

Shape Your Industry

- Fit your application by 3 advanced features.
- The VF-MB1 can drive elevator, lifting, conveyor, food & beverage processing, material handling, machine tool and various applications.

SLIM SHAPE BODY

Side-by-side installation
Flat Mounting Installation

ADVANCED MOTOR DRIVE

Sensor-less Permanent Magnetic motor,
SPM/IPM, and Induction Motor drive
capability
Toshiba unique magnetic pole position
detection



FLEXIBLE OPERATION

Simple Panel
“Turn and Push” setting dial
RUN and STOP keys
Communication
<Built-in>
RS485 and CANopen®
<Add-on option>
EtherNet/IP™-Modbus® TCP,
PROFIBUS® DP, DeviceNet™,
EtherCAT® (coming soon)
Dual rating
Two types of rating can drive
variable torque and constant
torque applications with minimal
drive size.

- DeviceNet™ is a trademark of ODVA (Open DeviceNet Vendor Association, Inc).
- EtherCAT® is a registered trademark and patented technology, licensed by
Beckhoff Automation GmbH.
- CANopen® is a registered trademark of the CAN in Automation.
- PROFIBUS® is a registered trademark of PROFIBUS NutzerOrganisation EV.
- EtherNet/IP™ is a trademark of ControlNet International, Ltd.
- Modbus® is a registered trademark of Schneider Automation.

*Product names mentioned herein may be trademarks of their respective
companies.



SLIM SHAPE BODY

The slim design VF-MB1 fit to limited space and it can minimize the total machine spaces.



Side-by-side installation

The VF-MB1 has been minimized width size in comparison with conventional model. In addition, side-by-side installation can save space in control cabinet (*1).



DC bus terminals are located in top side for the model of 4.0kW or less, and bottom side for the model of 5.5kW to 15kW. These DC bus terminals are useful for Textile machinery in case of connecting multi-drive to the common DC bus supply.



45mm

- <45mm width>
 - 1ph-240V: 0.2kW to 0.75kW
 - 3ph-500V: 0.4kW to 1.5kW
- <60mm width>
 - 1ph-240V: 1.5kW and 2.2kW
 - 3ph-500V: 2.2kW and 4.0kW

Slim design

For 240V-0.2kW to 0.75kW and 500V-0.4kW to 1.5kW models are fitted to 45mm slim design. And also, 240V-1.5kW to 2.2kW and 500V-2.2kW to 4.0kW models can be fitted to 60mm.

Flat Mounting installation

The VF-MB1 can be mounted by Flat Mounting and front block can be attached 90 degree by using additional mount bracket (*2). The space can be minimized with various installation (*1).



For limited space For thin wall cubicle

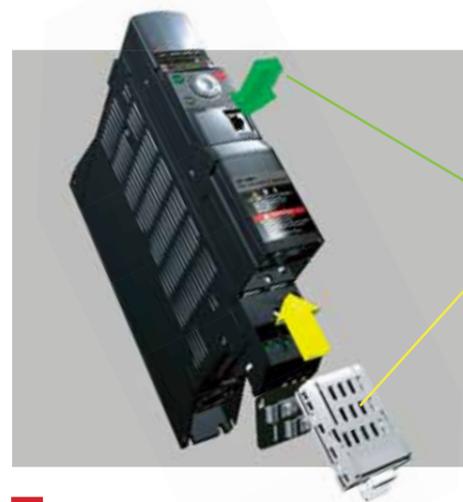


FLEXIBLE OPERATION

Flexible interface and improvement of a network communication can easily modify to arrange the wide range of application.

Simple panel

Setting dial, 4 keys, and 4 small LEDs with Green 7 segments LEDs can be easy to set parameters and operations.



Communication

Built-in (RJ45)

- RS485 (Modbus® RTU) Baud rate 38.4 kbps max.
- CANopen®: Baud rate 1.0Mbps max.

Optional (Add-on option)

- EtherNet/IP™-Modbus® TCP
- PROFIBUS® DP
- DeviceNet™
- EtherCAT® (Coming soon)
- CANopen®: Baud rate 1.0Mbps max.



Dual rating (CT/VT)

The VF-MB1 can be used for the constant torque and variable torque applications by dual rating operation. (5.5kW or larger type)
For example, if variable torque application (fan and pump) require 15kW drives, it can be operated by 11kW rated of VF-MB1.



Example: VFMB1-4110PL
11kW rated drive can be used for 15kW motor

Constant torque application

The torque value of constant torque application require the high torque level of different motor speed for Conveyors, Machine tool, Food machine and Elevator.



Variable torque application

The torque value of variable torque application such as Fan, Pump and HVAC require low torque until starts to operating speed. (Compressor is excluded)

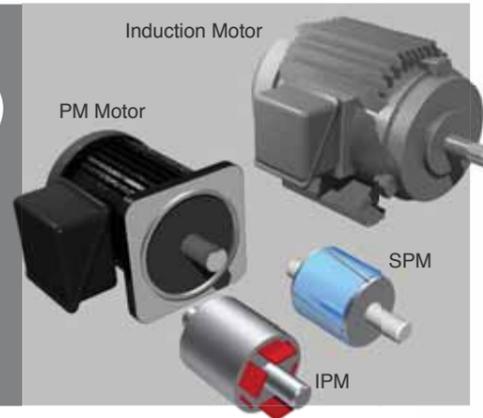


*1: Current reduction is required if VF-MB1 is installed into less ventilation spaces such as narrow space and side-by-side installation.
*2: The model whose front block is attached 90 degree is modified with additional mount bracket in factory. Please request 90 degree type with order, if it is required.

ADVANCED MOTOR DRIVE

Induction motor and Permanent Magnetic (PM) motor drive

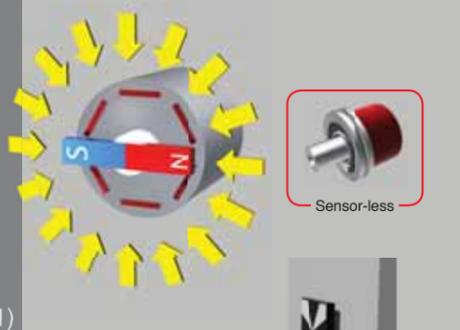
The VF-MB1 controls not only 3-phase induction motors (Standard, High efficiency motor) but also Interior Permanent Magnetic Motor (IPM) and Surface Permanent Magnetic Motor (SPM) for high efficiency, high torque, energy saving, downsizing and lightening.



PM drive technology

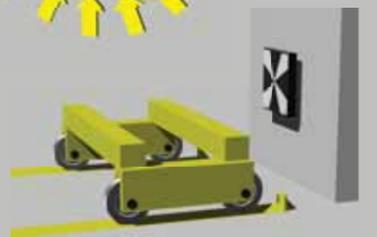
Power-ON sensor less initial magnetic pole detection

- Initial magnetic pole position can be detected quickly without magnetic pole sensor.
 - Motor has high starting torque
 - It can minimize motor space, wiring and suitable with system requirements.
- (If the auto-tuning performed with motor rated parameter settings, high torque control operation can be achieved.)(*1)



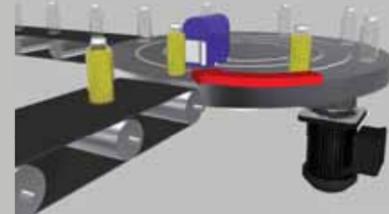
Hit and stop function (Torque limit function)

Extra limit switch can be eliminated for conveyor, machine tool or other mechanical application by using Hit and stop function with torque limit function which can be adjusted torque value of motor torque, and motor rotation can be stopped by torque detection.



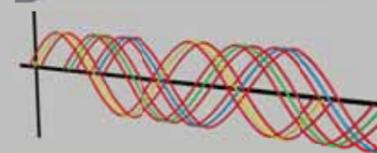
Servo lock function

The VF-MB1 and PM motor combined, servo lock function can be used for automated system. It can control easily for stop and go applications by smooth speed reduction control for shock-less mechanical braking.



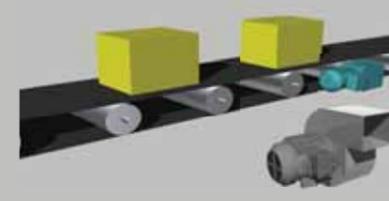
Sensor less step-out detection

The VF-MB1 will keep detecting the pole position during PM motor is rotating. This function can prevent the step-out even if motor has impact and variable load torque.



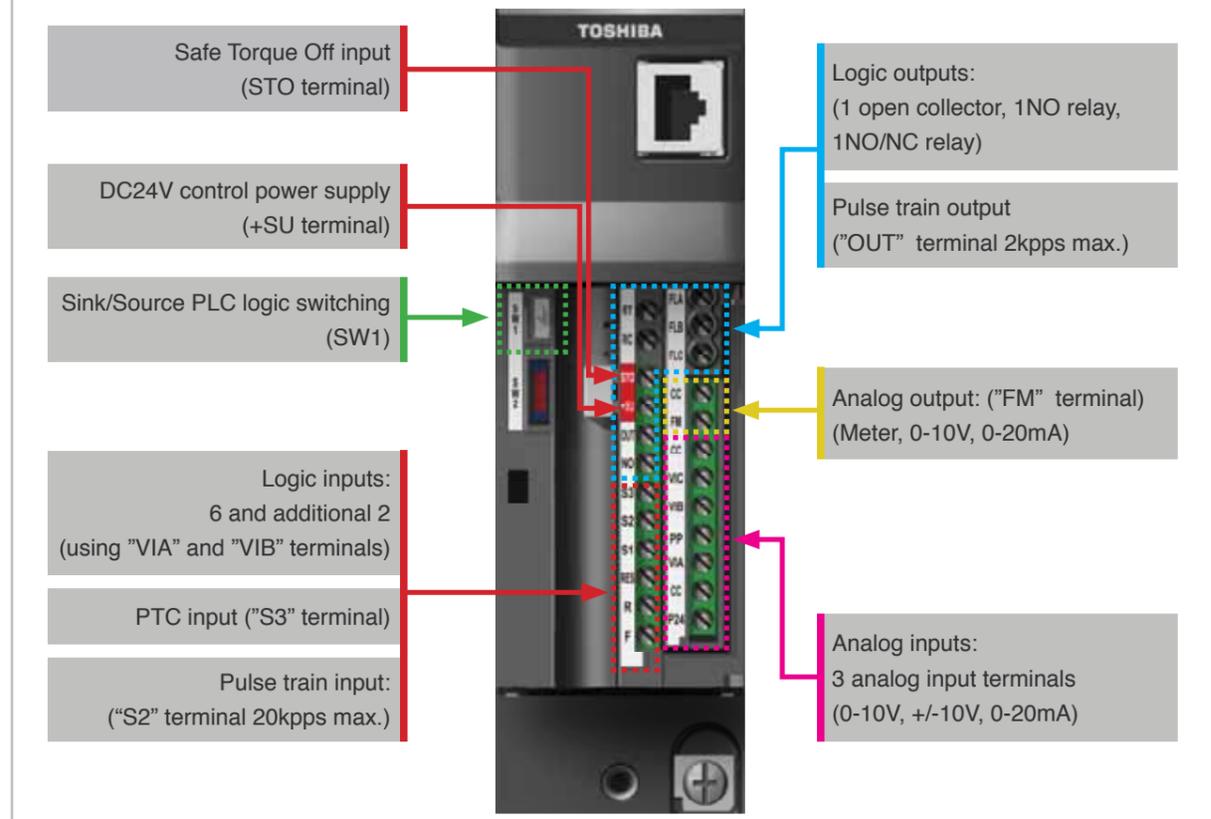
Constant and Variable torque control

The VF-MB1 can drive PM motor with not only variable torque but also constant torque which is required large torque when motor start to rotate.



FLEXIBLE TERMINALS

Control terminal layout



Combination I/O

Multiple input terminal functions can be assigned with single input terminal, also output terminal can be assigned by "AND" and "OR" logics. This variety of functions allows for flexible system design.



Covered input terminals

Easy connection of front side input terminals with safety quick open cover.



Removable output terminal block

Easy install and maintenance by quick detachable output terminal block. (up to 4.0kW)



*1: There is a possibility that some PM motors can NOT be driven by the VF-MB1 even if the motor parameters are set by auto-tuning function.

FUNCTIONALITY

Internal software

PID Control

Temperature, Pressure, Flow and Motion control can be controlled with minimal over or less drive by using feedback analog signals from a sensor, detector and process control.

Torque limit function

Output frequency can be decreased or increased according to the loading condition when the motor torque reaches the limit level such as paper and film rolling machine.

Light-load high-speed operation

The light-load high-speed operation is used to improve the operating efficiency of the machine by increasing the rotational speed of the motor when it is operated under light load. This function is useful for constant-torque load applications which repeatedly drive light and heavy loads, such as lifts and transfer equipment.

Braking function

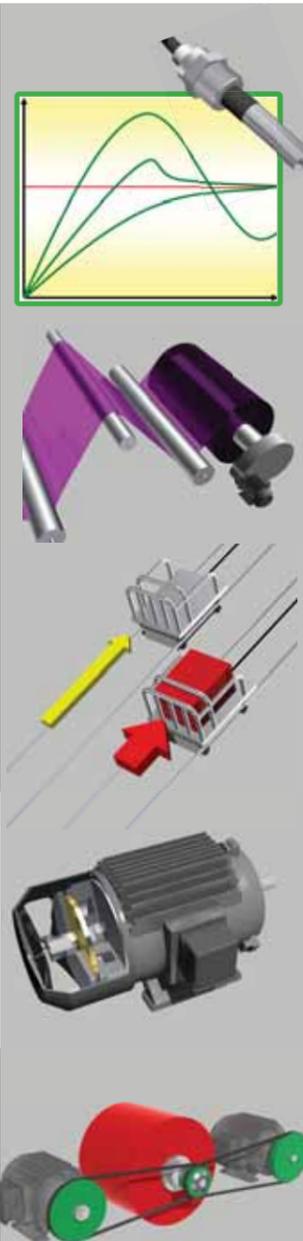
Lifts, crane and similar equipment require the smooth operation for braking and release timing with motor torque. The motor can produce enough torque before the brake is released by this function

Droop control

When single load is operated by multiple drives and motors, each drive and motor are necessary to control same value of load to prevent overload. This function can share the single loads to multiple drives.

Other functions

- V/F 5 points setting
- Forced fire-speed control
- Bumpless operation
- Tracing functions
- Integrating wattmeter
- Traverse
- Logic sequence function



PROGRAMMING

The VF-MB1 can be programmed by using computer based software “Logic sequence setting tool” and “PCM001Z”. Setup time and adjustment time for installation saving and appropriate setting for any conditions are achieved.

Sequence programming software (Logic sequence setting tool)

The VF-MB1 has logic sequence function and once VF-MB1 is connected with computer, it can be programmed by “Logic sequence setting tool”. “Logic sequence setting tool” can monitor the online input / output signals and monitoring status.



Communication software (PCM001Z)

The PCM001Z communication software allows you to edit, monitor and trace parameter data on a computer, also operating condition can be analyzed by monitoring function. Inverter can be managed by easy data settings.



EASY for ADVANCED CONTROL

Simple setup by Easy key

For quick setting, pressing the EASY key on the panel allows you to operate the inverter by eight basic parameters. When setting each of the functions, press the EASY key to move to the standard mode by one-touch operation. In this mode, you can access all parameters. The maximum of 32 target parameters are displayed and assigned to suit with your specific setup requirements. You can also use the EASY key as a local/remote key to switch between panel and remote operation, and as a shortcut key to directly access any specific setup or display screen.



Setting dial “turn-and-push”

The large setting dial at the center of the front panel allows you to set the parameters easily. Just turn the setting dial until you get the right parameter and push the setting dial to select. You can also use the setting dial to set the reference frequency.



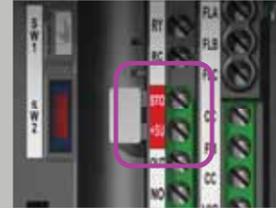
SAFETY

Safety function (approval pending)

The VF-MB1 supports the Safe Torque Off (STO) function according to following standards.

- EN/IEC 61508
- EN954-1
- ISO 13849-1

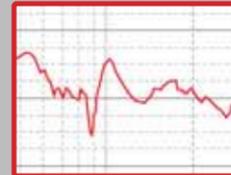
The STO function can be set by using parameter settings. When STO input is open, drive stops and start is prohibited until STO input is reconnected.



ENVIRONMENT

EMC noise filter inside

Built-in noise filters are ideal for site such as commercial facilities and offices where attention must be paid to peripheral devices. Compared to filter not integrated models, space and wiring can be saved by incorporating filter in the panel. The VF-MB1 complies with the European EMC Directive.



Long lifetime

10 years of operation design

The main-circuit capacitor, cooling fan and control board capacitors are designed for 10 years lifetime design.

- Conditions -

- Ambient temperature: 40 °C
- Output current: 80% of the rated current
- Running time: 24 hours/365 days

- (*1) The designed lifetime is calculated value.
- (*2) It is not guaranteed time.

Monitor informs when to replace major parts

The VF-MB1 tells you when to replace major parts and keeps track of the cumulative operation time. Since the VF-MB1 can generate warning, you can prevent a problem before it occurs.



Eco design

The VF-MB1 complies with the European RoHS Directive.



OPTIONAL DEVICES

LCD Extension Panel Option (coming soon)



This panel is an 23-character x 8-line display, and can be used for simple setup and monitoring by selection of parameters using the jog dial. The display language can be switched between English and Japanese.

LED Extension Panel Option (RKP002Z)



This RKP002Z is using 20 mm LEDs, the largest in its class in the market, to ensure outstanding visibility. It has also been designed to be fitted into panels for use as an extension panel or display.

(Note: Parameter copy function is available with RKP002Z-2 or later LED panels.)

LED Extension Panel Option (RKP007Z)



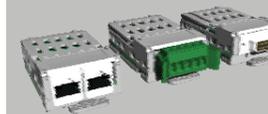
Compact extension panel RKP007Z also available parameter read and writing.

USB communications conversion unit (USB001Z)



This USB001Z converts USB port signal to the VF-MB1 built in (RJ45) port for data communication. By using serial data communication, all parameters and monitoring data can be accessed for commissioning and maintenance.

Add-on communication option



Add-on option lineups EtherNet/IP™ – Modbus® TCP, PROFIBUS® DP DeviceNet™, EtherCAT® and CANopen® (Insulated). The VF-MB1 can be connected to the common industrial networks.

Touch Panel (TR PMIU)



3.5" and 5.7" touch panel can be connected with the VF-MB1 by using RS485 (Modbus® RTU) communication. All commands, monitoring and parameter setting is preprogrammed in touch panel programming software. System operation can be achieved simply and quickly.

Intelligent I/O (TR SPUX)



Advanced sequence programming for system control can be structured. Various analog and digital I/Os are arranged for wide range applications.