TOSHIBA
Leading Innovation >>>

60.00

SET: 0.00%
Output power: 0.00kW
Output current: 0.00%
F R ST RES S1 S2 S3 S4
OUT1 OUT2 FL

HAND/ AUTO   ESC
RUN   MODE
STOP RESET

TOSHIBA

P9 ADJUSTABLE SPEED DRIVE

vlp
technology

P9 ASD >>>
LOW VOLTAGE DRIVE

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 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.
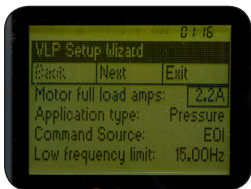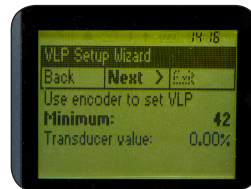
STEP 1:
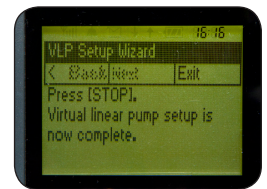Input
Motor's Electrical
Specifications
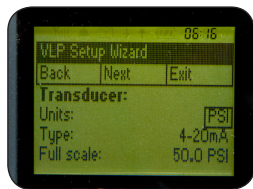
STEP 2:
Input
Transducer
Specifications
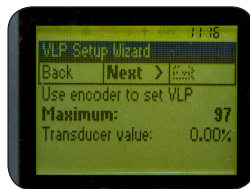
STEP 3:
Input
VLP Maximum

STEP 4:
Input
VLP Minimum

STEP 5:
Complete
VLP Setup

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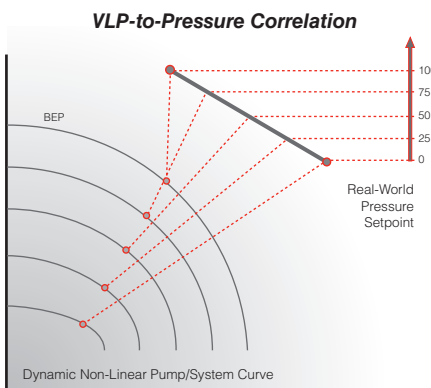
The setup process defines the operating boundaries by establishing a minimum VLP point and a maximum VLP point. By defining the minimum and maximum points, VLP creates an operating domain within the drive that is directly and proportionately related to the specific pumping system to which it is connected.

The P9 also offers safety features that protect the user's system from common pump anomalies. 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.

❯ OPTIMIZE YOUR MULTI-PUMP SYSTEM

VLP-to-Pressure Correlation

BEP

100
75
50
25
0

Real-World
Pressure
Setpoint

Dynamic Non-Linear Pump/System Curve

Prior to the P9 and VLP, pump-speed control was cumbersome and inefficient for multi-pump systems, resulting in unbalanced flow rates, pressure buildup, excessive wear-and-tear on pumping equipment, and unnecessary energy consumption. The P9, with its cutting-edge capabilities, has completely optimized multi-pump systems to dramatically reduce pressure buildup and energy consumption, thereby maximizing efficiency, energy savings, and the life of the pump equipment.

When several pumps are working on a common header, using a P9 in conjunction with a starter, allows multiple pumps to be managed simultaneously. The P9 gradually increases or decreases the pump speed, as required to meet the demand of the load.

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	1 to 150 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, Fixed, & Off	
PWM Carrier Frequency	Adjustable 0.5 to 15 kHz (Drive Specific, Consult Factory)	
Control System	Sinusoidal PWM System, Flux-Field Current Vector Control	
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 (PID)	Proportional Gain, Integral Gain, Feedback Settings, Upper/Lower Deviation Limits, Feedback Source Delay Filter, & Feedback Settings Differential Gain	
VLP Function	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 Compliance	UL-Approved	

INPUT/OUTPUT

Discrete Input Terminals	Eight Discrete Input Terminals 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; Options: 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 Pump Runs for User-Specified Time at VLP Minimum	
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) EOI	Plain-English Back-Lit Display	
LED (Light Emitting Diode) EOI	Seven-Segment Display	
LED Indicators	Run (Red), Stop (Green), Hand (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	
Selectable Display Units	Completely Configurable Along with Scaling Factor Multiplier; Display Selectable Between Amps (A) or Percentage Of FLA (%); Voltage Display Selectable Between Volts or %	

TOSHIBA INDUSTRIAL PRODUCTS:
- Adjustable Speed Drives
- Motors
- Motor Controls
- Instrumentation & PLCs
- Uninterruptible Power Systems

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