



TECHNICAL SUBMITTAL



PROJECT TITLE:

Brookfield WPCA - 133 Pump Station

REVISION NO:

0

DATE:

4/3024

CONTRACT NO:

SPECIFICATION:

Pump Replacement

LOCATION:

Brookfield, CT

FLEET JOB NO:

DE-03-1318

CUSTOMER PO NO:

20031 Pump Replacement



TAG NO.	MODEL	DESCRIPTION
	Flygt NP 3171.830 SH-275	(3) NP 3171.830 SH Pumps w/ 275 impeller 35 HP, 460/3/60 3530RPM - FLS & FM Non-clog explosion-proof wastewater pumps with 50 ft Electrical cable

OWNER:

Brookfield, CT

G.A FLEET ASSOCIATES CONTACT:

New York & Connecticut Office:
6 International Drive, 2nd Floor Suite# 210
Rye Brook, NY 10573
Phone: (914) 835-4000
Fax: (914) 939-4850

FLEET PUMP & SERVICE CONTACT:

455 Knollwood Rd, White Plains, NY 10603
NY/NJ Phone: (914) 835-3801
NY/NJ Fax: (914) 835-2946
CT: (203) 661-2680



Brookfield WPCA - 133 Pump Station

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KEYSTONE ENGINEERING GROUP SHOP DRAWING REVIEW

Keystone's review is with respect to the design concept of the project and the information given in the Contract Documents only. The Contractor is still responsible for compliance with the Drawings and Specifications including all details pertaining to the work and equipment to be supplied for a complete and operable system. This shop drawing submittal is:

- Approved
- Revise/Resubmit
- Approved as Noted (No Resubmittal Required)
- Approved as Noted (Resubmittal Required)
- Approved as Noted (Provide Requested Information Only)

Reviewed by Haley Scott Date 06/06/2024

Reviewed and Approved electrically.

Langan Project No. 190093201	
Spec. Section No. --	
File No. --	Submittal No. --
Date Received: 4/30/2024	
<input checked="" type="checkbox"/>	REVIEWED
<input type="checkbox"/>	EXCEPTION TAKEN AS NOTED
<input type="checkbox"/>	REVISE AND RESUBMIT
<input type="checkbox"/>	INCOMPLETE - RESUBMIT
<input type="checkbox"/>	FOR INFORMATION ONLY
Review is only for conformance with the design intent of information developed by Langan and issued for the Project. Contractor is responsible for performance of the work in accordance with the requirements of the Contract Documents and for all fabrication processes, means, methods, techniques, sequences and procedures of construction, coordination with the work of other contractors and subcontractors and verifying all dimensions and quantities. Contractor is also responsible for performing the work in a safe manner. Action does not authorize changes to contract requirements unless otherwise stated in a separate letter or change order. Langan's review of a specific item does not indicate approval of an assembly of which the item is a component.	
<p style="text-align: center;">LANGAN Langan Engineering, Environmental, Surveying, Landscape Architecture And Geology, D.P.C. Langan Engineering And Environmental Services, Inc. Langan International LLC Collectively known as Langan</p>	
Reviewed By: Imcmahon	
Date Returned: 6/7/2024	



Brookfield WPCA - 133 Pump Station

CONTACTS

Engineer

TBA

Contractor

Brookfield
53A Commerce Rd., Unit 1
Brookfield, CT 06804

Representative

G. A. Fleet Associates, Inc.
6 International Drive, 2nd Floor Suite # 210
Rye Brook, NY 10573
Phone: 914-835-4000
Fax: 914-939-4850

Service & Parts

Fleet Pump & Service
455 Knollwood Rd.
White Plains, NY 10603
Phone: 914-835-3801
Fax: 914-835-2946



Brookfield WPCA - 133 Pump Station

CONTACTS

Equipment Manufacturer

Flygt Corporation
2330 Yellow Springs Road
Malvern, PA 19355
Phone: 610-647-6620
Fax: 610-647-5563

Brookfield WPCA - 133 Pump Station

EQUIPMENT INFORMATION

- (3) Xylem/Flygt NP 3171.830 SH w/ 198 impeller FLS & FM
Non-Clog Submersible Explosion Proof Wastewater Pumps
- *1 Spare Pump
P/N: TBA

MOTOR DESCRIPTION:

35HP 3530RPM 460V/3/60Hz

Dry shell type, NEMA design B, induction squirrel cage motor Class H insulation rated 180 degrees C. Combined service factor of 1.15 (combined effect of voltage, frequency and specific gravity not to exceed this value).

Pumps will be provided with 50' Cable
Contractor to verify cable length is adequate prior to release.

DESIGN CRITERIA:

450GPM @ 170' TDH

TEST REQUIREMENTS:

- (3) Certified Performance Test P/N 14-699490 - 2B Tolerance Level

PUMP STATION ACCESSORIES:

- (2) 4" Discharge Connection P/N 5401305
- (4) Vibration Dampers P/N 2554700
- (2) 2" SS UGBB P/N 6615401
- (2) SS Hardware Kit P/N 14-590000
- (2) Grip-Eye Unit P/N 6200901
- (2) Chain Sling Assembly P/N 4421805
- (2) 2" Guide Rails 316SS P/N
- (2) Anchor Bolts / Discharge Connection Hardware Assy P/N 14-589535
- (2) Mix Flush Valve P/N 5565101



Brookfield WPCA - 133 Pump Station

G.A. FLEET CLARIFICATIONS

- Pumps to be installed by others.
- Fleet is not responsible for providing water to fill the pump station pit for startup, commissioning, or running the pumps under any circumstance for operation. This shall be provided under the contractor's scope of work.

NOTE:

Please contact GA Fleet's Technical Services Department at techservices@gafleet.com with a minimum of 3 weeks notice to schedule Start-up, Commissioning, Training, or other service appointments.

Julia French, Technical Services Scheduler
Sal Rigaglia, Technical Services Manager



WARRANTY

Xylem Water Solutions USA, Inc.

For the period defined, Xylem Water Solutions USA, Inc. offers a commercial warranty to the original End Purchaser against defects in workmanship and material on Flygt Products. Warranty covers Flygt parts and labor as outlined in **ADDENDUM – A**.

COVERAGE:

Xylem Water Solutions USA, Inc. will pay the cost of parts and labor during the warranty period, provided that the Flygt product, with cable attached, is returned prepaid to a Xylem Water Solutions USA, Inc. Authorized Service Facility for Flygt Product repairs. Coverage for Flygt parts and labor will be provided for the period shown in **ADDENDUM - A**. The warranty period will begin from date of shipment or date of a valid Start-up (For permanently installed pumps only). In cases where the Start-up date is used as the beginning of the warranty on a permanently installed Flygt pump, a Start-up Report completed by an approved service technician from a Xylem Water Solutions USA, Inc. Authorized Service Facility for Flygt products must be received by the Xylem Water Solutions USA, Inc. Area Service Manager for Flygt Products within thirty (30) days of the initial onset of the unit placed into service. If not received, the beginning of the warranty coverage will default to the Flygt product ship date. A Start-up for a permanently installed Flygt pump must occur within one (1) year from the date of shipment from a Xylem Water Solutions USA, Inc. authorized facility for Flygt Products or warranty will automatically default to ship date as start of warranty. (See **STORAGE** section) When using the start-up date as the beginning of the warranty, a copy of the Start-up Report will be required to support any Warranty Claims. Warranty on Flygt Dewatering pumps will begin with ship date only. No other date on Flygt Dewatering pumps will be considered.

Xylem Water Solutions USA, Inc.'s sole obligation under this Warranty for Flygt Products shall be to replace, repair or grant credit for Flygt Products upon Xylem Water Solutions USA, Inc.'s exclusive determination that the Flygt Product does not conform to the above warranty. In the event that the Flygt product is replaced, warranty on the replacement product will be equal to the balance remaining on the original product or ninety (90) days, whichever is greater.

MISUSE:

This Warranty shall not apply to any Flygt product or part of Flygt product which (i) has been subjected to misuse, misapplication, accident, alteration, neglect, or physical damage (ii) has been installed, operated, used and/or maintained in a manner which is in an application that is contrary to Xylem Water Solutions USA, Inc.'s printed instructions as it pertains to installation, operation and maintenance of Flygt Products, including but without limitation to (iii) operation of equipment without being connected to monitoring devices supplied with specific products for protection; or (iv) damaged due to a defective power supply, improper electrical protection, faulty installation or repair, ordinary wear and tear, corrosion or chemical attack, an act of God, an act of war or by an act of terrorism; or (v) has been damaged resulting from the use of accessory equipment not sold by Xylem Water Solutions USA, Inc. or not approved by Xylem Water Solutions USA, Inc. in connection with Flygt products.

WEAR PARTS:

This warranty does not cover costs for standard and/or scheduled maintenance performed, nor does it cover Flygt parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship can be determined by Xylem Water Solutions USA, Inc.. Wear Parts are defined as Cutters, Cutting Plates, Impellers, Agitators, Diffusers, Wear Rings (Stationary or Rotating), Volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Flygt equipment.



WARRANTY

Xylem Water Solutions USA, Inc.

DISCLAIMERS:

(i) Xylem Water Solutions USA, Inc.'s warranties are null and void when Flygt Products are exported outside of the United States of America without the knowledge and written consent of Xylem Water Solutions USA, Inc.; (ii) Xylem Water Solutions USA, Inc. makes no independent warranty or representation with respect to parts or products manufactured by others and provided by Xylem Water Solutions USA, Inc. (however, Xylem Water Solutions USA, Inc. will extend to the Purchaser any warranty received from Xylem Water Solutions USA, Inc.'s supplier for such parts or products).

LIMITATIONS:

XYLEM WATER SOLUTIONS USA, INC. NEITHER ASSUMES, NOR AUTHORIZES ANY PERSON OR COMPANY TO ASSUME FOR XYLEM WATER SOLUTIONS USA, INC., ANY OTHER OBLIGATION IN CONNECTION WITH THE SALE OF ITS FLYGT EQUIPMENT. ANY ENLARGEMENT OR MODIFICATION OF THIS WARRANTY BY A FLYGT PRODUCT DISTRIBUTOR, OR OTHER SELLING AGENT SHALL BECOME THE EXCLUSIVE RESPONSIBILITY OF SUCH ENTITY.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO FLYGT PRODUCT(S), INCLUDING AND WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. PURCHASER'S EXCLUSIVE REMEDY AND XYLEM WATER SOLUTIONS USA, INC.'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES IS LIMITED TO REPAIRING OR REPLACING FLYGT PRODUCTS AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE PURCHASER HEREUNDER. IN NO EVENT IS XYLEM WATER SOLUTIONS USA, INC. LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE, LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

XYLEM WATER SOLUTIONS USA, INC. WILL NOT BE HELD RESPONSIBLE FOR TRAVEL EXPENSES, RENTED EQUIPMENT, OUTSIDE CONTRACTOR'S FEES, OR ANY EXPENSES ASSOCIATED WITH A FLYGT PRODUCT REPAIR SHOP NOT AUTHORIZED BY XYLEM WATER SOLUTIONS USA, INC. U.S.A., INC. REIMBURSEMENT COSTS FOR CRANES AND/OR ANY SPECIAL EQUIPMENT USED IN CONJUNCTION FOR THE REMOVAL AND/OR REINSTALLATION OF ANY FLYGT EQUIPMENT IS NOT COVERED UNDER THIS WARRANTY.

ANY UNAUTHORIZED ALTERATIONS TO SUPPLIED FLYGT EQUIPMENT USED WITHOUT XYLEM WATER SOLUTIONS USA, INC. SUPPLIED FLYGT BRAND CABLE OR CONTROLS WILL NOT BE COVERED UNDER THIS WARRANTY, UNLESS IT CAN BE PROVEN SUCH ANCILLARY EQUIPMENT IS SUITABLE FOR THE PURPOSE AND EQUAL TO XYLEM WATER SOLUTIONS USA, INC. SUPPLIED FLYGT BRAND CABLES OR CONTROLS THAT WOULD ORIGINALLY HAVE BEEN SUPPLIED WITH THE TYPE OF EQUIPMENT IN USE.

REQUIREMENTS:

A copy of Electrical System Schematics of the Control used (including a Control's Bill of Material) could be required to support a Warranty Claim when a non Flygt Brand Control is used. In addition, a written record, hereby known as "the log", will be associated with each unit serial number and must be maintained by the organization having product maintenance responsibility. The log must record each preventative maintenance activity and any repair activity during the life of the warranty or verification that a Xylem Water Solutions USA, Inc. authorized Service Contract for Flygt Products is in force and must be available for review and/or auditing. Failure to meet these conditions could render this warrant null and void. Such logs could be required to determine warranty coverage.



WARRANTY

Xylem Water Solutions USA, Inc.

STORAGE:

Should a delay occur between ship date and the date of start-up, maintenance as outlined in Xylem Water Solutions USA, Inc.'s Care & Maintenance Manual for Flygt Products must be performed by the "CONTRACTOR" and/or "OWNER" during any such period of storage. Documentation providing proof and outlining what maintenance was performed must be provided to Xylem Water Solutions USA, Inc. or its Flygt Products representative within thirty (30) days of said maintenance, or the Xylem Water Solutions USA, Inc. warranty for Flygt Products could be considered void.

CONTROLS:

Warranty coverage for permanently installed controls will start for the end purchaser on the date of shipment. This warranty does not apply to controls that have been damaged due to a defective and/or improper input power supply, improper electrical protection, accidental damage, improper or unauthorized installation and/or repair, unauthorized alteration, negligence, environmental corrosion or chemical attack, improper maintenance or storage of control, any act of God, an act of war, an act of terrorism or damage resulting from the use of accessory equipment not approved by Xylem Water Solutions USA, Inc.. Further, this warranty does not apply in the event an adjustment is found to correct the alleged defect.

Solid state devices will be covered for a period of one (1) year. Electrical control panels containing controllers, PLC's, drives, soft starts, and other computerized equipment will require Transient Voltage Surge Suppression (TVSS) protection in order to satisfy the requirements of this warranty. The protection equipment associated with the control must be kept in working condition during the life of the warranty. Auxiliary equipment supplied with the control (air-conditioners etc.) is limited by the respective original equipment manufacturer's warranty offered. Consumable items such as: light bulbs, fuses, and relays are covered under normal operating conditions. Electrical surges experienced during startups and/or during normal operating use of the control panel will cause the consumable items not to be covered under this warranty policy. Components not supplied by Xylem Water Solutions USA, Inc. will not covered by this warranty.

TOP (The Optimum Pump Station)

Xylem Water Solutions USA, Inc. will warrant the Flygt TOP pre-engineered fiberglass pump station components against defects in material and workmanship for a period of one (1) year from date of start-up or eighteen (18) months from date of shipment and is valid only to the original owner of the station. Warranty shall cover the cost of labor and materials required to correct any warrantable defect, excluding any removal and reinstallation costs, FOB Xylem Water Solutions USA, Inc.'s authorized warranty service location for Flygt's TOP.

Flygt Products contained within a TOP pre-engineered fiberglass pump station will carry the standard Xylem Water Solutions USA, Inc. warranty for Flygt products and/or accessories installed in the TOP pre-engineered fiberglass pump station.

All Flygt Product restrictions and/or limitations as outlined and described within the context of this warranty are germane to all sections of this Xylem Water Solutions USA, Inc. Warranty document.

Xylem Water Solutions USA, Inc.
National Quality Assurance - US Corporate



WARRANTY
Xylem Water Solutions USA, Inc.

ADDENDUM – WARRANTY COVERAGE BY PRODUCT

PRODUCT	PRODUCT SERIES AND CONFIGURATION	MONTHS	MONTHS	MONTHS	MONTHS	MONTHS	MONTHS	MONTHS	MONTHS
		1-12	13-18	19-24	25-36	37-39	40-60	61-72	73-84
Axial Flow / Mixed Flow / Centrifugal Pumps & Mixers	3000 Series (CP, NP, DP, CT, NT, CZ, NZ, LL) 4000 Series (SR, PP) 7000 Series (PL)	100%			50%			25%	
Concertor Pumping System	6000 Series (DP)	100%			50%			25%	
ETO Electrical Control Panels	6000 Series (iPS) Engineered to Order, Xylem Manufactured Control Panels (permanently installed) - 3 Years	100% 1 YR	LIMITED – 2 YEAR						
		100% - 2 YEAR (From Ship Date)	3 YR (From DOM)	DOM= Date of Manufacture					
Grinder Pumps	3000 Series (MP, MF, MH)	100%							
Abrasion/Corrosion Resistant & Chopper Pumps	3000 Series (FP, FS, FT, HP, HS) 5000 Series (HP, HS) 8000,280 Series (DP, DZ, DT, DS, DF)	100%							
Centrifugal Pumps	1300 Series	100% (From Ship Date)							
Dewatering Pumps	2000 Series (BS, KS) 3000 Series (CS, NS, DS) 8000,280 Series (DS, DF)	100% (From Ship Date)							
TOPS	Fiberglass Pump Station	100% (From Ship Date)							
Accessories	Permanent / Portable	100% (From Ship Date)							
Hydrojectors/Aerators	HE, JA	100%							
Portable Pump Controls TOPS Control Panels	Control Boxes (Nolta, MSHA etc.) TOPS control panels (permanently installed)	100% (From Ship Date)							
Small Pumps	3045, 3057, SX	100% (From Ship Date)							
Parts - *	All new Flygtparts (mechanical & electrical)	100% (From Ship Date)							

* - Parts that fail where used in a repair are warranted for one (1) year from the date of the repair for the failed part only – no labor; This includes Flygt pump controllers, Flygt supervision equipment, Flygt submersible level transducers, etc.





TECHNICAL SUBMITTAL

PUMP STATION DOCUMENTS FOR REVIEW/APPROVAL

N Pump Design Features

(Typical features for N-3153 - 3315)

1. Cable Entry

Cable entry consists of two compressible rubber bushings to seal off motor area and relieve strain on the cable. Two sealing bushings means high reliability in difficult applications.

2. Junction Box

For the connection of the stator leads, power cable and the pilot cable, the drive unit is provided with a terminal block that is easily accessible by lifting off the entrance cover. The stator leads are brought to the terminal block through a penetration in the top of the stator housing. This opening is sealed off with a compressible rubber bushing. The stator leads are brought through holes in the bushing which is then compressed around the leads and against the walls of the opening.

3. Bearings

Bearings are rated for a minimum L_{10} bearing life of 50,000 hours. The upper guide bearing is a two-row angular contact ball bearing. The lower bearing consists of a two-row angular contact ball bearing. The bearings are sealed and permanently lubricated with high temperature grease.

4. Shaft

Motor shaft and rotor are a single integral unit. The short overhang of the shaft virtually eliminates shaft deflection, resulting in increased seal and bearing life, low vibration levels and quiet operation. Shaft is stainless steel.

5. Motor (Standard)

The high performance submersible induction motor is designed and manufactured by Flygt to be used specifically with Flygt pumps. Stator is Class H insulated using the trickle impregnation method and rated to 356°F.

The stator is shrink fit into the stator housing, providing superior heat transfer. The stator incorporates three thermal switches connected in series (one in each phase).

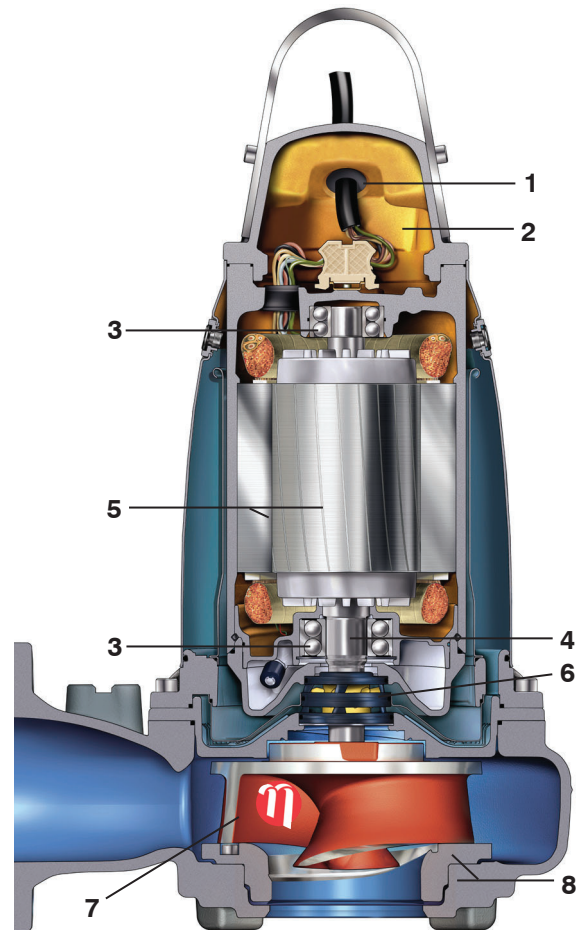
Cooling system

In wet-pit applications, the surrounding liquid cools the pump. In more demanding applications, or in dry-pit installations, all pumps can be provided with an integral closed-loop cooling system. The coolant is circulated around the motor by an integrated pump.

6. Shaft Seals

The Plug-in™ seal unit has corrosion resistant tungsten carbide faces. This design provides superior reliability and sealing of the motor from pumped liquid.

Seal wear protection: Spin-out™ is a patented design that protects the outer seal by expelling abrasive particles from the seal chamber. A float switch, installed in the seal leakage chamber, will activate if leakage into the chamber reaches 50% chamber capacity, signaling the need to schedule an inspection.



7. N Impeller

The standard impeller is of Hard-Iron® (ASTM A-532 Alloy III A 25% chrome cast iron). Select impellers are also available in grey cast iron or duplex stainless steel (ASTM CD-4MCuN), semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges are mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction area. The Hard-Iron impeller is hardened to Rc 60 and is capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet provides an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance is readily adjustable by means of a single trim screw. Wear rings are not required.

8. Volute/Suction Cover

Pump volute is of grey cast iron, Class 35B, non-concentric design with smooth passages large enough to pass any solids that may enter the volute inlet. The volute has a replaceable suction cover insert ring in which are cast spiral-shaped sharp-edged groove(s). The spiral groove(s) provide trash release pathways and sharp edge(s) across which each impeller vane leading edge crosses during rotation so to remain unobstructed. The insert ring, used in conjunction with Hard-Iron impellers, is cast of Hard-Iron (ASTM A-532 Alloy III A 25% chrome cast iron) and provides effective sealing between the multi-vane semi-open impeller and the volute housing.

NP 3171 SH 3~ 275

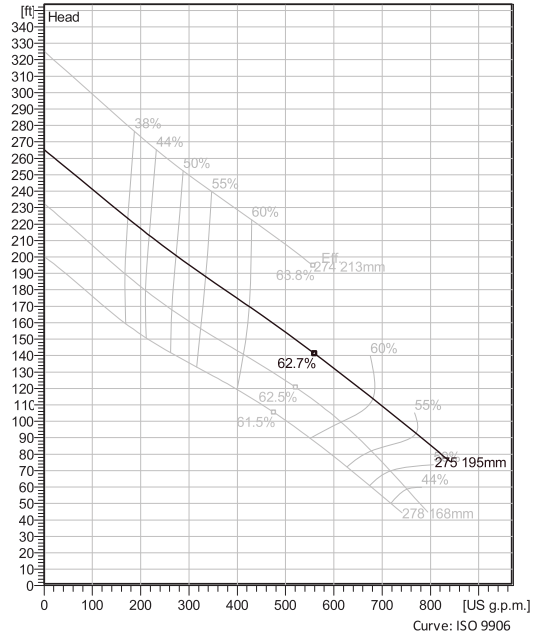
Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.



Technical specification



Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number N3171.830 25-31-2IE-W IE3 35hp	Installation type P - Semi permanent, Wet
Impeller diameter 195 mm	Discharge diameter 4 inch

Pump information

Impeller diameter 195 mm
Discharge diameter 4 inch
Inlet diameter 150 mm
Maximum operating speed 3530 rpm
Number of blades 2
Max. fluid temperature 40 °C

Material

Impeller Hard-Iron™

Project	Xylect-21773212	Created by	
Block		Created on	1/30/2024
		Last update	1/30/2024

NP 3171 SH 3~ 275

Technical specification



Motor - General

Motor number N3171.830 25-31-2IE-W IE3 35hp	Phases 3~	Rated speed 3530 rpm	Rated power 35 hp
ATEX approved FM	Number of poles 2	Rated current 37 A	Stator variant 9
Frequency 60 Hz	Rated voltage 460 V	Insulation class H	Type of Duty S1
Version code 830			

Motor - Technical

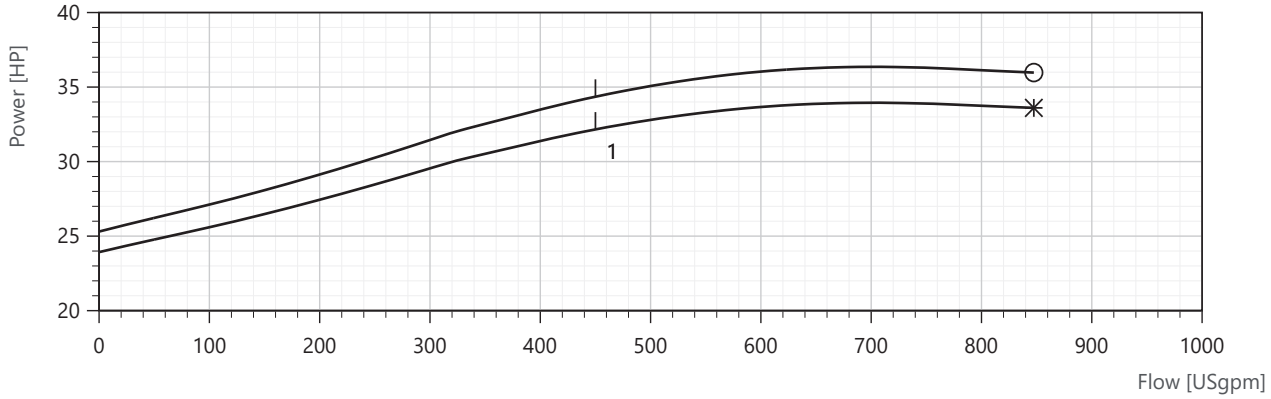
Power factor - 1/1 Load 0.95	Motor efficiency - 1/1 Load 92.7 %	Total moment of inertia 2.64 lb ft ²	Starts per hour max. 30
Power factor - 3/4 Load 0.94	Motor efficiency - 3/4 Load 93.6 %	Starting current, direct starting 291 A	
Power factor - 1/2 Load 0.90	Motor efficiency - 1/2 Load 93.8 %	Starting current, star-delta 96.9 A	

Project	Xylect-21773212	Created by		Last update	1/30/2024
Block		Created on	1/30/2024		



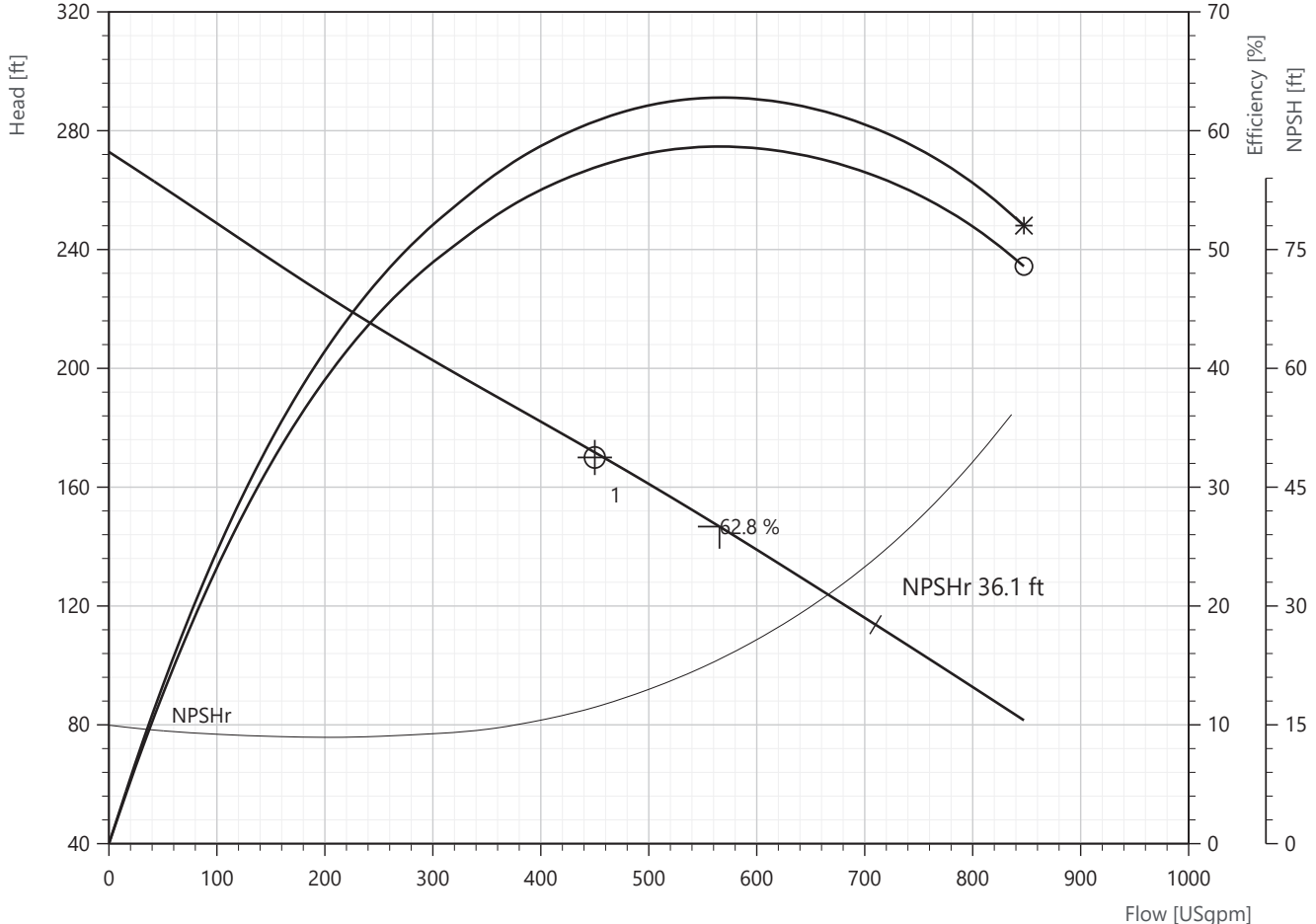
PERFORMANCE CURVE

DATE 2024-04-26	REPORT Brookfield WPCA	ISSUE 10	PRODUCT NP3171.830 SH FM 63-298-00-1070
NUMBER OF BLADES 2	TOTAL MOMENT OF INERTIA 0.11 kgm ²	RATED SPEED 3530 RPM	POLES 2 PHASES 3 FREQUENCY 60 Hz
			IMPELLER DIAMETER 198 mm
MOTOR COS PHI 0.95	1/1-RATED POWER 0.94	3/4-RATED POWER 0.90	RATED CURRENT 37 A
MOTOR EFFICIENCY 93.2 %		1/2-RATED POWER 95.0 %	RATED POWER 35 HP / 26 kW
			MOTOR TYPE / STATOR 25-31-2IE/01
			STARTING CURRENT 283 A
			MOTOR ISSUE 11
			DUTY CLASS S1
			STARTING TORQUE 93 Nm
			MAX TORQUE 230 Nm



Duty points	Flow [USgpm]	Head [ft]	Power [HP]	Efficiency [%]	NPSHr [ft]	Standard	Guarantee
1	450	170	(34) (32)	(57.0) (60.8)	17.3 ft	HI11.6-2017	2B QH

values in () not guaranteed



NOTE:
 CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER
 * : PUMP EFFICIENCY / SHAFT POWER
 O : OVERALL EFFICIENCY / INPUT POWER
 NPSHR = NPSH3 + MARGIN
 NO OPERATION ALONG DASHED CURVE.

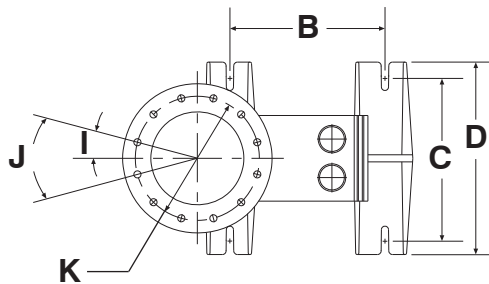
AUTHOR:
 MARIA ANDERSSON

Standard CP/NP Discharge Connections (Cast Iron)

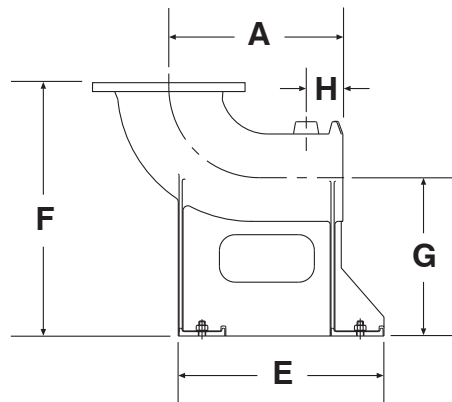
All dimensions (inches)

Pump Model	Part Number	Disch. Inlet	Disch. Outlet	A	B	C	D	E	F	G	H	I	J	K
2" - 3045, 3057, NP/DP/MP 3069*	486 55 01	2"	2"-11 1/2 NPT	3 13/16	4	4 1/2	5 1/2	7 1/4	6 3/4	3 15/16	7/8	---	---	---
2 1/2" - NP/DP 3069*	493 17 06	2 1/2"	2 1/2"	11 5/8	7 7/8	4 3/4	7 7/8	11 7/16	9 7/8	6 1/2	4 9/16	45°	90° x 4	5 5/8
3" - 3045, 3057, CNP/DP/MP 3069*	555 48 01	2"	3-8 NPT	6 3/4	5 1/2	4 1/8	5 1/2	10 3/4	6 3/4	3 15/16	7/8	---	---	---
3" - NP/DP 3069*, 3080,3085, 3102, 3127, 3153, 6020*	444 68 05	3"	3"	14	9 7/8	8	10 5/8	15 3/8	15 3/4	7 7/8	4 9/16	45°	90° x 4	6
4" - 3080, 3085, 3102, 3127,3153,3171, 3202, 6020*	540 13 05	4"	4"	14 3/8	9 7/8	8	10 5/8	15 3/8	15 3/4	7 7/8	4 9/16	22.5°	45° x 8	7 1/2
6" - 3102, 3127(MT), 6020*	444 70 06	5 1/2"	6"	15 9/16	11	10	12 3/16	15 3/8	17 3/4	9 7/8	4 9/16	22.5°	45° x 8	9 1/2
6" - 3153, 3171, 3202.	602 33 06	5 1/2"	6"	15 9/16	11	10	12 3/16	15 15/16	17 3/4	9 7/8	4 9/16	22.5°	45° x 8	9 7/16
6" - R3231	388 25 06	6"	6"	20 11/16	19 3/4	15 3/4	19 3/4	23 5/8	15 3/4	7 7/8	6 7/8	22.5°	45° x 8	9 7/16
6" - 3127(LT), 3301, 3315.	604 56 06	6"	6"	15 9/16	11 1/8	10	12 3/16	15 15/16	18	10 1/8	4 9/16	22.5°	45° x 8	9 7/16

Note: Alternative discharge connections may be available, contact Flygt Application Engineering.
* Requires installation kit

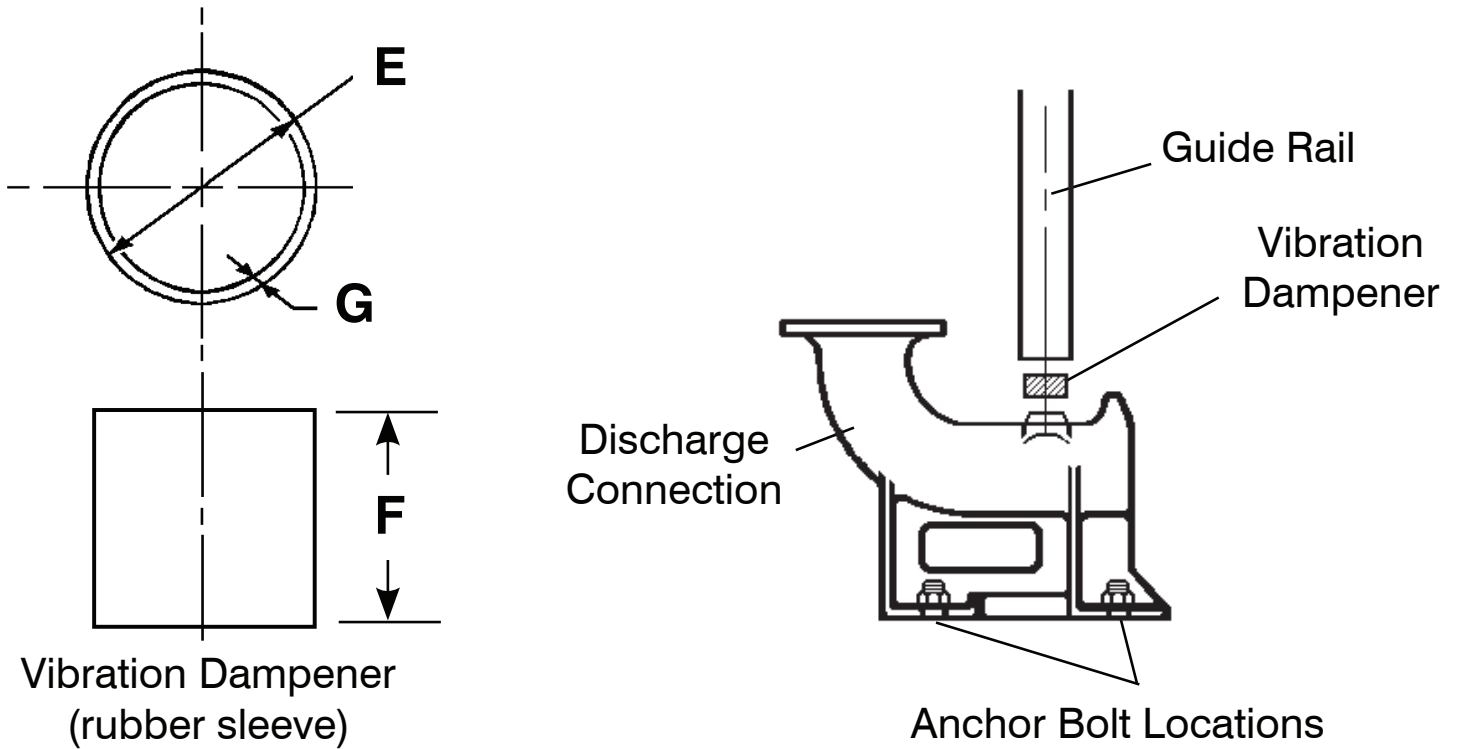


Caution:
Contact Flygt applications engineering department when making a pump/ discharge connection combination other than those paired in the chart above.



Note:
The discharge connection shown here is typical in appearance for most pumps.

Vibration Dampeners (Standard)

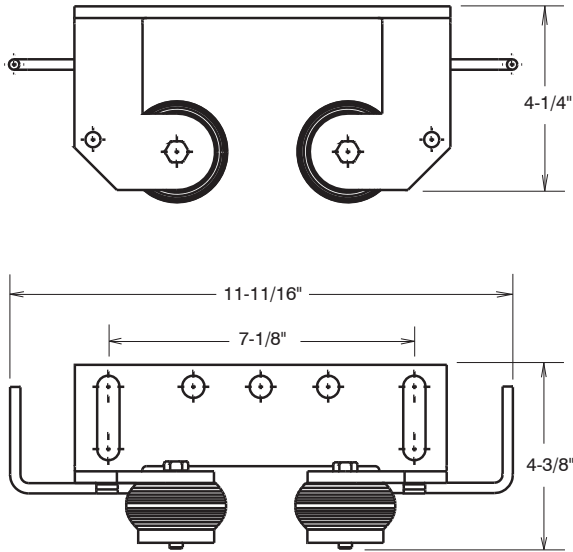


Description	Part No.	Qty.
Dampener for 2" Guide Rails	255 47 00	2 required per pump
Dampener for 3" Guide Rails	255 47 01	2 required per pump

Upper Guide Bar Bracket (for 3000, 5500 & 8000 Series Pumps)

2" UPPER GUIDE BAR BRACKET

613 68 00	Galvanized Steel
613 68 04	316 Stainless Steel



Note: use with 2" nominal guide bars

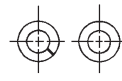
MOUNTING HARDWARE 14-59 00 00 (stainless steel)



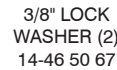
3/8"-16 LATERAL NUT
14-46 37 05



HEX. HEAD BOLT (2),
3/8"-16 x 7/8"
14-46 20 25



3/8" PLAIN WASHER (2)
14-46 50 07



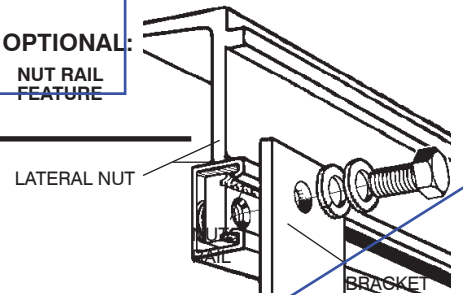
3/8" LOCK
WASHER (2)
14-46 50 67

Standard for the following pumps:

- DP/NP-3069
- DP-3080
- CP/DP/FP/NP-3085
- CP/FP/NP-3102
- CP/FP/NP-3127
- NP/FP-3153
- NP/FP-3171
- HP-5520, 5530
- NP-6020
- DP-8050, 8053, 8056, 8058

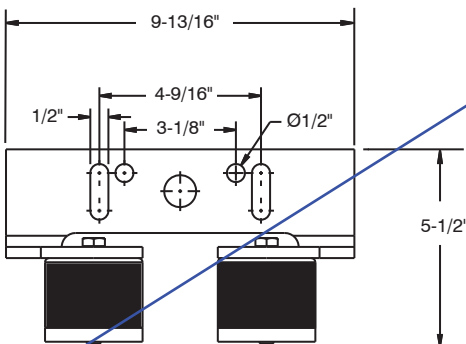
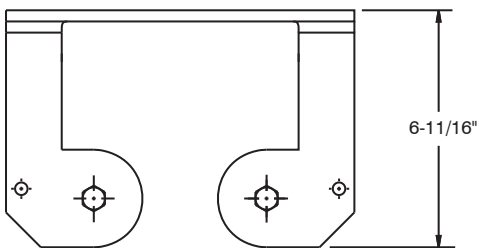


OPTIONAL:
NUT RAIL
FEATURE



3" UPPER GUIDE BAR BRACKET

661 54 00	Galvanized Steel
661 54 01	316 Stainless Steel



Note: use with 3" nominal guide bars

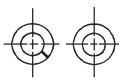
MOUNTING HARDWARE 14-59 00 00 (stainless steel)



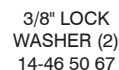
3/8"-16 LATERAL NUT
14-46 37 05



HEX. HEAD BOLT (2),
3/8"-16 x 7/8"
14-46 20 25



3/8" PLAIN WASHER (2)
14-46 50 07



3/8" LOCK
WASHER (2)
14-46 50 67

Standard for the following pumps:

- NP/FP-3171
- NP/FP-3202
- CP/NP/RP-3231
- CP-3240
- NP-3301
- CP/NP-3306
- CP/NP-3312
- NP-3315
- CP-3351
- CP/NP-3356
- CP/NP-3400
- CP-3501
- CP/NP-3531
- CP-3602
- CP-3800
- HP-5570



Flygt Pump Lift™ Pump Lifting System

The normal method of lowering and raising a NP/CP pump in and out of a lift station is by use of a chain or cable attached to the pump. The length of the chain or cable is dependent on the depth of the station. The average length would probably be between 18 to 20 ft. and in certain cases may be much longer. In many cases, depending on the lifting device (usually a hoist), the operator may have to take a second or third bite on the pump chain in order to lift the pump clear of the station.

An added accessory to the Flygt line is the patented **Flygt Pump Lift™** System which consists of a Nylon or stainless steel guide rope, a short length of high tensile strength carbon steel or stainless steel chain and a forged “Grip-Eye” of wrought alloy steel.

The pump raising operation using this positive recovery system is accomplished as follows:

1. Connect the small eye of the Grip-Eye to the end of the hoist cable.
2. Slip the top end of the guide rope through the large eye of the Grip-Eye. The guide rope simply acts as a guide for the Grip-Eye on its way down to the short length of the pump lifting chain.
3. While keeping the guide rope taut, proceed to lower the Grip-Eye until it is well positioned over the pump lifting chain.
4. Release the tension on the guide rope. The lifting chain will now take a position to become engaged in the Grip-Eye.
5. Gradually take up tension on the hoist cable and the Grip-Eye will make a positive grip on the pump lifting chain. Continue hoisting until the pump is clear of the station.

Caution: The Grip-Eyes may only be used with the corresponding special Flygt Chain Sling Units.

Grip-Eyes are not covered under warranty if other chains are used.

Guide Ropes are not to be used for lifting the pump.

Refer to the following pages for pump models and correct assembly.

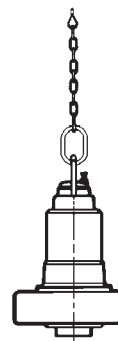
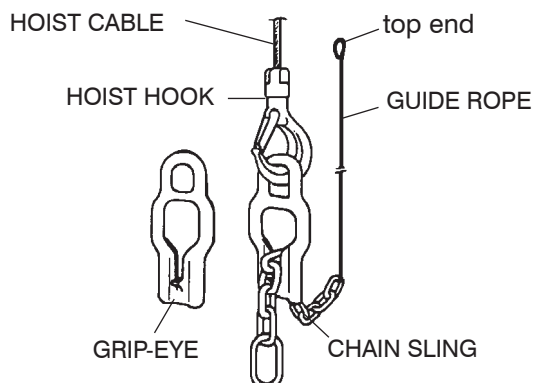


FIG. 1

(Standard) The end ring of the Chain Sling is slipped over the pump lifting handle.

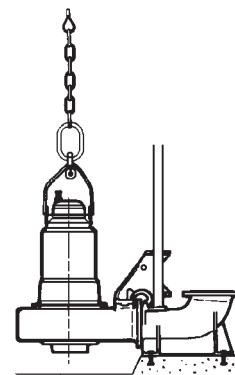


FIG. 2

(Customer to supply extra shackle)
A shackle of capable strength can be used in conjunction with the standard ring should customer choose not to remove and replace pump handle.



Guiding the Grip-Eye to the chain



Hoisting

Flygt Pump Lift™ Pump Lifting System

The normal method of lowering and raising a NP/CP pump in and out of a lift station is by use of a chain or cable attached to the pump. The length of the chain or cable is dependent on the depth of the station. The average length would probably be between 18 to 20 ft. and in certain cases may be much longer. In many cases, depending on the lifting device (usually a hoist), the operator may have to take a second or third bite on the pump chain in order to lift the pump clear of the station.

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3. While keeping the guide rope taut, proceed to lower the Grip-Eye until it is well positioned over the pump lifting chain.
4. Release the tension on the guide rope. The lifting chain will now take a position to become engaged in the Grip-Eye.
5. Gradually take up tension on the hoist cable and the Grip-Eye will make a positive grip on the pump lifting chain. Continue hoisting until the pump is clear of the station.

Caution: The Grip-Eyes may only be used with the corresponding special Flygt Chain Sling Units.

Grip-Eyes are not covered under warranty if other chains are used.

Guide Ropes are not to be used for lifting the pump.

Refer to the following pages for pump models and correct assembly.

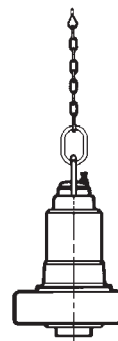
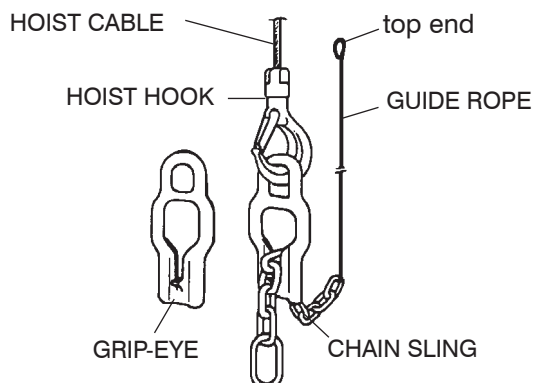


FIG. 1

(Standard) The end ring of the Chain Sling is slipped over the pump lifting handle.

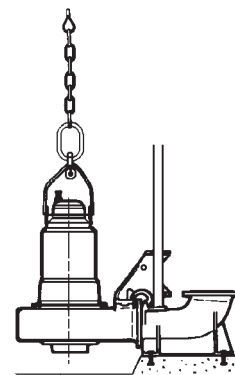


FIG. 2

(Customer to supply extra shackle)
A shackle of capable strength can be used in conjunction with the standard ring should customer choose not to remove and replace pump handle.



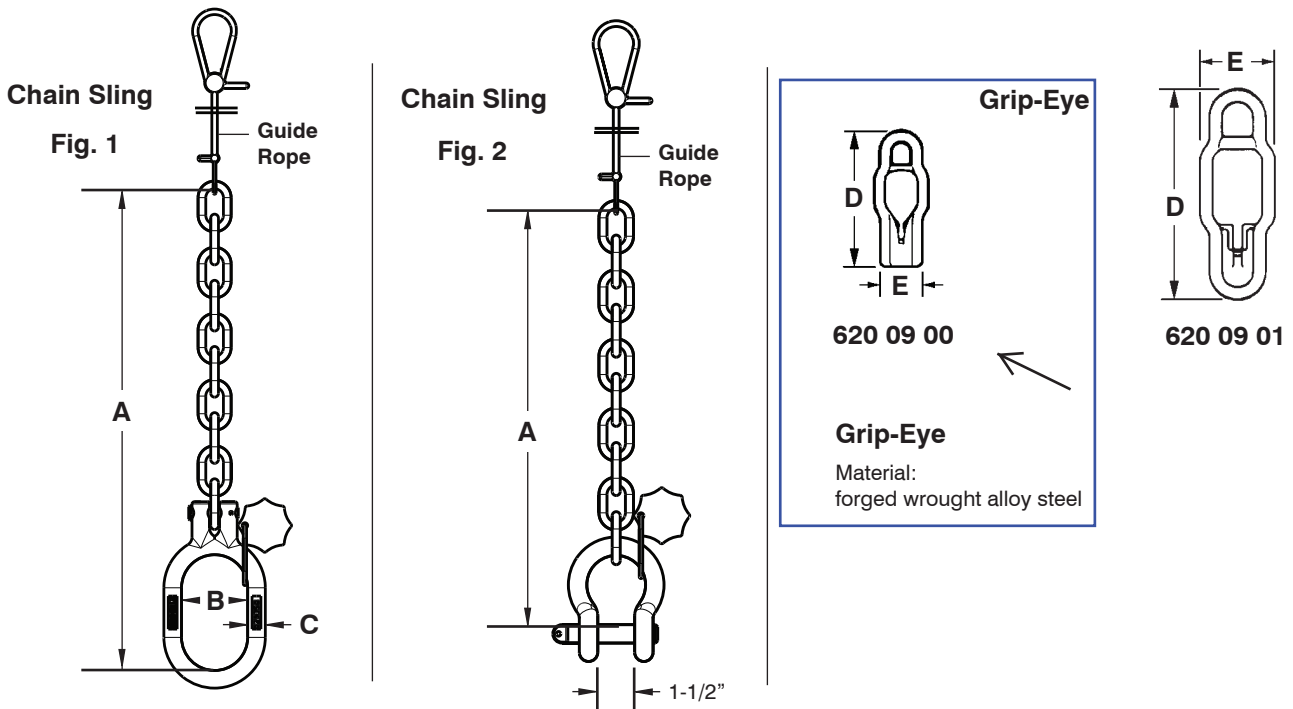
Guiding the Grip-Eye to the chain



Hoisting

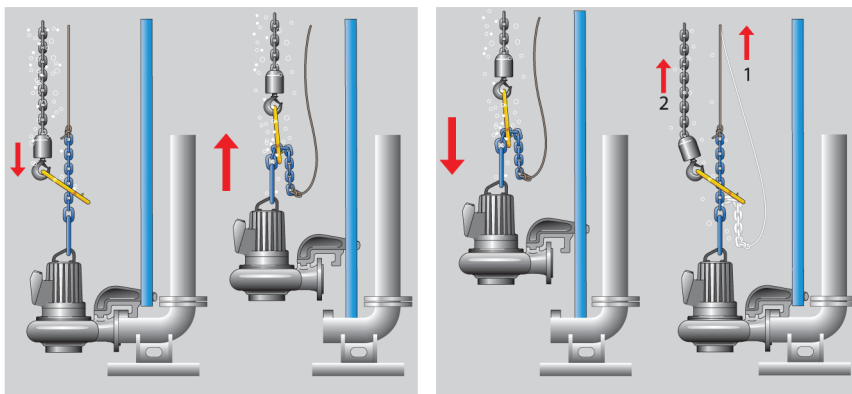
Flygt Pump Lift™

Pump Lifting System



Chain Sling Ass'y	Fig.	Chain Sling Dimensions (in)			Grip-Eye	Grip-Eye Dimensions (in)		Guide Rope (ft)	Max. Load (lbs)
		A	B	C		D	E		
442 18 00* ^	1	13-1/2	2-3/8	5/8	620 09 00	7-7/8	2-3/8	33	2,645
442 18 02* ^	2	21-7/8	--	--	620 09 01	13-3/4	4-3/4	49	9,260
442 18 05** ^	1	27-1/2	2-3/8	7/8	620 09 01	13-3/4	4-3/4	33	4,410
442 18 06** ^	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	33	1,190
442 18 16** †	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	33	1,190
442 18 17** †	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	25	1,190
442 18 18** †	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	20	1,190
442 18 19** †	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	15	1,190
14-587035** ††	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	30	1,190

*Carbon Steel **AISI 316 Stainless Steel ^ with Nylon guide rope † with 1/4" AISI 316 Stainless Steel guide rope †† with 3/32" AISI 316 Stainless Steel guide rope



Lifting the pump

Lowering the pump

Flygt Pump Lift™

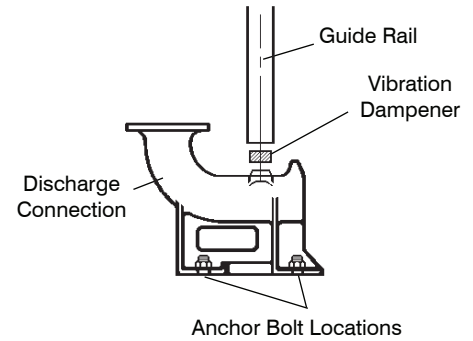
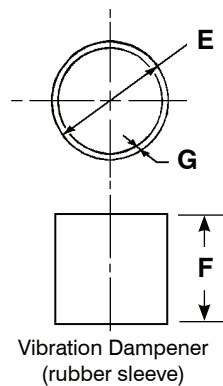
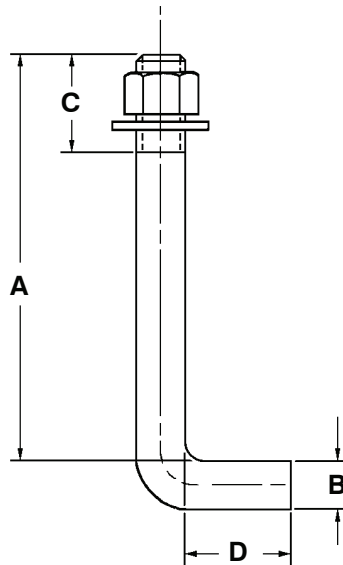
Pump Lifting System

Flygt Chain Sling units in Stainless Steel and Grip-Eye Combinations

Pump Model	Drive Unit	Chain Sling Assy. (in 316 Stainless Steel)	Grip-Eye	Guide Rope (ft)	Max. Useful Load (lbs.)
NP/FP-3202 NP-3301 NP-3315 CP/NP-3231 RP-3231 CP/NP-3306 CP/NP-3312 LL-3356 CP/NP-3356	605 to 775 605 to 745 605 to 745 705/715/735/745 605 to 776 605 to 745	442 18 05 ^	620 09 01	33	4,410
CP-3045 CP-3057 CP/DP-3060 CP/FP-3068 DP-3080 CP/NP/FP-3085 CP/NP/FP-3102 CP/NP/FP-3127 NP/FP-3153 NP/FP-3171 DP-8050 DP-8053 DP-8056 DP-8058 MP-3068 MP-3085 MP-3102 MP-3127 NL-3102 NL-3127		442 18 06 ^	620 09 00	33	1,190

^ with Nylon Guide Rope

Anchor Bolts (Standard)



Description	Part No.	Qty.
Dampener for 2" Guide Rails	255 47 00	2 required per pump
Dampener for 3" Guide Rails	255 47 01	2 required per pump

NOTE: Four Anchor Bolts and two Vibration Dampeners are required per pump.

Four Anchor Bolts are supplied with each kit (Vibration Dampeners not included). Order Vibration Dampeners separately.

PUMP MODEL	KIT PART NUMBER	MATERIAL	ANCHOR BOLT SIZE	A	B	C	D	E	F	G
C/D-3045, C/D-3057, C-3060, C/D/F/M-3068, M-3085, M-3102, M-3127	*14 58 95 45	Stainless Steel	1/2"-13 UNC	8"	1/2"	1-9/16"	2"	-	-	-
D-3080, C/D/F/N-3085, C/D/F/N-3102, C/D/F/N-3127, N/F-3153, N/F-3171, H-5520, 5530, D-8050, D-8053, D-8056, D-8058.	14 58 95 10	Carbon Steel	3/4"-10 UNC	10"	3/4"	1-1/2"	2"	2"	1"	1/16"
	14 58 95 35	Stainless Steel								
N/F-3171, N/F-3202, N-3301, N-3315, H-5570.	14 58 95 20	Carbon Steel	3/4"-10 UNC	10"	3/4"	1-1/2"	2"	3"	1"	1/16"
	14 58 95 40	Stainless Steel								

* Vibration Dampener sleeves not required for these pumps.

Flygt Mix-Flush System

Model 4901

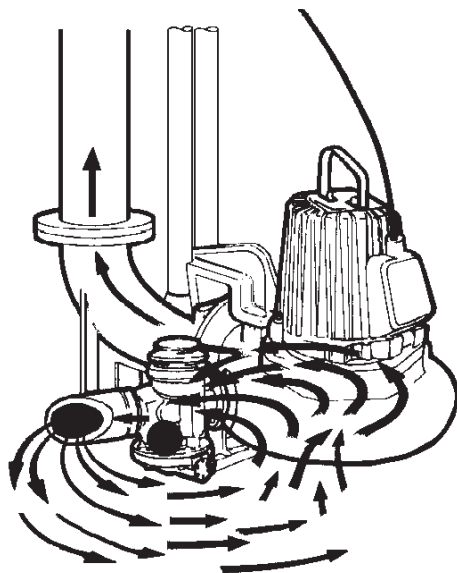


Model 4901 Flush Valve
(with 90° discharge elbow)
Part No. 556 51 01

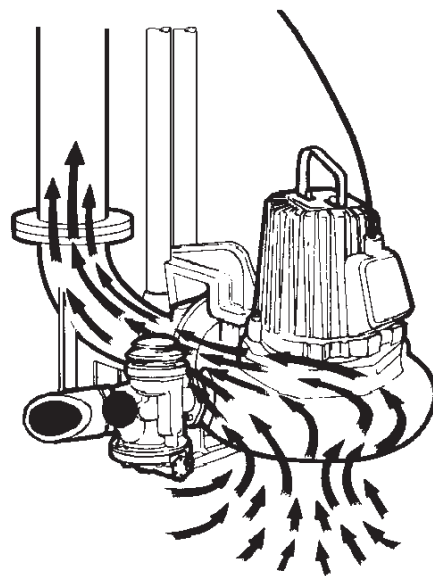
The Flygt Mix-Flush[™] System automatically flushes the sump during initial operation of the pump. The system consists of the Flygt 4901 Flush Valve, Impeller and Volute. The operation of the valve depends only on the pump flow and pressure. No electrical components or cables are used with the valve. Thus, the valve is intrinsically safe and suitable for pumps used in hazardous locations Class 1, Division 1, Groups C and D.

The powerful stream of water exiting the valve violently churns up the liquid in the sump thus re-suspending any built up sludge.

The system is based on the ejector principle with a ball closing the valve in a period of 20 to 50 seconds. A means of adjustment is provided on the outside of the valve to obtain the desired flushing period.



Valve Open

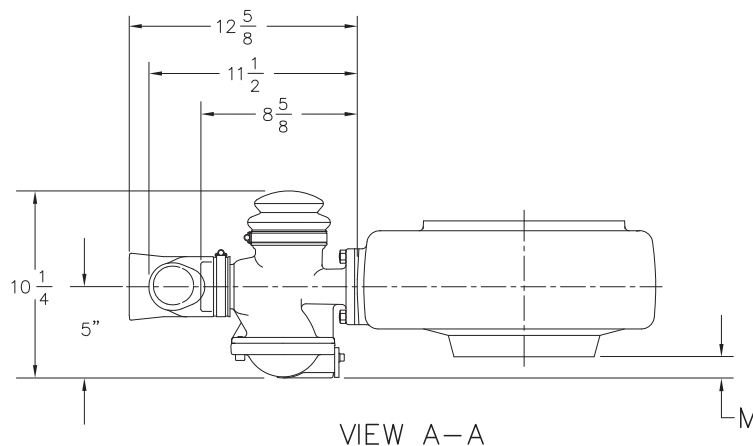
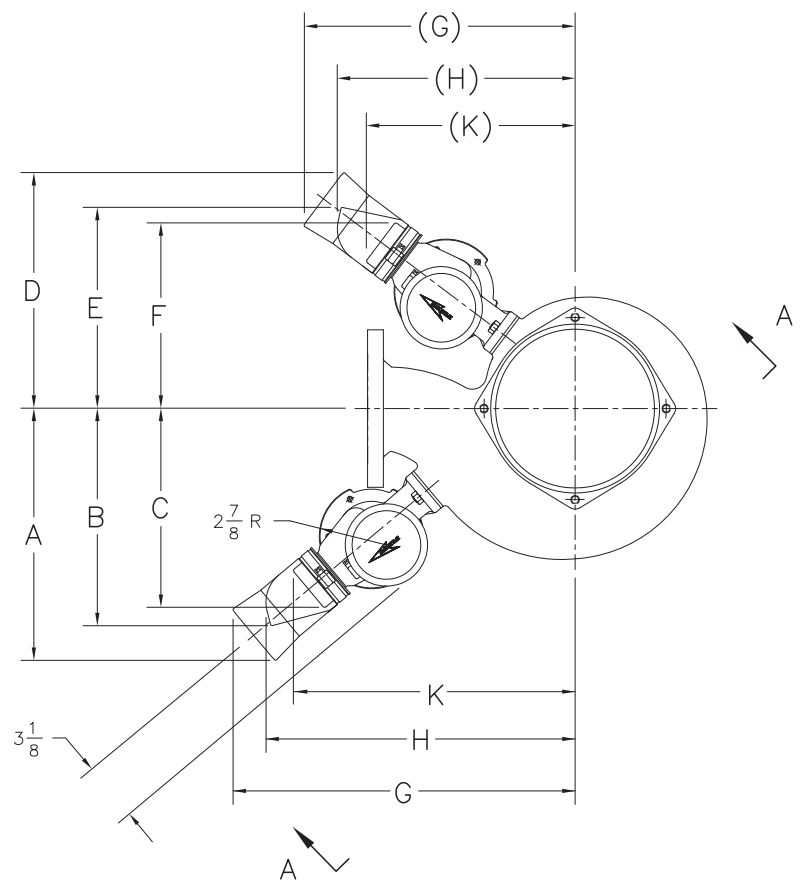


Valve Closed

Flygt Mix-Flush System

Mix-Flush Model 4901, With 90° Discharge Elbow

Standard Version, P/N 556 51 01 (Head must be above 10 feet, see individual curve)



* Flush Valve for Low Head Version, P/N 556 51 02 (Head must be above 7.5 feet and below 10 feet, see individual curve)

Note: Add 2" to Dimensions A & D and 2-3/8" to B & C when using valve with straight outlet pipe.

Flygt Mix-Flush System

Mix-Flush Model 4901, With 90° Discharge Elbow

Standard Version, P/N 556 51 01 (Head must be above 10 feet, see individual curve)

Model	Pump Housing	Pressure	A	B	C	D	E	F	G	H	K	M
3171	65098xx	HT				15 3/8	13 1/2	12 1/2	17 7/8	16 1/8	14 5/8	1/2
	65099xx	MT				15 3/8	13 1/2	12 1/2	17 7/8	16 1/8	14 5/8	
	66594xx	LT				17 5/8	15 3/4	14 3/8	17 5/8	15 3/4	14 3/8	
	68130xx	SH				16 3/4	14 7/8	13 5/8	16 3/4	15	13 5/8	
	70401xx	MT				15 1/2	13 5/8	12 5/8	18	16 1/8	14 3/4	1/4
	70408xx	HT				15 1/2	13 5/8	12 5/8	18	16 1/8	14 3/4	5/8
	70461xx	SHT				16 7/8	14 7/8	13 3/4	16 7/8	15	13 3/4	5/8
	70468xx	LT				16 7/8	15 3/4	14 1/2	17 5/8	15 3/4	14 1/2	3 1/8
3201	14-582402	SHH				17 1/2	15 5/8	14 3/8	17 1/2	15 3/4	14 3/8	
	38424xx	MT	17 1/4	15 3/8	14 3/4				26 5/8	14 5/8	23	3
	41211xx	HT				15 1/8	13 3/8	12 1/2	19 1/2	17 1/2	16	1
	43790xx	LT	18 3/4	16 7/8	16 1/8				29 5/8	27 5/8	26	4 3/8
	56244xx	SH	18 1/8	16 1/8	14 7/8				17 1/2	15 5/8	14 3/8	3 1/4
3202	60577xx	HT				18 1/8	16 1/4	14 7/8	18 1/8	16 1/4	14 7/8	
	60743xx	MT 50Hz				16 5/8	14 5/8	13 3/4	19 3/8	17 1/2	16	
	60744xx	MT				16 5/8	14 5/8	13 3/4	19 3/8	17 1/2	16	
	60784xx	HT				16 3/8	14 1/2	13 1/2	19 1/8	17 1/4	15 3/4	
	65112xx	LT				18 7/8	17	15 3/4	18 7/8	17 1/8	15 3/4	
	70425xx	HT				18 1/8	16 1/8	14 7/8	18 1/8	16 1/8	14 7/8	3/4
	70442xx	HT 60Hz				18 1/4	16 1/4	15	18 1/4	16 1/4	15	3/4
	70449xx	MT 50Hz				16 3/4	14 3/4	13 7/8	19 3/8	17 1/2	16 1/8	1 3/8
	70452xx	MT 60Hz				16 3/4	14 3/4	13 7/8	19 3/8	17 1/2	16 1/8	1 5/8
	70471xx	LT				19	17	15 7/8	19	17 1/8	15 7/8	4 1/8
3300	31930xx	MT				16 1/2	14 1/2	13 7/8	22 1/2	20 5/8	18 7/8	2 3/4
	31934xx	LT				16 3/8	14 3/8	13 5/8	20 7/8	18 7/8	17 3/8	1 3/4
	31936xx	HT	16 7/8	15	13 3/4				23 5/8	21 3/4	20 3/8	7/8
3301	60864xx	HT				19 1/4	17 3/8	16	19 1/4	17 3/8	16	
	60870xx	MT				19 3/8	17 1/2	16 1/8	19 3/8	17 1/2	16 1/8	
	66635xx	LT				19 1/2	17 5/8	16 1/4	19 1/2	17 5/8	16 1/4	
	66636xx	LT				20 3/8	18 5/8	17 1/4	20 3/8	18 5/8	17 1/4	
	70455xx	MT				19 3/8	17 1/2	16 1/4	19 3/8	17 1/2	16 1/4	4 1/8
	70458xx	HT				19 1/4	17 3/8	16 1/8	19 1/4	17 3/8	16 1/8	1 7/8
	70474xx	LT 6pol				18 3/4	17 5/8	16 3/8	19 1/2	17 5/8	16 3/8	4 1/4
	70477xx	LT 8pol				20 1/2	18 5/8	17 3/8	20 1/2	18 5/8	17 3/8	4 7/8
3315	70455xx	MT				19 3/8	17 1/2	16 1/4	19 3/8	17 1/2	16 1/4	4 1/8
	70474xx	LT 6pol				18 3/4	17 5/8	16 3/8	19 1/2	17 5/8	16 3/8	4 1/4
	70477xx	LT 8pol				20 1/2	18 5/8	17 3/8	20 1/2	18 5/8	17 3/8	4 7/8
	70458xx	HT										

* Flush Valve for Low Head Version, P/N 556 51 02 (Head must be above 7.5 feet and below 10 feet, see individual curve)

Note: Add 2" to Dimensions A & D and 2-3/8" to B & C when using valve with straight outlet pipe.

Flygt Mix-Flush System

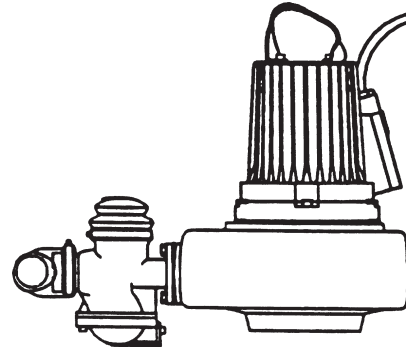
Mix-Flush Valve Specification

At least one pump in each sump shall be equipped with an automatically operating valve that will provide a mixing action within the sump at the start-up of the pumping cycle.

This valve shall be mounted directly on the pump volute and shall direct a portion of the pumpage into the sump to flush and re-suspend solids and grease by the turbulent action of its-discharge. The turbulent action caused by the flow shall also provide some sump aeration benefits. The valve shall be mounted on the pump volute so that it can be removed from the sump along with the pump during normal and routine maintenance checks and shall be positioned on the volute to provide for non-clogging operation. The valve shall be equipped with an adjustable, wear-resistant discharge nozzle which shall be used to direct flow from the valve to optimize mixing action within the sump.

The valve shall not require any external power source or control to operate, neither electric nor pneumatic. The use of the external power source is not acceptable. The valve shall be suitable for use in Class I, Division 1 hazardous locations.

The valve shall open at the beginning of each pumping cycle and shall automatically close during pump operation after a pre-selected time of operation. The valve shall operate automatically by differential pressure across the valve and shall be actuated through a self-contained hydraulic system which uses an environmentally safe fluid. A method of adjusting the valve operating time shall be provided.



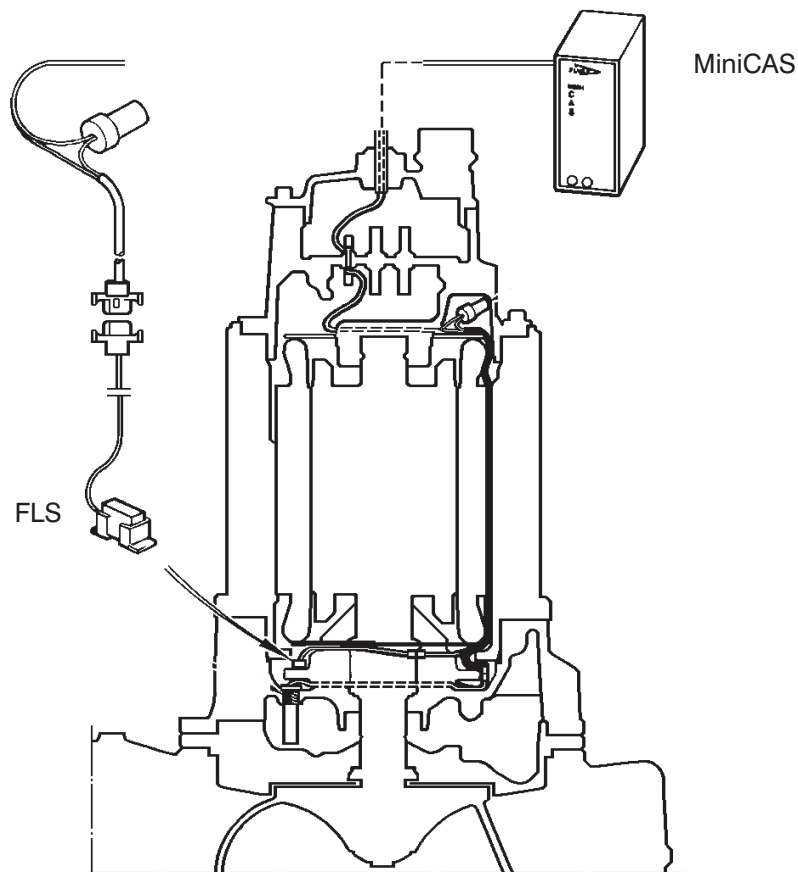
Leakage Sensors

Select Flygt pumps are available with leakage sensors for sensing the presence of water in the oil and/or stator housing. A plate in the junction box indicates that the pump is equipped with sensors.

The Flygt FLS sensor is a miniature float switch for the detection of water and/or oil in the stator housing. Due to its design, it is meant to be used for pumps that will be oriented in the standard vertical position. The FLS sensor is mounted in the bottom of the stator housing. The FLS is the only sensor that can be used for intrinsically safe designs which is required for explosion-proof installations.

The FLS is connected to the Flygt Mini CAS (Control and Status) monitoring unit. The FLS is wired in series with the thermal switches, thus, eliminating additional control leads. The Mini CAS unit monitors the current allowable to flow from both the temperature switches

and FLS sensor. On the front of the Mini CAS there are two indication lamps, one for supply and temperature and one for leakage. Only two wires are needed between the pump and the Mini CAS.



Leakage Sensors

FLS LEAKAGE SENSOR

DESCRIPTION

The FLS is a sensor designed to detect water presence into the stator housing. FLS is designed for CP/DP model pumps, which are installed in a vertical position.

The FLS is an electro-mechanical type device. The FLS has a rigid aluminum frame, with two small fixed resistors. Two wires are provided for device connection. Inside the frame, a mobile float element can move up and down guided by a shaft. The float contains a permanent magnet which, on the uppermost float position, causes the "reed-switch" closure. The FLS-10 is a similar device used with the new generation of N-pumps.

Note: When ordering FLS leakage sensor, a Mini CAS II or MAS 711 unit should be ordered with the pump. (See Mini CAS or optional MAS 711 for appropriate connection details).

MODE OF OPERATION

In normal conditions, the float element will rest at the bottom of the frame. Across the connection wires, the FLS resistance is about 1500 ohms. The FLS-10 resistance is 1,200 Ohms.

When water or any liquid enters the stator housing, the float element and magnet will raise and finally touch the upper side of the frame. The "reed-switch" will close and add a 375 ohms resistor in parallel with a 1500 ohms resistor. The resulting resistance across FLS leads is 300 ohms.

In the FLS-10 leak detector, supplied with the new generation of pumps introduced in 2000, the resistor values are 430 ohms in series with a 770 ohm resistor. The "reed-switch" will close and drop out the 770 Ohm resistor from the circuit resulting in a resistance value of 430 Ohms. An ITT Flygt supervising device such as Mini CAS II or MAS711, will be activated by this change of resistance and provide a "leakage" signal or turn off the motor.

INSTALLATION

The FLS is usually installed in C/D 3000 series pumps, at the bottom of the stator housing, on the top of bearing housing, bonded to it with an epoxy-based adhesive. The FLS can also be used to check for water intrusion in the junction box for big pumps and hydroturbine generators.

When used with the Mini CAS II supervision relay, the FLS is connected in series with pump motor thermal switches, so only two wires are required to connect both leakage and thermal sensors. If a CLS sensor is also used, the FLS and CLS are connected in parallel.



FLS

FLS TECHNICAL DATA, DIMENSIONS & PART NUMBERS

Technical data:

- Signal: 8mA off-duty current, 36mA alarm current
- Supply voltage: 12VDC
- Max temperature: 90°C, 1h
- Test temperature: 115°C, 1h
- Max duty temperature 70°C
- Material: aluminum

Dimensions

- Length: 27 mm (1.06 in.)
- Width: 16 mm (.63 in.)
- Height: 16 mm (.63 in.)

Part numbers

- FLS: 518 89 02
- FLS-10: 663 04 00

TESTING PROCEDURES

The FLS can be tested with a standard ohm-meter.

The FLS resistance should be:

- De-activated - about 1500 ohms;
- Activated - about 300 ohms.

The FLS-10 resistance should be:

- De-activated: about 1200 ohms
- Activated: about 430 ohms

Caution: Never apply more than 14VDC to the sensor. A higher voltage can destroy the sensor.

Installation Guidelines for Flygt Pumps

Pump Anchoring Recommendations

Introduction

Proper installation and anchorage of Flygt pumps and installation accessories is critical to limiting vibration and achieving reliable, trouble free operation. It is important to remember that all piping, fittings and supports that are mechanically connected to a pump are all part of a single system. Vibrations are unavoidable when a mass, such as a rotor assembly, is turning at high speeds. The rotating mass of a Flygt motor together with forces from the motor and the hydraulic end, will generate an intrinsic set of disturbance or “excitation” frequencies that are related to the speed of the motor (unbalance and blade pass are the two most important frequencies affecting vibration). When these frequencies coincide with a natural frequency of the system, vibration levels will increase substantially. The likelihood of this occurring is increased for variable speed applications where the pumps can operate over a range of speeds rather than a single constant speed. Most variable frequency drives have the option to exclude certain frequency ranges to avoid regions of high vibrations.

In addition, proper anchorage and support is critical to minimizing vibration. In vertical installations, the tall unsupported mass of the vertical motor exacerbates vibration levels at the upper bearing caused by imbalance, poor installation quality or hydraulic disturbances – more so than in horizontal installations. Therefore, eliminating system resonances and ensuring high quality installation in vertical Flygt pumps is critical to achieving a smoother running installation.

The following recommendations are consistent with Industry standards and generally accepted good design practices for concrete anchorage of rotating equipment. These recommendations can be applied to all Flygt pump installations but specific emphasis is placed on vertical, dry pit installations. Failure to follow these good design and construction practices may result in higher levels of vibration than desired. A registered Civil Engineer should be consulted for specific construction design details for each individual installation.

Vibration

Flygt pumps are manufactured to be of the highest quality to ensure compliance with ISO vibration test standard 10816-1 and Hydraulic Institute submersible pump test standard 11.6 for factory

vibration tests. Although the pump itself can withstand rather high vibration levels (3 or 4 times the actual limit) under running condition without noticeable life time reduction, the piping and supportive structure may suffer and crack if vibration levels are too high. It should be noted that pumps at stand-still are more sensitive to vibrations than when they are operating. To ensure acceptable vibration levels in the field, all parts of the system should be sufficiently stiff and firmly anchored so that the primary disturbances have frequencies below the lowest natural frequency of the system.

1. Anchor the piping to the floor or another solid structure (see **Piping Support**)
2. Anchor the pump firmly to the floor, concrete base or concrete pedestals (see **Anchor Recommendations**).
3. Concrete pedestals are an integral part of the installation and should be designed to resist vibrations through proper reinforcement and dimensioning (see **Concrete Foundations**).
4. Consider bracing attached to the top of the motor.

If weak parts like bellows are used, they must be firmly attached at both sides unless a more advanced soft installation is desired (see **Soft Installation Alternative** for further recommendations on this type of installation).

Piping Support

Dry installed pumps will generate disturbances that are transmitted to the adjoining pipe and structure through mechanical connection of the piping and the installation structure. Pump speed (imbalance) and blade pass (hydraulic forces) typically are two frequencies at which disturbances can occur. These frequencies can be used to estimate the critical pipe length; i.e. the natural bending frequency of a pipe filled with liquid. (see **Calculation of critical pipe length**).

Explosion-proof Pumps

Explosion-proof Pumps for Hazardous Locations

Flygt Electric Submersible Explosion-proof Wastewater Pumps are examined, tested, and approved by Factory Mutual Research (FM) as Explosion-proof. They conform to the latest edition of the National Electrical Code (NEC), Articles 500, 501, 502, and 503 requirements as explosion proof and suitable for use in Class I, Division 1, Groups C and D, and dust ignition proof and suitable for use in Class II, Division 1, Groups E, F and G hazardous locations, and suitable for use in Class III, Division 1 hazardous locations. FM approval also meets OSHA (Occupational Safety and Health Administration) requirements.

Definition of Hazardous Locations by NEC

Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosion or ignitable mixtures.

Class I, Division 1 location is a location: (1) in which ignitable concentrations of flammable gases or vapors exist under normal operating conditions; or (2) in which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or (3) in which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also **cause** simultaneous failure of electric equipment.

Class II locations are those that are hazardous because of the presence of combustible dust.

Class II, Division 1 location is a location: (1) in which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; or (2) where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes; or (3) in which combustible dusts of an electrically conductive nature may be present.

Class III locations are those that are hazardous because of the presence of easily ignitable fibers or flyings but not likely in air suspension in quantities sufficient to produce ignitable mixtures.

Class III, Division 1 location is one in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.

Special Features

The construction of an Explosion Proof pump is similar in most respects to the standard wastewater pump, but differs in the following details:

1. Hydrostatically pressure tested high strength, cast iron housings are designed to withstand an internal explosion and have long tight flame paths to reduce exit temperature of any exploding gases to a value below the ignition temperature of the surrounding environment.
2. All pumps have required pilot thermal sensors embedded in stator windings, to guarantee that the pump surface temperature never exceeds safe limits, avoiding possible environmental ignition.
3. Externally mounted leakage sensors may not be used unless explosion proof or intrinsically safe (consult factory for details).
4. Special approved power cables required: Flygt SUBCAB.
5. All pumps, except 3045(X), 3057(X), 3085(X), 3102(X) and 3127(X), have a **special** stator inspection plug. The 3085(X), 3102(X) and 3127(X) stator housings are inspected for leakage through the cable entry. Here, penetration of oil from the oil chamber below, or water from the junction chamber above can be detected.
6. Flygt controls supplied with these pumps incorporate the following **required** circuits:
 - A. Motor pilot thermal sensors (connection is approval **mandatory**).
 - B. Intrinsically safe relays for ENM-10 level sensors (or equal) - usage is **mandatory**.

CAUTION: All controls, used with these pumps but not supplied by Flygt, **must** be designed according to the latest applicable standards. See **Monitoring & Controls** Section for additional details and requirements.

Environmental Limits

The maximum temperature of exposed (external) pump surfaces is self controlled by the motor pilot thermal switches. Maximum allowed ambient (environmental) temperature is 115°F (46°C).

Application of Explosion-proof Pumps

These pumps may be used in sewage wet wells that are classified as Class I, Division 1, Groups C and D

Explosion-proof Pumps

hazardous locations (gases and vapors). They can also be used in applications that are classified as Class II, Division 1, Groups E, F and G hazardous locations (typified by grain or coal storage); also, Class III, Division 1 locations (fibers and flyings).

Other areas, which may be classified hazardous under normal conditions and where the use of Explosion-proof pumps for handling contaminated wastewater is required are: refineries, petrochemical industry locations, tank farms, gas utility vaults, etc., always taking into consideration that these pumps are **not designed or approved as process pumps deliberately and protractedly handling high concentrations of hazardous liquids, e.g.: gasoline, etc.**

Limitations

1. CP/CS, DP/DS and FP/FS 3085(X) does not optionally have a terminal board as does the standard version.
2. This Explosion-proof pump is not available in the Warm Liquid (WL) variant.

Division 2, All Classes: For Class I or II locations, a Division 2 designation means that the ignitable or combustible materials will not normally be present in hazardous concentrations except by accident or malfunctions of containing or protective systems. In Class III locations, Division 1 and 2 are almost the same (check NEC Article 503).

Equipment approved as suitable for use in Division 1 locations is automatically suitable for use in Division 2 locations. **However**, if the Authority Having Jurisdiction has definitely defined the area as Division 2, standard submersible pumps (motors) may be used so long as they do not contain any open (non-hermetically sealed) ignition sources (See NEC Article 501-8 and 502-8) and use motor pilot thermal switches to limit surface temperatures. Standard Flygt submersible pumps meet these requirements.

Classification

A sewage wet well (or any other wastewater collection location) is not automatically a hazardous location. The nature and classification of any location must be determined and indicated by whoever is considered to be the Authority Having Jurisdiction.

This Authority is not always easily determined. Care and diligence must be exercised to make sure, once a preliminary identification has been made, that there is not some other superseding Authority.

Depending on the type and geographical position of the "location", the Authority may range the gamut from a federal agency to state, regional, local agencies or the consulting or plant engineer. Often the best source of information is the state Administrative Code or a state agency such as a Department of Environmental Protection (DEP), Environmental Protection Agency (EPA), Department of Health, etc.

Approval Requirements (NEC/Factory Mutual)

Class I, Division 1: suitable equipment must be explosion proof. It must also contain pilot motor thermal sensors (which must be connected in the motor control).

Class II, Division 1: suitable equipment must be "dust ignition proof" and use motor pilot surface temperature limiting thermal switches as in Class I.

Class III, Division 1: suitable equipment need only be totally enclosed, non ventilated.

Current Approvals for hazardous location pumps previously noted are by FM (Factory Mutual Research). FM is officially listed by OSHA (Occupational Safety & Health Administration) in the Federal Register as a Nationally recognized testing laboratory (NRTL). It is in all regards equivalent to UL (Underwriters Laboratory).

Restrictions: The listed (X) pumps are not approved for "process pumping" where high concentrations of liquids (other than wastewater) are handled for process work, transfer, or recovery. The acceptable usage is for handling wastewater (contaminated water, sewage, etc.) for the purposes of treatment, transfer, storage, or disposal.

No accessory equipment may be attached to an approved pump unless it is specifically approved for the location or "intrinsically safe" (See NEC 500-2 for Intrinsic Safe requirements).

WARNING: All NEC and local code requirements must be scrupulously observed when making an installation. Be certain that glands and conduits where pump(s) or control wiring/cable passes from a hazardous location (wet pit, etc.) to electrical service, controls, or nonclassified area are suitably sealed against passage of gases or liquids.

Aggressive Liquids: Depending on temperature, pH, concentration, and their intrinsic reactivity, certain contaminant chemicals (acids, alkalies, solvents, etc.) may have a deteriorating effect on the equipment and

Explosion-proof Pumps

pose a safety hazard to the installation. Be careful to fully examine these circumstances with the end user or his representative and consult with Flygt.

A number of alternative configurations or approaches are available which may make the equipment suitable in the presence of these materials: alternate elastomers, cable sheathing, special cable entries, etc.

Accessories: Non-sparking bronze “Safe-Slide®” installation/removal guide accessories are available for all approved pumps. While not required by the Approval Authority they may be desired by local authorities and do provide an extra margin of safety for particularly hazardous classified locations.

Cable: Flexible cords or cables used in hazardous locations must be of the NEC type “extra-hard usage” and be specifically approved/tested for the approved equipment (motor/pumps) which they will be used with. **No unapproved substitutions may be made without loss of official approval.** Cables supplied by Flygt and used with Flygt electric submersible pumps are FM tested and approved for the hazardous locations listed for the pumps in the beginning of this Explosion-proof pumps section.

To protect against the damaging and unsafe effects of very aggressive contaminants (liquids, dissolved solids) in the wastewater, special cable entries are available which will allow pipe or stainless steel flex hose sheathing to be attached to protect the cable.

Special Exceptions for Hazardous Locations: It is possible in some circumstances to use standard pumps in what would normally be declared as hazardous locations. These approaches are supported by various codes but may **not** be used if specifically disallowed by an Authority Having Jurisdiction.

Guaranteed Pump Submersion (GPS): If the equipment is so controlled that the liquid level never falls below a point 4 - 6 inches above the topmost point of the pump, then standard non-approved pumps may be used. This is because the volume below a liquid surface is not considered hazardous.

The means for guaranteeing that a pump will always remain submerged during operation vary from one part of the country to another. Consult Flygt for appropriate configurations.

Declassification: An examination of local/state administrative codes, NEC Chapter 5, and NFPA Standard 70C and 496, shows that a hazardous location may be reduced in classification from Division 1 to Division 2 or even to a nonhazardous condition through the use of suitable air purging and use of monitoring safeguards. This would then allow the installation of standard pumping equipment.

This is a common practice in many parts of the country when the installation makes it practical. The approach has additional benefits: purging not only removes any explosive/flammable gases, but also removes smothering or poisonous gases thus improving the personnel safety aspects of the location.

Mine Safety and Health Administration (MSHA) Equipment approved by MSHA (Permissible-suitable for use in gassy mines) may **not** be used in any hazardous location covered by the NEC categories (Class I, II, or III) without written permission of the **authority having jurisdiction**.

Nor may equipment approved/listed by FM or UL be used in a gassy mine without the written approval of MSHA.

Storage

Each Flygt pump leaves the factory properly assembled and prepared to perform even after a reasonable idle time in storage. However, as prolonged idle time can be detrimental to any rotating machinery, the procedures outlined below should be followed in order to insure that the equipment is in top condition to operate when finally installed. Whenever possible, store pumping units in a dry environment free of extreme temperatures and strong direct sunlight.

NEW pumps:

Storage 6 to 12 months:

In general, rotating machinery left idle for extended periods of time, tends to establish a “set” position due to inaction of the moving parts. Some of these areas may be damaged (especially seals) from the sudden fast breakaway of start-up after a prolonged idle time. To insure that all rotating parts are free for final installation and start-up, it is good practice to rotate the impeller by hand once a month. It is also good practice to relieve the tension on the cable entry sealing grommet by backing off the cable entry compression screws slightly. If this is done, it is most important that a clear note be attached as a reminder to:

Re-Tighten Cable Entry Compression Screws Before Installation.

Storage 12 to 24 months:

In addition to the above, apply a protective spray coating of silicone or rust inhibiting oil to the impeller and inside of the volute by spraying in through the volute outlet and up through the volute inlet. Also coat the volute outlet flange face.

USED pumps:

Before storing a used pump for an extended period of time, the unit should be dismantled, checked for any defects, repaired where necessary and reassembled. At reassembly, follow instructions in the **Service Manual**, especially regarding seal assemblies. Protect the impeller and volute as mentioned in the paragraph above.

In all cases, it is good practice to check all external bolts, nuts and screws for tightness before final installation after extended storage.

CONTROLS:

It is most important to make sure that Electrical Controls, when subjected to extended storage, be stored in a protected dry environment free from any corrosive atmosphere. Moisture in any form, including condensation, can cause serious corrosion problems to the contact point surfaces as well as terminal connections.

Even though all terminal connections have been made tight on initial assembly at the factory, they may not remain 100% tight over an extended storage period due to the compressibility of the copper wire and possible movement due to variations in ambient temperature. The problem will vary in degree depending on wire size and whether the terminal connection is of solid or stranded wire. To insure proper operation, recheck all terminal connection screws for tightness prior to placing the control on line.



Brookfield WPCA - 133 Pump Station

SIGN-OFF/APPROVAL

4/30/2023

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