Honeywell

SmartVFD HVAC

SPECIFICATION DATA

APPLICATION

The SmartVFD HVAC is a variable frequency drive designed for use in HVAC application to control the speed of HVAC pumps and fans in order to maximize energy efficiency. Smart VFD is also designed to run 3 phase standard and high efficiency induction motors by varying the output voltage and frequency.

The SmartVFD is easy to install, communicates effectively with building control systems to minimize energy consumption.

The SmartVFD BYPASS is easy to specify, select, install and commission. It is the perfect complement to the advanced capabilities of the SmartVFD HVAC. The SmartVFD BYPASS configurations make it easy for you to select the right bypass to complete your drive package. All configuration are available in NEMA 1, NEMA 12 and ventilated NEMA 3R.

FEATURES

Easy Communication

- **Start-up Wizards—All you have to do is tell the VFD whether you have a pump or a fan, enter nominal motor information, and you are up and running**
- **Graphic Interface—The easy-to-use keypad and interface deliver menu-driven programming and monitoring for fast, uniform commissioning. It's also easy for the building owner or manager to learn and use, helping to reduce service calls. Plus, a manual is built into the keypad for easy access when needed.**
- **Built-In Communications—With BACnet®, N2 and Modbus built in, your customers will enjoy a lower total installed cost and reliable communications with the building management system.**
- **PC Software Wizards—Commissioning, programming and troubleshooting are all a snap thanks to these guided Startup and PID wizards.**
- **Built-In PLC—Another reason why SmartVFD HVAC is a great value for your customers, the built-in PLC eliminates the need for an expensive external controller.**

Built-in Protection

- **5% DC Choke for harmonic protection.**
- **Standard RFI Filter—Ensures that EMC/RFI requirements are met.**
- **Fire Mode for safe operation.**
- **Enclosure classes NEMA 1, NEMA 12 or NEMA 3R**
- **Bypass Options—Meet specifications and system critical applications with a comprehensive bypass offering.**
- **Motor Switch Ride-Through—Easy, fault-free maintenance.**
- **Overvoltage trip and undervoltage trip protection**
- **Ground fault protection**
- **Mains and motor phase supervisions**
- **Overcurrent and unit overtemperature protection**
- **Motor overload, motor stall and motor underload protection**
- **Short-circuit protection of +24V and +10V reference voltage**

Smart Technology

- **6-pulse IGBT, PWM technology**
- **Intelligent cooling arrangement. Control and power airflow separated.**
- **Real-Time Clock—Battery included**
- **98% Displacement Power Factor Rating**
- **98.5% Efficiency at full load**
- **0-320Hz output frequency capabilities**

Compliance

- **100KA SCCR (Short Circuit Current Requirement) compliant (except for some HP).**
- **EMC harmonics: EN 61000-3-12 compliant.**
- **EMC radio frequencies: EN 61800-3 Category C2 built in. Complies with radiated and conducted emissions.**
- **RoHS compliant, no electrolytic capacitors, no lead in the circuit boards.**
- **American Recovery and Reinvestment Act (ARRA).**

63-4520-08

Table 1. General.

Communication	RS485	Standard: Modbus™ RTU, BACnet, N2
	Ethernet	Standard: Modbus/TCP, BACnet/IP
Software features	Energy-saving functions	• Real-time clock for timed functions • Energy monitor for kWh monitoring • Sleep function to minimize downtime energy
	Protections	• Overload and underload protections (e.g. broken fan and dry pump) • Motor thermal protection • Missing phase detection • Automatic reset to avoid interruption of the process
Process control	2 * PID	For process control
	Multipump	For replacing the pump controller
	Flying start	For tripless catching of spinning fan
Human interfaces	Keypad	Graphical display with built-in manual and wizards.
	PC Tools	• PC Commissioning Tool for easy commissioning, monitoring, and troubleshooting. • Energy Savings calculator to estimate cost avoidance. • Product selection tool for selecting VFD and bypass, and creating submittal documents.

Table 2. I/O Connections.

Basic I/O Board		
Terminal		**Signal**
1	+10	Reference output
2	AI1+	Analogue input, voltage or current
3	AI1-	Analogue input common (current)
4	AI2+	Analogue input, voltage or current
5	AI2-	Analogue input common (current)
6	24	24 V aux. voltage
7	GND	I/O ground
8	DI1	Digital input 1
9	DI2	Digital input 2
10	DI3	Digital input 3
11	CM	Common A for DI1-DI6
12	24	24 V aux. voltage
13	GND	I/O ground
14	DI4	Digital input 4
15	DI5	Digital input 5
16	DI6	Digital input 6
17	CM	Common A for DI1-DI6

Table 2. I/O Connections. (Continued)

Basic I/O Board		
Terminal		**Signal**
18	AO1+	Analogue signal (+output)
19	AO-/ GND	Analogue output common
30	+24	24 V auxiliary input voltage
A	RS485	Differential receiver/transmitter
B	RS485	Differential receiver/transmitter

Table 3. I/O Connections, Relay Board 2.

Relay Board 2		
Terminal		**Signal**
21	Relay output 1*	Switching capacity24VDC/8A 250VAC/8A 125VDC/0.4A Min.switching load5V/10mA
22		
23		
24	Relay output 2*	Switching capacity24VDC/8A 250VAC/8A 125VDC/0.4A Min.switching load5V/10mA
25		
26		
28	Thermistor input	Rtrip = 4.7 kΩ (PTC); Measuring voltage 3.5V
29		

SmartVFD BYPASS Features

The Smart VFD BYPASS is available in 5 configurations as explained below. All configurations are available in NEMA 1, NEMA 12 and ventilated NEMA 3R.

SmartVFD Disconnect:
Fused Disconnect with no bypass

SmartVFD 2-Contactor:
Provides an economical means of bypassing the VFD.
- No Main Disconnect
- Freeze/Fire/Smoke Interlock

SmartVFD 3-Contactor:
Commission, service or replace the VFD without affecting the operation of the motor. Provide additional bypass control capabilities with Auto-bypass and HOA options.
- Fused Disconnect
- Freeze/Fire/Smoke Interlock
- VFD can be isolated from power with motor running in BYPASS mode
- TEST position powers the VFD without sending power to the motor

SmartVFD 3-Contactor Options:
AUTO-BYPASS
- Any VFD fault will automatically send the bypass to BYPASS mode
- A contact closure sends the bypass to BYPASS mode
- Dry contacts indicate when the bypass is in BYPASS mode, alerting the building management system.

Table 4. SmartVFD HVAC Technical Specifications.

Mains connection	Input voltage U_{in}	208...240V; 380…480V; -10%…+10%
	Input frequency	47…66 Hz
	Connection to mains	Once per minute or less
	Starting delay	4 s (Frame4 to Frame6); 6 s (Frame7 to Frame9)
Motor connection	Output voltage	0-U_{in}
	Continuous output current	I_L:Ambient temperature max. +104°F, overload 1.1 x I_L (1 min./10 min.)
	Starting current	I_S for 2 s every 20 s
	Output frequency	0…320 Hz (standard)
	Frequency resolution	0.01 Hz
Control characteristics	Switching frequency (see parameter M3.1.2.1)	1.5…10 kHz; Defaults: 6 kHz (Frame4-6), 4 kHz (Frame7), 3 kHz (Frame8-9) Automatic switching frequency derating in case of overheating.
	Frequency reference Analogue input Panel reference	 Resolution 0.1% (10-bit), accuracy ±1% Resolution 0.01 Hz
	Field weakening point	8…320 Hz
	Acceleration time	0.1…3000 sec
	Deceleration time	0.1…3000 sec
Ambient conditions	Ambient operating temperature	Frame4-Frame9: I_L: 14°F (no frost)…+104°F
	Storage temperature	-40°F…+158°F
	Relative humidity	0 to 95% R_H, non-condensing, non-corrosive
	Air quality: chemical vapors mechanical particles	 IEC 60721-3-3, unit in operation, class 3C2 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) Max. altitudes: **208...240V**: 14,764 ft. (4,500 m) (TN and IT systems) **380...480V**: 9,842 ft. (TN and IT systems)
	Vibration EN61800-5-1/ EN60068-2-6	5…150 Hz **Displacement amplitude** 1 mm (peak) at 5…15.8 Hz (Frame4…Frame9) **Max acceleration amplitude** 1 G at 15.8…150 Hz (Frame4…Frame9)
	Shock EN61800-5-1 EN60068-2-27	UPS Drop Test (for applicable UPS weights) Storage and shipping: max 15 G, 11 ms (in package)
	Enclosure class	IP21/NEMA 1 standard in entire kW/HP range IP54/NEMA12 option Notel Keypad required for IP54/NEMA12
EMC (at default settings)	Immunity	Fulfils EN61800-3 (2004), first and second environment
	Emissions	Depend on EMC level. +EMC2: EN61800-3 (2004), Category C2 Honeywell Smart VFD HVAC will be delivered with class C2 EMC filtering, if not otherwise specified. Honeywell Smart VFD HVAC can be modified for IT-networks.
Emissions	Average noise level (cooling fan) sound power level in dB(A)	Frame4: 65 Frame7: 77 Frame5: 70 Frame8: 86 Frame6: 77 Frame9: 87
Safety		EN 61800-5-1 (2007), CE, cUL; (see unit nameplate for more detailed approvals)

Table 4. SmartVFD HVAC Technical Specifications. (Continued)

Protections	Overvoltage trip limit Undervoltage trip limit	Yes Yes
	Ground fault protection	In case of ground fault in motor or motor cable, only the drive is protected.
	Mains supervision	Yes
	Motor phase supervision	Trips if any of the output phases is missing.
	Overcurrent protection	Yes
	Unit overtemperature protection	Yes
	Motor overload protection	Yes
	Motor stall protection	Yes
	Motor underload protection	Yes
	Short-circuit protection of +24V and +10V reference voltages	Yes

Table 5. Product Nomenclature.

HVFDSD	3	C	0100	G	1	0	0

Options
0 = Drive Only or No Special Options
1 = Auto-Bypass

Contactors
0 = Drive Only
1 = Disconnect Only
2 = Two Contactor Bypass
3 = Three Contactor Bypass

Enclosure Type
1 = NEMA 1
2 = NEMA 12
3 = NEMA 3R

Interface
T = Text KeyPad
G = Graphic KeyPad

Nominal Horsepower
0007 = .75 Horse Power
0010 = 1 Horse Power
0100 = 10 Horse Power

Nominal Voltage
A = 208/230 Vac Drive Alone, 208 Vac Bypass
B = 230 Vac Bypass
C = 480 Vac
D = 575 Vac

Input Phase
3 = Three Phase (3~in, 3~out)

Product Family
HVFDSD = Honeywell SmartVFD HVAC
HVFDSB = Honeywell SmartVFD BYPASS or DISC Only

Table 6. VFD Only, 460 Vac.

HP	NEMA 1	NEMA 12	Frame Size	Current (A)	Overall Dimensions			
					Width (in.)	Height (in.)	Depth (in.)	Weight (lb)
1.5	HVFDSD3C0015G100	HVFDSD3C0015G200	4	3.4	5	12.9	7.5	13
2	HVFDSD3C0020G100	HVFDSD3C0020G200	4	4.8	5	12.9	7.5	13
3	HVFDSD3C0030G100	HVFDSD3C0030G200	4	5.6	5	12.9	7.5	13
5	HVFDSD3C0050G100	HVFDSD3C0050G200	4	8	5	12.9	7.5	13
7.5	HVFDSD3C0075G100	HVFDSD3C0075G200	4	12	5	12.9	7.5	13
10	HVFDSD3C0100G100	HVFDSD3C0100G200	5	16	5.7	16.5	8.4	22
15	HVFDSD3C0150G100	HVFDSD3C0150G200	5	23	5.7	16.5	8.4	22
20	HVFDSD3C0200G100	HVFDSD3C0200G200	5	31	5.7	16.5	8.4	22
25	HVFDSD3C0250G100	HVFDSD3C0250G200	6	38	7.7	21.9	9	44
30	HVFDSD3C0300G100	HVFDSD3C0300G200	6	46	7.7	21.9	9	44
40	HVFDSD3C0400G100	HVFDSD3C0400G200	6	61	7.7	21.9	9	44
50	HVFDSD3C0500G100	HVFDSD3C0500G200	7	72	9.3	25.4	10.2	83
60	HVFDSD3C0600G100	HVFDSD3C0600G200	7	87	9.3	25.4	10.2	83
75	HVFDSD3C0750G100	HVFDSD3C0750G200	7	105	9.3	25.4	10.2	83
100	HVFDSD3C1000G100	HVFDSD3C1000G200	8	140	11.4	38	13.5	154
125	HVFDSD3C1250G100	HVFDSD3C1250G200	8	170	11.4	38	13.5	154
150	HVFDSD3C1500G100	HVFDSD3C1500G200	8	205	11.4	38	13.5	154
200	HVFDSD3C2000G100	HVFDSD3C2000G200	9	261	18.9	45.3	14.4	238
220	HVFDSD3C2500G100	HVFDSD3C2500G200	9	310	18.9	45.3	14.4	238

Table 7. NEMA 1 VFD and 3-Contactor Bypass with Fused Disconnect, 460 Vac.[a]

HP	3-Contactor BYPASS w/ Fused Disconnect	3-Contactor BYPASS w/ Fused Disconnect & Auto-Bypass	Frame Size	Current (A)	Overall Dimensions			
					Width (in.)	Height (in.)	Depth (in.)	Weight (lb)
1.5	HVFDSB3C0015G130	HVFDSB3C0015G131	4	3.4	8.9	38.7	10.7	44
2	HVFDSB3C0020G130	HVFDSB3C0020G131	4	4.8	8.9	38.7	10.7	44
3	HVFDSB3C0030G130	HVFDSB3C0030G131	4	5.6	8.9	38.7	10.7	44
5	HVFDSB3C0050G130	HVFDSB3C0050G131	4	8	8.9	38.7	10.7	44
7.5	HVFDSB3C0075G130	HVFDSB3C0075G131	4	12	8.9	38.7	10.7	44
10	HVFDSB3C0100G130	HVFDSB3C0100G131	5	16	8.9	41.5	10.7	55
15	HVFDSB3C0150G130	HVFDSB3C0150G131	5	23	8.9	41.5	10.7	55
20	HVFDSB3C0200G130	HVFDSB3C0200G131	5	31	8.9	41.5	10.7	55
25	HVFDSB3C0250G130	HVFDSB3C0250G131	6	38	12.4	55	12.6	96
30	HVFDSB3C0300G130	HVFDSB3C0300G131	6	46	12.4	55	12.6	96
40	HVFDSB3C0400G130	HVFDSB3C0400G131	6	61	12.4	55	12.6	96
50	HVFDSB3C0500G130	HVFDSB3C0500G131	7	72	21	59	12	145
60	HVFDSB3C0600G130	HVFDSB3C0600G131	7	87	21	59	12	145
75	HVFDSB3C0750G130	HVFDSB3C0750G131	7	105	21	59	12	145
100	HVFDSB3C1000G130	HVFDSD3C1000G131	8	140	25	70	16.2	285*
125	HVFDSB3C1250G130	HVFDSD3C1250G131	8	170	25	70	16.2	285*
150	HVFDSB3C1500G130	HVFDSD3C1500G131	8	205	25	70	16.2	285*

[a] * = approximate weight

Table 8. NEMA 1 VFD and 2-Contactor Bypass or Fused Disconnect, 460 Vac.

HP	Disconnect Only No Bypass	2-Contactor Bypass No Disconnect	Frame Size	Current (A)	Overall Dimensions			
					Width (in.)	Height (in.)	Depth (in.)	Weight (lb)
1.5	HVFDSB3C0015G110	HVFDSB3C0015G120	4	3.4	8.9	31.7	10.7	38
2	HVFDSB3C0020G110	HVFDSB3C0020G120	4	4.8	8.9	31.7	10.7	38
3	HVFDSB3C0030G110	HVFDSB3C0030G120	4	5.6	8.9	31.7	10.7	38
5	HVFDSB3C0050G110	HVFDSB3C0050G120	4	8	8.9	31.7	10.7	38
7.5	HVFDSB3C0075G110	HVFDSB3C0075G120	4	12	8.9	31.7	10.7	38
10	HVFDSB3C0100G110	HVFDSB3C0100G120	5	16	8.9	34.5	10.7	48
15	HVFDSB3C0150G110	HVFDSB3C0150G120	5	23	8.9	34.5	10.7	48
20	HVFDSB3C0200G110	HVFDSB3C0200G120	5	31	8.9	34.5	10.7	48
25	HVFDSB3C0250G110	HVFDSB3C0250G120	6	38	12.4	45	12.6	85
30	HVFDSB3C0300G110	HVFDSB3C0300G120	6	46	12.4	45	12.6	85
40	HVFDSB3C0400G110	HVFDSB3C0400G120	6	61	12.4	45	12.6	85
50	HVFDSB3C0500G110	HVFDSB3C0500G120	7	72	21	51.5	12	130
60	HVFDSB3C0600G110	HVFDSB3C0600G120	7	87	21	51.5	12	130
75	HVFDSB3C0750G110	HVFDSB3C0750G120	7	105	21	51.5	12	130
100	HVFDSB3C1000G110	HVFDSD3C1000G120	8	140	25	60	16.2	214
125	HVFDSB3C1250G110	HVFDSD3C1250G120	8	170	25	60	16.2	214
150	HVFDSB3C1500G110	HVFDSD3C1500G120	8	205	25	60	16.2	214

Table 9. VFD Only, 208/230 Vac.

HP	NEMA 1	NEMA 12	Frame Size	Current (A)	Overall Dimensions			
					Width (in)	Height (in)	Depth (in)	Weight (lb)
0.75	HVFDSD3A0007G100	HVFDSD3A0007G200	4	3.7	5	12.9	7.5	13
1	HVFDSD3A0010G100	HVFDSD3A0010G200	4	4.8	5	12.9	7.5	13
1.5	HVFDSD3A0015G100	HVFDSD3A0015G200	4	6.6	5	12.9	7.5	13
2	HVFDSD3A0020G100	HVFDSD3A0020G200	4	8	5	12.9	7.5	13
3	HVFDSD3A0030G100	HVFDSD3A0030G200	4	11	5	12.9	7.5	13
5	HVFDSD3A0050G100	HVFDSD3A0050G200	5	18	5.7	16.5	8.4	22
7.5	HVFDSD3A0075G100	HVFDSD3A0075G200	5	24	5.7	16.5	8.4	22
10	HVFDSD3A0100G100	HVFDSD3A0100G200	5	31	5.7	16.5	8.4	22
15	HVFDSD3A0150G100	HVFDSD3A0150G200	6	48	7.7	21.9	9	44
20	HVFDSD3A0200G100	HVFDSD3A0200G200	6	62	7.7	21.9	9	44
25	HVFDSD3A0250G100	HVFDSD3A0250G200	7	75	9.3	25.4	10.2	83
30	HVFDSD3A0300G100	HVFDSD3A0300G200	7	88	9.3	25.4	10.2	83
40	HVFDSD3A0400G100	HVFDSD3A0400G200	7	105	9.3	25.4	10.2	83
50	HVFDSD3A0500G100	HVFDSD3A0500G200	8	140	11.4	38	13.5	154
60	HVFDSD3A0600G100	HVFDSD3A0600G200	8	170	11.4	38	13.5	154
75	HVFDSD3A0750G100	HVFDSD3A0750G200	8	205	11.4	38	13.5	154
100	HVFDSD3A1000G100	HVFDSD3A1000G200	9	261	18.9	45.3	14.4	238
125	HVFDSD3A1250G100	HVFDSD3A1250G200	9	310	18.9	45.3	14.4	238

Table 10. NEMA 1 VFD and 3-Contactor Bypass with Fused Disconnect, 208Vac.*

HP	3-Contactor BYPASS w/ Fused Disconnect	3-Contactor BYPASS w/ Fused Disconnect & Auto-Bypass	Frame Size	Current (A)	Overall Dimensions			
					Width (in)	Height (in)	Depth (in)	Weight (lb)
0.75	HVFDSB3A0007G130	HVFDSB3A0007G131	4	3.7	8.9	38.7	10.7	44
1	HVFDSB3A0010G130	HVFDSB3A0010G131	4	4.8	8.9	38.7	10.7	44
1.5	HVFDSB3A0015G130	HVFDSB3A0015G131	4	6.6	8.9	38.7	10.7	44
2	HVFDSB3A0020G130	HVFDSB3A0020G131	4	8	8.9	38.7	10.7	44
3	HVFDSB3A0030G130	HVFDSB3A0030G131	4	11	8.9	41.5	10.7	55
5	HVFDSB3A0050G130	HVFDSB3A0050G131	5	18	12.4	55	12.6	96
7.5	HVFDSB3A0075G130	HVFDSB3A0075G131	5	24	12.4	55	12.6	96
10	HVFDSB3A0100G130	HVFDSB3A0100G131	5	31	21	59	12	145
15	HVFDSB3A0150G130	HVFDSB3A0150G131	6	48	21	59	12	145
20	HVFDSB3A0200G130	HVFDSB3A0200G131	6	62	21	59	12	145
25	HVFDSB3A0250G130	HVFDSB3A0250G131	7	75	21	59	12	145
30	HVFDSB3A0300G130	HVFDSB3A0300G131	7	88	21	59	12	145
40	HVFDSB3A0400G130	HVFDSB3A0400G131	7	105	21	59	12	145
50	HVFDSB3A0500G130	HVFDSB3A0500G131	8	140	25	70	16.2	285
60	HVFDSB3A0600G130	HVFDSB3A0600G131	8	170	25	70	16.2	285
75	HVFDSB3A0750G130	HVFDSB3A0750G131	8	205	25	70	16.2	285

* 230VAC same Information but with a “3B” in the part number, in place of a “3A.”

Table 11. NEMA 1 VFD and 2-Contactor Bypass or Fused Disconnect, 208Vac.*

HP	Disconnect Only No Bypass	2-Contactor Bypass No Disconnect	Frame Size	Current (A)	Overall Dimensions			
					Width (in)	Height (in)	Depth (in)	Weight (lb)
0.75	HVFDSB3A0007G110	HVFDSB3A0007G120	4	3.7	8.9	31.7	10.7	38
1	HVFDSB3A0010G110	HVFDSB3A0010G120	4	4.8	8.9	31.7	10.7	38
1.5	HVFDSB3A0015G110	HVFDSB3A0015G120	4	6.6	8.9	31.7	10.7	38
2	HVFDSB3A0020G110	HVFDSB3A0020G120	4	8	8.9	31.7	10.7	38
3	HVFDSB3A0030G110	HVFDSB3A0030G120	5	11	8.9	34.5	10.7	48
5	HVFDSB3A0050G110	HVFDSB3A0050G120	5	18	12.4	45	12.6	85
7.5	HVFDSB3A0075G110	HVFDSB3A0075G120	5	24	12.4	45	12.6	85
10	HVFDSB3A0100G110	HVFDSB3A0100G120	6	31	12.4	45	12.6	85
15	HVFDSB3A0150G110	HVFDSB3A0150G120	6	48	21	51.5	12	130
20	HVFDSB3A0200G110	HVFDSB3A0200G120	6	62	21	51.5	12	130
25	HVFDSB3A0250G110	HVFDSB3A0250G120	7	75	21	51.5	12	130
30	HVFDSB3A0300G110	HVFDSB3A0300G120	7	88	21	51.5	12	130
40	HVFDSB3A0400G110	HVFDSB3A0400G120	7	105	21	51.5	12	130
50	HVFDSB3A0500G110	HVFDSB3A0500G120	8	140	25	60	16.2	214
60	HVFDSB3A0600G110	HVFDSB3A0600G120	8	170	25	60	16.2	214
75	HVFDSB3A0750G110	HVFDSB3A0750G120	8	205	25	60	16.2	214

* 230VAC same Information, but with a “3B” in the part number, in place of a “3A.”

Automation and Control Solutions

Honeywell International Inc.

1985 Douglas Drive North

Golden Valley, MN 55422

customer.honeywell.com

Honeywell

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