No.DOC1099364
（NN70156000）

Operation Manual supplementary material

NAME

Programming Examples

MODEL/ Series/ Product Number

Step Motor Controller (Servo/24 VDC)

JXC51/JXC61

The descriptions in this instruction manual are for “programming examples” only.
For details on how to use the JXC51/61, please refer to the JXC51/61 instruction manual.

SMC Corporation

Table of Contents

JXC51/61 Controller
1. 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 relating to systems.
ISO 4413: Hydraulic fluid power -- General rules relating to systems.
IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)
ISO 10218: Manipulating industrial robots -Safety.
etc.

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

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

JXC51/61 Controller
1. Safety Instructions

⚠ Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not covered.
Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.∗2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

∗2) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Products that SMC manufactures or sells are not measurement instruments that are qualified by pattern approval tests relating to the measurement laws of each country.
Therefore, SMC products cannot be used for business or certification ordained by the measurement laws of each country.

2. Outlines of Product

Please read the following terms and conditions carefully before creating a program based on this document and use it only if you agree to the terms and conditions below.
The following terms and conditions apply only if you agree to the terms and conditions below.

【Terms of Use】
- By using this document, you agree to the following terms and conditions.

- The use of this material constitutes your agreement to the following terms and conditions.

- This material is provided as reference material for the creation of programs. The final conformity of the program is not guaranteed.

- The final conformity of the program is not guaranteed. Conformity evaluation is the responsibility of the customer.

- The company assumes no responsibility for any results or damages resulting from the use of programs created with reference to this document.

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3. Programming Example

3.1 PLC memory allocation examples

Examples of PLC memory allocation for controller I/O signals (JXC input, JXC output), internal relays, and timers are shown below.

	PLC Output relay	JXC Input signal
The start address	Y00	IN0
	Y01	IN1
	Y02	IN2
	Y03	IN3
	Y04	IN4
	Y05	IN5
	Y06	SETUP
	Y07	HOLD
	Y08	DRIVE
	Y09	RESET
	Y0A	SVON
	Y0B	-
	Y0C	-
	Y0D	-
	Y0E	-
	Y0F	-

	PLC Input relay	JXC Output signal
The start address	X00	OUT0
	X01	OUT1
	X02	OUT2
	X03	OUT3
	X04	OUT4
	X05	OUT5
	X06	BUSY
	X07	AREA
	X08	SETON
	X09	INP
	X0A	SVRE
	X0B	*ESTOP
	X0C	*ALARM
	X0D	-
	X0E	-
	X0F	-

Internal relay	Signal name (Return to Origin position)	Internal relay	Signal name (positioning operation)	Timer	
M00	Operation preparation complete	M10	St_No.1 instruction	T00	3s Timer
M01	Servo ON instruction	M11	St_No.1 instruction in progress	T01	30ms Timer
M02	Homing instruction	M12	IN0 input	T02	30ms Timer
M03	Homing start	M13	St_No.1 ready		
M04	Setup input	M14	Positioning operation instruction		
M05	Homing	M15	Positioning operation start		
M06	SETUP input complete	M16	DRIVE input		
M07	Homing completed	M17	Positioning operation in progress		
M08	-	M18	Positioning operation complete		
M09	-	M19	-		
M0A	-	M1A	-		
M0B	-	M1B	-		
M0C	-	M1C	-		
M0D	-	M1D	-		
M0E	-	M1E	-		
M0F	-	M1F	-		

For details on JXC input and output signals, refer to “9.2.3 Parallel I/O Signal Details” in the JXC51/61 Operation Manual.

3.2 Power on to Return to origin

Procedure for power-on and return to origin

- Procedures-

1) ***Checking operation preparation***

Apply the power.

↓

2) *ALARM is turned ON.

*ESTOP is turned ON.

↓

3) ***Servo ON operation***

SVON is turned ON.

↓

4) SVRE is turned ON.

The time taken for SVRE output to turn on depends on the electric actuator type and the operating conditions. (20 sec. or less)

The electric actuator with lock is unlocked.

↓

5) ***Origin return operation***

SETUP is turned ON.

↓

6) BUSY is turned ON.

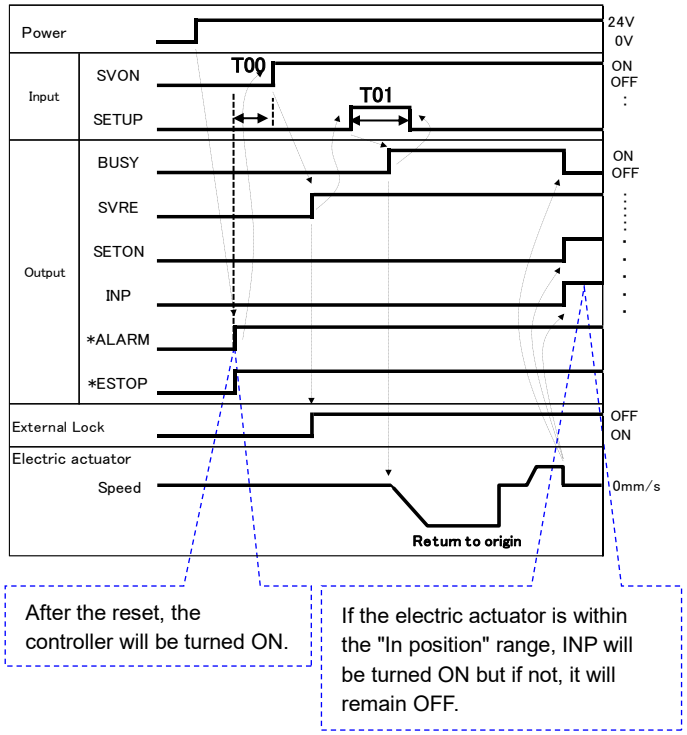
(The electric actuator moves.)

↓

7) SETON and INP are turned ON.

When the BUSY output is turned OFF, the return to origin operation has been completed.

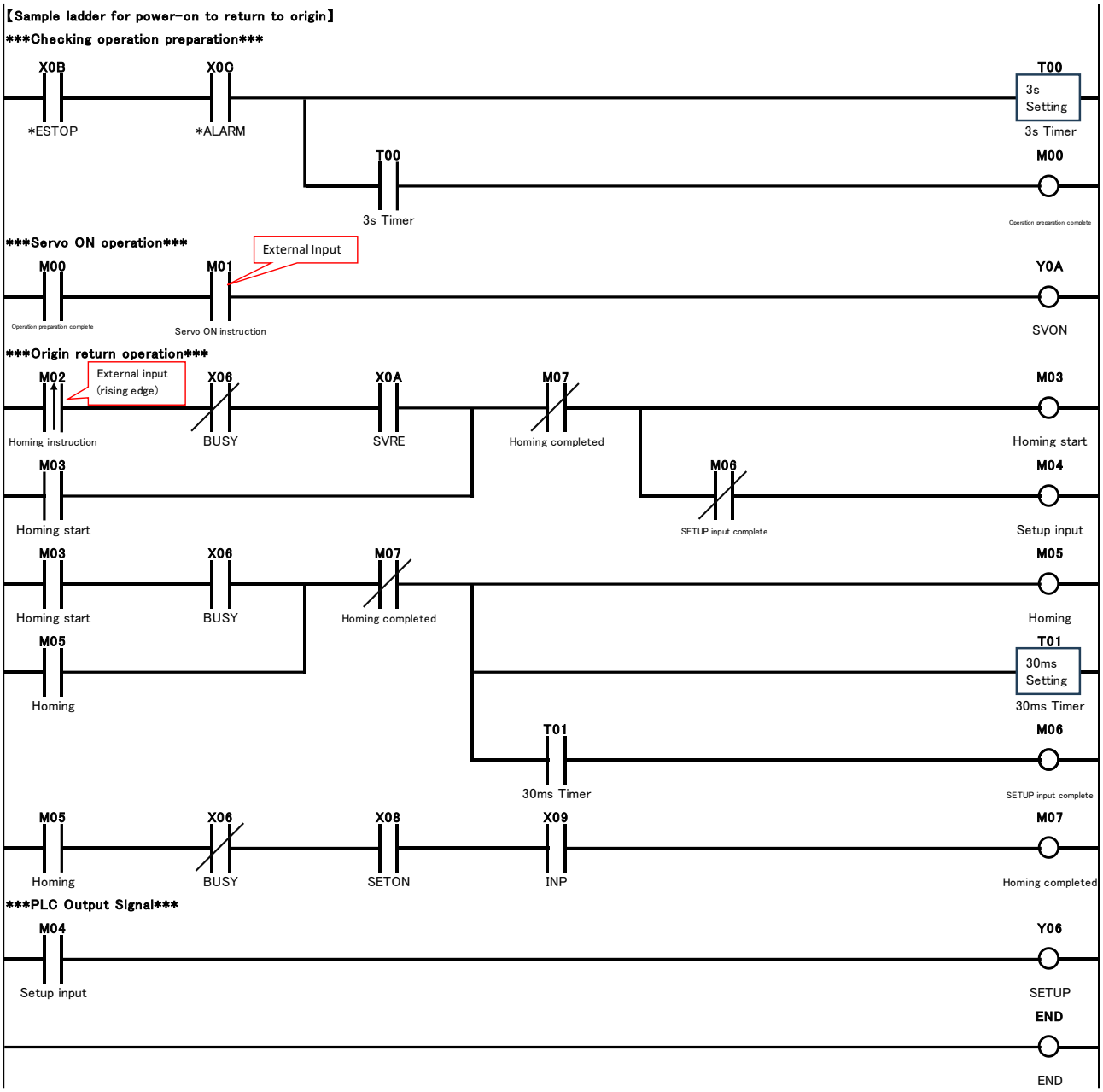
- Timing chart Power on to Return to origin -



The "*ALARM" and "*ESTOP" are expressed as negative-logic circuit.

T00: 3s timer (system initialization time + position data read time)

T01: 30ms timer (recommended value)


【Sample ladder for power-on to return to origin】
Checking operation preparation
X0B
*ESTOP
X0C
*ALARM
T00
3s Setting
3s Timer
T00
3s Timer
M00
Operation preparation complete
Servo ON operation
External Input
M00
Operation preparation complete
M01
Servo ON instruction
Y0A
SVON
Origin return operation
M02
External input (rising edge)
Homing instruction
X06
BUSY
X0A
SVRE
M07
Homing completed
M03
Homing start
M03
Homing start
M06
SETUP input complete
M04
Setup input
M03
Homing start
X06
BUSY
M07
Homing completed
M05
Homing
M05
Homing
T01
30ms Setting
30ms Timer
T01
30ms Timer
M06
SETUP input complete
M05
Homing
X06
BUSY
X08
SETON
X09
INP
M07
Homing completed
PLC Output Signal
M04
Setup input
Y06
SETUP
END
END

3.3 Positioning operation

Procedure for positioning operation

- Procedures-

1) ***Step data No.1 instruction***
   Input step data No. (IN0 to IN5)

   ↓

2) ***Positioning Operation***
   Output the step data no.

   DRIVE is turned ON.

   (OUT0 to OUT 5 is turned off)

   →Scan the step data number (from IN0 to IN5). Then, if DRIVE is turned OFF, the step data number will be output (from the output OUT0 to OUT5).

   ↓

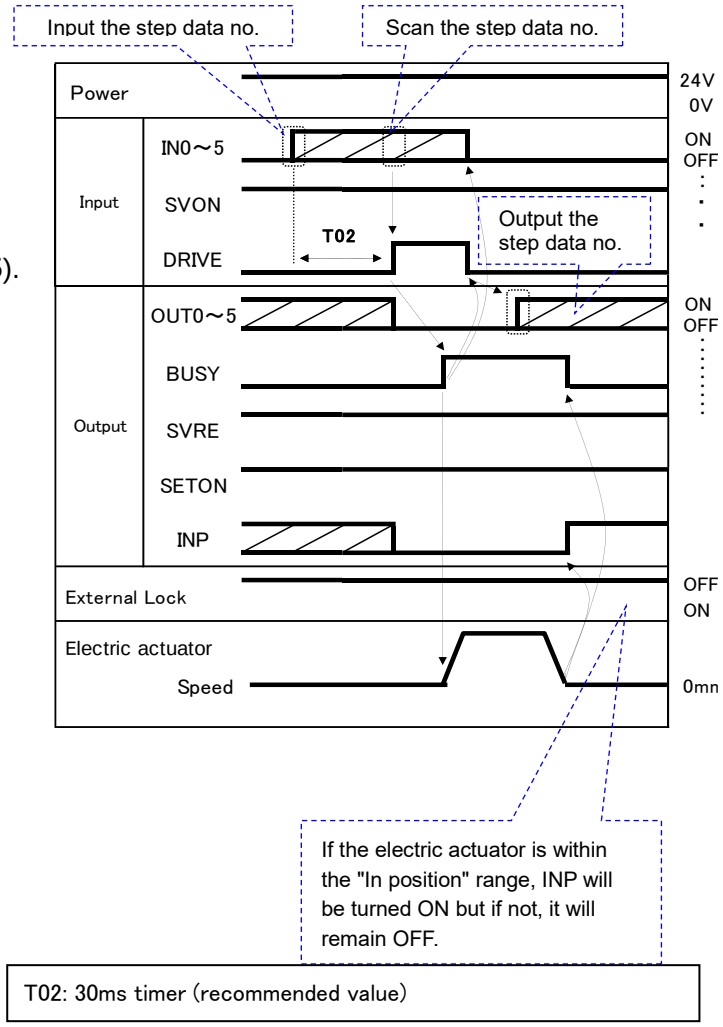
3) BUSY is turned ON.

   (The positioning operation starts.)

   ↓

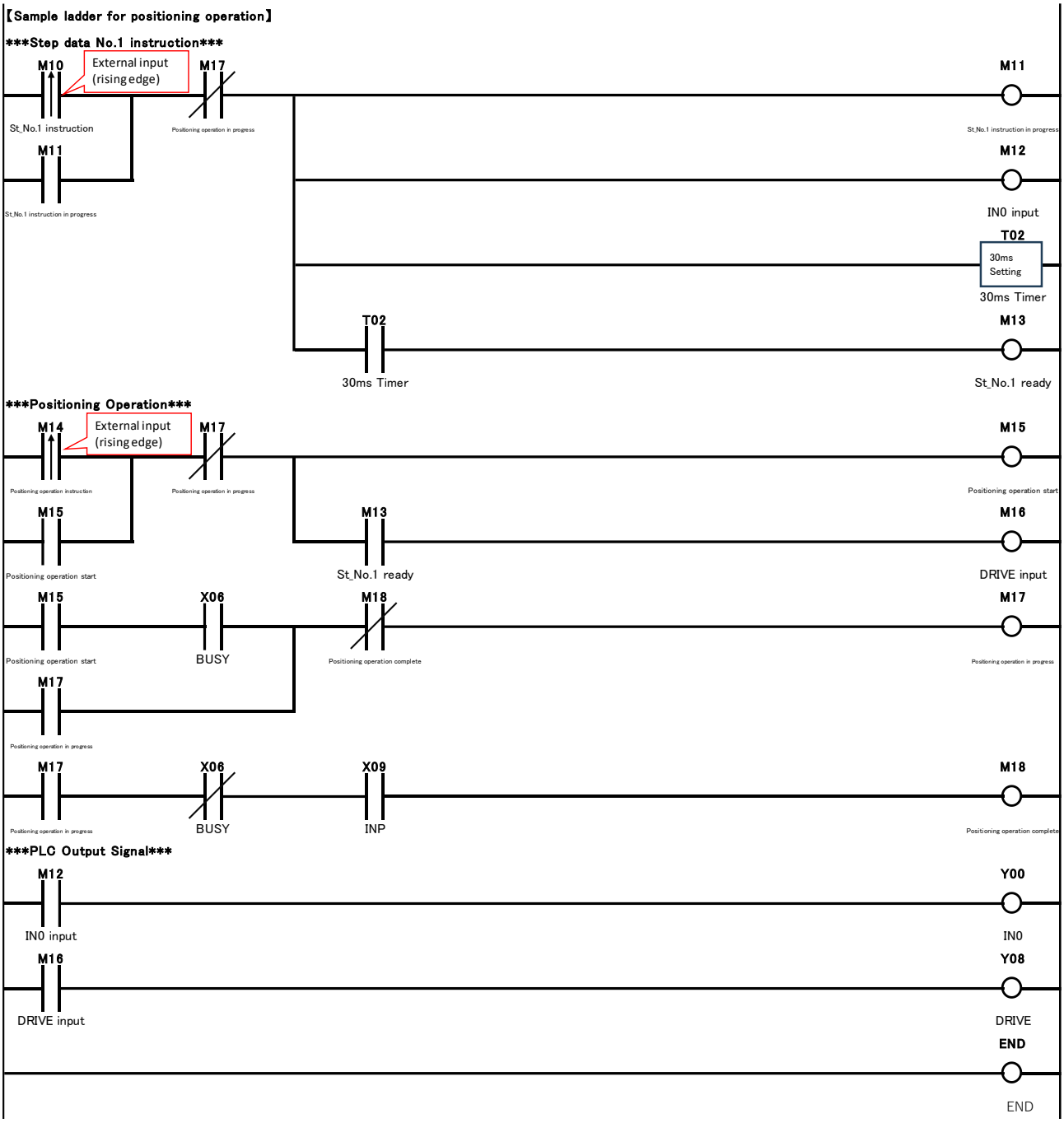
4) When INP turns ON and BUSY turns OFF, the positioning operation will be completed.

- Timing chart Positioning operation -



T02: 30ms timer (recommended value)

【Sample ladder for positioning operation】



Revision history
First edition: October 2024

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