TOSHIBA
TOSHIBA INTERNATIONAL CORPORATION

ADJUSTABLE SPEED DRIVES

P9

LOW VOLTAGE

SYSTEMATIC AND PRECISE PUMP CONTROL

The Toshiba P9 adjustable speed drive (ASD) incorporates Toshiba's proprietary VLP Technology®* and directly, precisely, and linearly controls pressure, temperature, level, and flow. The P9 eliminates certain obstacles users assumed were an unavoidable part of pump control.

- Linearizes Traditional Non-Linear Pump Curve, Providing Stable & Precise Control to HVAC Systems
- Solves Problem of Load-Balancing Over Multiple Fan Plenums or Pump Systems
- Allows User to Configure System in Five Simple Steps, Providing Complete Control in Only Minutes
- Self-Calibrates & Eliminates Common Anomalies
- Maximizes Energy Savings on Variable Torque Loads

* VLP Technology® as used herein refers to Virtual Linear Pump technology

vlp technology®

Start & Stop Points	Determines 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 help ensure that frequent fluctuations in the system feedback do not unnecessarily start and stop the pump.
Sleep Timer	Shuts off fan or pump in order to reduce energy consumption and prolong the lifespan of equipment after it has run at the minimum for a user-specified amount of time.
Run External Device Feature	Turns on external booster pumps to support the primary pump when necessary in order to increase energy savings and to minimize pump and system failures.
No-Flow/Low NPSH Cut-Off Feature	Stops the pump once loss of feed water or a closed output valve has been detected in order to protect against cavitation.
Sealing Water/Vacuum Priming Feature	Automatically controls and helps to improve 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.
Toshiba's Proprietary Windows®-Based ASD Pro Software	Available at no additional cost, this easy-to-use software can be used to program and control the P9, to download parameter sets, and to monitor real-time conditions.

TOSHIBA
TOSHIBA INTERNATIONAL CORPORATION

PRACTICAL STARTUP CONFIGURATION

With its intuitive and user-friendly startup, the P9 allows for configuration and optimization of HVAC system's performance.
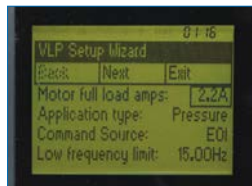
STEP 1:
Input Motor's Electrical Specifications

STEP 2:
Input Transducer Specifications


STEP 3:
Input Maximum

STEP 4:
Input Minimum

STEP 5:
Complete Setup

VLP TECHNOLOGY MAKES PID TUNING A THING OF THE PAST

Toshiba's VLP Technology algorithm has taken proportional/integral/derivative gain (PID) and changed how users control pressure and flow. With this technology, after simply inputting a few values into the P9, optimum control is attained. Toshiba's Setup Wizard effortlessly guides the user through the entire process. The setup process defines the operating boundaries by establishing a minimum point and a maximum point. By defining these points, VLP Technology creates an operating domain within the ASD that is directly and proportionately related to the specific pumping system to which it is connected. Once these points have been established, the P9 will:

• Monitor Multiple Systems for Friction Losses, Impeller Variations & Other System Variables
• Adjust Systems Accordingly to Help Ensure Only Necessary Fans or Pumps are Operating
• Balance Flow Rates for Each Operating Fan or Pump Under Different Conditions
• Maintain the Same Load for All Operating Fans or Pumps
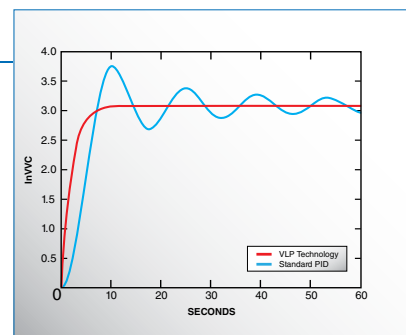
CENTRIFUGAL PUMPS

The P9's VLP Technology offers similar functionalities as proportional/integral/derivative gain (PID) with additional protective features for centrifugal pumping systems in numerous applicable industries. From vertical multistate pumps in a water municipality to slurry pumps in a coal mine, the P9 controls and protects centrifugal pumps with ease.

INDUSTRIES SERVED
• Chemical
• Oil & Gas
• Water/Wastewater
• Pulp & Paper
• Mining & Mineral
• Food & Beverage

PUMP APPLICATIONS
• Bilge
• Slurry
• Mixed-Flow Impeller
• Recessed Impeller
• Vertical Multi-Stage
• Disc Flow
• Grinder
• Water

TOSHIBA
TOSHIBA INTERNATIONAL CORPORATION

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	Proportional Gain, Integral Gain, Feedback Settings, Upper/Lower Deviation Limits, Feedback Source Delay Filter & Feeback Settings Differential Gain Selectable Between VLP Technology/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-Listed	

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 Relays 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 Help Ensure Pump Does Not Start/Stop Too Frequently Due to Unstable/Fluctuating Input Signal	
Sleep Timer	Shuts Off Pump After Running at 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 Technology, 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
Adjustable Speed Drives • Motors • Motor Controls

www.toshiba.com/tic

TOSHIBA
TOSHIBA INTERNATIONAL CORPORATION