Programming procedure for the FC_PWM module
- ## Replacement for rectifier USMDIQ04V01PP

The FC_PWM module is an electronic module for digital control of the speed of 12V DC fans. The module is powered by AC voltage ranging from 5.5 V AC to 14 V AC. The AC voltage is regulated by a 4 A D1 bridge and filtered by a C1, C108, L1 and C3 CLC filter. The obtained DC voltage is used to power DC motors. This voltage depends on the supplied AC voltage and it ranges from 7.4 V to 20 V. The module is controlled by 8-bit microprocessor PIC16F18313. It generates PWM1 and PWM2 control signals for the MOSFET power switch, which controls the speed of motors M1 and M2.
The module can operate in one of four control modes, which must be programmed in service mode before use.

Control modes for the FC_PWM module:

IQA - This control uses the DC control voltage at the Ureg inlet in the range of 0 V to 10 V. The speed of both motors depends on the minimum speed setting (MIN_RPM) and the maximum speed setting (MAX_RPM) in service mode.
For control: type **B** (*thermostat TH-0108*), **D** (*thermostat TH-0108 + control panel D*) and **E** (*thermostat TH-0108 + control panel E*)
- Attention! A jumper must be installed inside the control panels! The fans will not work without an installed jumper! See the photo below

IQB – This control does not use Ureg. The speed is determined by the service mode setting and the control works as follows: After the supply voltage is switched on (AC), the fans start running at minimum speed (MIN_RPM) for a time specified by the FW, usually 15 minutes. This is followed by another 15 minutes at medium speed (calculated by the FW based on the MIN_RPM and MAX_RPM). If the power is not switched off, it switches to maximum speed (MAX_RPM) for an unlimited period of time. A unit in this mode returns to its default mode when the power is switched off.
For control: Special use, there may also be improvements to the type **A** control (*with thermostat TH-0343*)

IQC – This mode is used to control fans by switching the taps on the power transformer. In service settings, the minimum speed (MIN_RPM) is set at the lowest supply voltage. The speed is automatically increased according to the set supply voltage. The speed depends on the motors used and the supply voltage. This mode also does not use the Ureg control voltage.
For control: Type **C** (*thermostat TH-0482 24V, or thermostat TH-0023 24V*)

IQD - In this mode the fan speed can only be set in one gear. The speed is set by trimmer R1 on the module board.
For control: Type **A** (*with thermostat TH-0343*), can also be type **C** (*thermostat TH-0482 24V, or thermostat TH-0023 24V*), when it is possible to adjust the speed outside the service settings, we recommend setting the speed in the 1st speed gear in order for the fans to start without trouble (1st gear lowest possible speed).

The module for setting the speed and selecting the control type does not use setting Jumpers. All settings are performed in service mode and consist of the minimum speed (MIN_RPM), maximum speed (MAX_RPM) and control mode. Setting the speed in this way allows you to select and set the speed for virtually any motor in combination with different sources. Of course, it must match the range of the voltage used.

Step	Description	Note
1.	Turn off the power and set trimmer R1 to the center	
2.	Hold the TL1 button down and turn on the power	Let go of the TL1 button about 1 second after the switch-on
3.	Use trimmer R1 to set the minimum speed (MIN_RPM)	The setting time is not limited
4.	Confirm TL1 for about 1 second	The fan will stop rotating

5.	Use trimmer R1 to set the maximum speed (MAX_RPM)	The setting time is not limited
6.	Confirm TL1 for about 1 second	The fan will stop rotating
7.	Set the control mode with trimmer R1: IQA – Trimmer R1 rotated at 0 degrees (leftmost position) IQB – Trimmer R1 rotated at 90 degrees IQC – Trimmer R1 rotated at 180 degrees IQD – Trimmer R1 rotated at 270 degrees (rightmost position)	The motors are not rotating. The IQB and IQC control does not have to be set exactly, what matters is whether the trimmer is in the lower or upper half of the path.
8.	Confirm TL1 for about 1 second	The motors will rotate 3x and the module will switch to the set mode

Once the parameters have been set, the module will remain in this mode even after the power is switched off. A change can be easily made by resetting the parameters in service mode.
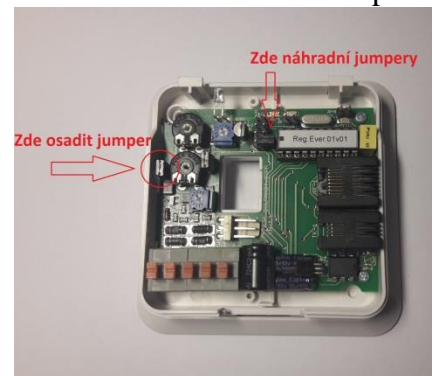
New FC_PWM module   **Older USMDIQ04V01PP rectifier**
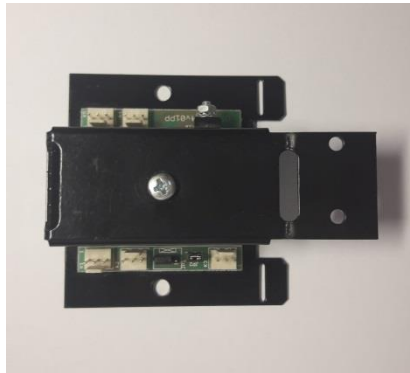
Control pictures:

Thermostat TH-0108 '(B, D, E control)   Control panel (D, E control) - Attention! A jumper must be installed inside the control panel!

Thermostat TH-0343 (A control) Thermostat TH-0023 24V (C control) Thermostat TH-0482 24V (C control)