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NXL Series Inverters

Honeywell



**NXL HVAC & COMPACT
USER'S MANUAL**



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Manual abstract:

2. @3. @4. Check the size of the motor cable, mains cable, mains fuses and check the cable connections, read Chapter 6. 5. Follow the installation instructions, see Chapter 5. 6. Control cable sizes and the grounding system are explained in Chapter 6.1.1.

7. Instructions on using the keypad are given in Chapter 7. 8. All parameters have factory default values. In order to ensure proper operation, check the rating plate data for the values below and the corresponding parameters of parameter group P2.

1. See Chapter 8.3.3. In all cases Honeywell NXL start up wizard is recommended to ensure easy commissioning.

· nominal speed of the motor, par 2.1.7 nominal current of the motor, par. 2.1.6 (2.1.8 in NXL Compact) (2.1.9 in NXL Compact) The following motor parameters need adjusting only if the motor voltage is different from 400 V or the equipment is installed to a electrical network which does not have the frequency of 50 Hz (e.

g. North America 60 Hz). · nominal voltage of the motor, par. 2.1.11 nominal frequency of the motor, par. 2.1.12 (2.1.

6 in NXL Compact) (2.1.7 in NXL Compact) All parameters are explained in the Application Manuals. 9. Follow the commissioning instructions, see Chapter 8.

10. The Honeywell NXL Frequency Converter is now ready for use. 11. In the end of this manual, you will find a quick help with the default I/O, control panel menus, monitoring values, fault codes and basic parameters Honeywell is not responsible for the use of the frequency converters against the instructions.

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ABOUT THE NXL HVAC & COMPACT USER'S MANUAL AND NXL APPLICATION MANUALS Congratulations for choosing the Smooth Control provided by NXL frequency converters! The User's Manual will provide you with the necessary information about the installation, commissioning and operation of NXL Frequency Converter. We recommend that you carefully study these instructions before powering up the frequency converter for the first time. In the NXL HVAC Application Manual and the Multi-Control Application Manual you will find information about the application used in Honeywell NXL drives.

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The control I/O-terminals are isolated from the mains potential. However, the relay outputs and other I/O-terminals may have a dangerous control voltage present even when NXL is disconnected from mains. The frequency converter has a large capacitive leakage current. If the frequency converter is used as a part of a machine, the machine manufacturer is responsible for providing the machine with a main switch (EN 60204-1). Only spare parts delivered by Honeywell can be used. The heat sink of types MF2 and MF3 may be hot when the frequency converter is in use. Coming into contact with the heat sink may cause burns. HOT SURFACE 1.2 Safety instructions 1 2 3 4 5 6 The Honeywell NXL frequency converter is meant for fixed installations only.



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Do not perform any measurements when the frequency converter is connected to the mains.

After disconnecting the frequency converter from the mains, wait until the fan stops and the indicators on the display go out. Wait 5 more minutes before doing any work on NXL connections. Do not perform any voltage withstand tests on any part of NXL. There is a certain procedure according to which the tests shall be performed. Ignoring this procedure may result in damaged product.

Prior to measurements on the motor or the motor cable, disconnect the motor cable from the frequency converter. Do not touch the IC-circuits on the circuit boards. Static voltage discharge may damage the components. 1 8(96) Safety Honeywell 1.3 Earthing and earth fault protection The Honeywell NXL frequency converter must always be earthed with an earthing conductor connected to the earthing terminal .

The earth fault protection inside the frequency converter protects only the converter itself against earth faults in the motor or the motor cable. Due to the high capacitive currents present in the frequency converter, fault current protective switches may not function properly. If fault current protective switches are used they must be tested with the drive with earth fault currents that are possible to arise in fault situations. 1.4 Running the motor Warning symbols For your own safety, please pay special attention to the instructions marked with the following symbols: = Dangerous voltage WARNING = General warning = Hot surface Risk of burn HOT SURFACE MOTOR RUN CHECK LIST Before starting the motor, check that the motor is mounted properly and ensure that the machine connected to the motor allows the motor to be started. Set the maximum motor speed (frequency) according to the motor and the machine connected to it. Before reversing the motor shaft rotation direction make sure that this WARNING can be done safely. Make sure that no power correction capacitors are connected to the motor cable. Make sure that the motor terminals are not connected to mains potential. 1 2 3 4 5 Honeywell 2.

EU DIRECTIVE EU Directive 9(96) 2.1 CE marking The CE marking on the product guarantees the free movement of the product within the EEA (European Economic Area). It also guarantees that the product meets the various requirements placed upon it (such as the EMC Directive and possibly other directives according to the so-called new procedure). NXL frequency converters carry the CE label as a proof of compliance with the Low Voltage Directive (LVD) and the Electro Magnetic Compatibility (EMC). The company SGS FIMKO has acted as the Competent Body. 2.2 EMC directive 2.2.1 General The EMC Directive provides that the electrical apparatus must not excessively disturb the environment they are used in, and, on the other hand, it shall have an adequate level of immunity toward other disturbances from the same environment. The compliance of NXL frequency converters with the EMC directive is verified with Technical Construction Files (TCF) checked and approved by SGS FIMKO, which is a Competent Body.

2.2.2 Technical criteria EMC compliance is a major consideration for NXL drives from the outset of the design. NXL frequency converters are marketed throughout the world, a fact which makes the EMC requirements of customers different. All NXL frequency converters are designed to fulfil even the strictest immunity requirements.

2.2.3 NXL frequency converter EMC classification NXL frequency converters are divided into two classes according to the level of electromagnetic disturbances emitted. Later in this manual the division is made according to the mechanical sizes (MF2, MF3, etc.).

The technical data of the different sizes can be found in Chapter 0. Class C (NXL HVAC IP54): NXL HVAC drives with IP54 enclosure are delivered as class C products with an integrated RFI filter. NXL HVAC drives IP54 selection fulfil the requirements of the product standard EN 618003 (2004) category C1 (EN 55011 class B). The emission levels correspond to the requirements of EN 61000-6-3. Class N (NXL Compact): No EMC emission protection. NXL Compact drives (frames MF2 and MF3) are delivered from the factory without an integrated RFI filter as class N products. External RFI filters for these products for class H are available. Class H (NXL HVAC IP21): NXL HVAC drives with IP21 enclosure are delivered as class H products with an integrated RFI filter. NXL HVAC drives IP21 selection fulfil the requirements of the product standard EN 618003 (2004) category C2 (EN 55011 class A). The emission levels correspond to the requirements of EN 61000-6-4.

Class T: The T-class converters have a small earth current and can be used with IT supplies only. If they are used with other supplies no EMC requirements are complied with. 2 10(96) EU Directive Honeywell All NX frequency converters fulfil all EMC immunity requirements (standards EN 61000-6-1, 61000-6-2 and EN 61800-3). 2.2.4 Honeywell EMC classes and market requirements 1 NX EMC le 55011 class B) Control keypad C = Standard 7-segment keypad Nominal current (low overload) 03 = 3 A etc. Product range: HVAC = NXL HVAC Figure 3-2. NXL HVAC type designation code for (sizes MF4 - MF6). 3.3

Storage If the frequency converter is to be kept in store before use make sure that the ambient conditions are acceptable: Storing temperature 40.

..+70°C Relative humidity <95%, no condensation 3.4 Maintenance In normal conditions, NXL frequency converters are maintenance-free. However, we recommend to clean the heatsink (using e.

g. a small brush) whenever necessary. Most NXL drives are equipped with a cooling fan, which can easily be changed if necessary. Honeywell 3.5 Warranty 3 Receipt of delivery 15(96) Only manufacturing defects are covered by the warranty.

The manufacturer assumes no responsibility for damages caused during or resulting from transport, receipt of the delivery, installation, commissioning or use. The manufacturer shall in no event and under no circumstances be held responsible for damages and failures resulting from misuse, wrong installation, unacceptable ambient temperature, dust, corrosive substances or operation outside the rated specifications. Neither can the manufacturer be held responsible for consequential damages. Honeywell's time of warranty is 30 months from the delivery or 24 months from the commissioning whichever expires first. The local distributor may grant a warranty time different from the above. This warranty time shall be specified in the distributor's sales and warranty terms.

Honeywell assumes no responsibility for any other warranties than that granted by Honeywell itself. In all matters concerning the warranty, please contact first your distributor. 16(96) Technical data Honeywell 4. TECHNICAL DATA 4.

1 Introduction Honeywell NXL is a compact frequency converter with the output ranging from 250 W to 30 kW. The Motor and Application Control Block is based on microprocessor software.



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(+45°C only applies to NXL HVAC) 4 Honeywell Technical data 21(96) EMC Immunity Emissions Safety Control connections Analogue input voltage Analogue input current Digital inputs Auxiliary voltage Output reference voltage Analogue output Relay outputs Complies with EN50082-1, -2, EN61800-3 MF2-MF3: EMC level N; With an external RFI filter (option) attached EMC-level H (see Ch. 6.1.2.

2) MF4-MF6: IP21 : EMC-level H: EN 61800-3 (2004) Cat C2, EN 55011 Class A IP54 : EMC level C: EN 61800-3 (2004) Cat C1, EN 55011 Class B EN50178, EN60204-1, CE, UL, cUL, FI, GOST R, IEC 61800-5 (see unit nameplate for more detailed approvals) 0...+10V, Ri = 200k, Resolution 10 bit, accuracy ±1% 0(4), .20 mA, Ri = 250 differential 3 positive logic; 18...24VDC NXL Compact 6 positive logic; 18...24VDC NXL HVAC +24V, ±15%, max. 100mA +10V, +3%, max. load 10mA 0(4)...20mA; RL max. 500; resolution 16 bit; accuracy ±1% 1 programmable change over relay output NXL Compact 2 programmable change over relay output NXL HVAC Switching capacity: 24VDC/8A, 250VAC/8A, 125VDC/0.4A Protections Motor thermistor Input *) Overvoltage protection Undervoltage protection Earth-fault protection Rtrip = 4.

7 k (PTC) NXL HVAC NXL_2: 437VDC; NXL_5: 911VDC NXL_2: 183VDC; NXL_5: 333VDC In case of earth fault in motor or motor cable, only the frequency converter is protected Yes Yes Yes Yes Yes Trip limit 4,0*I_H instantaneously Unit overtemperature protection Motor overload protection Motor stall protection Motor underload protection Short-circuit protection of +24V and +10V reference voltages Overcurrent protection Table 4- 4. Technical data 4 5 22(96) Installation Honeywell 5. 5.1.1 INSTALLATION NXL Compact (MF2 and MF3) 5.1 Mounting There are two possible positions in the wall mounting for the frames MF2 and MF3 (see Figure 5-1) The NXL type MF2 is mounted with two screws using the middle holes of the mounting plates. If an RFI filter is used, the upper mounting plate shall be attached with two screws (see Figure 5-2). MF3 and bigger types are always mounted with four screws.

Figure 5-1. The two possible mounting positions of NXL (MF2 and MF3) X X X X MF2 without a filter X MF2 with a filter Figure 5-2. Mounting of NXL, MF2 Honeywell Ø W1 5 Installation 23(96) W2 H7 D1 H8 H5 H2 H3 H1 H4 H6 D2 nxlk7.fh8 Figure 5-3. NXL Compact dimensions, MF2 W1 W2 H1 H2 MF2 30 60 172 152 Table 5-1. Dimensions of NXL, MF2 Type H3 140 Dimensions (mm) H4 H5 H6 130 80 42 H7 11 H8 6 D1 150 D2 144 6 5 24(96) Installation Honeywell D1 W2 W3 W1 H5 H3 H4 H2 H1 H6 H7 Ø nxlk8.fh8 D2 Figure 5-4.

NXL Compact dimensions, MF3 Type W1 W2 W3 H1 84 35 23 262 Table 5-2. Dimensions of NXL, MF3 MF3 H2 235 Dimensions (mm) H3 H4 H5 223 199 193 H6 184 H7 220 D1 172 D2 166 6 Honeywell 5 Installation 25(96) 5.1.2 NXL HVAC (MF4 MF6) The frequency converter shall be fixed with four screws (or bolts, depending on the unit size). Enough space shall be reserved around the frequency converter in order to ensure a sufficient cooling, see Table 5-4 and Figure 5-6.

Also see to that the mounting plane is relatively even. Ø W2 D1 H1 H2 H3 W1 E1 Ø E2 Ø* Ø fr:5ip21.fh8 Figure 5-5. NXL HVAC dimensions Type W1 W2 H1 H2 128 100 327 313 MF4 (HVAC03-12) MF5 (HVAC16-31) 144 100 419 406 MF6 (HVAC38-61) 195 148 558 541 Table 5-3. Dimensions of NXL HVAC, MF4--MF6 * = MF5 only Dimensions H3 D1 292 190 391 214 519 237 7 7 9 E1 3 x 28,3 2 x 37 3 x 37 E2* 1 x 28,3 5 26(96) Installation Honeywell 5.2 Cooling Forced air flow cooling is used for NXL HVAC and NXL Compact size MF3. 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. Dimensions [mm] A B C NXL 0002-0006 2 10 10 100 NXL 0001-0005 5 10 10 100 HVAC 03-12 20 20 100 HVAC 16-31 20 20 120 HVAC 38-61 30 20 160 Table 5-4. Mounting space dimensions Type A B C D D 50 50 50 60 80 C = clearance around the freq.

converter (see also B) = distance from one frequency converter to another or distance to cabinet wall = free space above the frequency converter = free space underneath the frequency converter B A A B D NK5_2 Figure 5-6. Installation space Type HVAC 03--12 HVAC 16--31 HVAC 38--61 Table 5-5. Required cooling air Cooling air required [m³/h] 70 190 425 Honeywell 5 Installation 27(96) 5.3 Changing EMC protection class from H/C to T in NXL HVAC The EMC protection class of NXL HVAC frequency converter types can be changed from class H/C to class T with a simple procedure presented in the figures below. Remove this screw Remove this screw Remove this screw Figure 5-7. Changing of EMC protection class, MF4 (left) and MF5 (right) Remove these screws Figure 5-8. Changing of EMC protection class, MF6 Note! Do not attempt to change the EMC-level back to class H or C. Even if the procedure above is reversed, the frequency converter will no longer fulfil the EMC requirements of class H or C! 28(96) Cabling and connections Honeywell 6.

CABLING AND CONNECTIONS 6.1 Power connections L1 L2 U/T1 V/T2 W/T3 L1 L2 L3 U/T1 V/T2 W/T3 1~ Figure 6-1. Power connections, MF2 3~ nxlk10.fh8 3~ 1~ L1 L2 L3 U/T1 V/T2 W/T3 BR+ BR- nxlk11.fh8 Figure 6-2. Power connections, NXL Compact MF3 (1~/3~/) B- B+ RL1 L2 L3 U/T1 V/T2 W/T3 nxlk58.fh8 Figure 6-3.

Power connections, NXL HVAC (MF4-MF6) 6 Honeywell Cabling and connections 29(96) 6.1.1 Cabling Use cables with heat resistance of at least +70°C. The cables and the fuses must be dimensioned according to the tables below. Installation of cables according to UL regulations is presented in Chapter 6. 1.4. 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 factory for more information. 1st environment (restricted distribution) 2nd environment Level L 1 2 4 Level T 1 1 4 Level N 1 1 4 Cable type Mains cable Motor cable Control cable Level C Level H Level L Level T: Level N: Level H/C 1 3* 4 Table 6-1. Cable types required to meet standards. = EN 61800-3 (2004), category C1 EN 61000-6-3 = EN 61800-3 (2004), category C2 EN 61000-6-4 = EN61800-3 (2004), 2nd environment (industrial) See page 9. See page 9. 1 2 3 = Power cable intended for fixed installation and the specific mains voltage.

Shielded cable not required. (NKCABLES/MCMK or similar recommended) = Power cable equipped with concentric protection wire and intended for the specific mains voltage. (NKCABLES /MCMK or similar recommended). = Power cable equipped with compact low-impedance shield and intended for the specific mains voltage.



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(NKCABLES /MCCMK, SAB/ÖZCUIY-J or similar recommended). *360° earthing of both motor and FC connection required to meet the standard = Screened cable equipped with compact low-impedance shield (NKCABLES /jamak, SAB/ÖZCuY-O or similar). 4 In NXL HVAC (MF4 MF6): A cable entry flange should be used when installing the motor cable at both ends in order to reach the EMC levels. Note: The EMC requirements are fulfilled at factory defaults of switching frequencies (all frames). 6 30(96) Cabling and connections Honeywell 6.1.

1.1 Cable and fuse sizes Frame Type IL [A] Fuse [A] Mains cable Cu [mm²] Terminal cable size (min/max) Main terminal 2 [mm] Earth terminal 2 [mm] Control terminal 2 [mm] Relay terminal 2 [mm] MF2 NXL0002 2 10 2*1.5+1.5 MF3 NXL0003--0006 3-6 16 2*2.5+2.

5 Table 6-2. Cable and fuse sizes for NXL Compact, 208 - 240V Frame Type IL [A] 1-2 1-5 7--9 12 16 22 31 3845 61 Fuse [A] 10 10 10 16 20 25 35 50 63 Mains cable Cu [mm²] 3*1.5+1.5 3*1.5+1.

5 3*1.5+1.5 3*2.5+2.5 3*4+4 3*6+6 3*10+10 3*10+10 3*16+16 0.5--2.5 0.5--2.5 0.5--2.

5 0.5--2.5 0.5--1.5 0.5--1.5 0.5--2.5 0.5--2.

5 Terminal cable size (min/max) Main terminal 2 [mm] Earth terminal 2 [mm] Control terminal 2 [mm] Relay terminal 2 [mm] MF2 MF3 MF4 MF5 MF5 MF5 MF6 MF6 NXL0001--0002 NXL0003--0005 HVAC03--09 HVAC12 HVAC16 HVAC23 HVAC31 HVAC38--45 HVAC61 0.5--2.5 0.5--2.5 1--4 1--4 1--10 1--10 1--10 2.

5--50 Cu 6--50 Al 2.5--50 Cu 6--50 Al 0.5--2.5 0.5--2.

5 1--2.5 1--2.5 1--10 1--10 1--10 6--35 6--35 0.5--1.5 0.5--1.5 0.5--1.5 0.5--1.

5 0.5--1.5 0.5--1.5 0.5--1.5 0.5--1.5 0.5--1.

5 0.5--2.5 0.5--2.5 0.

5--2.5 0.5--2.5 0.5--2.

5 0.5--2.5 0.5--2.5 0.5--2.5 0.5--2.5 Table 6-3. Cable and fuse sizes for NXL, 380 500V Note! This cable recommendation is based on standard EN 60204-1 and PVC isolated cable where there is either one cable on a shelf in temperature of + 40°C or four cables on a shelf in temperature of + 30°C.

6 Honeywell 6.1.2 Cabling and connections 31(96) Mounting of cable accessories Enclosed to your NXL frequency converter you have received a plastic bag containing components that are needed for the installation of the mains and motor cables in the frequency converter. 2 3 4 1 6 5 8 7 Figure 6-4. Cable accessories Components: 1 2 3 4 5 6 7 8 Grounding terminals (MF4, MF5) (2) Cable clamps (3) Rubber grommets (sizes vary from class to class) (3) Cable entry gland (1) Screws, M4x10 (5) Screws, M4x16 (3) Grounding cable clamps (MF6) (2) Grounding screws M5x16 (MF6) (4) NOTE: The cable accessories installation kit for frequency converters of protection class IP54 includes all components except 4 and 5. Mounting procedure 1. Make sure that the plastic bag you have received contains all necessary components. 2. Open the cover of the frequency converter (Figure 1). 3.

Remove the cable cover. Observe the places for a) the grounding terminals (MF4/MF5) (Figure 2). b) the grounding cable clamps (MF6) (Figure 3). 4. Reinstall the cable cover.

Mount the cable clamps with the three M4x16 screws as shown in Figure 4. Note that the location of the grounding bar in FR6/MF6 is different from what is shown in the picture. 6 32(96) Cabling and connections Honeywell 5. Place the rubber grommets in the openings as shown in Figure 5. 6.

Fix the cable entry gland to the frame of the frequency converter with the five M4x10 screws (Figure 6). Close the cover of the frequency converter. 6 Honeywell Cabling and connections 33(96) 6.1.3 Installation instructions 1 2 3 Before starting the installation, check that none of the components of the frequency converter is live. The NXL frequency converter types MF2 and MF3 shall be installed inside switchgear, separate cubicle or electrical room because of the protection class IP20 and the fact that the cable terminals are not protected. Place the motor cables sufficiently far from other cables: Avoid placing the motor cables in long parallel lines with other cables If the motor cables run in parallel with other cables, note the minimum distances between the motor cables and other cables given in table below. The given distances also apply between the motor cables and signal cables of other systems. The maximum length of the motor cables is 30 m (MF2-MF3), 50 m (MF4) and 300 m (MF5 MF6). The motor cables should cross other cables at an angle of 90 degrees.

Distance betw een cables [m] 0.3 1.0 Shielded cable [m] 2 0 5 0 4 5 If cable insulation checks are needed, see Chapter 6.1.5. Connect the cables: Strip the motor and mains cables as advised in Table 6-4 and Figure 6-5. Connect the mains, motor and control cables into their respective terminals (see e.g.). For Information on cable installation according to UL regulations see Chapter 6.

1.4. Make sure that the control cable wires do not come in contact with the electronic components of the unit. If an external brake resistor (option) is used, connect its cable to the appropriate terminal. Check the connection of the earth cable to the motor and the frequency converter terminals marked with . Connect the separate shield of the motor cable to the earth plate of the frequency converter, motor and the supply centre. Ensure that the control cables or the cables of the unit are not trapped between the frame and the protection plate. 6 34(96) Cabling and connections Honeywell 6.1.3.

1 Stripping lengths of motor and mains cables Earth conductor Earth conductor A1 C1 A2 C2 B1 D1 B2 D2 MAIN S Figure 6-5.Stripping of cables MOTOR nk6141.fh8 A1 B1 Frame 7 35 MF2 7 40 MF3 15 35 MF4 20 40 MF5 20 90 MF6 Table 6-4. Cables stripping lengths [mm] C1 7 7 10 10 15 D1 20 30 20 30 60 A2 7 7 7 20 20 B2 50 60 50 60 90 C2 7 7 7 10 15 D2 35 40 35 40 60 6 Honeywell Cabling and connections 35(96) 6.1.3.2 Installation of cables to NXL Note: In case you want to connect an external brake resistor (MF3 and bigger sizes), see separate Brake Resistor Manual. Figure 6-6. NXL Compact, MF2 Control cable Earth terminal Motor cable Mains cable Figure 6-7. Cable installation in NXL Compact, MF2 (500V, 3-phase) 6 36(96) Cabling and connections Honeywell Figure 6-8.

NXL Compact, MF3 Control cable Earth terminal Brake resistor terminals Motor cable BRBR+ Mains cable Figure 6-9. Cable installation in NXL Compact, MF3 NOTE! NXL Compact (MF2-3): It is advisable to connect the cables to the terminals and earthing plate first and then attach the terminals and earthing plate to the unit. 6 Honeywell Cabling and connections 37(96) Installation of an external RFI filter to NXL Compact (MF2-3) The EMC protection class of NXL Compact frequency converters MF2 and MF3 can be changed from N to H with an optional external RFI filter. Install the power cables in terminals L1, L2 and L3 and the grounding cable in terminal PE of the filter. See the figures below. See also mounting instructions of MF2 in Figure 5-2.



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MF2 MF3 BRBR+ W/T3 V/T2 U/T1 W/T3 V/T2 U/T1 L3 L2 RFI filter cable Earthing cable Ground L3 L2 L1 L1 PE L1 L2 L3 RFI filter Earthing cable Mains cable nxlk1.fh8 Figure 6-10. MF2 with the RFI-filter Figure 6-11. RFI installation for MF2 and MF3, 380. ..500V, 3 phase supply. Filter type NXLRFIV35 MF3 MF2 BRBR+ W/T3 V/T2 U/T1 W/T3 V/T2 U/T1 L3 L2 RFI filter cable Earthing cable Ground L2 L1 L1 PE N L RFI filter Earthing cable Mains cable rfi2.fh8 Figure 6-12.

RFI cable installation for MF2 and MF3, 208...240V, 1 phase supply. Filter type NXLRFIV12 6 38(96) Cabling and connections Honeywell RFI Filter type NXLRFIV35 NXLRFIV12 Input voltage 380-500V 3~ 208-240V 1~ Dimensions WxHxD (mm) 60x252x35 60x252x35 Table 6-5.

RFI filter types and their dimensions 6 Honeywell Cabling and connections 39(96) Figure 6-13. NXL HVAC (03-12), MF4 DC terminals Brake resistor terminals Earth terminals Mains cable Motor cable Figure 6-14. Cable installation in NXL HVAC (03-12), MF4 6 40(96) Cabling and connections Honeywell Figure 6-15. NXL HVAC (16-31), MF5 DC terminals Brake resistor terminals Earth terminals Mains cable Motor cable Figure 6-16. Cable installation in NXL HVAC (16-31), MF5 6 Honeywell Cabling and connections 41(96) Figure 6-17. NXL HVAC (38-61), MF6 DC terminals Brake resistor terminals Earth terminals Motor cable Mains cable Figure 6-18. Cable installation in NXL HVAC (38-61), MF6 6 42(96) Cabling and connections Honeywell 6.1.4 Cable installation and the UL standards To meet the UL (Underwriters Laboratories) regulations, a UL-approved copper cable with a minimum heat-resistance of +60/75°C must be used. The tightening torques of the terminals are given in Table 6-6.

Tightening torque [Nm] MF2 0.5--0.6 MF3 0.5--0.6 MF4 0.5--0.6 MF5 1.2--1.5 MF6 4 Table 6-6. Tightening torques of terminals Frame Tightening torque in lbs. 4--5 4--5 4--5 10--13 35 6.1.5 Cable and motor insulation checks 1. Motor cable insulation checks Disconnect the motor cable from terminals U, V and W of the frequency converter and from the motor. Measure the insulation resistance of the motor cable between each phase conductor as well as between each phase conductor and the protective ground conductor.

The insulation resistance must be >1M. 2. Mains cable insulation checks Disconnect the mains cable from terminals L1, L2 and L3 of the frequency converter and from the mains. Measure the insulation resistance of the mains cable between each phase conductor as well as between each phase conductor and the protective ground conductor. The insulation resistance must be >1M.

3. Motor insulation checks Disconnect the motor cable from the motor and open the bridging connections in the motor connection box. Measure the insulation resistance of each motor winding. The measurement voltage must equal at least the motor nominal voltage but not exceed 1000 V. The insulation resistance must be >1M. 6 Honeywell Cabling and connections 43(96) 6.2 Control unit 6.2.1 NXL Compact (MF2 MF3) The control unit of the NXL frequency converter is integrated with the power unit and consists roughly of the control board and one optional board, which can be connected to the slot connector of the control board. 6.

2.2 NXL HVAC (MF4 MF6) In NXL HVAC frames MF4-MF6 there are two option board connectors SLOT D and SLOT E (see Figure 6-19). Slot E: I/O boards, fieldbus boards and expanders Slot D: Fieldbus boards D E Figure 6-19. Option board slots D and E in frames MF4 MF6 6.2.2.1 Allowed option boards in NXL HVAC: See below for the allowed option boards in the two slots on NXL HVAC frequency converters: SLOT D SLOT E C2 AA C3 AI C4 B1 C6 B2 C7 B4 C8 B5 C1 B9 C2 C3 C4 C6 C7 C8 C1 C2 In NXL HVAC series the option board NXLOPTAI is included in all deliveries as standard. The free slot D is meant for additional fieldbus boards. When two option boards are used, the one in slot E has to be NXLOPTAI or NXLOPTAA. It is not allowed to use two NXOPTB_ or NXOPTC_ boards.

Also combinations of NXOPTB_ and NXOPTC_ boards are prohibited. See descriptions for NXLOPTAA and NXLOPTAI option boards in chapters 10 and 11. 6 44(96) Cabling and connections Honeywell 6.2.3 Control connections The basic control connections are shown below.

The signal descriptions of the HVAC and Multicontrol Applications are presented in Chapter 6.2.4 and in Chapter 2 of the HVAC and Multicontrol Application Manuals. 9 10 11 18 19 A B 30 21 22 23 1 2 3 4 5 6 7 8 nxlk13.fh8 Figure 6-20.

Control connections NXL Compact, MF2 MF3 9 10 11 18 19 A B 30 1 2 3 4 5 6 7 8 21 22 23 nxlk49.fh8 Figure 6-21. Control connections NXL HVAC, MF4 MF6 6 Honeywell Cabling and connections 45(96) 6.2.4 Control I/O Reference Potentiometer 1-10 k 1 2 3 4 5 6 7 8 9 10 11 mA 18 19 A B 30 21 22 23 Terminal +10Vref AI1+ AI1AI2+ AI2/GND +24V GND DIN1 DIN2 DIN3 GND AO1+ AO1RS 485 RS 485 +24V RO1 RO1 RO1 Signal Reference output Analogue input, voltage range 0--10V DC. I/O Ground Analogue input, current range 0--20mA Control voltage output I/O ground Start forward (programmable) Start reverse (programmable) Preset speed selection 1 (programmable) I/O ground Output frequency Analogue output Serial bus Serial bus 24V aux. input voltage Relay output 1 FAULT Description Voltage for potentiometer, etc. Voltage input frequency reference Ground for reference and controls Current input frequency reference Voltage for switches, etc. max 0.1 A Ground for reference and controls Contact closed = start forward Contact closed = start reverse Contact closed = Preset speed 1 Ground for reference and controls Programmable Range 0--20 mA/RL, max.

500 Differential receiver/transmitter Differential receiver/transmitter Control power supply backup Programmable Table 6-7. Default I/O configuration. Terminal +24V GND Exp DIN1 Exp DIN2 Exp DIN3 Exp RO1 Exp RO1 TI+ TISignal +24 V DC I/O ground Preset speed selection 2 (programmable) Fault Reset (programmable) Disable PID (PID control selection) (Programmable) Expander Relay output 1 (NO) RUN Motor Thermistor input Description Control voltage output; voltage for switches etc. Ground for reference and controls Contact closed = Preset speed 2 Contact closed = Fault reset Contact closed = Disable PID Programmable Active = Fault, stop according to defined method 12 13 14 15 16 25 26 28 29 Table 6-8. Additional inputs in NXL HVAC (available as option for NXL Compact) Terminal +10Vref AI1+ or DIN 4 AI1AI2+ AI2/GND + 24 V GND Signal Reference output Analogue input, voltage range 0--10V DC I/O Ground Analogue input, voltage range 0--10V DC or current range 0--20mA Control voltage output I/O ground Description Voltage for potentiometer, etc. Voltage input frequency reference (MF2-3) Voltage/current input frequency reference (MF4-MF6) Can be programmed as DIN4 Ground for reference and controls Voltage or current input frequency reference 1 2 3 4 5 6 7 Ground for reference and controls Table 6-9.



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All configuration, when programmed as DIN4 6 46(96) Cabling and connections Honeywell 6.2.5.1 2 Control terminal signals Signal Reference voltage Analogue input, voltage (MF4 and bigger: voltage or current) Terminal +10 Vref AI1+ 3 4 AI1 AI2+ Analogue input common Analogue input, voltage or current 5 6 7 8 9 10 11 18 19 A B 30 21 22 23 AI2 24 Vout GND DIN1 DIN2 DIN3 GND AO1+ AO1/GND RS 485 RS 485 +24V RO1/1 RO1/2 RO1/3 Analogue input common 24V auxiliary output voltage I/O ground Digital input 1 Digital input 2 Digital input 3 I/O ground Analogue signal (+output) Analogue output common Serial bus Serial bus 24V auxiliary input voltage Relay output 1 Technical information Maximum current 10 mA MF2-MF3: Voltage input MF4-MF6 Selection V or mA with jumper block X8 (see page 39): Default: 0 +10V (Ri = 200 k) 0 20mA (Ri = 250) Differential input if not connected to ground; Allows ±20V differential mode voltage to GND Selection V or mA with jumper block X4(MF2-MF3) and X13 (MF4-MF6) Default: 0 20mA (Ri = 250) 0 +10V (Ri = 200 k) Differential input; Allows ±20V differential mode voltage to GND ±10%, maximum current 100 mA Ground for reference and controls Ri = min. 5k Ground for reference and controls Output signal range: Current 0(4)20mA, RL max 500 or Differential receiver/transmitter, bus impedance 120 Differential receiver/transmitter, bus impedance 120 Control power supply backup Switching capacity: 24VDC/8A 250VAC/8A 125VDC/0,4A Relay output terminals are electrically isolated from the I/O ground Table 6-9.

Control I/O terminal signals NOTE! NXL HVAC additional inputs terminal signals defined in section 11 NXLOPTAI 6 Honeywell Cabling and connections 47(96) 6.2.5.1 Jumper selections on NXL basic board The user is able to customise the functions of the frequency converter to better suit his needs by selecting certain positions for the jumpers on the NXL board. The positions of the jumpers determine the signal type of analogue input (terminal #2) and whether the termination resistor RS485 is used or not.

The following figures present the jumper selections of NXL frequency converters: Jumper block X 4 in M F 2 : Analogue input programming T ermination resistor programming Jumper block X 4 in M F 3 : 0...20mA; Current input 0...20mA; Current input T ermination resistor RS 485 is not used Analogue input programming T ermination resistor programming Voltage input; 0...10V Jumper block X 7 in M F 3 : Voltage input; 0...10V T ermination resistor RS 485 is in use T ermination resistor RS 485 is in use = Factory default T ermination resistor RS 485 is not used nxlk15.fh8 Figure 6-22. Jumper selection for NXL, MF2 and MF3 6 48(96) Cabling and connections Honeywell Jumper block X 8 : AI1 m ode Jumper block X 1 3 : AI2 m ode 0.

...20mA; Current input 0...20mA; Current input Voltage input; 0...10V Voltage input; 0...10V Voltage input; 0...10V (differential) Jumper block X 9 : T ermination resistor RS 485 is in use T ermination resistor RS 485 is not used = Factory default nxlk54.

fh8 Figure 6-23. Jumper selection for NXL HVAC, MF4 MF6 WARNING ! Check the correct positions of the jumpers. Running the motor with signal settings different from the jumper positions will not harm the frequency converter but may damage the motor. If you change the AI signal content also remember to change the corresponding parameters (S6.9.

1, 6.9.2) in System Menu. NOTE ! 6 Honeywell Cabling and connections 49(96) Jumper block X4 Jumper block X7 Figure 6-24. The location of jumper blocks in MF2 (left) and MF3 (right) X8 X13 X9 Figure 6-25. The location of jumper blocks in the control board of NXL HVAC 6 50(96) 6.2.6 Cabling and connections Motor thermistor (PTC) connection Honeywell There are three possibilities to connect a PTC resistor to NXL: 1. With optional board NXLOPTAI. (Recommended method.

Board included in NXL HVAC as standard) NXL equipped with NXLOPTAI fulfils IEC 664 if the motor thermistor is insulated (= effective double insulation). 2. With optional board NXOPTB2. NXL equipped with NXOPTB2 fulfils IEC 664 if the motor thermistor is insulated (= effective double insulation). 3. With the digital input (DIN3) of NXL. The DIN3 is electrically connected to other I/O's of NXL. This is why reinforced or double insulation of the thermistor (IEC 664) is absolutely required outside the frequency converter (in the motor or between the motor and the frequency converter). Figure 6-26. Motor thermistor (PTC) connection +24 V (terminal 6) External resistor 4. 7 k...5.6 k DIN3 (terminal 10, par.

2.1.18 = 14) External PTC Resistor GND (terminal 11) nxlk60.fh8 Note! The NXL trips when PTC impedance exceeds 4,7 k It is strongly recommended to use NXLOPTAI or NXOPTB2 board for motor thermistor connection. If the motor thermistor is connected to DIN3, the instructions above must be followed; otherwise a serious safety hazard may result from the connection.

6 Honeywell 7. CONTROL KEYPAD Control Keypad 51(96) 7 The control keypad is the link between the NXL frequency converter and the user. The NXL control keypad features a seven-segment display with seven indicators for the Run status (RUN, , READY, STOP, ALARM, FAULT) and three indicators for the control place (I/O term, Keypad, , Bus/Comm). The control information, i.e. the number of menu, the displayed value and the numeric information are presented with numeric symbols. The frequency converter is operable through the seven push-buttons of the control keypad. Furthermore, the keypad serves the purposes of parameter setting and value monitoring. The keypad is detachable and isolated from the input line potential. 7.

1 Indications on the Keypad display Figure 7-1. NXL control keypad and drive status indications 7.1.1 Drive status indications The drive status indications tell the user what the status of the motor and the drive is. 1 RUN = Motor is running; Blinks when the stop command has been given but the frequency is still ramping down. = Indicate the direction of motor rotation. = Indicates that the drive is not running. 2 3 4 5 6 , STOP READY = Lights when AC power is on.

In case of a fault, the symbol will not light up. ALARM = Indicates that the drive is running outside a certain limit and a warning is given. FAULT = Indicates that unsafe operating conditions were encountered due to which the drive was stopped. 7 52(96) 7.1.2 Control place indications Control Keypad Honeywell The symbols I/O term, Keypad and Bus/Comm (see chapter 7.4.

3.1) indicate the choice of control place made in the Keypad control menu (see chapter 7.4.3). a b c 7. 1.3 I/O term Keypad Bus/Comm = I/O terminals are the selected control place; i.e. START/STOP commands or reference values are given through the I/O terminals.



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= Control keypad is the selected control place; i.e. the motor can be started or stopped and its reference values altered from the keypad. = The frequency converter is controlled through a fieldbus. Numeric indications The numeric indications provide the user with information on his present location in the keypad menu structure as well as with information related to the operation of the drive. Honeywell Control Keypad 53(96) 7.7.

2 Keypad push-buttons The NXL seven-segment control keypad features 7 push-buttons that are used for the control of the frequency converter (and motor) and parameter setting. Figure 7-2. Keypad push-buttons 7.2.1 Button descriptions ENTER reset = There are two operations integrated in this button. The button operates mainly as reset button except in the parameter edit mode. The button operation is shortly described below. The Enter button serves for: 1) confirmation of selections 2) fault history reset (2... 3 seconds)

This button is used to reset active faults. Note! The motor may start immediately after resetting the faults. Browser button up Browse the main menu and the pages of different submenus. Edit values. Browser button down Browse the main menu and the pages of different submenus. Edit values. Menu button left Move backward in menu. Move cursor left (in parameter edit mode). Exit edit mode. Hold down for 5 seconds for quick change of control place; manual (keypad) remote (fieldbus or I/O).

Menu button right Move forward in menu. Move cursor right (in parameter edit mode). Enter edit mode. ENTER = reset = + = 3 = 4 = 7 54(96) = Control Keypad Honeywell start Start button. Pressing this button starts the motor if the keypad is the active control place. See Chapter 7.4.3.1. Stop button.

Pressing this button stops the motor (unless disabled by parameter P3.4). Stop button serves also for activating the Start-up Wizard (see below) stop = 7.3 Start-up wizard NXL has a built-in start-up wizard, which speeds up the programming of the drive. The wizard helps you choose between four different operating modes, Standard, Fan, Pump and High Performance. Each mode has automatic parameter settings optimised for the mode in question. The programming wizard is started by pressing the Stop button for 5 seconds, when the drive is in stop mode. @@@@NXL Start-up wizard Note! @@@@The control keypad navigation chart is shown on page 46. Please note that the menu M1 is located in the lower left corner. @@@@The values are updated once every 0.

3 seconds. This menu is meant only for value checking. The values cannot be altered here. For changing values of parameters see Chapter 7.4. 2. Figure 7-5. @board: Relay output statuses I/O exp. @@@@The value editing procedure is presented in Figure 76. @@@@Pushing the Menu button right takes you to the edit mode.

As a sign of this, the parameter value starts to blink. @Consequently, the blinking stops and the new value is visible in the value field. 2 Push the Menu button right once again. Now you will be able to edit the value digit by digit. This editing manner may come in handy, when a relatively greater or smaller value than that on the display is desired. Confirm the change with the Enter button. The value will not change unless the Enter button is pushed. Pressing the Menu button left takes you back to the previous menu. Several parameters are locked, i.e.

not editable, when the drive is in RUN status. The frequency converter must be stopped in order to edit these parameters. The parameters values can also be locked using the function in menu S6 (see Chapter 7.4.7.2). You can return to the Main menu anytime by pressing the Menu button left for 1--2 seconds. The basic parameters are listed in Chapter 8.3. You will find the complete parameter lists and descriptions in the HVAC and Multi-Control Application manuals.

Once in the last parameter of a parameter group, you can move directly to the first parameter of that group by pushing the Browser button up. Honeywell Control Keypad 61(96) 7 READY STOP I/O term READY STOP READY STOP READY STOP I/O term I/O term I/O term READY STOP READY STOP READY STOP I/O term I/O term I/O term enter Hz Hz Hz nxlk17.fh8 Figure 7-6. Parameter value change procedure 7 62(96) Control Keypad Honeywell 7.4.

3 Keypad control menu (K3) In the Keypad Controls Menu, you can choose the control place, edit the frequency reference and change the direction of the motor. Enter the submenu level with the Menu button right. Parameters in Menu K3 P3.1 = Selection of control place R3.2 = Keypad reference P3.3 = Keypad direction 0 = Forward 1 = Reverse 0 = Limited function of Stop button 1 = Stop button always enabled Selections 1 = I/O terminals 2 = Keypad 3 = Fieldbus P3.4 = Stop button activation P3.5 = PID reference 1 P3.6 = PID reference 2 7.4.3.1 Selection of control place There are three different places (sources) which the frequency converter can be controlled from. For each control place, a different symbol will appear on the alphanumeric display: Control place I/O terminals Keypad (panel) Fieldbus Symbol I/O term Keypad Bus/Comm Change the control place by entering the edit mode with the Menu button right. The options can then be browsed through with the Browser buttons. Select the desired control place with the Enter button.

See the diagram below. See also Chapter 7.4.3 above. READY STOP READY STOP READY STOP I/O term I/O term I/O term READY STOP READY STOP I/O term I/O term enter Figure 7-7. Selection of control place Honeywell Control Keypad 63(96) 7 7.4.3.2 Keypad reference The keypad reference submenu (R3.2) displays and allows the operator to edit the frequency reference.

The changes will take place immediately. This reference value will not, however, influence the rotation speed of the motor unless the keypad has been selected as the active control place. NOTE: The maximum difference between the output frequency and the keypad reference is 6 Hz. The application software monitors the keypad frequency automatically. See Figure 7-6 for how to edit the reference value (pressing the Enter button is not, however, necessary).

7.4.3.3 Keypad direction The keypad direction submenu displays and allows the operator to change the rotating direction of the motor. This setting will not, however, influence the rotation direction of the motor unless the keypad has been selected as the active control place.

See Figure 7-7 for how to change the rotation direction. 7.4.3.4 Stop button activation By default, pushing the STOP button will always stop the motor regardless of the selected control place. You can disable this function by giving parameter 3.4 the value 0. If the value of this parameter is 0, the STOP button will stop the motor only when the keypad has been selected as the active control place. See Figure 7-7 for how to change the value of this parameter.



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4.4 Active faults menu (F4) The Active faults menu can be entered from the Main menu by pushing the Menu button right when the location indication F4 is visible on the keypad display. The memory of active faults can store the maximum of 5 faults in the order of appearance. The display can be cleared with the Reset button and the read-out will return to the same state it was before the fault trip. The fault remains active until it is cleared with the Reset button or with a reset signal from the I/O terminal. Note! Remove external Start signal before resetting the fault to prevent unintentional restart of the drive. Normal state, no faults: 7.4.4.1 Fault types In the NXL frequency converter, there are two different types of faults.

These types differ from each other on the basis of the subsequent behaviour of the drive. See Table 7-3. Fault types. Figure 7-8. Fault display READY SP TO I/O term S OP T READY I/O term S OP T READY I/O term nxlk19.

fh8 Fault type symbol A (Alarm) F (Fault) Table 7-3. Fault types Meaning This type of fault is a sign of an unusual operating condition. It does not cause the drive to stop, nor does it require any special actions. The 'A fault' remains in the display for about 30 seconds. An 'F fault' is a kind of fault that makes the drive stop.

Actions need to be taken in order to restart the drive. Honeywell 7.4.5 Fault codes Control Keypad 65(96) 7 The fault codes, their causes and correcting actions are presented in the table below. The shadowed faults are A faults only. The items written in white on black background present faults for which you can program different responses in the application. See parameter group Protections. Note! When you contact the factory or the distributor due to a fault, it is advisable to write down all fault texts and codes that appear on the keypad Fault code 1 Fault Overcurrent Possible cause Frequency converter has detected too high a current ($>4 \cdot I_n$) in the motor cable: - sudden heavy load increase - short circuit in motor cables - unsuitable motor The DC-link voltage has exceeded the limits defined in Table 4-3. - too short a deceleration time - high overvoltage spikes in supply Current measurement has detected that the sum of motor phase current is not zero. - insulation failure in cables or motor - component failure - faulty operation DC-link voltage is under the voltage limits defined in Table 4-3.

- most probable cause: too low a supply voltage - frequency converter internal fault Current measurement has detected that there is no current in one motor phase. Heatsink temperature is under 10°C Heatsink temperature is over 90°C . @@Check motor size. Check cables. 2 Overvoltage Make the deceleration time longer. 3 8 Earth fault System fault Check motor cables and motor. Reset the fault and restart. Should the fault re-occur, contact the distributor near to you. @@Check the supply voltage. If it is adequate, an internal failure has occurred.

Contact the distributor near to you. @@Motor overheating has been detected by frequency converter motor temperature model. Motor is overloaded. Check the correct amount and flow of cooling air. Check the heatsink for dust.

Check the ambient temperature (p2.6.8). Make sure that the switching frequency is not too high in relation to ambient temperature and motor load. Check motor.

Check that Pump or Fan is not jammed Decrease the motor load. If no motor overload exists, check the temperature model parameters. 7 66(96) Control Keypad Honeywell 17 22 Motor underload/ Pump Dry detection/ Broken belt Detection EEPROM checksum fault Counter fault Microprocessor watchdog fault Thermistor fault Motor underload protection has tripped. FAN: check that Belt is not broken PUMP: check that Pump is not dry 24 25 Parameter save fault - faulty operation - component failure Values displayed on counters are incorrect - faulty operation - component failure The thermistor input of option board has detected increase of the motor temperature Contact the distributor near to you Reset the fault and restart. Should the fault re-occur, contact the distributor near to you. Check motor cooling and loading Check thermistor connection (If thermistor input of the option board is not in use it has to be short circuited) Reset the fault and restart Should the fault re-occur, contact the distributor near to you. Contact the distributor near to you. Reset Contact the distributor near to you. Check loading. Check motor size.

Reset Reset Check the current loop circuitry. 29 34 Internal bus communication Application fault Device removed Device unknown IGBT temperature Device change Device added Analogue input $I_{in} < 4\text{mA}$ (selected signal range 4 to 20 mA) External fault Ambient interference or defective hardware 35 39 40 41 44 45 50 Selected application does not function. Option board removed. Drive removed. Unknown option board or drive. IGBT Inverter Bridge overtemperature protection has detected too high a motor current. Option board changed. Option board has default settings. Option board added. Current at the analogue input is $< 4\text{mA}$.

- control cable is broken or loose - signal source has failed Digital input fault. Digital input has been programmed as external fault input and this input is active. The connection between the control keypad and the frequency converter is broken. 51 52 Keypad communication fault Check the programming and the device indicated by the external fault information. Check also the cabling of this device.

Check keypad connection and possible keypad cable. Honeywell Control Keypad 67(96) 7 53 Fieldbus fault The data connection between the fieldbus Master and the fieldbus board is broken Defective option board or slot Check installation. If installation is correct contact the nearest Honeywell distributor Check board and slot. Contact the nearest Honeywell distributor 54 Slot fault 55 Actual value supervision Actual value has exceeded or fallen below (depending on par. 2.

7.22) the actual value supervision limit (par. 2.7.23) Table 7-4. Fault codes READY S OP T I/O term S OP T READY I/O term S OP T READY I/O term nxlk20.fh8 Push Enter to reset! 7.4.6 Fault history menu (H5) The Fault history menu can be entered from the Main menu by pushing the Menu button right when the location indication H5 is visible on the keypad display. All faults are stored in the Fault history menu in which you can browse through them using the Browser buttons.

You can return to the previous menu anytime by pushing the Menu button left. The memory of the frequency converter can store a maximum of 5 faults in the order of appearance. The latest fault carries the indication H5.1, the second latest H5.2 etc. If there are 5 uncleared faults in the memory the next occurring fault will erase the oldest from the memory. Pressing the Enter button for about 2 to 3 seconds resets the whole fault history.



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