

Intelligent Pump Controller



iQPUMP[®]

HP Range:

5 - 150 HP @ 208/240 VAC

5 - 500 HP @ 480 VAC

iQpump is UL approved for single-phase and three-phase AC input

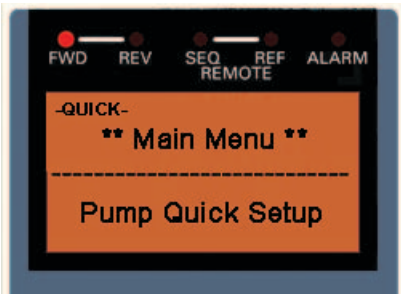
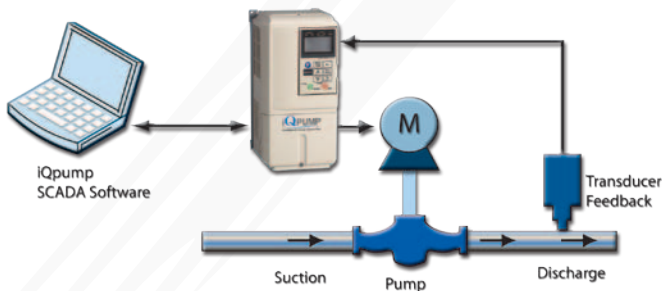
iQpump Concept . . . Your Total Pump Solution

The iQpump controller was designed with the pump service operators and pump system owners in mind. iQpump offers ease of setup and comprehensive pump and motor protection features. The integrated pump specific software and set up parameters allow the operator to program control values for a wide range of applications. The iQpump controller will automatically adjust pump operating conditions, as the process variables change while still maintaining optimum pump performance and protection. iQpump can also replace phase converters when converting from a single-phase to a three-phase pump motor.

Simplex System Overview

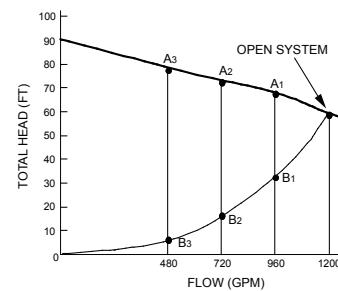
Easy Installation and Set up

1. Wire iQpump Controller
2. Connect pipe to pump
3. Set System Pressure (PSI) Setpoint
4. Calibrate Feedback Transducer Level (PSI)
5. Start iQpump controller

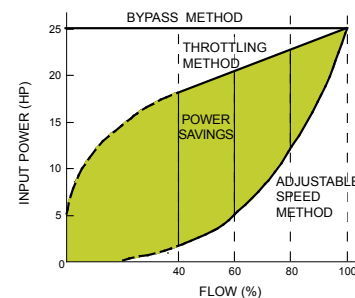


iQpump has an onboard "Pump Quick Setup" menu, and with just a few simple answered questions, a Simplex system can be running in minutes.

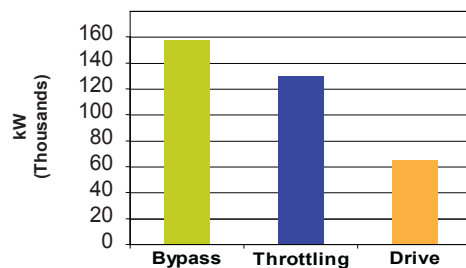
Typical Pump Energy Consumption and Savings



Comparison of Operating Points for Throttling (A) and Adjustable Speed (B) Flow Control



Above chart shows the typical power requirements and savings for throttling and bypass methods to adjustable speed method.



100,000 sq. ft. building operated 4000 hrs/year. (One 50 HP booster pump) Based on Energy Savings Predictor Software.

System Benefits

Typical Applications

Improved Process Control

By matching pump output flow or pressure directly to the process requirements, small variations in the process can be corrected more rapidly by iQpump than by other control forms.

Improved System Reliability

Any reduction in speed achieved by using iQpump has major benefits in reducing pump wear, particularly in bearings and seals.

Reduce Total System Cost

iQpump lowers system cost by eliminating sensors, jockey pumps, restriction valves as well as reducing pressure tank sizing.

Energy Savings

Depending on application, iQpump will reduce the demand for energy by 20 to 50% by adjusting pump speed to match a lower flow/pressure.

Ease of Installation and Set Up

iQpump uses pump terminology on all setup parameters and monitors. Also included is a "Pump Quick Setup" menu.

Eliminate Complex Control Panels

By installing iQpump, many of the electromechanical controls can be eliminated. This will reduce the maintenance that these panels require.

Reduce Mechanical Stress and Damage to Pumps

iQpump has soft-start and soft-stop capabilities. Pressure surges and water hammer are eliminated.

Cooler Running Pump Motor

Soft start eliminates inrush current, dramatically increasing winding insulation life.

- Commercial and Residential Irrigation, Fluid Storage Tanks
- Settling Ponds, Sewage Lift Stations
- Booster Pump Stations (Municipal, High-rises, Condos, Apartment Complexes, Residential Developments)

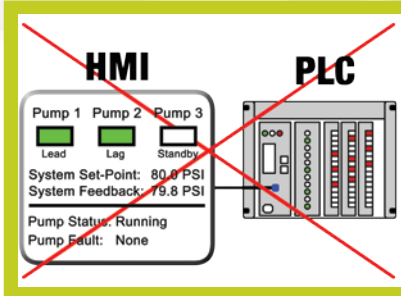


Pump Logic Made Easy

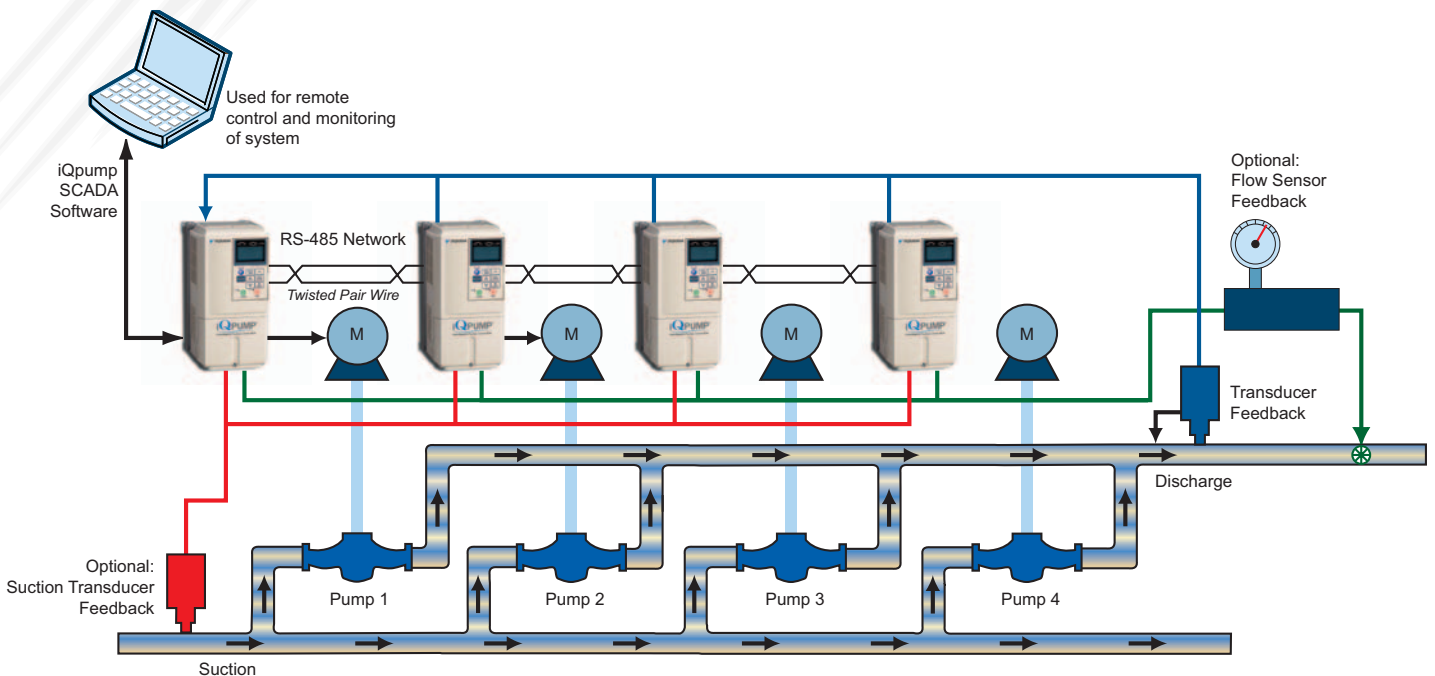
Multiplex Pump System Overview

iQpump has enhanced software, not available in most variable frequency drives, allowing for multiple drives to operate as a coordinated system. This allows pump system engineers the ability to add more modular pump systems together (Duplex, Triplex, etc.) to meet customer specifications.

- Automatically starts and stops Lead and Lag pumps on system demand
- Automatically alternates all pumps with a system programmable timer to provide even mechanical pump wear
- Configurable transducer feedback settings to provide redundant backup if failure occurs
- With the use of an optional 4-20mA suction meter, all iQpump's will monitor inlet pressure with programmable PSI settings for faults, alarms and station controlled shutdown
- Digital switch inputs for Low Suction / Low City Pressure / Low Water in Break Tank can be configured with selectable keypad message to match application.
- With the use of an optional flow transducer input 4-20mA all iQpump's can be configured to control staging and de-staging of lag pumps on GPM.



No PLCs, HMIs or external control relays are required for the pump logic control, therefore reducing total system cost, improved reliability, and reduced life cycle cost.

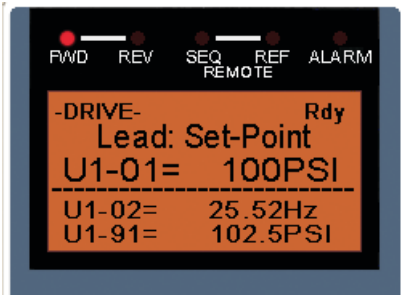


Systems can be configured for use with multiple feedback transducers for redundant backup. A minimum of one feedback transducer is required for system operation.

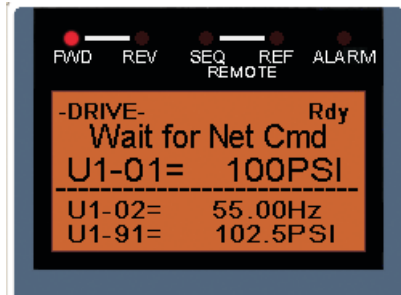
Pump Operator Keypad Messages

Typical Multiplex Keypad Messages

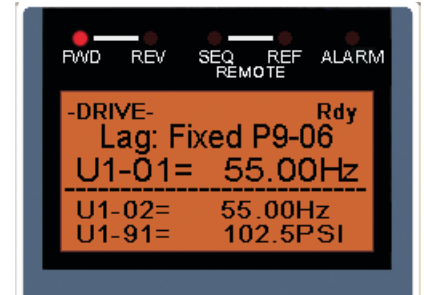
The iQpump Keypad will provide the user with all the necessary system status operation and pump fault messages to ensure that service operators can efficiently monitor and diagnose any condition.



iQpump is in Auto Mode and is the Lead pump.



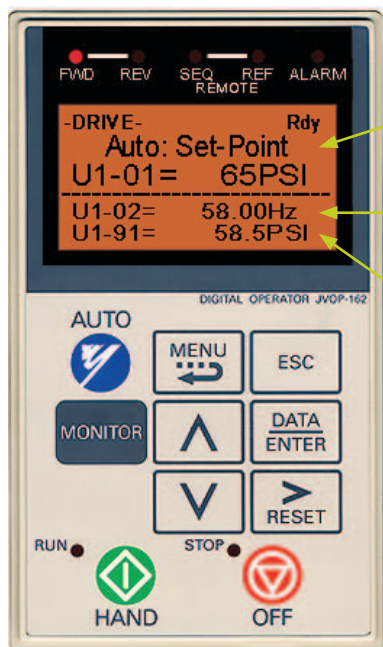
iQpump is in Auto Mode and waiting for a run command from the network based on user defined settings of PSI, GPM, Pump RPM.



iQpump is in Auto Mode and when Lag operation is called for, iQpump is switched from lead to lag fixed speed control.

Pump Specific Operator Keypad

Onboard LCD English display reduces field start up and troubleshooting time, with intuitive pump related terminology. Programmable pump process set points are adjusted using "True Engineering Units" (PSI, GPM, Flow, etc.). iQpump provides real time alarms, status and operating conditions in an easy-to-read format.



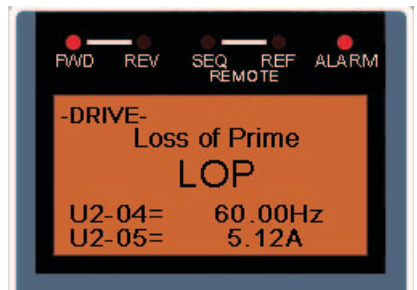
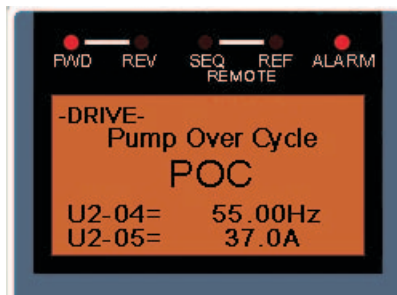
System Pressure Setpoint

Pump Motor Frequency

Transducer Feedback

Hand-Off-Auto

HOA operation made easy with user specific push buttons. Can also be configured for external HOA control.



Typical Operator Keypad Messages

Software Features . . . Unmatched Integrated Flexibility

THE MUST HAVES

- ▶ **Control Pressure, Start Level and Start Timer**
- ▶ **Sleep Mode Minimum Flow Protection**
- ▶ **No Flow / Deadhead Protection**
- ▶ **Thrust Bearing Control**
- ▶ **Loss of Prime (LOP) / Pump Dry-Run Protection**
- ▶ **Transducer Loss Protection**
- ▶ **Automatic System Restart**
- ▶ **Sleep Boost**
- ▶ **Pre-Charge Control**

Control Pressure, Start Level and Start Time

Flexibility to start the pump at different feedback levels or use the integrated timer to eliminate cycling.

Sleep Mode Minimum Flow Protection

Protects and shuts down the pump at low speeds or in low flow conditions.

No Flow / Deadhead Protection

Separate from Sleep Mode, this detects changes in pump motor RPM relative to sudden changes in pressure or flow; protecting against broken pipe, excessive well draw down or run-dry conditions.

Thrust Bearing Control

Protects the bearings of submersible pump motors by ensuring start up speeds and times meet manufacturer's recommendations.

Loss of Prime (LOP) / Pump Dry-Run Protection

Loss of prime protection is a feature to protect the pump and motor from damage that would be caused if the pump were operated without water. If a pump were to lose prime and

continue to operate without water moving through the pump, the pump would develop heat, which would eventually damage the pump seal, motor, pipe manifold and related components.

Transducer Loss Protection

iQpump monitors the feedback device voltage or current levels to determine if the transducer has failed.

Automatic System Restart

Programmable timers allow iQpump to automatically restart the system in Auto Mode for faults relating to brown outs, loss of power, and pump specific faults.

Sleep Boost

Intended for use with a pressure tank, iQpump will boost the set pressure prior to shutdown, extending the pump's sleep time, reducing cycling, and saving energy.

Pre-Charge Control (Controlled Pipe Fill)

This programmable feature eliminates water hammer and extends system life by gradually filling a pipeline before normal full pressure and flow operation. Pump motor speed can be controlled with a system timer, level or pressure control device to indicate when normal operation may begin.

THE MUST HAVES

- ▶ **Low and High Pressure Feedback Detection**
- ▶ **Low Flow and High Flow (GPM) Detection**
- ▶ **Impeller Anti-Jam Automatic Control**
- ▶ **Low City Pressure**
- ▶ **Constant Pressure with Well Draw Down Control**
- ▶ **Flow Meter Data Logging**
- ▶ **Programmable Set Point and Scaling**
- ▶ **Utility Start Delay Timer**

Low and High Pressure Feedback Detection

iQpump continuously monitors the system feedback device to provide a warning alarm or fault based on the programmed level.

Low Flow and High Flow (GPM) Detection

iQpump continuously monitors the system flow signal feedback to provide a warning alarm or fault based on the programmed level.

Impeller Anti-Jam Automatic Control

Provides a method for the user to select iQpump to detect high current and attempt to expel corrosion or solids which are keeping the pump impeller from operating efficiently, system will perform a quick reversal to try and dislodge jam.

Low City Pressure

Municipal booster systems that use an external pressure switch to monitor a minimum inlet city pressure for the pump system to run. iQpump will monitor the pressure switch and will display “Low City Pressure” to alert operator that an issue has occurred outside of the iQpump and pump system. iQpump also supports other operator alert messages “Low Suction Pressure” and “Low Water in Break Tank”.

Constant Pressure with Well Draw Down Control

This function allows iQpump to control constant pressure when there is adequate water in the well, while monitoring a second down hole transducer for water level. If the water level drops below user settings then iQpump reduces pump speed to maximize well output. System will return automatically to normal operation when well water is recharged to an adequate level.

Flow Meter Data Logging

Through a secondary analog input a flow sensor can be connected inline with the pump system back to iQpump to read and accumulate total flow for system reporting to authorities. System can be configured to detect “No Flow” and “Sleep” on low demand.

Programmable Set Point and Scaling

12 different plain text engineering units are available, including PSI and GPM.

Utility Start Delay Timer

Used in conjunction with “Automatic Restart”, a programmable timer will delay starting to allow for multiple pumps to sequence start on loss of power. This function ensures that the power system is not stressed when utility power has returned and pump system is automatically restarted.

Software Features . . . Unmatched Integrated Flexibility

THE MUST HAVES

- ▶ **Impeller De-Scale Automatic Control**
- ▶ **Lube Pump Control**
- ▶ **Time Delayed External Fault Inputs**
- ▶ **Flow Meter Input for Pump Staging & De-Staging**
- ▶ **Suction Transducer Control Input**
- ▶ **Lag Pump Lead Speed Follower Mode**
- ▶ **Volute Casing Temperature Inputs**

Impeller De-Scale Automatic Control

iQpump will monitor pump run time hours and will perform a rapid bi-directional acceleration to dislodge scale.

Lube Pump Control

Designed for pumps that require pre-lubrication before each start. Digital output will energize a solenoid valve for a programmable time before starting allowing for lubrication each time the pump is started.

Time Delayed External Fault Inputs

Programmable settings that will delay pump faults to allow for transition of input power from utility to generator and vice versa. Examples are moisture relays, seal failure relays, external phase monitors, etc.

Flow Meter Input for Pump Staging & De-Staging

Mainly used for domestic water booster systems, through a secondary flow input 4-20mA each iQpump can be programmed to stage and de-stage based on pump GPM to prevent run out on the right side of the curve, while still controlling system to discharge pressure. Wire break detection is enabled.

Suction Transducer Control Input

Through a secondary suction transducer input 4-20mA, all iQpump's will monitor inlet pressure either from a pressured line or flooded suction with user programmable PSI levels for fault, alarm, or system shut down with the ability to control the system reset when suction pressure returns. Wire break detection is enabled.

Lag Pump Lead Speed Follower Mode

When enabled, all lag iQpump drives will follow the main output speed (Hz or RPM) of the lead iQpump, thereby allowing all lead and lag pumps to run at the same speed for better system efficiency.

Volute Casing Temperature Inputs

External Volute temperature switches can be wired back to iQpump for system shut down with operator message.

Protection

Pump Fault and Alarms

iQpump provides a comprehensive set of pump related alarms and faults. Faults are displayed on the keypad in clear text to eliminate confusion (the following is just a sampling):

- Over Cycling
- Transducer Feedback Lost
- Dry Well
- No Flow
- Over Torque
- Broken Pipe Detection
- Loss of Prime
- Pumping Over Cycle
- Low and High Feedback Detection

iQpump Controller Protection

- Over / Under Voltage
- Short Circuit
- Input Phase Loss
- Over Temperature
- Phase Imbalance
- Heatsink Fan Failure

Motor Protection

- Output Phase Loss
- Motor Over Temperature
- Ground Fault
- Broken Shaft
- Motor Overload
- Minimum Speed

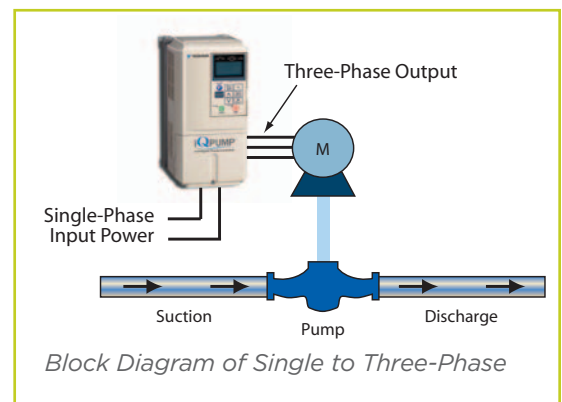
Why use Single-Phase

UL Tested and Approved for use on Single-Phase Power

In rural areas or commercial office buildings, that were not originally designed to support heavy manufacturing, utilities do not install three-phase power because the cost is significantly more than single-phase power. For many years, people have been using different technology to generate three-phase power from single-phase power sources. Common technologies include rotary-phase converters, static-phase converters and variable frequency drives. As initial investment costs of variable frequency drives have dropped, more users are turning to iQpump as the best solution to convert single-phase pump motor applications to three-phase.

Benefits of Three-Phase over Single-Phase Motors

1. Three-phase motors are more compact and less costly than a single-phase motor of the same voltage class and HP (kW) rating.
2. Single-phase AC motors, above 10 HP (7.5 kW), are not as efficient and are not usually manufactured in large quantity.
3. Three-phase motors have better starting torque, run more efficiently (i.e. 90% compared to 70%), and last much longer than their single-phase counterparts.
4. iQpump will provide motor protection at the same time providing for a more efficient and lower cost system.
5. Reduced motor cable sizes equal lower cost for long motor runs.



Note: When sizing iQpump for single to three-phase power conversion consult your local Yaskawa Representative.

iQpump Software Suite

The iQpump Software Suite is included with each iQpump Intelligent Pump Controller:



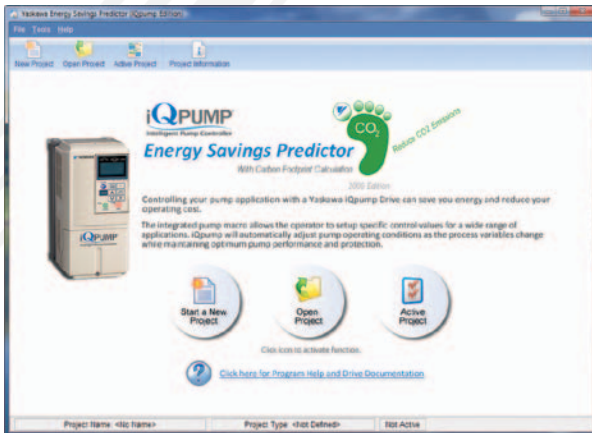
PC SCADA

Troubleshooting, Monitoring, Startup Wizard, Programming, and Trending



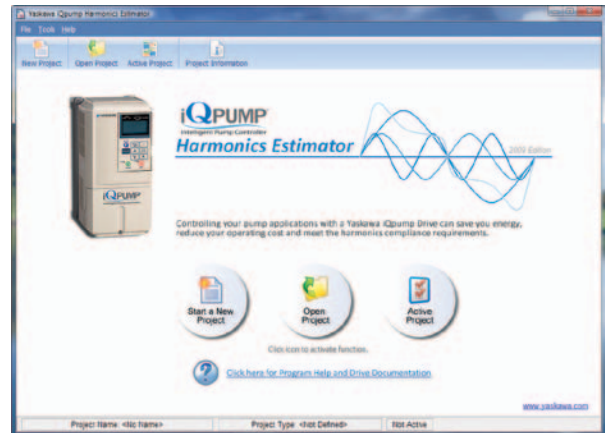
Energy Savings Predictor

Analysis of energy savings with carbon footprint calculation



Utility Harmonics Estimator

Estimate harmonics contribution back to main power source



iTunes App

Energy savings app for the iPhone and the iPod touch is available at iTunes.com - search for Yaskawa.

Packages for any Environment

Yaskawa has pre-engineered configured packages ranging from NEMA 3R (outdoor duty), NEMA 12, NEMA 1, and Bypass options allowing iQpump to handle many environmental conditions. Other severe duty, engineered packages, are available upon request.

The most popular and versatile package for users is NEMA 3R for many outdoor applications that combines environmental protection and cost effectiveness in a robust package.

NEMA 3R Specifications:

Designed and tested to meet UL Type 3R Listing. Space for several commonly specified options, makes this the preferred outdoor duty package for variable frequency drives.

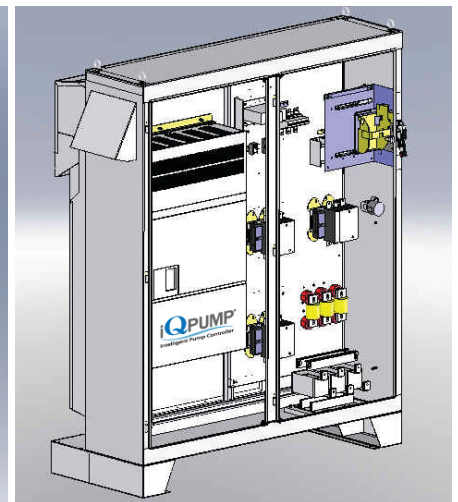
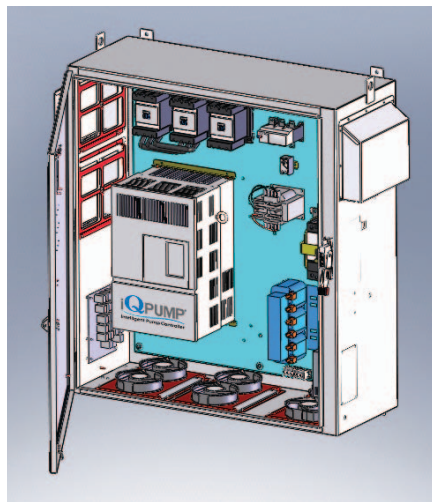
Standard Features include:

- 12 Gauge Steel Construction
- Integral ¼ Turn Door Latches
- Brass Hinges
- Stainless Steel Hardware
- Padlock Hasp
- Whole Door Gasket
- UV / Type 3R Keypad Membrane
- Sun Reflective White Powder Coat Paint
- Lifting Eyes

When vertical surfaces are limited, optional leg kits are available for the Type 3R Package to become a freestanding installation. An optional 12" Leg Kit or 30" Leg Kit is available.

The following are Type 3R package options:

- Service Entrance Rated Disconnect.
- Space Heater with Thermostat - maintains the internal cabinet temperature to reduce condensation.
- NEC branch circuit protection device for input power with flange-mounted operating handle.
- Surge Suppressor - adds a degree of protection to the Type 3R Package from transient surges coming through the power line cables. Lightning strikes are the most common source of surges.
- Custom Engraved Nameplates - white lettering on black background is available.
- Drive Keypad Viewing Window - the drive keypad viewing window is mounted on the outside of the Type 3R Package door. This option provides a viewing window which is hinged and lockable.
- Factory mounted configured power/control options, such as: circuit breaker, fuses, line/load reactors, RFI filter, 3-contactor bypass, and network communications.





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