TOSHIBA

Leading Innovation

vlp technology

P9 ASD

LOW VOLTAGE DRIVE

P9 ASD

WE'VE REWRITTEN THE LAWS OF PUMP CONTROL

The Toshiba P9 adjustable speed drive is a revolution in pump control. By incorporating Toshiba's proprietary, ground-breaking Virtual Linear Pump (VLP) Technology, the P9 directly, precisely, and linearly controls pressure, temperature, level, or flow. The P9 eliminates many obstacles users thought were an integral part of pump control and sets a new standard in ingenuity, performance, and ease-of-use for the pump industry.

- Linearizes Traditional Non-Linear Pump Curve, Providing User's System with Stable & Precise Variable Pumping Control
- Solves Problem of Load-Balancing Over Multiple Pumps
- Allows User to Configure System in Five Simple Steps, VLP Provides User with Complete Control in Only Minutes
- Self-Calibrates & Eliminates Common Pump Anomalies
- Protects Against Cavitation & Provides Thrust Bearing Protection
- Maximizes Energy Savings on Variable Torque Loads

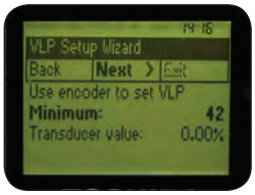
SIMPLE STARTUP AS IT'S NEVER BEEN SEEN BEFORE

Toshiba stands at the forefront of innovation with our remarkably intuitive and user-friendly startup. In fact, out-the-box, the P9 is only minutes from complete configuration and full optimization of your pump system performance.

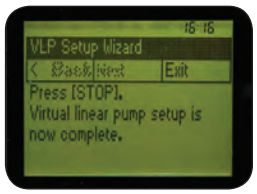
STEP 1:
Input
Motor's Electrical
Specifications

STEP 2:
Input
Transducer
Specifications

STEP 3:
Input
VLP Maximum



STEP 4:
Input
VLP Minimum



STEP 5:
Complete
VLP Setup

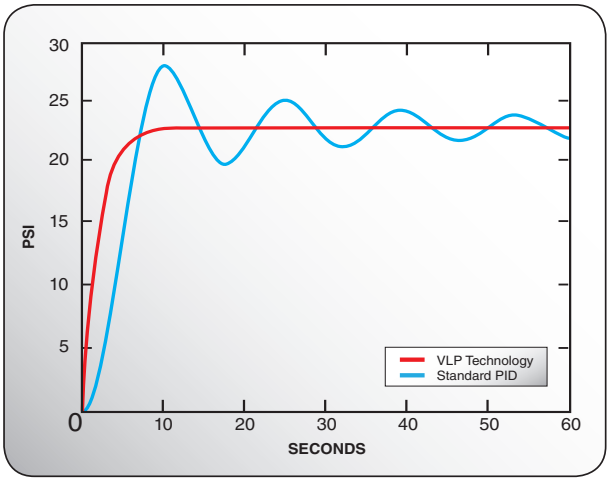
ADVANCED FEATURES TO PROTECT AGAINST COMMON PUMP ANOMALIES

The P9 also offers safety features that protect the pump system from common pumpanomalies. Protective features include:

- ***Start & Stop Points*** determine when to start and stop the pump based on user-set values and system feedback on pump water levels. These points work with a delay timer to ensure that frequent fluctuations in the system feedback do not unnecessarily start and stop the pump.
- ***A Sleep Timer*** shuts off the pump in order to reduce energy consumption and prolong the lifespan of pumping equipment after it has run at the VLP minimum for a user-specified amount of time.
- ***A Run External Devices Feature*** turns on external booster pumps to support the primary pump when necessary to increase energy savings and minimize pump and system failures.
- ***A No-Flow/Low NPSH Cut-Off Feature*** stops the pump once loss of feed water or a closed output valve has been detected to protect against cavitation.
- ***A Sealing Water/Vacuum Priming Feature*** automatically controls and improves system reliability by monitoring water flow and water level, and starting the pump once water flows through the seal or the pump is full of water.

MAKE PID TUNING A THING OF THE PAST WITH VLP TECHNOLOGY

Toshiba's breakthrough VLP algorithm has taken PID and made it obsolete, completely reinventing how users control pressure or flow. With this new technology, after simply inputting a few values into the P9, optimum control is attained. Toshiba's VLP Setup Wizard effortlessly guides the user through the entire process!



The setup process defines the operating boundaries by establishing a minimum VLP point and a maximum VLP point. By defining the minimum and maximum points, VLP creates an operating domain within the drive that is directly and proportionately related to the specific pumping system to which it is connected.

Once VLP points have been established, the P9 will perform the following functions:

- Monitor Multi-Pump Systems for Friction Losses, Impeller Variations, & Other System Variables
- Adjust the System Accordingly to Ensure Only Necessary Pumps are Operating
- Balance Flow Rates for Each Operating Pump Under All Conditions
- Balance the Load for All Operating Pumps

CENTRIFUGAL PUMPS

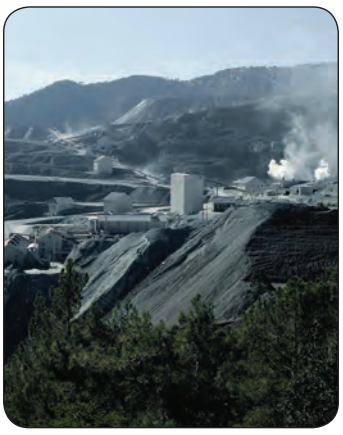
The P9 offers the same functionality and protective features for centrifugal pumping systems in numerous applicable industries. From vertical multi-stage pumps in a water municipality to slurry pumps in a coal mine, the P9 controls and protects centrifugal pumps with ease.

APPLICABLE PUMPS:

- Bilge
- Disc Flow
- Grinder
- Mixed-Flow Impeller
- Recessed Impeller
- Slurry
- Vertical Multi-Stage
- Vertical Turbine
- Water

APPLICABLE INDUSTRIES:

- Chemical
- City Municipality
- Coal Mine
- Food
- Industrial Marine
- Irrigation
- Paper
- Petroleum
- Power Plant
- Water/Wastewater



P9 ASD

MODEL RANGE	0.75 to 125 HP	1 to 400 HP
Voltage Rating	200 to 240 VAC	380 to 480 VAC
Input Voltage Tolerance	±10%	
Voltage Regulation	Main Circuit Voltage Feedback Control (Automatic Regulation, Fixed, & Control Off Selections)	
PWM Carrier Frequency	Adjustable 1 to 16 kHz (ASD-Specific, Consult Factory)	
Control System	Sinusoidal PWM with VLP Technology	
V/f Pattern	Constant Torque, Voltage Decrease Curve, Automatic Torque Boost, Sensorless Vector Control, 5-Point V/f Custom Curve, PM Drive, & PG Feedback Vector Control	
Overload Current Rating	100% Continuous; 120% for One Minute	
Frequency Setting	Rotary Encoder Integrated into EOI, 0 to 10 VDC, ±10 VDC, 0 to 20 mA, & Discrete Input	
Frequency Precision	Analog Input 0.2% of Maximum Output Frequency; Discrete/Communications Input 0.01% of Maximum Output Frequency	
Output Frequency Range	0 to 299 Hz	
Speed Regulation	Closed Loop (Up to 0.01%; 1000:1 Speed Range); Open Loop (Up to 0.1%; 60:1 Speed Range)	
Set-Point Control	Proporational Gain, Integral Gain, Feedback Settings, Upper/Lower Deviation Limits, Feedback Source Delay Filter, & Feeback Settings Differential Gain Selectable Between VLP/PID	
VLP	Proprietary Toshiba Technology	
Retry	User-Set Number of Retries for Automatic System Restart After Trip	
Restart	Able to Smoothly Catch Freewheeling Motor (Bidirectional)	
Enclosure Type	NEMA 1	
Standards/Compliances	UL-Approved & American Recovery & Reinvestment Act Compliant (ARRA)	
INPUT/OUTPUT		
Discrete Input Terminals	Eight; Each Programmable to 57 Functions; May be Increased Using Optional Hardware	
Analog Inputs	Three: One 0 to 20 mA or 0 to 10 VDC Isolated Input, One 0 To 10 VDC Input, & One ±10 VDC Input	
Discrete Output Contacts	Three Programmable To 83 Functions; Two Form-A Contacts & One Form-C Contact	
Analog Outputs	Two: One Programmable 4 to 20 mA or 0 to 10 VDC & One 4 to 20 mA Output	
Communication Port	Half/Full Duplex RS485; MODBUS RTU or Toshiba TSB Built-In Communications	
Power Terminals	Input (L1, L2, L3), Output (T1, T2, T3), DCL (PO, PA), DBR (PA, PB), & DC BUS (PA, PC)	
SAFETY FEATURES		
Start & Stop Points	Determine Start/Stop Based On User-Set Values, Transducer Feedback Signal, & Programmable Discrete Input Terminal; Work with Delay Timer to Ensure Pump Does Not Start/Stop Too Frequently Due to Unstable/Fluctuating Input Signal	
Sleep Timer	Shuts Off Pump After Running at VLP Minimum for User-Specified Time	
Run External Devices	Turns on External Booster Pumps to Support Primary Pump when Necessary	
No-Flow/Low NPSH Cut-Off	Stops Pump Once Loss of Water Feed or Closed Output Valve is Detected	
Sealing Water/Vacuum Priming	Monitors Water Flow/Water Level & Starts Pump Once Water Flows through Seal or Pump Fills with Water	
ELECTRONIC OPERATOR INTERFACE (EOI)		
LCD (Liquid Crystal Display)	Plain-English Back-Lit Display	
LED (Light Emitting Diode)	Seven-Segment Display	
LED Indicators	Run (Red), Stop (Green), Hand/Auto (Green), & DC Bus Charge Indicator (Red)	
Keys	Hand/Auto, ESC, Run, Mode, & Stop/Reset	
Rotary Encoder	Encoder with Integrated Enter Key to View/Change Parameter Settings	
Monitoring	Frequency Command Screen; Allows Two User-Selected Monitored Items to be Displayed; Selectable from: Output Current, DC Voltage, Output Voltage, Run Time, Comp. Frequency, VLP, Motor Overload, Motor Load, ASD Load, Input Power, Output Power, RR Input, V/I Input, RX Input, RX2 Input, & AM/FM Output	
Display Units	Completely Configurable Along with Scaling Factor Multiplier; Display Selectable Between Amps or Percentage of FLA; Voltage Display Selectable Between Volts or Percentage of FLA	
Set-Point Units	Selectable Between PSI, GPM, CFM, Inches of Water Column (inH2O), or Feet of Water Column (ftWC)	

TOSHIBA MOTORS & DRIVES DIVISION
- Adjustable Speed Drives
- Motors
- Motor Controls

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