FLYGT
a xylem brand

Flygt Concertor™

THE WORLD'S FIRST WASTEWATER PUMPING SYSTEM WITH INTEGRATED INTELLIGENCE

A new level of thinking to solve modern wastewater challenges

Are you prepared to meet the future challenges of the wastewater industry? Like never before, aging infrastructure, global urbanization, increasing energy costs and the need for sustainable solutions are making cost reduction an urgent priority for all. Just imagine that by 2050, an estimated 70% of all the world's population will be living in cities – an urban wastewater challenge on a scale we've never seen before.

The solution to all these challenges is not more components and complexity but intelligent, flexible and leaner solutions. This is why, for decades, we've been dedicated to developing sophisticated wastewater pumping solutions that substantially boost your efficiency while dramatically reducing your total equipment footprint and cost of ownership. It's a complex challenge that only the most innovative and integrated designs can solve.

Innovation and integration – it's part of Xylem's DNA

For more than 60 years, Xylem's Flygt brand has continuously raised industry standards for compact, trouble-free pumping. Ever since introducing the world's first submersible pumps, the focus has been on integrating technologies to reduce complexity and costs. The breakthroughs that have emerged along the way have been a huge benefit to wastewater pumping stations all over the world.

Our commitment to deliver peace of mind

At the end of the day, your peace of mind is the true measure of our success. And we remain as determined as ever to raise your expectations for smarter, more reliable and user-friendly pumping systems. Our new wastewater pumping system with integrated intelligence takes these expectations to the next level. A new level of technology, and a new level of thinking.

Sixty years of innovative, integrated techologies

1947
First submersible dewatering pump prototype – the "Parrot Cage"– was designed.

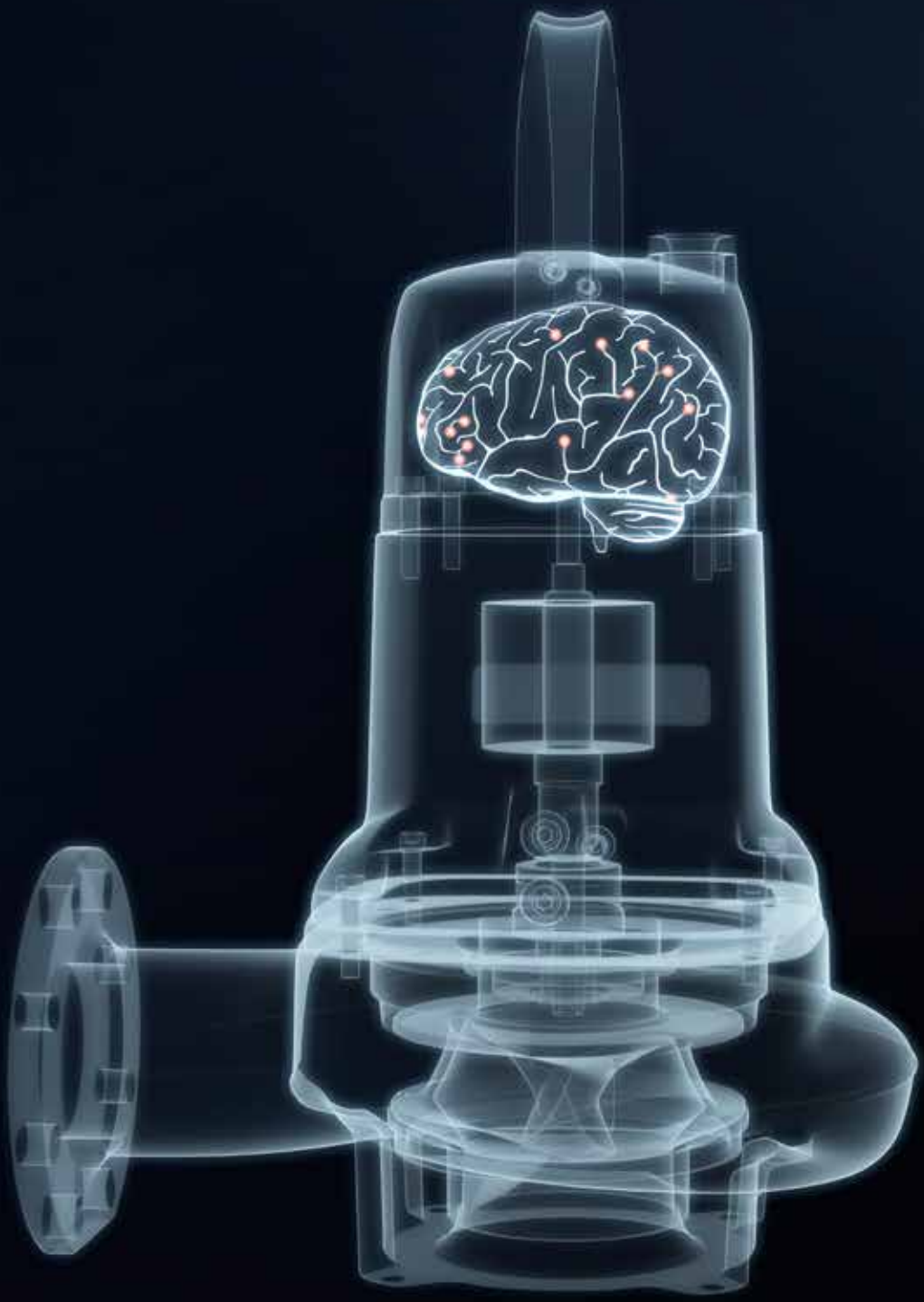
1997
Introduction of the first N-pump with a unique self-cleaning impeller.

2011
Flygt *SmartRun®, a new intelligent pre-programmed pump control system for water pump station, is launched.*

1901 ——— ***2016*** →

1956
Creation of the C-pump: the first-ever submersible wastewater pump, which vastly reduced the space required for modern pumping stations.

2009
Launch of the Adaptive N-Pump impeller, which moves upwards to allow larger objects and debris to pass through.



Flygt Concertor™ A new level of technology with unlimited possibilities

Xylem is proud to introduce the world's first wastewater pumping system with integrated intelligence. A real breakthrough innovation, Flygt Concertor™ is capable of sensing the operating conditions of its environment, adapting its performance in real time and providing feedback to pumping station operators. With this new system, Xylem is now bringing smart and interconnected solutions to the world of wastewater pumping.

The name Concertor relates to the system's unique synergy between software functions and state-of-the-art hardware and the remarkable benefits this innovation can bring to our customers around the world.

A new way of thinking
Concertor combines a fully integrated control system with IE4 motor efficiency, our patented Adaptive N-hydraulics and intelligent functionalities. The control system automatically adapts to the changing pumping environment, delivering the optimal level of performance at the lowest cost of ownership. The built-in intelligence also makes it easier to set up and operate, as well as allowing for a significantly smaller footprint.

One powerful solution, unlimited possibilities.
Concertor's advanced technology gives you a wide range of benefits covering four main categories. The whole idea is to give you greater peace of mind while reducing your total costs.

EFFICIENT ASSET MANAGEMENT	TROUBLE-FREE PUMPING	ENERGY SAVINGS	REDUCED TOTAL INVESTMENT
– Selection from a performance field instead of a fixed performance curve allows for enhanced operational flexibility. – Adaptive technology automatically selects the duty points to optimize performance. – Performance can be fine-tuned on site without changing the impeller.	– Built-in sump and pipe cleaning reduces odor and maintenance, delivering a safer overall system. – Clog detection and pump cleaning functions ensure clog-free operation. – Built-in self-monitoring functionality prevents overheating and extends pump lifetime. – Automatic rotation settings prevent incorrect impeller rotation.	– Patented Energy Minimizer automatically optimizes performance to reduce energy costs. – Adaptive N-technology delivers sustained efficiency. – Super premium IE4 motor efficiency.	– Pre-engineered solution with simple set-up wizard saves engineering time and makes start-up quick and easy. – A smaller, simplified cabinet frees up space and reduces cost.

EFFICIENT ASSET MANAGEMENT

From complex selection . . .

Flygt Concertor™ offers a pump performance field covering a wide range of pump curves. No need for the perfect station design data. No need for a large inventory. One pump self-adjusts or can be adjusted to fit changing conditions – without having to change impeller diameters or motor sizes.

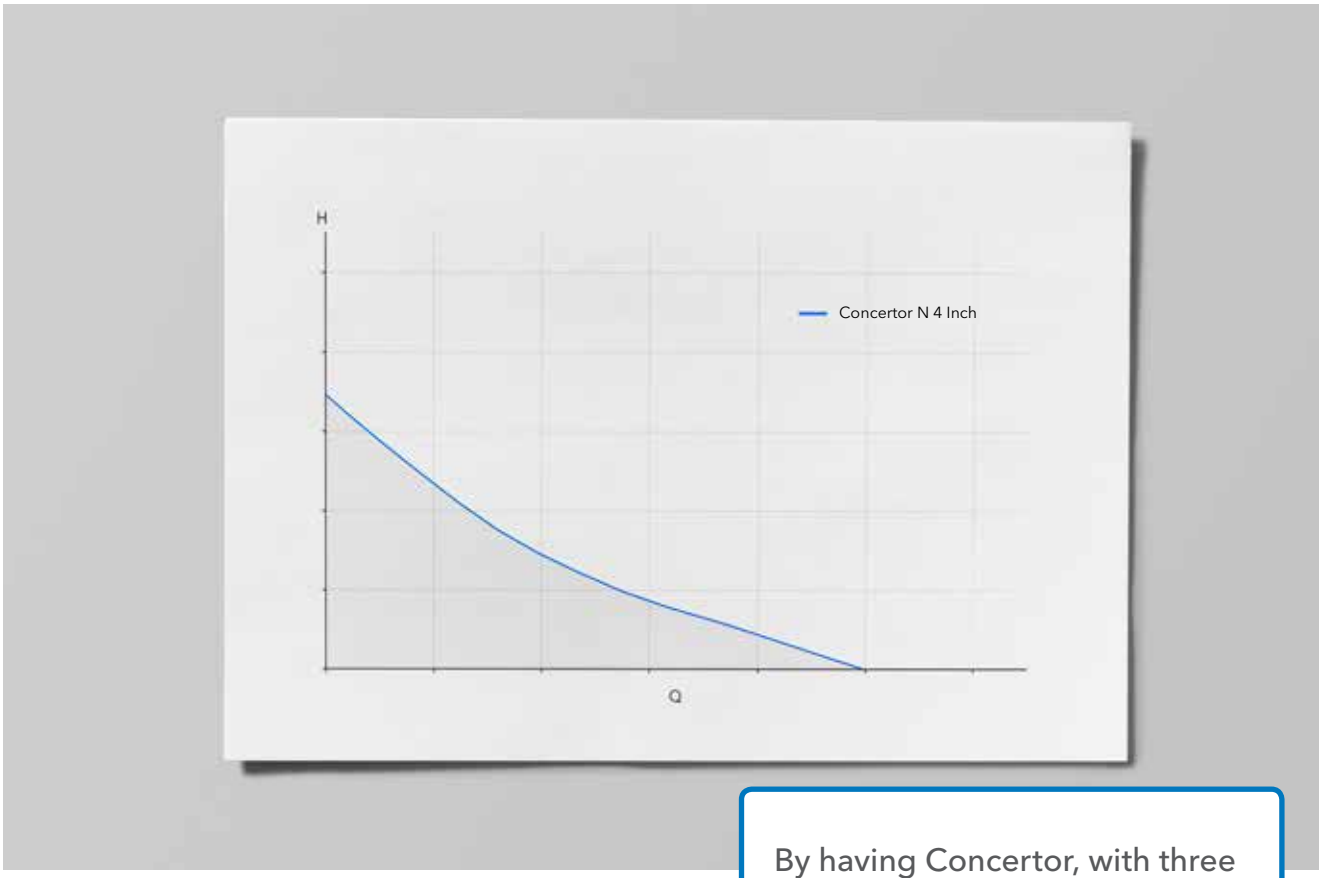
As wastewater volumes increase, it is often necessary to upgrade the pump and control equipment to manage the additional flow rates. Even an experienced professional may have difficulty in selecting just the right performance curves due to uncertain conditions. Concertor simplifies product selections and at the same time reduces your inventory.

INVENTORY CAN BE REDUCED BY UP TO

80%

DUE TO **CONCERTOR'S FLEXIBLE PERFORMANCE**

to an easy decision with one flexible solution



By having Concertor, with three outlet dimensions, we could drastically reduce our inventory.

Anders Sjöstrand, Lomma Municipality, Sweden

Self-optimizing performance
Unlike the fixed performance curves of conventional pumps, Concertor offers an entire performance field from which to choose the right operating point. Not only does this make selection extremely simple, but operating performance can easily be changed and fine-tuned on site or remotely, as required.

Reduced backup inventory
Since the system covers a broad performance field and adapts automatically to different duty points, your pump inventory can be significantly reduced. This also simplifies the process when searching for a spare or emergency pump.

EFFICIENT ASSET MANAGEMENT

- Easier product selection
- Adjustable performance curves
- Fine-tune remotely or on site
- Reduced backup inventory
- Easier spare part handling
- Reduced delivery lead times

to clean wet wells at all times

> We used to call the vacuum truck once a month to manually remove sediment and grease. That is now a thing of the past. With Concertor, we have saved both money and time.
>
> R. Ramesh, Sultan Qaboos University, Oman

for the first time ever. Extensive trials show that this dramatically minimizes unplanned and costly maintenance. An integrated pump cleaning function, together with our patented Adaptive N-technology, detects and resolves clogging from large debris. The result is a safe, clean system for operators.

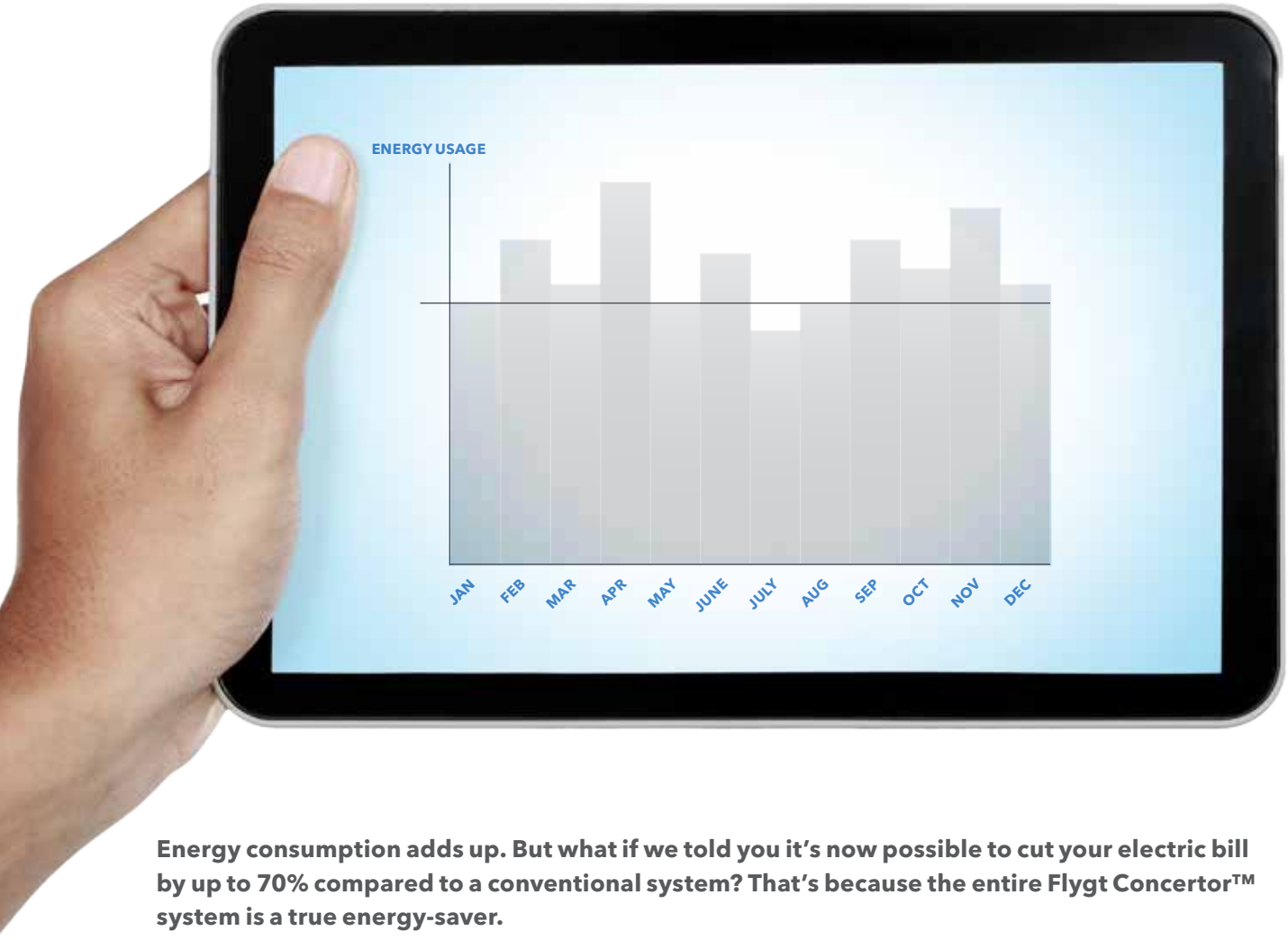
Increased reliability and product life cycle time
The pump provides self-monitoring functionality that will prevent overheating and motor failures due to external conditions. The innovative motor technology and Energy Minimizer increase the lifetime of the motors, seals and bearings. Finally, and very significantly, the control system inside the pump is placed in a stable environment, which protects it from unfavorable external conditions.

TROUBLE-FREE PUMPING

- Built-in sump and pipe cleaning
- Integrated pump cleaning function
- Self-cleaning hydraulics
- Self-monitoring functionality
- Self-tuning to preserve key components
- Electronics placed in stable submerged environment
- Safe operating system

ENERGY SAVINGS

From thirsty consumer . . .



Energy consumption adds up. But what if we told you it's now possible to cut your electric bill by up to 70% compared to a conventional system? That's because the entire Flygt Concertor™ system is a true energy-saver.

Equipped with a seamless combination of new software and next-generation hardware, Concertor is designed for automatic self-optimization to assure the lowest possible energy consumption. This is largely due to our patented Energy Minimizer function, which automatically ensures that all the pumps in your

ENERGY SAVINGS OF UP TO

70%

COMPARED TO **CONVENTIONAL PUMPING** SYSTEMS

to smart energy saver

We've not only improved our overall pumping performance, but also reduced our energy bill by 53% at one of our pumping stations.

Ian Jolly, Heathrow Airport Water Services Department, UK

stations are running at their most efficient duty points, at all times.

Energy savings is about more than just sophisticated built-in software. Unparalleled pumping efficiency is also enabled by state-of-the-art components such as our new Super Premium IE4 Efficiency motor and new mechanical self-cleaning Adaptive N-hydraulics. And since there is no need for ventilation, cooling or heating of cabinets, you get substantial savings over the total lifecycle.

ENERGY SAVINGS

- Automatic self-optimizing Energy Minimizer
- State-of-the-art components
- Premium Efficiency IE4 motor
- Adaptive N-hydraulics
- Climate control savings

REDUCED TOTAL INVESTMENT

From bulky equipment . . .

Advanced functionality is desirable, but it often requires additional components, custom engineering and large cabinets. Flygt Concertor™ solves this by integrating everything into one single system with a smaller footprint and even more attractive features.

Concertor's system design results in compact control cabinets since traditional components, such as motor protection, variable frequency drives (VFDs) and climate control equipment, are no longer fitted in the cabinet. They are either eliminated or built into the pump. The pump's integrated intelligence reduces the size of the cabinet while also enabling more monitoring functionalities.

CONCERTOR CAN **REDUCE THE SIZE** OF CABINETS UP TO

50%

COMPARED TO **CONVENTIONAL** CABINETS

to slim and smart controls

> The compact design allowed us to fit it into the existing position within the pump station, without any extra investment.
>
> Ian Jolly, Heathrow Airport Water Services Department, UK

Simple set-up for advanced systems
All monitoring and control functions are pre-engineered, configured and tested as a total solution – straight from the factory – giving you peace of mind from a single supplier. Installation and commissioning are also swift and stress-free thanks to a helpful set-up wizard and the straightforward cabinet design. All of this reduces the need for engineering hours, both at the design stage and at the time of pump station commissioning. In short, you reduce your total investment costs.

REDUCED TOTAL INVESTMENT

- Pre-engineered as total solution
- Factory configured and tested
- Smaller and simplified cabinet design
- User-friendly installation wizard
- Built-in supervision and monitoring functions
- No need for climate control equipment

How the Flygt Concertor™ integrated intelligence works

Concertor is a breakthrough innovation based on Flygt Dirigo™ technology. This new system is enabled by integrating a processor, software, sensors, power electronics, a synchronous electric motor and self-cleaning hydraulics into a submersible shell. The term "intelligent" refers to the system's ability to automatically deliver optimal pumping performance while reducing the total cost of ownership.

Concertor is capable of sensing the environment it is operating in as well as the load it is subjected to, adjusting its performance in real time to meet your optimization targets. By collecting and analyzing relevant data, the pump system can make smart decisions about how it operates and what relevant feedback to give you.

New Dirigo platform

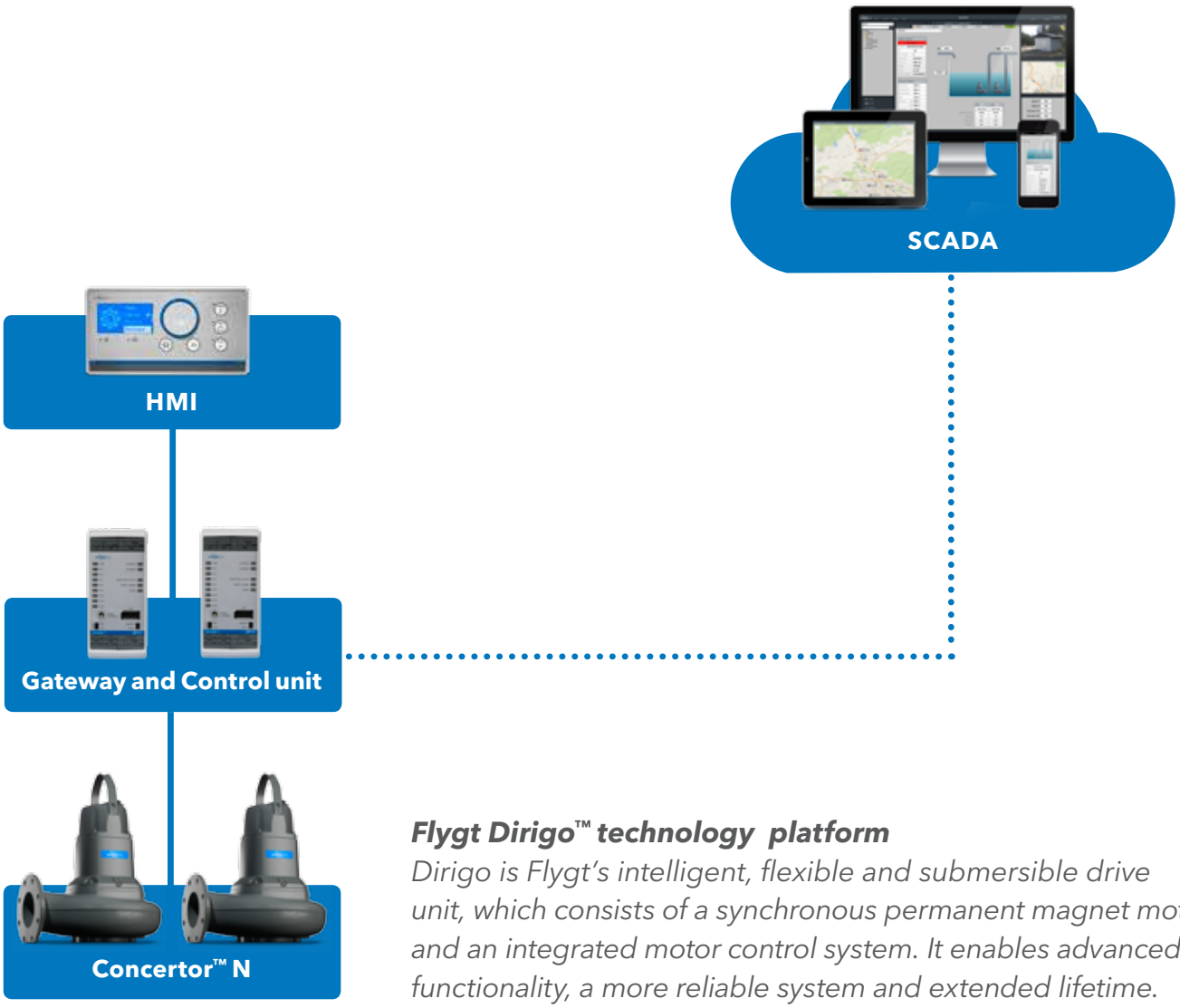
This higher level of integrated intelligence is enabled by our Dirigo platform that consists of a motor, control electronics and software. Dirigo delivers significant cost savings, a more precise level of motor control, reduced risk of clogging, substantial energy savings, comprehensive data reporting and more.

One fully scalable system

Thanks to the scalable nature of the system, you can always add new functionality without having to throw away your initial investment. The Concertor XPC, our most advanced wastewater pumping system, is pre-engineered and pre-configured so you can simply hook it up and start operating. For more basic on/ off operated pump stations, Concertor EA and N are also flexible choices that can easily be upgraded.

Self-adjusting functionality

There are several crucial differences between Concertor and standard systems. Firstly, the power



Flygt Dirigo™ technology platform

Dirigo is Flygt's intelligent, flexible and submersible drive unit, which consists of a synchronous permanent magnet motor and an integrated motor control system. It enables advanced functionality, a more reliable system and extended lifetime.

electronics are built into the pump, eliminating the need for a variable frequency drive (VFD) and other external electronics that require bulky cabinets. Secondly, all hardware and software features are designed to work in harmony with each other, allowing for semi- or autonomous self-adjustment during operation. This avoids the need to remove the pump to trim or change an impeller since a different duty point can be met at the touch of a button.

Full connectivity

Since Concertor covers a broad performance field, your main decision is not about duty points, but selecting the required level of connectivity. As shown in the diagram, you can connect it to a gateway, controller or via modem to a SCADA system. You can also add our HMI monitor if you prefer. A lot will depend on your current set-up and whether you are using a third-party system. Even if you already have a cabinet, the electronic components of Concertor are so few and compact that they can easily fit inside. In other words, the system gives you a proven way to reduce your total cost of ownership.

One scalable system

Flygt Concertor™ delivers high performance in four scalable configurations. The right solution for you will depend on your specific application requirements. And since the system is scalable and flexible, you can migrate from one solution to another as your needs evolve.

	Concertor™ XPC	Concertor™ DP	Concertor™ EA	Concertor™ N
Easy product selection	+ + +	+ + +	+ + +	+ + +
Reduced inventory	+ + +	+ + +	+ + +	+ + +
Flexible on-site operation	+ + +	+ + +	+ + +	+ +
Small-sized cabinets	+ + +	+ + +	+ +	+
Clog-free pumping	+ + +	+ + +	+ + +	+ + +
Energy savings	+ + +	+ +	+	+
Increased reliability and extended lifetime	+ + +	+ +	+ +	+ +
Compact installation with fewer components	+ + +	+ +	+	+
Free up engineering and installation hours	+ + +	+ +	+	+
Clean wet wells	+ + +			

Concertor benefits compared to conventional single vane impeller pump systems.

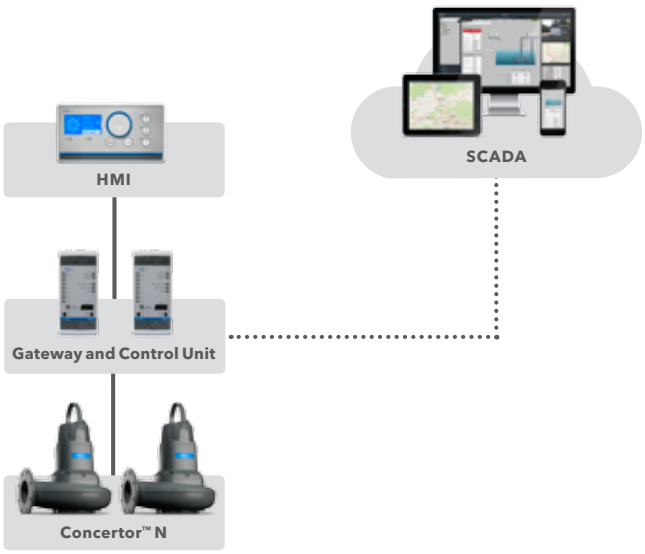
\+ *Better*
++ *Significantly better*
+++ *Best possible*

Concertor™ N
The most intelligent wastewater pump on the market. Suitable for customers operating traditional on/off pump stations who want to benefit from easily adjustable pump performance, soft start and constant power functions as well as motor protection.

Concertor™ XPC (Extended Performance Control)

Specifically designed for sewage pumping stations in collection systems, the XPC system consists of one to four pumps, one XPC control unit and one to three DP gateways.

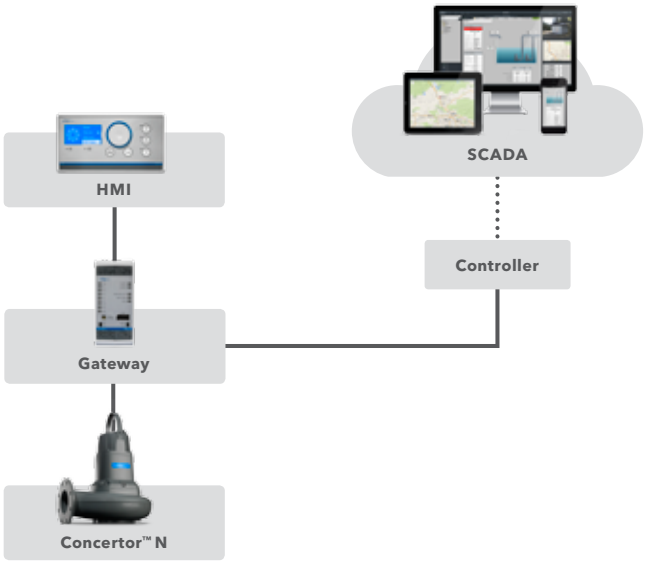
Perfect for users who desire the full functionality of the Concertor system, including maximum energy savings and clean wet wells.



Concertor™ DP (Dynamic Performance)

A process-controlled wastewater pumping system that consists of as many pumps as required by your application, as well as one gateway per pump.

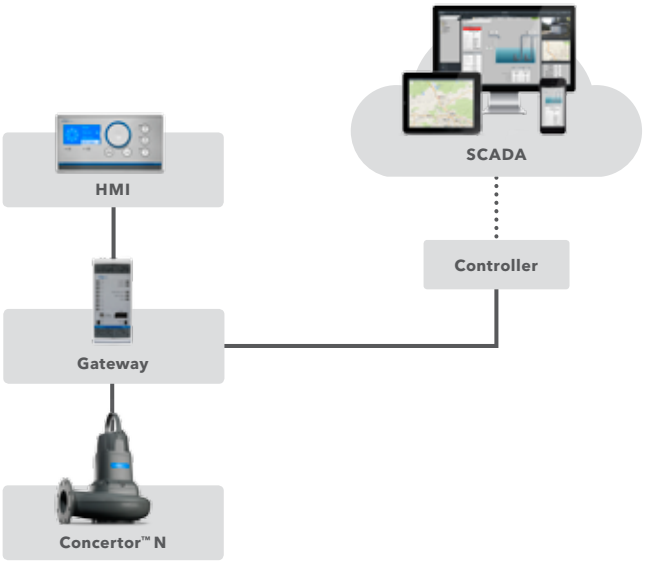
Suitable for users with specially designed process control algorithms who want to benefit from lower capital costs, smaller control cabinets and higher pump system efficiencies.



Concertor™ EA (Easily Adjustable)

The most reliable and energy-efficient on/off controlled wastewater system on the market. It consists of individual pumps together with a gateway for each pump.

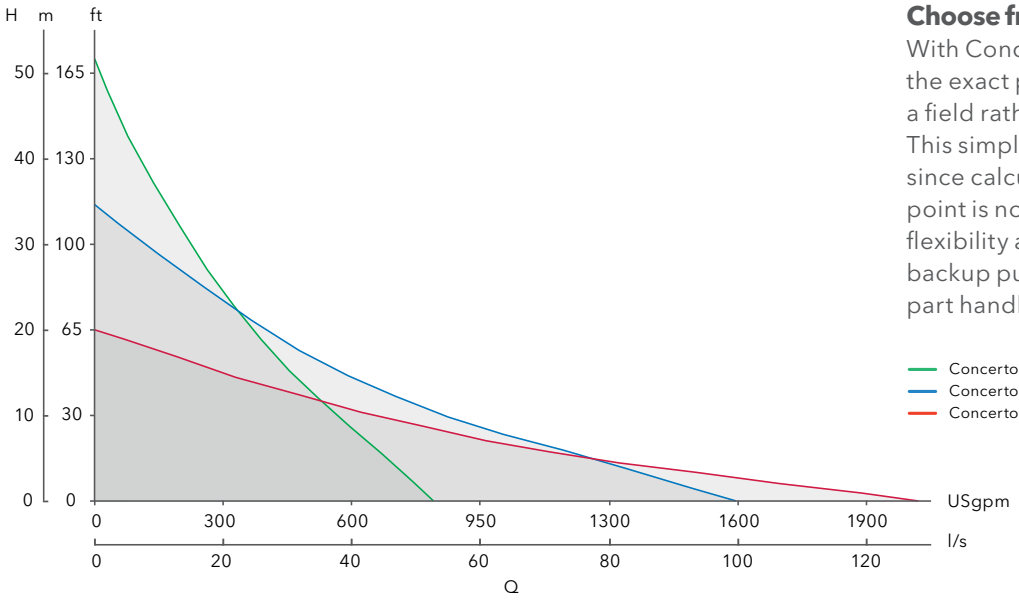
Suitable for customers who want to benefit from easily adjustable pump performance, soft start/soft stop functions, constant power and motor protection, among other features.



KEY FEATURES TO ACHIEVE EFFICIENT ASSET MANAGEMENT

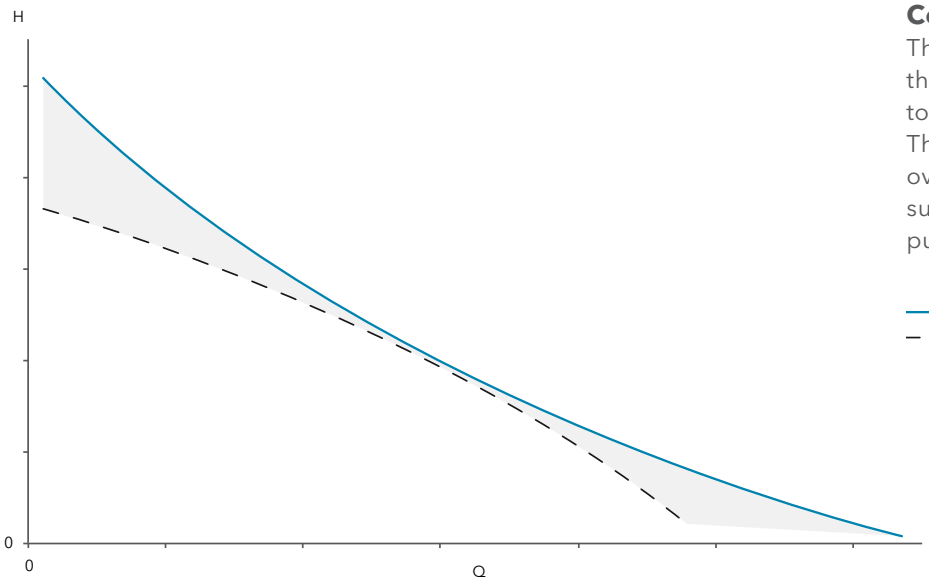
Easier product selection and reduced inventory

With Flygt Concertor™, pump selection has never been easier due to the unlimited number of performance curves. This reduces the need for backup inventory by up to 80% and enables pump performance to be easily changed on site or remotely.



Choose from a performance field

With Concertor, you can now choose the exact pump performance from a field rather than from fixed curves. This simplifies the selection process, since calculating your exact duty point is no longer critical. This flexibility also reduces the need for backup pumps and simplifies spare part handling.



Constant power functionality

This software function operates the pump at varying rotational speeds to achieve a constant motor power. The benefits are clear: no more overloading pump curves and substantially increased off-design pump performance.

KEY FEATURES TO ACHIEVE TROUBLE-FREE PUMPING

Clog-free pumps and clean wet wells

Flygt Concertor™ is designed to ensure clean wet wells, clog-free operation and a reduction in vacuum cleaning call-outs by up to 80%. The result is a clean, safe system for operators. Additional motor and pump system protection are part of the integrated offer for maximum reliability.

Pump cleaning

The built-in clog detection function detects when the pump is about to clog and triggers the pump cleaning cycle. A pump cleaning cycle is initiated when a clogging instance is detected and the built-in intelligence will then operate the impeller at different speeds and directions, to remove the debris.

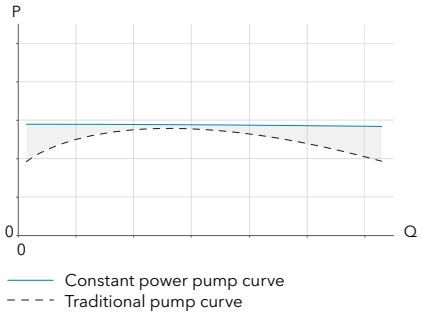
Sump and pipe cleaning

The sump cleaning function removes floating debris and sediments, eliminating the need for expensive wet well cleaning. The pipe cleaning function assures that pipe sediment is removed, minimizing the risk of pipe clogging.

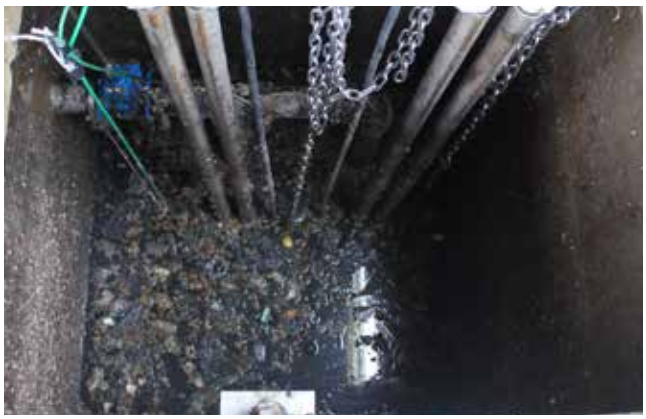
Increased reliability and extended lifetime

The self-monitoring function prevents motor failures due to external conditions. The control system inside the pump, which is placed in a stable and protected environment, will try to reset the pump automatically after a failure. The constant power and advanced motor protection functions ensure a high degree of reliability since the motor is never subjected to overloading.

The soft start function reduces electrical inrush currents and minimizes stress on the shaft, joints, bearings and impeller. By controlling acceleration and deceleration,



the motor will be gently started and stopped. This also reduces the risk for water hammer effects in the pump system. Concertor EA, DP and XPC also have built-in alarm management and history functionalities. Concertor XPC includes additional features such as pump alternation, emergency run at high level, random start and pump start/ stop delays.



To the left, a sump tank in one of our field trials before the Flygt Concertor™ system was installed and then after two weeks of operation (right).

KEY FEATURES TO ACHIEVE ENERGY SAVINGS

Unparalleled pumping system efficiency

Flygt Concertor™ is capable of reducing energy consumption by up to 70%, compared to conventional pumps and control systems. This is enabled by a unique synergy between software features and state-of-the-art technology.

Energy Minimizer

This patented software algorithm assures that all pumps are continuously controlled to achieve the lowest possible specific energy usage. It has been field proven in thousands of installations, reducing our customers' energy usage by up to 50%, compared to regular on/off operated pumps under identical operating conditions.

State-of-the-art N-hydraulics

A new generation of our Adaptive N-technology enables high efficiency and lower energy usage. The Adaptive N-impeller moves axially upward when needed, allowing bulky fibrous material and debris to pass through smoothly. After the debris has passed, the hydraulic pressure returns the impeller to its original position. Not only does this prevent clogging and reduce stress on the shaft, seals and bearings, but it enables a sustained low usage of energy. As with all Flygt N-pumps, this feature delivers constant self-cleaning functionality.

Motor efficiency meeting IE4 levels

Concertor utilizes a new Super Premium IE4 motor based on a concentrated winding synchronous design. Compared to standard induction motors, it offers significant benefits including increased motor efficiency, greater control, dramatically improved low speed efficiency and reduced size. The concentrated stator winding design allows it to be shorter and more compact than an induction motor with a comparable rating. The rotor is equipped with strong permanent magnets that create and maintain the rotor's magnetic field. Due to the low losses, virtually no heat is generated in the rotor and thus no heat flows out to the bearings via the shaft ends. The result is a cooler running motor with longer motor and bearing life.

Concertor's IE4 motor is shorter and more compact than a conventional motor due to its concentrated stator winding design.

Power factor close to 1

A power factor below 1 requires the utility to generate more reactive power than is really needed. This increases generation and transmission costs. To avoid this situation, the Concertor system keeps the power factor close to 1.

Our new, improved Adaptive N-hydraulics ensures both clog-free operation as well as a higher total level of system efficiency.

KEY FEATURES TO ACHIEVE REDUCED TOTAL INVESTMENT

Smaller control cabinets and easier commissioning

Flygt Concertor™ eliminates the need for traditional components in the cabinet such as motor protection, soft starters, variable frequency drives (VFDs) and climate control equipment. This gives you full process control functionality with a cabinet that can be up to 50% smaller.

Smaller control cabinets

The integration of intelligence in the Concertor system allows control cabinets to be simpler, more compact and cost-efficient. The following components, among others, are no longer needed:

- Motor protection devices
- Power and current measurement devices
- Soft starters
- VFDs
- Climate control equipment, fan, A/C equipment, particle filters

The intuitive HMI display features a set-up wizard that guides the user through the entire commissioning process.

Faster commissioning

A set-up wizard guides you through installation asking a set of pre-defined questions in a way that even an untrained user can understand and answer. After set-up, the system is ready to operate and communication to other systems, such as third-party PLC and SCADA, is possible through pre-configured interfaces.

Correct impeller rotation

The impeller in a pump is designed to rotate in one specific direction. For traditional three-phase pumps, this has to be checked at commissioning, since the impeller will rotate in the wrong direction if two of the phases are shifted. With Concertor's always-correct impeller rotation function, this potential problem is automatically eliminated.

The integration of intelligence in the Concertor system allows control cabinets to be simpler, more compact and cost-efficient.

Flygt Concertor™ feature and technical overview

Flygt Concertor™ System	XPC	DP	EA	N
Push a button to change pump performance	√	√	√	√*
Clog detection	√	√	√	√
Pump cleaning	√	√	√	√
Constant power	√	√	√	√
New generation Adaptive-N design	√	√	√	√
Motor efficiency in compliance with IE4	√	√	√	√
Power factor close to 1	√	√	√	√
Always correct impeller rotation	√	√	√	√
Automatic restart trials at faults	√	√	√	√
Soft start	√	√	√	√
Soft stop	√	√	√	
Pump sump alarm I/O, thermal and leakage	√	√	√	√
Multiple alarms, two priorities	√	√	√	
Set-up wizard	√	√	√	
External communication	√	√	√	
Status and history	√	√	√	
Human Machine Interface (HMI)	√	√	√	
Emergency run relay functionality		√	√	
Pump station controller	√			
Energy Minimizer	√			
Sump cleaning	√			
Discharge pipe cleaning	√			
External process control (4-20 mA or Modbus)		√		

** With Dirigo service tool*

Concertor™ N	
Motor	Synchronous (concentrated winding) Permanent magnet rotor IE4 according to IEC/TS 60034-30-2 Ed. 1
Frequency	50-60 Hz
Voltage	380-480 V 200-260 V
Rated Power	3.0; 5.5; 7.5; 10.0 Hp (2.2; 4.0; 5.5; 7.3 kW)
Rated ambient liquid temperature	104° F (40° C)
Hydraulic	Guide pin Adaptive N
Discharge sizes	3" (80 mm) 4" (100 mm) 6" (150 mm)
Speed range	500-3600 rpm
Impeller material options	Hard-Iron™ Duplex stainless steel
Seal system	Plug in seal with double mechanical seals Active seal function
Seal materials options	WCCR/WCCR RSiC/WCCR
Cooling system	Liquid-free heat-conduction technology
Installation	P - Portable wet well installation S - Portable free standing installation T - Vertically mounted, permanent dry well installation Z - Horizontally mounted, permanent dry well installation
Sensors	Leakage detection in stator housing Two independent temperature sensors
Cable	Screened Flygt SUBCAB®, with integrated control wires 30, 50, 60, 100 ft (10, 16, 20, 30 m)
Approvals	CE, FM, ATEX, IECEx, CSA
XPC Controller, DP Gateway, EA Gateway	
Power supply	24 VDC
Ports	1 x USB 1 x RS485 1 x Ethernet RJ 45 1 x Display interface, CAN
Communication	Modbus RTU Aquacom Modbus TCP
Standard I/O	4 x Digital outputs 4 x Digital inputs 1 x Analog input 1 x Analog output
Pump interface	1 x Pump communcation port
User interface	14 x LED 1 x Rotator switch
Data logging	1000 Data points
Environment class	Protection class: NEMA 1 (IP20) Operation temperature: -4˚ F to +158˚ F (-20˚C to +70˚C)
Size (Wx Lx H)	1.8x4.4x4.2 in (45x112x106 mm)
Approvals	CE, UL, CSA
HMI	
Basic HMI	3.5" monochrome LCD screen
Touch HMI	7" TFT, Full color, analog-resistive