



ENDURANCE™ DRIVE

Designed to run reliably without refrigerated A/C

TESCO®
CONTROLS, INC.

Low-Profile, Clean Power
VFD Solution for Outdoor Applications

OVERVIEW

No Refrigerated A/C



Features

- 5-year warranty
- No refrigerated cooling
- High efficiency
- Low-profile
- Lower total cost of ownership
- Tamper-resistant
- Meets IEEE 519 requirements

Applications

- Sewage lift stations
- Booster pump stations
- Well sites
- Other variable-speed applications

Communications

- Modbus TCP/IP, Modbus RTU, Ethernet/IP and TCP/IP
- DeviceNet
- Profibus DP
- Data Express Plus

Options

- 60–to–400 horsepower
- 6– or 18–pulse rectifier
- NEMA 3R or 3RX enclosures
- Materials: 316SS, 304SS, galvanized
- Utility metering
- Control section
- Choice of colors and finishes

Reliable, clean power, VFD solution for high heat environments

The TESCO Endurance Drive is a clean power VFD specifically designed to perform reliably in severe environments. It has been engineered for high outdoor temperatures, and the VFD drive has been sealed to protect the electronics from dust. The Endurance Drive requires no refrigerated A/C or outdoor buildings.

TESCO's outdoor variable-speed Endurance Drive is a revolutionary product. It provides the following advantages:

- Performs reliably in extreme outdoor temperatures
- Runs consistently in high dust environments
- Eliminates the need for refrigerated A/C
- Removes the need for buildings/housings
- Allows for shorter installation schedule
- Meets height and aesthetic goals
- Easy to program and maintain
- Energy efficient & budget-friendly
- 5-year warranty for ease of mind

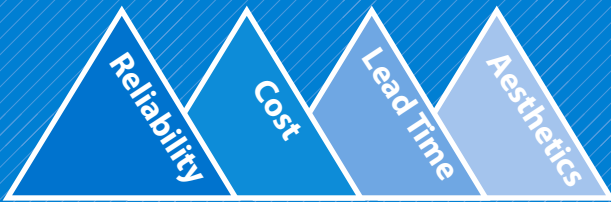
COMPARE

	TESCO ENDURANCE DRIVE	OUTDOOR PANEL WITH A/C UNIT	BUILDING WITH PANEL & A/C UNIT
Reliability	●	●	●
Capital Cost	●	●	●
Operational Cost	●	●	●
Standard Warranty Years	5	1	1
Aesthetics	●	●	●
Energy Efficiency	●	●	●

KEY: ● Best ● Better ● Functional

THE CHALLENGE

Outdoor VFD Applications



Low Reliability Under Extreme Conditions

Loss of refrigerated cooling is the #1 reason for VFD failure in outdoor applications. Most VFDs are not specifically designed for outdoor applications. Refrigerated A/C units are typically added to combat heat.

High Costs

Enclosures, refrigerated A/C, panel construction, and buildings to house VFDs can drive up construction, operational and energy costs. A/C and drive failures result in higher maintenance costs. Traditional VFD warranty agreements cover one to two years and do not cover the refrigerated cooling system.

Long Lead Times

Planning, securing permits, and waiting for construction of buildings can seriously delay installation schedules. Project completion can be subject to weather delays and/or materials availability, impacting the construction of buildings to house electrical equipment.

Aesthetics

Standard-height drives, or buildings added to house drives may not be ideal for areas with limited space or strict aesthetic requirements and CC&Rs. Limited drive color options can inhibit the ability to blend equipment into the environment. Graffiti protection is also a serious problem in many areas.

THE SOLUTION

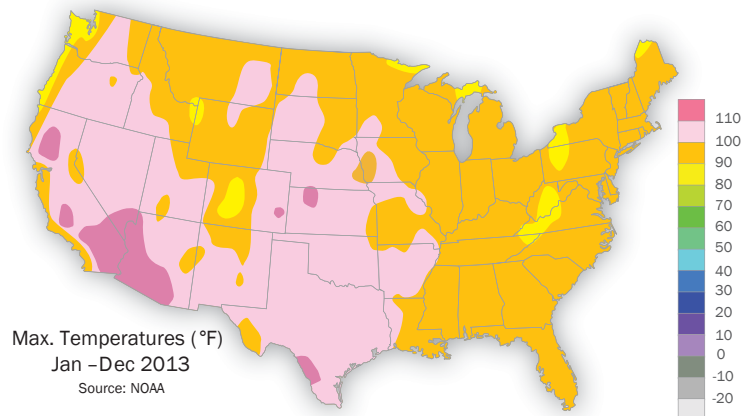
Reliable

Performs reliably in extreme temperature, high dust, outdoor applications

Self-contained cooling runs without refrigerated A/C

The primary cause of VFD failure in outdoor applications is refrigerated A/C failure. The TESCO Endurance™ Drive is a self-cooling system designed specifically to withstand severe heat—without a building or any form of refrigerated A/C — eliminating such common refrigerated A/C failures.

Built to run in harsh environments where temperatures can soar to over 120°



Proven in desert climates

The Endurance Drive chassis has been proven for applications in desert environments, deep mining locations, and oil and gas fields for over 15 years.

The drive runs reliably at normal operating temperatures ranging from 14°F up to 122°F (-10°C to 50° C). The VFD drive section is sealed to protect the electronics from dust—a common problem in outdoor applications.

Low-Profile, Clean Power VFD for Outdoor Applications

Cost Effective

Energy efficient and budget friendly
Best standard warranty

No refrigerated A/C or building required

With no building construction or any form of refrigeration needed, the TESCO Endurance Drive reduces your construction outlay and eliminates provisioning for failure-prone A/C equipment. Blower fans and a heat exchanger are all the cooling it requires.

Energy and operational savings

Operational expenditures are significantly reduced by the elimination of refrigerated A/C. This translates into reduced energy consumption and an increase in the mean time between failures (MTBF). Additionally, the use of its VLP technology increases the efficiency of the TESCO Endurance Drive in some applications.

Most VFD specs do not include A/C in their efficiency ratings—making it a “hidden cost.” The Endurance Drive calculates all necessary cooling factors into its efficiency rating specifications.

5 year warranty—best in the industry

TESCO is so confident in its Endurance Drive quality and performance that we provide a standard 5-year warranty. All repairs are completed by a certified TESCO technician.*

*See product warranty documentation

Time Saving

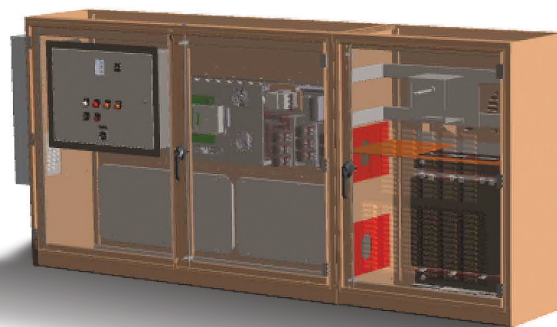
Reduces lead time on projects
No building = faster installation

Timely installation

Your Endurance Drive can be up and running in a fraction of the time needed to complete traditional VFD installations. The Endurance Drive can be installed directly on a housekeeping pad.

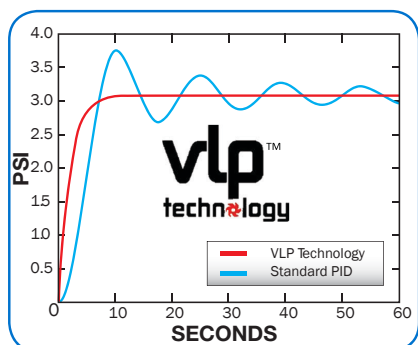
No more construction delays

Waiting for permits, plans, construction crews, and good weather is a thing of the past. The Endurance Drive helps to eliminate the lead time needed to order additional equipment and construct a building—reducing your installation time and providing faster project delivery.



Easy to program and maintain. VLP™ technology makes PID tuning a thing of the past.

The TESCO Endurance Drive combines patented VLP and Endurance technologies for higher drive efficiency.



*VLP™ technology is patented by Toshiba International Corporation.

VLP technology offers many advantages:

- » Setup wizard simplifies setup
- » Algorithm reinvents how users control pressure, temperature, level, and flow
- » Monitors multiple systems
- » Solves problem of load-balancing over multiple drives

VLP setup wizard eliminates PID tuning

- » Five easy steps; complete control in minutes
- » Self-calibrates; eliminates common anomalies in pumps & other devices
- » No overshoot

Aesthetic

Attractive, low-profile enclosure
Blends into most environments



Meets height and aesthetic goals

The TESCO Endurance Drive, available in NEMA 3R or 3RX low-profile enclosures, is suitable for residential applications having strict aesthetic requirements. Its heat exchanger and fan shrouds minimize height profile, staying below most standard fence lines. Five standard colors and custom color availability make it possible for it to blend into the environment.

Eliminates multiple control panels

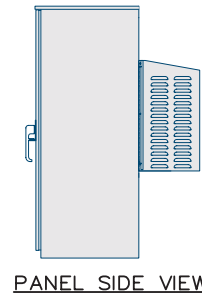
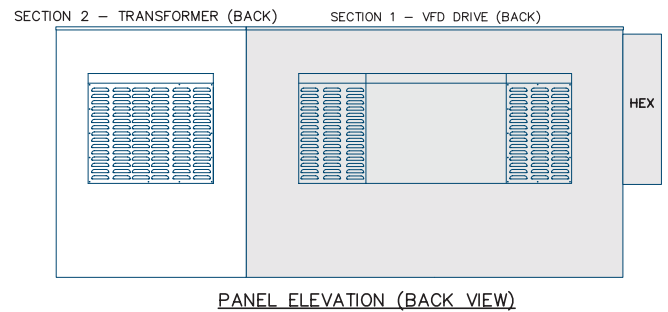
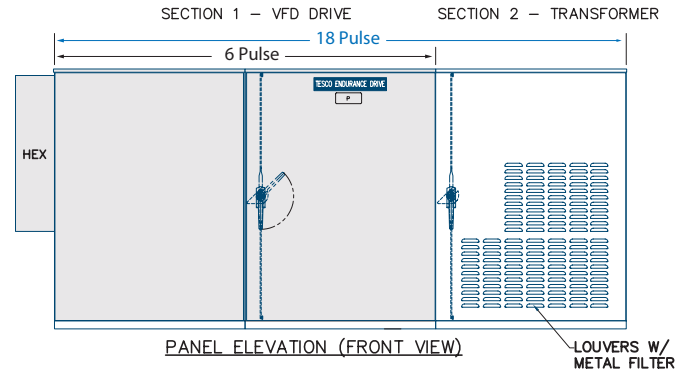
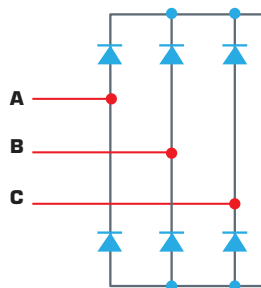
Customer control compartment can eliminate the need for separate control panels. Optional utility metering keeps equipment line-ups consistent, providing a uniform aesthetic solution.

Easier graffiti clean-up

The TESCO offers an optional anti-graffiti finish on its drives to simplify graffiti clean-up.

6 and 18 Pulse Models

TESCO can consult with you to determine which model meets the needs of your application.



DIMENSIONS

Nominal HP (460 V)	60	75	1001	50	200	250	300	400
Full Load Amps (A)	77	96	1241	90	240	302	370	480
6-Pulse	H	60.0 in.						
	W	88.0 in.						
	D	39.0 in.						
18-Pulse	H	60.0 in.						
	W	132.0 in.						
	D	39.0 in.						

CUSTOMIZATION OPTIONS

Material	Colors	Finish	User Controls	Add'l Options
304 - 14ga	ANSI Gray	Standard	Standard	Lock Shroud
316 - 14ga	Ranch Green	Anti-graffiti	Integration Package	Utility Metering
Galvanized 12ga	Hospital White		PLC (L3000)	
	Desert Tan		Custom	
	Autumn White			
	*Custom Color			

*TESCO will match your specific paint requirements. Colors shown are not exact.

TESCO Endurance™ Drive

Model Range	60 to 400 HP
Voltage Rating	380 to 480V

POWER REQUIREMENTS

Input Tolerance	Voltage ±10%; Frequency ±2%
Output Frequency	0 to 299 Hz

CONTROL SPECIFICATIONS

Control Method	Sinusoidal pulse-width modulation (PWM) with VLP Technology
Voltage Regulation	Main circuit voltage feedback control: Automatic, Fixed, & Off
V/Hz Control	Constant torque, variable torque, automatic torque boost, sensorless vector control, 5-point V/Hz custom curve, & PG feedback Vector control
PWM Carrier Frequency	Adjustable 0.5 to 15 kHz (consult factory for drive specific information)
Frequency Setting	Rotary encoder integrated into EOI, 0 to 10 VDC, ±10 VDC, 4 to 20 mA, digital input, binary input, & motorized potentiometer input
Frequency Precision	Analog input ±0.2% of maximum output frequency; discrete/communications input ±0.01% of maximum output frequency
Speed Regulation	Open loop: up to 0.1%; closed loop: up to 0.01%
Main Protective Functions	Overcurrent, overvoltage, inverter overheat, load-side short circuit, ground fault, VFD overload, communications error, autotuning error, emergency stop, undervoltage, overtorque, open-output phase, motor overload, low operating current, option PCB error, & gate array error
Overload Current Rating	100% continuous; 120% for one minute

CONTROL INTERFACE

Digital Input	Eight discrete input terminals programmable to 68 functions
Digital Output	Three discrete output terminals programmable to 64 functions; two form-A contacts, one form-C contact
Analog Input	Three programmable: one 0 to 20 mA or 0 to 10 VDC input, one 0 to 10 VDC input, & one ±10 VDC input
Analog Output	Two programmable: both 4 to 20 mA output
Communication Ports	Half/full duplex RS485/RS232 & TTL port

VLP TECHNOLOGY

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 for user-specified time at VLP minimum
Run External Device	Turns on external booster pumps to support primary pump only when necessary
No-Flow/Low NPSH Cut-Off	Stops pump once loss of water feed or closed output valve has been detected
Sealing Water/Vacuum Priming	Monitors water flow/water level & starts pump once water flows through seal or pump is full of water

CONSTRUCTION

Enclosure	Custom paint; NEMA 3R/NEMA 3RX; free-standing; front-access only
Power Cables	Bottom access for input/motor cables
Cooling	Air cooled; heat sink out the back; heat exchanger
Standards & Compliances	IEEE, UL listed in US & Canada, NEMA, NEC, & American Recovery & Reinvestment Act Compliant (ARRA)

AMBIENT CONDITIONS

Ambient Temperature	14°F to 122°F (-10 to 50°C)
Altitude	4500 ft. above sea level (higher altitude with derating)
Humidity	95% maximum (non-condensing)
Installation	Indoor/outdoor; protect from corrosive gases

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