

DESCRIPTION

The MMP742xxx-36-x1 is part of a family of smart motor driver modules for servo motor applications. This module is designed to fit 40mm and 42mm (NEMA 17) motors. It integrates an angular sensor, servo controller, and power stage components.

The MMP742xxx-36-x1 supports three control modes: profile position (PP), profile velocity (PV), and profile torque (PT).

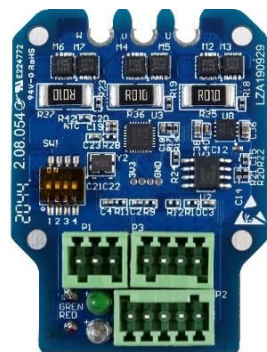
MotionLAB is an easy-to-use GUI software that allows users to flexibly optimize the design online via the RS-485 control interface. The parameters are saved in the module's non-volatile memory (NVM). The GUI and its user guide are available for download at www.EZmotion.co.

FEATURES

- PRS Series for RS-485 and Step/Direction Control Interface
- PSD Series for Step/Direction Control Interface
- 18V to 36V Input Voltage (V_{IN}) Range
- 38W to 105W Continuous Output Power (P_{OUT})
- 1.7A to 5A Continues Output Current (I_{OUT})
- 5A to 15A Peak Output Current (I_{OUT_MAX})
- 0.3° Position Resolution
- Three Different Control Modes: Profile Position (PP), Profile Velocity (PV), and Profile Torque (PT)
- Driver Module Temperature Sensing
- Operating Temperature: 0°C to 70°C (Power Derated > 40°C)
- Storage Temperature: -40°C to +125°C
- Applicable Motor Size: 40mm and 42mm (NEMA17) Motors

PRODUCT INFORMATION

Part Number	Dimension (mm)	Power (W)	Maximum Voltage (V)	Control Mode	Control Interface
MMP742038-36-R1-1	52.4x39.5	38	36	PP, PV, PT	RS-485, step/direction
MMP742038-36-S1-1	52.4x39.5	38	36	PP, PV, PT	Step/direction
MMP742052-36-R1-1	52.4x39.5	52	36	PP, PV, PT	RS-485, step/direction
MMP742052-36-S1-1	52.4x39.5	52	36	PP, PV, PT	Step/direction
MMP742077-36-R1-1	52.4x39.5	77	36	PP, PV, PT	RS-485, step/direction
MMP742077-36-S1-1	52.4x39.5	77	36	PP, PV, PT	Step/direction
MMP742105-36-R1-1	52.4x39.5	105	36	PP, PV, PT	RS-485, step/direction
MMP742105-36-S1-1	52.4x39.5	105	36	PP, PV, PT	Step/direction



PRODUCT SPECIFICATIONS

Parameter	Conditions	Value				Units
		38W	52W	77W	105W	
DC input voltage (V_{IN})		18 to 36				V
Continuous output power (P_{OUT})	0°C to 40°C	38	52	77	105	W
Continuous output current (I_{OUT})	0°C to 40°C	1.7	2.2	3.3	5	A
Peak output current (I_{OUT_MAX})	0°C to 40°C, <10s	5	6.6	10	15	A
Switching frequency (f_{SW})	Configurable	20 to 80				kHz
Current-sense resistor		10				mΩ
Current-sense gain		8	5	3	2	
Logic pin voltage range		0 to 5.5				V
Voltage-sense lower resistor		10				kΩ
Voltage-sense upper resistor		402				kΩ
Maximum allowed speed	1 pole pairs	60000				rpm
Position resolution		0.3				deg
Dimension		52.4x39.5				mm
RS-485 baud rate		115200				bps
Pulse frequency		<500				kHz

There are two accessory packages available for order that are used for driver module evaluation. The MMA02-3001 includes the EZmotion communication kit and cable. The MMA03-3001 also includes the matching connectors for the MMP742xxx-36-x1.

Part Number	Component	Description	Quantity
MMA02-3001	EZmotion communication kit	USB to RS-485/I ² C/SPI converter	1
	USB cable	1.5m, USB Type-A to USB Type-B cable	1
	Dupont line	Dupont wires, 3-pin	1
MMA03-3001	KF12EKD-2.5-3P-1G	2.5mm pitch, 3-position connector	1
	KF12EKD-2.5-4P-1G	2.5mm pitch, 4-position connector	1
	KF12EKD-2.5-5P-1G	2.5mm pitch, 5-position connector	1

RECOMMENDED OPERATING CONDITIONS

Input voltage (V_{IN}) 18V to 36V
 Control interface voltage 0V to 5.5V
 Maximum pulse frequency 500kHz
 RS-485 A/B voltage 0V to 5.5V
 RS-485 common-mode voltage ±15V
 Operating temperature 0°C to 70°C
 Storage temperature -40°C to +125°C

HARDWARE CONNECTIONS

The motor driver module can be installed into a motor (see Figure 1).

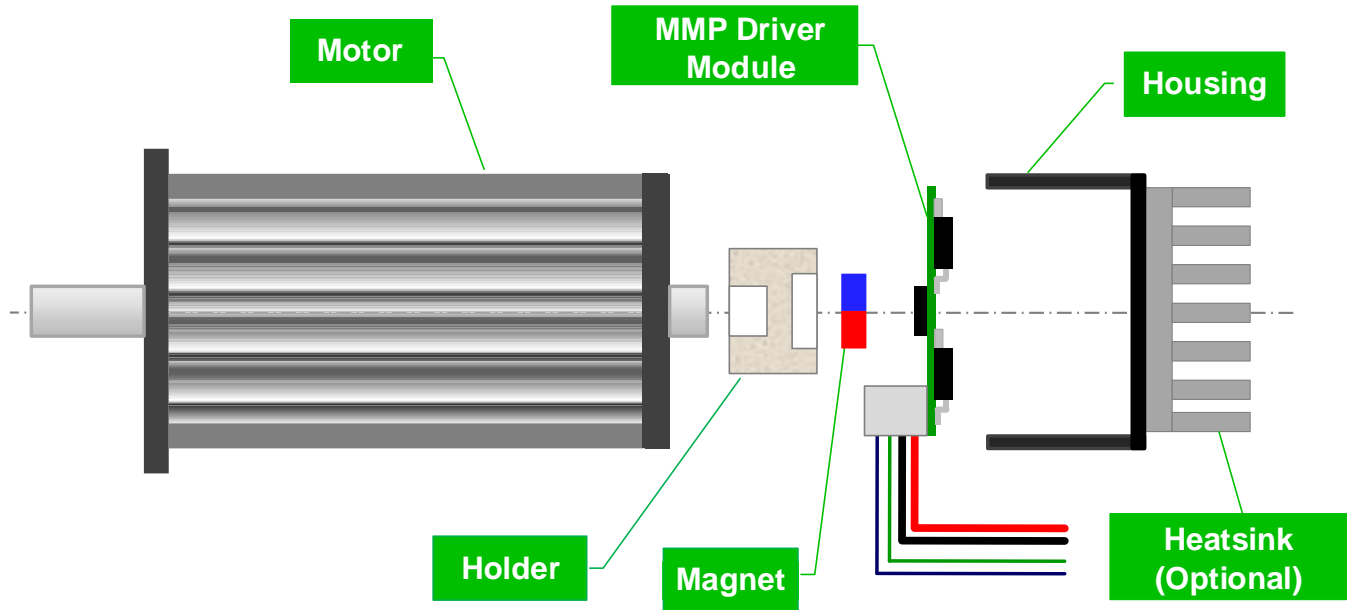


Figure 1: Installation of PCB Assembly in Motor

The user can manufacture custom control board housing and a magnet holder based on the actual motor dimensions. Table 1 lists recommended magnets to use with the MMP742xxx-36-x1, as well as the recommended minimum and maximum air gap spacing.

Table 1: Recommend Magnets and Air Gap

OD (mm)	H (mm)	Material	Remanence (Br) (T)	Magnetization	Min/Max Recommended Air Gap (mm)
6	2.5	N35	1.2	Diametrical	1.5 to 3.5
6	2.5	Sm26/16	1.08	Diametrical	1.3 to 3.3
6	3	N35	1.2	Diametrical	1.8 to 3.8
6	3	Sm26/16	1.08	Diametrical	1.5 to 3.6
8	2.5	N35	1.2	Diametrical	1.8 to 4.5
8	2.5	Sm26/16	1.08	Diametrical	1.5 to 4.1
8	3	N35	1.2	Diametrical	2.1 to 4.8
8	3	Sm26/16	1.08	Diametrical	1.8 to 4.5

A sintered neodymium (NdFeB) or samarium-cobalt (SmCo) magnet with a 6mm or 8mm diameter, 2.5mm to 3mm height, and remanent field strength between 1T to 1.2T is recommended. The magnet's diameter depends on the motor shaft and holder design selection. It is important that the magnetization is diametrically polarized.

The magnet air gap spacing to the sensor surface should be set to achieve a field strength between 30mT and 80mT. Figure 2 on page 4 shows the magnet dimensions and air gap.

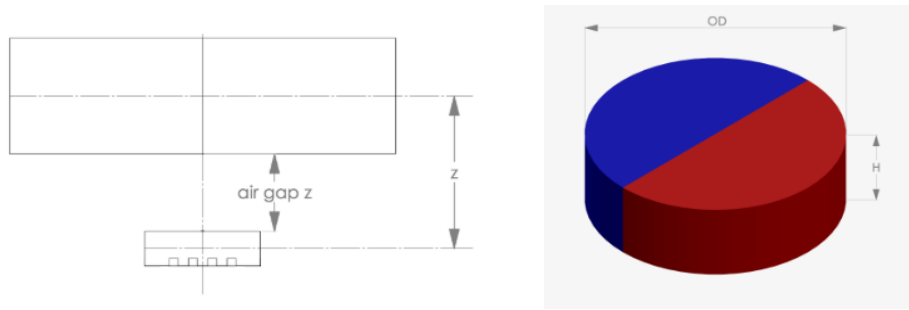


Figure 2: Magnet Dimensions and Air Gap

Selecting between NdFeB or SmCo material depends on the target motor end application. SmCo magnets have a higher working temperature range and corrosion resistance.

Selecting the holder material is also important. The material must be nonmagnetic, such as aluminum, brass, or plastic, in order to not influence or distort the sensor magnets field. The user can choose the attachment method to the shaft according to the motor design criteria. Using a high-temperature industrial adhesive is a possible approach to avoid detachment due to the magnet, holder, and shaft’s different coefficients for thermal expansion.

The magnet holder requires a motor with a shaft that extends from its rear. Contact the motor supplier to discuss the options available for shaft diameter and length, which determine the required holder size and housing depth.

The PCB housing should be designed to consider any requirements regarding heatsinking for the motor driver components, additional bulk motor supply capacitance, and EMC filtering necessary to meet the target application specifications. The housing should align the central angle sensor IC with the motor shaft magnet holder in the center with a maximum $\pm 0.4\text{mm}$ axial misalignment.

MotionLAB is a GUI software that allows users to configure flexible control parameters and test system performance. To connect the motor driver module to MotionLAB, a USB to RS-485 communication kit is required, which is available for download at www.EZmotion.co.

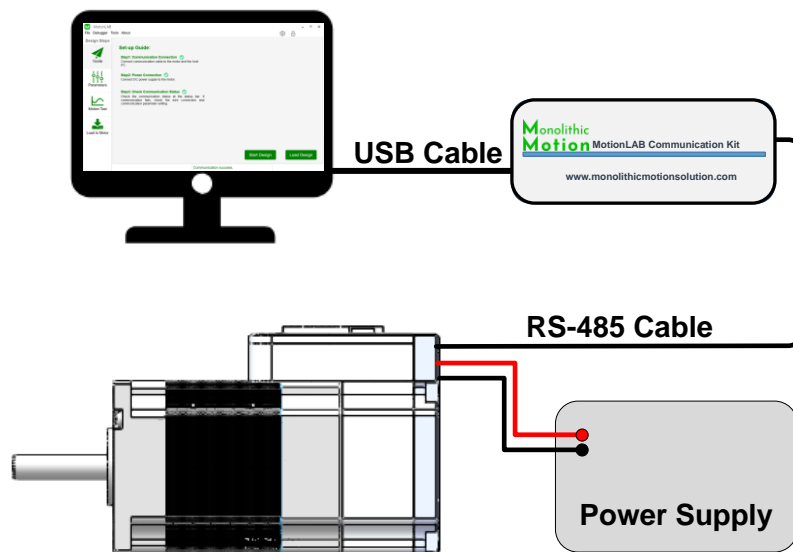
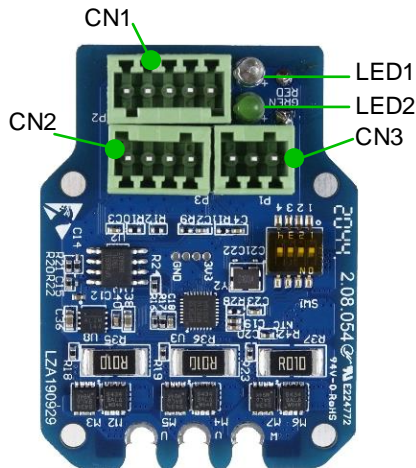


Figure 3: Connect Motor Driver Module to MotionLAB GUI

PIN CONFIGURATION



- CN1: IO Interface
- CN2: RS-485 Interface
- CN3: Power Interface
- LED1: Fault Indicator
- LED2: Power Indicator

MMP742xxx-36-x1 Pin Definitions ⁽¹⁾

I/O Interface (CN1)

CN1 Pin Number	Designation	Pin Description
1	COM-	Common return
2	DI1+	Digital input 1
3	DO1+	Digital output 1
4	DI2+	Digital input 2
5	DI3+	Digital input 3

RS-485 Interface (CN2)

CN2 Pin Number	Designation	Pin Description
1	EXT_5V	5V input for firmware configuration
2	B	RS-485 node B
3	AGND	RS-485 ground
4	A	RS-485 node A

Power Interface (CN3)

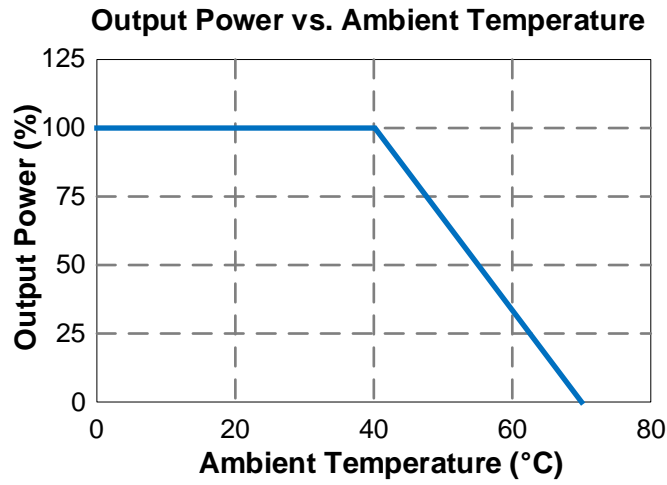
CN3 Pin Number	Designation	Pin Description
1	GND	Power ground
2	R-	Shunt resistor return node
3	VIN	Input power supply

Note:

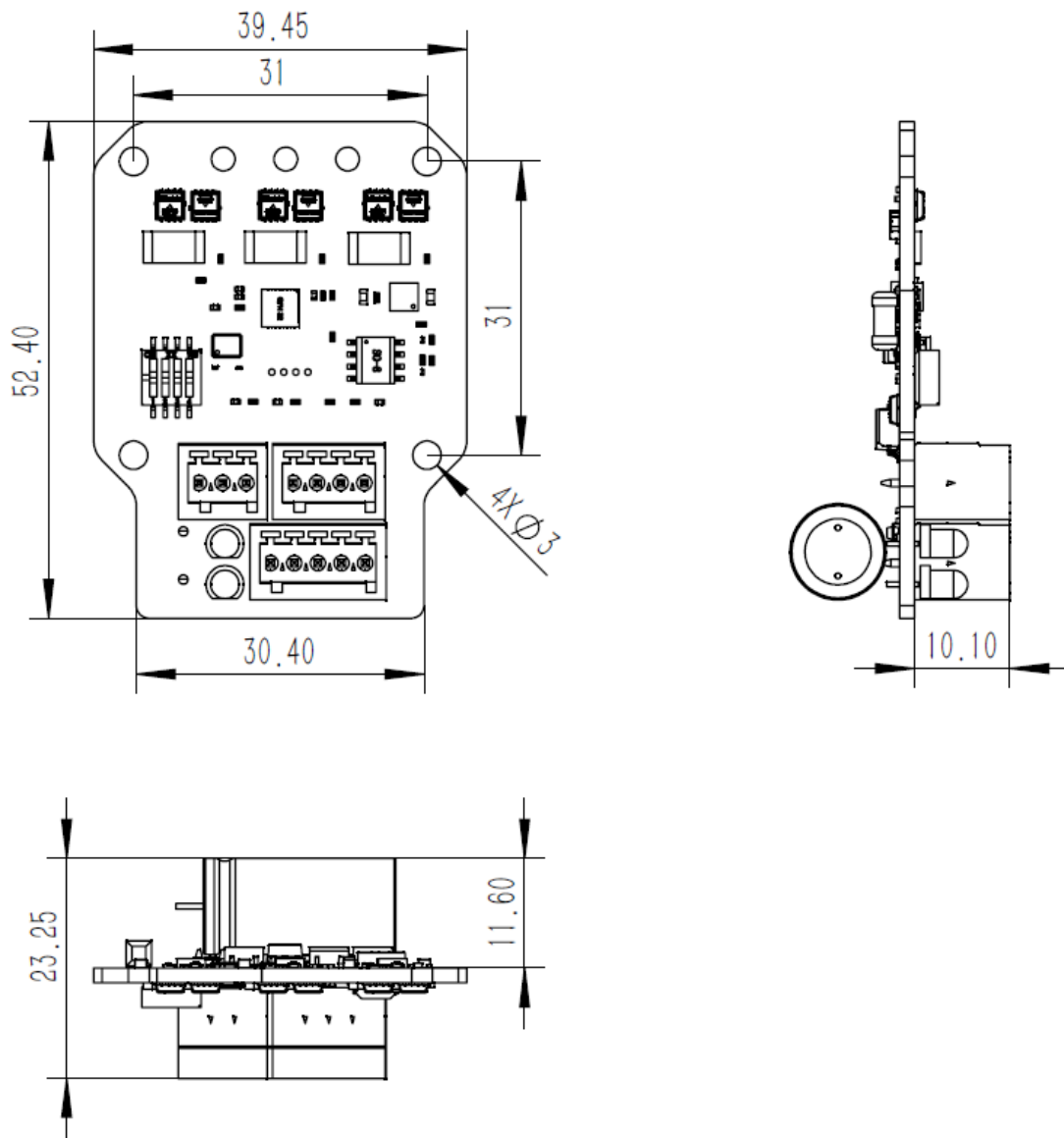
- 1) The leftmost pin of each connector is pin 1.

TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 24V, unless otherwise noted.



MECHANICAL DRAWING (2)



Note:

2) Units are mm.

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	10/5/2022	Initial Release	-

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