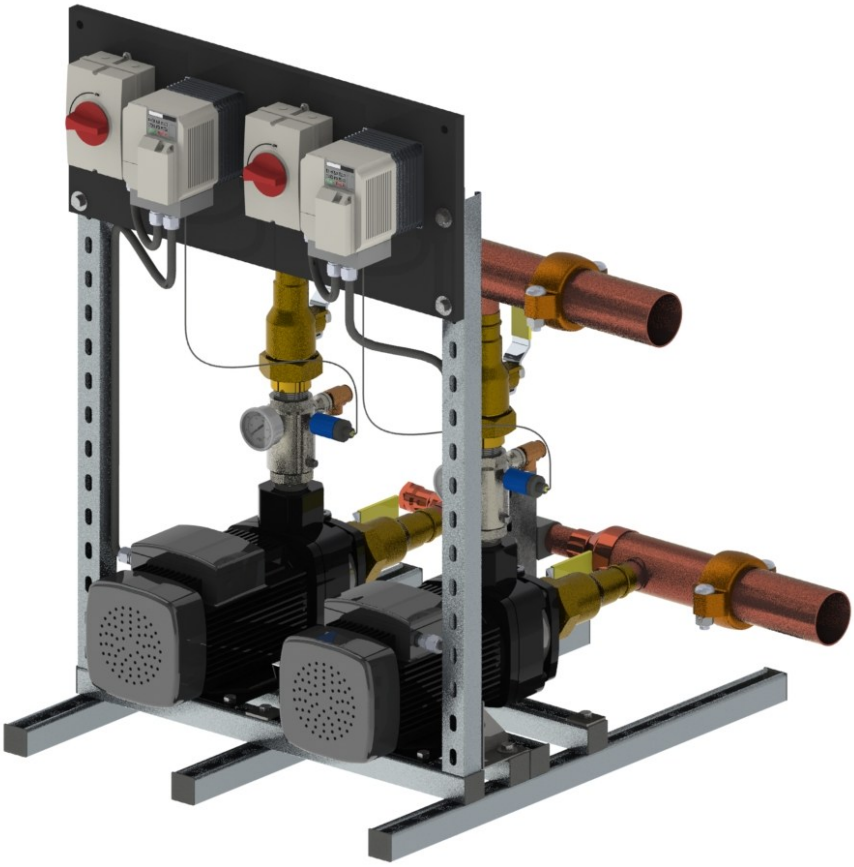
TOWLE WHITNEY
Booster Pump Systems



SYSTEM MODEL: TW2018T-3BF-3HP

VARIABLE SPEED DUPLEX BOOSTER PUMP SYSTEM

TOWLE WHITNEY
603-626-7371

SYSTEM MODEL: TW2018T-3BF-3HP

The Booster Pump System features centrifugal pumps with variable frequency drives (VFDs) that maintain constant pressure despite demand fluctuations. Designed to fit through a 30-inch doorway, the system alternates the lead pump every 24 hours, keeping the remaining pump(s) on standby.

Design Specifications:

System Flow Rate:	XXX GPM
Pump Flow Rate:	XX GPM
Incoming Pressure:	XX PSI
Pump Boost:	XX PSI
Set Pressure:	XX PSI
Power:	XXX-XXXV/X Phase
Circuits Required:	**Two**
Pump Hp (each):	**3 Hp**
Total Hp:	**6 Hp**

**See Page 9 for amp requirements (based on system power)*

Technical Data:

Frame
Material: Steel Strut Channel
Dimensions: 29" W x 42" H x 36" D

Pumps
Model: Goulds 3BF-C
Material: Cast Iron
Horsepower: 3 HP per pump
Maximum Volume: 150 GPM per pump
Maximum Boost: 40 PSI (92' TDH)
Performance Curve: Refer to page 3

Manifolds
Material: 3" Type L Copper
Connection: Plain End / Grooved *(both are provided)*
**Manifold direction is field reversible*

Expansion Tank *(included)*
Model: PL-20
Capacity: 20 Gallons
Dimensions: 32" x 15"

VF Drives
Model: Yaskawa iQPump Micro
Rated: NEMA 1

Power Options
200-240V/1Phase
200-240V/3Phase
360-480V/3Phase

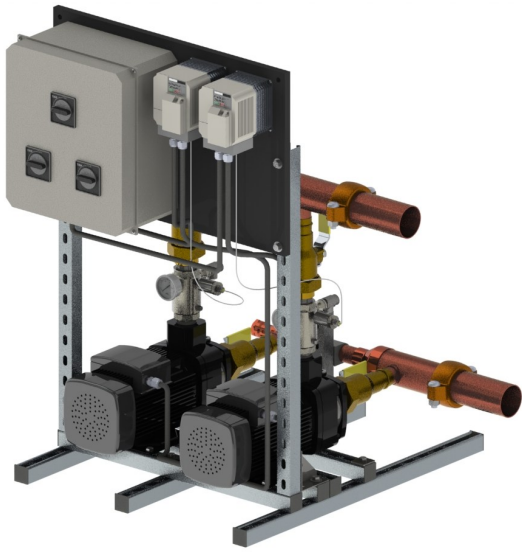
Fuse Amp Sizing
Refer to page 9

Electrical Options
Single Point Connection *(optional adder)*
NEMA 4 VFD *(optional adder)*

STANDARD: TWO INDEPENDENT DISCONNECTS

All parts shown included.
Actual system components may vary.
Some assembly required.

OPTIONAL: SINGLE POINT POWER PANEL



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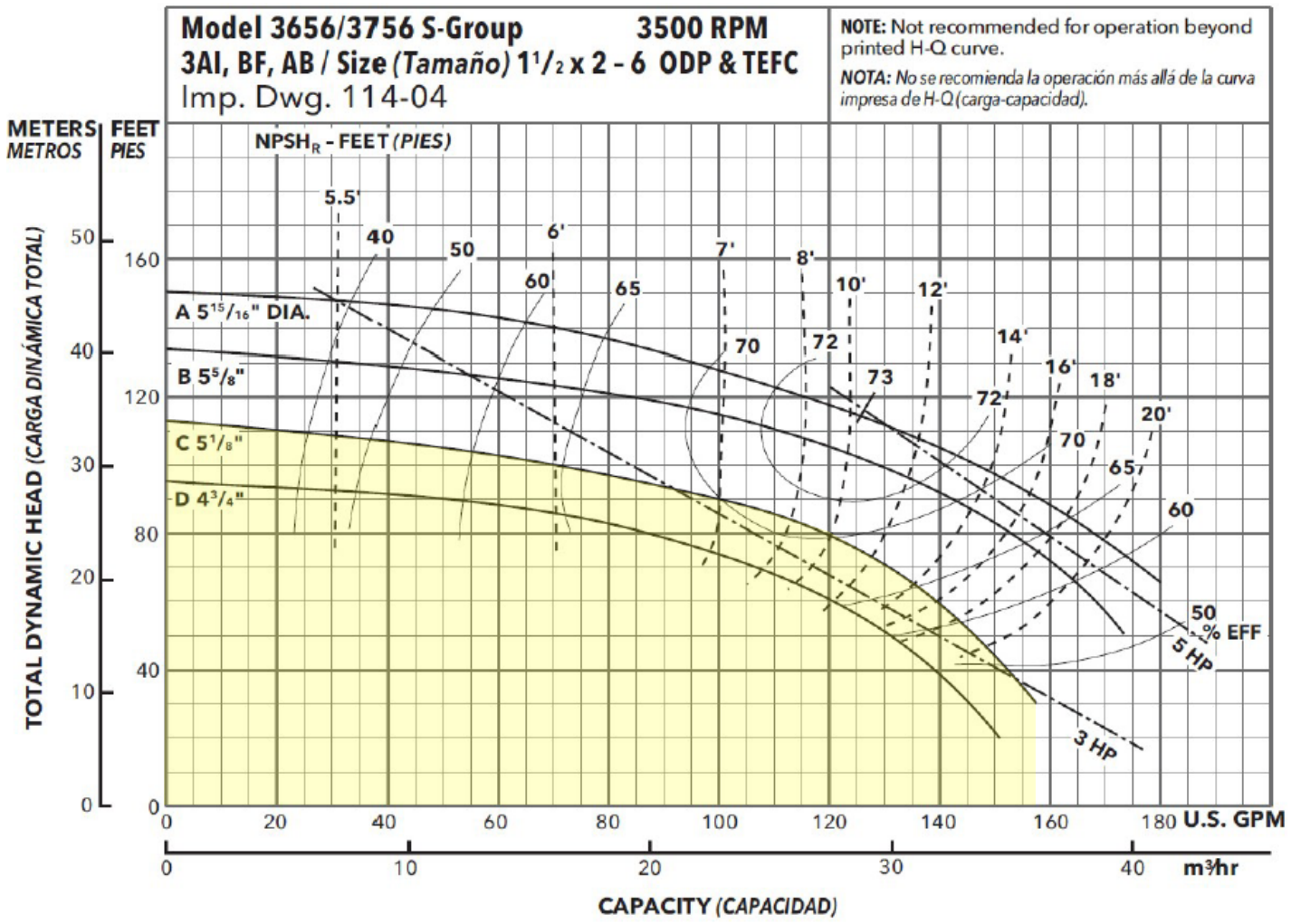
Performance curve for each pump



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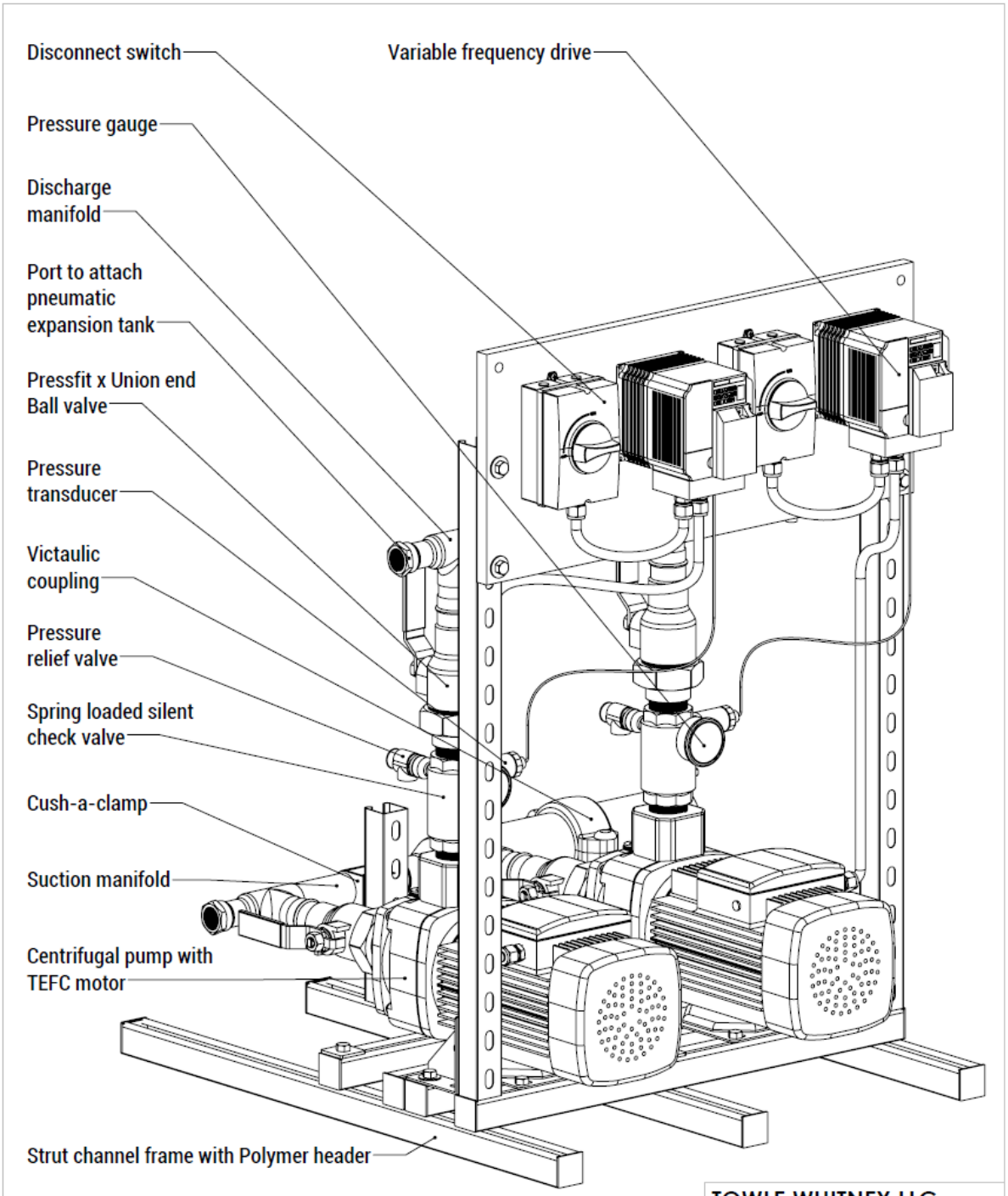
SYSTEM CONFIGURATION



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DIMENSIONS ARE SUBJECT TO CHANGE
DO NOT USE FOR CONSTRUCTION
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DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	VID	4/15/24
CHECKED	DW	4/15/24

COMMENTS:

TOWLE WHITNEY LLC

Duplex Variable Speed Booster System

SIZE A | DWG. NO. 2024-04-15-A | REV.
SCALE:1:16 | WEIGHT: | SHEET 1 OF 1

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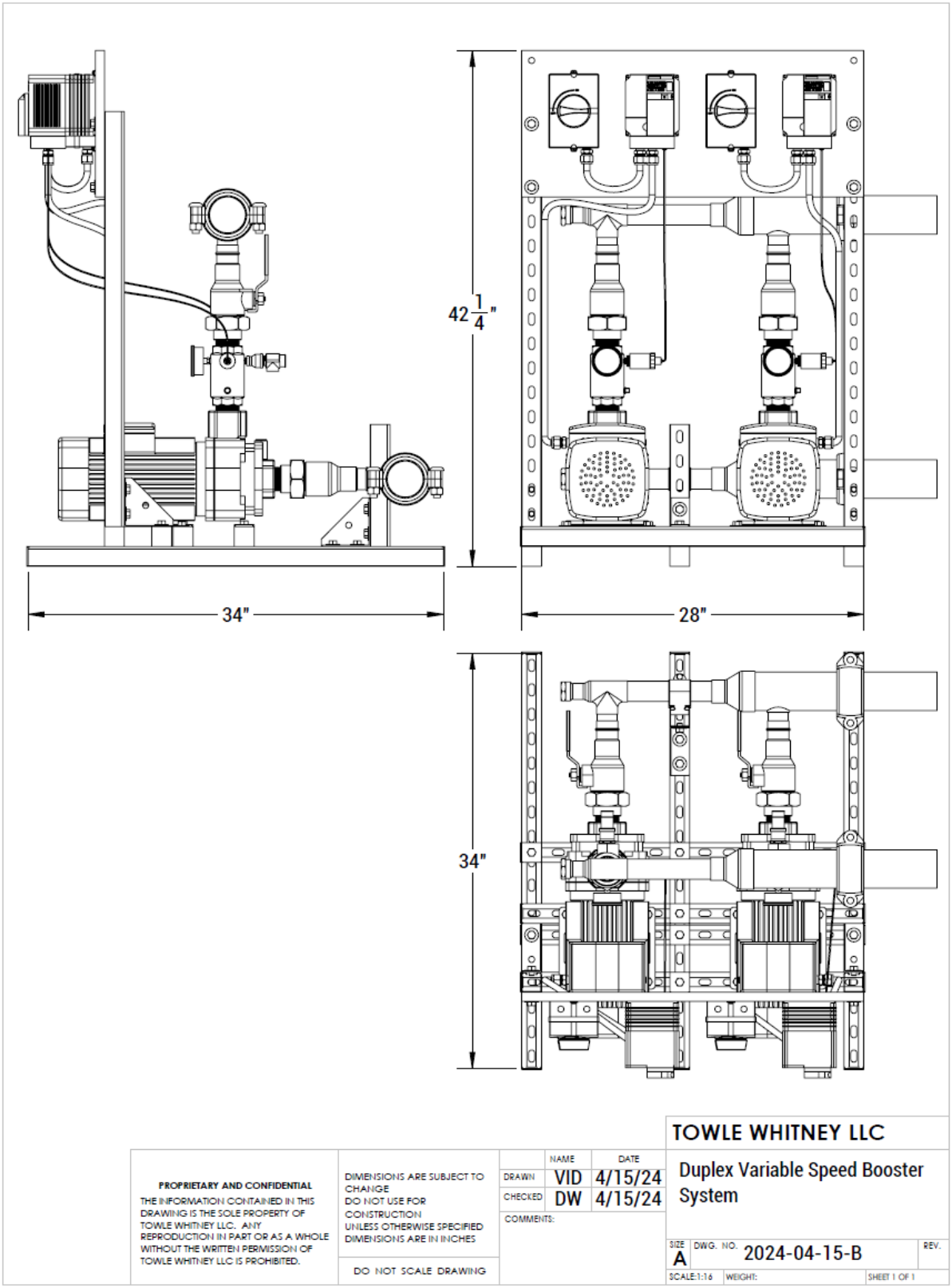
SYSTEM DIMENSIONS



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TOWLE WHITNEY LLC

Duplex Variable Speed Booster System

SIZE A | DWG. NO. 2024-04-15-B | REV.

SCALE:1:16 | WEIGHT: | SHEET 1 OF 1

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GENERAL SPECIFICATIONS

Assembled Units:

- All "wetted surfaces" shall be lead free (<.25% Pb) in conformance with the 1/4/14 federal law
- Shall include a separate and independent variable frequency drive (VFD) for each pump with a pressure transducer, pressure gauge, and relief valve. Piping and frame shall not interfere with access to the controls
- Each pump shall include isolation valves on both the suction and discharge piping
- Each pump shall have a separate and independent disconnect box *(unless otherwise specified)*
- Shall be mounted on a frame for ease of transport and installation

Variable frequency drive:

- Will ALTERNATE the lead pump every 24 hours (field adjustable) of run time. The lag pump shall be in standby
- Shall have hands-off automatic (HOA) capability
- Rated to operate using specified power requirement. The drive efficiency shall be 98% or better
- Have UL approval with all factory installed options and preset values and/or last saved data values will remain available to the operator after power outage
- Shall have at least NEMA 1 rated conduit enclosure *(unless otherwise specified)*
- The program safeguard the pumps from damaging hydraulic conditions, including:
  - Motor overload, Pump overflow surges, Loss of prime due to incoming water supply interruption, Hunting
  - Overload protection through frequency/current optimization
  - Hydraulic protection by restricting pump operation beyond the published end-of-curve limits
- Shall have the ability to automatically restart after an over-current, over-voltage, under-voltage or loss of input signal
- Shall have an operator control panel [keypad] for customization of parameters
- Shall include a feature to upload/download parameters into an external device to be used with another drive or the same drive
- Shall have a removable non-volatile memory device
- Shall be capable of accepting individual analog inputs from transducer. All transducer inputs must be wired to the variable frequency drive for continuous scan and comparison function
- Ladder logic program shall utilize a proportional - integral - derivative control function
- Shall display the following values:

Pump running/standby, Pump speed in Hz, User adjustable parameters such as PID set points, Motor frequency, Motor current, Threshold set points for PID error, Min operating frequency, Troubleshooting and diagnostics of faults

Transducer:

- The transducer shall be rated for required system pressure and shall be 4-20 mA analog
- Separate transducers shall be supplied for each variable frequency drive to ensure redundancy

Centrifugal pump:

- Shall have a cast iron casing with bronze fitted impellers.
- Shall have a 316 stainless steel shaft sleeve. Mechanical seal shall be rated to withstand pressure of up to 175 PSI
- Motor shall be open drip proof (ODP) or to totally enclosed fan cooled (TEFC) and manufactured in compliance with CE, RoHS and CSA

Pneumatic expansion tank:

- Pneumatic expansion tank shall be rated for use with potable water with an operating pressure of a maximum 125 PSI
- Pre-charged to a pressure below system operating pressure for system to run properly

Manifolds, valves and fittings:

- Manifolds are designed for either right or left access
- Shall be sized appropriately to allow water velocity not exceeding 10 ft/sec, to minimize cavitation and turbulence
- Check valves shall be silent and spring-loaded

Installation:

- Equipment shall be installed in accordance with applicable local building, electrical and plumbing codes
- Shall be installed indoors (unless otherwise specified) and protected from water spray

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COMPONENT COMPLIANCE

Lead-Free (Wetted) Components:

Pumps:	Cast Iron
Relief Valves:	Stainless Steel
Pressure Gauges:	Lead Free Brass
Transducers:	Stainless Steel
Check Valves:	Stainless Steel
Ball Valves:	Lead Free Brass
Manifolds:	Type L Copper
Fittings:	Lead Free Brass or SS

* All lead-free brass shall contain <.25% Pb

Electrical

Yaskawa VFD	UL 508C Power Conversion CSA 22.2 Industrial Controls	c UL us LISTED	CE	RoHS
Lovato Shut-off	NEMA4	c UL us LISTED	CE	RoHS

Pumps

Grundfos CM(I) SS Series	NSF 61	c UL us LISTED	CE	
Grundfos CR(I) SS Series	NSF 61	c UL us LISTED	CE	
Goulds 125MS Series	NSF 61	c UL us LISTED	CE	
Goulds BF Series	NSF 61			
Walrus TPH Series	NSF 372		CE	RoHS

Plumbing

Bluefin BVT200 Ball Valves	NSF 61		
Webstone BVT200 Ball Valves	NSF 61		
Bonomi Check 1000012	NSF 61	CE	
Flomatic VFD Check	NSF 61		
Victaulic 607 “E” Coupling	NSF 61		
Victaulic 660 Cap	NSF 61		
Amtrol PL Tank	NSF 61		
Watts PLT Tank	NSF 61		
Manifolds / piping	Type L Copper		
Fittings	Copper		
Discharge Riser	Copper	CE	
- Pressure Relief valve:			
- SS 4-20mA Transducer:			
- Pressure Gauges:	CA AB1953		

Sealants

Rectorseal Nokorode Flux	NSF 61
Worthington SILVER Solder	NSF 61
LocTite 567 Thread Sealant	NSF 61
Gasoila Thread Sealant	NSF 61

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VFD SPECIFICATIONS

Warranty: Provide VFD warranty, for one year from startup, not to exceed 18 months from the date of shipment. Warranty shall include parts, and labor allowance for repair hours.

YASKAWA

Performance Features (Drive)

- Ratings:
  1 to 5 HP at 200-240 VAC 1-Ph.
  1 to 25 HP (ND) at 200-240 VAC 3-Ph.
  1 to 25 HP (ND) at 380-480 VAC 3-Ph.
- Overload Capacity:
  120% for 60 sec. (Normal Duty)
- Control Methods: V/f Control,
  Open Loop Current Vector Control
- DC injection braking, ramp to stop
- Electronic reversing
- Adjustable accel/decel: 0.01 to 6000 seconds
- Controlled speed range:
  40:1(1) 100:1(2)
- Speed Regulation:
  ± 0.5 to 1% with slip compensation(1)
  ± 0.2%(2)
- Displacement power factor: 0.98
- Output frequency: 0 to 400 Hz
- Frequency resolution:
  0.01 Hz with digital reference
  0.06 / 60 Hz with analog reference
- Frequency accuracy:
  0.01% with digital command
  0.5% with analog command
- Volts / hertz ratio: infinitely adjustable pattern
- DC Injection braking: adjustable amplitude, duration, current limited
- Torque boost: full range, auto
- Power loss ride-thru: 0.5 sec.
- Speed search
- Auto restart
- 3 Critical frequency rejection settings
- Slip Compensation
- Energy $avings Function
- Enhanced PID with loss of feedback function

(1) V/f Mode
(2) Open Loop Current Vector Mode

Design Features (Drive)

- Dual microprocessor logic
- Digital keypad operator, 5 digits
- LED status display
- Remote Mount Keypad Capability
- RJ-45 Style Digital Operator Connector
- 7 multifunction digital inputs
- 3 multifunction digital outputs
- Hardwire baseblock (EN954-1 Cat. 3)
- Programmable form C output contact for customer use: 1A at 250 VAC or 30 VDC
- 24 VDC control logic compatible with sourcing or sinking outputs (PNP or NPN)
- Carrier frequency: 15 kHz max; swing PWM
- 2 Remote speed references:
  0-10 VDC (20 kohms) or isolated 4-20 mA (250 ohms)
- Signal follower: bias and gain
- 2 programmable open collector outputs
- Analog monitor output:
  0-10 VDC proportional to output frequency or output current
- Approx. 400 parameters and monitors
- Digital pulse train input (33 kHz max.)
- Cooling fan controlled by drive run/stop
- RS-422/485 Modbus 115 kbps
- UL recognized electronic overload
- MTBF: 28 years
- NEMA 1 enclosure
- Side-by-Side mounting
- Maintenance monitors

Protective Features (Drive)

- Current limit, stall prevention during accel, decel, and run
- Motor and drive overload
- Over voltage prevention function
- Instantaneous over current
- Short circuit
- Under voltage
- Heatsink overheat
- Ground fault protection
- Over/under torque
- Short circuit current rating: 30kA rms sym.

Pump Control Features

- Operator keypad with intuitive pump language
- Hand-Off-Auto
- Programmable pump process set point
- Pump start level and start time
- Sleep protection
- Simplex, duplex and triplex control
- Automatic system restart
- No flow detection
- Low and high feedback set points
- Pre-charge low level control
- Thrust bearing control
- Automatic system stabilization
- Motor condensation pre-heat function

Pump Protective Features

- Dry well
- Air in system
- Blocked impeller
- Pump over cycling
- No flow protection
- Loss of prime
- Transducer loss
- Over torque

Pump Alarms and Messages

- Low feedback
- High feedback
- Low level
- Low water
- Pump over cycling
- No flow detection
- Loss of prime
- Pump fault
- Motor thermostat
- Pre-charge mode
- Thrust bearing active
- Start mode active
- Sleep mode active

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■ Factory Recommended Branch Circuit Protection for UL Compliance

Yaskawa recommends installing one of the following types of branch circuit protection to maintain compliance with UL508C. Semiconductor protective type fuses are preferred.

Branch circuit protection shall be provided by any of the following according to ***Table D.10***.

- Non-time Delay Class J, T, or CC fuses.
- Time Delay Class J, T, CC, or RK5 fuses.
- Semiconductor fuses.
- Molded Case Circuit Breakers (MCCB).

Table D.15 Factory Recommended Drive Branch Circuit Protection

Drive Model	Non-time Delay Fuse Rating (A) <1>	Time Delay Fuses		Bussmann Semiconductor Fuse Part Number (Fuse Ampere) <4>	MCCB <5>	
		Class J, T, or CC Fuse Rating (A) <2>	Class RK5 Fuse Rating (A) <3>		Rating (A)	Minimum Enclosure Volume (in^3)
200 V Class Single-Phase Drives						
BV0006	40	20	30	FWH-80B (80)	30	1152
BV0010	40	35	45	FWH-100B (100)	50	1152
BV0012	50	40	50	FWH-125B (125)	60	1152
BV0018	80	60	70	FWH-175B (175)	80	1152
200 V Class Three-Phase Drives						
2V0006	20	10	15	FWH-25A14F (25)	15	1152
2V0010	25	15	20	FWH-70B (70)	25	1152
2V0012	25	20	30	FWH-70B (70)	30	1152
2V0020	40	40	50	FWH-90B (90)	60	1152
2V0030	–	60	80	FWH-100B (100)	90	1152
2V0040	–	90	110	FWH-200B (200)	125	1152
2V0056	–	110	150	FWH-200B (200)	150	2560
2V0069	–	125	175	FWH-200B (200)	200	2560
400 V Class Three-Phase Drives						
4V0002	6	3.5	3	FWH-40B (40)	15	1152
4V0004	15 <7>	7	8	FWH-50B (50)	15	1152
4V0005	20 <8>	10	10	FWH-70B (70)	15	1152
4V0007	25 <9>	12	15	FWH-70B (70)	20	1152
4V0009	25	15	20	FWH-90B (90)	20	1152
4V0011	30	20	30	FWH-90B (90)	35	1152
4V0018	–	35	45	FWH-80B (80)	50	1152
4V0023	–	40	50	FWH-100B (100)	60	1152
4V0031	–	60	80	FWH-125B (125)	90	1152
4V0038	–	70	90	FWH-200B (200)	110	1152

<1> Maximum 300% of drive input current rating for any Class J, T, or CC fuse except for models 4V0004, 4V0005, and 4V0007.

<2> Maximum 175% of drive input current rating for any Class J, T, or CC fuse.

<3> Maximum 225% of drive input current rating for any Class RK5 fuse.

<4> When using semiconductor fuses, Bussmann FWH are required for UL compliance.

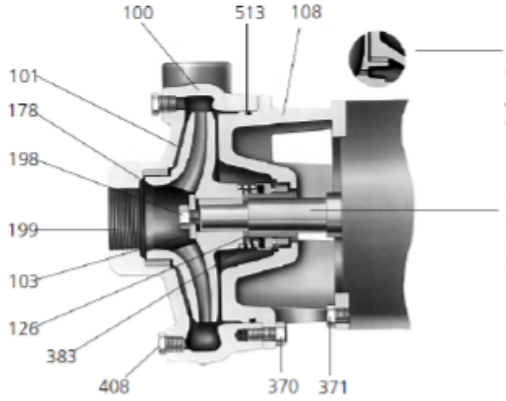
<5> Maximum MCCB Rating is 15 A or 200% of drive input current rating, whichever is larger. MCCB voltage rating must be 600 Vac or greater. Additionally, when using MCCBs for protection, the drive must be installed in a ventilated enclosure with minimum volume according the "Minimum Enclosure Volume" column.

<6> Model 4V0004 requires Mersen (Ferraz) part number A6T15 for compliance.

<7> Model 4V0005 requires Mersen (Ferraz) part number A6T20 for compliance.

<8> Model 4V0007 requires Mersen (Ferraz) part number A6T25 for compliance.

3656 S-GROUP MATERIALS OF CONSTRUCTION
MATERIALES DE CONSTRUCCIÓN - GRUPO S, MODELO 3756



Item No. / No. Ítem	Description / Descripción	Materials, Materiales: All Iron / Todo hierro	Bronze Fitted / Accesorios de bronce	All Bronze / Todo bronce
100	Casing, *Carcasa*	1001	1001	1101
101	Impeller, *Impulsor*		1101	
103	Casing wear ring, *Anillo de desgaste de la carcasa*		1618	1618
108	Adapter, *Adaptador*		1001	1001
184	Seal housing, *Cubierta del sello* ①	One piece with adapter, *Una pieza con adaptador*		1101
126	Shaft sleeve, *Camisa del eje*	AISI Type 300 series stainless steel, *Acero inoxidable serie AISI tipo 300*		
198	Impeller bolt, *Perno del impulsor*			
199	Impeller washer, *Arandela del impulsor*			
178	Impeller key, *Chaveta del impulsor*	Carbon Steel, *Acero al carbono*		
370	Hex head cap screw (adapter to case), *Tornillo de cabeza hexagonal (del adaptador a la cubierta)*	Steel SAE 1200 Grade 5, *Acero SAE 1200 grado 5*		
371	Hex head cap screw (adapter to motor), *Tornillo de cabeza hexagonal (del adaptador al motor)*			
383	Mechanical seal, *Sello mecánico*	See seal chart, *Ver tabla del sello*		
408	Pipe plug ¼" or ⅜", *Tapón de tubos de ¼ de pulgada ó ⅜ de pulgada*	Steel, *Acero*	Bronze, *Bronce*	
513	O-ring, *Anillo en O*	BUNA-N, *BUNA-N*		

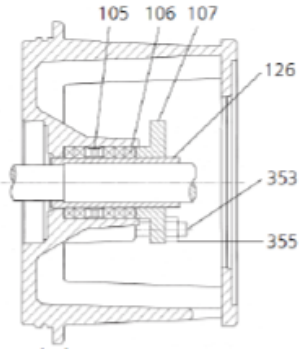
Material Code, *Código de material*	Engineering Standard, *Norma de ingeniería*
1101	Cast iron ASTM A48 CL20, *Hierro fundido ASTM A48 CL20*
1101	Silicon bronze ASTM B584, C87500, *Silicuro de bronce ASTM B584, C87500*
1618	Bizmuth brass, *Latón al bismuto*

Packed Box Arrangement, *Caja prensaestopas*

Item No., *No. Ítem*	Description, *Descripción*	Materials, *Materiales*
105	Lantern ring, *Aro de linterna*	Teflon™
106	Packing, 5 rings; *Empaquetadura, 5 aros*	Teflon Impregnated, *Impregnado de Teflon*
107	Gland, *Casquillo*	AISI 316SS
126	Shaft sleeve, *Camisa del eje*	AISI Type 300 Series Stainless Steel, *Acero inoxidable serie AISI tipo 300*
353	Gland stud, *Perno del casquillo*	
355	Gland nut, *Tuerca del casquillo*	

Type 21 Mechanical Seal, *Tipo 21 sello mecánico*

Seal Code, *Código del Sello*	Rotary, *Rotativo*	Stationary, *Estacionario*	Elastomers, *Elastómeros*	Metal Parts, *Partes Metálicas*	Part No., *Pieza Número*
0	Carbon, *Carbón*	Ceramic, *Cerámica*	BUNA-N	316 SS, *316 Acero inoxidable*	10K13
1		Sil-Carbide, *Carburo de silicona*	EPR		10K19
3			Viton		10K27
5	Sil-Carbide				10K64
9	Packed Box Design with BUNA O-Ring, *Diseño de prensaestopas empacado con anillo en O de BUNA*				15K16



Packed Box Arrangement
Caja prensaestopas

① For separate seal housing and adapter construction, all bronze material only, see repair parts page.

Para la construcción separada del compartimiento del sello y el adaptador, materiales de bronce únicamente, consulte la página de piezas de repuesto.

NOTE:
Pumps will be shipped with top-vertical discharge position as standard. For other orientations, remove casing bolts – rotate discharge to desired position – replace and tighten bolts to 25 ft./lbs. Note that discharge may extend below motor mounting surface in bottom-horizontal position; adequate clearance must be provided.

NOTA:
Las bombas salen de la fábrica con la descarga orientada en posición vertical superior de manera estándar. Para modificar la orientación, retirar los pernos de la carcasa, hacer girar la descarga hasta la posición deseada y volver a colocar los pernos, ajustándolos a una torsión de 25 pies/libras. Se ha de notar que la descarga se puede extender por debajo de la superficie de montaje del motor en la posición horizontal inferior; por lo tanto, debe proveerse suficiente espacio.

AMTROL

PRO-LINE®

Diaphragm Well Tanks: PL Series

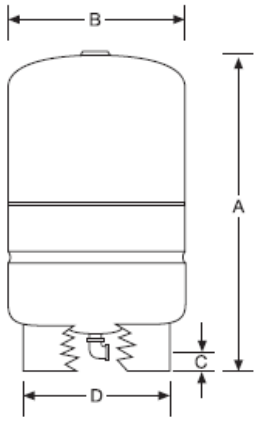
125 PSIG Working Pressure

Construction

Shell	Deep Drawn Steel
Diaphragm	Butyl
Liner	Polypropylene
System Connection	304L Stainless Steel
Finish	Tan
Water Circulator	Turbulator™
Air Valve	Projection Welded
Factory Precharge	38 PSIG (2.6 bar)

Application

- Controls pump cycling in residential well water systems.



Performance

Maximum Operating Temperature	200°F (93°C)
Maximum Working Pressure	125 PSIG (8.6 bar)
Maximum Relief Valve Setting	100 PSIG (6.9 bar)
Warranty	5 Year

Stand Models

Model	Tank Volume		Max. Accept. Factor	A Tank Height		B Tank Diameter		C Sys. Conn. Centerline		D Stand Diameter		System Conn. (NPTF)	Shipping Weight	
	Gal	Lit		In	mm	In	mm	In	mm	In	mm	In	Lbs	Kg
PL-14	14.0	53	0.81	25	635	15	381	1 19/32	40	12	304	1	22	10
PL-20	20.0	76	0.57	32	813	15	381	1 19/32	40	12	304	1	28	13
PL-26	26.0	98	0.44	39	991	15	381	1 19/32	40	12	304	1	34	15
PL-32	32.0	121	0.35	47	1194	15	381	1 19/32	40	12	304	1	40	18
PL-34	34.0	129	1.00	30	762	22	559	1 15/16	49	20½	521	1¼	50	23
PL-44	44.0	167	0.77	36	914	22	559	1 15/16	49	20½	521	1¼	57	26
PL-62	62.0	235	0.55	47	1194	22	559	1 15/16	49	20½	521	1¼	75	34
PL-81	81.0	301	0.41	57	1448	22	559	1 15/16	49	20½	521	1¼	92	42
PL-86	86.0	326	0.54	47	1194	26	660	2 1/16	52	20½	521	1¼	99	45
PL-119	119.0	450	0.39	62	1575	26	660	2 1/16	52	20½	521	1¼	133	60

All dimensions and weights are approximate.

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Booster Pump Systems

Three Year Limited Warranty

This warranty applies to booster pump systems built by Towle Whitney LLC, and shall:

- Exist 36 months from the date of shipment.
- Be in effect only after installation photographs are received by Towle Whitney LLC.

Towle Whitney LLC liability under this warranty shall be limited to the repair or replacement of any part or parts found to be defective (material or workmanship) within the warranty period. Towle Whitney LLC shall determine whether the part needs to be returned, or field scrapped. The warranty excludes:

- Any water damage or consequential damage.
- Transducers & Pump Seals.
- Debris in water causing damage to pump internal parts.
- Systems not installed in accordance with Installation and Maintenance Instructions.
- Labor, transportation, and related costs incurred by the customer.
- Misuse, negligence, inappropriate chemicals or additives in water.
- Inadequate protection from freezing.
- Lightning, high voltage spikes, accidents, floods, or acts of God.
- Re-Installation costs of repaired or replacement equipment.
- Re-Imbursement for the loss caused by interruption of service.
- Adjusting drive parameters without consulting Towle Whiney.

This warranty applies to all states and territories of the United States and Canada only. There are no express or implied warranties, including merchantability or fitness for a particular purpose, which extend beyond those warranties described or referred to above.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limit actions on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

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