Nova Water Technologies
Ultrascreen® Disk Filter

To:
Pasco County

For:
Trailer Mounted NOVA Disk Filter

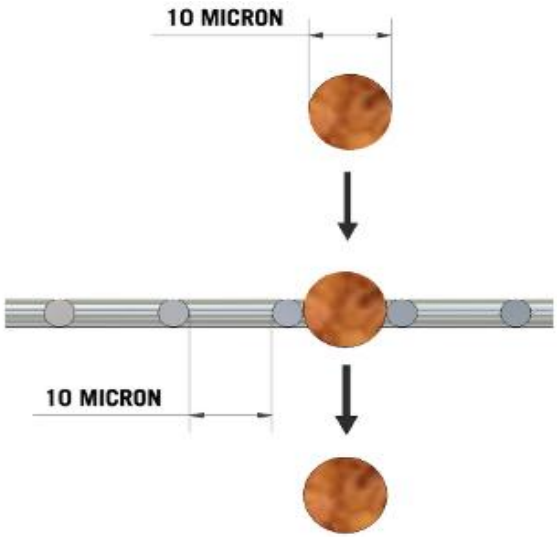
Represented by:
Dave Hartwig
Carter & VerPlanck, Inc.
813-240-1199

1.0 Introduction

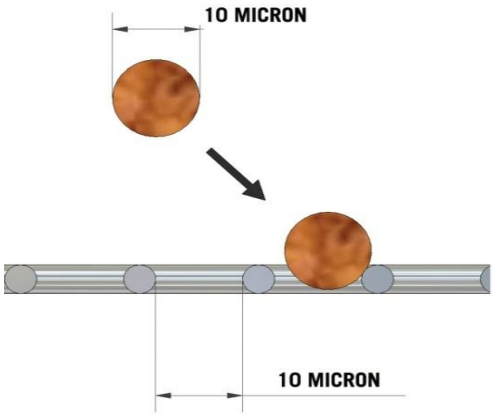
NOVA Water Technologies is pleased to offer equipment and services in accordance with our standard features. The basis of this proposal is compliant with the standard NOVA Water performance specifications and materials in 304SS stainless steel. This proposal uses our Model UL1602HS disk filter.

2.0 Principle of Operation

The disks are always in slow rotation during normal operation. The water with TSS is fed at angles less than 90º, which is the basis for "dynamic tangential filtration." The rotation allows use of precision woven wire Stainless Steel micronic mesh, with micron ratings typically between 15 and 25 microns. The disk rotation presents these openings as if they were actually smaller than in a static orientation. This allows for the removal of particles smaller than 10 micron, while requiring minimal water for cleaning. This allows the unit to operate at higher loading rates and achieve equivalent effluent quality compared to static disk filters. This same principle has been proven consistently in the operation of rotatory drum screens, as on example.



Static Filtration – Particle Path



Dynamic Tangential Filtration – Particle Path

3.0 Mechanical Principles

The feed to the disks is introduced into a zone between, or “inside”, each set of disks (see Figure No. 1 below). Each disk is sealed to the walls of the tank by long lasting EPDM rubber seals to maintain filtration integrity and to prevent any short-circuiting. The feed passes through the filter mesh and freely falls into the filtrate zone below (Figure No. 2) and flows out of the effluent outlet. As TSS is captured the liquid level in the feed zone rises until it reaches a pre-set level. A sensor then initiates operation of the wash water pump and the back of the screen mesh is sprayed by low pressure water at 2 to 4 bar for typically one minute. Once the mesh is cleaned the level in the feed zone recedes to another pre-set level where a second level sensor deactivates the wash water pump. All of the solids cleaned from the fine filtration mesh are collected in a simple trough between the disks and leaves the filter under gravity flow. The reject troughs are connected to a common outlet and the concentrated wash water (reject) is sent for further treatment.

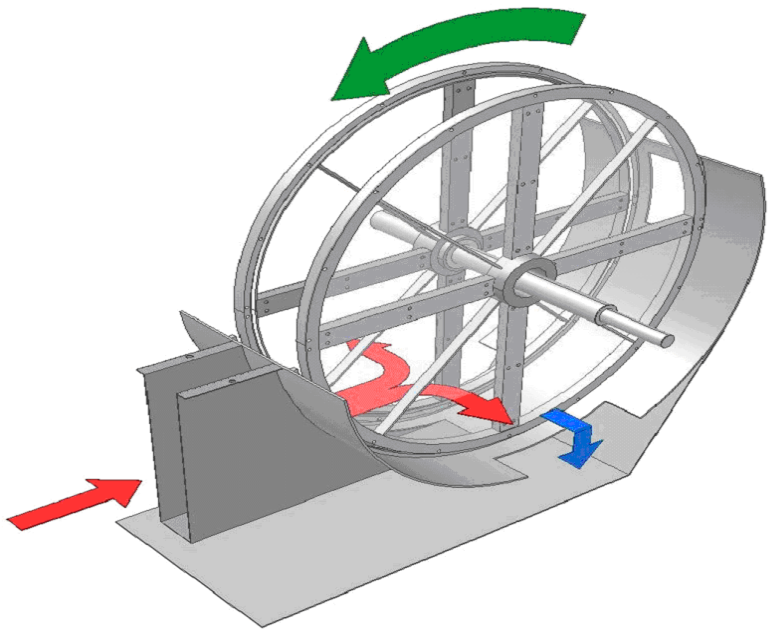


Figure No. 1
The filtration disks are arranged in pairs as show above

The level sensor is also used for turning the filter itself on and off. At low level the filter is de-energized and allowed to remain in a “filter ready” idle mode. This may occur in smaller plants during low flow periods of time. Once flow resumes the idle filter is energized and the normal filtration and wash cycles resume.

A level sensor will send a signal to the control panel when a high level condition or overflow situation occurs.

A situation such as this may occur when there is a significant upset in the plant or during a power outage.

The graphic below represents the typical flow condition during operation.

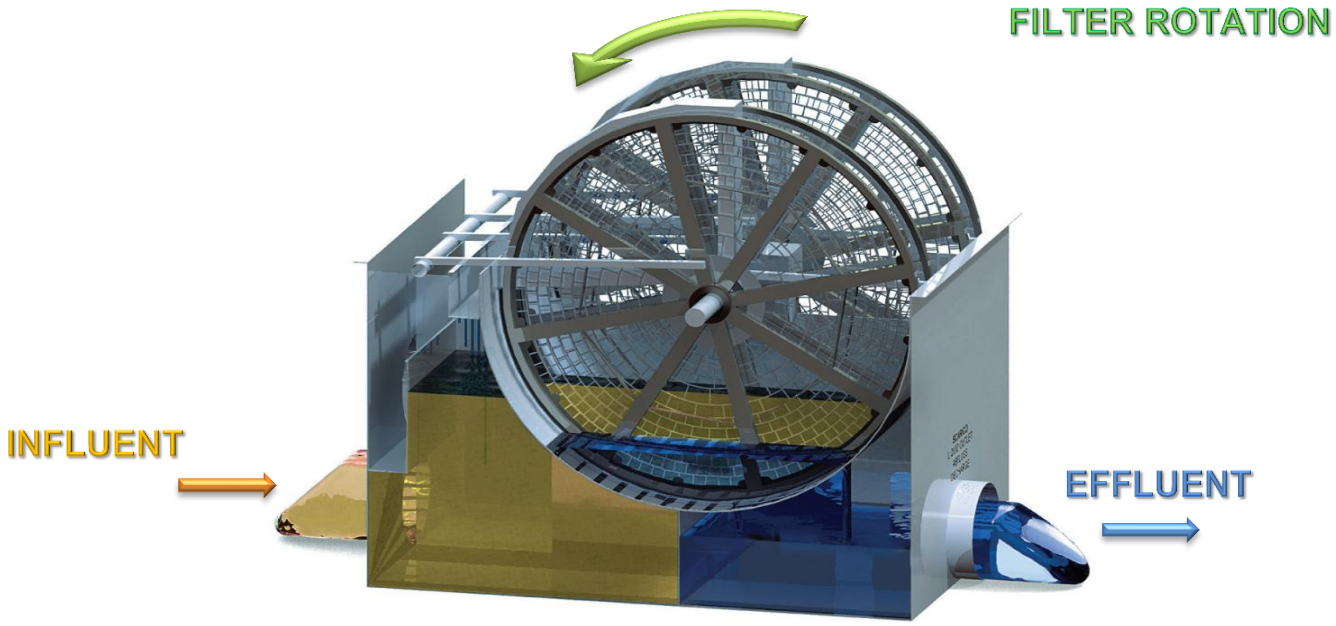


Figure No. 2
Improved filter design hydraulics results in significant increases in capacity

4.0 Plant Design Information

The filter is to be sized for:

	GPM	(MGD)
Average Daily Flow	694	(1.00)
Peak Daily Flow	1389	(2.00)

4.1 Design Information for Filter: UL1602HS

Number of filters	1	
Number of disks per filter	4	
Area per disk	22.0	sq.ft.
Total area per filter	88.0	sq.ft.
Loading rate at avg per filter	7.89	gpm/sq ft
Loading rate at peak per filter	15.78	gpm/sq ft
Filter Drive	(1) 3	hp
Wash Water pump	2.0	hp
Instantaneous Wash Water demand	29.0	gpm/unit
Wash water pressure	4	bar max
Total reject backwash wash water as % of the influent feed rate	0.5 - 1.0	%
Method of feeding filter	By Gravity or Pumped	
Maximum Head requirement	25.6	inches

4.2 Filter Performance Characteristics:

	Influent	**Effluent**
TSS	Avg. mg/L	Avg. mg/L

5.0 Scope of Supply: UL1602HS

Image of Four (4) Model UL-1606-CS shown

- Qty (1) UL1602HS Ultrascreen® Disk Filter
- 304 stainless steel tank
- 316L stainless steel filter mesh
- Qty (1) backwash pump (2 hp)
- Internal spray wash piping and nozzles
- Qty (1) Automatic sludge valve
- 304/304L stainless steel filter disks
- Ball valves and gauges as required
- NEMA compliant control panel with SS enclosure, 480 VAC, 3 Phase, 60 Hz
- Hollow Shaft drive system
- Filter Level Control Sensor as required
- 304SS covers with two handles per section for easy removal
- Qty (1) year manufacturer's standard warranty
- Spare Parts: (8) Filter Panels, (1) par of Seals, (1) external bearings, (8) nozzles, (1) Basket
- Qty (1) Trailer per spec: Bid No. IFB-KB-10-028, section: 6.1.2 "Trailer Unit"

6.0 Equipment Cost

Price for the scope of equipment as shown above is $ 206,800 USD

Any taxes or fees are not included.

Equipment freight to the jobs site, engineering submittals, and start-up services are included in the pricing. Price is valid for 60 days.

7.0 Typical Drawings: See attached

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SUBMITTAL FOR LAND O' LAKES, PASCO COUNTY

NOVA MODEL UL1602HS ULTRASCREEN TRAILER MOUNTED DISK FILTER

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P. O. Box 23523, Tampa, FL 33623 P.813.288.0533 F.813.289.3566

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O&M MANUAL

PASCO COUNTY, FL

ONE (1) NOVA MODEL UL1602HS ULTRASCREEN DISK FILTER

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1 – INTRODUCTION

A) CONTACT INFORMATION

For general information, literature requests, service requests, or other inquires please call:

Nova Water Technologies
PO Box 23523
Tampa, FL 33623
Ph: 813-288-0533
Fax: 813-289-3566

When Email Contact is necessary, please use one of the following email addresses:

DavidPopowitch@NovaWT.com

B) INSPECTION OF SHIPPED GOODS/PRODUCT ACCEPTANCE

i. Except for Products that are not assembled at Seller's facility, Buyer has the right to inspect Products at Seller's facility prior to shipment provided that advance written arrangements are made by Buyer and are confirmed in writing by Seller. Any and all costs associated with inspection and testing requested by Buyer at Seller's facility will be paid by Buyer.

ii. Buyer shall inspect the Products within a reasonable period of time following receipt at the point of destination and prior to conducting any Acceptance Test to determine if Products are damaged, incomplete or do not otherwise conform to Buyer's request.

iii. If Buyer receives Products with visible or suspected damage or loss, including damages to the packaging, or with discrepancies in the specification, Buyer shall make relevant notes in receiving documents and notify Seller immediately. Such notice shall be reasonably detailed and shall specify the damage or discrepancy.

iv. Buyer's failure to inspect the Products and give written notice to Seller of any alleged defects or non-conformity within a reasonable time after receipt at the point of destination shall waive Buyer's right to reject the Products and return them to Seller for credit and Buyer's sole remedy for nonconforming or defective Products shall be warranty claims made in accordance with the warranty.

v. For purposed of this Article, "reasonable period of time" means a period of time that is not immoderate or excessive, in accordance with industry standards.

vi. If Seller's Documentation provides that the Products are subject to specific acceptance testing (the "Acceptance Test") in order to verify Products performance in accordance with agreed specifications, the Products shall be deemed fully accepted when they have satisfied the requirements of the Acceptance Test. Buyer's remedy for Products that have failed an

Acceptance Test or are in the warranty period shall be limited, at Seller's sole discretion, to the repair or replacement of such Products.

vii. Notwithstanding any right conferred upon the Buyer to inspect or test the Products prior to acceptance, any use or alteration of the Products by Buyer, its agents employees or licensees, for any purpose after delivery thereof, shall constitute Buyer's irrevocable acceptance of the Products. Accordingly, in the event of any discovery by Buyer of non-conformity or defect following such acceptance of the Products, Buyer's sole recourse is a warranty claim pursuant to the warranty provisions.

C) INSTALLATION SUMMARY

ATTENTION: *The ULTRASCREEN® Disk Filter can represent an unbalanced load, if the weight is not evenly distributed. Special attention must be paid not to damage items that project from the sides of the unit such as the wash pump or gear drive.*

When using a crane with lifting beam:

- Affix 24mm stainless steel eyebolts (with anti-seize compound) to the casing (Figure 1, Item 2), and adequately tighten them
- Connect the eyebolts to the lifting beam and then to the crane by means of lifting chains or ropes of adequate length
- Make sure the ropes or chains do not touch the covers!
- Carefully lift and position the machine
- Take care to avoid damaging items that project out from the sides of the unit.

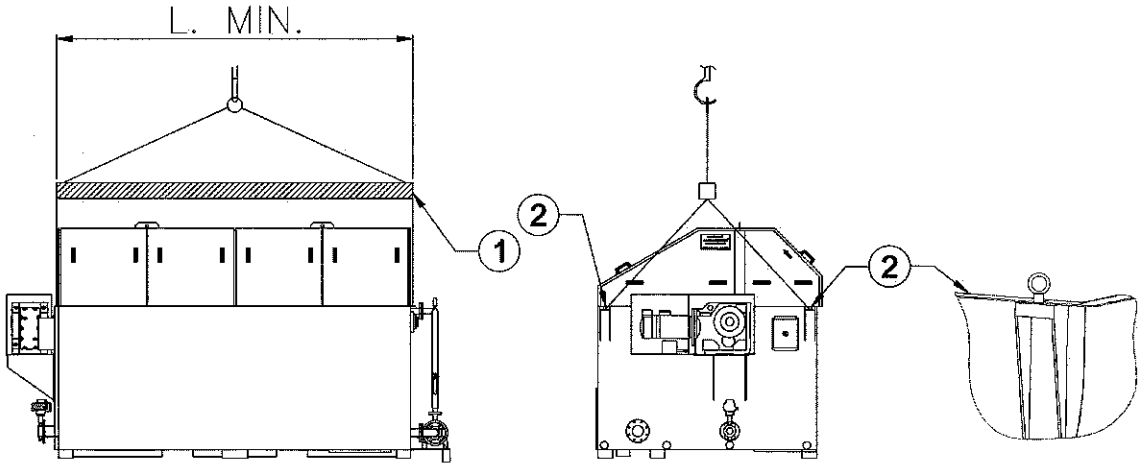


Figure 1– Lifting ULTRASCREEN® Disk Filter

Model	L, minimum , inches
UL 1602	43

***IMPORTANT**: Prior to the installation of your ULTRASCREEN® Disk Filter all upstream piping and process equipment must be flushed and void of corrosive chemicals, welding slag, construction hardware, or any other contaminants. Any of these items can damage the ULTRASCREEN® Disk Filter. The filter is designed to receive secondary clarifier effluent only. Construction debris entering the filter will void the manufacturer's warranty.*

The surface on which the ULTRASCREEN® Disk Filter is to be installed must be properly leveled and arranged to take the weight of the machine during operation (with the load of water to be filtered inside). The surface on which the filter is installed must include a free space of at least three feet around the sides of the machine for maintenance.

If maintenance where removal of the axle from the ULTRASCREEN® Disk Filter is required, it is necessary to take into account the height required for that operation and position the machine accordingly. It will otherwise be necessary to disconnect the ULTRASCREEN® Disk Filter from the water and electrical connections and carry out maintenance by moving the machine from the place of installation.

After positioning the ULTRASCREEN® Disk Filter, confirm it is level using a normal spirit level (bubble level).

D) PRE-STARTUP CHECKLIST

The filter will be supplied with components installed and tested prior to delivery to the job site.

FILTER INSTALLATION – The filter needs to be installed on a level concrete slab and secured to the floor with proper anchors. All dirt construction debris and trash must be removed from the filter piping connections. Make sure filter is level and plum before and after making the final anchor tightening.

PIPING – The inlet feed piping must be flushed before connecting to the filter to ensure that all construction residuals, pipe scale, tools and any foreign materials are removed before flow is initiated to the filter. Inlet and outlet piping should be level, plumb and adequately braced and supported so the weight of the piping is not transferred to the inlet or outlet fittings of the filter box.

Filters outfitted with tap flanges (Flush mounted flanges that have female threads) require thread sealant applied to the bolts. To ensure a leak free bolt installation on the tap flanges, Nova Water recommends the use of "LA-CO" brand "SLIC-TITE" paste with PTFE. SLIC-TITE can be sourced from McMaster Carr. (1qt. Brush Top Can, Part# 5477K17)

ELECTRICAL CONTROLS – Test incoming power for proper voltage and phasing. Pump and motor rotation and sludge discharge valve function will be verified by the factory technician during startup.

TRIAL RUN - Once the filter has been checked for preliminary mechanical, electrical and hydraulic compliance the filter will be test run for a brief period with plant water, secondary effluent or other suitable water source.

If all systems check out OK the screen will be operated for a 24 hour period of time under normal loading, and the frequency and duration of the bottom drain cycle will be assessed.

CONTROL LOGIC - The operating logic will be verified for all normal operating conditions and alarm functions.

ON BOARD SYSTEMS - The drive unit will be demonstrated to operate from minimum to maximum RPM range. The wash water pump (and/or manifold) pressure will be verified for the proper operating pressure. Verify that all spray nozzles are clear of obstruction and working properly. Wash water pressure should be 60 psi at the wash water spray header gauge.

REJECT DISPOSAL - The dirty wash water drain line will be verified for proper slope and flow capacity.

COVER ALIGNMENT - The filter covers will be checked for alignment and verified to be free of leaks at the gasket mating surfaces. IMPORTANT – NEVER OPERATE THE FILTER WITH THE COVERS REMOVED FOR ANY REASON.

FINAL START UP AND COMMISSIONING – Once the above checks and reviews have been completed the filter can be placed into normal full time operation. The flow rate to the filter, wash cycle duration, and time between wash cycles should be accurately measured at this time and recorded.

2 – SAFETY

A) MACHINERY SAFETY

The safe use and operation of this equipment is ultimately the responsibility of the owner and user. All reasonable design and safety considerations have been taken into account for operational and mechanical concepts of the machine.

B) TRIPPING HAZARDS

Be certain to pay attention to all possible tripping hazards in the area surrounding the machine. These can include floor stands for piping, conduit, instruments and other ancillary components. Never leave tools, rags, lubricants or spare parts laying around the machine for any reason. All spills of liquids, grease, oil, pastes, etc must be cleaned up immediately using proper procedures and disposal methods.

C) MACHINE GUARDS & COVERS

The machine is fitted with the proper enclosures to prevent accidental contact of tools and body parts with rotating assemblies. This includes the factory supplied covers for the gear drive, motors and rotating machine assembly. NEVER OPERATE THE MACHINE FOR ANY REASON WITH THE COVERS OFF. NEVER OPERATE ANY OF THE MOTORS WITH THE COVERS OFF.

D) ROTATING EQUIPMENT

Rotating objects present danger when operated improperly. Never allow hands, feet, arms, or legs to come into contact with moving parts. Never allow loose clothing, jewelry, or hair to come into contact with moving parts. THE OWNER AND USER ARE RESPONSIBLE FOR PROPER ADHERENCE TO THESE GUIDELINES.

E) EMERGENCY STOP FEATURE

The machine is equipped with an emergency stop "mushroom head" style push button. If initiated this stop button will disable the rotating mechanism. THE DISABLED MACHINE IS STILL CONNECTED TO 480 VAC 3 PHASE POWER. THE POWER SUPPLY MUST BE DISCONNECTED AT THE CONTROL PANEL TO PROPERLY DE-ENERGIZE THE MACHINE.

F) OPERATOR RESPONSIBILITY

The Owner and Operator are responsible to thoroughly review and be familiar with all safety precautions outlined in this manual. Service should only be performed by qualified technicians with factory certification and training. If there is a question or uncertainty regarding the correct and safe maintenance or operation of the filter CALL THE FACTORY (813) 288-0533 OR EMAIL AT **davidpopowitch@novawt.com**

G) OPERATING SPEEDS

The machine is designed to operate at predetermined rotational speeds. DO NOT MODIFY THE OPERATING GEAR OR MOTOR TO SPEEDS OUTSIDE OF THE FACTORY APPROVED SETTINGS. DAMAGE, INJURY, AND DEATH CAN OCCUR AS A RESULT. THIS WILL VOID THE FACTORY WARRANTY.

H) ELECTRICAL SAFETY

The machine operates on 3 phase high voltage. Additional lower voltage circuits may also be present. The only safe way to work on the electrical circuits regardless of voltage is with the power off and properly locked out. SERVICE ON ELECTRICAL CIRCUITS SHOULD ONLY BE PERFORMED BY QUALIFIED ELECTRICIANS AND FACTORY TRAINED TECHNICIANS.

I) LOCK OUT PROCEDURES

Industry standard lock and tag procedures should be followed anytime the electrical controls are accessed for maintenance or corrective work. NO WORK SHOULD BE PERFOMRED ON THE ROTATING EQUIPMENT UNTIL THE PROPER LOCK AND TAG PROCEDURE HAS BEEN COMPLETED.

J) SOUND ATTENUATION

The machine itself is not a source of high decibel sound pressure levels. It may be possible that ancillary components supplied with the filter are capable of producing higher sound and noise levels. If the operator is required to be in close proximity to the machine for a sustained period of time hearing protection should be worn.

K) DRUGS AND ALCOHOL

No one should use any legal or illegal substance that can impair vision, balance, depth perception, coordination, or judgment before or during the operation, maintenance, or supervision of the use of this machine.

L) O&M MANUAL

The O&M manual contains detailed information on the proper use and care of this machine. The owner and user are responsible for reviewing and knowing this information in addition to using the machine properly and only for the intended function and purpose.

M) PROPER & PROTECTIVE CLOTHING

For maintenance or cleaning activity the use of proper clothing is required. Eye protection, hand gloves, work shoes and hearing protection must be used at all times. LOOSE CLOTHING, LONG HAIR, AND JEWELRY CAN BECOME ENTANGLED IN ROTATING EQUIPMENT. REMOVE AND OR SECURE THESE ITEMS BEFORE WORKING WITH THIS MACHINE.

N) INTENDED USE

The machine is intended for liquid and solid separation only. THE FACTORY AUTHORIZES NO OTHER USE OF THIS MACHINE AT ANY TIME.

O) FALLING OJBJECTS

Never attach or rest other items like tools, supplies or hardware to the machine at a height that will create a "FALLING OBJECT HAZARD". Keep all required maintenance equipment and tools at the user's level.

P) CLEARING FAULTS AND FOREIGN OBJECTS

It is possible to experience a fault in the control sequence, a power interruption, or a foreign object that can disrupt normal operation. Always use the fault clearing procedure outlined in the O&M manual to troubleshoot an event of this nature. A FAULT DOES NOT MEAN A CIRCUIT IS DE-ENERGIZED. USE PROPER LOCK AND TAG PROCEDURES BEFORE OPENING THE CONTROL PANEL OR REMOVING THE MACHINE SAFETY COVERS.

Q) PROPER ANCHORING

The machine should never be operated unless it has been properly installed and anchored to the mounting foundation. If the mounting anchors ever become loose cease operation immediately, lock and tag and contact the factory.

R) NORMAL SERVICE AND PREVENTIVE MAINTENANCE

Use only the procedures outlined in the O&M manual for regular and preventative maintenance. Do not allow untrained technicians to perform work on this machine.

S) UNSCHEDULED REPAIRS

If a problem with the machine occurs that is not part of the routine maintenance outlined in the O&M manual contact the factory before attempting to service or repair the machine.

T) CONFINED SPACE

The machine may be located inside a building or structure that is considered by code a "CONFINED SPACE". The owner and user are responsible to determine and comply with all confined space entry procedures and requirements before seeking access to this machine.

U) CHEMICAL SAFETY

Over the life cycle of machine ownership it may be necessary to use chemical cleaning agents on the rotating machine parts to remove biological film, mineral deposits or fats, oil and grease. Hazardous cleaning chemicals including acids, caustics and degreasers may be required. The owner is responsible for the proper display of the appropriate MSDS for each chemical being used, the proper safety clothing, ventilation and training of the staff employed in these actions. The final disposal of the chemicals must meet all local codes and industry standards. THE OWNER AND USER MUST ONLY STORE CHEMICALS IN THEIR ORIGINAL CONTAINERS AND ONLY IN APPROVED STORAGE FACILITIES. NEVER MIX CHEMICALS WITH EACH OTHER. WEAR PROPER PROTECTIVE CLOTHING AND ONLY ALLOW PROPERLY TRAINED STAFF TO HANDLE HAZARDOUS CHEMICALS.

V) HOUSE KEEPING

Keep the area around the machine clean and free of tripping and slip hazards. Don't store tools, supplies, or spare parts on or around the machine. Keep the machine free of leaking grease and oil. Prevent nesting insects, birds and rodents.

W) EYE PROTECTION

Rotating equipment poses eye protection hazards. Always wear approved safety glasses when inspecting, servicing and maintaining this machine.

X) FACTORY TRAINING

A complete factory training course is provided on site with all new machines at the time of start up. If additional training is required please contact the factory. Our number one focus is to provide a safe operating machine.

3 – PRINCIPLES OF OPERATION

A) CONCEPT

Disk filters are generally designed for the removal of residual secondary solids from wastewater effluent prior to disinfection and final discharge or to reclaim purposes. The Nova Water disk filter is a complete filtration system which is factory built and tested and delivered self contained in its' own tankage.

The Nova Water disk filter represents a new approach in disk filtration technology. The concept of *dynamic tangential filtration* is employed to allow the filter to operate reliably at higher flow capacities while minimizing wash water reject volume and operator attention.

The traditional disk filter has been a static disk concept historically which resides in an idle position while flow is passing through the selected media. As particles are retained at the surface of the media the remaining open area of the filter is reduced and the liquid flowing through the unit either decreases in volume or the liquid rises in elevation to create additional driving pressure to force the same capacity through the reduced open media area.

Eventually the filter accumulates a high enough quantity of particles on the mesh that the liquid inside rises to the level where a cleaning cycle is initiated. Some filters use submerged media and clean by suction while others use partially submerged media and clean with wash water pumps. The Nova filter fits into this partially submerged category. The Nova disks operate from minimal submergence to approximately 45% submergence.

The discussion of the operation will benefit from a simple cutaway view of the filter as shown below.

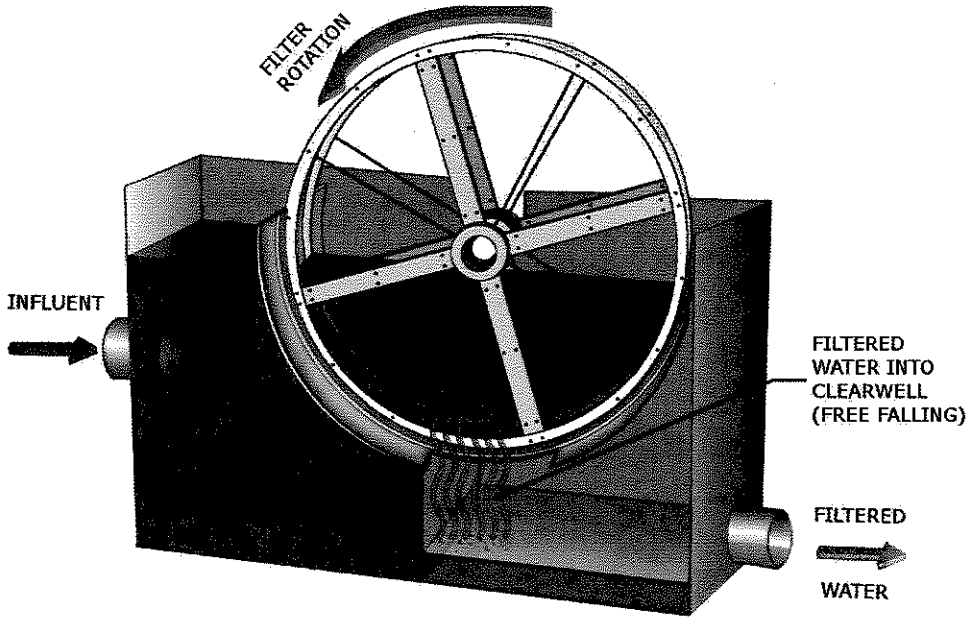


Figure 2 – Concepts of ULTRASCREEN® Disk Filter

The fluid enters on the left side of this diagram and exists on the right after passing through the disk.

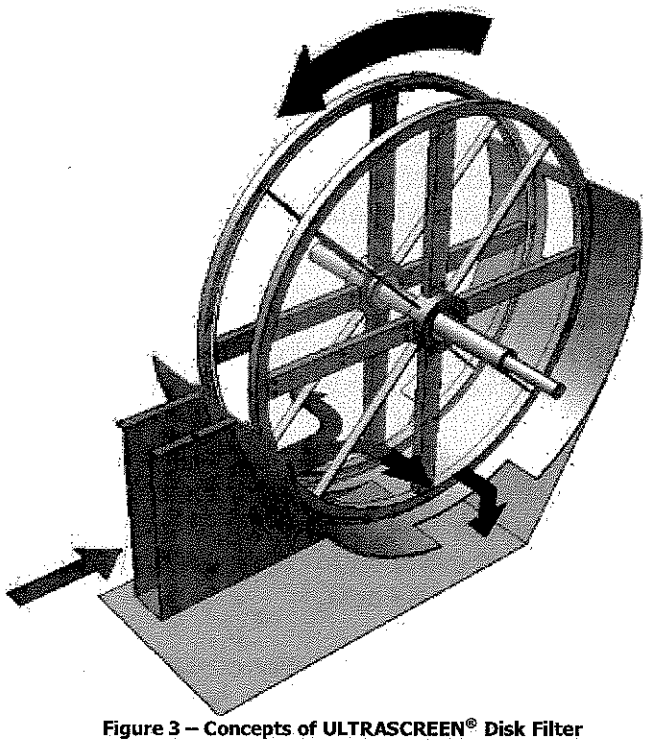


Figure 3 – Concepts of ULTRASCREEN® Disk Filter

The water being filtered passes through both disks from inside to outside. The Nova disk filter uses continuously rotating disks that wash periodically and can continuously pass filtrate even when the wash cycle is being performed.

B) TANGENTIAL FILTRATION

The concept of dynamic tangential filtration is accomplished using a simple principle that a particle of one size can pass through an opening of approximately equal size but it can not pass through that same sized opening if the opening is in motion. The analogy of throwing a snowball through the window of a moving car has been used to describe this concept. The faster the car is moving the less likely the chance the snowball will make it through the window.

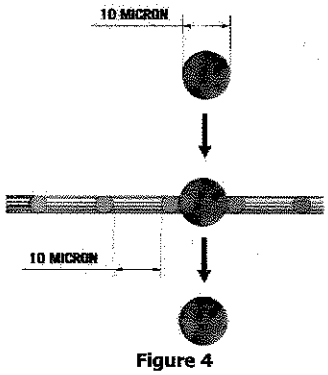


Figure 4

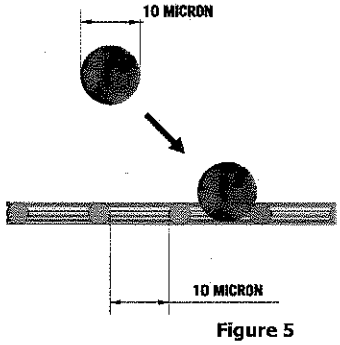


Figure 5

The Nova filter disk uses woven stainless steel media that has approximately 25 micron cross sectional openings and when operated in a dynamic rotational motion the snowball effect results in the filter capturing many particles much smaller than the actual opening size. Particles of 10 micron and below are successfully retained in this tangential filtration operation and then washed off the filter for return to the treatment plant as appropriate.

The number of particles in an effluent stream is highly variable, so the benefit of dynamic filtration versus static filtration will be that as the disk rotates it captures many particles smaller than the size of the openings in the media while allowing the water to pass through the openings at higher capacity. The media is gradually collecting particles and thus fouling during this normal operating cycle. Eventually the disk has collected enough retained particles that a cleaning cycle is required.

C) WASH FUNCTION

As is similar with static disk filters, the water in the Nova filter that is waiting to pass through the media will gradually rise in level until the Pressure Transducer detects the maximum normal high water level and initiates the wash water pump. The washing action involves the portion of the disk above the water level only and because the disk is in motion the washing cycle is brief and very effective.

The solids in the water waiting to be filtered then begin to once again accumulate on the surface and in the voids of the media as it rotates. This coating effect quickly decreases the number of open voids in the media and helps to capture ever smaller particles as the filter cycle phases from washing (clean), to seasoned (coated), eventually to sufficiently fouled, requiring another cleaning cycle. The washing water is obtained from water that has previously passed through the filter media. Small filters use an on board pump while larger systems with multiple filters can use manifold piping to feed many filters from one single pressurized water source.

The water to be filtered enters the unit and is directed to the area between the disks, passes through the disks (inside disk surface to outside) leaving the captured particles on the two disk surfaces (inside) that face each other. Using a simple wash water header arrangement with typical nozzles the disks are washed in the opposite direction from outside back to the inside. A small trough rests between the disks and collects the dirty water. The disks themselves rotate on a simple center shaft or axle.

D) REJECT FUNCTION

The dirty water from the wash function is collected by sloped troughs and conveyed to the concentrated discharge drain line. This water is then returned to the headworks of the plant for additional processing. The collection of reject water allows the filters to continue operation while removing solids that accumulate on the surface and voids of the filters.

E) BOTTOM SEDIMENT DRAIN

The function of the filter under normal conditions will be automated. Some heavier particles may settle to the bottom of the inlet feed area between the disks and removed via a bottom blow off valve that can be set for variable frequency of opening time and duration of time open. This allows the bottom of the filter to be kept free of solids accumulation. Since the nature of the solids to be filtered is highly variable from one application to another, this function is set during start-up after the number of normal running hours have established the reasonable cycle time needed.

4 – OPERATION

A) OPERATING SUMMARY

i. Turn the main circuit breaker to the "ON" position.

ii. Turn the control power, backwash pump and filter circuit breakers to the "ON" position.

iii. Check panel for illuminated fault lights and press "RESET" buttons as necessary.

iv. Check that the local and remote E-stops are not depressed and twist to release if necessary. Press the "reset" corresponding to releasing the e-stop buttons.

v. Place Filter H.O.A in the "AUTO" position. When the filter "DRIVE ON" water level probe is activated from flowing water through the filter, the filter disks will begin to rotate.

vi. Initially, when the filter begins to rotate, place Backwash Pump H.O.A in the " HAND " position to verify pump operation and pressure (55-60 PSI)*. Once verified, place the backwash pump H.O.A. to "AUTO". When the water level has risen to touch the "WASH ON" probe, the backwash cycle will start , typically lasting a minute or less. Backwash will stop once the water level falls below the "WASH OFF" probe height.

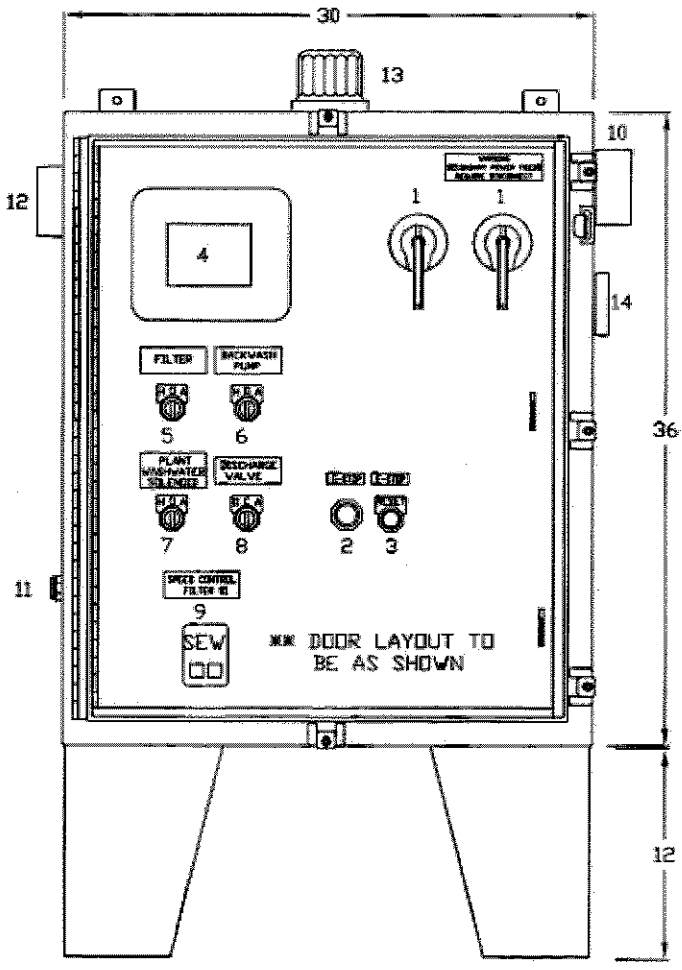
vii. Place Sludge Discharge Valve H.O.A in the "AUTO" position. The discharge valve will open and closed based on a repeat cycle timer. The frequency and duration of the valve's open time is operator adjustable to meet actual plant conditions. Note – the factory setting is once per day

viii. The filter is now operating in automatic mode.

*If the plant mains water is to be used for the backwash cycle, please refer to the following directions:

Place Backwash Pump H.O.A in the "OFF" position.

1. Install a 120VAC solenoid valve at the T of backwash pump discharge piping and wire into provided pigtail. Note – make all connections in accordance with national and local electrical code.
2. Close the ball valve on the discharge side of the backwash pump and open the ball valve for the plant mains water.
3. Place Plant Washwater H.O.A in the "AUTO" position.



OUTER DOOR HAS BEEN REMOVED FOR CLARITY

1 - MAIN & EMERGENCY BREAKER
2 - EMERGENCY STOP BUTTON
3 - ESTOP RESET BUTTON
4 - OPERATOR INTERFACE TOUCHSCREEN
5 - FILTER HAND-OFF-AUTO
6 - BACKWASH PUMP HAND-OFF-AUTO
7 - PLANT WASHWATER HAND-OFF-AUTO
8 - DISCHARGE VALVE OPEN-CLOSE-AUTO
9 - SPEED CONTROL FILTER #1
10 - DUPLEX RECEPTACLE (GFI)
11 - ASB ALARM SILENCE BUTTON
12 - AH ALARM HORN
13 - AL ALARM LIGHT
14 - GR GENERATOR RECEPTACLE

PAGE1 OF4

PASCO TRAILER			
QUOTE NO.	DATE	DRAWN BY	REVISION
70602BE	10/13/2010	TNT	

sta-con INCORPORATED 3825 S.O.R.T. APOPKA, FL. 32703

B) MANUAL EMERGENCY OPERATION

i. CASE I: Auto circuit is malfunctioning

1. In case the auto circuit is not functioning properly, all motors and valves can be operated manually by placing their corresponding H.O.A switches in the "HAND" position.
2. Check that Filter disk is at least 10% submerged. If so, place the Filter H.O.A. in the "HAND" position. DO NOT OPERATE THE FILTER DRY, DAMAGE TO DISKS AND SEALS WILL OCCUR.
   Note – the filter will operate continuously in this mode.
3. Place the Backwash Pump or Plant Washwater H.O.A in the "HAND" position. Note – the backwash cycle will run continuously in this mode.

ii. CASE II: Filter is in Overflow

1. The "HIGH LEVEL OVERFLOW" indicator light will be illuminated and the audible and visual alarms will be active. Note – the audible alarm can be turned off using the alarm silence button located on the left side of the panel.
2. Verify the flow rate coming into the filter is not exceeding the design and adjust accordingly.
3. If flow rate is correct, place the Backwash Pump or Plant wash water H.O.A in the "HAND" position to initiate a continuous backwash cycle.

iii. CASE III: Discharge Valve repeat cycle timer is malfunctioning

Place the Discharge Valve H.O.A in the "HAND" position for 1 minute twice a day until repeat cycle timer can be fixed or replaced. Note – the discharge valve will remain open while in the "HAND" position.

5 –ULTRASCREEN® DISK FILTER MAINTENANCE

A) SCHEDULED MAINTENANCE

i. **Spray nozzles** – Spray nozzles should be checked monthly for obstructions, if obstructions are present (improper spray pattern is evident), clean out the affected nozzles by removing the nozzles, and cleaning with compressed air. Remove the drain cap at the end of each spray header annually, the resulting drop in pressure will typically remove clogging particles from the spray nozzles and header. When cleaning nozzles, do not poke items into the nozzle orifice, this will damage nozzles. **IMPORTANT: ALWAYS REMEMBER TO SHUT OFF THE POWER TO THE FILTER AND CONTROL PANEL BEFORE SERVICING THE SPRAY NOZZLES!**

ii. **Strainer** - Inspect backwash strainer weekly for trash and debris. The frequency of strainer cleaning and inspection varies based upon the amount of filter operation, biological nature of the plant (Algae growth), and amount of trash and debris in the plant water loop. Clean the strainer as needed. Note- Low wash pressure is an indicator of a potentially clogged strainer. **IMPORTANT: ALWAYS REMEMBER TO SHUT OFF THE POWER TO THE WASH PUMP AND CONTROL PANEL BEFORE SERVICING THE STRAINER!**

iii. **Automated sludge discharge valve** – Confirm Monthly that the automated sludge discharge valve is fully opening and closing at the appropriate time(s) each day. There is an indicator of the valve position on the valve's actuator.

iv. **Shaft bearings** - require greasing, frequency depends on the hours of daily use.

Shaft bearings greasing frequency

Use (hours/day)	Greasing frequency (no. weeks)
8	12
16	12
24	10

Product to be used: SKF LGEP 2/0.4 grease (available at local SKF representative)

***IMPORTANT**: During correct use, the BEARINGS work silently and will be warm to the touch. Grease must be injected in the bearings while the shaft of the ULTRASCREEN® Disk Filter is turning.*

Any noise in the bearing requires immediate attention:
1. Immediately grease the bearing.
2. If the noise continues, check that the source of the noise is inside the bearing.
3. If the pump bearing appears to be the source of the noise, discontinue use of the pump and immediately contact Nova Water Technologies, LLC.

v. Wash Pump

Typically, no maintenance should be required for the on-board wash pump of the Ultrascreen®. If a loss of backwash pressure is identified, there may be trash or debris inside the impeller of the pump. Before disassembling the pump, it is advisable to check for other areas where pressure could be lost. This would include broken or missing nozzles, improper strainer operation, leaks, or inaccurate valve positioning on the backwash header.

If the backwash pump is ultimately identified as the source of low wash pressure or volume, consult the wash pump portion of this manual (Tab 2-2) for instructions.

vi. Gear Drive

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug

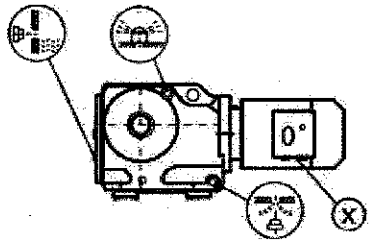


Figure 7 – Reduction unit

The reduction unit requires oil changes. Depending on the manufacturer of your drive, the following intervals are as follows:

SEW Eurodrive: Check the fluid quality and level every 6 months or 3000 hours. Change the fluid every 3 years on average.

Operations to be carried out for oil change in the reduction unit:

1. Lock-out power to the entire filter panel to reduce the chance of electrocution.
2. Wait for the gear drive to cool down, but not get cold. Cold gear fluid has a higher viscosity and will not completely empty from the drive.
3. Place an oil catch pan under the drive to collect the fluid.
4. Drain the oil from the reduction unit by unscrewing the drain plug. Loosen the breather valve as well. This will help the fluid drain more quickly.
5. Retighten the drain plug and remove the filler cap.
6. Slowly introduce the required oil and check the level through the oil level cap.
7. Retighten the filler cap.

Product to be used: Consult chart in Gear Drive O&M (Tab 2-1) for acceptable lubricants.

IMPORTANT: If the gear drive makes abnormal sounds, stop the Gear Drive Motor and contact the Manufacturer's Technical Department immediately.

vii. Variator

SEW Eurodrive Mechanical Speed Variators (If your Ultrascreen is equipped):

The VARIMOT mechanical speed variator from SEW Eurodrive is a dry operating variator. There is no fluid to change. Visual inspection and dust removal should be performed monthly. Check the input shaft monthly for torsional play. If there is more than 45 degrees of torsional play, the traction ring needs to be replaced. Consult SEW Eurodrive on replacement parts and instructions via (864) 439-7537.

IMPORTANT: If the variator makes abnormal sounds, stop the Gear Drive Motor and contact the Manufacturer's Technical Department immediately.

viii. Electric Motor

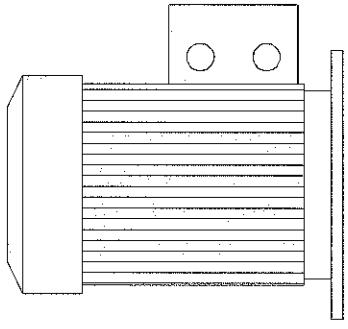


Figure 8 – Motor

The electric motor does not require any special maintenance, apart from external cleaning to maintain optimum cooling and ventilation. The motor must be replaced when the motor begins making abnormal noises.

B) NON-SCHEDULED MAINTENANCE

i. Filtration Media Maintenance

The size of the solids being filtered inevitably leads to the filter screens becoming dirty. After a certain period of time the stainless mesh cloth can become clogged due to the formation of organic slime and/or due to deposits of minerals such as iron and carbonates:

- *Formation of organic slime*: this may occur during applications in the treatment of waste waters (either municipal or industrial), and sometimes with surface waters being treated for drinking water. This phenomenon can be controlled by periodic cleaning with plant utility water, possibly aided by a mildly aggressive chemical treatment;

- *Chemical encrustations:* in some cases (treatment plants for primary waters or industrial waste waters), iron, manganese and carbonates may deposit on the filtering cloths, which will therefore require more frequent chemical cleaning.

IMPORTANT: *Regarding chemical washing, it is advisable to remain in a working range (dosing) of between pH 4 and pH 10; depending on the type of solids on the face of the screens, the following products can be used: caustic soda, sodium hypochlorite, phosphoric acid, formic acid.*

Chemical washing becomes necessary when clogging limits the flow through the mesh (despite the backwashing during the Disk Filter operating phase). The frequency of cleaning depends on the chemical-biological composition of the water to be treated: for waste-water treatment plants it is advisable to clean every 4 to 6 months at minimum. More frequent cleaning may be required in some plants.

In case of very stubborn deposits that cannot be removed by chemical washing, it is possible to clean the filtering cloths using a pressure water cleaner; **low pressure or small water pressure cleaners must be used carefully**: in any case the cleaning nozzle must be positioned at a suitable distance to avert any contact with the filtering screens (which could be seriously damaged). If the pressure water cleaner is so equipped, it is advisable to wash with hot water, since it is much more effective in being able to quickly dissolve the deposits and slime, while taking care not to exceed the maximum temperature of 158°/70°C.

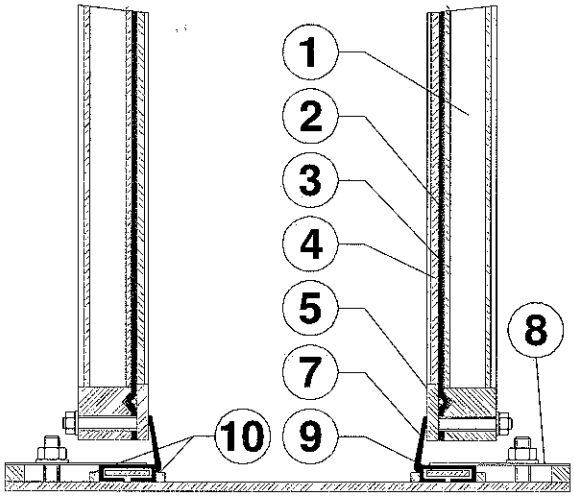
ii. Feed Well Cleaning

In the event that trash and solids accumulate in the feed well and do not flush while the sludge valve is cycling, the Ultrascreen® Disk Filter can be fully drained and cleaned.

1. Stop flow to the Ultrascreen®.
2. Allow Ultrascreen® to come to stop while in "Auto" mode.
3. Engage emergency stop and/or turn off power to the Ultrascreen® from the control panel.
4. Remove drain caps from the Ultrascreen®.
5. Once fully drained, remove filter covers and identify debris and trash.
6. If the trash and debris is close to the drains, a water hose can be used to clean the feed well.
7. If the trash and debris is too large to flush or wash, a wet vacuum should be used.
8. Reinstall the drain caps and resume normal filter operations.

iii. Replacing The Seals

Should the filter seals tear or begin to leak, replace them. The seals are a gasket made with a special elastomer and a specific profile is used as a sealing element between the casing and the flat filtering discs.



Position	Description
1	Disk wheel structure
2	Filtering screen
3	Reinforcement mesh
4	Straight screen clamping profile
5	Round screen clamping profile
7	Seals
8	Seal clamping plate
9	Seal holder
10	Square profile

Figure 9 – Replacing the seals (side shoulder)

To replace the seals, carry out the following operations:
*Requires two maintenance personnel.

1. Lock-out electrical power to the entire filter panel;
2. Remove the machine protection covers and remove all the residual sludge and debris contained between the disks (use caution not to damage the filtering screens);
3. Remove the upper seal holding block fixed to the end of the cradle.
4. Loosen the fixing nuts located on the seal holding plates (Position 8, Figure 9);
5. Slide the seal (Position 7, Figure 9) and the seal holder profile (Position 9, Figure 9) sliding it along the cradle of the casing towards the rear side of the Disk Filter;
6. Remove the seal to be replaced (Position 7, Figure 9) from the seal holder profile (Position 9, Figure 9);
7. To facilitate sliding of the profile and seal unit it is advisable to oil the contact surface with silicone oil;
8. Insert the new seal in the seal holder profile (Position 9, Figure 9);
9. Position the seal and the seal holder profile on the bottom of the frame inside the disks in the same original position, sliding it along the cradle of the casing from the front part of the machine towards the rear part;
10. Make sure the seal and the seal holder profile are resting against the other end;
11. Make sure the seal and the seal holder profile are perfectly housed inside their seat on the bottom of the casing inside the disks in the same original position and with the ends resting against the front and rear part of the cradle;
12. Tighten down the bolts of the seal clamping plate, hand tighten with 5lb/ft torque.
13. Proceed in reverse order for the remaining operations.
14. Seal removal tool (provided) is shown below.

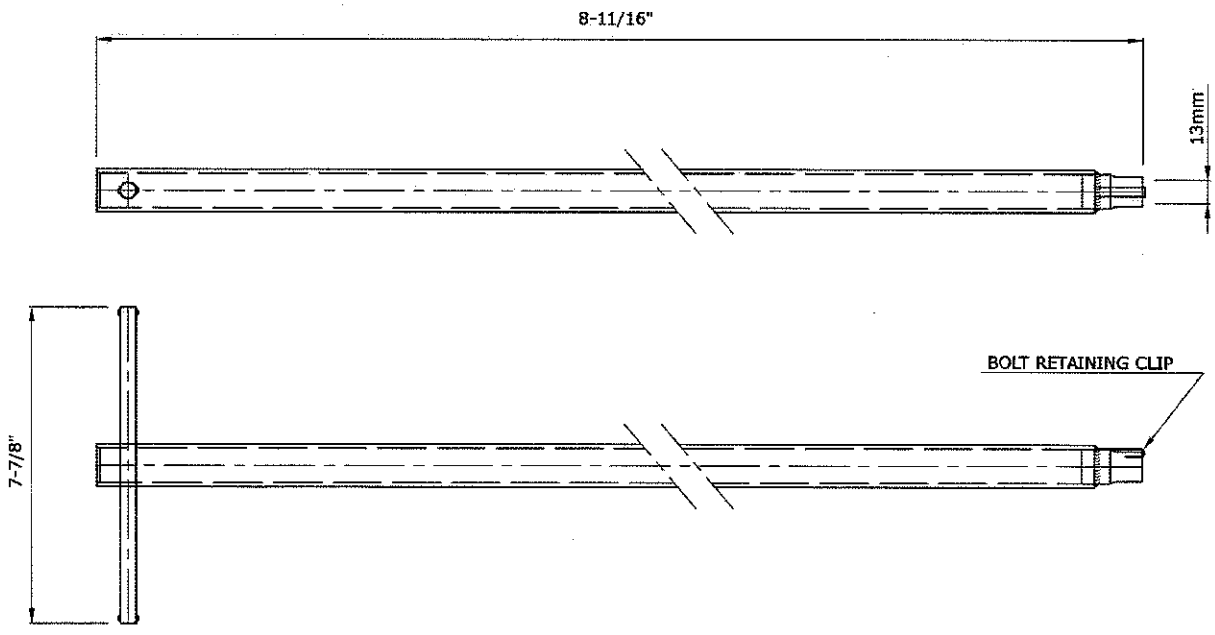
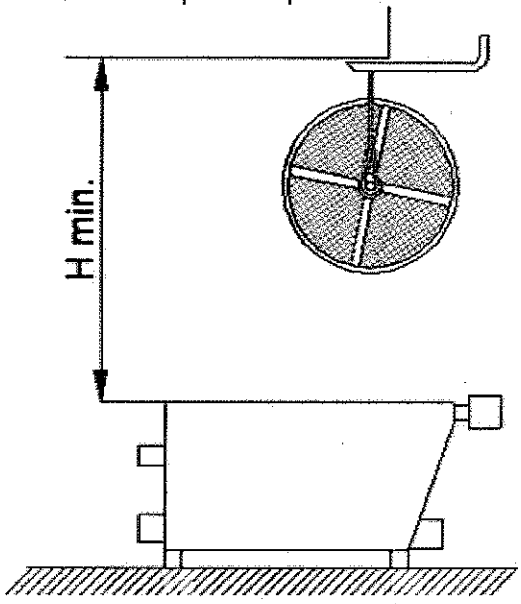


Figure 10 – Seal Removal Tool

iv. Axle Removal

In the very unusual event that the axle must be removed for service, remove it from above with suitable lifting equipment. When engineering the installation area for the filter, it is advisable to consider the overhead space requirements for the operation, as indicated in Figure 11.



Model	H min (ft.)
1001	6.'-7"
1351	6'-7"
1352	6'-7"
1601	8'- 6"
1602	8'- 6"
1603	8'- 6"
1604	8'- 6"
1605	8'- 6"
1606	8'- 6"

Figure 11 – Axle removal

Axle removal requires the following operations (Approximately 4 Hours Required):

1. Remove entire filter canopy cover.
2. Loosen spray wash header bolts and rotate out of the Ultrascreen.
3. Remove the concentrate discharge duct(s) after appropriately disconnecting them from the machine. Be very careful when removing these to not damage the filter media.
4. Detach the electrical leads connected to the gear drive, and remove the gear drive from the shaft.
5. Remove seals from Ultrascreen. Instructions on this procedure are located in the "non-scheduled maintenance" section of this manual.
6. Remove the bolts retaining the bearings on both ends of the disk shaft assembly, and bolts retaining the center bearing if the unit is equipped with a central support (Models UL1603 and smaller typically will not be equipped with a central support).
7. Using two nylon slings and a 4-6' spreader bar, strap the axle to the spreader bar in a way that ensures the slings do not touch the disk wheels themselves during removal.
8. Very slowly lift the axle out, do not allow it to rotate during removal.
9. Rotate header back into filter, and temporarily place the canopy cover back on the filter if outdoors.
10. Reinstallation should be done in reverse order of steps 1-8. If the center bearing plate and end bearing plates were not adjusted, the axle will line up correctly and not require laser adjustment. If the center and end bearing plates were adjusted for any reason, laser adjusting will be required. Consult Nova water (813-288-0533) for further details, if needed.

v. Filtration Media Panel Replacement

In the event that a media filtration panel is damaged, torn, or worn excessively, a replacement is necessary. To replace the filtration panel basic hand tools and replacement panels are needed. Follow the steps below to replace the media filtration panels:

1. Turn off power to the Ultrascreen®, and engage the e-stop.
2. Remove the cover, baffle, and washing ramp.
3. Remove gear drive motor cover and manually turn the fan to turn the disks and bring the panel to an accessible position.
4. Loosen retaining nuts on the backside of the disks to allow filtration panels to be removed.
5. Carefully remove the damaged filtration panel and inspect the area in which the panel sits for debris or dirt. Clean as necessary.
6. Once cleaned, carefully slide the new panel in place and bolt it down.
7. Reinstall the wash ramp, baffle, and cover.
8. Verify proper installation and operation by starting the filter up, with backwash off, and visually inspect during filtration.

C) SPARE PARTS

Common spare parts for the Ultrascreen® include filtration media panels, spray nozzles, strainer baskets, and seals. Various quantities of these parts are included with the Ultrascreen® upon delivery and startup. Bearings, electrical components, backwash pumps, and all other replacement items can be ordered from Nova Water Technologies at 813-288-0533.

D) SPECIAL TOOLS

Included with all Ultrascreens® is a T-handle wrench with integral socket to aid in removing the seal clamp bolts.

Other tools required for Ultrascreen® maintenance and operations include an electrical multi-meter, socket and ratchet set (Metric), and a large Channel Lock wrench.

E) OPERATING GUIDELINES FOR MAINTENANCE EVENTS

Following any possible interruption of Disk Filter operation (necessary for replacing the filtering screens/seals, for repair of the machine components, etc.) it is necessary to drain the compartments inside the filter. This is done in order to avoid stagnation of the refluent and the accumulation of sediment substances/solids, to avoid unpleasant odors and/or health problems, the possible formation of ice and above all serious management difficulties when restarting the plant.

When restarting the ULTRASCREEN® Disk Filter, following an unplanned shut down, before proceeding with reintroducing feed to the filter, it is very important and necessary to completely clean (e.g. with an industrial pressure water cleaner lance) the compartments inside the machine, always keeping the drain valves open after the Disk Filter operation was interrupted. This is to prevent contamination of the filtrate which will be filtered again (after complete machine operability has been reinstated) and above all to minimize the possibility of any clogging of the backwashing circuit (pump, filters, spray nozzles). Elimination of the temporary system bypass status and gradual opening of the valve located on the feed pipe of the ULTRASCREEN® Disk Filter can be carried out only after ensuring that the inside compartments (filtered product collection) of the machine have been properly cleaned and the spray nozzles work properly.

Also, before taking the ULTRASCREEN® Disk Filter out of service for extended periods of time, in addition to completely emptying and washing the inside compartments of the machine as indicated above, we recommend that the seals be lubricated. This operation must be carried out ***only and exclusively with silicone products***, as other types of products could damage the inside compartments.

6 – INSTRUMENTATION & CONTROLS

A) CONTACT INFORMATION

i. Before attempting operation and maintenance of the electrical system and instrumentation, be sure to read and understand this section thoroughly. Noncompliance to this section may cause serious injury or death and may result in damage to the electrical system.

ii. Danger of Voltage and Current

1. This control panel contains a mix of different voltages contained within. All of which are potentially deadly and should be treated with respect and extra care. Contacting energized parts may cause serious burns, injury or death.
2. During normal operation, the operator shall be protected from the internal components of the control panel that can cause injury. However, in the event troubleshooting of the panel or maintenance must be done, this should be carried out by a trained professional and all lockout/tagout procedures must be followed.

B) CONTROL PANEL SCHEDULED MAINTENANCE

i. The control panel is designed to be reliable virtually maintenance free, however annual preventative maintenance will insure continued performance.

ii. Before attempting any maintenance inside the control panel, the main power feed to the control panel should be locked out. The person performing the maintenance should be the ONLY one holding the key to unlock and re-energize the control panel.

iii. The following components should be inspected or replaced on an annual basis:

1. Check that all lugs, power distribution blocks, and grounding bars are adequately tightened.
2. Verify operation of the internal heat strip and adjust temperature setting if condensation is detected inside of enclosure.
3. The panel is equipped with a Zerust corrosion prevention vapor capsule that has a finite lifespan of 1 year. The vapor capsule should be inspected and replaced on an annual basis.

7 –TROUBLESHOOTING

NOTE: ALWAYS lockout power to the Ultrascreen before opening the filter covers.
*** Task to be performed by qualified electrical personnel**

A) CONTROL PANEL

i. CASE I: Main power is ON but other panel components do not work

1) Check to see if the Emergency Stop indicator light is illuminated. The MAIN or EMERGENCY STOP button is depressed.
   i. Twist to release the depressed EMERGENCY STOP button then press E-STOP RESET button on the control panel.

ii. CASE II: Motor overload.

1) The Filter or Backwash Pump is jammed with a foreign object and cannot rotate freely.
   i. Place the Filter and Backwash Pump H.O.A. in the OFF position and lockout power to the panel.
   ii. Check the Filter disks for foreign objects and remove them.
   iii. Refer to Backwash Pump Manufacturer's troubleshooting located in the "PERIPHERAL COMPONENTS" portion of this manual.
2) The Filter disk seals are damaged and not allowing the filter to rotate.
   i. Check the disk seals for damage.
   ii. If the disk seals are damaged please refer to the "Ultrascreen Disk Filter Maintenance" section, subcategory "Replacing the Seals" portion for replacing all damaged seals.
3) Backwash Pump is damaged
   i. Verify the current draw of motor using a clamp-on amp meter and compare to the F.L.A. on the motor nameplate.*
   ii. Refer to Backwash Pump Manufacturer's troubleshooting located in the "Peripheral Components" portion of this manual.

iii. CASE III: The automatic control circuit is not working properly

1) The Level Probes are dirty or have debris collected on them.
   i. Inspect the probes and clean if necessary
2) There is a loose connection where the control wire contacts the level probe.
   i. Verify proper connection of the control wire to the probe.*
   ii. In case the auto circuit is not functioning properly, all motors and valves can be operated manually by placing their corresponding H.O.A. switches in the "HAND" position.
   iii. Check that the Filter disks are at least 10% submerged. If so, place the Filter H.O.A. in the "HAND" position. DO NOT OPERATE THE FILTER DRY, DAMAGE TO DISKS AND SEALS WILL OCCURE. Note – the filter will operate continuously in this mode
   iv. Place the Backwash Pump or Plant Washwater H.O.A. in the "HAND" position. Note – the backwash cycle will run continuously in this mode.
   v. Please contact NOVA personnel if this problem persists.

NOTE: ALWAYS lockout power to the Ultrascreen before opening the filter covers.
*** Task to be performed by qualified electrical personnel**

iv. CASE IV: The "OVERFLOW" light/alarm are activated.

1) Flow rate is beyond the design capacity
   i. Reduce the flow rate to the Ultrascreen Disk Filters
2) Backwash Pump is not working properly
   i. Inspect the backwash assembly for correct operation. Refer to the "BACKWASH" and "SPRAY NOZZLE" portion of this Troubleshooting section for additional details.
3) Filtration media is fouled
   i. Consult the Operations & Maintenance for filtration media maintenance and cleaning
4) Gear drive is not rotating to allow for tangential filtration to occur.
   i. Inspect disks for proper rotation.

B) SLUDGE DISCHARGE VALVE

Please refer to the "Sludge Discharge Valve" section under the "PERIPHERAL COMPONENTS," TAB #2-5, of this manual for additional troubleshooting information.

i. CASE I: The Sludge Discharge Valve is opening or closing completely.

1. The Sludge Discharge Valve is jammed with foreign objects.
   i. Inspect the Sludge Discharge Valve and clean if necessary.

ii. CASE II: The Sludge Discharge Valve Repeat Cycle Timer is malfunctioning.

1. The Repeat Cycle Timer needs to be replaced or fixed.*
   i. Place the Sludge Discharge Valve H.O.A. in the "HAND" position for 1 every 12hrs until the Repeat Cycle Timer can be fixed or replaced.
   ii. Note - The Sludge Discharge Valve will remain open while in the "Hand" position.

iii. CASE III: The Sludge Discharge Valve is functioning properly.

1. The Limit Switch controlling the rotation of the valve is malfunctioning.*
   i. Contact Bi-Torq or NOVA Water Technologies, Inc.

C) BACKWASH PUMP

Please refer to the "Backwash Pump" section under the "PERIPHERAL COMPONENTS," TAB #2-2, of this manual for additional troubleshooting.

i. CASE I: Backwash Pump does not produce the necessary pressure.

1. Air is trapped in the feed side of the pump.
   i. Open the air bleeder on the feed pipe to allow air to escape.
2. There is not enough water in the feed well to run the pump.
   i. Allow water to pass through filter, filling the clear well before operating the pump.
3. The Y-Strainer element is clogged.
   i. Inspect Y-Strainer element and clean as necessary.
4. The Backwash Pump is wired incorrectly and is running in reverse.
   i. Lockout power to the Control Panel and configure wiring according to Backwash Pump motor data located in the Peripheral Components section of this manual.*
   ii. Please contact NOVA personnel if this problem persists.

NOTE: ALWAYS lockout power to the Ultrascreen before opening the filter covers.
*** Task to be performed by qualified electrical personnel**

D) SPRAY NOZZLES

i. CASE I: The Nozzles do not spray correctly, or at all.

1. Debris has clogged the nozzle(s).
   i. Remove nozzle, carefully inspect and clean as necessary, using compressed air.
   ii. Flush the nozzle headers by removing the cap at the end of the header and briefly running the pump in hand, and clean the Y-strainer element.
2. The Backwash Pump is not working properly.
   i. Please refer to the "Backwash Pump" troubleshooting located in this section, and the additional troubleshooting and information located in the "Peripheral Components" section of this manual.
3. The Y-Strainer element is clogged.
   i. Inspect Y-Strainer element and clean as necessary.

E) GEAR DRIVE

Please refer to the "Gear Drive" section under "PERIPHERAL COMPONENTS," TAB #2-1, of this manual for additional troubleshooting.

Startup Date: _____

Ultrascreen Disk Filter Maintenance Schedule

*Please utilize this document thoroughly, to ensure maximum life out of your Ultrascreen

Maintenance Item	Yearly	Quarterly	Monthly	Weekly	Daily	As Needed		
Gear Drive Fluid	X							
Disk Wheel Seals		X						
Bearings			X					
Spray Nozzles			X					
Wash Pressure					X			
Strainer						X		
Level Transducer*	X							
Wash Pump Motor **	X							
Control Panel***	X							
Speed Variator****				X				
Sludge Valve			X					
Backwash Troughs			X					

Only if your Ultrascreen is equipped with a level transducer

**Lubrication required based on run-hours of wash pump motor. Consult motor manufacturer for lubrication interval*

***Includes Zerust Capsule, motor starter wiring lugs, switches, heater block, timers, and all other associated annual maintenance*

****If equipped with mechanical speed variator. If your gear drive is VFD controlled, this does not apply.*

Maintenance Performed	Date	Comments and Notes

Maintenance Performed	Date	Comments and Notes

Maintenance Performed	Date	Comments and Notes

Maintenance Performed	Date	Comments and Notes

Maintenance Performed	Date	Comments and Notes

Maintenance Performed	Date	Comments and Notes

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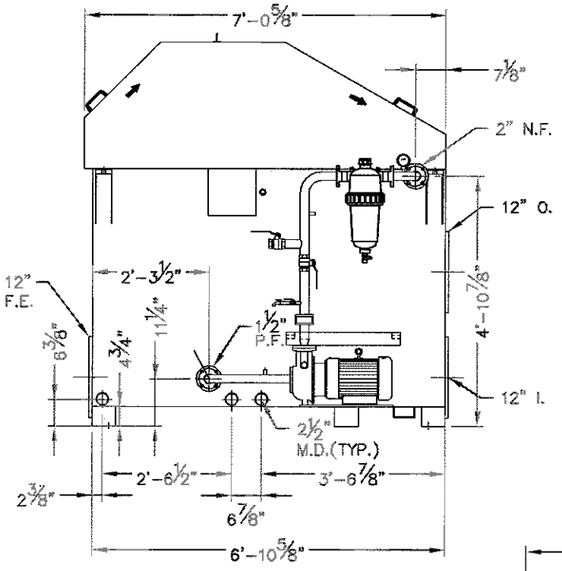
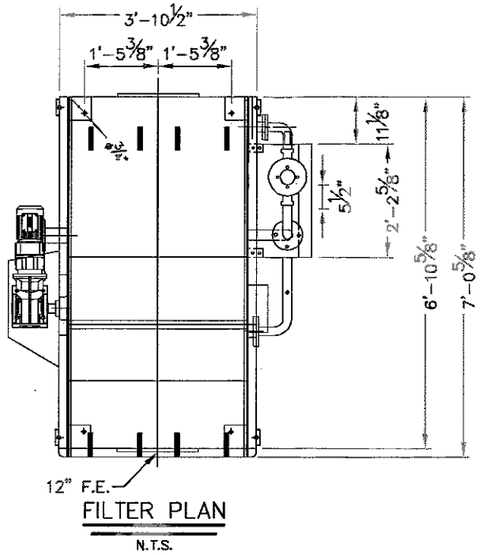
Maintenance Performed	Date	Comments and Notes



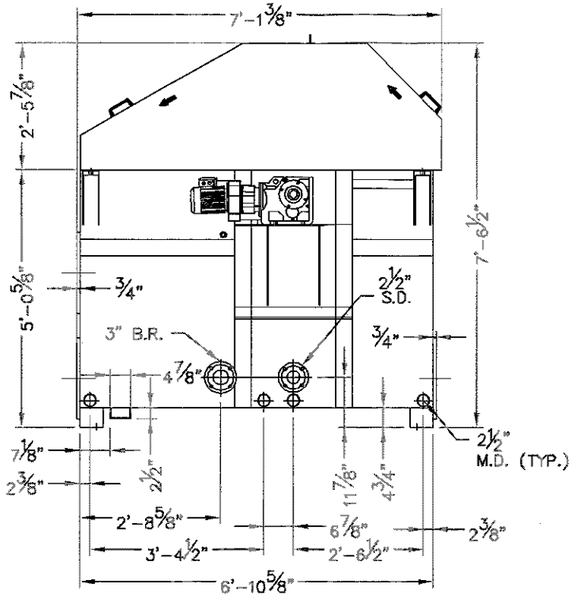
FILTER RIGHT SIDE

N.T.S.



FILTER PLAN

N.T.S.



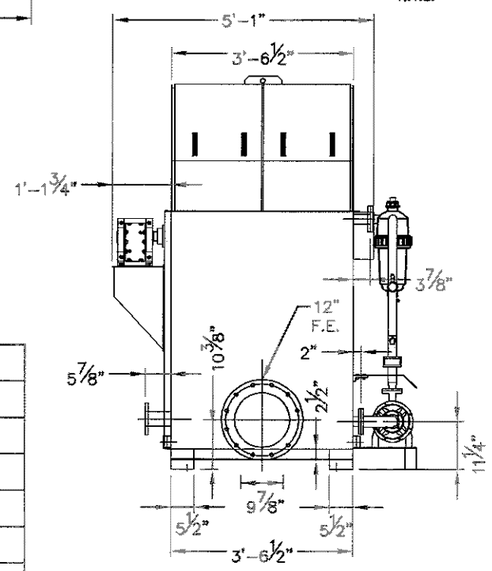
FILTER LEFT SIDE

N.T.S.

DRY WEIGHT: 3,400 lbs
WORKING WEIGHT: 9,350 lbs

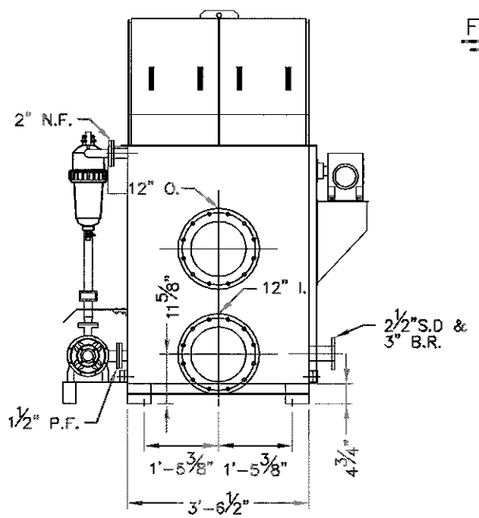
ABBREVIATION SUMMARY

I.	INFLUENT
N.F.	NOZZLE FEED
P.F.	PUMP FEED
F.E.	FILTERED EFFLUENT
B.R.	BACKWASH REJECT
S.D.	SEDIMENT DRAIN
M.D.	MAINTENANCE DRAIN
O.	OVERFLOW



FILTER REAR

N.T.S.



FILTER FRONT

N.T.S.

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NOVA #: UL1602HS-T
DATE: 10/5/2010
DIMENSIONS: SAE
PROJECT ENGINEER: D.P. & B.L.

UL1602HS
ULTRASCREEN® DISK FILTER
GENERAL ARRANGEMENT DRAWING
FOR
PASCO COUNTY, FL

NUOVE ENERGIE ADVANCED TECHNOLOGY

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P.O. BOX 272023, TAMPA, FL 33623
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DRAWING NO.
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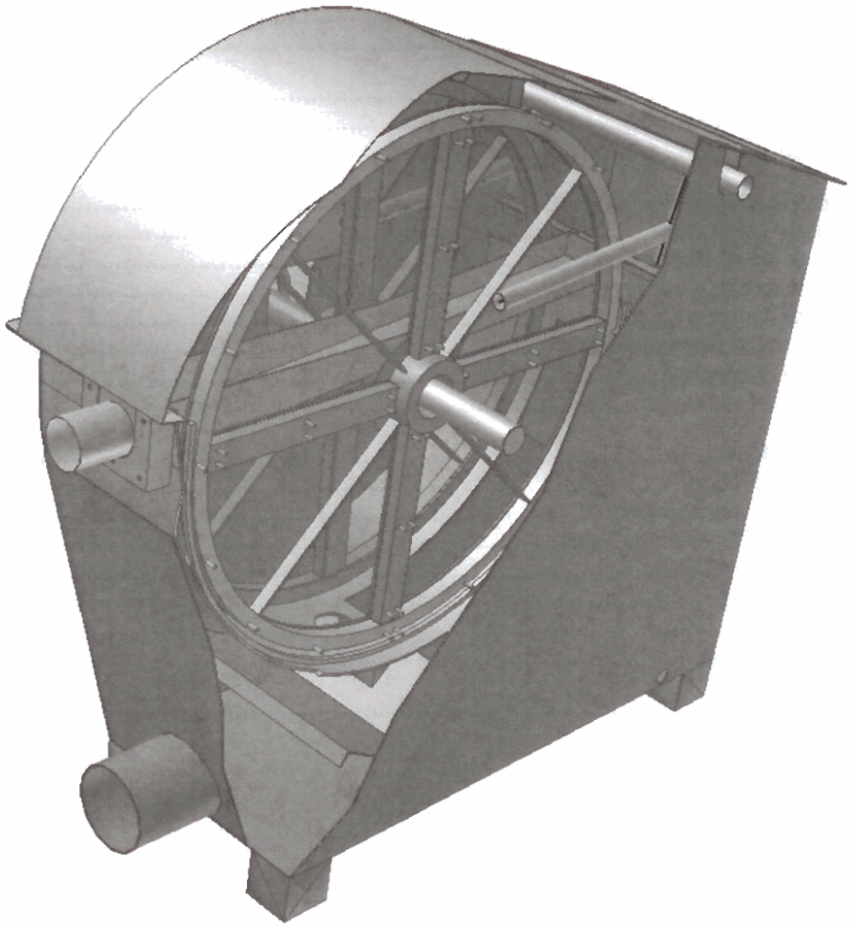
SUBMITTAL MANUAL



ULTRASCREEN® DISK FILTER

Rev. 10/20/10 DCP

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INTRODUCTION

This manual contains pertinent construction data concerning the Ultrascreen Disk Filter as well as instructions for assembly, operation, and maintenance.

Failure to comply with the conditions set forth by Nova for assembly and use of the Ultrascreen Disk Filter will void the manufacturer's warranty.

Routine maintenance can be performed with standard SAE and Metric tools. For all other tasks contact the nearest Nova Technician.

MANDATORY CONDITIONS FOR PROPER OPERATION

The Ultrascreen Disk Filter must be used for fine filtering for tertiary treatment or for other effluent treatment that contains less than 50 mg/l of total suspended solids (TSS). Raw sewage primary effluent or other process liquids are not to be applied.

The Ultrascreen Disk Filter is designed and sized to offer optimum efficiency with a maximum TSS load less than or equal to 30 mg/l of secondary activated sludge solids. These filters must only be used for filtering clarified effluents.

IMPORTANT

Prior to the installation of your Ultrascreen Disk Filter, careful consideration must be given to the nature of the upstream piping and equipment. All yard piping and process equipment upstream of the Ultrascreen must be flushed and void of corosive chemicals, welding slag, construction hardware, or any other contaminants. Any of these items can damage the Ultrascreen. The filter is designed to receive secondary clarifier effluent only. Construction debris entering the filter will void the manufacturers warranty. Do not ignore the importance of this procedure before installing and operating the Ultrascreen.

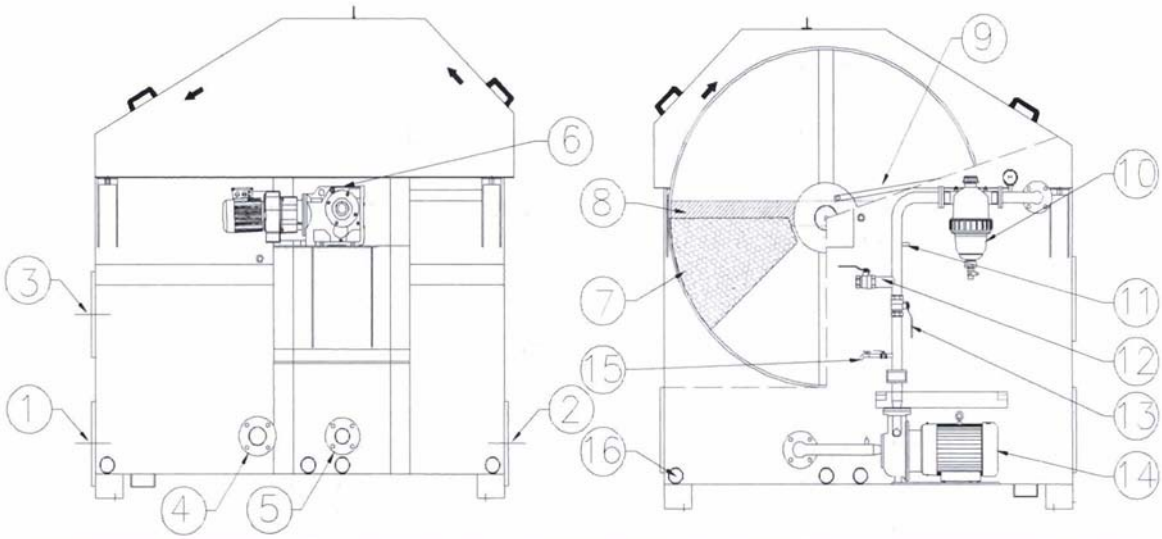
A safety screen to remove coarse solids must be installed upstream of these filters unless the plant has fine screens installed in the headworks. The Ultrascreen Disk Filter is not designed to remove coarse solids such as rocks, bricks, stones, metal, glass, etc. Their presence in the feed to the filter can damage the filter media. Damage of this nature is not covered by warranty.

The presence of coarse solids such as wood, rags, threads, metal objects, plastic cuttings, gravel, stones, etc., is extremely dangerous and harmful. They can damage the filter screens and/or the seals. These types of solids can also clog the wash pump impeller and wash nozzles and/or cause rapid wear of the screens and seals due to tearing and breakage. The entry, even accidentally, of coarse or foreign objects inside the Ultrascreen Disk Filter voids the manufacturer's warranty for wear or broken parts, torn filter media, etc. It is important to install the proper protection upstream of this filter.

1 – WORKING PRINCIPLE

The Ultrascreen® Disk Filter operates on the principle of progressive fouling, i.e., the filter meshes become clogged until the minimum water flow is reached, which corresponds to a pre-set elevation of the water level in the feed compartment of the filtering disks. The filter meshes are then cleaned by wash cycles (regeneration of the filtering medium) operated automatically, that utilize a portion of the filtrate from the filtrate well compartment below the filtering zone (or plant reuse water).

The Ultrascreen Disk Filter is designed for continuous, unattended operation using level probes to operate (and subsequently interrupt operation of) the wash water pump, in relation to load conditions (TSS, flow rate, etc) of influent waste water. This gives the machine considerable operating flexibility, enabling both constant and variable/intermittent flows to be treated. Key filter items are listed below:



Position	Description
1	Inlet section
2	Outlet section
3	Overflow
4	Back Wash Reject
5	Sediment Discharge Valve
6	Gear Drive
7	Filter Media Panel
8	Collection Duct
9	Spray Bar Header
10	Strainer
11	Chemical Injection Port
12	Solenoid Valve Isolation
13	Back Wash Pump Isolation
14	Back Wash Pump
15	Drain Port
16	Sampling Point

Figure 1 – Working principle

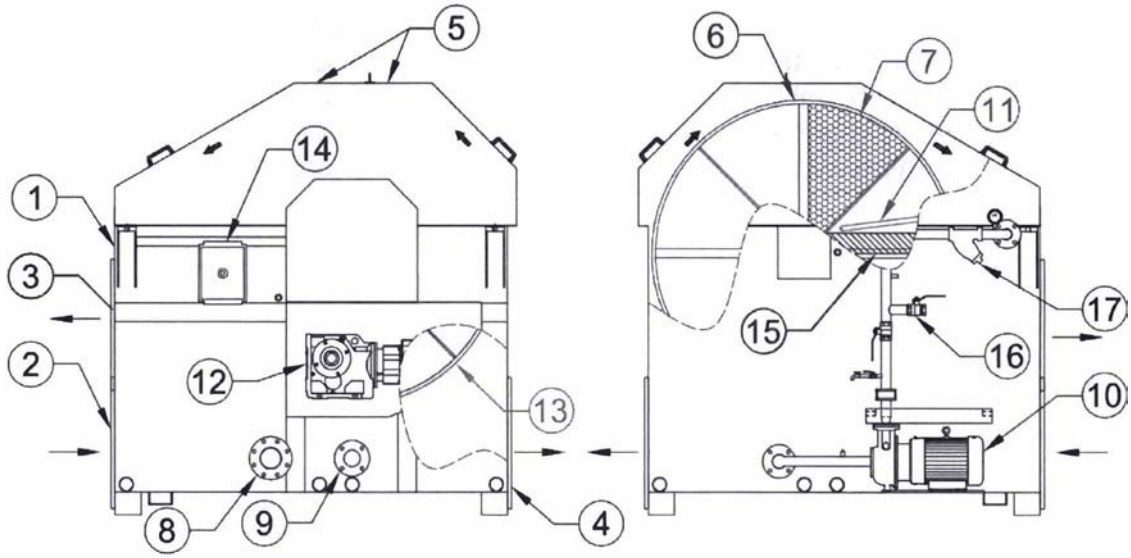
The sizing of the Ultrascreen Disk Filter generally provides for wash phases lasting approximately 10% (or less) of the total filtering time, with an average consumption of wash water in those conditions of approximately 0.1% to 0.5% of the average influent rate to the filter. The operating margin is very wide, which allows the filter to handle increased flows and solids loading (TSS, gpm, etc.) and in the most critical cases can operate continuously washing with a total wash water reflux equal to approximately 2 to 4% of the feed, depending upon the model of the filter being used. Wash water consumption is directly related to the concentration of solids to be removed.

The Ultrascreen Disk Filter is equipped with an actuator-operated valve for discharging sedimentation from the bottom of the filtering chamber. Even in the presence of turbulence during filtration, the heaviest micro particles tend to settle and deposit on the bottom of the filtering chamber. By means of a timer, the discharge valve allows the bottom of the filtering chamber to be cleaned automatically. This exclusive feature of the Ultrascreen Disk Filter allows the filtering zone to remain free of accumulated solids.

2 - TECHNICAL DESCRIPTION

2.1 – Identification of components

The Ultrascreen Disk Filter consists primarily of a stainless steel tank (Position 1) provided with covers that are equipped with handles (Position 5). The casing is comprised of an inlet section (Position 2) for the liquid to be filtered, and an outlet section (Position 4) for the filtrate. The inlet sections of the tank are baffled with stainless steel partitions.



Position	Description	Material
1	Body	304 Stainless Steel
2	Inlet section	304 Stainless Steel
3	Overflow	304 Stainless Steel
4	Outlet section	304 Stainless Steel
5	Covers	304 Stainless Steel
6	Flat filtering discs and support sectors	304 Stainless Steel
7	Filtering meshes	316L Stainless Steel
8	Concentrate discharge	304 Stainless Steel
9	Sediment discharge valve	Epoxy coated Ductile Iron, 316 SS Disk
10	Backwash pump	316 Stainless Steel (wet end)
11	Spray bar header	304 Stainless Steel
12	Adjustable speed gearbox/motor	Per Manufacturer's specifications
13	Disc seal	EPDM Rubber
14	E-Stop junction box	NEMA 4X, 304 Stainless Steel
15	Concentrate collection tray	304 Stainless Steel
16	Internal plant suppy water connection	-
17	Strainer	ABS Plastic

Figure 2 – Identification of units

The disks (Item 6) are equipped with filtering screens (Item 7), that are able to retain the suspended solids in the liquid. These segments are bolted to the disk wheels, which are attached to the shaft and driven by a variable speed gear drive (Item 12). The seals between the disk wheels and the circular cradle in the tank use high strength flexible silicon rubber gaskets (Item 13).

The liquid to be filtered is introduced between the disks via the feed ducts and then deposits the solid material on the filtering screens. The solid materials are then removed by pressure washing and conveyed to the outside through a duct and finally to a flange (Item 15, 8), and sent in the form of a concentrated liquid to the head of the treatment plant or other location designated by the owner.

The backwash system consists of header pipes (Item 11) equipped with multiple spray nozzles, which clean the filtering screens using pressurized water. A centrifugal pump (Item 10) feeds the backwash pipes with filtered water from the clearwell.

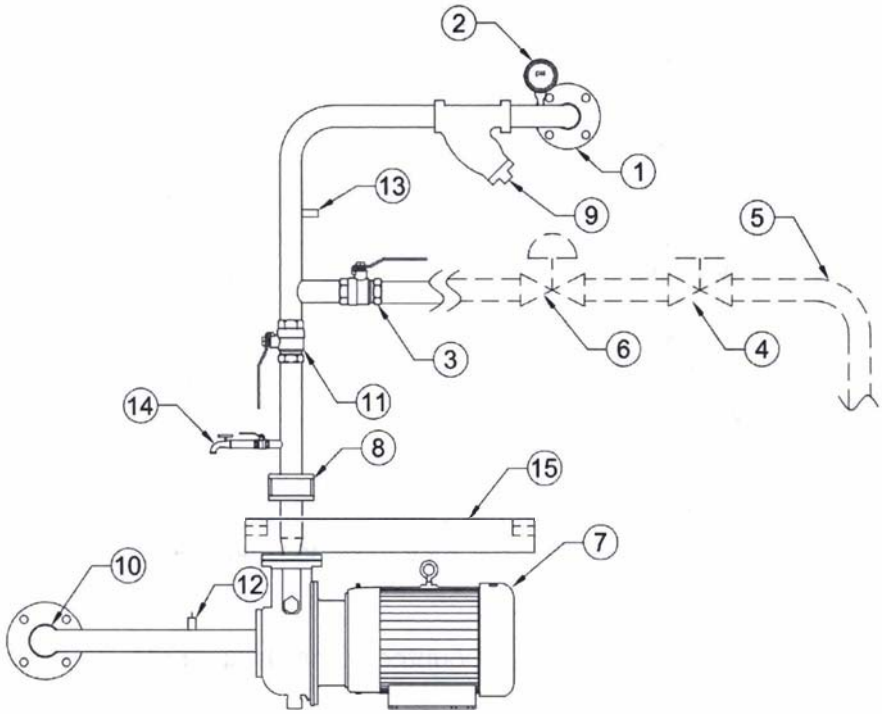
The backwash piping assembly is also provided with a connection (Item 16) for the main/plant water supply line. This allows the wash water to be available from both plant water and the local backwash pump as a redundant source.

A sediment discharge valve (Item 9) is installed on an outlet that is connected to the bottom of the cradle inside the filtering disks. This actuator is operated by a timer and when actuated removes any sediment that may have accumulated at the bottom of the filtering zone.

An electrical panel (not shown, remotely mounted) controls and commands the electrical and control functions of the machine.

2.2 – Hydraulic circuit

(Figure 3) shows the hydraulic circuit for washing the screens of the Ultrascreen® Disk Filter. The pressurized plant water supply line can be used with the arrangement shown below, by installing a solenoid valve and wiring it directly into the filter control panel.



Item	Description
1	Connection to the spray headers
2	Pressure gauge
3	Ball valve
4	Ball valve (recommended, by others)
5	Pressurized plant water
6	Solenoid valve (recommended, by others)
7	Backwash pump
8	Check valve
9	Strainer
10	Connection to filtered water clearwell
11	Ball valve
12	Air Bleeder
13	Bung for optional chemical feed
14	Hose Bib for sampling
15	Pump sun/rain shield

Figure 3 – Backwash Circuit

**The solenoid valve (Item 6, Figure 3) is for automatic operation with pressurized internal plant water*

3 – INSTALLING THE ULTRASCREEN® DISK FILTER

3.1 – Unloading and handling

ATTENTION: *The Ultrascreen Disk Filter can present an unbalanced load, if the weight is not evenly distributed. Special attention must be paid as to not damage items that project from the sides of the unit such as the backwash pump or gear drive.*

Operations to be carried out when using a crane truck with handling lifting beam:

- Unscrew the bolts attaching the covers and remove them
- Fix the eyebolts to the filter chassis (Item 2), and suitably tighten them.
- Connect the eyebolts to the lifting beam and then to the crane with lifting chains or ropes of adequate length.
- Make sure the ropes or chains do not touch any part of the filter
- Carefully lift and position the machine
- Take care to avoid damaging items that project from the side of the unit.

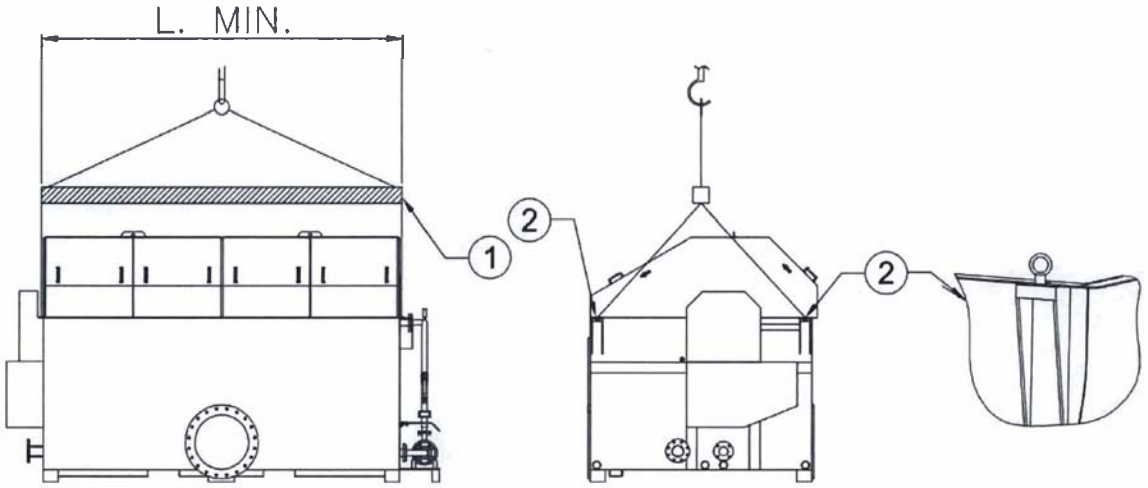


Figure 4 – Handling of ULTRASCREEN® Disk Filter

IMPORTANT*: The covers can be refitted in the machine starting phase.* ***In the meantime they must be placed in a safe place to prevent damage.***

Table 2 gives the minimum required lengths of the beam for lifting the ULTRASCREEN® Disk Filter:

Model	L, minimum , inches
UL 1602	43

Table 2. – Minimum length of lifting beam (position 1)

3.2 – Positioning

***IMPORTANT**: Prior to the installation of your Ultrascreen Disk Filter, careful consideration must be given to the nature of the upstream piping and equipment. All yard piping and process equipment upstream of the Ultrascreen must be flushed and void of corosive chemicals, welding slag, construction hardware, or any other contaminants. Any of these items can damage the Ultrascreen Disk Filter. The filter is designed to recieve secondary clarifier effluent only. Construction debris entering the filter will void the manufacturers warranty.*

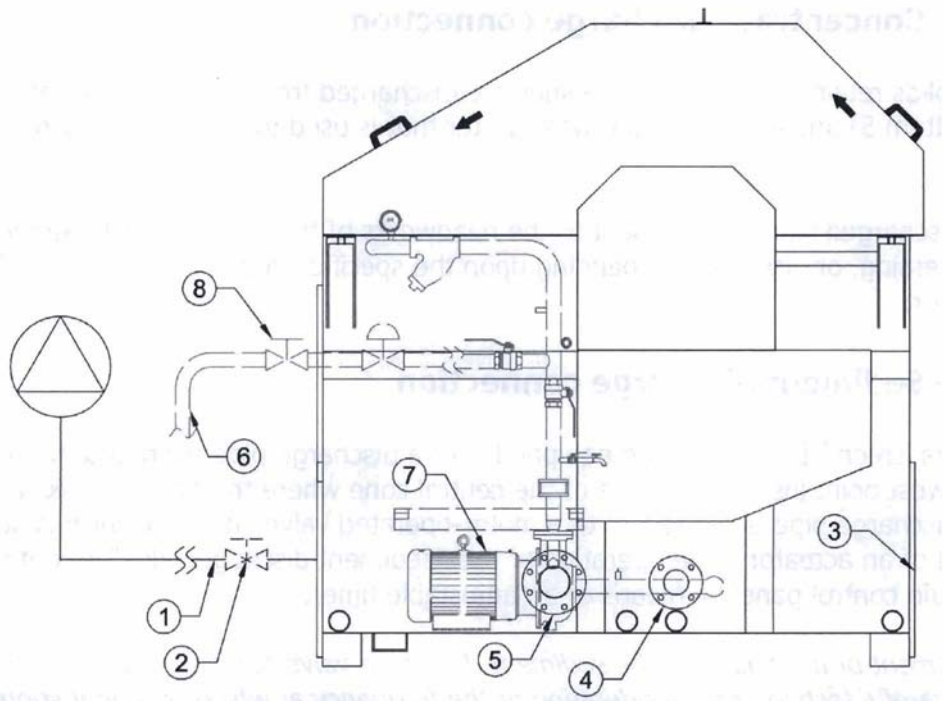
The ULTRASCREEN Disk Filter is delivered fully assembled and ready for installation.
The surface on which the ULTRASCREEN Disk Filter is to be installed must be level, plumb, and of even elevation throughout and arranged to take the weight of the machine during its operation (with the load of water to be filtered inside). After positioning the ULTRASCREEN Disk Filter the unit must be level, confirm using a normal spirit level (bubble level).

A free space of at least three feet must be left around the sides of the machine for maintenance. The dimensions and weights of the ULTRASCREEN Disk Filter are given under BLUE TAB 3 - *Ultrascreen Mechanical Drawings*.

4 – SYSTEM PRE-STARTING OPERATIONS

4.1 – Feed water connection – Pump Feed

The Ultrascreen Disk Filter can be gravity fed or fed by pump, regardless of feed method, there must be sufficient head to allow filling of the filter chamber. If the system is designed for pump feed, the feed piping should ideally be connected to the inlet section of the Disk Filter using a stainless-disc butterfly valve to regulate the flow (Item 2).



Item	Description
1	Feed piping
2	Butterfly valve
3	Discharge flange
4	Sediment discharge valve
5	Concentrate discharge
6	Main/Plant water supply line
7	Wash water pump
8	Main/Plant water solenoid valve

Figure 5 – Hydraulic connection of ULTRASCREEN® Disk Filter

4.2 – Filtered liquid discharge

The filtrate exits the Ultrascreen® Disk Filter through the outlet section (Figure 5 - Item 3).

4.3 – Overflow discharge connection

If the Ultrascreen® Disk Filter is unable to filter the entire quantity of inlet water in the feed chamber, the excess feed will exit the machine through the overflow section, and combine with the concentrate discharge.

4.4 – Concentrate discharge connection

The solids retained on the filter meshes are discharged from the filter through a collection duct (Item 5) and along with the wash water that is used to wash these solids off the disks.

The discharged liquid can be sent to the headworks of the wastewater treatment plant for reprocessing, or elsewhere depending upon the specific needs of the owner and/or operator.

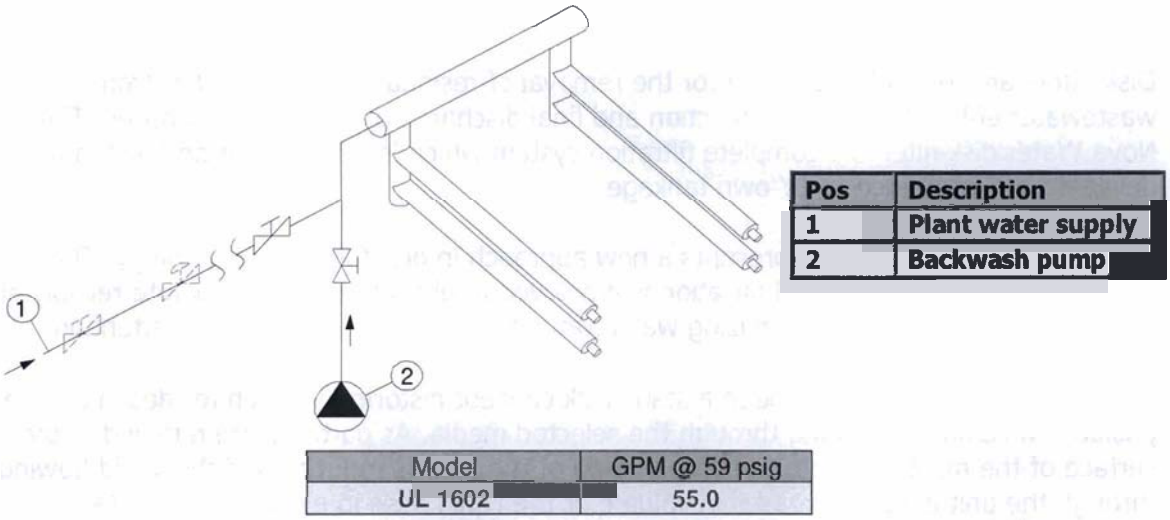
4.5 – Sediment discharge connection

All Ultrascreen® Disk Filters are equipped with a discharge pipe hydraulically connected to the lowest point inside the cradle of the central zone where the filtering disks are located. This discharge pipe is connected to a motor-operated valve (Item 4) which is activated by means of an actuator. The operation of this "sediment dischage valve" is controlled from the main control panel by means of an adjustable timer.

Adjustment of the timing of the sediment discharge valve opening must only be made after careful testing and consideration of the frequency at which sediment should be removed from inside the filtering disks. It should be opened only as frequently as needed.

4.6 – Washing piping connection

Connection to the wash piping is carried out according to the diagram in Figure 6.



Pos	Description
1	Plant water supply
2	Backwash pump

Model	GPM @ 59 psig
UL 1602	55.0

Figure 6 – Backwash piping connection and pressure-flow at nozzles (flow measured in US GPM)

It is advised to connect the main plant utility water supply to the Ultrascreen Backwash System (Item 1). If plant utility water is available at a temperature higher than ambient (higher than approximately 15º Celsius/60º Fahrenheit) it should be used, especially in plants that have a high grease and oil load in the influent. Cleaning the filter mesh with warm water is more effective than cold water.

IMPORTANT: To avoid damage or tearing of the filter mesh, the working pressure of the spray water must not be higher than 65 psig.

IMPORTANT: To avoid any damage to the lateral seals, the temperature of the wash water must not exceed 70º Celsius/158º Fahrenheit.

IMPORTANT: A local y-strainer is required on the main water supply to prevent particles from clogging the wash water nozzles. This strainer will be provided by the manufacturer.

The recommended connection to the main plant utility water supply line is 2" diameter as well as should be the diameter of the solenoid valve.

4.7 – Connection to the electrical grid

The connections to the electrical grid must be carried out in strict accordance with all local and national electrical codes and safety practices. The Ultrascreen Disk Filter is supplied with an electrical panel to which the filter controls and motors are interlocked.

5 – SYSTEM STARTING OPERATIONS

5.1 – OPERATING SUMMARY

Disk filters are generally designed for the removal of residual secondary solids from wastewater effluent prior to disinfection and final discharge or to reclaim purposes. The Nova Water disk filter is a complete filtration system which is factory built and tested and delivered self contained in its' own tankage.

The Nova Water disk filter represents a new approach in disk filtration technology. The concept of dynamic tangential filtration is employed to allow the filter to operate reliably at high flow capacities while minimizing wash water reject volume and operator attention.

The traditional disk filter has been a static disk concept historically which resides in an idle position while flow is passing through the selected media. As particles are retained at the surface of the media the remaining open area of the filter is reduced and the liquid flowing through the unit either decreases in volume or the liquid rises in elevation to create additional driving pressure to force the same capacity through the reduced open media area.

Eventually the filter accumulates enough particles on the mesh that the liquid inside raises to the level where a cleaning cycle is initiated. Some filters use submerged media and clean by suction while others use partially submerged media and clean with wash water pumps. The Nova filter fits into this partially submerged category. The Nova disks operate from minimal submergence to approximately 45% submergence.

The Nova disk filter uses continuously rotating disks that backwash periodically (and if need be, continuously) pass filtrate even when the wash cycle is being performed. The concept of dynamic tangential filtration is accomplished using a simple principle that a particle of one size can pass through an opening of approximately equal size but it can not pass through that same sized opening if the opening is in motion. The analogy of attempting to throw a snowball through the window of a moving car has been used to describe this concept. The faster the car is moving the less likely the chance the snowball will make it through the window.

The Nova filter disk uses woven stainless steel media that has approximately 25 micron cross sectional openings and when operated in a dynamic rotational motion the snowball effect results in the filter capturing many particles much smaller than the actual opening size. Particles of 10 micron and below are successfully retained in this tangential filtration operation and then washed off the filter for return to the treatment plant as appropriate.

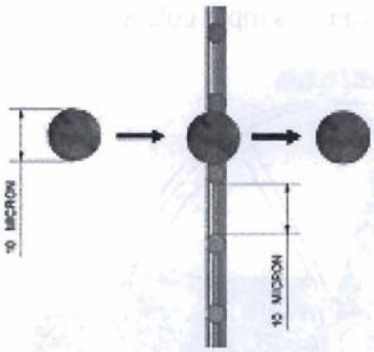


Figure 9

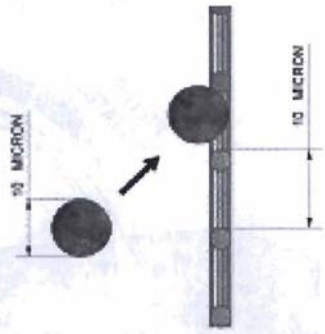


Figure 10

The number of particles in an effluent stream is highly variable, so the benefit of dynamic filtration versus static filtration will be that as the disk rotates it captures many particles smaller than the size of the openings in the media while allowing the water to pass through the openings at higher capacity. The media is gradually collecting particles and thus fouling during this normal operating cycle. Eventually the disk has collected enough retained particles that a cleaning cycle needs to be initiated.

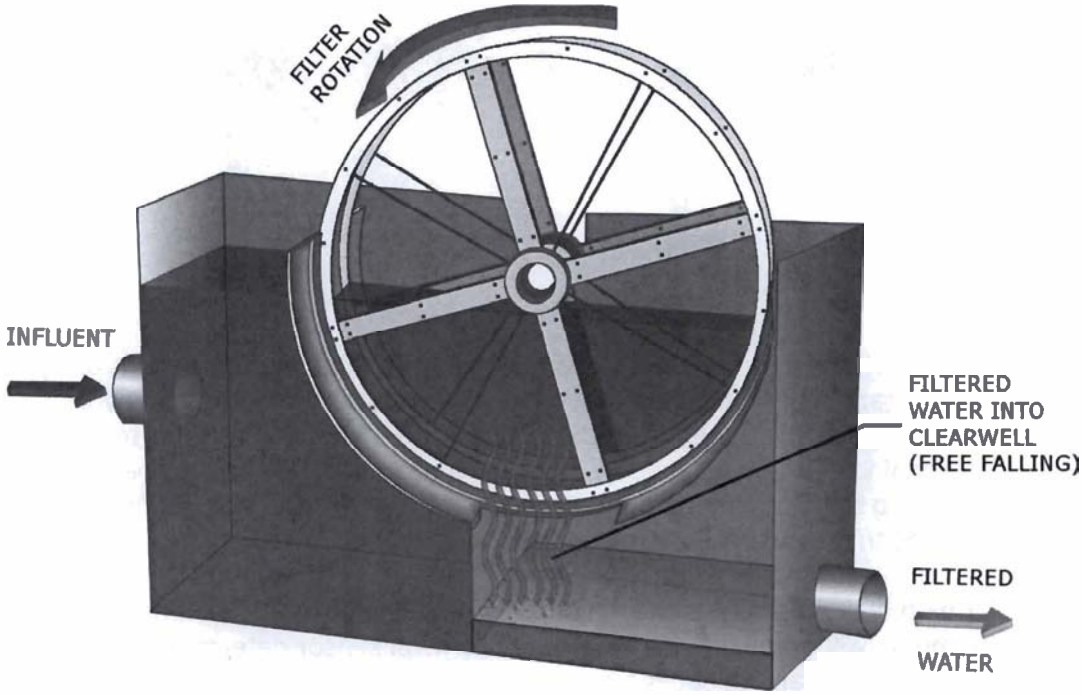
As is similar with static disk filters the water in the Nova filter that is waiting to pass through the media will gradually rise in level until a level sensor detects the maximum normal high water level and initiates a motor starter which energizes the backwash pump. The washing action involves the portion of the disk above the water level only and [redacted] because the disk is in motion the washing cycle is brief and very effective.

The solids in the water waiting to be filtered then begin to once again accumulate on the surface and in the voids of the media as it rotates. This coating effect quickly decreases the number of open voids in the media and helps to capture ever smaller particles as the filter cycle phases from washing (clean), to seasoned (coated), eventually to sufficiently fouled, requiring another cleaning cycle.

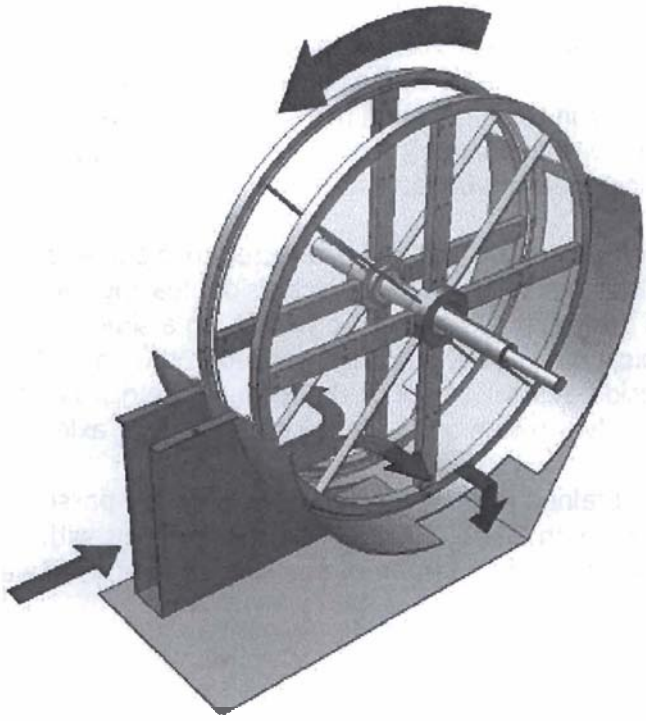
The water to be filtered enters the unit and is directed to the area between the disks, passes through the disks (inside disk surface to outside) leaving the captured particles on the two disk surfaces (inside) that face each other. Using a simple backwash header arrangement with typical nozzles the disks are washed in the opposite direction from outside back to the inside. A small trough rests between the disks and collects the dirty water. The disks themselves rotate on a simple center shaft or axle.

The washing water is obtained from water that has previously passed through the filter media. Small filters use an on board pump while larger systems with multiple filters can use manifold piping to feed many filters from one single pressurized water source.

The discussion of the operation will benefit from a simple cutaway view of the filter as shown below.



The fluid enters on the left side of this diagram and exists on the right after passing through the disk.



The water being filtered passes through both disks from inside to outside.

The filter operation sequence begins with the filter in the idle position (no disk rotation). Water is allowed to flow into the filter and when the liquid level reaches the filter "Drive On" level, the drive unit will energize. IMPORTANT – DO NOT ROTATE THE FILTER DISKS WITH THE UNIT DRY, THIS CAN DAMAGE THE SEALS

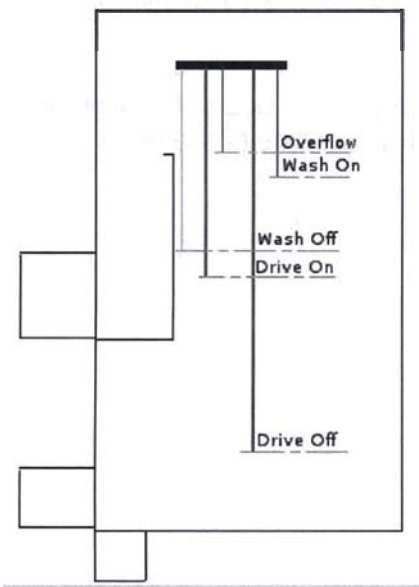
The filter also has a low level limit that will shut the "Drive Off" if the screen has inadequate water being fed to keep the disks properly wetted. The disk seal that prevents passing of dirty water to the clean water side of the filter needs to be wet to avoid excess friction wear.

Once the screen is in normal operation and filtration is continuous the liquid level will rise in the filter feed well and eventually reach the "Wash Water On" level. This will energize the backwash pump or main solenoid valve if the system is connected to a pressurized manifold system.

Once the disk media washing function is completed the liquid level in the filter will decrease and the "Wash Water Off" level will be reached. This will discontinue the backwash function.

A representation of the level probe control positions is shown below. Note that elevations are not to scale, they are provided to represent the relative positions within the filter.

Lastly, note that if your Ultrascreen is outfitted with a pressure transducer for level sensing control, the drawing below indicates the approximate heights at which control functions are performed during operation.



Position	Description
Drive Off	Disk motor deactivation level probe
Drive On	Disk motor activation level probe
Wash Off	Motor pump deactivation level probe
Wash On	Motor pump activation level probe
Overflow	Overflow level probe

The function of the filter under normal conditions will be completely automatic. Some heavier particles may settle to the bottom of the inlet feed area between the disks, which will be flushed out via opening and closing of the sediment discharge valve. This valve can be set to open with varying frequency and duration of time open. This allows the bottom of the filter to be kept free of solids accumulation. Because the nature of the solids to be filtered is very application-specific, this function is set during start up and after a week or more of typical filter operation, the frequency can be re-evaluated to determine the appropriate cycle times needed.

5.2 – DESCRIPTION OF COMPONENTS

Filter Tank – Holds the filter disks, seals, wash water collection trough and wash water headers.

Media – Woven stainless steel fabric attached to the rotating disks.

Disks – The actual rotating wheels that hold the filtering media fabric.

Center Shaft – The axle the disk wheels are attached to.

Gear Drive – The motor, reducer and gearbox that turns the center shaft.

Backwash Pump – The pump used for washing the media.

Sediment Valve – A simple timer operated valve for draining accumulated solids from the bottom of the filter inlet feed well.

Disk Seals – The silicon rubber seals located at the interface of the disk and the inlet filter feed well that prevent dirty water from passing to the clean water side of the unit.

5.3 – DESCRIPTION OF OPERATING CYCLES

Idle Cycle – The filter has no flow and the gear drive is not energized.

Filling Cycle – Inlet flow has been initiated and the filter drive unit is energized by the rising water reaching the "Drive On" level.

Continuous Filtering Cycle – The inlet feed rate is continuous (steady or variable flow) and the disks are in constant rotation. The liquid level is now rising based on the media capturing particles.

Backwash Initiation – The "Wash Water On" level is reached by the rising water in the inlet feed well and energizes the wash water pump (or the solenoid valve if the plant water pressure manifold is used) which then supplies filtered water for washing the disk media.

Backwash Duration – The washing of the disks will continue until the water level decreases to the point where it reaches the "Wash Water Off" level, but not for less than a duration of one minute. At this point the wash pump will de-energize.

Normal Operation - The backwash cycle will repeat as required based on the rise and fall of the inlet feed well liquid level. The filter is designed to run continuously from this time forward with the exception of maintenance functions.

Sediment Discharge/Drain – The sediment discharge valve can be programmed with a timer function to open and close on a preset basis. This function is variable for frequency and duration and is set at start up for each project.

Filtering Cycle Complete – In the event the feed to the filter is interrupted the filter will continue operation until the "Drive Off" level is reached and then the drive will de-energize. The filter will remain idle until the inlet feed is once again resumed. Flow interruptions can be the result of various events including lack of flow at the plant during late night and early morning hours.

Overflow Mode – It is possible to feed the filter with more flow than it can pass through the disks. If this event occurs the excess water will leave via the overflow to the next process as the yard piping directs it. An alarm will activate to alert the plant staff.

IMPORTANT – THE DISK SEALS CAN BE DAMAGED IF THE FILTER IS ALLOWED TO OPERATE IN A DRY CONDITION.

5.4 – SYSTEM START UP DETAILS

The filter will be supplied factory built with all components installed and tested prior to delivery to the job site.

FILTER INSTALLATION – The filter needs to be installed on a level concrete slab and secured to the floor with proper anchors. All dirt, construction debris, and trash must be removed from the filter piping connections. Make sure filter is level and plumb before and after making the final anchor tightening.

PIPING – The inlet feed piping must be flushed before connecting to the filter to ensure that all construction residuals, pipe scale, tools and any foreign materials are removed before flow is initiated to the filter. Inlet and outlet piping should be level, plumb and adequately braced and supported so the weight of the piping is not transferred to the inlet or outlet fittings of the filter box.

ELECTRICAL CONTROLS – Test the incoming proper power for voltage and phasing. Pump and Gear Drive rotation and Sediment Valve function will be verified by the factory technician during the preliminary equipment checkout.

TRIAL RUN - Once the filter has been checked for preliminary mechanical, electrical and hydraulic compliance the filter will be test run for a brief period with plant water, secondary effluent or other suitable water source.

If all systems check out OK the screen will be operated for a period of 24 hours under normal loading and the Sediment Valve cycle time will be assessed.

Current readings will be taken for the Gear Drive motor and Backwash Pump motor and recorded in the start up log.

ON BOARD SYSTEMS - The Gear Drive will be demonstrated to operate from minimum to maximum RPM range. The Backwash Pump (and or manifold) pressure will be verified for the proper operating pressure. All spray nozzles will be verified to be clear of obstructions and providing proper spray patterns. Wash water pressure should be 60 psi maximum available at the wash water spray header gauge.

REJECT DISPOSAL - The dirty wash water drain line will be verified for proper slope and flow capacity.

COVER ALIGNMENT - The filter covers will be checked for alignment and verified to be free of leaks at the gasketed mating surfaces. IMPORTANT – NEVER OPERATE THE FILTER WITH THE COVERS REMOVED FOR ANY REASON.

FINAL START UP AND COMMISSIONING – Once the above checks and reviews have been completed the filter can be placed into normal full time operation. The flow rate to the filter should be accurately measured at this time and recorded.

- The backwash duration should be recorded at this time.

- The time duration between wash cycles should be recorded.

- The drive unit speed should be recorded.

5.5 – OPERATOR CONTROLS

FLOW RATE – The filter inlet feed rate in gpm is the single most important factor in disk filter operation. Operate filter within design flow rate parameters, at all times.

DRIVE UNIT SPEED – The disks can operate at variable speeds typically ranging from 3 RPM to 15 RPM depending on the model of filter supplied. The operator can increase the speed of the unit at higher flow rates and/or TSS loadings and then reduce the speed at low flow rates and/or lower TSS concentrations.

SEDIMENT DISCHARGE/DRAIN – The frequency and duration of valve operation is a variable that can be adjusted periodically by the operator via the timer inside the control panel. THE POWER MUST BE OFF TO PERFORM THIS ADJUSTMENT.

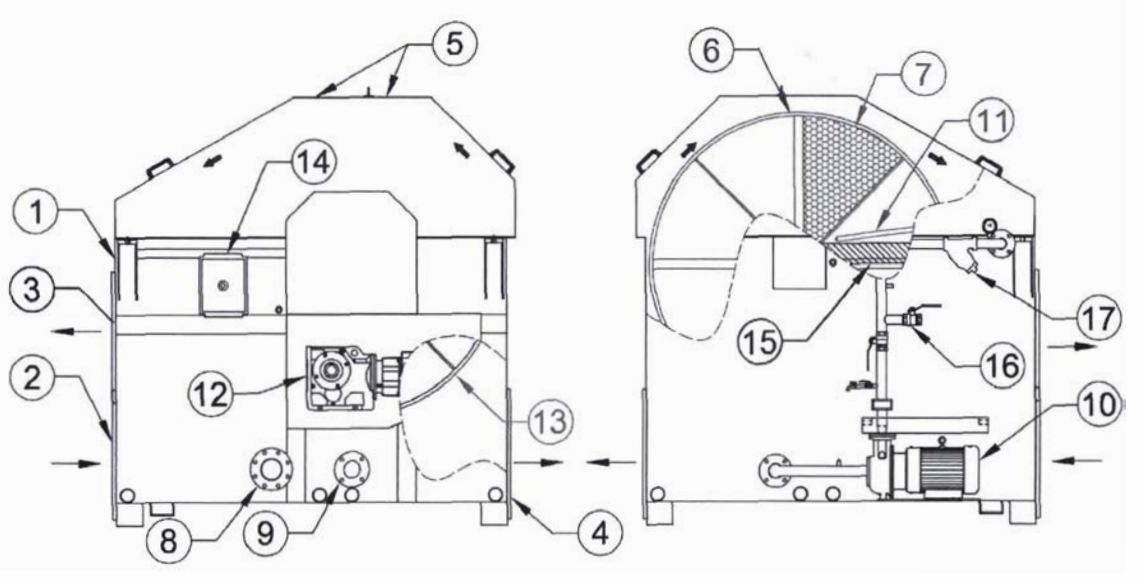
5.6 – SYSTEM ALARMS

The following scenarios will initiate an alarm signal:

Drive Unit – Fail to Run
Wash Pump – Fail to Run
Bottom Drain – Fail to Open
Bottom Drain – Fail to Close
High Level Overflow

5.7 – GLOSSARY OF TERMS

1. Disk Filter – The entire filter assembly with assembled peripheral components.
2. Filter Inlet – The connection to the source of water to be filtered.
3. Overflow – The emergency overflow outlet.
4. Filter Discharge – The connection from the filter to the effluent piping.
5. Filter Covers – Protective covers for the rotating disks.
6. Rotating Disk – The actual filtering elements.
7. Filter Media – The woven stainless steel fabric.
8. Concentrate Discharge – Outlet for dirty wash water.
9. Bottom Drain – The actuated valve that drains the filter feed well.
10. Backwash Pump – The on board centrifugal pump for disk washing.
11. Backwash Headers – Piping for the spray nozzles.
12. Gear Drive – The motor and gear reducer assembly utilized to turn the disks.
13. Disk Seal – Silicon rubber seal in feed chamber.
14. E-Stop/Junction Box – Cable junction box with emergency stop button.
15. Wash Water Trough – The capture trough for collecting dirty wash water.
16. Backwash Solenoid – Allows pressure manifold connection for wash water.
17. Strainer – Prevents particles from clogging the wash water nozzles.



6 – SEAL PROPERTIES

Main properties

Min. duty temperature: -68°F/-20°C
Max. duty temperature: 212°F/+100°C

***ATTENTION**: The above values are based on the properties of the seal material. Since the seals may be subjected to harmful chemicals and mechanical friction during operation of the ULTRASCREEN® Disk Filter, it is important to make sure the water to be filtered does not exceed the temperature of 158°F/70°C.*

Physical characteristics:

- *Mechanical properties* (elongation/tear strength): good/excellent
- *Resistance to permanent deformation*: from good/excellent
- *Abrasion resistance*: good

Other characteristics:

- Flame resistance practically nil
- Highly impermeable to air and gas
- Excellent dielectric properties
- Exceptional resistance to UV radiation

Chemical reactivity:

More than satisfactory for use with:
- water and steam up to 212°F/100°C, seawater, saline solutions, strong mineral bases and solutions
- glycols and related brake fluids
- alcohols, ketones and other oxygenated solvents, ozone and other atmospheric agents

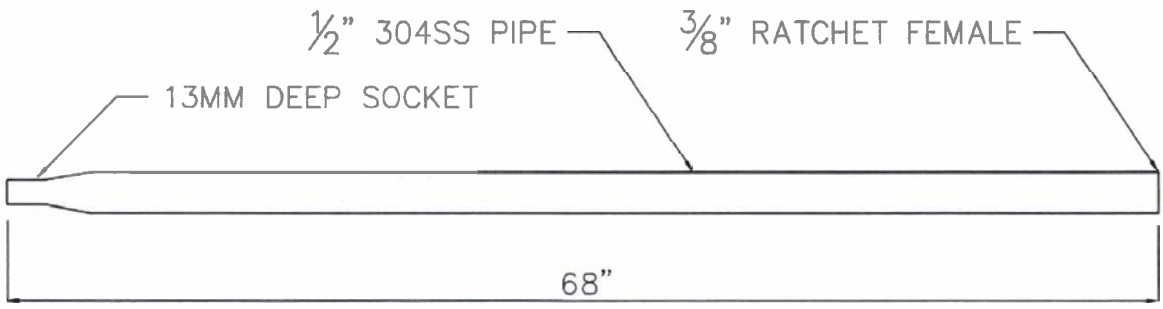
Satisfactory for use with :
- strong mineral acids and their solutions
- vegetable or animals oils and fats
- hydraulic fluids based on phosphoric esters

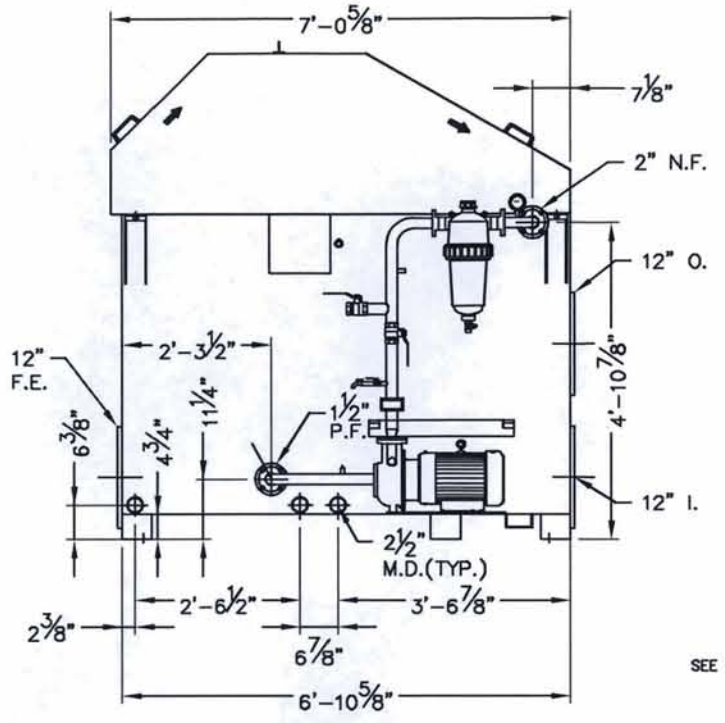
NOT SATISFACTORY FOR USE WITH:
- ***mineral oils and fats (aliphatic, aromatic and chlorinated hydrocarbons silicon ester-based hydraulic fluids; non-polar liquids in general)***

7 – SPECIAL TOOLS

Included with all Ultrascreens® is a wrench extension with integral socket to aid in removing the seal clamp bolts.

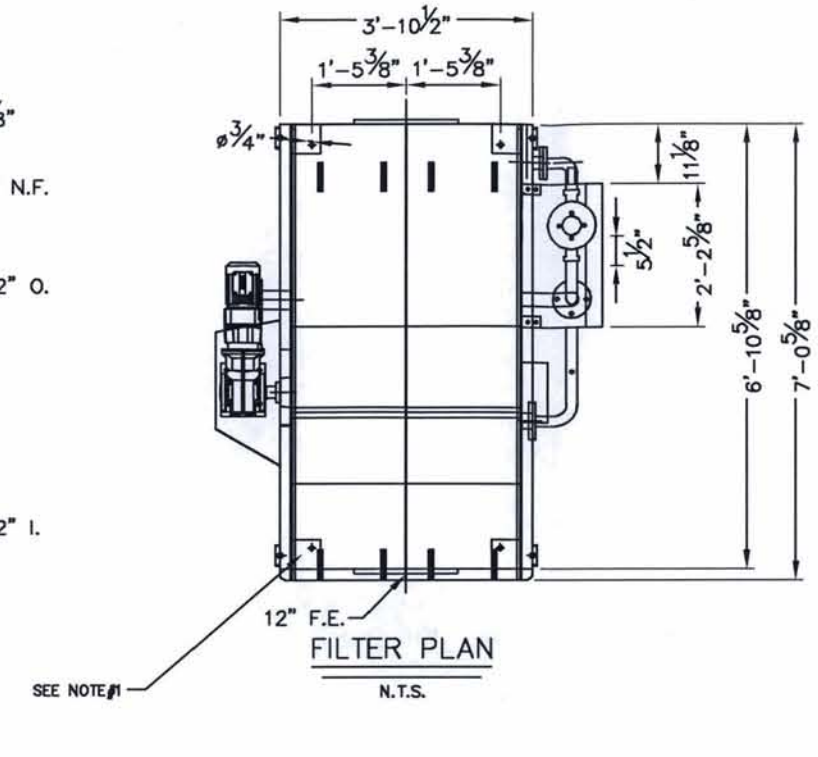
Other tools required for Ultrascreen® maintenance and operations include an electrical multi-meter, socket and ratchet set (Metric), and a large Channel Lock wrench.





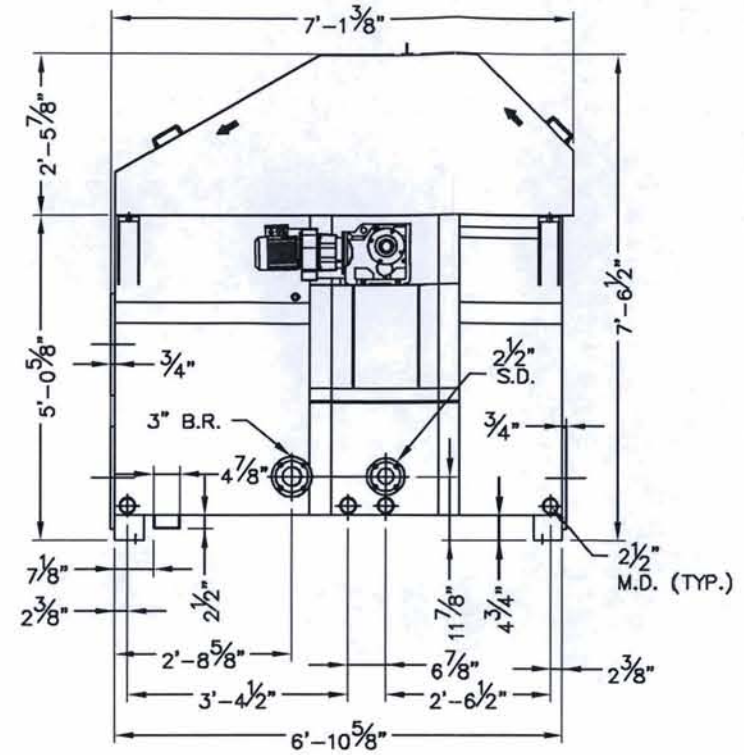
FILTER RIGHT SIDE

N.T.S.



FILTER PLAN

N.T.S.



FILTER LEFT SIDE

N.T.S.

DRY WEIGHT: 3,400 lbs

WORKING WEIGHT: 9,350 lbs

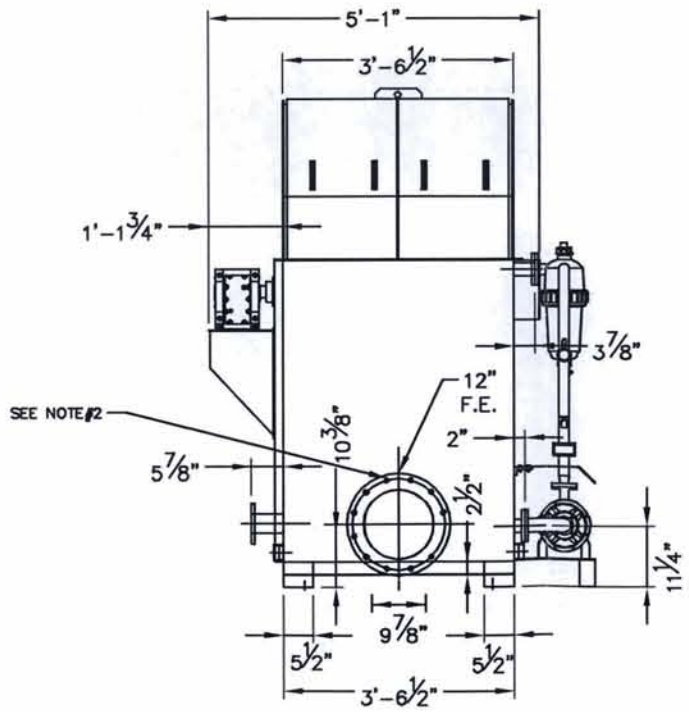
ABBREVIATION SUMMARY

I.	INFLUENT
N.F.	NOZZLE FEED
P.F.	PUMP FEED
F.E.	FILTERED EFFLUENT
B.R.	BACKWASH REJECT
S.D.	SEDIMENT DRAIN
M.D.	MAINTENANCE DRAIN
O.	OVERFLOW

NOTES:

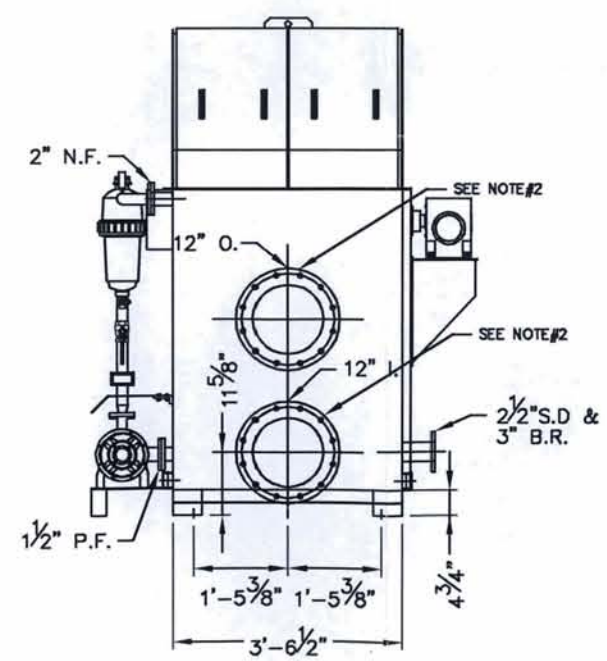
1) ANCHOR BOLTS TO BE PROVIDED BY CONTRACTOR. GROUT AS NECESSARY TO ENSURE FILTER IS LEVEL AND PLUM.

2) BOLT INSTALLATION DETAILS: FLANGE BOLT TYPE =M20x2.5 STAINLESS STEEL. USE OF "SLIC-TITE" SEALANT OR EQUIVALENT REQUIRED.



FILTER REAR

N.T.S.



FILTER FRONT

N.T.S.

NOVA #: UL1602HS-T

DATE: 12/27/2010

DIMENSIONS: SAE

PROJECT ENGINEER: B.L. & A.G.

UL1602HS

ULTRASCREEN® DISK FILTER

GENERAL ARRANGEMENT DRAWING

FOR

LAND O' LAKES, WWTP, PASCO COUNTY

NUOVE ENERGIE ADVANCED TECHNOLOGY

nova

DRAWING NO.

1

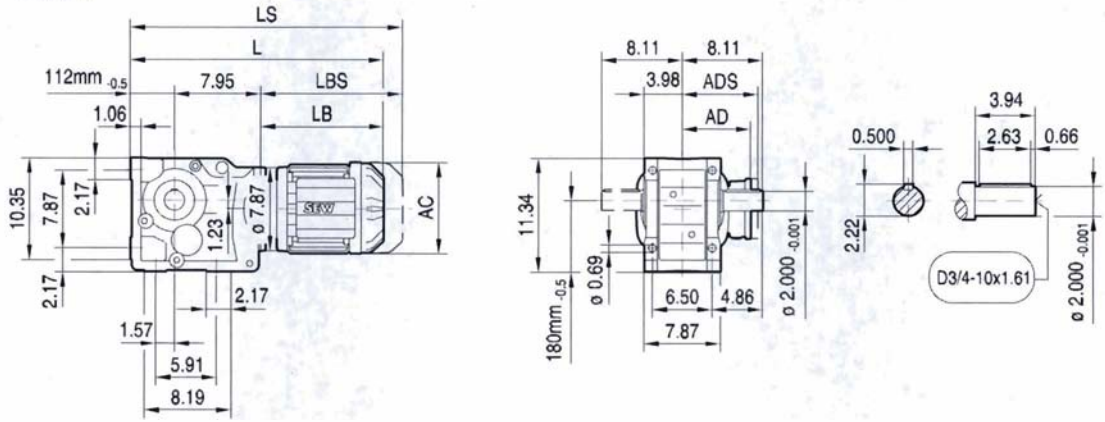
Constant Speed Reducers R/F/K/S

SEW EURODRIVE

Up to 98% Efficient • Superior Uptime • Long Life • Low Maintenance • Compact Design • Modular Components • Custom Assembled

33 065 00 09

K77..



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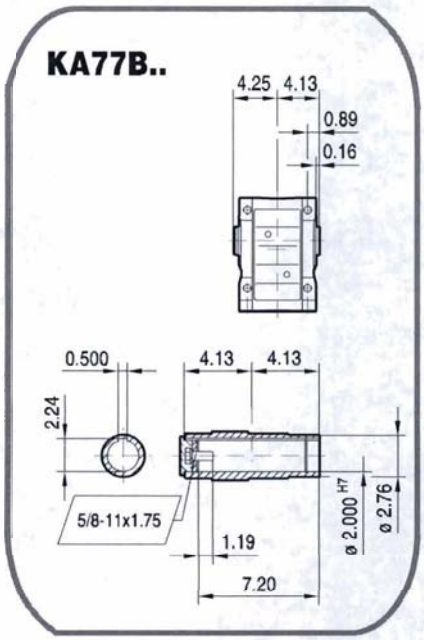

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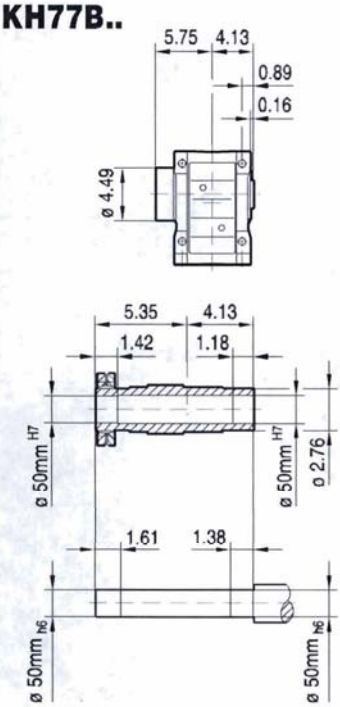

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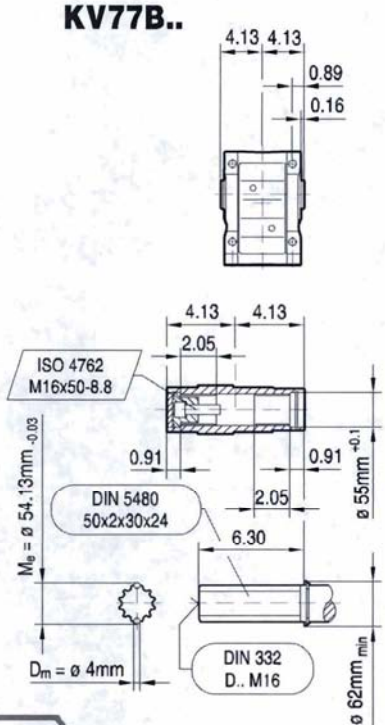
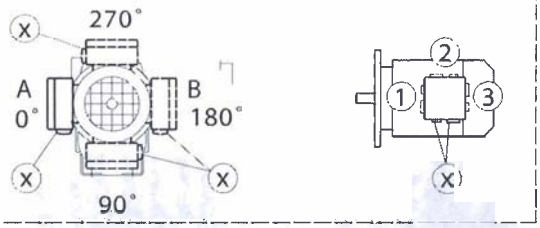


(→ 125)	DR71M	DR80S	DR80M	DR90M	DR90L	DR100M	DR100L/LC	DR132S	DR132M/MC	DR160..
AC	5.47	6.14	6.14	7.05	7.05	7.76	7.76	8.70	8.70	10.63
AD	4.69	5.04	5.04	5.51	5.51	6.18	6.18	6.69	6.69	8.98
ADS	5.08	5.47	5.47	5.91	5.91	6.22	6.22	6.77	6.77	8.98
L	20.79	21.14	22.36	22.44	23.23	24.41	25.59	27.28	29.25	30.87
LS	23.46	24.33	25.55	26.10	26.89	28.07	29.25	31.69	33.66	36.26
LB	8.43	8.78	10.00	10.08	10.87	12.05	13.23	14.92	16.89	18.50
LBS	11.10	11.97	13.19	13.74	14.53	15.71	16.89	19.33	21.30	23.90

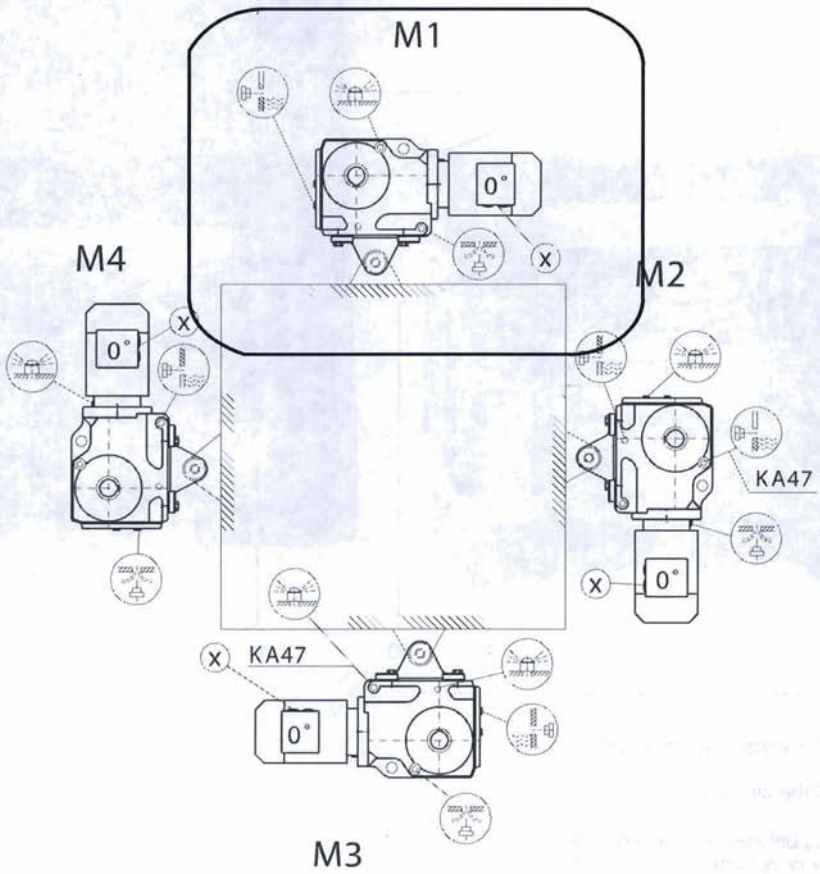
Mounting Position

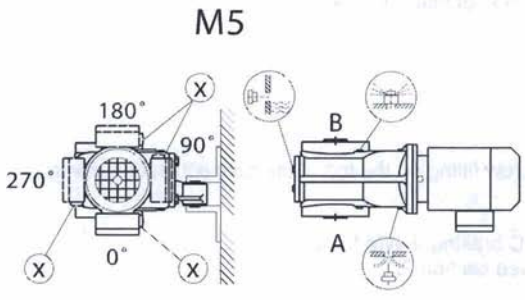
KA 37-157

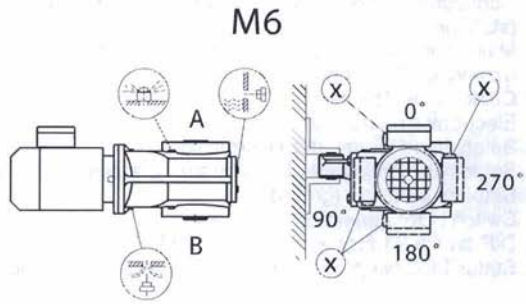
KA-77-DRE100L-4MM22



Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug







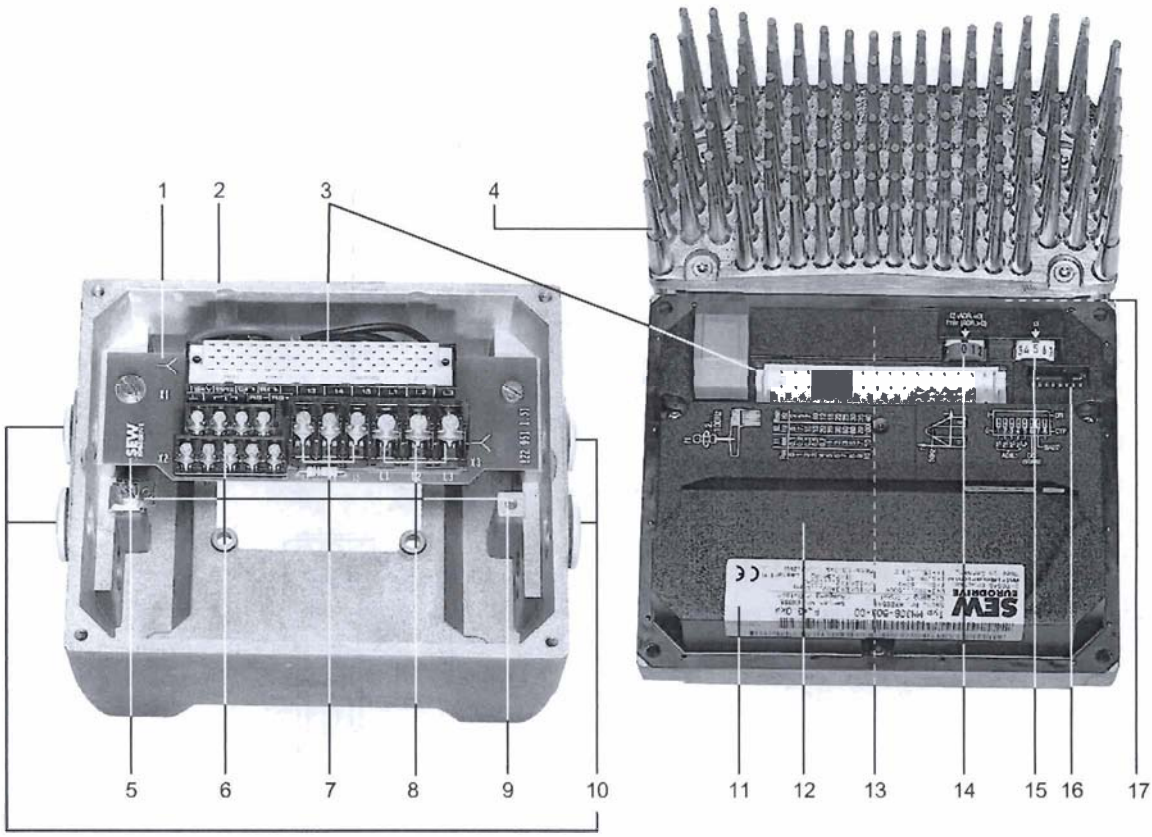


Fig. 1: MOVIMOT® (inverter) unit structure

1. Identification of the circuit type
2. Terminal box
3. Connection plug between connection unit and inverter
4. Connection box cover with inverter and heat sink
5. Connection unit with terminals
6. Electronics terminal strip X2
7. Connection of brake coil (X3); in motors without brake: Connection of internal braking resistor BW. (standard)
8. Mains connection L1, L2, L3 (X3) (suitable for 2 x 4 mm^2)
9. Screws for PE connection ⏚
10. Cable screw fittings
11. Electronics nameplate
12. Safety hood for inverter electronics
13. Setpoint potentiometer f1 (not visible), accessible through a screw fitting on the top of the connection box cover
14. Setpoint switch f2 (green)
15. Switch t1 for generator ramp (white)
16. DIP switch S1 for setting the bus address, motor protection, DC braking, PWM frequency
17. Status LED (visible from the top of the connection box cover, see section 7.1)

Mechanical Installation

Before you begin

MOVIMOT® may not be installed unless:

- the entries on the nameplate of the drive match the voltage supply system,
- the drive is undamaged (no damage caused by transport or storage) and
- it is certain that the following requirements have been fulfilled:
  - Ambient temperatures between -25 °C and +40 °C (remember that the temperature range of the gear unit may be restricted → operating instructions for the gear unit)
  - No oil, acid, gas, vapors, radiation, etc.
  - Installation altitude max. 1000 m above sea level

Installation tolerances

→ "MOVIMOT® Geared Motors" catalog, "Notes Appertaining to the Dimension Sheets" section.

Shaft end	Flanges
Diametric tolerance in accordance with DIN 748 ISO k6 at Ø ≤ 50mm ISO m6 at Ø > 50mm (Center bore in accordance with DIN 332, shape DR)	Centering shoulder tolerance in accordance with DIN 42948 ISO j6 at Ø ≤ 230 mm ISO h6 at Ø > 230 mm

Mounting MOVIMOT®

The MOVIMOT® may only be mounted or installed in the specified mounting position on a level, vibration-proof and torsionally rigid support structure.

Thoroughly remove anti-corrosion agents from the shaft extensions (use a commercially available solvent). Do not allow the solvent to penetrate the bearings and shaft seals – this could cause material damage!

Carefully align MOVIMOT® and the driven machine to avoid placing any unacceptable strain on the motor shafts (observe permissible overhung load and axial thrust data!).

- Do not butt or hammer the shaft end.
- Use an appropriate cover to protect motors in vertical mounting positions from objects or fluids entering!
- Ensure an unobstructed cooling air supply and that air heated by other apparatus cannot be drawn in or reused.
- Balance components for subsequent mounting on the shaft with a half key (output shafts are balanced with a half key).

  Any condensation drain holes are closed with plastic plugs and must not be opened unless needed.

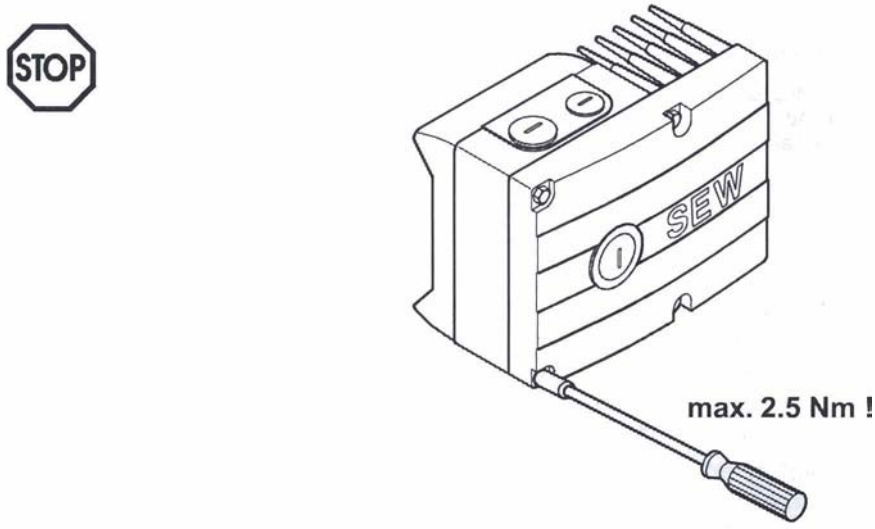
  Do not leave any condensation drain holes open, since this defeats higher enclosure ratings.

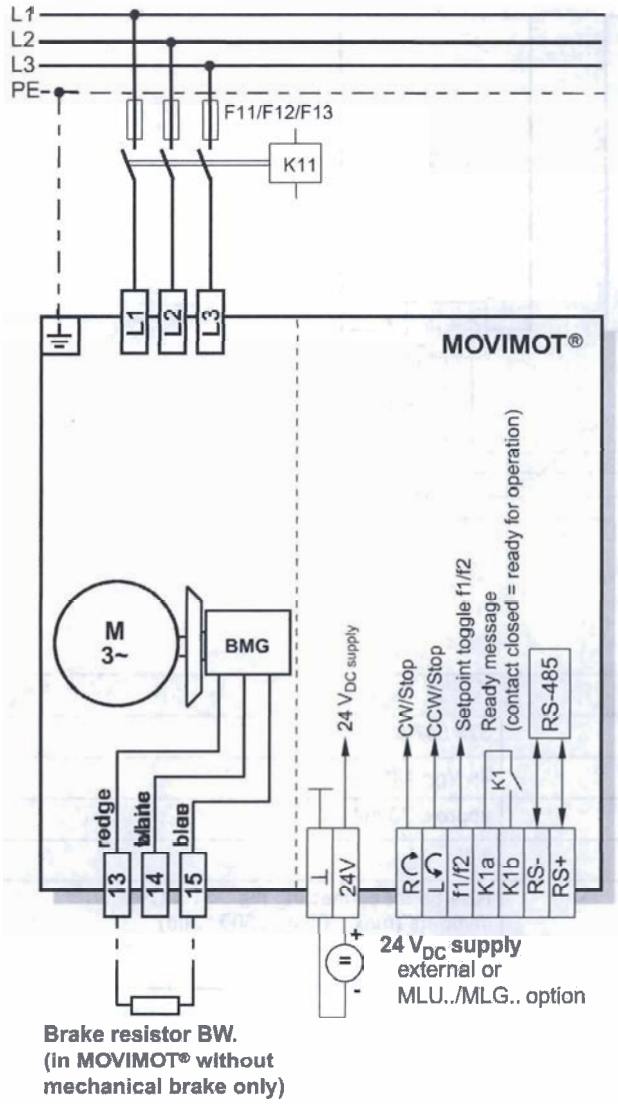
Installation in damp areas or in the open air

- Use suitable screwed cable glands for the supply leads (use reducing adapters if necessary).
- Coat the threads of cable screw fittings and pocket caps with sealant and tighten them well – then coat them again.
- Seal the cable entry well.
- Clean the sealing faces of the connection box cover well before re-assembly.
- Restore the anticorrosive coating if necessary.
- Check the type of enclosure is authorized (refer to the nameplate).

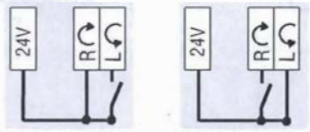
Screwing on the connection box cover

- Tighten the screws for the connection box cover to maximum **2.5 Nm**.
- The connection box cover may be deformed and damaged if it is tightened to a higher torque value.





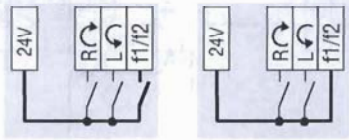
Functions of terminals R and L with binary control:



Rotation **CW** active

Rotation **CCW** active

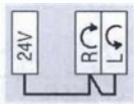
Functions of terminals f1/f2:



Setpoint **f1** active

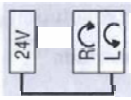
Setpoint **f2** active

Functions of terminals R and L with control via RS-485 interface / fieldbus:



Both directions of rotation are enabled

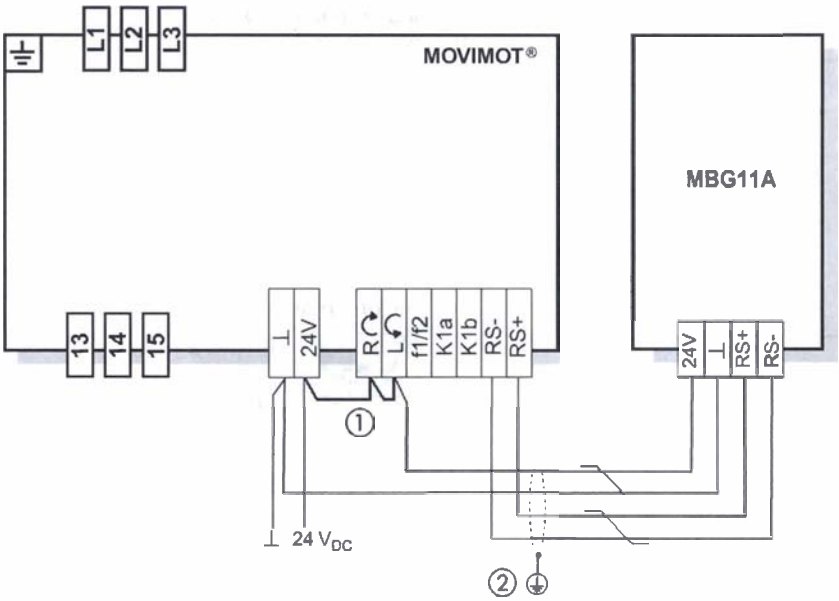
Only CW rotation is enabled
Setpoint selections for CCW rotation result in standstill of drive



Only **CCW** rotation is enabled
Setpoint selections for CW rotation result in standstill of drive

Drive is blocked or brought to standstill

MBG11A option connection



MBG11A

MBG11A option	
Part number	823 547 8
Input voltage	24 V_{DC} ±25 %
Current consumption	approx. 70 mA
Setpoint resolution	1 %
Serial interface[1]	RS-485 for connecting max. 31 MOVIMOT® inverters (max. 200 m, 9600 baud)
Enclosure	IP 65

1) with integrated dynamic terminating resistor

1. **Check MOVIMOT® is connected correctly (see section 5).**
2. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1).
3. Check the setting for 4Q operation (DIP switch S1/6 = OFF).

02765AEN

Fig. 9: Setting DIP switches

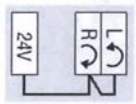
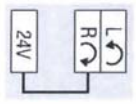
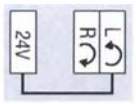
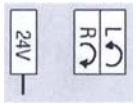
4. Set the minimum frequency f_{min} with switch f2.

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Minimum frequency f_{min} [Hz]	2	5	7	10	12	15	20	25	30	35	40

5. Set the ramp time with switch t1 (ramp times in relation to a setpoint step change of 50 Hz).

Switch t1											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Ramp time t1 [s]	0.1	0.2	0.3	0.5	0.7	1	2	3	5	7	10

6. Check whether the required direction of rotation is enabled.

Terminal R	Terminal L	Meaning
Activated	Activated	• Both directions of rotation are enabled
		
Activated	Not activated	• Only clockwise direction of rotation is enabled • Setpoint selections for counterclockwise lead to the drive being stopped
		
Not activated	Activated	• Only counterclockwise direction of rotation is enabled • Setpoint selections for clockwise lead to the drive being stopped
		
Not activated	Not activated	• Unit is blocked or the drive is stopped
		

7. Put on the connection box cover and screw it into place (max. 2.5 Nm).

8. Set the required maximum speed using setpoint potentiometer f1.

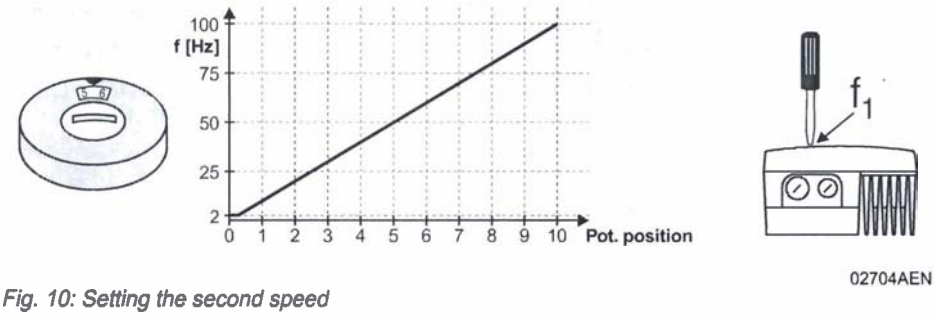
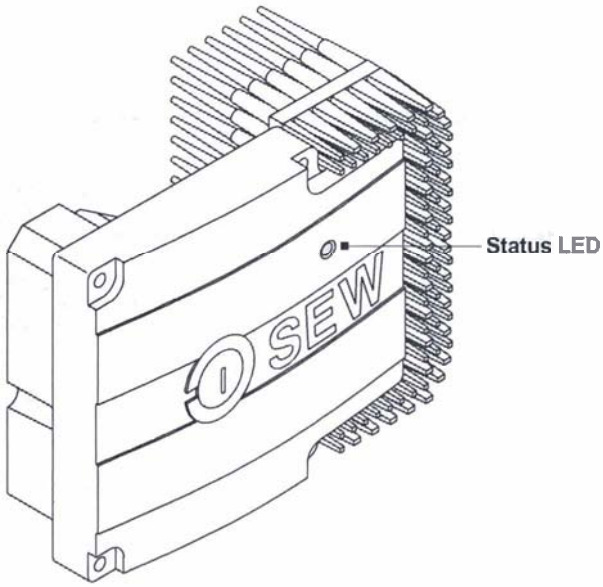


Fig. 10: Setting the second speed

9. Make sure the retaining screw of the cover has a seal and fit it back in.
10. Switch on the voltage.

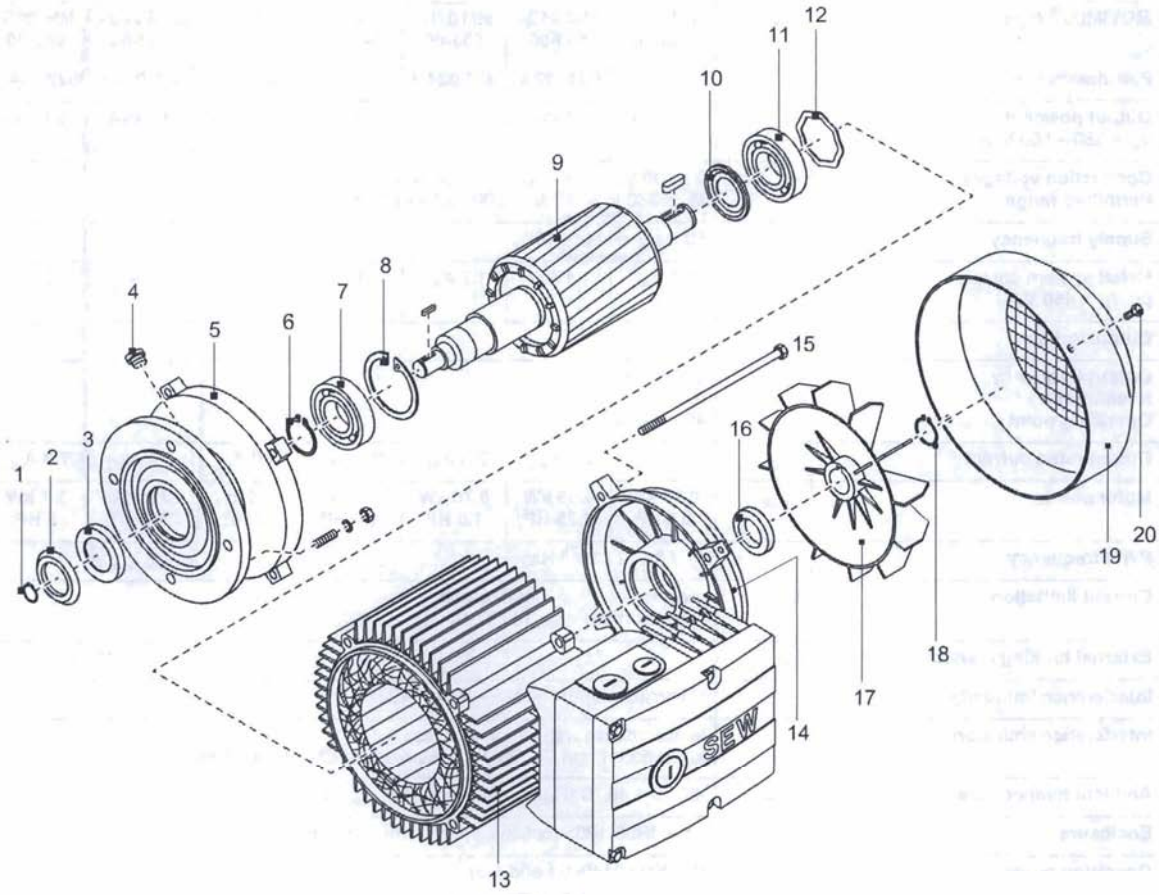
Operating MBG11A and MLG..A options	
Display	**Negative** display value e.g.  = Counterclockwise **Positive** display value e.g.  = Cl kwise The displayed value relates to the speed set using setpoint potentiometer f1. For example: Display "50" = 50 % of the speed set using the setpoint potentiometer. Important: If the display is "0", the drive is turning at f_{min}.
Increase the speed	If clockwise:  If counterclockwise: 
Reduce the speed	If clockwise:  If counterclockwise: 
Inhibit MOVIMOT®	Press the following keys simultaneously:  Display = 
Enable MOVIMOT®	 or  **Important:** MOVIMOT® accelerates to the previously stored value after enable
Change in direction of rotation from CW to CCW	1.  until display shows  2. Press again to change the direction of rotation from CW to CCW
Change in direction of rotation from CCW to CW	1.  until display shows  2. Press  again to change the direction of rotation from CW to CCW
Memory function	After the supply system has been switched off and on again, the value last set is retained provided the 24 V supply was present for at least 4 seconds following the most recent setpoint change.



Meaning of the status LED states

The 3-color LED signals the operating and fault states.

LED color	LED status	Operational status	Description
	Off	Not ready	No 24 V power supply
Yellow	Steady flashing	Not ready	Self-test phase active or 24 V power supply present but supply voltage not OK
Yellow	Steady light	Ready but unit inhibited	24 V power supply and supply voltage OK, but no enable signal
Green/ yellow	Flashing with alternating colors	Ready, but timeout	Communication via RS-485 disrupted
Green	Steady light	Unit enabled	Motor operating
Green	Steady, fast flashing	Current limit active	Drive has reached the current limit
Red	Steady light	Not ready	Check the 24 V_{DC} supply Make sure that there is a smoothing DC voltage with a low ripple (residual ripple max. 13 %) present
Red	2 x flash, pause	Fault 07	DC link voltage too high
Red	3 x flash, pause	Fault 11	Excessive temperature in output stage
Red	4 x flash, pause	Fault 84	Excessive temperature in motor Assignment of motor to frequency inverter incorrect
Red	5 x flash, pause	Fault 89	Excessive temperature in brake Assignment of motor to frequency inverter incorrect
Red	6 x flash, pause	Fault 06	Mains phase fault



1 Circlip
2 Oil flinger
3 Oil seal
4 Screw plug
5 Drive end bearing end shield
6 Circlip
7 Ball bearing
8 Circlip
9 Rotor
10 Nilos ring
11 Ball bearing
12 Equalizing ring
13 Stator
14 Non-drive end bearing end shield
15 Hex head screw
16 V-ring
17 Fan
18 Circlip
19 Fan guard
20 Housing screw

MOVIMOT® type		MM 03B-503-00	MM 05B-503-00	MM 07B-503-00	MM 11B-503-00	MM 15B-503-00	MM 22B-503-00	MM 30B-503-00
Part number		**823 022 6**	**823 023 4**	**823 024 2**	**823 025 0**	**823 026 9**	**822 953 8**	**822 954 6**
Output power at V_{in} = 380 – 500 V_{AC}	P_N	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA	3.8 kVA	5.1 kVA
Connection voltages Permitted range	V_{in}	3 x 380 V_{AC} / 400 V_{AC} /415 V_{AC} /**460 V_{AC}** / 500 V_{AC} V_{in} = 380 V_{AC} -10 % ... 500 V_{AC} +10 %						
Supply frequency	f_{supply}	50 Hz ... 60 Hz ± 10 %						
Rated system current (at V_{in} = 460 V_{AC})	I_{system}	1.1 A_{AC}	1.4 A_{AC}	1.7 A_{AC}	2.1 A_{AC}	3.0 A_{AC}	4.3 A_{AC}	5.8 A_{AC}
Output voltage	V_{out}	0 ... V_{in}						
Output frequency Resolution Operating point	f_{out}	2 ... 100 Hz 0.01Hz 460 V at 60 Hz						
Output rated current	I_{rated}	1.6 A_{AC}	2.0 A_{AC}	2.5 A_{AC}	3.2 A_{AC}	4.0 A_{AC}	5.5 A_{AC}	7.3 A_{AC}
Motor power	P_{mot}	**0.37 kW 0.5 HP**	**0.55 kW 0.75 HP**	**0.75 kW 1.0 HP**	**1.1 kW 1.5 HP**	**1.5 kW 2 HP**	**2.2 kW 3.0 HP**	**3.7 kW 5 HP**
PWM frequency		4[1] / 8 / 12 / 16[2] kHz						
Current limitation	I_{max}	**motor:** 160 % with ⍑ **regenerative:** 160 % with ⍑						
External braking resistor	R_{min}	200 Ω					100 Ω	
Interference immunity		Complies with EN 50082 – Parts 1+2						
Interference emission		In accordance with limit value class A to EN 55011 and EN 55014, complies with EN 50081 – Part 2						
Ambient temperature	ϑ_{amb}	**-25 °C – 40 °C** (P_{rated} reduction: 3 % I_{rated} per K to max. 60 °C)						
Enclosure		IP54, IP55, IP65 (options, specify when ordering)						
Operating mode		DB (EN 60149-1-1 and 1-3)						
Type of cooling (DIN 41 751)		Self-cooling						
Altitude		h ≤ 1000 m (P_{rated} reduction: 1 % per 100 m up to max. 2000 m)						
Ext. power supply to electronics	Tl. 24 V	V = +24 V ± 25 % I_{in} ≤ 250 mA						
Binary inputs		Isolated by opto-coupler, PLC-compatible (EN 61131-2) R_i ≈ 3.0 kΩ, I_E ≈10 mA, sampling interval ≤ 5 ms						
Signal level		+13 V ... +30 V = "1" = Contact made –3 V ... +5 V = "0" = Contact not made						
Control functions	Tl. R ↻ Tl. L ↺ Tl. f1/f2	CW/STOP CCW/STOP "0" = Setpoint 1 / "1" = Setpoint 2						
Output relay Contact data	Tl. K1a Tl. K1b	Response time ≤ 10 ms 24 V_{DC} / 0.6 A_{DC} / DC11 to IEC 337-1						
Signaling function		Normally open contact for ready signal						
Serial interface	Tl. RS+ Tl. RS-	RS-485 (to EIA standard) Max. 32 stations (1 bus master[3] + 31 MOVIMOT® units) Max. cable length: 200 m (for transmission rate: 9600 baud) 30 m (for transmission rate: 31250 baud [4])						

1) Factory setting
2) 16 kHz PWM frequency (low noise) When DIP SWITCH S1/7 = ON, the units operate with a 16 kHz PWM frequency (low noise) and switch back in steps to lower switching frequencies depending on the heat sink temperature.
3) Ext. control or MBG11A, MWA21A or MLG..A option
4) Transmission rate 31250 baud is detected automatically when operating with fieldbus interface MF...

Design and Operating Notes

Lubricants

General Information

Unless a special arrangement is made, SEW supplies the drives with a lubricant fill specifically for the gear unit and mounting position. The decisive factor is the mounting position (M1 – M6, Refer to "Mounting Positions" on page 52) specified when ordering the drive. You must adapt the lubricant fill to any subsequent changes made to the mounting position. Refer to Lubricant fill quantities on page 78.

Anti-friction bearing greases

The anti-friction bearings in SEW gear units are given a factory-fill with the greases listed in the following table. SEW recommends regreasing anti-friction bearings with a grease fill time as changing the oil.

	Ambient temperature	Manufacturer	Type
Anti-friction bearing in gear unit	-30 °C – +60 °C	Mobil	Mobilux EP 2
	-40 °C – +80 °C	Mobil	Mobiltemp SHC 100
Special greases for anti-friction bearings in gear units:			
Biodegradable oil	-30 °C – +40 °C	Aral	Aral Eural Grease EP 2
Lubricant for Food Processing Industry	-20 °C – +40 °C	Klüber	Klüberbio M32-82

The following grease quantities are required:

- For fast-running bearings (motor and gear unit input end): Fill the cavities between the roll barrels one third full with grease.
- For slow-running bearings (in gear units and gear unit output end): Fill the cavities between the roll barrels two thirds full with grease.

Gear Unit	Fill Quantities											
	M1		M2		M3		M4		M5		M6	
	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters
K..37	0.13	0.5	0.26	1	0.26	1	0.37	1.4	0.26	1	0.26	1
K..47	0.21	0.8	0.34	1.3	0.42	1.6	0.55	2.1	0.42	1.6	0.42	1.6
K..57	0.34	1.3	0.61	2.3	0.71	2.7	0.84	3.2	0.77	2.9	0.71	2.7
K..67	0.29	1.1	0.63	2.4	0.71	2.7	0.95	3.6	0.69	2.6	0.69	2.6
K..77	0.55	2.1	1.08	4.1	1.21	4.6	1.58	6	1.16	4.4	1.16	4.4
K..87	0.98	3.7	2.16	8.2	2.32	8.8	2.93	11.1	2.11	8	2.11	8
K..97	1.85	7	3.88	14.7	4.14	15.7	5.28	20	4.14	15.7	4.14	15.7
K..107	2.64	10	5.41	20.5	6.34	24	8.45	32	6.34	24	6.34	24
K..127	5.54	21	10.96	41.5	11.35	43	13.73	52	10.56	40	10.56	40
K..157	8.18	31	17.42	66	17.69	67	22.97	87	16.37	62	16.37	62
KH167	8.71	33	25.08	95	27.72	105	32.47	123	22.44	85	22.18	84
KH187	13.99	53	40.13	152	44.09	167	52.80	200	37.75	143	37.75	143

Lubricant table

	6) °C	DIN (ISO)	ISO, NLGI	Mobil®	Shell	Klüber	ARAL	BP	Tribol	TEXACO	Optimol	FUCHS
R...	Standard -10 +40	CLP(CC)	VG 220	Mobilgear 630	Shell Omala 220	Klüberoil GEM 1-220	Aral Degol BG 220	BP Energol GR-XP220	Tribol 1100/220	Meropa 220	Optigear BM 220	Renolin CLP220
	-25 +80	CLPPG	VG 220	Mobil Glygolyle 30	Shell Tivela WB	Klübersynth GH 6-220	Aral Degol GS 220	BP Enersyn SG-XP220	Tribol 800/220	Synlube CLP220	Optiflex A 220	
K...(HK...)	4) -40 +80	CLPHC	VG 220	Mobil SHC 630	Shell Omala 220 HD	Klübersynth EG 4-220	Aral Degol PAS 220		Tribol 1510/220	Pinnacle EP220	Optigear Synthetic A 220	Renolin Unisyn CLP220
	4) -40 +40		VG 150	Mobil SHC 629		Klübersynth EG 4-150				Pinnacle EP150		
	-20 +25	CLP(CC)	VG 150 VG 100	Mobilgear 627	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP100	Tribol 1100/100	Meropa 150	Optigear BM 100	Renolin CLP150
F...	-30 +10	HLP(HM)	VG 68-46 VG 32	Mobil D.T.E. 13M	Shell Tellus T 32	Klüberoil GEM 1-68	Aral Degol BG 46		Tribol 1100/68	Rando EP Ashless 46	Optigear 32	Renolin B 46 HVI
	4) -40 +10	CLPHC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
	4) -40 -20	HLP(HM)	VG 22 VG 15	Mobil D.T.E. 11M	Shell Tellus T 15	Isoflex MT 30 ROT		BP Energol HLP-HM 10		Rando HDZ 15		
S...(HS...)	Standard 0 +40	CLP(CC)	VG 680	Mobilgear 636	Shell Omala 680	Klüberoil GEM 1-680	Aral Degol BG 680	BP Energol GR-XP680	Tribol 1100/680	Meropa 680	Optigear BM 680	Renolin CLP680
	-20 +60	CLPPG	VG 680 1)	Mobil Glygoyle HE 680		Klübersynth GH 6-680		BP Enersyn SG-XP680	Tribol 800/680	Synlube CLP680		
	4) -30 +80	CLPHC	VG 460	Mobil SHC 634	Shell Omala 460 HD	Klübersynth EG 4-460				Pinnacle EP460		
	4) -40 +10		VG 150	Mobil SHC 629		Klübersynth EG 4-150				Pinnacle EP150		
	-20 +10	CLP(CC) HLP(HM)	VG 150 VG 100	Mobilgear 627	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP100	Tribol 1100/100	Meropa 100	Optigear BM 100	Renolin CLP150
	-25 +20	CLPPG	VG 220 1)	Mobil Glygoyle 30		Klübersynth GH 6-220			Tribol 800/220	Synlube CLP220	Optiflex A 220	
	4) -40 0	CLPHC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
R..., K...(HK...), F..., S...(HS...)	4) -30 +40	HCE 7)	VG 460		Shell Cassida Fluid GL460	Klüberoil 4UH1-460	Aral Eural Gear 460				Optileb GT 460	
	-20 +40	E 8)	VG 460			Klüberbio CA2-460	Aral Degol BAB 460				Optisynt BS 460	
W...(HW...)	Standard -20 +40	SEW PG	VG 460 2)			Klüber SEW HT-460-5						
	4) -40 +10	API GL5	SAE 75W90 (~VG 100)	Mobilube SHC 75 W90-LS								
	-20 +40	CLPPG 7)	VG 460 3)			Klübersynth UH1 6-460						
R32 R302	-25 +60	DIN 5) 51 818	00	Glygoyle Grease 00	Shell Tivela Compound A	Klübersynth GE 46-1200				Multifak 6833 EP00		
	Standard -15 +40		000 - 0	Mobilux EP004	Shell Alvania GL00		Aralub MFL00	BP Energrease LS-EP00		Multifak EP000	Longtime PD 00	Renolin SF 7 - 041

The lubricant table above shows the permitted lubricants for SEW gear units. Please note the following key to the lubricant table.

Key to the lubricant table

CLP = Mineral oil
CLP PG = Polyglycol (W gear units, conforms to USDA-H1)
CLP HC = Synthetic hydrocarbons
E = Ester oil (water pollution danger category WGK 1)
HCE = Synthetic hydrocarbons + ester oil (USDA - H1 certification)
HLP = Hydraulic oil
= Synthetic lubricant (= synthetic-based anti-friction bearing grease)
= Mineral lubricant (= mineral-based anti-friction bearing grease)

1) Helical-worm gear units with PG oil: Please contact SEW
2) Special lubricant for Spiroplan® gear units only
3) Recommendation: Select SEW $f_B \geq 1.2$
4) Note critical starting behavior at low temperatures!
5) Low-viscosity grease
6) Ambient temperature
7) Lubricant for the food processing industry
8) Biodegradable oil (lubricant for use in agriculture, forestry and water resources)

Troubleshooting

NOTICE

Improper handling of the gear unit and the motor may result in damage.

Potential damage to property

- Any repair work on drives must be performed by qualified specialists only.
- Only qualified specialists are permitted to separate the drive from the motor.

Gear unit

Failure	Possible cause	Remedy
Unusual, regular running noise	Meshing/grinding noise: Bearing damage	Check the oil, change bearings
	Knocking noise: Irregularity in the gearing	Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	• Check the oil • Stop the drive, contact customer service
Oil leaking [1)] • From the gear unit cover • From the motor flange • From the motor oil seal • From the gear unit flange • From the output side oil seal	Rubber gasket on the gear unit cover leaking	Tighten the screws on the gear unit cover and observe the gear unit If oil still leaks: Contact customer service
	Gasket defective	Contact customer service
	Gear unit not ventilated	Vent the gear unit
Oil leaking from breather valve	Too much oil	Correct the oil quantity, see "Inspection and maintenance for the gear unit" (see page 64)
	Drive operated in incorrect mounting position	• Properly adjust the breather valve • Correct the oil level
	Frequent cold starts (oil foams) and/or high oil level	Use an oil expansion tank
Output shaft does not turn although the motor is running or the input shaft is rotated	Connection between shaft and hub in gear unit interrupted	Send in the gear unit/gearmotor for repair

1) Short-term oil or grease leakage at the oil seal is possible in the run-in phase (48 hours running time).

Faults	Cause/solution
Communication timeout (motor stops, without fault code)	A No connection ⊥, RS+, RS- between MOVIMOT® and RS-485 master. Check the connection, in particular the ground, and repair. B EM interference. Check the shielding of the data cables and improve if necessary. C Incorrect type (cyclical) in acyclical protocol Time between the individual telegrams > 1 s for protocol type "cyclical". Shorten telegram cycle or select "acyclical".
DC link voltage too low, supply system off detected (motor stops, without fault code)	Check supply system leads and supply voltage for interruption. Motor restarts automatically as soon as the supply voltage reaches normal values.
Fault code 06 Phase fault	Check the supply system leads for phase fault. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 07 DC link voltage too high	A Ramp time too short → Increase ramp time B Faulty connection between brake coil and braking resistor → Check the connection between the braking resistor and the brake coil. Correct if necessary. C Incorrect internal resistance brake coil / braking resistor → Check the internal resistance of the brake coil / braking resistor (see chapter 9.6) D Thermal overload in braking resistor → Wrong size of braking resistor selected Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 11 Thermal overload of the output stage or internal unit fault	• Clean the heat sink • Reduce the ambient temperature • Prevent heat accumulation • Reduce the load on the drive Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 84 Thermal overload of motor	• Reduce the ambient temperature • Prevent heat accumulation • Reduce the load on the motor • Increase the speed Check the combination of the drive and MOVIMOT® frequency inverter if the fault is signaled shortly after the first release. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 89 Thermal overload of brake coil or brake coil defective	• Extend the set ramp time • Brake inspection (see chapter 8.3) • Contact SEW service Check the combination of the drive and MOVIMOT® frequency inverter if the fault is signaled shortly after the first release. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.

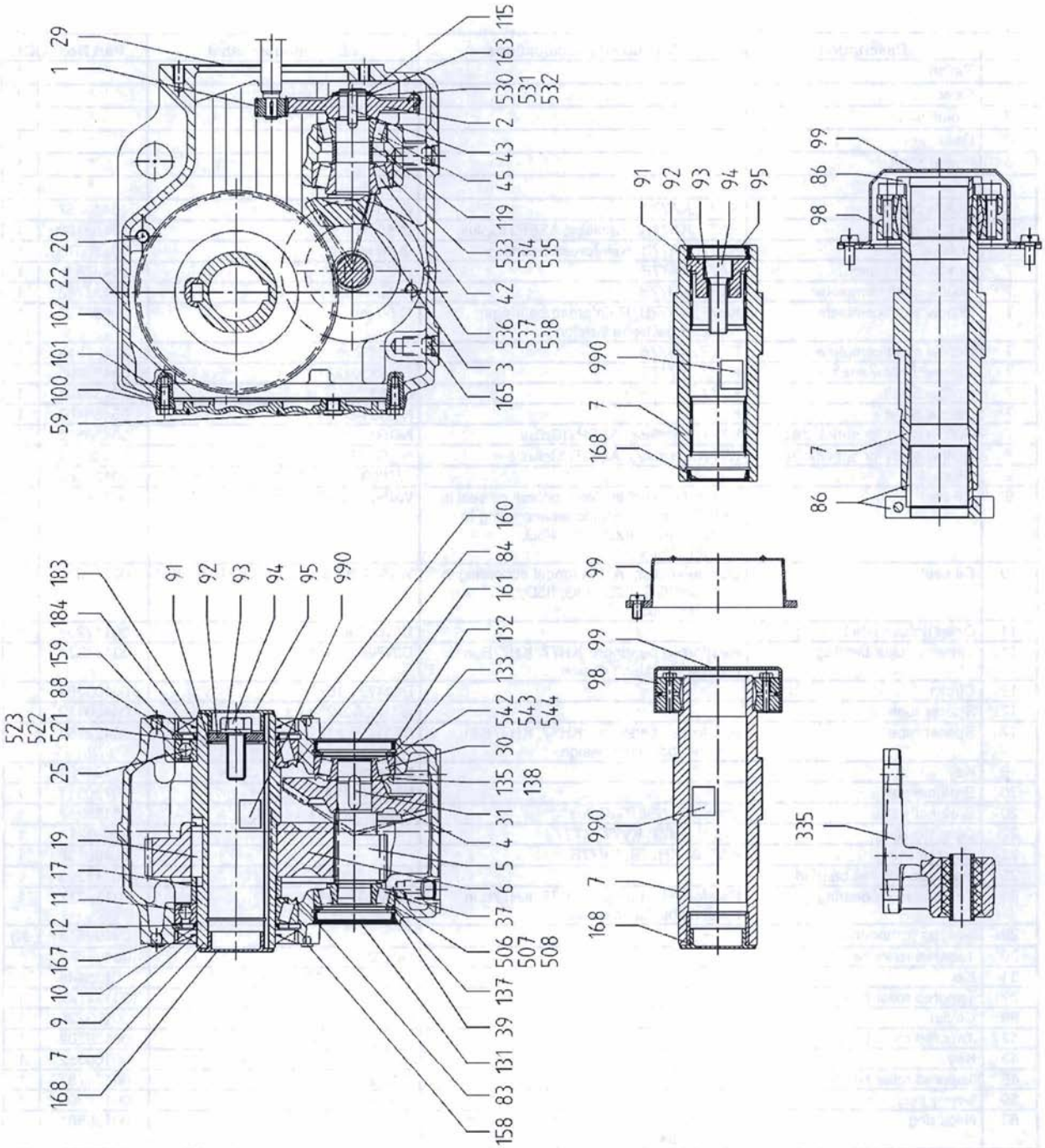
Note: If you require assistance from our customer service staff, please state the following:

- Data on the nameplate
- Type and extent of the fault
- Time and peripheral circumstances of the fault
- Presumed cause

Parts List

Helical-bevel gear unit

KA77, KH77, KV77, KT77, KA77B, KH77B, KV77B



When ordering spare parts always quote nameplate data with serial number and designation with part number!
Mount-on gear units have motors, variable speed gear units or special input shaft assemblies mounted on the drive end. For parts see appropriate parts list.

Parts List

Helical-bevel gear unit

KA77, KH77, KV77, KT77, KA77B, KH77B, KV77B

SEW EURODRIVE

No.	Description	Additional specifications	SEW standard label	Part No.	Qty.
1	Pinion			*	1
2	Gear			*	1
3	Pinion shaft			*	1
4	Gear			*	1
5	Pinion shaft			*	1
6	Gear			*	1
7	Hollow Shaft	KA77; KA77B	Ø 50 mm	06430457	1
7	Hollow Shaft	KA77; KA77B; stainless; ASEPTICplus	Ø 50 mm	00453188	1
7	Hollow Shaft	KA77; KA77B; Reinforced bearings	Ø 50 mm	00425079	1
7	Hollow Shaft (inch)	KA77; KA77B	Ø 2,000 in.	06432816	1
7	Hollow shaft complete	KH77; KH77B	Ø 50 mm	06431763	1
7	Hollow shaft complete	KH77; KH77B; Reinforced bearings; reduced backlash version	Ø 50 mm	00437123	1
7	Hollow shaft complete	KH77; KH77B	Ø 50/52 mm	0042451X	1
7	Splined hollow shaft	KV77; KV77B	50x2x30x24	06433995	1
7	Hollow Shaft	KT77	NG50	06437206	1
7	Hollow Shaft	KT77	NG50 AB	06438407	1
7	Hollow shaft for shrink disc	KT77; stainless; ASEPTICplus	NG50	06438520	1
7	Hollow shaft for shrink disc	KT77; stainless; ASEPTICplus	NG50 AB	06438644	1
9	Oil seal		W4560 BA-SF70x110x12/8-NBR	00177660	1
9	Oil seal	optional oil seal in Vitonoptional oil seal in FKM (Viton); ATEX model according to category II2G, II2D, II3G, II3D; ASEPTICplus	W4561 BA-SF70x110x12/8-FKM	00178063	1
10	Oil seal	Double sealing; ATEX model according to category II2G, II2D, II3G, II3D; ASEPTICplus	W4562 B1-SF70x104x10/14,5-FKM	00173665	1
11	Deep groove ball bearing		DIN625 6014-Z	00117293	1
11	Tapered roller bearing	Reinforced bearings; KH77, KH77B in reduced backlash design	DIN720 32014X	0013922X	1
12	Circlip		DIN472 110x4	00103284	1
17	Spacer tube		Ø71xØ80x23 mm	06430112	1
17	Spacer tube	Reinforced bearings; KH77, KH77B in reduced backlash design	Ø71xØ80x17,7 mm	00423254	1
19	Key		DIN6885 B16x10x45-C45K	00134791	1
20	Breather valve		W4087 M12x1,5-CuZn	00130311	1
20	Breather valve	stainless; ASEPTICplus	W4087 M12x1,5-NIRO	00136247	1
22	Gear Housing	KA77; KH77; KV77; KT77		0643021X	1
22	Gear Housing	KA77B; KH77B; KV77B		06430198	1
25	Deep groove ball bearing		DIN625 6014-Z	00117293	1
25	Tapered roller bearing	Reinforced bearings; KH77, KH77B in reduced backlash design	DIN720 32014X	0013922X	1
29	Sealing compound			09102558	X)
30	Tapered roller bearing		DIN720 303 06	0012477X	1
31	Key		DIN6885 AB10x8x25-55HRC	00135445	1
37	Tapered roller bearing		DIN720 303 06	0012477X	1
39	Circlip		DIN472 72x2,5	00103225	1
42	Tapered roller bearing		DIN720 323 06	00139262	1
43	Key		DIN6885 B8x7x25-55HRC	00100552	1
45	Tapered roller bearing		DIN720 322 06	00124737	1
59	Screw plug		W4085 M12x1,5-ST-A2L	00114308	7
83	Nilos ring	Reinforced bearings; KH77, KH77B in reduced backlash design	W4587 32014X-AV	00136581	1

* Gearing parts have embossed part numbers. These must always be quoted!

X) if required

When ordering spare parts always quote nameplate data with serial number and designation with part number!

Mount-on gear units have motors, variable speed gear units or special input shaft assemblies mounted on the drive end. For parts see appropriate parts list.

Parts List

Helical-bevel gear unit

KA77, KH77, KV77, KT77, KA77B, KH77B, KV77B

SEW EURODRIVE

No.	Description	Additional specifications	SEW standard label	Part No.	Qty.
84	Nilos ring	Reinforced bearings; KH77, KH77B in reduced backlash design	W4587 32014X-AV	00136581	1
86	Clamp set complete	KT77	Ø 50 mm	10678042	1
86	Clamp set complete	KT77; stainless; ASEPTICplus	Ø 50 mm	10678115	1
86	Clamp set complete	KT77	Ø 1,625 in.	10678328	1
86	Clamp set complete	KT77	Ø 1,750 in.	10678336	1
86	Clamp set complete	KT77	Ø 1,9375 in.	10678344	1
86	Clamp set complete	KT77	Ø 2,000 in.	10678352	1
86	Clamp set complete	KT77; stainless; ASEPTICplus	Ø 1,625 in.	10678565	1
86	Clamp set complete	KT77; stainless; ASEPTICplus	Ø 1,750 in.	10678573	1
86	Clamp set complete	KT77; stainless; ASEPTICplus	Ø 1,9375 in.	10678581	1
86	Clamp set complete	KT77; stainless; ASEPTICplus	Ø 2,000 in.	10678603	1
88	Circlip		DIN472 110x4	00103284	1
91	Circlip	KA77; KA77B	DIN472 50x2	00103381	1
91	Circlip	KA77; KA77B; stainless; ASEPTICplus	DIN472 50X2-NIRO	00130281	1
91	Circlip	KV77; KV77B	DIN472 55x2	00103357	1
92	Disc	KA77; KA77B	W4132 17x49,5x8	01039741	1
92	Disk (inch)	KA77; KA77B	W4132 11/16x1,98x3/8 IN.	08069441	1
92	Disc	KV77; KV77B		01174053	1
92	Disc	KA77; KA77B; stainless; ASEPTICplus	W4132 17X49,5X8-NIRO	0013029X	1
93	Lock washer	KA77; KA77B	DIN128 A16-FST-PHR	00109959	1
93	Lock washer	KA77; KA77B; stainless; ASEPTICplus	DIN128 A16-NIRO	00130273	1
93	Supporting ring	KV77; KV77B	DIN988 S17x24x1,5-FST	00103411	1
94	Hex head screw	KA77; KA77B	ISO4017 M16x45-8.8	00110248	1
94	Hex head screw	KA77; KA77B; stainless; ASEPTICplus	ISO4017 M16X45-A2-70	00130362	1
94	Hex head screw	KA77; KA77B	ISO4017 5/8-11x1-3/4 I	08069573	1
94	Machine screw	KV77; KV77B	DIN912 M16x50-8.8	00123307	1
95	Closing plug	KA77; KA77B	W4299 50,5	01140957	1
95	Closing plug	KA77; KA77B; For inch hollow shaft	W4299 51,5	01146653	1
95	Closing cap	KV77; KV77B	W4300 55x10	00124419	1
98	Shrink Disc	KH77; KH77B	W4941 62x110	06434665	1
98	Shrink Disc	KT77	W4941 68x118-TL	06439616	1
98	Shrink Disc	KT77; stainless; ASEPTICplus	W4941 68x118TL-Niro	06439683	1
99	Hood Cover	KH77; KH77B		01140965	1
99	Hood cover complete	KH77		06435165	1
99	Hood cover complete	KH77; KT77; ATEX model according to category II2G, II2D, II3G, II3D; stainless; ASEPTICplus		06435874	1
100	Gearcase cover			06433375	1
101	Hex head screw		ISO4017 M8x20-8.8	00110256	8
102	Gasket			06435068	1
115	Circlip		DIN471 24x1,2	00102733	1
119	Spacer tube		Ø30,6xØ35x20 mm	06433448	1
131	Closing cap		W4300 72x9	00106925	1
132	Circlip		DIN472 72x2,5	00103225	1
133	Supporting ring		DIN988 S56x72x3-FST	0010356X	1
135	Nilos ring	only for mounting position M5A (or M5B with reverse direction o rotation)	W4587 30306 AV	00136808	1
137	Supporting ring		DIN988 S56x72x3-FST	0010356X	1
138	Nilos ring	only for mounting position M6B (or M6A with reverse direction o rotation)	W4587 30306 AV	00136808	1
158	Closing plug	KA77; KH77; KV77; KT77	W4299 7,1	00136042	2
159	Closing plug	KA77; KH77; KV77; KT77	W4299 10,5	00113727	8
160	Closing plug	KA77; KH77; KV77; KT77	W4299 7,1	00136042	2
161	Closing cap		W4300 72x9	00106925	1
163	Supporting ring		DIN988 S24x36x2-FST	00124001	1
165	Closing plug	KA77; KH77; KV77; KT77	W4299 14,5	00113743	4
167	Closing plug	KA77; KH77; KV77; KT77	W4299 10,5	00113727	8

When ordering spare parts always quote nameplate data with serial number and designation with part number!
Mount-on gear units have motors, variable speed gear units or special input shaft assemblies mounted on the drive end. For parts see appropriate parts list.

Parts List

Helical-bevel gear unit

KA77, KH77, KV77, KT77, KA77B, KH77B, KV77B

No.	Description	Additional specifications	SEW standard label	Part No.	Qty.
168	Closing plug	KA77; KH77; KA77B; KH77B	W4299 50,5	01140957	1
168	Closing plug	KA77; KA77B; For inch hollow shaft	W4299 51,5	01146653	1
168	Closing cap	KV77; KV77B	W4300 55x10	00124419	1
183	Oil seal		W4560 BA-SF70x110x12/8-NBR	00177660	1
183	Oil seal	optional oil seal in Vitonoptional oil seal in FKM (Viton); ATEX model according to category II2G, II2D, II3G, II3D; ASEPTICplus	W4561 BA-SF70x110x12/8-FKM	00178063	1
184	Oil seal	Double sealing; ATEX model according to category II2G, II2D, II3G, II3D; ASEPTICplus	W4562 B1-SF70x104x10/14,5-FKM	00173665	1
335	Torque arm complete	KA77; KH77; KV77; KT77		06434347	1
506	Shim		DIN988 56x72x0,1-ST	00103772	X)
507	Shim		DIN988 56x72x0,3-ST	00104019	X)
508	Shim		DIN988 56x72x0,5-ST	00104256	X)
521	Shim		DIN988 90x110x0,1-ST	00103829	X)
521	Shim	Reinforced bearings; KH77, KH77B in reduced backlash design	W4140 100x110x0,1-St	00179108	X)
522	Shim		DIN988 90x110x0,3-ST	0010406X	X)
522	Shim	Reinforced bearings; KH77, KH77B in reduced backlash design	W4140 100x110x0,3-St	00179116	X)
523	Shim		DIN988 90x110x0,5-ST	00104221	X)
523	Shim	Reinforced bearings; KH77, KH77B in reduced backlash design	W4140 100x110x0,5-St	00179124	X)
530	Shim		DIN988 24x36x0,1-ST	00123706	X)
531	Shim		DIN988 24x36x0,3-ST	00123714	X)
532	Shim		DIN988 24x36x0,5-ST	00123722	X)
533	Shim		DIN988 30x42x0,1-ST	00103853	X)
534	Shim		DIN988 30x42x0,3-ST	00104094	X)
535	Shim		DIN988 30x42x0,5-ST	00123455	X)
536	Shim		DIN988 30x42x0,1-ST	00103853	X)
537	Shim		DIN988 30x42x0,3-ST	00104094	X)
538	Shim		DIN988 30x42x0,5-ST	00123455	X)
542	Shim		DIN988 56x72x0,1-ST	00103772	X)
543	Shim		DIN988 56x72x0,3-ST	00104019	X)
544	Shim		DIN988 56x72x0,5-ST	00104256	X)
990	Contact corrosion inhibitor			09107819	1

X) if required

When ordering spare parts always quote nameplate data with serial number and designation with part number!

Mount-on gear units have motors, variable speed gear units or special input shaft assemblies mounted on the drive end. For parts see appropriate parts list.

ITT

April 6, 2011

Proposal No: RB11-04-06 01
Item No: ITEM 001

Series: e-SV Size: 5SV QTY: 1 Stage No: 6

Operating conditions

SERVICE	
LIQUID	
CAPACITY	29.0 gpm
HEAD	150.0 (ft)

Performance at 3500 RPM

PUBLISHED EFFY	68.8% (CDS)
RATED EFFY	68.8%
RATED POWER	**1.60 hp (Run** out 2.0 hp)
NPSHR	5.5 ft
DISCHARGE PRESSURE	73.5 psi g (90.0 psi g @ Shut off) Based on 0.0 psi g Suc.press
PERF. CURVE	5SV-3600-0
SHUT OFF HEAD	208.0 ft

Quoted Features

CONSTRUCTION	Round-304 (SVB)
MECHANICAL SEAL	Carbon/Silicon Carbide/Viton

Driver : Electric motor Manufacturer : Factory Choice

FURNISHED BY		MOUNTED BY	
RATING	2.0 hp (1.5 KW)	ENCLOSURE	TEFC
PHASE/FREQ/VOLTS	3/60 Hz/208-230/460	SPEED	3600 RPM
INSULATION/SF		FRAME	56C

Program Version 1.36.0.0

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Submittal Data

Multi-Stage Pumps

MODEL : 5SV6FE4F20

Hydraulic Data					Motor Data	e-SV Vertical Model	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	NPSHR	Voltage/Phase/Enclosure		
44.0 gpm	29.0 gpm	208.0 ft	150.0 ft	5.5 ft	208-230/460V 3 PH TEFC	5SV6FE4F20	1

Submittal Prepared for:
Engineer:
Submittal Prepared by: Regina Blazys
Submittal Date: April 6, 2011

Job:
Contractor:
Company:
Approved by:

Proposal No: RB11-04-06 01
Item No: ITEM 001
Date: April 6, 2011

Engineering Data

Pump Code: 5SV6FE4F20
Pump Size: 5SV
Stage No: 6
Pump Horsepower at Rating Point: 1.60 hp
Pump Shut Off Head: 208.0 ft
Efficiency: 68.8 %
Motor Speed: 3600
System Input Power: 3 / 208-230/460 V
Motor Rated Horsepower: 2.0 hp
Max.Frequency: 60Hz
Discharge Size: 1.25 in
Frame Size: 56C
Impeller Size: 3.0 in
Impeller Construction: Round-304 (SVB)
Impeller Type: Radial Impeller
Shaft Seal: Carbon/Silicon Carbide/Viton
Impeller Diameter: 3.0000 in
Reduced Impeller Diameter: 0.0000 in

Standard Equipment / Capability:

PUMP

The e-SV pump is a non-self priming vertical multistage pump coupled to a standard motor.The liquid end, located between the upper cover and the pump casing, is held in place bytie rods. The pump casing is available with different configurations and connection types.

- Delivery: up to 700.0 gpm/ Head: up to 1200. ft
- Temperature of pumped liquid: -20.0 deg F to 250.0 deg F standard version
- Direction of rotation: clockwise looking at the pump from the top down (marked with an arrow on the adapter and on the coupling).

MOTOR

- Standard NEMA 56C Frame motor totally enclosed fan cooled
- 3600 RPM nominal
- Three phase version,2 pole: 208-230/460 V,60Hz,2.0 hp
- Vertical multistage centrifugal pump. All metal parts in contact with the pumped liquid are made of stainless steel.
- F-AISI Round Flange/304 with 580.0 psi g MAWP

Reduced axial thrusts enable the use of standard NEMA TC motors that are easily found in the market

- Seal housing chamber designed to prevent the accumulation of air in the critical area next to the mechanical seal
- Mechanical seal according to EN 12756 (ex DIN 24960) and ISO 3069
- Versions with ANSI flanges that can be coupled to ANSI counter-flanges
- Threaded oval counter-flanges made of stainless steel are standard supply for the T versions
- Easy maintenance. No special tools required for assembly or disassembly
- Standard version for temperatures ranging from: 0 deg F to 250 deg F (optional to 300 deg F)

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Unit Dimensions

Multi-Stage Pumps

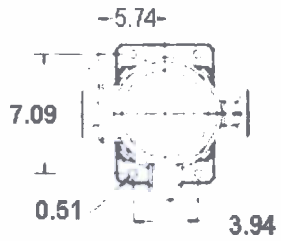
MODEL : 5SV6FE4F20

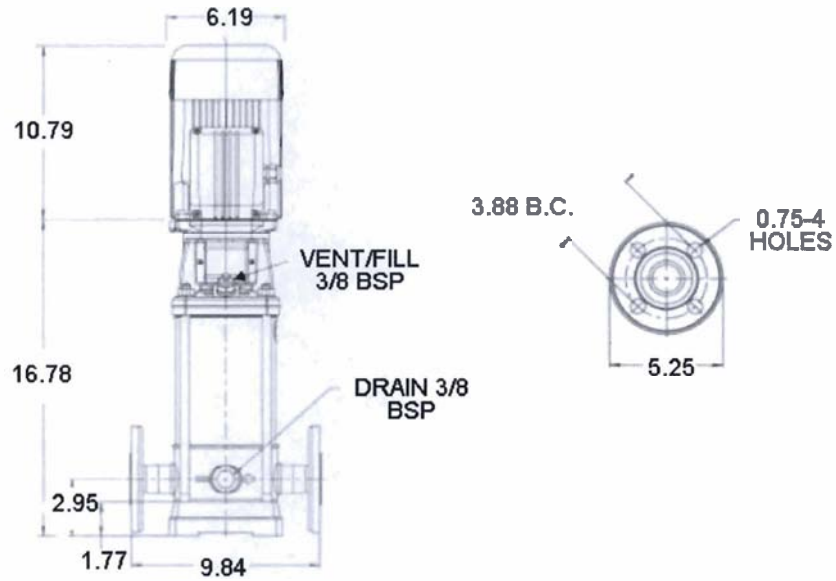
Hydraulic Data					Motor Data	e-SV Vertical Model	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	NPSHR	Voltage/Phase/Enclosure		
44.0 gpm	29.0 gpm	208.0 ft	150.0 ft	5.5 ft	208-230/460V 3 PH TEFC	5SV6FE4F20	1

Submittal Prepared for:
Engineer:
Submittal Prepared by: Regina Blazys
Submittal Date: April 6, 2011

Job:
Contractor:
Company:
Approved by:

Proposal No: RB11-04-06 01
Item No: ITEM 001
Date: April 6, 2011





• Dimensions are subject to change. Not to be used for construction purposes unless certified

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Performance Data

Multi-Stage Pumps

MODEL: 5SV6FE4F20

Hydraulic Data					Motor Data	e-SV Vertical Model	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	NPSHR	Voltage/Phase/Enclosure		
44.0 gpm	29.0 gpm	208.0 ft	150.0 ft	5.5 ft	208-230/460V 3 PH TEFC	5SV6FE4F20	1

Submittal Prepared for:
Engineer:
Submittal Prepared by: Regina Blazys
Submittal Date: April 6, 2011

Job:
Contractor:
Company:
Approved by:

Proposal No: RB11-04-06 01
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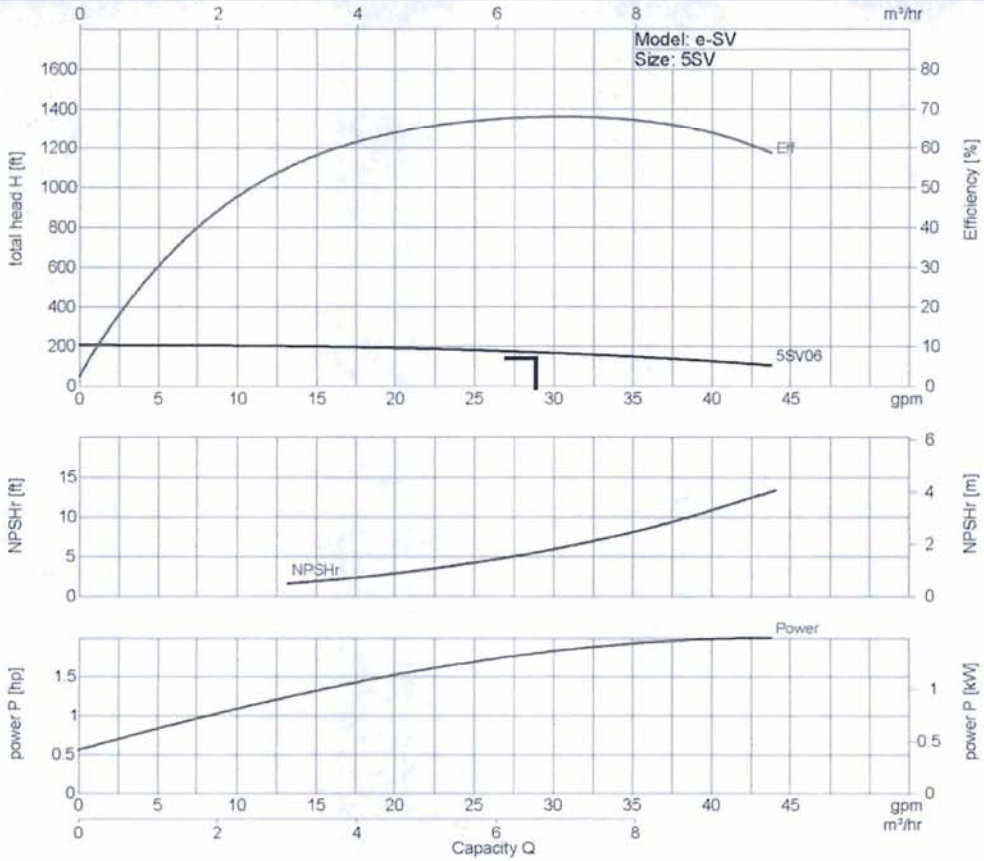

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Performance Data

Multi-Stage Pumps

MODEL: 5SV6FE4F20

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Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	NPSHR	Voltage/Phase/Enclosure		
44.0 gpm	29.0 gpm	208.0 ft	150.0 ft	5.5 ft	208-230/460V 3 PH TEFC	5SV6FE4F20	1

Submittal Prepared for:
Engineer:
Submittal Prepared by: Regina Blazys
Submittal Date: April 6, 2011

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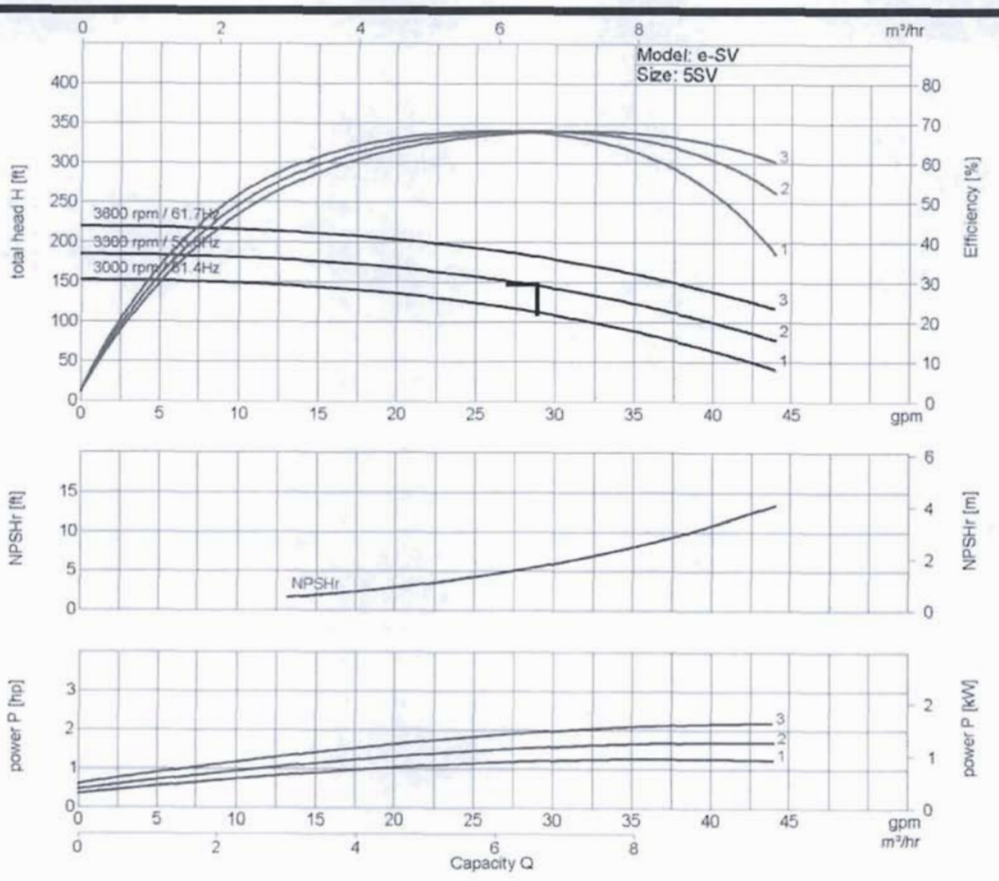
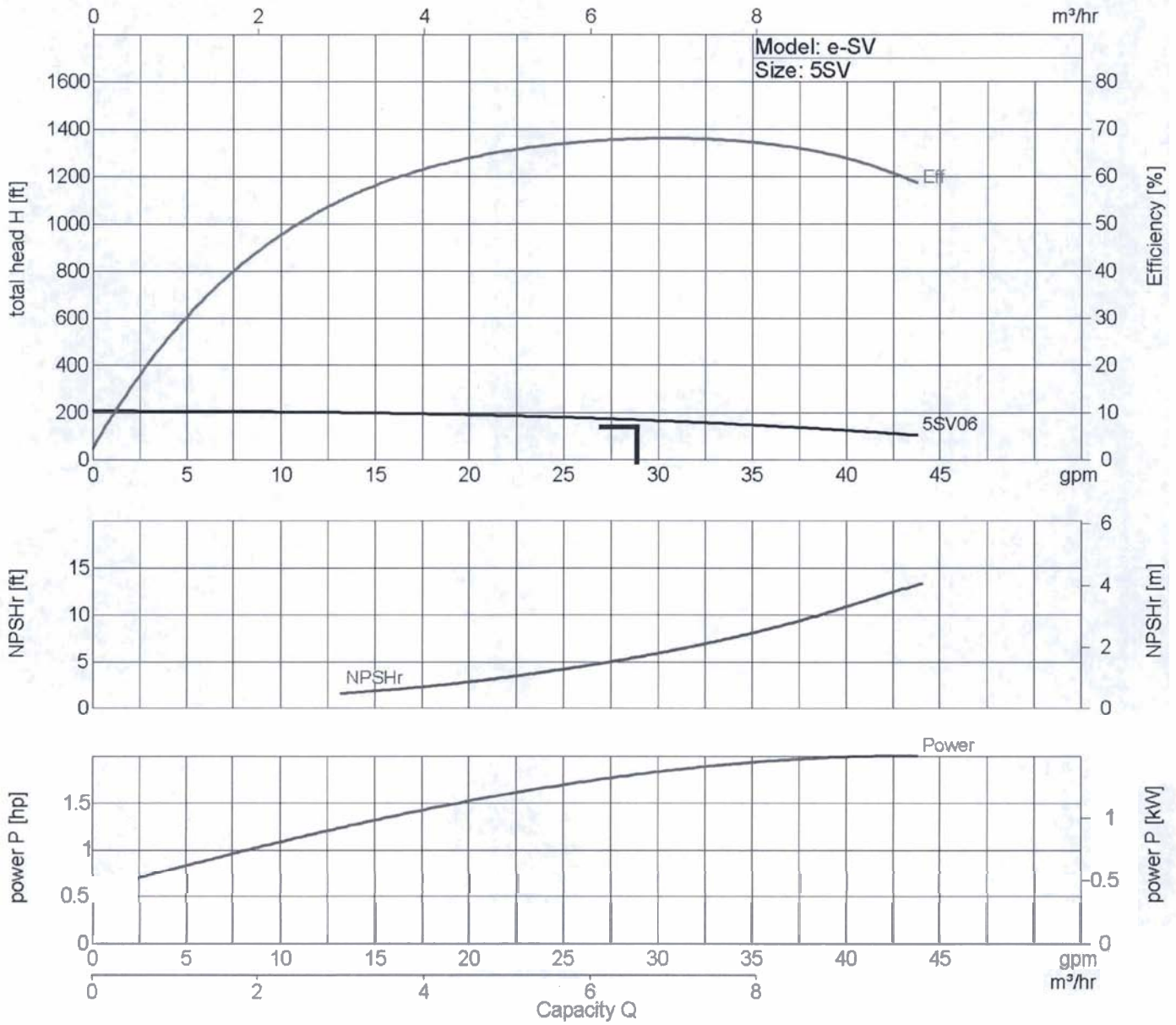


	Model **e-SV** Speed Variable	Size **5SV** Frequency 60Hz
Purchaser End User Item No. ITEM 001 Service Certified By	Liquid Nom. Temperature 70.0 deg F Spec. Gravity 1.000 Viscocity 1.000 cp Vapor Press Solids% / Size	Date 04/06/2011 Issued by: Regina Blazys Quotation No. RB11-04-06 01 Job/Inq.No. Order No.
Rated Operating Point		
Capacity 29.0 gpm Head 150.0 ft NPSHa NPSHr 5.5 ft Rated Efficiency 68.8 % Suction Spec. Speed 5,069 gpm(US) ft	Power - Pump 1.60 hp Power - Others Power - Totals 1.60 hp Power - max. 2.0 hp	No. of Stages 6 Imp. Dia. 1st Stg: 17.9528 in Imp. Dia. Adl Stg: Min. Hydraulic Flow 7.0 gpm Min. Thermal Flow N/A
Notes:		



	Model **e-SV** Speed Variable	**Size** **5SV** Frequency 60Hz
Purchaser End User Item No. ITEM 001 Service Certified By	Liquid Nom. Temperature 70.0 deg F Spec. Gravity 1.000 Viscocity 1.000 cp Vapor Press Solids% / Size	Date 04/06/2011 Issued by: Regina Blazys Quotation No. RB11-04-06 01 Job/Inq.No. Order No.
Rated Operating Point		
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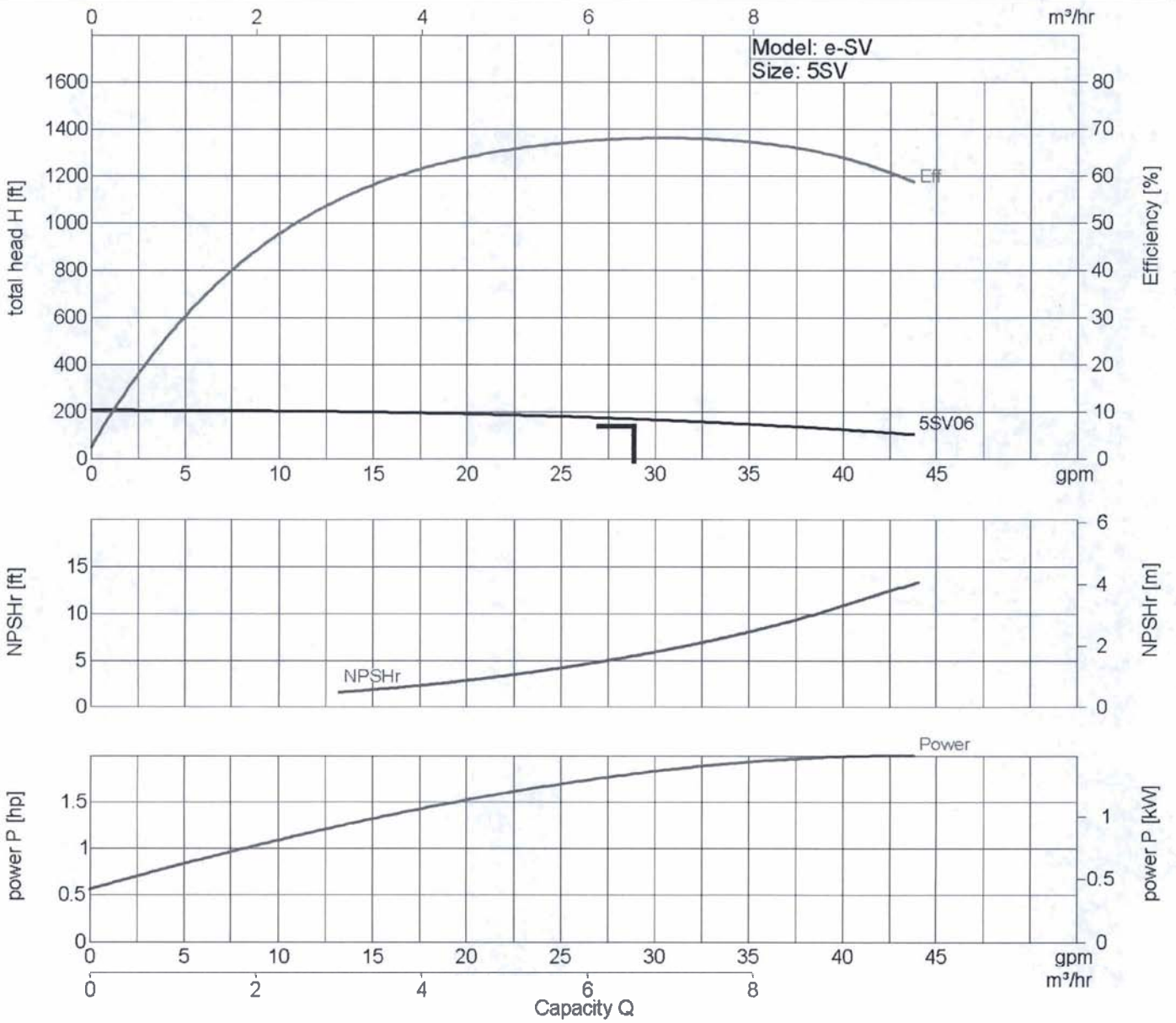
Notes:		



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BALDOR
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BALDOR • RELIANCE

Product Information Packet

VM3555

2HP,3450RPM,3PH,60HZ,56C,3428M,TEFC,F1

Part Detail							
Revision:	M	**Status:**	PRD/A	**Change #:**		**Proprietary:**	No
Type:	AC	**Prod. Type:**	3428M	**Elec. Spec:**	34WG0284	**CD Diagram:**	
Enclosure:	TEFC	**Mfg Plant:**		**Mech. Spec:**	34A063	**Layout:**	
Frame:	56C	**Mounting:**	F1	**Poles:**	02	**Created Date:**	
Base:	N	**Rotation:**	R	**Insulation:**	B	**Eff. Date:**	03-24-2011
Leads:	9#18	**Literature:**		**Elec. Diagram:**		**Replaced By:**	

Nameplate NP1256L								
CAT.NO.	VM3555							
SPEC.	34A063-0284							
HP	2							
VOLTS	208-230/460							
AMP	6.2-5.8/2.9							
RPM	3450							
FRAME	56C	**HZ**	60	**PH**	3			
SER.F.	1.15	**CODE**	H	**DES**	B	**CLASS**	B	
NEMA-NOM-EFF	80	**PF**	80					
RATING	40C AMB-CONT							
CC		**USABLE AT 208V**	6.2					
DE	6203	**ODE**	6203					
ENCL	TEFC	**SN**						
	SFA 6.8-6.4/3.2							

Parts List		
Part Number	**Description**	**Quantity**
SA009693	SA 34A063-0284	1.000 EA
RA006138	RA 34A063-0284	1.000 EA
NS2512A01	INSULATOR, CONDUIT BOX X	1.000 EA
34CB3002A	CB CAST W/.88 DIA HOLE	1.000 EA
34GS1029A01	GASKET, CONDUIT BOX	1.000 EA
51XB1016A07	10-16 X 7/16 HXWSSLD SERTYB	2.000 EA
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 EA
34EP3102A01SP	FR ENDPLATE, MACH	1.000 EA
HW5100A03SP	WAVY WASHER (W1543-017)	1.000 EA
34EP3300A24SP	PU ENDPLATE, MACH	1.000 EA
51XN1032A20	10-32 X 1 1/4 HX WS SL SR	2.000 EA
34FN3002A01SP	EXTERNAL FAN, PLASTIC, .637/.639 HUB W/	1.000 EA
51XW1032A06	10-32 X .38, TAPTITE II, HEX WSHR SLTD S	3.000 EA
34CB4517	CB LID 4 MTG HOLES .22 DIA STAMPED, FOR	1.000 EA
34GS1031A01	GASKET, FLAT CONDUIT BOX LID (LEXIDE)	1.000 EA
51XW0832A07	8-32 X .44, TAPTITE II, HEX WSHR SLTD SE	4.000 EA
HW2501D13SP	KEY, 3/16 SQ X 1.375	1.000 EA
34FH4002A01SP	IEC FH NO GREASER	1.000 EA
HA7000A04	KEY RETAINER 0.625 DIA SHAFTS	1.000 EA
MG1000G27	PAINT- S9282E CHARCOAL GREY	0.014 GA
10XF0440S02	04-40 X 1/8 TYPE F HEX HD STAINLESS STIC	2.000 EA
HA3100A45	THRUBOLT 10-32 X 8.875	4.000 EA
LB5040	INSTRUCTION TAG, AC & DC	1.000 EA
LB1125C01	STD (STOCK) CARTON LABEL BALDOR WITH FLA	1.000 EA

Parts List (continued)		
Part Number	**Description**	**Quantity**
LC0005E01	CONN.DIA./WARNING LABEL (LC0005/LB1119)	1.000 EA
NP1256L	ALUM, UL CSA CC, W/O THERMAL, LASER	1.000 EA
34PA1005	PACKING GROUP, BALDOR	1.000 EA

Performance Data at 460V, 60Hz, 2.0HP (Typical performance - Not guaranteed values)							
General Characteristics							
Full Load Torque:	3.11 LB-FT			**Start Configuration:**		DOL	
No-Load Current:	1.35 Amps			**Break-Down Torque:**		12.0 LB-FT	
Line-line Res. @ 25°C.:	7.39 Ohms A Ph / 0.0 Ohms B Ph			**Pull-Up Torque:**		10.6 LB-FT	
Temp. Rise @ Rated Load:	85 C			**Locked-Rotor Torque:**		13.4 LB-FT	
Temp. Rise @ S.F. Load:	103 C			**Starting Current:**		20.8 Amps	
Load Characteristics							
% of Rated Load	**25**	**50**	**75**	**100**	**125**	**150**	**S.F.**
Power Factor:	48.0	68.0	80.0	87.0	90.0	91.0	89.0
Efficiency:	67.7	77.5	80.1	80.0	78.5	76.0	79.1
Speed:	3547.0	3502.0	3447.0	3389.0	3324.0	3247.0	3350.0
Line Amperes:	1.47	1.76	2.21	2.72	3.34	4.07	3.09

Performance Graph at 460V, 60Hz, 2.0HP Typical performance - Not guaranteed values