

Final Control Elements

SERVO-TOP II ELECTRONIC ACTUATOR
(linear type; max. thrust 3000 N)

MODEL **PSN1**

MODEL & SUFFIX CODE SELECTION

PSN1-4□□-□□□

MODEL _____

STROKE _____
4 : 0 to 40 mm (0 to 1.57")

SEALING SPRING _____
1 : 1500 N use
2 : 3000 N use

OUTPUT STEM TYPE _____
1 : M14 male screw, pitch 1.5
2 : Stem button

INPUT _____
A : 4 – 20mA DC
6 : 1 – 5V DC

POWER INPUT _____
AC Power **DC Power**
K3: 100 – 120V AC *1 R : 24V DC
L3: 200 – 240V AC
*1. CE Not available

OPTIONS _____
/E : Failsafe function

ORDERING INFORMATION

Specify code number and variables.
Use Ordering Information Sheet (No. ESU-4857). Default setting (table below) will be used if not otherwise specified.

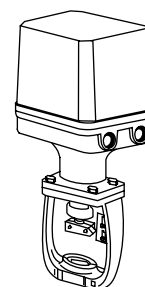
- Code number (e.g. PSN1-421-AK3)

PARAMETER	DEFAULT
Action	Reverse
Operation at abnormally low input	Stop
Output stem extended end	Longest
Output stem retracted end	Shortest
Ex-factory stem position	Shortest
Extended side limiter	0%
Retracted side limiter	100%
Full-open/closed signal (extended)	2%
Full-open/closed signal (retracted)	98%
Split range	Without
Split range type	LO
Split point	50%
Opening/closing speed	2.03 mm/s
Deadband	0.5%
Restart limiting timer	2 sec.
Failsafe target position *1	0%
Failsafe opening/closing speed *1	2.03 mm/s

*1. Option /E

RELATED PRODUCTS

- Programming unit (model: PU-2x)
- Backup battery (model: PSN-BAT)



Functions & Features

- Control valve actuator drive
- I to I positioner incorporated
- Lightweight, compact design
- High reliability without electrical contacts
- Friendly user interface
- High resolution stepping motor
- Failsafe (safety shutdown) function optional
- CE marking

GENERAL SPECIFICATIONS

Degree of protection: IP55

Action: Direct or reverse*2; field selectable with DIP switches

*2. In “reverse” action, the output stem is retracted with an input signal increase.

Operation at abnormally low input: Extend, retract or stop; field selectable with DIP switches

Detectable input drop level: 0.37 ±0.1V DC; converted into voltage

Housing material: Aluminium alloy (silver color)

Wiring conduits: G 1/2 female thread (two)

Terminal block: 7.62 mm pitch; M3 screw terminals

Drive: Stepping motor

Insulation class: E

Power control element: Power MOS-FET

Position detection: Brushless angle sensor

Full-open and full-closed positions: Any point within the full stroke; minimum stroke 8% of the full stroke; field adjustable with control buttons

Extended side limiter adjustment: -5 – +25%

Retracted side limiter adjustment: 75 – 105%

Full-open/-closed (extended) signal adj.: 0 – 25%

Full-open/-closed (retracted) signal adj.: 75 – 100%

Deadband adjustment: 0.1 – 5.0%

Restart limiting timer adjustment: 0 – 30 sec.

Opening/closing speed adjustment: 0.30 – 5.65 mm/s

Failsafe target position adjustment*3: 0 – 100%

Adjustments: Programming Unit (model: PU-2x); Full-open/full-closed positions, extended/retracted side limiters, full-open/full-closed signals, split range, opening/closing speed, deadband, restart limiting timer, failsafe opening/closing speed*3, failsafe target position*3

Sealing spring

TYPE	MAXIMUM PRESSURE (N)	FLEXURE AT MAXIMUM PRESS. (mm)	SET PRESS. (N)	RATED SPRING (N/mm)
1500 N use	1500	1	1170	330
3000 N use	3000	1	2410	590
	(lbs)	(inch)	(lbs)	(lbs/in.)
1500 N use	337	0.04	263	1880
3000 N use	674	0.04	542	3370

Isolation

AC powered: Signals to power to sequential signals to battery status*3 to metallic housing

DC powered: Signals or power to sequential signals to battery status*3 to metallic housing

Fuse

AC powered: 3A (replaceable)

DC powered: 4A (replaceable)

Protective functions: Error detection, abnormal temperature increase protection, space heater

Power indicator: Green LED turns ON with the power supplied

Input indicator: Green LED turns ON with normal input

Alarm indicator: Red LED turns ON in an abnormality; flashes in 1-sec. intervals when an abnormal temperature increase has been detected.

Manual operation: Available

■ BATTERY (failsafe function option)

Battery chemistry: NiCad

Battery ambient temperature

Charge: 0 to 55°C (32 to 131°F)

Storage: -20 to +55°C (-4 to +131°F), short term
-20 to +45°C (-4 to +113°F), long term

Battery life: Rechargeable up to 500 times; or 3 years, whichever is shorter, depending upon conditions of use

Drive capacity: Once

Charge method: Trickle charge after full rapid charge

Charge time: 180 minutes (completely discharged)

Battery status indicator LED: Turns ON with full charge; OFF with the power removed.

Charge indicator LED: Turns on during rapid charge

*3. Option /E

INPUT & OUTPUT

■ INPUT

• **DC Current:** 4 – 20mA DC; resistor (2W) incorporated
Input resistance: 250Ω

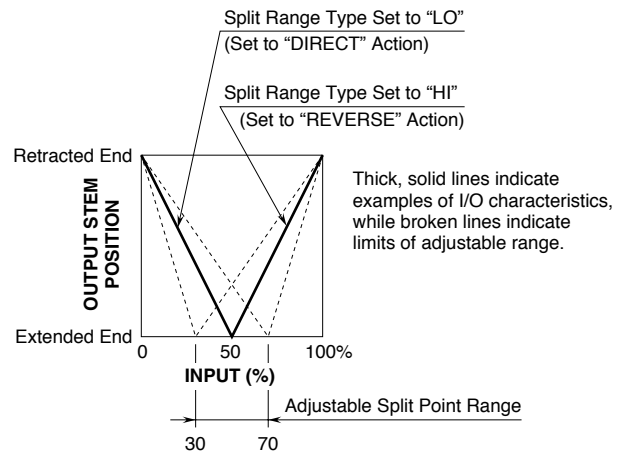
• **DC Voltage:** 1 – 5V DC

Input resistance: 1MΩ minimum

• **Split Range:** Specify split range type and split point.

Split range type: LO or HI

Split point: 30 – 70%

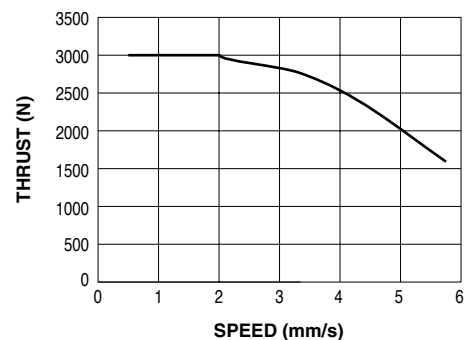


• **Forced Operation:** External contact signal input terminals provided for compulsory retracting or extending operation

■ OUTPUT

• Speed & Thrust

Acceleration or deceleration is not included in the speed. Acceleration or deceleration respectively requires approx. 0 to 2 sec.; takes longer with faster speed.



• **Position Signal:** 4 – 20mA DC

Load resistance: 300Ω maximum

• **Sequential Control Signal:** "Full-open", "full-closed" and "alarm"

Open collector: 30V DC @100mA max.

• **Failsafe Function (optional)**

Battery status output: ON with full charge; OFF with the power removed.

Open collector: 30V DC @100mA

INSTALLATION

Power input

AC: Operational voltage range for K3: 90 – 132V, L3: 180 – 264V; 47 – 66 Hz, approx. 240VA

DC: Operational voltage range 24V ±10% ripple 10% p-p max.; approx. 3A

Operating temperature: -25 to +55°C (-13 to +131°F)
Battery rechargeable within 0 to 55°C (32 to 131°F) with Option /E

Operating humidity: 30 to 85% RH (non-condensing)

Vibration: 2 G max.

Mounting position: Upside-down mounting prohibited

Dimensions: See External Dimensions.

Weight: 5.9 kg (13.0 lbs)
7.2 kg (15.9 lbs) with Option /E

PERFORMANCE

Resolution: 0.04 mm

Insulation resistance

AC powered: ≥100MΩ with 500V DC
(signal to power to sequential signals to battery status*3 to metallic housing)

DC powered: ≥100MΩ with 500V DC
(signal or power to sequential signals to battery status*3 to metallic housing)

Dielectric strength

AC powered: 2000V AC @1 minute
(signal or metallic housing to power to battery status*3 to sequential signals)
500V AC @1 minute
(signal to metallic housing)

DC powered: 2000V AC @1 minute
(signal or power or metallic housing to battery status*3 to sequential signals)
500V AC @1 minute
(signal or power to metallic housing)

*3. Option /E

STANDARDS & APPROVALS

CE conformity: EMC Directive (2004/108/EC)

EN 61000-6-4 (EMI)

EN 61000-6-2 (EMS)

Low Voltage Directive (2006/95/EC)

EN 61010-1

Installation Category II

Pollution Degree 2

Max. operating voltage 300V

Signal or metallic housing or seq. signals or to battery status*3 to power:

Reinforced insulation

Signal or metallic housing to seq. signals to battery status*3: Basic insulation

*3. Option /E

EXPLANATIONS

• Error Detection

When the position signal is deviated from the input signal but the output stem is stuck due to overload or certain malfunction, the PSN repeats starting the motor at the maximum torque for several times.

If the stem is still stuck after that, the PSN outputs an alarm signal (LED turned ON) and stops power supply to the motor.

In order to reset the PSN, apply several times 0% and 100% input signals in turn, or turn off and on the power supply.

• Abnormal Temperature Increase Protection

When the incorporated temperature sensor detects an abnormal temperature increase in the motor, the alarm LED flashes (repeating 0.5-sec. ON – 0.5-sec. OFF) and the power supply to the motor is stopped until the temperature decreases to an acceptable level. The PSN is designed to resume automatically power supply to the motor. It takes longer to resume normal operation when ambient temperature is higher.

• Restart Limiting Timer

The PSN is equipped with a timer protecting the motor from overheating. The timer prevents the motor from restarting for a certain interval once the motor has been stopped within deadband.

When the high temperature protection is activated in a high temperature ambient, adjust the timer to a longer interval.

• Sealing Spring

The PSN is incorporated with springs to maintain sealing pressure when the valve is fully closed. Choose an appropriate sealing pressure.

These springs provide the same pressure at both fully closed and fully open positions.

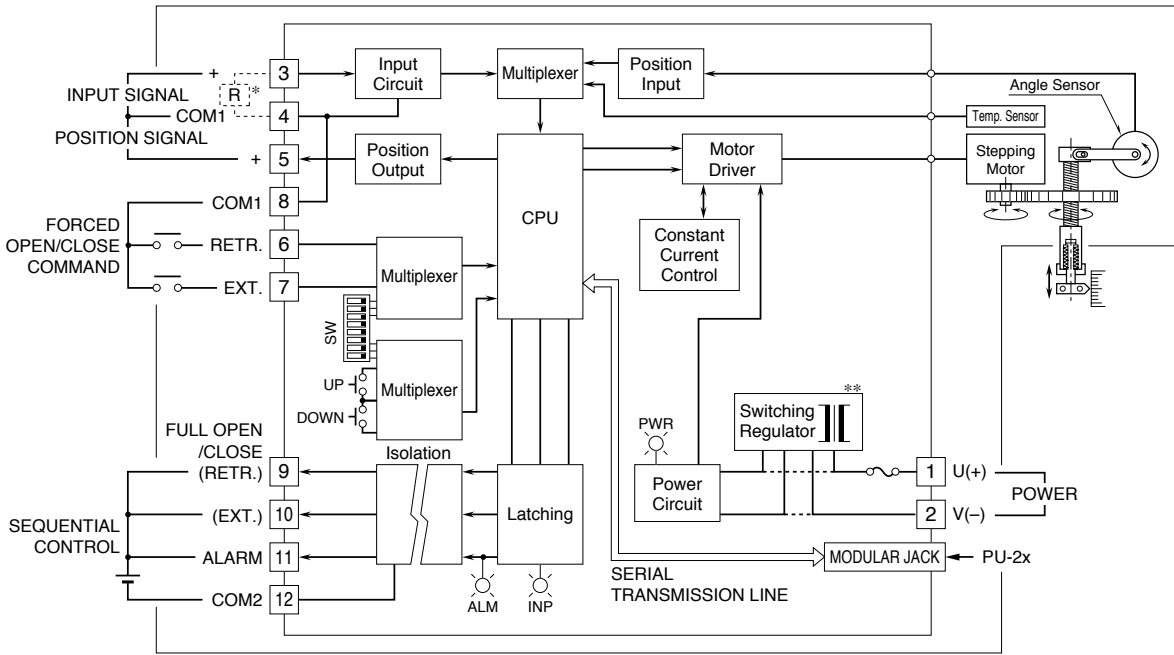
Do not apply a greater pressure to the spring than specified.

• Space Heater

When the PSN detects a temperature lower than 0°C or 32°F (approximate) on the surface of its motor, the PSN supplies current to the motor in order to warm up and maintain its surface temperature at 5°C or 41°F (approximate).

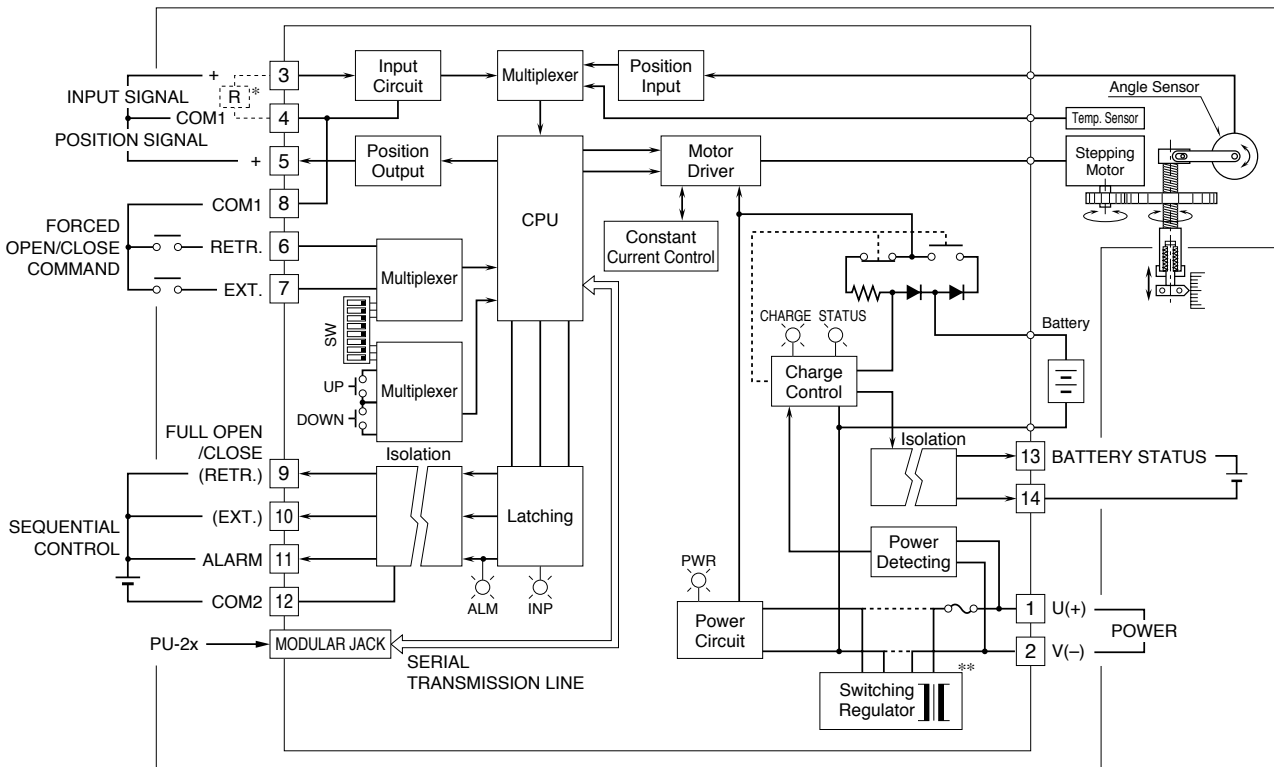
Maintain the power supply ON when the PSN is used in the ambient temperature below 0°C.

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



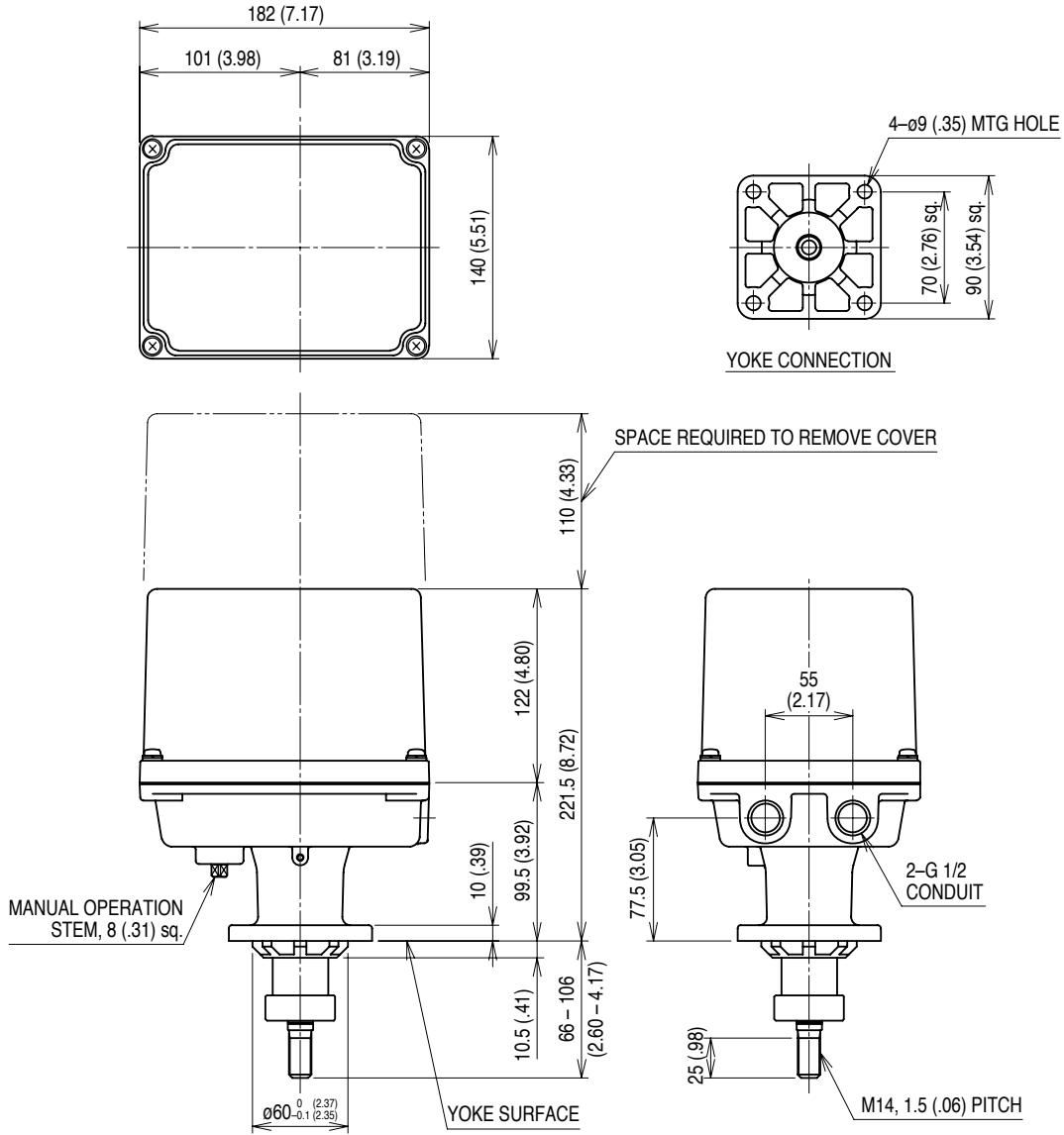
* Input resistor attached for a current input.
 **Switching regulator is not provided for DC power supply (shown in broken lines).

■ OPTION /E, FAILSAFE FUNCTION

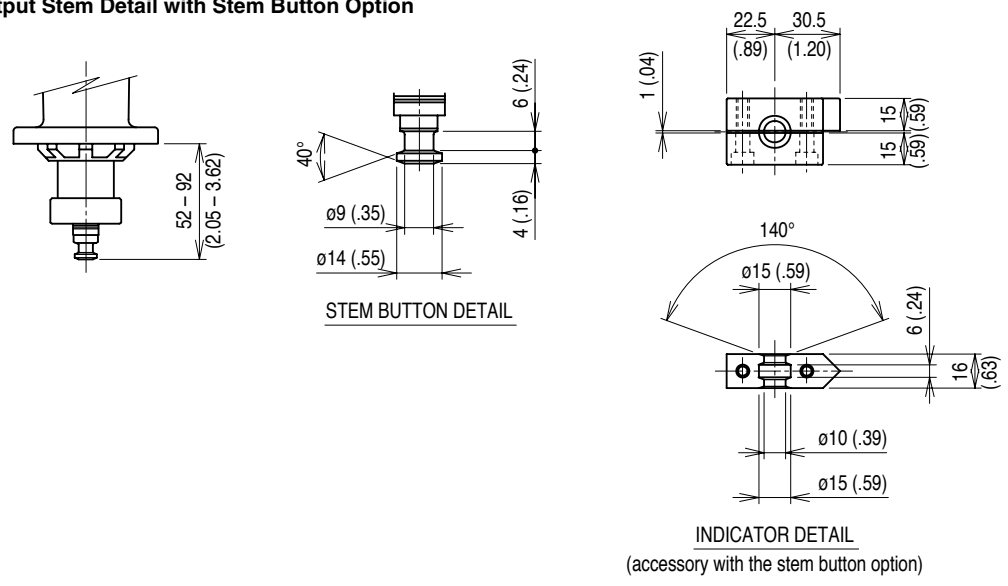


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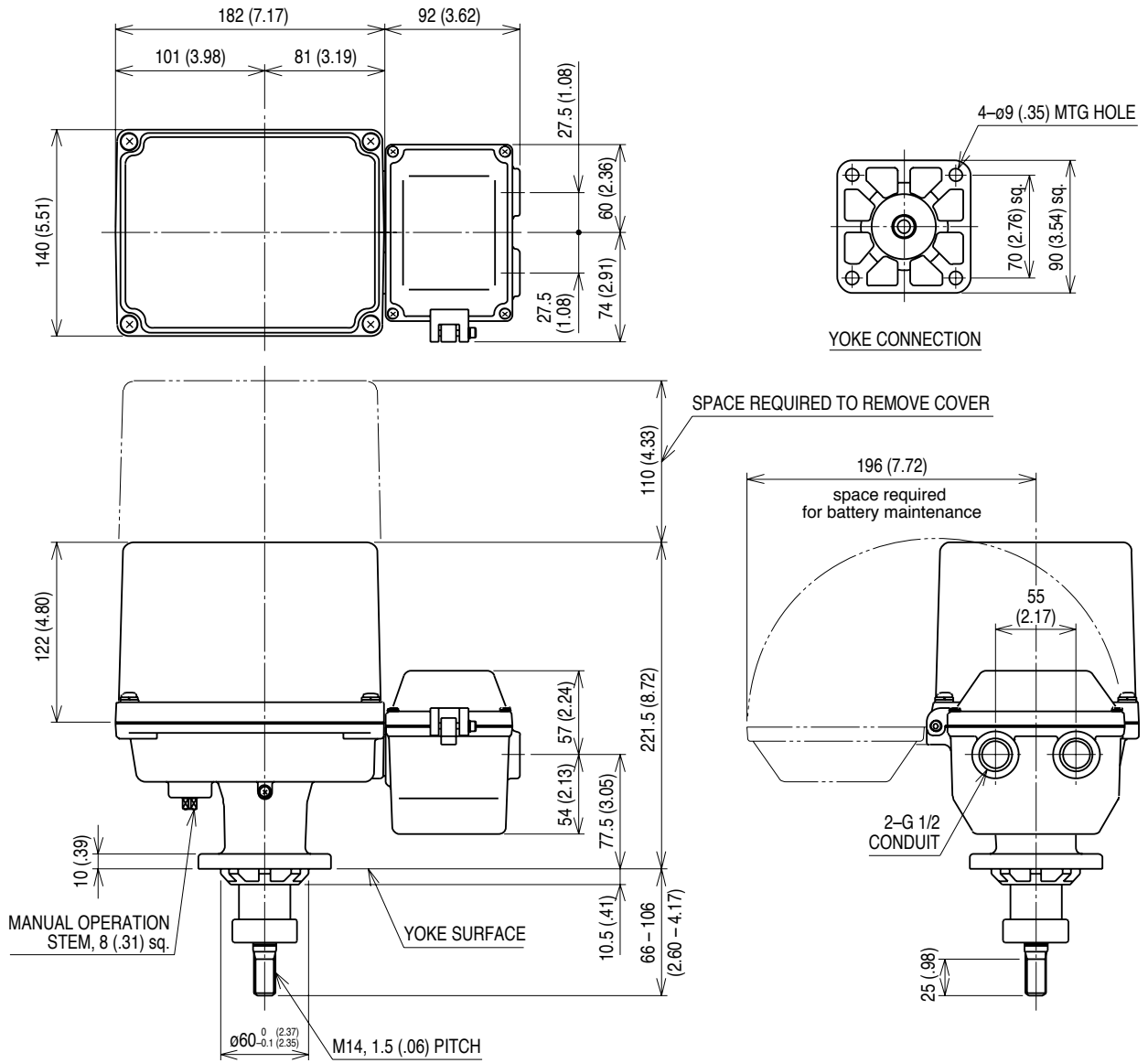
EXTERNAL DIMENSIONS unit: mm (inch)



• Output Stem Detail with Stem Button Option



■ OPTION /E, FAILSAFE FUNCTION



• Output Stem Detail with Stem Button Option

