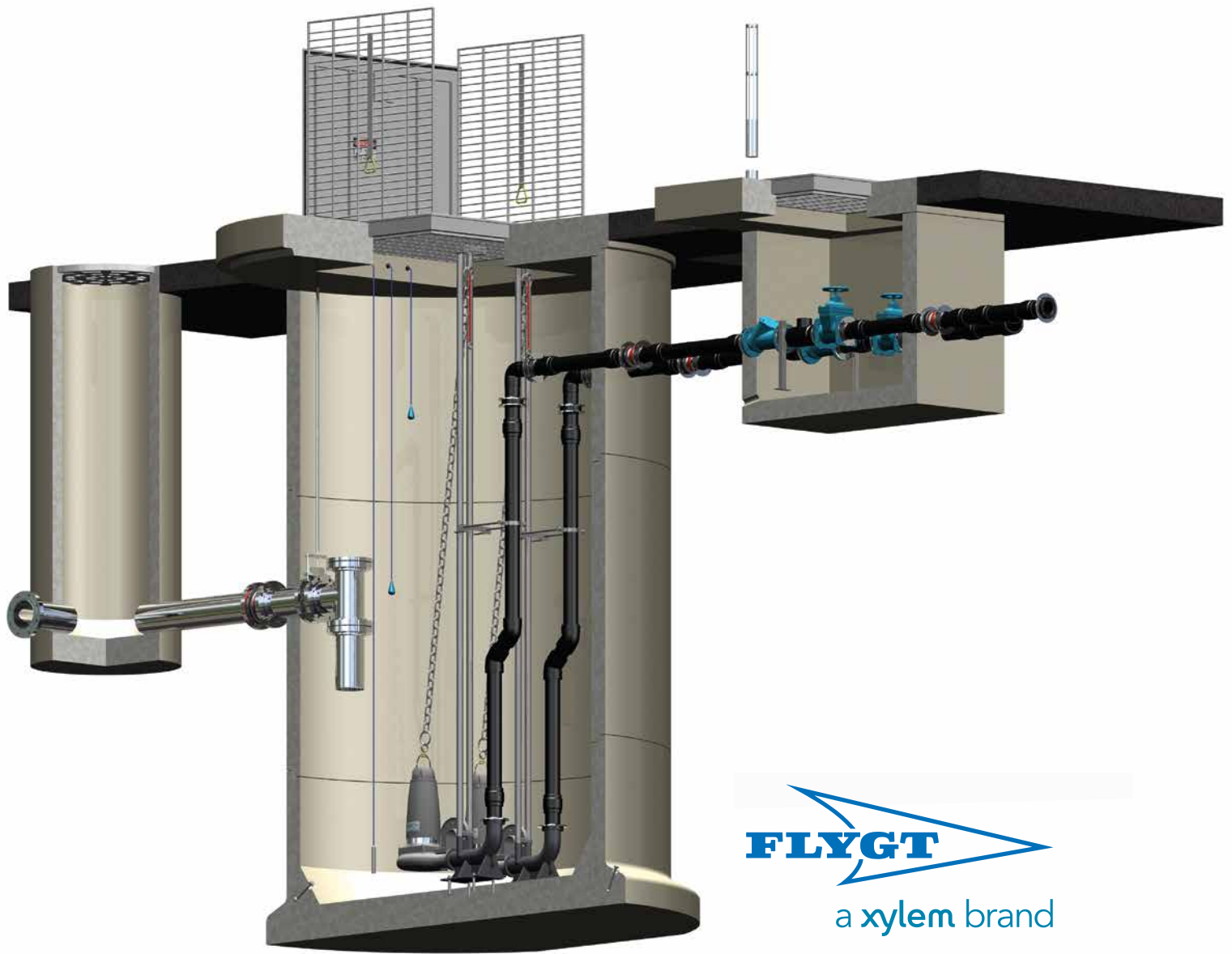




Packaged Pump Stations

Xylem's market leading products will save you time and money

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Foreword

Welcome new and existing customers to the Xylem Packaged Pump Stations handbook, for Australia and New Zealand.

This handbook is created to answer all the questions that arise when you need to design and install a pumping system, from start to finish. It is intended for designers, planners and users of sewage and storm-water pumping systems using our wide range of submersible pumps, which offer not only a long record of reliability but cutting edge innovations.

The pump and sump are parts of an overall system that includes a variety of structures and other elements such as the pipe system, valve chambers, ventilation systems and handling equipment. Operating costs can be reduced with the help of effective planning during the design stage and with optimised operation schedules.

Xylem's pumping stations are the complete solution, applying the latest in pump and wastewater transport technology, but strictly following a simple concept designed for situations where ground work and installation time must be kept to a minimum.

The stations are either in several modules or one piece and are available in various sizes, supplied and installed with all the necessary accessories to suit a range of industrial and civil uses. Our wide choice of pumps and controls mean the stations can be adapted to suit most requirements.

Applications include domestic wastewater for a single household right through to large housing and residential developments, industrial units, shopping centres and commercial premises; indeed any situation where sewage or surface water needs pumping to a mains connection. The chambers can also be used to augment existing facilities.

Xylem stations are available in concrete, fibreglass and polyethylene and are easily transported to the site. Construction time can be reduced to a matter of days with installation, piping and electrical connections designed so they can be easily completed on site.

At the heart of each pumping station is Xylem's Flygt pump itself. Flygt are the originators of the submersible pump, and as the biggest manufacturer in the world, offer a wide choice of specifications to suit the most arduous applications.

The proper design of the pump station is crucial in order to achieve an optimal and trouble-free environment for the pumps.

Xylem's experience is unparalleled and the company's reach is global. We are 12,000 people unified in a common purpose - to create innovative solutions to our world's water needs.

Developing new technologies that will improve the way water is used, conserved and re-used in the future is central to our work.

We move, treat, analyse and return water to the environment, and we help people use water efficiently in their homes, offices, factories and farms. In more than 150 countries, we have strong long-standing relationships with customers who know us for our powerful combination of leading product brands and application expertise, backed by a legacy of constant innovation.

We have led the way in improved energy consumption, and pumps which virtually eliminate all forms of clogging. This improves maintenance and efficiency costs, even under the most trying conditions.

In one of our latest partnerships, we have installed pumping stations in Christchurch that will withstand the pressures of earthquakes and are helping that city return its wastewater treatment systems to normal after the devastating damage of the February 2011 earthquake, which shattered infrastructure above and below ground.

Across Australia and New Zealand we back up our products with design services, warranties and total care services.

If you can't find what you are looking for in this handbook, pick up the phone and give us a call or send an email. We will work with you to swiftly design a solution to your needs with one of our Packaged Pump Stations.



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We have 6 World Class Brands under our Umbrella

At Xylem, we have the Flygt, Godwin, Leopold, Sanitaire, Multitrode and Wedeco brands under our umbrella and combined with our industry knowledge, service and support we believe Xylem should be your first choice when it comes to solving your water challenges.

Specialising in Advanced Water Treatment, Intelligent Fluid Solutions, Mining and Construction, Monitoring and Control, Wastewater Treatment and Industrial Pumps we can cover your sales, rental and service needs, no matter what the situation.



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Xylem. Our name may be new, but our reputation is built on nearly a century of leadership and value creation for our stakeholders.

Xylem a premium applications solutions company dedicated exclusively to solving our customers' most challenging water problems - was formed from ITT Corporation's spinoff of several strategic business segments in October 2011, namely the Water & Wastewater, Residential & Commercial Water, Analytics and Flow Control businesses.

We are a world leader in water technology, providing equipment and services for water and wastewater applications with a broad portfolio of products and services that address the full cycle of water from collection, distribution and use to its return to the environment.

Our strong product brands will continue to drive our business forward in moving, testing, analysing and treating water, and are the essential building blocks of the Xylem brand.

With greater strategic focus than ever before, a strong and experienced leadership team, a high-performance company culture and a clear plan for short and long-term growth globally, we are building on the strength of our history to deliver a higher level of customer service, innovation and value today and well into the future.

Flygt – when only the best will do

We provide and install the world's most advanced pumps. At the heart of our stations lies the pump, and in this field Xylem is an undoubted leader. The world renowned Flygt pump, a Xylem product, leads the field in submersible pumps in terms of its wide range of uses, energy efficiency, durability and trouble-free operation.

Every single component that goes into our pumps is either manufactured or specified by Xylem Flygt, to our high standards. With full control over components, we also take full responsibility for our whole product.

The standard version of the 3000 range of pumps, shown on this page, are made of cast iron. The impellers are dynamically balanced and fitted with replaceable wear rings as standard. The pump housing at the upper and lower shrouds of the impeller have a labyrinth seal design to prevent leakage and clogging.

The high performance induction motors are designed for Class S1 duty even when not submerged. The Class H insulated stator windings, rated at 155°C, are capable of starting up to 15 times an hour and are shrink fitted and locked against rotation for maximum heat transfer and performance.

Shaft mountings are of a robust, maintenance free design, comprising pre-greased rolling element bearings. Motor casings have integrated cooling ribs for maximum heat dissipation.

To protect against corrosion, all pumps can be equipped with zinc anodes, an extra corrosive-resistant outer seal, stainless steel shaft and impeller.

A short shaft virtually eliminates shaft deflection, which increases the life of seals and bearings, as well as guaranteeing low levels of vibration and quiet operation.

The junction box is hermetically sealed from the motor. Separate terminal boards for power and monitoring reduce the risk of voltage interference, as well as making maintenance easier.

Flygt also provides a number of additional products to ensure trouble-free pumping, including flush valves, level regulators, alarm and monitoring systems, and lifting aids.

Flygt has been manufacturing pumps since 1901, and is the first choice for many world class, high profile constructions and events, where only the best will do. Flygt pumps are installed in the multi-billion-dollar Channel Tunnel between England and France, in Europe's biggest waste water pumping station, in Athens, Greece, and are used to maintain water flow and levels in kayaking events in the Olympics.

Flygt has the most patents in the industry and has always been the leader in developing innovations based on customer needs, due to its large corps of design and application engineers. It is a brand that is synonymous with engineering excellence, reliability and service around the world.



Flygt Exporior - it's all about reliability

Xylem is proud to be able to offer its latest innovation in wastewater pumping. The Flygt Exporior pump technology builds on our unbeatable pumping and application experience and is a revolutionary design that is engineered to lead you into the future.

It builds on the premise that the most efficient and reliable pump is only achieved when three key functions work seamlessly together, namely the hydraulics, the control and the motor. Flygt Exporior allows you to combine the most technologically advanced features and components that fit your wastewater environment, so you have the option to select the perfect pump for your needs.

The Exporior combines Flygt's self-cleaning N-technology, with premium efficiency motors and intelligent control. This means the Exporior offers a brand new level of reliable pumping, allowing you the peace of mind to know your operations are always running as smoothly and efficiently as possible, with a saving of up to 25% of your electricity bills.

How the self-cleaning Adaptive N-hydraulics work

The Adaptive N-impeller is designed to move the impeller upwards when needed, allowing the bulkiest of rags and toughest of debris to pass through smoothly. After the debris has passed, the hydraulic pressure returns the impeller to its original position. This axial movement reduces stress on the shaft, seals and bearings, thereby extending its lifespan. This clog-free performance means the pump requires almost no maintenance or servicing, adding to the unit's economy and your peace of mind.

You can choose between standard cast iron impellers for normal wastewater applications; hard iron impellers for extremely abrasive and corrosive situations, and chopper impellers for chopping long fibres or solids in wastewater.

In the hard iron option both the impeller and insert ring are made of a high strength alloy which has a 25% chromium content. This is 10 times more durable than conventional cast iron and twice as durable as duplex stainless steel.

The chopper module is also made of hard iron and is typically used in wastewater facilities, agriculture, aquaculture, food processing, and pulp and paper.

New motors for efficiency and longer life

Another advantage of the Exporior range of pumps is that they are powered by our new Premium efficiency motors up to 70kW.

As the world's leading designer and manufacturer of motors for wastewater pumping, with over 50 years experience, Flygt engineers have used cutting edge computer programs to develop motors optimised for wastewater applications.

The Flygt Premium efficiency motors are designed to concentrate the losses around the stator in order to be as cool as possible. In achieving efficient cooling, it prolongs the lifespan of the motor.

Our Line Started Permanent Magnet (LSPM) motors have featured in Flygt compact mixers since 2009. It is another world-first technology that offers higher efficiency and less current on the data plate, which allows for smaller cables and protective devices. This makes it simple to retrofit your pump on your existing control panel.



Outstanding patented energy and cleaning functions

Function	Solution	Result
Energy-optimal speed finder	Steadily secures speed to optimal energy level without the use of a flow meter or any other external measurement equipment.	Cost savings with reduced energy consumption.
Pump cleaning	The pump cleaning sequence detects any abnormal blockage of the impeller and initiates an automatic cleaning sequence by momentarily reversing the pump.	Cost savings due to resolved clogging if it occurs.
Sump cleaning function	In a special sequence, the pump overrides the stop level to pump down to snoring level for the purpose of removing oil, grease, and other floating pollutants from the water surface.	Cleaner sump with less odor, reduced labor and maintenance costs. No need to pump down and clean the sump manually.
Pipe cleaning function	Regular full speed flushing of the pipe system.	Less sedimentation in the pipes and therefore less wear and tear leading to prolonged intervals between service calls and reduced maintenance costs.
Pump and drive protection	Temperature and leakage protection built into the drive.	Sends alarm when temperature is too high or if leakage occurs in the pump.
Soft start and stop	Speed ramping reduces start current flow and transients at pump stop.	Smoother and gentler running of the pump system leading to less damage and less wear and tear.
External fieldbus communication	System is compatible with fieldbus (ModbusRTU) App, MAS and other control units.	Simple standard protocol communication with other monitoring and control units.

SmartRun

Intelligent control

Clogging problems that require costly maintenance can even occur in pumps with a variable speed drive. This could be due to crucial, complex operating parameters not being correctly established for your wastewater pumping station. This results in you not getting the best out of your pump.

In the Flygt Experiør, Xylem's SmartRun technology is integrated in the pump control unit and is all the intelligence you require to capitalise on the benefits of variable speed pumping. All the parameters are pre-programmed into the unit and installations are speedy, simple and cost-effective.

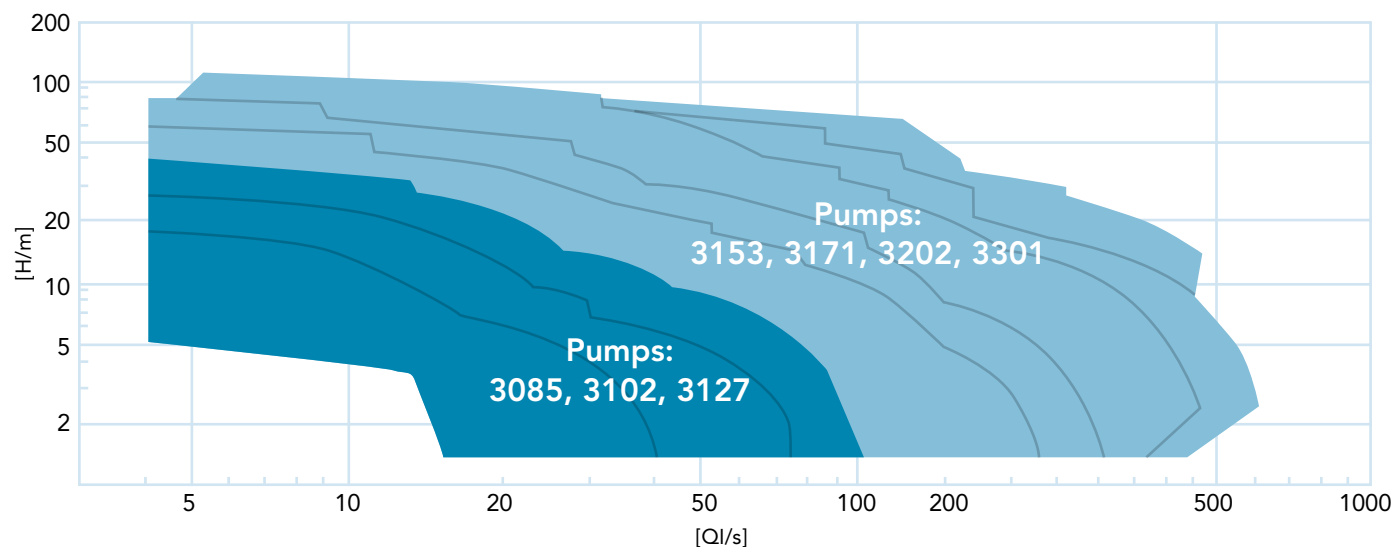
All you have to do is press Auto for start-up and you will enjoy the peace of mind knowing that the functions will run in the optimal manner for your pumping application. These functions have been developed and optimised to achieve energy savings and maximum cleaning within wastewater pumping.

In other units, by using a Flygt pump controller in the panel you get:

- A controller designed to control sewage pumps out-of-the box without any custom programming. Just configure some parameters and you are ready to go.
- Adjustable start / stop and alarm levels
- Wastewater pumping features like:
 - Alternation of duty pumps
 - Pump maintenance runs
 - Limit the number of pumps running
 - Maximum run-time of a pump
 - Simple well level and alarm displays
 - Pump current display and overload protection
 - Flow calculations (in some controllers)



Top performance with a broad capacity range



Power ratings and sizes

Pump model	3085	3102	3127	3153	3171	3202	3301
Rating, kW	1.3 - 2.4	3.1 - 4.2	4.7 - 7.4	7.5 - 15	15 - 22	22 - 47	45 - 70
Discharge, mm (in)	80 (3")	80 (3")	80 (3")	80 (3")	100 (4")	100 (4")	150 (6")
		100 (4")	100 (4")	100 (4")	150 (6")	150 (6")	250 (10")
		150 (6")	150 (6")	150 (6")	250 (10")	200 (8")	300 (12")
				200 (8")		300 (12")	
				250 (10")			
SmartRun™							
Rating, kW	4	5.5	7.5	15	22	45	75
Current, A	18 9.5	25 14	39 18	61 30	90 46	90	150
Voltage, V	230 380-440	230 380-440	230 380-440	230 380-440	230 380-440	380-440	380-440

Flygt Experior™

Pump model		3085	3102	3127	3153	3171	3202	3301
Hydraulics	N-technology				●	●	●	●
	Adaptive N	●	●	●				
	Hard-Iron™	●	●	●	●	●	●	●
	Chopper			●	●	●	●	
Intelligent control	SmartRun™	●	●	●	●	●	●	●
Motor	Premium Efficiency Motors	●	●	●	●	●	●	●

It all starts with the right design

Xylem offers a long history of expertise in the design and delivery of comprehensive solutions for water and wastewater transport and treatment.

Our know-how and experience are combined with a broad range of suitable products for delivering customised packages that ensure trouble-free operations for customers. To do this our engineers utilise our own special computer programs, as well as commercial programs, for design and development projects.

The scope of assistance includes a thorough analysis of the situation and proposed solutions – together with a wide selection of products and accessories. All this helps you choose the right Packaged Pump Station for your needs. We also provide hydraulic guidance and assistance for flow-related or rheological issues.

Customers turn to us, as well, for analysis of complex systems for network pumping, including calculations for hydraulic transients, pump starts and flow variations.

Additional services

- Optimisation of pump sump design for our products and specific sites.
- System simulation using computer-based fluid dynamics.
- Organising model tests.
- Advice on achieving the lowest costs in operations, service and installation.
- Engineering software to help with designing.



Visit www.xylect.com or look for the mobile apps for both apple and android

Xylect - Designing software

Xylect is a package of software that allows you to calculate which is the right pump to suit your needs. You can start by selecting the application you want the pump to best fit. Whichever application you choose will have its own product range.

Under various product categories, you can search or browse by product type to find the right one in the right series for your needs. You can search according to whether or not you need single or parallel pumps and what type of fluids you are dealing with, in terms of density or viscosity.

You can also filter by what speed you want; whether you want to supply single or three phase power; how many vanes you want on the impeller and what material you want them to be made of; and the width of the outlet.

If you are replacing a pump there are recommended replacement units for each previous generation model. The software will analyse what size head you need for the flow, how much power and what efficiency you can expect at different pump speeds. All of these are illustrated on graphs so you can compare where on the graph you can expect the smoothest flow for the least running cost.

This will generate a data sheet which will give you a drawing of the pump dimensions, a performance curve and all other technical data that will show you the best Xylem model for your particular situation.

The accompanying documents for that model will give you all the dimensional drawings, the care and maintenance manual and spare parts list. These also come as 3D Autocad drawings - from top, front and side views. To calculate your head loss, you can select individual pipes, parallel pipes or common pipes, using Colebrook-White or Hazen-Williams methods.

You can analyse the duty conditions in parallel pumps and print out the tabulated data, and then do VFD analysis to adapt the speed to the required duty point. Then you can check the duty conditions using different system curves.

If you print out all this analysis, you have a comprehensive fact sheet on what pump you require and how to best set it up. As part of our product support, Xylect also has an old pump archive with phased out products available for you to browse, so you can compare performance and technical data on older pumps.

In the next step of managing the project, you can save all this data in a Xylect workspace, as well as share it with a member of Xylem's sales staff via email. Xylect software is compatible with Internet Explorer, Mozilla Firefox, Google Chrome, Opera and Safari browsers. We even have an app for it.

Design Support

SECAD

SECAD is a program which is intended for designers, planners and users of wastewater and storm water pumping systems and mixers. With this program, the user can choose from eight different installation types, which differ in design and size, and receive automatically generated general arrangement drawings.

When the designer begins to develop a pump installation, there are many questions to be answered. This process can become difficult and time consuming. Many of the required dimensions are difficult to find or must come from the pump manufacturer. For example, "What is the minimum recommended distance between pumps?" "What is the minimum footprint or the overall dimensions of the pump station?"

With the help of the SECAD program, many of these questions are answered automatically, and a pump station can be designed and drawn in a matter of minutes.

The designs will be according to Xylem pump station standards, which have been developed and model tested to ensure proper flow conditions at the inlet of the pump and optimal mixing, conditions which are critical for the life of the equipment.



Design Recommendations

For pump stations with midrange centrifugal wastewater pumps.

This document is intended for designers, planners and users of sewage and storm-water pumping systems that incorporate the range of 3068-3301(2l/s - 300l/s) Flygt submersible pumps.

The pump and sump are parts of an overall system that also includes a variety of structures and other elements such as the pipe system, ventilation systems and handling equipment. Operating costs can be reduced with the help of effective planning during the design stage and with optimised operation schedules. The proper design of the pump sump is crucial in order to achieve an optimal environment for the pumps.

The design recommendations are only valid for the Flygt equipment. Xylem Flygt assumes no liability for non-Flygt equipment.

General Principles

The purpose of a sump design is to ensure proper approach flow to the pumps and prevent the accumulation of sediment and surface scum. The sump should also be big enough to prevent flooding. If the sump is not designed correctly, the hydraulic environment may affect the pump operation - resulting in diminished design performance and reduced pump life. To ensure that the pump operates in a suitable environment, some general points must be considered:

- Flow of water from the inlet of the sump should be directed towards the pump inlet.
- The flow in uniform without swirl or air entrainment.
- The walls must be designed and built to avoid stagnation regions in order to prevent the formation of air-entraining surface vortices and sediment accumulation.
- The water depth must be great enough to suppress surface vortices.
- Excessive turbulence or large eddies should be avoided, although a minor amount of turbulence helps to prevent the formation and growth of vortices.

Pump Station Inlet

Proper positioning of the inlet is crucial in order to ensure a good hydraulic environment for the pumps and to guarantee efficient operation. Preferably the inlet is positioned within a 120° sector on the opposite side of the discharge pipes. If the inlet is located high above the water surface, an inlet diffuser leading the water down to a lower level is advisable to prevent cascading flow and air entrainment during the pump cycle. Also, it is recommended that inlet velocities to the sump is between 0.7 - 1.8 m/s.

Required Volumes

The starting frequency of the pump depends on the inflow to the sump and the volume between start and stop levels - the "active" or "storage" volume. The real inflow to a sewage pumping station will never be constant. It will differ according to the time of the day, the weather, and the location of the station within the system.

If the maximum value of the inflow is used as a constant inflow value, the volume will be overestimated. This results in long periods of pump inactivity i.e. at night and in dry-weather. This can create problems as the sediment settles on the sump floor and floating materials accumulate on the surface. The settled sediment may cause clogging at start and noxious gases may build-up. Blockages of this sort are one of the most common causes of emergency call-outs for the pump failure. One way of solving the problem is to reduce the sump volume, which consequently increases the starting frequency. For Flygt pumps, 15 starts/hour are possible without endangering the life of the pump.

Calculating The Active Sump Volume

The required active volume of the sump, i.e. the volume between the pump start level and stop level, depends upon factors such as the cycle time for the pump, the capacity of the pump and the rate of the inflow into the sump.

We can calculate the minimum required sump volume as follows, where:

- $V_{\min}$ (L) = minimum required active volume
- q (L/s) = fixed pump capacity of a single pump
- i (L/s) = variable inflow rate to the sump
- $T_{\min}$ (s) = minimum (critical) cycle time between pump start and stop (determined by the number of starts per hour, with regard to the mechanical stress from the temperature rise in the motor)

$$T = \frac{Vq}{i(q-i)} \text{ (s)} \quad \text{Rearranging:} \quad V = Ti - \frac{Ti^2}{q} \text{ (L)}$$

The shortest cycle time, ' $T_{\min}$ ' occurs when the rate of inflow and outflow is maximum, i.e. $\frac{dV}{di} = 0$

Therefore the critical inflow rate is: $i = q/2$ (L/s)

Substituting into 'V' we can find the minimum active volume:

$$V_{\min} = \frac{T_{\min} q}{4} \text{ (L)}$$

Assuming 15 starts per hour implies a critical time of 240 seconds, therefore:

$$V_{\min} = \frac{240q}{4} \text{ (L)}$$

Xylem Flygt Systems Engineering

Flygt provides design assistance for any pump project. We have broad experience in design and operation of pump stations, and we use unique computer programmes developed at Flygt. The scope of assistance includes:

- Selection of pumps for a pump station with due consideration of the calculations in the flow capacity and the costs involved.
- Optimisation of the sump design for given pumps and specific site conditions.
- Analysis of complex systems for pump stations including calculations of hydraulic transients and pump starts.
- Advice on the need for model tests and arrangements of such tests.

Flygt's System Engineers are always ready to assist you in finding the most suitable solution to your pumping requirements, no matter how small or large.

Flygt Concrete Pump Stations

As we build in more inaccessible areas, the need to pump wastewater to treatment works become a key consideration at the planning stage, particularly with developments situated below the gravity sewer, or a considerable distance away.

The traditional solution has been to construct a cast in situ chamber, consisting of pipes, valves and pumping equipment. This type of construction is labour intensive, time consuming and requires considerable coordination on site.

The simple answer is a Flygt Pumping Station, fully fitted out with pump(s), valves and pipework, which can be delivered to site and placed in the ground.

As the market leader in submersible pumps, Xylem has developed a comprehensive range of Packaged Pumping Stations (PPS) that are suitable for single dwellings through to large water authority transportation systems.

In developing our product range we have taken into consideration the different demands an application may exert on a product and have created a unique and versatile range.

Xylem's Precast Concrete Packaged Pump Stations are ideally suited for situations where civil work and installation time must be kept to a minimum. They are available in standard diameters of 1800mm, 2200mm and 3000mm with depths from 2 to 14 metres and an internal or external valve chamber.

The Pump Stations are made from sulphate-resistant cement using calcareous aggregate for maximum durability, with a minimum design life of 50 years. They are fully configured with all the necessary equipment to allow ease and speed of installation.

These precast concrete stations are suitable for a wide range of applications, including:

- domestic dwellings
- commercial and industrial complexes
- hospitals
- mining and construction sites
- camping and caravan parks
- motels/hotels
- shopping centres
- sporting facilities
- schools



Our concrete is built to handle the worst

Xylem’s aim with its Packaged Pump Stations is to provide a chamber that will require the least amount of service and best withstand the corrosive effects of wastewater for at least 50 years. Our extensive research into concrete has revealed that concrete mixed with calcium rich aggregate, such as limestone, provides added resistance to acidic corrosion.

As you can see from the results displayed below, under extreme conditions over the three year three month test period, our calcareous aggregate marble performed far better than crushed Sellick Hill dolomite, or quartz river gravel and natural sand.

The calcareous concrete 50 MPa strength, guarantees structural integrity as well as durability, even under the most difficult and corrosive of conditions.

It’s just another way that Xylem stands behind its Packaged Pump Stations and offers you the best possible product for all wastewater jobs.



Section view of calcareous concrete

Concrete formula

Concrete mixed with Calcium rich aggregate such as limestone, provide added resistance to acidic corrosion.

Calcareous Aggregate
Xylem

Crushed Sellicks Hill
(other manufacturer)

River Gravel
(other manufacturer)



15.3% loss

23.8% loss

Disintegrated

Test over: 3 years, 3 months

A neat solution

Even in the most difficult situations, such as a pumping station that has to be constructed in a road, the Xylem Packaged Pump Stations fit the bill. In the example shown, note the separate valve chamber in the foreground with its own lid.

Construction



Ease of access and site safety are paramount features of all Xylem designs, no matter where the pump station is installed. Notice when the job is completed how inconspicuous the packaged pump station is.

The minimal installation time means that the rest of the surrounding construction work is hindered for only a short period.

Finished Product



Pump Station Details

Heights of Concrete Station without Valve Chamber

Weights of Concrete Pump Station without Valve Chamber			
Depth(m)	Weight (kg)		
	1.8m diameter	2.2m diameter	3.0m diameter
3.0	9,750	14,000	22,600
3.5	10,600	15,150	24,300
4.0	11,400	16,350	25,950
4.5	12,200	17,500	27,600
5.0	13,000	18,650	29,250
5.5	13,850	19,850	30,900
6.0	14,700	21,000	32,550
6.5	15,500	22,150	34,250
7.0	16,350	23,350	35,900
Additional Weight for Internal Valve Chamber			
-	1,350	1,200	2,200

Weights and minimum heights

Minimum Standard Depth & Weights, Base + Internal Valve Chamber + Cover

Station Diameter (m)	Base Weight (kg)	Min Depth with Internal Chamber (mm)	Min Depth with External Chamber (mm)
1.8	5,990	3,050	2,050
2.2	6,941	2,320	1,270
3.0	10,300	2,250	1,250

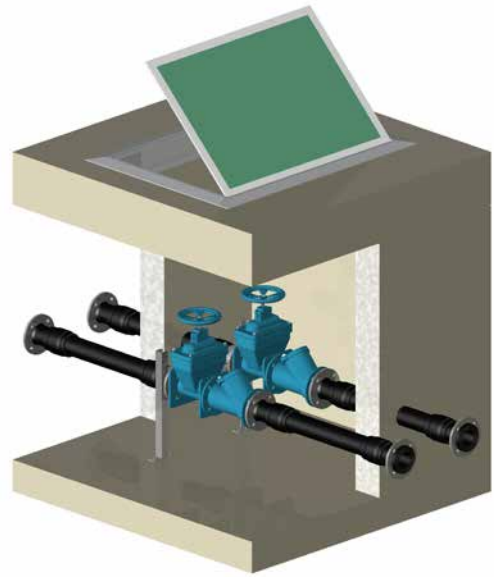
Note: All increments and the Ø 1.8m & Ø 2.2m bases are supplied with 5T lifters. The Ø 3.0m base has 10T lifters.

Valve chambers

The Flygt Packaged Pump Station can come with either a fully internal valve chamber, or a separate external chamber – both options will arrive on site with pre-fitted valves, pipes & supports.

Internal Valve Chambers are fitted completely within your pump station, allowing for a minimal footprint along with an even quicker installation time.

External Valve Chambers come in standard sized opening of 900x900mm, 1200x1200mm or 1500x1500mm with variable depths. However, we can also make our external chambers specifically sized to meet your project requirements.



Weights of External Valve Chambers

900 Valve Chamber		Weight (kg)
Sump	900 x 900 x 900 deep	1,918
Cover Slab	1200 x 1200 x 250 thick	864
Total Weight		2782

1500 Valve Chamber		Weight (kg)
Sump	1500 x 1500 x 1250 deep	4,829
Cover Slab	1800 x 1800 x 250 thick	1,945
Total Weight		6,774

1200 Valve Chamber		Weight (kg)
Sump	1200 x 1200 x 1200 deep	3,208
Cover Slab	1500 x 1500 x 250 thick	1,350
Total Weight		4558

2000 Valve Chamber		Weight (kg)
Sump	2000 x 1750 x 1250 deep	6,040
Cover Slab	2300 x 2050 x 250 thick	2,900
Total Weight		8,940



Special Designs

There are many extra functions and features that can be built into Flygt's Packaged Pumping Stations, so we can customise the station precisely to suit your long-term needs.

Flygt Flush valves

If grease and solids are permitted to build up in pump sumps, they can cause more than just an unpleasant smell. The pump's level regulators can become fouled, reducing operational efficiency and pump life, flooding may occur. Regular desludging is therefore essential and that means downtime and labour costs where mechanical desludging is used.

Flygt's Flush Valve provides a simple, effective and fully automatic way of continuously keeping pump sumps free of sludge by flushing the sump at the beginning of every pumping cycle. Sedimentation in the sump is greatly reduced, and unpleasant odours in and around the pumping station are virtually eliminated.

Fitting a Flush Valve harnesses the power of the pump to which it is fitted, creating an automatic flushing system that requires no additional power source. At the beginning of each pumping cycle, when the valve is open, the contents of the sump are subjected to intense agitation, turning the pump momentarily into a powerful mixer.

This re-suspends any sludge before the Flush Valve shuts off and the full power of the pump is again focused on pumping wastewater and the suspended solids out of the station. This unique system also ensures a high degree of oxygenation, which helps to practically eliminate malodorous hydrogen sulphide.

The Flush Valve can be easily fitted to the volute of any CP, DP or NP pump. Fitting just one Flush Valve in a wastewater pumping station, less than 2 metres in diameter, eliminates the need for regular manual desludging. The result is a significant savings in operation and maintenance costs, and much improved pumping efficiency.

Why Install a Flush Valve?

- To reduce risk of septicity, fat build-up, grit deposits and raggings.
- To prevent breakdown and blockages
- To increase pump life
- To ensure proper level control and telemetry
- To maintain pump station efficiency
- Gases in the station and unpleasant odours in the surroundings are completely eliminated
- Frequent cleaning and traditional de-sludging become unnecessary
- Significant saving in operation and maintenance costs (many documented examples of stations that have saved over 50% of their annual cleaning costs)

Isolation valve

In order to isolate your Flygt Pump Station, a Knife Gate Valve can be used on the inlet to prevent any discharge from the incoming gravity main from entering the wet well.

As a standard, the Flygt Pump Station incorporates a Lugged Style 316SS Unidirectional KGV to completely isolate the pump station inlet, in sizes ranging from DN50 to DN600, which features:

- Compact design
- Self-aligning gland box
- One piece integral cast body, chest & lugs
- High quality gate finish for optimum sealing
- Integral RTFE gate scraper
- Face to face dimension compliant & pressure tested to MSS SP-81
- Tailor made extended valve spindle with brackets & key cap allowing for manual operation of the valve at surface level



Well washer

An automatic wet well washer can be mounted inside the Flygt Pump Station to combat the problem of sludge building up on the walls in highly demanding environments. Not only will your station become more efficient, but by incorporating a wet well washer, you will also benefit from having:

- - Odor reductions within the station, allowing for happier customers & environmental benefits.
- - Reductions in sulphate gas build up, leading to less corrosion within the pump station & improving the longevity of the station.
- - Less maintenance requirements & service call outs through eliminating the need for vacuum truck extractions & manual cleaning in most cases.
- - Ease of installation through either wall mounting or guide rail mounting the washer.

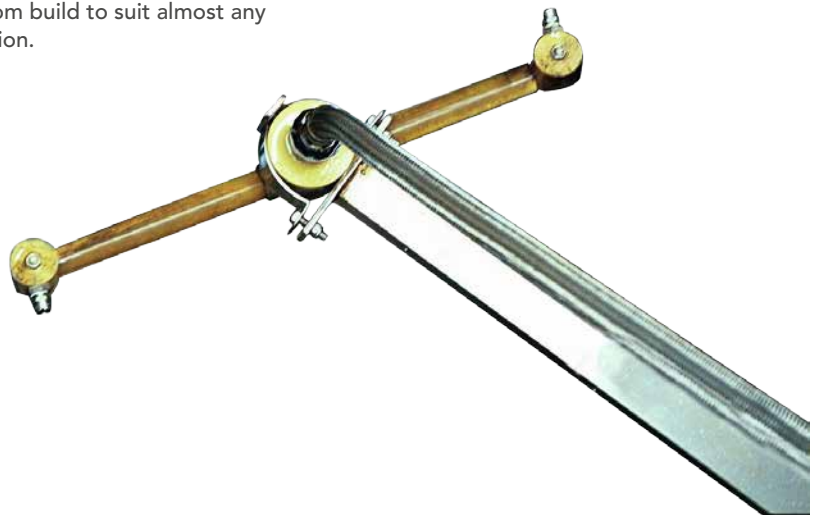
Design features

- Standard package pump stations are available in depths from 2 to 14 metres
- Fully transportable
- Involves a fast modular installation, therefore reduced civil costs
- Utilises Swift Lift anchors for lifting
- Internal/External Valve chamber available
- Class A, B or D standard access hatches for both pumps and valve chambers available
- Aims to satisfy the requirements of both the municipal and commercial sectors in terms of civil, mechanical and electrical design
- Automatic control and monitoring systems
- No need to enter wet well to service pumps.
- Meets Australian Standards AS 3600, AS 3735 & AS/NZS ISO9001
- Holes cored to customer specifications
- TOPS sump shape in 1800mm design can be used on all our station with additional benching

The Concrete Package Pump Station design complies with Australian standards for the structural use of concrete, water retaining structures and cover slab design, as well as providing all of the features required for a comprehensive mechanical and electrical installation.

Other special features

With Flygt's decades of experience in submersible pumps, we have the knowledge to precisely design and construct an efficient & operationally effective Packaged Pump Station to suit your project requirements. Whether it is inlet diffuser pipes, additional benching, ladders with extension handles or HDPE lining of the station interior walls, the Flygt Packaged Pump Station can be custom build to suit almost any application.



Optional accessories

- Stainless steel or galvanised ladder with lift-up stanchions
- Vent Stack Assembly
- Internal Epoxy coating
- 316SS Inlet Knife Gate Valve
- Hinged lockable aluminium lid with optional safety grate
- HDPE lining of internal walls
- Flush Valve
- Well Washer
- Bypass Connection
- Flow Meter Pit
- Puddle Flanges



Installation

The Flygt Precast Concrete Pump Station ensures you receive a high quality finished product, ready for immediate installation upon arrival to site. By providing a swift site installation time, our Packaged Pump Station allows for a considerable advantage over the traditional cast in-situ construction method.

In order for a trouble free installation, specific site conditions should be addressed, and the following recommendations can be generally applied:

Site Preparation:

All project requirements should be identified prior to the site excavation commencing; these can be determined through a detailed geotechnical engineering assessment, which establishes the site specific conditions & requirements to achieve a safe and efficient excavation & installation.

Base Preparation:

It is essential to form a stable base for the Flygt Pump Station to be installed onto; the site excavation shall extend at least 300mm below the underside of the pump station & the disturbed excavated surface, or sub-base, must undergo tamping or compaction to a minimum of 92% Maximum Modified Dry Density & levelled in preparation for the base course. To form the sub-base, selected gravel aggregate or selected coarse granular material can be used along with 6% cement content compacted Cement Stabilized 20mm Quarry Rubble for the sub-base surface. At all times, the sub-base must achieve a minimum allowable bearing pressure of 100kPa. Alternatively, the sub-base can be cleared of all loose material and a 300mm thick layer of minimum 20MPa uniformly placed zero slump concrete (recommended), can be cast as the sub-base & used for the base course. A 50mm sand screed layer can be used for the base course surface preparation. Further details about the base course preparation for both shallow & deep station installations, are outlined within the Flygt Concrete Package Pump Station Installation, Care & Maintenance Manual.

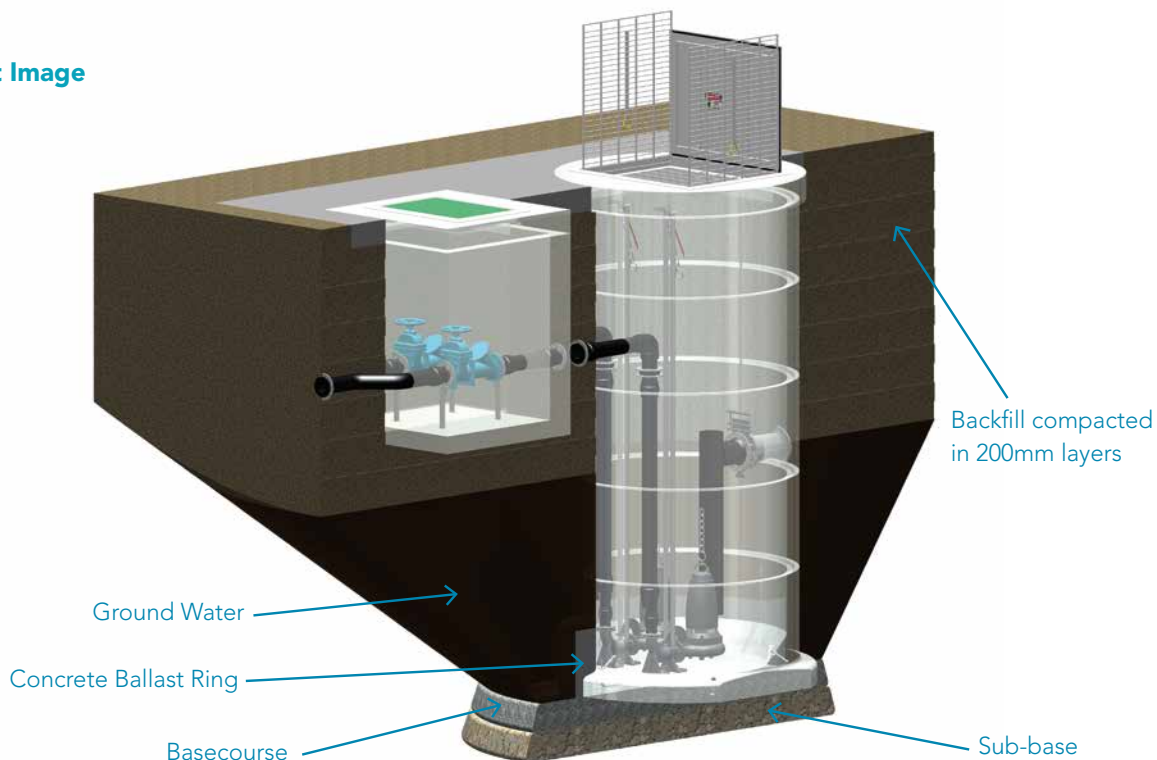
Sealing Penetrations:

Penetrations for pipework will be cored in the factory prior to delivery if the Xylem pump station coring sheet is completed with the order or at the quoting stage. These holes are to be located in the positions and to the levels shown on the construction drawing for each specific project. Penetrations will be cored 25mm oversize in diameter (leaving 12.5mm per side for grouting), and sealed with Megapoxy P1 or approved an equivalent.

Concrete Ballast:

Prior to the commencement of backfilling, it is essential that the ballast requirements are addressed in accordance with the recommendations of the Xylem Water Solutions Australia ballast tabulations to prevent flotation of the Concrete Pump Station. External ballast is required if the maximum possible site groundwater level exceeds the flotation point of the pump station. The ballast is used to resist the upward buoyancy forces from the surrounding groundwater & is most effective when placed at the base of the pump station to act as an anchor. The ballast should be placed uniformly around the concrete structure to avoid imbalanced loading of the station and in addition, the ballast must not be set in any manner to cause possible damage to the pipework and electrical connections.

Ballast Image

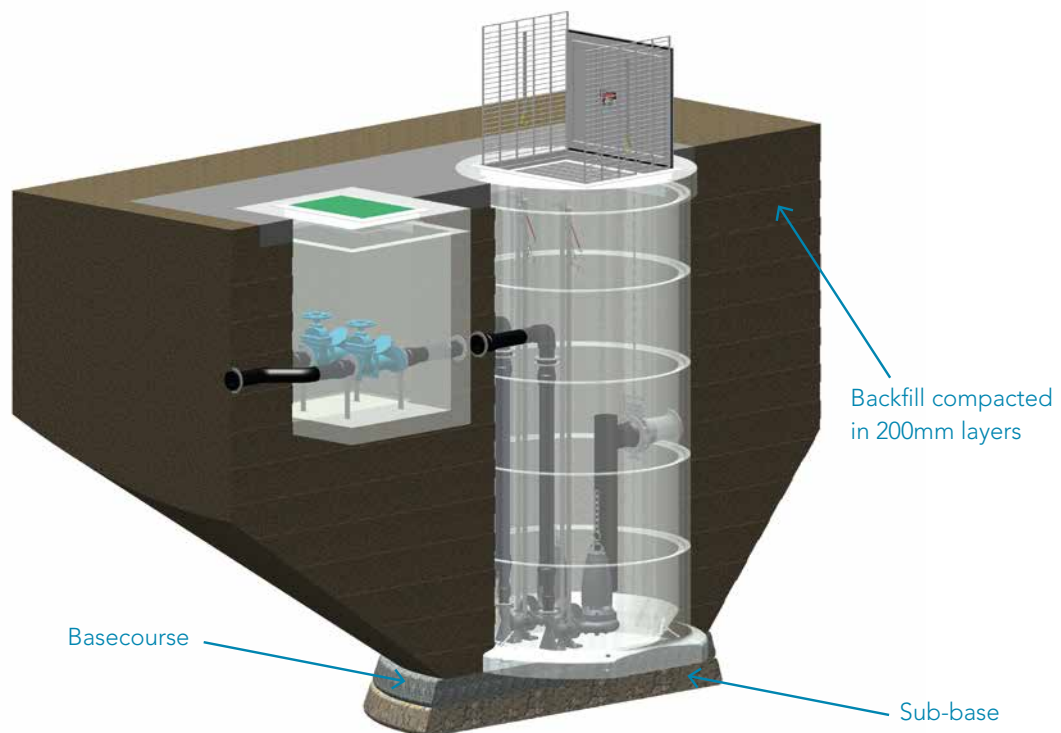


Backfilling:

Backfill content in all cases can be made up from local, or site derived clean, non-clay type granular material so long as it achieves the 92% Maximum Modified Dry Density +/- 2% Optimum Moisture Condition as per test 5.2.1 of AS1289. The local backfill material can be mixed with imported content to achieve the desired backfill material. Backfill content can be derived from cement stabilized sand, or 6% cement stabilized 20mm quarry rubble and compacted or tamped in 200mm layers as the concrete pump station increments are installed & backfilled around subsequently. Check that the pipework and electrical connections have no

load applied to them that could in any way cause damage those buried services, when compaction operations are undertaken. The backfill must not contain any contamination, such as vegetation matter, building rubbish and frozen material, or material susceptible to spontaneous combustion and excluding clay with a liquid limit greater than 80 and/or plastic limit greater than 55. In general terms, clay like material should be avoided within the pump station backfill content. However, an exception can be made when using it as a loosely compacted surface material in a non-trafficable area to act as a plug to prevent ground water building up around the pump station surface.

Backfill Image



Ballast is a vital foundation

In conditions where there is a high water table, external ballast will be required to resist the upward buoyancy forces from the surrounding groundwater. In many situations the most effective ballast is site poured concrete at the base of the pump station, to act as an anchor.

In pump stations, the standard design has an anti-flotation ring near the base, with the weight of the backfill on this ring providing the ballast. Concrete can be placed around the base and over the anti-flotation ring to provide more ballast and to lock the pump station in place.

Further details on all of the above can be found within the [Flygt Concrete Package Pump Station Installation, Care & Maintenance Manual](#).

Pumping Station access – we cover all needs

The Packaged Pump Station safety lids, or access covers, Xylem uses are made and built to the highest safety standards, with an emphasis on reducing any odour escaping from the unit.

They are available in aluminium, cast iron or concrete filled and come in a range of sizes. Standard features are:

- Rubber sealing to stop odours getting out and water getting in during heavy rain.
- Non-slip coating.
- Anti-theft devices.
- Reduced trip hazards.
- Stainless steel fittings.
- Safety grates.



Certified standard range of loadings for cast iron covers

				
RATING	Class A	Class B	Class C	Class D
DUTY	Extra Light	Light	Medium	Heavy
ULTIMATE DESIGN LOAD	10kN	80kN	150kN	210kN
WHEEL LOADS	Areas (including footways) accessible only to pedestrians, pedal cyclists and closed to other traffic 330kg	Areas (including footways and light tractor paths) accessible to vehicles (excluding commercial vehicles) or livestock 2.5 tonnes	Malls and areas open to slow moving commercial vehicles 5 tonnes	Carriageways of roads and areas open to commercial vehicles, including forklifts, fast moving trucks and aircraft parking 8 tonnes



Pipework goes high tech

Xylem uses high density polyethylene piping for reticulating all types of water, mining slurries and sewage. Developments in manufacturing the pipe have increased its resistance to cracks, hydrostatic pressure and temperature. Also, its impact resistance has helped widen its use in a broad range of applications in new construction.

In theory, there are virtually no joints in a HDPE piping network. The change-of-direction sections are fused to the pipe using either butt fusion or electrofusion welding. It can tolerate freezing much better than rigid pipe, an important consideration in alpine areas. In fact, water in it can freeze and thaw repeatedly without causing permanent damage to the pipe.

High Density Polyethylene, or HDPE, is commonly used within wastewater pump stations and has many beneficial properties for use, including:

- **Chemical Resistance:** HDPE is a non-corrosive material and is completely inert to the chemicals & sulphate gasses produced within a closed wastewater environment – making HDPE pipes & fittings ideal for use within the Xylem Packaged Pump Station.
- **Low Weight:** allowing for easy transport, handling & installation with reduction in costs.
- **Weldability:** through ElectroFusion welding, HDPE weld points form a stronger joint than the initial fitting itself.

PN16 & PE100 HDPE Common Pipe Sizes (SDR11)

Outer Diameter of Pipe (mm)	Inner Diameter of Pipe (mm)
63	51.4
90	73.6
110	90.0
125	102.2
160	130.8
200	163.6

- **Automation:** the HDPE Welder is able to read each specific HDPE fitting & automatically set the required weld time & temperature for that fitting. This creates the perfect joint and eliminates any possibility of operator weld errors.
- **Excellent Impact Resistance:** thanks to HDPE's elasticity, yet high strength which also provides superb longevity.

HDPE Pipe and Fittings are constructed in accordance with Australian & New Zealand Standards for:

- Pressure Fittings - AS/NZS 4129
- Pressure Pipe Specification – AS/NZS 4130
- HDPE Raw Materials – AS/NZS 4131
- Wastewater Pipe & Fittings – AS/NZS 5065:2005

Velocities through the Rising Main

In order to create a rising main system that is self-cleaning and efficient, the fluid velocity through the system must be sufficient enough to enable flushing of sedimentation, yet slow enough to avoid creating excessive friction and head losses.

The recommended velocity range through the pump station rising main is between 0.7 m/s and 3.2 m/s, but avoiding excessive high and low flows where possible. The ideal velocity is around 1.8 m/s.

If the required pump flow rate known, it is simple to calculate the flow velocity using:

$$v = \frac{4Q}{\pi D^2} \text{ (m/s)}$$

Where:

v = fluid velocity (m/s)

Q = pump flow rate (m³/s)

D = Diameter (m)

If the calculated velocity falls outside of the recommended range or is unacceptable, a different sized pipe will be required.



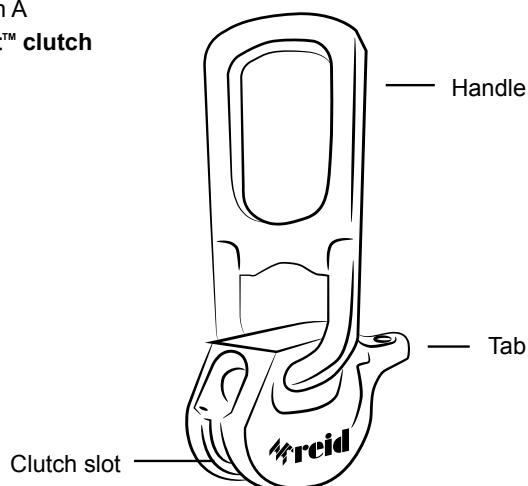
Guaranteeing an easy lift

As with all the components which are installed as part of a Flygt Package Pump Station, even the way the station is capped has been subject to rigorous and lengthy research. The lifting brackets for the concrete cover slab are designed to safely and comfortably bear the weight easily of this surface element of the pumping station.

The Swift Lift clutch clips under the anchor pin which is embedded in the concrete at manufacture. The pin itself tells you what its clutch size is and the length of the anchor, which determines its load limit.

Such innovations are designed to provide a safer working environment for all those who work on installing the pump stations, and makes for ease of placement and removal.

Diagram A
Swiftlift™ clutch



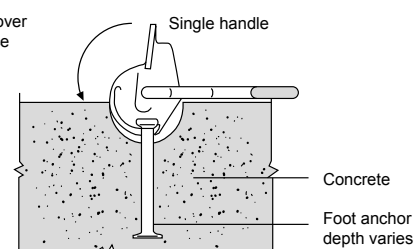
Manufacturers logo

Nominal clutch size

Length of the anchor
(determines Working
Load Limit - WLL)



Tail is rotated over
to sit on surface





The seal of approval

The finishing touch to make the concrete Packaged Pump Station efficient and able to trap all fluids and noxious gases from the wastewater is to seal the modular sections and any holes penetrated by pipework.

Butyl mastic is applied to seal the concrete components of the system. It is used because it seals in very wet and adverse conditions. Maximum seal is achieved under compression, after which up to 5% movement of joint width can be tolerated without failure of the joint. Both contact surfaces need to be painted with primer before assembly.

Megapoxy P1 is used to fill the gaps between all pipes and the concrete walls of the pumping station, to ensure there is no leaking. This is a two-component epoxy paste based on DGEBA epoxy resin and carbonate-free filler.

Megapoxy's principal characteristics:

- a simple 1:1 mix ratio
- creamy texture which makes it easy to work, and it blends easily
- does not sag on vertical and overhead surfaces
- adheres and cures under adverse conditions, including cold and damp
- retains its strength after prolonged immersion in water
- creates very high strength permanent bonds
- tensile and compressive strengths are superior to concrete
- has excellent chemical resistance
- is fully cured after four days at temperatures around 25°C
- is ideal for environments where concrete is exposed to aggressive chemicals

Heavy duty maintenance coating

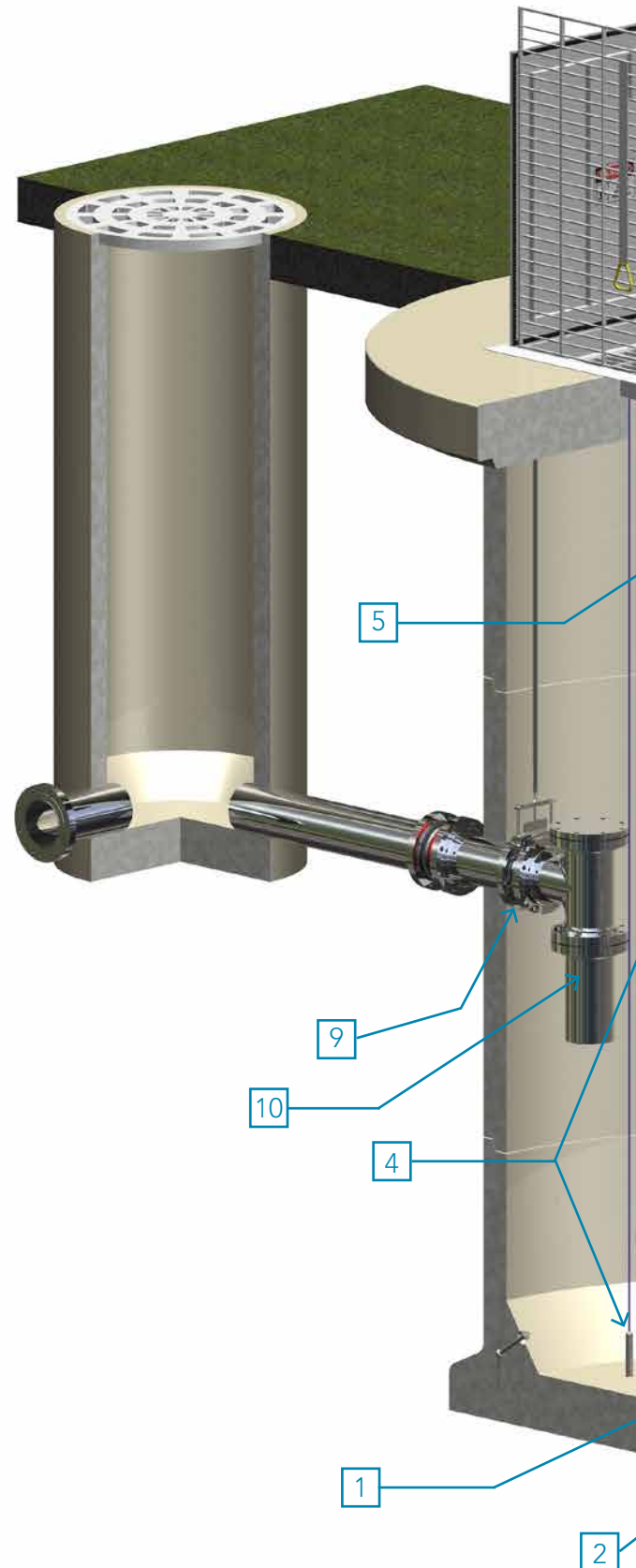
To improve the life expectancy of the pumping station, and at the same time create a smoother finish on the concrete, Megapoxy MC epoxy paint can be used to coat the inner walls of the station.

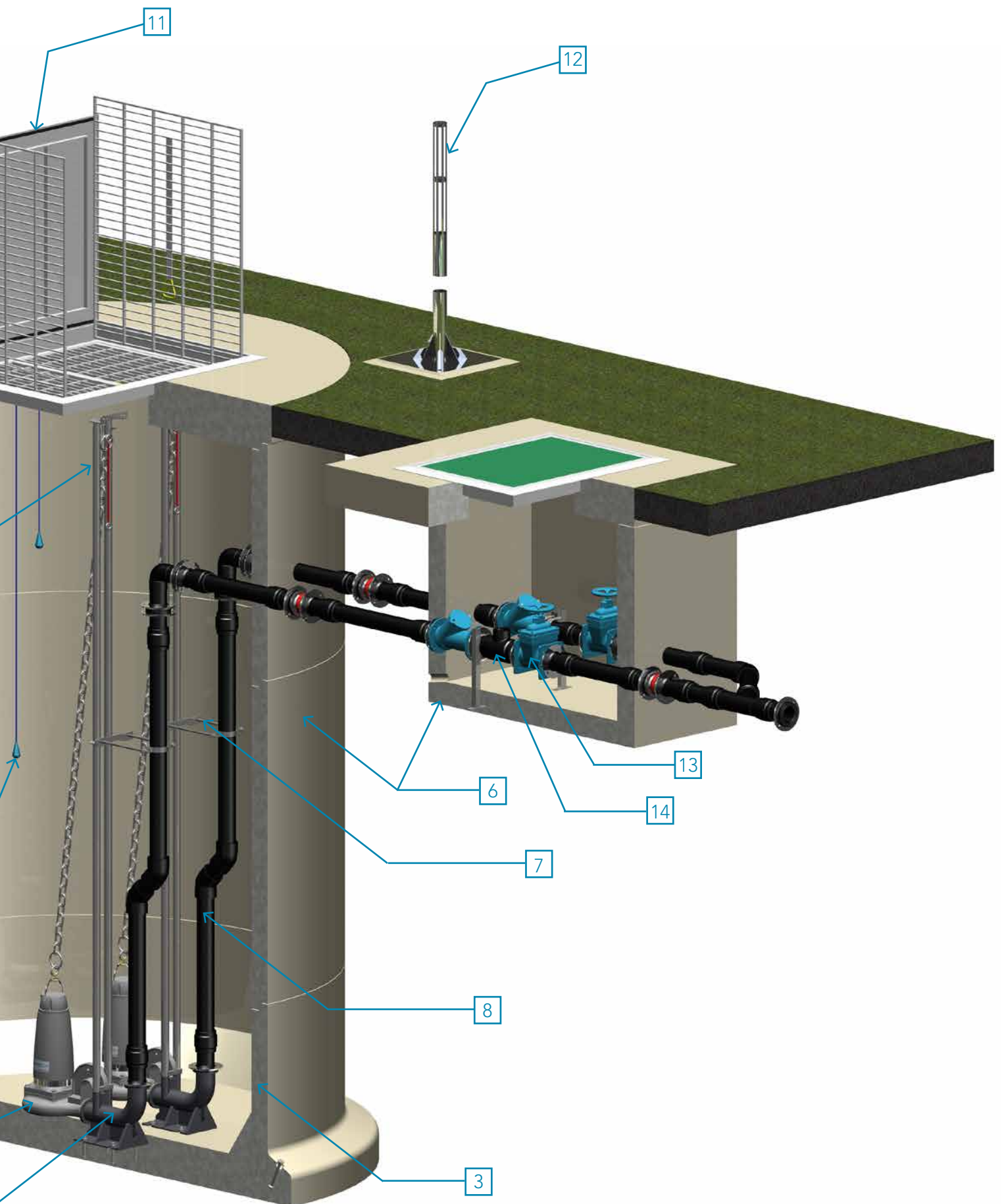
It is very heavy duty and is normally applied in three coats. This gives a total of 0.4mm to 0.5mm of dry film thickness, which is resistant to abrasion, impact and a wide range of chemicals.

Megapoxy MC can be applied by airless spray equipment, roller or brush.

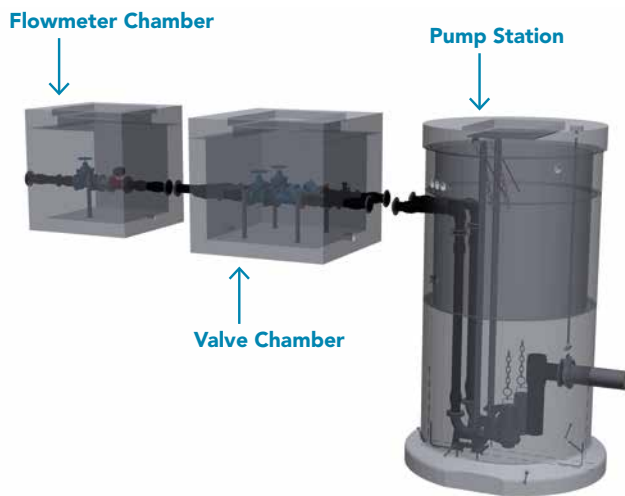
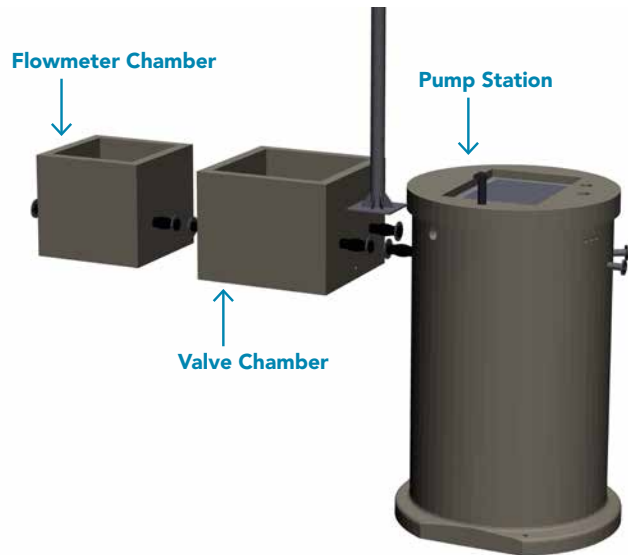
Flygt Packaged Pump Station

1. **Flygt Pumps** – the iconic Flygt pumps are the heart of our Packaged Pump Station (see page 5 for more details).
2. **Flygt Discharge Pedestal** – specially designed to reduce vibration & turbulent flow while allowing for easy connection to the Flygt pump.
3. **Flygt Calcareous Aggregate Concrete Base Unit** – Cast as one complete reinforced unit with a 50MPa structural strength, our base design allows for an ingress free active volume.
4. **Flygt Monitoring & Control Equipment** – engineered to make your station perform at its optimum (see page 38 for more details).
5. **Flygt Upper Guide Rail Brackets & Guide Rails** – engineered to allow for quick & easy installation of the Flygt pump onto the Flygt pedestal; just slide the pump down the rails & you're ready to go.
6. **Flygt Calcareous Aggregate Concrete Components** – precast reinforced concrete made to a 50MPa structural strength; easily transported to site & designed to withstand what any pump station project may entail (see page 13 for more details).
7. **Flygt Intermediate Guide Rail Brackets** – for the deeper stations where more support is needed, we've got the engineered equipment to fulfill your requirements.
8. **HDPE PN16 Pipework** – inert to the toxic gasses present in a closed sewage environment, making it ideal for use within the Flygt Packaged Pump Station (see page 21 for more details).
9. **316SS Unidirectional Knife Gate Valve** – specially designed with a 316SS Inlet Spool & Extended Spindle to allow for trouble free installation & quick operation from ground level.
10. **Inlet Diffuser** – designed to create more efficient pump operation by allowing for less turbulent inflow from the incoming gravity line to the pump station.
11. **Aluminium Access Cover with Safety Grates** – Xylem prides itself on safety. We offer safe methods of entrance and inspection to our pump station internals, with safety grates supplied as standard for the pump access cover (see page 20 for more details).
12. **Vent Stack Assembly** – engineered to prevent the buildup of toxic gasses within the station.
13. **Ball Check Valve & Gate Valve** – designed to the Australian Standards & built for the Australian market.
14. **Bypass Tee Piece** – enables a temporary bypass connection to a Godwin pumping unit to allow for inspection & service to your Packaged Pump Station (see page 36 for more details).





The total package - Design to Installation



Grinders - for arduous applications

Grinders play a vital role in preventing objects that find their way into the inlet pipe getting as far as the pump. There is a wide range of model sizes and configurations available to suit any need, even up to the most extreme cases.

The Muffin Monster is the most rugged system, which shreds just about any material that is capable of disrupting your pump's operation. The Muffin Monster has proved itself over many years in the most demanding wastewater solids reduction applications including pump stations, prisons, fish processing facilities and factories in general.

Dual shafted grinder

Is a low-speed, high torque grinder that handles rags, rocks, wood, clothing, plastics and other debris.

- It is more powerful and capable of grinding a wider variety of solids than single shafted machines and macerators.
- It comes with an energy efficient 2.2 kW motor or optional 3.7 kW.
- There are multiple cutter options to fit each application.

Compact and Efficient Design

- Adapts to pipelines or channels with little or no modification.
- Custom stainless steel frames allow easy installation in channels, wet wells and pump stations.
- In-line Mini and Muffin Monster incorporate an easy-to-remove cutter cartridge.

Cartridge Seal Assembly

- High pressure capability up to 90 PSI (6 bar).
- Runs submerged or dry with no seal flush required.

High-Flow Side Rails

- Increases flow capacity and decreases head loss.
- Deflects solids into the cutting chamber.

Automated Monitoring and Controls

- Automatic load sensing and reversal reduces interruptions performance.

Ease and Flexibility of Installation

- Adapts to most existing in-line or channel applications with little or no modification to the piping or channel.



Pressure Sewer System

The development of submersible centrifugal pumps with grinders has led to pumping stations that can pump wastewater at high pressure through systems using small-diameter pipes.

Due to the high cost of laying gravity sewage systems, pressure sewers have become one of the most popular and practical forms of alternative collection systems today, especially in less densely populated areas.

Pressure Sewage Systems have particular advantages in hilly areas where gravity sewers cannot be laid. They also work well in rocky areas and where planners and engineers are dealing with high water tables, very flat land and stream crossings. They have been proven to be very reliable, with no need for time-consuming and costly maintenance.

In addition to the most reliable high-quality PSS pumps, Xylem Flygt also offers:

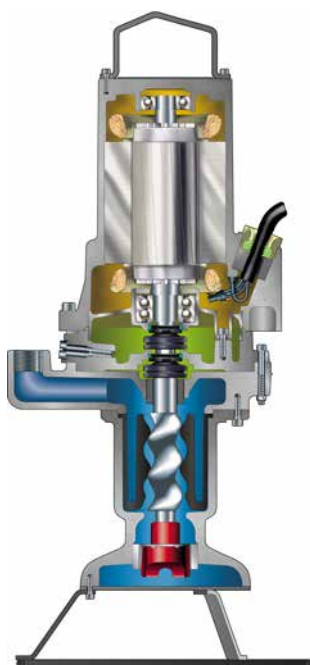
- System design services that use the most modern and sophisticated software.
- An extensive range of pumps and monitoring and control equipment.
- Local installation and after-sales service.
- An Australia and NZ-wide network of staff.

A Pressure Sewage System consists of a branched, small-diameter pipe network. The system is based on small pump stations located near homes from which wastewater is received. A small system may involve only a few households, while a large system can include as many as several hundred pump stations. Sometimes several households connect to a single pump station.

The usual pump basin volume is 1000 litres which often equals a receiving capacity of 24 hours. Pumps are usually grinder types that reduce solids in the wastewater to small particles that help prevent clogging of the pump and pipe system.



Simplex Tank



PC Grinder Pump



Minismart Controller

A typical pump size is in the range of 1 kW, and maximum flow 0.2 - 1.0 L/s. Wastewater from a pressure sewer system is released into the main sewer or into a larger receiving pump station for subsequent transportation to a wastewater treatment plant. A typical household produces between 400-800 litres of wastewater a day.

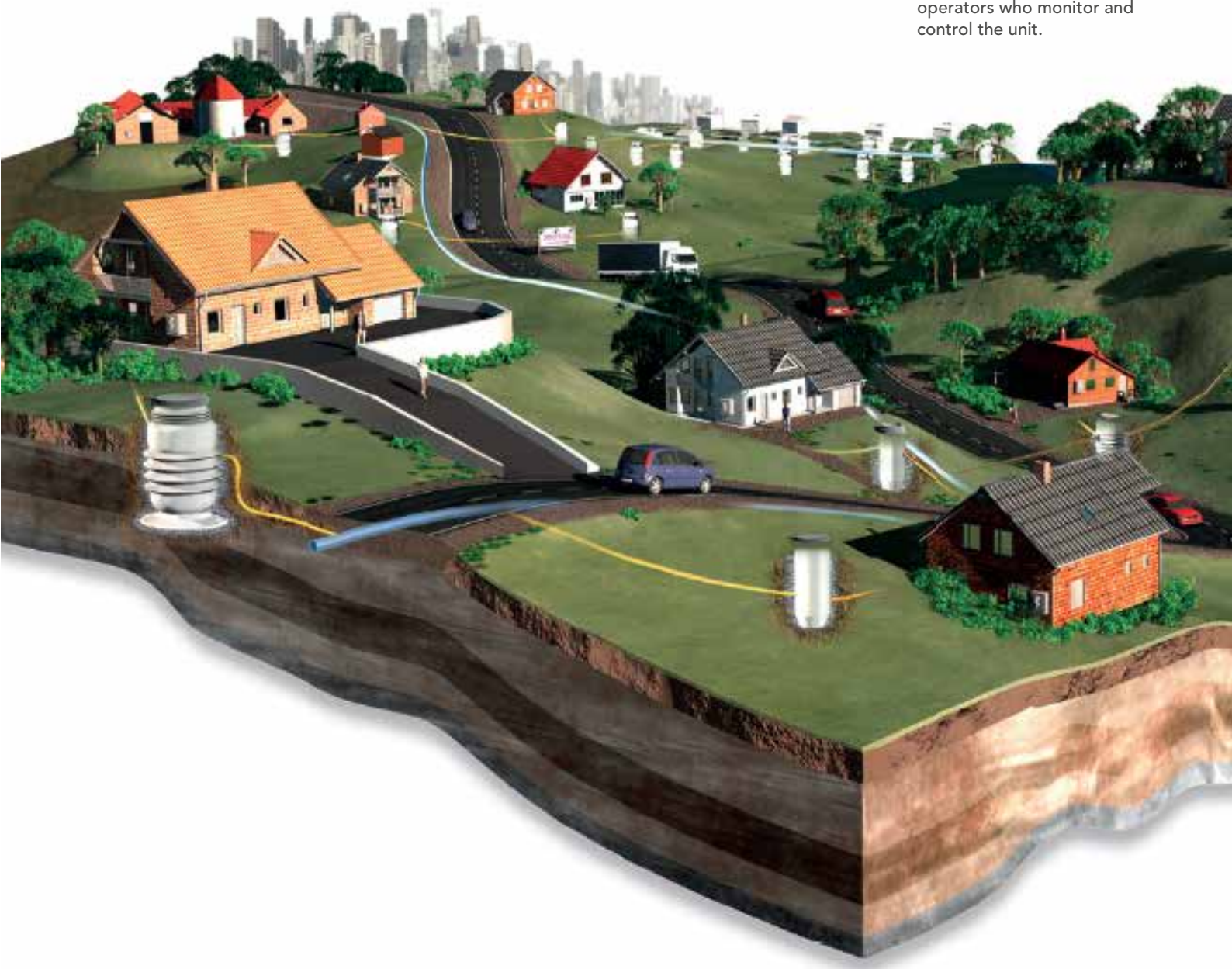
Varied application

Residential applications often have:

- Small pumps that typically weigh less than 40kg, and pump at 0.5 L/s.
- A higher focus on maintenance free equipment.

Commercial and municipal applications usually have:

- The pump station located inside the building or on the lot of the facility
- Higher flows
- Larger pumps
- Longer running hours
- Wastewater with sometimes higher solids content, paper towels, grease, etc.
- Sometimes high fluctuations in flow
- Professional maintenance by operators who monitor and control the unit.



TOPS - the sump that keeps itself clean

Under Xylem Flygt's The Optimal Pump Station (TOPS) program, the sump has been redesigned and the pump discharge connections have been optimised to improve the flow over the sump floor during pumping.

The TOPS base increases turbulence and causes re-suspension of settled solids and entrainment of floating debris. This results in more solids being removed from the sump, leaving a minimum residue beneath the pumps, which is ready to be removed during the next pump cycle.

Factors such as floor clearances and the spacing between adjacent pumps were fully evaluated before the optimum design for the self-cleaning sump could be finalised. In the tests, measured volumes of solids were dumped into each sump; the efficiency of the TOPS geometry became more obvious with every pumping cycle.

An added benefit is that, because Xylem Flygt pumps are capable of being run safely up to 15 starts per hour, sump volumes can be further reduced. This in turn means a reduction in construction cost and long term operating costs. The result is that if you fit the new TOPS sumps you can forget about those regular cleaning sessions.

TOPS can be retrofitted to existing concrete 1800mm pump stations and come as options on fibreglass stations.

The convergent, sloping geometry of the TOPS floor ensures controlled high fluid velocities which result in a dramatic improvement in solids transport.

How effective is the TOPS sump geometry?

In a series of tests conducted in laboratory conditions, sumps with different diameters and floor configurations were evaluated alongside each other to gauge their ability to prevent sediment build-up. These tests also demonstrated their efficiency in transporting solids.

At the end of each pump cycle, the solids pumped out from the sumps were weighed and then returned to the sump for the next cycle. The results were averaged.

The tests compared the effectiveness of a standard 1600mm sump vs TOP 100 sump. Each was inter-connected, with 49kg of solids in each and the system was filled with 800 litres of water shared between the two. Water was pumped back and forth from one sump to the other a total of 10 times. Stop level in each case was the top of the volute.

Result:

- 94kg of solids in 1600mm sump
- 4kg in TOP 100 sump

The TOPS design gives:

- An integrated, self-cleaning design
- Minimal residual water volume and maximum sump velocities
- Tested and verified performance
- Simple, cost-effective retrofit solution for older stations
- Package pump station solutions for new applications
- A cost effective solution
- Easy installation



We are TOPS for cutting down service calls

The flat shape of a traditional pumping station sump floor allows for the build-up of sludge, requiring regular cleaning.

This is time consuming and expensive and can present safety hazards to personnel. An option for the 1800mm concrete Packaged Pumping Station is the patented TOPS benching unit which improves the flow over the sump floor during pumping. This increase in turbulence causes re-suspension of solids and entrainment of floating debris.

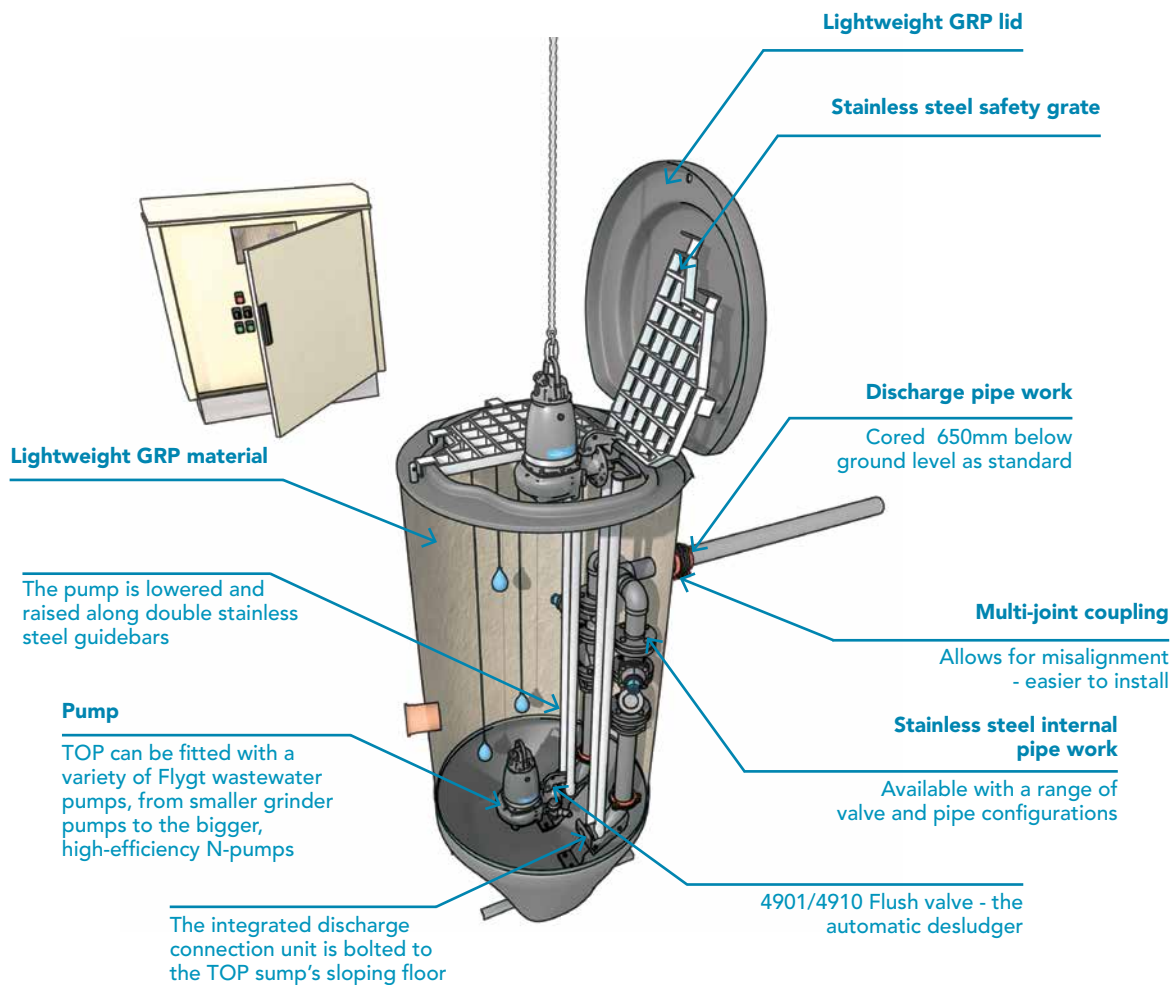
The result is more solids being removed from the sump, leaving a minimum sludge accumulation in the sump which cuts the cost of service calls.

The Xylem TOPS Packaged Pumping Station can be fully adoptable under the latest SFA guidelines, and has been approved by many water companies and local authorities in Australia and around the world. With the Xylem TOPS design, you can forget regular costly maintenance and expensive unplanned service calls.

It is available with a:

- Separate valve chamber.
- Complete range of monitoring and control equipment.
- Wide range of pipework sizes and access covers.
- Large variety of pump motor sizes and impeller combinations to suit all applications.

TOPS base available in 1800mm model



Fibreglass Packaged Pump Stations

The advantages of using a fibreglass Packaged Pump Station start with its speed of installation. Units are light in weight and are easily handled. Excavation time and confined space entry are minimised, and this means minimal site work and time at the site.

In addition, fibreglass offers smooth internal surfaces that are easily and quickly cleaned with a medium pressure hose. Corrosion is eliminated with all fibreglass construction, giving an anticipated design life of at least 50 years. All joints are factory sealed so there are no problems with infiltration or leaks.

Pump stations with TOPS bases with Flygt pumps offer enhanced pump station performance and minimise liquid and solids retention.

There is an anti-flotation ring near the base, and the weight of the backfill on this ring holds the ballast that stops the chamber floating up with the surrounding groundwater. Concrete can also be placed around the base and over the anti-flotation ring to lock the station in place.





Operation

The pumps operate automatically when the liquid level inside the tank rises and activates the level regulators.

- For single pump operations there are three liquid level controls to operate the pump – stop, start and high level alarm.

- For dual pump operation, there are normally four float switches used to control the two pumps; these comprise of three operation floats for pump stop, duty pump start & standby pump start and one alarm float switch for when high liquid level conditions are reached within the tank. If a high liquid level is reached within the tank, both pumps will operate until the level is reduced and the pump stop float switch is activated.

- The control system automatically alternates the duty and standby pumps to ensure an even amount of pump service.
- In the case of the pump failure, the failed pump is isolated, a warning light is activated and the standby pump continues to operate as duty pump.

Standing up to major shocks

Shock proof

As was discovered after the devastating earthquakes that hit Christchurch in New Zealand's South Island in 2010 and 2011, the fibreglass pump stations came through well. But much other infrastructure and pipework was destroyed. In partnership with Xylem, NZ company Armatec is now supplying new fibreglass pump stations and valve chambers for areas subject to the liquefaction which destroyed so much infrastructure above and below the ground.

In earthquake prone areas, the pump station and valve chamber are locked together on a concrete slab to eliminate movement. The concrete slab is then anchored to bedrock with screw piles.

A wide range of access lids can be fitted. These can be flush flat finish, or raised above the pump station. Safety grilles are pre-fitted to access lids as standard. These are sealed to prevent the escape of odours.

The excavated hole needs to be a minimum of 150mm below the invert of the pumping station (inside base dimension), allowing for at least 200mm of concrete or backfill around the outside of all fibreglass surfaces.





Polyethylene Packaged Pump Stations

Xylem Flygt Polyethylene Packaged Pump Stations are designed for situations where civil work and installation time must be kept to a minimum.

The lightweight prefabricated Polyethylene Pump Stations are available in multiple diameters and various depths. The Pump Stations are fully assembled with all the necessary equipment to allow ease and speed of installation.

They can be adapted to suit most requirements and are most suited for installation into difficult terrain locations. These include:

- Building Services
- Commercial centres
- Housing developments
- Construction sites
- Schools
- Caravan parks
- Motels/hotels
- Single dwellings

Design Features

- Lightweight, easily transported, easily handled at site
- Simple installation, reduce to a minimum on-site and civil costs
- Long life corrosion resistant material
- Fully factory assembled before dispatch
- Available in dual or single pump installation

Godwin Dri-Prime Backup System

Pump Station Standby pumping and power in one package.

The Godwin Dri-Prime Backup System (DBSTM) provides peace-of-mind as the ideal contingency plan for pump stations.

The DBS provides independently powered backup pumping in one dependable package for a variety of emergency situations. It is ideal for areas prone to cyclones, heavy rain or power failures.

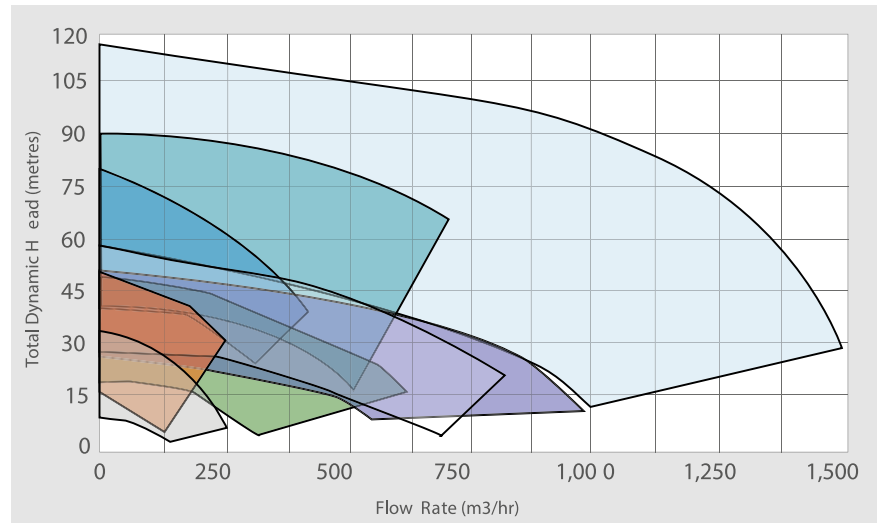
The Dri-Prime Backup System is engaged during loss of primary power (whether from a scheduled outage or natural disaster) or switch gear failure. It is also used during routine pump maintenance or unexpected pump failure.

DBS: Backup pumping instead of backup power

- 100% pump station redundancy (Capacity and head)
- Automatic pump priming without operator assistance
- Optional Flygt N-technology, for sustained efficiency while handling stringy material
- Automated control system assures cost efficient running
- Sound attenuation enclosure for quiet operation
- Flexible fuel options to meet your needs: diesel, natural gas (including propane) or LP vapor
- Cold weather package for use in freezing conditions
- Allows for routine pump maintenance on existing equipment, ensuring continuous pumping operation.

DBS Basic Pump Performance Field

Sample of pump line: 75mm to 200mm



DBS Dri-Prime Backup System Automatic priming without operator assistance

Venturi air evacuation:
automatic priming

- 8.5m of static lift
- Continuous operation
- Automatic re-prime

Oil bath mechanical seal:

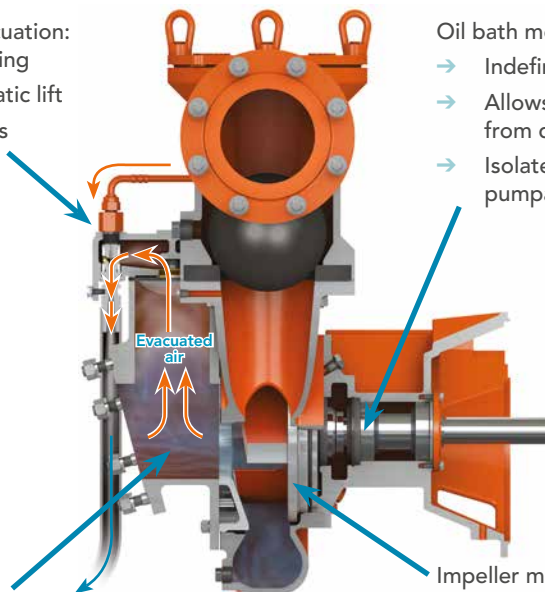
- Indefinite dry-running
- Allows pump to prime from dry
- Isolated from pumpage

Straight line:

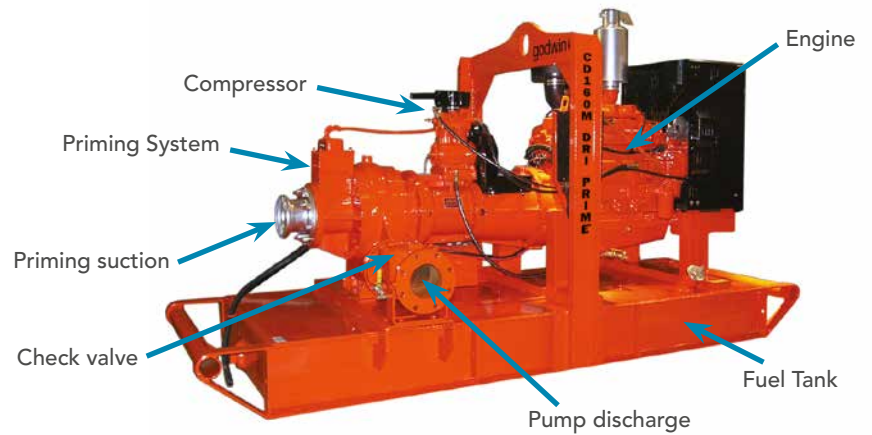
- Improved flow pattern
- Better solids handling — with CD-impeller
- Sustained pump efficiency — with N-impeller

Impeller materials:

- Cast chromium steel
- Stainless Steel CD4MCu
- Stainless Steel #316
- Hard Iron™



What's Inside the Box



Comparing a DBS pump station to a standby generator

DBS Features

- Continuous pumping despite loss of power, switch gear or failure of lift station submersible pumps
- Ability to function as primary pump during lift station pump maintenance
- Available in sizes 80mm to 500mm with flows to 3,357m³/hr and discharge heads to 120 metres

- PrimeGuard digital control panel allowing seamless interface to existing control systems for remote monitoring and control
- Optional sound-attenuating enclosure reducing sound levels as low as 64 to 69 dBA at 10 metres
- Hinged locking doors providing access to operating controls and service locations

Backup Generator vs. DBS

Possible Malfunction	Pump Station w/ Generator	Pump Station w/ DBS
Loss of Utility Power	✓	✓
Transfer Switch	---	✓
Control Panel Failure	---	✓
Automatic Control	---	✓
Existing Pumps	---	✓

Flygt Submersible + DBS = Xylem Total Pump Station Solution

DBS Features

- 100% Redundancy
- Flygt N-technology
- Redundant level controls
- SCADA interface capability



Monitoring & Control

Xylem offers a complete range of pre-configured pump and process controllers to suit all sizes of pumping stations. Exclusively designed for pumping applications, their standard features mean users can easily operate the entire range. All pump controllers have a user-friendly HMI (Human Machine Interface) front panel and can be connected to supervisory control systems.

Control panels

Xylem designs and builds control panels to the specification required by the customer, project, council or water authority. This service is designed to offer a complete package that will work and make the job easy, by saving you the need to run around and get all of the bits together.

We can offer a panel that will just do the job if that is what you are after. From the simplest electro-mechanical type with start and stop function to highly sophisticated monitoring and control systems, you can order a fully integrated Control Panel for your pump station from the world's leading manufacturer of submersible pumps and provider of fluid handling technology.

Xylem Flygt has the experience and knowledge to supply you with the right monitoring and control equipment to make your pump station function optimally with your pumps and for your application.

Monitoring

Using Xylem Flygt's electronic pump controllers in your Control Panel, you can accurately and efficiently monitor the pump station with information like pump status, pump capacity, energy consumption and overflow.

The Multitrode MultiSmart intelligent Pump Station Manager is the new face of technology for monitoring and control of water and wastewater pump stations. MultiSmart is a comprehensive and easy to use replacement for pump controllers, PLC's and RTU's backed by a 5-year warranty and free software upgrades for the life of the product.

Control

The simplest of our Control Panels is electromechanical with start/stop function activated by a level switch.

The next level comprises Control Panels with an electronic controller with a level sensor. The electronic controllers range from simple controllers with start/stop and alarms up to highly sophisticated monitoring and control systems that log data and provide statistics and trend reports.

After all, we know wastewater pump stations so you don't need to – we will give you something that will work well for the application. If you have a specification that you need to meet then we can (and often have) built the panel to your specification.



Custom Switchboard

Built to suit any council or water authority specifications



SmartRun

Pre-programmed control dedicated to wastewater pump stations



FGC300

1-2 pump controller for pumps up to 5.5kW

Sensors

We offer a range of level sensors.

Xylem Flygt LTU701 Level Sensor:

These hang (from their cable) near the bottom of the well and measure the pressure on a diaphragm. This pressure is due to the weight of the water – so the higher the water level, the deeper the water, the higher the pressure. These sensors also have a compensation for the variation in atmospheric pressure – by a breather tube running inside the cable from the sensor to atmosphere.

Our level sensors are specifically designed for wastewater and stormwater – not for other applications – so they are the best choice for your proposed pump stations.

At the lower-end of the price range we have a sensor with a smaller diaphragm / membrane which is sufficient for any wastewater or stormwater application.

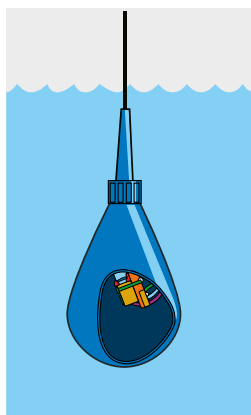
The higher-end sensors, with a bigger membrane, have higher accuracy and a wider temperature range. They are less prone to clogging, more reliable, and what we recommend for wastewater and particularly for municipal applications.



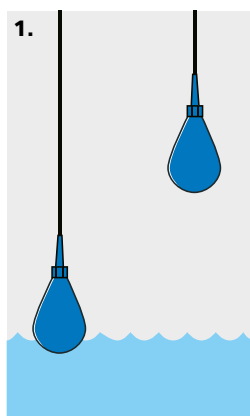
Float Switches / Level Regulators

These are a float that lifts or tilts when the water hits them. This activates a switch in the float. So they are a single point level sensor. In a typical pump station, one would use four float switches; from the bottom – Stop Pumps, Start Duty Pump, Start Standby/Assist Pump, High Alarm.

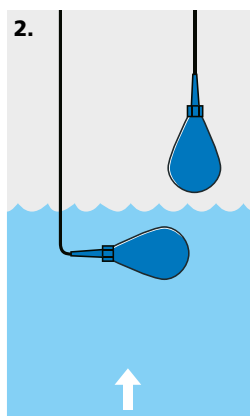
Operating principle



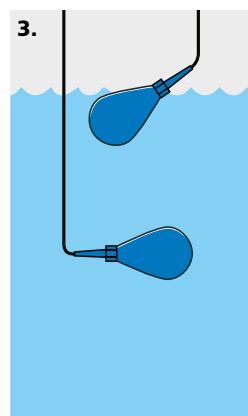
Polypropylene 'non-stick' casing. Buoyancy ratings for most applications.



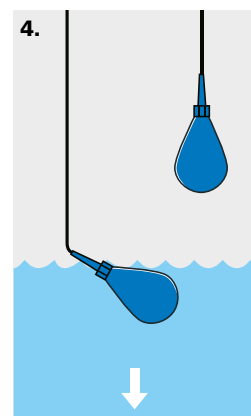
1. The pumping process stops when the lower regulator returns to the vertical position and signals a stop.



2. The media level begins to rise, starting the process again.



3. Media to be pumped reaches the pre-set level and tilts the upper regulator, which signals the start of the pumping process.



4. The pumping process stops when the lower regulator returns to the vertical position and signals a stop.

Xylem Flygt ENM-10 sensor

Is the simplest possible method for level control in sewage pumping stations. For ground water and drainage pumping – in fact, for most level control applications – the ENM-10 is the most obvious solution.

When the liquid level reaches the regulator, the casing tilts, activating the internal micro switch, thereby starting or stopping a pump or tripping an alarm device.

The regulator casing is made of polypropylene, a non-stick material resistant to most aggressive liquids.

The cable is sheathed with PVC or rubber to avoid the build up of impurities and deposits. This ensures reliable operation and a minimum of maintenance.

Rather than floating on the surface, the ENM-10 hangs immersed in the liquid. This prevents the cables from tangling when several regulators are used. Other float brands need to have a weight attached or be tied down. The weights tend to get fibrous material caught on them which can interfere with the operation. Tying the float down makes them difficult to replace or to adjust the level.

The ENM-10 has a great track record of reliability, is the industry standard product and is widely specified and accepted by municipalities. Its widespread acceptance is due to it being specifically designed for wastewater.

The ENM-10 has a proper microswitch inside for utmost reliability – both mechanically and electrically. Other float brands just use a large ball-bearing to actually make the electrical contact. This is not going to be as reliable as a Flygt switch.

So mechanically, and in all other ways, the ENM-10 is designed for reliable long-term operation.

Flygt LTU 601

The Flygt LTU 601 is a robust submersible hydrostatic level transmitter providing flexible and reliable level measurements. It is the ideal sensor for use in a wide range of applications from wastewater pumping stations, to tanks and containers at sewage plants as well as at waterworks and industrial plants.

The Robust Choice:

Built to last even in the most demanding environments, the LTU 601 consists of a heavy plastic design combined with high pull strength PUR cable. Its heavy weight not only makes installations simpler and safer but also allows the sensor to enter the media and sink easier making it less prone to turbulence. With the optional copper ring accessory, the sensor can even handle sea water applications, while the printed part information on the sensor's body ensures long term readability.

Reliable Performance:

By incorporating the latest technology, the LTU 601 delivers outstanding reliability thanks to the large membrane protection holes which minimize clogging and reduce the number of service visits required.



Multitrode

Why do you need the MultiSmart Pump Station Manager?

Your pump station can face a host of problems on any day or night. The best way to keep a close eye on it, and cut down on costly repairs and servicing, is to install the most advanced, electronic monitoring system on the market.

That is us. Xylem's Multitrode and our high performance MultiSmart pump station manager.

Why is it the best? Here's why:

- Our control panel is the heart of the system, monitoring and controlling every aspect; as well as making decisions to pre-empt pending problems.
- It can cut down expensive breakdowns, and operational costs in general, by up to 70 per cent.
- It can reduce your energy costs and carbon footprint by 15 per cent.
- It is cheaper than many of its competitors.

And that's just to start.

When you are trying to diagnose a problem with your pump station, often at a very inconvenient time, you know how important it is to get the right information. MultiSmart gives you comprehensive information on past and current problems.

SCADA System

Connecting a Xylem Flygt controller to a Supervisory Control and Data Acquisition (SCADA) system allows full remote control and monitoring of your pump station.

Communication

Our control panels offer a range of options for communication links with a remote SCADA system including dedicated or dial-up phone line, radio link, GSM or NextG system.

Starters

Flygt offers a wide range of IP rated starters to suit the various pump models.



The MultiSmart has hundreds of functions designed to meet the needs of water and wastewater pump stations. From something as simple as changing setpoints or how a fault condition affects a pump, through to complex alternation schemes for large pump stations, the MultiSmart puts the operational staff back in charge - quickly.

The beauty of the MultiSmart is that the defaults have been carefully thought out so that when a station is commissioned almost everything is working how you would like it. But nothing is fixed – so any parameter can be changed. This makes it quick to set up but always adaptable.

And for challenging applications where a new feature is required – there's an IEC61131-3 compliant PLC extension to MultiSmart – so that any system integrator can extend the functionality further.

MultiSmart features:

Max run time for a pump. It switches to the next pump and raises an alarm.

Odour reduction via max off time. This ensures wells do not become septic.

Run the **most efficient pump**, instead of alternation.

Clean the well out every Monday morning. This operates at just above the snore point of the pump.

Multiple setpoint profiles. This allows remote switching or on a date/time for spill management and energy reduction.

Generator profile. Allows a change of setpoints and limits max pumps to run when the generator is operating.

'Locked level' raises an alarm when the level has not changed enough in a given time period (possibly due to a suspect level device).

Each **fault configurable** as display only. This holds out the pump until the fault clears or holds out the pump until operator intervention. It will retry pump a set number of times after fault condition clears then finally locks out.

Optional **VFD module** to control one or more pumps, with easy set-up.

How our MultiSmart pump station manager cuts costs

- The control panel, and its installation, is typically \$5500 less expensive than its competitors.
- It has lower commissioning cost – one UK water utility calculated up to \$7000 saving in staff on site due to our smaller panel.
- Predictive maintenance indicators.
- Fault-finding data to get to the root cause of problems.
- Remote control means you can reset faults and pump auto/manual/off from the SCADA.

Better data is available to a SCADA system.

Predictive Maintenance

Predictive Maintenance is the ideal strategy because it identifies when assets need to be replaced – allowing the utility to plan cost-effective maintenance.

However, most utilities use Run to Fail or Preventive Maintenance Indicators as their strategy. This is because Predictive Maintenance has been considered too expensive to adopt. Critically, both Run to Fail and Preventive Maintenance have inherent flaws.

Run to Fail often seems like a low cost solution, but it has two major problems:

a) When a pump fails, what is the guarantee that the other pump is operational? Adopting a proactive approach to maintenance is far likelier to be viewed favourably by an EPA than adopting a "hope for the best" approach.

b) Without viewing the pumps prior to failure there is no guarantee that you are not running them into the ground. For example, one large utility found that a high proportion of its pumps failed after 7-8 years. The cause, identified by MultiTrove equipment, was that the 3-phase supply was too low, causing high running currents and reducing the life of the insulation on the motor windings. But at five years, the utility might have been feeling confident that its approach was working.



MultiSmart delivers a wealth of data to managers

SCADA systems for pump stations frequently only have a few points of data per site – pump running, pump fault, level, level alarm, mains fail and flow (if a flow meter is available on site). This does not provide the best platform for managing this asset. Asset managers, capital works managers and utility directors need real data to plan for the future.

MultiSmart provides 400-500 tags (data points) per site. This wealth of data includes Predictive Maintenance information, volumes through the station, energy usage, peak power requirements and detailed fault information – allowing the utility to find out where their real costs lie.

MultiSmart also simplifies remote control – turning pumps on and off, resetting faults and changing setpoints.

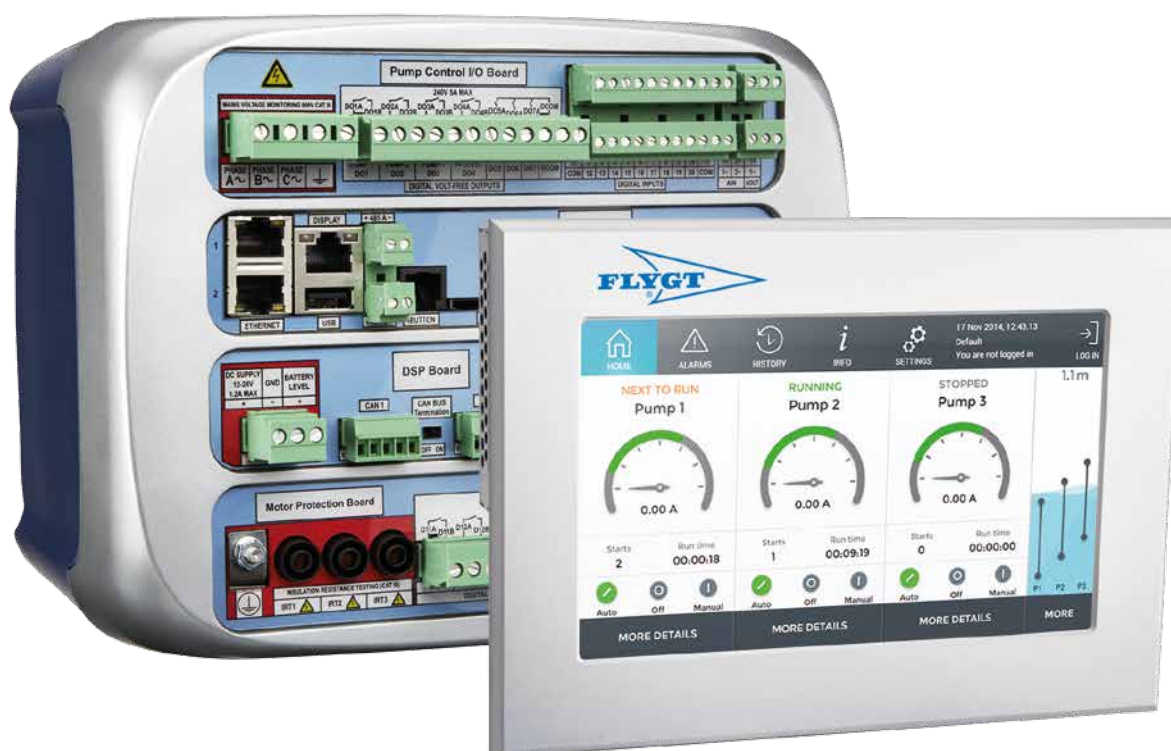
Which SCADA does MultiSmart connect to?

MultiSmart has a sophisticated RTU with Modbus & DNP3. The MultiSmart DNP3 implementation has been independently audited and proven to comply with the standard. MultiSmart has capacity for multiple masters and slaves to be configured allowing connection to any other modern SCADA platforms. MultiSmart also supports connection over serial radio.

It all adds up

MultiSmart is the best way to cut pump maintenance costs and reduce the headache of costly service call-outs. One UK water utility using MultiSmart found that one of their pumps in a 3-pump station was very inefficient. As a result they discovered the replacement cost of an impeller would pay for itself in 95 days.

Many utilities are unaware how much pump efficiency can degrade, even in clean water. A drop of 10% pump efficiency in the first 10 years of service in a clean water pump is not uncommon. In waste water, it will be more like 20%. MultiSmart can identify and address these problems.



We've got it in stock

Xylem's extensive network of depots carry a wide range of ready-to-install pump stations, featuring the latest in pump designs. In addition, accessories, valves, lids, controls, grinders and upgrades for your existing pumping station can generally be delivered within 4-6 weeks.

See the front inside cover of this handbook for details of your nearest Xylem service centres in Australia and New Zealand.



Rely on our complete service

Xylem commissioning engineers offer a commissioning service for our full range of packaged pumping stations and related control equipment.

Our commissioning service not only ensures the correct electrical connection of pumps, floats and ancillaries, but we will ensure that your packaged pumping station is fully functional and optimised to your particular application upon completion.

Aftercare

Xylem is able to provide a fully comprehensive aftercare service, including emergency breakdown attendance, preventative maintenance contracts, workshop repair and pumping station refurbishments.

It is our aim to provide customers with the highest possible level of care, starting with pre-sale and continuing throughout the entire lifetime of the product. Our strategically located service centres (see inside cover) are supported by a mobile team, reacting quickly to call-outs.

Service contracts

We offer a broad selection of planned maintenance service contracts, from the Bronze agreement providing annual inspections, to fully comprehensive Gold contracts that can include the cost of all parts and labour.

In addition, we can offer weekly remote performance checks, failure alarms sent to a mobile or email account and pump rental cover, in the event of a breakdown. Finally, the Platinum purchase scheme provides comprehensive cover and easy payment terms for the first five years of operation.

Warranty and repairs

Xylem has confidence in both its products and service skills, and offers a 12 month warranty on the whole pump – not just the repair.

Service centres

Our network of service centres in Australia and New Zealand offer a comprehensive pumping station commissioning service, on-site M&E maintenance, emergency call-out, workshop repair facilities, and pumping station upgrades and refurbishments.

Genuine Flygt spares

- Extensive stocks for rapid delivery
- Repair kits available for most pumps
- Upgrade kits to latest designs



Major projects



Melbourne Park Tennis Centre

The redevelopment of Melbourne Park is the single biggest investment in the precinct since the Australian Open moved to Melbourne Park from Kooyong more than two decades ago. It is expected that the \$363 million investment will also help open up opportunities for other sports, such as netball and basketball, as well as concerts and other events.

The expansion included rainwater harvesting and treatment facilities, which required a 4.5 megalitre underground stormwater retention tank.

Xylem Water Solutions supplied two 3m diameter x 7m deep pre-cast concrete packaged pumping stations. Each pump station contained three NP3102 3.1kW Flygt submersible wastewater pumps, one JWC Muffin Monster 30005 series grinding machine, and one SR4620 1.5kW Flygt submersible mixer.



Moonta Bay Wastewater Management System

The Stage 1 Moonta Bay & Port Hughes Community Wastewater Management Scheme in South Australia involves the provision of five new concrete packaged pump stations and four new concrete storage chambers.

Xylem Water Solutions will be supplying all four chambers & five stations, with each station packaged with dual Flygt submersible pumps, ranging from our MP3068 1.7kW grinder pumps, to our NP3153 11.0kW pumps.



Barrow Island Development

Xylem Water Solutions has been working as a part of the Gorgon project, located around 60km off the northwest coast of WA, for Chevron Australia in their development of a liquefied natural gas and domestic gas plant, by supplying multiple packaged pump stations for the wastewater pumping requirements in the region.

To date, our ongoing involvement with the project has included the supply of five 3.0m diameter stations and two of our 2.2m diameter stations of varying depths between 3.0m and 6.0m, along with multiple Flygt submersible wastewater pumps & JWC Muffin Monster 30005 series and JWC Mini Monster 20002 series grinder units.

Although Barrow Island is seen as one of the world's most important wildlife refuges, the environmental management of the island has allowed for a sustainable development, internationally recognized as a place where industry & the environment co-exist.



Enquiries

For all Packaged Pump Station enquiries
please call **13 19 14** or visit www.xylemwatersolutions.com/au

What can Xylem do for you?

Xylem ['zīləm]

1. The tissue in plants that brings water upward from the roots
2. A leading global water technology company

We're 12,700 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyse, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by legacy of innovation.

For more information on how Xylem can help you, go to www.xylemwatersolutions.com/au



godwin



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