

## Appendix 2 PWMDA Analog Output Module

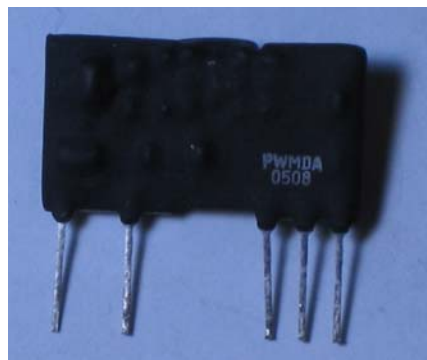
Although FBs Series main unit has been provide analog output module, but allow for the customer who only one point analog output demand. FATEK Automation created the simple and easy analog output module(PWMDA) which to fit various application.

FBs PWMDA Using the theorem of pulse width modulation, cooperate to peripheral output circuit, and then it can transform the different width of digital signal pulse to corresponding analog output voltage(0~10V).

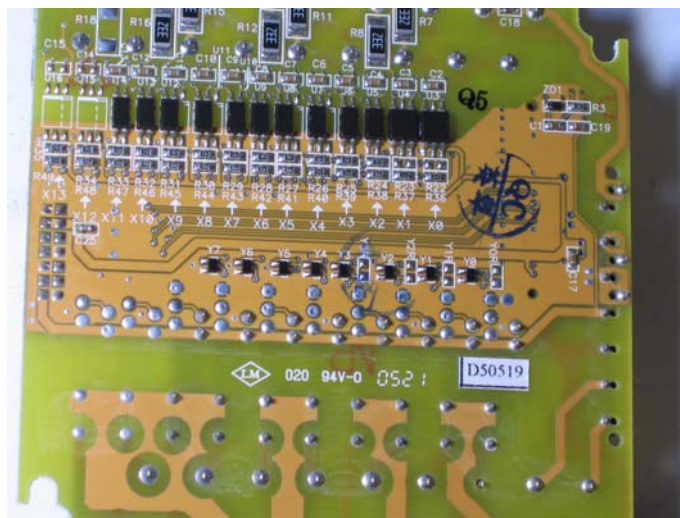
If you want to use PWMDA then you must purchase the PWMDA component form FATEK Automation, and replace to transistor output (the step of replace output component, please refer to chapter 1.1). After finish the component change procedure. Using high speed pulse width modulation instruction (FUN139) to send analog voltage.

### 1.1 PWMDA Component Installation

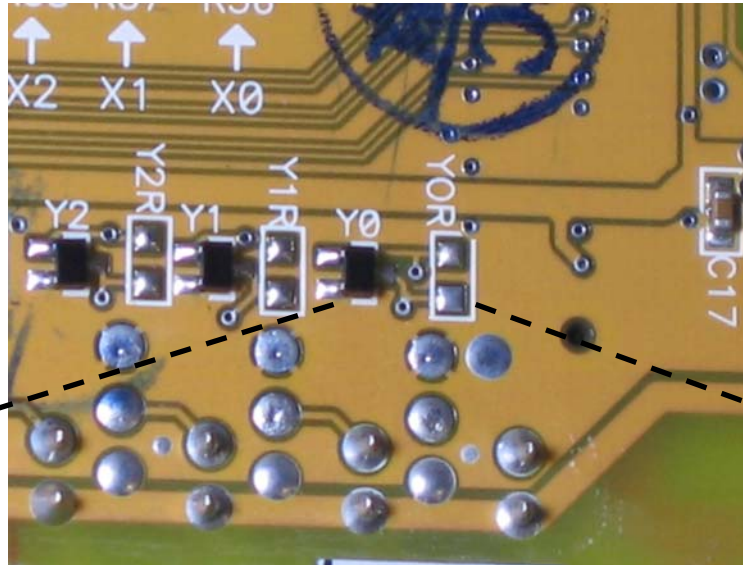
FBs-PLC PWMDA component only can be installed in high speed output(Y0 ~ Y2..), because it must match up with FUN139. The shape of PWMDA component and change method shows in below :



1. If the output component(Y0) were TR(J)-H originally, then remove TR(J)-H directly. And replace to PWMDA component to finish change procedure.
2. If the output component(Y0) were Relay, TR(J), or TR(J)-M originally, then you not only to remove driver transistor (DTC123E), but also to install a SMD resistance(100Ω) in Y0R position.



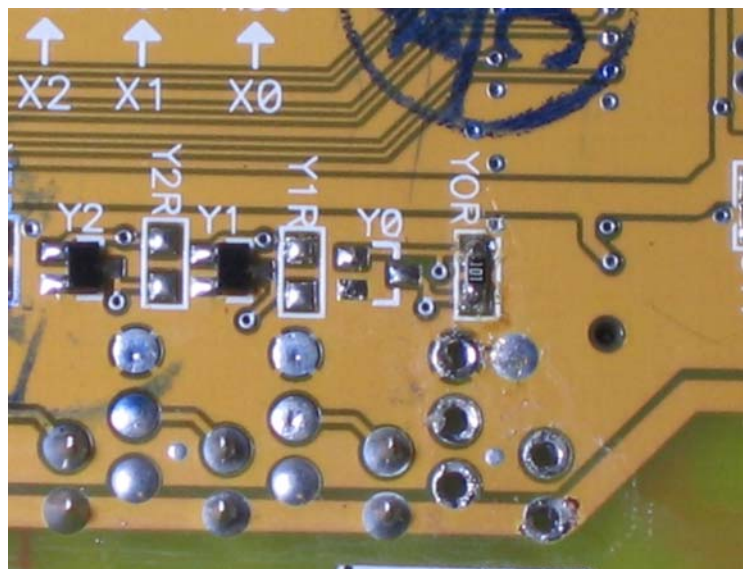
Opening the cover of PLC, take I/O board out and turn it over



Removed drive transistor  
DTC123E.

Installed the SMD  
resistance(100Ω) in Y0R  
position.

Before PWMDA component change



After PWMDA component change

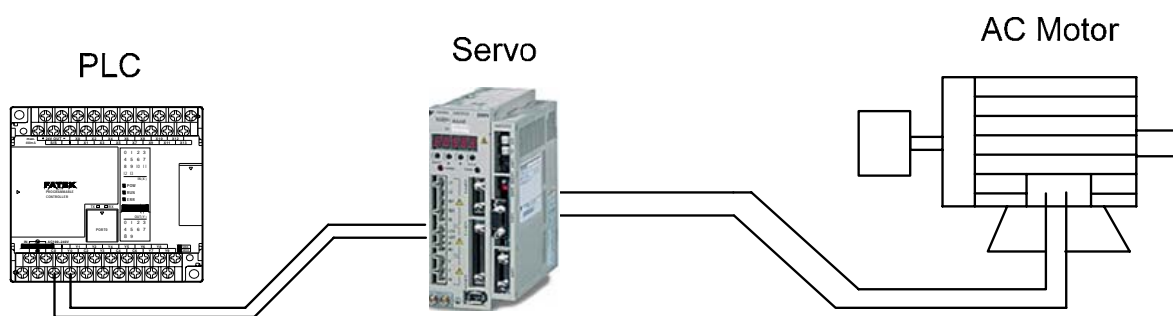
⚠ Caution

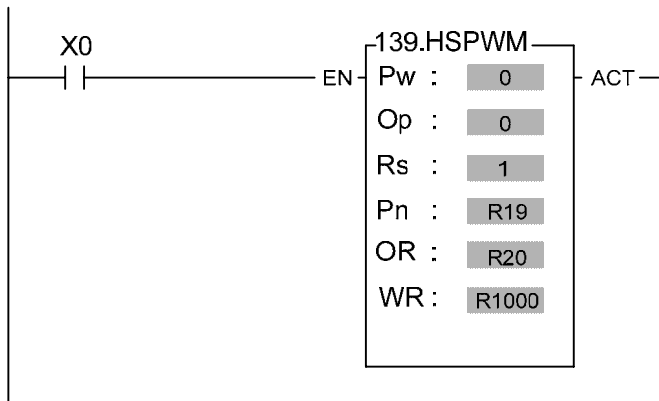
When Y0 has been finished PWMDA component change, then Y1 won't be used anymore (because they used the same common ground). After component changed, please pasting the serials number stickers in correct position for recognized easily.

## 1.2 Specifications of PWMDA

Items	Specifications	Remark
Span of Analog Output	DC 0 ~ 10V	
Digital output value	0 ~ 1000	
Resolution	10mV(10V/1000)	
Output resistance	1K	
Minimum loading (≥10V output)	5.2K	
D/A conversion time	< 50mS	
Performance curve	<p>Analog Output</p> <p>Digital Output Value</p>	

## Application Example





Pw : High speed pulse width modulation (pulse width modulation → analog voltage) output point(0=Y0, 1=Y2,...)

Op : Output polarity ; = 0 : Digital output value = 0, Vo=0V ; Digital output value = 1000, Vo=10V.

= 1 : Digital output value = 0, Vo=10V ; Digital output value = 1000, Vo=0V.

Rs : Resolution ;  $1=1/1000$  (0.1%) °

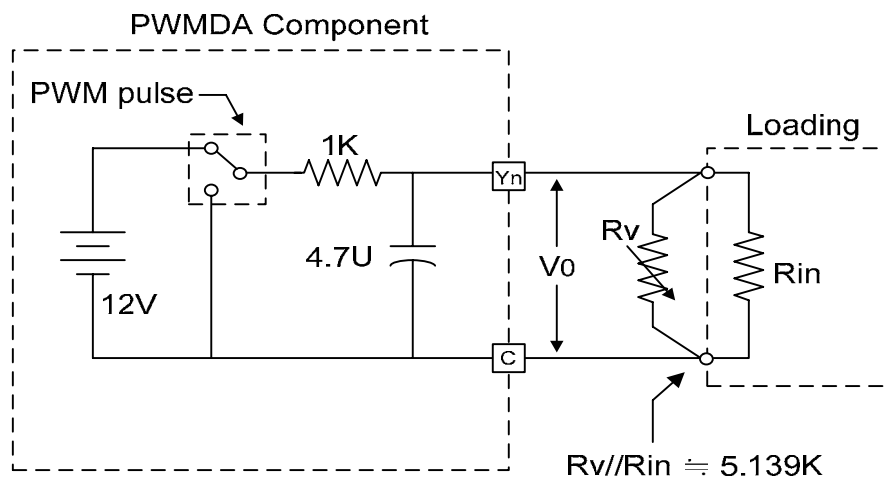
Pn : Setting of output frequency(0~255). Suggesting to set as 1(output frequency = 9.2KHz).

OR : Output pulse width setting register(0~1000).....digital output value.

WR : Working register, it can't repeat in use.

※ For detail illustration of FUN139, please refer to FBs user's manual I(Instruction Chapter).

PWMDA hardware diagram & resolution adjustment indication :



PWMDA hardware diagram

- Adjust through hardware : Firstly setting digital output value as 1000, then to adjust parallel resistance( $R_v$ ) to make  $V_o = 10V$ .(see curve A in below chart).
- Adjust through software : Firstly setting digital output value as 1000. If  $V_o \geq 10V$  then to reduce digital output value until  $V_o = 10V$ (see curve B in below chart).

