

FUZZY LOGIC TRAINER (Model : XPO-Fuzzy)



XPO-PID MU



Process I

1) Specifications of XPO-PID Master Unit :

Basic Resources on Top board :

- ◆ **Built in power supply :** DC supply $\pm 12V$, 500mA. 1_phase sine reference for cosine firing 30Vpp max. 17Vdc, 500mA unregulated for driving pulse X'mer, Variable DC power supply : 7 to 14V/3A
- ◆ **Display :**
 - A) DPM - 2Nos., for Temp. upto $100^{\circ}C$ / $500^{\circ}C$
 - B) Analog Meter - 2Nos.
- ◆ **Operating voltage :** Switch selectable 220-240Vac, $\pm 10\%$, 50Hz, 75VA
- ◆ **Mechanical Dimensions :**
 - a) Master Unit : 460mm(W), 160mm (H), 350mm(D), Net weight : 6.5 Kg. Gross weight : 8.5 Kg.
 - b) Panel : 215mm(W), 165mm(H), 40mm(D), Net weight : 700gm approx.

2) Thyristor Actuator panel (TAP) / EMT9 (CE2) (Provided with 13 banana tags.)

- Thyristor bridge based 0-200V/3A cosine firing circuit, I/P 0 to 2.5Vdc. Supports signal conditioning of RTD (PT100), Thermocouple K type & Photodiode to output 0-2.5Vdc (FS).
- Facilitates closed loop control experiments based on temperature, light intensity, speed measurement using built in P/PI controller as well as external Analog / Digital PID / Fuzzy controller.

3) Process I : Temperature / Light

Table top assembly : Process box containing 3 high wattage (60W) bulbs under aluminum plate heater. Builtin fan for cooling & lamp as heating disturbance generator.

Sensor : RTD for temp. control upto $100^{\circ}C$ with built in CAL facility.

4) PC (P4/XP/WIN7/FAT32) Software (Labview) based Fuzzy Controller (PC not in scope of supply), interfaces through USB Port, executable supplied on installable CD.

- **Computer Interface Adapter / CIA :** Optoisolated Adaptor to prevent damage to PC parallel port (25 pin LPT) due to wrong connections. Interfaces through 25 pin M to F cable 1mtr Length, 4 ADC channels : 0 to 2.5V full scale, 1 DAC channel: O/P 2.5 V FS.
- USB converter to interface 25 pin D connector on CIP panel to USB using PIC18F microcontroller 28 Pin SOIC enclosed in 25 Pin D shell using Type A to mini B cable.

5) a) Fuzzy software Controller : Aligantly designed spread out layout of realistic fuzzy controller with barchart, numeric display for controller output, set point & measurable variable in %. With parameter like Set Value R_n (0- 99.9), Sampling Time T_s (0.01- 99.9), Scale factor for error (0.1-99.9), Error dot (0.1-999), Fuzzy output Upper Limit U_h (0-99.9) and Lower Limit U_l (0-99.9), Facility to set units for output viz. Percentage (%), $^{\circ}C$, RPM, Voltage (V), mm, LPH, Kg/cm^2

b) Process Monitoring Mode :

Drawing graphs of analog data presented at CH 0 & CH1 of Computer Interface. Cursors for X & Y axis for measurement & online graphs savings for reproduction.

c) Fuzzification Mode :

Fuzzy controller based on linguistic rules & rule matrix (knowledge base), Calculation of N, Z, P, and membership function.

d) Defuzzyfier :

Calculation of strength of LH, MH, HH & crisp output using weighted average.

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