

Single Loop Controller Series

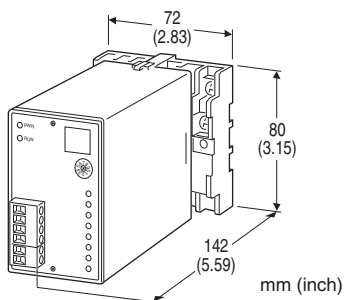
REMOTE I/O MODULE

(for NestBus use)

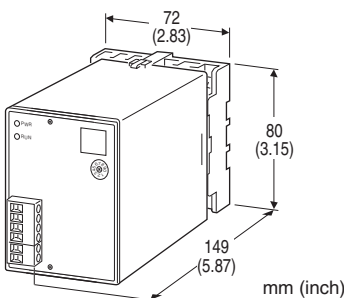
Functions & Features

- Remote I/O module for the NestBus use
- Plugin hardware
- Twisted-pair cable transmission
- Removable terminal block
- Self-diagnostics
- Monitor LED provided for contact I/O modules

OTHER THAN SML-R2



SML-R2



MODEL: SML-[1]-[2][3]

ORDERING INFORMATION

- Code number: SML-[1]-[2][3]

Specify a code from below for each of [1] through [3].

(e.g. SML-A4-K)

[1] I/O SECTION

- A4:** Di 8 points
- C7:** Do 8 points (photo MOSFET relay)
- C8:** Do 8 points (relay)
- E5:** Di 4 + Do 4 points (relay)
- G3:** Ai 8 points
- G4:** Ai 4 points
- M4:** Ao 4 points

- P4:** Pi 4 points
- R2:** Ai 2 points (isolated between chs)
+ Ao 2 points (isolated between chs, current output)
(power input code K, L not selectable)
- R3:** Ai 4 + Ao 4 points
- S5:** Ai 4 + Di 4 points
- S6:** Ao 4 + Do 4 points (relay)

[2] POWER INPUT

AC Power

M2: 100 - 240 V AC (Operational voltage range 85 - 264 V, 47 - 66 Hz)
(Selectable only for SML-R2)

K: 85 - 132 V AC (Operational voltage range 85 - 132 V, 50 - 60 Hz)

L: 170 - 264 V AC (Operational voltage range 170 - 264 V, 50 - 60 Hz)

DC Power

R: 24 V DC

(Operational voltage range 24 V \pm 10 %, ripple 10 %p-p max.)

[3] OPTIONS

Lowpass Filter

(only for SML-P4)

blank: Without

/LF: With

RELATED PRODUCTS

- Loop configuration builder software (model: SFEW3E)
Builder software downloadable at our web site.
A dedicated cable is required to connect the module to the PC. Please refer to the users manual for the Builder software for applicable cable types.

GENERAL SPECIFICATIONS

Construction: Plug-in

Connection

I/O signal, Power input: M3.5 screw terminals (torque 0.8 N·m)

NestBus, RUN contact output: Euro type connector terminal

Applicable wire size: 0.2 to 2.5 mm², stripped length 7 mm

Screw terminal: Chromated steel

Housing material: Flame-resistant resin (black)

Isolation:

I/O selection codes other than R2: NestBus to I/O to RUN contact output to power to FG

R2: NestBus to input 1 to input 2 to output 1 to output 2 to RUN contact output to power to FG

Power indicator: Red LED turns on when power is supplied.

RUN indicator: Red LED turns on when data are transmitted to the NestBus.

■ **RUN Output:** Contact opens in an abnormality.

Rating: 100 V AC @ 0.5A ($\cos \phi = 1$)
30 V DC @ 0.5 A (resistive load)
Maximum switching voltage: 250 V AC or 220 V DC
Maximum switching power: 62.5 VA or 60 W
Minimum load: 10 mV DC @ 1 mA
Mechanical life: 5×10^7 cycles

NestBus

Configuration: Bus type multi-drop
Standard: Conforms to TIA/EIA-485-A
Transfer rate: 19.2 kbps
Protocol: NestBus (our own protocol)
Max. transmission distance: 1 kilometer
Transmission media:
Shielded twisted-pair cable (CPEV-S 0.9 dia.)
Terminating resistor: Incorporated
Card No. adjustment: Rotary switch; 0 - F (16)

INSTALLATION

Power consumption

•AC

I/O selection codes other than R2: Approx. 6 VA

R2:

Approx. 5 VA at 100 V AC

Approx. 7 VA at 200 V AC

Approx. 8 VA at 264 V AC

•DC: Approx. 3 W (125 mA)

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

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

Mounting: Surface or DIN rail

Work area: 170 mm (6.7") min. from the mounting surface required

Weight

I/O selection codes other than R2: Approx. 400 g (0.88 lb)

R2: Approx. 500 g (1.10 lb)

PERFORMANCE

Permissible power failure duration: ≤ 20 ms

Insulation resistance: ≥ 100 M Ω with 500 V DC

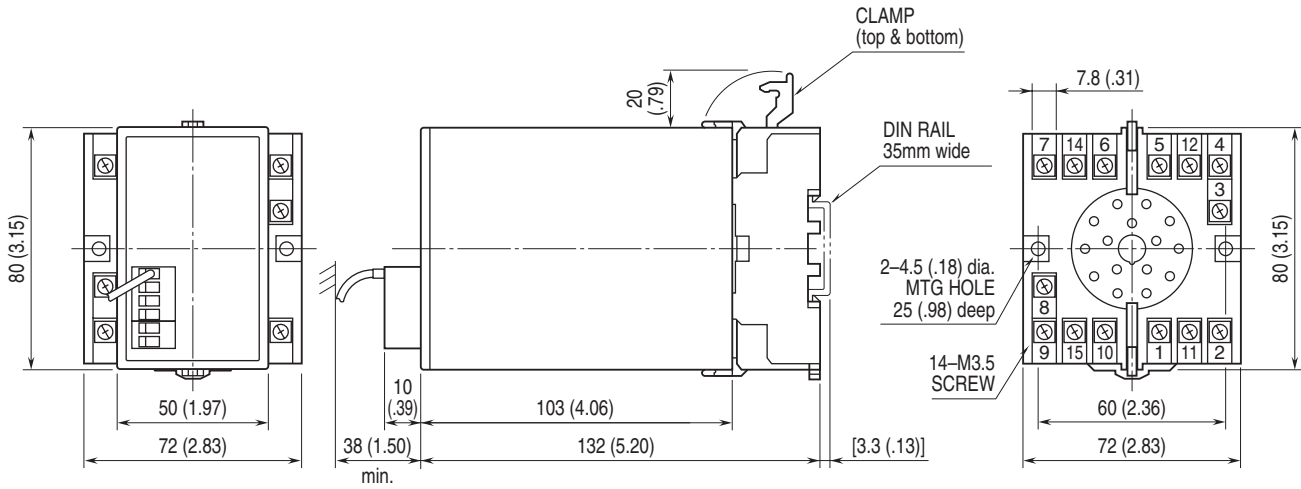
Dielectric strength

I/O selection codes other than R2: 1500 V AC @ 1 minute
(NestBus to I/O to RUN contact output to power to FG)

R2: 1500 V AC @ 1 minute
(NestBus to input 1 to input 2 to output 1 to output 2 to RUN contact output to power to FG)

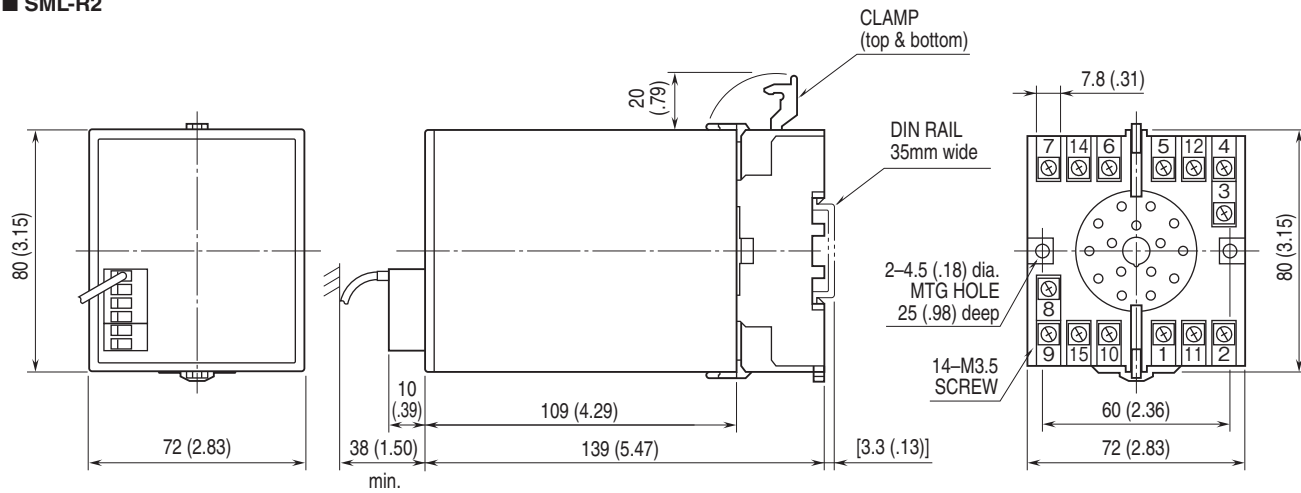
EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]

■ OTHER THAN SML-R2



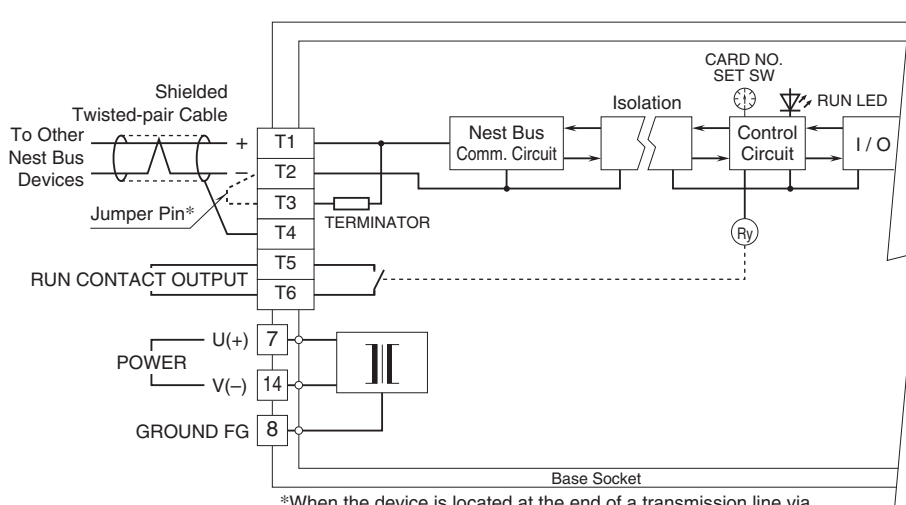
• When mounting, no extra space is needed between units.

■ SML-R2



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

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



*When the device is located at the end of a transmission line via twisted-pair cable (when there is no cross-wiring), close across the terminal T2 – T3 with the attached jumper pin (or with a leadwire). When the device is not at the end, remove the jumper pin. For cross-wiring, use the terminal T1, T2 and T4.

CONTACT INPUT MODULE

(Di 8 points)

MODEL: SML-A4-[1]

ORDERING INFORMATION

- Code number: SML-A4-[1]
- Specify a code from below for [1].
(e.g. SML-A4-K)

[1] POWER INPUT

- AC Power
- K: 85 - 132 V AC
- L: 170 - 264 V AC
- DC Power
- R: 24 V DC

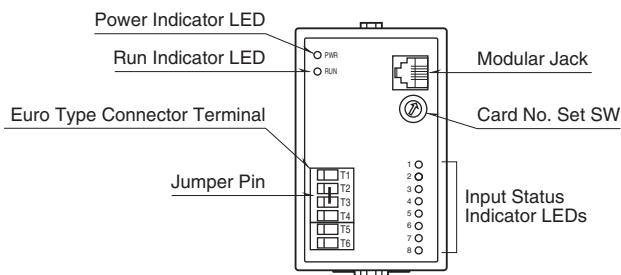
GENERAL SPECIFICATIONS

- Connection:** M3.5 screw terminals
- Isolation:** NestBus to input to RUN contact output to power to FG
- Input status indicator LED:** Red LEDs assigned to each channel

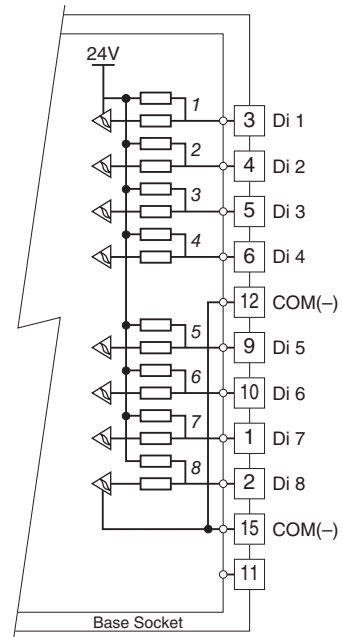
INPUT SPECIFICATIONS

- **Contact Input**
- Input:** Dry contact, 8 points
- Commons:** All negatives
- Sensing:** 24 V DC
- ON current/resistance:** 3 mA min., 1 kΩ max.
- OFF current/resistance:** 1 mA max., 50 kΩ min.

EXTERNAL VIEW



TERMINAL CONNECTION (INPUT)



Italic figures indicate LED No. on the front panel.

CONTACT OUTPUT MODULE

(Do 8 points (photo MOSFET relay))

MODEL: SML-C7-[1]

ORDERING INFORMATION

- Code number: SML-C7-[1]
- Specify a code from below for [1].
(e.g. SML-C7-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

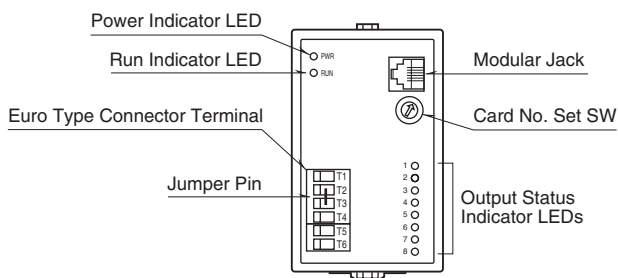
GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to output to RUN contact output to power to FG
Output status indicator LED: Red LEDs assigned to each channel

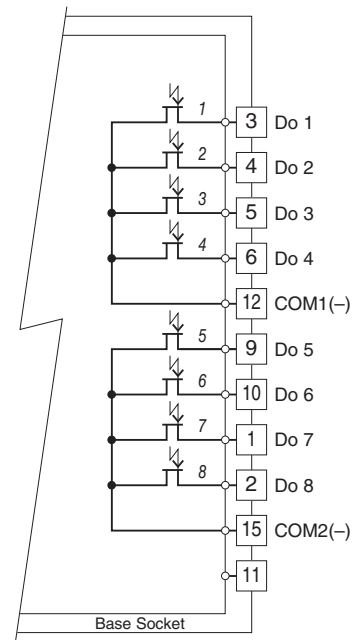
OUTPUT SPECIFICATIONS

■ **Contact Output**
Output: Photo MOSFET relay, 8 points
Commons: All negatives
Rating: 125 V AC/DC @ 50 mA (resistive load)
Maximum ON resistance: 50 Ω

EXTERNAL VIEW



TERMINAL CONNECTION (OUTPUT)



Italic figures indicate LED No. on the front panel.

CONTACT OUTPUT MODULE

(Do 8 points (relay))

MODEL: SML-C8-[1]

ORDERING INFORMATION

- Code number: SML-C8-[1]
- Specify a code from below for [1].
(e.g. SML-C8-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

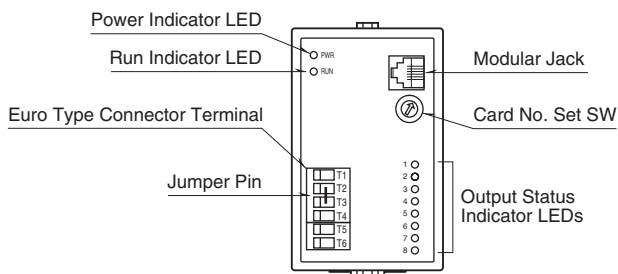
GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to output to RUN contact output to power to FG
Output status indicator LED: Red LEDs assigned to each channel

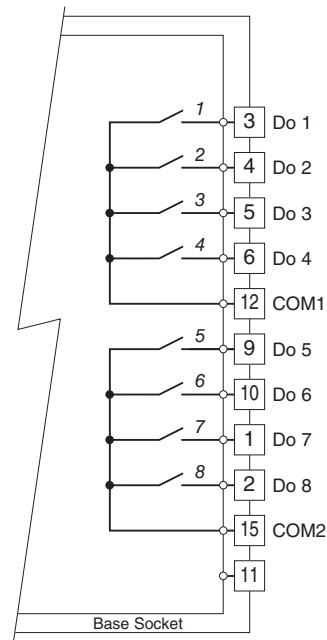
OUTPUT SPECIFICATIONS

- Contact output
- Output:** Relay contact, 8 points
Commons: 1 common per 4 points
Rating: 100 V AC @ 0.5 A (cos ϕ = 1)
 30 V DC @ 0.5 A (resistive load)
Maximum switching voltage: 250 V AC or 220 V DC
Maximum switching power: 62.5 VA or 60 W
Minimum load: 10 mV DC @ 1 mA
Mechanical life: 5×10^7 cycles

EXTERNAL VIEW



TERMINAL CONNECTION (OUTPUT)



Italic figures indicate LED No. on the front panel.

CONTACT I/O MODULE

(Di 4 + Do 4 points (relay))

MODEL: SML-E5-[1]

ORDERING INFORMATION

- Code number: SML-E5-[1]
- Specify a code from below for [1].
(e.g. SML-E5-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to I/O to RUN contact output to power to FG
I/O status indicator LED: Red LEDs assigned to each channel
 (No. 1 - 4 for input, 5 - 8 for output)

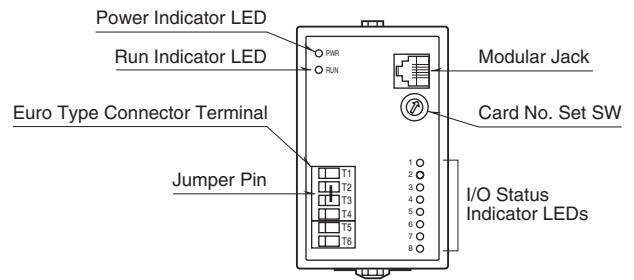
INPUT SPECIFICATIONS

■ **Contact Input**
Input: Dry contact, 4 points
Commons: All negatives
Sensing: 24 V DC
ON current/resistance: 3 mA min., 1 kΩ max.
OFF current/resistance: 1 mA max., 50 kΩ min.

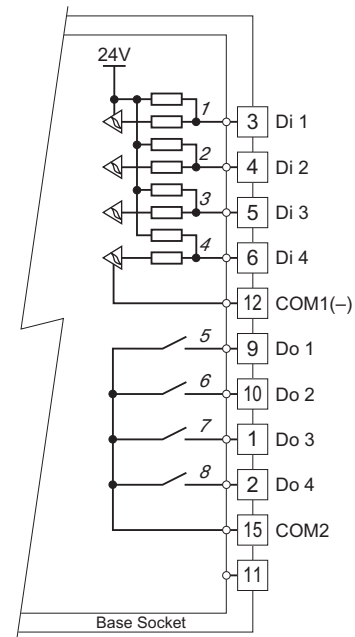
OUTPUT SPECIFICATIONS

■ **Contact Output**
Output: Relay contact, 4 points
Commons: 1 common per 4 points
Rating: 100 V AC @ 0.5 A (cos ϕ = 1)
 30 V DC @ 0.5 A (resistive load)
Maximum switching voltage: 250 V AC or 220 V DC
Maximum switching power: 62.5 VA or 60 W
Minimum load: 10 mV DC @ 1 mA
Mechanical life: 5×10^7 cycles

EXTERNAL VIEW



I/O TERMINAL CONNECTION



Italic figures indicate LED No. on the front panel.

ANALOG INPUT MODULE

(Ai 8 points)

MODEL: SML-G3-[1]

ORDERING INFORMATION

- Code number: SML-G3-[1]
- Specify a code from below for [1].
(e.g. SML-G3-K)

[1] POWER INPUT

AC Power

K: 85 - 132 V AC

L: 170 - 264 V AC

DC Power

R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals

Isolation: NestBus to input to RUN contact output to power to FG

INPUT SPECIFICATIONS

■ Analog Input

Input: DC voltage, 8 points

Operational range: 0.5 - 5.5 V DC (1 - 5 V DC)

Commons: All negatives

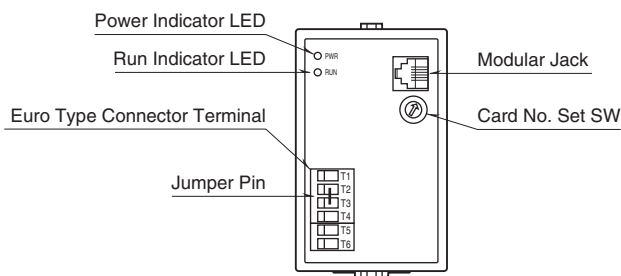
Input resistance: 1 MΩ minimum

PERFORMANCE in percentage of span

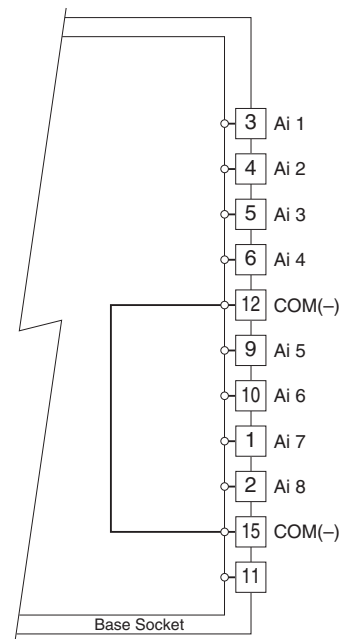
A/D conversion: ±0.1 %

Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)

EXTERNAL VIEW



TERMINAL CONNECTION (INPUT)



ANALOG INPUT MODULE

(Ai 4 points)

MODEL: SML-G4-[1]

ORDERING INFORMATION

- Code number: SML-G4-[1]
- Specify a code from below for [1].
(e.g. SML-G4-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to input to RUN contact output to power to FG

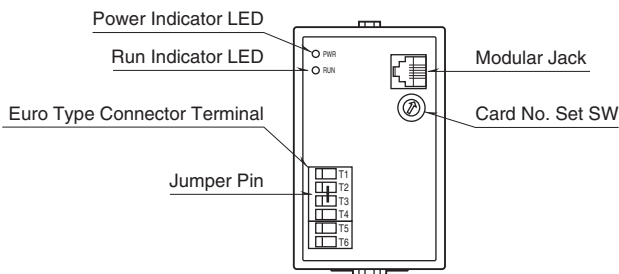
INPUT SPECIFICATIONS

- Analog Input
- Input:** DC voltage, 4 points
Operational range: 0.5 - 5.5 V DC (1 - 5 V DC)
Commons: All negatives
Input resistance: 1 MΩ minimum

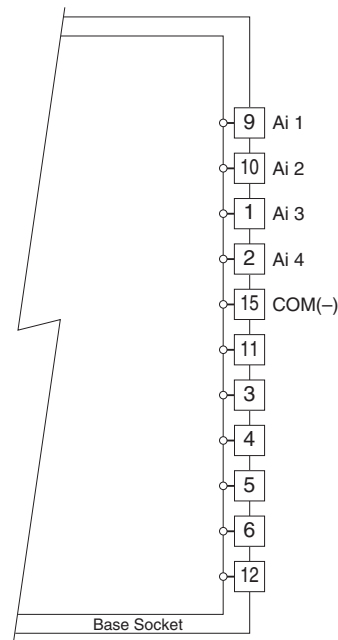
PERFORMANCE in percentage of span

A/D conversion: ±0.1 %
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)

EXTERNAL VIEW



TERMINAL CONNECTION (INPUT)



ANALOG OUTPUT MODULE

(Ao 4 points)

MODEL: SML-M4-[1]

ORDERING INFORMATION

- Code number: SML-M4-[1]
- Specify a code from below for [1].
(e.g. SML-M4-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to output to RUN contact output to power to FG

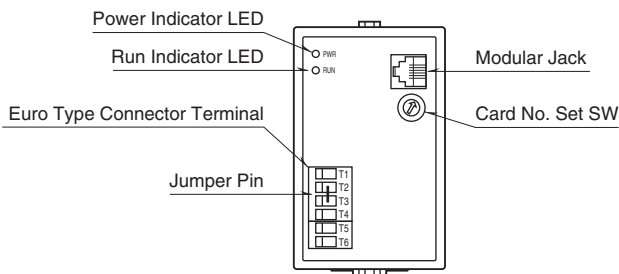
OUTPUT SPECIFICATIONS

■ **Analog Output**
Output: DC voltage, 4 points
Operational range: 0.5 - 5.5 V DC (1 - 5 V DC)
Commons: All negatives
Load resistance: 10 kΩ minimum

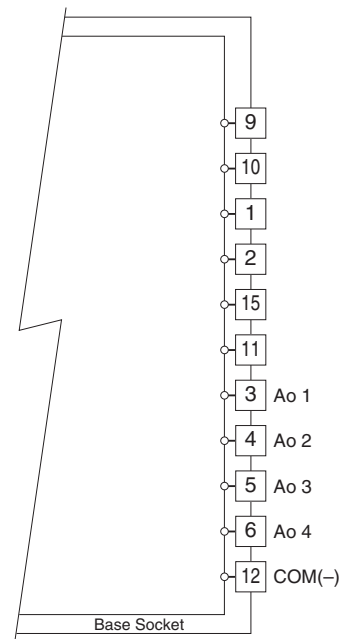
PERFORMANCE in percentage of span

D/A conversion: ±0.1 %
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)

EXTERNAL VIEW



TERMINAL CONNECTION (OUTPUT)



PULSE INPUT MODULE

(Pi 4 points)

MODEL: SML-P4-[1][2]

ORDERING INFORMATION

- Code number: SML-P4-[1][2]

Specify a code from below for each of [1] and [2].

(e.g. SML-P4-K/LF)

[1] POWER INPUT

AC Power

K: 85 - 132 V AC

L: 170 - 264 V AC

DC Power

R: 24 V DC

[2] OPTIONS

Lowpass Filter

blank: Without

/LF: With

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals

Isolation: NestBus to input to RUN contact output to power to FG

Input status indicator LED: Red LEDs assigned to each channel

INPUT SPECIFICATIONS

■ Pulse Input

Input: open collector, 4 points

Commons: All negatives

Frequency range: 0 - 10 kHz (without lowpass filter)

0 - 10 Hz (with lowpass filter)

Pulse width time requirement:

50 μ sec.(without lowpass filter)

60 msec.(with lowpass filter)

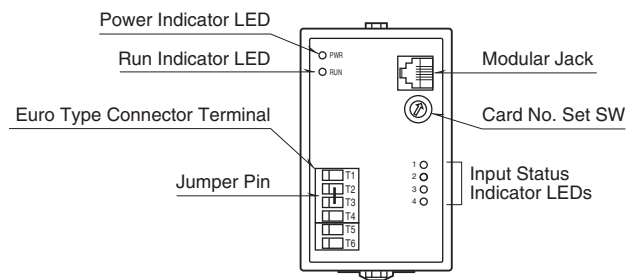
Sensing: 24V DC

ON current/resistance: 3mA min., 1 k Ω max.

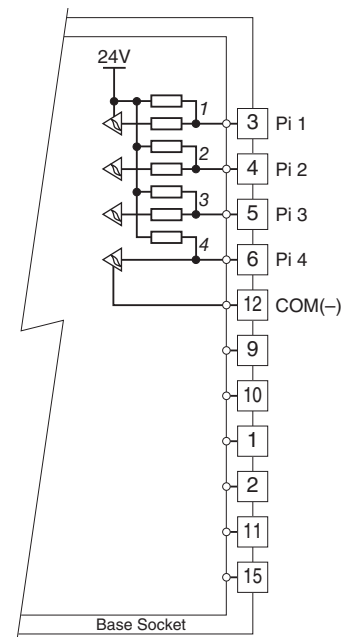
OFF current/resistance: 1mA max., 50 k Ω min.

Counter: 0 - 9999 (reset to zero with overflow)

EXTERNAL VIEW



TERMINAL CONNECTION (INPUT)



Italic figures indicate LED No. on the front panel.

ANALOG I/O MODULE

(Ai 2 points (isolated between chs) + Ao 2 points (isolated between chs, current output)

MODEL: SML-R2-[1]

ORDERING INFORMATION

- Code number: SML-R2-[1]

Specify a code from below for [1].

(e.g. SML-R2-M2)

[1] POWER INPUT

AC Power

M2: 100 - 240 V AC

DC Power

R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals

Isolation: NestBus to input 1 to input 2 to output 1 to output 2 to RUN contact output to power to FG

INPUT SPECIFICATIONS

■ Analog Input

Input: DC voltage, 2 points (isolated between chs)

Operational range: 0.5 - 5.5 V DC (1 - 5 V DC)

Input resistance: $\geq 1 \text{ M}\Omega$

OUTPUT SPECIFICATIONS

■ Analog Output

Output: DC Current, 2 points (isolated between chs)

Operational range: 3.2 - 20.8 mA DC (4 - 20 mA DC)

Load resistance: $\leq 300 \Omega$

PERFORMANCE in percentage of span

A/D conversion: $\pm 0.1 \%$

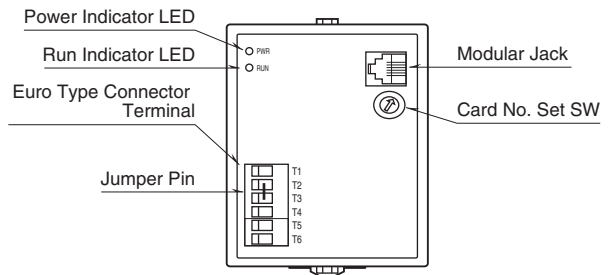
D/A conversion: $\pm 0.1 \%$

Temp. coefficient:

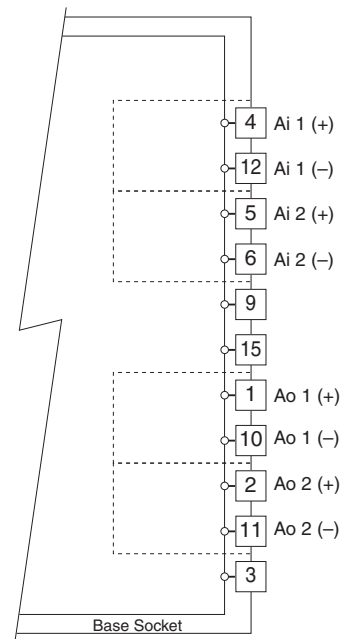
Input: $\pm 0.015\%/^{\circ}\text{C}$ ($\pm 0.008\%/^{\circ}\text{F}$)

Output: $\pm 0.015\%/^{\circ}\text{C}$ ($\pm 0.008\%/^{\circ}\text{F}$)

EXTERNAL VIEW



I/O TERMINAL CONNECTION



Enclosing broken lines indicate insulation sections.

ANALOG I/O MODULE

(Ai 4 + Ao 4 points)

MODEL: SML-R3-[1]

ORDERING INFORMATION

- Code number: SML-R3-[1]
- Specify a code from below for [1].
(e.g. SML-R3-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to I/O to RUN contact output to power to FG

INPUT SPECIFICATIONS

■ **Analog Input**
Input: DC voltage, 4 points
Operational range: 0.5 - 5.5 V DC (1 - 5 V DC)
Commons: All negatives
Input resistance: 1 MΩ minimum

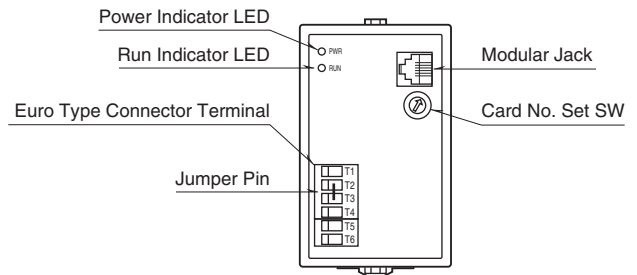
OUTPUT SPECIFICATIONS

■ **Analog Output**
Output: DC voltage, 4 points
Operational range: 0.5 - 5.5 V DC (1 - 5 V DC)
Commons: All negatives
Load resistance: 10 kΩ minimum

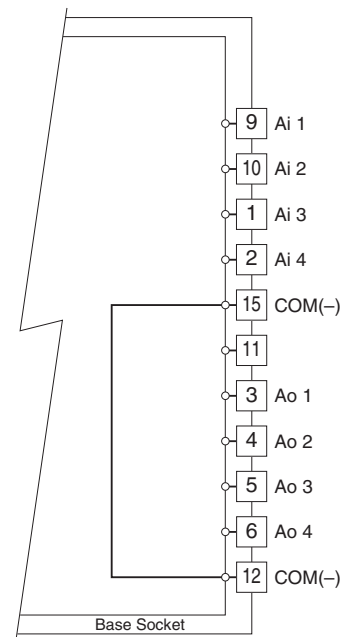
PERFORMANCE in percentage of span

A/D conversion: ±0.1 %
D/A conversion: ±0.1 %
Temp. coefficient:
 Input: ±0.015%/°C (±0.008%/°F)
 Output: ±0.015%/°C (±0.008%/°F)

EXTERNAL VIEW



I/O TERMINAL CONNECTION



ANALOG & CONTACT INPUT MODULE

(Ai 4 + Di 4 points)

MODEL: SML-S5-[1]

ORDERING INFORMATION

- Code number: SML-S5-[1]
- Specify a code from below for [1].
- (e.g. SML-S5-K)

[1] POWER INPUT

- AC Power
- K: 85 - 132 V AC
- L: 170 - 264 V AC
- DC Power
- R: 24 V DC

GENERAL SPECIFICATIONS

- Connection:** M3.5 screw terminals
- Isolation:** NestBus to input to RUN contact output to power to FG
- Input status indicator LED:** Red LEDs assigned to each contact channel (No. 1 - 4 for input)

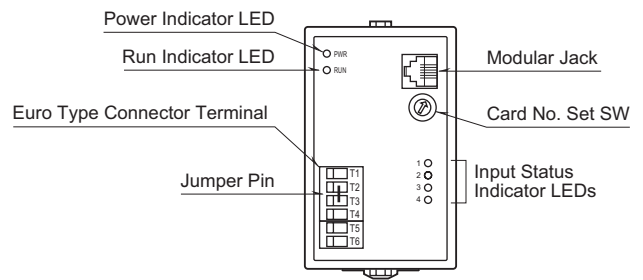
INPUT SPECIFICATIONS

- **Analog Input**
- Input:** DC voltage, 4 points
- Operational range:** 0.5 - 5.5 V DC (1 - 5 V DC)
- Commons:** All negatives
- Input resistance:** 1 MΩ minimum
- **Contact Input**
- Input:** Dry contact, 4 points
- Commons:** All negatives
- Sensing:** 24 V DC
- ON current/resistance:** 3 mA min., 1 kΩ max.
- OFF current/resistance:** 1 mA max., 50 kΩ min.

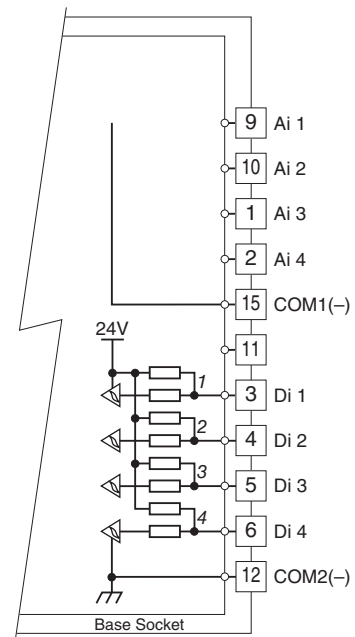
PERFORMANCE in percentage of span

- A/D conversion:** ±0.1 %
- Temp. coefficient:** ±0.015 %/°C (±0.008 %/°F)

EXTERNAL VIEW



TERMINAL CONNECTION (INPUT)



Italic figures indicate LED No. on the front panel.

ANALOG & CONTACT OUTPUT MODULE

(Ao 4 + Do 4 points (relay))

MODEL: SML-S6-[1]

ORDERING INFORMATION

- Code number: SML-S6-[1]
- Specify a code from below for [1].
- (e.g. SML-S6-K)

[1] POWER INPUT

AC Power
K: 85 - 132 V AC
L: 170 - 264 V AC
 DC Power
R: 24 V DC

GENERAL SPECIFICATIONS

Connection: M3.5 screw terminals
Isolation: NestBus to output to RUN contact output to power to FG
Output status indicator LED: Red LEDs assigned to each contact channel (No. 1 - 4 for output)

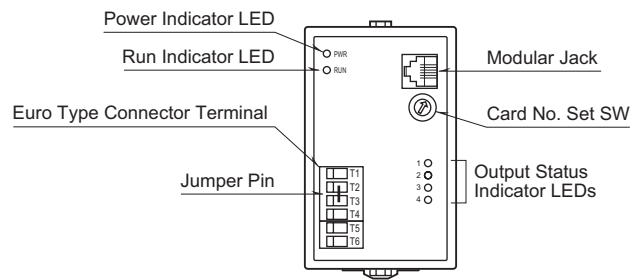
OUTPUT SPECIFICATIONS

- **Analog Output**
- Output:** DC voltage, 4 points
- Operational range:** 0.5 - 5.5 V DC (1 - 5 V DC)
- Commons:** All negatives
- Load resistance:** 10 kΩ minimum
- **Contact Output**
- Output:** Relay contact, 4 points
- Commons:** 1 common per 4 points
- Rating:** 100 V AC @ 0.5 A ($\cos \theta = 1$)
 30 V DC @ 0.5 A (resistive load)
- Maximum switching voltage:** 250 V AC or 220 V DC
- Maximum switching power:** 62.5 VA or 60 W
- Minimum load:** 10 mV DC @ 1 mA
- Mechanical life:** 5×10^7 cycles

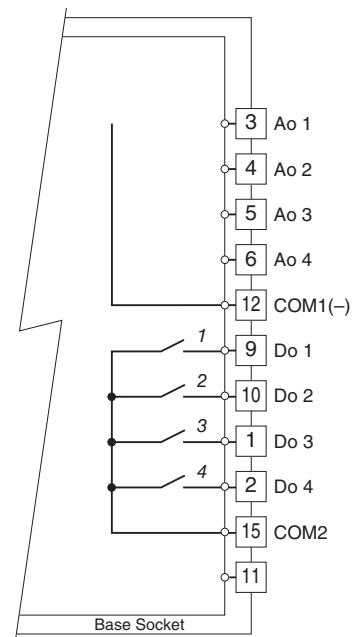
PERFORMANCE in percentage of span

D/A conversion: $\pm 0.1\%$
Temp. coefficient: $\pm 0.015\%/^{\circ}\text{C}$ ($\pm 0.008\%/^{\circ}\text{F}$)

EXTERNAL VIEW



TERMINAL CONNECTION (OUTPUT)



Italic figures indicate LED No. on the front panel.



Specifications are subject to change without notice.