OMRON

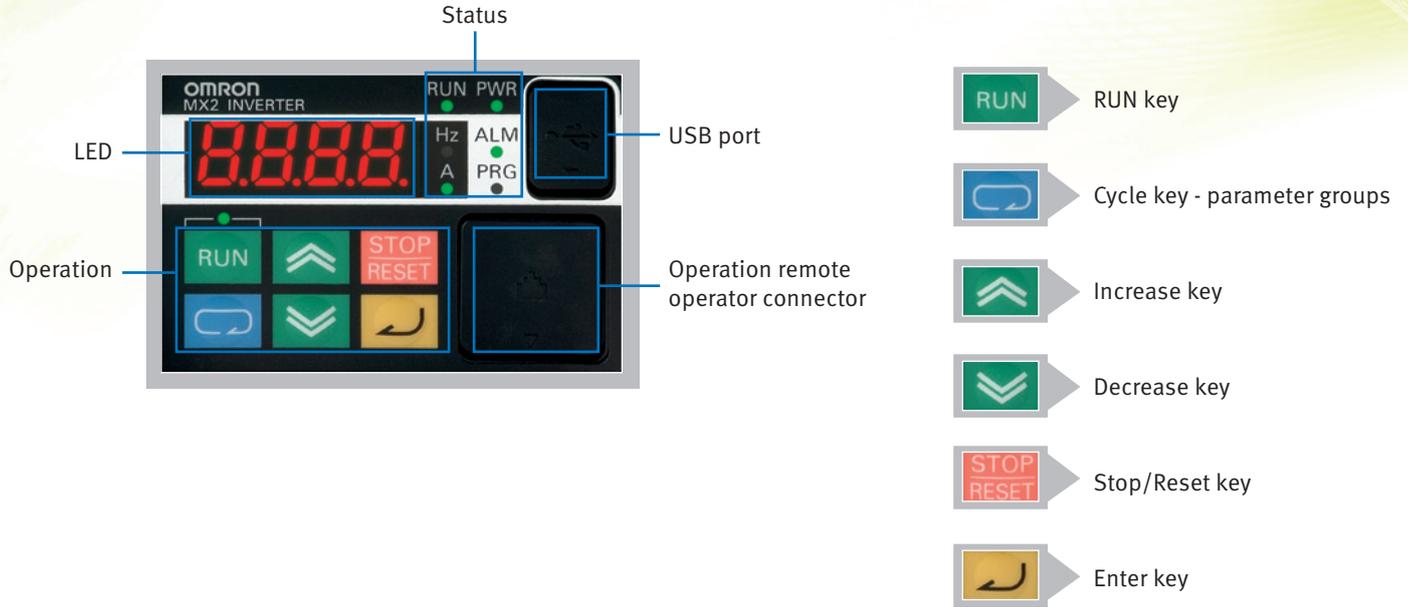# MX2 INVERTER DRIVES

Basic Parameter set-up Guide
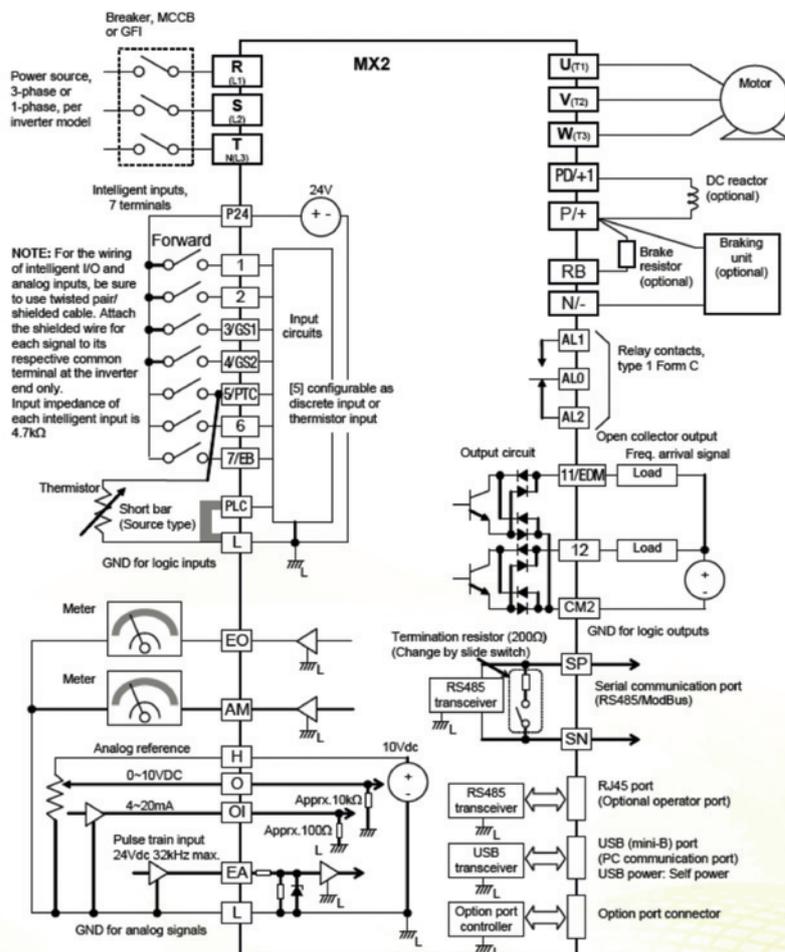
To be used in conjunction with the MX2 Quick Start Guide [I129] and Technical Manual [I570]

realizing

Keypad explanation:

Key	Description
RUN	RUN key
⟲	Cycle key - parameter groups
⌃	Increase key
⌄	Decrease key
STOP/RESET	Stop/Reset key
↵	Enter key

Wiring diagram – Control, mains and motor connections:

Standard connections

Key Functions:

Initialise parameters –

Parameter b084 is used to initialise the drive back to factory defaults:-

b084 =   01   Clears Trip History
         02   initialise All Parameters
         03   Clears Trip History & initialise All Parameters
         04   Clears Trip History & initialise All Parameters + Drive Programming

Initial Value Select (Country Code)
b085 =   00   Area A (Asia/America/China)
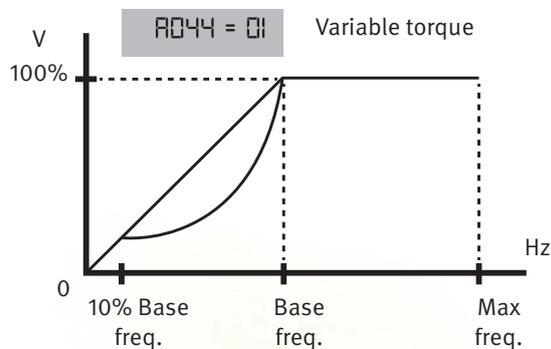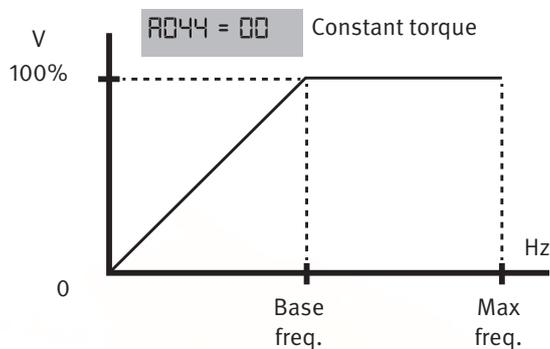   01   Area B (Europe)

Initialisation Trigger
b180 =   00   Disabled
         01   Perform initialise

IMPORTANT – the initialisation must be confirmed by parameter b180!

Control Method –

The drives control method is set in parameter A044

A044 =   00   Constant Torque V/F (Default)
         01   Reduced Torque V/F
         02   Free V/F (Set in b100 – b113)
         03   Sensorless Vector SLV (Open Loop Vector)

b049 is the setting of the Drive's Dual Rating

b049 =   00   Heavy Duty Mode (Default)
         01   Normal Duty Mode

Reference & Run Command Source -

Parameter A001 sets where the reference comes from:-

A001 =	00	Keypad (Pot on external operator)
	01	Control Terminals (Default)
	02	Function F001 setting (Digital Reference)
	03	Modbus network
	04	Option Card
	06	Pulse Train Input
	07	Via Drive Programming
	10	Calc from Function I/P

Parameter A002 sets where the run command comes from -

A002 =	01	Control Terminals (Default)
	02	Operator
	03	Modbus
	04	Option Card

Ramp settings -

Parameter F002 sets the Acceleration1 time in seconds
Parameter F003 sets the Deceleration1 time in seconds

Basic Start-Up Setup -

A003 = Base Frequency (Motor rated Frequency)
A004 = MAX Frequency (FMAX)
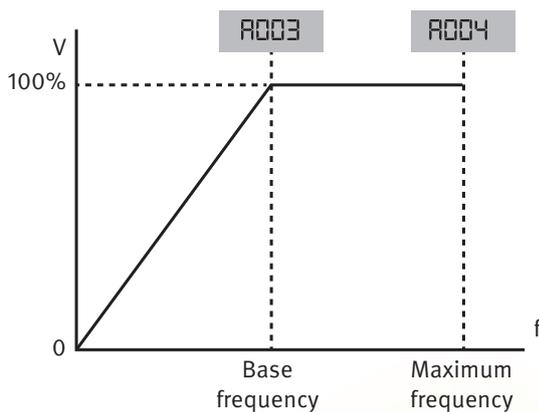
A082 = AVR Voltage (Automatic Voltage Regulator), Motor Voltage, this setting is in fixed steps
B012 = Electronic Thermal Protection (Motor Rated Current)
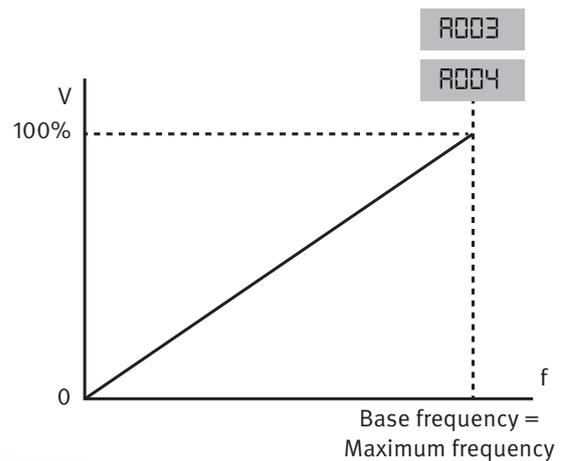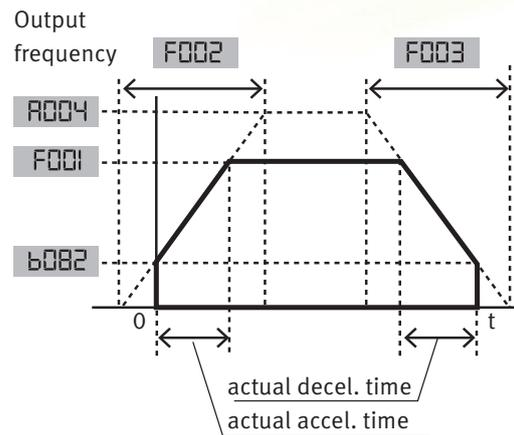B082 = Minimum output Frequency (FMIN)

Fixed References -

Parameters A020 to A035, are where Internal Multi-Step Reference frequencies are stored

Overall Frequency Limits -

A061 = Upper Freq Limit
A062 = Lower Freq Limit

Digital Input Terminals -

Parameters C001 to C007, used to set the functionality of the Digital Inputs1 to 7.

Parameter	Input Terminal	(Default Setting)	Description
C001	1	00	(Forward)
C002	2	01	(Reverse)
C003	3	12	(External Trip)
C004	4	18	(Drive Reset)
C005	5	02	(Multi-step Bit0)
C006	6	03	(Multi-step Bit1)
C007	7	06	(Jog)

Digital Output Terminals   -

Parameters C021, C022 & C026, used to set the functionality of the Digital Outputs 11,12 & Relay AL0, AL1 & AL2

Parameter	Output Terminal	(Default Setting)	Description
C021	11	00	(Run Signal)
C022	12	01	(Freq Arrival)
C026	Relay	05	(Alarm)

Analogue I/O Scaling – [Based on A004 MAX Freq]

Analogue input "O" Voltage
A012 = Upper Frequency Scaling in Hz
A011 = Lower Frequency Scaling in Hz

Analogue Input "OI" Current
A102 = Upper Frequency Scaling in Hz
A101 = Lower Frequency Scaling in Hz
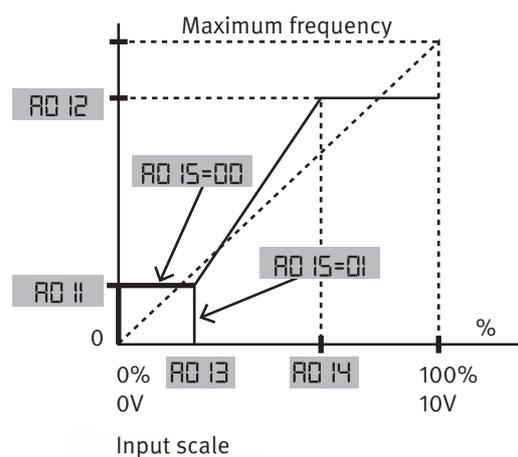
Analogue Output "AM" Function Set in C028
C106 = Gain %   (100 = Default)
C109 = Offset %   (0 = Default)

Note: A015 is 0 start selection
        0 = Start FQ
        1 = 0Hz

Auto-Tuning Function -

Motor Data
The following parameters are used to set-up the basic motor data:-

A003 = Motor Base Frequency (Default = 50Hz)
A082 = AVR Voltage (Automatic Voltage Regulator)
[Motor Volts set in Steps]
b012 = Motors rated current in amps
H003 = Motor Capacity in Kw
H004 = No of Motor Poles

Auto-Tune Function
Selects the type of Auto-tune operation:-
H001 =   00   Disabled
         01   Static Tune
         02   Rotational Tune

Display will show…..

     _ _ _ **o**   **Autotuning OK**
     _ _ _ **9**   **Failed Autotuning**

Auto-Tune Usage

This parameter selects which motor data is used:-
H002 =   00   Hitachi Standard Motor Data
         02   Auto-tuned Data

IMPORTANT – the initialisation must be confirmed by parameter H002!

Auto-tuned Data
The Auto-tuned data is stored in the following parameters, used with H002 = 02:-

H030 = R1   Motor Constant R1 (Ohms) Resistance
H031 = R2   Motor Constant R2 (Ohms) Resistance
H032 = L   Motor Constant L (mH) Inductance
H034 = IO   Motor Constant IO (Amps) Current
H035 = J   Motor Constant J (kgm2) Inertia

Carrier Frequency setting -

The following parameters are used to set the carrier frequency functions:-

b083 = Carrier Frequency (KHz)
b089 = Carrier Frequency Reduction
         00 =   Disabled
         01 =   Enabled dependent on output current (default)
         02 =   Enabled depends on heatsink temp
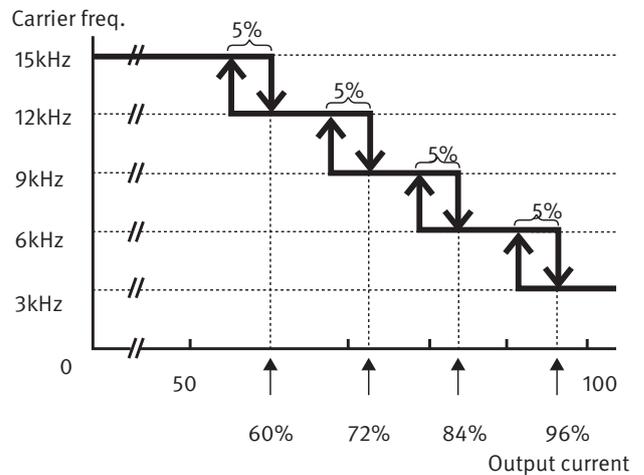
Useful Functions and monitoring -

Monitors

F001 = Reference Frequency in Hz
F002 = Accel Time1 in Seconds
F003 = Decel Time1 in Seconds
d001 = Output Frequency Hz
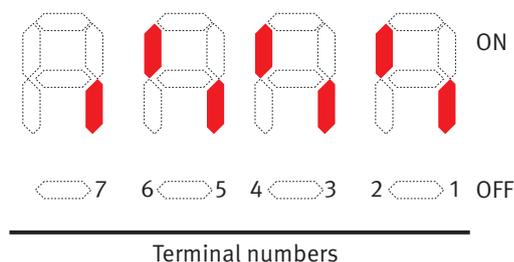d002 = Output Current in Amps
d003 = Rotation Direction F/R
d004 = Process Variable (PV), PID Feedback

d005 = 1 to 7 Input Terminal Status
      (Independent of Programming)
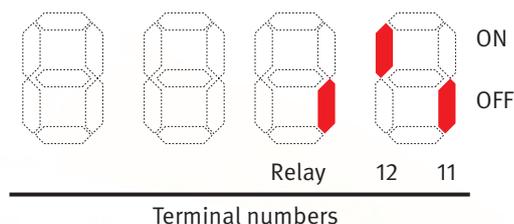
See below diagram for explanation:-

Displays the state of the
intelligent **input** terminals:

Terminal numbers

d006 = Digital Output Terminal Status of 11,12 and
      AL2/AL1/AL0 relay terminals
      (Output Function set in C021,C022 & C026
      Parameters)

See below diagram for explanation:-

Displays the state of the
intelligent **output** terminals:

Terminal numbers

Common Alarm Codes -

There are several common alarm codes which occur on a more frequent basis, below is an explanation of a few:-

E05: Motor Thermal Overload

This alarm is based around the motors rated current set in parameter b012.

The drive monitors the current being drawn by the motor and makes a calculation of how long and how much current the motor is drawing in the peak region above the setting in b012 during Acceleration and Running.

The drive also calculates the time spent running a motor at low output frequencies, as the cooling fan built into the rear of standard induction motors has little or no cooling effect in a motor running at low speed, thus the motor has a possibility of failure due to over heating.

E01 to E04: Over Current

The cause of this alarm is normally due to some form of short circuit on the output of the drive.

With the motor disconnected, run the drive and if this alarm still occurs it's likely the output transistors have gone short circuit, thus the drive will need repairing or replacement.

If this fault is not present with the motor disconnected, it's likely the fault lies with the motor, either the windings are shorting to earth or between phases.

In either case the motor should always be Checked / Tested thoroughly.

E07: DC Bus Overvolt

Generally this alarm only occurs for 2 reasons:

1. The incoming mains supply to the drive is very high, causing the DC bus voltage to rise above the trip level, usually shown as E15 alarm.
2. During motor deceleration, energy is regenerated from the motor back onto the DC bus of the drive causing the DC Bus Voltage level to Rise up to the internal trip level of the drive.
   This can be due to a large inertial load or if the drive has been fitted with regenerative resistors, which have gone open circuit.

E21: Inverter Thermal Trip

Heatsink Overtemp /Heatsink Max Temp, occurs when the drive's ambient temperature is too high or the cooling fans have become blocked with dirt build-up, these alarms will occur.

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Automation Systems
• Programmable logic controllers (PLC) • Human machine interfaces (HMI) • Remote I/O
• Industrial PC's • Software

Motion & Drives
• Motion controllers • Servo systems • Inverters

Control Components
• Temperature controllers • Power supplies • Timers • Counters • Programmable relays
• Digital panel indicators • Electromechanical relays • Monitoring products • Solid-state relays
• Limit switches • Pushbutton switches • Low voltage switch gear

Sensing & Safety
• Photoelectric sensors • Inductive sensors • Capacitive & pressure sensors
• Cable connectors • Displacement & width-measuring sensors • Vision systems
• Safety networks • Safety sensors • Safety units/relay units • Safety door/guard lock switches