

# 3G SMARTVFD

## VARIABLE FREQUENCY DRIVES

The 3G SmartVFD is the 3rd generation of SmartVFD variable frequency drives designed specifically for use in HVAC applications. Designed to control any HVAC pump or fan application to maximize system reliability and energy efficiency. SmartVFD will efficiently operate 3-phase induction, permanent magnet, and high-efficiency synchronous reluctance motors.

The 3G SmartVFD is easy to install, communicates effectively with building control systems to minimize energy consumption.



### FEATURES AND BENEFITS

#### EASY COMMUNICATION

- Start-up Wizards - SmartStart and Automatic Motor Adaptation make commissioning easy for all motor types, enter nominal information and let the drive measure motor characteristics to optimize performance.
- Graphic Interface - Using the graphical keypad makes navigating parameters easy. INFO key provides easy access to help information in the onboard manual. BACK and OK buttons simplify programming.
- Embedded Communications - Standard BACnet, Modbus, FLN and N2 allow monitoring and control of serial communications, reducing installation cost.
- Dedicated for HVAC - The 3G SmartVFD includes intelligent functions for pumps fans and compressors.
- Built-in logic - Smart logic controller and four auto-tuning PID controllers can control HVAC functions reducing the need for control tasks in the building management system.

#### BUILT-IN PROTECTION

- DC-link reactor ensures low harmonic disturbance of the power supply
- Fire override mode for continued operation for essential services
- Enclosure classes NEMA 1 or NEMA 12
- 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
- Back-channel cooling directly exhausts up to 90% of heat losses
- Real-Time Clock
- >98% Displacement Power Factor Rating
- 98% Efficiency at full load
- 0-590Hz output frequency capabilities

#### COMPLIANCE

- 100KA SCCR (Short-Circuit Current Rating) compliant
- EN 61000-3-12 compliant
- EN 61800-3 Category C1, C2 and C3
- RoHS compliant

# PRODUCT SPECIFICATION

## POWER CHARACTERISTICS

LINE POWER SUPPLY (L1, L2, L3)	
Supply Voltage	<b>Nominal 208/230 V AC:</b> 200 to 240 V AC $\pm$ 10% <b>Nominal 460 V AC:</b> 380 to 480 V AC $\pm$ 10% <b>Nominal 600 V AC:</b> 525 to 600 V AC $\pm$ 10% (Frame A, B, C), 525 to 690 V AC $\pm$ 10% (Frame D)
Supply Frequency	50/60 Hz $\pm$ 5%
True Power Factor ( $\lambda$ )	$\geq$ 0.9 nominal at rated load
Displacement power factor ( $\cos \phi$ )	Near unity ( $>$ 0.98)
Switching on input supply L1, L2, L3	<b>Frame A, B, C:</b> up to 10 HP maximum 2 times/min, greater than 10 HP maximum 1 time/min <b>Frame D:</b> maximum 1 time/2 min
Environment according to EN60664-1	Overvoltage category III/pollution degree 2

MOTOR OUTPUT (U, V, W)	
Output voltage	0-100% of supply voltage
Output frequency	0-590 Hz
Switching on output	Unlimited
Ramp times	1-3600 s

## AMBIENT ENVIRONMENT

OPERATING ENVIRONMENT	
Ambient temperature	Max 122°F [50°C] (24-hour average maximum 113°F [45°C])
Minimum ambient temperature during full-scale operation	32°F [0°C]
Minimum ambient temperature at reduced performance	14°F [-10°C]
Temperature during storage/transport	-13°+149/158°F [-25-+65/70°C]
Max. relative Humidity	5%-93% (IEC 721-3-3; Class 3K3 (noncondensing) during operation)
Maximum altitude above sea level without derating	3,300 ft [1000 m]
Vibration Test	1.0 g
Enclosure Ratings NEMA1/IP21 (All Frame Sizes)	NEMA12/IP55 (Frame A, B, C) NEMA12/IP54 (Frame D)
Aggressive environment (IEC 60068-2-43) H2S test	class Kd
EMC Standards, Emission	EN 61800-3
EMC standards, Immunity	EN 61800-3

## I/O CHARACTERISTICS

DIGITAL INPUTS	
Programmable digital inputs	4 fixed DI, 2 configurable DIO (6) total
Terminal number	18, 19, 27, 29, 32, 33
Logic	PNP or NPN
Voltage level	0-24 V DC
Voltage level, logic '0' PNP	$<$ 5 V DC
Voltage level, logic '1' PNP	$>$ 10 V DC
Voltage level, logic '0' NPN	$>$ 19 V DC
Voltage level, logic '1' NPN	$<$ 14 V DC
Maximum voltage on input	28 V DC
Input resistance, Ri	Approx. 4 k $\Omega$

**ANALOG INPUTS**

Number of analog inputs	2
Terminal number	53, 54
Modes	Voltage or current
Mode select	<b>Frame A, B, C:</b> Switch S201 and switch S202 <b>Frame D:</b> Switch A53 and A54
Voltage mode	Switch = OFF (U)
Voltage level	-10 to +10 V (scalable)
Input resistance, Ri	Approximately 10 k $\Omega$
Max. voltage	$\pm 20$ V
Current mode	Switch = ON (i)
Current level	0/4 to 20 mA (scalable)
Input resistance, Ri	Approximately 200 $\Omega$
Max. current	30 mA
Resolution for analog inputs	10 bit (+ sign)
Accuracy of analog inputs	Max. error 0.5% of full scale
Bandwidth	100 Hz

**PULSE INPUTS**

Programmable pulse	2
Terminal number pulse	29, 33
Max. Frequency at terminal 29, 33	110 kHz (pushpull driven)
Max. Frequency at terminal 29, 33	5 kHz (open collector)
Max. Frequency at terminal 29, 33	4 Hz
Voltage level	See digital inputs
Maximum voltage on input	28 V DC
Input resistance, Ri	Approx. 4 k $\Omega$
Pulse input accuracy (0.1-1 kHz)	Max. error: 0.1% of full scale

**ANALOG OUTPUTS**

Number of programmable analog outputs	1
Terminal number	42
Current range at analog output	0/4-20 mA
Max. load GND - analog output	500 $\Omega$
Accuracy on analog output	<b>Frame A, B, C:</b> Max. error: 0.5% of full scale <b>Frame D:</b> Max. error: 0.8% of full scale
Resolution on analog output	8 bit

**DIGITAL OUTPUT**

Programmable digital/pulse outputs	2 configurable DIO
Terminal number	27, 29
Voltage level at digital/frequency output	0-24 V
Max. output current (sink or source)	40 mA
Max. load at frequency output	1 k $\Omega$
Max. capacitive load at frequency output	10 nF
Minimum output frequency at frequency output	0 Hz
Maximum output frequency at frequency output	32 kHz
Accuracy of frequency output	Max. error: 0.1% of full scale
Resolution of frequency outputs	12 bit

RELAY OUTPUTS	
Programmable relay outputs	2
Environment according to EN 60664-1	Overvoltage category III/pollution degree 2
Relay O1 (Frame A, B, C)	
Terminal number	1-2 (NO), 1-3 (NC)
Maximum terminal load, 1-2 (NO) and 1-3 (NC)	240 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ $\cos\phi$ 0.4 60 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive
Minimum terminal load, 1-2 (NO) and 1-3 (NC)	24 V DC, 10 mA 24 V AC, 2 mA
Relay O1 (Frame D)	
Terminal number	1-2 (NO), 1-3 (NC)
Maximum terminal load, 1-2 (NO)	400 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ $\cos\phi$ 0.4 80 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive
Maximum terminal load, 1-3 (NC)	240 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ $\cos\phi$ 0.4 60 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive
Minimum terminal load, 1-2 (NO) and 1-3 (NC)	24 V DC, 10 mA 24 V AC, 2 mA
Relay O2 (All Frame Sizes)	
Terminal number	4-5 (NO), 4-6 (NC)
Maximum terminal load, 4-5 (NO)	400 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ $\cos\phi$ 0.4 80 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive
Maximum terminal load, 4-6 (NC)	240 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ $\cos\phi$ 0.4 60 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive
Minimum terminal load, 4-5 (NO) and 4-6 (NC)	24 V DC, 10 mA 24 V AC, 2 mA

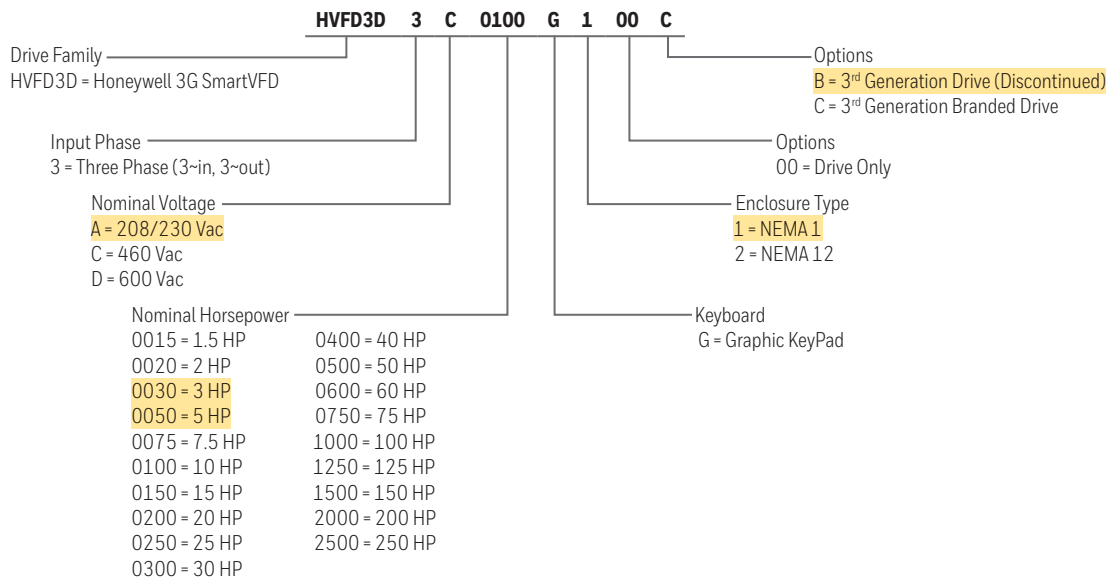
CONTROL CARD	
RS-485 serial communication	
Terminal number 68	(P, TX+, RX+), 69 (N, TX-, RX-)
Terminal number 61	Common for terminals 68 and 69
24 V DC output	
Terminal number	12, 13
Output voltage	24 V $\pm$ 1, -3 V
Max. load	200 mA
10 V DC output	
Terminal number	50
Output voltage	10.5 V $\pm$ 0.5 V
Max. load	15 mA
USB serial communication	
USB standard	1.1 (full speed)
USB plug	USB type B device plug

CONTROL CHARACTERISTICS	
Resolution of output frequency at 0-590 Hz	$\pm$ 0.003 Hz
Repeat accuracy of Precise start/stop (terminals 18, 19)	$\leq$ $\pm$ 0.1 ms
System response time (terminals 18, 19, 27, 29, 32, 33)	$\leq$ 2 ms
Speed control range (open-loop)	1:100 of synchronous speed
Speed accuracy (open-loop)	30-4000 rpm: error $\pm$ 8 rpm

## TERMINAL ASSIGNMENTS

TERMINAL	LABEL	DESCRIPTION
24 V DC	12	24 V DC supply voltage for digital inputs and external 13 transducers. Maximum output current 200 mA for all 24 V loads.
	13	
DI	18	Digital Inputs.
DI	19	
DIO	27	For digital input or output. Default setting is input.
DIO	29	
DI	32	Digital Inputs.
DI	33	
DI COM	20	Common for digital inputs and 0 V potential for 24 V DC supply.
AO COM	39	Common for analog output.
AO	42	Programmable analog output. 0-20 mA or 4-20 mA at a maximum of 500 $\Omega$
10 V DC	50	10 V DC analog supply voltage for potentiometer or thermistor. 15 mA maximum.
AI	53	Analog Input. For voltage or current. Switches A53 and A54 select mA or V.
AI	54	
AI COM	55	Common for analog input.
	61	Integrated RC filter for cable shield. ONLY for connecting the shield in the event of EMC problems.
RS-485 (+)	68	RS-485 Interface. A control card switch is provided for termination resistance.
RS-485 (-)	69	
RO1 (C)	01	Form C relay output. For AC or DC voltage and resistive or inductive loads.
RO1 (NO)	02	
RO1 (NC)	03	
RO2 (C)	04	
RO2 (NO)	05	
RO2 (NC)	06	

## PRODUCT NOMENCLATURE



# WEIGHT AND DIMENSIONS

## 208/230 V AC MODELS WEIGHTS AND DIMENSIONS

HP	CURRENT (A)	MODEL	ENCLOSURE	FRAME	OVERALL DIMENSIONS			
					WIDTH (IN.)	HEIGHT (IN.)	DEPTH (IN.)	WEIGHT (LB)
1.5	6.6	HVFD3D3A0015G100C	NEMA 1	A2	3.5	14.7	8.1	11.7
2	7.5	HVFD3D3A0020G100C						
3	10.6	HVFD3D3A0030G100C						
5	16.7	HVFD3D3A0050G100C		A3	5.3	14.7	8.1	15.5
7.5	24.2	HVFD3D3A0075G100C		B1	9.6	19.5	10.3	51.0
10	30.8	HVFD3D3A0100G100C						
15	46.2	HVFD3D3A0150G100C						
20	59.4	HVFD3D3A0200G100C		B2	9.6	26.1	10.3	59.6
25	74.8	HVFD3D3A0250G100C		C1	12.2	27.3	12.2	99.2
30	88	HVFD3D3A0300G100C						
40	115	HVFD3D3A0400G100C						
50	143	HVFD3D3A0500G100C		C2	14.6	30.7	13.2	143.3
60	170	HVFD3D3A0600G100C		D1	12.8	35.2	14.9	137.0
75	190	HVFD3D3A0750G100C						
100	240	HVFD3D3A1000G100C						
125	302	HVFD3D3A1250G100C	D2	16.5	41.3	14.9	276.0	
1.5	6.6	HVFD3D3A0015G200C	NEMA 12	A5	9.5	16.5	7.9	29.8
2	7.5	HVFD3D3A0020G200C						
3	10.6	HVFD3D3A0030G200C						
5	16.7	HVFD3D3A0050G200C		B1	9.6	19.0	10.3	51.0
7.5	24.2	HVFD3D3A0075G200C						
10	30.8	HVFD3D3A0100G200C						
15	46.2	HVFD3D3A0150G200C		B2	9.6	25.7	10.3	59.6
20	59.4	HVFD3D3A0200G200C		C1	12.2	27.0	12.2	99.2
25	74.8	HVFD3D3A0250G200C						
30	88	HVFD3D3A0300G200C						
40	115	HVFD3D3A0400G200C		C2	14.6	30.2	13.2	143.3
50	143	HVFD3D3A0500G200C		D1	12.8	35.2	14.9	137.0
60	170	HVFD3D3A0600G200C						
75	190	HVFD3D3A0750G200C						
100	240	HVFD3D3A1000G200C		D2	16.5	41.3	14.9	276.0
125	302	HVFD3D3A1250G200C						

**460 V AC MODELS WEIGHTS AND DIMENSIONS**

HP	CURRENT (A)	MODEL	ENCLOSURE	FRAME	OVERALL DIMENSIONS								
					WIDTH (IN.)	HEIGHT (IN.)	DEPTH (IN.)	WEIGHT (LB)					
1.5	2.7	HVFD3D3C0015G100C	NEMA 1	A2	3.5	14.7	8.1	11.7					
2	3.4	HVFD3D3C0020G100C											
3	4.8	HVFD3D3C0030G100C											
5	8.2	HVFD3D3C0050G100C											
7.5	11	HVFD3D3C0075G100C											
10	14.5	HVFD3D3C0100G100C											
15	21	HVFD3D3C0150G100C		A3	5.3	14.7	8.1	15.5					
20	27	HVFD3D3C0200G100C											
25	34	HVFD3D3C0250G100C											
30	40	HVFD3D3C0300G100C											
40	52	HVFD3D3C0400G100C											
50	65	HVFD3D3C0500G100C											
60	80	HVFD3D3C0600G100C		B1	9.6	19.5	10.3	51.0					
75	105	HVFD3D3C0750G100C											
100	130	HVFD3D3C1000G100C											
125	160	HVFD3D3C1250G100C											
150	190	HVFD3D3C1500G100C											
200	240	HVFD3D3C2000G100C											
250	302	HVFD3D3C2500G100C	B2	9.6	26.1	10.3	59.6						
1.5	2.7	HVFD3D3C0015G200C											
2	3.4	HVFD3D3C0020G200C											
3	4.8	HVFD3D3C0030G200C											
5	8.2	HVFD3D3C0050G200C											
7.5	11	HVFD3D3C0075G200C											
10	14.5	HVFD3D3C0100G200C	C1	12.2	27.3	12.2	99.2						
15	21	HVFD3D3C0150G200C											
20	27	HVFD3D3C0200G200C											
25	34	HVFD3D3C0250G200C											
30	40	HVFD3D3C0300G200C											
40	52	HVFD3D3C0400G200C											
50	65	HVFD3D3C0500G200C	C2	14.6	30.7	13.2	143.3						
60	80	HVFD3D3C0600G200C											
75	105	HVFD3D3C0750G200C											
100	130	HVFD3D3C1000G200C											
125	160	HVFD3D3C1250G200C											
150	190	HVFD3D3C1500G200C											
200	240	HVFD3D3C2000G200C	D1	12.8	35.2	14.9	137.0						
250	302	HVFD3D3C2500G200C											
1.5	2.7	HVFD3D3C0015G200C						NEMA 12	A5	9.5	16.5	7.9	29.8
2	3.4	HVFD3D3C0020G200C											
3	4.8	HVFD3D3C0030G200C											
5	8.2	HVFD3D3C0050G200C											
7.5	11	HVFD3D3C0075G200C											
10	14.5	HVFD3D3C0100G200C											
15	21	HVFD3D3C0150G200C	B1	9.5	19.0	10.3	51.0						
20	27	HVFD3D3C0200G200C											
25	34	HVFD3D3C0250G200C											
30	40	HVFD3D3C0300G200C											
40	52	HVFD3D3C0400G200C											
50	65	HVFD3D3C0500G200C											
60	80	HVFD3D3C0600G200C	B2	9.5	25.7	10.3	59.6						
75	105	HVFD3D3C0750G200C											
100	130	HVFD3D3C1000G200C											
125	160	HVFD3D3C1250G200C											
150	190	HVFD3D3C1500G200C											
200	240	HVFD3D3C2000G200C											
250	302	HVFD3D3C2500G200C	C1	12.1	27.0	12.2	99.2						
1.5	2.7	HVFD3D3C0015G200C											
2	3.4	HVFD3D3C0020G200C											
3	4.8	HVFD3D3C0030G200C											
5	8.2	HVFD3D3C0050G200C											
7.5	11	HVFD3D3C0075G200C											
10	14.5	HVFD3D3C0100G200C	C2	14.6	30.2	13.2	143.3						
15	21	HVFD3D3C0150G200C											
20	27	HVFD3D3C0200G200C											
25	34	HVFD3D3C0250G200C											
30	40	HVFD3D3C0300G200C											
40	52	HVFD3D3C0400G200C											
50	65	HVFD3D3C0500G200C	D1	12.8	35.2	14.9	137.0						
60	80	HVFD3D3C0600G200C											
75	105	HVFD3D3C0750G200C											
100	130	HVFD3D3C1000G200C											
125	160	HVFD3D3C1250G200C											
150	190	HVFD3D3C1500G200C											
200	240	HVFD3D3C2000G200C											
250	302	HVFD3D3C2500G200C											

## 600 V AC MODELS WEIGHTS AND DIMENSIONS

HP	CURRENT (A)	MODEL	ENCLOSURE	FRAME	OVERALL DIMENSIONS			WEIGHT (LB)
					WIDTH (IN.)	HEIGHT (IN.)	DEPTH (IN.)	
3	3.9	HVFD3D3D0030G100C	NEMA 1	A3	5.3	14.7	8.1	15.5
5	6.1	HVFD3D3D0050G100C						
7.5	9	HVFD3D3D0075G100C						
10	11	HVFD3D3D0100G100C		B1	9.6	19.5	10.3	51.0
15	18	HVFD3D3D0150G100C						
20	22	HVFD3D3D0200G100C						
25	27	HVFD3D3D0250G100C						
30	34	HVFD3D3D0300G100C						
40	41	HVFD3D3D0400G100C						
50	52	HVFD3D3D0500G100C						
60	62	HVFD3D3D0600G100C						
75	83	HVFD3D3D0750G100C						
100	100	HVFD3D3D1000G100C		C2	14.6	30.7	13.2	143.3
125	131	HVFD3D3D1250G100C						
150	155	HVFD3D3D1500G100C						
200	192	HVFD3D3D2000G100C	D1	12.8	35.2	14.9	137.0	
3	3.9	HVFD3D3D0030G200C	NEMA 12	A5	9.5	16.5	7.9	29.8
5	6.1	HVFD3D3D0050G200C						
7.5	9	HVFD3D3D0075G200C						
10	11	HVFD3D3D0100G200C		B1	9.5	19	10.3	51.0
15	18	HVFD3D3D0150G200C						
20	22	HVFD3D3D0200G200C						
25	27	HVFD3D3D0250G200C						
30	34	HVFD3D3D0300G200C						
40	41	HVFD3D3D0400G200C						
50	52	HVFD3D3D0500G200C						
60	62	HVFD3D3D0600G200C						
75	83	HVFD3D3D0750G200C						
100	100	HVFD3D3D1000G200C		C2	14.6	30.2	13.2	143.3
125	131	HVFD3D3D1250G200C						
150	155	HVFD3D3D1500G200C						
200	192	HVFD3D3D2000G200C	D1	12.8	35.2	14.9	137.0	

## APPLICABLE TECHNICAL LITERATURE

TABLE	REFERENCE
Installation and User Guide	31-00559

### Honeywell Building Technologies

Honeywell  
715 Peachtree Street NE  
Atlanta, GA 30308  
buildings.honeywell.com

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