

MM3 to MM4 on Profibus

This is a general description of what is required to replace a MM3 drive with a MM4 drive that is on a Profibus network. It is not a step by step process but gives the major steps required to achieve the upgrade from MM3 to MM4.

1. MM4 Quick Commissioning:

The parameter set on the MM4 drive is completely different than MM3 units. The Quick Commissioning procedure from the MM4 Operating Instructions or the Quick Start Guide – Five Easy Steps to Startup needs to be completed. This configures the MM4 drive for the Motor that is going to be connected.

2. MM4 Setup to Establish Communications:

To establish communications from the Profibus Master to the MM4 drive the only requirement is that you set the profibus address on the MM4 drive. This can be accomplished by two different methods. On the MM4 Profibus Module you have a bank of dipswitches that can be used to set the address, when you set the address via the dipswitches you can look at P918 to confirm the address set. Or if you leave these switches in the OFF position you can set the address via P918.

3. MM4 Setup to Control via Profibus:

To set the MM4 Drive for Profibus Control & Setpoint Control you set the following:
P700 = 6 Control Source – Profibus
P1000 = 6 Set point Source – Profibus

In a typical application this will be all that is required to place the MM4 drive under profibus control. Custom configuration for Hand-Off-Auto type control must be handled on a case by case basis.

4. PLC – Profibus Master Hardware Configuration.

The Profibus Master will be configured to look for a MM3 type slave. This configuration must be modified to look for a MM4 slave. In the hardware configuration of the master the MM3 slave must be deleted and replaced with a MM4 slave. You can use a .gsd file or if your master is a S7 PLC you can use the Drives ES Profile to add the MM4 drive to the configuration.

Before deleting the MM3 drive from the configuration make sure to record the profibus address, the telegram length (# of words configured) and the Input and Output addressing used in the profibus master. You will be able to configure the MM4 drive to the same address, telegram length, and input/output addresses as the MM3 drive.

With MM3 drives the 2 standard telegrams are:

PPO3 - 0 PKW word, 2 PZD words

PPO1 - 4 PKW words, 2 PZD words

	Input to PLC -----	Output to Drive -----
PZD 1	Control Word	Status Word
PZD 2	Status Word	Actual Speed

PZD – Control Words are used to send a Control Word and Speed Setpoint to the drive and the drive will report back a Status word and Actual speed running.

This remains the same between MM3 and MM4 with a few exceptions to the Control Word and Status word that is explained below.

The speed set point which will be the 2nd word in the telegram remains the same.

With both MM3 and MM4 drives the speed set point and actual speed is reported as a percentage of speed represented as either an integer between 0 to 16384 or hex 0 – 4000 hex which represent 0 to 100% speed.

Note * (In MM4 Drive 100% is equal to reference speed P2000)

PKW words are used to read and write to individual parameters. This will seldom be used with MM3 drives. If you come across an application that is using the PKW words there will be a lot of program modification required in the PLC code due to the fact that the MM4 parameters set is completely different than the MM3 and from the fact that the MM3 only supported 16 bit integer parameters and the MM4 supports 16 bit integers, 32 bit integers, and floating point parameters.

5. Control Word

The control word for a MM4 drive is slightly different than the Control Word in a MM3. The main difference is the Direction bit is different and the MM4 adds some additional bits.

What this means is in the user program you may have to modify the way the control word is handled. In a user program they are several different ways this can be done.

You can write to the individual bits of the control word or to the control word as a word.

If you write to the individual bits you will need to change the direction bit from bit 14 on the MM3 to bit 11 on the MM4. Note from the description below they also have the opposite meaning. With the MM3 bit 14, On – CW, OFF – CCW. With the MM4 bit 11, On – CCW, Off – CW.

If you write to the word you will need to modify the value that you write.

Here is the typical command send to the drive via Profibus.

Command	MM4 Hex – Decimal	MM3 Hex - Decimal
Stop	047E – 1150	047E – 1150
Run Forward	047F – 1151	447F – 17534
Run Reverse	0C7F – 3199	047F – 1151
Jog CW	057E – 1406	4577 – 17783
Jog CCW	067E – 1662	4677 – 18039
Fault Ack	04FE – 1278	04FE – 1278

Here is definition for both Control Words.

Bit	MM4 – Definition	MM3 - Definition
0	ON/OFF1	ON/OFF1
1	OFF2	OFF2
2	OFF3	OFF3
3	Enable Operation	Enable Operation
4	RFG Enable	RFG Enable
5	RFG Start	RFG Start
6	Set point Enable	Set point Enable
7	Fault Acknowledge	Fault Acknowledge
8	Jog CW	Jog CW
9	Jog CCW	Jog CCW
10	Control from PLC	Control from PLC
11	On Reverse	not used
12	not used	not used
13	MOP Up	not used
14	MOP Down	On Forward
15	CDC Bit 0	not used

6. Status Word

Again, the status word for MM3 is slightly different than the status word from MM4. The MM4 gives you some additional information plus some differences. Below I will explain the main differences between the two Status words. If you are using these bits as interlocks in the user program you must modify the program to accommodate for the differences.

Bit 0, 1, 2

With MM3 bit 0 will be ON when the unit is ready to run, when you tell the unit to go to RUN, bit 1 turns ON, then bit 2 turns ON so that when running bits 0,1, & 2 will all three be ON.

With MM4 bit 0 will be ON when the unit is ready to run, when you tell the unit to go to RUN, bit 0 turns OFF, then bit 1 turns ON, then bit 1 turns OFF, and bit 2 turns ON. So that when you are running only bit 2 it ON.

Bit 10

MM3 – Actual Frequency = Set point,

MM4 – Actual Frequency = Max frequency.

Bit	MM4 – Definition	MM3 - Definition
0	Drive Ready	Ready to Start
1	Ready to Run	Ready to Start
2	Drive Running	Operation Enabled
3	Drive Fault	Drive Fault
4	OFF2 Active	OFF2 Active
5	OFF3 Active	OFF3 Active
6	On Inhibit Active	On Inhibit Active
7	Drive Warning	Drive Warning
8	Dev. Set/Act	not used
9	PZD Control	PZD Control
10	Max Freq Reached	Act = Set point
11	Motor current limit	not used
12	Holding brake active	not used
13	Motor Overload	not used
14	Motor runs CW	On Forward
15	Inverter Overload	not used