

HVAC03C2 – HVAC61C2

HVAC03C5 – HVAC61C5

NXL HVAC INVERTERS

PRODUCT DATA



GENERAL

These variable frequency drives provide step-less speed control for all basic HVAC applications:

- Pumps
- Fans
- Compressors

FEATURES

- **Most compact size in the market (especially IP54)**
- **Integrated RFI-filters and AC-chokes**
- **Credit card size “Quick Guide” for installation and commissioning attached to every unit**
- **30s Start-Up Wizard**
- **HVAC-optimized software**
- **Easy “keypad – remote” change with 1 button**
- **Trip free operation with safety switch**
- **Silent motor operation with 6 kHz switching frequency**
- **Overtemperature ride-through**
- **Power ride-through**
- **Integrated PID controller**
 - Normal and Inverse regulation
 - Sleep Mode
 - Anti-Windup function
- **Integrated Pump/Fan Cascade Controller**

SPECIFICATIONS

Mains Connection

Input voltage U_{in}	380...500 Vac ($\pm 10\%$), 3~
Input Frequency	45...66 Hz
Connection to mains	Once per minute or less

Motor Connection

Output voltage	0 - U_{in}
Continuous output current:	
<i>Low overload (for Fan/Pump)</i>	I_L : Ambient peak temperature max. +45°C (with 24h average ambient +40°C), overload 1.1 x I_L (1min/10min)
Starting Torque:	
<i>Low overload (for Fan/Pump)</i>	150%
Starting Current	2 x I_H 2s/20s
Output Frequency	0...320 Hz
Frequency resolution	0.01 Hz

Control Characteristics

Control Method	Frequency Control U/f, Open Loop Sensorless Vector Control
Switching Frequency	1...16 kHz; default 6 kHz (no derating)
Frequency reference:	
<i>Analogue input</i>	Resolution 0.1% (10 bit), accuracy $\pm 1\%$
<i>Keypad reference</i>	Resolution 0.01 Hz
Field Weakening point	30...320 Hz
Acceleration time	0.1...3000 sec
Deceleration time	0.1...3000 sec
Braking torque	DC-brake: 30%*TN (without brake option)

Ambient Conditions

Ambient operating Temperature:

Low overload (for Fan/Pump) -10°C (no frost)...+45°C
(with 24 h average ambient +40°C)

Storage temperature -40...+70°C

Relative humidity 0...95% RH, non-condensing, non-corrosive, no dripping water

Air quality:

Chemical vapors IEC 721-3-3, unit in operation, class 3C2

Mechanical particles IEC 721-3-3, unit in operation, class 3S2

Altitude 100% load capacity (no derating) up to 1000 m
-1% derating for each 100 m above 1000 m; max. 3000 m

Relative humidity 0...95% RH, non-condensing, non-corrosive, no dripping water

Vibration: 5...150 Hz
EN50178/EN60068-2-6 Displacement amplitude 1(peak) mm at 5...15.8 Hz
Max acceleration amplitude 1 g at 15.8...150 Hz

Shock: UPS Drop Test (for applicable UPS weights)
EN50178, IEC 68-2-27 Storage and shipping: max 15 g, 11 ms (in package)

Enclosure class IP21 : HVAC__C2
IP54 : HVAC__C5

Electro Magnetic Compatibility (EMC)

Immunity Complies with EN50082-1, -2, EN61800-3

Emissions: EMC-level H: EN 61800-3 (2004)
IP21: HVAC__C2 Cat C2, EN 55011 Class A

IP54: HVAC__C5 EMC level C: EN 61800-3 (2004)
Cat C1, EN 55011 Class B

Safety

EN50178, EN60204-1, CE, GOST R, IEC 61800-5 (see unit nameplate for more detailed approvals)

Control connections

Analogue input voltage 0...+10V, Ri = 200kΩ, Resolution 10 bit, accuracy ±1% Galvanically isolated

Analogue input current 0(4)...20 mA, Ri = 250Ω, differential resolution 0.1%, accuracy ±1%, electrically isolated

Digital inputs 6 positive logic; 18...24 Vdc (+1 analogue input can be configured as digital input)

Auxiliary voltage +24 V, ±15%, max. 100 mA
Output reference voltage +10 V, +3%, max. load 10 mA
Analogue output 0(4)...20 mA; RL max. 500 Ω; resolution 16 bit; accuracy ±1%

Relay outputs 2 programmable change over relay output (1 NO/NC and 1 NO). Switching capacity: 24 Vdc / 8 A, 250 Vac / 8 A, 125 Vdc / 0.4 A. Min. switching load: 5 V / 10 mA

Motor thermistor Input R_{TRIP} = 4.7 kΩ (PTC), electrically isolated

Protections

Overvoltage protection 911 Vdc

Undervoltage protection 333 Vdc

Earth-fault protection In case of earth fault in motor or motor cable, only the frequency converter is protected

Unit overtemp. protection YES

Motor overload protection YES

Motor stall protection YES
(fan/pump blocked)

Motor underload prot. YES
(pump dry / belt broken detection)

Short-circuit protection YES

of +24V and +10V

reference voltages

Overcurrent protection Trip limit 4,0*I_H instantaneously

MODELS

Mains voltage 380-500 V, 50/60 Hz, 3~ Series NXL HVAC										
Frequency converter type		Motor shaft power		Loadability				Mechanical size Enclosure and protection class	Dimensions WxHxD [mm]	Weight (kg)
		400V supply		Low		High				
		Low overload (for pump/fan) 40°C P(kW)	High overload (for machines) 50°C P(kW)	Rated continuous current I _L (A)	10% overload current (A)	Rated continuous current I _H (A)	50% overload current (A)			
EMC-level H	HVAC03C2	1.1	0.75	3.3	3.6	2.2	3.3	MF4/IP21	128x292x190	5
	HVAC04C2	1.5	1.1	4.3	4.7	3.3	5.0	MF4/IP21	128x292x190	5
	HVAC05C2	2.2	1.5	5.6	5.9	4.3	6.5	MF4/IP21	128x292x190	5
	HVAC07C2	3	2.2	7.6	8.4	5.6	8.4	MF4/IP21	128x292x190	5
	HVAC09C2	4	3	9	9.9	7.6	11.4	MF4/IP21	128x292x190	5
	HVAC12C2	5.5	4	12	13.2	9	13.5	MF4/IP21	128x292x190	5
	HVAC16C2	7.5	5.5	16	17.6	12	18	MF5/IP21	144x391x214	8.1
	HVAC23C2	11	7.5	23	25.3	16	24	MF5/IP21	144x391x214	8.1
	HVAC31C2	15	11	31	34	23	35	MF5/IP21	144x391x214	8.1
	HVAC38C2	18.5	15	38	42	31	47	MF6/IP21	195x519x237	18.5
	HVAC46C2	22	18.5	46	51	38	57	MF6/IP21	195x519x237	18.5
HVAC61C2	30	22	61	67	46	69	MF6/IP21	195x519x237	18.5	

EMC-level C	HVAC03C5	1.1	0.75	3.3	3.6	2.2	3.3	MF4/IP54	128x292x190	5
	HVAC04C5	1.5	1.1	4.3	4.7	3.3	5.0	MF4/IP54	128x292x190	5
	HVAC05C5	2.2	1.5	5.6	5.9	4.3	6.5	MF4/IP54	128x292x190	5
	HVAC07C5	3	2.2	7.6	8.4	5.6	8.4	MF4/IP54	128x292x190	5
	HVAC09C5	4	3	9	9.9	7.6	11.4	MF4/IP54	128x292x190	5
	HVAC12C5	5.5	4	12	13.2	9	13.5	MF4/IP54	128x292x190	5
	HVAC16C5	7.5	5.5	16	17.6	12	18	MF5/IP54	144x391x214	8.1
	HVAC23C5	11	7.5	23	25.3	16	24	MF5/IP54	144x391x214	8.1
	HVAC31C5	15	11	31	34	23	35	MF5/IP54	144x391x214	8.1
	HVAC38C5	18.5	15	38	42	31	47	MF6/IP54	195x519x237	18.5
	HVAC46C5	22	18.5	46	51	38	57	MF6/IP54	195x519x237	18.5
HVAC61C5	30	22	61	67	46	69	MF6/IP54	195x519x237	18.5	

PRODUCT IDENTIFICATION CODE

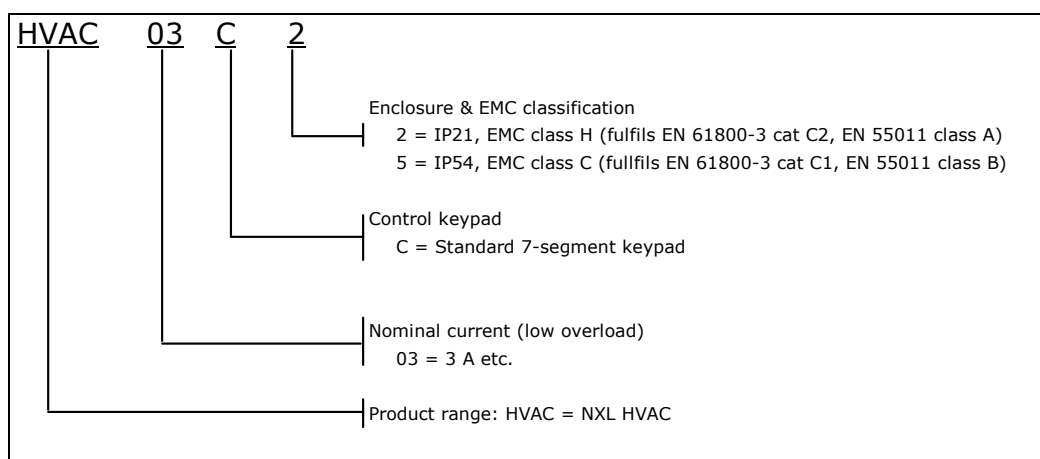


Fig. 1. Product Identification Code

HONEYWELL EMC CLASSES AND MARKET REQUIREMENTS

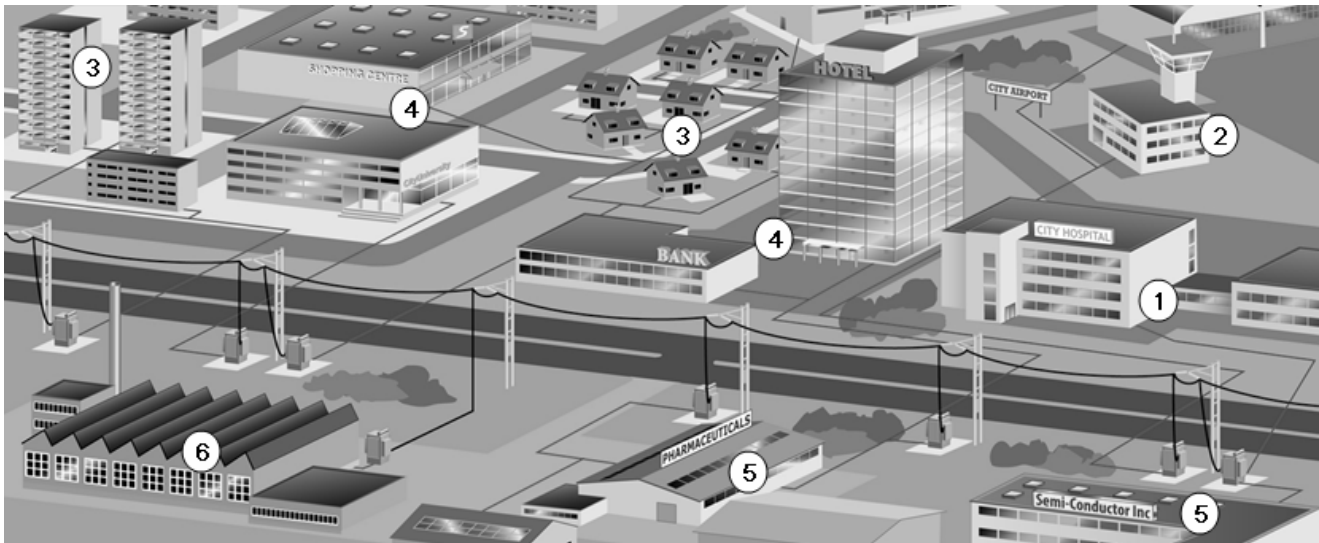


Fig. 2. EMC classes in practice



EMC levels	Hospital	Airport	Residential Area	Commercial	Light Industry Area	Heavy Industry
C	O	O				
H	R	R	R	R	O	O
L					R	R
T						R (IT Network)

O = optional, R = required

C = EN61800-3 [2004] Category C1 (standard in IP54 units)

H = EN61800-3 [2004] Category C2 (standard in IP21 units)

L = EN61800-3 [2004] industrial requirements fulfilled (standard in Honeywell inverters >160kW)

T = EN61800-3 [2004] IT network (e.g. ships) requirements fulfilled, units can be easily converted to T-class from standard EMC class. Instructions for this can be found from NXL HVAC User's Manual which can be downloaded from download centre in <http://inverter.ecc.emea.honeywell.com>

MECHANICAL DIMENSIONS AND MOUNTING

The frequency converter shall be fixed with four screws (or bolts, depending on the unit size).

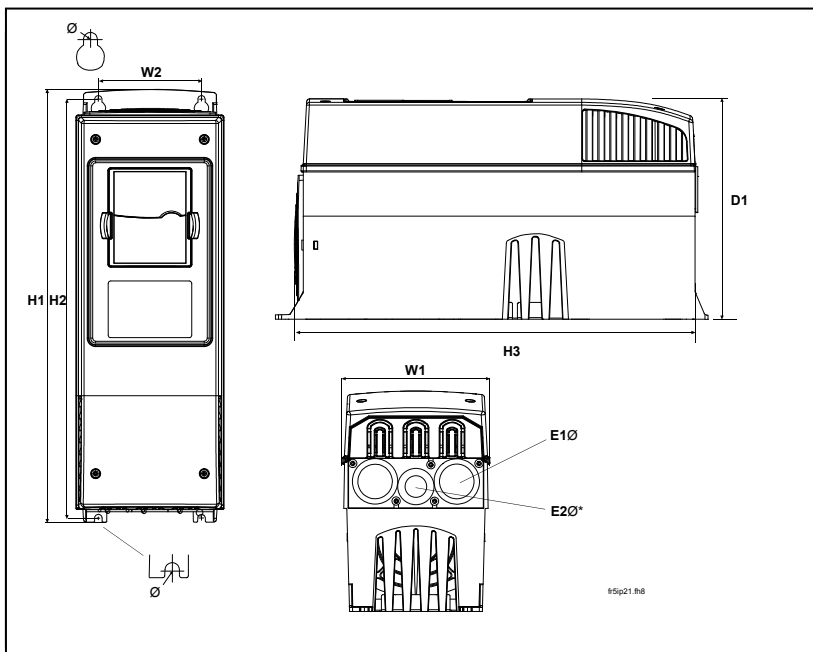


Fig. 3. NXL HVAC dimensions

Type	Dimensions								
	W1	W2	H1	H2	H3	D1	Ø	E1Ø	E2Ø*
MF4 (HVAC03-12)	128	100	327	313	292	190	7	3 x 28.3	///
MF5 (HVAC16-31)	144	100	419	406	391	214	7	2 x 37	1 x 28.3
MF6 (HVAC38-61)	195	148	558	541	519	237	9	3 x 37	///

Enough free space shall be left above and below the frequency converter to ensure sufficient air circulation and cooling. You will find the required dimensions for free space in the table below.

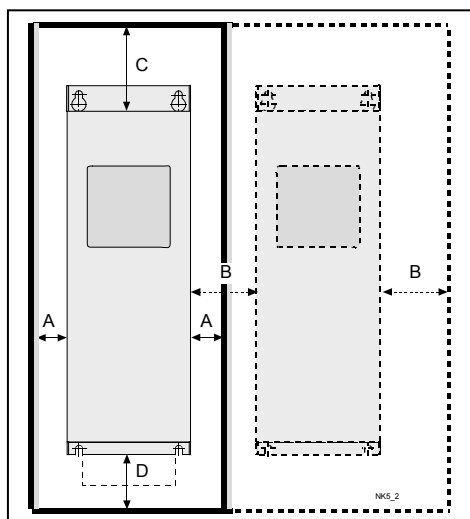


Fig. 4. NXL HVAC installation space

Type	Dimensions [mm]			
	A	B	C	D
MF4 (HVAC03-12)	20	20	100	50
MF5 (HVAC16-31)	20	20	120	60
MF6 (HVAC38-61)	30	20	160	80

- A** = clearance around the freq. converter (see also **B**)
- B** = distance from one frequency converter to another or distance to cabinet wall
- C** = free space above the frequency converter
- D** = free space underneath the frequency converter

REQUIRED COOLING AIR

Type	Cooling air required [m ³ /h]
MF4 (HVAC03-12)	70
MF5 (HVAC16-31)	190
MF6 (HVAC38-61)	425

CABLING

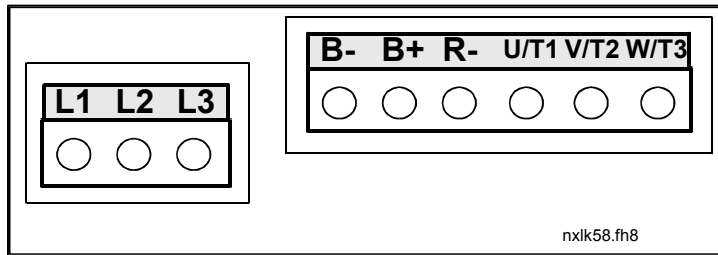


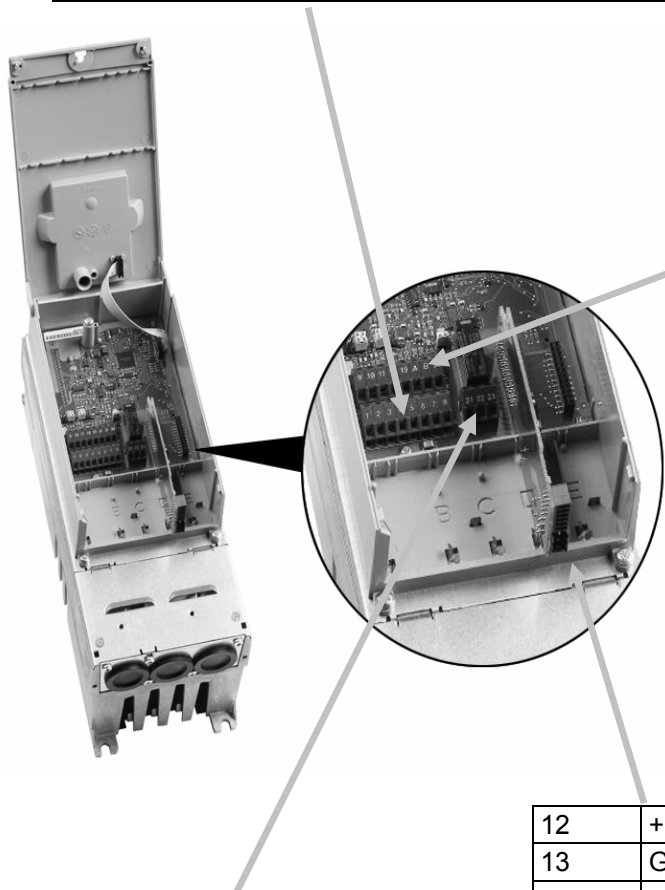
Fig. 4. NXL HVAC power connections

Use cables with heat resistance of at least +70°C. The cables and the fuses must be dimensioned according to the tables below. The fuses function also as cable overload protection. These instructions apply only to cases with one motor and one cable connection from the frequency converter to the motor. In any other case, ask the technical support for more information.

Connection	Cable type
Mains cable	Power cable intended for fixed installation and the specific mains voltage. Shielded cable not required. (NKCABLES/MCMK or similar recommended)
Motor cable	Power cable equipped with compact low-impedance shield and intended for the specific mains voltage. (NKCABLES /MCCMK, SAB/ÖZCUY-J or similar recommended). (360° earthing of both motor and FC connection required to meet the EMC requirements)
Control cable	Screened cable equipped with compact low-impedance shield (NKCABLES /jamak, SAB/ÖZCuY-O or similar)

Frame	Type	I _L [A]	Fuse [A]	Mains cable Cu [mm ²]	Terminal cable size (min/max)			
					Main terminal [mm ²]	Earth terminal [mm ²]	Control terminal [mm ²]	Relay terminal [mm ²]
MF4	HVAC03—09	7—9	10	3*1.5+1.5	1—4	1—2.5	0.5—1.5	0.5—2.5
MF4	HVAC12	12	16	3*2.5+2.5	1—4	1—2.5	0.5—1.5	0.5—2.5
MF5	HVAC16	16	20	3*4+4	1—10	1—10	0.5—1.5	0.5—2.5
MF5	HVAC23	22	25	3*6+6	1—10	1—10	0.5—1.5	0.5—2.5
MF5	HVAC31	31	35	3*10+10	1—10	1—10	0.5—1.5	0.5—2.5
MF6	HVAC38—46	38—46	50	3*10+10	2.5—50 Cu 6—50 Al	6—35	0.5—1.5	0.5—2.5
MF6	HVAC61	61	63	3*16+16	2.5—50 Cu 6—50 Al	6—35	0.5—1.5	0.5—2.5

1	+ 10 V _{ref}	Reference output (voltage for potentiometer etc.)
2	AI1 +	Analogue Input 1 (V signal)
3	AI1 –	I/O Ground
4	AI2 +	Analogue Input 2 (mA signal)
5	AI2 –	Analogue Input 2 (mA signal)
6	+24 V	+24 V output (max. 0.1 A)
7	GND	I/O ground
8	DIN1	Digital Input 1 (Start forward)



9	DIN2	Digital Input 2 (Start reverse)
10	DIN3	Digital Input 3 (Preset speed 1, default: 10 Hz)
11	GND	I/O Ground
18	AO1 +	Analogue output 1 Range 0–20 mA/R _L , max. 500 Ω
19	AO1 –	
A	RS485	Modbus RTU, serial bus
B	RS485	Modbus RTU, serial bus
30	+24V	Input for +24 V backup voltage

21	RO1		Relay 1 NO/NC (fault)
22	RO1		
23	RO1		

12	+ 24 V	+24 V output (max. 150 mA)	
13	GND	I/O ground	
14	DIE1	Exp. Digital Input 1 (Preset speed 2, default: 50 Hz)	
15	DIE2	Exp. Digital Input 2 (Fault Reset)	
16	DIE3	Exp. Digital Input 3 (Disable PID)	
25	ROE1		Exp. Relay 1 NO (run)
26	ROE1		
28	TI+	Thermistor Input; R _{trip} = 4.7 kΩ (PTC)	
29	TI –		

Fig. 5. NXL HVAC control connections

FEATURES / FUNCTIONS

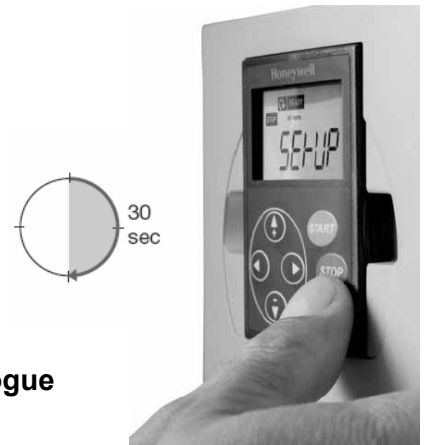
- **Easy to set-up features**

30 second start-up wizard

VFD programming in just 4 easy steps:

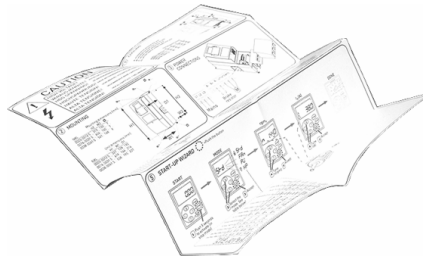
1. Activate the Start-up Wizard
2. Select the mode (fan or pump)
3. Tune the motor nominal speed
4. Tune the motor nominal current

- RESULT: Fully configured drive ready to accept 0-10 V analogue speed signal from controller in 30 seconds!



Quick installation guide

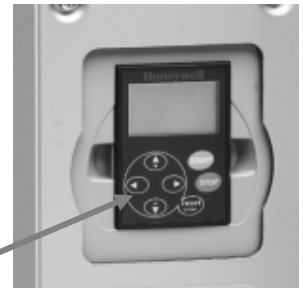
- Includes 1-page instructions for installation & set-up
- All the essential information on installation and basic commissioning on 1 paper
- Attached to every product



“Keypad – Remote” Operation

- Single button operation to change the control to manual (keypad) and back
- Useful function when commissioning and testing HVAC applications.
- Consistency: all Honeywell VFDs behave in similar way

**Press
LEFT ARROW for 3 s to
change control place**



• **Compact and Robust design**

Features	Functions	Benefits
Enclosure Class	<ul style="list-style-type: none"> NXL HVAC available with both IP21 and IP54 Smallest and lightest inverter available in the market (especially IP54) 	<ul style="list-style-type: none"> Consumes less space Easy to install
Modular design	<ul style="list-style-type: none"> Separated cooling channel (no electronics in air flow) Power electronics fully enclosed in metal Easily replaceable cooling fans 	<ul style="list-style-type: none"> Increased reliability Easy maintenance
Built in input AC choke and RFI filter	<ul style="list-style-type: none"> Protection against input voltage surges Lower total harmonic distortion THD Fulfills all EMC requirements in buildings 	<ul style="list-style-type: none"> Compact No additional costs

• **Uninterruptible operation and energy saving functions**

Features	Functions	Benefits
Overtemperature ride-through	Automatically adjusts switching frequency to adapt to unusual increase in ambient temperature	<ul style="list-style-type: none"> Uninterruptible operation
Power ride-through	Automatically lowers motor speed to adapt to sudden voltage drop such as power loss	<ul style="list-style-type: none"> Uninterruptible operation
Trip free output switching	Ensures trip free operation when an output switch (e.g. safety switch) is operated between the motor and the VFD. Truly intelligent and highly reliable function to ensure better functionality than with any other VFD	<ul style="list-style-type: none"> Uninterruptible operation
Auto restart function	Auto restart function can be configured to make VFD restart automatically once fault is addressed	<ul style="list-style-type: none"> Uninterruptible operation
Energy Saving Function “Flux Optimization”	Flux Optimization automatically minimizes energy consumption.	<ul style="list-style-type: none"> Even 5% increase in energy savings.

• **VFD and motor control features**

Features	Functions	Benefits
Best in performance Flying start	Ability to get an already spinning fan under speed control	<ul style="list-style-type: none"> • Improved performance • Important in clean room production to ensure the standard conditions
Automatic torque boost function	Boosts initial voltage to start high inertia fans	<ul style="list-style-type: none"> • Avoids tripping and enables smooth starts also to high inertia loads
Motor auto identification	Performs measurements to find out motor internal variables such as stator resistance.	<ul style="list-style-type: none"> • Increased reliability
High Switching Frequency	Honeywell HVAC drive has higher switching frequency than the most of the competition as standard (= no derating required)	<ul style="list-style-type: none"> • Less audible noise from the motor
Prohibit frequency	Overriding the critical frequencies to avoid resonance	<ul style="list-style-type: none"> • Elimination of resonance
Temperature-controlled fans	Fan stops operating when not needed	<ul style="list-style-type: none"> • Less audible noise from VFD itself • Increase of energy savings

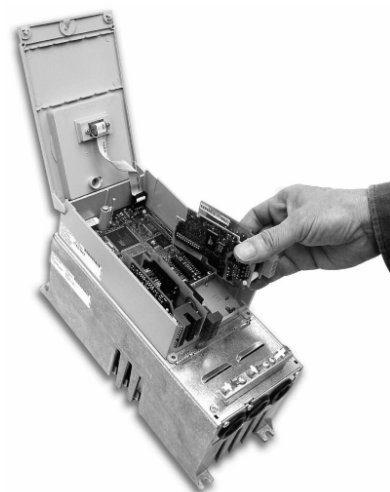
• **HVAC control features**

Features	Functions	Benefits
Inbuilt PID controllers	<ul style="list-style-type: none"> • Normal and Inverse Regulation • Delta P regulation with 2 standard pressure transmitters • Less wiring since sensor normally close to inverter 	<ul style="list-style-type: none"> • Cost saving • Faster response in process closed loop
Sleep Mode	Shutting down the motor, when no demand	<ul style="list-style-type: none"> • Energy saving
Fire override mode	Keeps fan/pump running in case of fire	<ul style="list-style-type: none"> • Legal requirement
Pump and Fan Cascade Controller	Controls total pumping system with several parallel pumps by equally sharing the load	<ul style="list-style-type: none"> • Longer lifetime of the system • Lower investment cost for pumping system

OPTIONAL ACCESSORIES

Field bus option boards

Fieldbus	Order type code
LonWorks	OPTC4
Metasys N2	NXOPTC2
Profibus DP	NXOPTC3
CANopen (slave)	NXOPTC6
Devicenet	NXOPTC7
Modbus/TCP (Ethernet)	NXOPTCI
BACnet MS/TP	NXOPTCJ



Option	Order type code	Note
Panel door installation sets	DRA-02L	NXL Door installation set for display panel, 2m cable
	DRA-04L	NXL Door installation set for display panel, 4m cable
PC-adapter	NXLPANRS	This adapter and RS232 cable are needed for PC connection
RS232 Cables	RS232C2M	2m RS232 serial link cable for PC connection
	RS232C-4M	4m RS232 serial link cable for PC connection
Digital I/O expander boards (*)	NXLOPTAA	1 Relay NO/NC, 1 Open collector output, 3 Digital inputs
	NXOPTB2	1 Relay NO/NC, 1 relay NO and thermistor input
	OPTB5	3 Relays NO
Analogue I/O expander boards (*)	OPTB4	1 Analogue input (mA) and 2 Analogue Outputs (mA)

(* when using this part of the standard I/O is replaced (3 Digital inputs, 1 relay and Thermistor input)

SPARE PARTS

Type	Order type code	Note
I/O spare parts	NXLOPTAI	Standard I/O replacement for: 3 DI, 1 RO (NO), Thermistor
Keypad spare parts	NXPANC	NXL standard keypad
Main cooling fans	NX-FAN-4	MF4 (HVAC03-12) main cooling fan assembly
	NX-FAN-5	MF5 (HVAC16-31) main cooling fan assembly
	NX-FAN-6	MF6 (HVAC38-61) main cooling fan assembly

Honeywell

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