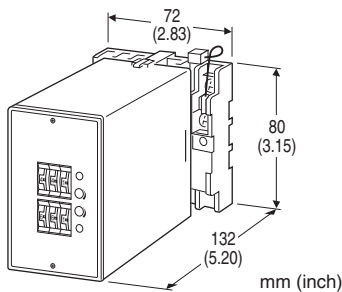


**Limit Alarms (with DC output) AE-UNIT**

**THERMOCOUPLE ALARM**

**Functions & Features**

- Providing SPDT relay outputs at preset input levels
- Direct input from a thermocouple
- Dual (Hi/Lo) trip
- Additional isolated DC output proportional to the temperature
- 7-segment linearization
- Burnout protection
- High-accuracy cold junction compensation
- Energized or de-energized coil at a tripped condition selectable
- Thumbwheel switch adjustments
- Relays can be powered 110 V DC



**MODEL: AET-[1][2][3][4][5][6]-[7][8]**

**ORDERING INFORMATION**

- Code number: AET-[1][2][3][4][5][6]-[7][8]
- Specify a code from below for each [1] through [8].  
(e.g. AET-2A2101-D/BN/Q)
- Temperature range (e.g. 0 - 800°C)
- Special DC output range (For codes Z & 0)
- Specify the specification for option code /Q  
(e.g. /C01/S01)

**[1] INPUT THERMOCOUPLE**

- 1: (PR) (Usable Range 0 to 1760°C, 32 to 3200°F)
- 2: K (CA) (Usable range -270 to +1370°C, -454 to +2498°F)
- 3: E (CRC) (Usable range -270 to +1000°C, -454 to +1832°F)
- 4: J (IC) (Usable range -210 to +1200°C, -346 to +2192°F)
- 5: T (CC) (Usable range -270 to +400°C, -454 to +752°F)
- 6: B (RH) (Usable range 0 to 1820°C, 32 to 3308°F)
- 7: R (Usable range -50 to +1760°C, -58 to +3200°F)
- 8: S (Usable range -50 to +1760°C, -58 to +3200°F)
- N: N (Usable range -270 to +1300°C, -454 to +2372°F)
- 0: Specify

**[2] DC OUTPUT**

- N: None
- Current**
- A: 4 - 20 mA DC (Load resistance 350 Ω max.)
- B: 2 - 10 mA DC (Load resistance 700 Ω max.)
- C: 1 - 5 mA DC (Load resistance 1400 Ω max.)
- D: 0 - 20 mA DC (Load resistance 350 Ω max.)
- E: 0 - 16 mA DC (Load resistance 430 Ω max.)
- F: 0 - 10 mA DC (Load resistance 700 Ω max.)
- G: 0 - 1 mA DC (Load resistance 7000 Ω max.)
- Z: Specify current (See OUTPUT SPECIFICATIONS)
- Voltage**
- 1: 0 - 10 mV DC (Load resistance 10 kΩ min.)
- 2: 0 - 100 mV DC (Load resistance 100 kΩ min.)
- 3: 0 - 1 V DC (Load resistance 1000 Ω min.)
- 4: 0 - 10 V DC (Load resistance 10 kΩ min.)
- 5: 0 - 5 V DC (Load resistance 5000 Ω min.)
- 6: 1 - 5 V DC (Load resistance 5000 Ω min.)
- 4W: -10 - +10 V DC (Load resistance 10 kΩ min.)
- 5W: -5 - +5 V DC (Load resistance 5000 Ω min.)
- 0: Specify voltage (See OUTPUT SPECIFICATIONS)

**[3] SETPOINT 1 OUTPUT**

- 1: Hi (coil energized at alarm)
- 2: Hi (coil de-energized at alarm)
- 3: Lo (coil energized at alarm)
- 4: Lo (coil de-energized at alarm)

**[4] SETPOINT 2 OUTPUT**

- 1: Hi (coil energized at alarm)
- 2: Hi (coil de-energized at alarm)
- 3: Lo (coil energized at alarm)
- 4: Lo (coil de-energized at alarm)

**[5] ON DELAY TIME**

- 0: 0.5 seconds
- 1: 1 second
- 2: 2 seconds
- 3: 3 seconds
- 4: 4 seconds

**[6] POWER ON DELAY TIME**

- 1: 1 second
- 2: 2 seconds
- 3: 3 seconds
- 4: 4 seconds
- 5: 5 seconds

**[7] POWER INPUT****AC Power**

B: 100 V AC

C: 110 V AC

D: 115 V AC

F: 120 V AC

G: 200 V AC

H: 220 V AC

J: 240 V AC

**DC Power**

S: 12 V DC

R: 24 V DC

V: 48 V DC

P: 110 V DC

**[8] OPTIONS (multiple selections)****Burnout**

blank: Upscale burnout

/BL: Downscale burnout

/BN: No burnout

**Other Options**

blank: none

/Q: Option other than the above (specify the specification)

**SPECIFICATIONS OF OPTION: Q (multiple selections)****COATING (For the detail, refer to M-System's web site.)**

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

**TERMINAL SCREW MATERIAL**

/S01: Stainless steel

**GENERAL SPECIFICATIONS****Construction:** Plug-in**Connection:** M3.5 screw terminals**Screw terminal:** Chromated steel (standard) or stainless steel**Housing material:** Flame-resistant resin (black)**Isolation:** Input to DC output to alarm output 1 to alarm output 2 to power**Overrange output:** Approx. -10 to +120 % at 1 - 5 V**Zero adjustment:** -5 to +5 % (front)**Span adjustment:** 95 to 105 % (front)**Setpoint adjustments:** Thumbwheel switches (front); 0 - 99 % independently; 1 % increments**Hysteresis (deadband) adjustments:** Thumbwheel switches (front); 0.5, 1 - 9 % independently; 1 % increments (SW position 0 = 0.5); [Lo SP + Hysteresis]  $\leq$  102**Burnout protection:** Upscale standard; downscale optional; Both DC and relay outputs respond respectively for upscale input.**Linearization:** Standard**Cold junction compensation:** CJC sensor attached to the input terminals**Front LEDs:** Red lights turn on when the coils are energized.**INPUT SPECIFICATIONS****Minimum span:** 3 mV**Offset:** Max. 1.5 times span**Input resistance:** 30 k $\Omega$  min.**Burnout sensing:** 0.1  $\mu$ A**Minimum span (in °C)****(PR):** min. span 370°C**K (CA):** min. span 75°C**E (CRC):** min. span 50°C**J (IC):** min. span 60°C**T (CC):** min. span 75°C**B (RH):** min. span 780°C**R:** min. span 360°C**S:** min. span 380°C**N:** min. span 110°C**Minimum span (in °F)****(PR):** min. span 670°F**K (CA):** min. span 140°F**E (CRC):** min. span 90°F**J (IC):** min. span 110°F**T (CC):** min. span 140°F**B (RH):** min. span 1410°F**R:** min. span 650°F**S:** min. span 690°F**N:** min. span 200°F**Remark:** The described accuracy may be partially not satisfied when the temperature ranges below 0°C. Consult factory.

## OUTPUT SPECIFICATIONS

### ■ DC Output

•DC Current: 0 - 20 mA DC

Minimum span: 1 mA

Offset: Max. 1.5 times span

Load resistance: Output drive 7 V maximum

•DC Voltage: -10 - +12 V DC

Minimum span: 5 mV

Offset: Max. 1.5 times span

Load resistance: Output drive 1 mA maximum; at  $\geq 0.5$  V

### ■ Alarm Output: Relay contact

100 V AC @ 1 A ( $\cos \phi = 1$ )

120 V AC @ 1 A ( $\cos \phi = 1$ )

240 V AC @ 0.5 A ( $\cos \phi = 1$ )

30 V DC @ 1 A (resistive load)

Maximum switching voltage: 380 V AC or 125 V DC

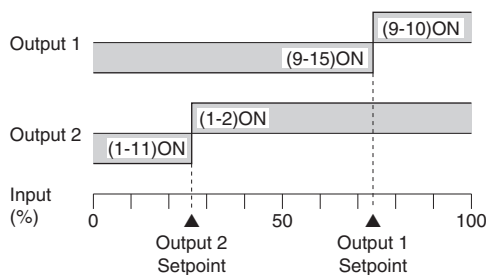
Maximum switching power: 120 VA or 30 W

Minimum load: 5 V DC @ 10 mA

Mechanical life:  $5 \times 10^7$  cycles

For maximum relay life with inductive loads, external protection is recommended.

### Alarm Trip Operation Terminal No. in parentheses



### Trip Operation in Power Failure

•Output Code: 1 & 4: Terminals 1 - 11, 9 - 15 turn ON

•Output Code: 2 & 3: Terminals 1 - 2, 9 - 10 turn ON

## INSTALLATION

### Power input

•AC: Operational voltage range: rating  $\pm 10$  %, 50/60  $\pm 2$  Hz, approx. 3 VA

•DC: Operational voltage range: rating  $\pm 10$  %, or 85 - 150 V for 110 V rating (ripple 10 % p-p max.) approx. 2 W (80 mA at 24 V)

Operating temperature: -5 to +55°C (23 to 131°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Mounting: Surface or DIN rail

Weight: 450 g (0.99 lb)

## PERFORMANCE in percentage of span

### •DC output

Accuracy:  $\pm 0.3$  % (at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

Response time:  $\leq 0.5$  seconds (0 - 90 %)

### •Alarm output

Setpoint accuracy:  $\pm 0.8$  % (at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

Hysteresis (Deadband) setpoint accuracy:  $\pm 0.3$  %

ON delay time accuracy: rating  $\pm 20$  % or 0.3 sec., whichever is greater.

Power ON delay time accuracy: Rating  $\pm 30$  %

Trip point repeatability:  $\pm 0.05$  % (at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

### Cold junction compensation error

(at 20°C  $\pm 10$ °C or 68°F  $\pm 18$ °F)

K, E, J, T & N:  $\pm 0.5$ °C or  $\pm 0.9$ °F

S, R & PR:  $\pm 1$ °C or  $\pm 1.8$ °F

Temp. coefficient:  $\pm 0.015$  %/°C ( $\pm 0.008$  %/°F)

(at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

Burnout response:  $\leq 10$  sec.

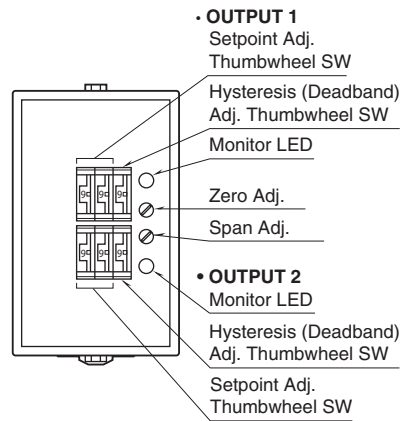
Line voltage effect:  $\pm 0.1$  % over voltage range

Insulation resistance:  $\geq 100$  M $\Omega$  with 500 V DC

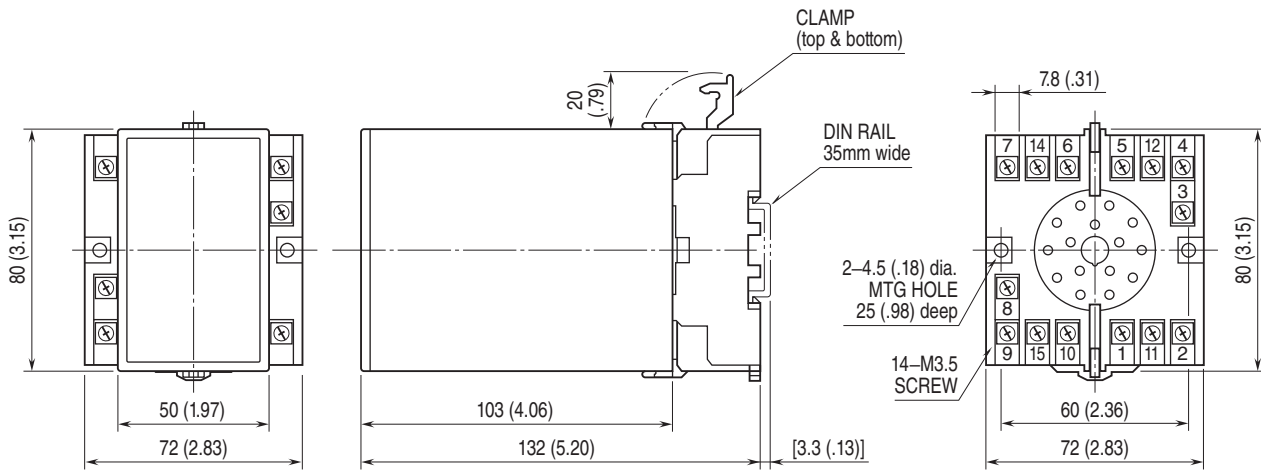
Dielectric strength: 2000 V AC @ 1 minute

(input to DC output to alarm output 1 to alarm output 2 to power to ground)

## EXTERNAL VIEW

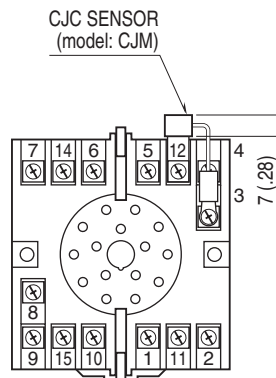


## EXTERNAL DIMENSIONS unit: mm (inch)

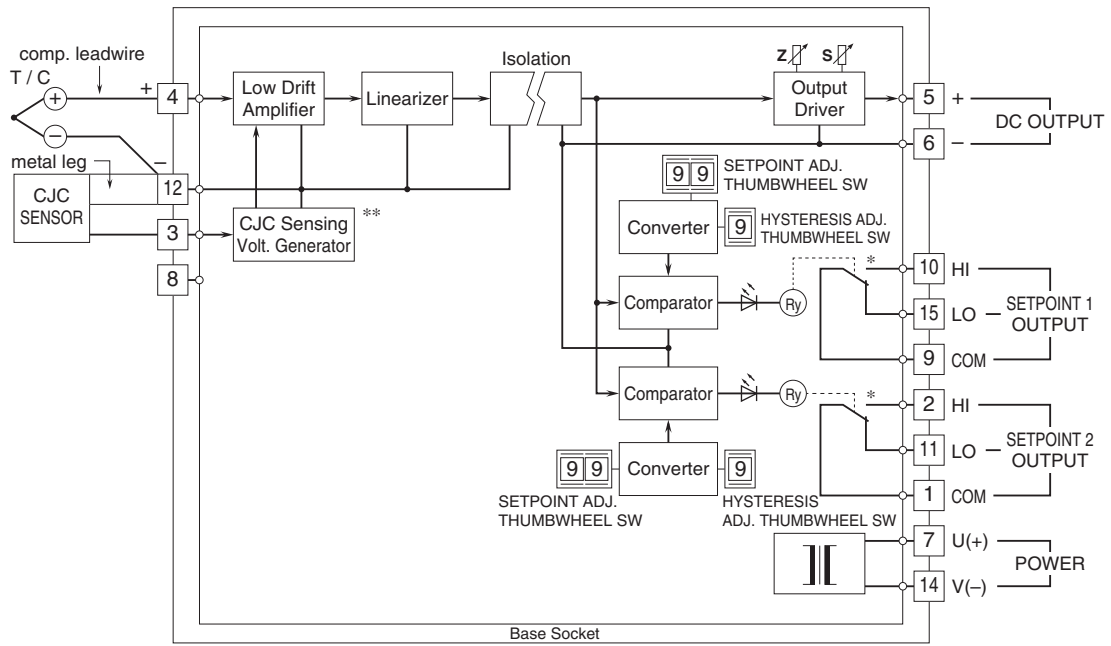


• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm (inch)



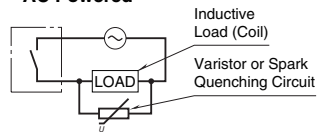
## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



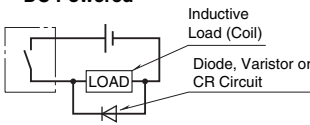
\*Relay status for output codes "1" & "4", at power OFF.  
\*\*Deleted with B thermocouple

### ■ Relay Protection

#### • AC Powered



#### • DC Powered



Specifications are subject to change without notice.