

# Operating comfort redefined Frequency Inverters M-MAX



Product Information  
Frequency Inverter M-MAX

## M-MAX Frequency Inverter System Features

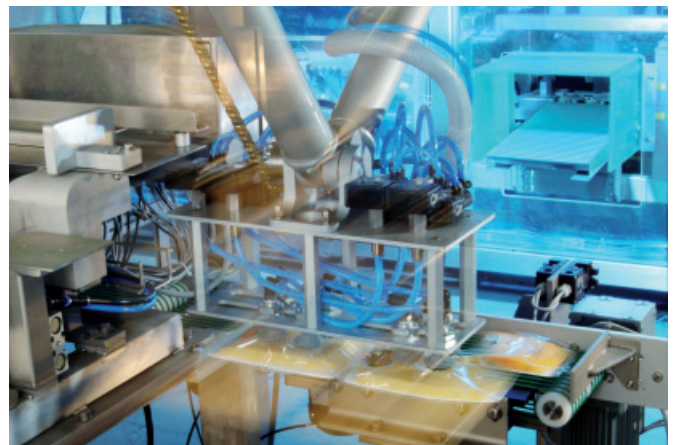


The M-MAX series frequency inverters allow drives to be adapted easily to customer requirements. With a compact design for assigned motor ratings from 0.25 kW to 5.5 kW, M-MAX can offer maximum flexibility. M-MAX also demonstrates how a high level of functionality can be implemented in a simple and user-friendly design. The small and compact book format design also allows a space saving installation. M-MAX is provided with an integrated RFI filter (EMC) and a flexible interface for solving important machine building requirements, for example, the optimization of production and manufacturing processes. It reliably ensures the required motion sequences of the drive motor and thus contributes to operational safety.



### M-MAX – the “energy optimizer”

M-MAX frequency inverters provide an economical solution for several processes in pumping applications. The integrated PI controller and extensive motor-protective functions ensure a high level of operational reliability and allow significant energy savings in the connected process. The lacquered control boards also allow use in highly humid and aggressive environments, such as in a sewage treatment plant. The optional MMX-IP21-FS... accessory enables the degree of protection of the M-MAX to be increased to IP21.



### M-MAX – for “dynamic precision”

The compact design of the M-MAX saves valuable mounting space in machine building since the RFI filter and the brake chopper are already integrated. Shielded control and motor cable can also be connected with EMC compliance directly to the frequency inverter. The maximum permissible ambient temperature of +50 °C during operation with continuous current and with full overload withstand capability also meets machine building requirements. The performance of the sensorless vector control ensures also a high speed accuracy; even with load deviations and low motor speeds.



### M-MAX – the “safe operator”

Good climatic conditions as well as safe operation in the event of fire (fume removal) are demanding tasks for frequency controlled ventilation systems in buildings. With its internal protective circuits and the automatic restart option (e.g. after a momentary power failure), as well as automatic synchronization with the running motor (flying restart circuit), the frequency inverters of the M-MAX series ensure the safe operation of fans in air conditioning and smoke control systems.



### MMX-COM-PC – the “in-line communicator”

The MMX-COM-PC communication module that can be plugged onto the front provides the following without a mains voltage on the frequency inverter (internal battery):

- Upload and download of all parameters,
- Direct link to a PC via USB interface (parameter assignment),
- Copying of parameters for series machines or when exchanging devices.

This communication module considerably increases data security and reduces the time required for commissioning and maintenance.

## Frequency inverters - simple and straightforward

### Display unit



#### Backlit liquid crystal display (LCD)

##### Status symbols (▲):

- READY = Ready to start
- RUN = Operational
- STOP = Stop, Stop command active
- ALARM = Alarm message active
- FAULT = Drive was stopped due to an error message

##### Menu level (◀):

- REF = Reference value entry
- MON = Monitor operating data
- PAR = Parameters
- FLT = Fault memory (Fault)

##### Control commands (▼):

- FWD = Forward run
- REV = Reverse run
- I/O = Via control terminals (Input/Output)
- KEYPAD = Via the keypad
- BUS = Via fieldbus (interface)

### Features

- Integrated RFI filter (EMC: C2 and C3 to/EN61800-3)
- Dynamic motor control with sensorless vector control or V/f control (selectable)
- Integrated keypad and display unit
- Electronic reference value potentiometer
- Fixed frequencies
- PI controller
- Integrated brake unit (with MMX34 in sizes 2 and 3)
- 6 digital control inputs (24 V DC)
- 1 digital output (transistor, 24 V DC, 50 mA)
- 2 analog inputs (0...+10 V DC and 0/4.20 mA)
- 1 output analog (0/4...20 mA)
- Serial interface (RS485 / Modbus RTU)
- 2 relays (1x NO, 1x changeover, 230 V AC, 2 A)
- International standards (CE, UL, cUL, c-Tick)

### Function keys



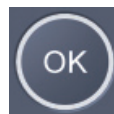
#### START

- Motor start via keypad
- (function must be activated)



#### STOP

- Motor stop via keypad
- Acknowledges the display fault message (Reset)
- Activates the Startup Wizard (press for 5 s)



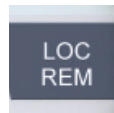
#### OK

- Activates the selected parameter
- Confirm the set value
- Parameter group selection (submenu)



#### BACK/RESET

- Back in menu. Exit edit mode and acknowledge error messages (reset).



#### LOC/REM

- Move between different control levels (keypad – control terminals – fieldbus)



#### UP/DOWN

- Menu level selection in the display unit (◀)
- Change in the parameter groups and parameter lists
- Increase and reduce parameter values
- Increase and reduce reference value (electronic motor potentiometer)

### Application examples

- Speed control of asynchronous three-phase motors up to 5.5 kW (400 V)
- Pump and fan applications in buildings and industrial areas with quadratic and linear load characteristics.
- The high speed accuracy (sensorless) allows a whole range of possible applications in the textile, paper and printing industry, as well as with finishing machines in the metal industry.
- The compact design with integrated EMC filter offers maximum flexibility in machine building and saves valuable mounting space.
- The twofold startup torque and 1.5 overload torque allows the implementation of applications with demanding speed and torque requirements.

## Technical data (extract)

### Type designation and Assigned motor rating

| Type designation                                                               | Article No. | Rated current | Size Motor rating |           |           | Motor rating $P$ |      | Motor rating $P$ |      |
|--------------------------------------------------------------------------------|-------------|---------------|-------------------|-----------|-----------|------------------|------|------------------|------|
|                                                                                |             | $I_e$<br>[A]  | W<br>[mm]         | H<br>[mm] | D<br>[mm] | [kW]             | [A]* | [HP]             | [A]* |
| Mains supply voltage: 1 AC 230 V, 50/60 Hz (177...264 V ±0 %, 45...66 Hz ±0 %) |             |               |                   |           |           |                  |      |                  |      |
| MMX12AA1D7F0-0                                                                 | 121363      | 1.7           | 66                | 157       | 99        | 0.25             | 1.4  |                  |      |
| MMX12AA2D4F0-0                                                                 | 121364      | 2.4           |                   |           |           | 0.37             | 2    | 1/2              | 2.2  |
| MMX12AA2D8F0-0                                                                 | 121365      | 2.8           |                   |           |           | 0.55             | 2.7  |                  |      |
| MMX12AA3D7F0-0                                                                 | 121366      | 3.7           |                   |           |           | 0.75             | 3.2  | 3/4              | 3.2  |
| MMX12AA4D8F0-0                                                                 | 121367      | 4.8           | 90                | 195       | 102       | 1.1              | 4.6  | 1                | 4.2  |
| MMX12AA7D0F0-0                                                                 | 121368      | 7             |                   |           |           | 1.5              | 6.3  | 2                | 6.8  |
| MMX12AA9D6F0-0                                                                 | 121369      | 9.6           | 100               | 263       | 109       | 2.2              | 8.7  | 3                | 9.6  |
| Mains supply voltage: 3 AC 400 V, 50/60 Hz (323...528 V ±0 %, 45...66 Hz ±0 %) |             |               |                   |           |           |                  |      |                  |      |
| MMX34AA1D3F0-0                                                                 | 121397      | 1.3           | 66                | 157       | 99        | 0.37             | 1.1  | 1/2              | 1.1  |
| MMX34AA1D9F0-0                                                                 | 121398      | 1.9           |                   |           |           | 0.55             | 1.5  | 3/4              | 1.6  |
| MMX34AA2D4F0-0                                                                 | 121399      | 2.4           |                   |           |           | 0.75             | 1.9  | 1                | 2.1  |
| MMX34AA3D3F0-0                                                                 | 121400      | 3.3           |                   |           |           | 1.1              | 2.6  | 1-1/2            | 3    |
| MMX34AA4D3F0-0                                                                 | 121401      | 4.3           | 90                | 195       | 102       | 1.5              | 3.6  | 2                | 3.4  |
| MMX34AA5D6F0-0                                                                 | 121402      | 5.6           |                   |           |           | 2.2              | 5    | 3                | 4.8  |
| MMX34AA7D6F0-0                                                                 | 121403      | 7.6           | 100               | 263       | 109       | 3                | 6.6  |                  |      |
| MMX34AA9D0F0-0                                                                 | 121404      | 9             |                   |           |           | 4                | 8.5  | 5                | 7.6  |
| MMX34AA012F0-0                                                                 | 121405      | 12            |                   |           |           | 5.5              | 11.3 | 7-1/2            | 11   |

\*) Rated motor current for normal four-pole internal and surface cooled asynchronous three-phase motors (1500 rpm).

### Operating data

|                                  |                                                                                                                                                                     |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                             | Sensorless vector control / V/f control (selectable)                                                                                                                |
| Output current                   | Rated current at max. +50 °C; Overload withstand capability 150 % for 60 s every 600 s; Startup current 200 % for 2 s every 20 s                                    |
| Output frequency                 | 0...320 Hz; Preset 50 Hz; Resolution 0.01 Hz                                                                                                                        |
| Operating frequency              | 1... 16 kHz; Preset 6 kHz; Resolution 0.1 kHz                                                                                                                       |
| Ambient temperature in operation | -10 °C (without icing) ...+50 °C at rated current                                                                                                                   |
| Humidity                         | 0...95 % relative humidity, non-condensing                                                                                                                          |
| Installation height              | Up to 1,000 m above sea level at 100 % rated current, up to 2,000 m with approx. 1 % reduction per 100 m.                                                           |
| Degree of protection             | IP 20, IP21 (NEMA1) MMX-IP21-FS... option                                                                                                                           |
| Protective functions             | Overvoltage, undervoltage, ground fault detection in motor and motor cable at start, overtemperature, overcurrent, motor overload, motor underload, motor blocking. |
| EMC measures                     | Internal RFI filter (use in accordance with IEC 61800-3 in public, commercial and industrial networks).                                                             |

### Accessories

| Type designation | Article No. | Designation                                                               |
|------------------|-------------|---------------------------------------------------------------------------|
| MMX-COM-PC       | 121406      | Communication module for PC link and parameter transfer                   |
| MMX-IP21-FS1     | 121407      | Housing accessories (66 x 157 x 99) for degree of protection IP21/NEMA1   |
| MMX-IP21-FS2     | 121408      | Housing accessories (90 x 195 x 102) for degree of protection IP21/NEMA1  |
| MMX-IP21-FS3     | 121409      | Housing accessories (100 x 263 x 109) for degree of protection IP21/NEMA1 |
| AWB8230-1603en   | 125633      | Manual M-MAX Hardware and Engineering                                     |
| AWB8230-1603de   | 125632      | Handbuch M-MAX Hardware und Projektierung                                 |

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