

## FAN FAILURE & TEMPERATURE DETECTION UNIT

### UL04-FFTDU ALM-4-20 mA

#### DESCRIPTION

The **UL04-FFTDU ALM-4-20 mA** is a micro-controller based AC Fan Monitoring Controller with digital temperature indication and signal retransmission, offered in a highly compact, rugged and reliable execution. The instrument has three keys on the front panel, with which the operator can set the parameters and configure the instrument as desired. The instrument has an in-built precision Temperature sensor which monitors the Ambient Temperature and displays the same on a Three digit red LED seven-segment digital on the front panel. The display can indicate any scale range between 00.0 to 99.9 units (Temperature) value in Degree Celsius (°C).

The Fan monitoring and Control modules are not designed for any specific make of Fans, and as such, the customer can use any Fan make of his choice. The rated current of the Fans need not be pre-specified by user, since the Fan Monitoring unit dynamically acquires this information while monitoring the Fans.

The Fan Control module provides powered output contacts for wiring the four AC Fans independently through internal control relays. The instrument also senses the normal healthy current being drawn by each fan and provides short-circuit and open-circuit protection by cutting off the supply to the corresponding Fan in case any abnormality is detected. Open Circuit and Short circuit conditions are monitored continuously and are digitally configurable.

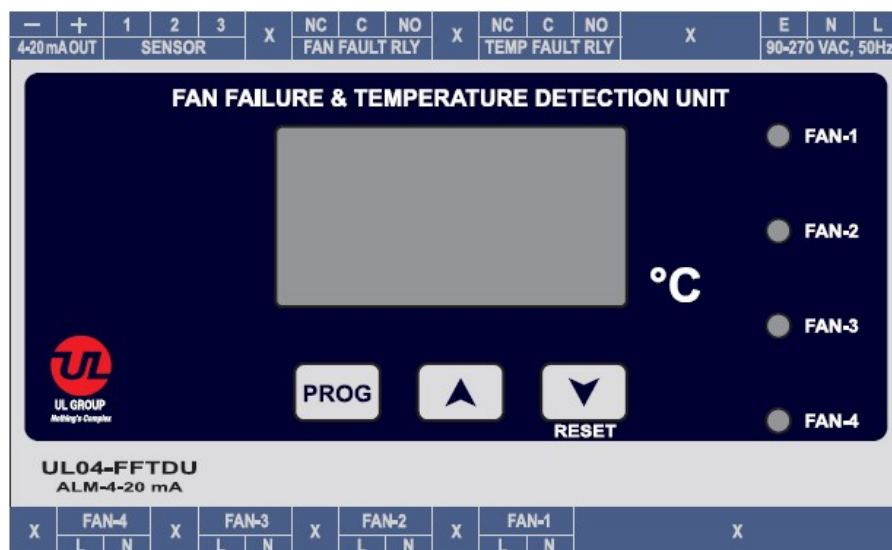
#### INSTALLATION

The instrument should be first mounted in an appropriate cut-out on the panel [See *TECHNICAL SPECIFICATIONS*]. All interconnections to the instrument should be made with strong multi-strand wire of the order of 2.5 sq.mm. The ends of the wires should be properly ferruled and suitable lugs must be used for effective termination.

The cables carrying the input signals should be routed separately and properly isolated from the power line cables, to prevent any electromagnetic interference in the input signal readings from the mains power line. Use of shielded twisted pair cable is recommended for input signals. The instrument should be earthed to a proper grounding point before connecting the Power Supply. The Relay contacts are potential free and any desired voltage may be used in conjunction with the same.

#### OPERATION & SETTINGS

The front panel of the Process Controller is as shown below:






The details of the front panel are as below:

### ► DISPLAY

**Ambient Temperature** - Three Digit Seven Segment Display shows the real time Temperature value.

### ► CONTROL KEYS

The instrument has three keys on the front panel, functions of which are described below:

	The <b>PROG</b> or PROGRAM key is the central coordinating key to access the settings of the instrument. Pressing this Key allows the operator to sequentially view, change and save the control parameters.
	The <b>INC</b> or Increment key allows the operator to select the numeral in the digit being set on an increasing scale. The digit will sequentially display 0, 1, 2....9 on each pressing of the INC key. The incrementing speed increases if the key is kept pressed.
	The <b>DEC</b> or Decrement key allows the operator to select the numeral in the digit being set on a decreasing scale. The digit will sequentially display 9, 8, 7....1 on each pressing of the DEC key. The decrementing speed increases if the key is kept pressed. The ▼ Key is used as a <b>RESET</b> key in the event of any fault condition.

### ► LED WINDOWS

<b>FAN-1</b>	- Dual-colour LED to indicate Fan status (Green: Healthy, Red: Faulty).
<b>FAN-2</b>	- Dual-colour LED to indicate Fan status (Green: Healthy, Red: Faulty).
<b>FAN-3</b>	- Dual-colour LED to indicate Fan status (Green: Healthy, Red: Faulty).
<b>FAN-4</b>	- Dual-colour LED to indicate Fan status (Green: Healthy, Red: Faulty).

## TERMINAL DETAILS

### UPPER TERMINAL BLOCK

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
-	+	1	2	3	X	NO	C	NC	X	NO	C	NC	X			E	N	L
4-20 mA OUT		SENSOR				FAN FAULT RELAY				TEMP FAULT RELAY						90-270VAC, 50 Hz		

### LOWER TERMINAL BLOCK

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
X	L	N	X	L	N	X	L	N	X	L	N	X						
	FAN-4			FAN-3			FAN-2			FAN-1								

## TECHNICAL SPECIFICATIONS

Model	: UL04-FFTDU ALM-4-20 mA
Type	: Fan Failure & Temperature Detection Unit.
No. of Fans	: Four.
Input Sensor	: LM35 Sensor.
Temperature Display	: Three Digit 0.4" Seven Segment Red LED Display.
Temperature Range	: 00.0 to 99.9 Degree Celsius.
Settings	: By Membrane keypad on front panel.
Control Outputs	: Two Relay (Fan Fail & Temp. Fail) change-over contacts.
LED Indications	: Four Dual colour LED to indicate Fan status (Healthy & Faulty)
Retransmission	: 4-20 mA DC
Contact Rating	: 10 Ampere @ 230 VAC (Resistive loads).
Accuracy	: + 1% Full scale.
Power Supply	: 90-270 VAC, 50 Hz Universal AC Power Supply.
Dimensions	: 75 x 100 x 110 mm [H x W x D].
Enclosure	: DIN-Rail mounting.
Weight	: Approximately 0.5 Kgs.
Operating Temperature	: 0 to 55°C.

## CONTROL & PARAMETER SETTINGS

KEY PRESSED	CONDITIONS	INITIAL DISPLAY	ALTERNATING DISPLAY	LED Indication and Relay Status
(POWER ON)	Ambient Temperature	25.0		If all FANS are in healthy condition bicolour LEDs of all Fans will show GREEN colour.
-	If ambient temperature reaches "HA" set point, the display toggles between "HA" and the current ambient temperature.	HA	45 (High Alarm set point)	Temperature Alarm Relay will get energized.
-	In the event of ANY ONE OR MORE FAN Failure or open condition, the display will toggle between FF and current ambient temperature.	FF	25	Bicolour LED for particular FAN will show RED colour as well as Fan Failure Alarm Relay will get energized
-	In the event of ANY ONE OR MORE FAN Failure or open condition, and ambient temperature reaches "HA" set point the display will toggle between FF and HA.	FF	HA	Bicolour LED for particular FAN will show red colour as well as Fan Failure Alarm Relay and Temperature Alarm Relay will get energized

The following is the sequence of settings on this module. All settings to be done using Increment (▲) and Decrement (▼) keys

KEY PRESSED	INITIAL DISPLAY	ALTERNATING DISPLAY	FUNCTION
(POWER ON)	UL	U1.1	Flash message
-	25.0	-	Ambient Temperature
INC and DEC (Together)	OF	00.0	Use Increment (▲) or decrement (▼) key for offset value.
PROG	HA	45.0	Display will toggle between "HA"(i.e. High Alarm Set Point) and previous set value. Use Increment (▲) or decrement (▼) key to set High Alarm Point.
PROG	tf	-	If Sensor Fails it shows error(Temperature failure)
PROG	E1	YS	YS=Enable Fan1, nO=Disable Fan1.
PROG		nO	Use Increment (▲) or decrement (▼) key to enable or disable Fan1. By selecting nO option user can skip Fan1.
PROG	H1	030	Not applicable
PROG	E2	YS	YS=Enable Fan2, nO=Disable Fan2.
PROG		nO	Use Increment (▲) or decrement (▼) key to enable or disable Fan2. By selecting nO option user can skip Fan2
PROG	H2	030	Not applicable
PROG	E3	YS	YS=Enable Fan3, nO=Disable Fan3.
		nO	Use Increment (▲) or decrement (▼) key to enable or disable Fan3. By selecting nO option user can skip Fan3
PROG	H3	030	Not applicable
PROG	E4	YS	YS=Enable Fan4, nO=Disable Fan4.
		nO	Use Increment (▲) or decrement (▼) key to enable or disable Fan4. By selecting nO option user can skip Fan4
PROG	H4	030	Not applicable
PROG	CO	50.0	Use Increment (▲) or decrement (▼) key to set maximum range of Temperature
PROG	Zr	200	Zero Setting Connect Digital Multimeter to 4-20 mA DC output terminal and adjust the ADC counts for 4 mA.
PROG	SP	500	Span Setting Connect Digital Multimeter to 4-20 mA DC output terminal and adjust the ADC counts for 20 mA.
PROG	LG	nO	Use Increment (▲) or decrement (▼) key to change logic nC and nO for relay logic
Decrement or Reset Key(▼)			The ▼ Key may be used as a RESET key in the event of any fault condition

**Testing Procedure:**

1. Once Powered ON the UNIT, it takes 10 sec to sense the fan's current, and update the upper current limit automatically.
2. After 10 sec block the fan to check rotor block condition, Fan will get stopped in 4 to 5 seconds.

#### **IMPORTANT NOTES**

1. The 2-Fan and 4-Fan FFTDUs are AC Fan Monitoring Controllers with Auto Current sensing facility. The AC Fans are powered through Relays in the FFTDU.
2. During Fan-fault or Rotor-Blocked condition, the Fan typically draws a higher current.
3. The FFTDU measures the line current drawn by each of the AC Fans individually.
4. When the FFTDU is powered on, the AC Fans get energized. The Fans are allowed to run for a period of 10 seconds, to give time for the start-up currents of the Fans to stabilize. Once the line currents of the Fans stabilize, these currents are saved in the FFTDU Memory.
5. Based on the Line Currents, the FFTDU automatically computes the alarm current levels for each individual Fan and stores these currents in Memory also.
6. Thus, within 10 seconds of start-up, the normal Line Current and the Alarm Current levels for the connected Fans are stored in memory. This is done each time the instrument is powered On.
7. During running, if there is a fault in the Fan, or a blocked rotor condition, the FFTDU will sense the increase in line current and immediately switch off power supply to the corresponding Fan. Also the Fan Fault Alarm Relay will energize.
8. In this Fan-Fault condition, the operator must replace the Fan or clear obstruction causing the fault. Once this is done, the Reset button needs to be pressed. Pressing the Reset key will supply power to the Fan and the instrument will again go through the 10 second period of current measurement, normal Line Current storage and Fault-Level current storage.
9. However, if the Fan is faulty or blocked, and the operator still presses Reset key, the FFTDU will again energize the power supply to the Fan and sense the current being drawn by the Fan. Since the FFTDU has no means of knowing whether the Fan is actually running or blocked, it will assume that the Line Current measured in the fault condition is the normal line current, and save that in memory. This is because in a 2-wire Fan there is no tachometer feedback indicating Rotor movement, which is only available in a 3-wire Fan.
10. It is therefore necessary that during initial commissioning of this product or when new Fans are used, the operator checks and visually confirms that the Fans are running normally. If a faulty or blocked-rotor Fan is connected, the FFTDU will simply assume the measured current to be the fan's normal line current and set alarms accordingly. It will not show red LED alarm of Rotor Block.

#### **NOTE:**

Please do not change any configuration manually of H1, H2, H3 and H4.

***If fan is blocked, kindly power off the FFTDU, clear obstruction causing the fault or replace the fan and then power it ON.***