TOSHIBA

Leading Innovation

vlp technology™

Q9 PLUS ASD

LOW VOLTAGE DRIVE

WE'VE REWRITTEN THE LAWS OF FAN & PUMP CONTROL

The Toshiba Q9 Plus adjustable speed drive is a revolution in pump control. By incorporating Toshiba's proprietary, ground-breaking Virtual Linear Pump (VLP) Technology, the Q9 Plus directly, precisely, and linearly controls pressure, level, or flow. This 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 Fan 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

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 Q9 Plus is only minutes from complete configuration and full optimization of your HVAC system's 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

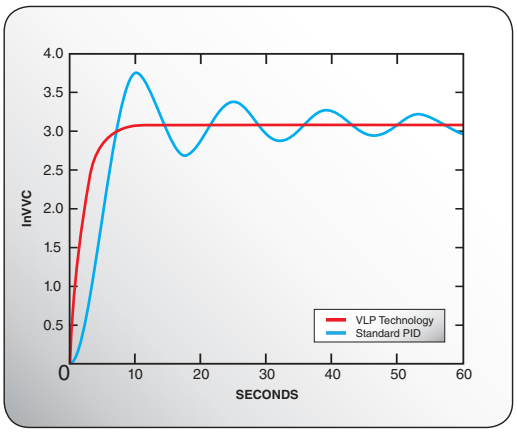
ADVANCED FEATURES FOR YOUR HVAC SYSTEM

The Q9 Plus also offers safety features that protect the user's drive, equipment, and system from common anomalies. Protective features include:

- ***Start & Stop Points*** determine when to start and stop the fan or pump based on user-set values and system feedback on air or 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 ASD.
- ***A Sleep Timer*** shuts off the fan in order to reduce energy consumption and prolong the lifespan of equipment after it has run at the VLP minimum for a user-specified amount of time.
- ***A Damper-Permissive Circuit*** protects from over-pressuring ductwork. The drive will not start until a signal from an open damper is received.
- ***Two Selectable Fire-Speeds*** come as standard features on the Q9 Plus. When a signal from a fire management system is received, the fire-speed circuit forces the drive to run at a preset speed and forced run.
- ***Customer Interlock*** disables the ASD from running whether the drive is in inverter or bypass mode.
- ***Toshiba's Proprietary Windows®-Based ASD Pro Software*** is available at no `additional cost. This easy-to-use software can be used to program and control the Q9 Plus, download parameter sets, and monitor real-time conditions.

VLP TECHNOLOGY MAKES PID TUNING A THING OF THE PAST

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 Q9 Plus, 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 Q9 Plus performs the following functions:

- Monitors Multiple Systems for Friction Losses, Impeller Variations, & Other System Variables
- Adjusts System Accordingly to Ensure Only Necessary Fans are Operating
- Balances Flow Rates for Each Operating Fan Under All Conditions
- Maintains Same Load for All Operating Fans

COMMUNICATION OPTIONS

The Q9 Plus supports many common communication protocols used in the HVAC industry. These include:

- BACnet® (Integrated)
- Modbus RTU® (Integrated)
- BACnet/IP®
- Metasys N2®
- APOGEE FLN®
- LonWorks®

INTEGRATED ENCLOSURE & BYPASS UNIT OPTIONS

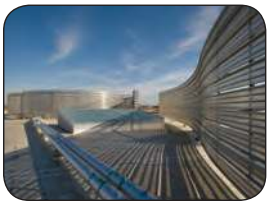
Toshiba allows users to "build your own drive" by including several popular options as standard choices for custom packages. Configuration options include line reactors for input power-conditioning and harmonic mitigation as well as the choice between two- or three-contactor bypasses to allow for across-the-line motor operation.

"Build Your Own Drive" packages use a standard NEMA 1 enclosure and are available with the following options:

- Input Circuit Breaker
- Two-Contactor Bypass
- Three-Contactor Isolated Bypass
- 3% AC Line Reactor
- 5% AC Line Reactor
- DC Link Reactor

APPLICABLE APPLICATIONS:

- Air Handling
- Chill Water Circulation
- Ventilation
- Fan Walls
- Cooling
- Heat Exchange





Q9 PLUS ASD

MODEL RANGE	1 to 125 HP	1 to 400 HP
Voltage Rating	200 to 240 VAC	380 to 480 VAC
Frame Size	2 to 10	2 to 13
HP Rating	1 to 125 HP	1 to 400 HP
Input Voltage Tolerance	±10%	
Voltage Regulation	Main Circuit Voltage Feedback Control: Automatic, Fixed, & Off	
PWM Carrier Frequency	Adjustable 1 to 16 kHz (Drive-Specific, Consult Factory)	
Control System	Sinusoidal PWM with VLP	
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; 110% 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	Selectable Between VLP/PID; Proportional Gain, Integral Gain, Feedback Settings, Upper/Lower Deviation Limits, Feedback Source Delay Filter, & Feedback Settings Differential Gain	
Load Balancing	Capable of Balancing Load on Pumps Operated by Q9 Plus Drives on Common Header	
Retry	User-Set Number of Retries for Automatic System Restart After Trip	
Restart	Able to Smoothly Catch Freewheeling Motor (Bidirectional)	
Sleep Timer	Shuts Off Fan After Running at VLP Minimum for User-Specified Time	
Enclosure Type	IP20/IP00 (Rating-Dependent), NEMA 1 Kit Available	
Standards/Compliances	UL Listed & American Recovery & Reinvestment Act (ARRA) Compliant	
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; Integrated Protocols: BACnet, Modbus, & Toshiba TSB	
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 ASD Does Not Start/Stop Too Frequently Due to Unstable/Fluctuating Input Signal	
Damper-Permissive Circuit	Protects Drive from Over-Pressuring the System	
Selectable Fire-Speeds	Two Fire-Speeds; Force Drive to Run at Preset Speeds	
ELECTRONIC OPERATOR INTERFACE (EOI)		
LCD (Liquid Crystal Display)	Full-English Backlit Display	
LED (Light Emitting Diode)	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	
Display Units	Completely Configurable Along with Scaling Factor Multiplier; Display Selectable Between Amps (A) or Percentage of FLA (%); Voltage Display Selectable Between Volts (V) or Percentage of Volts (%)	
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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Leading Innovation

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