

Preface

Thank you for choosing DELTA's high-performance VFD-M Series. The VFD-M Series is manufactured with high-quality components and materials and incorporates the latest microprocessor technology available.

Getting Started

This quick start will be helpful in the installation and parameter setting of the AC motor drives. To guarantee safe operation of the equipment, read the following safety guidelines before connecting power to the AC motor drives. For detail information, refer to the VFD-M User Manual on the CD supplied with the drive.

DANGER!

1. AC input power must be disconnected before any wiring to the AC motor drive is made.
2. A charge may still remain in the DC-link capacitors with hazardous voltages, even if the power has been turned off. To prevent personal injury, please ensure that power has turned off before opening the AC motor drive and wait ten minutes for the capacitors to discharge to safe voltage levels.
3. Never reassemble internal components or wiring.
4. The AC motor drive may be destroyed beyond repair if incorrect cables are connected to the input/output terminals. Never connect the AC motor drive output terminals U/T1, V/T2, and W/T3 directly to the AC mains circuit power supply.
5. Ground the VFD-M using the ground terminal. The grounding method must comply with the laws of the country where the AC motor drive is to be installed. Refer to the Basic Wiring Diagram.
6. VFD-M series is used only to control variable speed of 3-phase induction motors, NOT for 1-phase motors or other purpose.
7. VFD-M series shall NOT be used for life support equipment or any life safety situation.

WARNING!

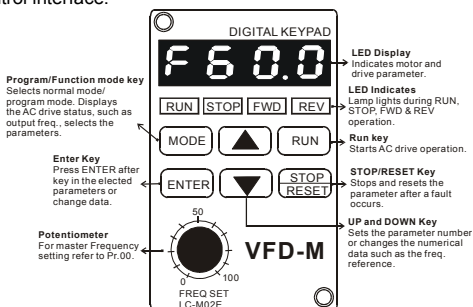
1. DO NOT use Hi-pot test for internal components. The semi-conductor used in AC motor drive easily damage by high-pressure.
2. There are highly sensitive MOS components on the printed circuit boards. These components are especially sensitive to static electricity. To prevent damage to these components, do not touch these components or the circuit boards with metal objects or your bare hands.
3. Only quality person is allowed to install, wire and maintain AC motor drive.

CAUTION!

1. Some parameters settings can cause the motor to run immediately after applying power.
2. DO NOT install the AC motor drive in a place subjected to high temperature, direct sunlight, high humidity, excessive vibration, corrosive gases or liquids, or airborne dust or metallic particles.
3. Only use AC motor drives within specification. Failure to comply may result in fire, explosion or electric shock.
4. To prevent personal injury, please keep children and unqualified people away from the equipment.
5. When the motor cable between AC motor drive and motor is too long, the layer insulation of the motor may be damaged. Please use a frequency inverter duty motor or add an AC output reactor to prevent damage to the motor. Refer to appendix B Reactor for details.
6. The rated voltage for AC motor drive must be $\leq 240V$ ($\leq 480V$ for 460V models, $\leq 600V$ for 575V models) and the mains supply current capacity must be $\leq 5000A$ RMS ($\leq 10000A$ RMS for the $\geq 40hp$ (30kW) models).

Description of Digital Keypad

The digital keypad includes two parts: Display panel and keypad. The display panel provides the parameter display and shows the operation status of the AC drive and the keypad provides programming and control interface.








Specifications

| Voltage Class | | 115V Class | | |
|-----------------------------------|-----------------------------|---|-----|------|
| Model Number VFD-XXXM | | 002 | 004 | 007 |
| Max. Applicable Motor Output (kW) | | 0.2 | 0.4 | 0.75 |
| Max. Applicable Motor Output (hp) | | 0.25 | 0.5 | 1.0 |
| Output Rating | Rated Output Capacity (kVA) | 0.6 | 1.0 | 1.6 |
| | Rated Output Current (A) | 1.6 | 2.5 | 4.2 |
| | Maximum Output Voltage (V) | 3-Phase proportion to twice the input voltage | | |
| Input Rating | Output Frequency (Hz) | 0.1~400 Hz | | |
| | Carrier Frequency (kHz) | 1-15 | | |
| | Rated Input Current (A) | Single phase | | |
| | | 6 | 9 | 16 |
| | Rated Voltage, Frequency | Single phase, 90-120 V, 50/60Hz | | |
| | Voltage Tolerance | ± 10%(90-132V) | | |
| Frequency Tolerance | | ± 5%(47~63Hz) | | |
| Cooling Method | | Fan Cooled | | |
| Weight (kg) | | 1.5 | 1.5 | 1.5 |

| Voltage Class | | 230V Class | | | | | |
|-----------------------------------|---|---------------------------------------|----------|----------|---------|------------------------------|-----|
| Model Number VFD-XXXM | | 004 | 007 | 015 | 022 | 037 | 055 |
| Max. Applicable Motor Output (kW) | | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 |
| Max. Applicable Motor Output (hp) | | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 7.5 |
| Output Rating | Rated Output Capacity (kVA) | 1.0 | 1.9 | 2.7 | 3.8 | 6.5 | 9.5 |
| | Rated Output Current (A) | 2.5 | 5.0 | 7.0 | 10 | 17 | 25 |
| | Maximum Output Voltage (V) | 3-Phase proportional to input voltage | | | | | |
| | Output Frequency (Hz) | 0.1~400 Hz | | | | | |
| | Carrier Frequency (kHz) | 1-15 | | | | | |
| Input Rating | Rated Input Current (A) | Single/3-phase | | | | 3-phase | |
| | | 6.3/2.9 | 11.5/7.6 | 15.7/8.8 | 27/12.5 | 19.6 | 28 |
| | Input Current for 1-phase Models when Using 3-phase Power | 3.2 | 6.3 | 9.0 | 12.5 | -- | -- |
| | Rated Voltage, Frequency | Single/3-phase 200-240 V, 50/60Hz | | | | 3-phase 200-240V, 50/60Hz | |
| | Voltage Tolerance | ± 10%(180~264 V) | | | | | |
| | Frequency Tolerance | ± 5%(4~63 Hz) | | | | | |
| Cooling Method | | Fan Cooled | | | | | |
| Weight (kg) | | 2.2/1.5 | 2.2/1.5 | 2.2/1.5 | 3.2/2.2 | 3.2 | 3.2 |

| Voltage Class | | 575V Class | | | | | |
|-----------------------------------|-----------------------------|---------------------------------------|-----|-----|-----|------|------|
| Model Number VFD-XXXM | | 007 | 015 | 022 | 037 | 055 | 075 |
| Max. Applicable Motor Output (kW) | | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 |
| Max. Applicable Motor Output (hp) | | 1.0 | 2.0 | 3.0 | 5.0 | 7.5 | 10 |
| Output Rating | Rated Output Capacity (kVA) | 1.7 | 3.0 | 4.2 | 6.6 | 9.9 | 12.2 |
| | Rated Output Current (A) | 1.7 | 3.0 | 4.2 | 6.6 | 9.9 | 12.2 |
| | Maximum Output Voltage (V) | 3-phase Proportional to Input Voltage | | | | | |
| | Output Frequency (Hz) | 0.1~400 Hz | | | | | |
| Input Rating | Carrier Frequency (kHz) | 1-10 | | | | | |
| | Rated Input Current (A) | 3-phase | | | | | |
| | | 2.4 | 4.2 | 5.9 | 7.0 | 10.5 | 12.9 |
| | Rated Voltage | 3-phase 500 to 600 V | | | | | |
| | Voltage Tolerance | -15% ~ +10%(425~660 V) | | | | | |
| Cooling Method | Frequency Tolerance | ± 5%(47~63 Hz) | | | | | |
| | | Fan Cooled | | | | | |
| Weight (kg) | | 1.5 | 1.5 | 2.0 | 3.2 | 3.2 | 3.3 |

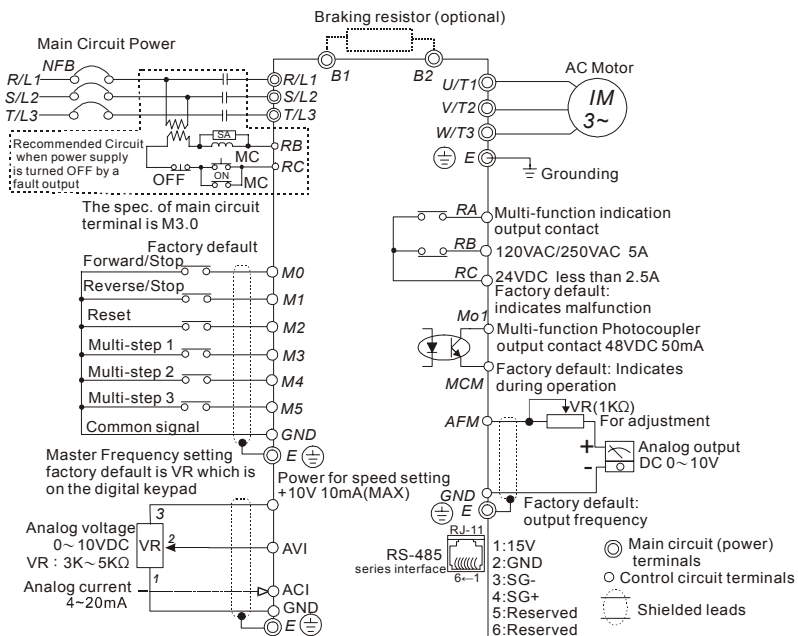
| General Specifications | | |
|---------------------------|--|--|
| Control Characteristics | Control System | SPWM (Sinusoidal Pulse Width Modulation) control (V/F or sensorless vector control) |
| | Freq. Setting Resolution | 0.1Hz |
| | Output Frequency Resolution | 0.1Hz |
| | Torque Characteristics | Including the auto-torque, auto-slip compensation; starting torque can be 150% at 5.0Hz |
| | Overload Endurance | 150% of rated current for 1 minute |
| | Skip Frequency | Three zones, settings range 0.1-400Hz |
| | Accel/Decel Time | 0.1 to 600 seconds (4 Independent settings for Accel/Decel Time) |
| | Stall Prevention Level Frequency Setting | 20 to 200%, Setting of Rated Current |
| | DC Injection Braking | Operation frequency 0-60Hz, output 0-100% rated current Start time 0-5 seconds, stop time 0-25 seconds |
| | Braking Torque | Approx. 20% (up to 125% possible with option braking resistor or braking unit externally mounted, 1-15HP braking transistor built-in) |
| Operating Characteristics | V/F Pattern | Adjustable V/F pattern |
| | Frequency Setting | Keypad Setting by   |
| | | External Signal Potentiometer-5K Ω /0.5W, 0 to +10VDC, 4 to 20mA RS-485 interface; Multi-Function Inputs 0 to 5 (7 steps, Jog, up/down) |
| | Operation Setting Signal | Keypad Set by RUN, STOP |
| | | External Signal M0 to M5 can be combined to offer various modes of operation, RS-485 serial interface (MODBUS). |
| | Multi-Function Input Signal | Multi-step selection 0 to 7, Jog, accel/decel inhibit, first to forth accel/decel switches, counter, PLC operation, external Base Block (NC, NO), auxiliary motor control is invalid, selections, driver reset, UP/DOWN key settings, sink/source selection |
| | Multi-Function Output Indication | AC drive operating, frequency attained, non-zero, base block, fault indication, local/remote indication, PLC operation indication, auxiliary motor output, driver is ready, overheat alarm, emergency stop |
| | Analog Output Signal | Analog frequency/current signal output. |
| Alarm Output Contact | | 1 Form C contact or open collector output |
| Operation Functions | | AVR, S-Curve, over-voltage, over-current stall prevention, fault records, adjustable carrier frequency, DC braking, momentary power loss restart, auto tuning, frequency limits, parameter Lock/Reset, vector control, counter, PID Control, PLC, MODBUS communication, reverse Inhibition, abnormal reset, abnormal re-start, digital frequency output, sleep/revival function, 1st/2nd frequency source selections |
| Protection Functions | | Self-testing, over voltage, over current, under voltage, overload, overheating, external fault, electronic thermal, ground fault. |

| General Specifications | | |
|--------------------------|------------------------------------|---|
| Display Keypads | | 6-key, 4-digit, 7-segment LED, 4 status LEDs, master frequency, output frequency, output current, custom units, parameter values for setup, review and faults, RUN, STOP, RESET, FWD/REV |
| Environmental Conditions | Protection Level | IP20 |
| | Pollution Degree | 2 |
| | Installation Location | Altitude 1,000 m or lower, keep from corrosive gasses, liquid and dust |
| | Ambient Temperature | -10°C to 40°C (-10°C to 50°C without blind plate) Non-Condensing and not frozen |
| | Storage/Transportation Temperature | -20°C to 60°C |
| | Ambient Humidity | Below 90% RH (non-condensing) |
| | Vibration | 9.80665m/s ² (1G) less than 20Hz, 5.88m/s ² (0.6G) at 20 to 50Hz |
| Approvals | |    |

Note: Do not attempt to connect a single-phase power source to a three-phase models drive. However it is acceptable to connect two wires of a three-phase power source to a single-phase drive.

Basic Wiring Diagram

Users must connect wiring according to the following circuit diagram shown below.

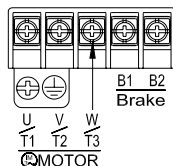
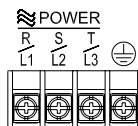


NOTE: Do not plug a Modem or telephone line to the RS-485 communication port, permanent damage may result. Terminal 1 & 2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

* If it is single phase model, please select any of the two input power terminals in main circuit power.

* Single phase model can be input 3-phase power.

Power Terminals



| Model Name | Max. Current (input / output) | Wire Gauge AWG (mm²) | Torque kgf-cm (in-lbf) |
|------------------|-------------------------------|----------------------|------------------------|
| 002M11A | 6A | 12-14 (3.3-2.1) | 14 (12) |
| 004M11A | 9A | | |
| 007M11A | 16A | 12 (3.3) | 15 (13) |
| 004M21B(1-phase) | 6.3A | 12-14 (3.3-2.1) | |
| 004M21B(3-phase) | 2.9A | | |
| 007M21B(1-phase) | 11.5A | | |
| 007M21B(3-phase) | 7.6A | | |
| 015M21B(1-phase) | 15.7A | 12 (3.3) | |
| 015M21B(3-phase) | 8.8A | 12-14 (3.3-2.1) | |
| 022M21A(1-phase) | 27A | 8 (8.4) | |
| 022M21A(3-phase) | 12.5A | 8-12 (8.4-3.3) | |
| 037M23A | 19.6A | 8-10 (8.4-5.3) | |
| 055M23A | 28A | 8 (8.4) | |
| 007M43B | 4.2A | 12-14 (3.3-2.1) | |
| 015M43B | 5.7A | | |
| 022M43B | 6.0A | | |
| 037M43A | 8.5A | 8-14 (8.4-2.1) | 15 (13) |
| 055M43A | 14A | 8-12 (8.4-3.3) | |
| 075M43A | 23A | 8-10 (8.4-5.3) | |
| 007M53A | 2.4A | 12-14 (3.3-2.1) | 14 (12) |
| 015M53A | 4.2A | | |
| 022M53A | 5.9A | | |
| 037M53A | 7.0A | 8-14 (8.4-2.1) | 15 (13) |
| 055M53A | 10.5A | | |
| 075M53A | 12.9A | 8-12 (8.4-3.3) | |

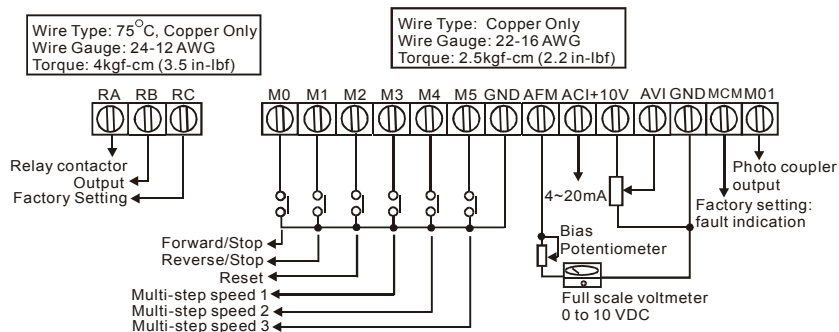
Wire Type: 75 °C Copper Only

Note: It needs to use the Recognized Ring Terminal to conduct a proper wiring.

Terminal Explanations

| Terminal Symbol | Explanation of Terminal Function |
|------------------|---|
| R/L1, S/L2, T/L3 | AC line input terminals (three phase) |
| U/T1, V/T2, W/T3 | Motor connections |
| B1 – B2 | Connections for Braking Resistor (optional) |
| ⊕ | Earth Ground |

Control Terminal Wiring (Factory Setting)



| Terminal symbols | Terminal name | Remarks |
|----------------------|--|---|
| RA – RC | Multi-Function Indication Output Contact | Refer to Pr.46 Relay output contact RA-RC (N.O. Contact) RB-RC (N.C. Contact) |
| RB – RC | Multi-Function Indication Output Contact | |
| MO1 -MCM | Multi-function PHC output | Refer to Pr.45 |
| RJ – 11 | Serial communication port | RS-485 serial communication interface |
| +10V - GND | | Power Supply (+10 V) |
| AVI - GND | Analog voltage freq. command | 0 to +10 V (Max. Output Frequency) Input |
| ACI - GND | Analog current freq. command | 4 to 20mA (Max. Output Frequency) Output |
| AFM - GND | Analog frequency/current meter | 0 to +10 V (Max. output Frequency) Output |
| M0 - GND | Multi-function auxiliary input | Refer to Pr.38 to Pr.42 |
| M1 - GND To M5 - GND | Multi-function input 1 To Multi-function input 5 | |
| | | |

Note: Use twisted-shielded, twisted-pair or shielded-lead wires for the control signal wiring. It is recommended to run all signal wiring in a separate steel conduit. The shield wire should only be connected at the drive. Do not connect shield wire on both ends.

SUMMARY OF PARAMETER SETTINGS

✎: The parameter can be set during operation

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|--|--|-------------------------|----------|
| Pr.00 | Source of Frequency Command | 00: Master frequency determined by digital keypad (LC-M02E) 01: Master frequency determined by 0 to +10 V input on AVI terminal with jumpers 02: Master frequency determined by 4 to 20mA input on ACI terminal with jumpers 03: Master frequency determined by RS-485 Communication port 04: Master frequency determined by potentiometer on digital keypad | 00 | |
| ✎Pr.01 | Source of Operation command | 00: Operation determined by digital keypad 01: Operation determined by external control terminals, keypad STOP is effective 02: Operation determined by external control terminals, keypad STOP is ineffective 03: Operation determined by RS-485 communication port, keypad STOP is effective 04: Operation determined by RS-485 communication port, keypad STOP is ineffective | 00 | |
| ✎Pr.02 | Stop Method | 00: Ramp stop 01: Coast Stop | 00 | |
| Pr.03 | Maximum Output Frequency | 50.00 to 400.0 Hz | 60.00 | |
| Pr.04 | Maximum Voltage Frequency (Base Frequency) | 10.00 to 400.0Hz | 60.00 | |
| Pr.05 | Maximum Output Voltage (Vmax) | 115V/230V: 0.1 to 255.0V 460V: 0.1 to 510.0V 575V: 0.1 to 637.0V | 220.0 440.0 575.0 | |
| Pr.06 | Mid-point Frequency | 0.10 to 400.0Hz | 1.50 | |
| Pr.07 | Mid-point Voltage | 115V/230V: 0.1 to 255.0V 460V: 0.1 to 510.0V 575V: 0.1 to 637.0V | 10.0 20.0 26.1 | |
| Pr.08 | Minimum Output Freq | 0.10 to 20.00Hz | 1.50 | |
| Pr.09 | Minimum Output Voltage | 115V/230V: 0.1 to 255.0V 460V: 0.1 to 510.0V 575V: 0.1 to 637.0V | 10.0 20.0 26.1 | |
| ✎Pr.10 | Acceleration Time 1 | 0.1 to 600.0 sec or 0.01 to 600.0 sec | 10.0 | |
| ✎Pr.11 | Deceleration Time 1 | 0.1 to 600.0 sec or 0.01 to 600.0 sec | 10.0 | |
| ✎Pr.12 | Acceleration Time 2 | 0.1 to 600.0 sec or 0.01 to 600.0 sec | 10.0 | |
| ✎Pr.13 | Deceleration Time 2 | 0.1 to 600.0 sec or 0.01 to 600.0 sec | 10.0 | |
| Pr.14 | Accel S-curve | 00 to 07 | 00 | |
| ✎Pr.15 | Jog Accel/Decel Time | 0.1 to 600.0 sec or 0.01 to 600.0 sec | 1.0 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|---|---|-------------------|----------|
| Pr.16 | Jog Frequency | 0.00 to 400.0 Hz | 6.00 | |
| Pr.17 | 1st Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.18 | 2nd Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.19 | 3rd Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.20 | 4th Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.21 | 5th Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.22 | 6th Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.23 | 7th Step Speed Freq. | 0.00 to 400.0Hz | 0.00 | |
| Pr.24 | Reserve Operation Inhibition | 00: Enable REV operation 01: Disable REV operation | 00 | |
| Pr.25 | Over-Voltage Stall Prevention | 00: Disable 115V/230V: 330 to 450 Vdc 460V: 660 to 900 Vdc 575V: 825 to 1025 Vdc | 390 780 975 | |
| Pr.26 | Over-current Stall Prevention during Acceleration | 00: Disable 20% to 200% | 150 | |
| Pr.27 | Over-current Stall Prevention during Operation | 00: Disable 20% to 200% | 150 | |
| Pr.28 | DC Braking Current Level | 00 to 100 % | 00 | |
| Pr.29 | DC Braking during Start-up | 0.0 to 5.0 sec | 0.0 | |
| Pr.30 | DC Braking during Stopping | 0.0 to 25.0 sec | 0.0 | |
| Pr.31 | Start-point for DC Braking | 0.00 to 60.00 Hz | 0.00 | |
| Pr.32 | Momentary Power Loss Operation Selection | 00: Stop operation after momentary power loss 01: Continues after momentary power loss, speed search starts with Master Frequency 02: Continues after momentary power loss, speed search starts with Minimum output Frequency | 00 | |
| Pr.33 | Maximum Allowable Power Loss Time | 0.3 to 5.0 sec | 2.0 | |
| Pr.34 | Base-Block Time for Speed Search | 0.3 to 5.0 sec | 0.5 | |
| Pr.35 | Maximum Current Level for Speed Search | 30 to 200 % | 150 | |
| Pr.36 | Upper Bound of Output Frequency | 0.10 Hz to 400.0 Hz | 400.0 | |
| Pr.37 | Lower Bound of Output Frequency | 0.00 Hz to 400.0 Hz | 0.00 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|---------------------------------------|--|-----------------|----------|
| Pr.38 | Multi-function Input Terminal (M0,M1) | 00: M0: FWD/STOP, M1: REV/STOP 01: M0: RUN/STOP, M1: REV/FWD 02: M0, M1, M2: 3-wire operation control mode | 00 | |
| Pr.39 | Multi-function Input Terminal (M2) | 00: No Function 01: Output OFF (N.O.) (enabled when running) 02: Output OFF (N.C.) (enabled when running) 03: External Fault (normally open) N.O. 04: External Fault (normally close) N.C 05: RESET 06: Multi-Step Speed Command 1 07: Multi-Step Speed Command 2 08: Multi-Step Speed Command 3 09: Jog Operation 10: Accel/Decel Speed Inhibit 11: First or Second Accel/Decel Time 12: Base-block (B.B.) (N.O) 13: Base-block (B.B.) (N.C) 14: Increase Master Frequency 15: Decrease Master Frequency | 05 | |
| Pr.40 | Multi-function Input Terminal (M3) | 16: Run PLC Program 17: Pause PLC | 06 | |
| Pr.41 | Multi-function Input Terminal (M4) | 18: Counter Trigger Signal 19: Counter Reset | 07 | |
| Pr.42 | Multi-function Input Terminal (M5) | 20: No function 21: RESET command (N.C) 22: Control source: External Terminal 23: Control source: Keypad 24: Control source: Communication 25: Parameter Lock (Write disable, Read is always 0) 26: PID Disable (N.O.) 27: PID Disable (N.C.) 28: Second Source for Frequency Command 29: Forward (contact is open) / Reverse (contact is close) 30: One-Shot PLC Run 31: Index input signal 32: Counter Incremented by Drive Output Frequency | 08 | |
| ↗Pr.43 | Analog Output Signal | 00: Analog Frequency Meter (0 to Maximum Output Frequency) 01: Analog Current Meter (0 to 250% of the rated AC drive current) 02: Feedback signal (0 - 100%) 03: Output power (0 - 100%) | 00 | |
| ↗Pr.44 | Analog Output Gain | 00 to 200 % | 100 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|--|--|-----------------|----------|
| Pr.45 | Multi-Function Output Terminal 1 (Photocoupler output) | 00: AC Drive Operational 01: Maximum Output Frequency Attained 02: Zero Speed 03: Over-Torque Detection 04: Base-Block (B.B) Indication 05: Low Voltage Indication 06: AC Drive Operation Mode 07: Fault Indication 08: Desired Frequency Attained 09: PLC Program Running 10: PLC Program Step Completed 11: PLC Program Completed 12: PLC Operation Paused 13: Top Count Value Attained | 00 | |
| Pr.46 | Multi-function Output Terminal 2 (Relay Output) | 14: Preliminary Counter Value Attained 15: Warning (PID feedback loss, communication error) 16: Below the Desired Frequency 17: PID supervision 18: Over Voltage supervision 19: Over Heat supervision 20: Over Current stall supervision 21: Over Voltage stall supervision 22: Forward command 23: Reverse command 24: Zero Speed (Includes Drive Stop) | 00 | |
| ↗Pr.47 | Desired Frequency Attained | 0.00 to 400.0 Hz | 0.00 | |
| ↗Pr.48 | Adjust Bias of External Input Frequency | 0.00 to 200.0% | 0.00 | |
| ↗Pr.49 | Potentiometer Bias Polarity | 00: Positive Bias 01: Negative Bias | 00 | |
| ↗Pr.50 | Potentiometer Frequency Gain | 0.10 to 200.0% | 100.0 | |
| Pr.51 | Potentiometer Reverse Motion Enable | 00: Reverse Motion Disabled in negative bias 01: Reverse Motion Enabled in negative bias | 00 | |
| ↗Pr.52 | Motor Rated Current | 30.0% FLA to 120.0% FLA | FLA | |
| ↗Pr.53 | Motor No-Load Current | 00%FLA to 99%FLA | 0.4* FLA | |
| ↗Pr.54 | Torque Compensation | 00 to 10 | 00 | |
| ↗Pr.55 | Slip Compensation | 0.00 to 10.00 | 0.00 | |
| Pr.56 | Reserved | | | |
| Pr.57 | AC Drive Rated Current Display (unit: 0.1A) | | ### | |
| Pr.58 | Electronic Thermal Overload Relay | 00: Standard Motor (self cool motor) 01: Inverter Motor (auxiliary cool fan on motor) 02: Inactive | 02 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|-----------------------------------|--|-----------------|----------|
| ↗ Pr.59 | Electronic Thermal Motor Overload | 30 to 300 sec | 60 | |
| Pr.60 | Over-Torque Detection Mode | 00: Over-Torque Detection Disable 01: Enabled during constant speed operation until the allowable time for detection (Pr.62) elapses. 02: Enabled during constant speed operation and halted after detection. 03: Enabled during acceleration until the allowable time for detection (Pr.62) elapses. 04: Enabled during acceleration and halted after detection. | 00 | |
| Pr.61 | Over-Torque Detection Level | 30 to 200 % | 150 | |
| Pr.62 | Over-Torque Detection Time | 0.0 to 10.0 seconds | 0.1 | |
| Pr.63 | Loss of ACI (4-20mA) | 00: Decelerate to 0 Hz 01: Stop immediately and display "EF" 02: Continue operation by last frequency command | 00 | |
| ↗ Pr.64 | User Defined Function for Display | 00: Display AC drive output Frequency (Hz) 01: Display User-defined output Frequency (H*Pr.65) 02: Output Voltage (E) 03: DC Bus Voltage (u_) 04: PV (i) 05: Display the value of internal counter (c) 06: Display the setting frequency (F or o=%) 07: Display the parameter setting (Pr.00) 08: Reserved 09: Output Current (A) 10: Display program operation (0.xxx), Fwd, or Rev | 06 | |
| ↗ Pr.65 | Coefficient K | 0.01 to 160.0 | 1.00 | |
| ↗ Pr.66 | Communication Frequency | 0.00 to 400.0 Hz | 0.00 | |
| Pr.67 | Skip Frequency 1 | 0.00 to 400.0 Hz | 0.00 | |
| Pr.68 | Skip Frequency 2 | 0.00 to 400.0 Hz | 0.00 | |
| Pr.69 | Skip Frequency 3 | 0.00 to 400.0 Hz | 0.00 | |
| Pr.70 | Skip Frequency Band | 0.00 to 20.00 Hz | 0.00 | |
| Pr.71 | PWM Carrier Frequency | 01 to 15 The factory setting of VFD075M43A is 10. | 15 | |
| | | 575V series: 01 to 10 | 6 | |
| Pr.72 | Auto Restart Attempts after Fault | 00 to 10 | 00 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|--|--|-----------------|----------|
| Pr.73 | Present Fault Record | 00: No fault occurred 01: Over-current (oc) 02: Over-voltage (ov) 03: Overheat (oH) 04: Overload (oL) | 00 | |
| Pr.74 | Second Most Recent Fault Record | 05: Overload 1 (oL1) 06: External Fault (EF) 07: CPU failure 1 (CF1) 08: CPU failure 3 (CF3) 09: Hardware Protection Failure (HPF) 10: Over-current during acceleration (oca) 11: Over-current during deceleration (ocd) 12: Over-current during steady state operation (ocn) 13: Ground fault or fuse failure(GFF) 14: Low Voltage (not record) 15: 3 Phase Input Power Loss 16: EPROM failure (CF2) 17: External interrupt allowance(bb) 18: Overload (oL2) 19: Auto Adjustable accel/decel failure (CFA) 20: CPU self detection failure (codE) | 00 | |
| Pr.75 | Third Most Recent Fault Record | | 00 | |
| Pr.76 | Parameter Lock and Configuration | 00: All parameters can be set/read 01: All parameters are read-only 02-08: Reserved 09: Resets all parameters to 50Hz factory defaults 10: Resets all parameters to 60Hz factory defaults | 00 | |
| Pr.77 | Time for Auto Reset the Restart Times in Abnormality | 0.1 to 6000.0 sec | 60.0 | |
| Pr.78 | PLC Operation Mode | 00: Disable PLC operation 01: Execute one program cycle 02: Continuously execute program cycles 03: Execute one program cycle step by step 04: Continuously execute one program cycle step by step | 00 | |
| Pr.79 | PLC FWD/REV Motion | 00 to 127 | 00 | |
| Pr.80 | Identity Code of the AC Motor Drive | Read only | ## | |
| Pr.81 | Time Duration of 1st Step Speed | 00 to 9999 sec | 00 | |
| Pr.82 | Time Duration of 2nd Step Speed | 00 to 9999 sec | 00 | |
| Pr.83 | Time Duration of 3rd Step Speed | 00 to 9999 sec | 00 | |
| Pr.84 | Time Duration of 4th Step Speed | 00 to 9999 sec | 00 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|--|--|-----------------|----------|
| Pr.85 | Time Duration of 5th Step Speed | 00 to 9999 sec | 00 | |
| Pr.86 | Time Duration of 6th Step Speed | 00 to 9999 sec | 00 | |
| Pr.87 | Time Duration of 7th Step Speed | 00 to 9999 sec | 00 | |
| Pr.88 | Communication Address | 01 to 254 | 01 | |
| Pr.89 | Transmission Speed | 00: 4800 bps 01: 9600 bps 02: 19200 bps 03: 38400 bps | 01 | |
| Pr.90 | Transmission Fault Treatment | 00: Warn and Continue Operating 01: Warn and RAMP to Stop 02: Warn and COAST to Stop 03: Keep Operation without Warning | 03 | |
| Pr.91 | Time Out Detection | 0.0: Disable 0.1 to 120.0 sec | 0.0 | |
| Pr.92 | Communication Protocol | 00: MODBUS ASCII mode, <7,N,2> 01: MODBUS ASCII mode, <7,E,1> 02: MODBUS ASCII mode, <7,O,1> 03: MODBUS RTU mode, <8,N,2> 04: MODBUS RTU mode, <8,E,1> 05: MODBUS RTU mode, <8,O,1> | 00 | |
| Pr.93 | Accel 1 to Accel 2 Frequency Transition | 0.01 to 400.0 0.00: Disable | 0.00 | |
| Pr.94 | Decel 1 to Decel 2 Frequency Transition | 0.01 to 400.0 0.00: Disable | 0.00 | |
| Pr.95 | Auto Energy Saving | 00: Disable auto energy saving 01: Enable auto energy saving | 00 | |
| Pr.96 | Counter Countdown Complete | 00 to 9999 | 00 | |
| Pr.97 | Preset counter countdown | 00 to 9999 | 00 | |
| Pr.98 | Total Time Count from Power On (Days) | 00 to 65535 days | Read Only | |
| Pr.99 | Total Time Count from Power On (Minutes) | 00 to 1440 minutes | Read Only | |
| Pr.100 | Software Version | | ## | |
| Pr.101 | Auto Adjustable Accel/Decel | 00: Linear Accel/Decel 01: Auto Accel, Linear Decel 02: Linear Accel, Auto Decel 03: Auto Accel/Decel 04: Linear Accel/Decel Stall Prevention during Deceleration | 00 | |
| Pr.102 | Auto Voltage Regulation (AVR) | 00: AVR function enabled 01: AVR function disabled 02: AVR function disabled when stops 03: AVR function disabled when decel | 00 | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|---|--|-----------------|----------|
| Pr.103 | Auto tune Motor Parameters | 00: Disable 01: Auto tune for R1 02: Auto tune for R1 + No Load testing | 00 | |
| Pr.104 | R1 value | 00 to 65535 mΩ | 00 | |
| Pr.105 | Control Mode | 00: V/F Control 01: Sensor-less Control | 00 | |
| Pr.106 | Rated Slip | 0.00 to 10.00 Hz | 3.00 | |
| Pr.107 | Vector Voltage Filter | 5 to 9999 (per 2ms) | 10 | |
| Pr.108 | Vector Slip Compensation Filter | 25 to 9999 (per 2ms) | 50 | |
| Pr.109 | Selection for Zero Speed Control | 00: No output 01: Control by DC voltage | 00 | |
| Pr.110 | Voltage of Zero Speed Control | to 20.0 % of Max. output voltage (Pr.05) | 5.0 | |
| Pr.111 | Decel S-curve | 00 to 07 | 00 | |
| Pr.112 | External Terminal Scanning Time | 01 to 20 | 01 | |
| Pr.113 | Restart Method after Fault (oc, ov, BB) | 00: None speed search 01: Continue operation after fault speed search from speed reference 02: Continue operation after fault speed search from Minimum speed | 01 | |
| Pr.114 | Cooling Fan Control | 00: Fan Off when the drive stop after 1 Min. 01: AC Drive Runs and Fan On, AC Drive Stops and Fan Off 02: Always Run 03: Reserved | 02 | |
| Pr.115 | PID Set Point Selection | 00: Disable 01: Keypad (based on Pr.00 setting) 02: AVI (external 0-10V) 03: ACI (external 4-20mA) 04: PID et point (Pr.125) | 00 | |
| Pr.116 | PID Feedback Terminal Selection | 00: Input positive PID feedback, PV from AVI (0 to 10V) 01: Input negative PID feedback, PV from AVI (0 to 10V) 02: Input positive PID feedback, PV from ACI (4 to 20mA) 03: Input negative PID feedback, PV from ACI (4 to 20mA) | 00 | |
| Pr.117 | Proportional Gain (P) | 0.0 to 10.0 | 1.0 | |
| Pr.118 | Integral Time (I) | 0.00: Disable 0.01 to 100.0 sec | 1.00 | |
| Pr.119 | Differential Time (D) | 0.00 to 1.00 sec | 0.00 | |
| Pr.120 | Integration's Upper Bound Frequency | 00 to 100 % | 100 % | |

| Parameter | Explanation | Settings | Factory Setting | Customer |
|-----------|---|--|-----------------|----------|
| Pr.121 | One-Time Delay | 0.0 to 2.5 sec | 0.0 | |
| Pr.122 | PID Frequency Output Command Limit | 00 to 110 % | 100 | |
| Pr.123 | Feedback Signal Detection Time | 0.0: Disable 0.1 to 3600 sec | 60.0 | |
| Pr.124 | Feedback Signal Fault Treatment | 00: Warning and RAMP to stop 01: Warning and COAST to stop | 00 | |
| Pr.125 | Source of PID Set Point | 0.00 to 400.0Hz | 0.00 | |
| Pr.126 | PID Offset Level | 1.0 to 50.0 % | 10.0 | |
| Pr.127 | Detection Time of PID Offset | 0.1 to 300.0 sec | 5.0 | |
| Pr.128 | Minimum Reference Value | 0.0 to 10.0 V | 0.0 | |
| Pr.129 | Maximum Reference Value | 0.0 to 10.0 V | 10.0 | |
| Pr.130 | Invert Reference Signal AVI (0-10V) | 00: Not inverted 01: Inverted | 00 | |
| Pr.131 | Minimum Reference Value (4-20mA) | 0.0 to 20.0mA | 4.0 | |
| Pr.132 | Maximum Reference Value (4-20mA) | 0.0 to 20.0mA | 20.0 | |
| Pr.133 | Invert Reference Signal (4-20mA) | 00: Not inverted 01: Inverted | 00 | |
| Pr.134 | Analog Input Delay Filter for Set Point | 00 to 9999 (per 2ms) | 50 | |
| Pr.135 | Analog Input Delay Filter for Feedback Signal | 00 to 9999 (per 2ms) | 5 | |
| Pr.136 | Sleep Period | 0.0 to 6550. sec | 0.0 | |
| Pr.137 | Sleep Frequency | 0.00 to 400.0 Hz | 0.00 | |
| Pr.138 | Wake Up Frequency | 0.00 to 400.0 Hz | 0.00 | |
| Pr.139 | Treatment for Counter Attained | 00: Continue operation 01: Stop Immediately and display E.F. | 00 | |
| Pr.140 | External Up/Down Selection | 00: Fixed Mode (keypad) 01: By Accel or Decel Time 02: Reserved | 00 | |
| Pr.141 | Save Frequency Set Point | 00: Not Save 01: Save | 01 | |
| Pr.142 | Second Source of Frequency Command | 00: Keypad Up/Down 01: AVI (0-10V) 02: ACI (4-20mA) 03: Communication 04: Keypad potentiometer | 00 | |

| Parameter | Explanation | Settings | | Factory Setting | Customer |
|-----------|--|---|--------------|-----------------|----------|
| Pr.143 | Software Braking Level | 115V/230V | 370-450 Vdc | 380.0 | |
| | | 460V | 740-900 Vdc | 760.0 | |
| | | 575V | 925-1075 Vdc | 950.0 | |
| Pr.144 | Total operation time (Day) | Read Only | | | |
| Pr.145 | Total operation time (Minutes) | Read Only | | | |
| Pr.146 | Line start Lockout | 00: Disable 01: Enable | | 00 | |
| Pr.147 | Decimal Number of Accel / Decel Time | 00: One decimal 01: Two decimals | | 00 | |
| Pr.148 | Number of Motor Poles | 02 to 20 | | 04 | |
| Pr.149 | Gear Ratio for Simple Index Function | 4 to 1000 | | 200 | |
| Pr.150 | Index Angle for Simple Index Function | 00.0 to 360.0 | | 180.0 | |
| Pr.151 | Deceleration Time for Simple Index Function | 0.00 to 100.00 sec | | 0.00 | |
| Pr.152 | Skip Frequency Width | 0.00 to 400.0Hz | | 0.00 | |
| Pr.153 | Bias Frequency Width | 0.00 to 400.0Hz | | 0.00 | |
| Pr.154 | Reserved | | | | |
| ✎ Pr.155 | Compensation Coefficient for Motor Instability | 0.0: Disable 0.1 to 5.0 (recommended setting d2.0) | | 0.0 | |
| ✎ Pr.156 | Communication Response Delay Time | 0 to 200 (x500us) | | 0 | |
| ✎ Pr.157 | Communication Mode Selection | 0: Delta ASCII 1: Modbus | | 1 | |

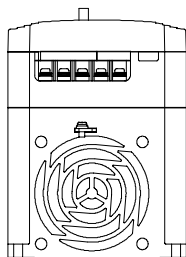
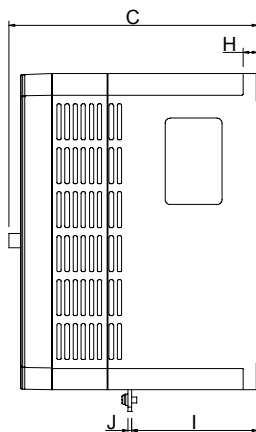
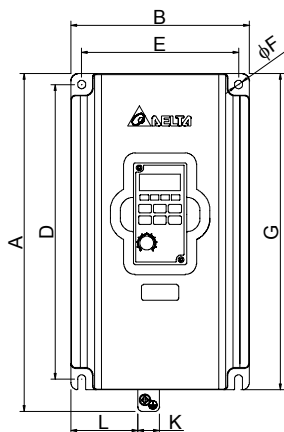
Fault Codes

| Fault Name | Fault Descriptions | Corrective Actions |
|------------|--|--|
| OC | Over current Abnormal increase in current. | <ol style="list-style-type: none"> 1. Check whether the motors horsepower corresponds to the AC drive output power. 2. Check the wiring connections between the AC drive and motor for possible short circuits. 3. Increase the Acceleration time (Pr.10, Pr.12). 4. Check for possible excessive loading conditions at the motor. 5. If there are any abnormal conditions when operating the AC drive after short-circuit being removed, it should be sent back to manufacturer. |

| Fault Name | Fault Descriptions | Corrective Actions |
|------------|--|---|
| OV | Over voltage The DC bus voltage has exceeded its maximum allowable value. | <ol style="list-style-type: none"> 1. Check whether the input voltage falls within the rated AC drive input voltage. 2. Check for possible voltage transients. 3. Bus over-voltage may also be caused by motor regeneration. Either increase the decel time or add an optional braking resistor. 4. Check whether the required braking power is within the specified limits. |
| OH | Overheating Heat sink temperature too high | <ol style="list-style-type: none"> 1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects from the heatsinks and check for possible dirty heat sink fins. 4. Check the fan and clean it. 5. Provide enough spacing for adequate ventilation. |
| LV | Low voltage The AC motor drive detects that the DC bus voltage has fallen below its minimum value. | <ol style="list-style-type: none"> 1. Check whether the input voltage falls within the AC motor drive rated input voltage range. 2. Check whether the motor has sudden load. 3. Check for correct wiring of input power to R-S-T (for 3-phase models) without phase loss. |
| OL | Overload The AC motor drive detects excessive drive output current. | <ol style="list-style-type: none"> 1. Check whether the motor is overloaded. 2. Reduce torque compensation setting in Pr.54. 3. Take the next higher power AC motor drive model. <p>NOTE: The AC motor drive can withstand up to 150% of the rated current for a maximum of 60 seconds.</p> |
| OL1 | Overload 1 Internal electronic overload trip | <ol style="list-style-type: none"> 1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Use a higher power motor. 4. Reduce the current level so that the drive output current does not exceed the value set by the Motor Rated Current Pr.52. |
| OL2 | Overload 2 Motor overload. | <ol style="list-style-type: none"> 1. Reduce the motor load. 2. Adjust the over-torque detection setting to an appropriate setting. |
| HPF | Hardware protection failure | Return to the factory. |
| CodE | Software protection failure | Return to the factory. |
| OCB | Over-current during acceleration | <ol style="list-style-type: none"> 1. Short-circuit at motor output: Check for possible poor insulation at the output lines. 2. Torque boost too high: Decrease the torque compensation setting in Pr.54. 3. Acceleration Time too short: Increase the Acceleration Time. 4. AC motor drive output power is too small: Replace the AC motor drive with the next higher power model. |

| Fault Name | Fault Descriptions | Corrective Actions |
|------------|---|--|
| oCd | Over-current during deceleration | <ol style="list-style-type: none"> 1. Short-circuit at motor output: Check for possible poor insulation at the output line. 2. Deceleration Time too short: Increase the Deceleration Time. 3. AC motor drive output power is too small: Replace the AC motor drive with the next higher power model. |
| oCn | Over-current during steady state operation | <ol style="list-style-type: none"> 1. Short-circuit at motor output: Check for possible poor insulation at the output line. 2. Sudden increase in motor loading: Check for possible motor stall. 3. AC motor drive output power is too small: Replace the AC motor drive with the next higher power model. |
| cF1 | Internal EEPROM can not be programmed. | <ol style="list-style-type: none"> 1. Turn off the power. 2. Check whether the input voltage falls within the rated AC drive input voltage. 3. Turn on the power. |
| cF2 | Internal EEPROM can not be read. | <ol style="list-style-type: none"> 1. Check the connections between the main control board and the power board 2. Reset the drive to the factory settings. |
| cF3 | Drive's internal circuitry is abnormal. | <ol style="list-style-type: none"> 1. Turn off the power. 2. Check whether the input voltage falls within the rated AC drive input voltage. 3. Turn on the power. |
| EF | External Fault | <ol style="list-style-type: none"> 1. Input EF (N.O.) on external terminal is closed to GND. Output U, V, W will be turned off. 2. Give RESET command after fault has been cleared. |
| cFR | Auto accel/decel failure | <ol style="list-style-type: none"> 1. Check if the motor is suitable for operation by AC motor drive. 2. Check if the regenerative energy is too large. 3. Load may have changed suddenly. |
| GF | Ground fault | <p>When (one of) the output terminal(s) is grounded, short circuit current is more than 50% of AC motor drive rated current, the AC motor drive power module may be damaged.</p> <p>NOTE: The short circuit protection is provided for AC motor drive protection, not for protection of the user.</p> <ol style="list-style-type: none"> 1. Check whether the IGBT power module is damaged. 2. Check for possible poor insulation at the output line. |
| cE1 | Communication error (see Pr.92) | <ol style="list-style-type: none"> 1. Check the connection between the AC drive and computer for loose wires. 2. Check if the communication protocol is properly set. |
| bb | External Base Block. | <ol style="list-style-type: none"> 1. When the external input terminal (B.B) is active, the AC motor drive output will be turned off. 2. Deactivate the external input terminal (B.B) to operate the AC motor drive again. |

Dimensions are in mm [inch]



| Model Name | A | B | C | D | E | F | G | H | I | J | K | L |
|---|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|-----------------|----------------|----------------|---------------|----------------|----------------|
| 004M21A/23A, 007M21A/23A, 015M21A/23A | 151.5 [5.96] | 85.0 [3.35] | 113.0 [4.45] | 130.5 [5.14] | 74.0 [2.91] | 5.0 [0.2] | 141.5 [5.57] | 10.0 [0.39] | 49.0 [1.93] | 2.0 [0.08] | 14.0 [0.55] | 30.5 [1.20] |
| 002M11A, 004M11A/21B, 007M11A/21B/43B/53A, 015M21B/43B/53A, 022M23B/43B/53A | 161.0 [6.33] | 100.0 [3.94] | 116.5 [4.59] | 140.0 [5.51] | 89.0 [3.50] | 4.5 [0.18] | 151.0 [5.94] | 10.0 [0.39] | 45.0 [1.77] | 2.0 [0.08] | 14.0 [0.55] | 23.0 [0.91] |
| 022M21A, 037M23A/43A/53A, 055M23A/43A/53A, 075M43A/53A | 235.0 [9.25] | 125.0 [4.92] | 166.3 [6.55] | 205.0 [8.07] | 110.0 [4.33] | 5.8 [0.23] | 220.0 [8.66] | 10.5 [0.41] | 88.5 [3.48] | 2.5 [0.10] | 15.0 [0.55] | 46.9 [1.85] |