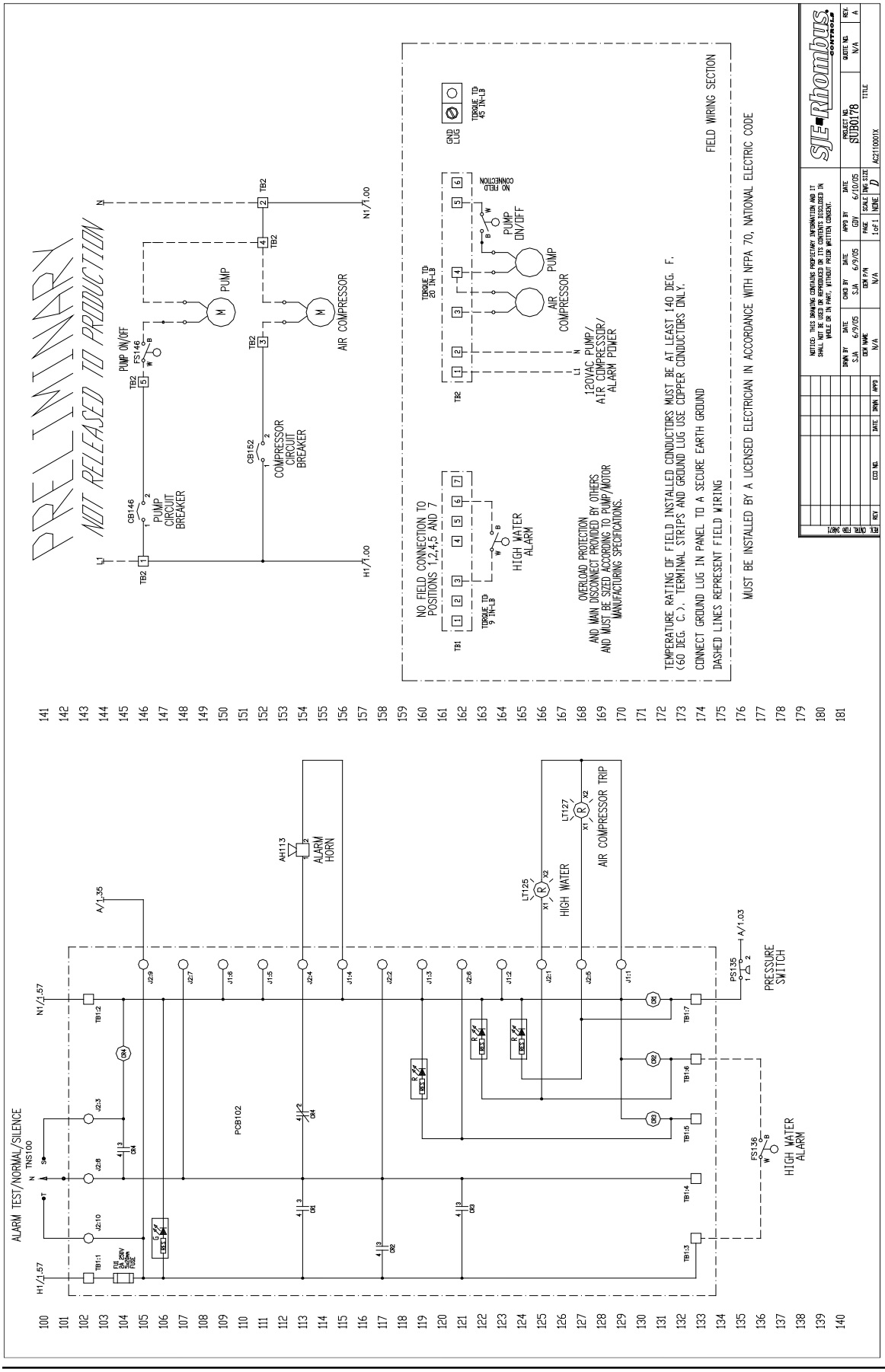
Aerobic Wastewater Treatment Systems

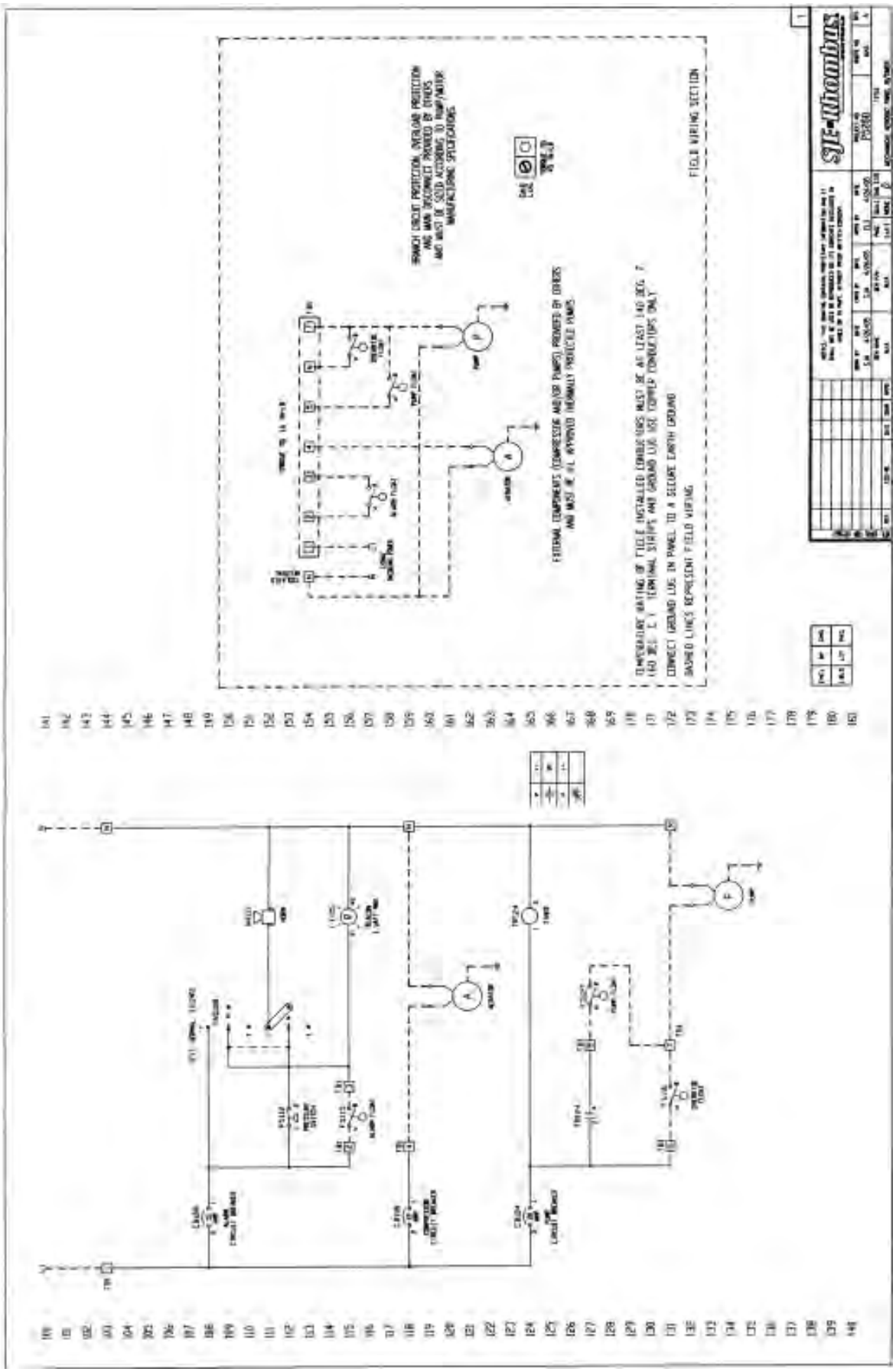


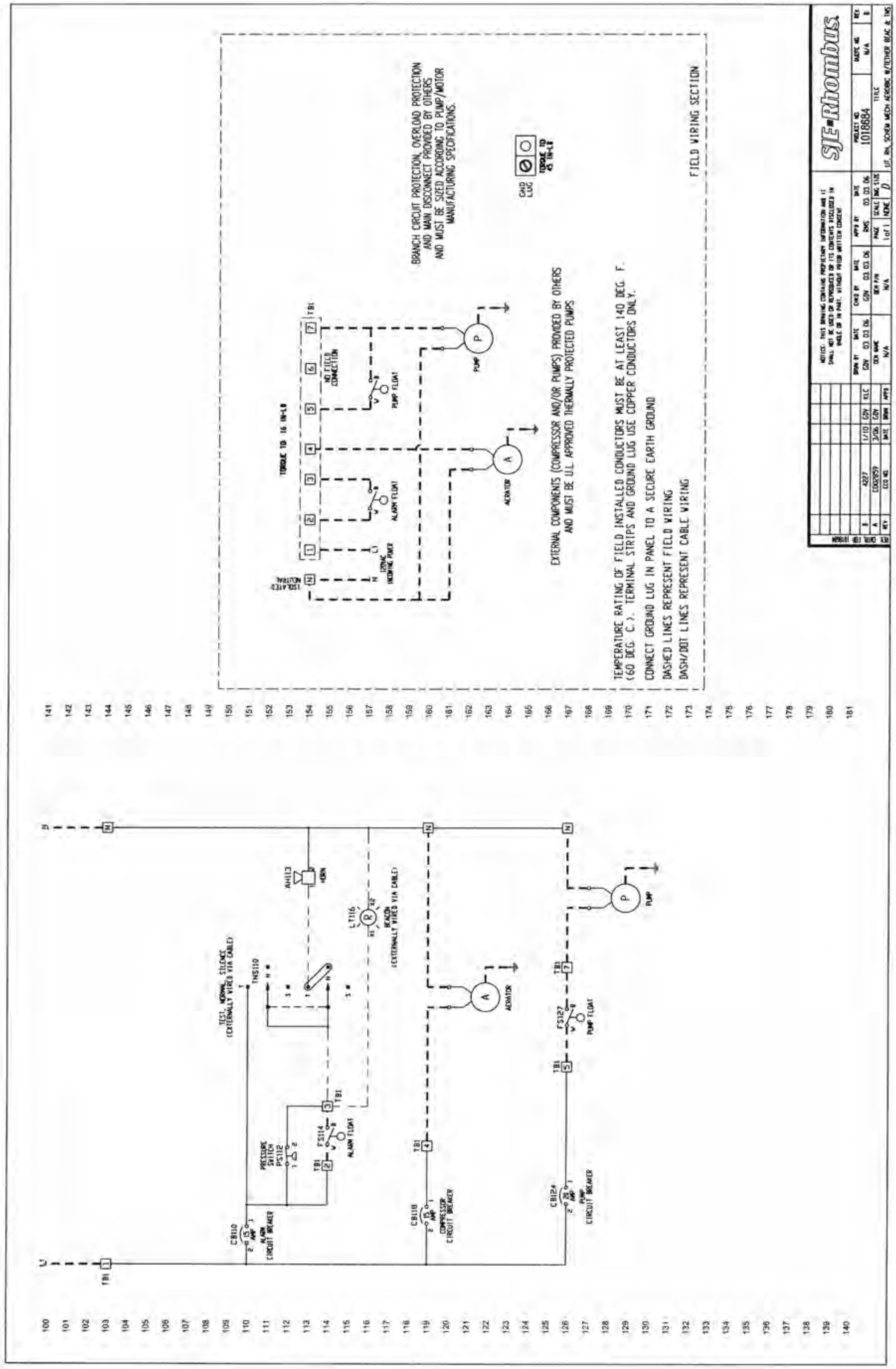
MODEL
500 SLPT²

Schematics and drawings of the equipment used in the Pro Flo System


ALARM TEST/NORMAL/SILENCE
PUMP TIMER
ALARM HORN
HIGH WATER
AIR COMPRESSOR TEMP
PRESSURE SWITCH
HIGH WATER ALARM
PUMP ON/OFF
TIMER OVERRIDE (OPTIONAL)
PUMP CIRCUIT BREAKER
COMPRESSOR CIRCUIT BREAKER
AIR COMPRESSOR
PUMP
NO FIELD CONNECTION TO POSITIONS 1,2,4,5 AND 7
OVERLOAD PROTECTION AND MAIN DISCONNECT PROVIDED BY OTHERS AND MUST BE SIZED ACCORDING TO PUMP/MOTOR MANUFACTURING SPECIFICATIONS
120VAC PUMP/ AIR COMPRESSOR/ ALARM POWER
TEMPERATURE RATING OF FIELD INSTALLED CONDUCTORS MUST BE AT LEAST 140 DEG. F (60 DEG. C.). TERMINAL STRIPS AND GROUND LUG USE COPPER CONDUCTORS ONLY
CONNECT GROUND LUG IN PANEL TO A SECURE EARTH GROUND
DASHED LINES REPRESENT FIELD WIRING
MUST BE INSTALLED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH NFPA 70, NATIONAL ELECTRIC CODE
FIELD WIRING SECTION
sje-rhombus


PRELIMINARY
NOT RELEASED TO PRODUCTION
PUMP ON/OFF
CB146
PUMP CIRCUIT BREAKER
CB152
COMPRESSOR CIRCUIT BREAKER
PUMP
AIR COMPRESSOR
NO FIELD CONNECTION TO POSITIONS 1,2,4,5 AND 7
HIGH WATER ALARM
OVERLOAD PROTECTION AND MAIN DISCONNECT PROVIDED BY OTHERS AND MUST BE SIZED ACCORDING TO PUMP/MOTOR MANUFACTURING SPECIFICATIONS.
120VAC PUMP/ AIR COMPRESSOR/ ALARM POWER
GND LUG
PUMP ON/OFF
NO FIELD CONNECTION
TEMPERATURE RATING OF FIELD INSTALLED CONDUCTORS MUST BE AT LEAST 140 DEG. F. (60 DEG. C.). TERMINAL STRIPS AND GROUND LUG USE COPPER CONDUCTORS ONLY.
CONNECT GROUND LUG IN PANEL TO A SECURE EARTH GROUND
DASHED LINES REPRESENT FIELD WIRING
MUST BE INSTALLED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH NFPA 70, NATIONAL ELECTRIC CODE
FIELD WIRING SECTION
ALARM TEST/NORMAL/SILENCE
TNS100
PCB102
ALARM HORN
HIGH WATER
AIR COMPRESSOR TRIP
PRESSURE SWITCH
HIGH WATER ALARM
SJE Rhombus CONTROLS
PROJECT NO. SUB0178
QUOTE NO. N/A
TITLE
ACC1100011X





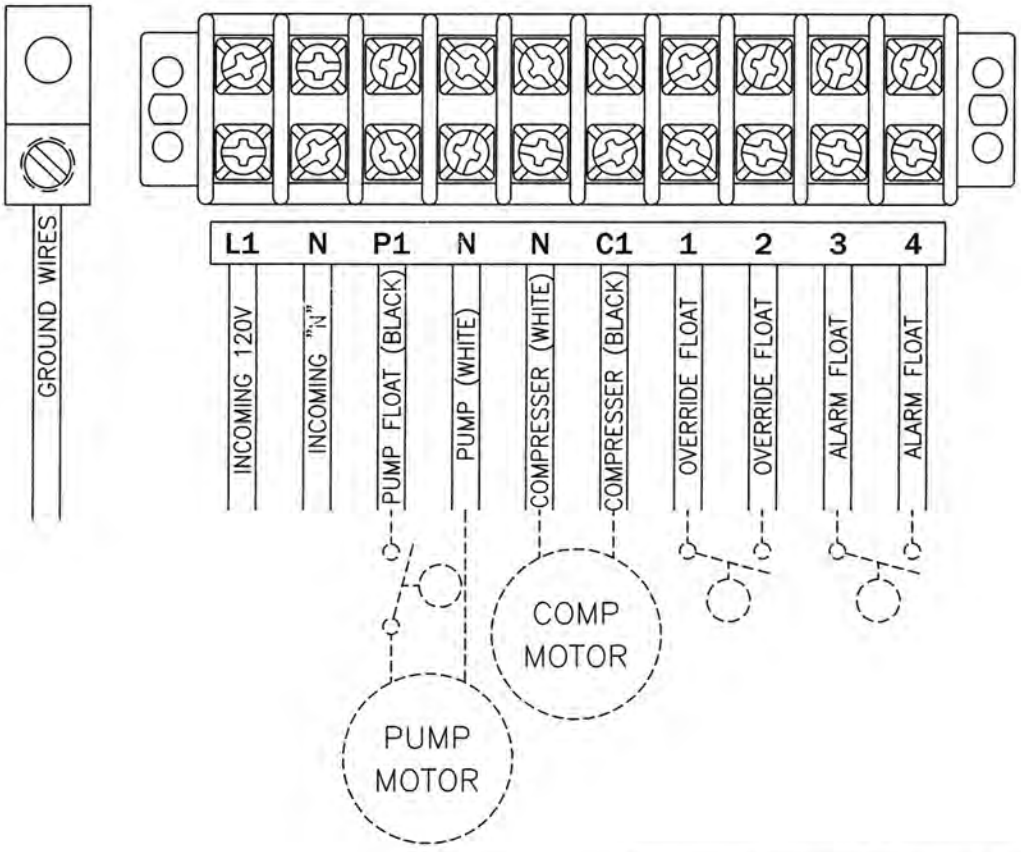
FIELD WIRING SECTION
BRANCH CIRCUIT PROTECTION, OVERLOAD PROTECTION AND MAIN DISCONNECT PROVIDED BY OTHERS AND MUST BE SIZED ACCORDING TO PUMP/MOTOR MANUFACTURING SPECIFICATIONS.
GND LUG
TORQUE TO 45 IN-LB
TORQUE TO 16 IN-LB
NO FIELD CONNECTION
ALARM FLOAT
PUMP FLOAT
AERATOR
PUMP
EXTERNAL COMPONENTS (COMPRESSOR AND/OR PUMPS) PROVIDED BY OTHERS AND MUST BE U.L. APPROVED THERMALLY PROTECTED PUMPS
TEMPERATURE RATING OF FIELD INSTALLED CONDUCTORS MUST BE AT LEAST 140 DEG. F. (60 DEG. C.). TERMINAL STRIPS AND GROUND LUG USE COPPER CONDUCTORS ONLY.
CONNECT GROUND LUG IN PANEL TO A SECURE EARTH GROUND
DASHED LINES REPRESENT FIELD WIRING
DASH/DOT LINES REPRESENT CABLE WIRING
CB110
ALARM CIRCUIT BREAKER
PRESSURE SWITCH PS112
FS114
AH113
HORN
LT116
TNS110
CB118
COMPRESSOR CIRCUIT BREAKER
CB124
PUMP CIRCUIT BREAKER
FS127
SJE-Rhombus
1018684

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

MODEL NO. TA

PAGE 1

CONNECTION DIAGRAM



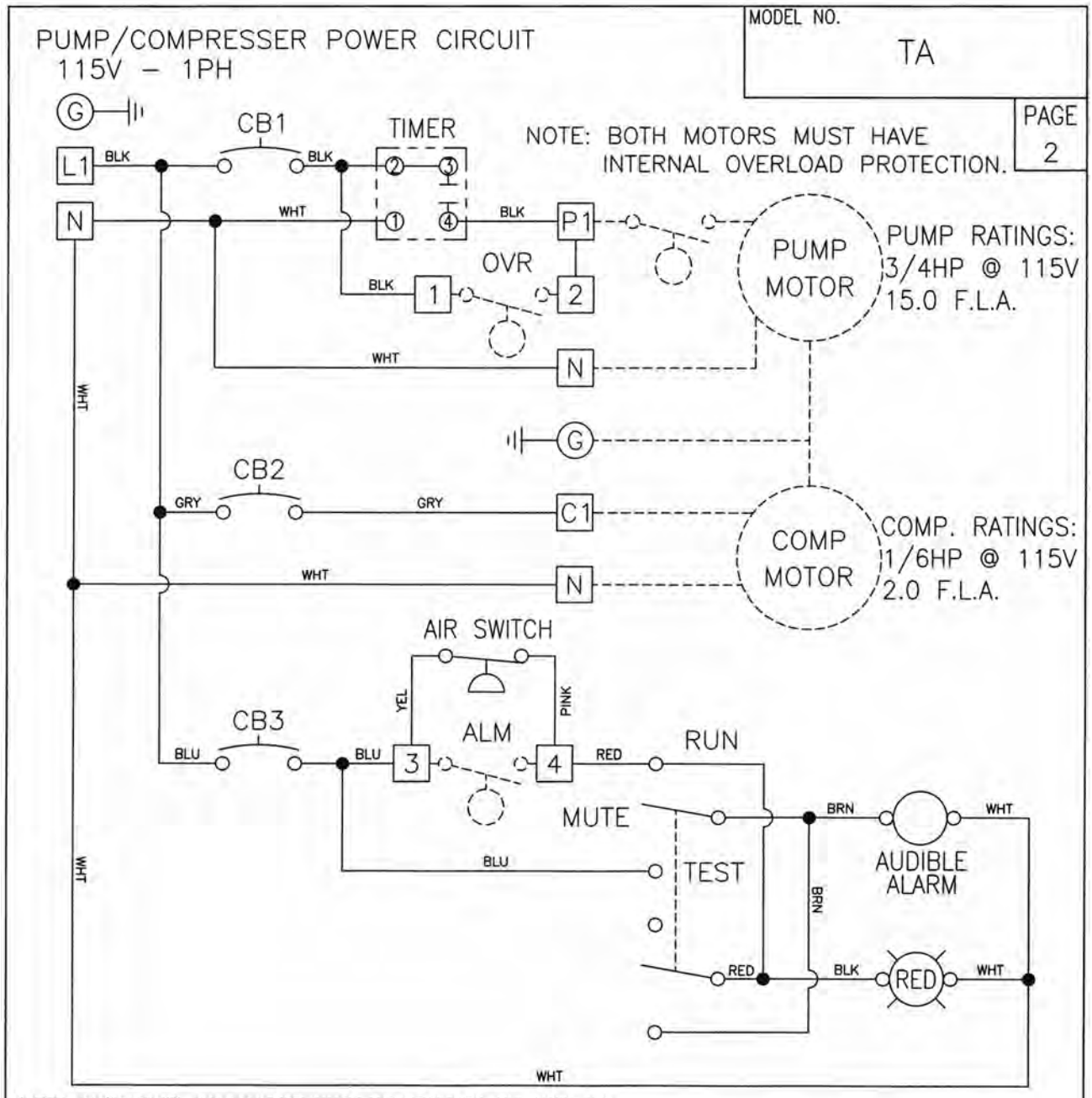
SPI/BIO Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	5/20/04
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B105



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in-lbs.

SPI/BIO
Wastewater Technologies

CHANGES		TOLERANCES	DRAWN BY	DATE
F		DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	06/20/04
E			MATERIAL SPECIFICATION: AS NOTED	
D				
C				
B				
A				

SCHEMATIC, ELECTRICAL W/TIMER & AIR SWITCH

SCALE:	PART NO.
FULL	50B105

Operating Instructions

INTERMATIC®

FM/1 Series
Time Switches

TECHNICAL DATA

Supply Voltage:	Synchronous: 24, 120 and 240VAC, 60Hz Quartz: 24V AC/DC, 120 and 240VAC 50/60 Hz
Switch Type:	SPDT
Switch Rating:	21A @ 250VAC resistive 1350 watt tungsten 1HP @ 125VAC 2HP @ 240VAC
Ambient Temp. Range:	–40°F to 180°F, synchronous units –20°F to 140°F, quartz units
Terminals:	1/4" spade terminals
Reserve Carryover:	7 days for quartz units
Weight:	Approximately 3 oz.
Agency Approvals:	UL Recognized

NOTE: 24V quartz unit will operate on 6VDC, 12VDC, or 24VDC

APPLICATIONS

The FM/1 series of time switches are designed for control of heating, ventilating, air conditioning, refrigeration, lighting, security, circulating pumps, spas or any electrical load requiring 24-hour or 7-day scheduling.

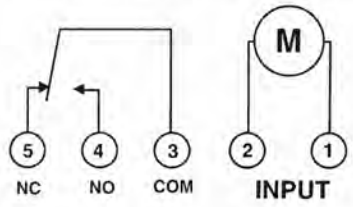
WIRING

Verify input voltage stated on back of unit. Use 1/4" quick connects and make connections in accordance with the wiring diagram shown and applicable code requirements. When using 24V units, it is important to use transformers that will supply the required 24 volts AC to terminals 1 & 2.

Terminal Connections

Contacts shown in "Off" position (trippers pushed inward)

"On" position (trippers pushed outward) will close contacts 3 & 4

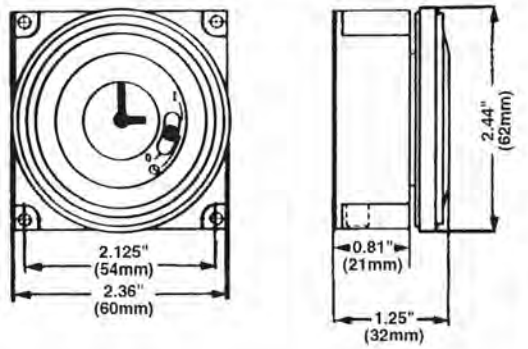


MOUNTING

The standard FM/1 units can be flush mounted (mounting kit with screws available) or surface mounted inside a panel. A printed circuit board mounting base is also available. An indoor or outdoor enclosure is available for stand-alone mounting. In addition, unit is also available in DIN housing for flush or surface mounting (see MIL72, Digi 20 or Digi 42 data sheets). Optional clear plastic dust cover is available.

Dimensions

FM/1 synchronous/quartz



TIME SETTING

TO SET THE CURRENT TIME (AND DAY OF WEEK ON 7 DAY UNITS), TURN THE MINUTE HAND CLOCKWISE. DO NOT SET THE TIME BY ROTATING "OUTER" DIAL.

Turn the minute hand clockwise until the day of the week (7-day timer) and the time of day on the outer dial is aligned with the triangle marker on the inner dial (two o'clock position).

Example for 7-day program dial Monday 10:30 AM. Turn the minute hand clockwise until Monday 10:30 AM is aligned with the triangle on the inner dial. The hour and minute hand will show exactly 10:30.

Example for 24-hour program dial 10:30 AM. Turn the minute hand clockwise until 10:30 AM is aligned with the triangle on the inner dial. The hour and the minute dial will show exactly 10:30.

PROGRAMMING

7-Day (SW, QRW Models)

The weekly program dial reflects the seven days of the week and AM/PM imprints for each day.

The time switch is programmed by pushing the captive trippers to the outer ring position for the entire period that the load is to be turned "ON", i.e., two hours for each tripper on the 7-Day dial. When the tripper is pushed to the inside, the switch is in the "OFF" position.

24-Hour (ST, QRT Models)

The 24-Hour dial has quarter-hour divisions and AM/PM indications.

The time switch is programmed by pushing the captive trippers to the outer ring position for the entire period that the load is to be turned "ON", i.e., fifteen minutes for each tripper on the 24-Hour dial. When the tripper is pushed to the inside, the switch is in the "OFF" position.

INTERMATIC INCORPORATED
Spring Grove, IL 60081-9698
www.intermatic.com

PROGRAMMING WITH MANUAL OVERRIDE SWITCH

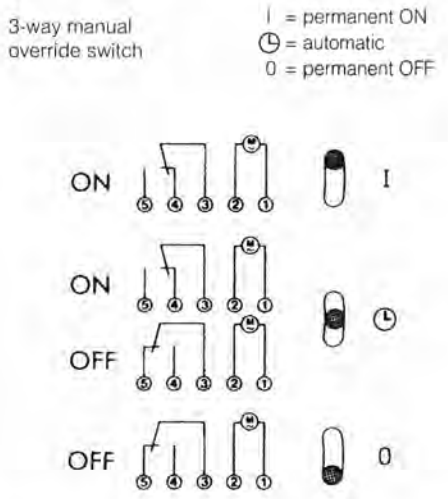
AUTOMATIC MODE

In order to operate the time switch module in the automatic mode, the manual switch must be in the center position (automatic) - see diagram.

MANUAL MODE

With the manual switch selector lever the selected programs can be overridden. In the lower position, marked "O", terminals 3 and 5 are permanently closed. In the upper position, marked "I", terminals 3 and 4 are permanently closed (see diagram).

Override Mode

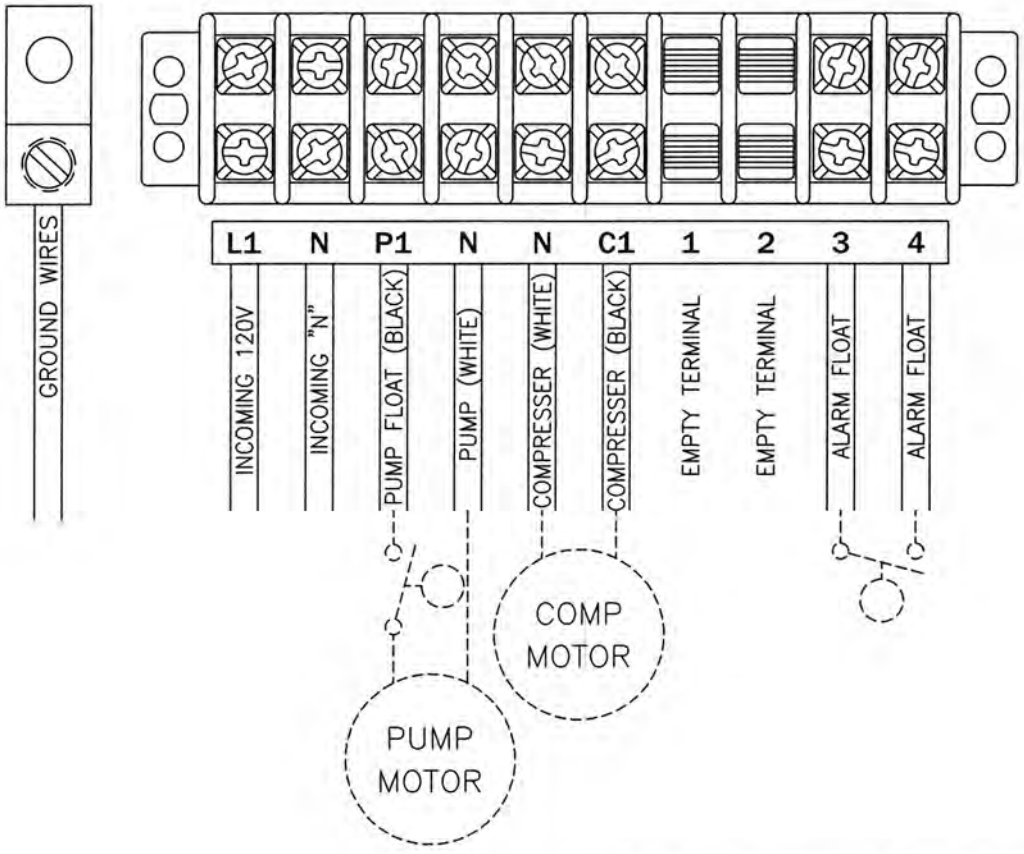


TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

MODEL NO. TANT

PAGE 1

CONNECTION DIAGRAM



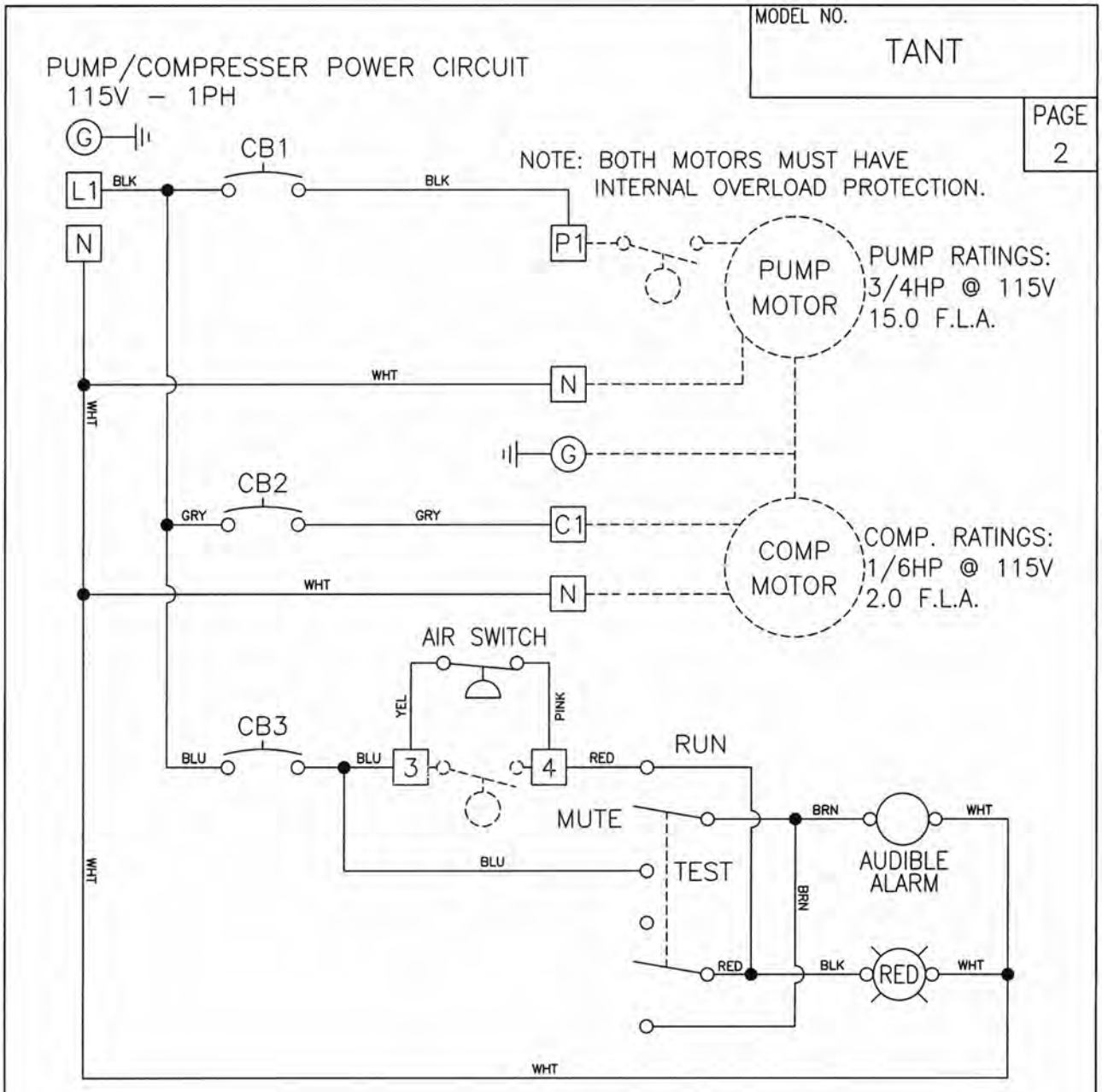
SPI/BIO Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	5/20/04
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B106



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in–lbs.

SPI/BIO
Wastewater Technologies

CHANGES		TOLERANCES	DRAWN BY	DATE
F		DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	06/20/04
E			MATERIAL SPECIFICATION: AS NOTED	
D				
C				
B				
A				

SCHEMATIC, ELECTRICAL W/TIMER & AIR SWITCH

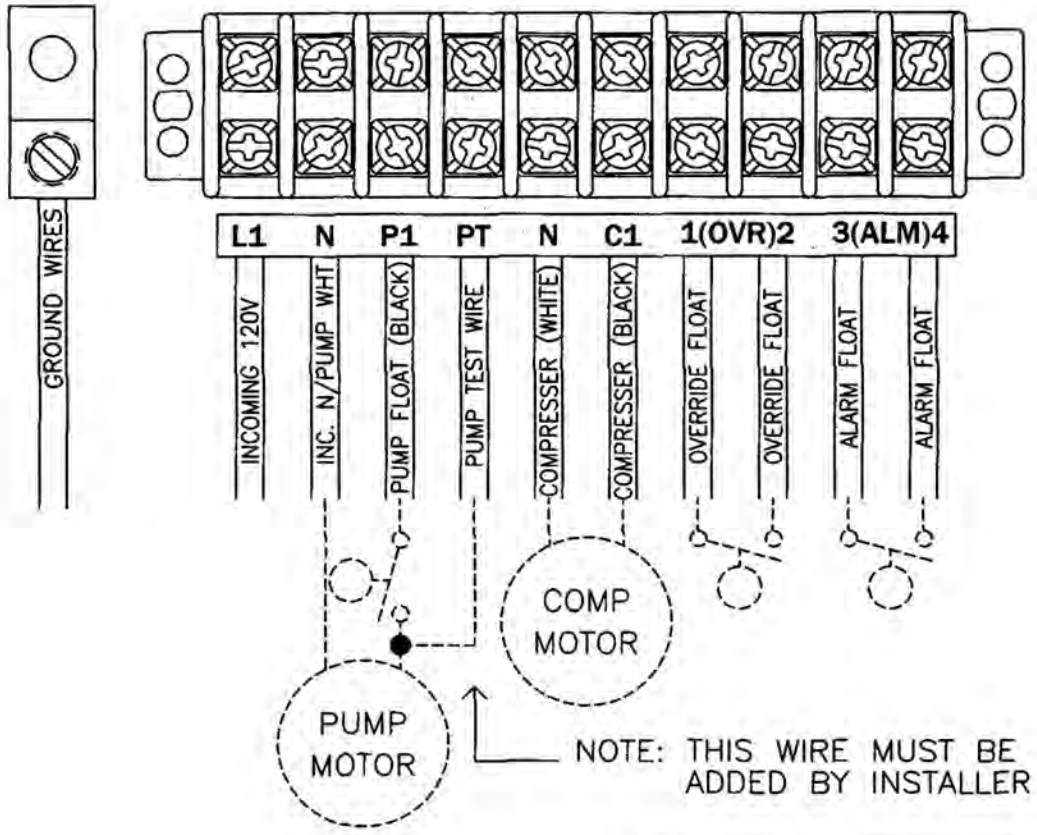
SCALE:	PART NO.
FULL	50B106

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in–lbs.

PART NO. PFT

PAGE 1

I LIGHT TIMER PANEL CONNECTION DIAGRAM



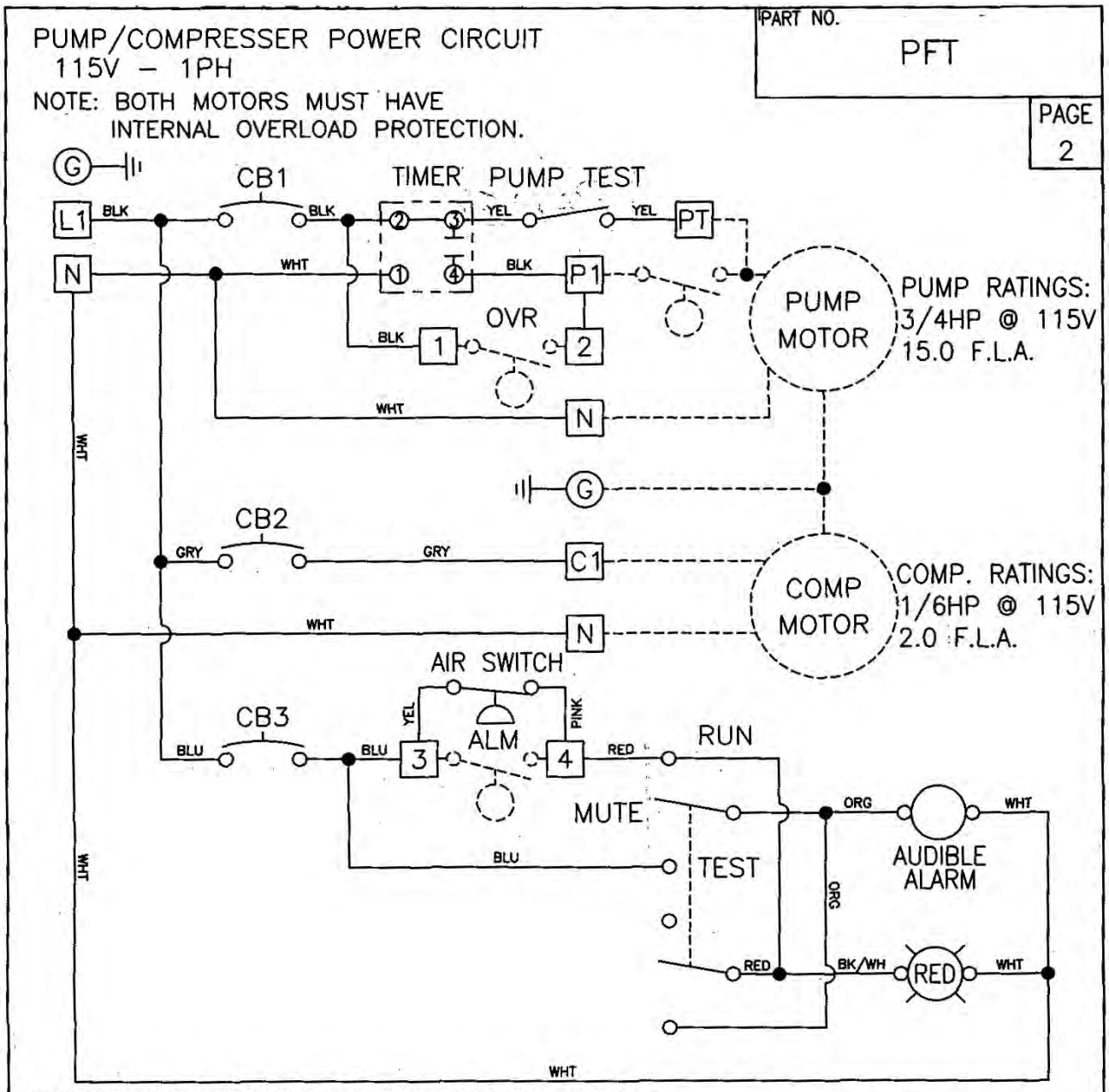
SPI/BIO Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010	D. MIDDLETON	10/22/07
E		MATERIAL SPECIFICATION:	
D	FRACTIONAL X/X = ±.1/64		
C		AS NOTED	
B	ANGLES X° = ±1/2°		
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B223



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in-lbs.

SPI/BIO
Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS	D. MIDDLETON	10/22/07
E	.XXX = ±.005		
D	.XX = ±.010	MATERIAL SPECIFICATION:	
C	FRACTIONAL	AS NOTED	
B	X/X = ±.1/64		
A	ANGLES		
	X° = ±1/2°		

SCHEMATIC, ELECTRICAL W/TIMER & PUMP TEST

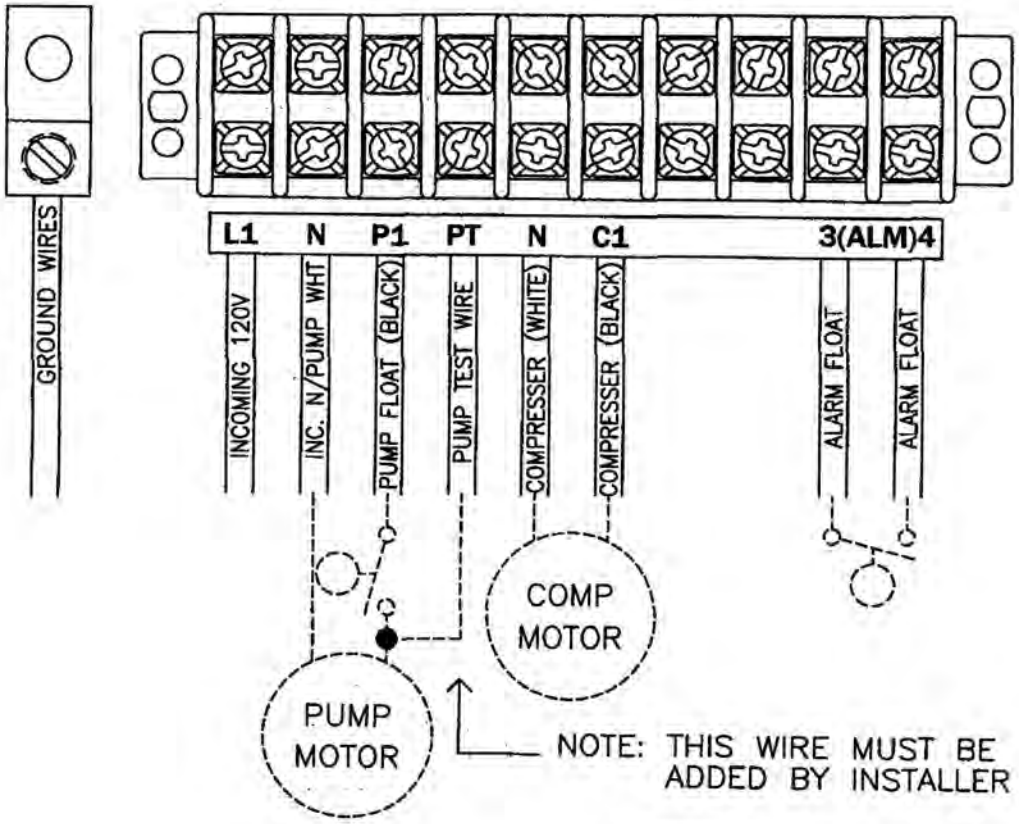
SCALE:	PART NO.
FULL	50B223

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in–lbs.

PART NO. 50B224

PAGE 1

CONNECTION DIAGRAM FOR 50B109-CAVPT CONTROL PANEL



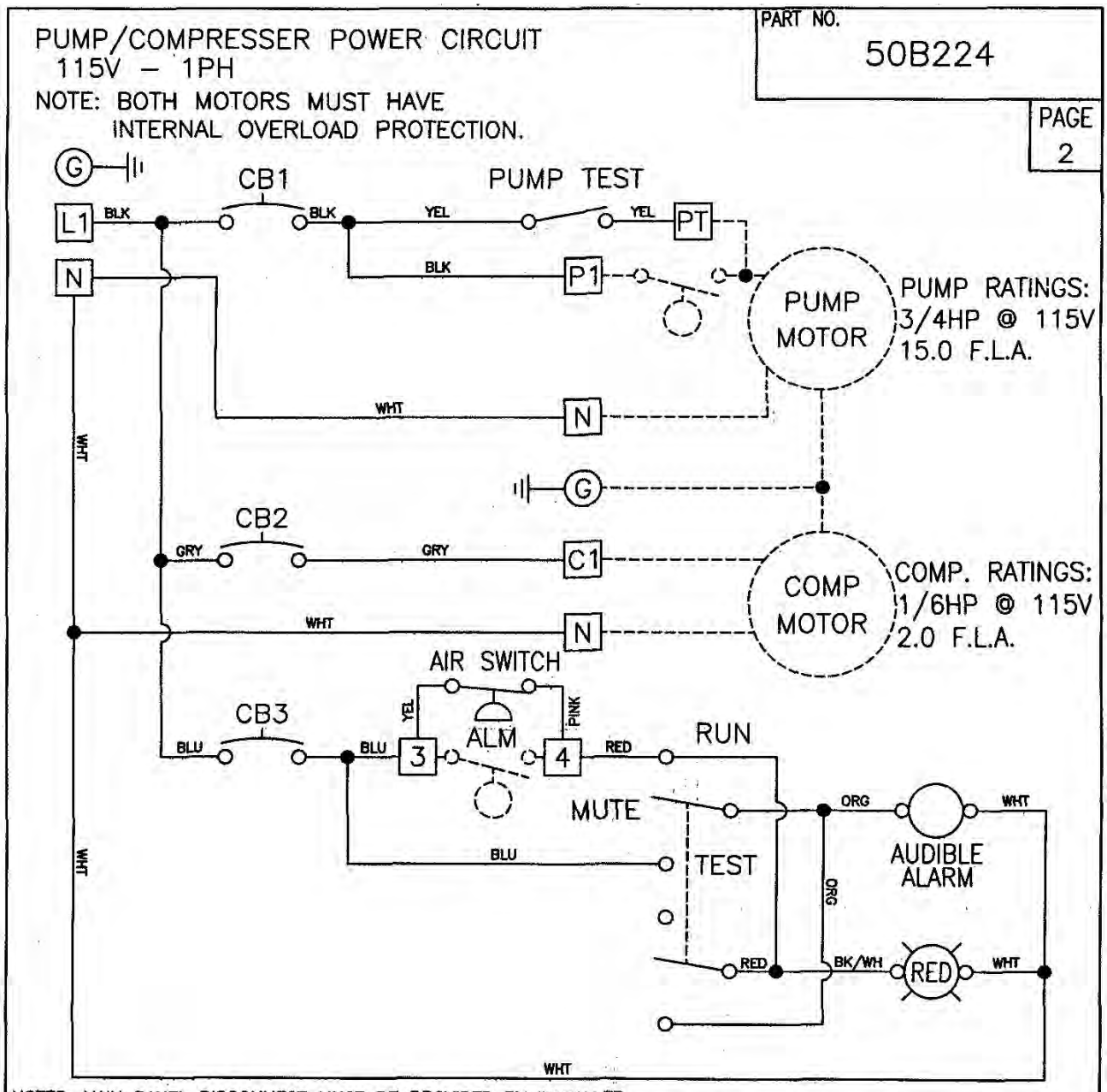
SPI/BIO Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010	D. MIDDLETON	10/22/07
E		MATERIAL SPECIFICATION:	
D	FRACTIONAL X/X = ±.1/64	AS NOTED	
C			
B	ANGLES X° = ±1/2°		
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B224



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in-lbs.

SPI/BIO
Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	10/22/07
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

SCHEMATIC, ELECTRICAL W/PUMP TEST

SCALE:	PART NO.:
FULL	50B224

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

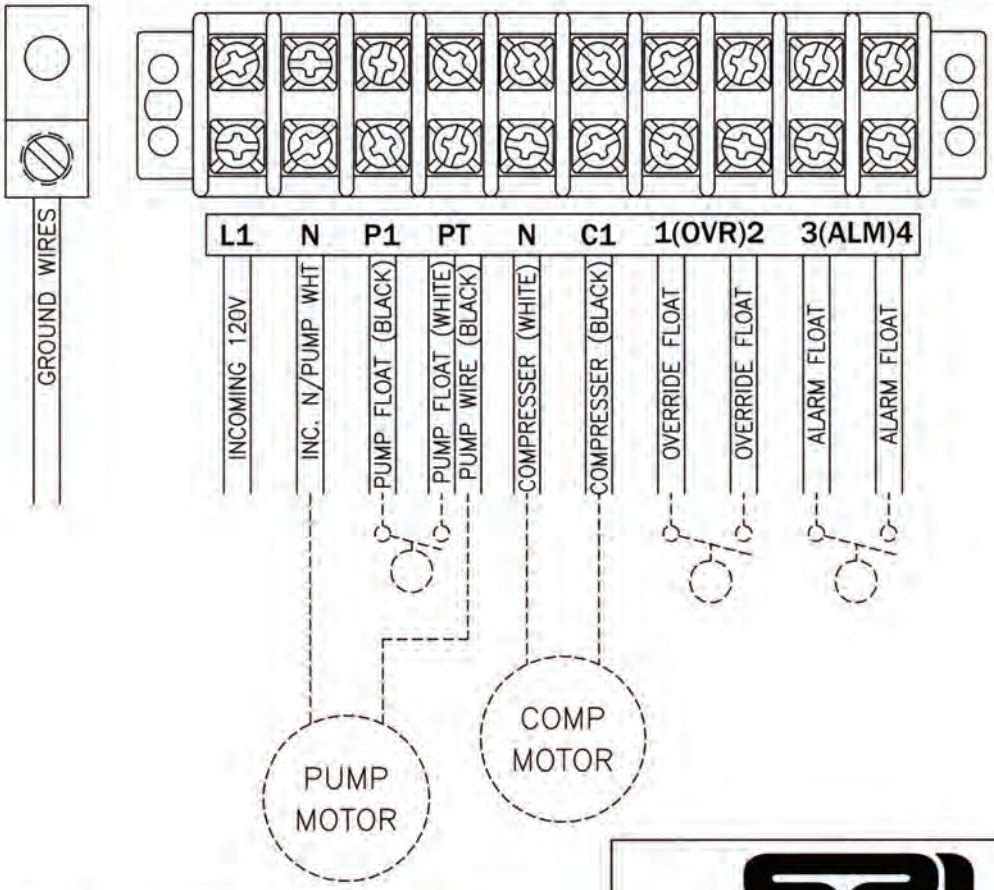
PART NO. 50B323

PAGE 1

CONNECTION DIAGRAM (AS RECOMMENDED BY SPI)

RECOMENDED FOR:

*DIRECT CONNECTION (NO JUNCTION BOX) OR
JUNCTION BOX AND 7 CONDUCTOR CABLE WITH GROUND (8 CONDUCTORS)
*FLOAT SWITCH ARANGEMENT OF YOUR CHOICE
*PUMP TEST OVERRIDES FLOATS AND TIMER (MAXIMIZED VALUE OF FEATURE)



SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	C. BARRICK	1/27/2012
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B323

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in–lbs.

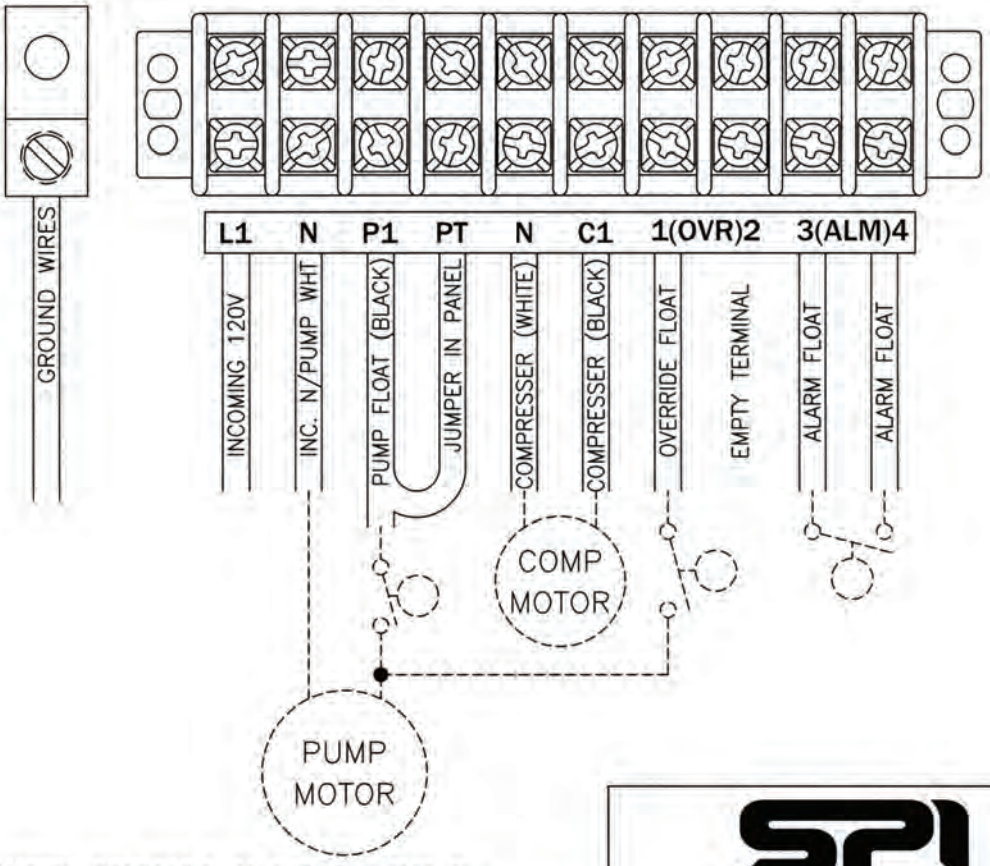
PART NO. 50B323

PAGE 2

CONNECTION DIAGRAM (MINIMAL CONDUCTORS)

RECOMENDED FOR:

- *JUNCTION BOX AND 3 CONDUCTOR CABLE WITH GROUND (4 CONDUCTORS)
- *OVERRIDE FLOAT PLACED ABOVE HIGH WATER ALARM FLOAT
- *PUMP TEST WILL NOT FUNCTION IF PUMP FLOAT FAILS OR IS SWITCHED OFF (OPERRATING THE PUMP TEST SWITCH HAS THE SAME EFFECT AS MOVING THE WHITE TABS ON THE TIMER DIAL)



SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	C. BARRICK	1/27/2012
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B323

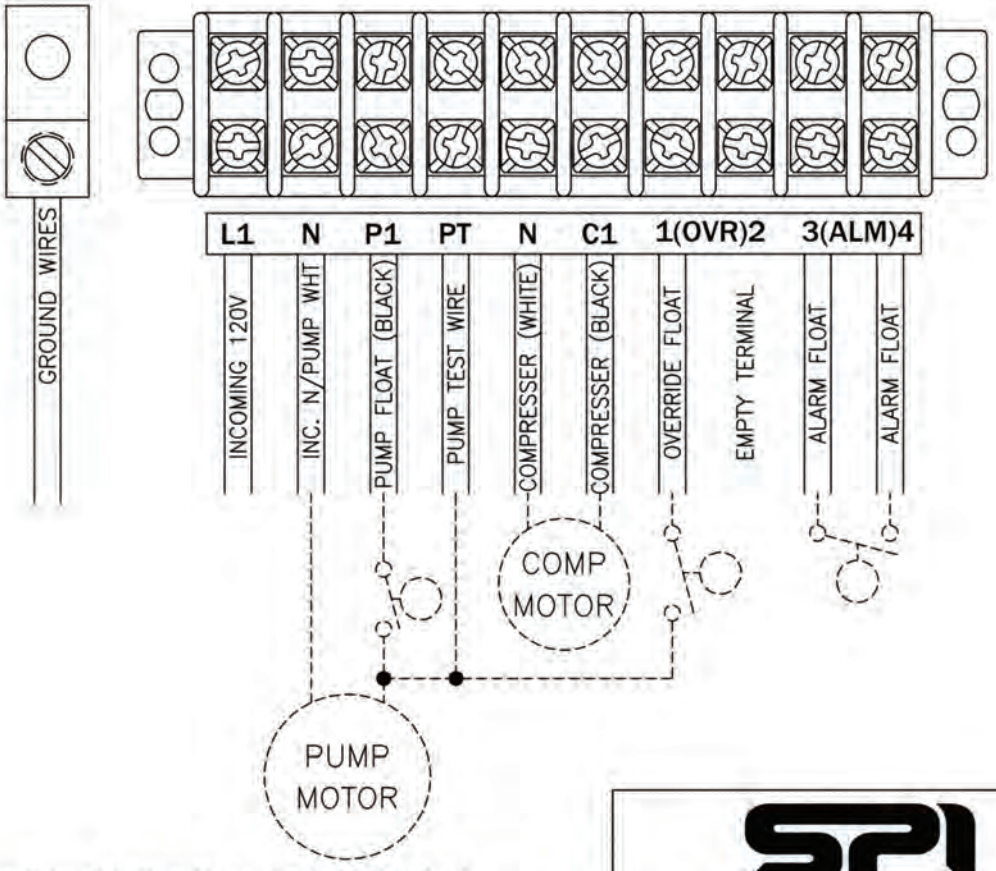
TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

PART NO. 50B323

PAGE 3

CONNECTION DIAGRAM (OPTIMAL CONDUCTORS)

RECOMENDED FOR:
- *JUNCTION BOX AND 4 CONDUCTOR CABLE WITH GROUND (5 CONDUCTORS)
- *OVERRIDE FLOAT PLACED ABOVE HIGH WATER ALARM FLOAT
- *PUMP TEST OVERRIDES FLOATS AND TIMER (MAXIMIZED VALUE OF FEATURE)



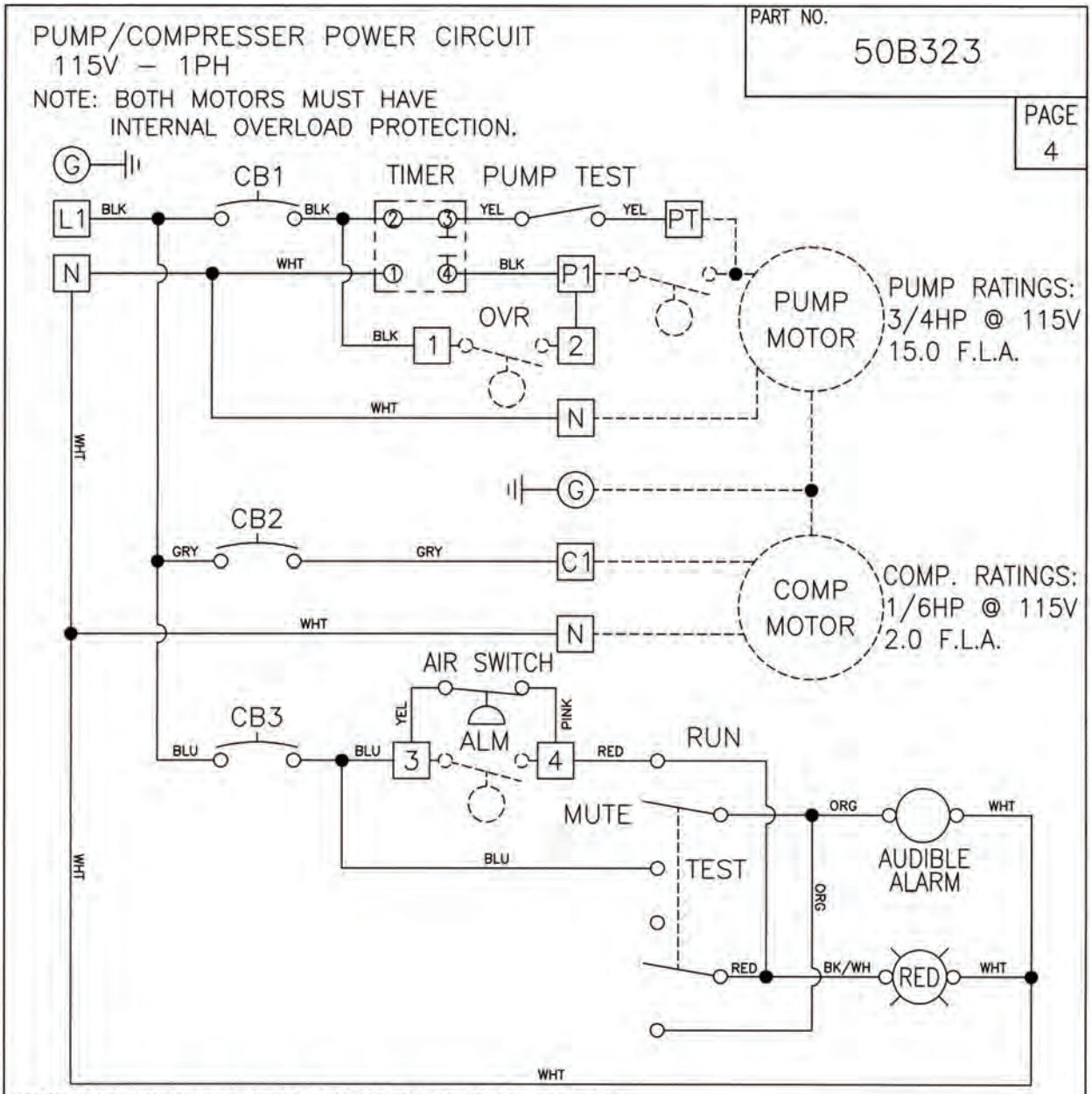
SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	C. BARRICK	1/27/2012
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B323



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in–lbs.

SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS	C. BARRICK	5/6/2014
E	.XXX = ±.005		
D	.XX = ±.010	MATERIAL SPECIFICATION:	
C	FRACTIONAL	AS NOTED	
B	X/X = ±.1/64		
A	ANGLES		
	X° = ±1/2°		

SCHEMATIC, ELECTRICAL W/TIMER & PUMP TEST

SCALE:	PART NO.
FULL	50B323

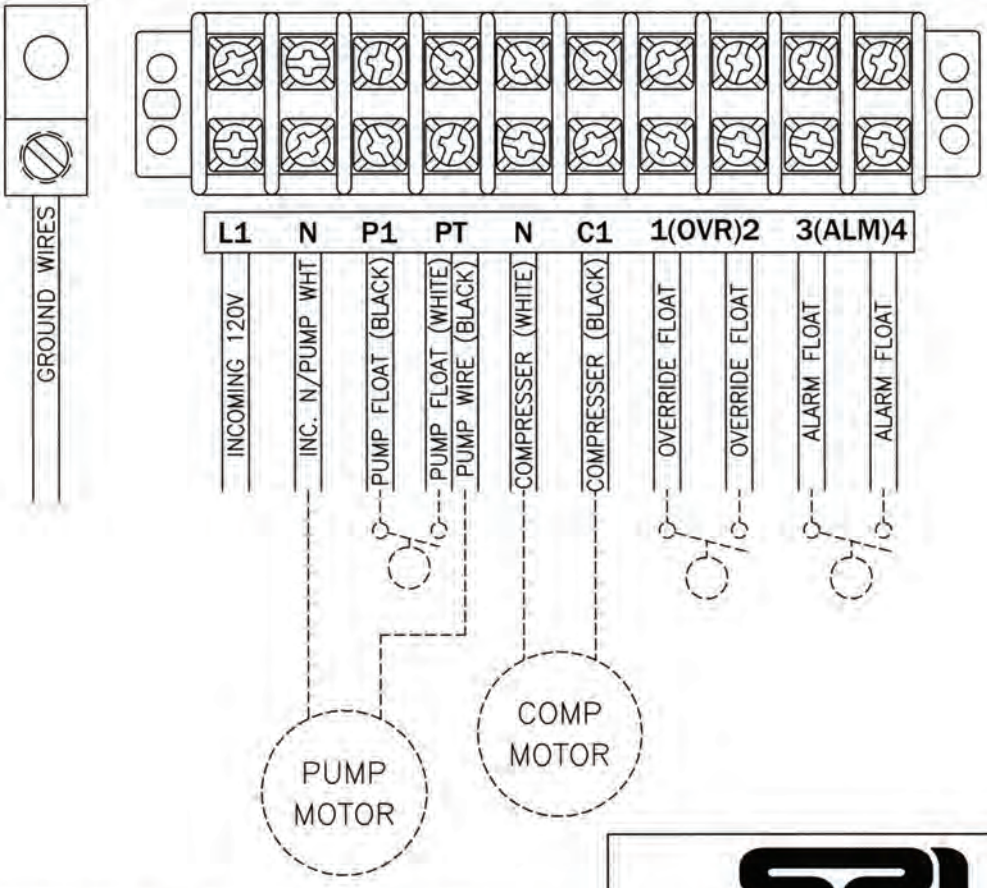
TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in–lbs.

PART NO. 50B324

PAGE 1

CONNECTION DIAGRAM (AS RECOMMENDED BY SPI)

RECOMENDED FOR:
- *DIRECT CONNECTION (NO JUNCTION BOX) OR JUNCTION BOX AND 7 CONDUCTOR CABLE WITH GROUND (8 CONDUCTORS)
- *FLOAT SWITCH ARANGEMENT OF YOUR CHOICE
- *PUMP TEST OVERRIDES FLOATS AND TIMER (MAXIMIZED VALUE OF FEATURE)



SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	C. BARRICK	4/1/2013
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B324

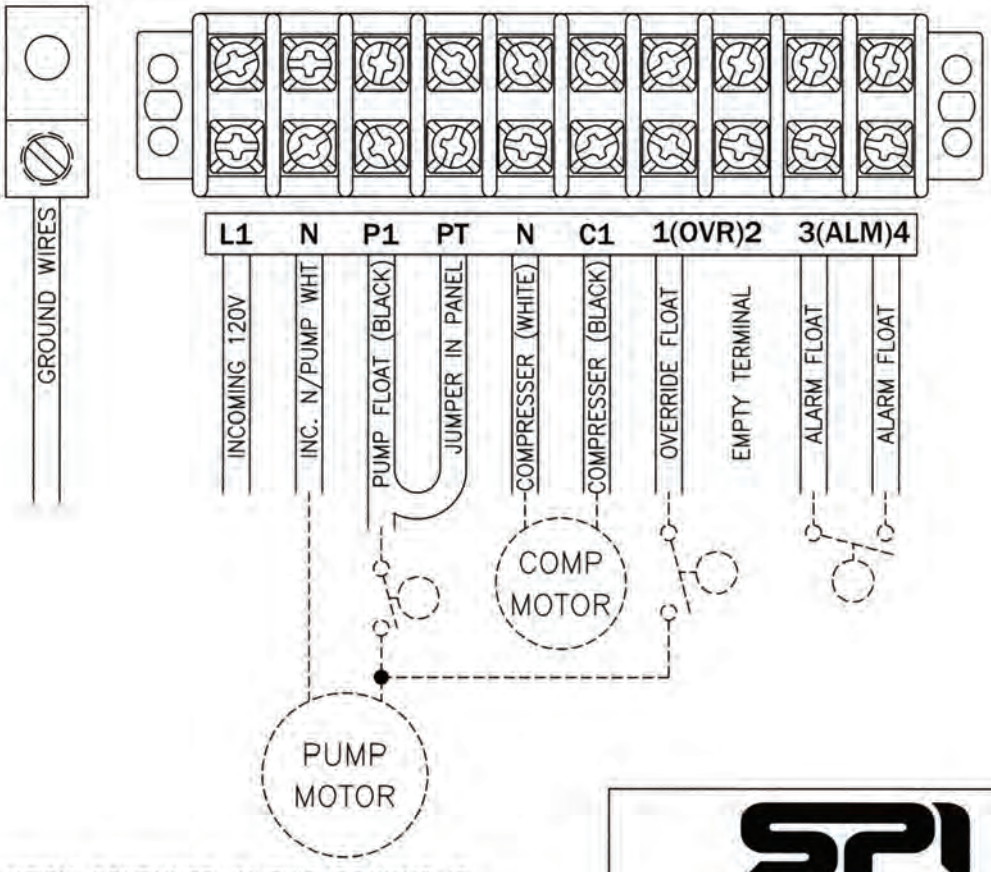
TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

PART NO. 50B324

PAGE 2

CONNECTION DIAGRAM (MINIMAL CONDUCTORS)

RECOMENDED FOR:
- *JUNCTION BOX AND 3 CONDUCTOR CABLE WITH GROUND (4 CONDUCTORS)
- *OVERRIDE FLOAT PLACED ABOVE HIGH WATER ALARM FLOAT
- *PUMP TEST WILL NOT FUNCTION IF PUMP FLOAT FAILS OR IS SWITCHED OFF (OPERRATING THE PUMP TEST SWITCH HAS THE SAME EFFECT AS MOVING THE WHITE TABS ON THE TIMER DIAL)



SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F, E, D, C, B, A	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	C. BARRICK	4/1/2013
		MATERIAL SPECIFICATION: AS NOTED	

POWER CONNECTION DIAGRAM

SCALE: FULL

PART NO. 50B324

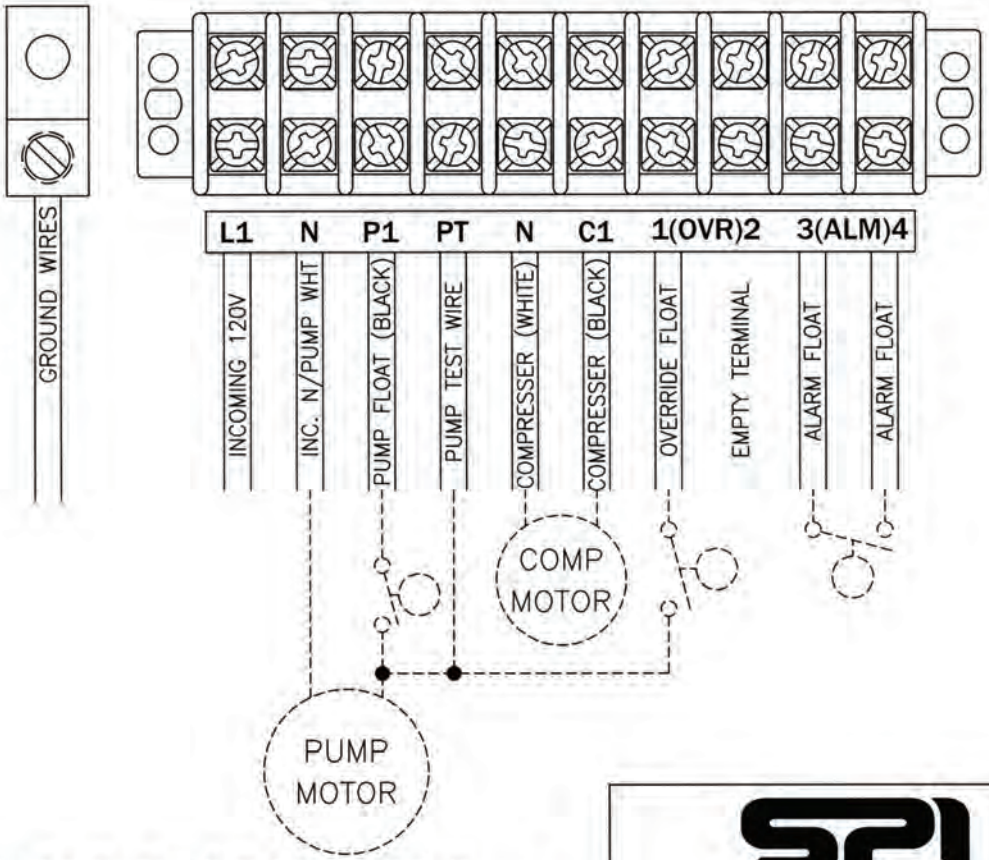
TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in–lbs.

PART NO. 50B324

PAGE 3

CONNECTION DIAGRAM (OPTIMAL CONDUCTORS)

RECOMENDED FOR:
- *JUNCTION BOX AND 4 CONDUCTOR CABLE WITH GROUND (5 CONDUCTORS)
- *OVERRIDE FLOAT PLACED ABOVE HIGH WATER ALARM FLOAT
- *PUMP TEST OVERRIDES FLOATS AND TIMER (MAXIMIZED VALUE OF FEATURE)



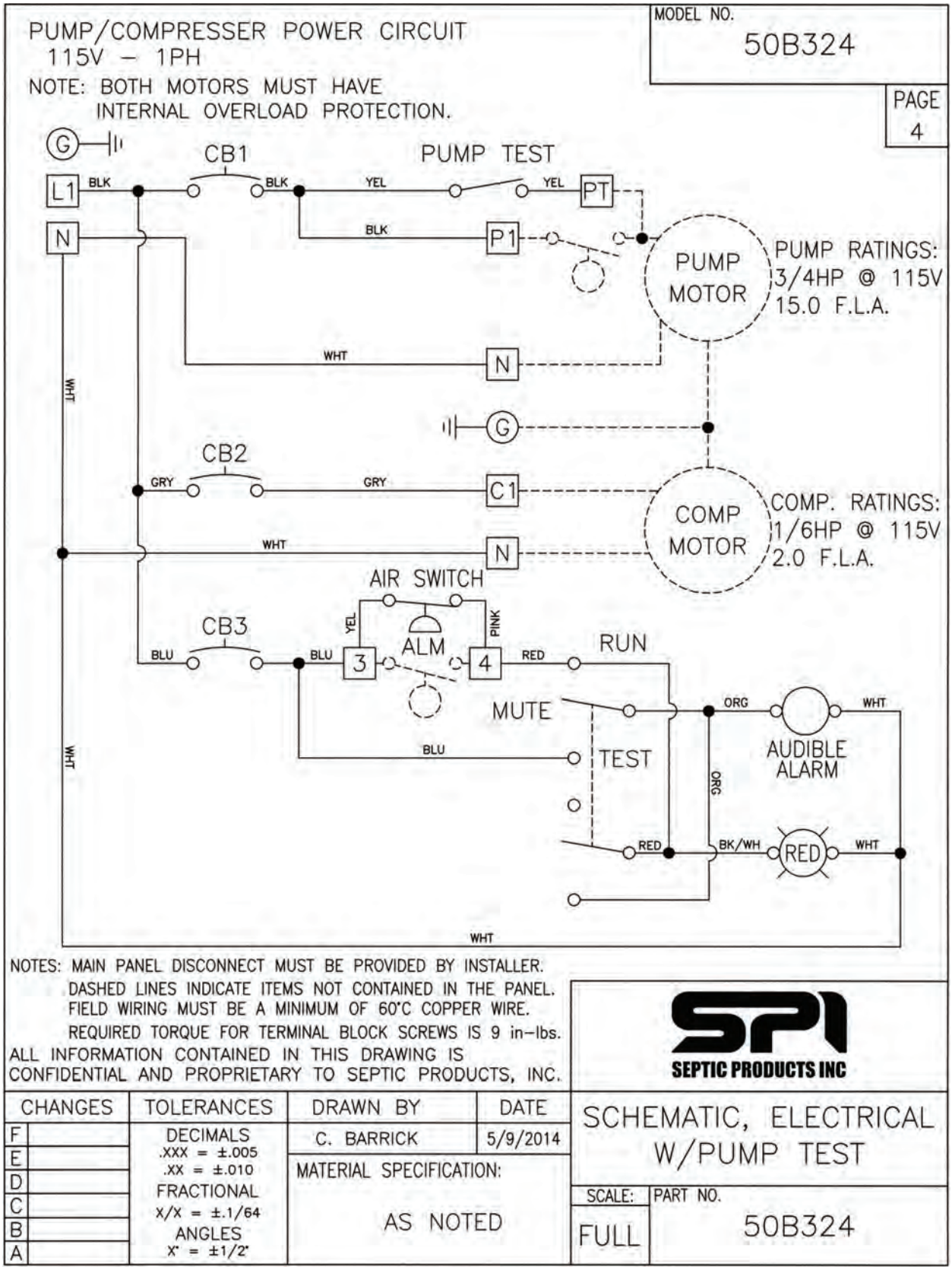
SEPTIC PRODUCTS INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	C. BARRICK	4/1/2013
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

POWER CONNECTION DIAGRAM

SCALE: FULL

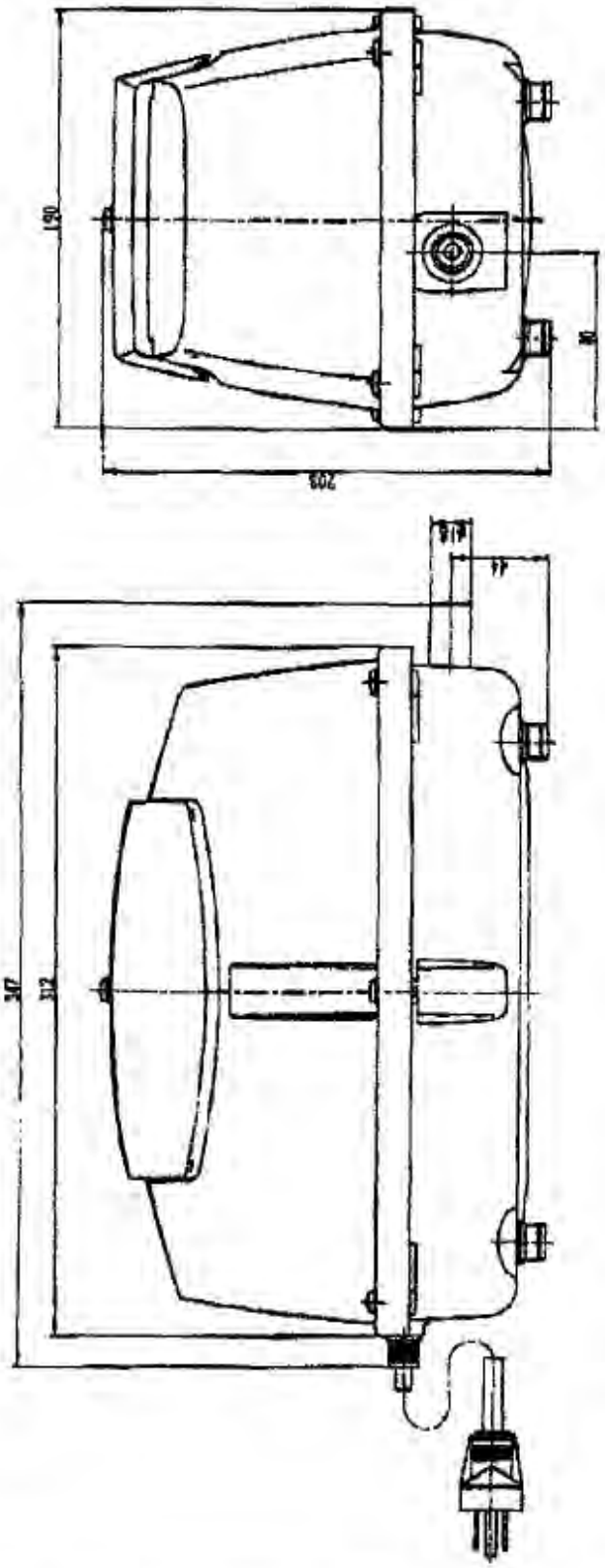
PART NO. 50B324


PUMP/COMPRESSER POWER CIRCUIT
115V – 1PH
NOTE: BOTH MOTORS MUST HAVE INTERNAL OVERLOAD PROTECTION.
MODEL NO.
50B324
PAGE 4
G
CB1
PUMP TEST
L1
BLK
BLK
YEL
YEL
PT
N
BLK
P1
PUMP MOTOR
PUMP RATINGS:
3/4HP @ 115V
15.0 F.L.A.
WHT
N
WHT
G
CB2
GRY
GRY
C1
COMP MOTOR
COMP. RATINGS:
1/6HP @ 115V
2.0 F.L.A.
WHT
N
AIR SWITCH
CB3
YEL
PINK
BLU
BLU
3
ALM
4
RED
RUN
MUTE
ORG
WHT
BLU
TEST
AUDIBLE ALARM
ORG
RED
BK/WH
RED
WHT
WHT
WHT
NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in-lbs.
ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS, INC.
SEPTIC PRODUCTS INC
CHANGES
F
E
D
C
B
A
TOLERANCES
DECIMALS
.XXX = ±.005
.XX = ±.010
FRACTIONAL
X/X = ±.1/64
ANGLES
X° = ±1/2°
DRAWN BY
C. BARRICK
DATE
5/9/2014
MATERIAL SPECIFICATION:
AS NOTED
SCHEMATIC, ELECTRICAL W/PUMP TEST
SCALE:
FULL
PART NO.
50B324

Drawing with external dimensions

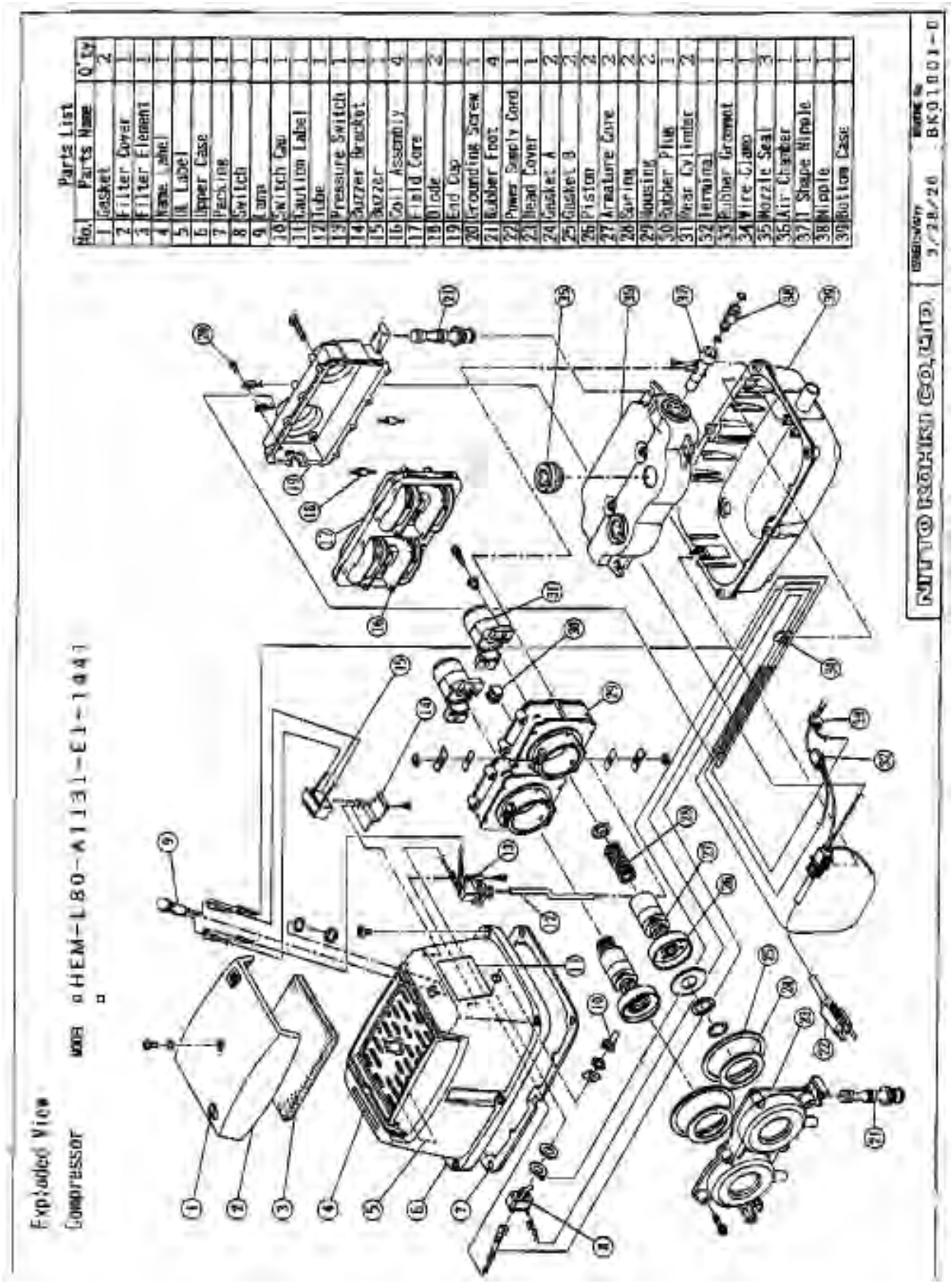
Air compressor(Blower)

Model



NOTE: 1. All dimensions in this drawing are for reference only.
2. No scale drawing
3. All dimensions are in millimeter.

NITTO KOHKI CO.,LTD.	Date: 11/28/1997	Drawing No. GK97046-1


Exploded View
Compressor
HEM-L80-A1131-E1-1041
Parts List
No. Parts Name Q'ty
1 Gasket 2
2 Filter Cover 1
3 Filter Element 1
4 Name Label 1
5 R Label 1
6 Upper Case 1
7 Packing 1
8 Switch 1
9 Cams 1
10 Switch Cau 1
11 Caution Label 1
12 Tube 1
13 Pressure Switch 1
14 Buzzer Bracket 1
15 Buzzer 1
16 Coil Assembly 4
17 Field Core 1
18 Diode 2
19 End Cap 1
20 Grounding Screw 1
21 Rubber Foot 4
22 Power Supply Cord 1
23 Head Cover 1
24 Gasket A 2
25 Gasket B 2
26 Piston 2
27 Armature Core 2
28 Spring 2
29 Housing 2
30 Rubber Plug 1
31 Rear Cylinder 2
32 Terminal 1
33 Rubber Grommet 1
34 Wire Clamp 1
35 Nozzle Seal 3
36 Air Chamber 1
37 T Shape Nipple 1
38 Nipple 1
39 Bottom Case 1
MITO KOKI CO.,LTD.
3/28/20
BK01001-0

Parts List:

No.	Parts Name	Parts No.	Q'ty	No.	Parts Name	Parts No.	Q'ty
1	Binding Head Screw	LP30581	1	23	Outlet Valve	LP10359	4
2	Sealed Washer M5	LP30653	2	24	Pan Head Screw M5×20	LP12599	4
3	Gasket Air Cleaner	LQ02607	2	25	Insulating Bush	LP10355	4
4	Filter Cover	LB03213	1	26	Rear Cylinder Assembly	LB02443	2
5	Filter element	LQ02730	1	27	Field Core Assembly	LB04038(LA-60)	2
6	Upper Case	LB03138	1			LB04028(LA-80)	2
7	Binding Head Screw	LP30581	6	28	End Cap	LQ03008(LA-60)	2
8	Gasket C	LQ02739	1			LQ02960(LA-80)	2
9	Hexagon Head Bolt M5×30	LP31316	8	29	Hexagon Head Bolt M5×30	LP31316	8
10	Head Cover	LQ02567(LA-60)	2	30	Foot	LQ02603	4
		LQ02063(LA-80)	2	31	Foot B	LQ02735	4
11	Gasket A	LQ01043	2	32	Power Supply Cord	LB04755	1
12	Gasket B	LQ01042	2	33	Nozzle Seal	LQ02598	3
13	Piston Assembly	LB03132	2	34	Air Tank Assembly	LB04760	1
14	Piston Sub Assembly	LB03133	2	35	Bottom Case Sub Assembly	LB03140	1
15	Inlet Valve	LP30916	2	36	Earth Cord	LB03510	1
16	Valve Retainer A	LP11548	2	37	Hose Assembly	LB03185	1
17	CS Ring CSTW-19	LP12948	2				
18	Spring Seat	LP12155	2				
19	Spring	LP30585(LA-60)	2				
		LQ02743(LA-80)	2				
20	Front Cylinder Assembly	LB03184	2				
21	SE Ring SE-5	LP12475	4				
22	Valve Retainer B	LP13735	4				

PART NO. 70 - 290 G375PL (REV-H)

23 SERIES OIL-LESS VACUUM PUMPS & COMPRESSORS

OPERATION & MAINTENANCE MANUAL

Model #0523-101 Shown

Model #1023-V103 Shown

Model #1023-101Q Shown

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

WARNING

PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS PRODUCT. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE PRODUCT.

General information

- **Clearances:** Model 0323/0523
  Top: .0015”
  End: .0015”
  Model 0823/1023
  Tops .003”
  End : .002”

- **Vane Life:** 5,000-15,000 hours depending upon application

- **Model numbers ending in “X”** have automatic thermal protectors which protect the motor by shutting the motor off if it overheats. The motor will automatically restart once the motor has cooled.

Product Use Criteria:

- Pump only clean, dry air.
- Operate at 32 F - 104 F (0 C - 40 C).
- Protect unit from dirt & moisture.
- Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.
- Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants or other liquids must be filtered out.
- Consult your Gast Distributor before using at high altitudes.

- Oil-Less rotary-vanes require NO lubrication.
- Sealed bearings are grease packed.
- Use of petroleum or hydrocarbon products will reduce carbon-vane service life.

GAST A Unit of IDEX Corporation

ISO 9001 & 14001 CERTIFIED **www.gastmfg.com**

MAINTENANCE

WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

WARNING

Injury Hazard

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Flush this product in a well ventilated area.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to:

- **Regularly inspect and make necessary repairs to product in order to maintain proper operation.**
- **Make sure that pressure and vacuum is released from product before starting maintenance.**

Check intake and exhaust filters after first 500 hours of operation. Clean filters and determine how frequently filters should be checked during future operation. This one procedure will help to assure the product's performance and service life.

General Maintenance

1. Remove end cap and filters. Inspect filters for rips,tears, cuts, brittleness and excessive foreign material.
2. Clean filters if in good condition with compressed air. Re-inspect for wear conditions. Set filters aside.
3. Check filter/muffler (#11) for compacted debris. If debris is present, replace filter/muffler.
4. Check condition of O-ring. It should be soft and flexible. Replace if it is not.
5. Remove and inspect muffler box. Clean box. Set box aside. (Not all models have a muffler box.)
6. Check gasket for cracks or tears. Install new gasket if any cracks or tears appear. Replace gasket.
7. Replace muffler box.
8. Reinstall filters or install new filters if required. Reinstall end cap.

Flushing

Flushing this product to remove excessive dirt, foreign particles, moisture or oil that occurs in the operating environment will help to maintain proper vane performance. There are 2 options for this operation. If Option 1 does not remedy your problem, go on to Option 2.

Use only Gast AH255B Flushing Solvent or other non-petroleum based flushing solvent. Do Not use kerosene or ANY other combustible solvents to flush product.

Option 1

You will need 2 pipe nipples at least 4 inches long with 1/4" NPT for 0323 and 0523 products, or 3/8" NPT on one end for 0823 and 1023 products. No nipples are needed if the unit does not have a muffler box.

1. Remove filter and muffler cap (#9).
2. Remove 5 bolts. Use a small hammer to tap on muffler box to remove it. Attach pipe nipples where muffler caps were removed.
3. Start product and add flushing solvent to the inlet port. If using liquid solvent, pour several tablespoons directly into the inlet port. If using Gast AH255B, spray solvent for 5-10 seconds into inlet port. Place towel over exhaust port to clean up solvent.
4. Plug inlet port for 20-30 seconds. Listen for changes in the sound of the pump. If pump sounds smooth, go to next step. If pump does not sound like it is running smoothly, installing a Service Kit will be required (See Service).
5. Release vacuum.
6. Repeat steps 3-5 three or four times.

If Option 1 is not successful, remove the end plate and examine.

Option 2

1. Remove six end plate bolts. (See exploded view.)
2. Use a small hammer to carefully tap on end plate to remove. Do not use a screwdriver to pry off.
3. Check that vanes are moving freely in and out of vane slots. Replace vanes if more than 50% of the vane extends past the vane slot.
4. Remove vanes and clean both sides with fine emery cloth. Clean end-plate with fine emery cloth.
5. Flush vanes with AH255B solvent and remove all solvent from vanes.
6. Flush body, rotor and end plate with AH255B solvent, then remove all solvent from each part.
7. Check body, rotor and end plate for scoring. If each part is clean and shows no signs of scoring, re-install parts. If scoring appears, send unit to factory or replace with new part(s).

Check that all external accessories such as relief valves and gauges are attached to cover and are not damaged before re-operating product.

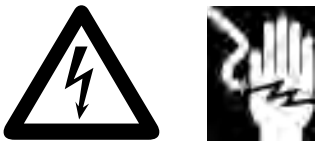
SHUTDOWN PROCEDURES

It is your responsibility to follow proper shutdown procedures to prevent product damage.
NEVER ADD OIL TO THIS OIL-LESS PUMP.

1. Disconnect plumbing.
2. Operate product for at least five minutes without plumbing.
3. Run at maximum vacuum for 10-15 minutes.
4. Repeat step 2.
5. Disconnect power supply.
6. Plug open ports to prevent dirt or other contaminants from entering product.

SERVICE KIT INSTALLATION

WARNING



Electrical Shock Hazard

Disconnect electrical power supply cord before installing Service Kit.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before installing Service Kit.

Vent all air lines to release pressure or vacuum.

Failure to follow these instructions can result in death, fire or electrical shock.

Gast will NOT guarantee field-rebuilt product performance. For performance guarantee, the product must be returned to a Gast-authorized facility.

Service Kit contents vary. Most contain vanes, gaskets and filter parts.

1. Remove filter/muffler parts from front of muffler box.
2. Remove the 5 muffler box bolts.
3. Use a small hammer to tap on box to remove. Do not use a screwdriver.
4. Remove the 6 end plate bolts.
5. Remove end plate. Check direction of bevel edges of vanes then remove vanes.
6. Clean body and rotor slots.
7. Check end plate, rotor and body for scoring. Severe scoring or worn bearings will require service at a Gast-authorized facility.

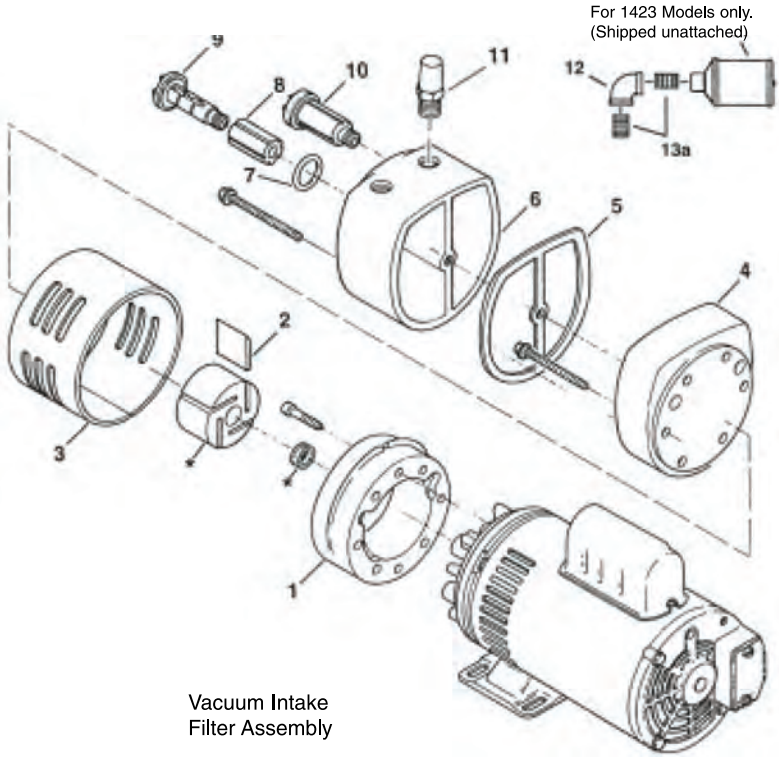
DO NOT remove rotor or motor bolts.

8. Insert vanes, checking that the bevel edges are in the correct direction.
9. Replace end plate. Torque bolts to 90-120 in. lb.
10. Check gasket for damage.
11. Reinstall muffler box. Torque bolts to 90-120 in. lb.

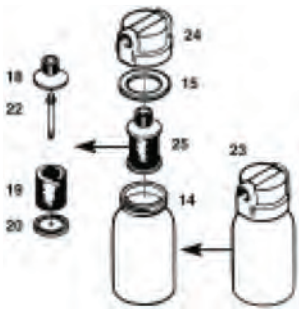
Check that all external accessories such as relief valves and gauges are attached and are not damaged before re-operating product.

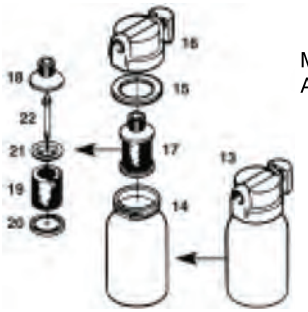
EXPLODED PRODUCT VIEW, PARTS & ORDERING INFORMATION

REF	DESCRIPTION	QTY	0823-101	0823-101Q	1023-101	1023-101Q	1023-V103	1423-101Q
1	BODY	1	AK517	AK517	AK518	AK518	AK518	AL283
2 *	VANE	4	AK513	AK513	AK513	AK513	AK513	AL284
3	SHROUD	1	AK511	AK511	AK511	AK511	AK511	AL281
4	END PLATE	1	AK515A	AK514	AK515A	AK514	AK515A	AK514
5 *	GASKET	1		AK522		AK522		AK522
6	MUFFLER BOX	1		AK520		AK520		AK520
7 *	O-RING	2		AK473		AK473		AK473
8 *	FELT	2		AK524		AK524		AK524
9	END CAP	2		AK510		AK510		AK510
10	END CAP ASSEMBLY	2		AK526		AK526		AK526
11	FILTER / MUFFLER	1		AK840		AK840		AC432
12	ELBOW	1						BA206
12	ELBOW ***	2					AF272	
13	MUFFLER ASSEMBLY	1					AB599B	
13 a	NIPPLE	2						BA714
14	JAR	2					AA805	
15	COVER GASKET	2					AA405	
16	COVER ASSEMBLY	1					AV805BPC	
17	MUFFLER ASSEMBLY	1					AC434-1	
18	COUPLING	2					AC391	
19	CARTRIDGE	2					AC393	
20	END CAP ASSEMBLY	2					AC394	
21	MUFFLER PLATE	1					AC395	
22	STUD	2					AC396	
23	FILTER ASSEMBLY	1					AB599	
24	COVER ASSEMBLY	1					AV805APC	
25	FILTER ASSEMBLY	1					AC433-1	
	SERVICE KIT	1	K479A	K479	K479A	K479	K479A	K575A



Vacuum Intake
Filter Assembly





Muffler
Assembly

* Denotes parts included in the Service Kit. Parts listed are for stock models.
** No Service Kit available, order parts separately. *** Not shown.
For specific OEM models, please consult the factory. When corresponding or ordering parts, please give complete model and serial numbers.

PART NO. 70 - 290 G375PL (REV-H)

TROUBLESHOOTING CHART

Low		High		Pump	Motor	Reason and remedy
Vacuum	Pressure	Vacuum	Pressure	Overheat	Overload	for problem.
●	●	At pump		●	●	Filter dirty. Clean or replace.
	●		At pump	●	●	Muffler dirty. Clean or replace.
●		At pump		●	●	Vacuum line collapsed. Repair or replace.
			●	●	●	Relief valve set too high. Inspect and adjust.
●	●					Relief valve set too low. Inspect and adjust.
●	●	At pump	At pump	●	●	Plugged vacuum/pressure line. Inspect and repair.
●	●					Vanes sticking. Clean or replace.
●	●					Vanes worn. Replace.
●	●					Shaft seal worn. Replace.
●	●			●	●	Dust or offset powder in pump. Inspect and clean.
●	●			●	●	Motor not wired correctly. Check wiring diagram and line voltage.

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Benton Harbor, MI 49023-0097
Ph: 269/926-6171
FAX: 269/925-8288
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Gast Hong Kong
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6, On Ping Street, Shatin
N. T. Hong Kong
Ph: (852) 2690 1008
Fax: (852) 2690 1012
www.gasthk.com
FAX: 269/925-8288

SPECIFICATION SHEET

MODEL:

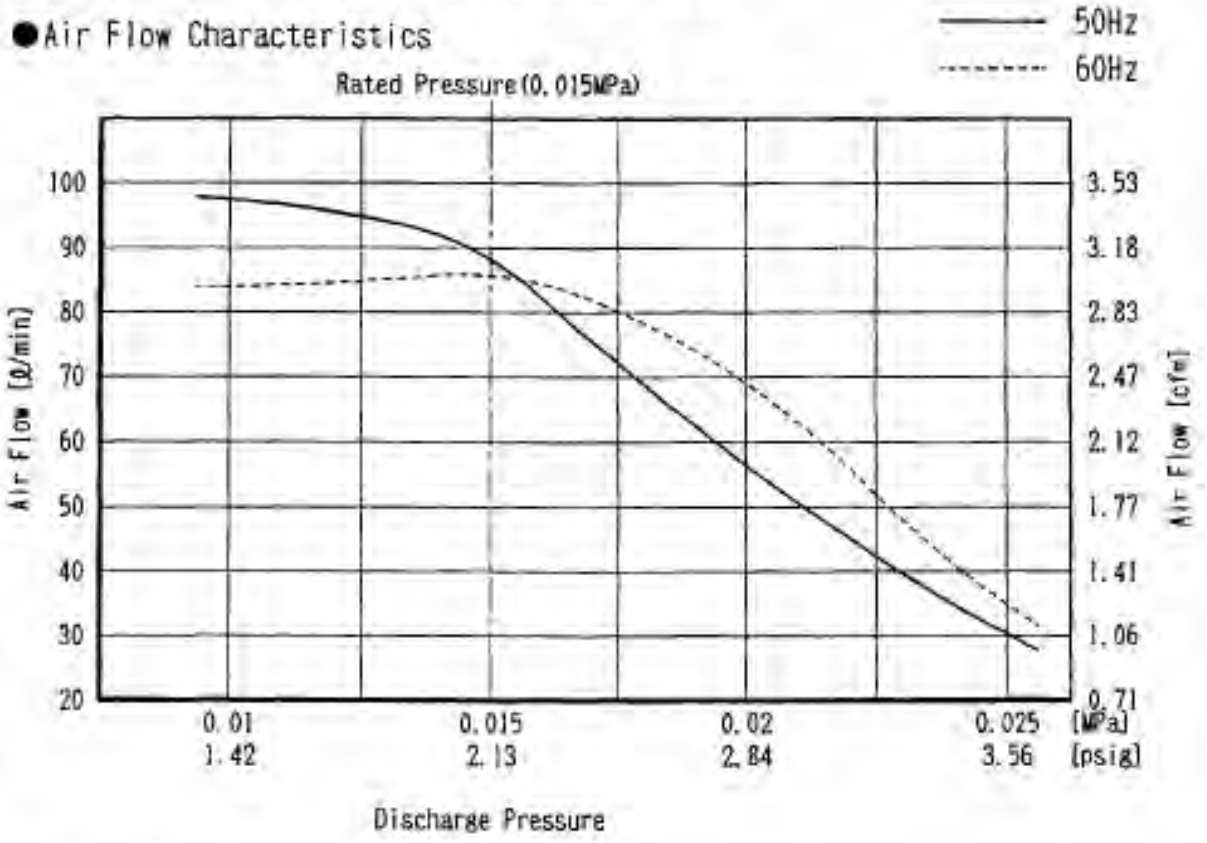
1 Primary Applications: Aerobic Waste Water Treatment Units (ATU - Residential) and Fish Tank

	MODEL	
2	Rated	
2-1	Rated Voltage	AC 120V
2-2	Rated Frequency	60HZ
2-3	Rated Pressure	2.13 PSIG (o.15 kgf/cm2)
2-4	Air Flow	2.83CFM (80 LPM) and over
2-5	Input Power	80 W +/- 20%
2-6	Current	1.0A (Reference)
2-7	Rated Time	Continuous
3	Dimensions and Sturcture	
3-1	Appearance	LA type new design
3-2	Dimensions	L13-2/3 x W7-1/2 x H8.0 in.
3-3	Gross Weight	12.7 Lbs. (5.8 Kg)
3-4	Outlet Port Size	11/16" (18mm) OD
3-5	Power Cord	5.2ft long with molded 3 Pin plug
4	Electric Performance	
4-1	Insulation Resistance	Min. 100 MΩ
4-2	Dielectric withstanding	10 mA Max. @1200V for 2 sec.
4-3	Coil Insulation	Class E
4-4	Voltage Change	No Smoke or spark should be present within the range of +/- 10% of Rated Voltage.
4-5	Satrt-up Voltage	90V or over
4-6	Normal Temperature Increase	less than 85°C at the wound coil portion. less than 55°C outside the unit.
5	Other Performance	
5-1	Maximum Pressure	4.97 psig (0.35 kgf/cm2) Ref.
5-2	Life	10,000 hours
5-3	Noise Level	less than 45 dB(A)/1 m
6	Operating Condition	
6-1	Ambient Temperature	from -5°C to 35°C
6-2	Ambient Moisure	from 35% to 85%
6-3	Operating Pressure Range	0.7-2.84 psig (0.05-0.2Kgf/cm2)
6-4	Applicable Place	Outdoor
6-5	Applicable Fluid	Air
7	Packaging	
7-1	External Package	Carton Box with inner corgated carton material
7-2	Drop Test	as per Level IV of JIS Z 0200
8	Standards	
8-1	Electrical Standards	JETL 91-55262, UL1450 pending

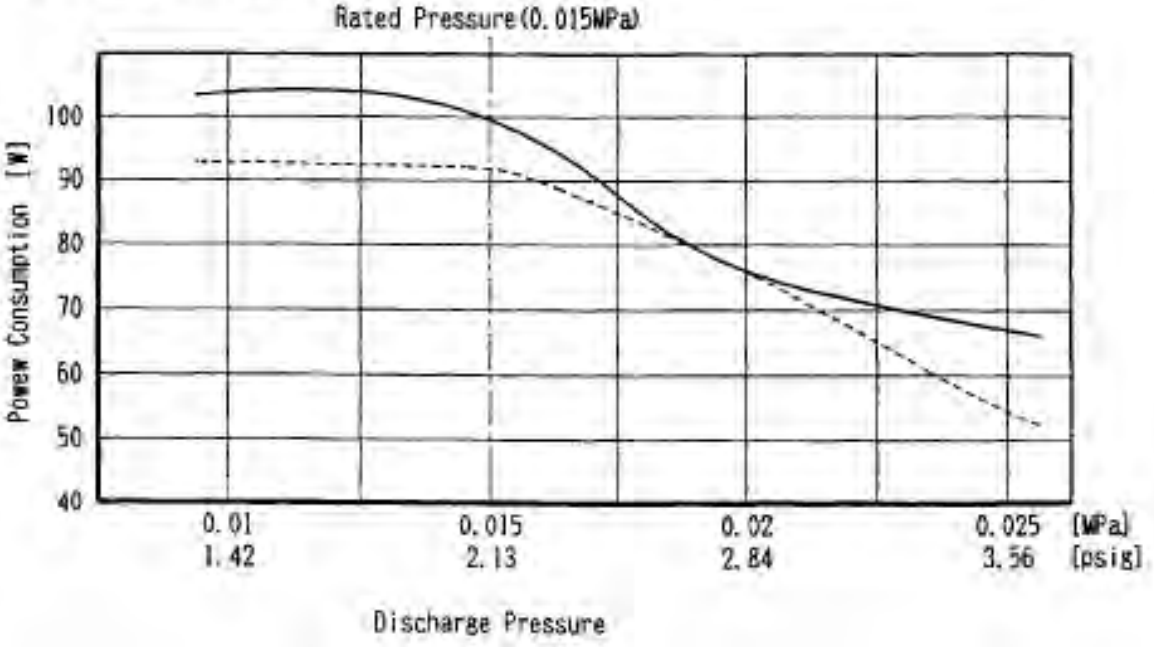
NO. TK99002-0

Performance Curve
(Referential data)

● Air Flow Characteristics



● Power Consumption Characteristics



ROTARY

Pumps & Compressors
QR Series 1/3 & 3/4 HP

MODELS:

Standard models available.

QR-0030 (291305), QR-0050 (291306)
QR-0080 (291303), QR-0100 (291304)

Other models based on availability and minimum purchase.

291305
291306

FEATURES:

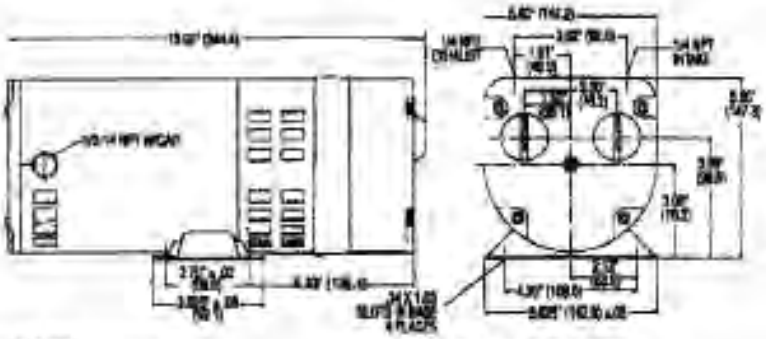
- Quiet design
- Lightweight
- Oil-less, non-lubricated pump components
- Permanently lubricated-for-life motor ball bearings
- Extended life vane design
- Built-in inlet & exhaust filters
- External exhaust muffler
- UL & CSA recognition
- Die cast aluminum sound chamber
- Low air flow pulsations
- World Voltage Motors

291303
291304
291309
291310

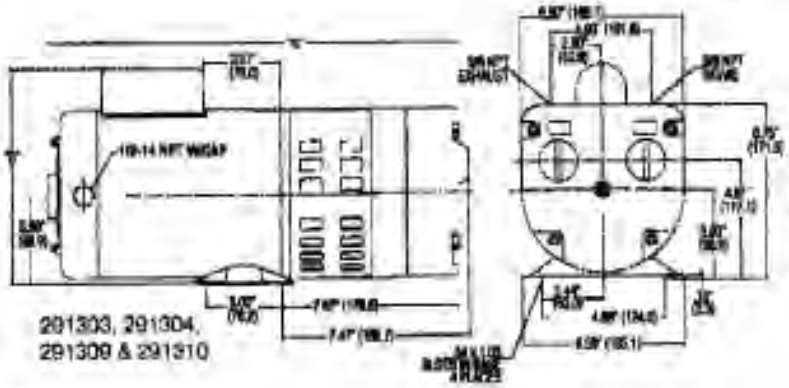
Consult factory for custom applications

DIMENSIONS:

Millimeters are in ( )



291305 & 291306



291303, 291304,
291309 & 291310

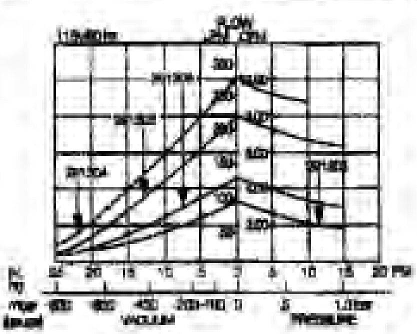
Part No.	Model No.	A IN. / (mm)	B IN. / (mm)
291303	QR-0080	15.41 / (416.9)	8.37 / (212.6)
291304	QR-0100	15.41 / (416.9)	8.37 / (212.6)
291309	QR-0080	15.37 / (416.8)	N/A / N/A
291310	QR-0100	15.37 / (416.8)	N/A / N/A

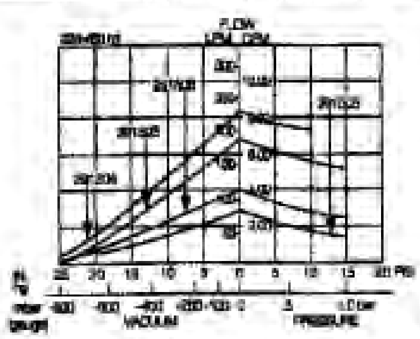
ISO 9001 CERTIFIED

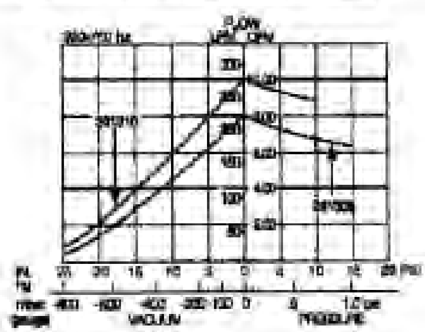
THOMAS
FLUMPS & COMPRESSORS

QR SERIES PERFORMANCE DATA:

		CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM
		STANDARD		STANDARD		STANDARD		STANDARD					
MODEL NUMBER:		QR-0050		QR-0080		QR-0080		QR-0100		QR-0080		QR-0150	
MANUFACTURING CODE:		291302		291305		291303		291304		291308		291310	
HEAD CONFIGURATION:		Pressure/Vacuum		Pressure/Vacuum		Pressure/Vacuum		Pressure/Vacuum		Pressure/Vacuum		Pressure/Vacuum	
PRESSURE:		Flow @ 115/220v		Flow @ 115/220v		Flow @ 115/220v		Flow @ 115/220v		Flow @ 230v		Flow @ 230v	
CFM @ PSI	LPM @ bar												
PSI	bar	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM
0	0	3.20/2.70	90.6/76.4	4.60/4.00	130.2/113.2	9.20/5.70	260.5/158.7	10.00/8.30	283.1/235.0	8.00	226.5	10.00	283.1
5	.3	2.70/2.30	76.3/65.7	4.10/3.50	116.7/99.7	7.10/6.20	201.1/168.5	9.40/7.80	259.5/214.4	7.30	201.1	9.40	259.6
10	1.0	2.20/1.80	49.8/40.7	3.60/3.00	91.8/59.5	6.80/5.00	177.2/148.5	8.80/7.30	233.8/185.9	5.80	177.2	8.80	233.8
15	1.0	1.70/1.40		3.00/2.40		6.20/5.20				5.20			
MAX. CONTINUOUS PRESSURE:		10 PSI	.7 bar	10 PSI	.7 bar	10 PSI	.7 bar	10 PSI	.7 bar	10 PSI	.7 bar	10 PSI	.7 bar
MAX. INTERMITTENT PRESSURE:		15 PSI	1.0 bar	15 PSI	1.0 bar	15 PSI	1.0 bar	10 PSI	.7 bar	15 PSI	1.0 bar	10 PSI	.7 bar
VACUUM:		Flow @ 115/220v		Flow @ 115/220v		Flow @ 115/220v		Flow @ 115/220v		Flow @ 230v		Flow @ 230v	
CFM @ IN. hg	LPM @ mbar (gauge)												
IN. hg	mbar (gauge)	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM	CFM	LPM
0	0	3.20/2.70	90.6/76.4	4.60/4.00	130.2/113.2	9.20/5.75	260.5/158.7	10.00/8.30	283.1/235.0	8.00	226.5	10.00	283.1
6	-100	2.50/2.20	76.5/66.0	3.80/3.30	116.9/101.5	6.40/5.30	119.7/166.5	9.10/6.80	261.5/195.0	6.40	188.7	9.10	261.3
10	-200	1.90/1.50	57.7/52.2	2.90/2.50	100.6/85.3	4.80/4.00	179.0/143.4	8.05/6.00	219.5/175.8	4.80	179.0	8.00	219.8
15	-400	1.30/1.10	47.5/40.1	2.00/1.70	72.6/62.0	3.40/2.50	121.3/102.8	4.40/3.40	157.0/128.1	3.40	121.5	4.40	157.0
20	-600	.80/.50	28.3/21.5	1.20/.80	44.9/35.5	2.00/1.40	74.7/57.7	3.50/1.80	95.3/73.1	2.00	74.7	3.00	95.5
25	-800			.30/.10	17.5/9.0	.40/.10	25.7/12.9	.80/.35	35.9/21.8	.40	25.7	.80	35.9
MAX. VACUUM:		26.0" hg	-838 mbar	26.0" hg	-809 mbar	26.0" hg	-869 mbar	26.0" hg	-869 mbar	26.0" hg	-809 mbar	26.0" hg	-809 mbar
MAX. AMBIENT TEMPERATURE:		95°F	35°C	95°F	35°C	95°F	35°C	95°F	35°C	95°F	35°C	95°F	35°C
MIN. AMBIENT TEMPERATURE:		32°F	0°C	32°F	0°C	32°F	0°C	32°F	0°C	32°F	0°C	32°F	0°C
MAX. RESTART PRESSURE:		0 PSI	0 bar	0 PSI	0 bar	0 PSI	0 bar	0 PSI	0 bar	0 PSI	0 bar	0 PSI	0 bar
MAX. RESTART VACUUM:		0" hg	0 mbar	0" hg	0 mbar	0" hg	0 mbar	0" hg	0 mbar	0" hg	0 mbar	0" hg	0 mbar
MOTOR VOLTAGE/FREQUENCY:		100-115/200-240/60/50/1		100-115/200-240/60/50/1		100-115/200-240/60/50/1		100-115/200-240/60/50/1		200-240/460/60/3 200-220/380-415/50/3		200-240/460/60/3 200-220/380-415/50/3	
HORSEPOWER:		1/3		1/3		3/4		3/4		3/4		3/4	
MOTOR TYPE:		Split Phase		Split Phase		Capacitor Start		Capacitor Start		Polyphase		Polyphase	
CURRENT AT RATED LOAD (AMPS):		5.8/2.7		5.6/2.7		10.4/5.0		10.4/5.0		2.8/1.6		2.8/1.6	
POWER AT RATED LOAD (WATTS):		300/300		360/315		790/840		800/760		740/610		740/610	
STARTING CURRENT (LOCKED ROTOR, AMPS):		26.0/13.0		26.0/13.0		37.0/17.0		37.0/17.0		19.0/9.0		19.0/9.0	
INSULATION CLASS:		B		B		B		B		B		B	
MIN. FULL LOAD SPEED (RPM):		1725/1425		1725/1425		1725/1425		1725/1425		1725		1725	
THERMAL PROTECTOR:		Yes		Yes		Yes		Yes		No		No	
NET WEIGHT:		33 lbs.	15 Kg	33 lbs.	15 Kg	54 lbs.	24.5 Kg	54 lbs.	24.5 Kg	55 lbs.	25 Kg	55 lbs.	25 Kg
SHIP WEIGHT:		36 lbs.	16 Kg	36 lbs.	16 Kg	60 lbs.	27 Kg	60 lbs.	27 Kg	62 lbs.	28 Kg	62 lbs.	28 Kg







This information presented in this material is based on technical data and test results of nominal units. It is believed to be accurate and reliable and is offered as an aid to help in the selection of Thomas products. It is the responsibility of the user to determine the suitability of the product for his intended use and the user assumes all risk and liability whatsoever in connection therewith. Thomas Industries does not warrant, guarantee or assume any obligation or liability in connection with this information.

Note: Models pictured are representative of the series and do not represent a specific model number. Consult factory for detailed physical description.

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THOMAS PUMPS & COMPRESSORS

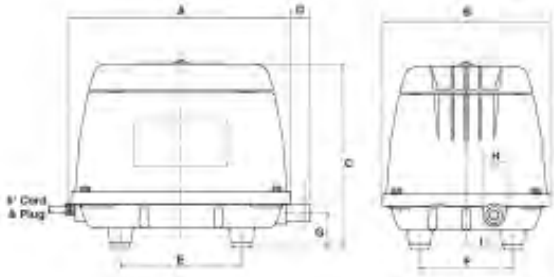
1419 Illinois Avenue, P.O. Box 29
Sheboygan, WI 53082-0029 USA
(920) 457-4891 Fax (920) 451-4276
Internet: http://www.thomaspumps.com

HP Series Linear Pumps

Models HP20, 40, 60 and 80

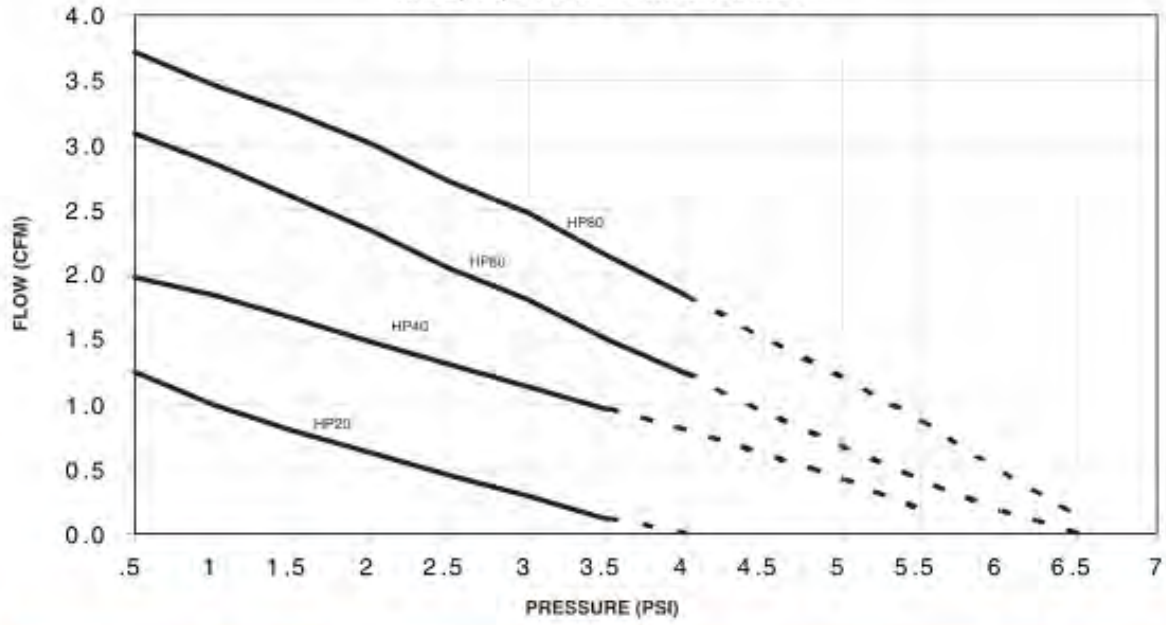
Model Number	HP20-0110	HP40-0110	HP60-0110	HP80-0110
Voltage (VAC)	120	120	120	120
Frequency (Hz)	60	60	60	60
Max. Cont. Pressure (psig)	3.5	3.5	4	4
Max. Inter. Pressure (psig)	3.8	5.5	6.5	6.5
Open Flow (c.f.m.)	1.25	2	3.1	3.7
Power Consumption (amps)	0.3	0.8	1.3	1.6
Sound Level (dBA@3 ft.)	31	32	35	36
Weight (lbs.)	7	13	15.5	15.5
Service Kit # Chamber Blck	10PC000010	40PC000030	80PC000041	80PC000041

Performance data noted is representative of typical values. Specifications and performance data are subject to change without notice. Purchaser is responsible for determining suitability for product applications.



Model	Dim.	A	B	C	D	E	F	G	H	I
HP60/80	Inches	9.3	7.1	7.8	0.8	5.1	4	1.5	0.7	1.2
	Millimeters	235	180	197	21	130	102	37	18	30
HP40	Inches	8.2	6.8	7.5	0.8	4.8	3.5	1.5	0.7	1.2
	Millimeters	208	173	190	21	120	90	37	18	30
HP20	Inches	7.2	5.4	6.7	0.8	3.6	3.1	1.5	0.7	0.8
	Millimeters	182	138	170	21	92	78	37	18	20

HP20, 40, 60 & 80 PERFORMANCE



1300 Tefft Court, Suite 8
Saline, Michigan 48176

HIBLOW USA INC.

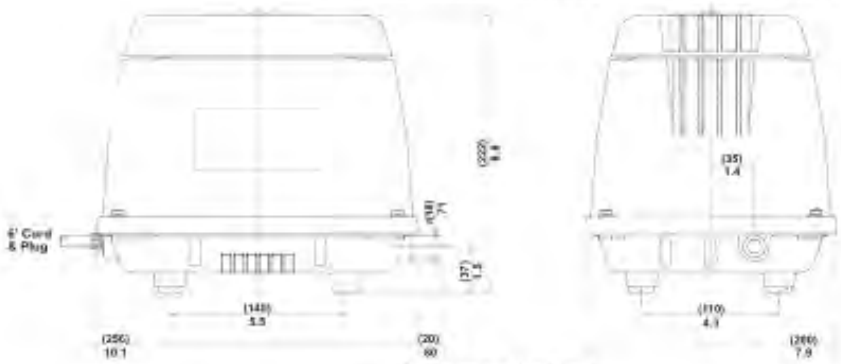
734-944-5032 fax 734-944-5163
www.hiblow-usa.com

HP Series Linear Pumps

Models HP100, 120, 150 and 200

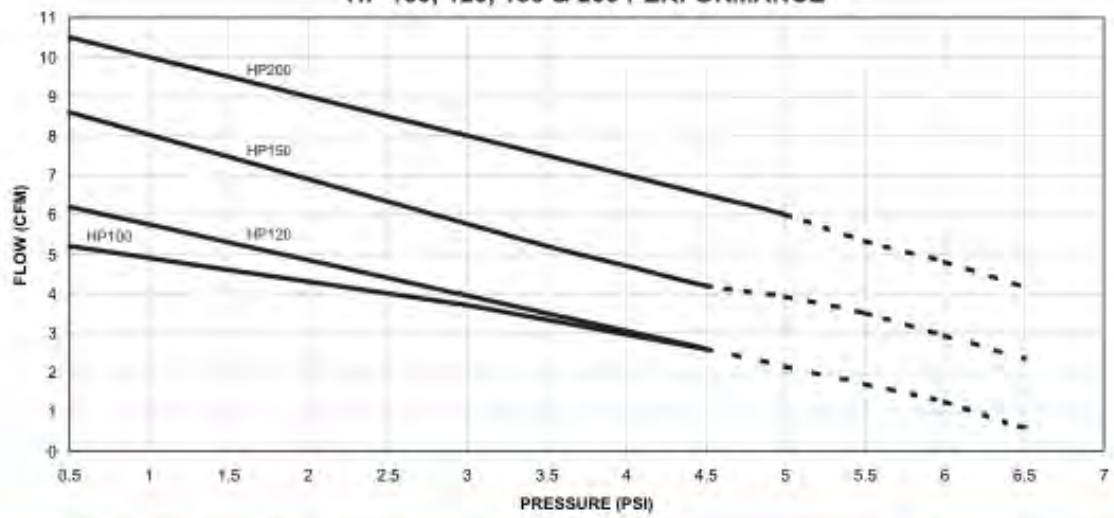
Model Number	HP100-0110	HP120-0110	HP150-0110	HP200-0110
Voltage (Vac)	120	120	120	120
Frequency (Hz)	60	60	60	60
Max. Cont. Pressure (psig)	4.5	4.5	4.5	5
Max. Inter. Pressure (psig)	6.5	6.5	6.5	6.5
Open Flow (c.f.m.)	5.2	6.1	9.6	10.5
Power Consumption (amps)	1.55	2.1	2.1	3.4
Sound Level (dBA@3 ft.)	38	40	48	47
Weight (lbs.)	19	19	20	20
Service Kit # Chamb. Blck	120PC20011	120PC20011	200PC20011	200PC20011

Performance data noted is representative of typical values. Specifications and performance data are subject to change without notice. Purchaser is responsible for determining suitability for product applications.



Dimensions in inches & (mm)

HP 100, 120, 150 & 200 PERFORMANCE



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HIBLOW USA INC.

734-944-5032 fax 734-944-5163
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INSTRUCTION MANUAL

OPERATION & MAINTENANCE TECHNICAL MANUAL

HIBLOW SERIES COMPRESSORS

MODELS

HP-40, HP-60, HP-80,
HP-100, HP-100LL, HP-120, HP-120LL,
HP-150, HP-200

This is a hazard alert symbol: ⚠ When you see this symbol, be aware that personal injury or property damage is possible. The hazard is explained in the text following the symbol. Read the information carefully before proceeding.

The following is an explanation of the three different types of hazards:

⚠ **DANGER:** Severe personal injury or death will occur if hazard is ignored.
⚠ **WARNING:** Severe personal injury or death can occur if hazard is ignored.
⚠ **CAUTION:** Minor injury or property damage can occur if hazard is ignored.

GENERAL INFORMATION

⚠ **DANGER:** Do not pump flammable or explosive gases or operate the unit in an atmosphere containing them.

⚠ **CAUTION:** The pump is designed for air only. Do not allow corrosive gases or particulate material to enter the pump. Water vapor, oil-based contaminants, or other liquids must be filtered out.

⚠ **CAUTION:** Ambient temperature should not exceed 40 (104° F). For operation at higher temperatures, consult the factory.

⚠ **CAUTION:** Close supervision is necessary when any appliance is used by or near children.

This pump's function is to pump air and under no circumstances should it be used to pump any other gases. The pump must not be used for the pumping of fluids, particles, solids or any substance mixed with air, particularly combustible substances likely to cause explosions.

Never lubricate this oil-less pump, the moving parts consist of an actuating rod supported by two special synthetic rubber diaphragms which vibrate laterally, permitting long-term continuous operation. Operation is based upon the principle of electromagnetic vibration which eliminates the need for sliding parts, thereby minimizing power consumption and offering high efficiency.

INSTALLATION

⚠ **WARNING:** To avoid risk of electrocution do not use this product in an area where it could become submerged in water or other liquids. The Canadian (c-UL) pumps need to be stored in a dry location and it is not intended for outdoor use.

⚠ **CAUTION:** Do not block the flow of cooling air around the pump in any way. The life of pump may be reduced or malfunction could occur, if hazard is ignored.

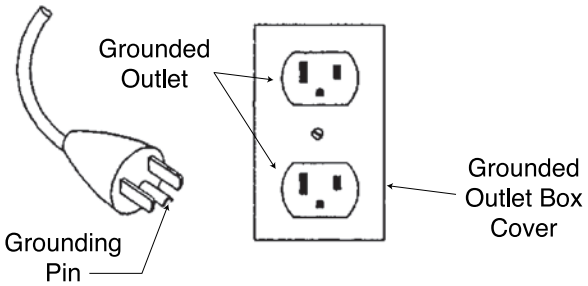
GROUNDING INSTRUCTIONS

FOR ALL GROUNDED, CORD-CONNECTED PRODUCTS

This product should be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This is equipped with a cord having a grounding wire with an appropriate grounding plug.
The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

⚠ **DANGER:** Improper installation of the grounding plug can result in a risk of electric shock. If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green, with or without yellow stripes, is the grounding wire.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded. Do not modify the plug provided; if it will not fit the outlet, have the proper outlet installed by a qualified electrician.



For a grounded, cord-connected product rated less than 15 amperes and intended for use on a nominal 120 volt supply circuit.

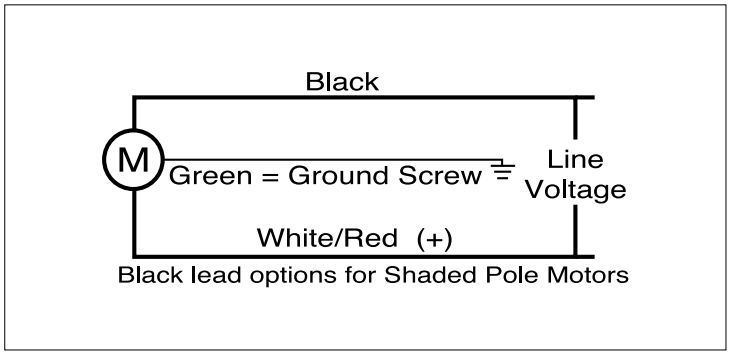
This product is for use on a nominal 120 volt circuit, and has grounding plug. Make sure that the product is connected to an outlet having the same configuration as the plug. No adapter should be used with the product.

FOR PERMANENTLY CONNECTED PRODUCT

This product should be connected to a grounded, metallic, permanent wiring system, or an equipment-grounding terminal or lead on the product(refer to wiring diagram).

WIRING

120V AC Wiring Diagram



EXTENSION CORDS

Use only a 3-wire extension cord that has a 3-blade grounding plug, and a 3-slot receptacle that will accept the plug on the product. Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current that your product will draw. A cord no longer than 100 feet, No.16 AWG extension cord should be used. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating. For outdoor use, use an extension cord that is approved for outdoor use, marked W-or W-A.

MOUNTING

⚠ **CAUTION:** When using the pump to inject air into a liquid, make sure that the pump is higher than the surface level of the liquid, otherwise that liquid may run back into the pump if the power is interrupted.

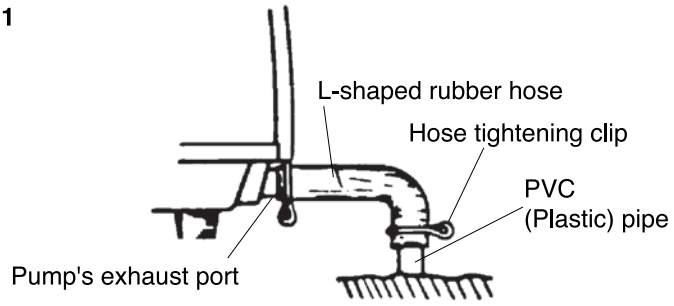
The pump should be in an upright, level position and remain on a stable, rigid operating surface for proper operation.

PLUMBING

Improper connection will cause leakage of air.

HP Series : Connect the pumps exhaust port and PVC(plastic)pipe with an L-shaped rubber hose. Be sure to secure place of connection with a hose tightening clip(Refer to Fig.1).

Fig. 1



STORAGE

Store indoors out of the weather in a dry area. Make certain the electrical cord is placed so there will be no chance of damage.

⚠ **CAUTION:** To avoid risk of electrocution or damage to the pump do not store this unit where it could come into contact with water or other liquids. Store indoors. Inspect compressor and cord for damage prior to putting compressor back into service.

OPERATION

⚠ **WARNING:** Lower housing and pump surfaces can become very hot during operation. Do not touch these surfaces until unit has been shut off and allowed to cool.

⚠ **CAUTION:** Carefully examine the air pump after installation. It should not be plugged in if there is water on parts not intended to be wet.

⚠ **CAUTION:** Do not operate if the cord or plug is damaged, or if the pump is malfunctioning, dropped, or damaged in anyway.

⚠ **CAUTION:** Ensure pump is securely mounted prior to operation.

When alternating current is applied to electromagnet as in the figures, the actuating rod moves first in the arrow direction shown in Fig. 2A and then in the arrow direction shown in Fig. 2B, by the magnetic attraction and repellent forces exerted between the electromagnet and the permanent magnets attached to the rod.

The rod vibrates at the power supply(60Hz/50Hz)frequency and changes the volume of the space enclosed between the head(casing) and the diaphragm. Thus, air intake, compression, and exhaust, can be performed as the rod vibrates.

Fig. 2A

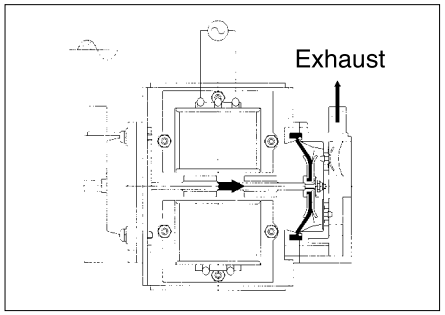
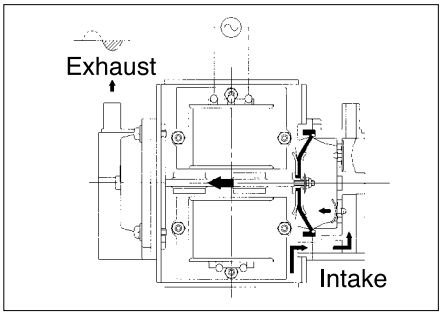


Fig. 2B



MAINTENANCE

⚠ **WARNING:** Always disconnect power before installing or servicing. Failure to do so could result in electrical shock, personal injury or death. The motor may be thermally protected and will automatically restart when it cools, if the thermal protection switch is tripped.

⚠ **CAUTION:** The filters must be periodically cleaned or replaced. A clogged filter can cause overheating or pump failure.

Any servicing of the unit other than that recommended in the instruction manual must be performed by an Authorized Service Facility. Inspection of filters is suggested every three months.
When inspecting filter, also clean inlet port area of filter and housing. Filters can be cleaned with soap and water. Be sure to dry all parts and filter well before reinstalling. If the pump makes an abnormal noise, or the amount of discharged air is greatly decreased, turn off the power immediately.

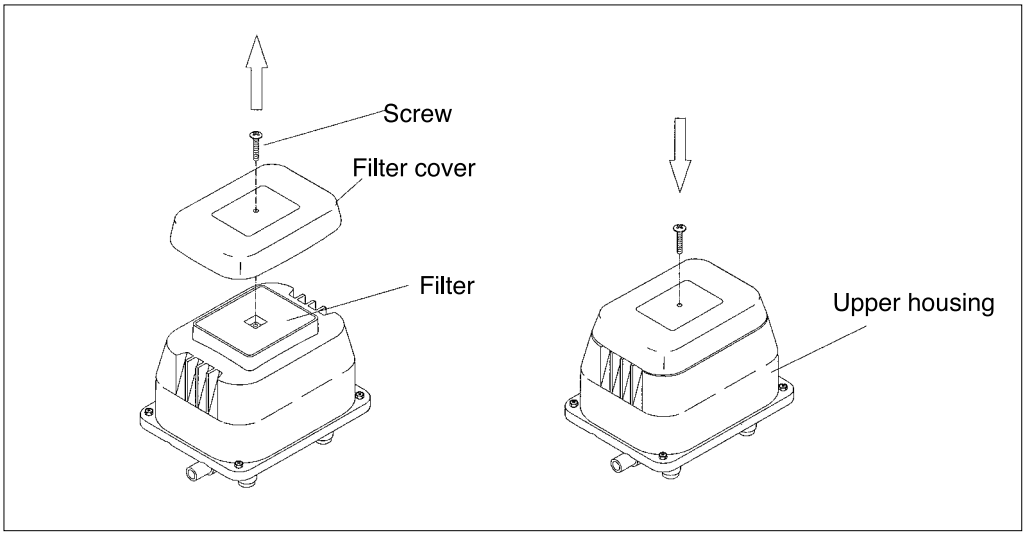
For repairs or replacement parts, please contact the factory, or send unit to an Authorized Service Facility.

Cleaning the filter (Refer to Fig.3)

REPLACEMENT FILTERPAD PART#	
HP-40	40PA000010
HP-60/HP-80	80PA000040
HP-100/HP-100LL/HP-120/HP-120LL/HP-150/HP-200	120PA20010

- Undo the truss screw securing the cover to the pump housing, and remove the Filter pad.
- Gently dust the Filter pad then hand-wash in mild soapy water and be sure to dry well before reinstalling
- Replace the Filter pad and cover. Secure with the truss screw.

Fig. 3



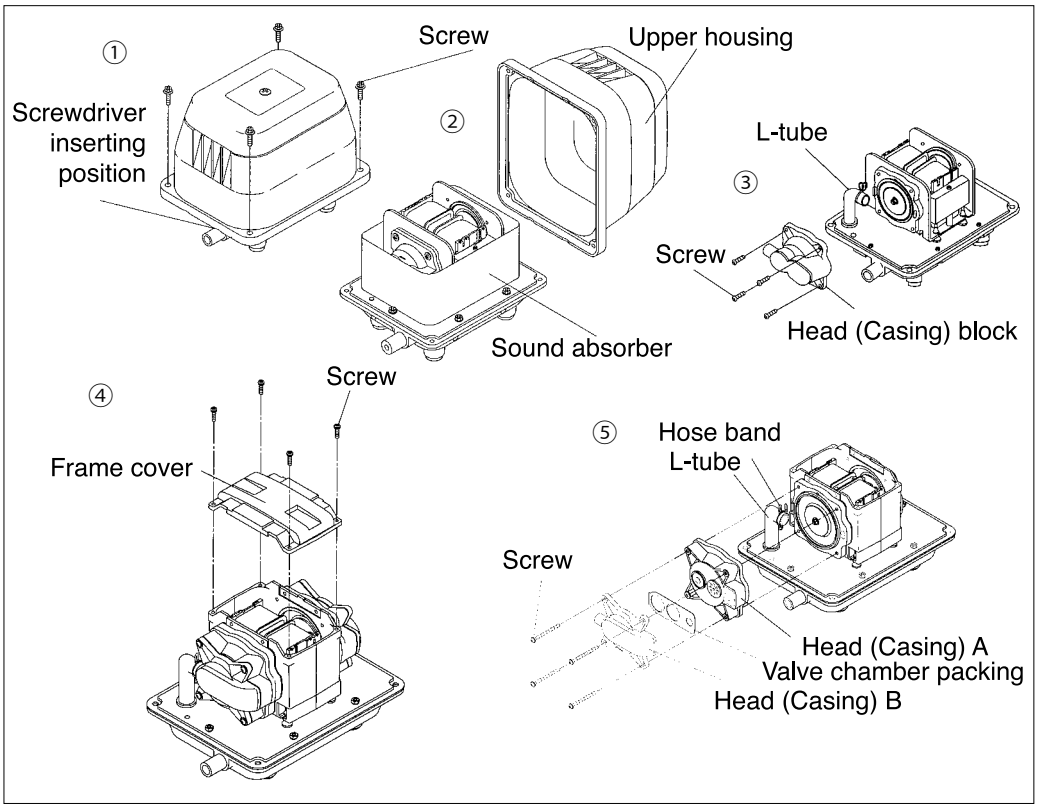
Changing the Pump (Chamber) Assembly-HP Series

REPLACEMENT PUMP ASSEMBLY PART#		CONTENTS
HP-40	40PC000030	Head (Casing) block
HP-60/HP-80	80PC000041	Diaphragm mounting block
HP-100/HP-120	120PC20011	Hex nut (U-lock nut) / washer
HP-100LL/HP-120LL	120PC20021	Safety screw / plastic nut (HP-60 and over)
HP-150/HP-200	200PC20011	

〔1〕 **Remove the Head (Casing) block** (Refer to Fig.4)

- Remove the four corner screws(Refer to Fig.4-①), and the Upper housing. (Refer to Fig.4-②) If stuck, insert screwdriver between exhaust outlet and Upper housing, and gently pry apart.
- Remove the Sound absorber. (Refer to Fig.4-②, except for HP-40, HP-100LL, HP-120LL)
- Remove the screws from all the corners of Frame cover for subsequent removal of the Frame cover. (For HP-100/120, Refer to Fig.4-④)
- Undo the hose band and remove the L-tube from the Head (Casing) block.
- Remove screws attaching the Head (Casing) to the pump mechanism, and remove Head (Casing) block. (Refer to Fig.4-③. For HP-100/120, Refer to Fig.4-⑤)

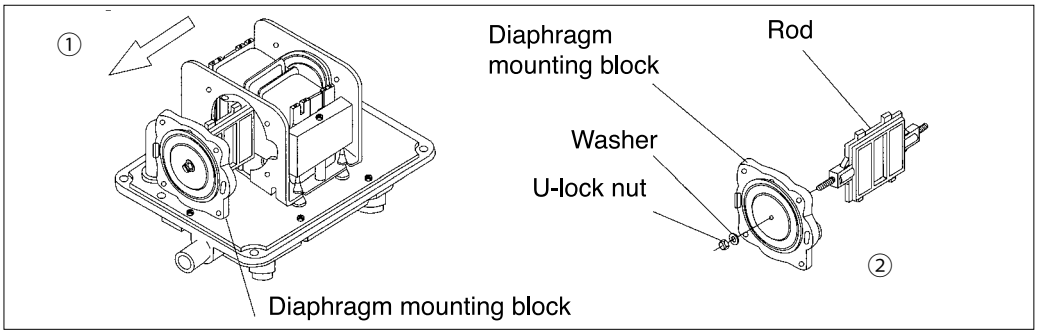
Fig. 4



〔2〕 **Replacing Diaphragm mounting block** (Refer to Fig.5)

- After removing Head (Casing) block, remove one of the hex nut (U-lock nut) and washer in the center of the diaphragm.
- Remove one of the Diaphragm mounting blocks from the Rod, and pull out the other Diaphragm mounting block from the pump body together with the Rod without loosening its hex nut (U-lock nut) and washer. (Refer to Fig.5-①)
- Then remove the other Diaphragm mounting block from the Rod. (Refer to Fig.5-②)
- Reattach a new Diaphragm mounting block on one side of the Rod with new hex nut (U-lock nut) and washer, insert the Rod in accordance with the procedure reverse to that performed when the Rod was removed the pump.
- Reattach washer and new hex nut (U-lock nut) to Rod screw protruding through other Diaphragm mounting block and tighten.

Fig. 5



・After the Diaphragm mounting block have been installed, replace with the new Head (Casing) block, reattaching the L-tube, and reinstall the 4 screws holding the Head (Casing) on. (Refer to Fig.4-③or⑤)

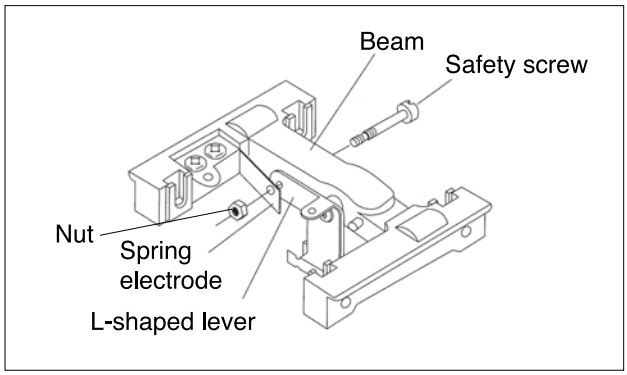
〔3〕 Replacement of Safety Screw (Refer to Fig.6)

SP Switch (For HP-60/HP-80/HP-100/HP-100LL/HP-120/HP-120LL/HP-150/HP-200 Series)

The body of the switch is set on the upper part of the Rod. If the Diaphragm is damaged or unit is dropped, the unusual movement of the Rod will cause the upper part of the Rod to touch the L-shaped lever, contacting the spring terminal, breaking the safety screw. This turns the power off, stopping the pump automatically. This is a built in safety device to prevent any further damage to the pump. To replace SP Screw:

REPLACEMENT SAFETY SCREW PART#
HP-60/HP-80/HP-100/HP-100LL/HP-120/HP-120LL/HP-150/HP-200 ····· PASPSW0200

Fig. 6



・First remove the pump plug from the electrical outlet.

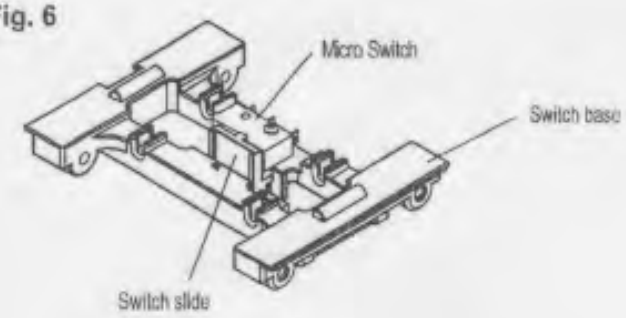
⚠ **WARNING:** All power must be disconnected or deenergized before servicing unit. If hazard is ignored personal injury or property damage is possible.

・Dispose of broken screw. Be sure all debris is removed (may be necessary to turn pump upside down) from unit.
・Fasten screw with plastic nut. The screw is designed so that the nut will turn freely when it is properly fastened, stop tightening when this happens.

〔4〕 Reinstall the Upper housing (Refer to Fig.4)

・Reinstall the 4 screws holding the Frame cover on. (For HP-100/120, Refer to Fig.4-④)
・Reinstall the Sound absorber (except for HP-40, HP-100LL, HP-120LL).
・Reinstall the Upper housing and tighten corner screws. (Refer to Fig.4-①)

Fig. 6



2.How to restart

Warning
Do not touch the power plug and the pump body with wet hands. This can result in electrical shock.
When you work with pumps, make sure the pump is disconnected from power outlet.

Caution
When you work with pumps, make sure the pump is disconnected from power outlet.
If the pump remains connected to the electricity supply,
moving parts may cause injury or there is a possibility of electrocution.
Please make sure to reset the switch after replacement of diaphragm.
Resetting the switch without replacement of diaphragm can damage the switch and be a cause of failure.

1) Pinch the both side of the switch slide and slide it to the center position of the switch base until it clicks into place.

At this time, check that the protrusion of the switch slide is adjusted to the position of "▲" mark and switch part of the micro swich is pressed. (Fig7, Fig8)

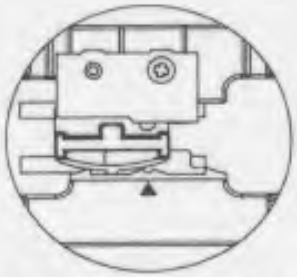


Fig. 7 Operating State

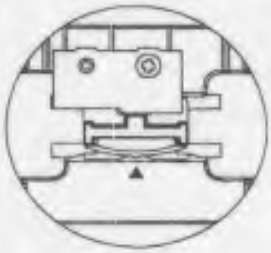


Fig. 8 Reset position

Operation of Compressor Alarm Module

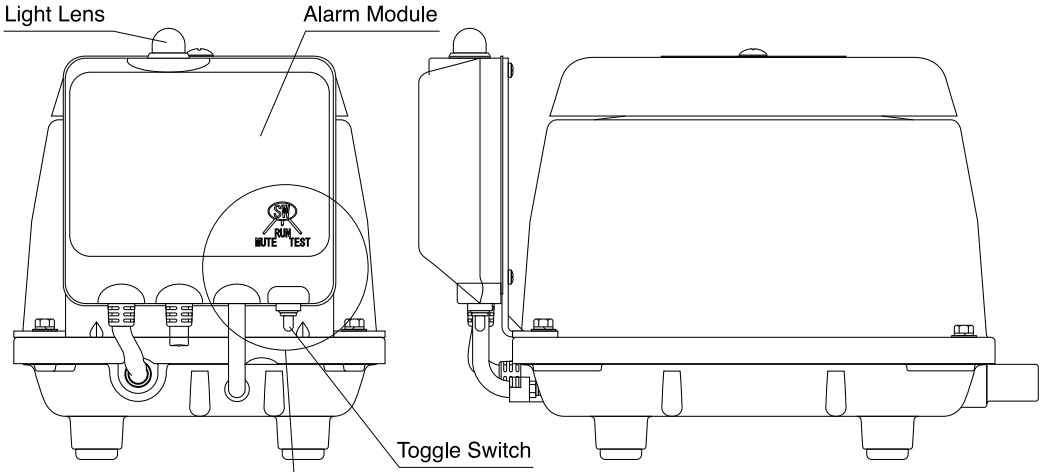
General Information

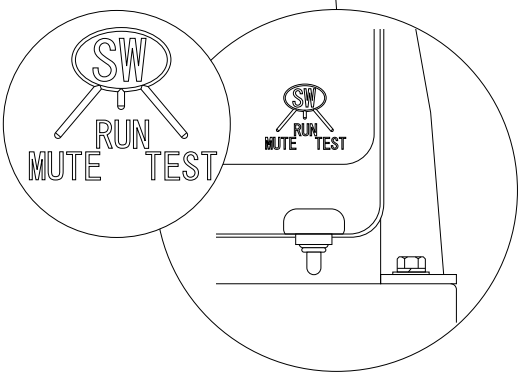
⚠ **Danger:** Do not attempt to open the alarm module. If the unit is connected to electricity, opening of the alarm module can result in a risk of electric shock.

⚠ **Danger:** Service of the alarm module should only be done by a qualified electrician or serviceman.

⚠ **Danger:** If the outside of the alarm module or light lens becomes cracked or damaged, unplug or shut-off the electric power immediately and contact an electrician or serviceman.

⚠ **Caution:** Do not carry the unit by the alarm module or electrical cord. It could damage the alarm module.





The three position toggle switch is clearly labeled on the alarm module.

RUN : During normal operation the switch is in the "RUN" or center position.

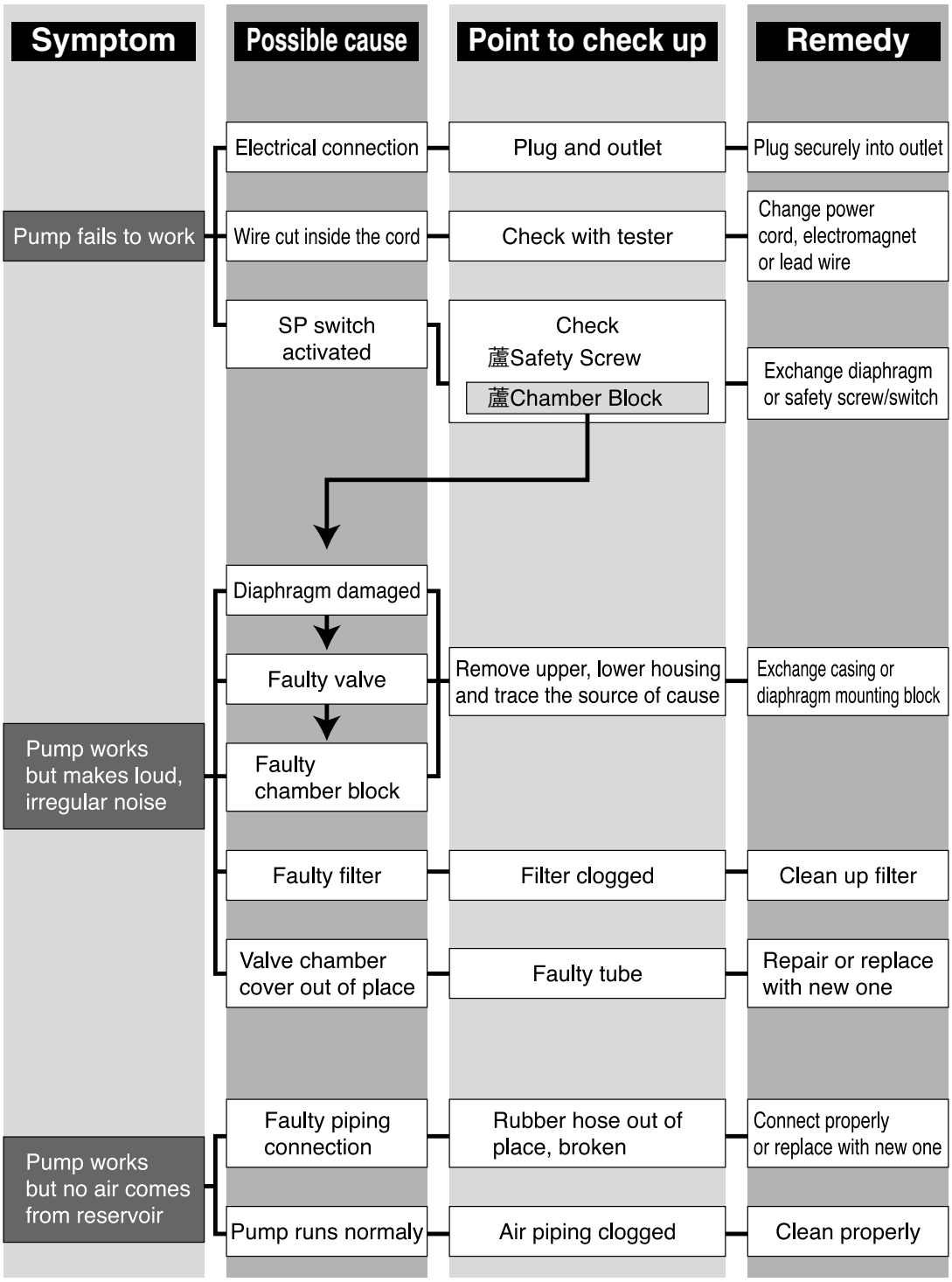
MUTE : The "MUTE" position will silence the audible alarm while leaving the visual alarm operational.

TEST : The "TEST" position will activate both the audible and visual alarms to check to see if they are working.

In Case of an Alarm :

The alarm module audible alarm (buzzer) and visual alarm (light) are intended to signal a system malfunction. Contact your service provider whenever you hear or see the alarm when the switch is in the "RUN" or center position. The "MUTE" position can be used to silence the audible alarm until the service provider arrives.

TROUBLE SHOOTING



9

YOUR WARRANTY

Hiblow products, when properly installed and operated under normal conditions of use, are warranted by Hiblow to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase from Hiblow. In order to obtain performance under this warranty, the buyer must give written notice within thirty (30) days after discovery of the defect to Hiblow USA, Inc., 1300 Tefft Court Suite 8, Saline Michigan USA 48176. Buyer is responsible for freight charges both to and from Hiblow in all cases.

Hiblow's warranties do not extend to any goods or parts which have been subjected to misuse, lack of maintenance, neglect, damage by accident or transit damage.

This warranty excludes all other warranties or representations expressed or implied by any literature, data or person. Hiblow's maximum liability under this exclusive remedy shall never exceed the cost of the subject product and Hiblow reserves the right, at its sole discretion, to refund the purchase price in lieu of repair or replacement.

Hiblow will not be responsible or liable for indirect or consequential damages of any kind, however arising, including but not limited to those for use of any products, loss of time, inconvenience, lost profit, labor charges, or other incidental or consequential damages with respect to persons, business or property, whether as a result of breach of warranty, negligence or otherwise.

Buyer's remedy against Hiblow for goods supplied or for non-delivered goods or failure to furnish goods, whether or not based on negligence, strict liability or breach of expressed or implied warranty is limited solely, at Hiblow's option, to replacement of or cure of such nonconforming goods or non delivered goods or return of the purchase price for such goods and in no event shall exceed the price or charge for such goods. Hiblow expressly disclaims any warranty or merchantability or fitness for a particular use or purpose with respect to goods sold. There are no warranties which extend beyond the descriptions set forth in this warranty, notwithstanding any knowledge of Hiblow regarding the use or uses intended to be made of goods, proposed changes or additions to goods, or any assistance or suggestions that may have been made by Hiblow personnel.

Unauthorized extensions of warranties by the customer shall remain the customer's responsibility.

Customer is responsible for determining the suitability of Hiblow products for customer's use or resale or for incorporating them into objects or applications which customer designs, assembles, constructs or manufactures.

This warranty can be modified only by authorized Hiblow personnel by signing a specific, written description of any modifications.

AUTHORIZED SERVICE CENTER

HIBLOW *USA INC.*
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TEL 734-944-5043 FAX 734-944-5163
http://www.hiblow-usa.com

TECHNO TAKATSUKI CO.,LTD.
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OSAKA, JAPAN 569-0095
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Printed in Japan KA04000840 2JU.0802.500 犠

HIBLOW USA INC.
1300 Tefft Ct. Suite 8, Saline, MI 48176 TEL (734) 944-5032 FAX (734) 944-5163

Diffusers for Waste Water Tank Systems
Supplied by Hiblow USA, Inc.

Physical Properties

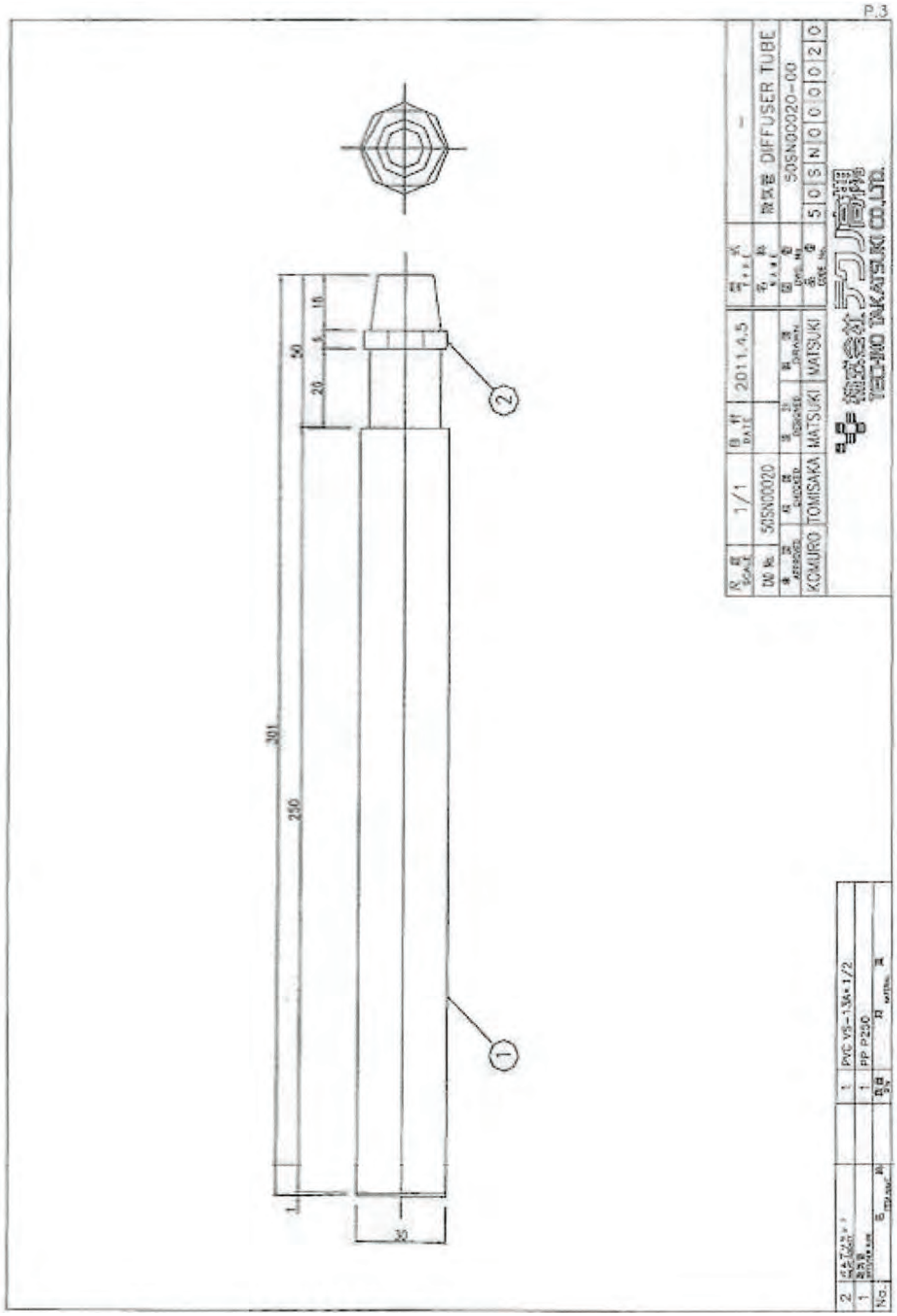
Diffuser / Kind	Diffuser Material	Pore Diameter (micron)	Bend Strength	Compressive Strength	Thermal Deformation ℃ (F)
TP-250	Polypropylene	200-350	30kg or more	900kg or more	115 (239)

Note: "Diffuser Kind" (TP-250) is a general reference to the air diffuser pore diameter.

Air Flow Ratings

Connection	**Length (mm)**	**Diffuser Diameter (mm)**	**Air Flow Liters/min**
Metric thread approximating 1/2 inch NPT Male thread	250	30	30-55

One end is sealed with a cap of hard vinyl chloride.


P.3
DIFFUSER TUBE
50SN00020-00
5 0 S N 0 0 0 2 0
1/1
50SN00020
2011.4.5
KOMURO
TOMISAKA
MATSUKI
MATSUKI
TECHNO TAKATSUKI CO.,LTD.
301
250
50
20
5
15
30
1
2
PVC VS-13A×1/2
PP P250
No.

Performance Data | HE8/HE12/HE20/HE25 HE30/HE35/HE50

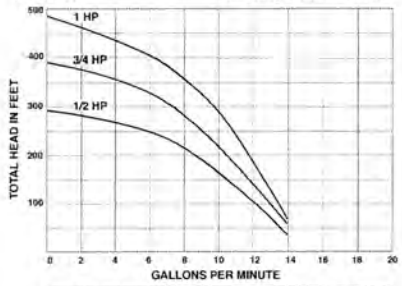
RPM: **3450** Discharge: * Solids: **1/16"**

Wholesale Products Page: 6650-1
Section: Performance Data
Dated: June 2007

High Head Filtered Effluent Pumps

8 GPM

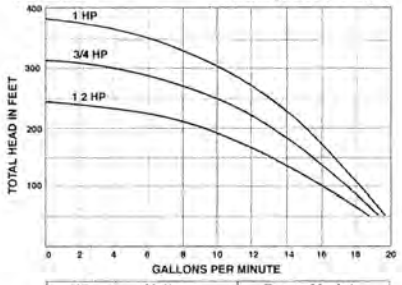
*Discharge Size 1-1/4" NPT



HP	Voltage	Pump Model
½	115	HE8-51
½	230	HE8-52
¾	230	HE8-72
1	230	HE8-12

12 GPM

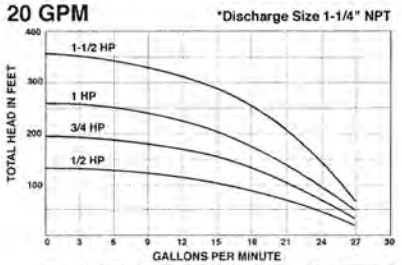
*Discharge Size 1-1/4" NPT



HP	Voltage	Pump Model
½	115	HE12-51
½	230	HE12-52
¾	230	HE12-72
1	230	HE12-12

20 GPM

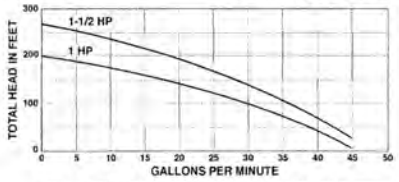
*Discharge Size 1-1/4" NPT



HP	Voltage	Pump Model
½	115	HE20-51
½	230	HE20-52
¾	230	HE20-72
1	230	HE20-12
1½	230	HE20-152

25 GPM

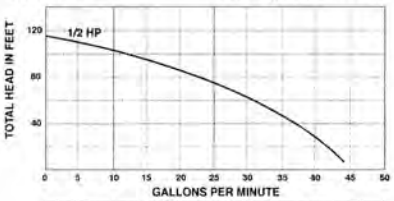
*Discharge Size 2" NPT



HP	Voltage	Pump Model
1	230	HE25-12
1½	230	HE25-152

30 GPM

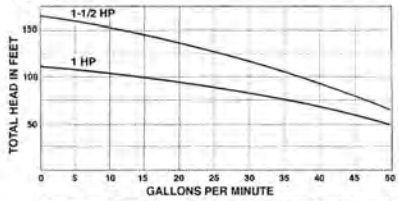
*Discharge Size 1-1/4" NPT



HP	Voltage	Pump Model
½	115	HE30-51

35 GPM

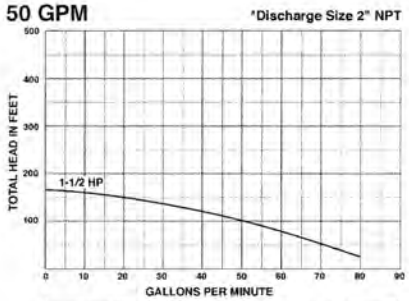
*Discharge Size 2" NPT



HP	Voltage	Pump Model
1	230	HE35-12
1½	230	HE35-152

50 GPM

*Discharge Size 2" NPT



HP	Voltage	Pump Model
1½	230	HE50-152

The curves reflect maximum performance characteristics without exceeding full load (Nameplate) horsepower. All pumps have a service factor of 1.2. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

Conditions of Service:

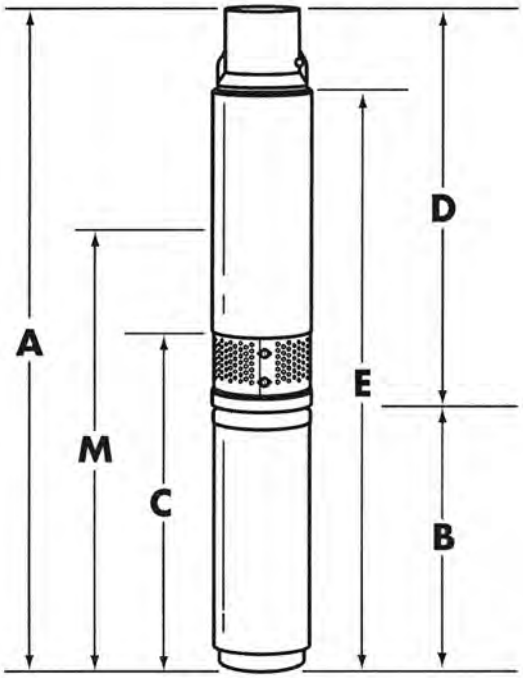
GPM:_____ **TDH:**_____

HYDROMATIC®

Dimensional Data | HE8/HE12/HE20/HE30 HE35/HE50

Wholesale Products Page: 6650-2
Section: Dimensional Data
Dated: June 2007

High Head Filtered Effluent Pumps



A = Overall Pump Height
B = Motor Height
C = Intake Height
D = Pump End Height
E = Bypass Orifice Height
M = Minimum Liquid Level
Discharge = Discharge Size (NPT)

MODEL	A	B	C	D	E	M	DISCHARGE
HE8-51	24-1/4"	9-1/2"	12"	14-3/4"	20-3/4"	19-1/2"	1-1/4"
HE8-52	24-1/4"	9-1/2"	12"	14-3/4"	20-3/4"	19-1/2"	1-1/4"
HE8-72	26"	10-1/2"	13"	15-1/2"	22-1/2"	21"	1-1/4"
HE8-12	29-3/4"	11-3/4"	14-1/4"	18"	26-1/4"	23"	1-1/4"
HE12-51	23-1/4"	9-1/2"	12"	13-3/4"	19-3/4"	20"	1-1/4"
HE12-52	23-1/4"	9-1/2"	12"	13-3/4"	19-3/4"	20"	1-1/4"
HE12-72	26-1/4"	10-1/2"	13"	15-3/4"	22-3/4"	21-1/2"	1-1/4"
HE12-12	29"	11-3/4"	14-1/4"	17-1/4"	25-1/2"	23-1/2"	1-1/4"
HE20-51	23-1/2"	9-1/2"	12"	14"	20"	20"	1-1/4"
HE20-52	23-1/2"	9-1/2"	12"	14"	20"	20"	1-1/4"
HE20-72	25-1/2"	10-1/2"	13"	15"	22"	22"	1-1/4"
HE20-12	27-1/2"	11-3/4"	14-1/4"	15-3/4"	24"	26"	1-1/4"
HE20-152	34-1/4"	15-1/4"	17-3/4"	19"	30-3/4"	27"	1-1/4"
HE30-51	23-1/2"	9-1/2"	12"	14"	20-1/2"	20"	1-1/4"
HE25-12	29-3/4"	11-3/4"	14-1/4"	18"	28"	27"	2"
HE25-152	36-1/4"	15-1/4"	17-3/4"	21"	34-1/2"	29"	2"
HE35-12	26-1/4"	11-3/4"	14-1/4"	14-1/2"	24-1/2"	27"	2"
HE35-152	33-3/4"	15-1/4"	17-3/4"	18-1/2"	32"	29"	2"
HE50-152	34"	15-1/4"	17-3/4"	21"	32-1/4"	29"	2"

All dimensions in inches. Metric for international use. Component dimensions may vary ± 1/8 inch. Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product (s) and the product (s) specifications without notice.

HYDROMATIC®

MODEL: HE8/HE12/HE20/HE25/HE30/HE35/HE50
High Head Filtered Effluent Pumps

R.P.M.	3450
MOTOR PROTECTION	BUILT IN OVERLOAD AND SURGE PROTECTION

HP	VOLTAGE	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS
1/2	115	1	-	1	10.5
1/2	230	1	-	1	6
3/4	230	1	-	1	8
1	230	1	-	1	9.8
1-1/2	230	1	-	1	13.1

HYDROMATIC®

Technical Data | HE8/HE12/HE20/HE25 HE30/HE35/HE50

MODEL: HE8/HE12/HE20/HE25/HE30/HE35/HE50
High Head Filtered Effluent Pumps

Physical Data:

DISCHARGE SIZE (NPT)	(1-1/4" on 8, 12, 20, and 30 GPM pumps) (2" on 25 and 35 GPM pumps)
SOLIDS SIZE	1/16" Diameter
IMPELLER TYPE	
CABLE LENGTH	20' STANDARD 30' OPTIONAL
PAINT	

Temperature:

MAXIMUM LIQUID	122°F
MAXIMUM STATOR	
OIL FLASH POINT	

Technical Data:

POWER CORD TYPE		SJTW, STW-A
MATERIALS OF CONSTRUCTION	MOTOR HOUSING	STAINLESS STEEL
	CASING	STAINLESS STEEL
	IMPELLER	THERMOPLASTIC
	MOTOR SHAFT	
	HARDWARE	STAINLESS STEEL
	"O" RINGS	
MECHANICAL SEALS Standard:		
UPPER BEARING		
LOWER BEARING		

HYDROMATIC®

Submersible Pumps

E-Series Environmental Pumps
Features

Applications:

- Filtered effluent service
- Aeration
- Ornamental fountains/waterfalls

Features:

- Ideal for effluent pumping applications.
- Stainless steel or thermoplastic discharge and motor bracket are tough and non-corrosive. Both materials are highly resistant to damage by minerals, metals and other substances typically found in water.
- Heavy duty, 300 V, 10' SJOOW motor leads.
- Ceramic bearing sleeve has time proven durability for years of reliable service.
- Hex rubber bearing has extra large surface assuring shaft stability and multiple flow channels keeping particles away from bearing surfaces.
- Proven hydraulic staging allows close tolerances and increased performance.
- Carbon phenolic up thrust washer prevents excessive wear in severe applications.
- Removable built in check valve on 10-20 gpm pumps. No built in check valves on high capacity pumps.
- Powered by Franklin Electric submersible motor.

E-Series Environmental Pumps

Ordering Information (See pgs. 2-3 for model number explanation)

Thermoplastic Ordering Information

1/2 - 1.5 HP Single-Phase Units						
GPM	HP	Volt	Wire	Order No.	Model	Wt.
10	1/2	115	2	94741005	10FE05P4-2W115	25
	1/2	230	2	94741010	10FE05P4-2W230	25
	3/4	230	2	94741015	10FE07P4-2W230	29
	1	230	2	94741020	10FE1P4-2W230	33
	1.5	230	2	94741025	10FE15P4-2W230	41
20	1/2	115	2	94742005	20FE05P4-2W115	24
	1/2	230	2	94742010	20FE05P4-2W230	24
	3/4	230	2	94742015	20FE07P4-2W230	28
	1	230	2	94742020	20FE1P4-2W230	31
	1.5	230	2	94742025	20FE15P4-2W230	39

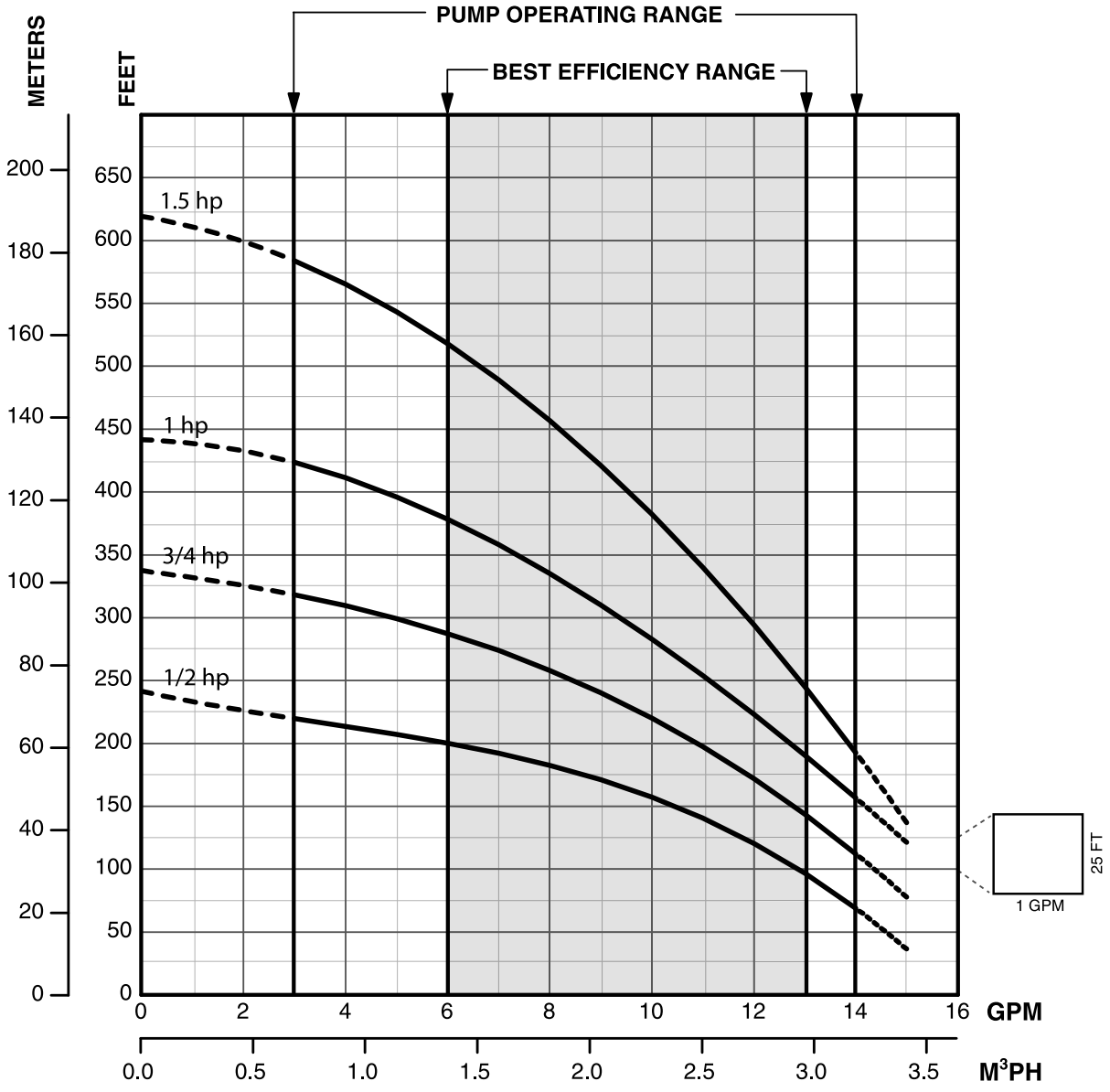
1/2 - 2 HP Pump Ends						
GPM	HP	Volt	Wire	Order No.	Model	Wt.
10	1/2	N/A	2	94751005	10FE05P4-PE	7
	3/4	N/A	N/A	94751010	10FE07P4-PE	8
	1	N/A	N/A	94751015	10FE1P4-PE	9
	1.5	N/A	N/A	94751020	10FE15P4-PE	10
20	1/2	N/A	N/A	94752005	20FE05P4-PE	6
	3/4	N/A	N/A	94752010	20FE07P4-PE	6
	1	N/A	N/A	94752015	20FE1P4-PE	7
	1.5	N/A	N/A	94752020	20FE15P4-PE	8
	2	N/A	N/A	94752025	20FE2P4-PE	9

Notes: Discharge is 1-1/4″ NPT. Maximum diameter across cable guard is 3.90″ on all models. Weight in pounds.

Submersible Pumps

E-Series Environmental Pumps

Thermoplastic - 10 GPM Performance Curves



E-Series Environmental Pumps

Thermoplastic - 10 GPM Performance Charts

Capacities in U.S. Gallons per Minute

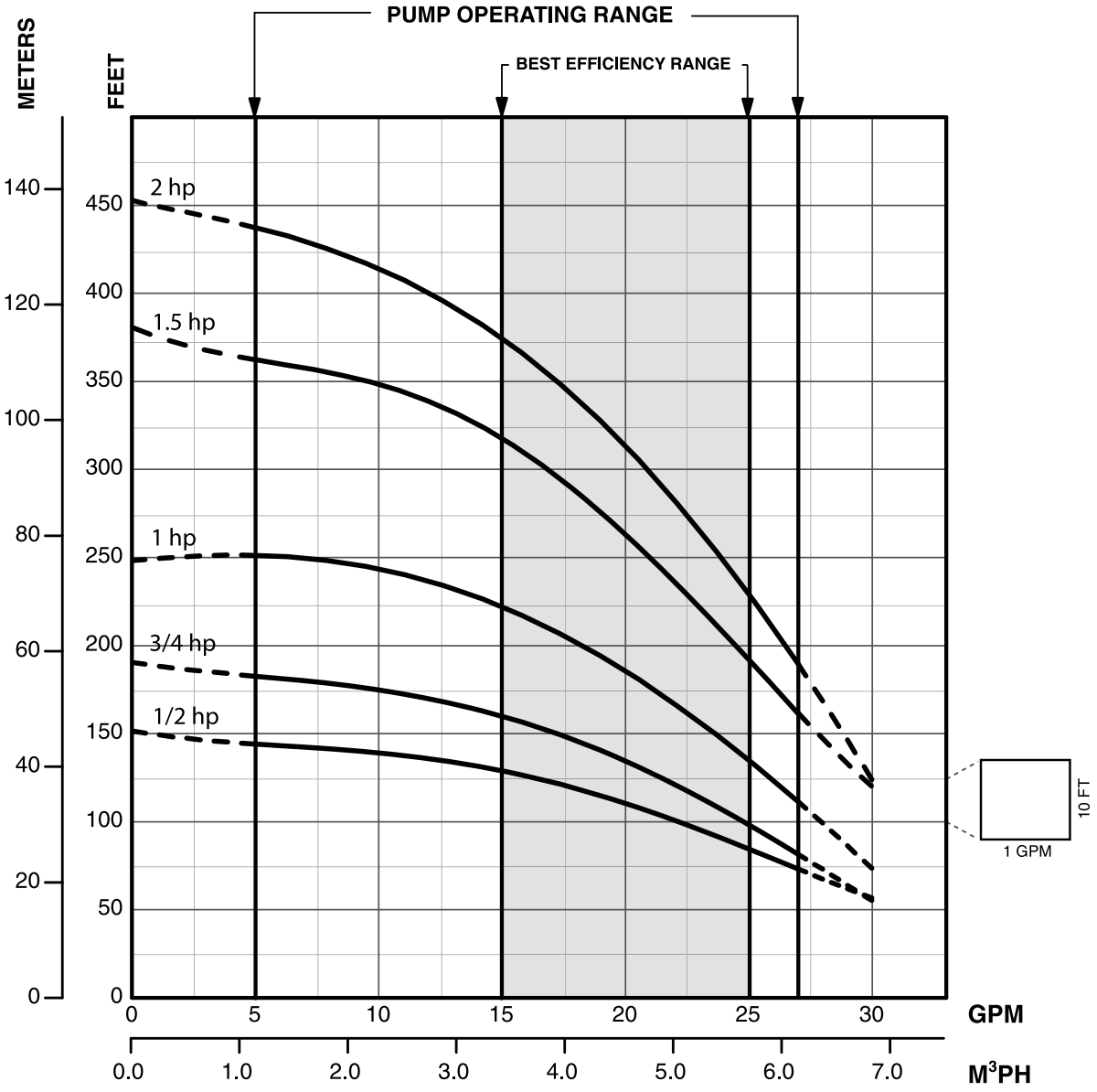
HP	PSI	Depth to Pumping Water Level, or Lift, in Feet. Shaded Areas Indicate Most Efficient Performance																	
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	600	
1/2	0			14	14	13	12	11	10	8	6									Shut-off 242 ft
	20	14	13	13	12	11	9	8	5											
	30	13	12	12	11	9	7	5												
	40	12	11	10	9	7	4													
	50	11	10	9	6	4														
	60	10	8	6	3															
	70	8	6	3																
	80	5																		
Shut-off PSI		96	87	79	70	61	53	44	35	27	18									
3/4	0					14	14	13	12	12	11	8	5							Shut-off 337 ft
	20			14	14	13	12	11	11	10	9	5								
	30		14	13	13	12	11	10	10	9	7	3								
	40	14	13	13	12	11	10	9	8	7	6									
	50	13	13	12	11	10	9	8	7	5	3									
	60	13	12	11	10	9	8	7	5	3										
	70	12	11	10	9	8	6	5												
	80	11	10	9	8	6	4													
Shut-off PSI		137	129	120	111	103	94	85	77	68	59	38	16							
1	0							14	14	13	13	11	9	7	5					Shut-off 441 ft
	20					14	14	13	13	12	11	9	8	5						
	30				14	14	13	13	12	11	10	9	7	3						
	40			14	13	13	12	12	11	10	10	8	5							
	50	14	14	13	13	12	12	11	10	9	9	7	4							
	60	14	13	13	12	12	11	10	9	9	8	6								
	70	13	13	12	11	11	10	9	8	8	7	4								
	80	13	12	11	11	10	9	8	8	7	6									
Shut-off PSI		182	174	165	156	148	139	130	122	113	105	83	61	40	18					
1.5	0									14	14	13	12	11	9	8	7	5		Shut-off 619 ft
	20						14	14	14	13	13	12	11	10	8	7	5			
	30					14	14	14	13	13	13	12	10	9	8	6	4			
	40				14	14	14	13	13	13	12	11	10	8	7	5				
	50			14	14	14	13	13	12	12	12	10	9	8	6	4				
	60		14	14	14	13	13	12	12	12	11	10	8	7	5	3				
	70	14	14	13	13	13	12	12	11	11	10	9	8	6	4					
	80	14	13	13	13	12	12	11	11	10	10	9	7	5	3					
Shut-off PSI		259	251	242	233	225	216	207	199	190	181	160	138	117	95	73	52	30	8	

Notes: 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

Submersible Pumps

E-Series Environmental Pumps

Thermoplastic - 20 GPM Performance Curves



E-Series Environmental Pumps

Thermoplastic - 20 GPM Performance Charts

Capacities in U.S. Gallons per Minute

HP	PSI	Depth to Pumping Water Level, or Lift, in Feet. Shaded Areas Indicate Most Efficient Performance																	
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	
1/2	0				26	22	18	9											Shut-off 152 ft
	20		24	21	16														
	30	24	21	15															
	40	20	13																
	50	12																	
	60																		
	70																		
	80																		
Shut-off PSI		57	48	40	31	22	14	5											
3/4	0				27	25	22	19	15	7									Shut-off 191 ft
	20		26	24	21	18	13												
	30	26	24	21	18	12													
	40	23	20	17	11														
	50	20	16	9															
	60	15	8																
	70	6																	
	80																		
Shut-off PSI		74	65	57	48	39	31	22	13	5									
1	0						26	25	23	20	18	6							Shut-off 251 ft
	20			27	26	24	22	20	18	15	8								
	30		27	26	24	22	19	17	14	7									
	40	27	25	23	21	19	17	13											
	50	25	23	21	19	16	12												
	60	23	21	18	16	11													
	70	20	18	15	10														
	80	18	15	9															
Shut-off PSI		100	91	83	74	65	57	48	40	31	22	1							
1.5	0								27	26	24	21	17	9					Shut-off 379 ft
	20						27	25	24	23	21	17	10						
	30					26	25	24	22	21	20	15							
	40				26	25	23	22	21	19	18	11							
	50		27	26	25	23	22	21	19	17	15								
	60	27	26	24	23	22	20	19	17	15	11								
	70	26	24	23	21	20	19	17	14	11	5								
	80	24	23	21	20	18	16	14	10										
Shut-off PSI		156	147	138	130	121	112	104	95	86	78	56	34	13					
2	0									27	27	24	21	17	12				Shut-off 452 ft
	20							27	26	25	24	21	18	13					
	30						27	26	25	24	23	19	16	9					
	40					27	26	25	24	23	21	18	13						
	50				27	26	25	24	22	21	20	16	10						
	60		27	27	26	25	23	22	21	19	18	14	5						
	70	27	27	26	24	23	22	21	19	18	16	10							
	80	26	25	24	23	22	20	19	18	16	14	6							
Shut-off PSI		187	178	170	161	153	144	135	127	118	109	88	66	44	23				

Notes: 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

Submersible Pumps

E-Series Environmental Pumps

Ordering Information (See pgs. 2-3 for model number explanation)

Stainless Steel Ordering Information

1/2 - 1.5 HP Single-Phase Units						
GPM	**HP**	**Volt**	**Wire**	**Order No.**	**Model**	**Wt.**
35	1/2	115	2	94743505	35FE05S4-2W115	25
	1/2	230	2	94743510	35FE05S4-2W230	25
	3/4	230	2	94743515	35FE07S4-2W230	29
	1	230	2	94743520	35FE1S4-2W230	33
	1.5	230	2	94743525	35FE15S4-2W230	39
45	1/2	115	2	94744505	45FE05S4-2W115	28
	1/2	230	2	94744510	45FE05S4-2W230	28
	3/4	230	2	94744515	45FE07S4-2W230	33
	1	230	2	94744520	45FE1S4-2W230	36
	1.5	230	2	94744525	45FE15S4-2W230	44
60	1/2	115	2	94746005	60FE05S4-2W115	29
	1/2	230	2	94746010	60FE05S4-2W230	29
	3/4	230	2	94746015	60FE07S4-2W230	33
	1	230	2	94746020	60FE1S4-2W230	37
	1.5	230	2	94746025	60FE15S4-2W230	45
90	1.5	230	2	94749025	90FE15S4-2W230	44

Notes: Maximum diameter across cable guard is 3.90″ on all models. Weight in pounds.
Discharge is 2″ NPT with no built in check valve.

E-Series Environmental Pumps

Ordering Information (See pgs. 2-3 for model number explanation)

Stainless Steel Ordering Information

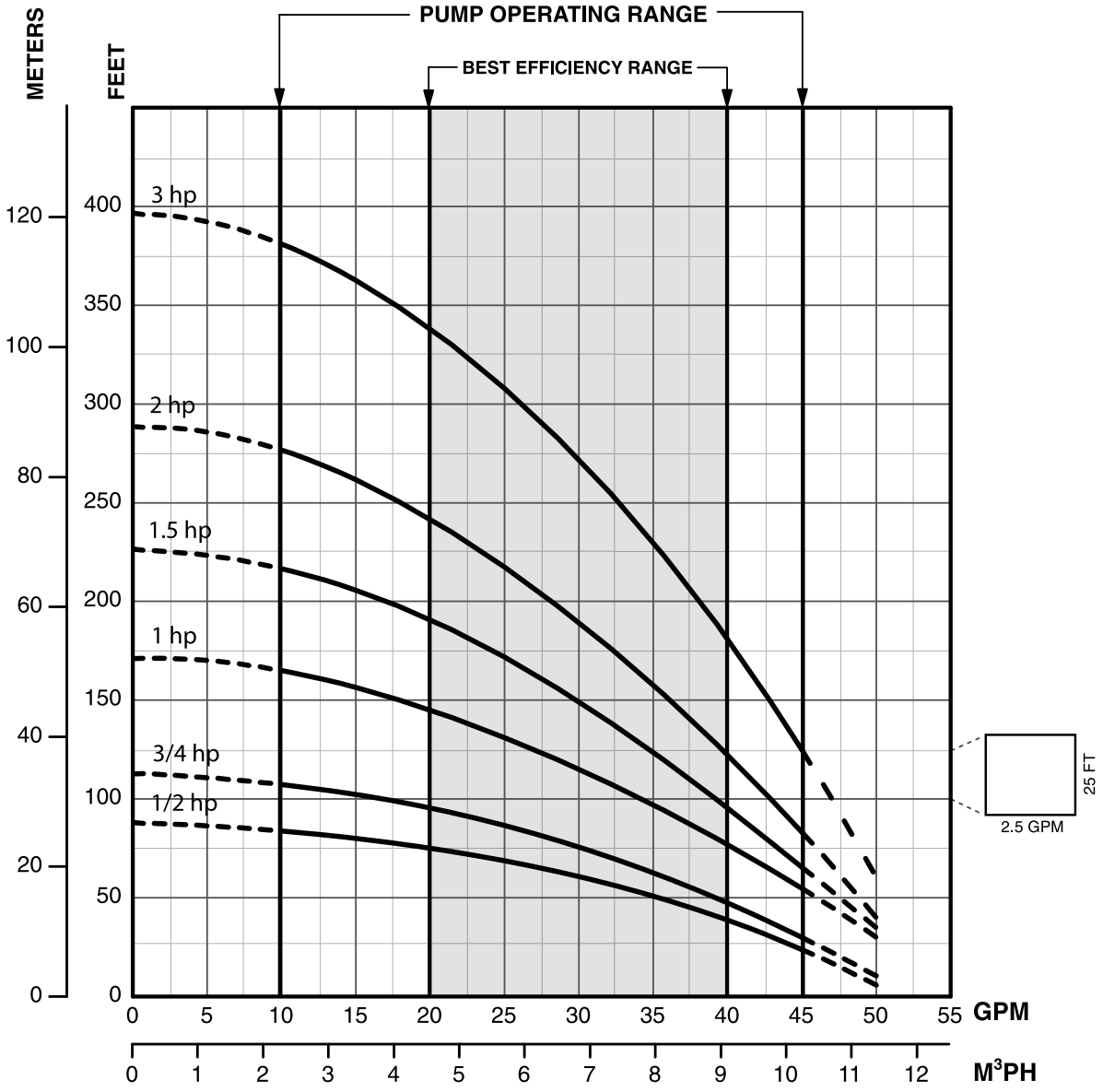
1/2 - 3 HP Pump Ends				
GPM	**HP**	**Order No.**	**Model**	**Wt.**
35	1/2	94753505	35FE05S4-PE	7
	3/4	94753510	35FE07S4-PE	8
	1	94753515	35FE1S4-PE	9
	1.5	94753520	35FE15S4-PE	10
	2	94753525	35FE2S4-PE	11
	3	94753530	35FE3S4-PE	12
45	1/2	94754505	45FE05S4-PE	10
	3/4	94754510	45FE07S4-PE	11
	1	94754515	45FE1S4-PE	12
	1.5	94754520	45FE15S4-PE	15
	2	94754525	45FE2S4-PE	16
	3	94754530	45FE3S4-PE	19
60	1/2	94756005	60FE05S4-PE	11
	3/4	94756010	60FE07S4-PE	12
	1	94756015	60FE1S4-PE	13
	1.5	94756020	60FE15S4-PE	14
	2	94756025	60FE2S4-PE	15
	3	94756030	60FE3S4-PE	17
90	1.5	94759020	90FE15S4-PE	15
	2	94759025	90FE2S4-PE	15
	3	94759030	90FE3S4-PE	17

Notes: Maximum diameter across cable guard is 3.90″ on all models. Weight in pounds.
Discharge is 2″ NPT with no built in check valve.

Submersible Pumps

E-Series Environmental Pumps

Stainless Steel - 35 GPM Performance Curves



E-Series Environmental Pumps

Stainless Steel - 35 GPM Performance Charts

Capacities in U.S. Gallons per Minute

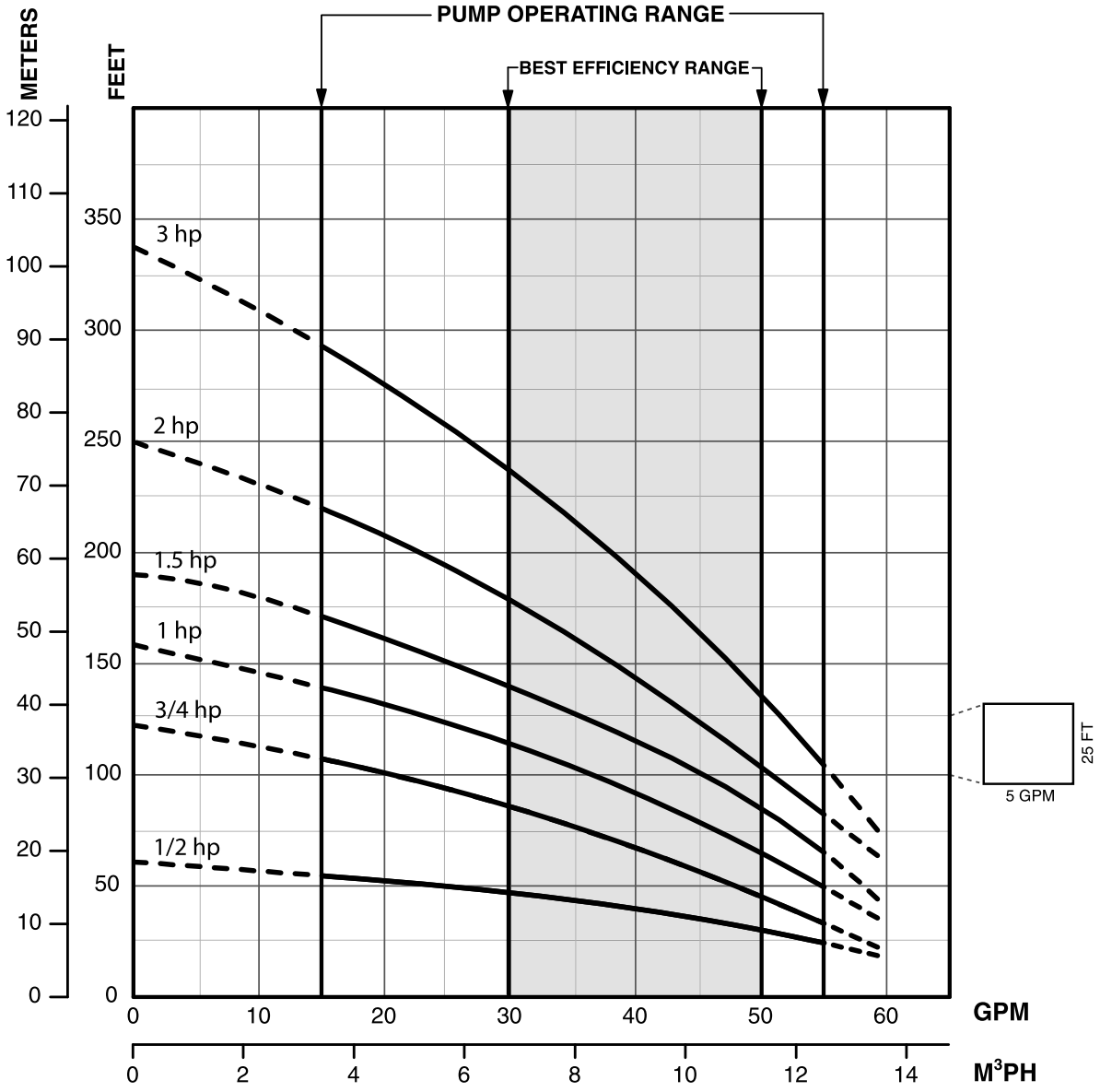
HP	PSI	Depth to Pumping Water Level, or Lift, in Feet. Shaded Areas Indicate Most Efficient Performance																	
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	
1/2	0		40	30	15														Shut-off 88 ft
	10	38	29	11															
	20	27																	
	30																		
	40																		
	50																		
Shut-off PSI		29	21	12	3														
3/4	0		42	36	28	17													Shut-off 113 ft
	10	42	35	27	14														
	20	33	25	11															
	30	24																	
	40																		
	50																		
Shut-off PSI		40	32	23	14	6													
1	0			44	40	34	28	22	13										Shut-off 171 ft
	10		43	39	33	27	21	11											
	20	43	38	32	26	20													
	30	37	31	26	19														
	40	30	25	17															
	50	24	16																
	60	14																	
Shut-off PSI		65	57	48	39	31	22	13	5										
1.5	0				43	40	36	31	27	23	18								Shut-off 226 ft
	10		45	42	39	35	31	27	23	16									
	20	45	42	38	34	30	26	22	15										
	30	41	38	34	30	26	21	13											
	40	37	33	29	25	20	12												
	50	32	28	24	19	10													
	60	28	24	18															
	70	23	17																
	80	16																	
Shut-off PSI		89	81	72	63	55	46	37	29	20	11								
2	0				45	43	41	38	34	31	28	19							Shut-off 288 ft
	10			45	43	40	37	34	31	27	24	11							
	20		45	42	40	37	33	30	27	24	20								
	30	44	42	39	36	33	30	26	23	19	12								
	40	42	39	36	32	29	26	22	18	11									
	50	38	35	32	29	25	22	17	10										
	60	35	31	28	25	21	16												
	70	31	28	24	21	15													
	80	27	24	20	14														
Shut-off PSI		116	107	99	90	81	73	64	55	47	38	16							
3	0						45	44	42	40	38	32	26	18					Shut-off 396 ft
	10					45	44	42	40	38	36	29	23	12					
	20				45	44	42	40	38	35	33	27	19						
	30			45	43	42	39	37	35	32	30	24	13						
	40		45	43	41	39	37	34	32	30	27	20							
	50	44	43	41	39	36	34	32	29	27	24	14							
	60	43	41	38	36	34	31	29	26	24	21								
	70	40	38	36	33	31	28	26	23	20	15								
	80	38	35	33	30	28	26	23	19	15									
Shut-off PSI		163	154	145	137	128	119	111	102	94	85	63	42	20					

Notes: 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

Submersible Pumps

E-Series Environmental Pumps

Stainless Steel - 45 GPM Performance Curves



E-Series Environmental Pumps

Stainless Steel - 45 GPM Performance Charts

Capacities in U.S. Gallons per Minute

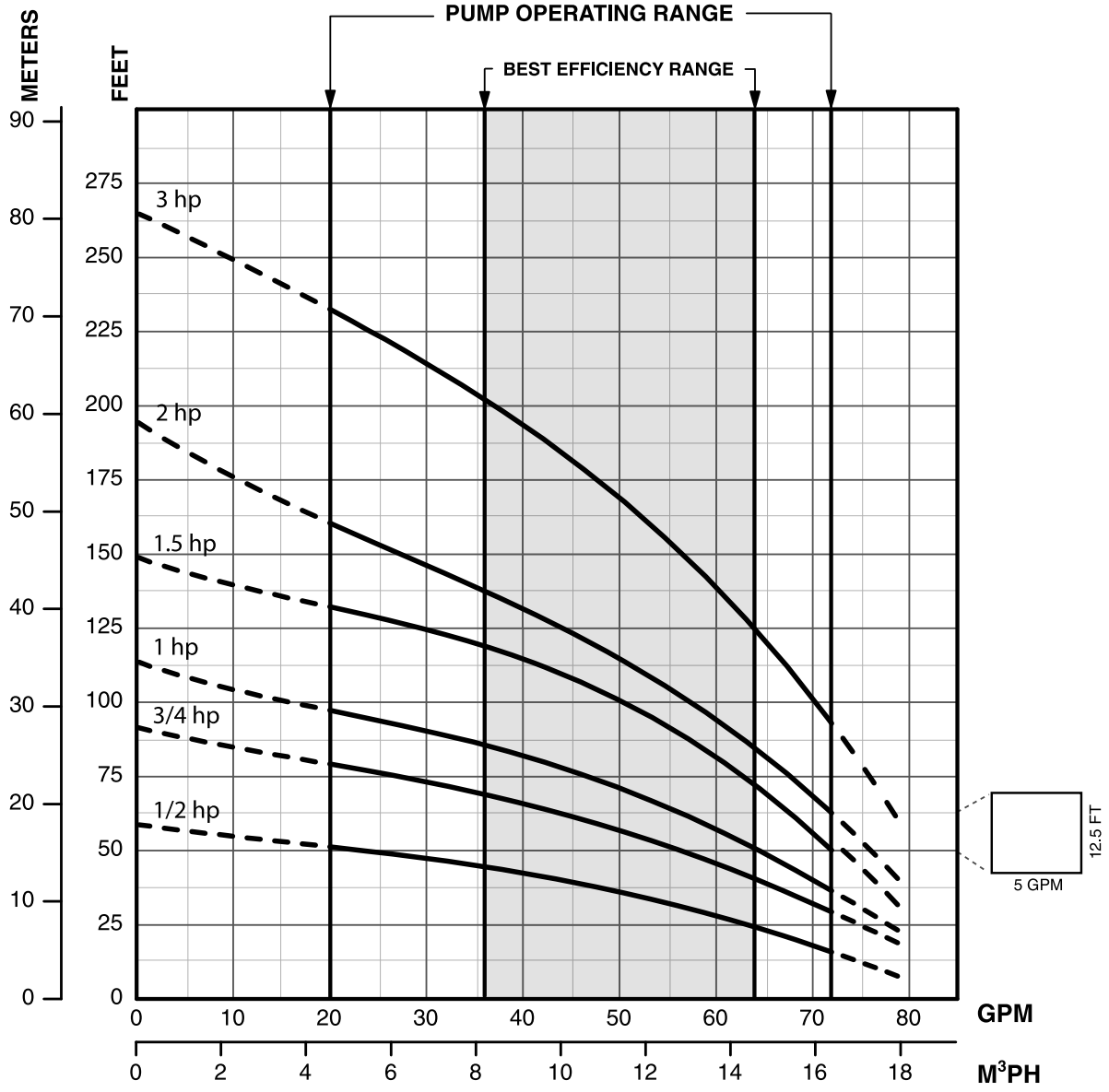
HP	PSI	Depth to Pumping Water Level, or Lift, in Feet. Shaded Areas Indicate Most Efficient Performance																	
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	
1/2	0		40																Shut-off 61 ft
	10	36																	
	20																		
	30																		
	40																		
	50																		
Shut-off PSI		18	9																
3/4	0		52	43	33	21													Shut-off 122 ft
	10	51	42	32	18														
	20	40	30	16															
	30	28																	
	40																		
	50																		
Shut-off PSI		44	36	27	18	10													
1	0			52	45	37	27												Shut-off 158 ft
	10		51	43	35	25													
	20	49	42	34	23														
	30	41	32	21															
	40	31	20																
	50	17																	
Shut-off PSI		60	51	43	34	25	17												
1.5	0				52	46	38	30	21										Shut-off 190 ft
	10		55	51	44	37	28	19											
	20	55	50	43	35	27	18												
	30	49	42	34	26	16													
	40	41	33	24															
	50	32	23																
	60	22																	
Shut-off PSI		74	65	56	48	39	30	22	13										
2	0				55	51	46	41	36	30	23								Shut-off 250 ft
	10			55	50	45	40	35	29	22									
	20		54	49	44	39	34	28	21										
	30	53	49	44	38	33	27	19											
	40	48	43	38	32	26	18												
	50	42	37	31	24	17													
	60	36	30	23	16														
Shut-off PSI		99	91	82	73	65	56	48	39	30	22								
3	0					56	53	49	46	42	38	27							Shut-off 337 ft
	10				55	52	49	45	41	37	33	21							
	20			55	52	48	45	41	37	32	28								
	30		54	51	48	44	40	36	32	27	22								
	40	54	51	47	44	40	35	31	26	21	15								
	50	50	47	43	39	35	30	25	20										
	60	46	42	38	34	30	25	19											
	70	42	38	33	29	24	18												
	80	37	33	28	23	17													
	90	32	27	22	16														
	100	27	21	16															
Shut-off PSI		137	129	120	111	103	94	85	77	68	59	38							

Notes: 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

Submersible Pumps

E-Series Environmental Pumps

Stainless Steel - 60 GPM Performance Curves



E-Series Environmental Pumps

Stainless Steel - 60 GPM Performance Charts

Capacities in U.S. Gallons per Minute

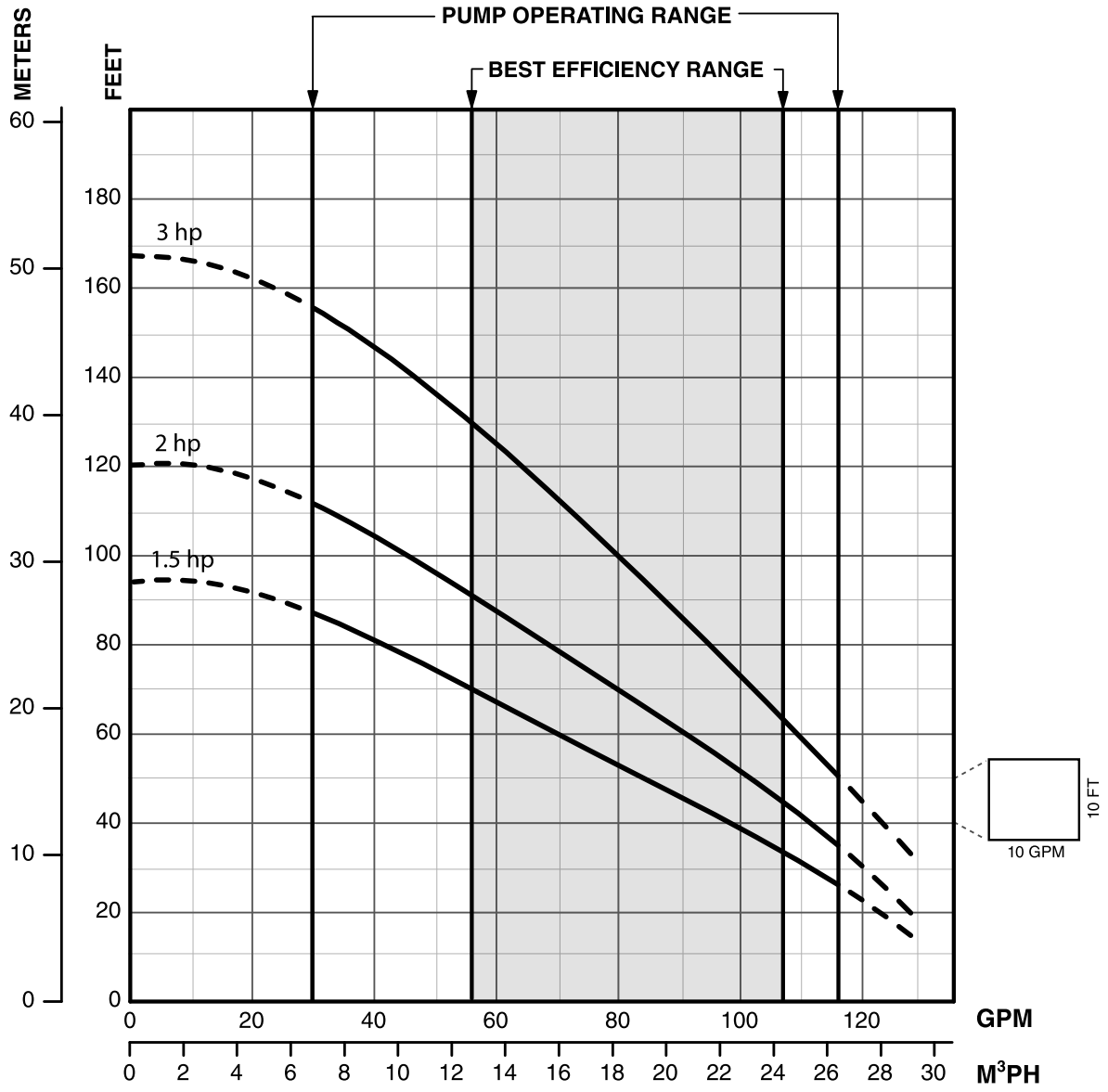
HP	PSI	Depth to Pumping Water Level, or Lift, in Feet. Shaded Areas Indicate Most Efficient Performance																	
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	
1/2	0	68	44																Shut-off 59 ft
	10	39																	
	20																		
	30																		
	40																		
	50																		
Shut-off PSI		17	8																
3/4	0		64	47															Shut-off 92 ft
	10	62	43																
	20	40																	
	30																		
	40																		
	50																		
Shut-off PSI		31	22	14															
1	0		70	58	42														Shut-off 114 ft
	10	68	56	39															
	20	54	35																
	30	31																	
	40																		
	50																		
Shut-off PSI		41	32	23	15														
1.5	0			69	61	51	34												Shut-off 149 ft
	10		67	59	49	31													
	20	66	58	47	27														
	30	57	44	24															
	40	42	20																
	50																		
Shut-off PSI		56	47	39	30	21	13												
2	0				66	57	47	34	21										Shut-off 195 ft
	10		72	65	56	45	32												
	20	71	64	54	43	30													
	30	62	53	41	28														
	40	51	39	26															
	50	37	24																
	60	22																	
Shut-off PSI		76	67	58	50	41	32	24	15										
3	0					70	65	60	53	46	37								Shut-off 265 ft
	10				70	64	59	52	45	36	25								
	20			69	64	58	51	43	34	24									
	30		68	63	57	50	42	33	22										
	40	67	62	56	49	41	31	20											
	50	61	55	48	39	29													
	60	54	46	38	28														
Shut-off PSI		106	98	89	80	72	63	54	46	37	28								

Notes: 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

Submersible Pumps

E-Series Environmental Pumps

Stainless Steel - 90 GPM Performance Curves



E-Series Environmental Pumps

Stainless Steel - 90 GPM Performance Charts

Capacities in U.S. Gallons per Minute

HP	PSI	Depth to Pumping Water Level, or Lift, in Feet. Shaded Areas Indicate Most Efficient Performance																
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	
1.5	0		99	69	43														Shut-off 95 ft
	10	94	65	38															
	20	61	32																
	30																		
	40																		
	50																		
Shut-off PSI		32	24	15	6														
2	0		112	91	68	47													Shut-off 121 ft
	10	109	88	65	43														
	20	84	61	39															
	30	58	34																
	40																		
	50																		
Shut-off PSI		44	35	26	18	9													
3	0			110	96	79	64	48											Shut-off 167 ft
	10		108	93	77	61	45												
	20	106	91	74	59	42													
	30	88	72	57	38														
	40	69	54	34															
	50	52	30																
Shut-off PSI		64	55	46	38	29	20	12											

Notes: 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

PROPLUS™

The ProPlus™ is packed with features that ensure reliability, saving the installer time, money and needless frustration.

- **Revolutionary Patented Easy Arc Set** – Simplified arc set allows for wet or dry adjustment in seconds.
- **5" Riser** – Perfect for grasses with thick thatch.
- **3/4" Inlet**–Replaces all standard rotors.
- **2N1 Adjustable or Continuous Rotation** – Provides a full range adjustment from 40° to a continuous full circle.
- **Patented Arc Set Degree Markings** – Clearly indicates the current watering pattern and simplifies arc set adjustment.
- **Arc Memory Clutch** – Prevents internal gear damage and returns rotor to its prior setting automatically if nozzle turret is forced past its stop.
- **Time Proven Patented Reversing Mechanism** – Assures continuous reverse and return…over a 20 year history.
- **Ratcheting Riser** – Allows for easy adjustment of your left starting position with a simple turn of the riser.
- **Rubber Cover** – Seals out dirt and increases product durability.
- **Wide Selection of Nozzles** – Including standard and low angle, provides flexibility in system design.
- **Optional Check Valve** – Prevents low head drainage.

K RAIN®

IRRIGATION SOLUTIONS WORLDWIDE™

PROPLUS™

The **PROPLUS**™ adjustable arc and full-circle gear driven rotor comes standard with nine numerically coded interchangeable nozzles. Excellent nozzle performance delivers an exceptional fall out pattern. In independent testing by C.I.T., the **PROPLUS**™ delivered up to 90% uniform coverage.

Also Available: 12" High Pop, Shrub Head and Reclaimed Water models.

Tough, proven and advanced, the **PROPLUS**™ is the leader in it's class. Set it and forget it. Arc Memory Clutch returns the rotor to its preset position. Technology works for you.

MODELS

11003	Pro*Plus*
11003-HP	Pro*Plus* 12" High Pop
11003-SH	Pro*Plus* Shrub Head

OTHER OPTIONS: ADD TO PART NUMBER

-CV	Check Valve
-LA	Low Angle Nozzle
-NN	No Nozzle
-RCW	Pro*Plus* for Reclaimed Water w/Low Angle Nozzle

EASY ARC SETTING

Arc Selection 40° to Continuous 360°

Adjust From Left Start

HOW TO SPECIFY

11003	-RCW
Model Number	Description

K-Rain Manufacturing Corp.
1640 Australian Avenue
Riviera Beach, FL 33404 USA
+1 561 844-1002
FAX: +1 561 842-9493
1.800.735.7246 | www.krain.com

SPECIFICATIONS

- Inlet: 3/4" Threaded NPT
- Arc Adjustment Range: 40° to Continuous 360°
- Flow Range: .5 - 10.0 GPM
- Pressure Rating: 20 - 70 PSI
- Precipitation Rate: .06 to .50 Inches Per Hour (Depending on Spacing and Nozzle Used)
- Overall Height (Popped Down): 7 1/2" / 17" for High Pop
- Recommended Spacing: 28' to 44'
- Radius: 22' to 50'
- Nozzle Trajectory: 26°
- Low Angle Nozzle Trajectory: 12°
- Standard and Low Angle Nozzle: Included
- Riser Height: 5"

PERFORMANCE DATA

PERFORMANCE

NOZZLES	PRESSURE PSI	RADIUS FT.	FLOW GPM
#0.5	30	28'	.5
	40	29'	.6
	50	29'	.7
	60	30'	.8
#0.75	30	29'	.7
	40	30'	.8
	50	31'	.9
	60	32'	1.0
#1	30	32'	1.3
	40	33'	1.5
	50	34'	1.6
	60	35'	1.8
#2	30	37'	2.4
	40	40'	2.5
	50	42'	3.0
	60	43'	3.3
#2.5 PRE-INSTALLED	30	38'	2.5
	40	39'	2.8
	50	40'	3.2
	60	41'	3.5
#3	30	38'	3.6
	40	39'	4.2
	50	41'	4.6
	60	42'	5.0
#4	30	43'	4.4
	40	44'	5.1
	50	46'	5.6
	60	49'	5.9
#6	40	45'	5.9
	50	46'	6.0
	60	48'	6.3
	70	49'	6.7
#8	40	42'	8.0
	50	45'	8.5
	60	49'	9.5
	70	50'	10.0

METRIC

NOZZLES	PRESSURE KPA	PRESSURE BARS	RADIUS METERS	FLOW L/M	FLOW M3/H
#0.5	206	2.0	8.5	1.89	.11
	275	3.0	8.8	2.27	.14
	345	3.5	8.8	2.65	.16
	413	4.0	9.1	3.03	.18
#0.75	206	2.0	8.8	2.65	.16
	275	3.0	9.1	3.03	.18
	345	3.5	9.4	3.41	.20
	413	4.0	9.8	3.79	.23
#1	206	2.0	9.8	4.92	.30
	275	3.0	10.1	5.68	.34
	345	3.5	10.4	6.05	.36
	413	4.0	10.7	6.81	.41
#2	206	2.0	11.3	9.08	.54
	275	3.0	12.2	9.46	.56
	345	3.5	12.8	11.35	.68
	413	4.0	13.1	12.49	.75
#2.5 PRE-INSTALLED	206	2.04	11.6	9.46	.57
	275	2.72	11.9	10.60	.64
	345	3.40	12.2	12.11	.73
	413	4.08	12.5	13.25	.79
#3	206	2.0	11.6	13.63	.81
	275	3.0	11.9	15.89	.95
	345	3.5	12.5	17.41	1.04
	413	4.0	12.8	18.92	1.13
#4	206	2.0	13.1	16.65	.99
	275	3.0	13.4	19.30	1.15
	345	3.5	14.0	21.19	1.27
	413	4.0	14.9	22.33	1.33
#6	206	3.0	13.7	22.33	1.33
	275	3.5	14.0	22.71	1.36
	345	4.0	14.6	23.85	1.43
	413	5.0	14.9	25.35	1.52
#8	206	3.0	12.8	30.28	1.81
	275	3.5	13.7	32.12	1.92
	345	4.0	14.8	35.95	2.15
	413	5.0	15.3	37.85	2.27

LOW ANGLE DATA

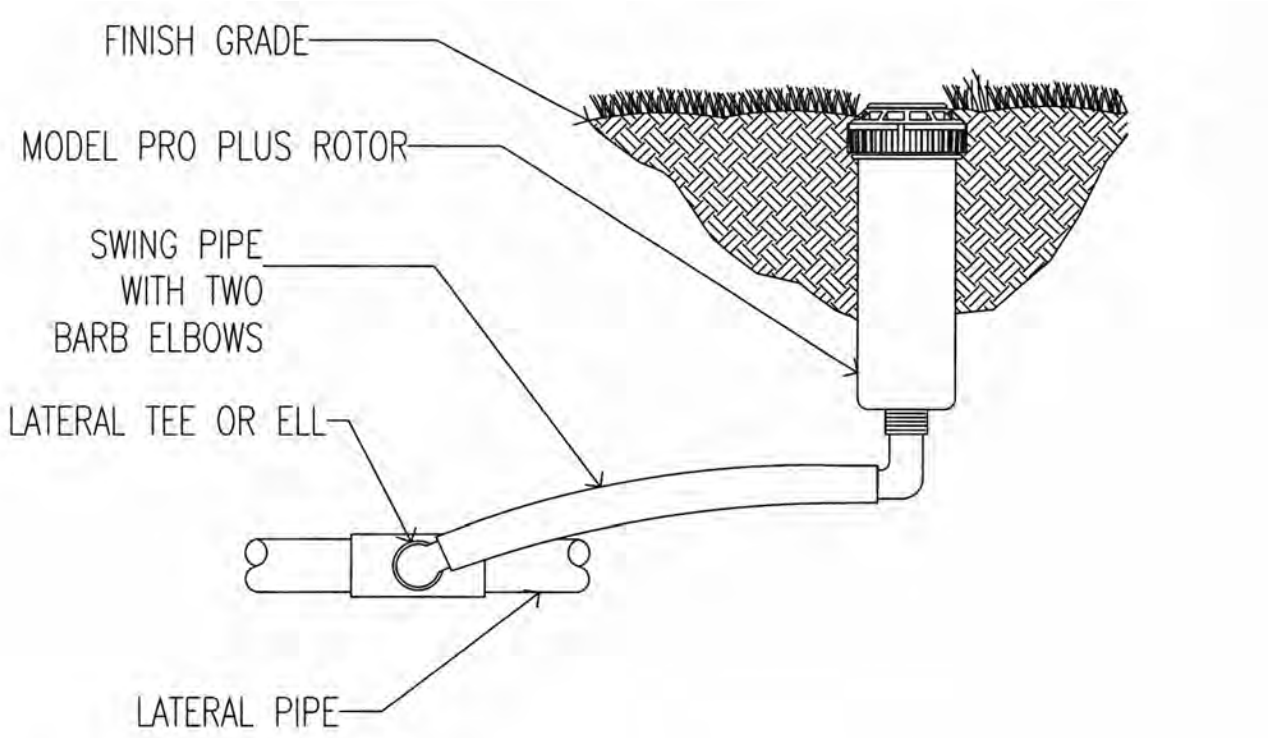
NOZZLES	PRESSURE PSI	RADIUS FT.	FLOW GPM
#1	30	22'	1.2
	40	24'	1.7
	50	26'	1.8
	60	28'	2.0
#3	30	29'	3.0
	40	32'	3.1
	50	35'	3.5
	60	37'	3.8
#4	30	31'	3.4
	40	34'	3.9
	50	37'	4.4
	60	38'	4.7
#6	40	38'	6.5
	50	40'	7.3
	60	42'	8.0
	70	44'	8.6

METRIC

NOZZLES	PRESSURE KPA	PRESSURE BARS	RADIUS METERS	FLOW L/M	FLOW M3/H
#1	207	2.04	6.71	4.54	.27
	275	2.72	7.32	6.43	.39
	344	3.40	7.92	6.80	.41
	413	4.08	8.53	7.56	.46
#3	207	2.04	8.84	11.34	.68
	275	2.72	9.75	11.72	.71
	344	3.40	10.67	13.23	.80
	413	4.08	11.58	14.36	.87
#4	207	2.04	9.45	12.85	.78
	275	2.72	10.36	14.74	.89
	344	3.40	11.28	16.63	1.00
	413	4.08	11.58	17.77	1.07
#6	275	2.72	11.58	24.57	1.48
	344	3.40	12.19	27.59	1.76
	413	4.08	12.80	30.24	1.82
	482	4.76	13.41	32.51	1.96

Data represents test results in zero wind. Adjust for local conditions.
Radius may be reduced with nozzle retention screw.

L-10011



K RAIN

PRO PLUS GEAR DRIVEN ROTOR

IRRIGATION INSTALLATION DETAIL

SUPER*PRO*™ GEAR DRIVEN SPRINKLER SETTING INSTRUCTIONS

NOTE: The SuperPro is factory preset with a 90° arc setting, and includes a pre-installed #2.5 nozzle.

CHANGING A NOZZLE

1. REMOVING THE NOZZLE RETENTION SCREW

Use your key (B) or a small flat blade screwdriver to remove the nozzle retention screw (M) by turning counter-clockwise to remove and clockwise to re-install.

2. PULL UP THE RISER

Insert the key (A) in the keyhole (C) on the top of the nozzle turret (D) and turn the key ¼ turn to insure that the key does not slip out of the keyhole when you pull it up. Firmly pull up the entire spring-loaded riser to access the nozzle socket (G). Hold the riser assembly with one hand.

3. REMOVING THE NOZZLE

With the nozzle retention screw (M) removed, insert the key (B) into the slot directly under the nozzle "prongs" (H) at the top of the nozzle. Now, turn the key ¼ turn to "hook" the nozzle and pull the nozzle out.

4. INSTALLING A NOZZLE

Press the desired nozzle into the nozzle socket (G). Make sure the nozzle number is visible and the nozzle "prongs" (H) are up. Then, re-install the nozzle retention screw (M). NOTE: The nozzle retention screw is also a break-up screw and used to adjust the distance of the spray.

SETTING THE ARC ADJUSTMENT

1. FINDING THE LEFT START POSITION

Place your finger on the top center of the nozzle turret (D). Rotate the turret to the right until it stops and then back to the left until it stops. Notice the position of the nozzle arrow (L). This is the "Left Start" position. The sprinkler will begin spraying from this position and rotate clockwise until it reaches the right Adjustable Stop-Return Point.

2. ORIENTING THE LEFT START POSITION

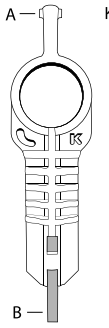
Insert the key (A) in the keyhole (C) on the top of the nozzle turret (D) and turn the key ¼ turn to insure that the key does not slip out of the keyhole when you pull it up. Being careful not to allow the nozzle turret to turn, firmly pull up the entire spring-loaded riser. Hold the lower riser assembly up with one hand. Now turn only the lower riser (E) clockwise or counter-clockwise until the nozzle arrow is pointing where you want the sprinkler to begin spraying.

3. CHANGING THE ARC

Insert the key (B) or a small flat blade screwdriver into the arc set adjustment slot (N). Turn clockwise to increase the arc or counter-clockwise to decrease the arc. NOTE: The arc set arrow in the center of the nozzle turret rotates to show the current setting. When set at 360°, the SuperPro will rotate continuously in a clockwise direction.

4. OPERATING THE SHUT OFF

To shut off the water flow, insert your key into the flow shut-off slot (P) and turn counter-clockwise. During system operation, the riser will remain elevated. To open flow again, turn key clockwise.



SPRINKLER INSTALLATION

1. INSTALL AND BURY

Thread the sprinkler on the pipe. Bury the sprinkler flush to grade. NOTE: Do not use pipe dope. Gear driven sprinklers and pop-up sprays should not be installed on the same watering zone.

2. INSPECTING THE FILTER

Unscrew the top and lift the complete sprinkler assembly out of the housing can (K). The filter is located on the bottom of the sprinkler assembly and can be easily pulled out, cleaned and re-installed.

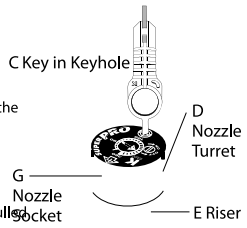
3. WINTERIZATION TIPS

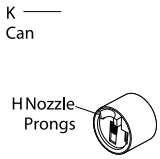
When using an air compressor to remove water from the system please note the following:

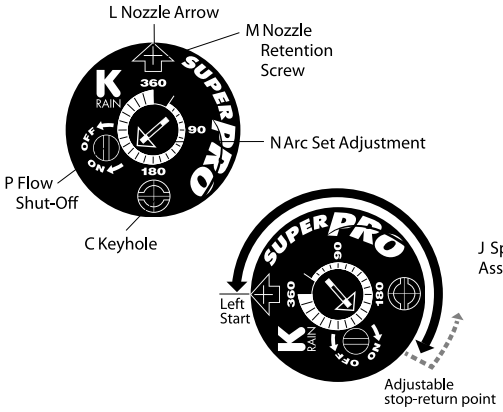
a. Do not exceed 30 PSI.

b. Always introduce air into the system gradually to avoid air pressure surges. Sudden release of compressed air into the sprinkler can cause damage.

c. Each zone should run no longer than 1 minute on air. Sprinklers turn 10 to 12 time faster on air than on water. Over spinning rotors on air can cause damage to the internal components.







PERFORMANCE DATA

PERFORMANCE

NOZZLES	PRESSURE PSI	RADIUS FT.	FLOW GPM
#0.5	30	30′	.45
	40	29′	.5
	50	26′	.6
	60	26′	.7
#0.75	30	32′	.7
	40	32′	.8
	50	33′	.9
	60	33′	1.0
#1	30	30′	1.1
	40	32′	1.3
	50	33′	1.5
	60	33′	1.6
#2	30	38′	2.3
	40	38′	2.5
	50	40′	2.7
	60	42′	3.0
#2.5 PRE-INSTALLED	30	35′	2.5
	40	36′	2.8
	50	37′	3.2
	60	38′	3.6
#3	30	35′	3.4
	40	36′	3.8
	50	38′	4.2
	60	39′	4.8
#4	30	42′	4.1
	40	44′	4.6
	50	45′	5.1
	60	46′	5.7
#6	40	46′	5.8
	50	48′	6.4
	60	49′	7.0
	70	49	7.5
#8	40	42′	7.5
	50	45′	8.2
	60	48′	9.0
	70	48′	9.5

METRIC

NOZZLES	PRESSURE KPA	PRESSURE BARS	RADIUS METERS	FLOW L/M	FLOW M3/H
#0.5	207	2.1	9.1	1.70	.10
	276	2.8	8.8	1.89	.11
	345	3.4	7.9	2.27	.14
	414	4.1	7.9	2.65	.16
#0.75	207	2.1	9.8	2.65	.16
	276	2.8	9.8	3.03	.18
	345	3.4	10.1	3.41	.20
	414	4.1	10.1	3.79	.23
#1	207	2.1	9.1	4.16	.25
	276	2.8	9.8	4.92	.30
	345	3.4	10.1	5.68	.34
	414	4.1	10.1	6.06	.36
#2	207	2.1	11.6	8.71	.52
	276	2.8	11.6	9.46	.57
	345	3.4	12.2	10.22	.61
	414	4.1	12.8	11.36	.68
#2.5 PRE-INSTALLED	207	2.1	10.7	9.46	.57
	276	2.8	11.0	10.60	.64
	345	3.4	11.3	12.11	.73
	414	4.1	11.6	13.63	.82
#3	207	2.1	10.7	12.87	.77
	276	2.8	11.0	14.38	.86
	345	3.4	11.6	15.90	.95
	414	4.1	11.9	18.17	1.09
#4	207	2.1	12.8	15.52	.93
	276	2.8	13.4	17.41	1.04
	345	3.4	13.7	19.31	1.16
	414	4.1	14.0	21.58	1.29
#6	276	2.8	14.0	21.96	1.32
	345	3.4	14.6	24.23	1.45
	414	4.1	14.9	26.50	1.59
	483	4.8	14.9	28.39	1.70
#8	276	2.8	12.8	28.39	1.70
	345	3.4	13.7	31.04	1.86
	414	4.1	14.6	34.07	2.04
	483	4.8	14.6	35.96	2.16

LOW ANGLE DATA

NOZZLES	PRESSURE PSI	RADIUS FT.	FLOW GPM
#1	30	26′	1.3
	40	27′	1.5
	50	27′	1.7
	60	28′	1.9
#3	30	29′	2.9
	40	30′	3.3
	50	31′	3.4
	60	33′	4.0
#4	30	28′	4.0
	40	31′	4.7
	50	34′	5.0
	60	36′	6.0
#6	40	30′	6.0
	50	34′	7.0
	60	37′	7.8
	70	38′	8.2

METRIC

NOZZLES	PRESSURE KPA	PRESSURE BARS	RADIUS METERS	FLOW L/M	FLOW M3/H
#1	207	2.1	7.9	4.92	.30
	276	2.8	8.2	5.68	.34
	345	3.4	8.2	6.44	.39
	414	4.1	8.5	7.19	.43
#3	207	2.1	8.8	10.98	.66
	276	2.8	9.1	12.49	.75
	345	3.4	9.4	12.87	.77
	414	4.1	10.1	15.14	.91
#4	207	2.1	8.5	15.14	.91
	276	2.8	9.4	17.79	1.07
	345	3.4	10.4	18.93	1.14
	414	4.1	11.0	22.71	1.36
#6	207	2.8	9.1	22.71	1.36
	276	3.4	10.4	26.50	1.59
	345	4.1	11.3	29.53	1.77
	414	4.8	11.6	31.04	1.86

* Data represents test results in zero wind. Adjust for local conditions. Radius may be reduced with nozzle retention screw.

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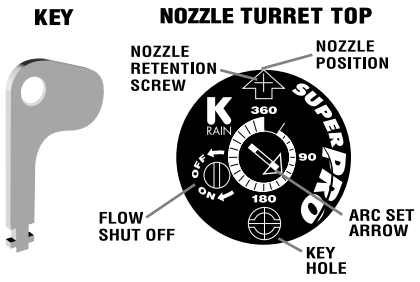
SUPER*PRO*™ GEAR DRIVEN SPRINKLER SETTING INSTRUCTIONS

NOTE: The **Super*Pro*** is factory preset with a 90° arc setting, and includes a pre-installed #2.5 nozzle.

CHANGING A NOZZLE

1▶ REMOVING THE NOZZLE RETENTION SCREW

Use your K-Key or a small flat blade screwdriver to remove the nozzle retention screw by turning counter-clockwise to remove and clockwise to re-install.

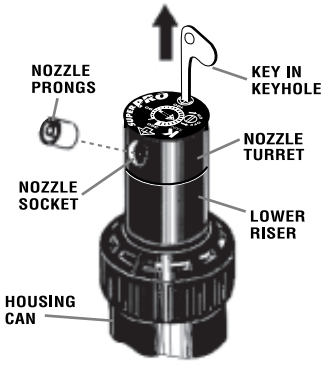


2▶ PULL UP THE RISER

Insert the K-Key in the keyhole on the top of the nozzle turret and turn the key 1/4 turn to insure that the key does not slip out of the keyhole when you pull it up. Firmly pull up the entire spring-loaded riser to access the nozzle socket. Hold the riser assembly up with one hand.

3▶ REMOVING THE NOZZLE

With the nozzle retention screw removed, insert the K-Key into the slot directly under the nozzle "prongs" at the top of the nozzle. Now, turn the key 1/4 turn to "hook" the nozzle and pull the nozzle out.



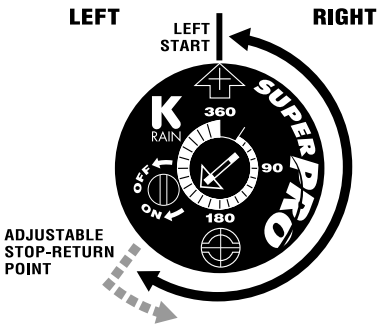
4▶ INSTALLING A NOZZLE

Press the desired nozzle into the nozzle socket. Make sure the nozzle number is visible and the nozzle "prongs" are up. Then, re-install the nozzle retention screw. **NOTE:** The nozzle retention screw is also a break-up screw and used to adjust the distance of the spray.

SETTING THE ARC ADJUSTMENT

1▶ FINDING THE LEFT START POSITION

Place your finger on the top center of the nozzle turret. Rotate the turret to the right until it stops and then back to the left until it stops. Notice the position of the nozzle arrow. This is the "Left Start" position. The sprinkler will begin spraying from this position and rotate clockwise until it reaches the right Adjustable Stop-Return Point.

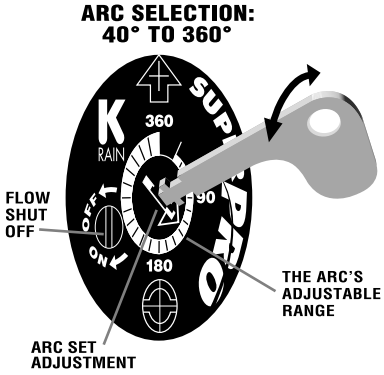


2▶ ORIENTING THE LEFT START POSITION

Insert the K-Key in the keyhole on the top of the nozzle turret and turn the key 1/4 turn to insure that the key does not slip out of the keyhole when you pull it up. Being careful not to allow the nozzle turret to turn, firmly pull up the entire spring-loaded riser. Hold the lower riser assembly up with one hand. Now turn only the lower riser clockwise or counter-clockwise until the nozzle arrow is pointing where you want the sprinkler to begin spraying.

3▶ CHANGING THE ARC

Insert the K-Key or a small flat blade screwdriver into the Arc Set Adjustment slot. Turn clockwise to increase the arc or counter-clockwise to decrease the arc. **NOTE:** The arc set arrow in the center of the nozzle turret rotates to show the current setting. **WHEN SET AT 360°, THE SUPER*PRO* WILL ROTATE CONTINUOUSLY IN A CLOCKWISE DIRECTION.**



4▶ OPERATING THE SHUT OFF

To shut off the water flow insert your K-Key into the flow shut-off slot and turn counter-clockwise. During system operation, the riser will remain elevated. To open flow again, turn key clockwise.

SUPER*PRO*™ GEAR DRIVEN SPRINKLER SETTING INSTRUCTIONS

SPRINKLER INSTALLATION

1▶ INSTALL AND BURY

Do not use pipe dope.Thread the sprinkler on the pipe. Bury the sprinkler flush to grade. **NOTE:** Gear driven sprinklers and pop-up sprays should not be installed on the same watering zone.

2▶ INSPECTING THE FILTER

Unscrew the top and lift the complete sprinkler assembly out of the housing can. The filter is located on the bottom of the sprinkler assembly and can easily be pulled out, cleaned and re-installed.

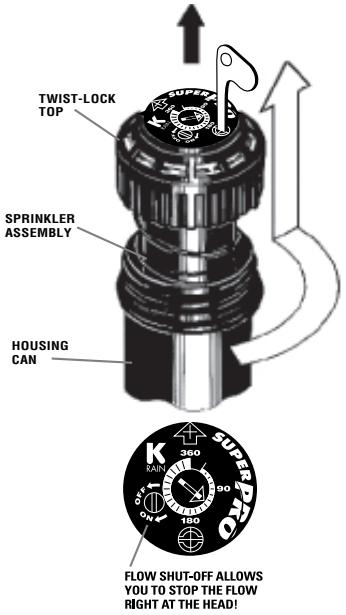
3▶ WINTERIZATION TIPS

When using an air compressor to remove water from the system please note the following:

1) Do not exceed 30 PSI.

2) Always introduce air into the system gradually to avoid air pressure surges. Sudden release of compressed air into the sprinkler can cause damage.

3) Each zone should run no longer than 1 minute on air. Sprinklers turn 10 to 12 times faster on air than on water. Over spinning rotors on air can cause damage to the internal components.



STANDARD NOZZLE PERFORMANCE

Nozzle	U.S. Pressure PSI	U.S. Radius Ft.	U.S. Flow GPM	METRIC Pressure KPa	METRIC Pressure Bars	METRIC Radius Meters	METRIC Flow L/M	METRIC Flow M³/H
#2.5 Factory Installed Nozzle	30	35'	2.5	207	2.1	10.7	9.46	.57
	40	36'	2.8	276	2.8	11.0	10.60	.64
	50	37'	3.2	345	3.4	11.3	12.11	.73
	60	38'	3.6	414	4.1	11.6	13.63	.82
#0.5	30	30'	.45	207	2.1	9.1	1.70	.10
	40	29'	.5	276	2.8	8.8	1.89	.11
	50	26'	.6	345	3.4	7.9	2.27	.14
	60	26'	.7	414	4.1	7.9	2.65	.16
#0.75	30	32'	.7	207	2.1	9.8	2.65	.16
	40	32'	.8	276	2.8	9.8	3.03	.18
	50	33'	.9	345	3.4	10.1	3.41	.20
	60	33'	1.0	414	4.1	10.1	3.79	.23
#1	30	30'	1.1	207	2.1	9.1	4.16	.25
	40	32'	1.3	276	2.8	9.8	4.92	.30
	50	33'	1.5	345	3.4	10.1	5.68	.34
	60	33'	1.6	414	4.1	10.1	6.06	.36
#2	30	38'	2.3	207	2.1	11.6	8.71	.52
	40	38'	2.5	276	2.8	11.6	9.46	.57
	50	40'	2.7	345	3.4	12.2	10.22	.61
	60	42'	3.0	414	4.1	12.8	11.36	.68
#3	30	35'	3.4	207	2.1	10.7	12.87	.77
	40	36'	3.8	276	2.8	11.0	14.38	.86
	50	38'	4.2	345	3.4	11.6	15.90	.95
	60	39'	4.8	414	4.1	11.9	18.17	1.09
#4	30	42'	4.1	207	2.1	12.8	15.52	.93
	40	44'	4.6	276	2.8	13.4	17.41	1.04
	50	45'	5.1	345	3.4	13.7	19.31	1.16
	60	46'	5.7	414	4.1	14.0	21.58	1.29
#6	40	46'	5.8	276	2.8	14.0	21.96	1.32
	50	48'	6.4	345	3.4	14.6	24.23	1.45
	60	49'	7.0	414	4.1	14.9	26.50	1.59
	70	49	7.5	483	4.8	14.9	28.39	1.70
#8	40	42'	7.5	276	2.8	12.8	28.39	1.70
	50	45'	8.2	345	3.4	13.7	31.04	1.86
	60	48'	9.0	414	4.1	14.6	34.07	2.04
	70	48	9.5	483	4.8	14.6	35.96	2.16

LOW ANGLE NOZZLE PERFORMANCE

Nozzle	U.S. Pressure PSI	U.S. Radius Ft.	U.S. Flow GPM	METRIC Pressure KPa	METRIC Pressure Bars	METRIC Radius Meters	METRIC Flow L/M	METRIC Flow M³/H
#1	30	26'	1.3	207	2.1	7.9	4.92	.30
	40	27'	1.5	276	2.8	8.2	5.68	.34
	50	27'	1.7	345	3.4	8.2	6.44	.39
	60	28'	1.9	414	4.1	8.5	7.19	.43
#3	30	29'	2.9	207	2.1	8.8	10.98	.66
	40	30'	3.3	276	2.8	9.1	12.49	.75
	50	31'	3.4	345	3.4	9.4	12.87	.77
	60	33'	4.0	414	4.1	10.1	15.14	.91
#4	30	28'	4.0	207	2.1	8.5	15.14	.91
	40	31'	4.7	276	2.8	9.4	17.79	1.07
	50	34'	5.0	345	3.4	10.4	18.93	1.14
	60	36'	6.0	414	4.1	11.0	22.71	1.36
#6	40	30'	6.0	207	2.8	9.1	22.71	1.36
	50	34'	7.0	276	3.4	10.4	26.50	1.59
	60	37'	7.8	345	4.1	11.3	29.53	1.77
	70	38'	8.2	414	4.8	11.6	31.04	1.86

Data represents test results in zero wind for ProPlus. Adjust for local conditions. Radius may be reduced with nozzle retention screw.

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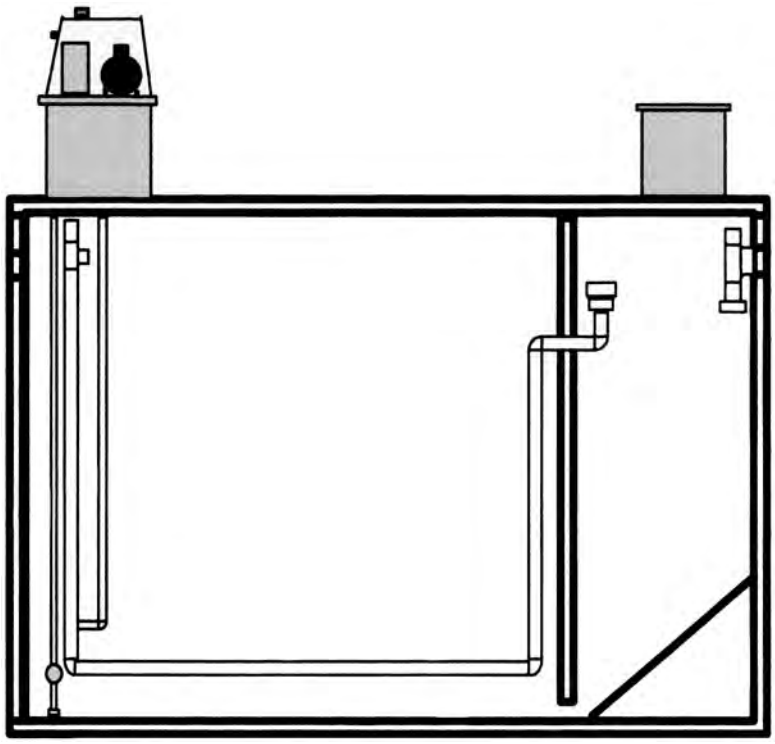
PRO FLO AEROBIC SYSTEMS, LP

Aerobic Wastewater Treatment Systems



MODEL
Pro Flo 500HC GPD

Comprehensive Training Manual – HC Insert Sheets –

BACK
COVER

- BLANK -

TECHNO TAKATSUKI CO.,LTD.	Electromagnetic vibration air pump	PART No.	50HP20210P
	Confirmation of specifications	Page	1 / 4

1. Range of Application

These specifications apply to electromagnetic vibration air pump HP-50W-

2. Appearance and dimensions

Appearance and dimensions of the air pump are specified according to drawing 50HP20210PS-00.

3. Quality

3-1 Appearance

Each part should be correctly assembled, and there are not any failure such as peel-off of paint, looseness of assembly, bending, blemish, dirt, cracks, and corrosion.

3-2 Usage Conditions

Item	Use conditions
Operating	Continuous operation (outdoor use)
Installation	Should be horizontalized
Ambient temperature	5℃ - 40℃ natural ambient temperature
Range of pressure	5 - 23.5kPa
Rated operating pressure	12.5kPa

3-3 Characteristics and performance

Item	HP-50W		Test method
RATING			
Voltage	AC120V		
Frequency	60Hz		
Insulation class	A Rank		
Operating time	Continuous		
CHARACTERISTICS AND PERFORMANCE			
	Solenoid Valve Off	Solenoid Valve On	
Voltage(V)	AC120V		Voltmeter
Current(A)	1.1 or less	1.3 or less	Ammeter
Power consumption(W)	34 ± 20%	40 ±20%	Wattmeter
Air volume(L/min)	47.3 +20 % -5 %		Mass flowmeter
Leak air volume(%)	1.0 or less	2.0 or less	Mass flowmeter
Noise level(dBA)	43.0 or less		Noise level meter
Valve movement N/L(dBA)	75.0 or less		Noise level meter
Temperature rise	60deg or less at 30℃ room temperature.		Thermo pen recorder

Note *The above-mentioned performance is a value at rated pressure 12.5kPa.

*The figures mentioned above are under natural conditions.

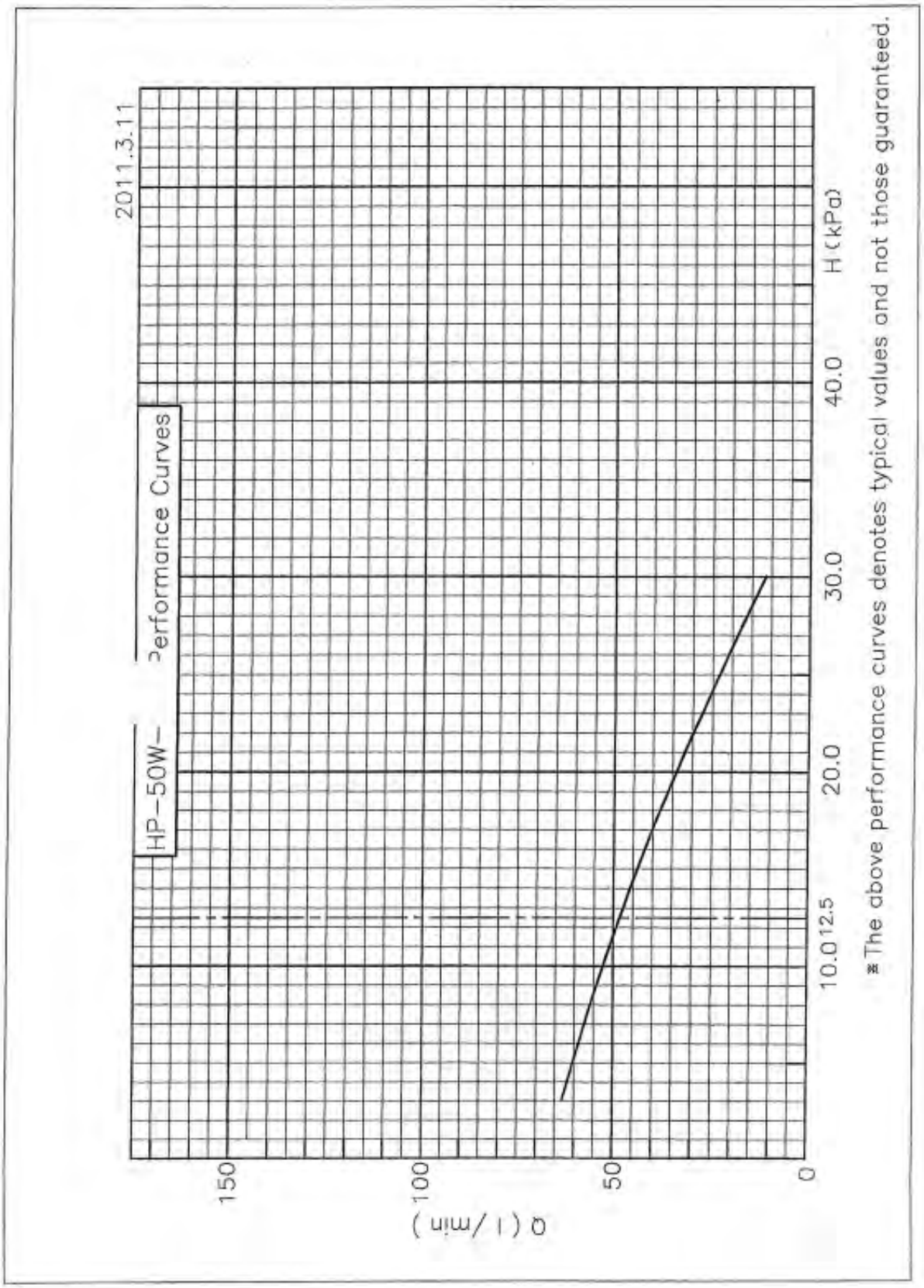
*The noise value was measured at a distance of 1 meter, and no abnormal noise.

*Clock sets the USA Pacific Standard Time.

*Timer sets from 02:00 to 03:00.

Sign	Revision reason	Date	Prepared

Development Department	Date	March 11, 2011	Prepared	Y.MATSUDAIRA	Approval	S.KAMADA


HP-50W-
Performance Curves
2011.3.11
Q (l/min)
150
100
50
0
10.0 12.5
20.0
30.0
40.0
H (kPa)
※The above performance curves denotes typical values and not those guaranteed.

TECHNO TAKATSUKI CO.,LTD.	Electromagnetic vibration air pump	PART No.	60HP20210P
	Confirmation of specifications	Page	1 / 4

1. Range of Application

These specifications apply to electromagnetic vibration air pump HP-60W.

2. Appearance and dimensions

Appearance and dimensions of the air pump are specified according to drawing 60HP20210PS-00.

3. Quality

3-1 Appearance

Each part should be correctly assembled, and there are not any failure such as peel-off of paint, looseness of assembly, bending, blemish, dirt, cracks, and corrosion.

3-2 Usage Conditions

Item	Use conditions
Operating	Continuous operation (outdoor use)
Installation	Should be horizontalized
Ambient temperature	5℃ - 40℃ natural ambient temperature
Range of pressure	5 - 23.5kPa
Rated operating pressure	14.7kPa

3-3 Characteristics and performance

Item	HP-60W		Test method
RATING			
Voltage	AC120V		
Frequency	60Hz		
Insulation class	A Rank		
Operating time	Continuous		
CHARACTERISTICS AND PERFORMANCE			
	Solenoid Valve Off	Solenoid Valve On	
Voltage(V)	AC120V		Voltmeter
Current(A)	1.4 or less	1.6 or less	Ammeter
Power consumption(W)	51 ± 20%	57 ±20%	Wattmeter
Air volume(L/min)	60 ± 10%		Mass flowmeter
Leak air volume(%)	1.0 or less	2.0 or less	Mass flowmeter
Noise level(dBA)	43.0 or less		Noise level meter
Valve movement N/L(dBA)	75.0 or less		Noise level meter
Temperature rise	60deg or less at 30℃ room temperature.		Thermo pen recorder

Note *The above-mentioned performance is a value at rated pressure 14.7kPa.

*The figures mentioned above are under natural conditions.

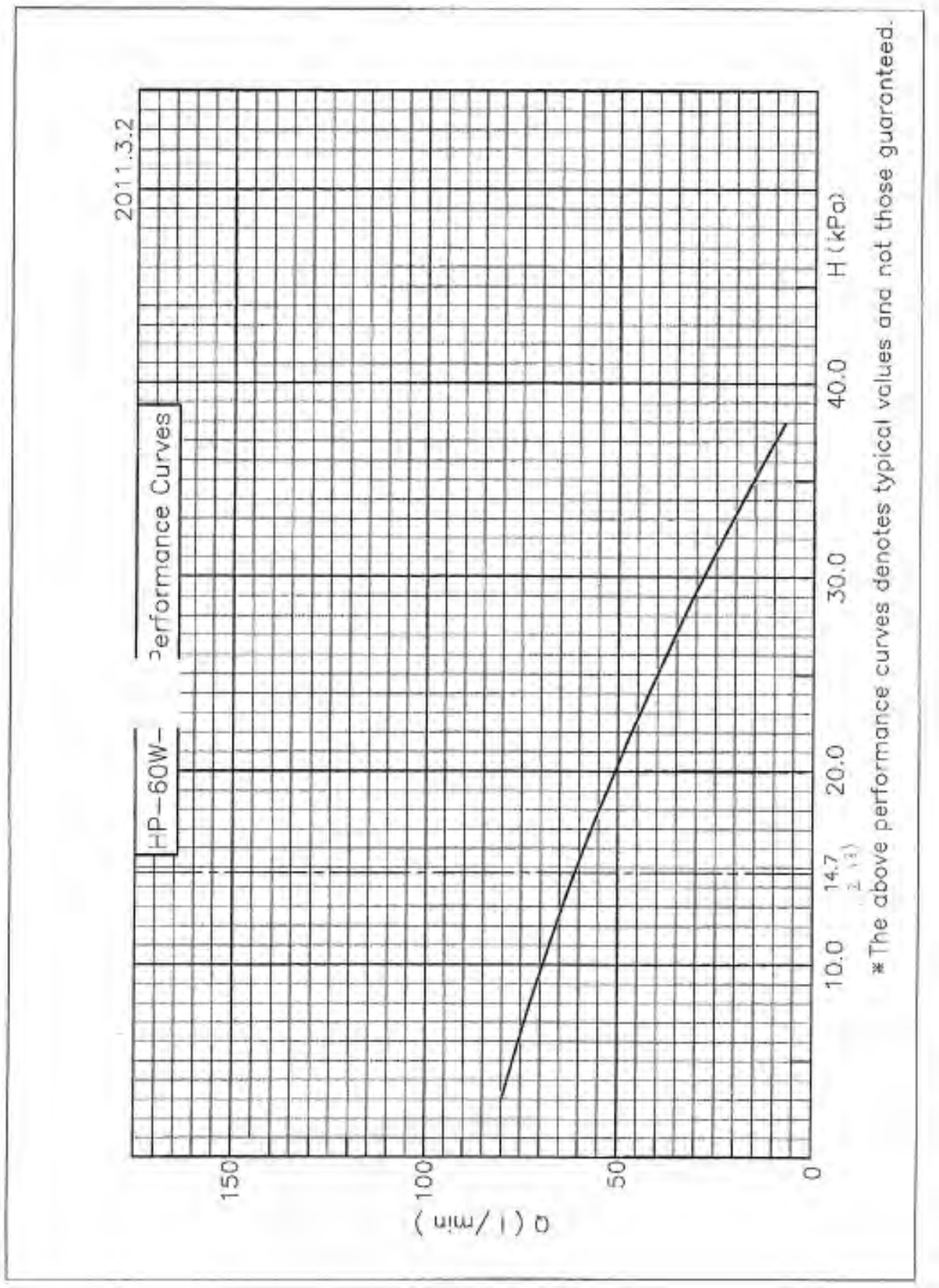
*The noise value was measured at a distance of 1 meter, and no abnormal noise.

*Clock sets the USA Pacific Standard Time.

*Timer sets from 02:00 to 03:00.

Sign	Revision reason	Date	Prepared

Development Department	Date	March 2, 2011	Prepared	H.MITO	Approval	S.KAMADA


2011.3.2
HP-60W-
Performance Curves
Q (l/min)
150
100
50
0
10.0
14.7
20.0
30.0
40.0
H (kPa)
*The above performance curves denotes typical values and not those guaranteed.

TECHNO TAKATSUKI CO.,LTD.	Electromagnetic vibration air pump	PART No.	80HP20210P
	Confirmation of specifications	Page	1 / 4

1. Range of Application

These specifications apply to electromagnetic vibration air pump HP-80W-

2. Appearance and dimensions

Appearance and dimensions of the air pump are specified according to drawing 80HP20210PS-00.

3. Quality

3-1 Appearance

Each part should be correctly assembled, and there are not any failure such as peel-off of paint, looseness of assembly, bending, blemish, dirt, cracks, and corrosion.

3-2 Usage Conditions

Item	Use conditions
Operating	Continuous operation (outdoor use)
Installation	Should be horizontalized
Ambient temperature	5℃ - 40℃ natural ambient temperature
Range of pressure	5 - 27.5kPa
Rated operating pressure	14.7kPa

3-3 Characteristics and performance

Item	HP-80W		Test method
RATING			
Voltage	AC120V		
Frequency	60Hz		
Insulation class	A Rank		
Operating time	Continuous		
CHARACTERISTICS AND PERFORMANCE			
	Solenoid Valve Off	Solenoid Valve On	
Voltage(V)	AC120V		Voltmeter
Current(A)	1.8 or less	2.0 or less	Ammeter
Power consumption(W)	71 ± 20%	77 ±20%	Wattmeter
Air volume(L/min)	80 ± 10%		Mass flowmeter
Leak air volume(%)	1.0 or less	2.0 or less	Mass flowmeter
Noise level(dBA)	43.0 or less		Noise level meter
Valve movement N/L(dBA)	75.0 or less		Noise level meter
Temperature rise	60deg or less at 30℃ room temperature.		Thermo pen recorder

Note *The above-mentioned performance is a value at rated pressure 14.7kPa.

*The figures mentioned above are under natural conditions.

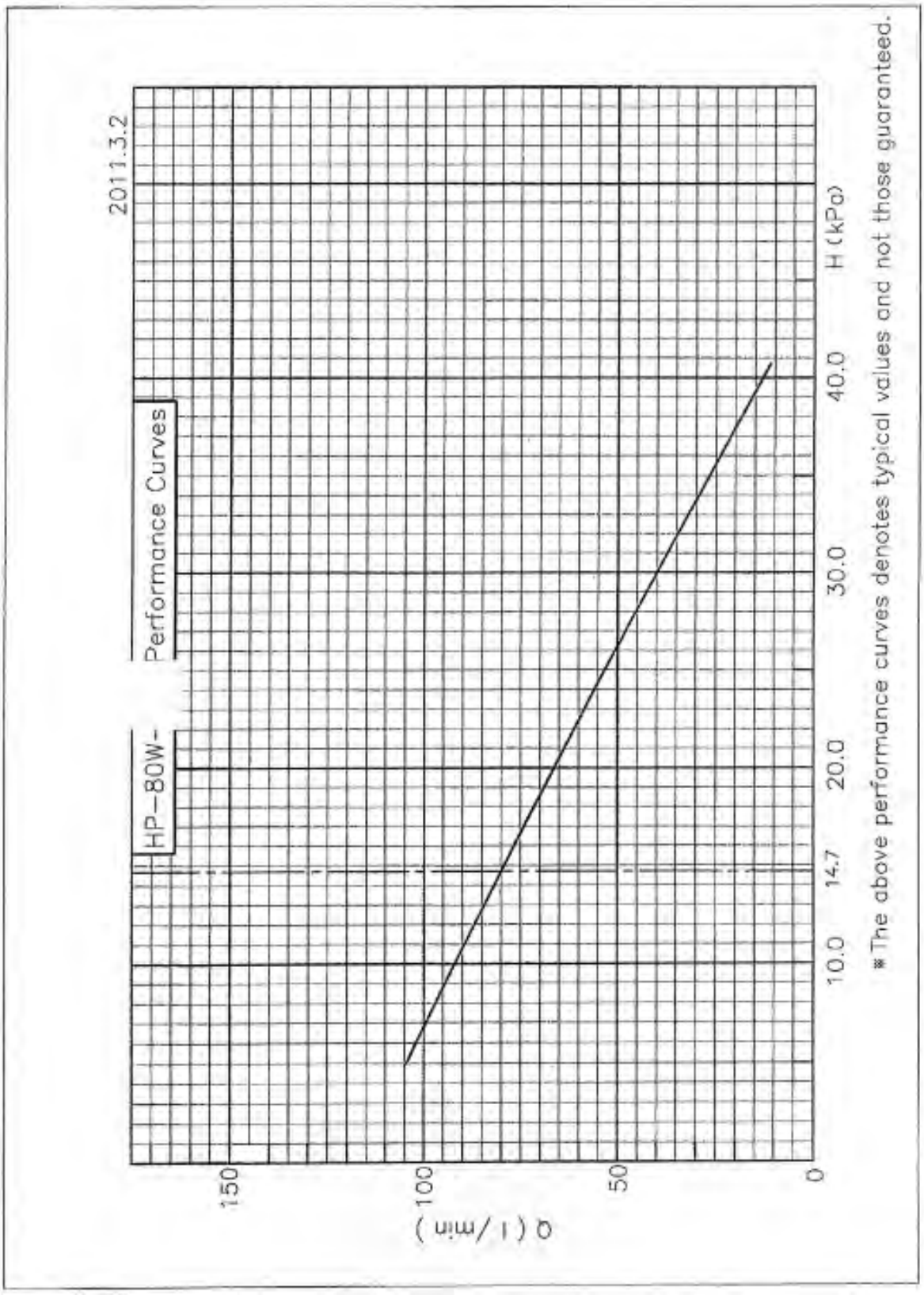
*The noise value was measured at a distance of 1 meter, and no abnormal noise.

*Clock sets the USA Pacific Standard Time.

*Timer sets from 02:00 to 03:00.

Sign	Revision reason	Date	Prepared

Development Department	Date	March 2, 2011	Prepared	H.MITO	Approval	S.KAMADA


2011.3.2
Performance Curves
HP-80W-
Q (l/min)
150
100
50
0
10.0
14.7
20.0
30.0
40.0
H (kPa)
* The above performance curves denotes typical values and not those guaranteed.

株式会社テクノ高槻	Electromagnetic Liner Air Blower	Model code	60/70/80/90FP102010
	Delivery specification sheet	Page	3/7

6.1 Range of application

This is the PCB for intermittent driving installed in the Techno Takatsuki's blower model HP.

6.2 Electrical specification

Item	Detail
Rated voltage	AC120V
Range of voltage	AC120V±10%
Power consumption	1.5W or less
Frequency	50/60Hz
Operating temperature	-10～60℃
Storage temperature	-20～70℃

6.3 Battery backup period

More than 3 years to memorize clock and timer setting when disconnected to 120VAC power supply(at 25 degrees C from production date)

6.4 Intermittent drive

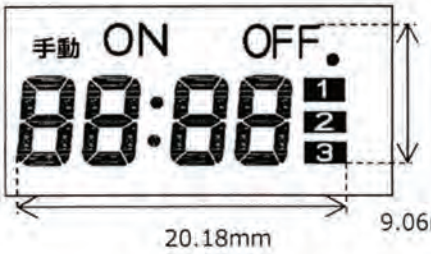
Intermittent timer can be set up to 5 times.

6.5 Clock accuracy

Less than ±26 seconds/month(at rated voltage, 25 degrees C)

Allowable range for clock setting error : Less than ±18 minutes

6.6 LCD



ON Lights when blower is operated

OFF Lights when blower is

1 Intermittent operation once(Timer 1)

2 Intermittent operation twice(Timer 2)

3 Intermittent operation 3 times(Timer 3)

手動 Lights when manually operated

● Light when 4th and 5th timer is set

88:88 Time with colon(:)

Time is shown in 24 hour clock.

			Revisions	No.	Details of revision	Date	By
R&D	Issued	Takao		1	Revision adding new models(FP-70N, FP-90N)	6/2/2009	Mito
	Approved	Yokotani		3	Revision due to timer setting change	2/1/2011	Shoji
	Date	2008/9/30		5	Revision due to timer setting change	9/30/2011	K.Kato

株式会社テクノ高槻	Electromagnetic Liner Air Blower	Model code	60/70/80/90FP102010
	Delivery specification sheet	Page	4/7

6.7 Buttons

HOUR	MINUTE	SET

<HOUR> : Button to set hour for clock and timer

<MINUTE> : Button to set minute for clock and timer

<SET> : Button to determine the settings.

6.8 Operating status

① **Auto mode**

<Operation>

Blower stops during the period of set timer. Blower operates other than the timer period.

【Display】

【7 segment display】 : Current time

【ON】 【OFF】 : Lights 【ON】 During operation and 【OFF】 when not in use.

【1】 【2】 【3】 : Lights valid(set) timer setting number

【●】 : Lights if there's any valid timer setting for #4 and #5.

【Colon】 : Lights as second(ON 0.5 seconds / OFF 0.5 seconds)

【手動】 : Does not light

② **Manual mode**

<Operation>

Press **<MINUTE>** button more than 2 seconds during **[Auto mode]** to operate/stop the blower.

Each time press **<MINUTE>** button more than 2 seconds to start/stop the blower.

Press **<SET>** button to switch to **[Auto mode]** again.

Blower will be back to **[Auto mode]** after 15 minutes since the last operation(push any button)

【Display】

【7 segment display】 : Current time

【ON】 【OFF】 : Lights 【ON】 During operation and 【OFF】 when not in use.

【1】 【2】 【3】 : Does not light

【●】 : Does not light

【Colon】 : Lights as second(ON 0.5 seconds / OFF 0.5 seconds)

【手動】 : Lights

③ Clock setting mode

<Operation>

Press **<HOUR>** button more than 2 seconds during **[Auto mode]** to set clock.

Press **<HOUR>** button to adjust hour. Press more than 1 second to fast-forward every 0.25 seconds.

Press **<HOUR>** button to adjust minute. Press more than 1 second to fast-forward every 0.25 secon

			Revisions	No.	Details of revision	Date	By
R&D	Issued	Takao					
	Approved	Yokotani					
	Date	2008/9/30					

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Press **<SET>** to determine the time and start counting from 0 second.

No switch operation or no pressing **<SET>** button after pressing **<HOUR>** or **<MINUTE>** button more than 1 minute will return to **[Auto mode]**. In this case, clock setting will not change.

【Display】

【7 segment display】: Flashes current setting(2 digits on left: ~23, nothing is shown on tenths place when it is zero. 2 digits on right: ~59)

【ON】【OFF】: Blower operation status(continue the operation of **[Auto mode]**)

【1】【2】【3】: Does not light

【●】:]Does not light

【Colon】: Flashes

【手動】: Does not light

④ **Timer setting mode for intermittent operation**

<Operation>

Press **<SET>** button more than 2 seconds during **[Clock setting mode]** to set intermittent operation timer. Press **<HOUR>** button to adjust hour. Press more than 1 second to fast-forward every 0.25 seconds. Press **<HOUR>** button to adjust minute. Press more than 1 second to fast-forward every 0.25 seconds. To clear the set time, press **<HOUR>** and **<MINUTE>** button more than 2 seconds at the same time(If there is no setting, nothing is shown).

Press **<SET>** button to change to **[Start time for timer #1]** → **[Finish time for timer #1]** → **[Start time for timer #2]** ...(abbr)... **[Finish time for timer #3]**

Press **<SET>** button after setting **[Finish time for timer #3]** will set **[Auto mode]**. To set 4th timer, press **<SET>** button more than 2 seconds after setting **[Finish time for timer #3]**.

To set 5th timer, do the same procedure to set 4th timer. After setting 5th timer, press**<SET>** button to switch to **[Auto mode]**.

During **[Timer setting mode]**, no switch operation or no pressing **<SET>** button after pressing **<HOUR>** or **<SET>** button more than 1 minute will move to the next timer setting. However, setting timer with **<HOUR><MINUTE>** buttons and no pressing **<SET>** button more than 1 minute will show the time set(changed). No pressing **<SET>** button more than 1 minute will:

1) In case only timer #1 is set...

[Start timer for timer #1]→[Finish time for timer #1]→[Start timer for timer #2]→[Auto mode]

2) In case timer #1 and #2 are set...

[Start timer for timer #1]→[Finish time for timer #1]→[Start timer for timer #2]→ [Finish time for timer #2]→[Start timer for timer #3]→[Auto mode]

3) In case timer #1, #2 and #3 are set...

[Start timer for timer #1]→[Finish time for timer #1]→[Start timer for timer #2]→ [Finish time for timer #2]→[Start timer for timer #3]→[Finish time for timer #3]→[Auto mode]

			Revisions	No.	Details of revision	Date	By
R&D	Issued	Takao					
	Approved	Yokotani					
	Date	2008/9/30					

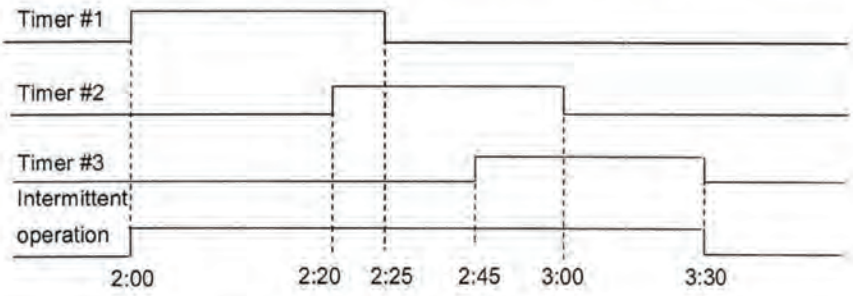
株式会社テクノ高槻	Electromagnetic Liner Air Blower	Model code	60/70/80/90FP102010	
	Delivery specification sheet	Page	6/7	

*Switch to [Auto mode] after displaying [Finish time for timer #3] regardless of timer #4 or #5.

4) In case timer #1, #2, #3 and #4 are set...
[Start time for timer #4]→[Finish time for timer #4]→[Start time for timer #5]→[Auto mode]

5) In case timer #1, #2, #3, #4 and #5 are set...
[Start time for timer #4]→[Finish time for timer #4]→[Start time for timer #5]→
[Finish time for timer #4]→[Auto mode]
*To display timer #4 and #5, press **<SET>** longer after [Finish time for timer #3]

【Display】
【7 segment display】: Flashes time set for timer. If no timer set, does not light.
【ON】【OFF】: Displays【OFF】when set [Start time], displays【ON】when set [Finish time]
【1】【2】【3】: Flashes timer number(1 to 3)
Flashs【1】and【3】for timer #4
Flashs【2】and【3】for timer #5
【●】: Lights when timer #4 or timer #5 are set.
【Colon】: Flashes
【手動】: Does not light
<Conditions for timer setting>
In case the timer setting overlaps, blower continues to stop following each timer setting.
Example... Timer #1: 2:00～2:25, Timer #2: 2:20～3:00, Timer #3: 2:45～3:30



Blower stops from 2:00 until 3:30

・ In case the [Start time] and [Finish time] are set at the same time(synchronized), the setting will be invalid.

Example...

Start time for timer #3	2:30
Finish time for timer #3	2:30

↓

Pressing **<SET>** button to switch to [Auto mode] and timer #3 will be invalid

			Revisions	No.	Details of revision	Date	By
R&D	Issued	Takao					
	Approved	Yokotani					
	Date	2008/9/30					

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- When the setting for timer #2-5 are unset, pressing **<SET>** button will switch to **[Auto mode]**.

Start time for timer #3	2:30
Finish time for timer #3	Unset

↓

Pressing **<SET>** button to switch to **[Auto mode]**, and timer #3 will be unset.

- When the clock is unset, pressing **<SET>** button will set timer #1 for default setting(2:00～2:15) (timer #1 should always be set, and no "unset" status exists.)

- Timer setting should be in order(cannot be skipped).

- When the timer is unset, all timer setting after the timer will be unset.

Timer #1	2:00～2:15
Timer #2	3:00～3:15
Timer #3	4:00～4:15
Timer #4	5:00～5:15
Timer #5	6:00～6:15

⇨ Unset timer #3

Timer #1	2:00～2:15
Timer #2	3:00～3:15
Timer #3	Unset
Timer #4	Unset
Timer #5	Unset

⑤ Reset software

Supply power pressing **<HOUR>** button and **<MINUTE>** button will reset timer software. Resetting software will reset clock setting(start from 0:00). Timer setting also will be reset and set default timer on #1, #2 and #3(refer to the table below).
When battery dies, software will be reset when the blower is unplugged.

【Display】
【7 segment display】: 0:00
【ON】【OFF】: Lights【ON】During operation and【OFF】when not in use.
【1】【2】: Lights
【●】: Does not light
【Colon】: Flashes as second for current time
【手動】: Does not light

Timer #1	2:00～2:15
Timer #2	2:45～3:00
Timer #3	3:30～3:45
Timer #4	Unset
Timer #5	Unset

			Revisions	No.	Details of revision	Date	By
R&D	Issued	Takao		4	Revision due to timer setting change	9/30/2011	K.Kato
	Approved	Yokotani					
	Date	2008/9/30					

1. Set up panel

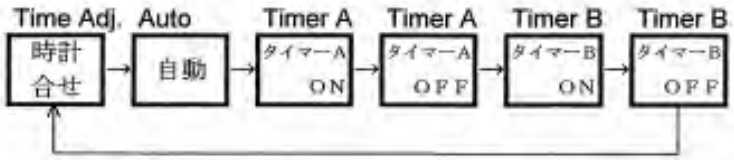
2. Format

Timer A ON	[2 : 00]
Timer A OFF	[2:05]
Timer B ON	[NO set up]
Timer B OFF	[NO set up]

3. Set up way

Time Adjust and Timer set up can change the showing when the push 「設定」 button. The set up item show to push The 「設定」 button.

The showing chage whenever push the 「設定」 button.
When the panel change [タイマーB ＯＦＦ] to [時計合せ] when push the 「設定」 button.

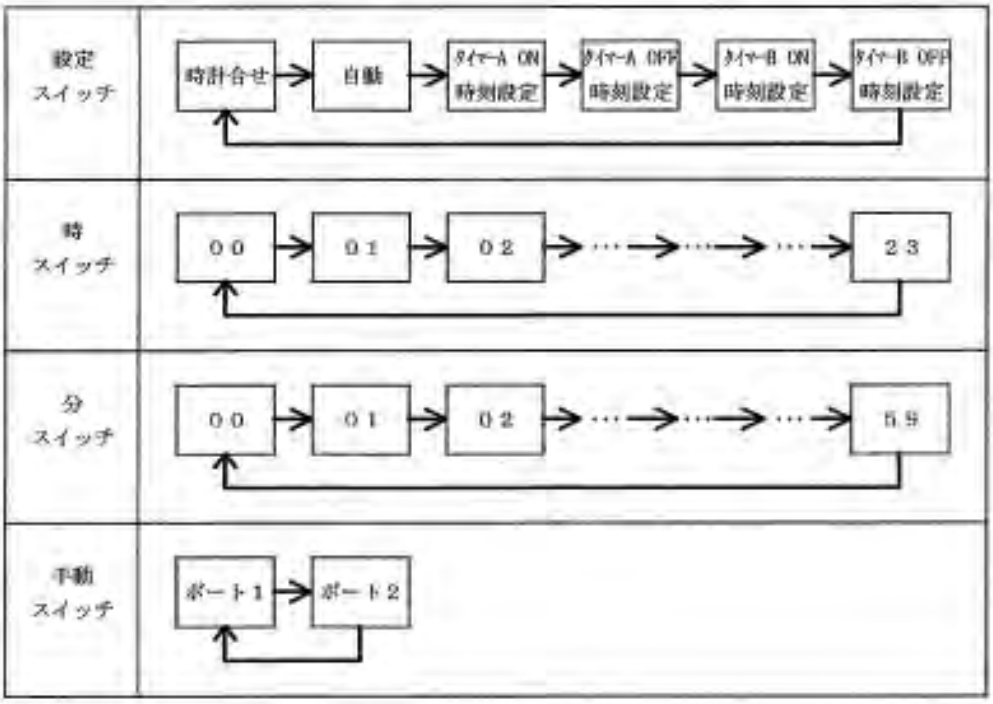


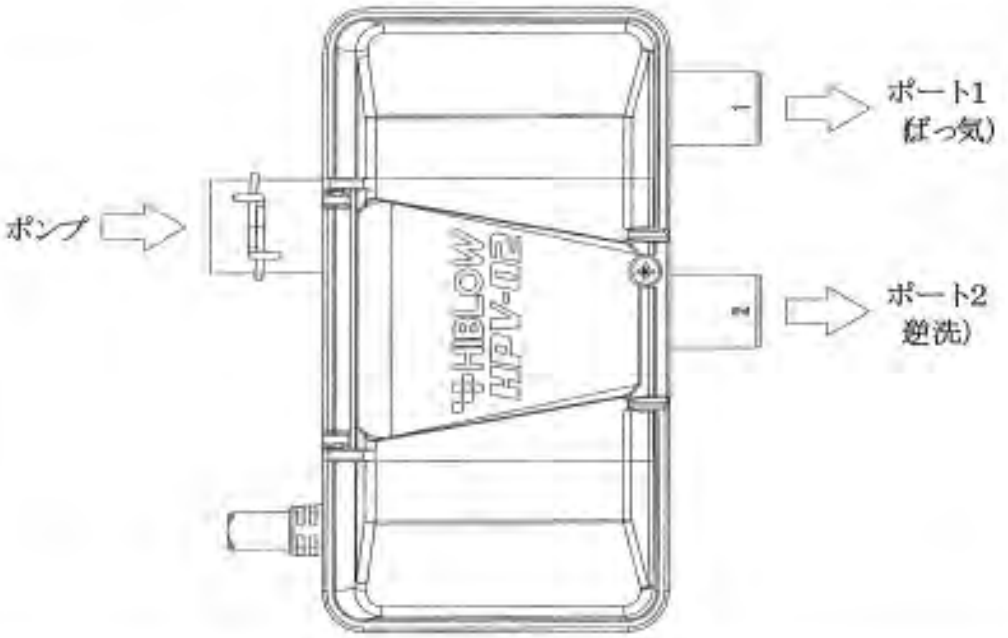
4. Present time st up	Present time set up before Timer set up. Present time set up To push the「設定」button, show the [時計合せ] on the panel. When the time isn't set up , [００：００] one and off. After push「時」and「分」button, the one and off stopped. The hour change whenever push「時」００→０１→０２・・・２３→００ The min. change whenever push「分」、００→０１→０２・・・５９→００ 「時」and「分」change whenever push the button. Keep pushing (over 1 second) become fast-forward (時：each 0.4 second、分：each 0.2 second) When the「分」change to 59→00, the <時> don't change.
12. Timer A ON time set up	Do the Timer set up after present time set up. "ON time" said that the changing time from Port 1 to Port 2. To push the「設定」button and show the [タイマーA　ON]. [タイマーA] is on and off、[ON] is on. タイマーA　ON time is don't set up yet. (Time Indication is [　　:　　]) ※Remarks(Hour & Minute is bl To push the「時」&「分」button, time indication change 「時」Button:００→０１→０２・・・２３→００ 「分」Button:００→０１→０２・・・５９→００ 「時」and「分」change whenever push the button. Keep pushing (over 1 second) become fast-forward (時：each 0.4 second、分：each 0.2 second) When the「分」change to 59→00, the <時> don't change. To using「時」and「分」button, please do the OFF time set up.

ＯＦＦ Time set up	ＯＦＦ time is finish time of the reverse, it is started [タイマーA　ON] time. To push the「設定」button, please show [タイマーA　ＯＦＦ]. [タイマーA] is on and off, [ＯＦＦ] is on. タイマーA　OFF time is don't set up yet. （Time Indication is [　　:　　]）※Remarks (Hour & Minute is b To push the「時」&「分」button, time indication change The hour change whenever push「時」００→０１→０２・・・２３ The min. change whenever push「分」、００→０１→０２・・・５９ 「時」and「分」change whenever push the button. Keep pushing (over 1 second) become fast-forward （時：each 0.4 second、分：each 0.2 second） When the「分」change to 59→00, the <時> don't change.
Timer Working	After finished Timer A On and OFF time, to push the「設定」button and show the [自動]. The [自動] means air exhaust port change set up time every day.
13.Timer B	Normally, Timer B don't need to set up. When you need 2 times reverce per day, please set up Timer B t Set up way is same as Timer A.
ＯＮ Time set up	To push the「設定」putton and show the [タイマーB　ＯＮ]. This time [タイマーB] is on and off、[ＯＮ] is on. タイマーB　ＯＮ time isn't set up yet. （Time Indication is [　　:　　]）※注(Hour & Minute is blank) To push the「時」&「分」button, time indication change The hour change whenever push「時」００→０１→０２・・・２３→００ The min. change whenever push「分」、００→０１→０２・・・５９→００ 「時」and「分」change whenever push the button. Keep pushing (over 1 second) become fast-forward （時：each 0.4 second、分：each 0.2 second） When the「分」change to 59→00, the <時> don't change.

	After finished ON time set up using「時」and「分」button, please set up OFF time.
ＦＦ time set up	To push the「設定」button, please show [タイマーB　ＯＦＦ]. [タイマーB] is on and off, [ＯＦＦ] is on. タイマーB　OFF time isn't set up yet. (Time Indication is [　　:　　]) ※注(Hour & Minute is blank) To push the「時」&「分」button, time indication change The hour change whenever push「時」００→０１→０２・・・２３→００ The min. change whenever push「分」、００→０１→０２・・・５９→００ 「時」and「分」change whenever push the button. Keep pushing (over 1 second) become fast-forward (時：each 0.4 second、分：each 0.2 second) When the「分」change to 59→00, the <時> don't change.
Timer Working	After finished Timer A On and OFF time, to push the「設定」button and show the [自動]. The [自動] means air exhaust port change set up time every day. Remarks：The timer don't work at the following conditions. ・Don't set up the present time. ・Don't set up the timer ・The timer time is incorrect set up.
14.Hand- operated	To push the「手動」button, it can chage from ポート1 to ポート2. This isn't no relation with timer set up time. This is the confirmation of the working. So normally use「自動」. Remarks：To push the「手動」button when normal working, the air flow change to the reverse. To push the「手動」button when the recverse, the air flow change to the normal. After 10 minutes pass「手動」working, automatically change to「自動」
15. Reset	To pushing「リセット」button over 3 second, time and timer set up delation. The「リセット」button push when the timer set up, only timer time deletion. For example, To push「リセット」putton when showing [タイマーA　ON], only the time deletion. When the「タイマーA OFF」time want to delete, show the「タイマーA OFF」and push the「リセット」button.

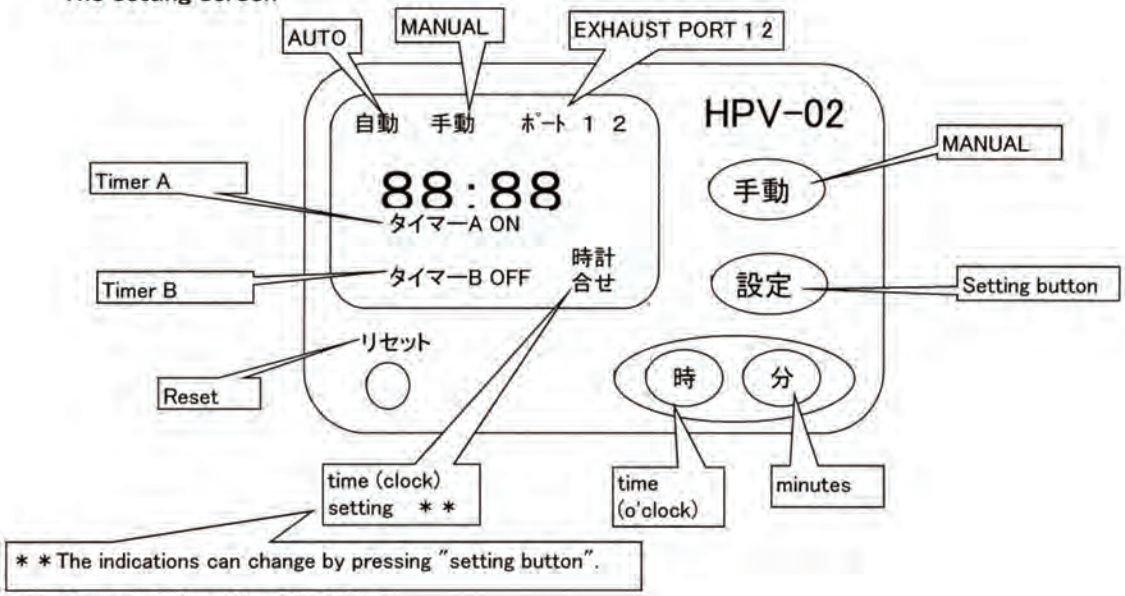
別紙


設定
スイッチ
時計合せ
自動
タイマーA ON
時刻設定
タイマーA OFF
時刻設定
タイマーB ON
時刻設定
タイマーB OFF
時刻設定
時
スイッチ
00
01
02
23
分
スイッチ
00
01
02
59
手動
スイッチ
ポート1
ポート2


ポート1
ぱっ気)
ポンプ
ポート2
逆洗)

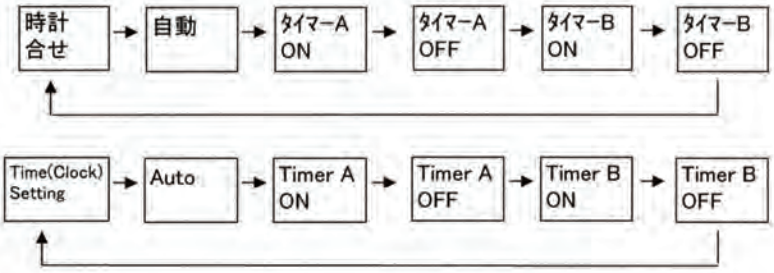
HPV-02 INSTRUCTION MANUAL

The setting screen



The way of setting the timer

Press setting button to change indication of "time (clock) setting".
The order of different indications are as follows.



To set the present time

Set the present time before setting the timer.

Choose the indication of "Time(clock) setting " by pressing setting button.
Set the present time by pressing "time (o'clock)" or "minutes" button.

To set the "timer A ON"

"ON" will be a time to switch exhaust port of air flow from Port 1 to Port 2.

Choose the indication of "Timer A ON" by pressing setting button.
The indication of "Timer A" part will be blink and "ON" part will be remained on.
Set the time for Timer A on by pressing "time (o'clock)" or "minutes" button.

To set the "timer A OFF"

"OFF" will be a time to switch exhoust port of air flow from Port 2 to Port 1.

Choose the indication of "Timer A OFF" by pressing setting button.
The indication of "Timer A" part will be blink and "OFF" part will be remained on.
Set the time for Timer A off by pressing "time (o'clock)" or minutes" button.

Choose the indication of "AUTO" after complete the timer setting.
The air flow will switch between port 1 and port 2 every day at the fixed time.

Timer B
Set the timer B on and off only if it is necessary to switch exhaust port of air flow twice a day.
The procedure will be the same with "To set the timer A ON" and OFF.

The timer won't work with the following conditions.
* The present time is not set.
* The timer setting is not completed.

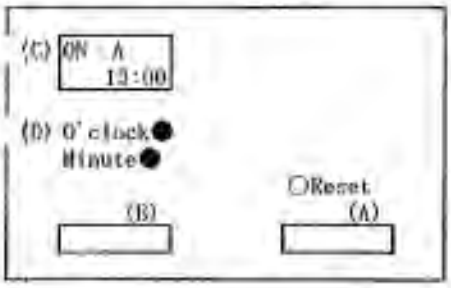
The way of Manual setting
It is available to switch exhaust port of air flow by pressing "MANUAL" button regardless of timer setting.
* It will return to "AUTO" mode automatically after 10 minutes of Manual operation.

Reset
The all setting (present time and timer A or B) will be cleared by pressing "RESET" button while setting present time.
The timer setting will be cleared by pressing "RESET" button while setting timer A or B.

ex. The only setting time of "Timer A ON" will be cleared by pressing "RESET" button while setting "Timer A ON".

The normal surrounding condition.
temperature (25±5℃)
humidity (65±20%)

≪Timer setting method more than once≫

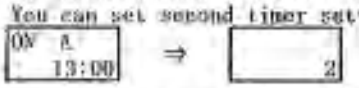


(A)
backwash by automatic
1 2 3 4
1 Time control
2 Automatic operation
3 Beginning time
4 Ending time
(B)
backwash operation by hand
ON OFF

<1> Please set as below
(A)"Automatic operation"
(B)"OFF"

<2> If you put "O'clock(D)" more than 3 seconds,
(C) will change as below.

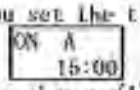
"2" means second timer setting.
You can set second timer setting.



In addition to above situation, if you put "O'clock(D)" more than 3 seconds,
(C) will change as below.

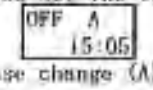
"3" means third timer setting.
You can set third timer setting.

<3> How to set "beginning time" of (A)
(1)Please set "beginning time of (A)"
(2)Please set the time with using (D)
(3)If you set the time, (C) will be as below.



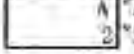
(4)Please change (A) from begginning time to automatic operation.

<4> How to set "ending time" of (A)
(1)Please set "ending time of (A)"
(2)Please set the time with using (D)
(3)If you set the time, (C) will be as below.



(4)Please change (A) from ending time to automatic operation.

<5> If we set as above, (C) will be as below.



"A" means Automatic operation
"2" means second timer setting

<6> If you put "O'clock(D)" more than 2 seconds,
(C) will show the current time.
***In case of neglecting more than 5 minutes,
it will automatically reset to the current time.