

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives

Description

The Johnson Controls® VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect drives, powered by Eaton® technology, provide a premier intelligent drive integrated with a reliable bypass configuration. The IntelliDisconnect variable speed drive combines a premier quality drive with a manual motor protector (MMP) and disconnect (no bypass). The IntelliPass bypass is a two- or three-contactor design using the Eaton 24 VDC Series of contactors and power supplies. The features, function, and form allow the drive and bypass to become an integrated design. The IntelliPass drives come standard with an Eaton/Cutler-Hammer® MMP integrated into the drive and bypass design.

Refer to the *VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives Product Bulletin (LIT-12011814)* for important product information.

Features

- Network Connectivity for Drive and Bypass (BACnet®, SA Bus, N2, and LON) — allows for compatibility with current and future Johnson Controls network architecture
- Software Parameters That Utilize Engineering Units Common to the HVAC Industry — allows for quick and easy startup using the onboard startup wizard with engineering units transmitted over a communications bus
- Top and Bottom Removal Conduit Plate — provides access to cabling and components for ease of installation
- Johnson Controls Support That Includes Ordering, Estimating, and Project Management Tools: Advanced Order Management System (AOMS), Advanced Installation Management (AIM) Tools - QuickLIT, Catalog, PRESTO, and STORE — allows users to easily identify and order products
- Closed-Loop Control Programmed with Engineering Units for Specific HVAC Applications: Standard, PID, or multi-pump — provides software parameters using engineering units common to the HVAC industry
- Standard TYPE 12 Keypad on all Drives with Copy and Paste Function; Capable of Monitoring Three Parameters Simultaneously — allows easy transfer of parameter settings from one drive to another drive
- Drive Programming Capability Using Auxiliary 24 V Power Supply (VS-AUX24V) — allows variable speed drive programming (including network communication validation) prior to wiring 3-phase power to the drive

Additional IntelliPass and IntelliDisconnect Features

- Plenum rated
- EMI/RFI Filters standard on all drives
- I/O and communication cards provide plug-and-play functionality
- Serial communication interface that can control both the drive and all bypass features so that the remote operator can fully control the motor whether the motor is operated by the drive or the bypass
- Top and bottom conduit entry for ease of installation
- Copy and paste keypad function that allows you to transfer parameter settings from one drive to another
- Keypad that displays up to nine monitored parameters simultaneously
- Standard TYPE 12 keypad on all drives
- Anti-trip DC bus regulation
- Input surge protection against voltage spikes varistor input
- Onboard RS-485 (BACnet, N2, Modbus®)
- Onboard Ethernet-based communications (BACnet/IP, Modbus/TCP)
- Standard I/O, 6DI, 2AI, 1AO 2 Form C RO (NO/NC), 1 Form A RO (NO)
- Hard-wired external/damper interlock
- Circuit breaker provides flexible drive isolation configurations
- Standard DC link choke for enhanced transient and harmonic distortion protection
- Optional fusing — fuse rating 200 kAIC
- Simplified operating menu allows for typical programming changes
- Accommodates a wide variety of expander boards and adapter boards
- Control logic can be powered from an external auxiliary control panel
- DB chopper standard frames (frame 4 through frame 9) for USA application
 - 1.5 to 40 hp, 2.1 to 52 A, 480 VAC
 - 1 to 20 hp, 4.2 to 54 A, 230 VAC
 - 1 to 20 hp, 4.6 to 60 A, 208 VAC

Additional IntelliPass Only Features

- HAND/OFF/AUTO and DRIVE/BYPASS selector on keypad that simplifies control
- Two power sources for control ensures redundancy and provides additional ride-through capability
- Programmable Automatic Restart Options — choose from disable; automatically transfer to Bypass; reset drive only; or reset drive and, if fails, then transfer to Bypass (IntelliPass only)
- Fully rated, mechanically interlocked contacts



VSD Series II Variable Speed IntelliPass and IntelliDisconnect Drive

- Self-healing power supplies
- Bypass circuit current interrupting rating up to 65 kAIC without fusing
- Fully featured mechanically interlocked bypassing featuring Eaton's XT contactors
- Pre-engineered options to allow for custom configurations
- Robust steel enclosure for simple installation

Repair Information

If the VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives fail to operate within their specifications, contact the nearest Johnson Controls representative.

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Continued)

VSD Series II Enclosed Drives Selection Chart (Frames 4 to 7)

Code Number		V	S				0	0	A	—	0	0	0	0	0
Base Product	VS = Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drive prefix														
Amps/hp/kW	2D1 = 2.1 A, 1 hp, 0.75 kW ¹ 3D4 = 3.4 A, 2 hp, 1.5 kW ¹ 4D2 = 4.2 A, 1 hp, 0.75 kW ² 4D6 = 4.6 A, 1 hp, 0.75 kW ³ 5D6 = 4.8 A, 3 hp, 2.2 kW ¹ 6D8 = 6.8 A, 2 hp, 1.5 kW ² 7D5 = 7.5 A, 2 hp, 1.5 kW ³ 7D6 = 7.6 A, 5 hp, 4 kW ¹ 9D6 = 9.6 A, 3 hp, 2.2 kW ² 011 = 10.6 A, 3 hp, 2.2 kW ³ 011 = 11 A, 7.5 hp, 5.5 kW ¹ 014 = 14 A, 10 hp, 7.5 kW ¹ 016 = 15.2 A, 5 hp, 4 kW ² 017 = 16.7 A, 5 hp, 4 kW ³ 021 = 21 A, 15 hp, 11 kW ¹ 022 = 22 A, 7.5 hp, 5.5 kW ² 025 = 24.2 A, 7.5 hp, 5.5 kW ³ 027 = 27 A, 20 hp, 15 kW ¹ 028 = 28 A, 10 hp, 7.5 kW ² 031 = 30.8 A, 10 hp, 7.5 kW ³ 034 = 34 A, 25 hp, 18.5 kW ¹ 040 = 40 A, 30 hp, 22 kW ¹ 042 = 42 A, 15 hp, 15 kW ² 047 = 46.2 A, 15 hp, 11 kW ³ 052 = 52 A, 40 hp, 30 kW ¹ 054 = 54 A, 20 hp, 15 kW ² 060 = 59.4 A, 20 hp, 15 kW ³ 065 = 65 A, 50 hp, 37 kW ¹ 068 = 68 A, 25 hp, 18.5 kW ² 075 = 74.8 A, 25 hp, 18.5 kW ³ 077 = 77 A, 60 hp, 45 kW ¹ 080 = 80 A, 30 hp, 22 kW ² 088 = 88 A, 30 hp, 22 kW ³ 096 = 96 A, 75 hp, 55 kW ¹ 104 = 104 A, 40 hp, 30 kW ²														
Voltage	1 = 208 V 2 = 230 V 4 = 480 V														
Enclosure Rating	1 = NEMA Type 1 (IP21) 2 = NEMA Type 12 (IP54) ⁴ 3 = NEMA Type 3R (IP22) ⁴														
Drive Style	1 = IntelliPass 2 = IntelliDisconnect														
Revision #	B = Rev. 2 (Americas) D = Rev. 2 (Canada)														
Separator (—)															
Communications	0 = STD (BACnet/Legacy N2/Modbus) S = SA Bus, CS Card (added to JC-VSD)														
Options	00 = None M1 = Manual Bypass Switch, on front door (for frames 4 to 7 IntelliPass that includes L4 option = HMAX Pilot Lights and P6 option = third contactor for drive isolation) P3 = Drive Isolation Fuses, (for frames 4 to 7 IntelliPass and IntelliDisconnect, not available with IntelliPass, P6 option) P4 = Drive Output Contactor (IntelliDisconnect only) P6 = Drive Isolation Contactor includes drive test switch (for frames 4 to 7 IntelliPass, not available with P3 option) P7 = Drive Isolation Fuses and Drive Output Contactor (IntelliDisconnect only) P9 = Both P3 and P6 available only in Type 3R (or larger frame 8 and frame 9 Type 12 boxes) L3 = HMAX Pilot Lights (IntelliDisconnect only) L4 = HMAX Pilot Lights (IntelliPass only)														

1. 480 Volts 3-phase.
2. 230 Volts 3-phase.
3. 208 Volts 3-phase.
4. Contact your local Johnson Controls representative for product availability.

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Continued)

VSD Series II Enclosed Drives Selection Chart (Frames 8 and 9)

Code Number		V	S				0	0	B	—	0	0	0	0	0
Base Product	VS = Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drive prefix														
Amps/hp/kW	114 = 114 A, 40 hp, 30 kW ¹ 124 = 124 A, 100 hp, 75 kW ² 130 = 130 A, 50 hp, 37 kW ³ 143 = 143 A, 50 hp, 37 kW ¹ 154 = 154 A, 60 hp, 45 kW ³ 156 = 156 A, 125 hp, 90 kW ² 169 = 169 A, 50 hp, 45 kW ¹ 180 = 180 A, 150 hp, 110 kW ² 192 = 192 A, 75 hp, 55 kW ³ 211 = 211 A, 75 hp, 55 kW ¹ 240 = 240 A, 200 hp, 132 kW ² 248 = 248 A, 100 hp, 75 kW ³														
Voltage	1 = 208 V 2 = 230 V 4 = 480 V														
Enclosure Rating	1 = NEMA Type 1 (IP21) 2 = NEMA Type 12 (IP54) ⁴ 3 = NEMA Type 3R (IP22) ⁴														
Drive Style	1 = IntelliPass 2 = IntelliDisconnect														
Revision #	B = Rev. 2 (Americas) D = Rev. 2 (Canada)														
Separator (—)															
Communications	0 = STD (BACnet/Legacy N2/Modbus) S = SA Bus, CS Card (added to JC-VSD)														
Options	00 = None M1 = Manual Bypass Switch, on front door (for frames 4 to 7 IntelliPass that includes L4 option = HMAX Pilot Lights and P6 option = third contactor for drive isolation) P3 = Drive Isolation Fuses, (for frames 4 to 7 IntelliPass and IntelliDisconnect, not available with IntelliPass, P6 option) P4 = Drive Output Contactor (IntelliDisconnect only) P6 = Drive Isolation Contactor includes drive test switch (for frames 4 to 7 IntelliPass, not available with P3 option) P7 = Drive Isolation Fuses and Drive Output Contactor (IntelliDisconnect only) P9 = Both P3 and P6 available only in Type 3R (or larger frame 8 and frame 9 Type 12 boxes) L3 = HMAX Pilot Lights (IntelliDisconnect only) L4 = HMAX Pilot Lights (IntelliPass only)														

1. 208 Volts 3-phase.
2. 480 Volts 3-phase.
3. 230 Volts 3-phase.
4. Contact your local Johnson Controls representative for product availability.

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Continued)

Technical Specifications

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Part 1 of 3)

Input Voltage (V_{in})	208, 230, 480 VAC, -10%/+10%
Input Frequency (f_{in})	50/60 Hz (Variation Up to 47-66 Hz)
Connection to Power	Once Per Minute or Less (Typical Operation)
Current Withstand Rating	65 kAIC
Output Voltage	0 to V_{in} Line Voltage In
Continuous Output Current	Ambient Temperature Maximum 104°F (40°C), Overload 1.1 x I_L (1 min./10 min.)
Overload Current	110% (1 min./10 min.)
Initial Output Current	150% for 2 Seconds
Output Frequency	0 to 320 Hz
Frequency Resolution	0.01 Hz
Control Method	Frequency Control (V/f) Open Loop Sensorless Vector Control
Switching Frequency	1 – 310 A adjustable with parameter 2.6.9 Frame 4 – 7: default 6 kHz
Frequency Reference	Analog Input: Resolution 0.1% (10 bit), Accuracy +/-1% Panel Reference: Resolution 0.01 Hz
Field Weakening Point	8 to 320 Hz
Acceleration Time	0.1 to 3,000 s
Deceleration Time	0.1 to 3,000 s
Braking Torque	DC Brake: 30% x T_n (without Brake Option)
Ambient Operating Temperature	14 (No Frost) to 104°F (-10 to 40°C)
Storage Temperature	-40 to 158°F (-40 to 70°C)
Relative Humidity	0 to 95% RH, Noncondensing, Noncorrosive, No Dripping Water
Air Quality	Chemical Vapors: IEC 60721-3-3, Unit In Operation, Class 3C2; Mechanical Particles: IEC 60721-3-3, Unit In Operation, Class 3S2
Altitude	100% Load Capacity (No Derating) Up to 3,280 ft (1,000 m); 1% Derating for Each 328 ft (100 m) Above 3,280 ft (1,000 m); Maximum 9,842 ft (3,000 m)
Vibration	Frame 4 – 7, EN 61800-5-1, EN 60668-2-6; 5 to 150 Hz, Displacement Amplitude 1 mm (Peak) at 5 to 15.8 Hz, Max. Acceleration Amplitude 1 G at 15.8 to 150 Hz
Shock	EN 61800-5-1, EN 60668-2-27 United Parcel Service® (UPS) Drop Test (for Applicable UPS Weights) Storage and Shipping: max. 15 G, 11 ms (in package)
Enclosure Class	NEMA Type 1/IP21 or NEMA Type 12/IP54 (keypad required for IP54/Type 12)
EMC (at default settings)	Immunity: Fulfills all Electromagnetic Compatibility (EMC) Immunity Requirements; Emissions: EN 61800-3 (2004), LEVEL H (EMC C2)
Emissions	EMC Level Dependent: +EMC 2: EN 61800-3 (2004) Category C2, Delivered with Class C2 EMC filtering as Default
Analog Input Voltage	0 to 10 V, R = 200 kOhms Differential Resolution 0.1%; Accuracy ±1%, Dip Switch Selection (Voltage/Current)
Analog Input Current	0 (4) to 20 mA; R_i - 250 Ohms Differential
Digital Inputs (6)	Positive or Negative Logic; 18 to 30 VDC
Auxiliary Voltage	24 V ±10%, Maximum 250 mA
Output Reference Voltage	10 V +3%, Maximum Load 10 mA

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Part 2 of 3)

Analog Output	0 to 10 V, 0 (4) to 20 mA; R_L max. 500 Ohms; Resolution 10 bit; Accuracy ± 2%, Dip Switch Selection (Voltage/Current)
Relay Outputs	3 Programmable, 2 Form C, 1 Form A Relay Outputs Switching Capacity: 24 VDC/8 A, 250 VAC/8 A, 125 VDC/0.4 A
Hard-Wired Jumper	Between Terminal 6 and 10 (Factory Default)
DIP Switch Setting Default	RS485 = Off, A01 = Current, A12 = Current A11 = Voltage
Overcurrent Protection	Yes
Overvoltage Protection	Yes
Undervoltage Protection	Yes
DC Bus Regulation Anti-trip	Yes (Accelerates or Decelerates the Load)
Earth Fault Protection	Yes, in case of earth fault in motor or motor cable, only the frequency converter is protected.
Input Phase Supervision	Yes, trips if any of the input phases are missing.
Motor Phase Supervision	Yes, trips if any of the output phases are missing.
Overtemperature Protection	Yes
Motor Overload Protection	Yes
Motor Stall Protection	Yes
Motor Underload Protection	Yes
Short Circuit Protection	Yes
Surge Protection	Yes (Varistor Input)
Conformed Coated (Varnished) Board	Yes (Prevents Corrosion)
OHSPD Special Seismic Certification Pre-Approval	Yes
Compliance	UL Listed File No 508C, cUL Listed Safety – EN 61800-5-1
Warranty	2 Years Standard Terms; 3 Years with Certified Startup
Reliability	500,000 hours Mean Time Between Failures (MTBF)
Weight	
	FR4 45 lb (20.41 kg)
	FR5 58 lb (26.1 kg)
	FR6 98 lb (44.45 kg)
	FR7 165 lb (74.84 kg)
	FR8 IntelliPass Type 12: 950 lb (430.9 kg) IntelliPass Type 3R: 1,000 lb (453.6 kg) IntelliDisconnect Type 12: 850 lb (385.6 kg) IntelliDisconnect Type 3R: 900 lb (408.2 kg)
	FR9 IntelliPass Type 12: 1,275 lb (578.3 kg) IntelliPass Type 3R: 1,750 lb (793.8 kg) IntelliDisconnect Type 12: 1,175 lb (533 kg) IntelliDisconnect Type 3R: 1,650 lb (748.4 kg)
Voltage/hp/Amps	
	FR4 208 V, 1 to 3 hp, 0.75 to 2.2 kW, 4.6 to 10.6 A 230 V, 1 to 3 hp, 0.75 to 2.2 kW, 4.6 to 9.6 A 480 V, 1 to 7.5 hp, 0.75 to 5.5 kW, 2.1 to 11 A
	FR5 208 V, 5 to 10 hp, 4 to 7.5 kW, 16.7 to 30.8 A 230 V, 5 to 10 hp, 4 to 7.5 kW, 15.2 to 28 A 480 V, 10 to 20 hp, 7.5 to 15 kW, 11 to 21 A

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Continued)

VSD Series II Variable Speed Enclosed IntelliPass and IntelliDisconnect Drives (Part 3 of 3)	
FR6	208 V, 15 to 20 hp, 11 to 15 kW, 46.2 to 59.4 A
	230 V, 15 to 20 hp, 11 to 15 kW, 42 to 54 A
	480 V, 25 to 40 hp, 18.5 to 30 kW, 34 to 52 A
FR7	208 V, 25 to 30 hp, 18.5 to 22 kW, 74.8 to 88 A
	230 V, 25 to 40 hp, 18.5 to 30 kW, 68 to 104 A
	480 V, 50 to 75 hp, 37 to 55 kW, 65 to 96 A
FR8	208 V, 40 to 60 hp, 30 to 45 kW, 114 to 169 A
	230 V, 50 to 75 hp, 37 to 55 kW, 130 to 192 A
	480 V, 100 to 150 hp, 75.6 to 110 kW, 124 to 180 A
FR9	208 V, 75 hp, 55 kW, 211 A
	230 V, 100 hp, 75 kW, 248 A
	480 V, 200 hp, 132 kW, 240 A