

PUMPSMART[®]

CONTROL SOLUTIONS

Simplicity

Dedicated pump control and protection logic in an easy to use package

Reliability & Safety

Longer Pump and Seal life means reduced maintenance and down time

Control

Improved pumping accuracy and repeatability means better process control

Operating Cost

Variable speed cuts Energy Cost up to 70%
Reduced maintenance & downtime cuts cost

Flexibility

Multi-pump control & sizes up to 700 hp



PumpSmart



ITT Industries
Engineered for life

PUMP RELIABILITY & SAFETY

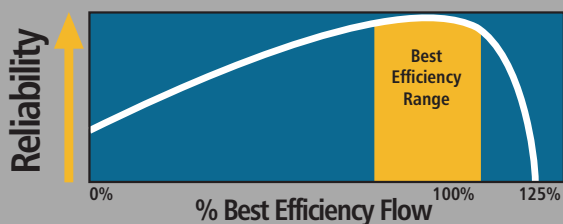
Smart Protection

PumpSmart prevents your pump from running in the upset conditions that cause most pump and mechanical seal failures.

- **Sensorless Protection on Dry Run or Severe Cavitation**
- **Control Min/Max Flows**
- **Prevent Running at Shut Off**
- **Optional Pump Bearing Vibration Monitor**
- **Instrument Failure Detection and Control**
- **Faults and Upsets Recorded for Analysis**
- **Pump Wear Monitor**

Variable Speed Operation

Running at slower speeds and closer to the Best Efficiency Pt reduces the loads on bearings and seals for longer pump life.



OPERATING COSTS

Power Consumption is a significant portion of your plant's operating cost. Oversized pumps and control valves burn unnecessary energy. By adjusting the pump speed to the system demand, PumpSmart will improve your bottom line. How Much?

ENERGY FACTS

- A Control Valve **80% Open** is Adding **40% Wasted Energy**
- Reducing the Speed of a Centrifugal Pump by **20%** results in a Power Reduction of **50%**

Energy Monitor

PumpSmart drives compute and display a continuous running total of your actual energy saved in dollars and cents. Simply input your fixed speed power consumption and electricity rate. PumpSmart does the rest!

Maintenance

Reduced downtime results in reduced maintenance costs and higher productivity rates.

CONTROL

Accurate and repeatable control of virtually any parameter, often eliminating the need for costly control valves. Select a single instrument based on your control parameter.



Pressure Flow Temp Level RPM

SIMPLICITY

PumpSmart application macros make setting up a variable speed control system easier than ever. One device provides the capability for exacting process control, automatic pump protection, and continuous condition monitoring. PumpSmart eliminates the need for external PLC's, custom programming, or complex wiring schemes.

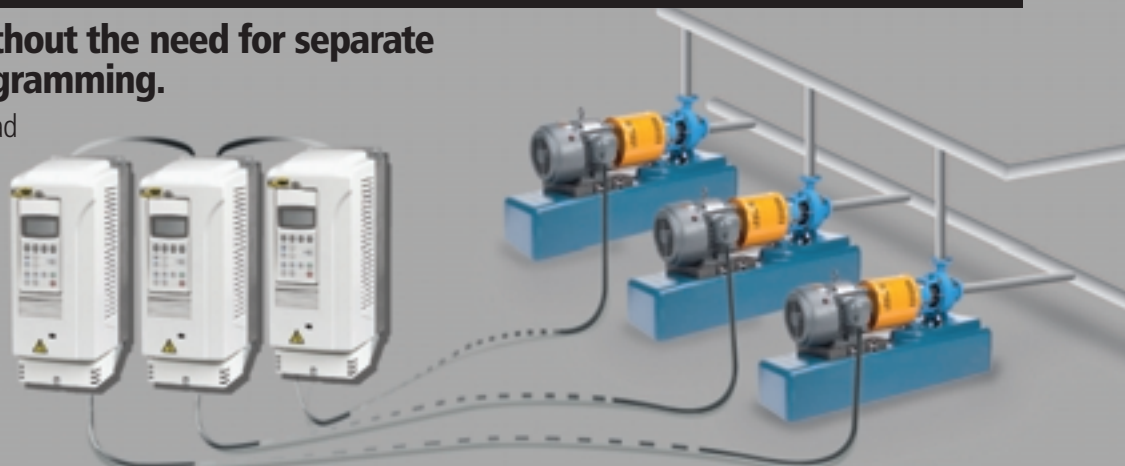
Our detailed programming manual builds upon our experience with pumping systems and guides you through installation and start-up, explaining where to find needed information and what it is used for.

- **Pump Specific Macros and operating modes**
- **Common pumping terminology**
- **Documented programming**

MULTI-PUMP SEQUENCE CONTROL

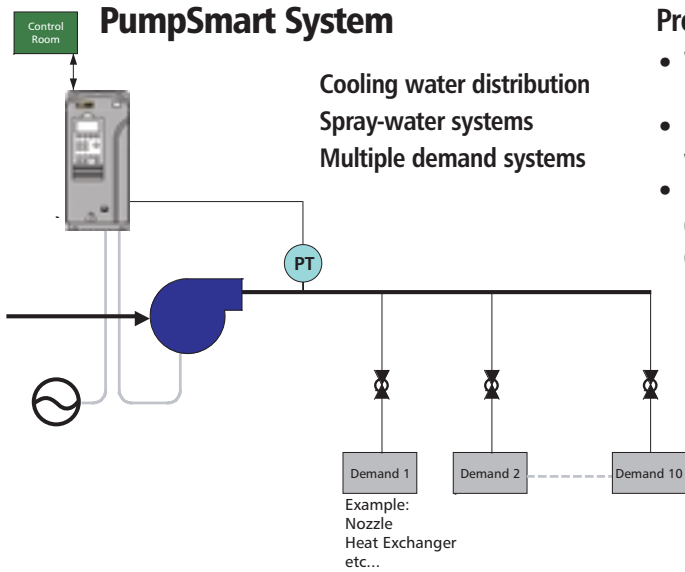
Control 2-4 pumps without the need for separate PLC's and custom programming.

The PS200 provides seamless load sharing and automatic lead-lag alternation for even usage and maximum pump life. The simple-to-use programming sets up in minutes, and fiber optic cable provides the communication link between each PS200 drive.



REDUCED SYSTEM COMPLEXITY

PRESSURE CONTROL

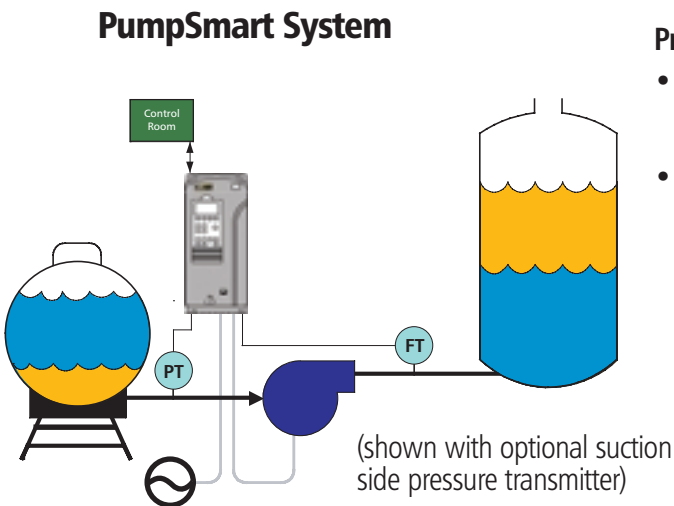


Problems Solved

- Wasted energy during periods of low demand
- Inconsistent pressure with varying demand
- Poor pump reliability due to low flow operation



FLOW CONTROL SYSTEM

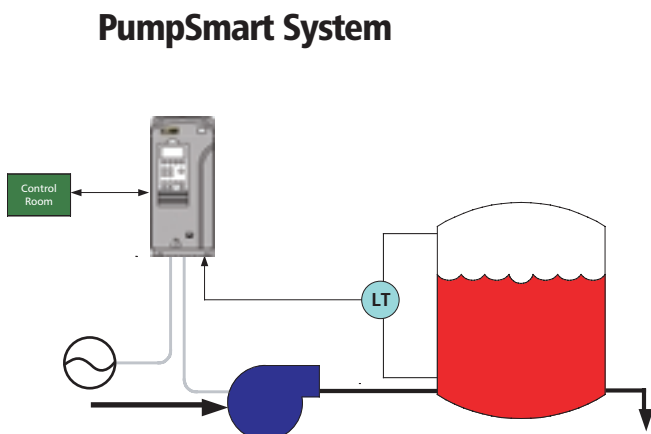


Problems Solved

- Poor pump reliability due to cavitation near end of transfer
- Automatic shutoff at end of transfer.



LEVEL CONTROL SYSTEM



Problems Solved

- Wasted energy during periods of low demand
- More precise level control
- Poor pump reliability due to low flow operation
- Valve maintenance reduced



Industrial Strength Pump Control

The workhorse of the PumpSmart family, the PS200 offers process control and pump protection in one easy-to-use package for virtually every industrial process. With pre-programmed applications such as pressure, flow, and level control, set-up is quick and easy. The PS200 is capable of coordinating efforts between other PS200 controllers as well as existing constant speed pumps.

With the Patent Pending Torque Based Pump Protection (TPP) feature, the PS200 can recognize dry run, minimum flow, or runout conditions without the need for costly external sensors.

With the Pump Wear Monitor (PWM)*, PumpSmart will periodically monitor your pump performance and automatically issue warnings when pump wear has reduced the performance of your pump. The PS200 can also monitor and react to excessive bearing housing vibrations and temperature excursions with the addition of optional 4-20mA transmitters.

The PS200 can also be integrated seamlessly into your existing control system when an optional Fieldbus control module is used. Available in most common protocols including: Modbus, Modbus Plus, Profibus, DeviceNet, CAN open, LonWorks, Interbus S, and CS-31.

* US Patents No. 6,648,606 & 6,564,627



DIMENSIONS, WEIGHTS

WALL MOUNTED

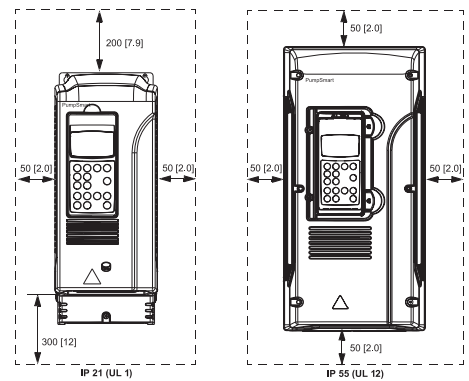
| Frame Size | IP21 | | | | | IP55 | | | |
|------------|-------|-------|----------|----------|-----------|-----------|----------|----------|-----------|
| | H1 mm | H2 mm | Width mm | Depth mm | Weight kg | Height mm | Width mm | Depth mm | Weight kg |
| R2 | 405 | 370 | 165 | 226 | 9 | 528 | 263 | 241 | 16 |
| R3 | 471 | 420 | 173 | 265 | 14 | 528 | 263 | 273 | 18 |
| R4 | 607 | 490 | 240 | 274 | 26 | 774 | 377 | 278 | 33 |
| R5 | 739 | 602 | 265 | 286 | 34 | 775 | 377 | 308 | 51 |
| R6 | 880 | 700 | 300 | 399 | 67 | 923 | 420 | 420 | 77 |

H1: height with cable connection box.
H2: height without cable connection box.

Free space around the unit

Required free space around the drive to enable cooling air flow, service and maintenance is shown below in millimetres and [inches]. When mounting IP 55 units above one another, leave 200 mm (7.9 in.) free space above and below the unit.

WALL MOUNTED

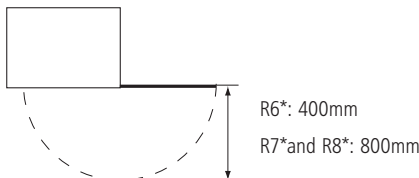


FLOOR STANDING

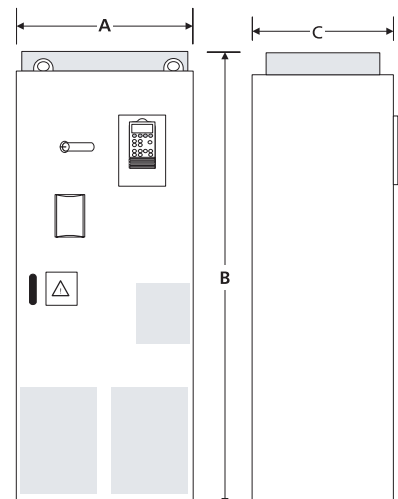
| Frame Size | B Height | | A Width mm | C Depth mm | Weight kg | Required free space around the unit for cooling | | |
|------------|----------|---------|------------|------------|-----------|---|---------|------------|
| | IP21 mm | IP54 mm | | | | Front mm | Side mm | Above** mm |
| R6* | 2130 | 2315 | 430 | 689 | 300 | 150 | - | 600 |
| R7* | 2130 | 2315 | 830 | 689 | 400 | 150 | - | 600 |
| R8* | 2130 | 2315 | 830 | 689 | 500 | 150 | - | 600 |

**measured from the base plate of the cabinet top

Space requirement for the door opening:



FLOOR STANDING



TECHNICAL SPECIFICATIONS

CERTIFICATIONS

UL Listed
 Canadian UL Listed
 CSA Certified
 CE Compliant

INPUT POWER

Voltage 230 VAC 1 Phase and 3 Phase ± 10%
 380...690 VAC 3 Phase ± 10%

Frequency 48...63 Hz

Power Factor $\cos\phi_1 = 0.98$ (fundamental)
 $\cos\phi_1 = 0.93$ (total)

MOTOR CONNECTION

Voltage 0... $V_{in}/\sqrt{3}$ in

Frequency 0...300 Hz
 0...120 Hz with dV/dT filters

Motor Control ABB Direct Torque Control (DTC)
 Software

Torque Control Torque Step Rise Time:
 <5ms with nominal torque
 Non-Linearity:
 ± 4% with nominal torque

Speed Control Static Accuracy:
 10% of motor slip
 Dynamic Accuracy:
 0.4% second with 100% torque step

DRIVE PLATFORM

ABB ACS800

ENVIRONMENTAL LIMITS

Enclosure(s) IP21 (NEMA 1)
 IP54/55 (NEMA12)
 NEMA 3R (Optional)
 NEMA 4/4X (Optional)

Temperature 32...104°F (0...40°C) Standard
 104...120°F (40...50°C) with derating
 (1%/1°C)

Relative Humidity 5...95% Relative Humidity

Altitude 0...3000 Ft (0...1000 m) Standard
 3000...13123 Ft (1000...4000 m)
 withderating (1%100M)

STANDARD INPUT/OUTPUT

2 Current Analog 4...20 mA
Input Configurable 11 bit resolution

1 Voltage Analog 2...10 VDC
Input Configurable 200 k Ω Input resistance
 11 bit resolution
 Galvanically isolated as a group

2 Current Analog 4...20 mA
Output Configurable 10 bit resolution
 700 Ω Max load impedance
 24 VDC Input voltage
 1 mS filtering time

Digital Inputs (7)

- 2 Wire Start/Stop
- Setpoint 1-2
- Secondary Protection 2
- Digital Reset
- 3 Wire Start/Stop
- Secondary Protection 1
- E-Stop/Permissive
- Motor Thermistor

Relay Outputs (3) Switchover Contact
Configurable 24-120 VDC or 110...240 VAC
 2A max continuous current

Reference Voltage 10 VDC ± 0.5%
Output 10 mA Max current

Auxiliary power 24 VDC ± 10%
output 250 mA Max current output

DRIVE PROTECTIONS

Keypad Failure Motor Phase Loss
Earth Fault Over Current
Over Voltage Under Voltage
Over Temp (VFD) Over Temp (Motor)
Motor Stall Over Torque

PUMP PROTECTIONS

Closed Valve Dry Run
Low Flow Min Speed
Run-out Flow High Vibration
General Condition Sensor Failure

OPTIONS

Analog Input/ 2 Current Analog Input
Output Extension 2 Current Analog Output
Module - 4...20 mA
 - 100 Ω Input resistance
 - 12 bit resolution

Fieldbus - Modbus - DeviceNet
Communication - Modbus Plus - CS-31
Modules - Profibus - Interbus S
 - Canopen - Ethernet
 - Lonworks - Control Net

IEC RATINGS

NOMINAL RATINGS 230-380/400/415VAC-IP21/ 54 / 55

| 230 VAC | | | 380/400/415 VAC | | | Frame Size | Noise Level DBA @ 3ft. | Air Flow m ³ /h |
|--------------------|-----------------------------|------------------------|--------------------|-----------------------------|------------------------|------------|------------------------|----------------------------|
| Light-overload Use | | Heat Dissipation Watts | Light-overload Use | | Heat Dissipation Watts | | | |
| Power (kW) | Output Amps I _{2N} | | 400 VAC kW | Output Amps I _{2N} | | | | |
| 0.75 | 4.7 | 100 | 1.5 | 4.7 | 100 | R2 | 62 | 35 |
| 1.1 | 6 | 100 | 2.2 | 5.9 | 120 | R2 | | |
| 1.5 | 7.7 | 100 | 3 | 7.7 | 140 | R2 | | |
| 2.2 | 10.2 | 120 | 4 | 10.2 | 160 | R2 | | |
| 3 | 12.7 | 140 | 5.5 | 12.7 | 200 | R2 | | |
| 4 | 18 | 160 | 7.5 | 18 | 250 | R3 | 65 | 69 |
| 5.5 | 24 | 200 | 11 | 24 | 340 | R3 | | |
| 7.5 | 31 | 250 | 15 | 31 | 440 | R3 | | |
| 11 | 42 | 340 | 18.5 | 41 | 530 | R4 | | |
| 11 | 50 | 440 | 22 | 50 | 610 | R4 | | |
| 18.5 | 69 | 530 | 30 | 69 | 810 | R5 | 65 | 168 |
| 22 | 80 | 610 | 37 | 80 | 990 | R5 | | |
| 22 | 94 | 810 | 45 | 94 | 1190 | R5 | | |
| 37 | 132 | 1190 | 55 | 132 | 1440 | R6 | | |
| 45 | 155 | 1190 | 75 | 155 | 1940 | R6 | | |
| 55 | 184 | 1440 | 90 | 184 | 2310 | R6 | 65 | 405 |
| | | | 55 | 132 | 1440 | R6* | | |
| | | | 75 | 155 | 1940 | R6* | | |
| | | | 90 | 184 | 2310 | R6* | | |
| | | | 110 | 202 | 3050 | R7* | | |
| | | | 132 | 243 | 3700 | R7* | 61 | 540 |
| | | | 160 | 284 | 4300 | R7* | | |
| | | | 200 | 440 | 6600 | R8* | | |
| | | | 250 | 516 | 7200 | R8* | | |
| | | | 315 | 590 | 8100 | R8* | | |
| | | | 355 | 679 | 8650 | R8* | 72 | 1220 |
| | | | 400 | 704 | 9100 | R8* | | |

IEC RATINGS

| NOMINAL RATINGS 460 /500VAC - IP21/54/55 | | | | | |
|--|-----------------------------|------------|------------------------|------------------------|---------------|
| Light-overload Use | | Frame Size | Noise Level DBA @ 3ft. | Heat Dissipation Watts | Air Flow m³/h |
| 500 VAC kW | Output Amps I _{2N} | | | | |
| 2.2 | 4.5 | R2 | 62 | 120 | 35 |
| 3 | 5.6 | R2 | | 140 | |
| 4 | 7.7 | R2 | | 160 | |
| 5.5 | 10 | R2 | | 200 | 69 |
| 7.5 | 12 | R2 | | 250 | |
| 11 | 18 | R3 | | 340 | |
| 15 | 23 | R3 | 65 | 440 | 103 |
| 18.5 | 31 | R3 | | 530 | |
| 22 | 39 | R4 | | 610 | |
| 30 | 44 | R4 | | 810 | 168 |
| 37 | 61 | R5 | | 990 | |
| 45 | 75 | R5 | | 1190 | |
| 55 | 88 | R5 | 63 | 1440 | 405 |
| 75 | 115 | R6 | | 1940 | |
| 90 | 145 | R6 | | 2310 | |
| 110 | 163 | R6 | | 2810 | 405 |
| 75 | 115 | R6* | | 1940 | |
| 90 | 145 | R6* | | 2310 | |
| 110 | 163 | R6* | 71 | 2810 | 540 |
| 132 | 192 | R7* | | 3050 | |
| 160 | 240 | R7* | | 3850 | |
| 200 | 284 | R7* | | 4550 | 1220 |
| 250 | 435 | R8* | | 6850 | |
| 315 | 510 | R8* | | 7850 | |
| 355 | 545 | R8* | 72 | 7600 | |
| 400 | 590 | R8* | | 8100 | |
| 450 | 670 | R8* | | 9100 | |
| 500 | 704 | R8* | | 9700 | |

| NOMINAL RATINGS 575/690VAC-IP21/54/55 | | | | | | |
|---------------------------------------|-----------------------------|------------|------------------------|------------------------|---------------|-----|
| Light-overload Use | | Frame Size | Noise Level DBA @ 3ft. | Heat Dissipation Watts | Air Flow m³/h | |
| 690 VAC kW | Output Amps I _{2N} | | | | | |
| 7.5 | 11.5 | R4 | 62 | 300 | 103 | |
| 11 | 15 | R4 | | 340 | | |
| 15 | 20 | R4 | | 440 | | |
| 18.5 | 23 | R4 | | 530 | | |
| 22 | 30 | R4 | | 610 | | |
| 30 | 34 | R4 | | 690 | | |
| 37 | 46 | R5 | 65 | 840 | 168 | |
| 45 | 52 | R5 | | 1010 | | |
| 55 | 73 | R6 | | 1220 | | |
| 75 | 86 | R6 | | 1650 | 405 | |
| 90 | 108 | R6 | | 1960 | | |
| 55 | 73 | R6* | | 1220 | | |
| 75 | 86 | R6* | 63 | 1650 | 405 | |
| 90 | 108 | R6* | | 1960 | | |
| 110 | 125 | R7* | | 2800 | | 540 |
| 132 | 155 | R7* | | 3550 | | |
| 160 | 165/195** | R7* | | 4250 | | |
| 160/200** | 175/212** | R7* | | 4800 | | |
| 250 | 290 | R8* | 72 | 6150 | 1220 | |
| 315 | 344 | R8* | | 6650 | | |
| 355 | 387 | R8* | | 7400 | | |
| 400 | 426 | R8* | | 8450 | | |
| 450 | 482 | R8* | | 8300 | | |
| 500 | 537 | R8* | | 9750 | | |

- Note:
- 1) I_{2N}: continuous rms current.
 - 2) The current ratings are the same regardless of the supply voltage with in one voltage range. To achieve the rated motor power given in the table, the rated current of the drive must be higher than or equal to the rated motor current.
 - 3) * Floor Standing.
 - 4) **Higher value applicable if output frequency is above 41Hz.



The PumpSmart PF700 couples the advanced PumpSmart control and protection algorithms in combination with Allen-Bradley Power Flex 700 technology. Available for single pump process and speed control applications, the PumpSmart PF700 can dramatically reduce your pump's total life cycle costs.

With the patent pending Torque-Based Pump Protection system, the PumpSmart PF700 can recognize dry running, minimum flow, or run-out fault conditions without the need for costly external sensors. For cus-

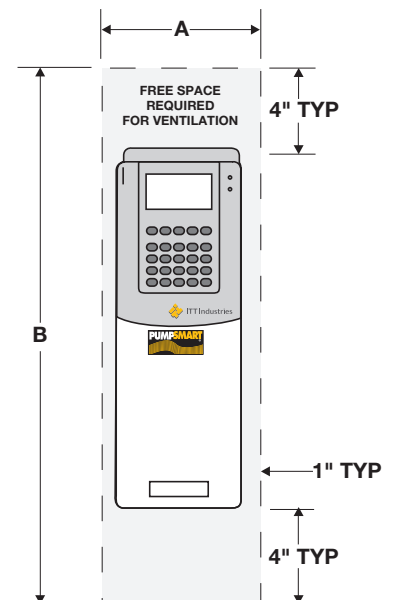
tomers that use DCS for process control, this feature enables pump condition feedback while operating in either process control or speed control.

The PumpSmart PF700 can be integrated into your current control system with optional digital communications modules. Protocols currently supported include: DeviceNet, ControlNet, Ethernet, Profibus, Interbus, and Remote I/O.

DIMENSIONS

| Frame | Drive Weight LB (kg) | Basic Drive Dimensions | | | Free Space Requirements | |
|-------|----------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-----------------------|
| | | Height inches (mm) | Width inches (mm) | Depth inches (mm) | A (inches) (mm) | B (inches) (mm) |
| 0 | 11.5 LB (5.2 kg) | 13.23 (336) | 4.33 (110) | 3.15 (80) | 6.33 (161) | 21.23 (539.2) |
| 1 | 15.5 LB (7.0 kg) | 13.23 (336) | 5.31 (135) | 4.13 (105) | 7.31 (185.7) | 21.23 (539.2) |
| 2 | 27.6 LB (12.5 kg) | 13.48 (342.5) | 8.74 (222) | 7.56 (192) | 10.74 (272.8) | 21.48 (546.6) |
| 3 | 40.9 LB (18.6 kg) | 20.37 (517.5) | 8.74 (222) | 7.56 (192) | 10.74 (272.8) | 28.37 (720.6) |
| 4 | 54 LB (29 kg) | 29.88 (758.9) | 8.65 (219.8) | 7.94 (201.6) | 10.65 (270.5) | 37.88 (962.2) |
| 5 | 82 LB (37.2 kg) | 25.37 (644.5) | 12.16 (308.9) | 10.84 (275.4) | 14.65 (359.7) | 33.37 (847.6) |
| 6 | 157.5 LB (71.4 kg) | 38.43 (976.3) | 15.9 (403.9) | 10.85 (275.5) | 17.9 (454.7) | 46.43 (1179.3) |

Wall Mounting Dimensions



Nominal Ratings 380 - 480 VAC - NEMA 1

| 380 VAC | | 480 VAC | | Frame Size | Noise Level DBA @ 3 ft. | Heat Dissipation (W) | Air Flow CFM |
|---------------|--------------|---------------|--------------|------------|----------------------------|----------------------------|-----------------|
| Power (kW) | IMAX Amps | Power (HP) | IMAX Amps | | | | |
| 0.37 | 1.3 | 0.5 | 1.1 | 0 | 58 | 53 | 30 |
| 0.75 | 2.1 | 1 | 2.1 | 0 | | 63 | |
| 1.5 | 3.5 | 2 | 3.4 | 0 | | 76 | |
| 2.2 | 5 | 3 | 5 | 0 | | 93 | |
| 4.0 | 8.7 | 5 | 8 | 0 | | 164 | |
| 5.5 | 11.5 | 7.5 | 11 | 0 | | 194 | |
| 7.5 | 15.4 | 10 | 14 | 1 | 59 | 218 | 30 |
| 11 | 22 | 15 | 22 | 1 | | 326 | |
| 15 | 30 | 20 | 27 | 2 | 57 | 394 | 50 |
| 18.5 | 37 | 25 | 34 | 2 | | 441 | |
| 22 | 43 | 30 | 40 | 3 | 61 | 459 | 120 |
| 30 | 56 | 40 | 52 | 3 | | 610 | |
| 37 | 72 | 50 | 65 | 3 | | 717 | |
| 45 | 85 | 60 | 77 | 4 | 59 | 974 | 190 |
| 55 | 105 | 75 | 96 | 5 | 71 | 1146 | 200 |
| 75 | 125 | 100 | 125 | 5 | | 1475 | |
| 90 | 170 | 125 | 156 | 6 | 72 | 1838 | 300 |
| 110 | 205 | 150 | 180 | 6 | | 2204 | |
| 132 | 260 | 200 | 248 | 6 | | 2512 | |

Nominal Ratings 575 VAC - NEMA 1

| Power (kW) | IMAX Amps | Frame Size | Noise Level DBA @ 3 ft. | Heat Dissipation Watts | Air Flow CFM |
|---------------|--------------|---------------|----------------------------|------------------------------|-----------------|
| 3 | 1.7 | 0 | 58 | 54 | 30 |
| 5 | 6.1 | 0 | | 142 | |
| 7.5 | 9 | 0 | | 157 | |
| 10 | 11 | 1 | 59 | 186 | 20 |
| 15 | 17 | 1 | | 270 | |
| 20 | 22 | 2 | 57 | 343 | 50 |
| 25 | 21 | 2 | | 385 | |
| 30 | 32 | 3 | 61 | 419 | 120 |
| 40 | 41 | 3 | | 569 | |
| 50 | 52 | 3 | | 710 | |
| 60 | 62 | 4 | 59 | 825 | 190 |
| 75 | 77 | 5 | 71 | 1361 | 200 |
| 100 | 99 | 5 | | 1874 | |
| 125 | 125 | 6 | 72 | 1900 | 300 |
| 150 | 145 | 6 | | 2280 | |

PS10/PS20 PUMP LOAD MONITORS



PumpSmart Protection for Fixed Speed Applications

The PS10 and PS20 Pump Load Monitors measure the motor input power in combination with a proprietary algorithm to accurately determine the pump's load.

During dry-run conditions, pump power is reduced and recognized by the PumpSmart Pump Load Monitor. During run-out conditions, power increases, which is also a recognizable condition.

Power increase is also experienced when internal wear results from upset conditions. Customers may configure the devices to automatically shutdown the pump or warn the operator via integrated relay output(s).

PS10 Pump Load Monitor

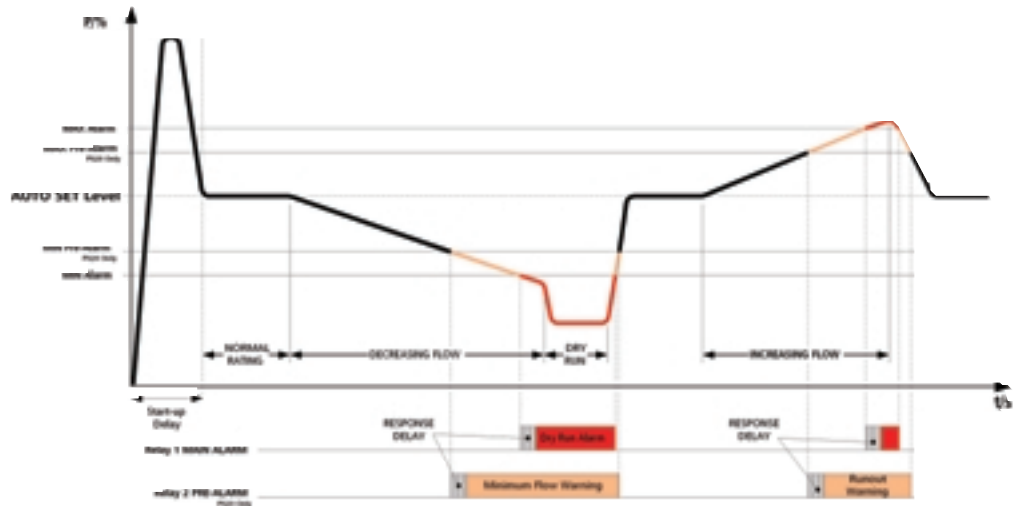
The PS10 offers single underload or overload condition protection for pumps up to 40 HP (50 Amps MAX). Alarm setpoints can be entered either manually or automatically set using the Auto-Set functionality during normal operation.

PS20 Pump Load Monitor

The PS20 offers two underload and two overload condition protection functions (four total) as well as the ability to output pump load through an integrated 4-20 mA output. A six button keypad and LCD readout enables greater configuration and operation options. The PS20 can be applied on motors up to 999 F.L. Amps.

Pump Load Measurement

The instantaneous power supplied to the pump by the electrical motor is monitored by measuring the input power and by calculating the motor power losses with a proprietary algorithm. The value of the real motor shaft power is used to accurately determine overload and underload conditions.



TECHNICAL DATA

| | PS10 | PS20 |
|---|--|--|
| Alarm Setpoints | 1 — 1 Underload or 1 Overload | 4 — 2 Underload and 2 Overload |
| Dimensions | 45mm x 90mm x 115mm (1.77" x 3.54" x 4.53") | 45mm x 90mm x 115mm (1.77" x 3.54" x 4.53") |
| Weight | 0.3 kg / (10.5 Oz) | 0.3 kg / (10.5 Oz) |
| Enclosure | IP20 / (NEMA 1) | IP20 / (NEMA 1) |
| Mounting | 35mm DIN-rail 46277 | 35mm DIN-rail 46277 |
| Power Consumption/Fuse | 5VA (10A) Maximum | 6VA (10A) Maximum |
| Motor Voltage(s) | 1P x 100-240 VAC ± 10% 3P x 100-600 VAC ± 10% 3P x 600-690 VAC ± 10% | 1P x 100-240 VAC ± 10% 3P x 100-240 VAC ± 10% 3P x 380-500 VAC ± 10% 3P x 500-600 VAC ± 10% 3P x 600-690 VAC ± 10% |
| Frequency | 50Hz or 60 Hz | 50Hz or 60 Hz |
| Analog Output Motor Power Relay Output | None | Programmable, self powered 4-20 mA, 20-4 mA, 0-20 mA, 20-0 mA, Max Load 500 Ω |
| Relay Output | Main Alarm 5A / 240 VAC Resistive 1.5A / 240 VAC Pilot Duty / AC12 | Main Alarm (R1) – Pre Alarm (R2) 5A / 240 VAC Resistive 1.5A / 240 VAC Pilot Duty/AC12 |
| Current Input | 50A Max w/ Current Transformers (p/n) A08180A01, 02, 03 | 100A Max w/ Current Transformers (p/n) A08180A01, 02, 03, 04 101-999A w/ A08180A01 and Standard Current Transformers (p/n) A08180A05, 06, 07, 08 |
| Digital Input External RestA | 48VDC or 240 VAC Maximum High: >24 VAC/VDC Low: <1 VAC/VDC | 48VDC or 240 VAC Maximum High: >24 VAC/VDC Low: <1 VAC/VDC |
| Approvals | UL / cUL | UL / cUL |

PLANT ASSESSMENTS TO IDENTIFY OPPORTUNITIES TO OPTIMIZE PUMP LIFE CYCLE PERFORMANCE

Optimizing pump life cycle performance provides a new path to help reduce plant-operating cost. The largest consumers of industrial motor energy, typically, are the centrifugal pumps moving fluid throughout your operation.

Recent studies show that average pumping efficiency in industrial plants is below 40%. Pump over-sizing and throttled valves are identified as the two major contributors to efficiency loss.

Optimizing pump performance has the potential to achieve 30% to 70% improvements in energy and maintenance cost, while improving both pump and process reliability.



ASSESSING YOUR SYSTEMS

Pump assessments help identify process modifications that offer the most potential for efficiency improvements:

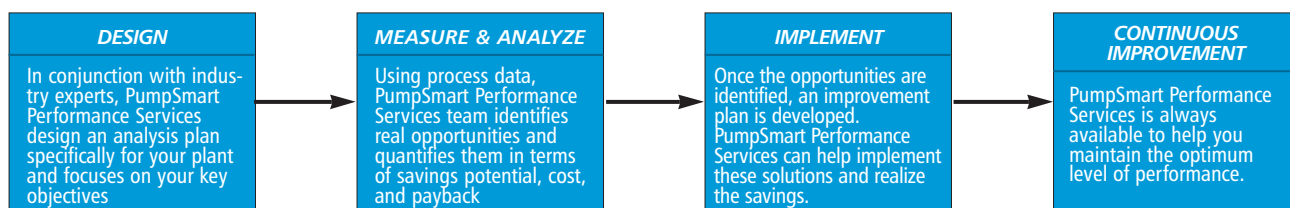
- Motor efficiency via replacement or upgrade
- Best match between component size and load requirement
- Reduced load on motor through improved process and system design
- Use of variable speed control instead of throttling or bypass mechanisms

The following pump symptoms are indicators of potential opportunity: throttled valve; bypass line normally open; multiple parallel pump system with the same number of pumps always operating; continuous pump operation in a batch environment, and presence of cavitation noise.

Drawing on over 150 years of ITT Goulds Pumps system experience, PumpSmart™ Performance Services' team of

consultants provides in-depth pump and process assessments to identify the factors limiting pump performance. After completing an onsite assessment, a recommendation report is provided with strategies to improve pump performance. Design and equipment modifications are typical. In many cases, the application of intelligent flow control systems is needed to fully optimize system efficiency. A financial analysis includes total installed cost and annual savings to provide a clear return on investment.

To learn how to make a quantum leap in reducing plant operating cost, contact your local representative for more information or to arrange a plant assessment.



APPLICATION FLEXIBILITY

Cooling Water



- Pressure or Temp Control
- Multi-Pump Sequencing
- Auto Load Sharing
- Eliminate Control Valves

Transfer & Loading



- Flow Control
- Auto Shut Off
- No Dry Run/Cavitation
- Total Protection for Mag Drive Pumps

Paper Stock



- Fan, Broke, Liquor, Digester
- Control Level, Pressure, Flow
- Improved Headbox Control

Reboiler & Bottoms Pumps



- Increase Drain Down
- Control Suction Level
- Control Cavitation
- Eliminate Control Valves

Municipal Wastewater



- Handle Wide Load Swings
- Multi-Pump Control
- Remote Diagnostics
- Reduce HP Requirements

Filtration



- Maintain Constant Flow as Filters Clog
- Fewer Filter Changes
- No Flow Protection

Slurry Pumps



- Control Pump Output
- Run Slower
- Run in Pump Sweet Spot
- Reduce Pump Wear

Boiler Feed



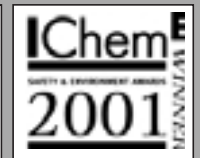
- Level Control
- Reduce Recirculation
- Eliminate Valves
- Reduce Horsepower

AWARD WINNING DESIGN



"...A sublime piece of engineering skill."

- IChemE - Institute of Chemical Engineers



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