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フリップチップ実装機  
Flipchip Bonding Machine

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MODEL : AFM-15

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TYPE : AFM-1562

ローダーマニュアル  
**Loader Manual**

**For China Wafer Level CSP Co., Ltd. 1562 Loader Option**



# Introduction

This manual describes how to operate the Flipchip Bonding machine safely and efficiency. Please read carefully before operating and refer to it whenever necessary.

This manuals is for the loader unit option of the Flipchip Bonding machine AFM1562.

This manual consists of the following parts.

Chapter 1	Explanation of Functions
Chapter 2	Explanation of Operations
Appendix A	Alarm message
Appendix B	Pneumatic piping diagram
Appendix C	Electrical wiring diagram

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- Store this manual in a location easily accessible.
  - If the manual becomes lost or damaged, promptly order a replacement copy.
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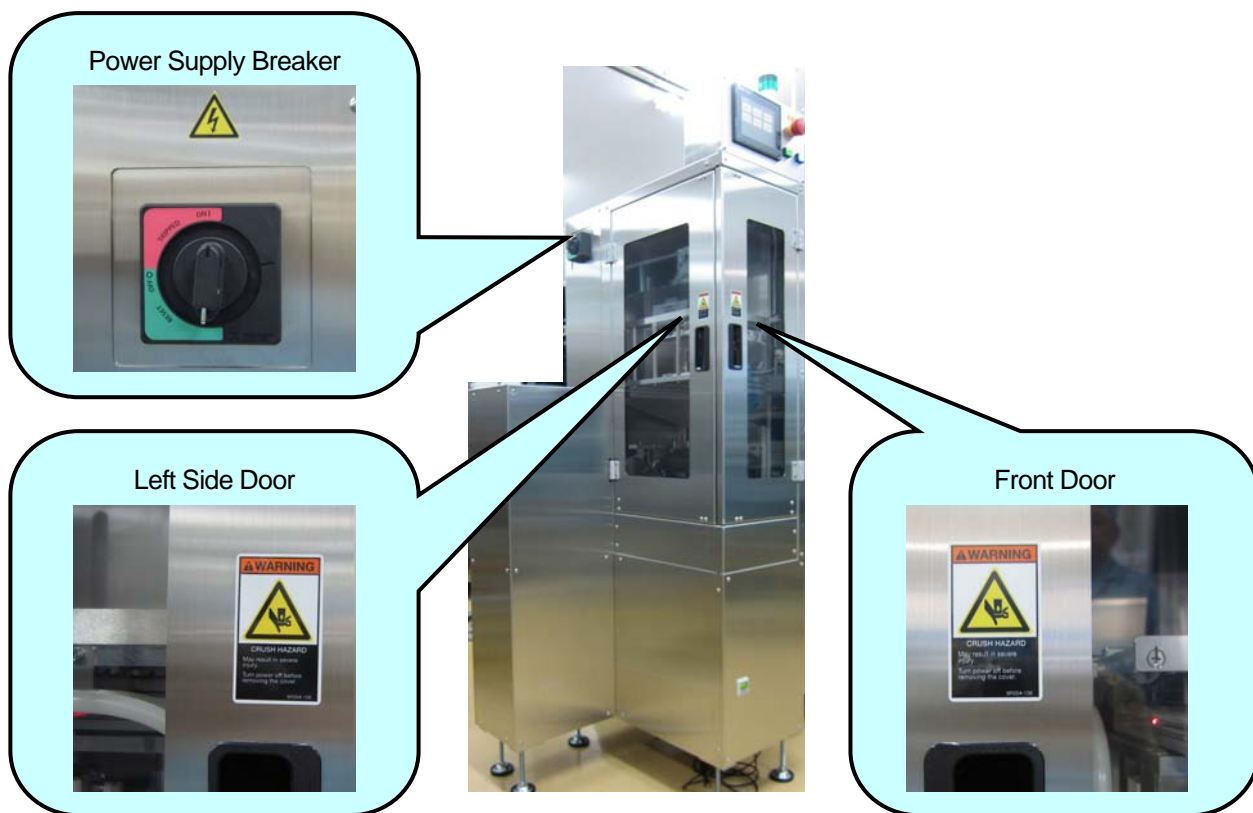


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# Chapter1 Explanation of Functions

## 1-1 Warning Labels

### 1.[ Warning Labels ]



### 2.[ Wiring Earth ]

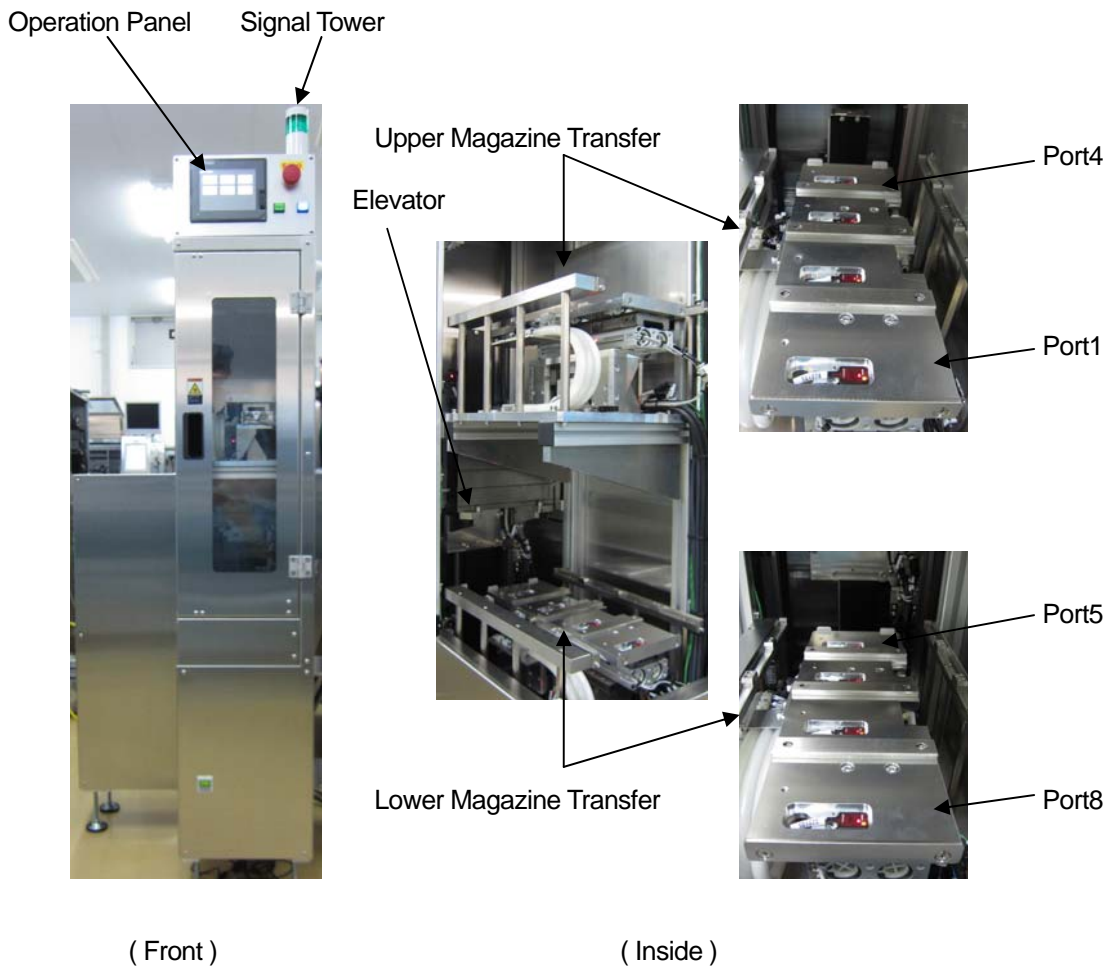


( Left Side Door Earth Line )



( Front Door Earth Line )

## 1-2 Configurations



Upper Magazine Transfer - Transport the magazine with substrates supplied in port1 to port4.

Transported magazine to port4 is derived to the elevator.

Elevator ----- Supply substrates to the AFM15 from the magazine in the elevator received from port4 of upper magazine transfer.

After substrates supply from the magazine to the AFM15 is completed, empty magazine is derived to the port5 of lower magazine transfer.

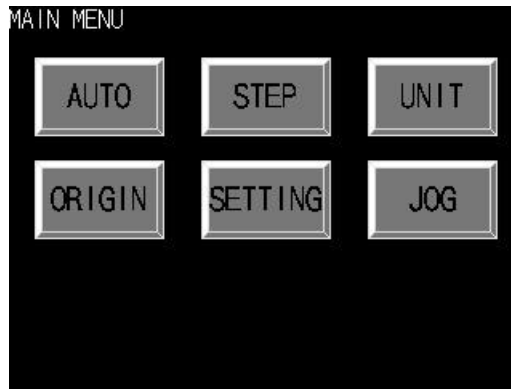
Lower Magazine Transfer - Transport the magazine received from elevator in port5 to port8.

The loader unit comes to alarm stop when the magazine in the elevator is empty in the state with the magazine exist in port8.

## 1-3 Operations

### 1-3-1 Startup

- (1) Turn on the circuit-breaker of the AFM15.
  - \* The loader power supply goes through AFM15. Necessary to turn on the circuit-breaker of the AFM15 beforehand to supply the loader with a power supply.
- (2) Open the air supply valve on the back face lower part of the loader unit.
- (3) Turn on the circuit-breaker on the left side upper part of the loader unit.
  - \* Wait until panel applications starts and "MAIN MENU" screen appears.

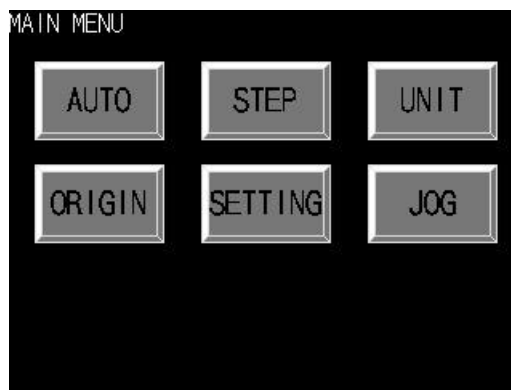


( MAIN MENU Screen )

### 1-3-2 Origin Return

After startup the loader unit, you need to return each unit to their origin to get the equipment running. In case where you operate in an axis manually, be sure that you return the axis to its origin to avoid trouble.

- (1) Touch **ORIGIN** button to return each unit to their origin. A processing serene is displayed during the origin return process.
- (2) When the zero return is completed, the screen will be returned to "MAIN MENU" screen and **ORIGIN** button lights up.



( MAIN MENU Screen )

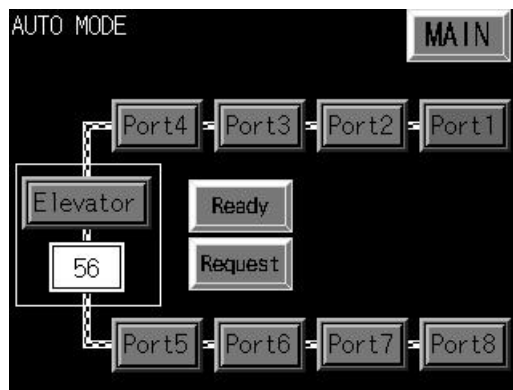
### 1-3-3 Start the Automatic Operation

Start the automatic operation of the loader unit.

To start the automatic operation, there have to be the elevator axis and each cylinder in the designated position. In case of execute manual operation after origin return, need to do origin return again before start the automatic operation.

- (1) "AUTO MODE" screen appears to touch **AUTO** button on the "MAIN MENU" screen.

The status of each unit is indicated on the "AUTO MODE" screen. (Refer to 2-2)



( AUTO MODE Screen )

- (2) To start automatic operation, push the **START** button on the right part of operation panel.



( Operation Panel )

### 1-3-4 Stop the Automatic Operation

Stop the automatic operation of the loader unit.

- (1) To stop automatic operation, push the **STOP** button on the right part of operation panel.



( Operation Panel )

- (2) Touch the **MAIN** button on the "AUTO MODE" screen and return to the "MAIN MENU" screen.



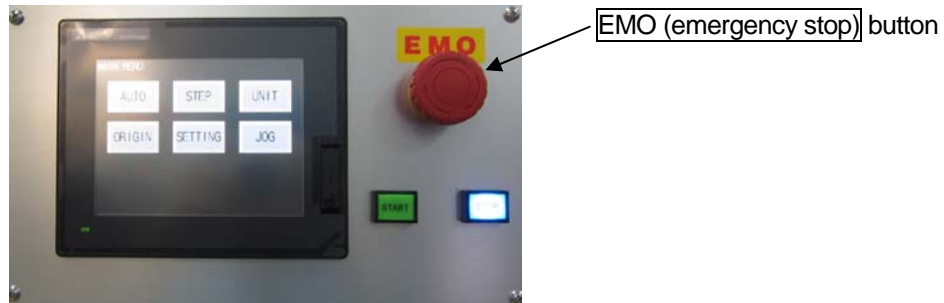
### 1-3-5 Emergency stop and restoration

This section describes how to make an emergency stop and restoration.

In case of an emergency, push the **EMO (emergency stop)** button right away to prevent further accident or trouble.

Each axis comes to a stop suddenly and its servo will be turned off.

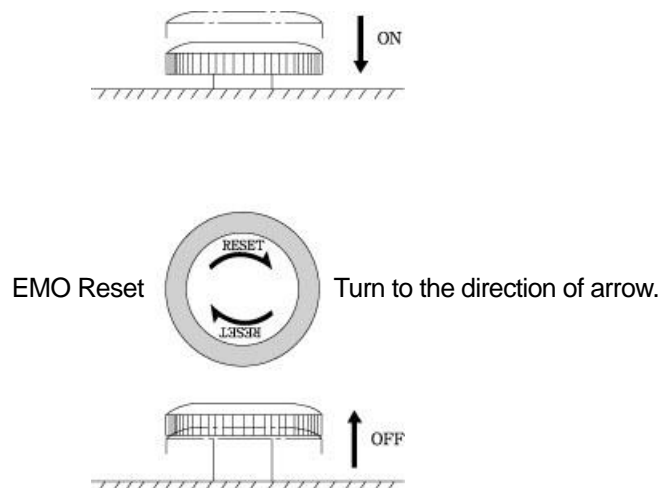
( The touch panel displays “Emergency Stop” message. )



( Operation Panel )

To reset the **EMO(emergency stop)** button, turn the button in the direction of the arrow showed in the below diagram.

Never perform the origin return process until you make certain that you can do so safely.



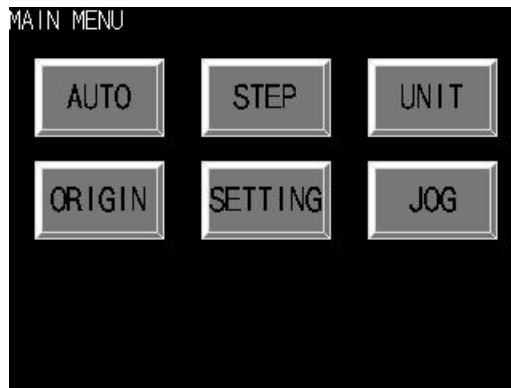
### 1-3-6 Shutdown

- (1) Turn off the circuit-breaker on the left side upper part of the loader unit in the state by which the “MAIN MENU” screen is displayed.
- (2) Close the air supply valve on the back face lower part of the loader unit.

## Chapter2 Explanation of Operations

### 2-1 MAIN Screen

Switch to the related operation screen by touching each button.



**AUTO**----- Display AUTO MODE screen at the case of elevator axis and cylinder position are in the set position.

In case of the AUTO MODE screen is not displayed, do the origin return and retry.

**STEP**----- Display STEP screen.

**UNIT**----- Display UNIT MENU screen.

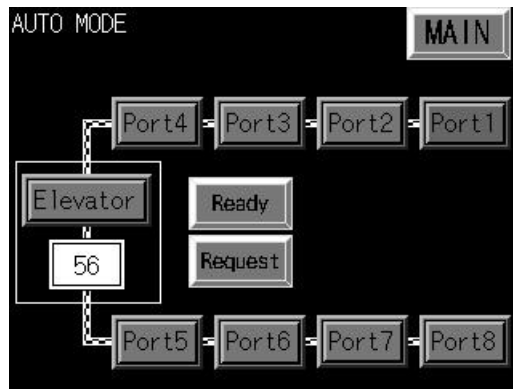
**SETTING**----- Display SETTING1 screen.

**JOG**----- Display JOG screen.

**ORIGIN**----- Execute the origin return. The button lights up after the origin return has been completed.

## 2-2 AUTO Screen

Indicate the state of each part during automatic operation.



Ready(Lamp) ----- The lamp lights up when a substrate supply from the loader unit is possible.

Request(Lamp) ----- The lamp lights up when receiving a substrate supply request from the AFM15.

Port1~4(Lamp)----- The lamp in each port of upper magazine transfer lights up where a magazine exists.

Elevator(Lamp)----- The lamp lights up when a magazine exists in the elevator.

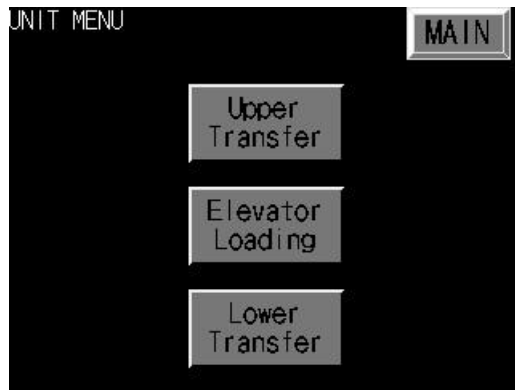
The present slot which exists in the substrate supply position is shown to a numerical value display.

Port5~8(Lamp)----- The lamp in each port of lower magazine transfer lights up where a magazine exists.

**MAIN**----- Return to the MAIN MENU screen.

## 2-3 UNIT MENU Screen

Display the related part manual operation screen by touching each button.



**Upper Transfer** ----- Display the upper magazine transfer manual operation screen.

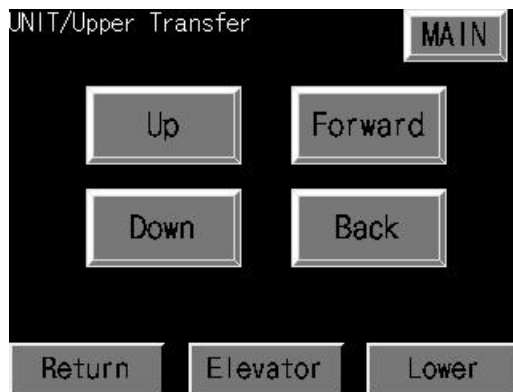
**Elevator Loading** ----- Display the elevator axis, substrate pusher, and magazine clump manual operation screen.

**Lower Transfer** ----- Display the lower magazine transfer manual operation screen.

**MAIN** ----- Return to the MAIN MENU screen.

## 2-3-1 Upper Transfer Screen

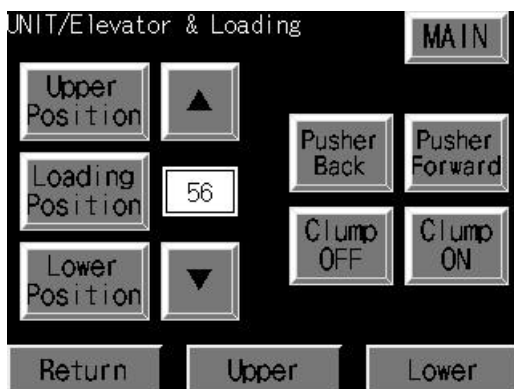
Execute the manual operation of upper magazine transfer by touching each button.



- Up** ----- Move up the upper magazine transfer.  
The button lights up when the upper magazine transfer is in the up position.
- Down** ----- Move down the upper magazine transfer.  
The button lights up when the upper magazine transfer is in the down position.
- Forward** ----- Move forward the upper magazine transfer.  
The button lights up when the upper magazine transfer is in the forward position.
- Back** ----- Move back the upper magazine transfer.  
The button lights up when the upper magazine transfer is in the back position.
- Return** ----- Return to the UNIT MENU screen.
- Elevator** ----- Display the elevator axis, substrate pusher, and magazine clump manual operation screen.
- Lower** ----- Display the lower magazine transfer manual operation screen.
- MAIN** ----- Return to the MAIN MENU screen.

## 2-3-2 Elevator & Loading Screen

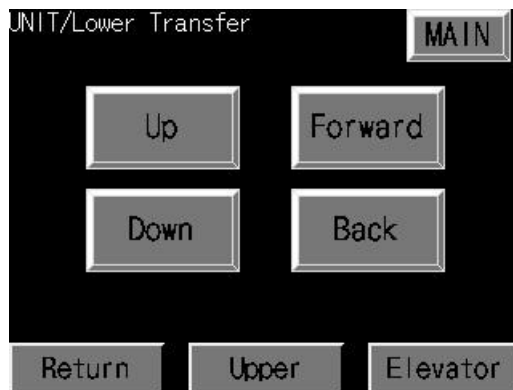
Execute the manual operation of elevator axis, substrate pusher, and magazine clump by touching each button.



- Upper Position** ----- Move the elevator axis to the upper magazine receive position.  
The button lights up when the elevator axis is in the upper magazine receive position.
- Loading Position** ----- Move the indicated present slot position of the elevator axis to the substrate supply position.  
The button lights up when the indicated present slot is in the substrate supply position.
- Lower Position** ----- Move the elevator axis to the lower magazine deliver position.  
The button lights up when the elevator axis is in the lower magazine deliver position.
- ▲ ▼** ----- Move the elevator axis up/down by one pitch.  
The present slot which exists in the substrate collect position is indicated to a numerical value display.
- Pusher Back** ----- Move back the substrate pusher.  
The button lights up when substrate pusher is in the back position.
- Pusher Forward** ----- Move forward the substrate pusher.  
The button lights up when substrate pusher is in the forward position.
- Clamp Off** ----- Move off the magazine clump.  
The button lights up when the magazine clump is off.
- Clamp On** ----- Move on the magazine clump.  
The button lights up when the magazine clump is on.
- Return** ----- Return to the UNIT MENU screen.
- Upper** ----- Display the upper magazine transfer manual operation screen.
- Lower** ----- Display the lower magazine transfer manual operation screen.
- MAIN** ----- Return to the MAIN MENU screen.

### 2-3-3 Lower Transfer Screen

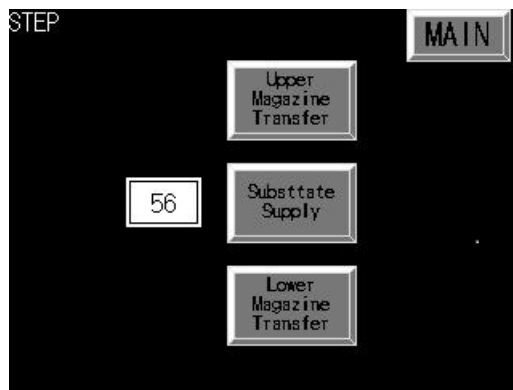
Execute the manual operation of lower magazine transfer by touching each button.



- Up** ----- Move up the lower magazine transfer.  
The button lights up when the lower magazine transfer is in the up position.
- Down** ----- Move down the lower magazine transfer.  
The button lights up when the lower magazine transfer is in the down position.
- Forward** ----- Move forward the lower magazine transfer.  
The button lights up when the lower magazine transfer is in the forward position.
- Back** ----- Move back the lower magazine transfer.  
The button lights up when the lower magazine transfer is in the back position.
- Return** ----- Return to the UNIT MENU screen.
- Upper** ----- Display the upper magazine transfer manual operation screen.
- Elevator** ----- Display the elevator axis, substrate pusher, and magazine clump manual operation screen.
- MAIN** ----- Return to the MAIN MENU screen.

## 2-4 STEP Screen

Execute the cycle operation of magazine transfer and substrate supply by touching each button.



**Upper Magazine Transfer** - Execute cycle operation of the upper magazine transfer.

The button lighting up during cycle operation is carrying on.

Each steps of cycle operation of the upper magazine transfer is as follows.

- (1) Move up the upper magazine transfer
- (2) Move back the upper magazine transfer
- (3) Move down the upper magazine transfer
- (4) Move forward the upper magazine transfer
- (5) Move the elevator axis (Move to the substrate supply position in case of a magazine exists in the elevator, or move to upper magazine receive position in case of a magazine does not exist in the elevator).

**Substrate Supply** ----- Execute cycle operation of the substrate supply at the indicated present slot.

The button lighting up during cycle operation is carrying on.

Each steps of cycle operation of the substrate supply is as follows.

- (1) Move forward the substrate pusher
- (2) Move back the substrate pusher
- (3) Move the elevator axis (Move to the lower magazine deliver position in case of the indicated present slot is last slot, or move to the substrate supply position in case of the present slot is others).

**Lower Magazine Transfer** - Execute cycle operation of the lower magazine transfer.

The button lighting up during cycle operation is carrying on.

Each steps of cycle operation of the lower magazine transfer is as follows.

- (1) Move back the lower magazine transfer
- (2) Move up the lower magazine transfer
- (3) Move forward the lower magazine transfer
- (4) Move down the lower magazine transfer
- (5) Move the elevator axis (Move to the upper magazine receive position in case of a magazine exist in the port5 of lower magazine transfer, or move to the lower magazine deliver position in case of a magazine does not exist in the port5).

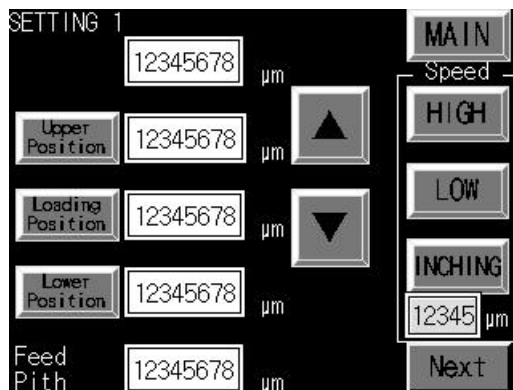
**MAIN** ----- Return to the MAIN MENU screen.



## 2-5 SETTING Screen

### 2-5-1 SETTING1 Screen

Execute teaching of the elevator axis.



(numerical value display) -- Present position of elevator axis is indicated.

**Upper Position** ----- Execute the upper magazine receive position teaching of the elevator axis.

By keep touching for one second, sets the present position of the elevator axis to the upper magazine receive position. The button lights up while keep touching the button.

The upper magazine receive position of the elevator axis is indicated at a right numerical value display. To click the numerical value display and input the upper magazine receive position directly by numerical value.

Sets the upper magazine receive position in the position where magazine receipt from the upper magazine transfer to the elevator is performed smoothly.

**Loading Position** ----- Execute the substrate supply position teaching of the elevator axis.

By keep touching for one second, sets the present position of the elevator axis to the substrate supply position. The button lights up while keep touching the button.

The substrate supply position of the elevator axis is indicated at a right numerical value display. To click the numerical value display and input the substrate supply position directly by numerical value.







Sets the substrate supply position in the position where substrate supply from the AFM15 is performed smoothly.

**Lower Position** ----- Execute the lower magazine deliver position teaching of the elevator axis.

By keep touching for one second, sets the present position of the elevator axis to the lower magazine deliver position. The button lights up while keep touching the button.

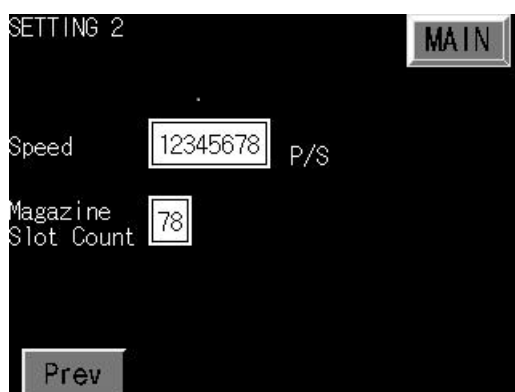
The lower magazine deliver position of the elevator axis is indicated at a right numerical value display. To click the numerical value display and input the lower magazine deliver position directly by numerical value.


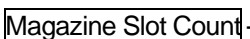


Sets the lower magazine deliver position in the position where magazine delivery from the elevator to the lower magazine transfer is performed smoothly.

-  ----- Move the elevator axis up/down by the selected speed.
-  ----- Sets the JOG operation speed of the elevator axis to high speed.  
The button lights up when the JOG operation speed is high speed.
-  ----- Sets the JOG operation speed of the elevator axis to low speed.  
The button lights up when the JOG operation speed is low speed.
-  ----- Sets the JOG operation speed of the elevator axis to inching.  
The button lights up when the JOG operation speed is inching.  
Inching amount of movement is indicated at a under numerical value display. To click the numerical value display and input the inching amount of movement directly by numerical value.
- Feed Pitch ----- Sets the one pitch amount of movement of the elevator axis.  
Pitch amount of movement is indicated at a right numerical value display. To click the numerical value display and input the pitch amount of movement directly by numerical value.
-  ----- Display the SETTING2 screen.
-  ----- Return to the MAIN MENU screen.

## 2-5-2 SETTING2 Screen

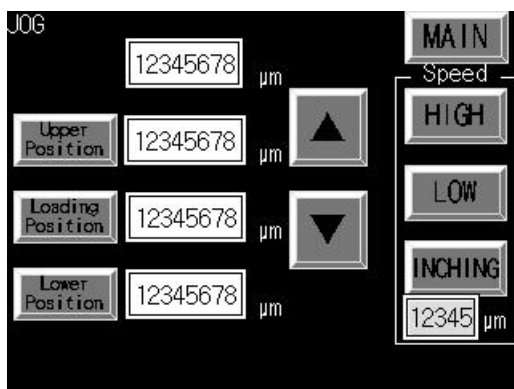
Execute teaching of the elevator axis.



-  ----- Sets the speed of the elevator axis for automatic operation.  
Speed for automatic operation is indicated at a right numerical value display using (pulse/sec) unit. To click the numerical value display and input the speed directly by numerical value.
-  ----- Sets the magazine slot count.  
Magazine slot count is indicated at a right numerical value display. To click the numerical value display and input the slot count directly by numerical value.
-  ----- Display the SETTING1 screen.
-  ----- Return to the MAIN MENU screen.

## 2-6 JOG Screen

Execute the JOG motion of the elevator axis.



(numerical value display) -- Present position of elevator axis is indicated.

**Upper Position** ----- Execute the upper magazine receive position teaching of the elevator axis.

By keep touching for one second, sets the present position of the elevator axis to the upper magazine receive position. The button lights up while keep touching the button.

The upper magazine receive position of the elevator axis is indicated at a right numerical value display.

**Loading Position** ----- Execute the substrate supply position teaching of the elevator axis.

By keep touching for one second, sets the present position of the elevator axis to the substrate supply position. The button lights on while keep touching the button.

The substrate supply position of the elevator axis is indicated at a right numerical value display.

**Lower Position** ----- Execute the lower magazine deliver position teaching of the elevator axis.

By keep touching for one second, sets the present position of the elevator axis to the lower magazine deliver position. The button lights up while keep touching the button.

The lower magazine deliver position of the elevator axis is indicated at a right numerical value display.

**▲ ▼** ----- Move the elevator axis up/down by the selected speed.

**HIGH** ----- Sets the JOG operation speed of the elevator axis to high speed.

The button lights up when the JOG operation speed is high speed.

**Low** ----- Sets the JOG operation speed of the elevator axis to low speed.

The button lights up when the JOG operation speed is low speed.

**INCHING** ----- Sets the JOG operation speed of the elevator axis to inching.

The button lights up when the JOG operation speed is inching.

Inching amount of movement is indicated at a under numerical value display. To click the numerical value display and input the inching amount of movement directly by numerical value.

**MAIN** ----- Return to the MAIN MENU screen.

# Appendix A

## Alarm Message

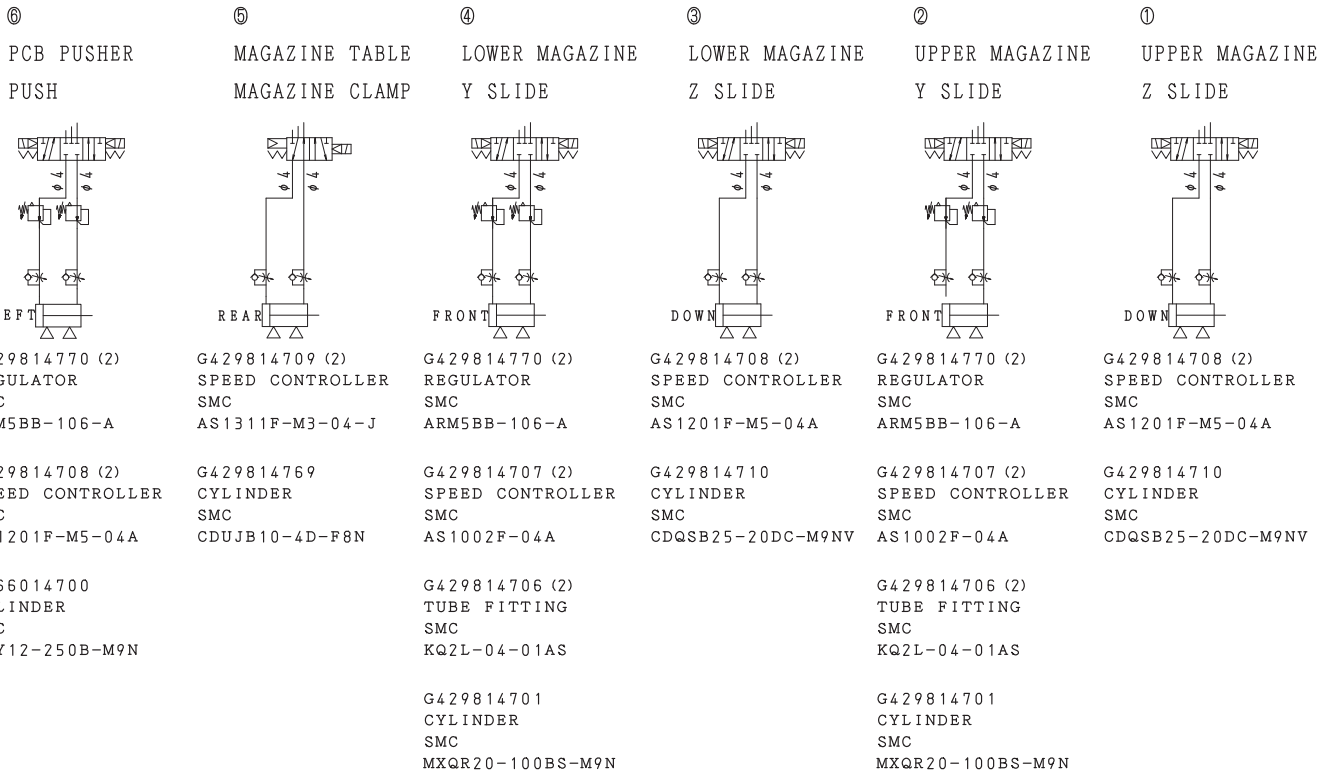
Category	Message	Alarm contents	Recovery Procedures
Emergency Stop	Emergency Stop	Emergency-stop button was pressed. Emergency-stop signal SQX023 is turned on.	Check the state of the emergency-stop button. Check of the emergency-stop signal SQX023 (Refer to 76-002). Cancel the emergency-stop and do the origin return.
	Main Air Down	The supply air pressure became below the regulation. Supply air pressure sensor SQX026 did off.	Check the air. Check the air pressure sensor SQX026 (Refer to 76-003). Make the air pressure regulation equal to or more than. Do the origin return.
	PLC Alarm	Alarm of PLC unit occurred.	Check the state of PLC unit. Turn on the power again and do the origin return.
	PLC Low battery	Battery alarm of PLC unit occurred.	Check the state of PLC unit. Exchange the battery of PLC unit. Turn on the power again and do the origin return.
	Servo Alarm	Alarm of loader magazine axis driver occurred.	Check the cause why the driver error occurred. After OFF/ON circuit protector FR4 for the driver, do the origin return (Refer to 76-001).
	Safety cover open (Front)	Cover is opened during auto operation or origin return operation. Cover sensor INX024 is turned on.	Check the state of front and side cover. Check the input of cover sensor INX024 (Refer to 76-003). Close the cover and do the origin return.
	Safety cover open (Side)	Cover is opened during auto operation or origin return operation. Cover sensor INX025 is turned on.	Check the state of front and side cover. Check the input of cover sensor INX025 (Refer to 76-003). Close the cover and do the origin return.
	Magazine Axis Interlock	Any of the sensor of upper transfer forward end or lower transfer forward end or substrate pusher back end is turned off during the magazine axis is moving.	Check the forward/back position of each cylinder. Check the input of any of sensor INX030/033/037 (Refer to 76-003). Close the cover and do the origin return.
Circuit Protector Emergency Stop	FR03 Circuit protector error	The circuit protector for the DC24V isn't doing on.	Check the state of circuit protector FR3. After turning the circuit protector on, do the origin return (Refer to 76-001).
	FR04 Circuit protector error	The circuit protector for the servo motor isn't doing on.	Check the state of circuit protector FR4. After turning the circuit protector on, do the origin return (Refer to 76-001).
	FR05 Circuit protector error	The circuit protector for the servo motor isn't doing on.	Check the state of circuit protector FR5. After turning the circuit protector on, do the origin return (Refer to 76-001).
	FR06 Circuit protector error	The circuit protector for the DC24V for input isn't doing on.	Check the state of circuit protector FR6. After turning the circuit protector on, do the origin return (Refer to 76-001).
	FR07 Circuit protector error	The circuit protector for the DC24V for output isn't doing on.	Check the state of circuit protector FR7. After turning the circuit protector on, do the origin return (Refer to 76-001).
Interlock Emergency Stop	discharge part Substrate detection	Substrate detection sensor at the discharge part INX03C is turned on, during magazine axis moving.	Check the input of substrate detection sensor at the discharge part INX03C (Refer to 76-003). Do the origin return.
Time Over Cycle Stop Alarm	Upper Magazine Back/Front time over	The forward/back cylinder for the upper magazine conveyance does not reach the sensor SQX032/033 within the time limits.	Check the cylinder sensor. Check the cylinder interference. After resetting, check the cylinder work (Refer to 76-002).
	Upper Magazine Up/Down time over	The up/down cylinder for the upper magazine conveyance does not reach the sensor SQX034/035 within the time limits.	
	Lower Magazine Back/Front time over	The forward/back cylinder for the lower magazine conveyance does not reach the sensor SQX036/037 within the time limits.	
	Lower Magazine Up/Down time over	The up/down cylinder for the lower magazine conveyance does not reach the sensor SQX038/039 within the time limits.	
	Magazine Clamp Back/Front time over	The on/off cylinder for the magazine clamp does not reach the sensor SQX03A/03B within the time limits.	
	Substrate Pusher Back/Front time over	The forward/back cylinder for the substrate pusher does not reach the sensor SQX030/031 within the time limits.	

Category	Message	Alarm contents	Recovery Procedures
Magazine Supply/Collect Cycle Stop Alarm	Upper Magazine Empty	Magazine detection sensor SQX027/028/029/02A/02B is not turned on.	Check the state of magazine. Check the input of magazine detection sensor SQX027/028/029/02A/02B (Refer to 76-003). Reset and check the magazine movement.
	Lower Magazine Full	Magazine detection sensor SQX027/02C is not turned off.	Check the state of magazine. Check the input of magazine detection sensor SQX027/02C (Refer to 76-003). Reset and check the magazine movement.
	Lower Magazine Transfer Miss	Magazine detection sensor SQX027 is not turned off and SQX02F is not turned on, during lower magazine moving.	Check the state of magazine. Check the input of magazine detection sensor SQX027/02F (Refer to 76-003). Reset and check the magazine movement.
Interlock Alarm	Unit movement	Each unit is performing the current operation.	Wait until motion stop and operate again.
	Safety cover open	Cover sensor INX024/025 is turned on.	Check the state of front and side cover. Check the input of cover sensor INX024 (Refer to 76-003). Close the cover and operate again.
	Substrate Pusher Back	Substrate pusher back sensor SQX030 is turned off.	Check the position of substrate pusher. Check the input of substrate pusher back sensor SQX030 (Refer to 76-003). Move the pusher to back using unit operation and operate again.
	Upper Transfer Forward	Upper magazine transfer forward sensor SQX033 is turned off.	Check the position of upper magazine transfer. Check the input of upper magazine transfer forward sensor SQX033 (Refer to 76-003). Move the upper magazine transfer forward by unit operation and operate again.
	Upper Transfer Down	Upper magazine transfer down sensor SQX035 is turned off.	Check the position of upper magazine transfer. Check the input of upper magazine transfer down sensor SQX035 (Refer to 76-003). Move the upper magazine transfer down by unit operation and operate again.
	Lower Transfer Forward	Lower magazine transfer forward sensor SQX037 is turned off.	Check the position of lower magazine transfer. Check the input of lower magazine transfer forward sensor SQX037 (Refer to 76-003). Move the lower magazine transfer forward by unit operation and operate again.
	Lower Transfer Down	Lower magazine transfer down sensor SQX039 is turned off.	Check the position of lower magazine transfer. Check the input of lower magazine transfer down sensor SQX039 (Refer to 76-003). Move the lower magazine transfer down by unit operation and operate again.
	Axis Stop Position	A magazine axis doesn't stop at a designated stop position.	Check the position of magazine axis. Move the magazine axis to the designated stop position and operate again.
	Magazine detection	Magazine detection sensor SQX027 is turned on.	Check the input of magazine detection sensor SQX027 (Refer to 76-003). Check the movement of upper magazine transfer and operate again.
	Lower Magazine Full	Magazine detection sensor SQX027/02C is turned on.	Check the input of magazine detection sensor SQX027/02C (Refer to 76-003). Check the state of magazine and operate again.
	Magazine Clamp OFF	Though magazine detection sensor SQX027 is on, but the magazine clamp is off.	Check the input of magazine detection sensor SQX027 (Refer to 76-003). Check the state of magazine and operate again.
	Upper Transfer Fwd/Back	Upper magazine transfer forward/back sensor SQX033/032 is turned off.	Check the state of upper magazine transfer forward/back. Check the input of upper magazine transfer sensor SQX032/033 (Refer to 76-003). Check the movement of upper magazine transfer forward/back using unit operation and operate again.
	Lower Transfer Fwd/Back	Lower magazine transfer forward/back sensor SQX037/036 is turned off.	Check the state of lower magazine transfer forward/back. Check the input of lower magazine transfer sensor SQX036/037 (Refer to 76-003). Check the movement of lower magazine transfer forward/back using unit operation and operate again.
	Magazine Axis READY	Magazine axis servo motor is not ready.	Check the state of magazine stop. Wait until servo motor status READY and operate again.
	Magazine Axis NOT ORIGIN	Magazine axis position is not origin.	Check the state of magazine axis origin return. Do the origin return.

# Appendix B

## Pneumatic Piping Diagram

## LD





# Appendix C

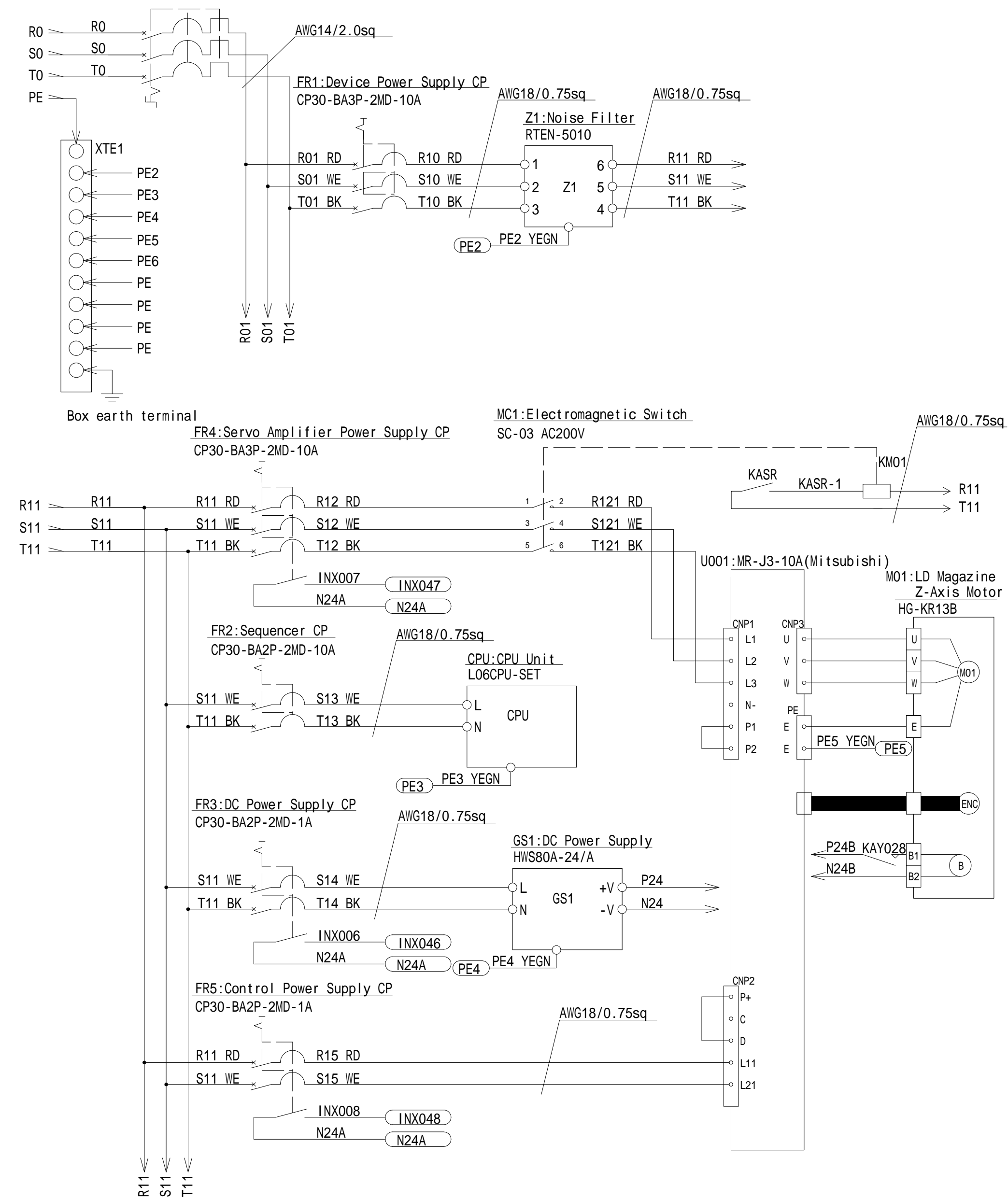
## Electrical Wiring Diagram

Power Circuit 1

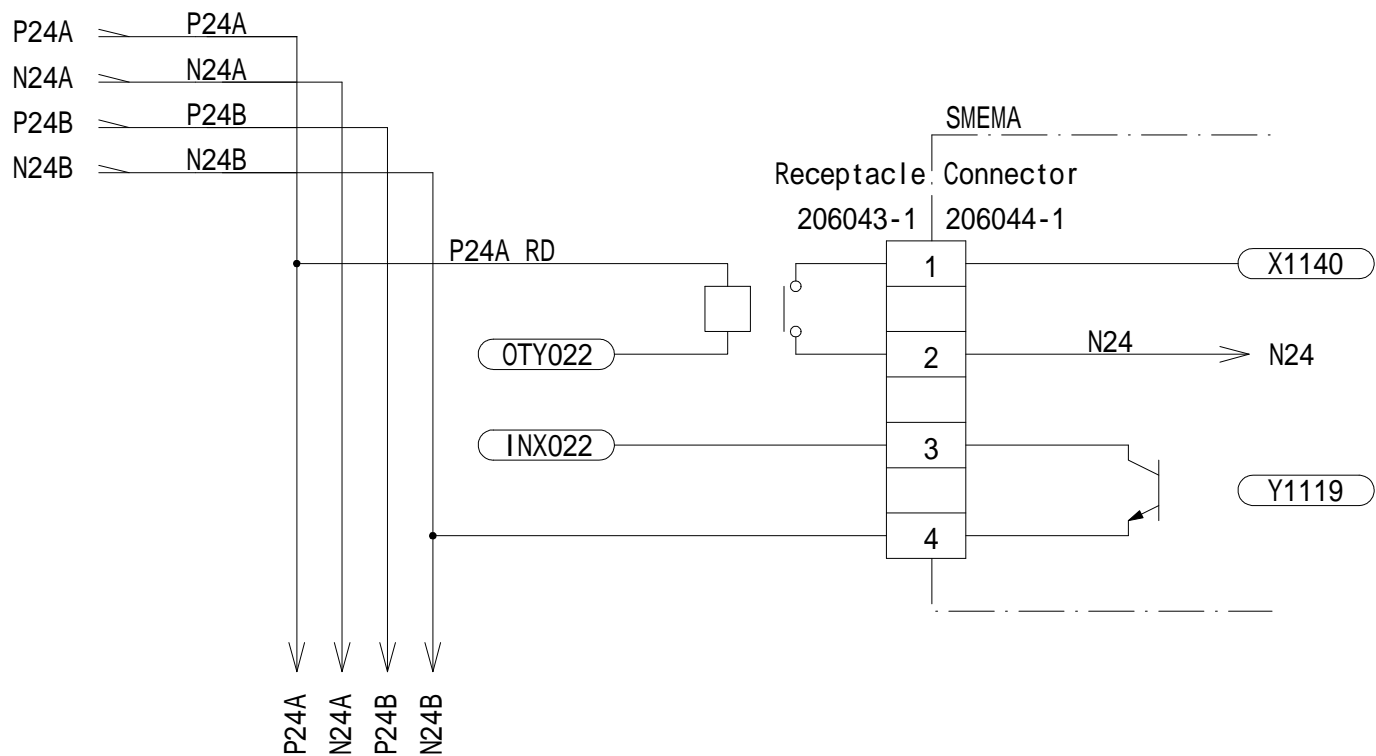
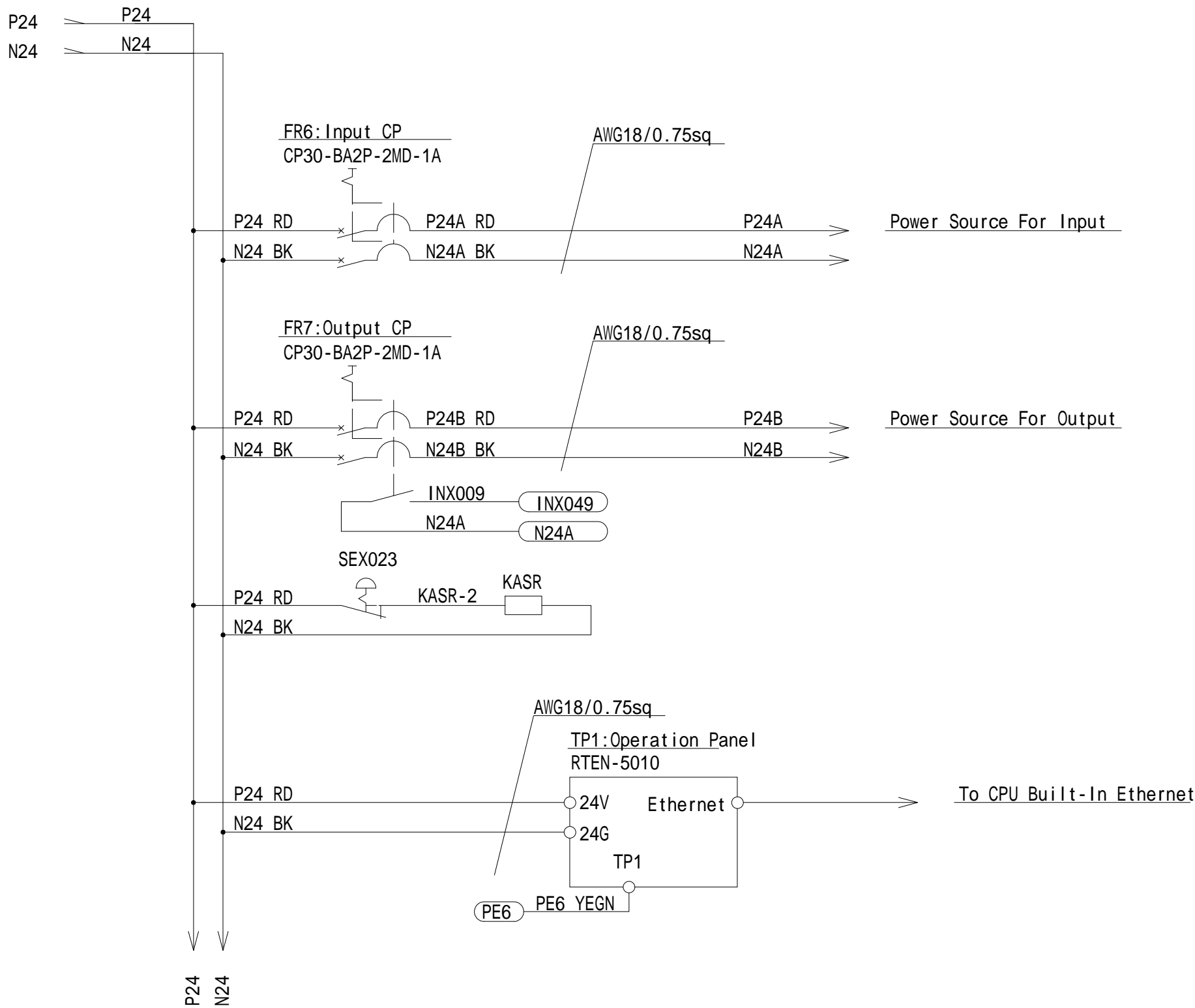
G4298-76-001

QF1:No Fuse Breaker

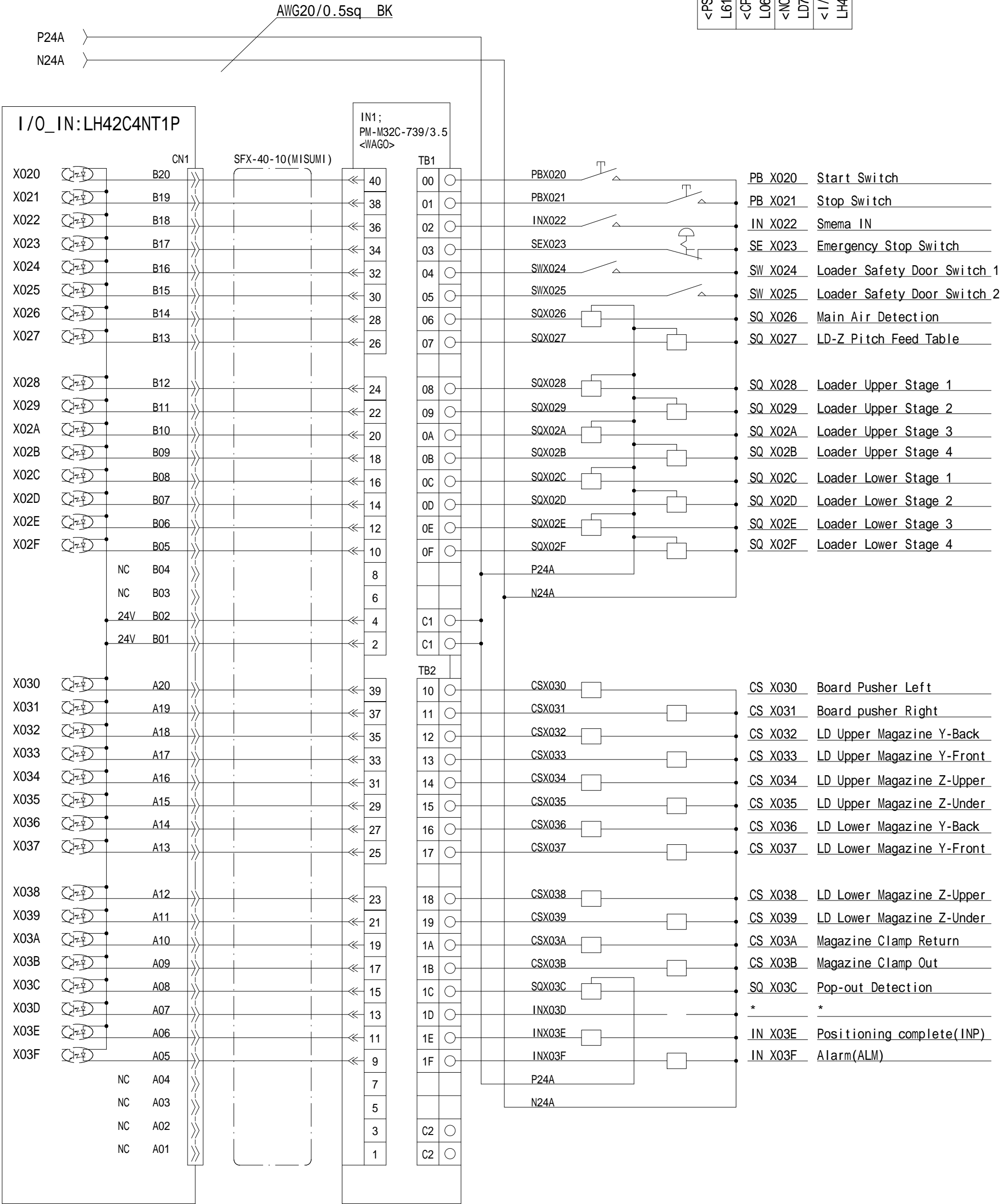
NF32-SVF 3P 10A 30mA(Mitsubishi)



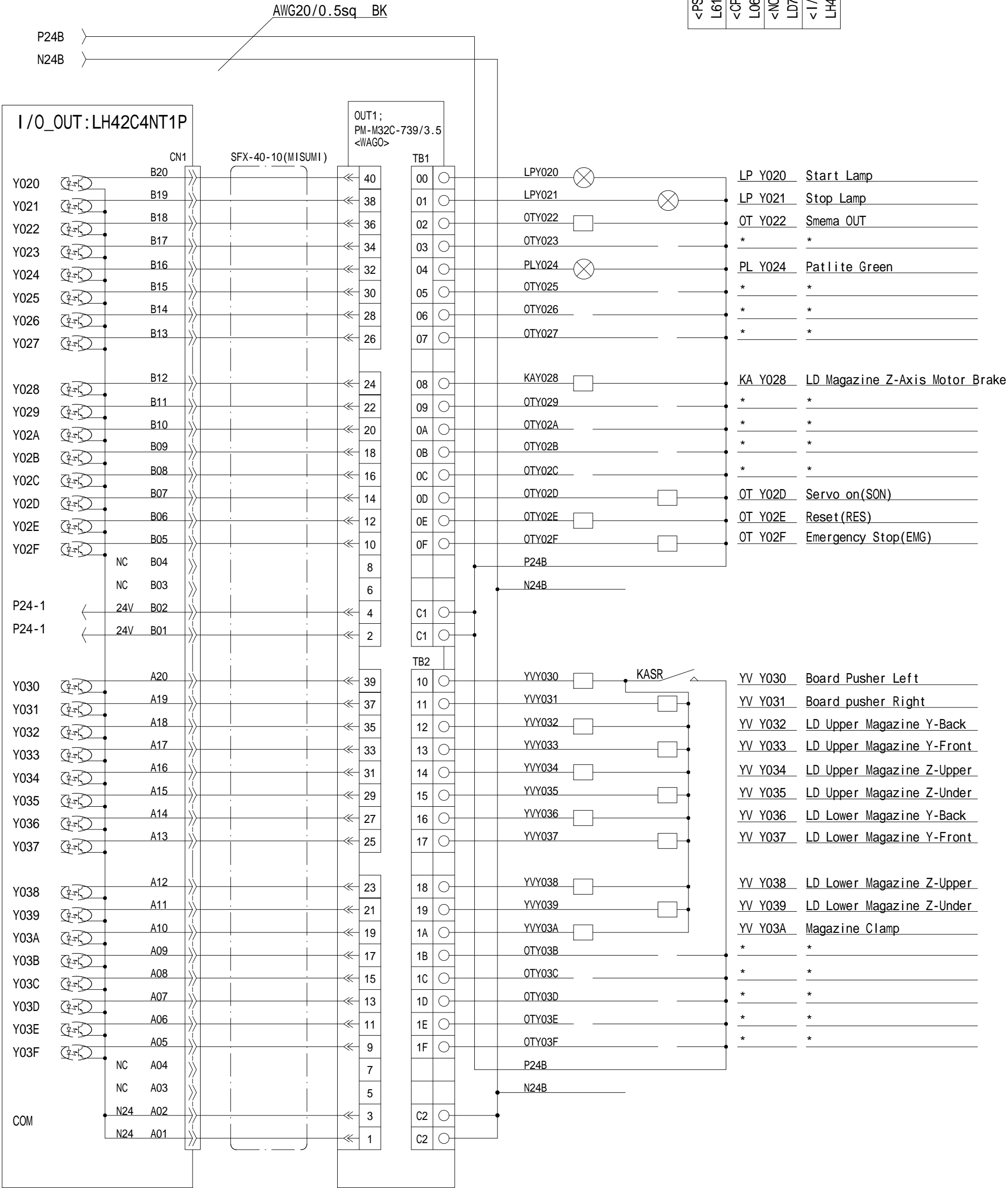
Power Circuit 2  
G4298-76-002



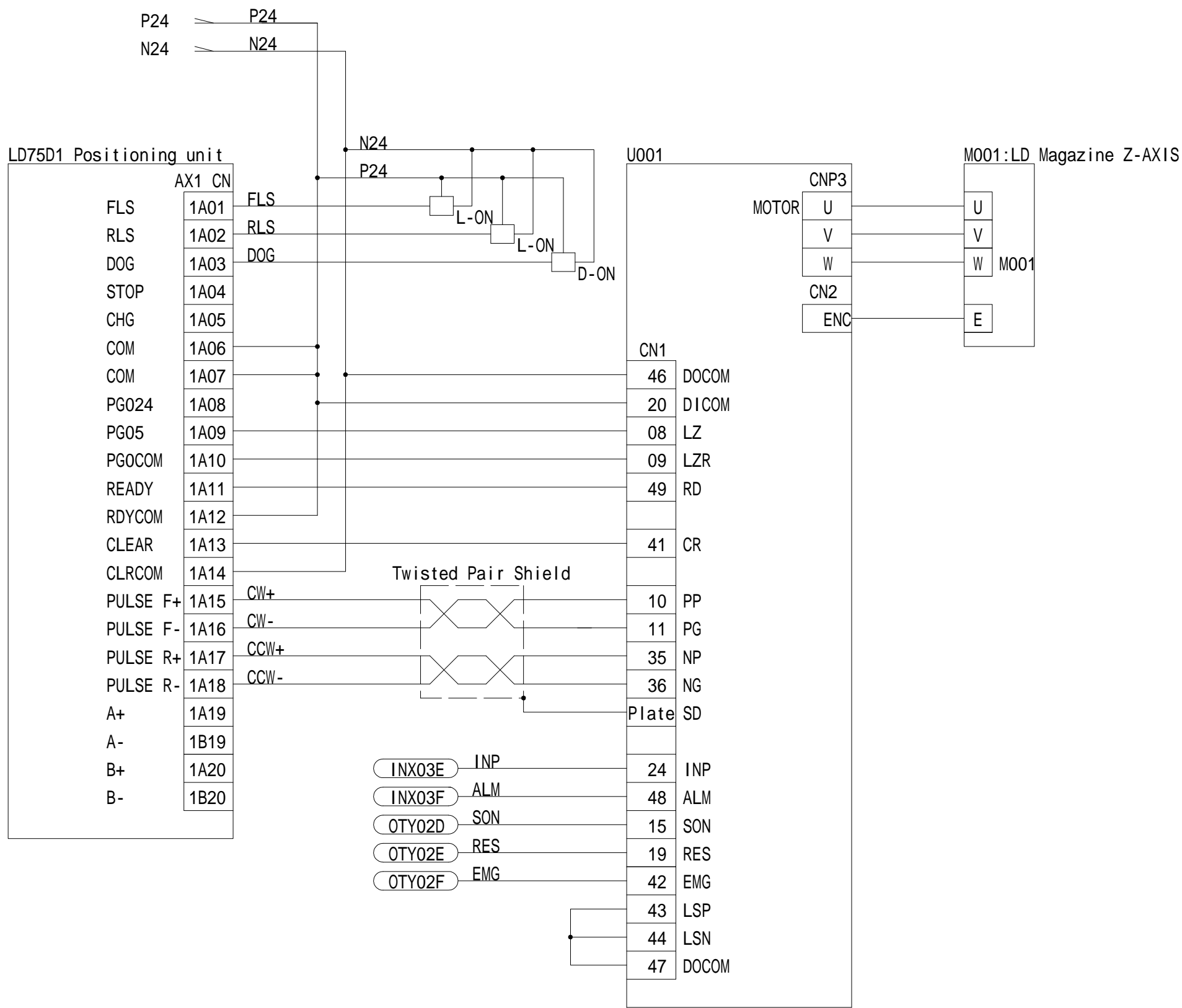
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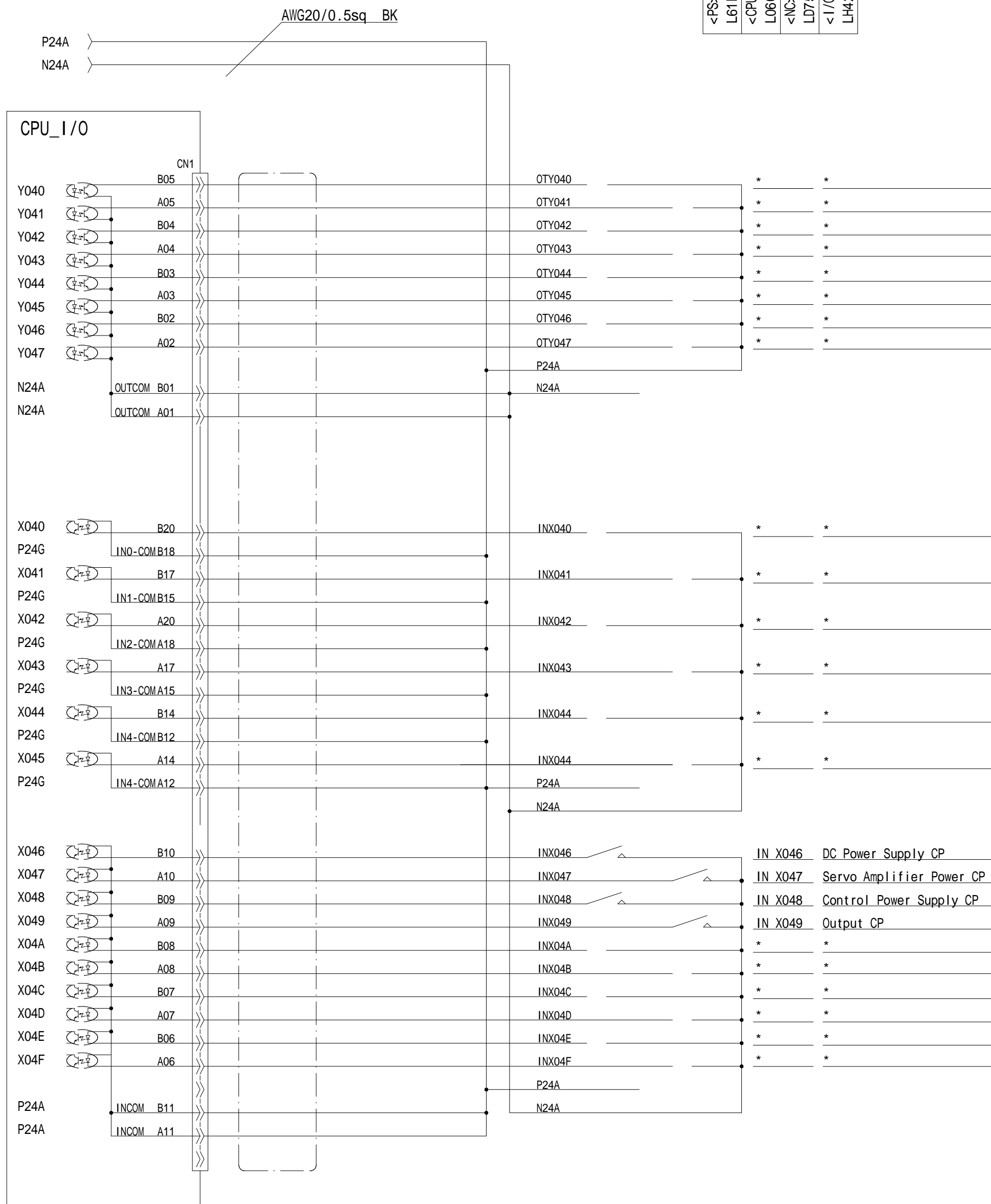
<PS> L61P	<CPU> L06CPU-SET	<NC> LD75D1	<I/O> LH42C4NT1P
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Motor diagram  
G4298-76-005



<PS> L61P	<CPU> L06CPU-SET	<NC> LD75D1	<I/O> IH42C4NT1P
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Manifold IO  
G4298-76-007

