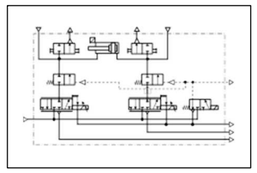
ORIGINAL INSTRUCTIONS

Instruction Manual
Air Servo Cylinder
IN-777 Series



The intended use of an Air Servo Cylinder is to convert energy from compressed air in linear motion and have multi-point positioning functionality.

4 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger."
They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) *1), and other safety regulations.

*1)ISO 4414: Pneumatic fluid power — General rules and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robotics – Safety requirements – Part 1: Industrial robots

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

⚠ **Danger**	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
⚠ **Warning**	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ **Caution**	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning

- **Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

5 Specifications

5.7 Product Specification

Fluid	Air
Filtration of compressed air	0.3 µm or less
Proof pressure	1.2 MPa
Operating pressure range	0.55 MPa to 0.8 MPa
Repeated stop position accuracy	+/-0.5 mm or less *1
Ambient temperature	Refer to *2
Fluid temperature	-20 to 60ºC (No freezing)
Operating humidity	35-85% (No condensation)
Housing protection	IP67
Weight	Refer to Table 1
Mounting orientation	Vertical downward / upward
Allowable lateral load at rod end	Refer to Table 2
Vibration Resistance	Amplitude/acceleration: 1.5 mm/3G Frequency: 5 Hz to 100 Hz Direction: X,Y,Z 3 times each Sweep time, sweep cycle: 12 min・10 cycle (De-energized)
Impact Resistance	Acceleration: 15 G Duration of shock pulse, Pulse shape: 11 ms, sinusoidal waveform Direction: X,Y,Z 3 times each (De-energized)

2 Specifications (continued)

*1 Based on the SMC's test conditions
*2 -20 ºC to 60 ºC (With rod boot of silicone rubber material and without rod boot)
-10 ºC to 60 ºC (With rod boot of nylon tarpaulin)
(No freezing)

Table 1 Weight

Bore size (mm)	Stroke (mm)	Weight (kg)
125	250	23
160	200	33
	300	35
200	200	41
	300	43
250	350	76
	450	80
320	200	97
	350	122
	530	144

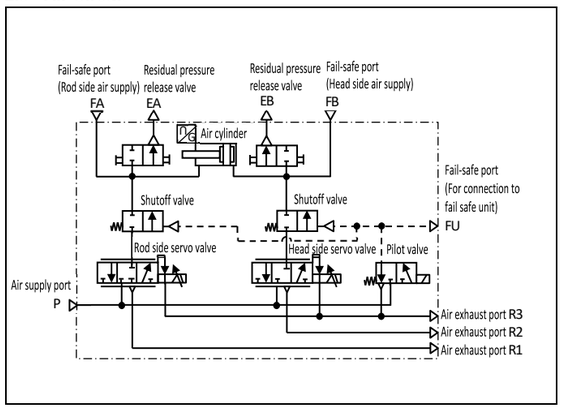
Table 2 Allowable lateral load at rod end

Bore size (mm)	Allowable lateral load at rod end (N)
125	70
160	90
200	140
250	160
320	230

2.2 Electrical Specification

	4-20 mA (HART Communication)	Foundation Fieldbus Communication
Power supply	Applied voltage: 24 VDC±10%	
Control system	Closed loop	
Positioning sensor	Absolute	
Analog input signal	4 to 20 mADC	-
Analog input impedance	Approx. 250 Ω	-
Analog output signal	4 to 20 mADC	
Maximum load impedance (Analog output)	500 Ω	
Switch input signal	4 points, Connected to +24 VDC+/-10% Current consumption: 10 mA or less	
Switch output signal	5 points, N-type MOSFET Open source output Maximum load current: 100 mA	

2.3 Air Circuit



⚠ Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

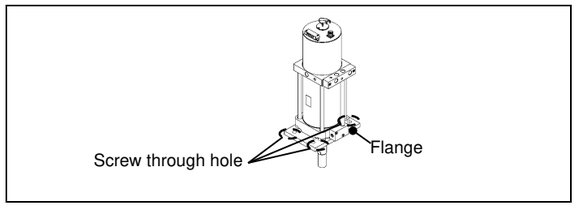
3.7 Installation

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.

3.7.1 Installation

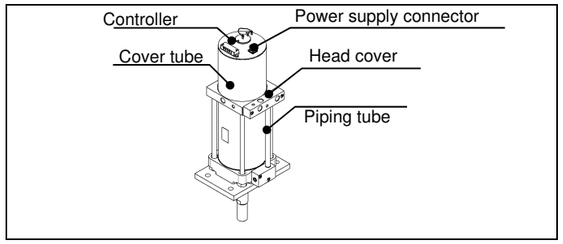
Mount the flange to the base and secure with screws using the screw through holes.



Bore Size (mm)	Screw through hole size (mm)	Size of screw	Thickness of flange (mm)
125	16	M14	20
160	18	M16	20
200	22	M20	25
250	26	M22	25
320	33	M30	30

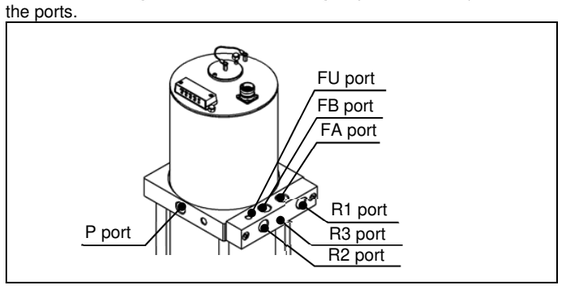
⚠ Caution

When installing the product, do not apply an excessive external force or impact to the cover tube and piping tube. This may damage the controller in the cover tube and the piping tube and power supply connector.
Applying excessive external force to the piping may result in damage to the piping or a malfunction.
As screw holes for installing eye bolts are provided on the head covers of sizes ø160 and larger, insert the eye bolts into the screw holes and hang the product to mount it.



⚠ Caution

Do not allow foreign matter such as cutting chips inside the cylinder from the ports.



3.7.2 Electrical Wiring Diagram

Perform wiring according to the connector pin numbers and the wiring diagram. (Connector pin numbers – shown from the Male Side).

3 Installation (continued)

HART Communication

Pin No.	Signal name	Input/ output status	Description
1	Sig-in+	Input	4-20 mA analog input signal (+), (with HART *1)
2	Sig-in-	Input	4-20 mA analog input signal (-), (with HART *1)
3	JOG+	Input	JOG operation signal (Move to the extended end direction)
4	JOG-	Input	JOG operation signal (Move to the retracted end direction)
5	PWR DC24V		+24 VDC Power supply
6	PWR GND		Power supply GND
7	Pos-out+	Output	4-20 mA analog output signal (+)
8	Pos-out-	Output	4-20 mA analog output signal (-)
9	CTR	Output	Controller normal signal
10	CYL	Output	Positioning sensor error signal
11	VAL	Output	Valve error signal
12	GND_I/O	—	Input/output signal GND
13	CAL	Input	Calibration signal
14	E-STOP		Emergency stop signal (Negative edge triggered *2)
15	-	-	-
16	RF	Output	Piston rod worn error signal
17	PWR	Output	Power supply error signal
18	-	-	-
19	-	-	-

*1 When selecting HART communication protocol by How to order.
*2 Emergency stop is performed when signal is OFF.

FOUNDATION Fieldbus Communication

Pin No.	Signal name	Input/ output status	Description
1	FB+	Input/output	Fieldbus signal (+)
2	FB-	Input/output	Fieldbus signal (-)
3	JOG+(*3)	Input	JOG operation signal (Move to the extended end direction)
4	JOG-(*3)	Input	JOG operation signal (Move to the retracted end direction)
5	PWR_24VDC		+24 VDC Power supply
6	PWR_GND		Power supply GND
7	Pos-out+	Output	4-20 mA analog output signal (+)
8	Pos-out-	Output	4-20 mA analog output signal (-)
9	CTR	Output	Controller normal signal
10	CYL	Output	Positioning sensor error signal
11	VAL	Output	Valve error signal
12	GND_I/O	—	Input/output signal GND
13	CAL(*1)	Input	Calibration signal
14	E-STOP	Input	Emergency stop signal (Negative edge triggered *4)
15	-	-	-
16	RF	Output	Piston rod friction error signal
17	PWR	Output	Power supply error signal
18	-	-	-
19	-	-	-

3 Installation (continued)

*3 JOG+, JOG-, and CAL signal inputs are valid when the operation mode is in Target POS mode..
*4 Emergency stop is performed when signal is OFF

3.2 Environment

Warning

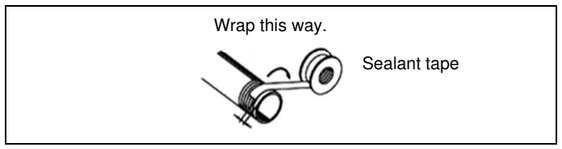
- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

Insert here all product specific environment information

3.3 Piping

Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.



3.4 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to catalogue for details.

4 Settings

- Perform the DIP switch setting for normal/reversed switching of the piston rod travel direction (during target position operation), cylinder bore size, and piston rod operating direction at no signal operation. By performing the rotary switch setting, the piston rod speed during target position operation can be set.
- With the power to the air servo cylinder disconnected, remove the hexagon socket head cap screws to remove the switch cover from the panel. Using the DIP switch and rotary switch mounted inside the switch cover, perform setting whilst referring to the procedure below.

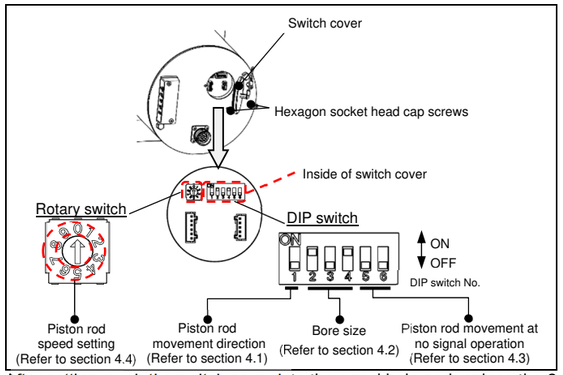
Caution

- If the settings of the DIP switch and rotary switch are changed while power is supplied, the setting will not become effective. Changes to the DIP switch and rotary switch setting should be performed with no power supplied to the product.

Set up required steps:

- Set the DIP switch (Refer to section 4.1, 4.2 and 4.3).
- Set the rotary switch (Refer to section 4.4).
- Supply power.

4 Settings (continued)

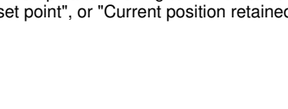
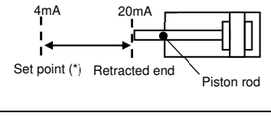


After setting, push the switch cover into the panel hole and replace the 2 hexagon socket head cap screws.

(Recommended tightening torque: 0.5 N·m to 0.75 N·m).

4.1 Piston Rod Movement Direction [DIP Switch #1]

The piston rod movement direction relative to the analogue input signal (4-20 mA) can be set, for when the target position operation is performed.

DIP Switch #1	Direction	Relationship between the analog input signal and the piston rod direction of movement
OFF (Default)	Standard	
ON	Reverse	

* Set point: Position set by calibration (Refer to section 4.5.2 for details)

4.2 Bore Size [DIP Switches #2, #3 and #4]

DIP Switch #2	DIP Switch #3	DIP Switch #4	Bore size
ON	OFF	OFF	Ø125
OFF	ON	OFF	Ø160
ON	ON	OFF	Ø200
OFF	OFF	ON	Ø250
ON	OFF	ON	Ø320
OFF	ON	ON	Don't use.

If all switches are set to ON or OFF, a cylinder bore setting error will occur and an alarm will be generated (Refer to section 4.6). Change the setting of the DIP switch correctly.

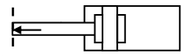
Caution

Please do not change the DIP switch No.2, No.3 or No.4 on the controller mounted on the air servo cylinder. The bore size set to the DIP switch No. 2 to 4 and cylinder bore size must be identical, otherwise vibration, damage and unexpected motion may occur.

4.3 Piston Rod Movement at No Signal Operation [DIP Switches #5 and #6]

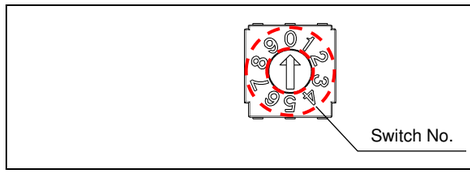
Set the piston rod operation at no signal operation (Refer to section 4.5.4) using DIP switch No. 5 and No. 6. The piston rod operation setting can be selected from "Stops after moving to the retracted end", "Stops after moving to the set point", or "Current position retained".

4 Settings (continued)

DIP Switch #5	DIP Switch #6	Piston Rod Operation
OFF	OFF	Cylinder stops after moving to the retracted end 
ON	OFF	Cylinder stops after moving to the set point 
ON / OFF	ON	Cylinder retains current position 

4.4 Maximum Piston Rod Speed Setting (Rotary Switch)

The piston rod speed can be set using the rotary switch. The relation between the switch numbers and speed is shown in the table below.



Switch No.									
0 (Default)	1	2	3	4	5	6	7	8	9
Slower	→ → (Gradual Increase in Speed) → →								Faster

4.5 Operation (HART Communication)

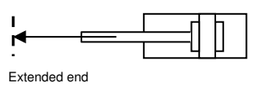
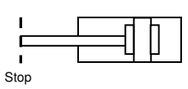
The operation modes for this product include JOG operation, Calibration, Target position operation (4-20mA), No signal operation, and Emergency stop. The functions available during operation are residual pressure release and alarm LED display. This section describes each operation mode and function.

4.5.1 JOG Operation

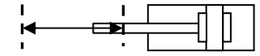
The piston rod moves at a set speed in response to the JOG signal being input. The range of movement is the length of the cylinder stroke. JOG mode is used to stop the piston rod for positioning before calibration or to move the piston rod to a specified position. The speed of movement during the JOG operation is approximately 50 mm/sec (guideline) regardless of the rotary switch speed setting (Refer to section 4.4).

4.5.1.1 Extend Stroke Movement

When the JOG+ signal (Pin No. 3) is ON, the piston rod moves to the extended end. When the JOG- signal (Pin No. 4) turns ON while the JOG+ signal is ON, the piston rod stops and retains the current position. When the JOG+ signal turns OFF during operation, the operation mode will change from the JOG operation to the Target position operation (Refer to section 4.5.3).

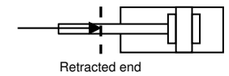
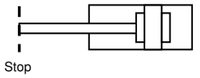
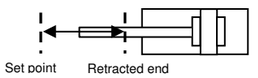
JOG+	JOG-	Piston Rod Operation
ON	OFF	Moves to the extended end direction 
ON	ON	Stops moving 

5 Settings (continued)

OFF	OFF	Target position operation (4-20mA) 

4.5.1.2 Retract Stroke Movement

When the JOG- signal (Pin No. 4) is ON, the piston rod moves to the retracted end. When the JOG+ signal (Pin No. 3) turns ON while the JOG- signal is ON, the JOG operation is stopped, and the piston rod retains the current position. When the JOG- signal turns OFF during operation, the operation mode will change from the JOG operation to the Target position operation (Refer to section 4.5.3).

JOG+	JOG-	Piston Rod Operation
OFF	ON	Moves to the retracted end direction 
ON	ON	Stop moving 
OFF	OFF	Target position operation (4-20mA) 

4.5.1.3 Calibration

The piston rod movement range (set point) can be set when using the Target position operation (Refer to section 4.5.3). By performing the calibration, the relationship between the piston rod position (from the retracted end to the set point) and the current value (4-20 mA) input to Sig-in+ and Sig-in- can be set. Once the calibration is performed, the set point is stored in the product and will be recorded even when the power supply is OFF.

- There are two types of calibration mode; Automatic and Manual.
- The set point is not set when the product is shipped from the factory.

Caution

Perform the calibration at the initial installation of the product. Otherwise, the cylinder will not operate even when an analogue signal is input in the target position operation.

4.5.1.4 Change the Mode

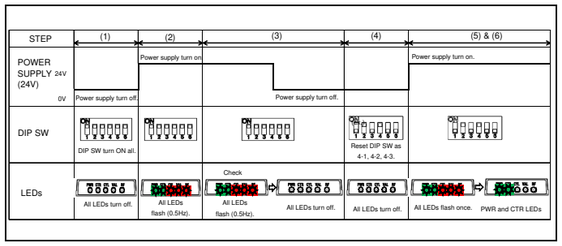
Automatic Mode

- **Step 1**: Turn the power supply OFF if it is not already. Ensure that all DIP switches are turned to ON position and check that all LEDs are off.
- **Step 2**: Turn the power supply ON. Ensure that all DIP switches remain in the ON position and check that the LEDs begin to flash at a rate of 1Hz.

The product will make an emergency stop and JOG operation, target position operation, no signal operation and calibration are not available.

- **Step 3**: At this stage verify that the LEDs are still flashing at 1Hz; if yes, turn the power supply OFF and check that the LEDs stop flashing. All DIP switches should still be in the ON position.
- **Step 4**: While the power supply is still OFF, refer to sections 4.1, 4.2 and 4.3 and set all DIP switches to the desired positions for the operation required. All LEDs should remain OFF.
- **Step 5**: Turn the power supply ON once all DIP switches have been set to the desired positions and immediately follow step (6).
- **Step 6**: When power supply has been turned ON, all LEDs should flash once. Following this, PWR and CTR lights should remain ON and CYL, VAL and RF should be OFF. Automatic mode calibration has now been performed and JOG operation, target position operation, and no signal operation are available.

4 Settings (continued)

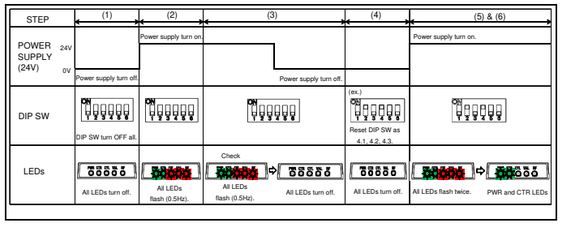


Manual Mode

- **Step 1**: Turn the power supply OFF if it is not already. Ensure that all DIP switches are turned to OFF position and check that all LEDs are off.
- **Step 2**: Turn the power supply ON. Ensure that all DIP switches remain in the OFF position and check that the LEDs begin to flash at a rate of 1Hz.

The product will make an emergency stop and JOG operation, target position operation, no signal operation and calibration are not available.

- **Step 3**: At this stage verify that the LEDs are still flashing at 1Hz; if yes, turn the power supply OFF and check that the LEDs stop flashing. All DIP switches should still be in the OFF position.
- **Step 4**: While the power supply is still OFF, refer to sections 4.1, 4.2 and 4.3 and set all DIP switches to the desired positions for the operation required. All LEDs should remain OFF.
- **Step 5:** Turn the power supply ON once all DIP switches have been set to the desired positions and immediately follow step (6).
- **Step 6:** When power supply has been turned ON, all LEDs should flash twice. Following this, PWR and CTR lights should remain ON and CYL, VAL and RF should be OFF. Manual mode calibration has now been performed and JOG operation, target position operation, and no signal operation are now available.



4.5.1.5 Performing Calibration

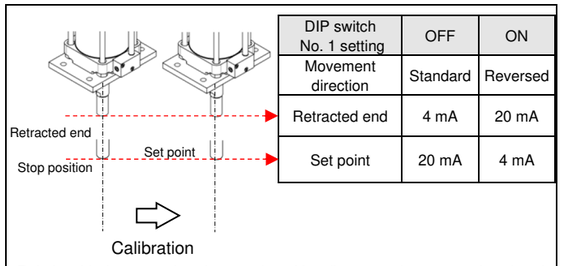
Automatic Calibration Procedure

While the calibration signal (CAL) is ON the automatic calibration will be performed, and the piston rod will move in the extended end direction. The position at which the piston rod must stop for 1 second, due to an external stopper or cylinder extended end, is set as a set point. When the calibration signal is turned OFF, the operation mode will change to the target position operation. The piston rod speed during auto calibration is approximately 50 mm/sec (guideline).

Manual Calibration Procedure

Perform JOG operation or target position operation (*1) to move the piston rod to the required stop position (example: position where an external stopper is located). When the calibration signal (CAL) is input for 100ms or longer, the position where the piston rod stops is set as a set point. When the setting of the set point is completed, and the calibration signal is turned OFF, the operation mode will change to the target position operation.

4 Settings (continued)



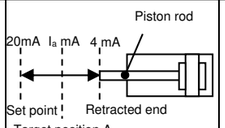
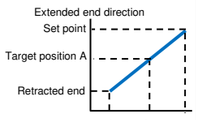
DIP switch No. 1 setting	OFF	ON
Movement direction	Standard	Reversed
Retracted end	4 mA	20 mA
Set point	20 mA	4 mA

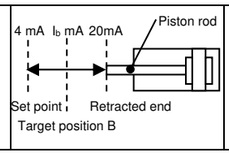
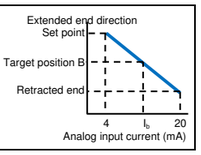
Relationship between the piston rod position (between the retracted end and set point) and Sig-in (+/-) input current.

*1 - If calibration is never performed after receiving the product from SMC, the set point is set to the retracted end. Therefore, even if current (4-20mA) is input at the target position operation, the piston stays at the retracted end.

4.6.1 Target Position Operation (4-20 mA)

By inputting an analogue signal, the piston rod moves to the target position which corresponds to the input current (between 4 and 20 mA) from the retracted end to the set point.

No.1	Movement Direction	Relationship between the analog input signal and the piston rod movement direction	Relationship between the analog input current and the target position
OFF	Standard (Default)		

No.1	Movement Direction	Relationship between the analog input signal and the piston rod movement direction	Relationship between the analog input current and the target position
ON	Reversed		

4.6.2 No Signal Operation

When an analogue input signal of 3.9 mA or less is input, the piston rod operates according to the No signal operation setting set beforehand. The operation can be selected from 3 types of operation by switching the DIP switch No. 5 and No. 6 (Refer to section 4.3). The speed of movement can be set using the rotary switch.

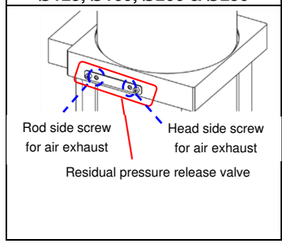
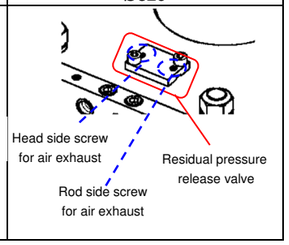
4.6.3 Emergency Stop

The piston rod will stop operating when the E-STOP signal (pin No. 14) is turned OFF during JOG operation, calibration (automatic mode), target position operation, or No signal operation. When the E-STOP signal is turned ON again, it will return to the previous operation mode.

4.6.4 Residual Pressure Release

The pressure on the head side and rod side of the air cylinder can be released from the residual pressure release valve in the head cover of the product. Rotate the exhaust screw (hexagon socket head cap screw) in the counter clockwise direction to release the valve and exhaust the air. Exhaust the air only after disconnecting the power supply and air supply. Be cautious of a sudden extension or retraction of the rod during the air exhaust operation. When tightening the air exhaust screw, use a tightening torque of 5.0 to 7.4 Nm.

4 Settings (continued)

Bore Size Ø125, Ø160, Ø200 & Ø250	Bore Size Ø320
	

⚠ Warning

Take care that a sudden extension or retraction of the piston rod will occur when returning from emergency stop or switching the operation mode.

4.7 Operation (FOUNDATION Fieldbus Communication)

4.7.1 Target Position Operation

- The target position input is assigned to AO_FB. The cylinder operates according to the input signal of 0% to 100%.

4.7.2 Emergency Stop Operation (E-STOP)

- The E-STOP input is assigned to DO_FB. State 0 is the emergency stop operation (E-STOP), and State 1 allows the cylinder to operate.

4.7.3 JOG operation

- Set OPERATION_MODE to JOG Mode. Set JOG_OPERATION to Stop, Extend, or Retract to execute each operation. The initial setting is Stop. After setting OPERATION_MODE to JOG Mode, if JOG_OPERATION is set to Extend or Retract, execute Stop once before executing Extend or Retract.

4.7.4 Automatic Calibration

- Set OPERATION_MODE to JOG Mode. Set CALIBRATION_EXE to Calibration execution to perform automatic calibration, moving the piston rod towards the extrusion end. The position where the piston rod stops for 1 second at the external stopper or cylinder extrusion end is set as the setpoint. The initial setting is No operation.
- After setting OPERATION_MODE to JOG Mode, if CALIBRATION_EXE is set to Calibration execution, set it to No operation once before setting it to Calibration execution.

4.7.5 Manual calibration

- Set OPERATION_MODE to JOG Mode. Set JOG_OPERATION to Extend or Retract to move the piston rod, and set it to Stop at the required stop position (e.g., where there is an external stopper). Set CALIBRATION_EXE to Calibration execution to set the position where the piston rod stops as the setpoint. The initial setting is No operation.
- After setting OPERATION_MODE to JOG Mode, if CALIBRATION_EXE is set to Calibration execution, set it to No operation once before setting it to Calibration execution.

4.7.6 JOG Operation, Calibration, and Emergency Stop Operation via Air Servo Cylinder Switch Input Signals

- When performing JOG operation or calibration via the air servo cylinder switch input signals, set OPERATION_MODE to Target POS Mode. Target position operation can only be performed via FOUNDATION Fieldbus communication.

4 Settings (continued)

4.8 Operation Conditions (FOUNDATION Fieldbus Communication)

4.8.1.1 Preparation of DD Files

FOUNDATION fieldbus systems require DD files that list various device parameters.

Tokenizer	DD files
DD4	0101.ffo, 0101.sym, 010101.cff
DD5	0101.ff5, 0101.sy5, 010101.cff
DD6	smc_corporation.in-777.01.01.00.ff.fdix

4.8.1.2 Node Address Configuration

The initial node address of the IN-777 is 20. When using it, please set it to an appropriate value (20 to 247).

4.8.1.3 Fault State Configuration

When operating in Target POS mode with a target value of 0-100%, the cylinder's behavior in case of a communication error is defined. Upon a communication error, the initial "Retract end" moves to the retracted end, "Calibration position" moves to the setpoint, and "Stay" stops at the point of error occurrence. To change the fault state configuration, the operating mode must be set to Parameter mode.

Block	Setting
IN-777_TB	OPERATION_MODE => Parameter Mode
IN-777_TB	NO_SIGNAL_OPERATION => Retract end => Calibration position => Stay

4.8.1.4 Piston Rod Movement Direction

The movement direction of the piston rod is defined. In Target Position and AO_FB Readback, the initial "Retract end = 0%" means the retracted end is 0% and the setpoint is 100%, while "Extend end = 0%" means the setpoint is 0% and the retracted end is 100%. To change the piston rod movement direction, the operating mode must be set to Parameter mode.

Block	Setting
IN-777_TB	OPERATION_MODE => Parameter Mode
IN-777_TB	MOVE_DIRECTION => Retract end = 0% => Extend end = 0%

4.8.1.5 Calibration

When operating in Target POS mode with a target value of 0-100%, calibration must be performed. To perform calibration, the operating mode must be set to JOG mode. There are two types of calibration methods: AUTO and MANUAL, with the initial setting being AUTO. For details on changing the calibration method, please refer to Section 4.5.2

4.8.1.6 Channel Setting (No change required from the default)

Channel	Content	Parameter	Readback	FB
1	Target Position	IN-777_TB FINAL_VALUE	Current Position	AO_FB
2	E-STOP	IN-777_TB FINAL_VALUE_D	none	DO_FB

4.8.1.7 Scale (No change required from the default)

The cylinder scale is set so that the range from the retracted end to the calibration position is 0-100%, and this setting cannot be changed.

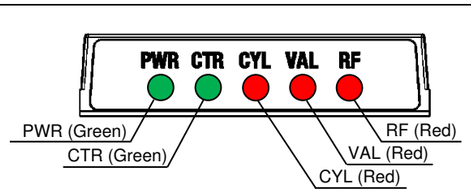
⚠ Caution

The emergency stop (E-STOP) function will not operate if either the input signal to the air servo cylinder or the input via FOUNDATION Fieldbus communication allows cylinder operation. Therefore, to perform an emergency stop (E-STOP), ensure that both the input signal to the air servo cylinder and the input via FOUNDATION Fieldbus communication are set to disable cylinder operation.

4 Settings (continued)

4.7 LED Alarm Display Function

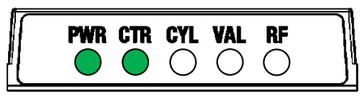
The names and functions of the LED alarm display are shown in the figure and table below.



LED Alarm display	LED name	LED condition	Description (*1)
PWR	Power supply indicator	Green LED is ON	Power supply is ON.
		Green LED flashing (1 Hz)	Power supply error (Outside of 24 V +/-10%)
		OFF	Power supply is OFF or incorrect power supply (17 V or less)
CTR	Controller indicator	Green LED is ON	Power supply is ON (Normal control)
		Green LED flashing (0.5 Hz)	Incorrect cylinder bore size setting
		Green LED flashing (2 Hz)	Setting the set point in auto calibration mode
CYL	Positioning sensor error indicator	Red LED is ON	Over current to the positioning sensor
		Red LED flashing (1 Hz)	Incorrect positioning sensor
		Red LED flashing (0.5 Hz)	Incorrect positioning sensor connection
VAL	Valve error indicator	Red LED is ON	Over current to the emergency stop valve
		Red LED is ON	Over current to the servo valve
		Red LED flashing (0.5 Hz)	Incorrect servo valve connection
RF	Piston rod worn error indicator	Red LED is ON	Piston rod is worn-out

LED Alarm display	LED condition	Description (*1)
PWR CTR CYL VAL RF (All LEDs)	All LEDs flashing (0.5Hz)	Calibration setting mode (Automatic mode and manual mode)
	All LEDs flashing once (0.5Hz)	Selecting calibration automatic mode (*2)
	All LEDs flashing twice (0.5Hz)	Selecting calibration manual mode (*2)

*1: Refer to operation manual (K35-OMW0030 "9. Alarms") for further details.
*2: Immediately after turning on the power supply in the normal operation mode.



Above is the LED condition in normal operation (no errors generated)

4.10 Priority of Operation

- The priority of the operation modes is shown in the table below. To change the operation mode to a high priority mode while the required operation mode is being performed, it can be changed by turning ON the signal for the next operation mode (turning OFF the signal for the emergency stop operation) without stopping (signal OFF) the current operation mode.

4 Settings (continued)

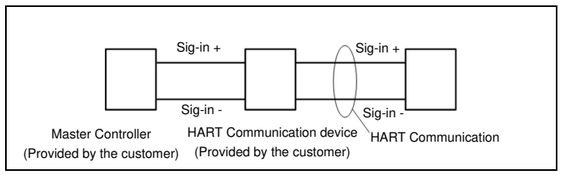
- To change the operation mode to a low priority mode, stop (turn OFF the signal/turn ON the signal for emergency stop) the current operation mode before turning ON the signal for the operation mode in the next step.

Priority	Operation Mode
1 (High)	Emergency Stop
2	Calibration
3	JOG Operation
4 (Low)	Target position operation (4-20 mA), No signal operation

4.11 Protocol:

4.11.1 HART Communication Protocol

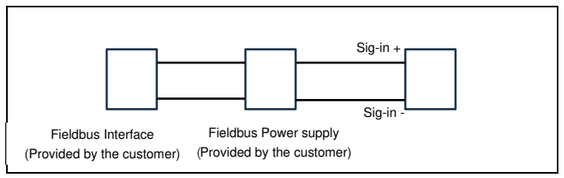
HART (Highway Addressable Remote Transducer) communication function is available for IN-777 series when H: 4-20mA/HART communication is selected as communication protocol (see How to order). HART communication is a technology in which digital signals are sent over the same cable for 4-20mA analogue signals using the HART communicator.



	Operation
1	Checking and changing of the equipment information
2	Checking and changing of the HART communication setting
3	Setting and checking of the cylinder parameter
4	Calibration
5	Setting and checking of the operation mode
6	JOG operation
7	Checking of the operating conditions

4.11.2 FOUNDATION Fieldbus Communication Protocol

The IN-777 series supports FOUNDATION Fieldbus communication. FOUNDATION Fieldbus is a technology that enables fully digital communication between field devices, allowing multiple devices to be connected and controlled via a single communication cable. Using a dedicated Fieldbus interface, control signals and device diagnostic information can be transmitted bidirectionally in real time.



	Operation
1	Checking and changing of the equipment information
2	Checking and changing of the FOUNDATION Fieldbus communication setting
3	Setting and checking of the cylinder parameter
4	Calibration
5	Setting and checking of the operation mode
6	JOG operation
7	Checking of the operating conditions

5 How to Order

Refer to catalogue for 'How to Order'.

6 Outline Dimensions

Refer to catalogue for outline dimensions.

7 Maintenance

7.1 General maintenance

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.

Do not disassemble the product, unless required by installation or maintenance instructions.

8 Limitations of Use

8.1 Limited warranty and disclaimer/compliance requirements.

Refer to Handling Precautions for SMC Products.

8.2 Mounting

⚠ Caution

- (1) Vibration may occur due to positioning control depending on the operating environment, load, conditions, etc.
- Be sure to inspect the actual machine for sufficient strength retention in regard to the amount of cylinder vibration that occurs.

- (2) Mount so that a lateral load which exceeds the allowable lateral load is not applied to the piston rod.
- If a lateral load which exceeds the allowable lateral load is applied, the positioning repeatability during the target position operation will decline, which may lead to piston rod malfunction.
- In addition, if the seals, cylinder tubing, etc., come into direct contact with the metal parts of the piston, air leakage due to uneven wear or reduced service life due to accelerated wear of the bearing may result. Refer to Table 2 on page 18 for the allowable lateral load.

- (3) When a workpiece is mounted on the piston rod end, connect them by aligning the axial center of the piston rod and that of the workpiece.
- If they are off-center, a lateral load will be generated and the phenomena mentioned in item 2 may occur.

8.3 Operating

- (1) When powering-up the product, restarting after an emergency stop, or switching the operating mode, be careful as the piston rod may suddenly extend or retract according to the settings.

- (2) Avoid use in environments where condensation is generated.
When moving the product to a location at room temperature after operating it in low-temperature conditions, the temperature will rise suddenly and condensation will be generated. If water droplets from the generated condensation adhere to the internal substrate, an electric short-circuit may occur, resulting in a malfunction.

9 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

10 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : https:// www.smcworld.com (Global) https:// www.smc.eu (Europe)
SMC Corporation, 1-5-5, Kyobashi, Chuo-ku, Tokyo 104-0031, JAPAN