T100MD888+ to FMD88-10 Upgrade Notes

The FMD88-10 is designed to be a near drop-in replacement for the T100MD888+, but with superior capability, as well as a free Ethernet port. Nevertheless, there are some differences that have to be taken into consideration when upgrading your current design from T100MD888+ to FMD88-10.

A. Is FRAM-RTC Required?

The first thing to check is whether you need to buy the FRAM-RTC together with your FMD88-10. An important difference to consider when upgrading a *basic* (i.e. without all the add-on options) T100MD888+ PLC to an FMD88-10 is that the *basic* FMD88-10 has only 1000 words of DM: from DM[1] to DM[1000], and there is no built-in EEPROM. However, the FMD88-10 does have 1024 words of RAM-shadowed Flash memory that acts like a pseudo EEPROM, only that the software needs to execute a special command to save the content to the flash memory for permanent storage.

The optional **FRAM-RTC** module adds a battery-backed real-time clock to the FMD PLC (just like what MX-RTC does for the T100MD+ PLC), extends the DM from DM[1001] to DM[4000], and adds 11K words of non-volatile FRAM memory (equivalent to an extremely fast EEPROM).

Therefore, you will need an FRAM-RTC if any of the following applies to your current application:

1) You need to use DM[1001] to DM[4000] and these cannot be moved down to DM[1] to DM[1000] through a code rewrite.
2) You need more than 1024 words of EEPROM for data storage, or you need to regularly write to the EEPROM memory for data logging purpose.
3) You need a battery-backed real time clock to keep the time when the PLC is powered off.

B. Analog Output Connection

Although the FMD88-10 uses the same DB15 female connector as the T100MD888+, its 2 analog outputs are available at different pins from those on the T100MD888+. On the T100MD888+, the analog outputs 1 & 2 are multiplexed with analog inputs 7 & 8, whereas on the FMD88-10 the analog outputs 1 & 2 have their own independent pins. As such, the FMD88-10 has 8 analog inputs plus 2 analog outputs, giving it a total of 10 analog I/Os (expandable to 12 in the future).

Please refer to Chapter 1 of the FMD88-10 User's Manual for the location of the analog output pins. As a result of this change, if you are using the analog outputs, you would need to change the wiring of the DB15 connectors to the new analog output pin locations.

C. Non-volatile Variables and I/Os

Even with the installation of the FRAM-RTC- on the FMD88-10, only the following variables can be configured to be non-volatile: A to Z, A$ to Z$ and DM[1] to DM[4000]. On the T100MD888+ with MX-RTC, even some system variables such as RELAY[], EMINT[], EMLINT[] can be made non-volatile via DIP switch #1.

You can however overcome this by storing the system variable that needs to be made non-volatile into FRAM memory on the FRAM-RTC at every scan of the ladder logic program. A first-scan initialization function can then load the FRAM data back into the system variables. **Note**: the FRAM can be re-written an unlimited number of times and read/write at full speed so it is a much better non-volatile memory than EEPROM.

Please refer to the next page for a comparison table that shows the main differences between the FMD88-10 and the T100MD888+. You will quickly discover that the FMD88-10 delivers performance that is totally unmatched by any small PLCs on the market, and could easily be a game changer that you could use to upgrade the capability of your equipment beyond those of your competitors!

FMD88-10 vs T100MD-888+ Comparison Table

	FMD88-10 (without FRAMRTC)	T100MD-888
Ethernet	Built-in	-
Program Memory	8 K words	6 K words
CPU Speed	4 μs per step	10 μs per step
DM	1 to 1000	1 to 4000
Non-volatile EEP Memory	No real EEPROM. 1024 words emulated EEPROM	1700 words
Analog Inputs		
- Resolution	12-bit	10-bit
- No. of Ch.	8 (Fixed)	6, 7 or 8 (shared with AO)
Analog Outputs		
- Range	0-5V or 0-10V (software selectable)	0-5V only
- Resolution	12-bit	8-bit
- No. of Ch.	2 (Fixed)	0, 1 or 2 (shared with AI)
PWM Outputs		
- Resolution	0.01% (1 in 10000)	0.4% (1 in 250)
- No. of Ch.	4	2
- Frequencies	50 Hz to 50KHz	8 fixed frequecies
Digital Outputs #7 and #8	8A peak, 4A Continous @24VDC	10A peak, 2A Continous @24VDC
Serial Port		
RS232 Interface	True EIA-232	Transistor level-shifter
Compatible Baud Rates	110-1200,2400,4800,9600,19200,38400	110-1200,2400,4800,9600,19200,38400
Incompatible Baud Rates	57600,100K,115.2K,230.4K	62500,100K, 250K,500K

	FM88-10 + FRAM-RTC	T100MD888 + MX-RTC + M2018P + Xserver
Program Memory	16 K words	8.2 K words
RS232 port	Available	Used by Xserver exclusively
DM	1 to 4000	1 to 4000
Non-volatile Variables		
A to Z, A$ to Z$	Yes	Yes
DM[1] to DM[4000]	Yes	Yes
Sys Var. (e.g. INPUT[])	No	Yes
EMINT[], EMLINT[]	No	Yes
Non-volatile EEP memory	Ferromagnetic RAM	EEPROM
- No of Words	11,000	7,750
Write Speed	Full speed, very Fast	Slow, 10ms per word
- Max Erase/Write	Unlimited	100,000 cycles
Real Time Clock		
Backup Battery	Replaceable	Non-replaceable